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Report on the in-depth review of the third national communication of Austria

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I. INTRODUCTION AND NATIONAL CIRCUMSTANCES RELEVANT TO GREENHOUSE GAS EMISSIONS AND REMOVALS

A. Introduction

1. The secretariat received Austria's third national communication under the United Nations Framework Convention on Climate Change, hereinafter referred to as the NC3, on 30 November 2001. An in-depth review was carried out between September 2002 and February 2003, including a visit to Vienna from 30 September to 4 October 2002. The review team consisted of Mr. Avelino Suárez (Cuba), Mr. Emilio Sempris (Panama), Mr. Sandór Molnár (Hungary), Mr. Michael Schön (Germany) and Mr. Harald Diaz-Bone (UNFCCC secretariat, coordinator).

2. The review team had a number of meetings and discussions on all aspects of the Austrian climate policy as outlined in the NC3. During these meetings with governmental officials, academics and business and environmental non-governmental organizations (NGOs), the review team was given a wealth of additional materials and information, which supported the information provided in the NC3.

B. National circumstances

3. Austria is a land-locked country in central Europe. It is expected to be vulnerable to a changing climate in view of the fact that ecosystems in mountainous regions are highly sensitive. Seventy per cent of the area of the country lies more than 500 m above sea level; 40 per cent lies above 1,000 m. Forests cover 47 per cent of the territory and another 41 per cent is used for agriculture, including grassland and alpine pasture.

4. Since the fall of the Iron Curtain at the end of the 1980s, Austria has been in the process of regaining some parts of its historical role as a focal centre for central Europe. The traditional linkages to its four eastern neighbouring states (the Czech Republic, Slovakia, Hungary, Slovenia, all of which are EC accession states for the year 2004), have been reactivated, with considerable implications for Austria's economic development and transport activity. On average, gross domestic product (GDP) grew by more than 2.3 per cent annually during the 1990s, and by more than 3 per cent since 1998. Industrial production increased by 32 per cent in real terms during the 1990s. Passenger transport grew by 22 per cent; total freight transport by 48 per cent and road freight transport by a remarkable 71 per cent.

5. In the early 1990s Austria's population increased by more than 1 per cent annually. Total population grew from 7.72 million in 1990 to 8.11 million in 2000. The Austrian population is ageing: in 2030 over one third of all Austrians are expected to be 60 years of age or more (1999: 20 per cent). Immigration policy will primarily determine future demographic development in Austria.

6. Between 1990 and 2000, the total primary energy supply (TPES) grew by more than 13 per cent, with a slight shift from coal to natural gas. In 2000, Austria's energy profile showed a relatively high share of hydropower (13 per cent) and other renewable energy sources (12 per cent), when compared to other industrialized countries. Some 70 per cent of electricity is generated in hydropower plants. However, the total energy supply is still heavily dependent on oil products (41 per cent), natural gas (23 per cent) and coal products (13 per cent). Domestic energy sources account for about one third of TPES.

7. Mainly as a result of the high share of renewable energy sources, particularly hydropower and biomass, the per capita CO_2 emissions are relatively low when compared to those for other members of the Organisation for Economic Co-operation and Development (OECD). In 2000, per capita CO_2 emissions amounted to 8.2 Mg; total greenhouse gas (GHG) emissions per capita amounted to 9.83 Mg of CO_2 equivalent. Partly because of a continuous decoupling of industrial production growth and energy

consumption since the mid-1970s, Austria shows a considerable reduction of 18 per cent in GHG emissions per GDP unit (see table 1). Others reasons for this include the growing share of the service sector in the gross national product.

Table 1. Main macroeconomic indicators and GHG emissions

	1990	2000	Change (%)[a]
Population (millions)	7.72	8.11	5.1
Gross domestic product – GDP (billions US$ of 1995)[b]	155.98	196.02	25.7
Total primary energy supply – TPES (Mtoe[c])	25.22	28.58	13.3
Electricity consumption (TWh)	46.99	56.81	20.9
Greenhouse gas (GHG) emissions[d] (Tg[e] CO_2 equivalent)	77.39	79.75	3.1
GHG emissions per capita (Mg CO_2 equivalent)	10.03	9.83	–1.9
GHG emissions per GDP unit (kg CO_2 equivalent per US$ of 1995)	0.496	0.407	–18.0

Source: Data for population, GDP, TPES, and electricity are from "Energy balances of OECD countries, 1999–2000", OECD/IEA, Paris, 2002. GHG data are from the Austrian inventory submission in 2002.

[a] In per cent of 1990 values.
[b] Calculated using the method of purchasing power parities (PPP).
[c] Millions of tonnes of oil equivalent.
[d] Without accounting for land-use change and forestry (LUCF).
[e] One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes (Mt).

8. Austria is a federal state made up of nine federal provinces (Länder). Legislative and executive competences are distributed between the federation and the provinces. The responsibility for policies and measures (PaMs) to mitigate GHG emissions is distributed among several federal ministries as well as the provinces and municipalities. The Ministry for Agriculture, Forestry, Environment and Water Management (Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft – BMLFUW) is responsible for the coordination of the national climate change policy.

9. Different committees have been established for the coordination of the policy-making and implementation process: on the federal level, the Inter-ministerial Committee for the Coordination of Measures to Protect the Global Climate (IMC Climate Change); the Kyoto Forum, for coordination between the federation, the provinces and the municipalities; and the Austrian Council on Climate Change (ACCC), dealing with scientific issues. The review team was informed that for the task of monitoring the implementation of the national climate strategy, Austria will establish a Kyoto Coordination Committee, in which relevant stakeholders from federal ministries – including the ministries responsible for finances, economy and transport – and from the provinces will be represented.

C. Key developments in climate change policies

10. Austria ratified the United Nations Framework Convention on Climate Change (UNFCCC) in February 1994 and is committed to contribute to achieving the objective and the aim of the Convention. During the review, the review team analysed the information provided in the NC3 together with data from the most recent inventory submission of Austria to the Convention secretariat, which contains data on 1990–2000 emission trends. The results of this analysis suggest that Austria contributed to achieving the aim of the Convention, as its total GHG emissions in 2000 exceeded the 1990 level by only 3.1 per cent without considering CO_2 from LUCF, and by 5.8 per cent if CO_2 from LUCF is considered.

11. Austria signed the Kyoto Protocol in April 1998 and ratified it jointly with the other EC member States in May 2002. Its Kyoto target under the EC burden-sharing agreement is to reduce the total emissions of all six GHGs during the first commitment period (2008–2012) compared to the 1990 base year emissions level by 13 per cent. (The base year for the fluorinated gases, i.e. HFC, PFC and SF_6, is 1995.)

12. In the late 1990s, Austria redefined its national GHG reduction target. In 1997, Austria's national target as reported in the NC2 was aligned with the "Toronto target", which meant a 20 per cent reduction of its CO_2 emissions by 2005 based on the emissions level of 1988. According to the NC3, which lists the "Agreement between the Federation and the Länder on measures to reach the 'Toronto-Target'" in chapter 4.3 (Policies and measures no longer in place), this target has lost importance since 1997. Instead, the Austrian climate policy is now focusing on meeting its target under the EC burden-sharing agreement.

13. In June 2002, the Ministerial Council adopted the Austrian Climate Strategy (Strategie Österreichs zur Erreichung des Kyoto-Ziels, Klimastrategie 2008/2012). This central document for Austrian climate policy contains a list of policies and measures that are supposed to be implemented within the different sectors, supplemented by reduction potentials and cost estimates for single technical measures (see chapter III for more details).

14. In addition, several important measures have already been implemented or adopted over the past years. For example, in the period between the NC2 and the NC3, several support schemes for energy efficiency in building construction and the use of renewable energy were introduced or improved in different provinces. Preferential market access for electricity from renewable energy sources was implemented in 2000 as an amendment to the Austrian Electricity Act. Efficiency labelling of passenger cars was introduced in 2001.

15. The review of the NC3 and the additional information provided during the visit allowed the review team to conclude that Austria's third national communication is a comprehensive document, which reflects well all the relevant aspects of the Austrian climate change policy at the time it was prepared and published. It satisfactorily covers the GHG inventory, policies and measures, projections and other issues required by the UNFCCC guidelines.[1]

II. GREENHOUSE GAS INVENTORY INFORMATION

A. Inventory preparation and reporting

16. The Austrian Environmental Agency (Umweltbundesamt – UBA) is by law responsible for the preparation of and reporting on the Austrian national inventory, and prepares the relevant reports (common reporting format and national inventory report) for submission to the UNFCCC secretariat. The UBA Department of Air Emissions collects and compiles all the data, with the involvement of external research institutions or consultants where required. For this purpose, published data from several relevant institutions, such as Statistics Austria, BMLFUW and the Austrian Federal Economic Chamber, were used.

17. The NC3 provides data on the Austrian GHG emission inventory for the period from 1990 to 1999 and includes emission figures for the gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluroride (SF_6), nitrogen oxides (NO_X), carbon monoxide (CO), sulphur dioxide (SO_2) and non-methane volatile organic compounds (NMVOCs). An estimate for the GHG sink capacity from LUCF in Austria is provided, and CO_2 emissions from bunker fuels are documented. The NC3 inventory is presented in accordance with the UNFCCC guidelines, and is consistent with Austria's 2001 inventory submission.

18. When compared to the NC2, the estimates in the NC3 for the total CO_2 emissions for the years 1990 and 1995 are slightly higher (+0.4 per cent for 1990 and +2.8 per cent for 1995). The figures for

[1] Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications. Document FCCC/CP/1999/7.

CH_4 were revised downwards substantially (–8.5 per cent for 1990 and –15.6 per cent for 1995), for the following four reasons: emissions from managed forests were transferred from the LUCF sector to non-anthropogenic emissions and thus are no longer considered in the national total; emissions from waste disposal underwent a more detailed study; CH_4 emission factors for fuel combustion activities were improved; and the quality of information on agricultural activities was increased. The figures for N_2O were also substantially revised downwards (–43.4 per cent for 1990 and –42.7 per cent for 1995), as a result of improved emission factors for the transport sector and the above-mentioned new interpretation of emissions from managed forests. In the NC3, time series for the emissions of fluorinated gases are given, whereas in the NC2 only some preliminary assessments of these gases were presented. Major improvements in the reporting of GHG inventory data in the NC3 are summarized below.

Important changes in the reporting of GHG inventory information in the Austrian NC3

- Recalculated GHG emission estimates for the year 1990 (to obtain consistent time series)
- More detailed information on GHG emissions and fuel consumption in specific industries and processes, and more detailed information about some industrial activities
- Use of new energy statistics for 1994
- Improved emission factors and calorific values
- Improved sectoral allocation of emission sources
- Re-allocation of the GHG emissions of managed forests from LUCF to non-anthropogenic emissions
- More accurate estimates of emissions from waste
- Better information on agricultural activities
- Apportioning of CO_2 emissions according to the common reporting format (solid, liquid, gaseous, biomass-related)

19. Austria's GHG inventory submission to the UNFCCC from April 2001, including a complete national inventory report (NIR) for the years 1990–1999, was subject to an individual review (in-country review) on a voluntary basis in October 2001 (see document FCCC/WEB/IRI(2)/2001/AUT). The inventory review team commended the quality of the Austrian inventory system and encouraged Austria to continue to improve the system and to address the existing gaps. No major omissions were identified, and the inventory was generally assessed to be transparent and consistent with the UNFCCC reporting guidelines and the IPCC guidelines.[2] Uncertainties were comprehensively analysed and documented for three gases (CO_2, CH_4 and N_2O), as well as the overall uncertainty level.

20. Although the uncertainty of CO_2 emissions was estimated to be quite low (around 2 per cent), the uncertainty for other gases (N_2O, CH_4, fluorinated gases) was much larger. The main factors were uncertainty of activity of waste input and solid waste disposal; uncertainty of the CH_4 emission factor for enteric fermentation and solid waste decomposition; and high uncertainty of the N_2O emission factor for emissions from soils. The uncertainty for net CO_2 emissions or removals from LUCF for individual years ranges from ±20 per cent to ±74 per cent, because of different growth increments depending mainly on variability in annual weather conditions and harvest activities. The review team was informed that this value will be recalculated after data from the recent forest inventory are available.

21. Some national emission factors were supplied by industrial partners for the respective industrial processes. References for CO_2, CH_4 and N_2O emission factors are national studies. In some cases, emission factors described in chapter 1.4.1.1 of the "IPCC Reference Manual"were used.

[2] "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories", IPCC, 2000.

22. In April 2002, Austria submitted an updated GHG inventory to the UNFCCC secretariat, which includes data for the year 2000. The quantitative analysis below is based on these data.

B. Emission profile and trends

23. The Austrian GHG emissions profile shows a clear domination by the energy sector, including transport, with CO_2 as the main greenhouse gas. Overall emissions trends in Austria show a slow upward tendency, with strong fluctuations due to temperature and precipitation variations influencing both the electricity production of hydro plants and the heating demand of households. Table 2 shows the emissions trends by gas in the period from 1990 to 2000.

Table 2. Greenhouse gas emissions trends, 1990–2000

	Gg CO_2 equivalent											Change
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**(%)[a]**
CO_2[b]	62 297	66 174	60 349	60 717	61 995	64 015	65 386	67 012	65 464	66 025	66 102	6.1
CH_4	11 298	11 078	10 814	10 685	10 511	10 289	10 118	9 872	9 642	9 537	9 402	–16.8
N_2O	2 308	2 399	2 420	2 485	2 550	2 566	2 561	2 552	2 561	2 544	2 515	9.0
Fluorinated gases	1 485	1 663	1 310	883	1 103	1 736	1 886	1 884	1 791	1 626	1 735	16.8
Net GHG[c]	68 173	67 810	66 236	65 788	68 298	71 352	74 565	73 686	71 825	72 098	72 121	5.8
Total GHG[d]	**77 388**	**81 314**	**74 893**	**74 770**	**76 159**	**78 606**	**79 951**	**81 319**	**79 458**	**79 731**	**79 754**	**3.1**

[a] In per cent of 1990 values.
[b] CO_2 emissions without LUCF.
[c] Total GHG (with net CO_2 emissions/removals from LUCF).
[d] Total GHG (without CO_2 from LUCF).

24. In 1990, CO_2 made up 80 per cent of the total GHG emissions (without LUCF), followed by CH_4 (15 per cent), N_2O (3 per cent) and fluorinated gases (2 per cent). The growing trend in CO_2 emissions and decline in CH_4 emissions resulted in a minor change in this pattern for the year 2000, when the share of CO_2 was 83 per cent, followed by CH_4 (12 per cent), N_2O (3 per cent) and fluorinated gases (2 per cent).

25. The total GHG emissions excluding CO_2 from LUCF increased by 3.1 per cent between 1990 and 2000, while the total GHG emissions including net removals from LUCF increased by 5.8 per cent. This increase was mainly attributed to the growth of CO_2 emissions, which grew by 6 per cent, and also to the increase of N_2O emissions by 9 per cent. The CH_4 emissions declined by 17 per cent, partly offsetting the growth of the other gases. Emissions of fluorinated gases increased by 17 per cent, but have remained at a constant level since 1995, which was chosen to be the base year for these new gases.

26. Total emissions of CO_2 in Austria were 66,102 Gg in 2000. As shown in figure 1, the growth of 6 per cent between 1990 and 2000 was determined by the high growth of emissions from transport (42 per cent) and energy use in industry (26 per cent). Fugitive emissions decreased by 21 per cent and emissions from energy industries decreased by 16 per cent. Emissions from other sectors, including households, commercial, and energy use in agriculture, experienced a 2 per cent decline.

27. Table 3 presents the Austrian CO_2 emissions trend for the period from 1990 to 2000. In 1990 energy industries were the major source of CO_2 emissions, but transport overtook this sector in 1992. Since 1992, transport has remained the most important source, being responsible for 26 per cent of CO_2 emissions in 2000, followed by energy use in other sectors (21 per cent), energy industries (18 per cent), industrial processes (18 per cent) and energy use in industry (16 per cent). Other sectors contributed only 1 per cent to the total CO_2 emissions.

Table 3. Carbon dioxide emissions trends, 1990–2000

GHG gas source and sink categories	Gg CO_2 equivalent										
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Energy	48 818	53 326	48 580	48 805	49 426	51 152	53 043	53 487	52 896	53 436	53 414
Energy industries	*14 395*	*15 537*	*12 045*	*11 320*	*11 657*	*13 125*	*13 996*	*14 357*	*13 488*	*12 918*	*12 137*
Energy use in industry	*8 450*	*7 871*	*8 017*	*7 883*	*7 723*	*8 546*	*9 788*	*10 053*	*10 690*	*9 997*	*10 607*
Transport	*11 944*	*13 396*	*13 377*	*13 700*	*14 602*	*13 791*	*13 785*	*14 185*	*15 155*	*15 996*	*16 937*
Energy sector others	*13 908*	*16 391*	*15 001*	*15 770*	*15 297*	*15 540*	*15 379*	*14 749*	*13 398*	*14 331*	*13 638*
Industrial processes	12 919	12 371	11 297	11 458	12 093	12 357	11 847	12 999	12 063	12 104	12 187
Land-use change and forestry	–9 215	–13 504	–8 656	–8 982	–7 862	–7 254	–5 385	–7 633	–7 633	–7 633	–7 633
Other sectors	681	606	612	586	624	656	590	669	671	678	597
Total CO_2 emissions/ removals with LUCF	**53 082**	**52 670**	**51 693**	**51 735**	**54 133**	**56 761**	**60 000**	**59 378**	**57 830**	**58 391**	**58 469**
Total CO_2 emissions without LUCF	**62 297**	**66 174**	**60 349**	**60 717**	**61 995**	**64 015**	**65 386**	**67 012**	**65 464**	**66 025**	**66 102**

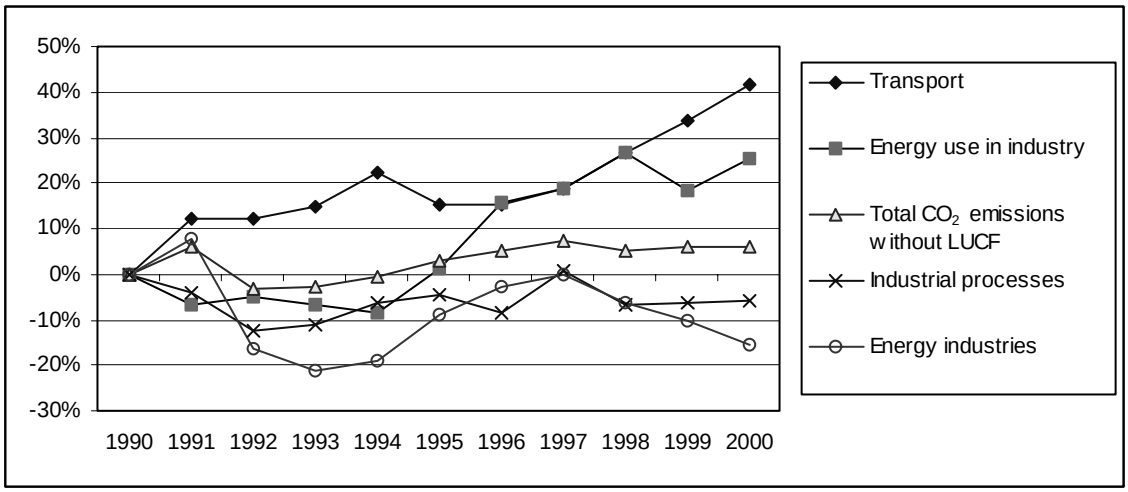
28. The high growth rate of 42 per cent in CO_2 emissions from transport for the period between 1990 and 2000 can be explained by special national circumstances (see paragraph 4), relatively strong economic growth, declines in fuel prices and the absence of effective response measures in this sector.[3] Passenger transport grew by 22 per cent, total freight transport by 48 per cent and road transport by 71 per cent. Some of the effects of growth in road transport have been offset by a shift in the fuel market from gasoline to diesel oil. While diesel oil use nearly tripled during the 1990s, gasoline use reduced by one quarter. The CO_2 emissions from international bunker fuels grew by 78 per cent.

29. The trend in CO_2 emissions from energy use in industry and industrial processes in the period 1990–2000 was determined by changes in industrial output. These emissions started to increase in 1994 after some decline at the beginning of the 1990s due to recession. Since 1997, CO_2 from industrial processes has declined considerably, in spite of the high industrial production growth rates of 6–9 per cent, which might be interpreted as a result of efficiency improvements in Austria. However, CO_2 emissions from energy use in industry continued to follow the rising industrial production index.

30. Because of the high proportion of hydropower in Austria, the trend line for CO_2 emission from energy industries is strongly correlated to the annual variation in water availability for hydropower plants. Reductions during the periods 1992–1994 and 1998–2000 followed the precipitation pattern and water flow levels in rivers.

[3] The main drivers behind this development are discussed in chapter III (see paragraph 61).

Figure 1. Carbon dioxide emissions, percentage change from 1990, by source



31. Emissions of CH_4 amounted to 9,402 Gg CO_2 equivalent in 2000. As shown in table 4, they declined steadily by 17 per cent between 1990 and 2000, which was largely attributed to the decline of emissions from agriculture (–17 per cent) and waste (–16 per cent), the two most important sectors for these emissions. A substantial reduction in cattle population, stemming from the EC Common Agricultural Policy, was the major reason for a 19 per cent reduction of emissions from enteric fermentation. Emissions from solid waste disposal also decreased by 19 per cent, despite an increase in the waste volume. This decrease largely resulted from an active waste management policy, in particular from a large reduction in the number of landfill sites and from landfill gas capture utilization for energy, stemming from the EC Landfill Directive. CH_4 emissions from energy have seen a 28 per cent reduction and accounted for a small (4 per cent) share of total CH_4 emissions in 2000.

Table 4. Methane emissions trends, 1990–2000

GHG gas source and sink categories	Gg CO_2 equivalent											Change (%)[a]
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	
Energy	527	488	442	474	454	487	478	421	413	402	376	–29
Agriculture	4 569	4 496	4 340	4 304	4 263	4 131	4 068	4 038	4 027	3 933	3 823	–16
Enteric fermentation	*3 243*	*3 176*	*3 031*	*2 976*	*2 952*	*2 839*	*2 787*	*2 755*	*2 744*	*2 686*	*2 597*	*–20*
Waste	6 199	6 091	6 029	5 905	5 791	5 668	5 569	5 409	5 198	5 199	5 200	–16
Solid waste disposal on land	*5 438*	*5 327*	*5 261*	*5 133*	*5 018*	*4 894*	*4 795*	*4 634*	*4 424*	*4 424*	*4 424*	*–19*
Total emissions	**11 298**	**11 078**	**10 814**	**10 685**	**10 511**	**10 289**	**10 118**	**9 872**	**9 642**	**9 537**	**9 402**	**–17**

[a] In per cent of 1990 values.

32. Emissions of N_2O reached 2,515 Gg CO_2 equivalent in 2000, after having grown by 9 per cent between 1990 and 2000. Table 5 shows that emissions increased by 11 per cent until 1995, stabilized thereafter and have even slightly decreased since 1998. The overall emission growth was defined by the growth of emissions from energy (30 per cent), which was only partly compensated by reductions in emissions from agriculture (4 per cent). The market diffusion of three-way catalytic converters in passenger cars during the first half of the 1990s is the reason for the observed increase in N_2O emissions from transport (82 per cent). Nitrous oxide from agricultural soils is also a considerable source of emissions. Its falling trend should be interpreted cautiously, because the inventory data show a high degree of uncertainty in this field. Emissions from the other sectors remained stable.

Table 5. Nitrous oxide emissions by source, 1990–2000

GHG gas source and sink categories	Gg CO_2 equivalent											Change (%)[a]
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	
Energy	840	926	960	1 013	1 092	1 124	1 115	1 107	1 121	1 112	1 087	29
Transport	*307*	*383*	*435*	*483*	*540*	*551*	*544*	*541*	*567*	*564*	*558*	*82*
Agriculture	1 026	1 029	1 032	1 035	1 024	1 014	1 014	1 015	1 004	994	990	–4
Agricultural soils	*1 024*	*1 027*	*1 029*	*1 032*	*1 022*	*1 011*	*1 012*	*1 012*	*1 002*	*991*	*987*	*–4*
Other sectors	441	444	427	437	434	428	432	430	436	438	439	–1
Total emissions	**2 308**	**2 399**	**2 420**	**2 485**	**2 550**	**2 566**	**2 561**	**2 552**	**2 561**	**2 544**	**2 515**	**9**

[a] In per cent of 1990 values.

33. The emissions of fluorinated gases increased by 17 per cent between 1990 and 1995 and then stabilized until 2000 (see table 6). Within the different groups of gases, a significant variation can be observed. Emissions of HFCs, mainly from air conditioning, refrigeration and foam blowing, increased remarkably, substituting the substances phased out under the Montreal Protocol. Decreases in PFC emissions (for which the main source is semiconductor manufacturing) only partly compensated for the increases in HFC emissions. SF_6 emissions (which originate from the semiconductor industry and magnesium production) increased until 1996 and decreased thereafter. The base year for fluorinated gases is 1995.

Table 6. Fluorinated gas emissions, 1990–2000

	Gg CO_2 equivalent											Change (%)[a]
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	
HFCs	4	6	9	12	17	546	625	718	816	870	1 033	27 900
PFCs	963	974	576	48	54	16	15	18	21	25	25	–97
SF_6	518	683	725	823	1 033	1 175	1 246	1 148	955	730	677	31
Total	**1 485**	**1 663**	**1 310**	**883**	**1 103**	**1 736**	**1 886**	**1 884**	**1 791**	**1 626**	**1 735**	**17**

[a] In per cent of 1990 values.

III. POLICIES AND MEASURES

34. NC3 reporting on policies and measures (PaMs) to mitigate GHG emissions broadly follows the UNFCCC guidelines. The NC3 comprehensively describes the policy-making process at the three different federal levels in Austria (federation, provinces and municipalities) and the institutional arrangements for the design of the national climate strategy, and outlines the most important Austrian PaMs. It also contains a summary table of the key PaMs by sector required by the UNFCCC guidelines.

35. Decisions related to PaMs in Austria can be taken at different levels. Legislative measures are taken by the federation and the federal provinces; decisions on administrative measures are taken at federal and provincial level, as well as at the level of districts and municipalities. Jurisdiction for important aspects relating to climate change is shared among the different levels. These highly fragmented responsibilities for the Austrian climate policy might be a challenge for coherent monitoring and assessment of PaMs.

36. The NC3 describes the implementation status of the individual PaMs. The review team was informed that even those PaMs that are described as "planned" are expected to be implemented with a high degree of probability. The review team noted that only limited information is available on the extent to which the PaMs so far implemented may already have mitigated the recent increase of emissions. Information on the costs of implemented PaMs is available on public costs for subsidy programmes only. Furthermore, the review team noted that no monitoring system is currently implemented.[4] The review team was informed that the implementation of such a system is intended, beginning with the identification of appropriate indicators. The first results are expected within the next

[4] Except for annual reporting under the EU decision on the Greenhouse Gas Monitoring Mechanism.

3–4 years. It is the opinion of the review team that the Austrian climate policy would benefit greatly from the early implementation of a monitoring system, since it could enable the responsible authorities to react in a timely manner if the implemented PaMs should fail to generate the expected mitigation effects in certain sectors.

37. Given the limited amount of empirical evaluation data at present, the review team cannot assess the success of the implemented PaMs and, as a consequence, cannot judge whether the additional (planned) measures will be sufficient to meet the national mitigation target (see also chapter IV).

38. The review team gained the impression that most of the implemented PaMs described in the NC3 were primarily motivated by reasons other than climate change, but nevertheless had noticeable effects on GHG emissions and sinks. One example is the long Austrian tradition of using forests in a sustainable manner. Here, improved maintenance and extension of vital forests, along with improved protection against torrents, avalanches and erosion, is reported in the NC3 as an enhancement of sink capacity. Also, road tolls for lorries, as referred to in the General Transport Plan, are essential for raising resources for maintenance of the existing infrastructure (roads and railways), as well as for new investment. Waste management measures are primarily implemented to reduce ecological pressure. Recently Austria has implemented several PaMs which primarily addressed climate concerns, e.g. measures to reduce the emissions of fluorinated gases.

A. National climate strategy

39. In June 2002, six months after the publication of the NC3, the Austrian Climate Strategy (Strategie Österreichs zur Erreichung des Kyoto-Ziels, June 2002) was adopted by the federal government. The decision was followed by provincial governors in October 2002. In more than 100 pages, it describes in detail the general approach of the Austrian climate policy, seven sectoral policy packages, some cross-sectoral supportive policy schemes (subsidies, ecological tax reform, research and development), as well as some overall cost estimates and economic effects related to employment. It also describes the contribution of the EC common and coordinated policies and the role of the flexibility mechanisms for Austria.

40. The Austrian Climate Strategy sets the goal of reducing emissions of GHGs by 17 Tg CO_2 equivalent by 2010, aiming to fill the gap between the projected level of approximately 84 Tg CO_2 equivalent in the trend scenario ("no additional measures") and the Kyoto target of approximately 67 Tg CO_2 equivalent under the EC burden-sharing agreement. It divides this goal into seven policy areas with specific emission reduction targets and identifies additional PaMs needed to reach each of them. The total domestic reduction potential is estimated as 13.85 Tg CO_2 equivalent, thus leaving a gap of 3–3.5 Tg CO_2 equivalent that is supposed to be bridged mainly by the use of project-based flexibility mechanisms. The review team noted that this gap equals 30–35 per cent of Austria's reduction commitments, compared to the 1990 levels.[5] Ensuring ecological and economical efficiency is a main principle for the Austrian Climate Strategy, as well as using a balanced mix of instruments.

41. Austria currently considers its additional PaMs as outlined in the Austrian Climate Strategy, supported by the potential use of flexibility mechanisms and the effects of the EC-wide common and coordinated policies, to be sufficient to fulfil its Kyoto target. A clear need to monitor, evaluate and adapt the action programme over time is expressed within the Austrian Climate Strategy. The Kyoto Coordination Committee is supposed to give advice to the federal government and the provinces and to

[5] The Austrian Climate Strategy refers to Council Conclusions of the European Council of Ministers dated 18 May 1999, in which the environmental ministers agree to limit the use of flexible mechanisms to approximately 50 per cent of the reduction commitments, compared to the 1990 levels ("supplementarity").

report biannually both on the progress of the implementation of the Austrian Climate Strategy and on the need for further action to be taken (see also paragraph 9).

42. As shown in table 7, more than half of the domestic emission reduction potential is envisaged to derive from only two policy areas, i.e. energy use for space heating and small consumers (29 per cent) and transport (27 per cent), thus devolving a great deal of responsibility to consumers and end-users. The review team noted that obtaining a large policy effect from sectors with a large number of actors could be a challenge if not supported by strong economic incentives in combination with an active public awareness campaign.

43. The Austrian Climate Strategy defines additional PaMs at the federal level and provides guidelines for provincial action. As indicated in the introduction to chapter 4 of the NC3, most provinces have already adopted regional climate change programmes supplementing the national strategy.

44. The review team was informed that the Federal Environmental Minister proposed a budget plan to support the Austrian Climate Strategy with new financial means of up to €90 million per year. New budgetary means are planned to flow into "renewable energy, energy efficiency and waste management projects within the Federal Environment Fund" (up to €33 million per year); promotion of biomass (up to €10 million per year); "GHG emission reduction programmes in transport" (up to €11 million per year); and the JI/CDM Programme (up to €36 million per year).

Table 7. Emissions and trends as reported in the Austrian Climate Strategy

	CO_2 equivalent							
	1990	2000	Trend 2010[a]		Target 2010[a]		Difference[b]	
Policy area	**Tg**	**Tg**	**Tg**	**%**	**Tg**	**%**	**Tg**	**%**
Space heating and small consumers	14.60	14.17	14.5	–1	10.5	–28	4.0	29
Energy industries	14.44	12.18	14.5	0	12.4	–14	2.1	15
Waste management	6.26	5.33	4.8	–23	3.7	–41	1.1	8
Transport	12.32	17.53	20.0	62	16.3	32	3.7	27
Industrial processes	21.71	23.15	22.0	1	20.75	–4	1.25	9
Agriculture	5.60	4.81	4.8	–14	4.4	–21	0.4	3
Fluorinated gases (1990 = 1995)	1.74	1.74	3.0	72	1.8	3	1.2	9
Other (including solvent use)	0.97	0.84	0.8	–18	0.7	–28	0.1	1
Total	**77.64**	**79.75**	**84.4**	**9**	**70.55**	**–9**	**13.85**	**100**

[a] Right column: percentage change relative to the 1990 value.
[b] Difference (i.e. reduction potential of additional PaMs) for 2010 in Tg CO_2 equivalent and in percentage of total reduction potential.

B. Other cross-cutting policies and measures

45. In the NC3, two further cross-cutting PaMs were presented: energy-related taxes as an implemented fiscal instrument and GHG emissions trading as a planned economic instrument. With the adoption of the EC draft directive on emissions trading, Austria's preparation for implementing the EC framework at the national level will be accelerated. Discussion with industry representatives on emission caps have already been initiated.

46. In addition, the application of the project-based flexibility mechanisms (JI/CDM), and the planned amendment to the Environmental Promotion Act defining the framework conditions for the Austrian JI/CDM Programme (see section E below), should be mentioned in this context.

47. In the NC3, some elements of an ecological tax reform are already listed in the catalogue of PaMs, namely road tolls and energy-related taxes. As outlined by host-country officials, at present the revenues of all environment-related taxes in Austria are slightly below OECD average. According to a rough estimate given to the experts, about 1 per cent of overall Austrian GHG emissions are presently avoided as a result of the taxes already implemented. Host-country officials emphasized that Austria has a clear need to introduce an ecological tax reform as outlined in the Austrian Climate Strategy.

C. Energy

48. Between 1990 and 2000, GHG emissions from the energy sector decreased by 3 per cent[6] and accounted for 17.8 per cent of total emissions in 2000. In the NC3, the energy sector is subdivided into "energy demand" and "energy supply". "Energy demand" mainly represents energy consumption for space heating and hot water preparation in the commercial/institutional/residential sector; "energy supply" mainly represents energy use for electricity and heat production (including transformation and transport losses).

1. Energy demand

49. The NC3 describes nine PaMs in the subsector "energy demand". The main focus is on the improvement of thermal standards for buildings and on the use of renewable energy sources for space heating. Planned measures account for about two thirds of the estimated emission reduction potential in this subsector.

50. In Austria, the provinces are responsible for insulation standards for buildings and the design of support schemes in the household sector. Since the submission of the NC2, several support schemes at the provincial level have been adopted or improved. Support schemes have been established chiefly for social purposes, but environmental considerations are becoming increasingly important as a condition for granting support. The total budget amounts to more than €2 billion, of which €1.77 billion stems from the federation (but is under provincial jurisdiction).

51. The review team noted that the highly fragmented distribution of responsibilities for measures to reduce energy demand in this sector (a different support scheme in each of the nine provinces) might cause problems in estimating the effects of these measures. The review team also noted that the wide variation of efficiency standards and support schemes in the nine provinces might be an obstacle to the optimal utilization of the existing potentials for energy and emission savings in the housing sector.

52. Recently, priority has shifted from the promotion of energy efficiency in new buildings to the energy efficiency of existing building stock. One of the measures reported in the NC3 (thermal insulation of dwellings) addresses the situation in existing dwellings, a large proportion of which were built between 1950 and 1980 to meet a rising demand for affordable dwellings. The review team noted that the most promising GHG mitigation potentials are to be found within the existing building stock.

53. Austrian climate policy relating to energy demand places emphasis on the use of renewable energy sources for space heating. This encompasses a number of PaMs, including support schemes for energy-efficient construction and the use of renewable energy; as well as the promotion of the replacement of old heating systems by renewable energies and district heating. Nevertheless, as the NC3 outlines within the context of the planned future development of housing support schemes, public funds may also be granted for the replacement of old fossil fuel systems by efficient natural gas systems.

54. A success story in promoting renewable energies in the housing sector is the sharp increase in sales of both wood pellet boilers for individual houses and woodchip boilers for district heating. The review team was informed that, in the province of Salzburg, biomass combustion technology had gained a market share of 41.6 per cent in new, subsidized private buildings by the year 2000.

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[6] This is true for the energy sector excluding transport. Because of the aggressive growth of GHG emissions from the transport (sub-)sector, overall GHG emissions from the energy sector (including transport) increased by 9 per cent during the last decade.

55. From 1990 to 2000, the number of conventional wood-burning systems used for space heating decreased. This was mainly attributable to the replacement of heating systems in existing buildings with modern and more convenient systems, such as those based on natural gas. This adverse effect is reflected in the NC3. The review team gained the impression that it will be difficult to mitigate this trend. The review team acknowledged a need for further efforts as a condition for full utilization of the potential of the "promotion of replacement of old heating systems by renewable energies and district heating". With an estimated annual contribution of 2 Tg CO_2 mitigated, this measure has to be considered as one of the key measures of the overall PaMs package.

2. Energy supply

56. Between 1990 and 2000, GHG emissions from energy supply decreased by 15.6 per cent. They accounted for 15.3 per cent of total Austrian emissions in 2000. During the 1990s, Austria was a net exporter of electricity with an average of about 1.9 PJ net exports per year (average imports 35 PJ per year, average exports 36.9 PJ per year).

57. The NC3 describes eight PaMs relating to energy supply. The main focus is on the use of renewable energy sources and, to a lesser extent, on energy efficiency improvements through the promotion of combined heat and power production (CHP). As in the energy demand subsector, planned PaMs account for about two thirds of the overall mitigation potential, but, with the new Green Electricity Act (Ökostromgesetz) which came into force in August 2002, most of the PaMs are now being implemented.

58. The Green Electricity Act replaces some provisions of the Austrian Electricity Act, which already contained national targets for electricity from renewable energy sources. In line with the EC directive 2001/77/EG on electricity production from renewable energy sources, the new act sets a national target for electricity from small-scale hydropower plants of 9 per cent until 2008.[7] The target for electricity from other non-traditional renewables is 4 per cent by 2008. The act guarantees the tariffs for the feed-in of such electricity to the grids. For electricity from photovoltaic plants, this guarantee is capped at 15 MW at the national level. The feed-in tariffs were under negotiation during the review.

59. Furthermore, the Green Electricity Act is extending support for CHP operators, allowing them to produce electricity and heat in an economically feasible way. This support is available only for existing plants and is available only until the end of 2008 (2010 for modernized plants). Although Austria is competitive as a provider of CHP technology, the GHG mitigation potential of CHP within the country is limited, since the share of renewable energy sources for electricity production is high.

D. Transport

60. The transport sector represents the GHG emissions from the combustion of transport fuels.[8] Since 1990, GHG emissions from this sector have increased enormously, by 42.3 per cent, and accounted

[7] "Small-scale" means up to 10 MW; the potential of large-scale hydro power for electricity production is considered to be already fully exploited.

[8] Construction and maintenance of transport infrastructure, as well as production of vehicles, are not included. Moreover, pre-chain emissions (processing of fuels in refineries, listed under energy supply industries) and HFC emissions from mobile air conditioners (listed under industry) are included elsewhere. Also, international aviation and maritime transport are reported separately and are not included in the national totals, following the IPCC methodology. These international bunker fuel emissions show an add-on share of 2.5 per cent of total GHG emissions in Austria.

for 22 per cent of total Austrian emissions in 2000.[9] Increased economic activity after Austria's accession to the EC in 1995 clearly stimulated transport activity in the country. Also, cross-border transit transport from north to south increased within the internal market. In addition, transport increased with the opening of the borders to eastern Europe. A considerable portion of the growth of emissions in this sector may be attributed to fuel tourism, since in recent years fuel prices have been lower in Austria than in many of the neighbouring countries, reversing the price relation in the early 1990s.

61. Sixteen transport PaMs are reported within the NC3. As far as estimates for individual effects are available, implemented or adopted and planned PaMs both contribute similar shares of the overall GHG mitigation effect. However, for eight PaMs (mainly implemented) no estimates of their mitigation effect are reported.

62. The main focus of the implemented PaMs is on the promotion of vehicles with lower fuel consumption (EC agreement with car manufacturers) and on fiscal instruments such as road tolls, fuel consumption levies and vehicle taxes. Implemented and adopted transport PaMs further include railway infrastructure improvements and fuel quality improvements and biodiesel promotions, as well as several model projects and programmes to support environmentally sound mobility and logistics. The sum of the estimated effects of implemented or adopted PaMs amounts to 1.45 Tg CO_2 equivalent.

63. In 1996, a toll for the use of private cars on motorways (on the basis of a vignette valid for one year) was introduced. As reported in the NC3, a mileage-based road toll might replace the vignette system in the future, but the review team was informed that no clear time horizon can be drawn for this at present.

64. Austrian road-use regulations for heavy-duty vehicles had to be relaxed dramatically after EC accession for the sake of convergence with the internal market law. Additional emissions are expected to result from this. The existing time-based vignette for vehicles up to 12 tonnes is due to be replaced by an electronic mileage-based system. Until this is implemented, an increased vehicle tax for lorries (above 3.5 tonnes) will apply. The effect of the adopted mileage-based toll is estimated to be 0.3 Tg CO_2 equivalent per year.

65. Planned PaMs in this field address the optimization of transport logistics; the improvement of spatial planning; fiscal instruments such as increased fuel taxes; promotion of walking and cycling; increased public awareness; and traffic management and speed limits. The sum of the estimated effects of planned PaMs amounts to 1.85 Tg CO_2 equivalent. This figure does not include mitigation effects of planned fiscal measures, since these could not be quantified.

66. Not all of the PaMs reported in the NC3 are also elements of the General Transport Plan (Generalverkehrsplan Österreich). This document was available as a draft when the NC3 was prepared, and was presented in its final version by the Federal Ministry for Transport, Innovation and Technology (Bundesministerium für Verkehr, Innovation und Technologie) in January 2002. It is a strategy concept for the long-term development of the transport infrastructure in Austria and focuses on the completion of superior road connections, both domestic and connections to eastern Europe, on the development of the railway system for passenger and goods transport, and especially on the shift of goods transport from road to rail. The estimated total investment for some 270 projects amounts to €44.9 billion.

67. The promotion of sustainable mobility is emphasized in the General Transport Plan and priority is given to the development of railways. In the short and medium term (10–15 years), investments in

[9] In addition to emissions of the main GHGs, the transport sector became a major source of tropospheric ozone precursors (NO_X, NMVOC and CO) in Austria, as the related emissions from stationary sources have declined considerably in the past decade.

road construction amount to €4.7 billion and investments in the development of the railway system to €12.4 billion. Nevertheless, according to the General Transport Plan, the road projects will be realized within a shorter time frame, partly because of the lower investment costs. The development of rail infrastructure, including regional and urban public transport investments, has an estimated GHG mitigation potential of 0.3 Tg CO_2 equivalent per year.

68. A further promotion of combined transport, including railways as well as the use of the river Danube as a waterway, is intended in the context of the proposed shift of goods transport from road to rail and ship, as outlined in the General Transport Plan. Several model projects for environmentally sound logistics are in line with these concepts. With further planned improvements of transport logistics (improved logistic management and infrastructure measures), major GHG emission reductions from heavy-duty vehicles are expected (0.5 Tg CO_2 equivalent per year).

69. The General Transport Plan has to be considered as a plan for adaptation to the expected increase in transport demand in a reference case. No PaMs for transport demand management (TDM) are reported in the General Transport Plan, for instance spatial planning (which lies in the competence of the provinces), which is reported in the NC3 to have an estimated GHG mitigation effect of 0.3 Tg CO_2 equivalent per year. The implementation of road tolls, i.e. mileage-based tolls for heavy-duty vehicles, with an estimated GHG mitigation effect of 0.3 Tg CO_2 equivalent per year, is considered to be a means for promoting the shift to rail transport, but, above all, to be a prerequisite for raising financial resources for the necessary investments.

70. The General Transport Plan does not contain any estimates of the increasing demand for transport induced by the extension of road and rail infrastructure. The review team noted that the NC3 does not provide information on this effect. The UNFCCC guidelines invite Parties to report on policies and practices which encourage activities that lead to greater levels of anthropogenic GHG emissions than would otherwise occur.

E. Industry

71. The overall GHG emissions from Austrian industry increased by 7.3 per cent between 1990 and 2000, when they accounted for 31.2 per cent of total emissions. Most relevant in this sector are the emissions from iron, steel and cement production. The overall emissions from industrial processes decreased by 3.3 per cent from 1990 to 2000, when they accounted for 17.7 per cent of the total GHG emissions. The energy-related emissions from industry increased by 25.3 per cent during the 1990s and accounted for 13.5 per cent of the total in 2000.

72. Implemented and planned PaMs in the industry sector cover different regulatory (EC IPPC directive), incentive-based, and conceptual/consultative approaches for the efficient use of energy and the use of renewable energies. The estimated effect of the implemented PaMs is either not quantified on an individual basis or does not exceed 0.2 Tg CO_2 equivalent per year. The sum of the individual effects of the planned PaMs amounts to 0.8 Tg CO_2 equivalent per year (overlaps not taken into account). In addition, by means of voluntary agreements and the use of flexibility mechanisms, reductions of 1–2 Tg CO_2 equivalent per year are estimated. With the exception of the latter, the PaMs reported in the NC3 exclusively cover energy-related emissions; PaMs to reduce CO_2 emissions from industrial processes, such as iron and steel and cement production, were not reported.

73. The review team noted that, given the high level of uncertainty of the assessment of the PaMs in this sector, continuous monitoring and evaluation appeared essential for achieving the estimated emission reduction potential. Host-country officials stressed the importance of industry-related PaMs fulfilling

cost-effectiveness criteria, since urging businesses to go beyond cost-effective limits would harm their international competitiveness.

74. The potential for reducing emissions from the industry sector is estimated at around 10 per cent for the first commitment period under the Kyoto Protocol. This may suggest that the reduction of emissions from industry is somewhat out of proportion. A rationale for this might be that the potential for efficiency improvement in industry is much smaller than in other sectors, e.g. in the housing sector where there is a huge stock of old dwellings with poor efficiency standards.

75. The review team acknowledged the preference for use of project-based flexibility mechanisms (JI/CDM) and for the implementation of an emissions trading scheme. This is why voluntary agreements with the industry, although noted in the NC3, are not currently under consideration.

76. The review team was provided with the draft of an amendment to the Austrian Environmental Promotion Act (Umweltförderungsgesetz) from September 2002. This amendment defines the framework for the implementation of the Austrian JI/CDM programme. With an estimated GHG mitigation effect of 1–2 Tg CO_2 equivalent per year, the application of project-based flexibility mechanisms in industry has to be considered as a key measure.

F. Agriculture

77. Agricultural land, including extensively used alpine pastures, accounts for 41 per cent of the Austrian national territory. In 2000, the CH_4 and N_2O emissions in this sector[10] accounted for 4.8 Tg CO_2 equivalent, representing 6 per cent of the total GHG emissions, and decreased by 14 per cent during the 1990s. Since 1990 the number of cattle has decreased by 17 per cent and the number of pigs by 7 per cent. The use of mineral fertilizers has also decreased substantially, mainly as a result of the EC Common Agricultural Policy.

78. The reduction potential in the agricultural sector is estimated to be 0.4 Tg CO_2 equivalent. The NC3 describes two implemented PaMs: the extension of ecological farming and the cultivation of oilseed crops. A further enforcement of measures to reduce CH_4 and N_2O emissions has been adopted. Agricultural PaMs aim to produce substitutes for mineral oil products, to reduce the use of mineral fertilizers, to limit livestock density, to improve manure management and to promote organic products. They also aim to promote a more environmentally friendly management of the agro-ecosystems. There is little potential for the implementation of additional measures in this sector.

G. Forestry

79. Forests make up about 47 per cent of the total Austrian territory. This represents the largest carbon reservoir and has been a net carbon sink during recent decades. In 2000, the LUCF sector sequestered 7,633 Tg CO_2, an amount which equals about 9.6 per cent of the total Austrian GHG emissions. In 1990, the sink capacity of LUCF amounted to 9,215 Tg or 11.9 per cent of the total GHG emissions. Because of their protective function, mountain forests are of great importance to Austria.

80. For more than 100 years, it has been a guiding principle of Austrian forest management policy to use forests in a sustainable manner, balancing their ecological, economic and social functions. In the NC3, the adopted, planned and implemented activities in the forestry sector are reported under the heading "Maintenance and extension of vital forests", encompassing research activities, public awareness elements and regulatory approaches. The focus of these activities is to maintain the biodiversity,

[10] IPCC sector 4 covers only the non-energy-related GHG emissions from agriculture.

productivity, regeneration capacity and vitality of forests and to improve adaptation to a changing climate.

H. Waste management

81. Since 1990, GHG emissions from waste management decreased by 14.8 per cent and accounted for 6.7 per cent of the total GHG emissions in 2000. Solid waste disposal accounted for 85 per cent of the sector's GHG emissions (4,424 Tg CO_2 equivalent), followed by sludge spreading (420 Tg CO_2 equivalent) and wastewater handling (302 Tg CO_2 equivalent).

82. The Waste Management Act of 1990 and the Landfill Regulation of 1996 implemented pursuant to the EC regulations are the two central PaMs to mitigate GHG emissions from waste. The Landfill Regulation, with an estimated mitigation effect of 0.9 Tg per year CO_2 equivalent, is considered to be one of the most important instruments for implementing the overall targets of the Waste Management Act. Among other things, the regulation limits the total organic carbon content of waste fractions disposed of in landfills, making thermal or mechanical–biological pre-treatment obligatory. This implies an extension of waste treatment capacities, which has to be considered as a second key measure in this sector, with an estimated effect of 1.1 Tg CO_2 equivalent per year, including the effect of other accompanying PaMs such as energy recovery from waste incineration. In March 2002, a directive for mechanical–biological treatment of waste as an alternative to thermal treatment was released.

83. The review team was informed that a detailed database on the composition of municipal waste is available, allowing estimations of emissions from landfills with a relatively high degree of accuracy. Furthermore, the review team noted that the time schedule for the implementation of the Landfill Regulation, i.e. the provision of treatment capacities, probably will be met. This means that landfilling of untreated waste will be phased out in 2004.

I. Fluorinated gases

84. After the closing of an aluminium smelter in the early 1990s, emissions of PFCs decreased by 98 per cent between 1990 and 1995, which was chosen as the base year for the fluorinated gases. Between 1995 and 2000, PFC emissions increased slightly. At present, only minor quantities of PFCs are emitted from the electronics industry and some refrigeration applications. According to the inventory data submitted in 2002, PFC emissions made up 0.03 per cent of the overall emissions in 2000.

85. Following a worldwide trend, emissions of HFCs, a group of substances mainly used as a substitute for the "Montreal gases", showed a steep increase by a factor of nearly 280 from 1990, when only negligible amounts had been used. Between 1995 (the base year for fluorinated gases) and 2000, the emissions increased by nearly 90 per cent; by the end of this period they contributed 1.3 per cent to the overall GHG emissions in Austria.

86. The emissions of SF_6 increased by nearly 31 per cent between 1990 and 2000, but decreased again by about 42 per cent after 1995 (base year). In 2000, the emissions of SF_6 contributed 0.8 per cent to the overall GHG emissions.

87. At the time of the review team's visit, regulatory measures were under preparation for a partial phase-out of HFCs and SF_6 which, with an estimated effect of 0.8 Tg per year CO_2 equivalent, have to be considered as key measures in this field. The relevant regulation was adopted in November 2002.

IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

88. The NC3 provides a set of projections of the future levels of GHG emissions, based on model calculations. It includes projections by gas and by sector, and also projections of the overall emission

levels. The review team noted that reporting on projections broadly conforms with the UNFCCC reporting guidelines. In particular, projections cover all GHGs, namely CO_2, CH_4, N_2O and fluorinated gases, and all sectors except for LUCF.

89. Projections for the transport sector were included in the energy sector and were not reported separately. To improve transparency, the review team was provided with a separate table of projections for the transport sector in November 2002. Emissions from bunker fuels were not reported. The time horizon for projections is 2020 and emission levels are projected for the years 2005, 2010, 2015 and 2020. The base year for projections is 1999. The review team acknowledged that projections were broadly consistent with the inventory data that had been submitted in 2001.

90. The NC3 also makes reference to a second set of projections which represents the estimated development according to the draft National Climate Strategy. This approach is based on expert judgements and provides projections for the year 2010 only. It includes projections for the total GHG emissions and for the following sectors and gases: energy demand (CO_2 + N_2O + CH_4), energy supply (CO_2), waste (CH_4 + CO_2), transport (CO_2 + N_2O), industry (CO_2 + N_2O), agriculture (CH_4 + N_2O), fluorinated gases, and other (including solvent use). The review team noted that in spite of different methodologies, and slightly different scenario definitions, both sets of projections show similar results for the estimated total GHG emissions in 2010. Therefore, the following analysis of the Austrian projections focuses on the first approach.

91. The overall responsibility for the Austrian greenhouse gas emission projections lies with the Ministry for Agriculture, Forestry, Environment and Water Management (BMLFUW). Commissioned by the BMLFUW and the Ministry for Economic Affairs and Labour (BMWA), energy scenarios ("Energieszenarien bis 2020") have been computed by the Austrian Institute of Economic Research (WIFO). On this basis, the Austrian Research Center Seibersdorf (ARCS) calculated the energy sector's emission projections for the three main GHG, namely CO_2, CH_4 and N_2O. Emissions from industrial processes are projected on the basis of an ARCS analysis. The projections for agriculture and waste have also been calculated by ARCS. Projections for the fluorinated gases emissions were taken from a survey on the use of these substances.

A. Scenario definition, key assumptions and methods used

92. **Scenarios.** The NC3 presents two different scenarios: a "with measures" scenario, which comprises all implemented and adopted PaMs, and a "with additional measures" scenario, which takes into account the planned PaMs as well. The review team was informed that the use of flexibility mechanisms was not taken into account for the "with additional measures" scenario, although it is listed in the catalogue of planned national PaMs. Thus, this scenario represents a possible development of domestic GHG emissions.

93. **Assumptions.** Several key assumptions underline the emission projections (see table 8). Among the more important of these for Austria are economic growth (measured through GDP growth), oil price changes and population growth. The economy is expected to grow slowly but steadily by 1.9–2.1 per cent annually, starting from a relatively high level of 3.9 per cent GDP growth in 2000. The review team noted that during the last decade, the Austrian economy grew considerably faster (more than 2.3 per cent annually on average, see table 1 and paragraph 4). The oil price is assumed to decline by one third of its 2000 level within the current decade and to increase slightly thereafter without returning to its 2000 level; population is supposed to grow by only 100,000 inhabitants per decade (see paragraph 5); and energy efficiency is assumed to improve slowly by 10 per cent between 2000 and 2020, compared to the historical value of 18 per cent improvement between 1990 and 2000. The review team noted that

the effects of low-level assumptions for GDP growth and population growth may partly be offset by low-level assumptions for oil price development and energy efficiency improvements.

Table 8. Key parameters for the model calculations as reported in the NC3

	1990	1995	2000	2005	2010	2015	2020
GDP growth (per cent per year)	+4.6	+1.5	+3.9	+2.1	+2.0	+1.9	+2.0
Oil price (€ (1990)/bbl)			24.9	16.5	16.5	19.7	22.5
Population (million)	7.73	8.05	8.11	8.17	8.21	8.25	8.30
Electricity import/export ratio (per cent)			–2.6	+2.6	+2.0	+2.0	+2.0
Number of dwellings (million)	2 97		3.26	3.36	3.44	3.51	3.59
Private cars (million)	2.99	3.59	4.03	4.40	4.77	5.10	5.37
Energy prices (per cent of 2000 price)							
Fuel oil			*100*	*78*	*76*	*79*	*84*
Electricity			*100*	*92*	*102*	*103*	*106*
Gasoline			*100*	*86*	*84*	*86*	*89*
Final energy consumption (PJ)	833	880	945	1 010	1 049	1 085	1 121
Steel production activity (thousands of tonnes)	3 922	4 529	5 366	5 502	5 502	5 447	5 393
Energy efficiency (per cent)		+18			+10		
Cattle (1 000 head)	2 584	2326	2 156	2 092	2 010	1 941	1 875
Municipal waste deposition in landfills (thousands of tonnes)	4 115	3529	3 640	3 463	2 700	2 147	1 783

94. **Methods used.** Emissions from the energy sector are projected with a set of WIFO models, combining features of top-down and bottom-up approaches. This set comprises the energy model DEDALUS and the macroeconomic multisectoral model MULTIMAC. DEDALUS combines an econometric sub-model for energy demand (represented by 13 energy use sectors) and an input–output sub-model of energy transformations that takes into account projected technological changes in energy supply and use. Projections of energy-related variables by DEDALUS are integrated with the projected macroeconomic parameters by MULTIMAC through information exchange between these two models. The resulting figures for energy demand in the Austrian economy are split according to the subsectors of the Austrian GHG emission inventory. The projections for the non-energy sectors are calculated based on spreadsheet models, using expert estimates for the future level of activity data and emission factors from the Austrian GHG inventory. Future activity levels are derived from the Austrian Carbon Balance Model and adjusted to economic data from the energy model.

95. **Comparison with the NC2.** In the NC2, the "with measures" scenario showed a decrease in total CO_2 emissions of 6 per cent for 2010 compared to 1990, whereas the current "with measures" scenario projects a 17 per cent increase for the same period. The review team was informed that lower than expected energy prices and higher than expected GDP growth rates were the main causes for this major shift. Furthermore, the modelling environment used for projections in the NC3 contains a number of substantial re nements compared to the model used for the NC2: the sectoral disaggregation was further elaborated by a multisectoral integrated input–output framework; emphasis was given to the role of induced and embodied technological change; and the dynamics of price change and energy price development were considered more carefully.

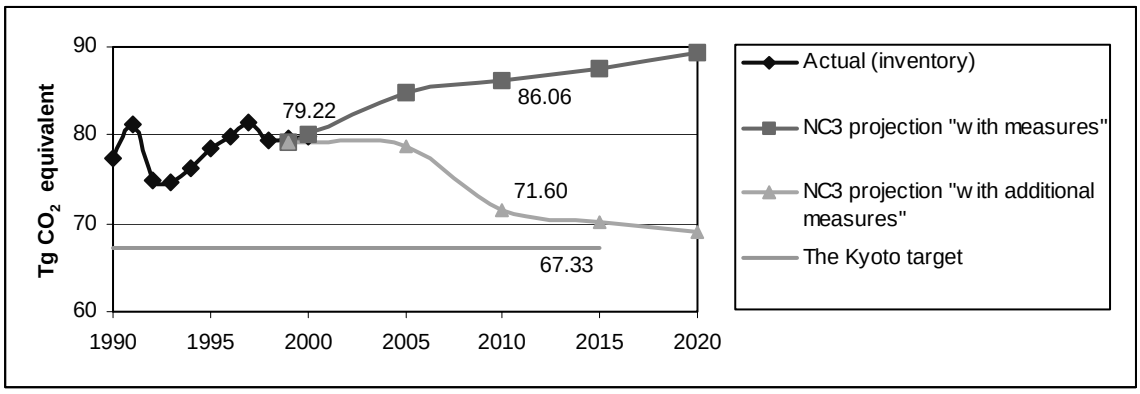
96. When projecting GHG emissions by sector, transport was included in the energy sector. The review team noted that the UNFCCC guidelines required projections to be presented on a sectoral basis to the extent possible, using the same sectoral categories as those used in the PaM section. Given the importance of the transport sector for the Austrian climate policy, the review team felt that future national communications would benefit from a separation of the transport projections from the energy projections. Following a request from the review team, the BMLFUW compiled a table with separate projections for the transport sector, derived from the energy projections, and forwarded them to the secretariat in November 2002.

B. Projected emission trends

97. The "with measures" scenario shows an increase of total GHG emissions of about 9 per cent between 1999 and 2010, whereas the "with additional measures" scenario leads to a 10 per cent decrease. The review team noted that the main GHG mitigation effect of the additional PaMs in the "with additional measures" scenario (about 7 Tg CO_2 equivalent) is projected to take place between 2005 and 2010. Between 2010 and 2020 the "with additional measures" scenario shows a further 4 per cent decrease, and the "with measures" scenario shows a further 4 per cent increase (see figure 2).

98. In the "with additional measures" scenario, which includes all planned PaMs, total GHG emissions are projected to reach 71.6 Tg CO_2 equivalent by 2010, which means a decrease of 7 per cent compared to 1990. According to the NC3, the remaining gap of around 3.5 Tg CO_2 equivalent to the national Kyoto target should be bridged by utilizing the project-based flexibility mechanisms of the Kyoto Protocol. The review team noted that the Austrian Climate Strategy lists the need for budgetary means of up to €36 million for JI/CDM projects (i.e. about €10 per tonne of CO_2).

Figure 2. Projected emission trends – total GHG emissions



99. In the "with measures" scenario, total GHG emissions are projected to arrive at 86.06 Tg CO_2 equivalent by 2010, which means an increase of 12 per cent compared to 1990 (see table 9). Thus, to meet the national Kyoto target under the EC burden-sharing agreement of a 13 per cent reduction compared to 1990, a gap of ca. 18 Tg CO_2 equivalent needs to be bridged by additional PaMs.[11]

[11] Because of different assumptions and methods used, the projections for the Austrian Climate Strategy show a slightly smaller gap of 17 Tg CO_2 equivalent (see table 7).

Table 9. Sectoral projections of GHG emissions as reported in the NC3 (CO_2 equivalent)

	1990	1999	With measures 2010[a]		With additional measures 2010[a]		Difference 2010[b]	
	Tg	Tg	Tg	%	Tg	%	Tg	%
Energy (including transport)	49.93	54.56	60.06	20	48.29	–3	11.77	81
Transport[c]	12.32	16.59	21.32	73	16.98	38	4.34	30
Energy (excluding transport)[d]	37.61	37.97	38.74	3	31.31	–17	7.43	51
Industry (including fluorinated gases)	14.42	13.75	16.40	14	14.93	4	1.47	10
Waste	6.24	5.33	4.84	–22	3.76	–40	1.08	7
Agriculture	5.59	4.96	4.76	–15	4.62	–17	0.14	1
Total	**76.94**	**79.22**	**86.06**	**12**	**71.60**	**–7**	**14.46**	**100**

[a] Right column: percentage change relative to the 1990 value.
[b] Difference (i.e. reduction potential of additional PaMs) for 2010 in Tg CO_2 equivalent and in per cent of total reduction potential.
[c] Projection data for the transport sector were submitted in November 2002.
[d] Difference of the above two rows.

100. Future emissions by sector for the two scenarios were obtained from model calculations and were presented in the NC3. The analysis of projected trends of GHG emissions from the energy sector, excluding transport, for 2010 shows an increase of 2 per cent in the "with measures" scenario and a decrease of 18 per cent in the "with additional measures" scenario, compared to the 1999 levels. The review team was informed that the potential for additional CHP was not considered.

101. The projection data for the transport sector, which were submitted retroactively, show a continuous growth of GHG emissions, with a reduced growth rate of 29 per cent by 2010 in the "with measures" scenario, compared to 1999 levels. The review team was unable to find any explanation for this significant slowdown of the transport emissions growth, and noted that according to the Austrian Climate Strategy, current trends in society and economy indicate a continuous strong growth of transport demand with a continuously growing share of road transport. The Austrian Climate Strategy also states that a reversal of the historical growth trend of 42 per cent during the 1990s is not foreseeable at the moment.

102. In contrast to the continuous growth in the "with measures" scenario, the "with additional measures" scenario shows a return of the transport-related GHG emission to the 1999 level by 2010 (i.e. 38 per cent increase compared to the 1990 levels).[12] In the "with measures" scenario the transport sector emissions keep on growing beyond 2010, but the "with additional measures" scenario projects a declining emission trend between 2010 and 2020.

103. Emissions from the industry sector are projected to increase by 2010 by 19 per cent in the "with measures" scenario and by 9 per cent in the "with additional measures" scenario, compared to 1999. Steel production increases by only 2.5 per cent in the same period. Emissions from waste and agriculture are projected to decrease by 9 per cent and 4 per cent respectively in the "with measures" scenario, mainly as a result of reductions in the number of cattle and in municipal waste deposition in landfills (see table 8). In the "with additional measures" scenario, emissions from these two sectors decrease by 29 per cent (waste) and 7 per cent (agriculture). The projected effects from reduced fertilizer use and improved manure were not estimated because of methodological problems.

104. The NC3 refers to a sensitivity analysis conducted by Austrian experts for the following four variables: utilization of renewable energy sources for energy supply; electricity import–export ratio; number of cattle in agriculture; and waste deposition in landfills. Quantitative assumptions and results were reported. The review team noted that future reporting might benefit from a sensitivity analysis for the main variables of GHG emission projections, namely GDP growth rate, oil price development and population growth.

[12] The main drivers behind this trend have already been discussed in chapter III.C (transport PaMs).

C. Effects of policies and measures

105. As there is no without-measures scenario, the aggregate effects of PaMs implemented or adopted were derived from the sum of the potentials of the individual PaMs. The latter are based on expert judgements and documented in the background paper "Kyoto Options Analysis".[13] The NC3 does not provide detailed information about the methods used for the estimation of the mitigation effects of the 59 PaMs presented. The review team noted that future descriptions of expert judgements might benefit from explanations of how the judgements were obtained (e.g. expert group discussion or individual expert interviews, survey method, selection of reports analysed, quantification method, quality assurance).

106. Because there is a certain amount of overlap, the aggregate effect of a policy package is smaller than the sum of the estimated effects of its elements. The review team acknowledged that for the Austrian Climate Strategy such overlaps have been taken into account in the form of a 16 per cent "discount" on the total of the effects of individual PaMs. As outlined in the WIFO report on the calculation of the energy scenarios, and in the verbal presentation given to the review team, a comparable percentage (25 per cent) resulted from the model calculations with DEDALUS III.

107. The effect of planned PaMs is derived from the difference between the "with measures" and the "with additional measures" scenarios. The effect of the PaMs in the Austrian Climate Strategy for the trend and target scenarios is again based on the background paper "Kyoto Options Analysis". Newly adopted measures (e.g. green electricity feed-in tariffs - novel 2000 – EIWOG) were also included.

108. The NC3 does not provide any estimates of the economic impacts of the additional measures. The review team noted that such useful information could easily be obtained with the macroeconomic models used.

V. VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

109. Austria is expected to be vulnerable to a changing climate. Alpine and hilly regions (>500 m) cover 70 per cent of its surface area. The NC3 presents detailed vulnerability assessments for mountainous regions, including the discussion of climate change impacts on its physical (hydrology, cryosphere, avalanches and geomorphological processes), ecological (vegetation migration, forest growth, alpine forest), and socio-economic (mountain agriculture, hydropower, timber activities, tourism, human health, property) systems.

110. Reduced snow cover will have a negative impact on Austria's winter tourism, which accounts for about 4 per cent of the country's GDP. Since the length of the ski season is sensitive to quite small climatic changes, considerable socio-economic disruptions in communities that depend on the skiing industry can be expected.

111. The vulnerability assessment presented in NC3 focuses mostly on mountainous regions. The review team noted that the vulnerability of the Austrian lowlands, where the vast majority of the Austrian

[13] The review team received a copy of the background paper "Kyoto Options Analysis" ("Kyoto-Optionen-Analyse"; 1999) of Kommunalkredit Austria, in which expert judgements from various sources have been compiled. In addition to estimates of the mitigation effects, the background paper provides information on the underlying assumptions, the implementing entities, as well as cost data, e.g. necessary investments and required subsidy amounts. The background paper covers PaMs in the sectors space heating / commercial sector, waste management, transport, electricity supply, district heating, industry and agriculture and measures with regard to the mitigation of fluorinated gases. The estimates of the background paper were adapted for the Austrian Climate Strategy.

population is located, will become increasingly important in the context of floodings of human settlements in narrow river valleys during extreme weather events. In 2002, the historic city centre of Salzburg (inter alia) was exposed to high waters, causing severe economic and cultural damage.

112. Parties are committed to implementing Article 4.1 (b) and (e) of the UNFCCC including adaptation and mitigation options. The review team noted that, in the future, Austria may devote even more attention and importance to action in the field of adaptation. Many adaptation measures (e.g. the reforestation of mountainous areas with a high risk of snow avalanches) show various ancillary benefits, because of the close linkage between adaptation and mitigation.

113. The review team noted that Austria has complied with the revised guidelines for reporting on vulnerability, climate change impacts and adaptation measures.

VI. FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

114. Since 1991, Austria has contributed US$ 35 million to the Global Environment Facility (GEF) pilot phase, US$ 20 million to its first replenishment, and US$ 10 million between 1997 and 2000. The Austrian participation in the GEF has been financed in addition to existing commitments and payments to other multilateral financial institutions and is therefore called “new and additional”.

115. Austria focuses its official development assistance (ODA) support on several priority regions in Africa, the Himalayas and Central America, with a large share of least developed countries. All ODA projects have to comply with the goal of environmental sustainability and are externally reviewed at the Ministry of Foreign Affairs. Austrian ODA projects related to climate change focus on small-scale hydropower, solar energy and protection of rainforests.

116. Financial contributions reported in the NC3 represent the Austrian overall contribution to multilateral institutions and programmes. Disaggregated financial contributions to UNFCCC, the United Nations Development Programme and the United Nations Environment Programme were not reported in the NC3.

117. Bilateral financial contributions relating to the implementation of the Convention were reported annually for the years 1997–2000 and within the sectors energy, transport and forestry. Disaggregated information on financial assistance for the sectors agriculture, waste and industry as well as ODA projects in the field of adaptation (capacity-building, coastal zone management and other vulnerability assessments) was not reported.

118. Austria intends to raise its development assistance from 0.25 per cent to 0.33 per cent of its GDP. Thus more resources will be available in the near future for projects related to climate change, including CDM/JI projects.

119. Austria actively participates in international institutions and initiatives such as the International Energy Agency and Climate Technology Initiative. Some bilateral projects are also reported as effective means for technology transfer. Selected projects include small hydropower plants (Nepal, Bhutan), solar energy (Cuba, India, Uganda, Tanzania, Zimbabwe), solar drying systems for crops (Burkina Faso), a biomass project (Nicaragua), clay ovens (Zimbabwe and others) and reforestation (Senegal, Mauritania).

VII. RESEARCH AND SYSTEMATIC OBSERVATION

120. In the NC3, Austria has described its international and domestic activities related to research and systematic observation. Obligations in promotion and cooperation in scientific and technical research and systematic observation of the climate system are fulfilled through activities supporting capacity-building in technical research as well as relevant social, economic and technical research and

development covered in the policies and measures section of the NC3. The review team noted that Austria has contributed to meeting the commitments under Article 5 of the UNFCCC, including assistance to developing countries, enabling them to participate in research and development efforts.

121. The review team noted that, traditionally, climate system research and research on impacts in the Alps are a priority in Austria. A large number of research institutions addressing climate change and a dense network of observing stations for meteorological and hydrological parameters underpin the role of Austrian research in this field. The Austrian state plays a key role in coordinating and financing research, since more than half of the research projects on climate change and air quality have been funded by federal ministries, with the rest being equally funded by the provinces and municipalities, the EC and the research institutions themselves. However, during the visit, the review team was informed that project-based funding by ministries has been cut to almost zero in the last two years.

122. The Federal Ministry of Education, Science and Culture finances the Austrian Network for Environmental Research, which has several functions and elements, including a node on "Climate, Climate Change and Atmospheric Environment Research". The main objective of the network is the promotion of international research activities and the support of environmental scientists. During the review team's visit, Austrian representatives expressed the need for a competence centre for climate change research, the need for additional budget to be distributed by the Council for Research and Technology Development and the re-activation of the Austrian Council on Climate Change.

123. Austrian research on the climatic system is heavily influenced by the geographic situation of Austria, especially by the Alps, whereas socio-economic research focuses on cost-benefit analysis and regional response options for reductions in GHG emissions. Research on mitigation and adaptation policies and technologies is carried out in a number of areas, including energy efficiency, transport, solar energy, biogeneration and forest management. The review team noted that probably because of a lack of budgetary and/or human resources, information on more than 40 research projects or activities has not been made available on the Internet.

124. Austria provided a summary of information on its participation in the global climate observing system (GCOS). A separate report on GCOS following the UNFCCC reporting guidelines was also submitted. There is a long tradition of climate observations in Austria. A dense network of stations is operational, and participation in space-based observation programmes is increasing. The climate system database includes time series for the atmosphere, hydrosphere, biosphere and geosphere. Monitoring concentrates on the alpine region. The review team was informed that a glacier mass balance (GTN-G°) station, which participates in the global terrestrial observing system, will cease operation in 2005.

VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

125. In 1970, environmental education was embodied into Austrian school curricula. Since then, climate protection has received increased attention, resulting in a high public awareness of climate change. According to a survey, almost 9 out of 10 Austrians are concerned about the state of the environment, and those Austrians who believed in global warming were aware that they had to contribute personally to fighting the greenhouse effect.

126. A huge variety of specific education, training and public awareness programmes and projects has been carried out, e.g. a programme on raising ecological awareness of schools, the bonus model for schools, the action programme on climate, the climate rescue campaign and the car-free day. TV commercials, brochures, web sites, CD ROMs and other media have been used to attract public attention. Activities relating to training and public awareness are undertaken at all three federal levels.

127. Education, training and public awareness in GHG mitigation (energy efficiency, biomass for heating, solar energy, etc) are a priority. Considerably less effort has been made in addressing adaptation issues. Public participation in addressing climate change takes place through several NGOs, including the Climate Alliance Austria. Business NGOs are regular participants in the process of preparing the Austrian national communications. The review team noted that the inclusion of environmental NGOs could be an opportunity for improvement.

IX. CONCLUSIONS

128. When reviewing the information reported in the third Austrian national communication, the review team did not identify any major gaps and concluded that the document broadly met the provisions of the UNFCCC guidelines. The review team was of the opinion that the NC3, in combination with the national climate strategy and the GHG inventory submissions, provided a comprehensive overview of Austrian activities relating to climate change. The review team formed the impression that Austria is working towards the design and implementation of an integrated climate change strategy. This strategy is based on broad participation by the general public, since major mitigation efforts are to be obtained in two end-user sectors, transport and space heating, and is characterized by a high level of public awareness on the implications of climate change. The strategy is also based on the active support of other ministries (e.g. the Ministry of Transport and the Ministry for Economic Affairs and Labour). An active integration of climate policy into their policy fields seems to be necessary. Finding sufficient funds to support this strategy, strengthening the institutional framework and launching an effective monitoring system will be crucial for its successful implementation.

129. The assessment of past GHG emissions trends allowed the review team to conclude that Austria contributed to achieving the aim of the Convention, as its total GHG emissions in 2000 exceeded the 1990 level by only 3.1 per cent without considering CO_2 from LUCF, and by 5.8 per cent if CO_2 from LUCF is considered. Possible reasons for emissions being higher in 2000 than in 1990 include the steep increase in transport activity, population growth of 5% between 1990 and 1999 and the strong growth of industrial output in the second half of the 1990s. The review team noted that the PaMs implemented in the last decade in transport and energy use in industry were not sufficient to contain the growth of emissions in these two subsectors. On the other hand, the implementation of the EC Landfill Regulation and of some elements of the EC Common Agricultural Policy was considered to be successful, given their impact on reducing CH_4 emissions from waste and agriculture, partly offsetting the growth of CO_2 and N_2O emissions.

130. In contrast to the situation described in the NC2, Austria is now expecting a significant increase of its GHG emissions (by 12 per cent in its 1990 GHG emissions) by 2010 under trend conditions (the "with measures" scenario). This redirection of projected emissions levels is largely attributed to revised assumptions of both lower energy prices and higher GDP growth rates in the NC3 projections than in the NC2. Nevertheless, according to the model-based projections for the "with additional measures" scenario, it is still possible to achieve a considerable reverse of the emissions growth trend if all planned policies and measures are implemented. The projections for the full implementation of the Austrian Climate Strategy "With Additional Measures Strategy", which are based on expert judgements, show a similar reduction trend of 7 per cent of the 1990 GHG emissions by 2010. Both sets of projections show a remaining mitigation gap of 3–3.5 Tg CO_2 equivalent in 2010 towards the national Kyoto target of a 13 per cent reduction, based on 1990 emissions levels.

131. The review team identified three major risks that may affect the planned contribution of domestic action in fulfilling Austria's national Kyoto target (see paragraph 40). These are: higher-than-expected baseline emissions, lower-than-expected total effects of domestic PaMs, and incomplete implementation of domestic PaMs. Factors that increase the probability of the first risk include low assumptions of GDP

growth (see paragraph 93) and transport emissions growth (see paragraph 101) in the "with measures" scenario. The second risk is fuelled by the high level of uncertainty which is linked to expert judgements as the method chosen for the assessment of the total effect of PaMs (see paragraph 105). Factors that may increase the risk of incomplete implementation of domestic PaMs include the uncertainty of sufficient funding (see paragraph 44), the high number of actors involved (see paragraph 42) and the highly fragmented responsibility for the implementation of the policy (see paragraphs 8 and 35).

132. In this context, strengthening of the implementation of PaMs in the transport sector seems indispensable. Moreover, as the projections might not account for a possible additional demand for transport services induced by the planned extensions of road and railway infrastructure, the review team deemed it necessary to suggest assessing the total effect of the National Transport Plan on the transport-related GHG emissions. Successful implementation of several key PaMs in other sectors (e.g. support schemes for energy efficiency in building construction; preferential market access for electricity from renewable energy sources; biomass for heating) is also important if future emission trends are to be successfully reversed. Cross-cutting PaMs, such as an ecological tax reform and an EC emissions trading system, are still unknown factors in the projection of future Austrian GHG emissions.

133. The review team was informed that a monitoring system for GHG mitigation measures is to be implemented shortly. Also, a new high-level Kyoto Coordination Committee is to be established. The review team noted that such a committee might give a positive further impetus to the implementation of mitigation policies and measures, especially in the transport and energy sectors.

134. The review team commended Austria for its impressive research on the vulnerability of the Alps, and suggests further strengthening of the work on adaptation measures.

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