UNITED NATIONS

UNFCCC Framework Convention on Climate Change

Distr.
GENERAL

FCCC/SBI/2003/7
16 May 2003

Original: ENGLISH

SUBSIDIARY BODY FOR IMPLEMENTATION
Eighteenth session
Bonn, 4–13 June 2003
Item 3 (a) of the provisional agenda

NATIONAL COMMUNICATIONS FROM PARTIES INCLUDED IN ANNEX I TO THE CONVENTION

COMPILATION AND SYNTHESIS OF THIRD NATIONAL COMMUNICATIONS

Compilation and synthesis report on third national communications

Executive summary

Note by the secretariat*

Summary

This is the executive summary of the compilation and synthesis report on third national communications from Annex I Parties. It summarizes information presented in the other parts of the report (FCCC/SBI/2003/7/Add.1–4). This document provides an overview of trends in greenhouse gas emissions in the period 1990–2000, highlights major policies and measures of Annex I Parties, presents an overview of projections of emissions and covers other information provided by Parties in their national communications.

* This document is being submitted after the official deadline for translation because of late submission of national communications by Parties.

CONTENTS

I. MANDATE AND APPROACH

1. Articles 4.1, 4.2 and 12 of the Convention require Parties included in Annex I to the Convention (Annex I Parties) to communicate information periodically to the Conference of the Parties (COP). The COP, by its decision 33/CP.7, requested the secretariat to prepare the compilation and synthesis of third national communications.[1] The Subsidiary Body for Implementation (SBI), at its sixteenth session, noted that, owing to delays in the submission of national communications, the compilation and synthesis report would be prepared for the eighteenth session of the SBI.[2] This note responds to these requests and contains information compiled and synthesized from the third national communications of 32 Annex I Parties submitted to the secretariat by 28 February 2003.[3]

2. The compilation and synthesis report consists of five parts. This note is an executive summary of information contained in documents FCCC/SBI/2003/7/Add.1–4. The main report (FCCC/SBI/2003/7/Add.1) covers all aspects of information included in the national communications. Document FCCC/SBI/2003/7/Add.2 contains a detailed discussion of the policies and measures reported by Annex I Parties and could be used as an input to an ongoing discussion of "good practices" in policies and measures in the Subsidiary Body for Scientific and Technological Advice (SBSTA). Document FCCC/SBI/2003/7/Add.3 provides information on the approaches used by Annex I Parties in preparing their projections. Document FCCC/SBI/2003/7/Add.4 provides an overview of activities relating to education, information and public awareness. It could serve as an input to the consideration of activities under Article 6 of the Convention by the SBI and the COP. Each of the above-mentioned documents can be read as a stand alone paper. All references to Parties in this note are to Annex I Parties unless otherwise indicated.

II. NATIONAL CIRCUMSTANCES

3. National circumstances as reported in the national communications covered governmental, demographic, geographic, climatic and economic and energy profiles. They also described sector profiles including transport, industry, waste, building stock and urban structure, agriculture and forest.

4. **Distribution of responsibilities** for climate-change-related issues among the different levels of government was quite diverse. Sharing responsibilities between central and local government was described as a challenging task because it required a high degree of cooperation at all levels. This was especially true for countries that have recently devolved power from the central government. Implementation of climate-related actions was typically delegated to local authorities; this generally included territorial planning and management of buildings, public transport and waste management. Strengthening of institutional frameworks was achieved through involvement of new institutions and agencies, and by enhancing coordination and cooperation in the work of inter-agency committees or similar institutions.

5. The total **population** of reporting Parties was 1,062.2 million in 2000. Population growth in the last decade was less than 1 per cent annually in most Parties, and some of them reported a decrease in population from 1990 to 2000. For the majority of Parties – except Australia, Canada, New Zealand and the United States, where the population grew by more than 10 per cent over the last decade – population growth was not a significant factor compared to economic growth and behaviour changes. Population density and distribution patterns affected emissions from transport and housing.

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1 FCCC/CP/2001/13/Add.4.

2 FCCC/SBI/2002/6.

3 Slovenia and Croatia have submitted their first national communications, and Lithuania its second one. They are also considered in the report.

6. Most Parties presented their **geographical profile** in relation to their vulnerability to climate change and related factors, such as vulnerability of mountain ecosystems, availability of water and freshwater, extreme events such as floods and droughts, or a possible rise in sea level. Geographical location was often linked to activities in the transport sector. Most Parties have forest and wooded land making up 30 per cent or more of their total land area, some even more than 50 per cent. In some Parties only about 10 per cent of total land was used for agriculture, mainly because of unfavourable climatic conditions. For the rest the figure was around 30 per cent or more.

7. With respect to **economic profile**, most Annex II countries belong to the high-income group with gross domestic product (GDP) per capita more than US$ 20,000 (in 1995 prices adjusted for purchasing power parity). Some are middle-income countries with GDP per capita of US$ 15,000–20,000, including some Parties with economies in transition (EIT). Most EIT Parties have GDP per capita of about US$ 10,000 or less. The average annual GDP growth rate in most Annex II Parties was about 2 to 3 per cent in the 1990s, but for EIT Parties it varied significantly.

8. The service sector was the largest sector of the economy in almost all reporting Parties, with its share of GDP being more than 50 per cent. Even with the increasing share of services, the **structure of industry** continued to affect the emissions profile significantly. As a result of their natural resources endowment some Parties relied on production and export of natural resources, including energy. Technology and efficiency levels also affected emission and energy intensity profiles.

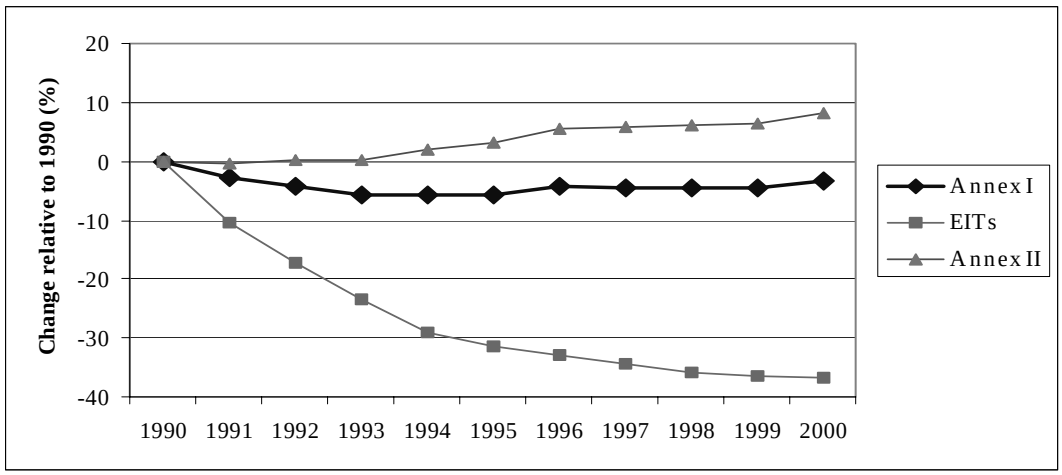
9. The natural resources endowment to a large extent determined the **energy profile** and affected the possibility of fuel switching. Cleaner fossil fuels, such as natural gas, were especially favoured because of their environmental advantages. Natural gas was also preferred for cogeneration of electricity and heat. Many Parties relied heavily on imports to meet more than half of their demand for energy. Only a few Parties were large producers and exporters of natural gas, and some exporting countries indicated they could become net importers in the foreseeable future. In many countries this raised concerns about the **security of energy supply** and prompted actions to diversify it. However, fossil fuels with a high carbon content still accounted for a high proportion of primary energy consumption. Parties that traditionally relied heavily on hydropower continued to do so, but reported the exhaustion of viable sites and thus began to exploit other sources for power generation in order to meet the growing demand for electricity. Most Parties had large forest resources, so renewable energy resources, particularly biomass (wood and wood waste) have been actively explored.

III. TRENDS IN GREENHOUSE GAS EMISSIONS IN THE PERIOD 1990–2000

10. Data on GHG emissions provided by Parties in their third national communications and updated in the annual inventory submissions cover the period from 1990 to 2000. Although the available data do not cover all 40 Annex I Parties, they nevertheless make it possible to present a **general trend** in GHG emissions of Annex I Parties for these 11 years.

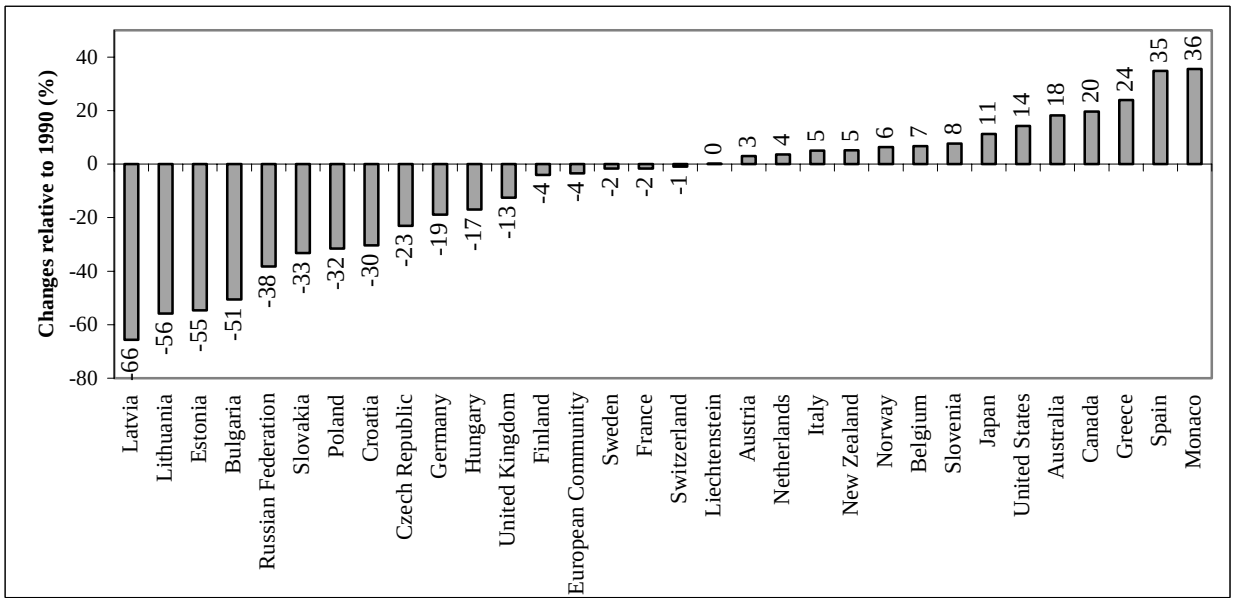
11. The total aggregated GHG emissions (excluding land-use change and forestry, LUCF) **decreased by 3 per cent** from 1990 to 2000. Thus Annex I Parties **have jointly attained the aim** of Article 4.2 of the Convention – to return their 2000 emissions to 1990 levels, although the extent to which Annex II Parties succeeded in reversing an increasing trend in GHG emissions varied widely (see sections IV and V below). The decrease was mainly due to a 37 per cent decline in emissions from EIT Parties, whereas emissions from Annex II Parties increased by 8 per cent (see figure 1). Two thirds of this increase originated in the two Annex II Parties that do not intend to be bound by the commitments of the Kyoto Protocol. The total GHG emissions of the European Community (EC) as a whole decreased by 3.5 per cent, although in individual member States the changes varied between a decrease of 19 per cent and an increase of 35 per cent (see figure 2).

Figure 1. Trends in aggregated GHG emissions, 1990–2000



12. For individual countries, changes in aggregated GHG emissions varied widely: from a decrease of 66 per cent to an increase of 36 per cent. These data are presented in figure 2, which indicates that for about half of reporting Parties GHG emissions in 2000 were below the 1990 level. In addition to particular national circumstances, these reductions were apparently due to implementation of a number of policies and measures described in section IV below.

Figure 2. Changes in aggregated GHG emissions, 1990–2000



13. Trends in total aggregated GHG emissions followed the trends in carbon dioxide (CO_2) emissions because **CO_2 remained the main contributor** with a share of 82 per cent in 2000 (80 per cent in 1990). **Fuel combustion** remained the most important source of emissions and its share of the total GHG emissions has increased by 2 per cent (from about 78 to 80 per cent). Methane (CH_4) and nitrous oxide (N_2O) accounted for 10 and 6 per cent respectively in 2000 (12 and 6 per cent in 1990). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) combined contributed about 2 per cent in 2000. CO_2 remained the predominant GHG for all Parties, except New Zealand where CH_4 dominated the GHG emissions profile.

14. Total **CO_2 emissions** decreased by nearly 1 per cent over the period 1990–2000. In the same period **CH_4 emissions** decreased by 21 per cent and **N_2O emissions** decreased by 5 per cent. Total emissions of **HFCs, PFCs and SF_6** increased by 24 per cent.

15. In 1990–2000 **an overall decline** in GHG emissions was observed in all major sectors except transport and the energy industry. GHG emissions from **transport** and the **energy** industry **increased** by 20 per cent and 10 per cent respectively. Aviation emissions from international bunkers increased by about 48 per cent, while emissions from shipping remained relatively stable. Fugitive emissions decreased the most (by 31 per cent). Emissions from fuel combustion, agriculture and waste decreased initially, then levelled off after the mid-1990s. Emissions from fuel combustion even slightly increased from 1999 to 2000. Overall emissions from these three sectors decreased by 1, 7 and 7 per cent, respectively. Emissions from industrial processes fluctuated in the mid-1990s, peaked in 1997, and later declined, with an overall decrease of 3 per cent.

IV. POLICIES AND MEASURES

16. Policies and measures covered a wide range of planned, adopted and/or implemented activities, not necessarily directly addressing climate change but contributing to the reduction of GHG emissions. Policies and measures were designed and implemented at all levels of government. A number of Parties reported progress in **reversing increasing trends** in GHG emissions that can be partly attributed to the successful implementation of particular policies and measures.

A. Overview

17. Parties reported policies and measures which covered all the important sources of emissions much more comprehensively than in the previous communications. There is a clear indication of a shift towards implementing new climate-specific policies and measures. Examples of such policies and measures include emissions trading, carbon taxes and green certificate trading.

18. The greatest number of policies and measures was reported in the energy sector, which is explained by the fact that CO_2 emissions from this and the transport sector were the most important. Some policy-relevant national circumstances, e.g. higher-than-expected economic growth and lower-than-expected oil prices, contributed to higher-than-expected emissions and lowered expected emission reductions from many policies in some of the Annex II Parties experiencing emission growth. In addition, in many Parties climate policies implemented at the beginning of the 1990s were apparently not sufficient, or the development and implementation of policies took much longer than expected. Nevertheless, by the end of the last decade some slowdown in the rate of emission growth in several Annex II countries could be observed, and as a result emissions in some Annex II Parties in 2000 only slightly exceeded the 1990 level. This could be explained at least in part by the effects of climate policies, although some slowdown in economic growth at the end of the decade and milder winters could also have contributed.

19. With a very few exceptions, Parties underlined the **importance of the Kyoto Protocol** in shaping their domestic climate policy responses. They reiterated their Kyoto targets as a first step towards long-term and continued emission reductions, and stressed the importance of the domestic effort to deliver significant contributions towards meeting these targets. Parties emphasized, to different extents, the need to use the Kyoto mechanisms and sinks in addition to domestic measures to achieve these targets. Several Parties reported considering development and implementation of emissions trading schemes in order to meet Kyoto Protocol commitments.

20. As part of their climate change policy framework, many Parties reported **strengthening of the existing institutional arrangements** for climate change policy design and implementation. More emphasis was placed on the coordination and strengthening of linkages between all relevant national

institutions. Central governments continued to play a major role in setting the overall climate response strategy, but the greater involvement of local and regional governments and municipalities, as well as consultation and collaboration with targeted groups and major stakeholders, seemed to play an increasingly important role in climate change policymaking. This reflected the expectation that regional and local governments, municipalities and key stakeholders would in future play an increasingly prominent role in addressing both **mitigation** and **adaptation** issues.

21. Although the approach to climate policy formulation and implementation remained fragmented in some Parties, there was generally a clear tendency towards the use of a **new integrated approach**. This tendency was characterized by an emphasis on a portfolio and phased approach, and also by greater involvement of local and regional governments and important groups of stakeholders in the design and implementation of climate change policy. In this integrated approach, Parties usually stressed mitigation, but also included elements of adaptation. Under the portfolio approach, a wide range of instruments that complemented each other was used to obtain maximum mitigation gains. Many Parties estimated that, even with the most recent measures launched in the late 1990s, they might not achieve the Kyoto targets. This is why some of them outlined phased approaches to their climate policy, clearly identifying initial and reserve policy packages to be put in place if there were indications that the Kyoto targets could not be otherwise met.

22. Parties used combinations of policy instruments for climate change mitigation. There was a clear, common trend towards widening the scope and increasing the coverage of the policy instruments within each sector. Some important cross-sectoral instruments, such as carbon taxes and emissions trading, were given an increasingly prominent role. Overall, **economic and fiscal instruments** together with **regulations** appeared to be the most important policy instruments used.

23. Economic and fiscal instruments were widely used in practically all sectors. In the energy sector there has been an expansion in the coverage of **energy/CO_2 taxes** and an increase in the number of Parties applying or seriously considering them. Several Parties reported increased energy/CO_2 taxes applying to the industry sector, although there were exemptions or caps designed to protect the competitiveness of energy-intensive industries. Some Parties reported a CO_2 tax in addition to the fuel taxes in the transport sector. Several Parties also implemented fiscal instruments in the waste sector, most commonly as a landfill tax. Fiscal measures were also mentioned in relation to afforestation. Several Parties emphasized that broad ecological **tax reform**, and a shift from tax on labour to tax on resources, was an important policy objective. Some Parties noted that revenue recycling was a useful tool, e.g. for reducing labour costs and promoting cleaner technologies.

24. Most Parties were enacting **regulatory reform** in the energy sector to increase the efficiency of their economies. In many EIT Parties this has led to phasing out of subsidies for fossil fuels, reduction of demand for these fuels and increased incentives for energy conservation. Regulations were the most important policy instruments in the waste sector.

25. **Voluntary agreements** still prevailed in the energy use by industry. Several Parties emphasized the importance of "negotiated" agreements, where other measures – particularly environmental permits – were used to enforce or strongly encourage participation in the agreements. Historically, voluntary agreements have been the most frequently used instruments for industry. However, a few Parties have moved away from this strategy towards using some economic and fiscal instruments.

26. Most of the Parties attached great importance to policies promoting **new technologies**. They also considered these technologies in a broader context of confronting environmental, economic, employment and natural resource challenges. However, environmental and climate change considerations were not apparently a principal area of corporate attention. Pivotal technologies noted by most Parties included renewable sources of energy, more efficient energy end-use technologies and fuel

cells. Many Parties also used measures to increase the market share of new technologies in order to reduce costs through economies of scale and the "technology learning" effect. Several Parties emphasized advanced fossil-fuel power generation, including capture and storage of CO_2, and a few Parties noted the need for advanced nuclear power technologies.

27. Many Parties, especially the EC member States, stressed the role of **monitoring and evaluation** of climate change mitigation as an integral element of their climate change strategies. Monitoring provided a means of tracking annual emission levels and assessing progress towards meeting policy objectives and targets, such as national emission targets and targets for renewables and combined heat and power (CHP). Many Parties noted **methodological difficulties** in ex-post evaluation of the implementation of policies and measures, particularly in establishing a counterfactual baseline scenario, obtaining high-quality data and clearly separating the effect of different measures or portfolios of measures. They also noted uncertainties associated with estimates of mitigation effects and cost.

28. A few Parties reported policies and measures that had a **adverse impact** on emission trends. They noted that energy market reforms had reduced energy prices, favouring established, low-cost, fossil-fuel-based electricity producers and reducing incentives for energy efficiency. Most Parties were yet to study such negative effects of energy market liberalization in any detail. One Party noted that its border charges on imported electricity, intended to reflect the CO_2 content of the source fuels in neighbouring Parties, were disallowed under EC trade rules. These charges were replaced with a tax on electricity consumption that was less cost-effective in reducing CO_2 emissions.

B. Sector-specific issues

29. Key policy objectives in the **energy** sector were safeguarding the environment, promoting economically efficient energy supply and energy use, and security of energy supply. Climate change has increased in importance as a policy objective in almost all Parties. Climate-related policies mostly targeted CO_2 emissions, but tended to reduce other energy-related gases in proportion to their share in the primary energy supply. Almost all Parties reported new mandatory policies, including taxes on energy and CO_2, negotiated agreements linked to environmental permits, emission trading schemes, energy efficiency standards and portfolio standards, and generation quotas for renewables or CHP. Almost all Parties also reported new policies that give a direct financial incentive to some actors to take measures that reduce emissions.

30. In the energy sector, Parties reported a variety of methodologies to monitor and evaluate the effectiveness of existing policies. Few Parties addressed additionality and baselines, making estimates of cost-effectiveness uncertain and difficult. Estimates of the effects of some of the current policies were also provided, but methodologies were reported for only a limited number of these measures.

31. Most Parties projected that existing, adopted and planned measures will be sufficient to stabilize or reduce their emissions from the energy sector. Some projected a substantial increase in energy sector emissions even with existing, adopted and planned measures. Using the Kyoto mechanisms should, in their opinion, help to close this gap. An overview of the projections is contained in section V below.

32. Most Parties introduced or updated direct financial incentives for **renewable** sources of energy and CHP. Grants for investment in renewables power generation projects continued to be widely reported and several Parties reported new types of financial incentive, such as accelerated depreciation on capital. Mandatory measures were introduced or strengthened in some Parties. Several Parties reported new measures for trading green or renewables certificates.

33. Parties continued to report measures to **shift** from coal power generation to other fuels, particularly natural gas. Several Parties emphasized programmes to develop cleaner and more efficient coal- and gas-fired power generation. Some of these Parties noted activities to develop technologies to

capture CO_2 emissions from fossil-fuel-fired plants and sequester them in geological structures. Several Parties reported that they have expanded, or plan to expand, **nuclear power** generation.

34. Energy efficiency in **buildings** was a priority for many Parties, which emphasized the large potential for energy savings not just through improvements in existing buildings, but also over the longer term, as the stock of buildings is gradually replaced. Minimum national standards for energy efficiency of new buildings were updated or introduced by a number of Parties. Parties reported on a mix of measures including direct grants; relief from income tax; lower taxes on equipment and services that improve efficiency; free energy audits; and information, advice and training for owners and building professionals. Some Parties reported new or strengthened policies for the public sector to procure energy from low-GHG-emitting sources, especially renewables, and to reduce energy consumption.

35. **Fugitive fuel emissions**, from oil and gas production, coal-mining and leakage of natural gas from pipelines, accounted for more than 90 per cent of CH_4 emissions from the energy sector. EIT Parties with significant fugitive emissions reported that measures to address these emissions were part of broader measures to modernize their energy industries. Developed countries reported on voluntary programmes that encouraged coal-mining companies to reduce CH_4 emissions, and programmes to help industry to develop and apply improved technologies and practices. They also noted that a market-driven shift from underground mines to open pit mines had restrained or reduced fugitive CH_4 emissions from coal-mining.

36. Emissions from the **transport** sector were increasing in practically all Parties, which is why this sector received particular attention in the national communications. Climate change policies in the transport sector can be broadly divided into technical measures aimed at improving both the energy efficiency of the vehicle fleet and the carbon intensity of the fuel mix, and non-technical policies and measures addressing transport activity and structure through transport demand management, push-and-pull incentives for modal shifts towards less polluting transport modes, traffic flow improvements and spatial planning. The transport policies reported were mainly linked to air quality management, congestion management and energy security (dependence on oil imports).

37. **Economic and fiscal** instruments were the most widely used measures in the transport sector, followed by regulatory instruments, information and education, and voluntary agreements. Hence, compared to the policies reported in the previous national communications, a shift from regulatory approaches towards economic and fiscal approaches can be observed. Fuel taxes and other transport-related taxes have been widely used by Parties. Short-term travel patterns are seen to be fairly unresponsive to changes in the fixed or even variable cost of travel, so the effects of fiscal transport measures are reported to be moderate. The policy response pattern of Parties showed a clear preference for addressing energy intensity of vehicles and transport fuel mix. Transport activity and structure were rarely addressed, although analysis of the emission trends in transport suggests that these two drivers contributed most to emission growth in this sector. Several Parties reported on individual policies in the transport sector, but the estimated effects of these appeared to be limited.

38. Among the measures reported in the **industrial processes** sector, reductions in emissions from production processes, such as the PFC emissions of the primary aluminium industry, were most easily quantified and have led to relatively high reductions. Measures to reduce leakage of HFCs in applications were very difficult to quantify. Only a few Parties gave information on the costs of measures. The common and cost-effective technology for reducing N_2O emissions from adipic acid production by treating waste gas with catalytic converters was implemented through voluntary agreements, regulation and taxation, and has had a significant effect on total GHG emissions for some countries. By-product emissions of HFCs were substantially reduced by waste gas treatment.

39. The **waste** sector was a major concern for governments, mainly not because of its effects on climate but because of other environmental effects, such as local pollution, possible soil and underground water contamination, and odour. However, policies in this area have a considerable indirect impact on GHG emission levels and reductions in the emissions from landfills contributed substantially to the trends of total emissions for many Parties. Almost all Parties reported general waste management plans, policy targets and standards for technologies. Several Parties implemented national waste strategies and programmes to prevent or minimize the generation of waste. Many Parties required or encouraged, through regulation, the separate collection of waste fractions and recycling of organic and other types of waste. Several measures were intended to increase the share of waste incineration compared to landfilling.

40. Most Parties reported decreases in **agricultural** emissions in 2000 compared to 1990 and expected further decreases by 2010, reflecting the fact that their existing portfolios of wider agricultural policies have a positive impact on emission reductions. Some Parties seem to be able to integrate elements of the climate change agenda directly into agricultural policies, but most Parties established indirect linkages between these two issues. Although none of the policies and measures reported were particularly innovative, some research activities could result in innovative policies in future. Policies with wider objectives have been designed to reduce the negative environmental impacts of agricultural practices and promote sustainability. These policies have the potential to affect emissions of both N_2O and CH_4.

41. Many reported policies in the **land-use change and forestry** sector were implemented for a variety of primary objectives other than climate change. Also, these policies and measures were strongly linked to other domestic policies implemented by Parties, such as national forest programmes; land-use management within the agricultural sector (e.g. afforestation and reforestation and conservation policies); biodiversity and wildlife conservation; soil and water conservation; resource supply; sustainable forest management; rural development; and protection from pests and fires. Several Parties reported the development of national forest strategies and programmes promoting a wide range of measures likely to contribute to an overall increase in carbon stored in forests and forest products. Some Parties reported policies designed to increase carbon sequestration in soils or promote use of wood products and biomass for energy. Specific policies and measures to reduce emissions of CO_2 and non-CO_2 GHGs were seldom reported. The policies and measures in the LUCF sector were implemented using a range of instruments, with regulatory, fiscal and economic instruments being the most common.

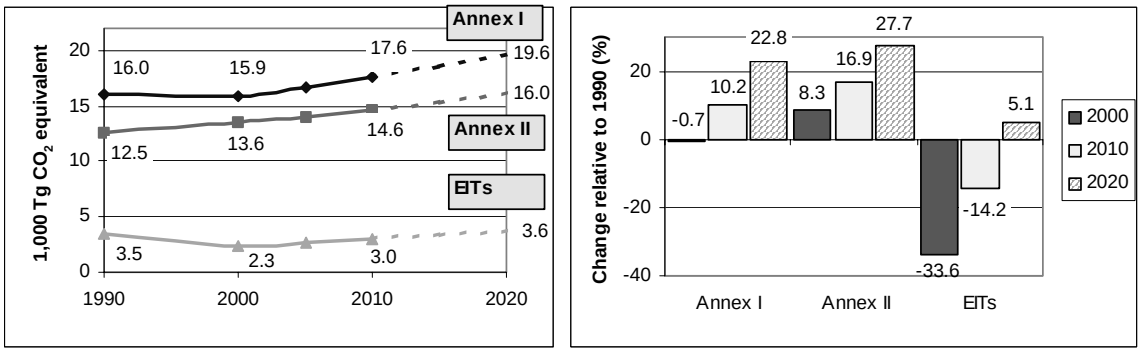
V. PROJECTIONS AND TOTAL EFFECTS OF POLICIES AND MEASURES

42. All reporting Parties used projections as a useful planning tool. They used different approaches, models and assumptions that were not always compatible. Nevertheless, it was possible to draw at least tentative and preliminary conclusions about future emission trends for the period 2000–2010. Projections for the period 2010–2020 were reported as less reliable; they were submitted by a limited number of Parties and did not cover all sectors. The information on projections presented below should be considered as an attempt to **highlight and qualitatively assess** some factors that might influence possible future behaviour of GHG emissions in Annex I Parties, rather than to predict the future.

43. The information presented in figure 3 was drawn from individual national communications and covers all reporting Parties including those that do not intend to be bound by the commitments of the Kyoto Protocol. It indicates that after being relatively stable in the 1990s, GHG emissions are expected **to increase** under the "**with measures**" scenario in 2010 by about **10 per cent above** the 1990 level. The emissions are projected to increase both in Annex II Parties and, contrary to the situation in the 1990s, in EIT Parties, reflecting an economic recovery that occurred in most EIT Parties in the late 1990s and is expected to continue. Information contained in the national communications seems to indicate that emissions in Annex II Parties could increase under this scenario because expected rates of economic

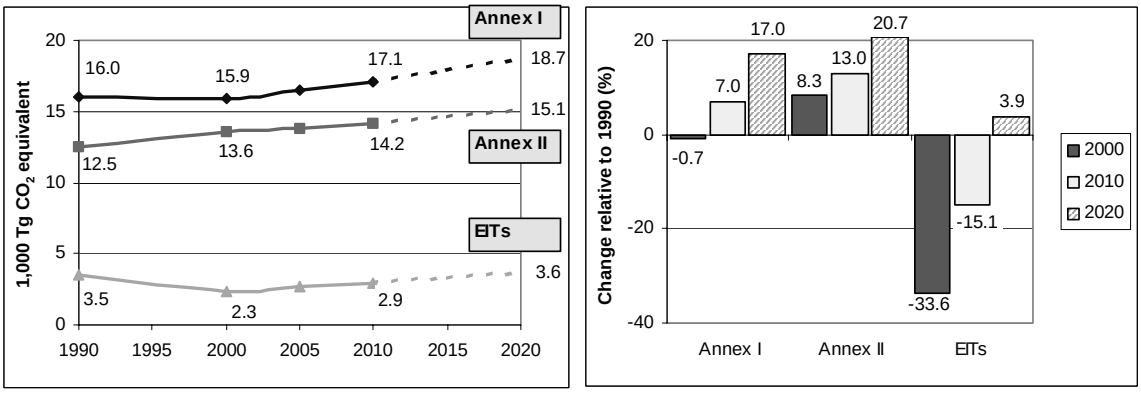
growth would outweigh the impact of GHG mitigation measures included in the national "with measures" projections. **For 12 out of 30 Parties,[4] GHG emissions in 2010 are projected to be lower than in 1990; for 18 Parties, an increase is projected**. Emissions levels lower than in 1990 are projected for most EIT Parties and for some Annex II Parties.

Figure 3. GHG projections "with measures"[5]



44. Most Parties presented a "**with additional measures**" scenario, although this was not mandatory. The effect of additional measures on the overall GHG emission trends is shown in figure 4. It is assumed that for those Parties that did not submit a scenario "with additional measures" such a scenario would be equivalent to the "with measures" scenario.

Figure 4. GHG projections "with additional measures"



45. The use of additional policies and measures for GHG mitigation **would lead to lower emission levels** than in the "with measures" scenario, as shown in figure 4. Nevertheless, total GHG emissions would **still increase** after 2000, although at a lower rate than in the "with measures" scenario. While the difference between figures 3 and 4 is small, it may be attributed to the lack of projections "with additional measures" and for some Parties, therefore, the effect is barely discernible compared with the total GHG emissions. The effect of additional measures is most visible in the projections for Annex II Parties; for some, these measures are projected to result in significant emission reductions. For EIT Parties, additional policies seem to be regarded as a lower priority, primarily because implementation of existing policies would still result in GHG emissions being below the 1990 level. For several Parties,

[4] Two Parties (Lithuania and Monaco) did not provide sufficient information on their projections to be included here.

[5] The numbers for 2000 differ from the corresponding numbers for the emission trends due to the different ways national projections were prepared and reported.

implementation of **additional measures** is projected to lead to a **reduction** in GHG emissions by 2010 compared with the 1990 level, which was not the case under the "with measures" scenario.

46. **By sector,** for the Annex II Parties considered, under the "with measures" scenario GHG emissions are projected to increase between 2000 and 2010 in all but one sector. The exception is the waste sector. Emissions in the EIT Parties after 2000 are projected to increase in all sectors although, with the exception of transport, they are expected to remain well below 1990 levels. Emissions from the international bunker fuels are projected to increase considerably by 2010 (for some Parties by more than 100 per cent). Lack of sectoral projections under the "with additional measures" scenario makes it impossible to present a general emission trend. Most Parties provided an assessment of the GHG emissions and removals from the LUCF sector until 2010 under a "with measures" scenario indicating that, except for Australia, Greece and the UK, the LUCF sector will continue to act as a significant net sink.

47. GHG emissions **by gas** are projected to change only slightly between 1990 and 2010. CO_2 would remain the dominant GHG, accounting for about 84–86 per cent of the total GHG emissions. An increasing share of HFCs, PFCs and SF_6 is expected; these emissions are projected to grow in many Parties, mostly as a result of an increase in HFC emissions. The shares of CH_4 and N_2O are projected to decrease between 2000 and 2010, as a result of policies and measures leading to emission decreases in the chemical industry, agriculture and waste.

VI. OTHER COMMITMENTS

A. Vulnerability assessment, climate change impacts and adaptation measures

48. The assessments of climate change impacts presented by all Parties were scenario based and included data on recent projections of likely future climate change. Some Parties reported on the steps they had taken in the national climate change process, including the allocation of additional funding to develop a policy framework for adaptation. All Parties presented initiatives on adaptation research that are in the planning stage or the very early stages of implementation.

49. Overall, **three** broad approaches for identifying vulnerability of important sectors of the economy to the impacts of climate change and for exploring adaptation options have been presented in national communications. First, Parties reported on government-led studies of climate change impacts and vulnerability on a national or sector specific basis. Second, Parties reported on various ongoing research programmes carried out by a range of publicly owned and private research institutes, aimed at gaining a better understanding of projected climate changes and their impact on. Third, Parties listed initiatives for future research into assessment of vulnerability and identification of adaptation options and areas.

50. The national communications generally treated the **impacts** of climate change and the **assessment of vulnerability** to climate change as a single issue. At the country level, a wide range of models as well as expert judgement were used in the assessment of impacts in various sectors. Climate scenarios were primarily drawn from results available from global circulation models (GCMs) and from model simulations carried out at national centres in many countries.

51. Most Parties presented **new scenarios** that differed from earlier scenarios, based on up-to-date projections of likely future climate change. Parties described the expected socio-economic or ecological impacts of climate change, depending on the level of research in different subject areas and the development of models. These models were either process-based or integrated for a wide range of sectors, including water resources, soil and land resources, coastal zones, ecosystems, forestry, agriculture, fisheries, socio-economic aspects of transport, tourism and energy, insurance, and human health. Most Parties reported that their assessment of vulnerability and/or benefits for the environment

and key sectors, in the event of climate change, is consistent with scenarios produced by the Intergovernmental Panel on Climate Change (IPCC).

52. Most Parties described **adaptation activities** in terms of future programmes and ongoing areas of research and provided information on potential adaptation options, measures or strategies relating to climate change impacts for a wide range of sectors at the national and regional levels. Many of the Parties did not provide a clear indication of the methods used to assess and analyse adaptation options. However, where present, this information was based on studies and findings on climate variability; climate change scenarios derived from GCMs; and sector-specific studies in areas such as agriculture, forests, water resources and coastal, marine and other ecosystems. Most Parties reported on the significant challenges that exist in the development of adaptation strategies as a result of the uncertainties in climate change science, and in projections of possible future climate change at the regional or national level because current downscaling of models is still too coarse.

53. Some Parties reported that initial work has been undertaken to identify **strategic adaptation priorities** for the coming decades. Potential adaptive measures identified have, so far, been very limited and sector specific. Several communications reported on efforts by environmental ministries, devolved administrations, provinces, states, territories and cantons to encourage sectoral authorities to take climate considerations into account in their planning processes where relevant. Others reported on the inclusion of climate change in the preparation or amendment of existing laws governing natural disasters.

54. Parties also reported an increasing focus on **integrated assessments** to include economic and cross-sectional analysis of adaptation options. As most of the decision-makers who will be planning for climate change and implementing adaptation strategies are regionally based, such as State, provincial or local governments, many Parties have underlined the importance of ensuring that they have access to information, guidelines and policy advice. To this end, these Parties have developed improved access to such information through briefings, seminars, written material, and web-based information with search capabilities, as well as through networking.

B. Financial resources and transfer of technology

55. All Annex II reporting Parties provided information on their contributions to the Global Environment Facility (GEF) and other multilateral institutions. Almost all Parties provided extensive and detailed information on bilateral and regional **cooperation projects**. Most of the Parties provided information on specific activities relating to adaptation. Several Parties highlighted activities relevant to supporting the development and enhancement of endogenous capacities and technologies of developing countries. Information provided by Parties shows that capacity-building activities have been increasing. Although the third national communications of Annex II Parties are superior to their previous national communications in terms of both quantity and quality of information, in that more information was reported and the reporting format is more standardized, there were still gaps.

56. All Annex II reporting Parties provided information on their **bilateral** financial contributions relating to the implementation of the Convention. From the information reported, it can be seen that the energy, transport and forestry sectors were the main areas in which bilateral assistance was provided, both in developing countries and in EIT countries. An increase in the share of bilateral projects has been recorded, particularly in capacity-building, as well as in agriculture and coastal zone management. The regions receiving the largest amount of bilateral financial resources were Asia and the Pacific and Africa. Available information indicates that bilateral financial contributions decreased in 1999 compared to 1998 in all sectors except transport, agriculture and capacity-building. A number of Parties provided information on **new and additional financial resources**, but the criteria for determining these resources differed. Some Parties identified their contribution to the GEF as “new and additional” resources.

57. Almost all Parties referred to bilateral projects and programmes that will help countries to **adapt** to climate change, but the quality and quantity of information provided was still variable. Some Parties indicated that it was difficult to single out the adaptation component of a climate change project; others indicated that projects designed to achieve **sustainable development** can be considered as indirectly intended to adapt to the adverse effects of climate change. The adaptation activities receiving most support were capacity-building and coastal zone management. The former in particular has been seen as a cross-cutting aim in all projects relevant to climate change. Some Parties described projects aimed at assessments of vulnerability, disaster preparedness, and response and risk management as key components of adaptation policies. It was also noted that much of the bilateral assistance directed toward sustainable forestry management and agriculture would also facilitate adaptation to climate change.

58. The fields of activity which received most of the support in the **capacity-building** area were: training and education; the preparation and implementation of national environmental strategies and plans, including GHG inventories; vulnerability assessments; institutional development; research institutes; environmental management; disaster preparedness, including climate change monitoring and response programmes; the participation of non-Annex II representatives in meetings and workshops; and capacity-building activities relating to the development and implementation of clean development mechanism/joint initiative (CDM/JI) projects.

59. Parties participating in multilateral cooperative initiatives such as the International Energy Agency's Greenhouse Gas Technology Information Exchange (GREENTIE), the Centre for the Analysis and Dissemination of Demonstrated Energy Technologies (CADETT) and the Climate Technology Initiative (CTI) highlighted the important role played by these initiatives in enhancing the **transfer of technology**.

60. Only a limited number of Parties described policies or programmes relating to the **private sector**. Although this is only a partial picture, the increased amount of information on the role of the private sector suggested increased interest and involvement of private companies in the Convention process. Several Parties indicated their plans to ensure greater involvement of private entities in ongoing activities relating to the Kyoto Protocol mechanisms. Among the initiatives reported by Parties in facilitating private-sector participation in the transfer of environmentally sound technologies, a few main categories can be identified: financial support for the development and commercialization of private-sector technologies to mitigate and adapt to climate change; facilitation of information sharing and personal contacts between private-sector technology producers and potential users of these technologies such as web-based databases and information clearing houses; provision of financial guarantees against risks in international transactions; and technical assistance for private companies seeking to make their technologies available to non-Annex II Parties.

C. Research and systematic observation

61. Most Parties reported on their research activities in a summary form, although some Parties provided detailed results of research studies, such as observed historical trends in mean climatic characteristics and climate variability. Notably, Parties presented the results of studies on climate change impacts and adaptation, including climate modelling and prediction, in greater detail when describing **impacts** and **adaptation** measures. Similarly, results of studies on mitigation technologies and on effects of measures taken were integrated into the reporting on policies and measures. Some of the research results were mentioned in the sections describing education, training and public awareness activities.

62. In most countries **research** was carried out by government-funded research institutions and by universities. Some Parties with comprehensive climate research activities indicated that special funds

have been established for climate change research. Most of these Parties also reported specific figures (giving absolute values or percentages of GDP) allocated for climate change research in their countries. A few EIT countries noted that climate change research is carried out with international and/or bilateral support. Almost all Parties noted involvement of several governmental bodies, agencies and research institutes in systematic observation, organized hierarchically. Most Parties identified agencies responsible for ground- and space-based observations.

63. About half of the Parties reported specifically on their activities in **support of developing countries**, including support for observation networks, equipment, training and assistance in the preparation of workshops. Several Parties noted new and planned commitments, e.g. financial resources for essential observations, recently allocated funds for restructuring measures in developing countries, continuing support to the workshops for the Asia-Pacific Network on Climate Change related to the Global Climate Observing System (GCOS), and general strengthening of capacity-building in developing countries.

64. Most Parties provided information on **data exchange** in different areas of observation. All Parties noted that international agreements regarding data exchange were adhered to in principle and that much GCOS data were being exchanged and, in particular, supplied to international data centres. This was particularly the case for operational systems such as meteorological and atmospheric systems. Parties noted that terrestrial and oceanographic systems were currently mostly research-based. A number of Parties provided information on some of their activities on management and operation of data and on collaborative efforts in this area. A few barriers to the exchange of data were reported, such as financial restrictions and the need for technical assistance and capacity-building or potential non-regulated commercial use of data.

65. Most Parties reported on **data management**, quality, and opportunities for free and open exchange of data. Reporting in relation to atmospheric observations was the most comprehensive. Most Parties mentioned studies to observe climate and to identify historical trends, in some cases including palaeoclimatic studies. Parties that possessed GCMs reported on their experiments and research in the area of climate processes, which often include climate predictions and studies of future regional climate change. Many Parties also reported on the use of outputs from GCMs to predict future regional climate change using downscaling techniques.

66. The research on climate change **impacts** and **vulnerability** was, in most cases, related to research on **adaptation** to climate change. Ongoing studies on adaptation included the assessment of different adaptation options in different priority sectors; studies on interdisciplinary approaches to adaptation to climate change; and development of adaptation strategies together with stakeholders. Several Parties reported on research networking and collaborative efforts in this area. Some Parties reported on their efforts to incorporate consideration of sustainable management and of development and risk assessments into the assessments of vulnerability and adaptation measures in important economic sectors, such as agriculture, water resources, health, and coastal zones and settlements.

67. Almost all Parties reported on socio-economic analyses of the impacts of different **mitigation** measures and policies on national economy and stated that these analyses were well developed. Parties studied combinations of different policy instruments for climate change mitigation within different sectors. A number of Parties noted the need for more studies on how to integrate climate change mitigation into the development of objectives, especially in the energy sector. Parties mentioned research programmes covering issues relating to **inventories**, such as measurements of emissions and developing specific emission factors from soil.

D. Education, training and public awareness

68. Almost all Parties dedicated a separate chapter to reporting on initiatives relating to education, training and public awareness (Article 6 of the Convention). These issues continued to feature prominently in the national communications, and most Parties could demonstrate progress. In addition, there was a growing tendency to report on other elements pertaining to Article 6, such as public participation and public access to information.

69. Most Parties noted that there was a need for long-term sustained efforts to increase public awareness and understanding of climate change and its impacts, and actions to reduce emissions and to adapt to change. Some Parties, in particular EIT Parties, perceived their current efforts as insufficient, mainly as a result of financial constraints.

70. There is evidence that activities under Article 6 of the Convention are emerging as a significant policy tool to respond to climate change. Parties often emphasized a more integrated, strategic and phased approach to developing and implementing initiatives and programmes related to Article 6 within their national climate change action plans, in particular in education.

71. The importance of training, and the breadth of opportunities it provides to support policies and measures relating to mitigation, was acknowledged by most Parties. Many new programmes are being developed accordingly, and some Parties have already identified priority areas and key targets. The growing importance of collaborative activities with non-governmental organizations as well as the private sector was noted by many Parties.

72. Most Parties also placed strong emphasis on facilitating access to information. The emerging use of electronic tools to facilitate this process was reported by many Parties, and was identified as a major opportunity to build up information resources and enhance partnerships and networking in this area.

VII. CONCLUSIONS

73. Climate change has increased in importance in Parties' national policy agenda, and climate change objectives have been integrated into the objectives of several sectors to various extents. Linkages were established in a number of national communications between climate change issues, including energy and mobility on the one hand, and sustainable development on the other. With few exceptions, reported measures were driven by objectives other than climate change, but some climate-driven policies and measures led to notable emission reductions from specific sources.

74. The total aggregated GHG emissions (excluding LUCF) of the 32 reporting Annex I Parties **decreased by about 3 per cent** from 1990 to 2000. Thus Annex I Parties **have jointly attained the aim** of Article 4.2 of the Convention – to return their 2000 emissions to 1990 levels, although the extent to which Annex II Parties succeeded in reversing an increasing trend in GHG emissions varied widely.

75. In several Annex II Parties (the EC, Finland, France, Germany, Sweden, Switzerland and the United Kingdom), GHG emissions (excluding LUCF) in 2000 were **below** their 1990 levels. Twelve other Annex II Parties and Slovenia **exceeded** their 1990 emission levels in 2000. Some of these Parties slowed their emission growth or even stabilized their emissions after an initial emission increase in the early 1990s. A number of Parties had clearly **rising emission trends** at the end of the decade.

76. The bulk of the reductions in the GHG emissions from Annex I Parties was due to the **steep economic decline** in the countries of eastern Europe and the former USSR, resulting from the transition from centrally planned to market economies and associated structural changes. In recent years most of these countries have experienced appreciable economic growth which is projected to lead to **increased emissions** in the future.

77. The GHG emissions of Annex I Parties are **projected to increase** after 2000, reaching about 10 per cent above the 1990 level (under the "**with measures**" scenario). The highest increase of GHG emissions is projected for **transport**. For this scenario, the projected GHG emissions in 2010 are lower than the 1990 emissions for 12 of the 30 Parties; for 18 Parties, an increase is projected. The emissions are expected to increase both in Annex II Parties and, unlike the situation of the 1990s, in EIT Parties too, reflecting the economic recovery that occurred in most EIT Parties in the late 1990s. For several Parties, the implementation of **additional measures** is projected to reduce GHG emissions by 2010 in comparison with the 1990 level.

78. Integrated climate **strategies** that are now emerging are the result of a diverse and carefully designed policy mix. They focus clearly on climate **mitigation**, but also contain elements of **adaptation**. Many Annex I Parties bound by the commitments of the Kyoto Protocol, or intending to be so, plan to design and implement integrated strategies that could achieve significant emission reductions in the medium term.

79. Many Parties considered **monitoring of implementation** of policies and measures and estimation of their effects to be a priority. Moreover, they noted that monitoring would be critical to ensure that policies are on track to deliver the effect expected, or to trigger the strengthening of existing policies, and the launch of new ones if necessary, to meet the Kyoto targets. However, Parties acknowledged **methodological problems** relating to *ex-ante* and *ex-post* assessment, data quality, and inevitable uncertainties associated with estimates of mitigation effects or cost.

80. Developed countries continued to provide bilateral **assistance** to non-Annex I Parties and EIT countries and contributed to multilateral institutions, in particular to the GEF. Energy, transport and forestry were the main areas in which bilateral assistance was provided. An **increase** in the share of bilateral projects has been recorded in capacity-building, agriculture and coastal zone management. Support to developing countries was also mentioned in relation to **research and systematic observation**. Some barriers to the exchange of data were reported, such as financial restrictions and the need for technical assistance and capacity-building.

81. Activities under Article 6 of the Convention (education, training and public awareness) were emerging as a significant **policy tool** to respond to climate change. Parties often emphasized a more integrated, strategic and phased approach to developing and implementing initiatives and programmes related to Article 6 within their national climate change action plans.

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