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Item 3 (a) of the provisional agenda
National communications and greenhouse gas inventory data from Parties included in Annex I to the Convention
Compilation and synthesis of fourth national communications

Compilation and synthesis of fourth national communications

Executive summary

Note by the secretariat

Summary

This document contains a summary of the information presented in the compilation and synthesis report of the fourth national communications submitted to the secretariat by Parties included in Annex I to the Convention. It provides information on a range of issues relating to the implementation of the Convention, such as national circumstances; greenhouse gas inventories; policies and measures; emission projections and estimates of the total effects of policies and measures; vulnerability assessment, climate change impacts and adaptation measures; financial resources and transfer of technology; research and systematic observation; and education, training and public awareness.

CONTENTS

I. Mandate and approach

1. Articles 4, paragraphs 1 and 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 4/CP.8, requested Annex I Parties to submit to the secretariat, in accordance with Article 12, paragraphs 1 and 2, their fourth national communications (NC4) by 1 January 2006. In accordance with decisions 11/CP.4, 4/CP.5, and 4/CP.8, Annex I Parties should use the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines) for the preparation of national communications under the Convention.

2. The COP, by its decision 7/CP.11, requested the secretariat to prepare a compilation and synthesis report on NC4 for consideration by the COP at its thirteenth session. This document responds to that request and contains information compiled and synthesized from the NC4 of the 39 Annex I Parties that submitted them by 31 June 2007.[1,2] Information on the status of submissions is contained in document FCCC/SBI/2007/INF.8.

3. The compilation and synthesis report comprises three separate documents. The main report, which includes information on all reporting elements following the UNFCCC reporting guidelines, is published in two parts: document FCCC/SBI/2007/INF.6/Add.1 contains a synthesis of the reported information on national circumstances, greenhouse gas (GHG) inventories, policies and measures, and emission projections and estimates of the total effects of policies and measures; and document FCCC/SBI/2007/INF.6/Add.2 contains a synthesis of the reported information relating to vulnerability assessment, climate change impacts and adaptation measures, financial resources and transfer of technology, research and systematic observation, and education, training and public awareness. The present document is an executive summary of the information contained in these two documents.

4. Each of the documents referred to in paragraph 3 above can be read as a stand-alone paper. When appropriate, cross-references are made to avoid repetition. All references to Parties in these documents are to Annex I Parties, unless otherwise indicated.

II. Executive summary

A. National circumstances and greenhouse gas emission trends

5. **The trend of total GHG emissions of Annex I Parties without land use, land-use change and forestry (LULUCF) changed considerably over the period 1990–2004** – falling 6.9 per cent during 1990–1995, rising 1.3 per cent during 1995–2000 and rising another 2.4 per cent during 2000–2004. These changes reflect to a large extent the consequences of several major one-off factors and events: the economic decline and restructuring in Parties with economies in transition (EIT) followed by economic growth; the reunification of Germany; and the major shift from coal to gas-based power generation in the United Kingdom of Great Britain and Northern Ireland in the 1990s. Since 2000,

[1] The two Parties that did not submit their NC4 were Italy and Luxembourg. Where appropriate, information on these Parties based on data from other sources, for example the NC4 of the European Community, has also been included. It should also be noted that the NC4 of Monaco does not contain projections.

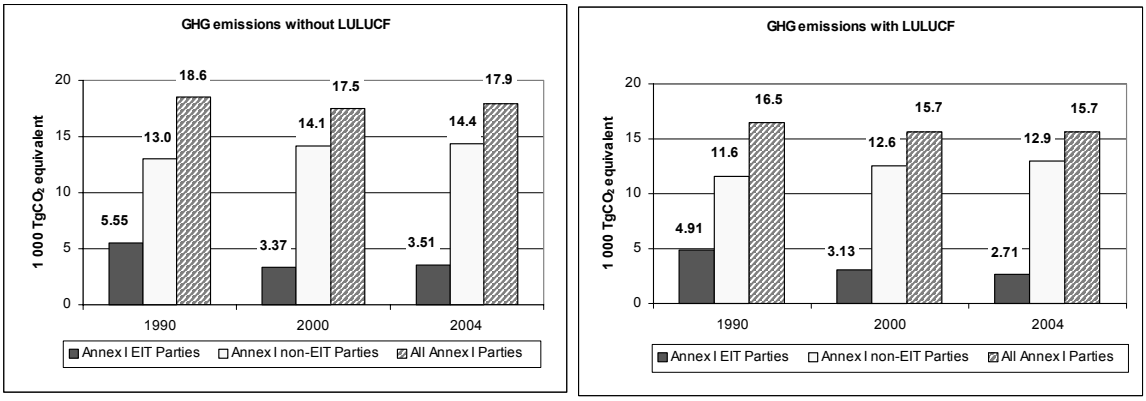
[2] In a few cases, Annex I Parties that are also Parties to the Kyoto Protocol submitted their reports demonstrating progress under the Kyoto Protocol (RDPs) a few months after submitting their NC4. According to decision 25/CP.8, the information reported in the RDPs should be consistent with information provided in the NC4. Where relevant and when more updated information was available in the RDPs, this information has also been used in the current document.

emission trends reflect fairly stable economic conditions, which are likely to be indicative for future trends, and the effects of increasing policy efforts to mitigate climate change.

6. **In nearly all Parties either the rate of growth in emissions has been slower than the rate of growth in economic activity, measured through the gross domestic product (GDP[3]), or the rate of decline in emissions has been more rapid than that of the GDP.** During 1990–2004, GHG emissions from Annex I Parties without LULUCF declined by 3.3 per cent (with LULUCF the decline was by 4.9 per cent), while total GDP grew by 36.2 per cent. The decoupling of trends in emissions and GDP was greater for EIT Parties (36.8 per cent decrease in emissions without LULUCF; 11.7 per cent increase in GDP), because of the vast economic restructuring and technology renewal in these countries. Some decoupling in the trends of non-EIT Annex I Parties also occured (11.0 per cent increase in emissions without LULUCF; 39.5 per cent increase in GDP). This was reflected in reduced emissions intensity of the economy (emissions per unit of GDP), which fell by 29 per cent for all Annex I Parties. Many economic, energy and environmental factors – some policy driven, some not – helped to moderate the upward pressure of economic activity growth on GHG emissions.

7. **Total GHG emissions in EIT Parties without LULUCF, which fell sharply during the 1990s** (–9.3 per cent between 1990 and 2000; –2,180 $TgCO_2$ eq.),[4] **have risen since 2000, but remained well below 1990 levels in 2004** (–2,040 $TgCO_2$ eq.) (figure 1)**.** The economic decline and restructuring in EIT Parties in the 1990s was the largest factor behind the 3.3 per cent reduction in GHG emissions for all Annex I Parties between 1990 and 2004. The GDP growth in many EIT Parties since 2000 has been much higher than in non-EIT Annex I Parties. This renewed economic momentum has resulted in the GDP levels of almost all EIT Parties being higher in 2004 than in 1990. This makes further GHG emission reductions by these Parties more difficult than in the past and may push overall Annex I Party emissions to rise accordingly.

Figure 1. Greenhouse gas emissions from Annex I Parties, 1990, 2000 and 2004



Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, EIT = economies in transition.
Note: GHG emissions with LULUCF, data for Estonia, Lithuania, Luxembourg, Poland, Slovenia, Switzerland and Turkey are not included because of the unavailability or incompleteness of some LULUCF data in the period 1990–2004.

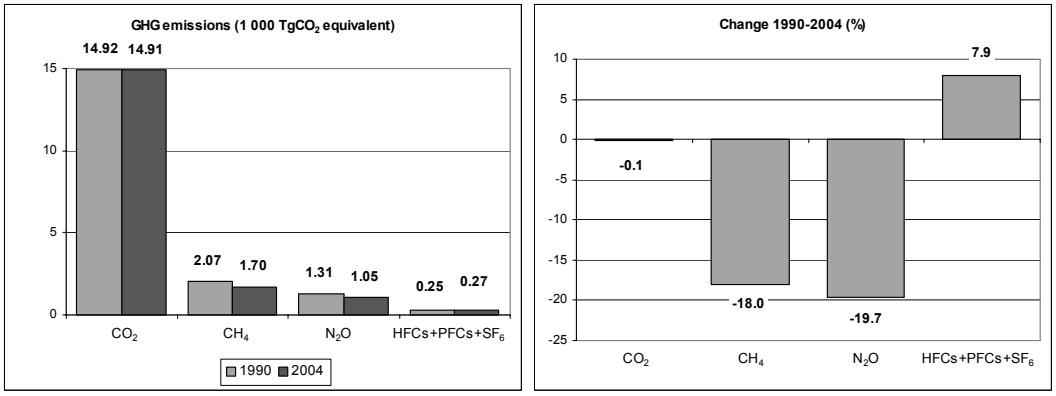
[3] GDP is given in United States dollars in year 2000 prices based on purchasing power parity. For comparability data are taken from the International Enery Agency databases "Energy Statistics of OECD Countries" and "Energy Statistics of non-OECD Countries".

[4] $TgCO_2$ eq. refers to one teragram of carbon dioxide equivalent.

8. **Several non-EIT Annex I Parties have also managed to reduce emissions despite strong economic growth**. Denmark, the European Community (EC), France, Germany, Iceland, Monaco, the United Kingdom and Sweden succeeded in keeping their total GHG emissions without LULUCF in 2004 at or below their 1990 levels. While various factors contributed to this result, considerable credit is due to effective policies that promote energy efficiency, renewable energy sources and fuel switching. **However, emissions stabilization remains a challenge for most of the non-EIT Annex I Parties, and increases in their total emissions have nearly offset the substantial drop in EIT Party emissions** (1,430 $TgCO_2$ eq., without LULUCF).

9. **Total emissions of methane (CH_4) and nitrous oxide (N_2O) from Annex I Parties declined substantially** (by 18.6 per cent, or 630 $TgCO_2$ eq.), **while emissions of CO_2 remained broadly stable and emissions of fluorinated gases**, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) **grew by 7.9 per cent** (figure 2). The decrease in the CH_4 and N_2O emissions can in part be attributed to policies directly addressing these gases. The portrayal of stable CO_2 emissions masks important changes in the contributions of different sectors: increases of at least 1,000 $TgCO_2$ emissions in the transport and energy industry sectors were offset by reductions in CO_2 emissions from energy use in other sectors (see para. 12 below).

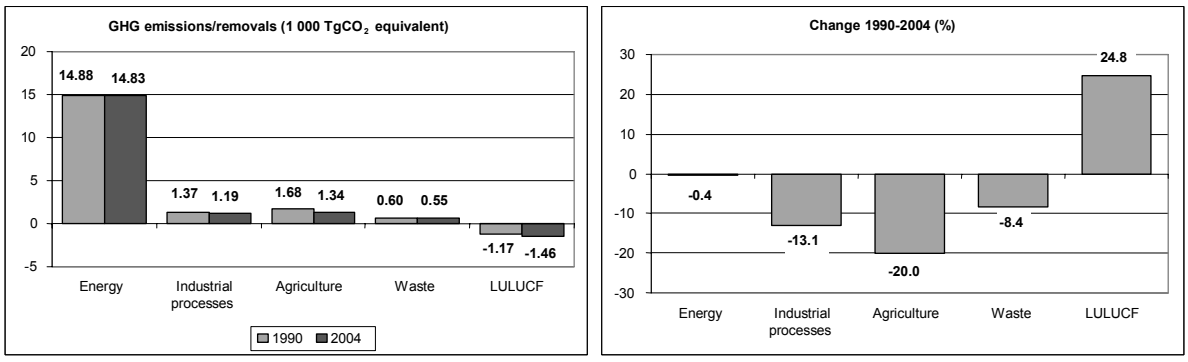
Figure 2. Annex I Parties greenhouse gas emissions by gas, 1990 and 2004



Abbreviation: GHG = greenhouse gas.

10. **Emissions decreased most in the following sectors: agriculture** (mostly N_2O and CH_4), **industrial processes** (mostly CO_2, but also other gases), **manufacturing industries and construction** (mostly CO_2) and **fugitive emissions** (mostly CH_4); and there was a sizeable increase in net GHG removals from LULUCF (figure 3). Within the energy sector, **emissions increased most in the subsectors of transport** (mostly CO_2) and **energy industries** (mostly CO_2).

Figure 3. Annex I Parties greenhouse gas emissions and removals by sector, 1990 and 2004



Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry.

11. **EIT Parties taken together reduced their emissions in all sectors, except for the waste sector**. **Non-EIT Annex I Parties taken together increased emissions in all the energy subsectors, except for fugitive emissions** (energy industry, manufacturing industry and construction, and transport, as well as energy use in sector others, including residential, commercial and institutional sectors), and decreased their emissions in nearly all the non-energy sectors (industrial processes, agriculture, waste and LULUCF).

B. Policies and measures

12. **Parties have continued to develop and implement climate change strategies, action plans and programmes that contain broad portfolios of policies and measures to mitigate GHG emissions.** These portfolios include: **emissions pricing mechanisms**, such as carbon taxes and tradable emissions allowances, which seek to send pervasive signals and consistent incentives throughout the economy to elicit investment and behaviour changes needed to reduce GHG emissions; **barrier reduction policies**, which aim to overcome the information, financial and market barriers to the development and deployment of existing climate-friendly technologies and options to their full potential; and **policies aimed at creating new technology solutions, or long-term research and development**, which provide the needed advances, primarily in energy supply and energy use. **The mix of policies varies considerably among the key emissions sectors**:

(a) For **energy industries** (+390 $TgCO_2$ eq. from 1990–2004), the primary policies used are: tradable emissions allowances, framework targets (e.g. for renewables in power generation), voluntary enterprise challenges and partnerships, regulations, market incentives (e.g. green certificates for renewables in power generation), economic incentives (e.g. feed-in tariffs for renewables in power generation) and long-term research and development;

(b) For **industrial processes** (–180 $TgCO_2$ eq. from 1990–2004), **manufacturing industries and construction** (–200 $TgCO_2$ eq.) and **fugitives emissions** (–140 $TgCO_2$ eq.), the primary policies used are: regulations, voluntary enterprise challenges and partnerships, voluntary sectoral commitments, and tradable emissions allowances for manufacturing industries and construction;

(c) For **transport** (+680 $TgCO_2$ eq. from 1990–2004), the primary policies used are: regulations and voluntary sectoral commitments (for automobile fuel economy), framework targets (e.g. for renewables in transport fuels), economic incentives (e.g. vehicle purchase and fuel taxes, and road pricing), voluntary enterprise challenges and partnerships and government operations (for vehicle fleets), and long-term research and development;

(d) For **energy use in other sectors (i.e. residential, commercial and institutional)** (–90 $TgCO_2$ eq. from 1990–2004), the primary policies used are: information and awareness programmes (e.g. product labels and audits), regulations (e.g. product and building standards), market incentives (e.g. white certificates for energy efficiency), voluntary enterprise challenges and partnerships, operation by governments of their own facilities, and carbon taxes in some Parties;

(e) For **agriculture** (–340 $TgCO_2$ eq. from 1990–2004) and **LULUCF** (–290 $TgCO_2$ eq. from 1990–2004), the primary policies used are: economic incentives (mostly in the form of subsidies), regulation (e.g. production quotas), and public infrastructure and resource management;

(f) For **waste** (–50 $TgCO_2$ eq. from 1990–2004), the primary policies used are: regulations, voluntary enterprise challenges and partnerships, framework targets, economic incentives (mostly in the form of fees) and public infrastructure and resource management.

13. **Annex I Parties, with few exceptions, are increasingly relying on harder (economic and regulatory) instruments over softer (voluntary) instruments to elicit emission reductions. In addition, new and innovative policy approaches have gained prominence and share in overall policy portfolios such as market-based mechanisms, including tradable certificate schemes.** Carbon taxes have played a key role in some countries for some time, but newer quotas and tradable certificates systems (i.e. regulations with an element of economic flexibility) are growing more quickly and are already more widely used. In countries where both carbon taxes and emissions trading are implemented, governments are seeking synergy between the two instruments to ensure comprehensive coverage of emission sources: in most cases, emissions trading targets a fixed number of mostly large sources and installations, while carbon tax remains in sectors that are not easily incorporated under emissions trading. Emissions trading is the largest and most visible form of tradable certificate systems, but green certificates (renewable energy sources), white certificates (energy efficiency) and landfill allowance trading schemes are growing as well. Moreover, regulatory approaches are widely used to mitigate emissions from industrial processes, for example emissions of PFC, HFC and SF_6

14. **Market-based mechanisms** successfully created a new valuable commodity, carbon (or more exactly, the allowance to emit CO_2), whose total quantity can now be limited as needed to meet specific climate change objectives in certain sectors. The goal is to have this commodity tradable across as wide a range of GHGs, sectors and locations as possible, in order to minimize overall mitigation costs by improving the access to low-cost emission reduction opportunities for all stakeholders. Widespread tradability helps market forces to seek out the most cost-effective mitigation options. Among the emission trading schemes, the European Union emissions trading scheme (EU ETS) stands out in terms of scale and rigorous objective. Although a relatively young instrument, this scheme has become the centrepiece of the EC climate change strategy aimed at meeting the Kyoto mitigation commitment. As yet, there is little information reported on how entities covered by this and other schemes balance their emissions and carbon allowances, whether through improving and better implementing of existing technologies, developing new technologies, purchasing carbon allowances from domestic or foreign entities, or through shifting high-emissions operations offshore. The nature and scale of these actions will to some extent depend on the ability of the entities to pass mitigation costs through to consumers. Owing to some inertia in social and economic systems, emissions trading schemes and other innovative policy approaches introduced in the 2000s will need some time and thorough implementation before their total full effects manifest themselves.

15. Some Parties, in particular Australia and the United States of America, continued to make great use of **voluntary enterprise challenges and partnerships** to mitigate emissions in the commercial, industrial (energy use and industrial processes), waste and LULUCF sectors, as well as fugitive emissions. These policies are used in specific technology areas where there could be concern about the efficiency and effectiveness of regulations and taxes, and where there is a recognition that mitigation options which could face multiple barriers would need the concerted effort of many stakeholders to be overcome.

16. **Although the energy sector remains at the centre of the emission mitigation effort, Parties are making extensive use of the relatively low-cost (i.e. more cost-effective) options of mitigating non-CO_2 emissions (CH_4, N_2O, PFCs, HFCs and SF_6) primarily in non-energy sectors.** A fairly high proportion (in relation to their share of total GHG emissions) of emission reductions have already been

achieved and further reductions are expected as result of policies and measures that address these non-CO_2 gases.

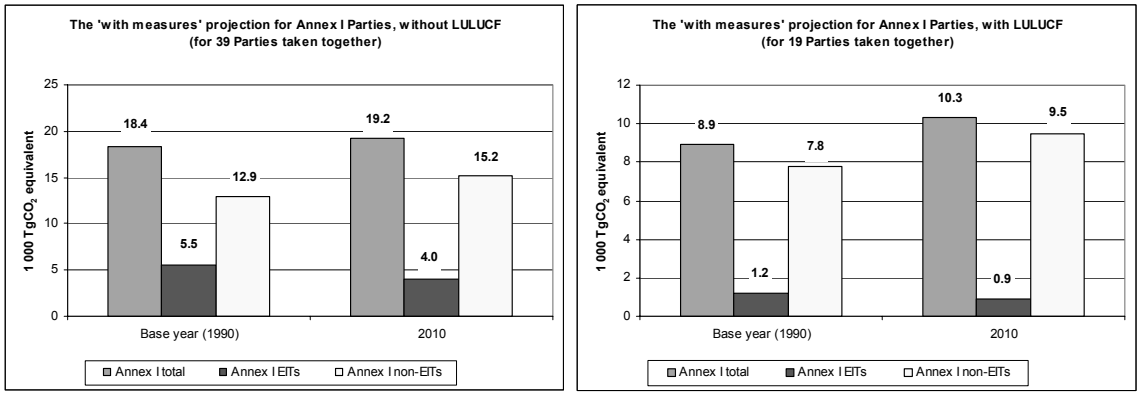
17. **Parties are also making great use of multilevel governance** – across multiples scales of government (e.g. local to national) and horizontally across governmental departments and non-governmental actors – on climate change issues. Leadership from cities and other subnational governmental authorities is increasingly influencing GHG emission trends and is also playing an essential role in adaptation planning (see section D below). **There has also been greater use of international bilateral and multinational activities to foster climate-friendly technology development and deployment**, such as the International Partnership for the Hydrogen Economy, the Carbon Sequestration Leadership Forum, Renewable Energy and Energy Efficiency Partnership, and the Methane to Markets Partnership.

C. Projections and estimates of total effect of policies and measures

18. **Projections to 2010 and to 2020 of total GHG emissions in Annex I Parties show increases under the 'with measures' scenario, with and without LULUCF**. The total effect of implemented and planned policies and measures and of trends from 2010 to 2020 cannot be fully assessed because of many reporting differences among Parties.

19. For 2010, **total GHG emissions of Annex I Parties** (39 reporting Parties) **without LULUCF under the 'with measures' scenario** are projected to be 800 $TgCO_2$ eq. (+4.2 per cent) higher than in 1990 (figure 4)**.** Emissions from EIT Parties are projected to remain below their 1990 levels (1,500 $TgCO_2$ eq.; –27.5 per cent), while those from non-EIT Annex I Parties are projected to grow further above 1990 levels (2,300 $TgCO_2$ eq.; +17.8 per cent). For 2020, these emissions (34 reporting Parties) are projected to be 15 per cent higher than in 1990 and 10.7 per cent higher than in 2010.

Figure 4. Projected greenhouse gas emissions from Annex I Parties in 2010



Abbreviations: LULUCF = land use land-use change and forestry, EIT = economies in transition.
Note: (1) The base year under the Convention is 1990 for all Parties except for Bulgaria (1988), Hungary (average of 1985 to 1987), Poland (1988), Romania (1989) and Slovenia (1986), as defined by decisions 9/CP.2 and 11/CP.4; (2) The base year data used by Parties in their projections are not always consistent with the base year data reported in the GHG inventories. This leads to some differences between the base year emission level in the projections and the base year emission level in the inventory data; (3) Because of differences in the number of Parties included, these two figures are comparable neither with one another nor with the historical emissions trends presented in figure 1.

20. For 2010, **total GHG emissions of Annex I Parties** (19 reporting Parties) **with LULUCF under the 'with measures' scenarios** are projected to be 1,400 $TgCO_2$ eq. (+15.8 per cent) higher than in 1990. For 2020, these emissions (18 reporting Parties) are projected to be 23.6 per cent higher than in 1990 and 6.7 per cent higher than in 2010.

21. A '**without measures**' scenario was reported by 16 Parties only. This scenario provides an indication of the aggregated effect of implemented and adopted measures when compared with the 'with measures' scenario. For these Parties, **the total effect of implemented and adopted measures in 2010 amounts to 8 per cent of their total emission levels in 1990, and 14 per cent in 2020**. In absolute terms, the EC and the United States reported by far the highest total effect of implemented and adopted policies and measures (420–450 $TgCO_2$ eq. and 405 $TgCO_2$ eq., respectively).

22. For 2010, for most Annex I Parties (22 reporting Parties), the implementation of planned policies and measures according to the **'with additional measures' scenarios is expected to reduce total GHG emissions by another 5–10 per cent** in relation to total emission levels in 1990. For these Parties as a group, emissions are projected to decrease by 11.9 per cent by 2010 under the 'with additional measures' scenario, compared with the projected decrease of 5.8 per cent under the 'with measures' scenario. In absolute terms, the EC reports by far the highest total effect of planned policies and measures (218 $TgCO_2$ eq.).

23. **By sector**, for 2010, according to the '**with measures' scenario**, emissions of Annex I Parties (35 Parties that reported projections by sector) are projected to increase in the energy sector (+830 $TgCO_2$ eq.; 6.8 per cent above 1990 levels), in particular in the transport subsector (+360 $TgCO_2$ eq.; 30.5 per cent), and to decrease in the remaining sectors, including agriculture (–130 $TgCO_2$ eq.; –17.3 per cent), waste (–60 $TgCO_2$ eq.; –27.3 per cent) and industrial processes (–50 $TgCO_2$ eq.; –7.5 per cent). Net GHG removals from LULUCF are expected to decrease (–20 $TgCO_2$ eq.; –1.9 per cent).

24. **Projections of emission trends from 1990 to 2010 for the 'with measures' scenario vary greatly by Party**: from a decrease of 56 per cent (Estonia) to an increase of 157.6 per cent (Turkey) for GHG emissions without LULUCF; and from a decrease of 46.4 per cent (Lithuania) to an increase of 81.3 per cent (New Zealand) for GHG emissions with LULUCF. Altogether, 18 Parties project emissions without LULUCF to decrease from 1990 to 2010, and 21 Parties project emissions to increase. With LULUCF, 9 Parties project emissions to decrease from 1990 to 2010, and 10 Parties project emissions to increase.

D. Vulnerability assessment, climate change impacts and adaptation measures

25. **Coastal zones, water resources, human health and agriculture** are the areas and sectors most vulnerable to climate change according to Parties' assessment. **Coastal zones** are at increased risk from erosion, flooding, storm damage, changing coastal contours, wetlands build-up and salt-water intrusion into freshwater reserves. **Water resources** could be diminished through the drying of lakes, reduced stream flow and underground outflow and increased flooding, and degradation through freshwater contamination. **Human health** is at increased risk from heat (and in some cases, cold) stress, water scarcity, vector-, food- and water-borne diseases such as malaria, dengue fever and diarrhoea, and pollen-induced allergies such as asthma and hay fever. **Agriculture** is at risk from net reductions in crop production, with decreases in many regions and increases in fewer regions.

26. Many Parties emphasized the **importance of further research** on vulnerability assessment and adaptation options. Some 19 Parties reported moving beyond research to the **implementation of concrete national plans, strategies and programmes for adapting to climate change**. Some Parties reported on their cooperation on adaptation with developing country Parties and regional programmes, including technology transfer projects.

E. Financial resources, transfer of technologies and capacity-building

27. The majority of Annex II Parties have reported **an increase in their contribution to the Global Environment Facility** in the 2001–2004 period (reported in the NC4) in relation to the 1997–2000 period (reported in the third national communication (NC3)). The majority of Parties have also reported **an increase in their contribution to multilateral institutions** between these two periods.

28. **An increase in the total bilateral contribution reported on mitigation-related activities** occurred between the 1998–2000 period and the 2001–2003 period. As a continuation of the past trend, the energy and transport sectors received the greater part of total bilateral assistance relating to mitigation between 2001 and 2003, when the contribution to these sectors increased sharply.

29. Reported values indicate that the **total bilateral contribution on adaptation-related activities remained broadly stable** between the 1998–2000 period and the 2001–2003 period. Overall, this contribution **remains small in relation to the contribution to mitigation activities and programmes**. In 2003, although the financial contribution to adaptation has increased since 2000, its share compared with the resources allocated to mitigation was at its lowest levels since 1998 (i.e. 3.2 per cent).

30. On technology transfer, **the majority of the relevant activities have taken place in the energy sector**, in particular in the area of energy efficiency and renewable energy. The **role of bilateral and multilateral partnerships**, as well as partnerships with key stakeholders, to foster cooperation on technology transfer between developed and developing countries has been enhanced significantly.

31. Parties included in Annex II to the Convention recognized that capacity-building in developing countries is key to enabling them to effectively implement the Convention and **continued to support capacity-building as an integral and key part of their support programmes**. There is an emerging strategic approach to environmental matters in the context of development cooperation that includes support for capacity-building in the area of climate change.

F. Research and systematic observation

32. **Climate change related research topics in many cases reflect national and regional circumstances and priorities**. General research on earth science and the climate system and processes, as well as on climate variability and prediction, continues to be carried out by many Parties. Cross-cutting and interdisciplinary research is receiving increasing attention, one objective being to address sustainability and environmental issues in an integrated way. Many Parties also see research as a basis for developing domestic climate policy, including for assessing climate change mitigation policies and measures, assessing climate change impacts and developing adaptation strategies, and managing risks.

33. **International cooperation continued to be strengthened for both research and systematic observation**. **Research** is often carried out as part of international and regional cooperation and joint projects, with many Parties participating and supporting international and/or regional research programmes and organizations that have a major research focus on climate change. A number of Parties highlighted their contributions to the IPCC Fourth Assessment Report. Some Parties reported on international and regional projects undertaken in cooperation with developing countries with a view to providing capacity-building and technical assistance and support for research and observations.

34. Almost all Parties reported on international cooperation on networks for **systematic observation** and associated international data exchange. Some Parties, mainly EIT Parties, noted deficiencies in their observing systems which in some cases affected the possibility of exchanging data internationally, for example within the Global Climate Observing System or the Global Ocean Observing System. Problems include lack of financial support for modern equipment and training of experts as well as non-homogeneity of data due to changes in instruments and protocols.

G. Education, training and public awareness

35. **All Parties emphasized the significant role of public awareness and education in their response to climate change**. While the focus of reporting in the NC3 was on **public awareness** activities, the NC4 offers a more comprehensive reporting on formal and non-formal education, as most Parties recognize that an effective national commitment to **environmental education** is necessary to achieve systemic and long-lasting behavioural change.

36. **Climate change awareness** strategies have usually pursued three key objectives: ensuring broad understanding of climate change and its impacts; garnering broad support among key stakeholders for mitigation and adaptation policies and programmes; and encouraging industry and individual action and involvement in GHG reduction initiatives. Many Parties also recognized the importance of **environmental education** and **training** in the scientific and technical skills that are required to implement mitigation and adaptation measures and to understand the motivation and justification for pursuing and applying them. In this context, most Parties report that environmental education – often pursued under the wider banner of sustainable development – has become an integral part of the primary and secondary education levels. Climate change related topics are also being given increasing attention in higher education. Teacher-training was recognized as key in the implementation of environmental education. A few Parties reported on their **international and cooperative activities** towards the development and exchange of educational and public awareness materials on climate change and its effects, and on the development and implementation of education and training programmes and capacity-building activities.

III. Conclusions

37. **Annex I Parties taken together have achieved a certain level of reduction in total GHG emissions in the past** (3.3 per cent between 1990 and 2004); **however, many of them are projecting rising emissions for the near future** (4.2 per cent between 1990 and 2010 for Annex I Parties taken together), if no further mitigation action is taken. While emission reductions during the 1990s resulted to a large extent from one-off factors and events, mainly the economic restructuring in EIT countries, considerable credit is also due to the policy effort that in many cases began in the early 1990s. This effort essentially centred on effective policies and measures that promote energy efficiency, renewable energy sources and fuel switching. Future emission reductions seem to require sustained policy efforts to mitigate climate change, to enhance the effectiveness of implemented policies and measures and to implement additional policies and measures.

38. **Recent developments in climate policy approaches of many Annex I Parties show an increasing reliance on harder (economic and regulatory) instruments, shifting away from softer (voluntary) instruments**, as Parties expect greater efficiency and effectiveness from such policy approaches. In addition, new and innovative policy approaches gained prominence in overall policy portfolios, with emissions trading as the most prominent example. Emissions trading is widely seen as a policy instrument to obtain sizeable emission reductions and as a vehicle to lower overall mitigation costs. The portfolio of implemented and adopted policies and measures varies considerably among Parties and among the key emissions sectors. Another recent development is that **Parties are making greater use of multilevel governance** – across multiples scales of government (e.g. local to national) and horizontally across governmental departments and non-governmental actors – on climate change issues.

39. For 2010, for many Annex I Parties that reported relevant estimates, **the implemented and adopted policies and measures are estimated to reduce GHG emissions by around 8 per cent of total 1990 emission levels, while planned policies and measures are estimated to reduce GHG emissions by another 5–10 per cent**. In absolute terms, the EC and the United States expect by far the

greatest total effect of policies and measures. A large proportion of emission reduction effects in relation to the total emissions was achieved, and is expected in the near future, from policies and measures that address non-CO_2 gases. The total effect of implemented and planned policies and measures cannot be fully assessed because of many reporting differences among Parties. Moreover, the innovative policy approaches that were introduced in the 2000s will need some time and thorough implementation before their total effects manifest themselves.

40. **Projections to 2010 and to 2020 of total GHG emissions in Annex I Parties show increases under 'with measures' scenario for emissions with and without LULUCF**. For 2010, total emissions of Annex I Parties without LULUCF under 'with measures scenario' are projected to be 800 $TgCO_2$ eq. (+4.2 per cent) higher than in 1990. This increase results from projected growth in emissions from the energy sector (+830 $TgCO_2$ eq.; 6.8 per cent above 1990 levels), including an increase in the transport sub-sector (+360 $TgCO_2$ eq., 30.5 per cent above 1990 levels). When policies and measures that are currently planned are fully implemented they will help to moderate further growth in emissions or even reverse the emission trend in many Parties in accordance with the 'with additional measures' scenario.

41. Coastal zones, water resources, human health and agriculture are the areas and sectors that are assessed to be the most vulnerable to climate change. While the importance of further research in the areas of vulnerability assessment and adaptation options continued to be emphasized by most Parties, **many Parties are already moving towards the implementation of concrete national plans, strategies and programmes for adapting to climate change**.

42. **Financial resources and contributions to developing countries have increased in almost all areas**, with reported financial contributions to adaptation remaining small in relation to the financial contribution to mitigation activities and programmes. A number of activities in the fields of transfer of technology, capacity-building, research and systematic observation, and education, training and public awareness were highlighted in NC4, including a number of international, bilateral and multinational activities and partnerships to foster the development and deployment of climate-friendly technology.

43. As reported in the NC4, **Annex I Parties continue to advance the implementation of their commitments under the Convention**. They have also continued to improve the reporting on their relevant activities in the national communications and to provide essential information that underpins the consideration of implementation of the UNFCCC at the international level. Notwithstanding this improvement, **there are some reporting issues and problems that could be addressed to enhance the usefulness of the reported information**. These include: the need for reporting on all of the elements (and not only on the mandatory elements) of the UNFCCC reporting guidelines on emission scenarios and estimates of effects of policies and measures, and on financial assistance and technology transfer, using approaches that are fully consistent with the UNFCCC reporting guidelines; and the need to make full use of available information.

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