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Report on the in-depth review of the national communication of the European Community

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Under Articles 4 and 12 of the Convention, Parties are required to prepare national communications on their implementation of the Convention. Guidelines for the preparation of national communications and the process for their review were agreed on by the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change, by its decisions 9/2 and 10/1, and by the Conference of the Parties, at its first session, by its decisions 2/CP.1 and 3/CP.1 (see FCCC/CP/1995/7/Add.1). In accordance with these decisions, a compilation and synthesis of the first 33 national communications from Annex I Parties was prepared (FCCC/CP/1996/12 and Add.1 and 2).

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

Summary¹

1. The national communication of the European Community was due on 21 September 1994 but was only received in July 1996. The in-depth review took place in the period November 1996 to June 1997 and included a visit to Brussels from 11 to 15 November 1996. The team included experts from Zimbabwe, Romania, Japan and the secretariat of the Organisation for Economic Co-operation and Development (OECD). The European Community is the only regional economic integration organization that is a Party to the Convention, as are all its 15 member states separately. Each of their reports is also being reviewed, and the review of the Community's communication therefore focused on activities at the Community level. There is mixed competence between the Community and its member states on various issues related to climate change. On some of the issues where there is Community competence, the Commission of the European Communities, as the executive body of the Community, takes the lead, but on most of the issues the Council of Ministers leads.

2. The team noted that the Community's member states are very diverse in terms of geography, energy needs, structure of energy supply and economic development. The Community imports most of the energy used, although some member states are major producers of fossil fuels and in others renewables contribute considerably to the energy balance. Some have substantial capacity for production of nuclear power. Total carbon dioxide (CO₂) emissions were estimated at 3,285,620 Gg in 1990. This corresponds to a per capita average of about 9 tonnes, compared to the OECD average of about 12. The figure varied from 4 to 12.5 tonnes among the various member states except for Luxembourg, where it was more than 28 tonnes. Three members joined 1 January 1995, and about ten central and eastern European countries as well as Cyprus and Malta have taken steps to be able to join within 5-10 years. The Community has committed itself as a whole to stabilizing emissions of CO₂ at 1990 levels in 2000, implying that emissions would drop in some member states and grow in others. The Community strategy on climate change has four pillars: energy conservation and energy technology programmes, fiscal measures, national programmes and a monitoring mechanism to survey the action taken to reach the target.

3. The inventory in the communication is built on the member states' submissions under the Convention, but the European Environment Agency (EEA) has cross-checked them with data from the CORINAIR² programme as well as the statistical office EUROSTAT. Certain adjustments have been made in a transparent way to improve the internal consistency, including separate treatment of final non-energy consumption of energy commodities (for which an upper limit estimate is equivalent to 7.4 per cent of total emissions) and the

¹ In accordance with decision 2/CP.1 of the Conference of the Parties, the full draft of this report was communicated to the Commission of the European Communities, which had no further comments.

² CORINAIR is the component dealing with air emissions inventories of the European Community's CORINE (Coordinated Information System of the State of Natural Resources and the Environment).

elimination of adjustments that some member states had made for temperature and electricity trade anomalies. Emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphurhexafluoride (SF₆) were not included, but were not believed to represent a major share of emissions in 1990. Owing to the lack of complete information, the land-use change and forestry sector was also excluded. Using the Intergovernmental Panel on Climate Change's (IPCC) 1994 global warming potentials (GWP), CO₂ accounted for 80, methane (CH₄) 14 per cent and nitrous oxide (N₂O) for 7 per cent of the emissions in 1990. The team noted the efforts that had been made to develop a uniform inventory system, CORINAIR, at the Community level and to extend it to the pan-European level, and the efforts soon to be completed to make this compatible with the IPCC system.

4. The team noted that the bulk of policies and measures to mitigate climate change is initiated nationally in the member states, with limited progress on common actions. Still the team noted the potential importance of developing common measures implemented Community-wide, given the development of a single market where there is pressure to harmonize the conditions for competition. The development of common measures could also provide lessons for the UNFCCC process in the light of Article 4.2(e)(i). It also noted the important role of the Community in creating a common legal and technical "infrastructure" for the implementation of policies and measures by member states.

5. The Council has agreed on legally binding directives requiring energy labelling of several appliances and minimum energy efficiency standards for refrigerators and freezers as parts of the SAVE programme, but it has not yet reached agreement on a directive on rational energy planning. These directives are so new that they are still in the process of implementation in member states. The programmes on energy efficiency and new, renewable energy sources, the latter called ALTENER, also include budgets for activities such as information, demonstration projects, workshops and the development of product standards. The team noted that funding for the extension of the SAVE programme has been substantially reduced compared to the figures quoted in the communication. The Community has not been able to agree on common CO₂/energy taxes. In March 1997 the Commission has adopted a proposal for a Council Directive restructuring the Community framework for the taxation of energy products. This is already in place for mineral oils, although the levels are often lower than those applied in most member states. The team was not given quantitative assessments of the effectiveness of these measures, and it is not clear to what extent the regulations go beyond what national policies and/or the market would achieve on their own.

6. Although the emphasis has been on mitigating CO₂ emissions, the monitoring mechanism now also includes other gases and steps are being taken to develop an explicit strategy for non-CO₂ gases, starting with a strategy on methane. At present measures aimed at reducing emissions of CH₄, N₂O, HFCs, PFCs and SF₆ are implemented only in some member states. The team noted that the 1992 reform of the common agricultural policy (CAP) is believed to limit emissions of methane and nitrous oxide as well as stimulate sequestration in forests and production of biofuels. Also, common policies in the waste sector limit methane emissions. The team noted that the structural and cohesion funds, which constitute about one third of the Community's budget, are partly used to provide funding for

energy and transport infrastructure and thus could influence emission patterns substantially. The team noted that some policies and measures, notably the CAP, the efforts to deregulate the energy sector, transport initiatives, the use of structural and cohesion funds and the development of the single market, warrant examination in the light of Article 4.2(e)(ii) to see how they influence greenhouse gas (GHG) emissions.

7. The communication included an estimate that CO₂ emissions could grow by 5-8 per cent from 1990 to 2000. According to the second monitoring report of March 1996, the most likely development is an increase by the year 2000 in the range of 0 to 5 per cent. Based on preliminary figures, emissions in 1995 were considered to be at the 1990 level, following a dip in the early 1990s caused mainly by the reduction in Germany's new states, where there was a 50 per cent drop between 1987 and 1993, equivalent to 4 per cent for the Community as a whole, substitution of coal by gas in electricity production, particularly in the United Kingdom, and low economic growth. The communication included scenarios showing that emissions could grow after the turn of the century in the absence of marked improvements in energy efficiency or the carbon ratio in fuels, but that there is scope for political action to prevent this. The communication did not include projections for other gases, but the projections made by the member states suggest reductions for methane and possibly also nitrous oxide. The team noted that the use of HFCs is expected to grow as they are used to replace gases regulated by the Montreal Protocol on substances that deplete the ozone layer. PFCs have already been reduced significantly in some member states. Estimates of the total effects of measures were not available for the Community level, and only the effects of some individual measures were described in the communication.

8. The Community has been an important contributor of funding to understand and monitor climate change and its impacts, as well as to develop possible response strategies. It has not developed a common adaptation strategy, and the implementation of adaptation measures has so far been left to the member states. Cooperation on research, development, demonstration and dissemination of technologies is an important task for the Community, and it provides substantial funding through the non-nuclear programme known as JOULE/THERMIE. Funding is also provided for nuclear research, including both fusion and fission, which was not mentioned in the communication.

9. The Community is not a member of the Global Environment Facility (GEF), although the member states are. The Community does, however, co-finance GEF projects. It also has major programmes of cooperation with central and eastern European states (PHARE), former Soviet Union Republics in Asia (TACIS) and developing countries (for example through the Lomé conventions). Under these programmes there are a number of energy, agriculture and forestry projects which have implications for GHG emissions. The team noted that the programmes on research, development and dissemination of technologies involve the participation of several non-member states. It also noted that the CORINAIR activities have helped to enable Parties both inside and outside the Community to compile inventories for direct as well as indirect GHG and thus implement the Convention. The team noted that information and capacity building are given priority in the Community's programmes, but this will only be complementary to efforts by member states.

I. INTRODUCTION AND SPECIAL CIRCUMSTANCES

10. The European Community (EC) ratified the Convention on 21 December 1993. The communication was due on 21 September 1994, but was only received by the secretariat on 8 July 1996, 21 months late and dated 11 June 1996. However, the secretariat had already received an incomplete draft communication covering the then 12 member states in December 1994. The in-depth review took place from November 1996 to June 1997 and included a visit to Brussels 11 to 15 November 1996. The team consisted of Mr. Amos Makarau (Zimbabwe), Mr. Jean Constantinescu (Romania), Mr. Ryutaro Yatsu (Japan), Ms. Jan Corfee-Morlot (the secretariat of the Organisation for Economic Co-operation and Development, OECD) and Mr. Peer Stiansen, UNFCCC secretariat, coordinator. The team met with several directorates of the Commission for the European Communities, as well as with the European Environment Agency (EEA) and environmental non-governmental organizations, and was given additional background information.

11. The European Community is the only regional economic integration organization that is a Party to the Convention. It is the legal entity under which the countries members of the European Union cooperate in the field of climate change, because the Union as such is not a separate legal entity. The Community consisted of 12 member states at the time of the ratification (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the United Kingdom of Great Britain and Northern Ireland), and another three (Austria, Finland and Sweden) joined on 1 January 1995. The reunification of Germany in 1990 also meant an enlargement of the Community. Each of the 15 member states have also ratified the Convention individually and submitted national communications. By May 1997, all but Belgium have been visited in the course of the in-depth review process and separate reports have been or will be issued. The Community could be further enlarged within the next 5-10 years, and at present about ten eastern and central European countries, as well as Cyprus and Malta, have taken initial steps to make membership possible. The team noted that a number of countries that are currently not members, both in eastern and western Europe, align their legislation with that of the Community, as well as participating in regular programmes on research and development, etc.

12. The communication builds on communications submitted by the member states under the UNFCCC and/or under the Community's internal monitoring mechanism. It was considered important to include also the new member states that joined on 1 January 1995. Since several of the member states' communications were not available until well into 1995, this was a main cause of the delay of the submission from the Community. The degree to which the Community's communication builds on the national submissions varies, but these are particularly important for the sections on inventories and policies and measures, while the communication mainly describes activities at the Community level in other chapters. The communication is not meant to cover the member states' full implementation of the Convention in a comprehensive way. It still presents a lot of country-specific information on each member state in a way that allows comparisons. The team noted that much of the information was last updated in the first half of 1995, and that the visit in November 1996 thus added information on recent developments.

13. The geographical and economic conditions within the European Community vary enormously. On the whole about 27 per cent of the land is arable, 35 per cent forested, 18 per cent grassland and 20 per cent other. It has around 370 million inhabitants and in general is relatively densely populated, although some areas are not. The population growth rate (0.3 per cent per annum) is low compared to the OECD average (0.7 per cent). Greece, Ireland, Portugal and Spain have the lowest per capita income in the Community and are the main beneficiaries of support from the structural and cohesion funds. Several member states went through an economic recession in the early 1990s, when overall growth in the Community was low, but the economic growth has since picked up somewhat.

14. The Community as a whole is a net importer of energy, although some member states are considerable producers of fossil fuels and to some extent electricity and heat based on renewable sources. There are large differences between countries regarding resources and fuel choices, as well as on the demand side. There is no common energy policy (despite the fact that two of the original three areas of European cooperation were coal and nuclear energy), although elements of such a policy are under development. At the time of the team's visit, the Council reached common positions on a partial liberalization of the electricity market. The European Parliament has since agreed to a directive which will generally ensure that 22 per cent of the market is open to competition among producers by 1 January 1999, and more later. A similar directive is under development for natural gas. At present there are large differences in how member countries organize their energy markets. If the main elements of a common energy policy are agreed, Community regulations would be increasingly important in those markets. In particular in the electricity market, which is currently characterized by overcapacity, some of the Community's actions may have considerable effects on future fuel choices and investment patterns, and hence fuel shares. The nature of these effects is not fully clear.

15. Per capita carbon dioxide (CO₂) emissions in the Community are relatively low, at about 9 tonnes, compared to the OECD average of about 12 tonnes (1990 data). The figure varied between 4 and 12.5 tonnes among the various member states except for Luxembourg, where it was 28 tonnes (primarily because of the high share of emissions from steel production). Differences are due to the different levels and structures of economic activity, application of various policies and measures, heating requirements and energy efficiency levels as well as fuel shares in the electricity sector. Some member states generate almost all their electricity from carbon-free sources, while others are almost totally dependent on coal and gas in this sector. The team noted that the communication does not describe the use of nuclear power; some member countries have forbidden the use of this source by law, while others use it to produce most of their electricity. The status and development of nuclear power is, however, discussed in the background documentation from the monitoring mechanism. Energy prices are often relatively high in EC countries by international standards, particularly those of transport fuels as a result of taxes.

16. The instrument of ratification was accompanied by the following declaration:

"The European Economic Community and its Member States declare that the commitment to limit anthropogenic CO₂ emissions set out in Article 4(2) of the Convention will be fulfilled in the Community as a whole through action by the Community and its Member States, within the respective competence of each.

In this perspective, the Community and its Member States reaffirm the objectives set out in the Council conclusions of 29 October 1990, and in particular the objective of stabilization of CO₂ emissions by 2000 at 1990 level in the Community as a whole.

The European Community and its Member States are elaborating a coherent strategy in order to attain this objective."

The team noted that this statement from the Community and its member states is seen as consistent with a differentiation of commitments internally; that inside a common commitment to stabilize CO₂ emissions at 1990 levels in 2000, some countries could continue to increase emissions if this is offset by reductions in other countries. A similarly structured negotiating position on a target for 2010 is also tabled in the Ad hoc Group on the Berlin Mandate (AGBM). The Community has not made any further statement on the respective responsibilities of this regional economic integration organization vis-à-vis its member states in response to Article 22, paragraphs 2 and 3, of the Convention.

17. On activities related to climate change there is shared or mixed competence between the European Community and its member states, and thus, as in many international agreements, a need is seen for both the Community and its member states to be Parties. Member states cooperate in various ways depending on the issue, a matter which is elaborated upon in the communication and in the specific chapters of this report. The fact that several areas fall fully or partly within Community competence is a main reason for ratification as such, although many areas of response are still fully or partly the responsibility of the member states, even though support activities may be carried out in or via the Community.

18. The institutional framework of the Community includes the Commission of the European Communities (CEC) which, at the time of the team's visit, had 20 commissioners and was organized in 23 directorate generals (DG). Many of these have responsibility for issues relevant to the responses to climate change and are involved in development and implementation of the strategy on climate change. In these matters the CEC, and in particular the DG XI on environment and nuclear safety, which coordinates the policy with a relatively small staff, is also supported by the statistical office, EUROSTAT, and the European Environmental Agency.

19. As far as law on the environment is concerned, on most subjects this is made under what is usually called the cooperation procedure. This procedure is laid down in Article 189(c) of the Treaty. It involves the Commission, the Council (which consists of the ministers from all member states), and the directly elected Parliament. The Commission

makes a proposal, then the Council adopts a common position. The Parliament has the opportunity to improve by proposing amendments to it or rejecting it. Depending on the positions adopted by the Parliament and the Commission, the procedure may conclude in the Council adopting the final text by qualified majority or by unanimity. In contrast, legislation on some specific subjects requires the Council always to act unanimously on a proposal from the Commission and after consulting the Parliament. These subjects include in particular provisions primarily of a fiscal nature and measures significantly affecting a member state's choice between different energy source and the general structure of its energy supply. There is also a Court of Justice to ensure that the member states, Council, Commission and Parliament interpret, and apply the Treaty in accordance with Community law.

20. Community policies are carried out through a variety of instruments and papers. The CEC prepares "communications" and "green" and "white" papers for the Council, to prepare the ground for more binding decisions in other documents later in the process. These initial steps can later result in "regulations", which are directly applied as law in all member states, as is often the case for example in the agricultural sector, or "directives", which are binding as to the result to be achieved in all member states to which they are addressed, but which leave to the member states national authorities the choice of form and methods. As this latter instrument is seen as more flexible for use in member states having different institutional and legal structures, it is often preferred to regulations. The Council can also make "decisions" which are binding to those to whom they are addressed. Further, the Council could agree on "conclusions" of a political nature. The Council may also agree on "common positions", for example on issues related to the negotiations under UNFCCC.

21. Once the Community has taken a decision, the relevant provisions are to be implemented by the member states within a specified time-frame. The principle of subsidiarity has been increasingly emphasized in the 1990s and means that responsibilities should be assumed at the lowest level of government. This implies that what could be done best at the national level should be done there and not at the Community level. The team notes that the Maastricht criteria for a single currency inside the Union include restrictions on national budget deficits and thus put pressure on public expenditure, including for the funding of activities in response to climate change and international cooperation, while providing incentives for taxes, some types of which are also parts of the mitigation strategy. The team noted that the Community has exclusive competence in trade matters and on agricultural policy, both of which could influence the development of emissions. Exclusive competence implies that the CEC negotiates on behalf of all member countries.

22. The European Community started to develop a common response to climate change in the second half of the 1980s, and in 1990 the Council agreed on a commitment to stabilize CO₂ emissions at 1990 levels in 2000. By 1992 the Commission had proposed a strategy to the Council which included the main elements of the present policy, although this is not static and has developed considerably over the years. The pillars of the policy, as presented in the communication, are Community programmes on energy conservation and energy technology, fiscal measures, national programmes, and a monitoring mechanism which provides information to the Parliament and Council on the Community and member state actions to

meet the Community target. The climate change strategy is currently carried out within the framework of the fifth Environment Action Programme, "Towards sustainability", which was agreed by the Council in 1993. Integration of environmental concerns in sectoral policies is a major element in this programme. The Commission produces comprehensive progress reports on its implementation, which the team found most useful.

23. The team noted that the European Commission has monitored and evaluated the programmes of member states to limit their anthropogenic CO₂ emissions based on the Council decision of June 1993. The monitoring mechanism has had several meetings, and its second evaluation report, which includes greenhouse gas (GHG) inventories and evaluation of progress towards the target and which was published in March 1996, provided useful information to the team. Assessments are still at a relatively aggregate level, with little detail on impacts of, for example the SAVE programme. At the time of the visit, a proposal to amend the monitoring mechanism had been submitted to the Council (upon its invitation) to satisfy the reporting requirements under the UNFCCC and report on all GHGs rather than CO₂ only.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

24. In the Community, inventories are carried out by the individual member countries. The role of the European Environment Agency, which has provided the inventories in the communication drawing upon its selected topics centre, has been to compile these and to co-ordinate and lead activities to improve the methodologies and presentation. The communication contained data on CO₂ emissions from energy and industrial use, methane (CH₄), nitrous oxide (N₂O) and the indirect GHGs carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOC). The figures in the communication are based on the inventories submitted by the member countries under the UNFCCC and the Community's monitoring mechanism (the latter particularly for Belgium), and were cross-checked with and used some information from CORINAIR and EUROSTAT. Owing to incomplete reporting by the member countries, figures for the land-use change and forestry sector were not provided. In addition, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphurhexafluoride (SF₆) were not included. The team has concentrated on issues related to the figures given at the Community level.

25. Based on the Intergovernmental Panel on Climate Change (IPCC) 1994 global warming potentials (GWPs), and including only the gases and sectors that were reported, CO₂ accounted for about 80 per cent, methane 14 per cent and nitrous oxide 7 per cent of the emissions in 1990. Other gases (PFCs, HFCs and SF₆) were believed to have made only a limited contribution in that year, and thus the relative importance of the three major GHGs in 1990 is not expected to change much following a more complete reporting of other gases.

26. The Community has been working over a number of years to establish a comprehensive air emissions inventory system, which is referred to as CORINAIR. CORINAIR aims to ensure that one set of complete and transparent inventories is available

for use by all member states for national and international air policy purposes. It has been adopted by the United Nations Economic Commission for Europe as the official inventory system for reporting under the Convention on Long-Range Transboundary Air Pollution. As a result, CORINAIR is now widely used all over Europe, including non-member countries in the western, central and eastern Europe. The team noted that the Community's efforts to develop CORINAIR has built up capacity for making inventories both in member states and in other countries, and contributed to their ability to prepare national GHG inventories.

27. CORINAIR was originally not designed to include GHGs, and CO₂, CH₄ and N₂O were included only recently. The structure of the system was tailored to cater to issues such as local and regional air pollution. It has a sectoral split different to that of the IPCC, as well as including natural sources, and more detail on the location of large point sources. In preparation for its most recent (1990) inventory, CORINAIR added GHGs to its list of original pollutants and the system can now be used by member states as the basis for the GHG inventories. Significant differences remain between CORINAIR and national inventories submitted under the UNFCCC according to the IPCC guidelines, which is one of the reasons for the inventories in the communication being based on the member states' submissions. Cross-checking with CORINAIR and EUROSTAT was done to identify gross inconsistencies among different major source categories, in particular where comparison of inventory estimates revealed that the national submission provided lower and hence perhaps incomplete estimates of any particular source. Member states inventories were still adjusted as seen necessary for reasons of consistency. This approach, including the adjustments, was clearly documented in the communication. A detailed assessment of the inventories is only possible country by country, which is done in the individual in-depth reviews. The EEA had not undertaken detailed reviews of the underlying activity data or emission factors. The team noted that the assessments made through the review process under the Convention (in-depth reviews and analysis in relation to compilation and synthesis reports) could also be drawn upon by the EEA to improve the consistency.

28. The team noted the important work done over several years to make the CORINAIR and IPCC inventory systems compatible, which was seen as close to completion at the time of the team's visit. In the longer run, the use of CORINAIR as the basic inventory system by all European countries for the preparation of all air emission inventories (including GHG inventories) should improve the overall consistency and quality of inventory data in this region. One of the major changes to the CORINAIR system as a result of its extension to include GHGs is the addition of the land-use change and forestry sector as a separate anthropogenic source of GHG emissions. Data should be available from this sector in the next round of CORINAIR for 1994 data. This iteration will also bring a few other modifications to make them almost entirely consistent with the latest IPCC guidelines. However, the new gases (PFCs, HFCs, SF₆) are still not included in the guidebook for CORINAIR-94 inventories. By the end of 1997, the reporting of CORINAIR data will be annual and it is expected that data will be available for the years 1990 to 1995. For some countries, even 1996 figures could then be available.

29. In order to ensure consistency in the presentation of data, CO₂ from final non-energy consumption (FNEC), basically consisting of feedstocks, was pulled out of the inventories and presented as a separate category. Equivalent to 7.4 per cent of the total emissions, this figure represents "potential" CO₂ emissions from this source and is considered an upper estimate. Some portion of this potential is actually stored in non-energy products. For consistency, EUROSTAT-based estimates for FNEC were used rather than national estimates. This adjustment was made to highlight to decision makers and to inventory analysts the need for improved estimates of this source of emissions. Total CO₂ from energy commodities for the Community, consistent with the IPCC Guidelines, would be the sum of the total provided in the document plus this potential CO₂ from FNEC or 3,529,220 Gg CO₂. The Community's inventory did not include adjustments for temperature variation and electricity trade, and in this way it differed from the inventories presented by some of its member states.

30. A similar adjustment was made for the bunker emissions, where the data quality is considered to be relatively poor. Marine bunker emission estimates equal to 3.5 per cent of the total CO₂ were derived from EUROSTAT data rather than from national submissions in order to ensure complete and consistent estimation. Aviation bunker emissions, equivalent to 1.7 per cent of CO₂ from energy sources, were estimated by deducting CORINAIR estimates of landing and take-off cycle emissions from EUROSTAT estimates of total aviation energy CO₂. The net result is the total cruise CO₂ from all aviation energy use. To the extent that it also includes domestic aviation cruise emissions, this gives an overestimate of the CO₂ emissions from international aviation.

31. Regarding the so-called "new gases" (PFCs, HFCs, SF₆), only some countries had been able to produce estimates. To overcome difficulties in data collection, carrying out inventories at the Community level could become increasingly important. The team also noted that data on industrial activity available through EUROSTAT could be used to get a first estimate of some of these gases and also for checking assumptions in member states' estimates. Regarding data for the land-use change and forestry sector the team noted that many member states, including those with major forested areas, had compiled inventories for this sector. For all of these the sector was a net sink, in total of more than 150,000 Gg (see FCCC/1996/CP/12/Add.2). Extensive forestry data are collected and made available through EUROSTAT. These data could be used to provide information on the underlying levels of activity as well as to assist member states in the preparation of their inventories and for checking their assumptions.

32. The Community did not submit inventory data for years subsequent to 1990 even though these were due on 15 April 1996. The second evaluation report under the Community's monitoring mechanism includes some information on trends in CO₂ emissions from 1990 to 1993, indicating these fell by 2.2 per cent. The factors behind the variations in emissions are slow economic growth, the restructuring of the industry and energy sectors in the former German Democratic Republic (where emissions declined by 50 per cent between 1987 and 1993, corresponding to a 4 per cent reduction in the total Community emissions) and the change-over from coal to gas for electricity production in the United Kingdom, resulting from the removal of subsidies for coal production, increased availability of gas and

deregulation. The team noted that emissions from the transport sector grew by 7 per cent. In some member states emissions increased while in others they were stable or decreasing. Indicators for the carbon intensity of the economy and carbon per capita showed a decline from 1990 to 1994.

III. POLICIES AND MEASURES

33. The Community's original strategy for mitigating climate change focused largely on CO₂ and the energy sector, the four pillars being: energy conservation and energy technology programmes, fiscal measures, national programmes and a monitoring mechanism to survey the actions taken to reach the target. The results are reported to the European Parliament and the Council of Ministers. The main elements of this strategy are still relevant, but the Community has introduced policies affecting other gases and sources, although climate change mitigation is generally not the main motivation behind these. The Commission is moving towards possible common actions motivated by climate change concerns on emissions other than CO₂ from the energy sector, but it had not developed a comprehensive strategy covering all gases and sources at the time of the team's visit. The team noted that the competence of the Community vis-à-vis the member states varies between the different sectors, but that it is particularly important in agriculture. There is no common energy policy, although most mitigation efforts are directed towards energy-related emissions. Up till now, the bulk of mitigation measures taken in most member states have been initiated nationally rather than at the Community level.

34. The team saw the Community's efforts to agree on policies and measures as important for the UNFCCC process, and felt that, since for example the energy situation in the member states differ so widely, these efforts could provide lessons for the Convention process. The team noted that policies and measures have to fit the changes in the market structure of the Community, where the continuous development of a single market for goods and services, deregulation of electricity and gas markets and subsidy reforms in the agricultural sector are important factors. Such developments induce changes in the behaviour of the actors in the member countries, and pose new challenges to policy. The Community's efforts are particularly relevant to Article 4.2(e)(i) of the Convention which states that the Annex I Parties should *"coordinate as appropriate with other such Parties, relevant economic and administrative instruments developed to achieve the objective of the Convention;"*

35. The team noted that there has been limited progress in terms of mandatory measures (e.g. regulations, taxes) proposed by the Commission and reported in the communication. Only two minimum standards and some labelling schemes had been adopted as directives at the time of the team's visit, and these are still under implementation in the member states. The team also noted that, to be effective, policies and measures agreed at the Community level have to go beyond the least common denominator of policies and measures in the member states, as well as what the market alone would have achieved. The communication did not document to what extent this was the case. The team recognized, however, that implementing mandatory measures as minimum levels (e.g. standards, taxes) means that

countries cannot go lower than these in the future, and that they thus may have an impact even if they do not go beyond the present state. Also, it recognized that having the legal framework in place could in principle make it easier to tighten the regulations later. Community legislation allow countries to go beyond the minimum standards as long as this does not conflict with the principle of the internal market.

36. The team noted that the structural and cohesion funds, amounting to about one third of the Community's budget, are partly used to provide funding for energy and transport infrastructure and thus could influence emission patterns substantially. The use of these funds was not covered in the communication. The team noted that some Community policies and practices may, if countermeasures are not taken, increase GHG emissions from the member states, while others could reduce them. UNFCCC Article 4.2(e)(ii) states that each of the Annex I Parties shall "*identify and periodically review its own policies and practices which encourage activities that lead to greater levels of anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol than would otherwise occur*". The team felt that a number of areas would warrant an assessment of how they influence GHG emissions, including the development of the single market (in particular effects on transport and on harmonization and level of ambition for national policies and measures), deregulation of the energy sector, transport policy, the use of the structural and cohesion funds and the common agricultural policy.

Carbon dioxide

37. The main Community level programmes to limit CO₂ emissions are: SAVE, which aims to improve energy efficiency; ALTENER, which aims to enhance the use of new and renewable energy sources; and JOULE/THERMIE, which represents a framework for research, development, demonstration and dissemination of new technology. The team recognized the crucial role Community-wide action could play regarding policies that seek to develop and implement better technologies in a single market through these programmes. Many initiatives under these programmes build largely on "no-regrets" policies started before the Community strategy was drawn up in 1992. They complement efforts undertaken by member states on their own initiative, which still constitute the bulk of policies and measures that are implemented across the Community. Common and increased taxes on energy commodities are still seen as crucial for significant progress in mitigation.

38. Attempts to achieve agreement on a common CO₂/energy tax within the Community have so far not been successful. Differences in energy situation, with some member states heavily and others less dependent on fossil fuels and thus economic and environmental effects differing correspondingly, make agreement on the tax structure difficult. Differences in economic development are used as an argument for flexible timing of implementation in certain member states. Some member states have not been willing to accept any taxes decided at the Community level. Four member states, Denmark, Finland, the Netherlands and Sweden, have unilaterally implemented taxes with carbon elements, while others have made statements of intent but are still waiting for the Community to agree on a common approach.

39. At the time of the team's visit, the Commission was working on a system of minimum levels of taxation for energy commodities. In March 1997 the Commission has adopted a proposal for a Council Directive restructuring the Community framework for taxation of energy products. The proposal enlarges the scope of the Community minimum rate system at present limited to mineral oil to cover all energy products including mineral oil, natural gas, solid fuels and electricity. The proposal also provides the framework for member states to introduce carbon components in their national energy taxation system by applying differentiated rates of taxation. The team noted that, to the extent this new initiative is agreed upon and entails effective tax rates on commodities that are not taxed or are very lightly taxed at present (in particular gas and coal in several member states), it would increase incentives to conserve these energy sources and thus reduce carbon emissions. However, the team considered a pure CO₂ tax, which is also applied directly to the CO₂ content of fuels in electricity and heat production would be more efficient in terms of stimulating fuel switching and clean technology. It is recognized that finding a practical way to tax electricity and heat poses some problems. Integration of the European electricity market has, as an example, given further incentives to unify the tax system, and there has been at least one example of a country abandoning direct taxation on the CO₂ content of fuels because it was not applied in other countries participating in the market. Originally the country in question had imposed direct CO₂ taxes on fuels and it taxed imported electricity at an average rate of the domestic taxes, as it is difficult to identify the fuel sources used to produce imported electricity and apply a tax system that corresponds to these. However, international trade regulations do not allow a country to apply taxes to imported electricity that are different to those for domestically produced electricity, and such an average rate could be interpreted as a pure import tax. This has led to lower effectiveness in GHG abatement as there is no direct tax incentive to shift to low- or no-carbon fuels.

40. SAVE is considered to be mainly a legislative programme with the emphasis on mandatory measures (e.g. labelling and standards for appliances), although it also includes softer measures (e.g. information and subsidies). Its initial duration was from 1991 through 1995, and its target was to improve energy efficiency by 20 per cent between 1986 and 1995; estimates indicate that an improvement of 10 per cent was attained. The budget totalled 35 million ECU. Decisions on mandatory measures have been slow in coming and, at the time of the team's visit, only a few had been adopted; they include minimum energy performance standards on freezers and refrigerators and energy labelling schemes for various household appliances. A directive on hot water boilers was adopted in 1992 and is currently under review. There are as yet no Community standards on such matters as energy efficiency in industrial processes. Directives covering the above measures were agreed on so recently that the implementation in the member states could not be assessed, although energy labelling is now starting to reach the market. Their effectiveness is uncertain. In particular there is uncertainty whether the agreed standards really go beyond what the market would achieve on its own, and if so, how far. The initial SAVE programme is to be followed up by SAVE II, covering the period 1996 to 2000. The budget was still under discussion at the time of the team's visit and had suffered a number of cuts from the 150 million ECU given as the proposed figure in the communication, to 45 million ECU.

41. ALTENER, which is a programme to promote the use of new, renewable energy sources (biomass, solar, wind, geothermal), also consists of certain types of regulatory measures and financial support schemes. It has a budget of 40 million ECU for the five years from 1993 to 1997 for financial support for various activities to create a technical and information infrastructure that will facilitate the market penetration of these energy sources. It includes information and training, pilot projects, local development plans etc. Regulatory measures include standards for products and appliances to facilitate their use on the European market. At the time of the team's visit, standardization of biofuels had been achieved. The team noted that for the time being, national circumstances in the member states governed the application of new, renewable energy sources, and that there was still some way to go to implement the programme's targets of doubling the market share for renewables from 4 to 8 per cent from 1991 to 2005, tripling the production of electricity from renewables and securing a 5 per cent share of biofuels in motor vehicle consumption. It is generally believed that the main effects of the ALTENER programme are long-term and will occur after the year 2000. An extension of the programme, ALTENER II, is to be discussed in 1997. The team noted that a directive on integrated resource planning, which could boost emphasis on new and renewable energy sources, was also under discussion in the Council, but had not yet been agreed.

42. The Community has pursued the development and dissemination of new energy technologies over many years. Since 1989 the main research and development efforts on non-nuclear energy have been concentrated in the JOULE I and II programmes, with an aggregated budget of 380 million ECU, while demonstration and dissemination activities received funding of about 700 million ECU through the THERMIE programme from 1990 to 1994. These programmes were merged as from 1995 to integrate research and development with demonstration and dissemination. The budget for such non-nuclear activities for the period 1994 to 1998 is currently about one billion ECU.

43. The Community has implemented some regulatory as well as fiscal measures that affect GHG emissions from transport, a major and rapidly growing emissions source, although climate change has not been the motivation. Directive 92/82/EEC set minimum rates for excise duties on petrol and diesel fuels. The team notes that these rates in principle prevent member states from going below certain levels, but that the actual taxes in member states are generally above, and in some cases well above the minimum rates. In these countries the directive has little effect. Directive 93/116/EC defines a method of measuring CO₂ emissions from passenger cars. Although the European Parliament has demanded limit values for CO₂ emissions from cars, such standards are not currently part of the Community strategy for reducing CO₂ emissions from cars as proposed by the Commission (CO(95) 689 final) and endorsed by the Council (Council Conclusions of 25.06.96). This strategy is based on an agreement with the automotive industry, fiscal measures related to vehicle purchase and/or ownership, and fuel economy labelling. The objective is to reach a fuel efficiency of 5 l/100 km for new passenger cars by 2005 (and 4.5 l/100 km for diesel-powered vehicles), and at the latest by 2010. The team noted the Commission's regret that the Council did not fully endorse the strategy in June 1996, i.e. including the element on vehicle-related fiscal measures.

44. Community action is also aimed at improving the structure of the demand for transport rather than reducing the demand. The Commission has contributed to the discussion on internalization of external costs of transportation by publishing a paper on fair and efficient pricing, as well as on a citizen's network, outlining ways to influence modal choice. There are also initiatives to assist local authorities to improve urban structures, establish car-free city networks and enhance public transport, improve public awareness, etc. The Commission has also issued a white paper on extended use of railways for freight.

45. As far as industry is concerned, there is at present no Community-wide mandate to reduce GHG emissions specifically from this sector, which is thus left to the member states. The Directive on Integrated Pollution Prevention and Control is expected to have positive side-effects on limitation of greenhouse gases although it does not explicitly include these. In the implementation of the directive member states could, however, do so. The team noted that the Council in 1993 agreed on a regulation allowing voluntary participation by companies in the industrial sector in a Community eco-management and auditing scheme, and that to the extent that GHGs and/or energy use covered by this regulation, it would increase the companies' awareness of their emissions and possibly also of how they could mitigate them, which could then bring about voluntary action to limit greenhouse gases. Eco-labelling has been introduced in some member states, but there is no Community-wide system. The Community has, however, set up an award system for products that cause the least environmental damage during their entire life cycle. Voluntary agreements were seen as a politically desirable way of dealing with GHG emissions in this sector, but at present it is not clear how such an instrument could be implemented Community-wide, and in particular which institutions would have the competence to sign at the Community level on behalf of both the Community and the industry.

Non-CO₂ gases

46. Although no specific mitigation policies for non-CO₂ gases had been agreed at the Community level at the time of the visit, the team noted that a number of policies in the agriculture and agri-environmental areas, as well as waste policies, are already influencing GHG trends. Initial steps had been taken to deal with methane emissions directly. The team also noted that a number of member states have included all or some of these emissions as well as removals in their national policies and measures.

47. The Community has sole competence regarding the regulations in the agricultural sector, where the Common Agricultural Policy (CAP) makes it a major player in determining levels and methods of production, and hence emissions of CH₄ and N₂O, as well as removals of CO₂. The overall budget for interventions in the agricultural sector was 36,681 million ECU in 1994, more than half of the total Community budget. The subsidies have been increasing during the 1990s, but more slowly since 1992, when a major reform in the CAP was undertaken. The main objective of the reform is economy: to reduce prices of agricultural products to make them more competitive both within the Community and elsewhere. This has required a change in the way interventions are done; while still

motivated by regional and social concerns, a central mechanism is to decouple support for farmers from production levels.

48. Despite having major effects on the environment and being seemingly beneficial regarding GHG emissions, the CAP reform was not founded on any explicit environmental strategy. An important effect of the reform is the reduction of N₂O emissions triggered by incentives for more extensive farming (with less use of fertilizers). Further, the change in the subsidy structure will give incentives to produce less meat, and thus reduce methane emissions from ruminants and manure by lowering the animal numbers. In addition there is a programme to set aside agricultural land in order to reduce the surplus of agricultural products in the Community; the programme covered about 1 million hectares at the time of the team's visit. This both reduces agricultural production directly and provides increased incentives for afforestation, and thus enhanced sequestration of CO₂. About 90 per cent of the set-aside land has been used for production of rapeseed, which is utilized to make biofuels and thus assists indirectly in reducing of emissions from transport. The team noted, however, that when the demand for food increases, set-aside land could again be put into ordinary production and the recent developments would be reversed. No quantitative information was available on the effects on GHG emissions of changes in the level of agricultural activities. Further moves towards world market prices could entail significant changes in the sector, with corresponding effects for GHG emissions. Extension of Community membership to large agricultural countries in central and eastern Europe is likely to influence the CAP significantly.

49. To accompany the CAP reforms, the Community has also introduced so-called agri-environmental measures, intended to achieve environmental objectives in this sector. The team was informed that the budget for these activities for 1993 to 1997 is 4,300 million ECU, equivalent to about 3 per cent of the CAP budget. In addition there is matching funding from the member states. To receive support, projects must include environmental objectives as outlined in the regulation for agri-environmental measures. Projects fall mainly into three categories: promotion or stimulation of sustainable farming practices (e.g. low stocking densities and lower fertilizer inputs); landscape protection; training and demonstration. By June 1996, 115 projects were approved. Monitoring of these is the responsibility of the member states. As the projects are still being implemented, a first assessment of the effects was to be ready at the earliest in the first half of 1997.

50. A Community-level strategy for reducing methane emissions is being developed, and the Commission issued a communication on this subject in November 1996. The proposed strategy aims to develop or build on actions in three areas: energy, waste and agriculture. The team noted that Community action on energy issues, such as coal subsidies and the production, transport and distribution of hydrocarbons, could influence CH₄ emissions in the future. Several activities at the Community level affect the waste sector and hence methane emissions. Still the situation regarding recycling, incineration, landfilling and gas recovery varies greatly among the member countries and currently must be considered the main determinant of emissions. Under Community law, waste is a good and can thus move freely within the Community. This reduces obstacles to re-use and could thus help reduce the total

amount for disposal. The Community strategy on waste was recently reviewed resulting in a hierarchy of priorities: first waste minimization, then materials recovery, and finally energy recovery. Waste minimization is to be achieved through initiatives on recycling and packaging, for example. The Community is promoting materials recovery projects through its LIFE programme, which covers various environmental issues. A directive on packaging described in the communication was agreed in 1994 and is currently in the course of implementation, so the effects can not be assessed yet.

51. The Commission is preparing a directive on landfills with the objective of decreasing methane emissions from this source by 45 per cent by 2005 (compared to a business-as-usual scenario) and 60 per cent by 2010. At the time of the team's visit, this directive was being redrafted to ensure fuller coverage of existing and new landfills in the Community. It is likely to require methane recovery. The Directive on Integrated Pollution Prevention and Control could also be applied to large landfills, and even if GHGs are not specified in it, these emissions would be influenced by measures taken to comply with it.

52. There is no Community strategy for controlling emissions of HFCs, PFCs and SF₆. The team noted that some member countries control these gases at the national level, in particular where they are emitted from industrial processes. It also noted that for certain uses such gases are traded freely inside the Community, which means that the Community level could be appropriate for some types of policies and measures. Further, Community institutions gather information, e.g. through industry surveys, that could possibly provide relevant data for policy-making.

53. Regarding the indirect GHGs, NO_x, CO and NMVOC, measures are taken to comply with the Convention on Long-Range Transboundary Air Pollution as well as air quality standards. The communication mentions that the Community standards for road vehicles, which are legally binding for member states, have been strengthened. Various member states have used fiscal incentives to promote the introduction of cars that meet the new Community standards before their mandatory application based on Council Directive 92/458/EEC. There are also a number of other instruments that regulate various sources of emissions of these gases, including the above mentioned Directive on Integrated Pollution Prevention and Control, the directive on large combustion plants and specific regulations to reduce emissions of NMVOC from solvents and fuels.

Removal by sinks

54. Unlike the case of agricultural policy, the Community does not have sole competence in the area of forestry policy, and forestry products are not covered in its market policy. Forestry support from the Community level has arisen as means of establishing an alternative non-agricultural source of incomes for farmers, as well as for environment and rural development purposes, and is usually supporting initiatives taken at local, regional and national level in accordance with the principle of subsidiarity. There is Community involvement in several different areas; fire protection and atmospheric pollution prevention; role of forests in rural development; statistical information gathering and monitoring; and

stewardship policy concerning animals and plant resources and the protection of genetic variety.

55. The CAP reform has provided measures for afforestation of agricultural land and the improvement of forests within agricultural holdings, and 1340 million ECU have been granted for new forests and rehabilitation of existing farm woodlands for the period 1993 to 1997. Structural funds for economic development are to some extent used for forestry-related activities; for the period 1994-1999, 416 million ECU have been budgeted to stimulate development in the least developed areas and 545 million ECU to support restructuring of agriculture. No systematic evaluation of the GHG results of these programmes is available. In relation to local and regional pollution and consequent damage to forests, the Community contributes to monitoring efforts and thus provides information on the health of forest areas. The Community programmes on protection against forest fires, which are a threat to the carbon reservoirs and a source of non-CO₂ emissions, in particular in southern Europe, centre on information and the development of prevention strategies.

IV. PROJECTIONS AND EFFECT OF POLICIES AND MEASURES

56. The communication included projections for CO₂ emissions only. Two different kinds of estimate were provided, one that could be characterized as a best guess estimate for 2000, and a second based on a scenario approach, using extensive modelling and expert assessments with a time perspective to 2020. The team assessed possible developments in emissions of other gases and sequestration by sinks from material that was provided during the review. The team noted that member states presented projections in their own communications, some showing stabilization or reductions and others considerable growth, and that these are examined in separate in-depth reviews.

57. In the section dealing with the Commission's working paper on the European Union's Climate Strategy from March 1995, the communication referred to an analysis suggesting that the Community could face a 5-8 per cent growth in CO₂ emissions for the year 2000 compared to 1990. This reflected prevailing expectations about policies, economic growth and energy prices. Since then, economic growth has been lower than expected so these emission levels may be overestimated. Individual member states' projections have been assessed under the monitoring mechanism and a conclusion from March 1996 is that the best estimate for 2000 would be a 0-5 per cent increase over 1990 levels. Inside this picture, the team noted that the transport sector is showing strong growth which could be more than 20 per cent under a business-as-usual scenario.

58. The scenarios briefly presented in the communication were mainly developed for energy policy purposes. The Commission has sought involvement of member states in this work, to enhance relevance and disseminate information to other decision makers. At the point of departure are more holistic sets of scenario assumptions on issues important for the energy futures of Europe, and then illustrations are given of different developments in energy markets through various combinations of energy policies and their corresponding impact on

CO₂ emissions. This was all well documented in background material provided to the team. The team noted the explicit assessment of technological development (*inter-alia* penetration of nuclear, renewables and more efficient technologies utilizing fossil fuels) done in this exercise, which is a critical factor in studies with such a long time perspective. The outcome in terms of CO₂ emissions in 2020 varies from -10 to +17 per cent compared to 1990 levels, which should, however, not be seen as the extreme case in each direction. The discussion also gave consideration to developments regarding other direct and indirect GHGs. The team found these scenarios very useful, even if their main focus was not on climate change policies, in providing a sense of uncertainty and the scope for political decisions. It noted that all of the scenarios foresee greater improvements in CO₂ and energy intensities than observed in historical trends. In that way, they may be seen as optimistic and illustrative of the fact that considerable growth in CO₂ emissions is possible. These scenarios were used as supporting information for a white paper which outlines energy policy directions and for proposed strategies on renewable energy at the Community level.

59. A number of factors are crucial for the development of CO₂ emissions in the Community. Deregulation, which was recently agreed at the Community level for a part of the electricity market and discussed for the gas market, poses great uncertainties in the medium and long term, as well as challenges to policy-makers in adapting to this new situation. At present it is difficult to assess the longer term effects, as these will depend crucially on the availability and competitiveness of natural gas, the political acceptance of nuclear power, and the economic performance of technologies based on nuclear and other fuels, including both renewables and coal. The extension of Community membership will also be important for the emissions development.

60. The communication refers to a 1993 study estimating that methane emissions could be reduced by around 10 per cent from 1990 to 2005 for the then 12 member states as a result of policies already implemented nationally. In their first communications under the UNFCCC member states generally projected stabilization or decline in these emissions, although that trend is not yet evident in the inventories for the early 1990s. A number of the member states expect substantial falls in emissions in the last half of the 1990s, particularly thanks to changed waste policies. Also the CAP is entailing considerable reductions through cuts in livestock numbers, although this could partly be offset by emissions accompanying increased use of natural gas. Still, a report from the European Environment Agency issued in 1996 notes that methane emissions are expected to increase from the 1990 level, while the prospects for N₂O were considered more mixed. For N₂O, the CAP reform gains are also noted but with potentially offsetting increases in N₂O resulting from the transport sector, following the increased use of catalytic converters. The information the team obtained on the land-use change and forestry sector indicates that it could continue as a sink for some time. One factor behind the net sink situation is that the forested area increased by 10 per cent between 1960 and 1990. It is uncertain whether the net sink can be kept at the present level and, if so, for how long.

61. The team noted that the Community is rapidly phasing out substances regulated by the Montreal Protocol on Substance that Deplete the Ozone Layer, and that this leads to increased

use of replacements such as the GHGs HFCs. Some member countries have reduced or expect to reduce their industrial PFC emissions but too few have reported to justify an overall assessment of the trend. The communication provided estimates of 37 to 53 per cent reductions of the emissions of indirect GHGs from the transport sector, which is the dominant source for these gases inside the Community, following measures to combat local and regional air pollution.

62. No estimates of the overall effects of policies and measures were available to the team. There were also few estimates of the individual effects of measures at the Community level in the communication, while the material from the monitoring mechanism included some assessments of measures implemented nationally. Such estimates do not exist for specific Community programmes and their overall effects. The team recognized that there were methodological problems, and that the information from the countries was often considered insufficient by the Commission. The team noted that developing methodologies represented a challenge and would benefit both the monitoring mechanism and the UNFCCC process.

V. EXPECTED IMPACTS OF CLIMATE CHANGE AND ADAPTATION MEASURES

63. As the territory of the European Community covers several climatic zones, climate change is not expected to affect it in a homogeneous way. Detailed impact assessments are complex and would be a function of local or regional circumstances such as demography, land use and preparedness. The communication describes in general terms some possible impacts of climate change on the Community and its vulnerability. More detailed assessments, to the extent they are carried out, are usually done at the member state level. The communication gave general information on possible impacts of climate change on agriculture, forestry and water resources as well as sensitivity analysis programmes on matters such as societal response to ecological vulnerability. It also referred to a study putting monetary figures on possible effects, which estimated that global warming will most likely represent a net economic cost for the Community as a whole. However, costs and benefits are not considered to be well understood at this stage.

64. The team noted that the Community is playing an important role in increasing the understanding of impacts through its research efforts. The second, third and fourth framework programmes on research and development all contain specific programmes (e.g. the Agricultural Research Programme, the European Programme on Climatology and Natural Hazards (EPOCH), the Environment Programme of the Joint Research Centre) which focus on such aspects as sea-level rise and land resources (agriculture and forestry). The fourth framework programme (1994-1998) contains specific objectives relating to possible climate change impacts on economic sectors.

65. The Community strategy originally focused on mitigation measures, but later issues related to adaptation were also encompassed. Although most adaptation measures were addressed at the member state level, there are activities at the Community level. For

example, the fifth environment action programme puts emphasis on coastal zone management. The team also took note of the objectives of the 1993 Helsinki Ministerial Conference on the Protection of Forests in Europe, and noted that adaptation is a subject of attention in the forestry as well as in the agriculture sectors. Development of a common adaptation strategy is being discussed at the Community level, although this initiative is still in an early state. The need for more work on impacts, vulnerability and adaptation is recognized by the Commission.

VI. INTERNATIONAL COOPERATION, FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER

66. The Community has an active policy of international cooperation with countries and organizations outside its borders, which comprises many types of activities. This is additional to the activities of its member states, which have chosen to concentrate some of their efforts at the Community level. Still there is no common foreign aid policy. The Community is not a member of the Global Environment Facility (although its member states are), but it still allocated 4 million ECU in 1996 as new and additional resources for co-financing programmes with GEF, mainly for climate change and conservation of biodiversity. After the team's visit this has been allocated to an energy efficiency project in China.

67. The Community has been expanding its cooperation with developing countries in the environmental area, mainly on energy and forestry, which could have a positive effect on CO₂ emissions through technical assistance and grant aid even if climate change is not a separate element in the programmes. Specific programmes, such as those under the Lomé conventions (with African, Caribbean and Pacific countries), and cooperation with Asian and Latin American countries, largely aim at capacity building rather than subsidizing investments. An important cooperation project is being carried out jointly with other donors in Brazil, aiming at developing sustainable forestry practices. Cooperation with former centrally planned countries is a priority for the Community and is done through the major programmes PHARE, which now covers the central and eastern European states, and TACIS, which covers the former Soviet Union republics in Asia. SYNERGY is a smaller programme funding projects in energy planning and transfer of technology both to developing countries and to eastern Europe. These programmes are described in the communication. All cooperation projects undergo an environmental impacts assessment, and under the most recent Lomé convention each project's relevance to climate change has to be explicitly assessed.

68. Cooperation with countries outside the Community is very much a part of the Community's efforts to improve inventories of GHGs and other pollutants through the CORINAIR system, which provides a framework for cooperation in assessing emissions for the whole UN-ECE region. Further, the Community's research and development programmes also involve active participation by a number of countries from outside the Community, in particular the countries of the European Economic Area but also central and eastern European countries. This also extends to the THERMIE programme for dissemination of energy technologies, and the team noted the important role of the organisations for the promotion of

energy technologies known as OPETs, that are widely spread also outside the Community. In addition, the LIFE programme offers possibilities for funding of environmental projects outside the Community.

69. So far the role of the Community vis-à-vis its member states has not been defined in relation to implementation of projects under the pilot phase of Activities Implemented Jointly, and thus it has not been involved in such projects. However, some of its member states are involved in such projects.

VII. RESEARCH AND SYSTEMATIC OBSERVATION

70. The team noted that the funding of research and development is an area where the Community has a strong and increasing role, although by far most of the funding is still provided by members states' governments directly and by the private sector. The Community channels considerable parts of these resources to activities relevant for climate change. Research on scientific aspects has been funded since the early 1980s. The team noted that several non-members of the Community also take part in the research activities on an equal footing. Most of the relevant activities were described in the communication, which also describes participation in world-wide cooperative research efforts.

71. Climate-related research programmes are based upon the Community framework programmes of research and development (including EPOCH and the Science and Technology for Environmental Protection (STEP) programme, the Agricultural Research Programme and the Joint Research Center's Environment Programme), the objectives of which are discussed in the communication. The team noted that the Community has provided essential support to key European institutes that have made critical contributions to the IPCC and other scientific efforts to study and document the science and potential impacts of climate change.

72. The Community funds consultants, universities and European centres to conduct research on climate diagnostics, natural climate variations, signal detection, climate impact assessments and other subjects. There are problems, though, which have to be addressed, such as transparency of methodologies, credibility of results and continuity of research. The team was briefed on activities that were not included in the communication, including on-going research on coal and bio-gasification. In particular in the agricultural sector, some developments additional to those described in the communication were presented to the team, such as further work on alternative crop productivity, genetic breeding and quantitative impacts related to soil erosion and nitrogen balance. It was recognized that more research is needed to find feasible ways of abating methane emissions from ruminants. The Community is planning to extend research beyond its geographical boundary on such issues as remote sensing, droughts and desertification, coordinated through its established European Network for Research in Global Change (ENRICH) programme.

73. The Community, under its fourth framework programme on research and development for 1994 to 1998, provides around one billion ECU for non-nuclear activities, also covering

demonstration and dissemination. In addition to what was mentioned in the communication, about 800 million ECU for nuclear fission and about 600 million ECU for nuclear fusion are being provided inside the framework of European cooperation, constituting more than half the budget for energy-related research and development. In addition, the Directorate General for Agriculture has a budget of 15-20 million ECU for energy-related research and development. The team noted the dominance of activities related to the supply side. Under the fourth framework programme, JOULE was merged with the more dissemination-oriented THERMIE programme to integrate research and development with demonstration and promotion initiatives. The programme emphasizes renewable energy and transport and support for more rational use of energy, fossil fuel technology and information dissemination. The team noted that this merger could be important in terms of getting new and innovative technologies to the market.

74. The team noted the importance of research in economics and social sciences for developing a framework for decision-making, and that the Community has recently increased its support to socio-economic and policy relevant research. In this respect, efforts under way include energy-oriented modelling incorporating work on policies and measures and lifestyle issues, assessments of institutional aspects of climate policy, and as integrated environmental assessment research.

VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

75. There are a number of activities at the Community level that contribute to the public's knowledge of climate change and activities relevant to it, although also in this area many tasks are the responsibility of the member states. These include school curricula, and thus documentation on member states' efforts to provide environmental education in schools was not covered. The Community has a code of conduct on access to its documents. There is wide consultation with the member states, the general public and non-governmental organisations at early stages of decision-making, e.g. through green and white papers, although at later stages the process is seen as less open. Regular reports on Community action are produced which include information ranging from early warnings on climate change to legislative initiatives.

76. Under existing programmes, including SAVE, ALTENER and THERMIE-JOULE the Community provides research centres and universities with funds to produce publications and bulletins, and to convene seminars and conferences, as well as providing fellowships. Dissemination to the public of the results of scientific research is considered important, as is reflected in the budgets for such activities. The European School of Climatology and Natural Hazards, in close collaboration with leading European research institutions, universities and non-governmental organisations, produces publications to meet the diverse needs of the various concerned audiences. Another example of information activities is the launching by the European Environment Agency of a home page on the World Wide Web in November 1995. This could play a key role in communicating with the general public. Aid programmes also aim at providing training in climate-friendly practices and informing decisionmakers, and

in addition a small budget line is set aside, e.g. through SYNERGY, for public awareness programmes aimed at developing countries.

77. The communication described a number of initiatives to support in particular local communities and their organizations in efforts to improve urban development, which often focus on improving the environment-friendliness of transport. The Community participates in pan-European programmes such as Sustainable Cities and Towns, the Car-Free Cities Club and Cities for Climate Protection. These programmes are supported through the International Council for Local Environmental Initiatives.

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