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Report on the in-depth review of the national communication of Portugal

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Summary

1. Portugal ratified the Convention on 21 December 1993 and submitted its first national communication on 25 January 1995. The in-depth review was carried out during the period August-November 1996 and included a visit to Lisbon from 9 to 12 September 1996. The review team included experts from Argentina and Spain.

2. Portugal has fulfilled its reporting commitments under the Convention. It is also committed to achieving the European Union (EU) target to stabilize carbon dioxide (CO_2) emissions at 1990 levels by 2000, even though Portugal's own national target is to limit growth in CO_2 emissions from fossil fuel combustion to 40 per cent in the decade. The review of the country's policies relevant to the Framework Convention on Climate Change cannot be undertaken without an understanding of the complex process of integration of the Portuguese economy into the EU and the Government's commitment to raise living standards towards the EU average. Since Portugal joined the EU in 1986, its economy has become increasingly intertwined with the European economy as a whole. Its energy, transport and industrial policies have been determined to a growing extent by main trends in the EU, with decreasing scope for independent domestic policy-making.

3. During the review, a considerable amount of additional background information about inventories, projections and policies and measures was made available in a transparent and cooperative way. This new material greatly improved and updated information submitted with the national communication. Of particular importance were the revisions made to CO_2 projections for 2000, the estimate of the country's sink capacity and the submission of new greenhouse inventories, primarily for CO_2, for 1991 through 1994. Regarding CO_2 sinks, the estimation of annual CO_2 uptake by Portuguese forests was considerably revised during the review following the review team's suggestion that the Intergovernmental Panel on Climate Change (IPCC) default methodology be applied. The annual removal of CO_2 was thus estimated at 29,718 Gg, rather than the 70,400 Gg reported in the national communication.

4. In light of the economic performance of Portugal in the first half of the 1990s and assuming that the expected increase in the use of natural gas in electricity production takes place as planned, total energy-related CO_2 emissions in Portugal are now projected to grow by 34.5 per cent in the decade. This is a significant downward revision of the 40 per cent projected in the national communication. The team strongly urged government officials to prepare emission projections for CO_2 from other sources also, and for methane

(CH4) and
nitrous oxide (N2O).

5. The team noted that no effort has so far been made to estimate the possible mitigation effects of ongoing policies and measures, even though some measures being implemented could be considered "no regrets" measures. The review team strongly recommended that such an effort be made for the second national communication due in April 1997, in particular in the energy, transport and industry sectors.

6. The energy system in Portugal has undergone major restructuring to meet increasing energy demand and increased dynamics in EU energy markets. Former policy objectives such as energy security and energy supply diversification are giving way to EU-wide energy supply and demand forces and becoming less dependent on strictly national circumstances. Energy demand is expected to keep growing at an annual rate of 4 to 5 per cent, but national per capita consumption remains lower than the EU average. The introduction of natural gas in total primary energy supply in early 1997 -- with the entering into operation of the Algerian gas pipeline through Spain -- is expected to meet part of this energy demand growth, both for electricity supply and for industrial and residential end-uses. The country's dependence on imported oil is expected to decrease from the current 70 to 60 per cent of its needs by 2010. There is no nuclear power generation in Portugal.

7. An unprecedented road-building process has been under way for the last 10 years. The transport sector has grown much faster than gross domestic product, while the population has remained stable. This trend is expected to continue as consumption patterns approach those of the EU. The EU average car ownership rate per inhabitant has not yet been attained. The team was informed that bottlenecks to this expansion could occur in the near future as city and nation-wide road infrastructures are not always available. Emissions in the transport sector are expected to increase 46 per cent by 2000 and 78 per cent by 2010, while in electricity production they may grow by 35 per cent by 2000, even when the increased share of natural gas is factored in.

8. Other important measures which may impact on CO2 emissions from the energy sector include incentives for independent producers (i.e. small hydropower producers and other renewable sources) to generate electricity, which must be purchased by the recently restructured Eletricidade de Portugal. Programmes have provided direct capital investment grants and loans in the past, mainly to industry, while a more recent programme has been designed to provide financial incentives to the industry, transport and

building sectors. Fiscal incentives are in place for the installation of new equipment needed in the use of renewable sources of energy for domestic consumers. Regulations related to energy management, building insulation, building acclimatization systems and equipment labelling and standards are part of the government's energy efficiency policy and likely to also limit CO_2 emissions. During the review, government officials stated that the introduction of demand-side management measures and integrated resource planning are under discussion in connection with future energy policies. The possible mitigation effects and timing for implementation of these measures were not specified.

9. Portugal, as a participant in the Global Environment Facility (GEF), made a contribution in 1994 to the GEF pilot phase of 4.5 million SDR (special drawing rights), or roughly US$ 6.5 million. Portugal considers its bilateral cooperation with Portuguese-speaking African countries as a priority in its commitment to implement Agenda 21. Regarding climate change, the Ministry of Foreign Affairs has approached Cape Verde and Guinea-Bissau to promote their active participation in the GEF, and similar contacts have been made with Angola and Mozambique. A decision has also been taken by the group of Portuguese-speaking countries to create an agency for the assessment of environmental impact. Such an agency would include Portugal, Brazil, all Portuguese-speaking African countries and the Territory of Macau. Several projects have already been identified in the areas of greenhouse gas (GHG) inventories, air pollution monitoring, climate observation and adaptation measures and dissemination of technical information.

I. INTRODUCTION AND NATIONAL CIRCUMSTANCES

10. Portugal ratified the Convention on 21 December 1993 and submitted its first national communication on 25 January 1995. The in-depth review was carried out during the period August-November 1996 and included a visit to Lisbon from 9 to 12 September 1996. The review team met officials from more than ten ministries, representatives from the academic community whose work is relevant to Portugal's implementation of the Convention, and representatives from several environmental non-governmental organizations, which all provided a wealth of additional background information. The review team was composed of Mr. Leonidas Oswaldo Girardin (Argentina), Ms. María Angeles Cristobal López (Spain) and Mr. Lucas Assunç o (UNFCCC secretariat, Coordinator).

11. Since Portugal joined the European Union (EU) in 1986, its economy has become

increasingly intertwined with the European economy as a whole. Its energy, transport and industrial policies have been determined to a growing extent by main trends in the EU, with decreasing scope for independent domestic policy-making. The review of the country's policies relevant to the Framework Convention on Climate Change cannot be undertaken without an understanding of the complex process of integration of the Portuguese economy in the EU and the Government's commitment to raise living standards towards the EU average.

12. Portugal has 3 per cent of the EU population, 3 per cent of its territory but only 1.5 per cent of the gross domestic product (GDP) of the EU as a whole. Eighty per cent of its territory contains only 20 per cent of the population, the remaining population being concentrated on the coast, mainly in the larger cities of Lisbon and Porto. Population has stabilized since the late 1980s at roughly 10 million inhabitants.

13. Although national consumption patterns have moved steadily closer to those of EU countries in general, GDP per capita still amounts to only 70 per cent of the EU average of US$ 10,000. It is worth mentioning, on the other hand, that owing to its cultural and climatic conditions the country does not expect to reach the same level of per capita energy consumption as in other European countries.

14. Some of the factors conditioning this convergence process are (a) the integration of Portuguese firms into a EU-wide free market, where market forces prevail over national sovereign isolated policies; (b) the compulsory alignment with EU policies in specific sectors such as agriculture and environment; and (c) the availability of EU structural funds which have provided Portugal with incentives in a few sectors such as transport, energy and environmental management and legislation. The expected EU monetary integration is perceived as providing new business opportunities, as well as new challenges for the Portuguese economy.

15. Although major structural changes are not taking place in the industrial sector, there are signs of a broadening of the base of industrial production. Increased access to the EU markets has not as yet led to greater diversification of export products but rather to concentration on traditional products, such as textiles, clothing, wood, paper and cork. Despite the low rate of economic growth that has prevailed since 1991, some industries such as the chemical, petrochemical and automotive industries have gone through rapid change, with increasing dependence on high technology.

16. The energy system in Portugal has undergone major restructuring to

meet increasing energy demand and increased dynamics in energy markets, particularly in the EU. Policy objectives such as energy security and energy supply diversification are now considered as being better achieved within the EU-wide energy market and less dependent on strictly national circumstances. Portugal's high dependence on oil is increasingly perceived as a Union-wide concern rather than an exclusively domestic problem. There is no nuclear power generation in the country, although no formal declaration or commitment against its use has been made. Since all decisions regarding energy policies now have to be submitted to cost-benefit assessments at the EU level, there has been no discussion about building national nuclear plants.

17. Energy demand is expected to keep growing at an annual rate of 4 to 5 per cent, but national per capita consumption is expected to remain lower than the EU average. The introduction of natural gas in total primary energy supply (TPES) is expected to meet part of this energy demand growth, both for electricity supply and for industrial and residential end-uses. Natural gas is not used at all in the country at present. It is expected to be introduced as a major energy carrier in early 1997 with the entering into operation of the Algerian gas pipeline through Spain. According to estimates, it will account for 8 per cent of TPES in 2000 and 15 per cent in 2010-2015. Energy demand forecasts contained in the national communication tend to over-estimate actual trends when compared to most recent forecasts. This has been the case in several sectors except in the transport sector where actual energy demand has exceeded forecasts. The country's dependence on imported oil is expected to decrease from the current 70 to 60 per cent of its needs by 2010, even though some fuel switching from oil to natural gas is expected after 1997. A new 900 MW combined cycle (natural gas) power plant to produce electricity is under construction in northern Portugal and is planned to come into operation by early 1998.

18. The agricultural sector has also been greatly affected by integration with the EU. It now accounts for only 6 per cent of GDP and involves 10 per cent of the active population, while 30 years ago it accounted for 20 per cent of GDP and employed 30 per cent of the population.

19. An unprecedented road-building process has been under way for the last 10 years. The transport sector has grown much faster than GDP, while population has remained stable. This trend is expected to continue as consumption patterns approach those of the EU. The EU average rate of car ownership per inhabitant has not yet been attained.

During the review, the team was informed that bottlenecks to this expansion could occur in the near future as city and nation-wide road infrastructures are not always available.

20. The gradual phasing-out of the monopoly exercised by the public company Eletricidade de Portugal (EDP) in the electricity production sector may well have important effects on the demand for fossil fuel-based electricity, as well as on operating costs of the energy production sector in the country. The recent restructuring of the electricity system allows for the direct access of end-users to independent producers. In the case of natural gas, transportation is clearly separated from distribution and four new distribution companies have already been established.

II. INVENTORIES OF ANTHROPOGENIC EMISSIONS AND REMOVALS

21. The national greenhouse gas (GHG) inventories were prepared for 1990 drawing mostly on the CORINAIR methodology. They were later converted to the Intergovernmental Panel on Climate Change (IPCC) reporting format by employing the CORINAIR/IPCC interface methodology developed by CITEPA. National inventories were submitted for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), non-methane volatile organic compounds (NMVOC), nitrogen oxides (NOx) and carbon monoxide (CO). Most emission factors used in estimations were either CORINAIR default values or factors referenced in the international literature, so they did not always reflect specific Portuguese conditions. For some categories of activity such as enteric fermentation and use of fertilizers in agriculture, emission levels were estimated using the proposed IPCC methodology, which was considered to be more appropriate than CORINAIR.

22. In accordance with the IPCC methodology, emissions resulting from biomass burning for fuel were reported separately and not added to total emissions from fuel combustion; emissions from international bunker fuels (for both maritime and air transport) were reported separately; and the carbon content of CH_4, CO and NMVOC emissions during fuel combustion was converted to CO_2 and added to CO_2 emission totals. The national communication included the required IPCC minimum tables containing activity levels and aggregate emission factors, which greatly enhances the comparability of inventories. It also included qualitative estimates of confidence levels for each broad source category.

23. There has been no estimation of GHG emissions originating from agricultural waste burning or land-use change, because of the lack of national activity data.

Regarding CO2 sinks, however, the estimate of annual CO2 uptake by Portuguese forests was greatly revised during the review following the review team's suggestion that the IPCC default methodology be applied. The annual removal of CO2 was thus estimated at 29,718 Gg, rather than the 70,400 Gg reported in the national communication. Although the revised figures seemed more plausible, it would be advisable to improve the estimation procedures and increase knowledge of specific national conditions with a view to reducing the high uncertainty level associated with the estimation of sink capacity in Portugal.

24. In the 1990 inventory, CO2 emissions from fuel combustion represented 92 per cent of the total of 42,148 Gg, with the remainder originating from industrial processes. The largest emission sources are the energy production and transformation and transport sectors, responsible for 50 and 26 per cent of total energy-related CO2, respectively. The reported total of 38,700 Gg of CO2 emissions from fuel combustion in 1990 is 3 per cent lower than the total energy-related CO2 emissions estimated by EUROSTAT (39,800 Gg) and 6 per cent lower than estimates made by the International Energy Agency (41,000 Gg). Regarding CH4, total emissions amounted to 5,554 Gg -- in CO2 equivalent, using 1994 IPCC global warning potential (GWP) values -- with 78 per cent of emissions originating in 1990 from enteric fermentation, animal wastes and rice cultivation and 16 per cent from waste treatment. Total N2O emissions were 3,392 Gg (in CO2 equivalent) in 1990, 47 per cent arising from fuel combustion and 34 per cent from the use of fertilizers in agriculture. Using 1994 IPCC GWP values for a 100-year horizon, CO2 represented 83 per cent of greenhouse gases in Portugal, while CH4 and N2O represented 11 and 6 per cent, respectively.

25. With respect to hydrofluorocarbon (HFC) and perfluorocarbon (PFC) emissions, the Portuguese officials did not include their emission levels in the first communication owing to methodological issues, but are committed to doing so in the next one, especially after the confirmation that there is aluminium smelting in the country. The team was informed, however, that there is no production of magnesium in Portugal.

26. During the country visit, the Government submitted new inventories for 1991 through 1994 for the broad emission source categories for all the gases reported in the first national communication. These new inventories include new data for fuel combustion only and partially for the industrial processes category. Emissions from other broad source categories, i.e. solvent use, agriculture, land-use change, forestry and waste, have not been estimated for years other than 1990. For CO2, the new inventories show a sharp 18 per cent

increase in emissions from 1990 to 1992 and a decrease thereafter to a 1994 level which is 9.6 per cent higher than in 1990. This emission pattern could be explained by both the climatic fluctuations and variations in economic activity level. An assessment of the evolution in CH_4 and N_2O emissions has not been possible since estimates for the major source categories of these gases were not provided in the new inventories.

27. The review team recommended that more information be provided on activity data and emission factors used for each source category at a level of detail to permit reconstruction of the inventories. In this respect, it would be useful to make available the CORINAIR inventory for those source categories where that methodology has been used. It would also be useful to have a better knowledge of emissions arising from land-use change and forestry in Portugal.

III. POLICIES AND MEASURES

28. So far, Portugal has not implemented any mitigation measures as such, although during discussions with individual ministries the team noted that there are measures in place which could be described as "no regrets" measures, even if they were not explicitly introduced in response to climate change concerns. On the other hand, Portugal does not seem to be under any pressure to introduce specific mitigation measures because of the flexibility clause it was granted in the EU target to stabilize CO_2 emissions at 1990 levels by 2000.

A. Energy

29. In 1990, the energy production and transformation sector was the largest source of CO_2 emissions in Portugal, accounting for 50 per cent of fuel combustion emissions and 46 per cent of total CO_2 emissions. Bearing in mind the sustained growth in energy demand in recent years and economic prospects for future decades, the sector is likely to remain a major source of these emissions. The evolution of CO_2 emission trends in Portugal will largely depend on measures introduced in relation to efficiency in energy use and the country's energy supply structure.

30. The explicit objective of the national energy policy is energy security, reduction of energy intensity per unit of GDP, enhanced market competition and respect for the environment. Increased dependence on energy imports is to be avoided by the diversification of supply sources, intensified efforts to employ national energy resources, efficiency improvements in national energy supply systems and equipment upgrading.

31. Portugal's energy sector is relatively small compared with other European economies. Total energy demand in 1990 was 12.7 million tonnes of oil equivalent (toe), roughly 1.5 per cent of the EU total. Additionally, Portugal has a relatively low per capita energy consumption, the total final consumption per capita being 1.3 toe while the EU and OECD averages are 2.5 and 3.4 toe per person, respectively. The ratio of energy-related CO2 emissions per capita is the lowest in the EU, 4.5 tonnes compared to an average of 9 in the EU and 12 tonnes in OECD countries as a whole. On the other hand, the country's level of energy-related CO2 emissions per unit of GDP was in 1990 considerably higher than both the EU and OECD averages, 1.54 tonnes compared to 0.97 and 1.01 tonnes, respectively. This last indicator reveals the country's relatively lower stage of economic development compared to other EU and OECD partners.

32. Portugal is dependent on energy imports for roughly 90 per cent of its needs; it has to import all its consumption of oil, virtually all coal after national coal mines were closed in 1995 and, in the near future, all its consumption of natural gas. Indigenous energy resources such as hydropower (the potential of which is almost fully exploited) and other renewable sources including biomass account for the remaining 10 per cent of TPES. There is no nuclear power generation and co-generation still plays only a limited role in total energy supply.

33. As far as electric power production is concerned, in 1994 thermal generation accounted for 66 per cent and hydropower for the remaining 34 per cent. These shares tend to vary considerably according to, inter alia, the varying rainfall levels in different years (i.e. hydropower made up 10 per cent of TPES in 1979, 5 per cent in 1991 and it may be 4 per cent in 2000). Historically, electricity prices have been relatively higher than in other EU countries. With a view to increasing competition in electricity supply, the Government in 1991 initiated the restructuring of the national electricity system and in 1994 the national electricity company, Eletricidade de Portugal (EDP), separated its generation, transport and distribution functions. This latter process is being concluded. The government is now preparing the privatization of the holding electricity company.

34. Oil represents roughly 70 per cent of TPES, with the transport and service sectors taking an increasing share in total (oil) consumption at the expense of the industrial and residential sectors. This dependence on oil is expected to fall but only to 61 per cent in 2000. Coal's share in TPES was roughly 17 per cent in 1990, from 5 per cent in 1979, and it is

projected to reach 18 per cent in 2000 and 15 per cent in 2010. Biomass accounted for 7 per cent of TPES in 1990 and is expected to decrease slightly to 5 per cent by the end of this decade.

35. The most significant development in the energy sector in Portugal, with very important effects on its CO2 emission profile, will be the introduction of natural gas in early 1997. With the entering into operation of the Maghreb pipeline from Algeria through Spain, Portugal expects to reduce its dependence on imported oil and coal. The increasing use of natural gas will not only improve energy diversification, but should also substantially reduce the growth in CO2 emissions. Natural gas is expected to account for over 8 per cent of TPES in 2000, which implies a fast penetration of natural gas, since it will be used for electricity generation in a new combined cycle gas turbine (CCGT) in Tapada do Outeiro. At the same time, natural gas will gradually be introduced in the industry and residential sectors. The existing power plant in Carregado will be converted to a dual-fired natural gas and fuel oil power plant. During the review, the team was informed that most connections in the high-pressure gas network have been made. The distribution networks still need completing. Government officials informed the team during the review that natural gas may represent 13 per cent of TPES in 2010 and 15 per cent by 2015, which would reflect a major fuel switch from oil and coal.

36. Other important measures which may impact on CO2 emissions from the energy sector include incentives for independent producers (i.e. small hydropower producers and other renewable sources) to generate electricity, which must be purchased by Eletricidade de Portugal (EDP). The SIURE and VALOREN programmes have provided direct capital investment grants and loans in the past, mainly to industry, while more recently the SIURE programme has been revised to provide financial incentives to the industry, transport and building sectors. Fiscal incentives are in place for the installation of new equipment needed in the use of renewable sources of energy for domestic consumers. Regulations related to energy management (RGCE), building insulation (RCCTE), building acclimatization systems (RQSCE) and equipment labelling and standards are part of the government's energy efficiency policy and likely to also limit CO2 emissions. During the review, government officials stated that the introduction of demand-side management (DSM) measures and integrated resource planning are under discussion in connection with future energy policies. The possible mitigation effects and timing for implementation of these measures were not

specified.

37. It would be desirable to establish a monitoring mechanism on the effects of ongoing and planned measures in the energy sector, in view of their relevance to the implementation of the Convention in Portugal. This would necessarily require closer and continuing cooperation among the ministries concerned. Improved monitoring would, for example, contribute to a better understanding of how an announced 5 per cent increase in energy efficiency in the industrial sector as a whole would be achieved by 1999. It would also be instrumental in showing that some current measures are indeed "no regrets" measures with clear mitigation and economic benefits.

B. Industry

38. In 1990, the industrial sector accounted for 16 per cent of CO2 emissions associated with fuel combustion and 14 per cent of total CO2 emissions, making it the second largest CO2 emission source in Portugal. Although the sector's share in total energy consumption remained practically stable in the 1980s and declined slightly in the early 1990s, all projections point to an increase in energy needs in industry in conjunction with the process of economic opening and integration with the EU.

39. Industry accounted for 24 per cent of GDP in 1990, even though it is rather concentrated in a few centres and highly dependent on energy imports and foreign technologies. Its main sectors are textiles, transport equipment, chemicals, food products and beverages, paper and cork, which together account for 76 per cent of the industrial value-added and 74 per cent of employment in industry. The process of integration with the EU is likely to have an impact on some sectors, possibly leading to a greater degree of specialization as a consequence of the increased competition from other EU suppliers.

40. Although the team was not informed of any policies to foster specific industrial sectors, the broad objectives of industrial development in the country have been to sharpen international competitiveness and create employment. There is an expectation that the process of integration with the EU will generate changes within and between industrial sectors in Portugal, for example as seems to be occurring in the chemical, petrochemical and traditional pharmaceutical sectors. Very little information was made available in this regard, although during the review there was some mention of recent developments in the car (and car parts) industry in Portugal.

41. There is a clear concern about keeping pace and being in harmony with

EU policies, as Portugal remains highly dependent on foreign investments from EU and OECD partners. Since industrial, social and environmental regulations have a direct impact on the competitiveness of firms in particular and on the national economy as a whole, there cannot be major discrepancies between regulations adopted by Portugal and its major trade partners.

42. An important initiative to promote the incorporation of environmental concerns into industrial decisions is taking place through the second phase of the Specific Development Programme for Portuguese Industry, 1994-1999 (PEDIP II). During the review it was reported that for 1996 US$ 56 million were made available for eligible industrial firms interested in adopting environmentally sounder technologies. No information was provided on the effects of the programme.

43. The team noted that gains in energy efficiency could reduce the sector's dependence on energy imports, while also reducing growth in GHG emissions. During the review, however, it seemed that measures to improve energy efficiency in the sector came solely under the responsibility of the General Directorate of Energy which is now part of the Ministry of Economic Affairs. Only limited information was made available on promising measures such as the Incentive System for the Rational Use of Energy (SIURE), which aims at supporting energy efficiency projects in all non-domestic energy end-use sectors. It would be useful if more information could be provided on the progress and effects of these actions.

44. As in the case of the energy sector, some sort of mechanism for monitoring of developments in different industrial sectors would be recommendable, including an assessment of policies and measures currently in place. The team noted that no measures have been introduced with the explicit objective of limiting the growth of or reducing GHG emissions in Portuguese industry. It recommended that, as a minimum, data on current and future energy consumption in different industrial sectors be disaggregated. This would greatly improve knowledge about which sectors are expected to grow and whether growth in industrial activity and energy consumption is accompanied by gains in efficiency.

C. Agriculture and Forestry

45. In 1990 the agricultural sector was responsible for 78 per cent of methane emissions, of which 46 per cent was due to enteric fermentation, 26 per cent to animal wastes and 6 per cent to rice cultivation. The sector accounted in 1990 for 6 per cent of GDP and 20 per cent

of the labour force. It occupied 45 per cent of the national continental territory, a further 36 per cent of which is covered with forests.

46. Portugal's agricultural policy is largely determined by EU policy, which aims to reduce incentives to the sector. Consequently, any sectoral measures are highly conditioned by what has been decided for the EU as a whole, including the management of traditional agricultural systems and restrictions on the use of fertilizers and pesticides.

47. The team was informed that no major changes are expected in coming years regarding the area under rice cultivation (currently 320,000 ha) and the national cattle stock. Based on this assumption and the fact that no measures to reduce methane emissions from the agricultural sector have been introduced, the Government does not expect any changes in CH4 emission trends from the sector.

48. Total forest area in Portugal amounts to 3.85 million ha, of which 78 per cent is privately owned, 12 per cent is owned by municipalities and the remainder by the State and workers' associations. It has been estimated that the country has a potential forest area of 5.28 million ha. The measures in place in the forest sector aim at managing, expanding and conserving national forests. The Forest Plan 1994/1999 foresees an increase of 200,000 ha in the forest cover and further improvements in another 150,000 ha. The team was informed of plans for the creation of a permanent fund to support measures aimed at improving, expanding and protecting national forests and to finance reforestation after forest fires. No information was provided as to when the fund would come into being.

49. The team was informed that, owing to variations in market prices, there is a trend in Portugal today to plant forests in areas with lower agricultural potential and to use fast-growing species instead of the slow-growing ones planted in the past. On the other hand, the team was also informed that the lack of technical and financial resources has undermined existing incentives for afforestation, as well as the harmonization of national forest inventories and the national forest plan. It would be useful if the second communication could describe the progress made under the forest plan, its effects in terms of increased sink capacity and the emission or removals projections for 2000.

D. Transport

50. In 1990 the sector, as the second largest source of greenhouse gases after energy production, was responsible for one fifth of total CO2 emissions in the country. Emissions from the sector have increased consistently every year since 1990, reaching a growth rate of

34 per cent in 1994 compared to 1990. The share of transport in total final energy consumption is expected to increase from 29 per cent in 1990 to over 35 per cent in 2000. The sector's consumption of petroleum products is expected to almost double in the decade and grow by a further 84 per cent by 2010, by which time the sector could account for 50 per cent of total final energy consumption in Portugal.

51. In recent years, the transport sector has undergone a major transformation. The growth in total traffic in the 1980s and 1990s, measured in terms of the number of vehicles multiplied by the number of kilometres travelled has been twice as rapid as the growth in GDP. There has also been an unprecedented expansion in road infrastructure in the last 10 years. For example, from 1990 to 1994, the total length of motorway increased from 318 to 587 km, an 84 per cent increase! In the same period, the number of registered private cars increased by 37 per cent, although the car ownership rate (337 cars per 1000 inhabitants) remains lower than the EU average.

52. Roughly 98 per cent of domestic transport is done by road while the railway system accounts for only 2 per cent. Most of the road-building currently under way consists of first-time roads, rather than the renovation or duplication of existing ones. Tolls are charged on all national motorways and a strict 120 km per hour speed limit has been applied for some years. Car purchase taxes and fuel consumption taxes are among the highest in the EU and have been a prime source of government revenue.

53. No GHG emission mitigation measures have been introduced specifically for climate change or air pollution reasons. However, some measures currently under implementation should certainly reduce the growth in GHG emissions. Possible mitigation effects of these measures have not been estimated, either in the national communication or in the in-depth review. Examples of these measures are: (a) periodic vehicle pollution inspections, by which every truck must be inspected annually and every six months after seven years of use; and testing of private cars every two years for cars more than four years old, to control emission levels of major pollutants, check catalytic converters and ensure compliance with EU standards; (b) expansion of Lisbon's subway and suburban surface light rail systems; (c) improvement of urban traffic flow, including improved access to motorways and secondary roads in major cities, a new bridge over river Tagus (Lisbon) and the expansion of the 25 April Bridge in Lisbon to ease commuting in the city; (d) fiscal and financial incentives by the central government for the purchase of more efficient heavy goods vehicles; (e)

construction of a multimodal station in Lisbon by 1998 and Porto subway by 2000; and (f) an incentive scheme to promote transportation of goods by specialized companies.

E. Waste

54. This sector accounted for 16 per cent of CH_4 emissions in 1990, counting only emissions from managed landfills and wastewater streams under treatment. According to the National Waste Plan of July 1995, urban waste production has increased very fast in recent years and is expected to sustain such growth in the coming years. While in 1994 Portugal had a per capita average of 0.96 kg of waste per day, in 2000 this average is expected to be 1.1 kg per day as a result of increased consumption levels.

55. The management of urban waste, including collection, transportation and disposal or recycling, comes under the responsibility of each municipality. Currently in Portugal there exist 12 managed landfills, 307 unmanaged open dumps and 2 composting plants. The National Waste Plan foresees the phasing out or management of all open dumps, as well as the recovery of CH_4 from some landfills for energy purposes. It also includes the construction of incinerators for urban waste in Lisbon and Porto and an incinerator for industrial wastes.

56. There are no estimates of GHG emissions in the sector for years other than 1990. The team was informed that there are plans to start monitoring such emissions more closely after the establishment of an official body, the Waste Treatment Institute in the Ministry of the Environment.

F. Land-use planning

57. The executive functions of government in Portugal are exerted through the central government and local authorities, with no administrative power at the regional level. The central government is in charge of land-use planning at the regional level. Several plans have been approved for high priority zones where uncontrolled urban growth has threatened regional natural resources or hindered the promotion of sounder and more sustainable urban development. At the municipal level, "guiding plans" are established to regulate specific local urbanization plans, including building standards, infrastructure plans for local industrial centres and rehabilitation of historical sites. The team noted that these municipal development plans do not include as an objective the promotion of energy efficiency for new and old buildings, neither do they establish building efficiency standards. Much potential exists for efficiency gains in the residential sector in Portugal, in particular through

the enforcement of the recent regulations introduced for insulation standards in new buildings.

IV. PROJECTIONS AND EFFECTS OF POLICIES AND MEASURES

58. A considerable amount of new background information was provided during the review which greatly clarified how emission projections were made, including the methodologies used and assumptions made. All projections were made using a bottom-up approach, with assumptions made for developments in each sector and specific scenarios for GDP and population growth. Assumptions made were considered plausible and realistic by the review team. Portugal has provided projections for CO2 emissions related only to fuel combustion, because of technical constraints and the lack of basic activity data on the other sectors. The team strongly urged government officials to prepare emission projections for CO2 from other sources also, and for CH4 and N2O.

59. Mitigation effects of ongoing measures have not been estimated and were not incorporated in projections of energy-related CO2 emissions for the 1990-1995 and 1995-2000 periods. The only exception has been the attempt to include the impact on energy-related CO2 emissions of the increase in the share of natural gas in total primary energy supply expected from 1997 onwards. In preparing the second communication, it would be desirable to incorporate rough estimates of the possible effects of some ongoing "no regrets" measures, even though they are not described as mitigation measures by Portugal.

60. During the review, total energy-related CO2 emissions projected for 2000 were revised to include the latest data on actual growth in GDP from 1991 through 1995, and to allow for the expectation of lower economic growth in the second half of the decade as a result of slower growth in the EU economy. Actual annual GDP growth from 1990 to 1995 averaged 1.3 per cent, instead of the 1.8 per cent originally expected. Accordingly, the new energy-related CO2 emission projection for the period 1996-2000 has been adjusted and now shows an average annual growth rate in GDP of 3.7 per cent instead of the original 4.9 per cent assumed in the communication. These new projections indicate that energy-related CO2 emissions may now grow by 34.5 per cent over the decade, instead of the 40 per cent growth originally expected. In view of the 40 per cent growth limit for CO2 emissions agreed with its EU partners, Portugal can claim that it is meeting its commitments towards the EU stabilization target, even though, domestically, stabilization of CO2 emissions is not in sight.

61. Together with this new updating of projections, prepared by the

General Directorate of Energy, new projections were also submitted for energy-related CO2 emissions in 2005 and 2010, including the breakdown of CO2 emissions from the energy sector by type of fuel and by end-use sub-sector. These submissions include the new assumptions for GDP and population growth, the total of light passenger vehicles and vans in circulation and the average distance travelled. The team noted that the national communication did not report in sufficient detail on the methodology used to prepare CO2 emission projections and recommended that such information be provided next time, including a description of the three basic scenarios contained in the "Strategy for the Energy Sector 1995-2015", prepared by the former Ministry of Industry and Energy, now incorporated in the Ministry of Economic Affairs.

V. PROJECTED PROGRESS IN GREENHOUSE GAS MITIGATION

62. Based on the new inventories for 1991 through 1994 submitted during the review, which provided new data for the fuel combustion and industrial processes categories, CO2 emissions show a sharp 18 per cent increase from 1990 to 1992 and a decrease thereafter to a 1994 level which is 9.6 per cent higher than in 1990. Part of these year-to-year fluctuations is explained by the varying levels of precipitation, dry years such as 1992 entailing increased oil-fired generation to replace hydropower. Another important determining factor is, obviously, the varying level of economic activity in different sectors.

63. The new projections of CO2 emissions from the energy sector show that the sectors with fastest growing emission levels are the power generation, road transport and residential and services sectors. Emissions in the transport sector are expected to increase 46 per cent by 2000 and 78 per cent by 2010, while in electricity production they may grow by 35 per cent by 2000, even when the increased share of natural gas is factored in. Even though total CO2 emissions are now expected to increase less (34.5 per cent) than the agreed growth limit of 40 per cent in the decade, GHG emissions in Portugal are increasing fast and could increase even faster if natural gas does not make further inroads into the electricity and residential sectors and road transport continues with its impressive growth trend.

VI. EXPECTED IMPACTS OF CLIMATE CHANGE

64. During the review, the Institute of Meteorology of the Ministry of the Environment provided extensive information on climate observation in Portugal and possible impacts of climate change in its territory. In the last 30 years, it has been observed

that precipitation levels have decreased in the spring and increased in the winter, particularly in northern Portugal where most agricultural activity takes place. Portugal is particularly vulnerable to desertification and drought in the southern and eastern regions of Alentejo, Algarve and Tras-os-Montes. A series of studies and measures to enhance climate monitoring are in place, although no adaptation measures as such have been reported.

65. A detailed study prepared by researchers of the Institute of Meteorology on possible impacts of sea level rise on the Portuguese coast showed that Portugal may be subject to severe adverse impacts, particularly on the southern coast and low-lying banks of some rivers, such as the Tejo, Sado and Douro rivers. There is evidence that some aquifers in the Algarve region have already been contaminated with sea water.

VII. FINANCIAL ASSISTANCE AND TECHNOLOGY TRANSFER

66. Portugal, as a participant in the Global Environment Facility (GEF), made a contribution in 1994 to the GEF pilot phase of 4.5 million SDRs (special drawing rights), or roughly US$ 6.5 million. It has also recently contributed 4 million SDRs to the GEF first phase.

67. Portugal considers its bilateral cooperation with Portuguese-speaking African countries as a priority in its commitment to implement Agenda 21. Regarding climate change, the International Cooperation Institute of the Ministry of Foreign Affairs considers the GEF as the main financial instrument for the approval of bilateral cooperation projects. The Institute has approached Cape Verde and Guinea-Bissau to promote their active participation in the GEF, and has signalled with the possibility of assisting these non-Annex I Parties to UNFCCC in the preparation of their national GHG inventories. Similar contacts have also been made with Angola and Mozambique, although these two Parties have not yet joined the GEF.

68. During the review, the review team was informed of a decision by the group of Portuguese-speaking countries to create an agency for the assessment of environmental impact (CRIA). Such an agency would include Portugal, Brazil, all Portuguese-speaking African countries and the Territory of Macau. Several projects have already been identified in the areas of GHG inventories, air pollution monitoring, climate observation and adaptation measures and dissemination of technical information.

69. The team noted with appreciation that total official development assistance (ODA), which represented 0.25 per cent of GDP in 1989 and 1990, had risen to 0.31 per cent in 1991

and 0.36 per cent in 1992. In 1993, the share of ODA dropped to 0.29 per cent but, in 1994, it was again brought back to the level of 0.35 per cent of GDP, just above the average of 0.30 per cent recorded by OECD Development Assistance Committee countries for that year.

VIII. RESEARCH AND SYSTEMATIC OBSERVATION

70. Through its Institute for the Promotion of Technology Development, the Ministry of Science and Technology promotes activities related to the development and adaptation of environmental technologies in the country and technology cooperation with international programmes, primarily with EU partners. Three specific climate-related projects are currently under way, focusing on combating forest fires, atmospheric environment (in conjunction with the Institute of Meteorology) and on the atmospheric environment in coastal zones to determine the correlation between gas emissions, transport of contaminants and effects.

71. Climate monitoring systems are well developed in Portugal. Over 30 synoptic stations and 70 climatic stations have collected climate data since 1931. Very long-term series do identify minor rises in temperature, even though the fact that most stations are located in urban areas makes it difficult to discard a possible "urban heat island" effect. 1995 was the hottest year to date in Portugal, in line with findings of the IPCC Second Assessment Report.

IX. EDUCATION, TRAINING AND PUBLIC AWARENESS

72. There has been increasing collaboration between the education and environment ministries to promote environmental education, including the subject of climate change in schools from elementary to the secondary levels. The Institute of Environmental Awareness (IPAMB) of the Ministry of Environment carries out several training programmes related to environmental management, sensitizes public opinion through awareness campaigns on local environmental issues and has produced teaching material for more formal environmental education. The team was informed during the review that other relevant activities are also carried out by other ministries and highly recommended that such information be included in the next national communication.

73. The main environmental problems in Portugal are water pollution and contamination due to mismanagement in urban waste disposal. Climate change is not yet perceived by the public in general as a major environmental problem. The review team, however, had the opportunity to meet with national non-governmental organizations which are actively engaged in promoting a national sustainable development strategy to influence government policies, in particular with respect to transport. These organizations seemed to be also pursuing the adoption by the Government of integrated resource planning in the energy sector, as well as the promotion of renewable sources of energy. In a joint meeting with

government officials it
 was agreed that non-governmental organizations will be given the opportunity
to comment on
 the second national communication before it is officially submitted.

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