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

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

A. Introduction

1. Spain ratified the United Nations Framework Convention on Climate Change (UNFCCC) on 21 December 1993. It signed the Kyoto Protocol to the UNFCCC on 29 April 1998 and ratified it, with the other members of the European Community (EC), on 31 May 2002. The UNFCCC secretariat received the first national communication of Spain (NC1) in September 1994, and the second one (NC2) in November 1997. This third national communication (NC3) was received on 1 April 2002.[1]

2. The NC3 was prepared by the Spanish Climate Change Office (Oficina Española del Cambio Climatico, OECC) of the Ministry of Environment (MoE). Preparation of the NC3 began in April 2001 and was completed almost one year later. All relevant Ministries, as well as the Autonomous Communities (CCAAs), participated in its elaboration.[2] The final version of the NC3 was approved in March 2002. Although non-governmental organizations (NGOs) did not take part in the preparation of the NC3, they are members of working groups established by the government to discuss the national climate change strategy.

3. The in-depth review of the NC3 was carried out between February and September 2003, including a visit to Madrid from 24 to 28 February 2003. The review team consisted of Mr. Julio Torres (Cuba), Ms. Patricia Iturregui (Peru), Mr. Gonçalo Cavalheiro (Portugal), Ms. Rocio Lichte (UNFCCC secretariat) and Ms. June Budhooram (UNFCCC secretariat, coordinator). During the visit, the team met officials representing the central government and the CCAAs, and representatives of trade unions and of business, environmental, consumer and industrial NGOs.

B. National circumstances

4. Spain is located in the south-west of Europe. It has land boundaries with France to the north and Portugal to the west. The Atlantic Ocean lies to the west and north of the country, and the Mediterranean Sea to the east and south. The mountainous terrain and proximity to two large masses of water (the Atlantic Ocean and the Mediterranean Sea) give rise to a climate that varies from temperate in the north to hot and dry in the south. The average annual temperatures vary between 8ºC in the mountainous north and 18ºC in the southern coastal areas.

5. Spain[3] is the second largest country in Western Europe, with a total area of 505,000 km^2. In 2000, about 29 per cent of the territory was covered by forests, and 38 per cent was used for agriculture.

6. Spain is composed of 17 CCAAs, and two Cities with Statute of Autonomy, Ceuta and Melilla, which are located on the North African coast. The constitution provides for the progressive empowerment of the regions, and this has had a significant impact on the implementation of climate change policies in Spain. The central government is responsible for basic legislation on the environment, identification of strategic economic objectives and general jurisdiction over energy and energy taxes. It is also responsible for issues that concern more than two CCAAs. The 17 CCAAs, each with its directly

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[1] The submission date was 30 November 2001 (decision 11/CP.4).

[2] All Ministries, CCAAs and the FEMP (the main association of municipalities and provinces) were invited to contribute with information before elaboration of the first draft. All of them took part in the revision of the first draft.

[3] Including the Canary Islands, the Balearic Islands, Ceuta and Melilla.

elected parliament and executive body, are each responsible for issues exclusively within their territory and therefore implement most of the policies defined by the central government.

7. In 2000, Spain's population was estimated at 39.9 million; the most populous CCAAs are Andalucia, Cataluña, Madrid and the Valenciana Community. During the past decade the population has grown on average by 120,000 (about 0.3 per cent) per year. The birth rate is stagnant, and life expectancy has increased considerably. A surge of immigration to Spain, as well as migration from rural to urban areas, has changed the demographic profile of the country in recent years while exerting increasing pressure on demand for energy and services. This has contributed to increases in emissions of greenhouse gases (GHGs).

8. As the largest net beneficiary of structural funds of the EC, most of Spain's policies are directed toward convergence with the EC and increasing economic development. As a result, the country has experienced steady economic growth since the mid-1990s. During the past decade it has achieved economic growth rates that are above the EC annual average of 1.8 per cent. The average annual growth rate of gross domestic product (GDP) was 3.5 per cent from 1995 to 2000, and per capita GDP in 2000 was approximately US$17,600, which is still well below the EC average. The services sector accounted for the largest share of GDP (65 per cent in 2000),[4] followed by industry (31 per cent) and the agriculture, forestry and fisheries sectors (4 per cent).

9. Energy intensity has also been rising in the last decade, but here the difference between Spain and the EC average has been decreasing. However, it should be noted that in the 1990s the energy intensity of Spain's GDP increased from 0.165 to 0.172 kg of oil equivalent per US$ of 1995, whereas in the same period the average energy intensity for the EC decreased from 0.198 to 0.177. Spain is one of the very few EC countries, if not the only one, where energy intensity is increasing on average, which is a factor in the growth of GHG emissions. Together with its economy and its energy demand, Spain's GHG emissions have grown rapidly, by 34.6 per cent between 1990 and 2000 (table 1).

Table 1. Main macroeconomic indicators and GHG emissions for Spain

	1990	1995	2000	Change (%) 1990–2000
Population (millions)	38.85	39.22	39.93	2.8
Gross domestic product – GDP (billions US$ of 1995)[a]	546.53	584.19	704.05	28.8
Total primary energy supply – TPES (Mtoe[b])	90.53	103.12	124.88	37.9
Electricity consumption (TWh)	137.47	155.61	209.55	52.4
GHG emissions[c] (Tg[d] CO_2 equivalent)	287.60	319.40	387.10	34.6
GHG emissions per capita (Mg CO_2 equivalent)	7.40	8.14	9.69	30.9
GHG emissions per GDP unit (kg CO_2 equivalent per US$ of 1995)	0.52	0.55	0.55	4.4

Notes:

(1) The data for population, GDP, TPES, and electricity are from "Energy balances of OECD[5] countries, 1999–2000", OECD/IEA[6], Paris, 2002. GHG data are taken from updated inventory provided during the review, and which correspond to the annual inventory submission 2003.

(2) Exchange rate in the NC3: 1€=166.386 pesetas (January 1999).

[a] GDP (billions US$ of 1995 using exchange rates).

[b] Millions of tonnes of oil equivalent.

[c] Without accounting for land-use change and forestry (LUCF).

[d] One teragram (Tg) is equal to 1,000 gigagrams (Gg) or one million tonnes.

10. Between 1990 and 2000 the primary energy demand in Spain grew at an average annual rate of 3 per cent, which is considerably higher than the EC average of approximately 1.4 per cent. Spain has no

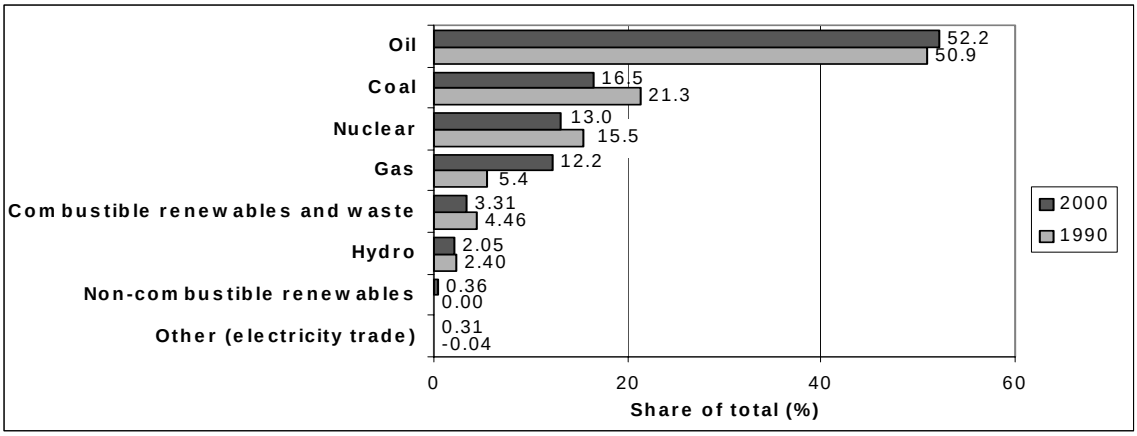
[4] Data from the Spanish National Statistics Institute.

[5] Organization for Economic Development

[6] International Energy Agency

significant oil and gas reserves, although there are modest reserves of coal and considerable localized reserves of brown coal. Hydropower and other renewables accounted for only 5.7 per cent of total primary energy supply in 2000 (see figure 1). As a result of EC decisions, the electricity, gas and oil markets were rapidly liberalized in the 1990s and this has resulted in an increased diversification of energy supply sources between 1990 and 2000, as shown in figure 1. The share of coal fell from 21.3 per cent in 1990 to 16.5 per cent in 2000 and nuclear energy from 15.5 per cent to 13.0 per cent in 2000.[7] Oil still has a large share (52 per cent), and this partly explains the increase in emissions since 1990, in spite of a greater penetration of gas, which went up from 5.4 per cent in 1990 to 12.2 per cent in 2000. Spain also has international agreements to exchange electricity supply with France and Portugal.

Figure 1. Structure of primary energy supply in Spain



Source: "Energy balances of OECD countries, 1999–2000", OECD/IEA, Paris, 2002.
Note: The sum of shares may not be exactly 100 per cent because of rounding.
[a] The negative number for electricity trade means, in accordance with the conventions of IEA statistics, that the country exports more electricity than it imports.

C. Relevant general and environmental policies

11. The central government formulates the policies for mitigating climate change, while the regional governments have the authority to adapt policies to suit the specific needs of their regions. The regional governments also play an important role in the implementation of policies on energy installations, producing energy from renewable sources, the promotion of energy efficiency, transport, industry and forestry planning and oversight.

12. Spain created the National Climate Commission (Comisión Nacional del Clima) in 1992. The Commission prepared and approved a National Climate Programme (Programa Nacional sobre el Clima) in 1995, although a thorough revision was considered necessary to take into account the international negotiations and the objectives for limitation of GHG emission foreseen under the Kyoto Protocol. The creation of the MoE in 1996 led to the transformation of the Commission into the National Climate Council (Consejo Nacional del Clima, CNC) in 1998. The council was entrusted with the task of producing a national strategy by adapting previous work to new circumstances. The CNC was modified

[7] In 1984 the approval by the Council of Ministers (Consejo de Ministros) of the National Energy Plan (Plan Energético Nacional) 1983–1992 stopped work on five nuclear plants under construction at that time (around a total of 5,000 MWe of installed capacity). The temporary moratorium on nuclear power plants was resolved in 1994, when Law 40/1994 (Ley 40/1994, de 30 de Diciembre, de Ordenación del Sistema Eléctrico Nacional) established the dismantling of the five plants.

in 2001.[8] Among other functions, the CNC is responsible for: preparing and presenting to the Government, for its approval, the Spanish Climate Change Strategy (Estrategia Española sobre cambio climático para el cumplimiento del Protocolo de Kioto); the monitoring of the implementation of the Spanish Climate Change Strategy; gathering information from appropriate institutions; and preparing proposals and recommendations to define policies and measures to address climate change in the areas of research, impacts and adaptation, and mitigation of GHG emissions.

13. To ensure the involvement of all stakeholders, representatives from a broad spectrum of government and non-governmental entities participate in the plenary of the CNC.[9] The extensive cross-section of representatives from the central administration, CCAAs and local entities, environmental and business and industry NGOs, chambers of commerce, senior experts, consumer associations and trade unions is an important step towards the full involvement of all the actors that may be affected by climate change issues.

14. An important institutional development was the creation of the OECC, established in 2001 through Royal Decree (376/2001). The OECC acts as the secretariat for the CNC. It has also established three working groups with representatives from the central government and the business community: one to address issues on emissions trading, one on sectoral policies and measures for GHG mitigation and one on Joint Implementation and the clean development mechanism (JI/CDM). In 2002, Spain initiated the preparation of the new Spanish Climate Change Strategy, with inputs from representatives of several Ministries, the CCAAs, local entities, trade unions, chambers of commerce, and environmental, business, industry and consumer NGOs. For the first time, a climate change strategy is being formulated with the participation of all stakeholders.

15. This latest strategy was under discussion and negotiation at the time of the review. Negotiations have since concluded and it is now pending approval by the plenary of the CNC, after which the Strategy will be submitted to the Council of Ministries for adoption.

16. In July 2001, an Interministerial Coordinating Commission to prepare a Strategy on Sustainable Development (Comisión Interministerial de Coordinación de la Estrategia Española de Desarrollo Sostenible) was established. The OECC ensures that the objectives of the strategy developed by this group are compatible with those of the Spanish Climate Change Strategy.

17. The Kyoto Protocol commits the EC to an 8 per cent reduction in GHG emissions in the first commitment period (2008–2012). In order to achieve this reduction, under the EC burden-sharing agreement, Spain must ensure that its GHG emissions do not exceed the base year level (289 Mt CO_2 equivalent[10]) by more than 15 per cent in 2008–2012 (332 Mt CO_2 equivalent[8]). In 2000, Spain's total GHG emissions were 34.6 per cent higher than in 1990, or 33.6 per cent higher than in the base year.

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[8] The modification of the CNC and its new responsibilities are stated in Royal Decree 1188/2001, of 2 November 2001, which regulates the composition and functions of the National Climate Council with increased participation and transparency in the decision-making process.

[9] In addition to the Ministry of Environment and its Minister, other representatives include: General Directors of the Ministries of Foreign Affairs, of Finance, of Home Affairs, of Promotion, of Education, Culture and Sport, of Agriculture, Fisheries and Food, of the Presidency, of Public Administrations, of Health and Consumption, of Economy, of Science and Technology, designated by the respective Ministers; representatives of all the CCAAs; three representatives of the Local Entities Association; two delegates of the most representative business and industry NGOs; a representative of the Council of Chambers of Commerce; two senior environmental experts, designated by the Ministry of the Environment; three delegates of the most representative environmental NGOs; two senior environmental experts, designated by the Ministry of Science and Technology; two delegates of the most representative national trade unions; two representatives of the Council of Consumers and Users.

[10] These figures are preliminary.

Under the rules of EC accession, Spain must achieve economic growth in keeping with EC average, but at the same time it is faced with the challenge of reducing GHG emissions.

II. GREENHOUSE GAS INVENTORY INFORMATION

18. The NC3 inventory covers the period from 1990 to 1999 and includes information on all GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6),[11] nitrogen oxides (NO_X), carbon monoxide (CO), non-methane volatile organic compounds (NMVOC) and sulphur dioxide (SO_2), as well as CO_2 removals. Emissions from fuels used in international aviation and marine transportation and CO_2 emissions from biomass were also presented. The NC3 inventory series is more extensive than the one in the NC2 and is presented in accordance with the UNFCCC guidelines on national communications.[12] The inventories are also consistent with Spain's inventory submission to the UNFCCC in 2001. During the visit, the review team received updated summary inventories for the entire time series from 1990 to 2001. The updated inventories are used in the analysis below.

A. Inventory preparation

19. The national GHG inventory is prepared by the Directorate-General for Environmental Quality and Assessment of the MoE, which is responsible for its overall preparation, coordination, updating and submission to the UNFCCC and to the EC. It is prepared as part of the national inventory of atmospheric pollutants (such as ozone precursors, heavy metals and persistent organic pollutants), which is used both in meeting national requirements, for example in designing and evaluating national policies and measures, and in complying with other international reporting requirements on air emissions and pollutants. The Directorate-General for Conservation of Nature prepares the national forestry inventory as well as GHG data on land-use change and forestry (LUCF) for the UNFCCC inventories.

20. The inventory presented in the NC3 is well prepared, comprehensive and transparent. In terms of completeness, it constitutes a major improvement over the NC2, where estimates for HFCs, PFCs and SF_6 were not included. For the LUCF sector, the inventory covers estimates from CO_2 fluxes from forest biomass, but not CO_2 estimates from soils and abandonment of managed lands, nor CH_4 and N_2O emission estimates from forest fires.

21. Inventory data are consistent with the corresponding data in the annual 2001 inventory submission (1990–1999 inventories). The analysis of emission trends in the NC3 appeared limited, but the factors underlying the observable trends were discussed during the review team's visit.

22. The major part of the national inventory is prepared using the CORINAIR methodology, and covers all activities of the latest Selected Nomenclature for Air Pollution (SNAP) which is harmonized with the categories of the revised 1996 IPCC Guidelines.[13] For the categories other than fuel combustion, i.e. for industrial processes, agriculture and waste, emissions are estimated mainly using IPCC methods. For a small number of sources, estimates are based on direct measurements, for example for the estimation of HFC-23. Large installations that produce high levels of emissions (such as power stations; petrol refineries; and chemical, metal and paper industry installations) are included as point sources in the inventory. Emission factors are to a large extent taken from the IPCC Guidelines and CORINAIR guidebook, but country-specific factors are also used.

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[11] For all fluorinated gases, only actual emissions are presented.

[12] Document FCCC/CP/1999/7.

[13] "Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories", Intergovernmental Panel on Climate Change (IPCC), 1996.

23. Statistical information on activity data is obtained mainly from statistical publications, which are provided annually through the relevant ministries (Ministry of Economy, Ministry of Agriculture, Fisheries and Food, Ministry of Science and Technology). Data by sector are also obtained through the relevant industry associations, or, in the case of large point sources, directly from the facilities in the form of questionnaires. To a large extent, such sectoral data are provided on a voluntary basis, upon request by the MoE. International data sources are also used in the preparation of the national inventory; for example, energy balance sheets from EUROSTAT and energy statistics from the International Energy Agency (IEA) for estimating emissions from international aviation.

24. Estimates of CO_2 removals from changes in forest and other woody biomass stocks were prepared as part of Spain's Forestry Plan using a country-specific methodology together with country-specific factors and parameters. Although during the inventoried time period there were increases in the wooded area of forest (by about 828,000 hectares (ha), corresponding to a 5.9 per cent increase compared to 1990), as well as in the wood density, a constant CO_2 removal estimate has been reported for all years since 1990. This was explained by the fact that the major data source is still the Second National Forest Inventory (covering 1986–1995) and the reported estimate constitutes only an averaged value. The Third National Forest Inventory, currently under preparation, covers the period 1996–2005, and will be finalized in 2006.

25. The Spanish Forestry Plan encompasses activities that will contribute to improving the upcoming national forest inventory and hence GHG estimates. For example, the extrapolation of regionally collected forest data (such as detailed expansion factors) to the entire forest inventory, the establishment of comprehensive forestry statistics, and research on expansion factors (above-ground biomass) and carbon stocks in forest soils are envisaged. Although preliminary estimates of the rates of carbon capture by Mediterranean soils exist, national experts do not consider them to be reliable.

26. The national inventory is prepared on a continuous basis and updated annually, with recalculations back to 1990 as needed. The 1990 emissions reported in the NC3 were revised upwards by 0.2 per cent compared to the NC2 data. Ongoing revisions and an improved harmonization between the CORINAIR and IPCC categories has allowed inventory experts in Spain to address inaccuracies and reporting problems identified during the in-depth review of the NC2.

27. Recalculations were performed for all gases and sectors, except LUCF, for all years since the NC3. This resulted in an overall downward revision of all years (6 per cent for 1990), but a notable increase in the trend: emissions in 1999 were 24.3 per cent higher than in 1990 according to the NC3, and 29 per cent after recalculations.

28. The inventories prepared after the NC3 demonstrate that considerable improvements have been made, not only with regard to the actual emission estimation but also in the overall inventory preparation, for example by implementing stepwise elements from the IPCC good practice guidance.[14] Those include ongoing efforts to implement a quality assurance/quality control system and to estimate uncertainties in a quantitative manner. (In the NC3 uncertainties were estimated qualitatively for all gases and processes.) Plans are under way to prepare a quantitative assessment of uncertainties for CO_2 and SO_2 in the first instance, and for CH_4 and N_2O by 2004.

29. The review team noted that, besides the national inventory preparation, considerable work on inventories is also undertaken by the CCAAs, some of which presented their regional inventories to the review team. Although those inventories are not used directly in the preparation of the national

[14] "IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories" (hereinafter referred to as the IPCC good practice guidance).

inventory, efforts are made to achieve coherence in methods and adherence to the IPCC guidelines. The team was informed that since 2002, Spain has started to establish national registries of emissions and sources of pollutants (EPER) in order to implement the provisions of the European Integrated Pollution Prevention and Control (IPPC) directive.

B. Overall emission trends

30. Spain's total GHG emissions (excluding LUCF) increased by 34.6 per cent between 1990 and 2000. This increase was mainly attributable to sizeable rises in the three main GHGs, which increased by 35.5 (CO_2), 29.8 (CH_4) and 15.6 per cent (N_2O) (see table 2 and figure 2). Emissions of the fluorinated gases (HFCs, PFCs and SF_6) increased by 167 per cent in the same period, with HFCs and SF_6 increasing by 240 and 279 per cent respectively, while PFCs decreased by 51 per cent. The LUCF sector constitutes a net sink of CO_2, for which a constant estimate has been reported for the entire period. For the LUCF sector a constant estimate of approximately 29,250 Gg removals was provided for every year in the period 1990–2000, a figure that has been maintained since the NC3.

Table 2. GHG emissions by gas, 1990–2000

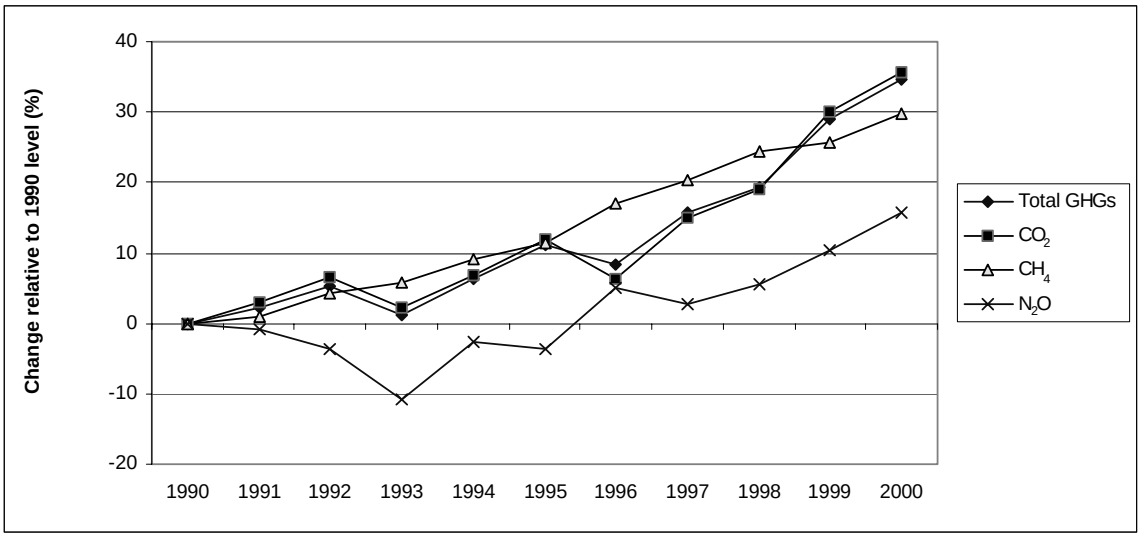
	Tg CO_2 equivalent											Change[a] 1990–2000 (%)
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	
CO_2	227.4	234.2	242.2	232.5	242.7	254.4	241.9	261.7	270.6	295.5	308.2	35.5
CH_4	30.3	30.6	31.6	32.0	33.1	33.8	35.4	36.5	37.7	38.1	39.3	29.8
N_2O	26.6	26.4	25.6	23.7	26.0	25.7	28.0	27.4	28.1	29.4	30.8	15.6
HFCs	2.4	2.2	2.8	2.3	3.5	4.6	5.2	6.1	5.8	7.2	8.2	240.0
PFCs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.4	–51.1
SF_6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	278.5
HFCs+PFCs+SF_6	3.3	3.0	3.6	3.1	4.3	5.5	6.1	7.0	6.7	8.0	8.8	167.3
CO_2 removals (LUCF)	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	0.0
GHG total[b]	**287.6**	**294.2**	**303.1**	**291.3**	**306.1**	**319.4**	**311.4**	**332.5**	**343.1**	**371.1**	**387.1**	**34.6**

Source: Updated inventory provided during the review, which corresponds to the annual inventory submission 2003.

[a] Discrepancies in totals are due to rounding errors.

[b] The GHG total does not include CO_2 removals from LUCF.

Figure 2. Relative changes in GHG emissions, 1990–2000



31. Spain's emission profile had not changed significantly by the end of the decade. CO_2 continued to be the most important gas, contributing 79.6 per cent to total emissions in 2000 (79.1 per cent in 1990). The share of N_2O decreased from 9.3 in 1990 to 8.0 per cent in 2000, while that of CH_4 decreased slightly from 10.5 to 10.2 per cent. The share of HFCs, PFCs and SF_6 more than doubled (from 1.1 to 2.3 per cent) in the same period.

32. The growth in emissions reflected the increasing energy demand driven by strong economic growth rate. In addition, the increased industrial energy demand was mainly satisfied through increased fossil fuel consumption. Despite the overall increasing trend, however, annual decreases with respect to the previous years' emissions can be observed in 1993, 1996 and 2001. These annual reductions resulted from higher rainfall and hence more availability of hydropower and less dependence on fossil fuels for energy generation in those years. A decline in economic performance also contributed to a decrease in emissions in 1993.

C. Key emission sources and sectoral trends

33. The key contributors to Spain's national GHG total, accounting for about 70 per cent of total emissions in 2000, are CO_2 emissions from stationary combustion (which includes energy generation, manufacturing industries and energy uses in the residential-commercial sector) together with CO_2 emissions from the transport sector.

34. The review team noted the following trends between 1990 and 2000 as being particularly important: a substantial increase in energy-related CO_2 emissions (38 per cent) from fuel combustion, in particular from transport (48 per cent); a sizeable increase in total CH_4 emissions (almost 30 per cent) and N_2O emissions (about 15 per cent); and fluctuations in emissions of the individual fluorinated gases with an overall increasing trend. These trends reflect the overall increase in emissions.

35. Sizeable increases were also experienced in all other sectors; the overall increase in emissions from industrial processes was about 36 per cent and that from agriculture about 17 per cent. The largest increase was noted for the waste sector, which increased by 55 per cent during the decade. Table 3 shows GHG emissions by major sectors for the period 1990–2000.

Table 3. GHG emissions by sector and subsector, 1990–2000

	Tg CO_2 equivalent											Change[a] 1990–2000
	1990	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**(%)**
Energy	216.9	224.4	234.0	224.6	233.2	244.8	232.3	251.6	259.5	283.9	296.5	36.7
Energy industries	78.0	78.8	86.5	80.3	80.6	86.5	73.9	85.9	84.9	100.9	105.5	35.2
Manufacturing industries and construction	46.2	47.6	46.4	45.1	49.6	55.1	49.2	55.0	55.8	58.3	61.8	33.7
Transport	58.5	60.4	63.7	63.0	66.0	67.0	71.7	72.5	79.7	84.8	87.3	49.2
Other sectors	27.5	31.2	30.8	30.0	31.1	30.8	31.9	32.0	32.7	34.3	35.6	29.5
Fugitive emissions	6.7	6.4	6.5	6.1	5.9	5.4	5.6	6.2	6.4	5.7	6.3	–5.9
Industrial processes	22.6	21.4	20.1	18.6	22.3	24.7	25.0	26.7	27.4	29.6	30.7	36.1
Solvents	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.6	1.7	1.7	28.4
Agriculture	37.4	37.2	36.9	35.6	37.5	36.8	40.3	39.6	40.9	41.9	43.6	16.8
LUCF	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	–29.3	0.0
Waste	9.4	9.9	10.6	11.3	11.7	11.7	12.4	13.1	13.6	14.0	14.5	54.7
GHG (with LUCF)	**258.4**	**265.0**	**273.8**	**262.1**	**276.8**	**290.1**	**282.1**	**303.3**	**313.8**	**341.8**	**357.9**	**38.5**

Note: Updated inventory provided during the review, which corresponds to the annual inventory submission 2003.

[a] Discrepancies in totals are due to rounding errors.

36. The notable rise in energy-related CO_2 emissions was to a large extent driven by the transport sector, which rose by 49 per cent between 1990 and 2000, and by 2001 had risen by 55 per cent compared to 1990. Road transport is the dominant contributor to this trend, constituting around 90 per cent of total CO_2 emissions from transport. It rose by 49 per cent during the decade, reflecting the rapid growth in the use of private passenger cars (high motorization rate), and increase in highways and road construction. The number of vehicles (private cars, lorries and motorcycles) rose by 36 per cent from 1990 to 2000. There was also an increase in the average length of trips, more use of cars in urban areas and an increase in the average size of vehicles. The volume of goods transported by road also increased by 40 per cent. Currently, road transport accounts for 80 per cent of the national transportation of goods.

37. All other subsectors within the energy sector also experienced substantial increases (around 34–35 per cent in the energy generation and manufacturing sectors respectively, followed by 31 per cent in the residential-commercial sector). In absolute terms, emissions growth in the energy industries (27.5 Tg CO_2 equivalent) was comparable to the growth in the transport sector (28.8 Tg CO_2 equivalent), reflecting the steady increase in energy and electricity demand. These emission trends largely reflect the overall improved socio-economic situation in Spain during the 1990s which was characterized by strong economic growth,[15] a construction boom (150,000 new buildings every year), an increase in the size of houses, an increase in the overall use of domestic electrical appliances, the introduction of domestic central heating systems, and the resulting continuously increasing demand for electricity consumption, including significant additional energy demands resulting from tourism.

38. CH_4 emissions were largely driven by a substantial increase in CH_4 emissions from waste disposal (87 per cent between 1990 and 2000), and in 2000 waste was the second largest source of CH_4. This is to a large extent the result of the ongoing replacement of unmanaged waste disposal sites by managed landfills. The amount of waste disposed of in managed landfills increased by 85 per cent in 2000, whereas amounts disposed of in unmanaged sites decreased by 41 per cent in the same period. The 20 per cent increase in agricultural emissions, which is the largest source of Spain's total CH_4 emissions in 2000 (59 per cent), reflects the rises in livestock-related emissions – enteric fermentation (12.6 per cent) and manure management (35.7 per cent) – mainly because of the increase in numbers of cattle and pigs (by 20 per cent and 44 per cent, respectively).

39. CH_4 emissions from fugitive fuels generally declined (–14.4 per cent). Emissions from coal mining and handling fell by 33 per cent between 1990 and 2000, as a result of the closure of coal mines. This trend was, however, partially offset by a 42 per cent growth in emissions from oil and natural gas, reflecting the continuous growth in natural gas consumption.

40. Notable trends in N_2O emissions were observed in road transport; these emissions more than doubled over the decade. This reflects not only the introduction of catalytic converters but also the rapid growth in the transport sector. There were also sizeable increases in stationary sources of the energy sector. A decline in nitric acid production reduced emissions from the chemical industry by 20 per cent between 1990 and 2000.

41. Emissions were also reduced in other industrial sectors, for example from ammonia production, and between 1990 and 2000 there was a 56 per cent decrease in PFC emissions from aluminium production, due to improved technology (smelter anode effect). Conversely, HFCs from the production

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[15] Final energy demand of the industrial sector, as a whole, increased by about 43 per cent from 1990 to 2001. The individual growth rates for some energy-intensive branches were also notable: +51 per cent for the chemical/petrochemical industry, +30 per cent for the iron and steel industry, +55 per cent for non-metallic minerals.

of halocarbons increased by 166 per cent between 1990 and 2000, although these emissions are currently declining as a result of the introduction of gas-capturing facilities in one plant.

42. Although they are not part of Spain's total national GHG emissions, the review team noted the large increase in emissions from international aviation, which rose by almost 142 per cent by 2000. The NC3 did not compare the projections in the NC2 with those in the NC3. The review team also noted a significant discrepancy in the predicted trend according to the projections in the NC2/IDR2, which projected CO_2 emissions to increase in 2000 by 14 per cent over 1990 levels, CH_4 to increase by 8 per cent and N_2O to be maintained at 1990 levels. In 2000, actual emissions of CO_2 increased by 35.5 per cent, CH_4 by 29.8 per cent and N_2O by 15.6 per cent compared to 1990. Emissions from fuel combustion increased by 38 per cent overall.

III. POLICIES AND MEASURES

43. In general, reporting on policies and measures in the NC3 complied with the UNFCCC guidelines. For each sector, there was a clear itemization of some important policies and measures implemented and planned for limiting growth of GHG emissions, and of the institutions responsible for ensuring their application. The NC3 presented a comprehensive description of the institutional complexities between central government and CCAAs, associated with planning and implementing policies and measures. However, the review team noted that the NC3 provided limited information on the GHG mitigation effect of most of the individual policies and measures implemented and planned. Estimates of the GHG mitigation impact in terms of CO_2 equivalent were presented only in a few cases (mainly for agriculture but also for energy, forestry and transport).

44. National experts explained that in addition to methodological difficulties in assessing the mitigation effects of each policy, the decentralization of decision-making between central government and the CCAAs has made it difficult to monitor the status of implementation of policies and measures. While recognizing these methodological difficulties, the review team reiterated the importance of quantifying these effects for formulating and implementing the Spanish Climate Change Strategy, and for its possible modification in the medium term if the emission reductions objectives are not on track.

45. The initial target for Spain as a member of the EC was to limit the increase of energy-related CO_2 emissions to 25 per cent between 1990 and 2000. In 1995, the government announced that the economic slowdown in 1992–1994 would allow Spain to lower its energy-related CO_2 emissions targets to 16–20 per cent. However, in 2000, energy-related CO_2 emissions from fuel combustion were 38 per cent above 1990 levels.

A. Institutional and policy framework for sectoral planning

46. The Spanish Climate Change Strategy (see paragraph 12) has formed the basis for the formulation and implementation of sectoral policies and measures to mitigate GHG emissions.

47. Policy-making at the EC level also plays an important role in defining national action to combat climate change in Spain, and to date most of the policies and measures for climate change have been implemented in the context of adapting and transposing EC legislation at a national level. The review team was informed that Spain is actively engaged in preparing for its entry to the EC emissions trading scheme by 2005, as well as in evaluating the extent to which it may utilize the other international flexibility mechanisms in meeting its GHG emission commitments under the Kyoto Protocol.

48. Since the NC2, there have been many institutional changes that affect the planning and implementation of sectoral policies in general and climate policy in particular. For example, before May 2000, energy policy and planning was the responsibility of the Ministry of Industry and Energy.

These tasks have been transferred to the Office of the State Secretary for Industrial Development, Energy and Small and Medium-sized Enterprises, where there are three directorates with responsibilities for industrial development and regional incentives, small and medium-sized enterprises, and energy and mining. Within this arrangement the central government is involved mostly in fiscal measures, the regulation of tariff structures, energy pricing and, to some extent, in the development of the structure of the national energy profile.[16] The CCAAs now play an important role in promoting the use of renewables and are directly responsible for environmental issues relating to energy production and use, and environmental taxation. These institutional complexities pose a challenge to implementation, monitoring and evaluating of policies and measures in meeting their GHG mitigation objectives.

49. The OECC was created in 2001 to also encourage and promote policies and measures that have climate change benefits and to promote the preparation of the national strategy for climate change and the establishment of mechanisms to monitor the process.

50. The implementation of policies and measures specifically for climate change is still at an early stage, although many policies and measures implemented in compliance with EC directives have had some benefits in terms of GHG reduction. However, the team questioned the effectiveness of current policies and measures for modifying longer-term trends in anthropogenic GHG emissions and removals, taking into account that emissions have grown more than expected.

51. It is worth mentioning that some CCAAs have made remarkable progress in implementing policies and measures with GHG mitigation benefits. For example, in February 2003 the Comunidad Autónoma of Andalucía adopted a strategy for climate change with institutional mechanisms for follow-up. Various other CCAAs have prepared their own GHG inventories. They are also directly responsible for implementing the integrated pollution directive of the EC as established in the Spanish Act 16/2002 of 1 July 2002. Under this Act, the CCAAs directly provide integrated environmental licences to facilities.

52. Although no cross-sectoral policies and measures are reported in the NC3, the review team was informed of the restructuring of energy taxes introduced, in part, to meet Spain's target under the Kyoto Protocol. Energy taxes are set by the central government, which recently introduced a fiscal amendment to the tax structure for fuels, i.e. a special regime of zero tax for biofuels, as contained in Act 24/2001 (31 December 2001). This required an amendment of the Act of 38/1992 on special taxes for fuels.

53. The energy sector (excluding transport) accounted for 54.0 per cent of total GHG emissions in 2000, representing a marginal decrease from 54.8 per cent in 1990. The sector's emissions increased by 32.1 per cent between 1990 and 2000. Given that more than 90 per cent of CO_2 emissions originate from energy-related activities, this sector was covered in great detail in the NC3 and updated with information provided during the review from experts at the Ministry of Economy's General Directorate on Energy Policy and Mines.[17]

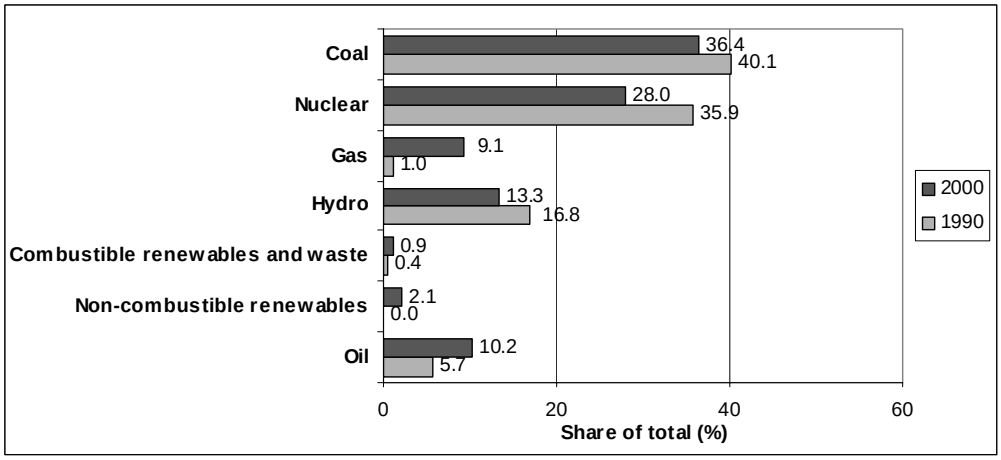
54. Spain depends on imports for 90 per cent of its oil and gas needs and 50 per cent of its coal supplies. The share of domestically mined coal in the energy balance continues to decline, as this fuel is not competitive and is not favoured by environmental policy. On the other hand, natural gas is growing in importance for use in power generation, industries and households. About 70 per cent of the gas supply comes from Algeria and Libya. Spain's seven nuclear power plants (nine nuclear groups), with a

[16] Central government also oversees basic energy legislation, power plants over 50 MW, energy transmission planning, research and development in energy.

[17] More information is available in the yearbook "Energy in Spain 2001" (Dirección General de Política Energética y Minas, Subdirección General de Planificación Energética. Ministerio de Economía, Madrid, 2002).

total gross generating capacity of about 7,800 MW, accounted for 28 per cent of power generation in 2000 (see figure 3). Renewable energy, mainly hydro, accounts for 36 per cent of electricity generation capacity.

Figure 3. Use of fuels for electricity generation, 1990–2000



Source: "Energy balances of OECD countries, 1999–2000", OECD/IEA, Paris, 2002; IEA energy statistics (http://data.iea.org/ieastore/default.asp).
Note: The sum of shares may not be exactly 100 per cent because of rounding.

55. In the past, energy policy was set out periodically in a series of National Energy Plans. The main goals of energy policy were to ensure security of supply, increase the share of domestic energy sources, diversify energy supply, reduce the cost of energy supply, increase energy use efficiency, adapt EC rules and incorporate environmental protection into energy policies. The 1997 Electric Power Act, the 1998 Hydrocarbon Act and the Plan for Developing Renewable Energies complemented the last energy plan of 1991–2000. The first two are aimed at liberalizing the energy sector. The Renewables Plan, as well as most other measures in the sector, is part of the EC-wide policies that are implemented by the CCAAs.

56. Energy policy at the national level is formulated to ensure competitiveness in supplying energy, reducing the cost of energy for final consumers, improving energy efficiency, reducing GHG emissions, and promoting clean energy and new technologies. Most of the GHG mitigation measures are in the following categories: liberalization of the electricity sector and expansion in the use of natural gas; plan for developing renewable energy in accordance with the EC's White Paper on Renewable Energy; promotion of energy conservation and efficient use of energy; voluntary agreements with industry; and technology development and research.

57. The NC3 reports that notable progress has been made in the liberalization of electricity, gas and oil; the government has decided to fully liberalize the electricity and gas sectors by the end of 2003, sooner than required by the EC directives. The main challenge in the liberalization of the electricity and gas sectors will be to ensure an energy supply that satisfies a growing energy demand while at the same time reducing the growth of GHG emissions. The review team is of the view that a liberalized energy market might not have a substantial effect on mitigating GHG emissions, as electricity demand is expected to continue to grow in the future.

58. Since the preparation of the NC3, a new plan[18] for gas and electricity has been adopted with the objective of substituting coal and oil power plants by combined-cycle natural gas plants and renewable

[18] Plan for the development of the electricity and gas sectors: Development of transport network 2002–2011 (Planificación de los sectores de electricidad y gas: Desarrollo de las redes de transporte 2002–2011).

energies (13,000 MWe wind energy capacity by 2011), and this is expected to curb the growth of total GHG emissions, especially CO_2 emissions. The number of combined-cycle plants is estimated to increase from 7 in 2002 (installed capacity 2,800 MW) to 79 in 2011 (installed capacity 31,800 MW). Under this plan, a total of 5,179 km of gas pipelines is planned, which will cost €1,331 million for the pipelines themselves, €2,647 million for regasification plants, €311 million for pressure stations and €945 million for underground storage.

59. In the NC2, it was reported that the Energy Saving and Efficiency Plan (Plan de Ahorro y Eficiencia Energetica, PAEE)[19] set a target to increase the use of renewables in Spain by 1.1 Mtoe by 2000. Various measures were taken to meet this target, including the allocation of national and EC funding. During the review the team learned that these measures have been successful and the PAEE targets have been exceeded. The contribution of renewables to primary energy supply in 2000 was 3.6 per cent (excluding hydropower; 5.6 per cent with hydropower).[20] Installed capacity for electricity production from hydropower was 31.4 per cent and other renewables (wind, solar and biomass) accounted for 5 per cent (3,383 MW) of the total (57,424 MW). After 1998, wind capacity grew sharply, reaching an installed capacity of 2,884 MW in 2000.[21]

60. As part of its future GHG strategy, and as a result of the success of the PAEE, the government introduced a new Plan for the Promotion of Renewable Energy in Spain (Plan de Fomento de las Energías Renovables en España, PFER) for increasing the use of renewable energy sources, co-generation and wastes (under 50 MW) with a special incentive programme and direct economic benefits. The Institute for Diversification and Energy Saving (Instituto para la Diversificatión y el Ahorro Energético, IDAE) prepared the PFER in 1999,[22] in collaboration with the former Ministry of Industry and Energy, the CCAAs and various agencies. New targets have been set to achieve a 12 per cent share of total primary energy (or 29.5 per cent of electricity consumption) by 2010, in line with the EC target established in the EC White Paper for Renewable Energy Sources.

61. If the PFER is implemented fully, by 2010 the quantity of primary energy provided by renewables will more than double compared to 2000 levels. Most of the increase in renewables is expected to come from biomass and wind. Waste from forestry, wood processing industries and agriculture, and energy crops are also expected to be important biomass sources. At the time of the review, concrete policy measures were being formulated to put the PFER into action.

62. The IDAE is responsible for promotion of energy conservation and efficient use of energy. It reports to the Ministry of Economy. The PAEE had set quantitative targets for energy conservation in several sectors. The IDAE managed and monitored the first few years of the PAEE, but then the CCAAs took over the responsibility of managing the PAEE and the IDAE monitored progress. The target for energy saving in the industrial sector, 2,261 thousand tonnes of oil equivalent (ktoe) by 2000, was almost achieved (2,185 ktoe). The targets for transport and energy use in buildings were not reached.[23]

63. For the future, and as part of the EC-wide policies on improving energy efficiency in buildings, Spain is targeting residential, commercial and institutional buildings. Space heating and water heating account for most of the energy consumed by buildings, followed by lighting and appliances. Policies are

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[19] The PAEE was established in the National Energy Plan 1991.

[20] CCAAs provide permits and licences for co-generation and the use of renewable facilities under 50 MW.

[21] Spain is the third largest wind power generator in the world after the United States and Germany.

[22] Agreement of Council of Ministers of 30 December 1999. The PFER is the government's response to a commitment of the electricity sector included in Law 54/1997 of 27 November. .

[23] Targets for transport and energy use in buildings were 1,645 ktoe and 927 ktoe respectively. Cumulated savings between 1991 and 1999 were estimated at 148 ktoe for transport and 331 ktoe for buildings.

aimed at providing incentives, as well as increasing consumer awareness of energy conservation. Actions focus on promoting specific measures to ensure that heating, cooling and hot-water systems in new and renovated buildings are energy efficient. This will be achieved through local information schemes, the certification of installations, and by training installation companies/engineers about energy efficiency requirements contained in Spain's Technical Codes for Building (Código Técnico de la Edificación). These measures are expected to result in total annual energy savings of nearly 2,200 ktoe and are estimated to cost more than €19 billion by 2011.

64. Since 1994, voluntary agreements to improve energy efficiency have been signed with 10 industrial associations representing sectors that are large energy consumers, including pulp and paper, ceramics, glass manufacturing sector, tanneries, cement, food chemicals, textiles and automobile equipment. These agreements included actions aimed at energy saving, the installation of co-generation systems and promoting the use of natural gas and biomass. The Institute of Diversification and Energy Savings (IDAE) has estimated that these agreements have accounted for energy savings of 641 ktoe and the installation of 285 MW of co-generation facilities. The IDAE is now targeting energy efficiency projects in approximately 140 small and medium enterprises. It was also noted that energy companies[24] may switch from voluntary agreements, as some have started discussions on the use of the EC scheme of emissions trading and flexibility mechanisms under the Kyoto Protocol.

B. Transport

65. Between 1990 and 2000 GHG emissions from transport in Spain increased by 49.2 per cent, representing an annual average growth of 4.1 per cent over the decade. Transport emissions are the second-largest sector, accounting for 22.6 per cent of total GHG emissions in 2000 (compared to 20.3 per cent in 1990). In the transport sector the division of responsibilities between the central government and the CCAAs is very important for the implementation of policies and measures. The central government is responsible for setting the basic laws governing all modes of transport, as well as regulating and developing transport infrastructure that involve more than one CCAA.

66. The review team found that although the GHG impact of various factors in transport growth has not been quantified, the factors driving the growth in transport and the resulting emissions of CO_2 are well documented in the NC3. Spain has identified nine initiatives that are already in progress to reverse the GHG growth trend in this sector; three more have been adopted and will be implemented shortly. These include tax relief, differentiated tax rates for low- and high-octane lead-free gasoline, regulatory measures, voluntary agreements on fuel efficiency with vehicle manufacturers, and introduction of a modal shift from road to rail for passenger and freight transport.

67. Information presented during the review helped the team to reach a deeper understanding of the reasons for the increase in GHG emissions in the sector over the decade, as well as the plans that are expected to address these issues. Between 1995 and 2000 there was a large increase in the number of vehicles, modernization of the vehicle fleet and an extension of the high-quality road network. As a result of an intensive road-building programme in the 1980 and 1990s, Spain has relatively good roads between cities. In 1990 the total number of vehicles in Spain was estimated at 16.5 million; by 1999 this had increased to 22.4 million. Freight transported from ports also increased by 41 per cent, from 248 million tonnes in 1990 to 338 million tonnes in 2000. In addition, Spain produced more than 3 million vehicles in 2000, consolidating its position as one of the leading vehicle manufacturers in Europe, but complicating its management of GHG emissions in the sector.

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[24] Some electricity companies have participated in the first and second CO_2 emissions and electricity simulations organized by Eurelectric in 1999 and 2000.

68. Measures for reducing GHG emissions from transport are contained in the Transport Infrastructure Plan 2000–2007. The modal shift from road to rail for both passenger and freight transport is expected to reverse the upward trend in GHG emissions. In the plan the central government committed itself to increasing the proportion of rail traffic (for both passenger and freight transport) between 2000 and 2011 through the development of transport infrastructure. The central government has already approved €41 billion for transport infrastructure development between 2000 and 2007. These funds will be used to extend the high-speed train network between Madrid and Sevilla by 2000, and to upgrade the current rail system, including the construction of a high-speed rail link between Madrid and Barcelona by 2005. A modal change from road to rail is expected to help reduce the volume of goods transported by road in the future.

69. Transport fuel prices in Spain are among the lowest in Europe. Pre-tax prices are at approximately the same level as the European average, but the taxes on fuels are lower. The NC3 reports three fiscal measures that could have a positive effect on GHG emissions from this sector. These include the revision in the tax structure on low- and high-octane lead-free gasoline; the regulation of local taxes to ensure a 50 per cent rebate on fuel taxes in vehicles that use environmentally friendly fuels; and a rebate of 10 per cent of total investments by businesses that provide environmentally friendly transport services.

70. A new measure, not included in the NC3 but reported in the presentations to the review team, related to the promotion of short-distance maritime transport, through intermodal promotion with other EC countries, as well as door-to-door transport chains. The GHG reduction potential of this measure was not estimated.

71. The review team noted the importance of coordination between the central government and the CCAAs in developing public transport policy. Extensive consultations were required for the preparation of the Transport Infrastructure Plan 2000–2007 and more may be necessary to ensure that the plan is implemented as planned in order for it to have a sizable impact on GHG emissions.

C. Industry

72. The contribution of industrial processes to overall GHG emissions in Spain decreased from 8.7 per cent in 1990 to 7.9 per cent in 2000, but emissions increased by 36.1 per cent between 1990 and 2000. Most of the increase came from the production of fluorinated gases (HFCs and SF_6) in the chemical industries. Measures to reduce GHG emissions from industrial processes are part of the EC PROFIT Initiative,[25] which was introduced in March 2000. These projects, as well as earlier ones, are intended to promote scientific research and technological development projects to reduce the consumption of HFCs, PFCs and SF_6 in industry. The review team understands the methodological constraints associated with estimating the GHG mitigation effects of such projects, but the absence of details on technologies that have been successfully used commercially under these projects since 1994 led the team to question the usefulness of these projects in mitigating GHGs in the sector.

73. One project that could lead to a reduction of GHG emissions in this sector is the implementation of the EC Directive on Integrated Pollution Prevention and Control (IPPC).[26] During the review, details were provided of Spain's timetable for transposing the EC Directive on the IPPC into its national legislation and the role of the CCAAs in ensuring its timely implementation. An estimation of the GHG

[25] This program was initiated in 1994 under the PITMA project "Programa de Inversion en Tecnología y Medio Ambiente". On its completion in 1996 PITMA was replaced by a new project titled "Apoyo a la Tecnología, la Seguridad y la Calidad de la Industría" (ATYCA) which was implemented in 1997–1999. This project was then replaced by "El Programa de Fomento de la Investigación Técnica" (PROFIT).

[26] Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control.

reduction potential of this initiative would be very useful in analysing the importance of the IPPC for emissions reduction.

D. Agriculture

74. GHG emissions in the agriculture sector accounted for 12 per cent of total GHG emissions in 2000 and increased by 16.8 per cent in the last decade. The NC3 reported 20 comprehensive measures with GHG reduction potential on a gas-by-gas basis by 2005. These measures are expected to result in a total reduction of emissions of 14.8 Tg CO_2 equivalent by 2005. Although the Ministry of Agriculture, Fisheries and Food oversees policy direction in this sector, most of these measures are implemented by the CCAAs to encourage environmentally friendly agricultural practices. Many such measures are integrated into regional agricultural development plans and are implemented in line with the Common Agricultural Policy of the EC and its related Good Agricultural Practices Codes.

75. The most important measure in terms of emissions reduction is the increase of land use for biomass production (800,000–1,000,00 ha) by 2010, aimed at fuel switching within the energy sector in the framework of the national plan for renewable energy. This is estimated to reduce GHG emissions by 10 million tonnes CO_2 equivalent by 2005. Other measures that are expected to have substantial impacts on future CH_4 levels include increasing feed digestibility in livestock, which is expected to reduce emissions by 1.2 million tonnes CO_2 equivalent reduction for 2005. The review team was not fully convinced by these estimates, given that livestock populations, which increased by 14 per cent between 1990 and 2000, are not expected to decrease in the future.

76. To curb growth of N_2O emissions in the sector, under the Action Programme in Areas Vulnerable to Nitrate Contamination, fertilizers used in such areas would be reduced by 56,000 tonnes annually. This measure will be complemented by training programmes for farmers and public awareness campaigns on reducing the use of fertilizers in farming.

77. In order to monitor whether these sectoral measures are on track to meet their GHG mitigation objectives, agricultural inventories for each CCAA will be prepared annually to monitor progress and to introduce more stringent measures where needed.

E. Forestry

78. In 2000, about 29 per cent of Spain's land area was covered by forest. Forestry planning and maintenance activities are in the hands both of the central government, through the General Direction of Natural Conservation (Dirección General de Conservación de la Naturaleza, DGCN), and of the CCAAs. According to Spain's GHG emissions inventory, sinks are estimated at 29.3 Tg CO_2 equivalent over the entire 1990–2000 series. The NC2 reported that the previous National Forest Plan had earmarked afforestation of 84,000 ha by 2032, and forest management of 67,700 ha by the same year.

79. Measures in this sector that are relevant for climate change are part of the new Spanish Forest Plan which was approved in December 2002 with a total budget of €2.2 billion covering the next 30 years. Although the specific objectives of the plan are sustainable forest management, protection of river basins, and restoration of forests, several actions within the plan would have climate change benefits that are estimated to provide a sink capacity of around 220 million tonnes CO_2 equivalent by the end of the plan's implementation. These measures include reforestation and afforestation of agricultural land, which will increase the forested area by 22,000 ha annually by 2006. Forest conservation and the prevention of forest fires are expected to preserve 49,000 ha of forest per year.

F. Waste management

80. Waste management policy is the responsibility of the CCAA and local entities. The Ministry of Environment is responsible for identifying the strategic objectives on waste management, defining specific objectives and setting targets for reducing, recycling and eliminating waste. The CCAAs are responsible for implementing the plans. Spain has successfully integrated EC directives into national and regional legislation. Since the NC2, the National Municipal Solid Waste Plan 2000–2006 (Plan Nacional de Residuos Urbanos 2000–2006) was approved in January 2000.[27] This ambitious plan will fulfil the requirements of the EC Directive 75/442 on Solid Waste Management. It is intended to eliminate uncontrolled landfills and will be reviewed and updated biannually. If the plan is completely implemented, about 3,700 landfill sites will be closed, and 4,000 will have equipment installed for the complete recovery of CH_4. This target is consistent with the National Solid Waste Management Plan, which is aimed at reducing CH_4 emissions. Incineration plants that do not have energy recovery systems will also be closed. Other measures include the development of a network for waste recycling, the introduction of improved waste treatment procedures and more aggressive information campaigns.

81. The NC3 presented a comprehensive summary of policies and measures on waste, but the GHG reductions resulting from these measures were not estimated. National experts explained that there are still methodological difficulties associated with estimating such reductions. Nevertheless, the review team believes that stringent monitoring of these policies is required to meet the GHG reduction targets, especially given that the targets for GHG reduction under the National Municipal Solid Waste Plan 2000–2006 are more ambitious than in previous plans. If enough funding is available to the local governments, compliance with the timelines may be possible. Most of the funding for the plan will come from the EC Cohesion Funds, central government and the CCAAs. The government has allocated €3.3 billion for the period 2000–2006.

82. In summary, the review team recognized that there have been recent advances in terms of new initiatives such as the Plan for the Promotion of Renewable Energy, transposing the many relevant EC directives into action at the national level, and the application of the IPPC. At the same time, earlier targets for policies and measures included in the NC2, in some voluntary measures and in forestry, were not all met. The review team was not clear as to how some factors may change in the near future to ensure timely achievement of GHG emission reductions: the timely adoption of the Spanish Climate Change Strategy; coordinating the national policy response to climate change and those of the CCAAs to ensure that measures are on track in achieving their emission reduction targets; the allocation and availability of sufficient funding for the plans and policies that are contained in the above-mentioned strategy, when agreed and adopted.

83. The review team noted that between the NC1, the NC2 and the NC3 there have been very many institutional changes which make it difficult to determine clearly how these developments in the institutional framework at the central government level would affect the implementation of policies at the level of the CCAAs and the tracking of policies and measures, especially now that the implementation of measures is mainly in the hands of the CCAAs and energy planning is the responsibility of the energy industry. The review team welcomed the creation of the OECC as the first institutional arrangement that brings together the interests of all stakeholders in the climate change dialogue; it may serve as a useful catalyst in delivering, for the first time, a national climate change strategy.

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[27] Agreement of Council of Ministers of 7 January 2000.

IV. PROJECTIONS AND THE TOTAL EFFECT OF POLICIES AND MEASURES

84. The presentation of projections in the NC3 generally follows the UNFCCC reporting guidelines but is limited in the coverage of sectors and gases. Projections were presented only for CO_2, from energy use by subsectors (consumption in industry, transport, residential, services and agriculture), power generation and oil refining. Projections of CH_4, N_2O, and the fluorinated gases (HFCs, PFCs and SF_6) were not available for any sector. Emissions from international bunker fuels and from biomass were also not provided.

85. Two scenarios are presented: "with measures", entitled "Escenario Tendencial" and "with additional measures", entitled "Escenario Ahorro Base". A "without measures" scenario was not presented. The base year used for modelling GHG emissions is 1990, and CO_2 estimates are presented for 2005 and 2010. The 1990 data used in the projections of the NC3 are not fully consistent with the national GHG inventory because of the recent inventory recalculations. However, these inconsistencies are not expected to affect the emission trends significantly.

86. During the review, projections experts explained the reasons for the incomplete information presented in the NC3 and informed the review team of the efforts that are under way to meet the requirements of the UNFCCC guidelines. An agreement was made between the Madrid Polytechnic University (Universidad Politécnica de Madrid, UPM) and the General Directorate for Environmental Quality and Assessment (Dirección General de Calidad y Evaluación Ambiental, DGCEA) to develop a model for projecting all GHG emissions and software for validating scenarios, including an assessment of their costs and benefits, and evaluation of the impacts of emissions on the environment, taking into account the sensitivity of scenarios to changes in the key variables.

87. At the time of the review, experts from the UPM group had already prepared an initial forecasting approach to selected activities in Spain's economy such as electricity production, other industrial boilers, electric equipment, transport, and agriculture. Three scenarios have been proposed and will be projected for 2005, 2010 and 2020. These three scenarios have been named respectively "Tendencial" (business as usual), "Base" (with measures) and "Objetivo" (with additional measures). The effects of policies and measures for each scenario will depend on the outcome of discussions on the new Spanish Climate Change Strategy.

88. Since the preparation of the NC3, projections have been revised for the energy sector and are being developed for the remaining sectors, based on new data for power generation capacities, introduction of new technologies, upgrading and extension of electricity transmission infrastructure (high-voltage lines), and expansion of the natural gas network. These were presented to the review team, but information on the effects of these assumptions on GHG emissions was not available at the time of the review.

A. Methodology and key assumptions

89. The projections in the NC2 were prepared by a team made up of experts from the IDAE, the Ministry of Industry and Energy and the Ministry of Economy and Finance. As a result of institutional changes in 1999, the members of the team were relocated to different ministries. However, in 1999, they produced a new set of scenarios to serve as input to the preparation of the PFER. For this study two new scenarios up to 2010 were prepared for CO_2 emissions from energy production and consumption. The "with measures" and "with additional measures" scenarios share the same assumptions and projected data for population, economic growth and development objectives of the PFER, assuming that renewables would account for 12 per cent of primary energy by 2010. However, the "with additional

measures" scenario assumes intensification of energy efficiency in all sectors that surpasses the levels of the 1990–2000 period.

90. The projections in the NC3 were prepared in three stages: (1) final energy consumption was projected using the MED-PRO model, a bottom-up model from the MEDEE family which simulates final long-term energy demand disaggregated into five sectors (industry, transport, residential, services and agriculture); (2) energy required for transformation was evaluated (electricity and refining) applying several options on how energy demand would be met; (3) once the supply of primary energy had been estimated, the GHG emissions relating to these energy supply options were calculated.

91. The MED-PRO model was used to prepare medium-term projections (2000, 2005 and 2010) for energy demand using energy data for 1990 and 1995 (excluding international aviation bunkers and the combustion of biomass for energy).

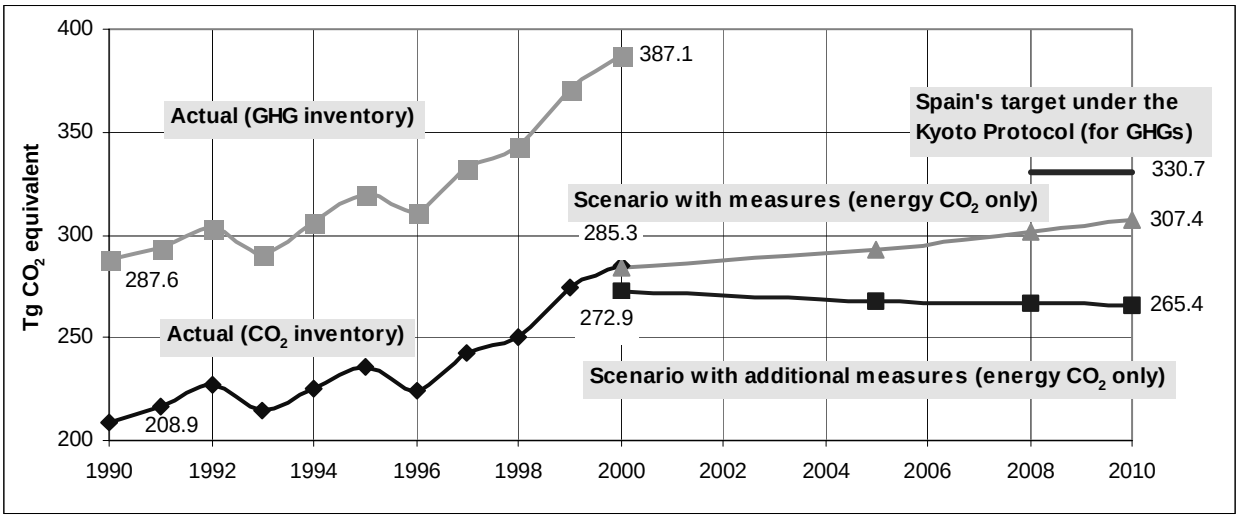
B. Projected emission trends

92. The projections in the NC3 show that the largest decrease in energy-related CO_2 reductions is likely to be achieved in the transport, residential and services sectors and that most of the reduction is expected to take place between 2005 and 2010. An analysis of the trend in emissions between the "with measures" and "with additional measures" scenarios indicate that energy-related emissions in the transport sector are projected to increase respectively by 73 per cent and 47 per cent between 1990 and 2010; residential 65 per cent and 44 per cent respectively; and services 77 per cent and 57 per cent respectively.

93. Another important observation is that in the "with measures" scenario, CO_2 emissions from the energy sector are projected to increase by 8 per cent between 2000 and 2010, while in the "with additional measures" scenario they should decrease by 2.7 per cent. According to the modelled results, this overall reduction in CO_2 emissions in the "with additional measures" scenario would result from a 17 per cent reduction in emissions from electricity generation as more coal-fired plants are replaced by gas. Figure 4 shows a comparison between the two scenarios presented in the NC3 and their relation to actual emissions of total GHGs.

94. The comparison of energy-related CO_2 emissions (figure 4) shows that with or without additional measures, limiting the growth of overall GHG emissions to 15 per cent above 1990 levels appears to be very difficult.

Figure 4. Actual GHG emissions and medium-term GHG projections from the NC3



Note: Actual CO_2 inventory includes CO_2 emissions from fuel combustion only.

95. The implementation of additional measures is expected to have an impact on energy supply by 2011. The information in table 4, which was provided by the General Subdirection for Energy Planning, shows that the consumption of coal (mainly for electricity generation) is expected to decrease by 33.6 per cent by 2011 and that its share in the overall energy balance will halve to 8 per cent. Gas consumption is expected to more than double; and the use of renewable energy sources is expected to nearly triple, and to contribute 12 per cent of energy supply in 2011. Petroleum and petroleum products continue to cover nearly 50 per cent of energy needs.

Table 4. Scenario results for primary energy demand in Spain 2011

	2000		2006		2011		Change (%)	Change (%)	Change (%)
	ktoe	%	ktoe	%	ktoe	%	2000–2006	2006–2011	2000–2011
Coal	21 635	17.3	17 999	12.0	14 363	8.2	–16.8	–20.2	–33.6
Oil	64 663	51.7	75 315	50.3	83 376	47.6	16.5	10.7	28.9
Natural gas	15 223	12.2	26 905	18.0	39 305	22.5	76.7	46.1	158.2
Nuclear	16 211	13.0	16 570	11.1	16 602	9.5	2.2	0.2	2.4
Renewables	7 061	5.6	12 464	8.3	20 956	12.0	76.5	68.1	196.8
Exchanges	382	0.3	385	0.3	385	0.2	0.8	0.0	0.8
TOTAL	**125 175**		**149 638**		**174 987**		**19.5**	**16.9**	**39.8**

96. In summary, the projections indicate that Spain will find it difficult to meet its GHG emission targets under the Kyoto Protocol; however, these scenarios do not contemplate the use of international flexibility mechanisms, which may be required to supplement the domestic GHG mitigation measures.

C. General comments on the projections

97. The modelling methodology did not change between the NC2 and the NC3. The projections are built on reasonable and consistent assumptions developed in extensive consultations between the modelling teams themselves, and also with policy-makers at various levels, but they do not include the non-CO_2 gases for any sector and this makes the projections largely indicative of the trend in the energy sector only, in spite of the fact that non-CO_2 emissions are an important component of overall GHG emissions and have substantially surpassed their estimates projected for 2000 in the NC2.

98. ***GHG mitigation policies and measures used for projections*** were explained at a general level but lacked clarity in the division of sectoral policies between the " with measures" and the "with additional measures" scenarios. The policies and measures presented in the NC3 chapter were not clearly included in the two scenarios presented on projections. National experts explained that the NC3 reflected the very latest policies whereas the projections were prepared only for the energy sector and do not consider cross-sectoral policies and measures. Modelling the behaviour of key emission drivers in transport, such as the projected intensity of freight and passenger transport (in tonne-kilometres and passenger-kilometres) or the projected modal structure of transport, as contained in the Transport Infrastructure Plan 2000–2007, would help the reader understand the projections better. The review team suggested that the planned forecasting analysis by the UPM team should reflect the GHG mitigation policies and measures outlined in the Spanish Climate Change Strategy. This will ensure that Spain is able to assess the expected GHG impacts of policies more accurately and monitor policy implementation more effectively.

99. The review team also noted that the cost-effectiveness of GHG mitigation measures was not considered in the NC3 modelling exercise, and encouraged Spain to determine where additional GHG reductions could be achieved at the lowest cost in evaluating the various options, including those relating to international flexibility mechanisms.

100. The projections in the NC3 are prepared for Spain as a whole. Because of the decentralization of responsibilities between the central government and the CCAAs for the implementation and monitoring of policies and measures, the review team believes it to be important that ***modelling GHG emissions at the national level in the future*** should take into account the status of regional initiatives. Several of the CCAAs presented results of GHG emissions projections for their territories to the review team, and these may be considered as useful input to the overall projection exercise, especially given that the degree of implementation varies among them.

101. ***Modelling of GHG emissions from transport***. The review team felt that the transparency of the presentation of the modelled GHG emissions from transport could be improved. The GHG projections for transport, provided in the NC3, indicate further increases in these emissions.

102. ***Modelling of the international flexibility mechanisms***. Spanish officials indicated that, in order to meet Spain's Kyoto Protocol target, they might have to complement domestic policy action with the international flexibility mechanisms. Future modelling could examine the possible role of such mechanisms. The information on the cost of reducing emissions through purely domestic policy action could serve as a guide to the appropriate future allocation of resources to flexibility mechanisms.

103. ***Projecting non-CO_2 emissions*** is important, given that CH_4 and N_2O emissions are increasing. These gases were not included in the NC2 or the NC3. From the data shown in figure 4, one could estimate that, assuming no reduction in the emissions of non-CO_2 gases, by 2010, total GHG emissions excluding LUCF could be at 409.2 Tg CO_2 equivalent under the "with measures" scenario (42.9 per cent above 1990 levels) and 379.6 Tg CO_2 equivalent under the "with additional measures" scenario (32.5 per cent above 1990 levels). The projection of these gases therefore needs to be studied in more detail, as they give an indication of the extent to which Spain may have to rely on the flexibility mechanisms of the Kyoto Protocol in meeting its GHG target in 2008–2012.

104. The sector with the highest growth rate in GHG emissions between 1990 and 2000 was waste. The NC3 mentions additional measures to mitigate non-energy CH_4 and N_2O emissions, and these also need to be modelled. Experts indicated that Spain would be evaluating the impact of liberalization in the electricity and gas sectors as part of a project involving the use of a PRIMES model. The results of such studies, when they become available, could usefully contribute to future GHG projections.

105. Reducing energy demand in the future might be difficult for Spain, and additional measures seem to be necessary to reverse the rising trend in GHG emissions. Regular review of the demand projections for energy, assessment of the performance of existing policies and their adjustment to meet energy objectives and climate change policy objectives could be useful. Renewable energy has also been included in the projections, its share of primary energy supply increasing every year since the NC3, although it is not clear to the review team how its use will substantially modify current emission patterns in spite of improving the energy supply structure. The national experts may need to address the projections of GHG totals to assess how close they come to the Kyoto Protocol emissions target and what additional measures may need to be taken.

V. VULNERABILITY ASSESSMENT, CLIMATE CHANGE IMPACTS AND ADAPTATION MEASURES

106. The reporting of Spain's vulnerability and adaptation to climate change in the NC3 generally follows the UNFCCC guidelines. The NC3 reports in detail on the expected impacts of climate change and respective adaptation measures, and this enabled the review team to have a clear overview of the impacts mentioned. During the review the team was informed that that there are no integrated studies on vulnerability, impacts and adaptation, but a number of isolated studies have been prepared over the years. However, recognizing the need to study these areas further, €1.6 million will be invested in several projects for assessing climate change impacts and the results are expected to be available by the end of 2004. The projects will focus mainly on coastal zones and forests. The National Meteorological Institute (Instituto Nacional de Meteorología) plans to develop national climate scenarios, which will be the basis for a more detailed study of the impacts of climate change in all economic sectors.

107. Two important climate change impacts reported in the NC3 were those on water resources and coastal zones. Two scenarios were used to model the impacts on water resources by 2030, assuming a doubling of CO_2 concentration: an increase of 1ºC in average annual temperature, and the same increase in temperature plus a reduction of 5 per cent in average annual precipitation. The results of the model indicate a decrease in annual runoffs ranging from 2 per cent in the north of the country in the first scenario and 25 per cent in the Canary Islands in the second scenario. It also shows that the southeast of the country, the Guadiana river basin, the Ebro valley and the Canary Islands are the areas most vulnerable to severe impacts on water resources.

108. As regards the impacts of decreased availability of water resources on hydropower production, the team was informed that in an extreme scenario (4ºC average annual temperature increase and 15 per cent reduction in average annual precipitation), in some rivers the interannual variability of water resources may increase up to 50 per cent in the coming years. One of the most important adaptation measures listed is the construction of conduits ("transvases") which will carry water from the northern water basins to the southern ones. Furthermore, plans for demand management and for saving water are being designed.

109. A rise in sea level at the current estimated rate of 5 mm/year will require the use of 4.5 million m^3 of sand annually in order to maintain the 3,000 km of beaches along the 9,000 km of Spain's coastline. This impact is reported to have a clear, although not quantified, economic impact, not only in terms of the artificial supply of sand to the beaches, but also given the fact that beaches are the backbone of Spain's important tourism sector. Measures implemented to address this problem include the construction of coastline defence systems and beach regeneration.

110. Impacts on forests include decreased vitality due to extreme weather events (such as droughts); displacement of optimal distribution area; changes in dominant species in given areas; greater risks and displacement of plagues and diseases; desertification and recurring forest fires making reforestation

impossible; greater risk of forest fires. Adaptation measures reported for the forestry sector include increased afforestation and reforestation in depleted soils; promotion of biological diversity as opposed to monocultures; development of forests more adapted to natural Mediterranean conditions; and prevention of forest fires.

VI. FINANCIAL RESOURCES AND TRANSFER OF TECHNOLOGY

111. The reporting on financial resources and transfer of technology in the NC3 was in compliance with the UNFCCC reporting guidelines, although the definition of "new and additional resources" for financial contributions to multilateral programmes and institutions was not provided. The team noted a great improvement in the reporting of financial commitments compared to the NC2. All tables required by the guidelines were provided in the NC3.

112. The Official Development Assistance (ODA) of Spain for 2000 was about 0.24 per cent of GDP (0.3 per cent if cancellation of debt from Nicaragua is included) and is expected to reach 0.33 per cent by 2006. Spain has contributed with the following amounts to the Global Environmental Facility (GEF): 10 million special drawing rights (SDR) to the GEF Pilot Phase (payments up to 1997); 12.36 million SDR to GEF-1 (total payment in 2000); 12.03 million SDR to GEF-2 (with payments up to 2010). The review team was informed that Spain would contribute 15.12 million SDR to the third replenishment of the GEF.

113. Spain also participated in a meeting of donor countries to the Least Developed Countries Fund, contributed €60,000 to this fund in 2002 and intends to contribute €90,000 in 2003. Spain has strong historical and cultural links with Latin America and Africa, and this has translated into greater economic cooperation with these two regions through regional and bilateral contributions. The national team explained that there is no systematic inventory of cooperation activities and thus the figures reported may be underestimated. Efforts will be made to improve reporting on regional and bilateral contributions. In 2001, US$ 22 million was invested in projects linked to UNFCCC objectives, according to the Development Assistance Committee of the OECD markers.

114. The review team was informed of the establishment of a new Spanish Cooperation Strategy, which will make it easier to account for all cooperation projects. Under this strategy, the environment is defined as an overall priority, meaning that all projects will be designed to optimize environmental gains.

115. Technology transfer projects promoted by the National Meteorological Institute were reported to be successful. The review team recommended that details on this success be included in national communications to the extent possible. Training is an essential part of the process for technology transfer. The PROFIT programme (which aims at the promotion of technological innovation) gives priority to projects with the private sector in Latin America. Also, scholarships granted to foreign students are now oriented to technology transfer and know-how.

VII. RESEARCH AND SYSTEMATIC OBSERVATION

116. The NC3 contains a comprehensive description of climate-related research and observation in Spain. Since the NC2, responsibility for research at national level has been concentrated in the Ministry of Science and Technology, thus allowing for a much greater coordination of efforts. In the Research and Development Plan 1996–1999, approximately €14 billion were allocated for climate change research, and this total was increased to €19 billion to cover the period 2000–2002. Part of this budget has been used for communicating the results of scientific studies to the public.

117. The plan defined four major objectives for research related to climate change: sensors; observation methods and data on the climate system; characterization of the climate system; studying and

modelling climate systems; and the impacts of climate and climate change on socio-economic activities and on natural disasters. About 500 researchers were involved and €4 million was used to fund these projects.

118. In the area of systematic observation the National Meteorological Institute is responsible for the meteorological and atmospheric observations. The National Institute for Oceanography (Instituto Nacional de Oceanografía), together with the State Entity for Ports (Ente Público Puertos del Estado), is responsible for oceanographic observations. Spain is a member of the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) programmes.

119. Spain considers that there are enough available funds to allow for the maintenance of an accurate and modern atmospheric observation system. It is committed to building capacity in the area of systematic observation, for instance through its participation in the World Meteorological Organization in that organization's voluntary cooperation programme. Some CCAAs are in the process of establishing regional meteorological services that, provided there is suitable coordination, will allow Spain to enlarge its network of meteorological stations and reinforce its leadership role in observations in the Mediterranean.

VIII. EDUCATION, TRAINING AND PUBLIC AWARENESS

120. The NC3 reports issues of education, training, and public awareness in compliance with the reporting guidelines and more comprehensively than did the NC2. Spain has been concentrating on education and public awareness as an integral step in establishing public support for an effective climate change policy.

121. Education and public awareness on climate change are dealt with both by the central government and by the CCAAs. Regional environmental policy and related training are also the responsibility of the CCAAs. Training programmes are offered at secondary schools; for example, there is one optional course on renewable energy. A number of postgraduate and masters' programmes are available on climate change, in particular on energy.

122. Several programmes are in place (for example, GLOBE) that aim at raising awareness and educating the public about global environmental problems, including climate change. Some of these are good examples of partnerships between public entities, the private sector and NGOs. Public awareness campaigns are conducted mainly through public–private partnerships, mainly relating to energy efficiency and energy conservation. One of these projects, Energy Certification for Residential Buildings, is being implemented by the Foundation for Ecology and Development (Fundación Ecología e Desarrollo) in cooperation with the Deputy General of Aragon. The Internet is also being used as an important means for raising public awareness.

123. The effectiveness of measures on public awareness was measured by sociological studies, which concluded that climate change is not ranked among the most serious environmental problems in Spain. However, measures that contribute to addressing climate change (for example, the development of clean energy sources) are ranked among the highest priorities for technological and scientific development. Spain has published a report summarizing the main findings of the IPCC Third Assessment Report and another about the OECC. Furthermore the "Spanish network of climate change focal points" will be enlarged to include civil society, thus facilitating greater access to information in the near future.

124. As for public participation in the decision-making process, the composition of the CNC (consultative body for the design of climate policies) includes representatives from NGOs (three representatives from environmental NGOs, two from trade unions, two from consumers and users associations, two from business associations and one from the chambers of commerce). Furthermore,

before each official session of the Conference of the Parties and the subsidiary bodies of the UNFCCC, the OECC organizes public meetings on the Spanish position on important issues at the negotiations.

IX. CONCLUSIONS

125. Spain's NC3 is, in general, in compliance with the UNFCCC reporting guidelines. The NC3 is better prepared than the NC2, the most notable improvements including a more detailed and more consistent GHG inventory; recent advances in terms of new initiatives such as the Plan for the Promotion of Renewable Energy, the transposition of many relevant EC directives into action at the national level and the application of the IPPC directive; more comprehensive data on financial resources and transfer of technology; new scientific research and assessments for vulnerability and adaptation; and a well-documented summary on the promotion of public awareness for climate change.

126. Ongoing revisions and improved harmonization between the CORINAIR and IPCC categories have allowed inventory experts in Spain to address inaccuracies and reporting problems which were identified during the in-depth review of the NC2. However, the review team identified some areas for further improvement, including an evaluation of GHG reductions from individual mitigation measures; introducing a more robust projections methodology that forecasts the future levels of all six GHGs for all sectors and is consistent with the GHG inventory; reporting on the status of implementation of policies and measures by the CCAAs and their climate change initiatives.

127. Between 1990 and 2000, the total GHG emissions in Spain (without LUCF) increased by 34.6 per cent. The increase in emissions is marked after 1995 and after 1998 and is associated with an upswing in economic growth. The relative increase in the decade was highest in waste (55 per cent) followed by transport (49 per cent) and industrial processes (36 per cent). The increase in CO_2 emissions from energy (only fuel combustion, not including fugitive emissions) between 1990 and 2000 was 38 per cent (from 205,011 Gg CO_2 in 1990 to 282,949 Gg CO_2 in 2000). At the time of the NC2, national officials had set a target of a 16 per cent increase in CO_2 emissions from energy by 2000.

128. Without further strengthening of current domestic policies, Spain may find it difficult to achieve its national emissions target under the Kyoto Protocol. Within the EC burden-sharing agreement for the Kyoto Protocol, Spain is required to limit the growth of GHG emissions in the period 2008–2012 by 15 per cent compared to its base year emissions. The institutional framework for dealing with climate and energy matters in Spain is complex. The decentralization of responsibilities to CCAAs for implementing policies and measures also complicates the monitoring of GHG reduction objectives. For this reason, coordination among the different institutions is essential for the formulation of effective policy and timely implementation of the Spanish Climate Change Strategy, which has yet to be adopted. In this regard the review team believes that the newly created OECC is an important institutional development that can play a pivotal role in ensuring coordination among all stakeholders in meeting climate change objectives and in monitoring their performance in meeting the objectives of the strategy.

129. The review team noted the importance of a timely and positive conclusion of the Spanish Climate Change Strategy and the need for agreement between the central government and the CCAAs in this regard. The strategy proposes the identification of priority actions in all sectors and is likely to result in monitoring the effects of the policies and measures implemented. Notwithstanding the absence of the strategy, Spain has successfully implemented many important EC-wide policies and measures. However, more effort is needed to ensure that after almost 10 years of deliberation Spain can produce and implement a national framework on climate. As soon as the strategy is adopted, monitoring of progress made in implementing policies and measures in meeting their GHG reduction objectives, at the level of central and regional government, would also have to be addressed.

130. Spanish officials indicated that while one of the challenges facing the government is the distribution of the 15 per cent emissions among sectors, Spain might need to use the international flexibility mechanisms in addition to domestic action to meet the national Kyoto Protocol target. At the time of the review the central government and CCAAs were still discussing details for implementing a pilot phase for the CDM and preparing its National Allocation Plan as part of the requirements of participating in the EC Emissions Trading Programme in 2005.

131. Coastal areas, forests and soils were cited as the areas most vulnerable to climate change impacts. Although a national programme for adaptation to climate change is not yet in place, Spain is investing €1.6 million in several projects related to the assessment of climate change impacts and the results are expected to be available by the end of 2004. These results will help in preparing a future national plan for adaptation.

132. Currently, Spain's ODA amounts to about 0.24 per cent of GDP. The government is committed to increasing it to 0.3 per cent by 2006. Activities targeting public awareness have been strengthened considerably since the NC2, and climate change is now given the same importance as other pressing environmental problems. However, more efforts are still needed to ensure full coordination between all the CCAAs and the central government to achieve the GHG limitation commitment.

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