COMPLIANCE COMMITTEE **CC/ERT/2019/27**
5 September 2019

Report of the technical review of the seventh national communication of Spain

Note by the secretariat

The report of the technical review of the seventh national communication of Spain was published on 29 November 2018. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decisions 4/CMP.4 and 8/CMP.9), the report is considered received by the secretariat on the same date. This report, FCCC/IDR.7/ESP, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

United Nations

Framework Convention on Climate Change

FCCC/IDR.7/ESP

Distr.: General
29 November 2018

English only

Report on the technical review of the seventh national communication of Spain

Parties included in Annex I to the Convention were requested by decision 9/CP.16 to submit their seventh national communication to the secretariat by 1 January 2018. According to decision 15/CMP.1, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol are required to include in their national communications supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. This report presents the results of the technical review of the seventh national communication and relevant supplementary information under the Kyoto Protocol of Spain, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

GE.18-20553(E)

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Abbreviations and acronyms

AEA	annual emission allocation
AECID	Spanish Agency for International Development Cooperation
AEMET	Spanish State Meteorological Agency
BR	biennial report
CER	certified emission reduction
CIMHET	Conference of the Directors of Ibero-American Meteorological and Hydrological Services
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
ERT	expert review team
ERU	emission reduction unit
ESD	effort-sharing decision
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
HFC	hydrofluorocarbon
ICAO	International Civil Aviation Organization
IE	included elsewhere
IMO	International Maritime Organization
IPPU	industrial processes and product use
ktoe	kilotonne of oil equivalent
LIFE SHARA	Sharing Awareness and Governance of Adaptation to Climate Change in Spain
LULUCF	land use, land-use change and forestry
MAPAMA	Spanish Ministry of Agriculture and Fisheries, Food and Environment
Mtoe	megatonne of oil equivalent
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
non-ETS sectors	sectors not covered by the European Union Emissions Trading System
N_2O	nitrous oxide
OOF	other official flows
PaMs	policies and measures
PFC	perfluorocarbon
PIMA	Spanish Plan to Drive Environmental Improvement
PNACC	Spanish National Climate Change Adaptation Plan
REGATTA	Regional Getaway for Technology Transfer and Climate Change Action in Latin America and the Caribbean

reporting guidelines for supplementary information	"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol, Part II: Reporting of supplementary information under Article 7, paragraph 2"
RIOCC	Ibero-American Network of Climate Change Offices
SF_6	sulfur hexafluoride
UNEP	United Nations Environment Programme
UNFCCC reporting guidelines on NCs	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications"
WAM	'with additional measures'
WEM	'with measures'
WMO	World Meteorological Organization
WOM	'without measures'

I. Introduction and summary

A. Introduction

1. This is a report on the in-country technical review of the NC7 of Spain. The review was coordinated by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part V: UNFCCC guidelines for the technical review of national communications from Parties included in Annex I to the Convention" (annex to decision 13/CP.20), and the "Guidelines for review under Article 8 of the Kyoto Protocol" (annex to decision 22/CMP.1 and annex I to decision 4/CMP.11).[1]

2. In accordance with the same decisions, a draft version of this report was transmitted to the Government of Spain, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. The review was conducted from 28 May to 2 June 2018 in Madrid by the following team of nominated experts from the UNFCCC roster of experts: Mr. Carlos Benavides (Chile), Mr. Pierre Brender (France), Ms. Maria Gutiérrez (Mexico), Ms. Inês Sousa Mourão (Cabo Verde) and Mr. Daniel Perczyk (Argentina). Mr. Brender and Ms. Gutiérrez were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the NC7 of Spain in accordance with the UNFCCC reporting guidelines on NCs (decision 4/CP.5) and the reporting guidelines for supplementary information, in particular the supplementary information required under Article 7, paragraph 2, and on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol (annex to decision 15/CMP.1 and annex III to decision 3/CMP.11).

1. Timeliness

5. The NC7 was submitted on 22 December 2017, before the deadline of 1 January 2018 mandated by decision 9/CP.16. An addendum to the NC7 was submitted on 31 May 2018.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Spain in its NC7, including the supplementary information under the Kyoto Protocol, mostly adheres to the UNFCCC reporting guidelines on NCs.

[1] At the time of the publication of this report, Spain had submitted its instrument of acceptance of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

Table 1
Assessment of completeness and transparency of mandatory information reported by Spain in its seventh national communication, including supplementary information under the Kyoto Protocol

Section of NC	*Completeness*	*Transparency*	*Reference to description of recommendations*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to description of recommendations*
Executive summary	Complete	Transparent	–	National system	Complete	Mostly transparent	Issue 1 in table 6
National circumstances	Complete	Transparent	–	National registry	Complete	Mostly transparent	Issue 1 in table 7
GHG inventory	Complete	Mostly transparent	Issue 1 in table 5	Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	–
PaMs	Complete	Mostly transparent	Issues 4 and 10 in table 9	PaMs in accordance with Article 2	Complete	Transparent	–
Projections and the total effect of PaMs	Mostly complete	Transparent	Issue 1 in table 15	Domestic and regional programmes and/or arrangements and procedures	Complete	Transparent	–
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent	–	Information under Article 10[a]	Complete	Transparent	–
Financial resources and transfer of technology	Mostly complete	Transparent	Issue 1 in table 18	Financial resources	Complete	Transparent	–
Research and systematic observation	Complete	Mostly transparent	Issue 1 in table 20	Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	–
Education, training and public awareness	Complete	Transparent	–	–	–	–	–

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] The assessment refers to information provided by the Party on the provisions contained in Article 4, paragraphs 3, 5 and 7, of the Convention reported under Article 10 of the Kyoto Protocol, which is relevant to Parties included in Annex II to the Convention only. Assessment of the information provided by the Party on the other provisions of Article 10 of the Kyoto Protocol is provided under the relevant substantive headings under the Convention, for example research and systematic observation.

3. Summary of reviewed supplementary information under the Kyoto Protocol

7. The supplementary information under Article 7, paragraph 2, of the Kyoto Protocol is incorporated in different sections of the NC7, and the supplementary information under Article 7, paragraph 1, of the Kyoto Protocol is reported in the NIR of the 2017 annual submission. Table 2 provides references to where the information is reported. The technical assessment of the information reported under Article 7, paragraphs 1 and 2, of the Kyoto Protocol is contained in the relevant sections of this report.

Table 2
Overview of supplementary information under the Kyoto Protocol reported by Spain

Supplementary information	*Reference to section of NC7*
National registry	3.4
National system	3.3
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	4.3.2 and 5.3
PaMs in accordance with Article 2	4
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	4.1
Information under Article 10	3.3, 4.2.1, 4.4, 4.5, 4.6, 4.7, 7.3, 7.4, 8 and 9
Financial resources	7.2
Minimization of adverse impacts in accordance with Article 3, paragraph 14	4.2.2; and also reported in the NIR of Spain's 2017 annual submission

II. Technical review of the information reported in the seventh national communication, including the supplementary information under the Kyoto Protocol

A. Information on national circumstances and greenhouse gas emissions and removals

1. National circumstances relevant to greenhouse gas emissions and removals

(a) Technical assessment of the reported information

8. The national circumstances of Spain explain the relationship between its historic and future emission trends and the climate change policy agenda. The changing nature of those circumstances defines the factors that affect the climate policy development and implementation of the Convention. The NC7 contains key data on legislation, population trends, geography and land use, climate and climate change, economic developments, energy, transport, the buildings sector, industry, trade, the services sector, agriculture, forestry, resource efficiency and wastewater. Spain is organized into municipalities, provinces and autonomous communities, which all have the autonomy to manage their own interests in accordance with their competences. The population of Spain has been almost constant since 2010 and was 46,528,966 in January 2017. The recent evolution of the Spanish economy has been characterized by recovery from the global financial crisis of 2007–2008. GDP increased by more than 3.0 per cent in both 2015 and 2016, and a corresponding trend was observed in the employment rate. The Spanish economy is characterized by the predominance of the services sector, supporting more than 65.0 per cent of the country's GDP. In contrast, agriculture contributes only about 2.5 per cent of GDP. The country is highly vulnerable to climate change; particular impacts noted include the reduction of water supply and acute variability in precipitation rates affecting hydropower production. The sea level has increased by between 0.8 and 2.4 mm per year since the 1940s. Maximum absolute temperatures

frequently exceed 45 ºC and the minimum values can reach –20 ºC. A number of changes occurred in land use in Spain from 1990 to 2015: the area of cropland decreased by 4.5 per cent (947,380 ha in 2015), while the area of forest land increased by 5.5 per cent (795,079 ha in 2015). Urban areas have increased by 55.0 per cent since 1990 (1,389,326 ha in 2015). Since 2010, Spain has been focusing on energy efficiency and the use of renewable sources of energy; in 2015, 16.2 per cent of final energy consumption came from renewable sources. The energy intensity of the country's GDP has also been consistently decreasing.

9. The ERT noted that during the period 1990–2015 Spain's population and GDP increased by 19.5 and 62.0 per cent, respectively, while GHG emissions per GDP unit and GHG emissions per capita decreased by 28.0 and 2.4 per cent, respectively. There are initial signs of the decoupling of Spain's emissions from its GDP growth due to the mitigation actions implemented in the country. However, the current rate of decoupling may not be sufficient to achieve emission reductions over several consecutive years during a period of sustained economic growth. The sustained reduction in emissions between 2007 and 2013 was concomitant with the economic crisis, although slightly ahead of phase; significant reductions had already been achieved in 2008, when the economy was still growing. Table 3 illustrates the national circumstances of Spain by providing some indicators relevant to emissions.

Table 3
Indicators relevant to greenhouse gas emissions and removals for Spain for the period 1990–2015

						Change (%)	
Indicator	*1990*	*2000*	*2010*	*2014*	*2015*	*1990–2015*	*2014–2015*
GDP per capita (thousands 2011 USD using purchasing power parity)	23.76	29.97	32.51	32.19	32.22	35.6	3.3
GHG emissions without LULUCF per capita (t CO_2 eq)	7.41	9.50	7.66	6.98	7.23	–2.4	3.6
GHG emissions without LULUCF per GDP unit (kg CO_2 eq per 2011 USD using purchasing power parity)	0.31	0.32	0.24	0.22	0.22	–28.0	0.3

Sources: (1) GHG emission data: Spain's 2017 GHG inventory submission, version 7; (2) population and GDP: World Bank.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

(b) Assessment of adherence to the reporting guidelines

10. The ERT assessed the information reported in the NC7 of Spain and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. However, the ERT noted an issue related to the provision of information on national circumstances using the headings recommended in the UNFCCC reporting guidelines on NCs. While the NC6 did not include any information on building stock and urban structure, such information was included in section 4.5.4.2 of the NC7 ("Long-term strategy for energy renovation in the building sector in Spain"). To improve comparability of the reporting on national circumstances, the ERT suggests that Spain include, in the national circumstances section of its next NC, information on building stock and urban structure, or a clear reference to the section where such information is located.

2. Information on greenhouse gas inventory arrangements, emissions, removals and trends

(a) Technical assessment of the reported information

11. According to the latest GHG inventory (version 1 of the 2018 annual submission of Spain), total GHG emissions[2] excluding emissions and removals from LULUCF increased by 12.9 per cent between 1990 and 2016, whereas total GHG emissions including net emissions or removals from LULUCF increased by 14.4 per cent over the same period.

12. Table 4 illustrates the emission trends by sector and by gas for Spain for up to 2016 on the basis of its latest GHG inventory submission.

Table 4
Greenhouse gas emissions by sector and by gas for Spain for the period 1990–2016

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Sector									
1. Energy	213 690.67	290 361.06	265 763.50	254 633.65	244 134.64	14.2	–4.1	74.3	75.2
A1. Energy industries	78 903.64	105 747.79	75 327.76	86 392.04	71 128.49	–9.9	–17.7	27.4	21.9
A2. Manufacturing industries and construction	45 098.62	58 663.14	49 765.31	40 462.33	40 865.37	–9.4	1.0	15.7	12.6
A3. Transport	59 198.62	86 730.28	91 154.24	83 197.46	86 130.73	45.5	3.5	20.6	26.5
A4. and A5. Other	26 652.36	35 822.78	46 325.62	40 126.52	41 507.94	55.7	3.4	9.3	12.8
B. Fugitive emissions from fuels	3 837.43	3 397.06	3 190.57	4 455.30	4 502.12	17.3	1.1	1.3	1.4
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NA	NA	NA	NA
2. IPPU	29 981.27	42 712.01	41 626.16	32 268.13	31 815.51	6.1	–1.4	10.4	9.8
3. Agriculture	34 159.64	39 472.67	33 913.41	34 532.98	34 405.38	0.7	–0.4	11.9	10.6
4. LULUCF	–39 349.52	–42 970.68	–40 450.15	–42 007.07	–40 744.68	3.5	–3.0	NA	NA
5. Waste	9 824.80	13 026.44	14 579.24	14 374.70	14 351.02	46.1	–0.2	3.4	4.4
6. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gas[a]									
CO_2	231 895.05	311 926.06	283 877.49	271 727.20	260 985.90	12.5	–4.0	80.6	80.4
CH_4	34 038.89	40 142.18	37 912.04	37 159.54	37 259.82	9.5	0.3	11.8	11.5
N_2O	17 454.53	20 278.62	16 803.50	16 750.84	16 425.57	–5.9	–1.9	6.1	5.1
HFCs	3 039.92	12 541.66	16 947.47	9 374.13	9 156.90	201.2	–2.3	1.1	2.8
PFCs	1 164.38	495.98	106.94	94.01	92.03	–92.1	–2.1	0.4	0.0
Unspecified mix of HFCs and PFCs	NA, NO	NA, NO	NA, NO	481.99	556.71	NA	15.5	NA	0.2
SF_6	63.61	187.68	234.87	221.75	229.62	261.0	3.6	0.02	0.1
NF_3	NA, NO	NA, NO	NO, NE, NA	NO, NA	NO, NA	NA	NA	NA	NA
Total GHG emissions without LULUCF	**287 656.37**	**385 572.18**	**355 882.31**	**335 809.46**	**324 706.55**	**12.9**	**–3.3**	**100.0**	**100.0**

[2] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified. Values in this report are calculated based on the GHG inventory, version 7, of the Party's 2017 annual submission, unless otherwise specified.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Total GHG emissions with LULUCF	**248 306.85**	**342 601.50**	**315 432.16**	**293 802.39**	**283 961.88**	**14.4**	**–3.3**	**NA**	**NA**

Source: GHG emission data: Spain's 2018 annual submission, version 1.
[a] Emissions by gas without LULUCF and without indirect CO_2.

13. On the basis of the Party's latest GHG inventory submission (2018), the ERT noted an increase in total emissions of 54.2 per cent over the period 1990–2007, which was driven mainly by strong economic and population growth. Some sectors experienced significant growth over that period: commercial/institutional consumption of energy increased by more than 145 per cent, emissions from transportation by more than 80 per cent and emissions from industrial processes by 67 per cent. The economic downturn and population stabilization that followed in the period 2008–2014, together with the mitigation PaMs implemented by Spain, contributed to a subsequent decrease in emissions.

14. Between 1990 and 2016, GHG emissions from the energy sector increased by 14.2 per cent (30,443.97 kt CO_2 eq), owing mainly to the increase in emissions from the transport and building sectors. The trend in GHG emissions from fuel combustion showed notable increases in transport (by 45.5 per cent or 26,932.11 kt CO_2 eq) and energy use in other sectors (by 55.7 per cent or 14,855.58 kt CO_2 eq). For energy industries, a significant increase in renewable energy use (especially wind and to a lesser extent solar) in electricity production helped to maintain emissions at a level similar to that observed in the early 1990s (a 9.9 per cent or 7,775.15 kt CO_2 eq decrease between 1990 and 2016). However, there is significant annual variation in the emissions from energy industries, which is due mainly to changes in hydropower production associated with the strong variability of the country's precipitation; for example, emissions in 2015 were 9.4 per cent above the 1990 level and a significant emission reduction of 17.7 per cent occurred between 2015 and 2016 (see table 4).

15. Between 1990 and 2016, GHG emissions from IPPU increased by 6.1 per cent (1,834.34 kt CO_2 eq). While these emissions increased by more than 30.0 per cent between 1990 and the early 2000s, they have decreased in recent years due to both the economic downturn and the tax policy on F-gases (see para. 49 below). Between 1990 and 2016, GHG emissions from the agriculture sector increased by 0.7 per cent (245.74 kt CO_2 eq). This near stability of the GHG emissions from the agriculture sector is the net effect of significant increases and decreases within the sector activities, especially those due to changes in the characteristics and population of livestock in the country. The LULUCF sector was a net sink of 40 744.68 kt CO_2 eq in Spain in 2016; net GHG removals have increased by 1,395.16 kt CO_2 eq since 1990. This trend was driven mainly by the increase in forest area. Between 1990 and 2016, GHG emissions from the waste sector increased by 46.1 per cent (4,526.22 kt CO_2 eq), owing mainly to the increase in waste generation.

16. Between 1990 and 2016, CO_2 emissions increased by 12.5 per cent (29,090.85 kt), CH_4 emissions by 9.5 per cent (3,220.93 kt CO_2 eq), HFC emissions by 201.2 per cent (6,116.98 kt CO_2 eq) and SF_6 emissions by 261.0 per cent (166.01 kt CO_2 eq). Over the same period, N_2O emissions decreased by 5.9 per cent (1,028.96 kt CO_2 eq) and PFC emissions by 92.1 per cent (1,072.35 kt CO_2 eq). The increase in CO_2 emissions over that period can be linked largely with the evolution in the consumption of fossil fuels, while the increase in CH_4 emissions was induced by the growth in waste generation, even as CH_4 emissions from agriculture decreased. Growth in the consumption of F-gases, particularly in refrigeration and air conditioning, explains the increase in the emissions of those gases. The decrease in N_2O emissions was induced by changes in the processes used in industry and the introduction of abatement technologies, even as N_2O emissions from agriculture increased over the same time period.

17. The summary information provided on GHG emissions was consistent with the information reported in Spain's 2017 annual submission.

(b) Assessment of adherence to the reporting guidelines

18. The ERT assessed the information reported in the NC7 of Spain and identified an issue relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table 5.

Table 5
Findings on greenhouse gas inventory information from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 11 Issue type: transparency Assessment: recommendation	The ERT noted that annex 1 to the Party's NC7 includes the summary tables of the GHG inventory for 1990–2015, but it does not include the emission trend tables given in the common reporting format, which were provided as annexes to the BR3 and as CTF tables. During the review, Spain took note of the need to include within the NC7 the emission trend tables or a reference to the emission trend tables included in the BR3. The ERT recommends that Spain include in its next NC the emission trend tables given in the common reporting format (table 10) as required by the UNFCCC reporting guidelines on NCs, or, if these tables are presented only in the BR and the CTF tables, provide an explicit reference to them.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

3. National system for the estimation of anthropogenic emissions by sources and removals by sinks

(a) Technical assessment of the reported information

19. Spain provided in the NC7 a reference to the description provided in the NIR of its 2013 annual submission[3] of its national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol. The description in the NIR includes how the Party's national system is performing the general and specific functions defined in the annex to decision 19/CMP.1. The NIR also includes a description of all elements mandated by paragraph 30 of the annex to decision 15/CMP.1. However, during the review, in response to a question from the ERT, Spain confirmed that some changes had been introduced to the national system since 2014, and that a reference should therefore have been made to the NIR of its 2017 annual submission and to the web page of the Spanish national emissions inventory.[4]

20. The ERT took note of the review of the changes to the national system reflected in the report on the individual review of the 2017 annual submission of Spain.

(b) Assessment of adherence to the reporting guidelines

21. The ERT assessed the information reported in the NC7 of Spain and identified an issue relating to transparency. The finding is described in table 6.

[3] Available at http://cdr.eionet.europa.eu/es/un/colrdzxpg/envuwvvja/Informe_Inventario_GEI_Espana_1990-2011_Ed_2013_SCMCC_V2.pdf/manage_document.

[4] http://www.mapama.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/.

Table 6
Findings on the national system for the estimation of anthropogenic emissions by sources and removals by sinks from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 30 Issue type: transparency Assessment: recommendation	The ERT noted that Spain, in its NC7, provided a reference to the description of the national system provided in the NIR of its 2013 annual submission. The ERT also noted that since 2014 changes have been introduced to the national system. The reference in the NC7 should, therefore, have been to the NIR of the Party's 2017 annual submission or to another source containing an updated description of the national system. During the review, Spain acknowledged that a reference should have been provided in the NC7 to the up-to-date information on its national system contained in the NIR of its latest annual submission. The ERT recommends that Spain provide in its next NC an up-to-date description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol, or an explicit reference to a document containing an up-to-date description of its national system.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information. The reporting on the requirements not included in this table is considered to be complete and transparent.

4. National registry

(a) Technical assessment of the reported information

22. In the NC7 Spain provided information on how its national registry performs the functions in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and complies with the requirements of the technical standards for data exchange between registry systems. The ERT took note of the review of the changes to the national registry reflected in the NC7 and the report on the individual review of the 2017 annual submission of Spain.

(b) Assessment of adherence to the reporting guidelines

23. The ERT assessed the information reported in the NC7 of Spain and identified an issue relating to transparency. The finding is described in table 7.

Table 7
Findings on the national registry from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 32 Issue type: transparency Assessment: recommendation	The ERT noted that the Party's NC7 did not contain the name and contact information of the registry administrator designated by the Party to maintain the national registry. During the review, Spain provided the required information to the ERT. The ERT recommends that Spain provide explicitly in its next NC the name and contact information of its registry administrator in accordance with paragraph 32(a) of the reporting guidelines for supplementary information.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the reporting guidelines for supplementary information. The reporting on the requirements not included in this table is considered to be complete and transparent.

B. Information on policies and measures and institutional arrangements

1. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol

(a) Technical assessment of the reported information

24. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Spain committed to contributing to the joint EU effort to reduce GHG emissions by 20 per cent below the base-year level. The key cross-sectoral policies in the EU include the EU ETS and the ESD. In addition, Spain introduced national policies to achieve its targets under the ESD and domestic emission reduction targets (see paras. 38, 40 and 41 below).

25. Implementation of the Kyoto Protocol by Spain is underpinned at several levels by ensuring the implementation of related EU regulations. The EU can launch a procedure of infraction if a member State does not fulfil its commitments under EU regulations. Within Spain, Organic Law 2012/2 and Royal Decree 515/2013 regulate the responsibilities of the autonomous communities in the implementation of EU regulations.

26. At the national level, the overall responsibility for climate change policymaking lies with the Environment Secretary in MAPAMA, and a number of national institutions are involved in policy implementation. Responsibility for the compilation of the annual GHG inventory and annual submission under the Kyoto Protocol lies with the Directorate-General for Environmental Assessment and Quality and Natural Environment. The Deputy Directorate-General on Emissions Trading and Flexible Mechanisms, and the Deputy Directorate-General on Coordination of Action to Fight Climate Change are responsible for both mitigation and adaptation action in the country and are part of the Spanish Climate Change Office, which is the governing body, within the Environment Secretary, leading policymaking and coordination of climate change action. The Interministerial Commission on Climate Change ensures the coordination of the proposal of PaMs and the monitoring of their implementation within the central administration. Other forums, such as the National Climate Council, which is presided over by MAPAMA, ensure coordination of the actions of the autonomous communities and other administrative entities, social partners and civil society representatives.

27. Spain has legislative arrangements and administrative procedures in place to make information publicly accessible. The Party reported this information in the addendum to the NC7. All relevant information on actions and matters related to the Kyoto Protocol is published in the Spanish Government's official gazette (*Boletín Oficial del Estado*) and in the *Official Journal of the European Union*.

28. Spain reported in its NC7 on the national legislative arrangements and administrative procedures in place that seek to ensure that the implementation of activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contributes to the conservation of biodiversity and the sustainable use of natural resources. The Spanish Forest Plan covers activities that occur in forest areas and recognizes that the use of forest areas for forestry production is complemented by the protection and regulatory functions of water, soil, biodiversity and landscape. In addition, Spain reported on the application of two EU directives, on the conservation of natural habitats and of wild fauna and flora (directive 92/43/EEC) and on the conservation of wild birds (directive 79/409/EEC), which gave rise to the European network of nature protection areas, Natura 2000. The directives were transposed into the Spanish legal system by Law 42/2007 on natural heritage and biodiversity, which requires the incorporation of measures and mechanisms for the conservation of biodiversity in forest management activities to be guaranteed and duly prioritized within the objectives of forest management activities. Regarding cropland management activities, elected by Spain under Article 3, paragraph 4, of the Kyoto Protocol, the Party mentioned that the EU Common Agricultural Policy includes subsidies that are conditional upon the application of environmental good practices, thereby contributing to the sustainable use of natural resources.

(b) Assessment of adherence to the reporting guidelines

29. The ERT assessed the information reported in the NC7 of Spain and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

2. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

(a) Technical assessment of the reported information

30. Spain provided information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol. It provided information on PaMs subdivided by sector, but not subdivided by GHG, in the PaMs section of the NC7; however, the information on PaMs is subdivided by GHG in summary table 41 of the NC7 and in CTF table 3.

31. Spain provided information on implemented, adopted and planned mitigation actions in all sectors as well as on cross-sectoral measures. Most of the PaMs reported in the NC7, however, are measures that have already been implemented. During the review, Spain presented to the ERT information on additional PaMs that have been adopted or are in the planning stage and that are not described in the NC7, such as subsidies for the implementation of new projects within the framework of the Climate Projects under the Carbon Fund for a Sustainable Economy (FES-CO_2); tenders to incentivize the development of new renewable energy projects; the Innovation Plan for Transport and Infrastructure 2018–2020; the update of the Energy Retrofitting of Buildings Programme (PAREER II); the update of the technical building code; the State Housing Plan 2018–2021; the implementation of energy renovation projects for existing buildings of the central administration; and the update of the Spanish Forest Plan.

32. Spain reported on its policy context and legal and institutional arrangements in place to implement its commitments. A detailed description of how the effectiveness of PaMs to mitigate GHG emissions is monitored and evaluated over time was not provided in the NC7; only a short note was included indicating that the National Climate Council is in charge of elaborating, tracking and evaluating the general principles for the implementation of climate change mitigation policies in Spain. During the review, Spain informed the ERT that it is working on improving this aspect of its reporting.

33. Spain provided information on a set of PaMs similar to those previously reported, with a few exceptions. It also provided information on changes made since the previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target. There have been no changes in the domestic institutional arrangements in Spain since its BR2, except for the creation in 2017 of an interministerial working group for coordinating the preparation of the draft law on climate change and energy transition and the National Integrated Energy and Climate Plan, and an interministerial commission for the preparation of the Spanish Circular Economy Strategy.

34. Spain gave priority to implementing the PaMs that make the most significant contribution to its emission reduction efforts. Explicit information on how Spain believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals in accordance with the objective of the Convention was not provided in the NC7. Information was presented implicitly in the NC7 in the description of PaMs. Spain reported on the PaMs that have been discontinued since the previous submission, but did not report on how it periodically updates its PaMs to reduce greater levels of emissions.

35. In Spain, some PaMs are deferred to the community and local level. In many cases, national policies are complemented by PaMs implemented by the autonomous communities and local entities. Almost all the autonomous communities have established a regulatory framework for the implementation of PaMs through strategies or action plans, and they have created their own administrations for the implementation of these measures. The NC7 includes information on the policies and plans developed by the autonomous communities. During the review, representatives of some of the autonomous communities presented their

main implemented PaMs, such as fostering the development of renewable energy sources, increasing energy efficiency, implementing sustainable transport and improving waste management. At the local level, the Spanish Network of Cities for Climate, formed by local entities with the objective of integrating climate change into their municipal policies, promotes, among other actions, the introduction of renewable energy sources and energy efficiency in transport and buildings. The European Regional Development Fund and the European Agricultural Fund for Rural Development have contributed to funding mitigation measures implemented by the Spanish autonomous communities and local entities.

36. The key overarching cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO_2 emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package.

37. In operation since 2005, the EU ETS is a cap-and-trade system that covers all significant energy-intensive installations (mainly large point emissions sources such as power plants and industrial facilities), which produce 40–45 per cent of the GHG emissions of the EU. It is expected that the EU ETS will guarantee that the 2020 target (a 21 per cent emission reduction below the 2005 level) will be achieved for sectors under the scheme. The third phase of the EU ETS started in 2013 and the system now includes aircraft operations (since 2012) as well as, inter alia, N_2O emissions from chemical industries, PFC emissions from aluminium production and CO_2 emissions from industrial processes (since 2013), in addition to the sectors and gases already covered during the first and second phases.

38. The ESD became operational in 2013 and covers sectors outside the EU ETS (except LULUCF), including transport (excluding domestic and international aviation, and international maritime transport), residential and commercial buildings, agriculture and waste, together accounting for 55–60 per cent of the GHG emissions of the EU. The aim of the ESD is to decrease GHG emissions from non-ETS sectors in the EU by 10 per cent below the 2005 level by 2020 and it includes binding annual targets for each member State for 2013–2020.

39. Spain did not indicate any EU-wide mitigation actions currently under development. Among the mitigation actions that are critical for Spain's contribution to attaining the EU-wide 2020 emission reduction target are the Renewable Energy Action Plan 2011–2020, the Energy Efficiency Action Plan 2017–2020, the promotion of biofuels (Royal Decree 1085/2015) and the national tax on F-gases.

40. Spain introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policies reported are the Climate Projects; the Renewable Energy Action Plan 2011–2020; the Energy Efficiency Action Plan 2014–2020 and the Energy Efficiency Action Plan 2017–2020; the promotion of biofuels; and the national tax on F-gases. The mitigation effect of the national tax on F-gases is the most significant of the PaMs evaluated. Other policies that have delivered significant emission reductions are the promotion of biofuels and the Climate Projects.

41. Spain did not provide information on the domestic mitigation actions that are under development. However, during the review, the Party presented to the ERT information on additional PaMs that have been adopted or are in the planning stage, such as subsidies for the implementation of new projects within the framework of the Climate Projects under the Carbon Fund for a Sustainable Economy (FES-CO_2); tenders to incentivize the development of new renewable energy projects; the Innovation Plan for Transport and Infrastructure 2018–2020; the update of the Energy Retrofitting of Buildings Programme (PAREER II); the update of the technical building code; the State Housing Plan 2018–2021; the implementation of energy renovation projects for existing buildings of the central administration; and the update of the Spanish Forest Plan. Table 8 provides a summary of the reported information on the PaMs of Spain.

Table 8
Summary of information on policies and measures reported by Spain

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	EU ETS	NE	NE
	ESD	NE	NE
	Climate Projects under the Carbon Fund for a Sustainable Economy (FES-CO_2)	1 995[a]	2 070
Energy			
Transport	Promotion of biofuels (Royal Decree 1085/2015)	4 000[b]	4 000[b]
Renewable energy	Renewable Energy Action Plan 2011–2020	32 000[c]	NE
Energy efficiency	Energy Efficiency Action Plan 2014–2020	NE	NE
	Energy Efficiency Action Plan 2017–2020	NE	NE
IPPU	National tax on F-gases	6 000	11 000
Agriculture and LULUCF	National Rural Development Programme and the rural development programmes of the autonomous communities	NE	NE
Waste	State Waste Management Framework Plan 2016–2022	NE	NE

Note: The estimates of mitigation impact are estimates of emissions of CO_2 or CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

[a] Emission reductions are mainly included under the sectors covered by the ESD.

[b] During the review Spain noted that this estimate of mitigation impact should be 3,856 kt CO_2 eq instead of 4,000 kt CO_2 eq.

[c] Information provided by Spain during the review.

(b) Policies and measures in the energy sector

42. **Energy supply**. The contribution of renewable energy sources to the total gross electricity generation in Spain in 2016 was 38.1 per cent, of which wind generation produced 46.7 per cent and hydroelectric sources 34.6 per cent (81.3 per cent together). Electricity generation from other sources in 2016 came from nuclear (21.3 per cent), natural gas (19.2 per cent), coal (13.6 per cent), oil products (6.2 per cent) and other technologies (1.6 per cent).[5] The key policy in the energy supply sector is the Renewable Energy Action Plan 2011–2020 (see para. 43 below).

43. **Renewable energy sources**. Renewable energy is promoted in Spain through the Renewable Energy Action Plan 2011–2020, comprising a package of more than 80 sectoral and cross-sectoral measures, with the aim of achieving a share of 20 per cent for renewable energy sources in the gross energy consumed in the country by 2020, including renewable energy use for electricity generation, transport, and heating and cooling. The measures in the Plan cover the promotion of wind, solar and hydroelectric generation. During the review, Spain provided information on the status of compliance with this target and the emission reductions expected from the Plan, namely 32,000 kt CO_2 eq in 2020 (the accumulated emission reductions expected from the Plan are 170,000 kt CO_2 eq by 2020). In 2016, renewable energy consumption accounted for 17.3 per cent of the total energy consumption used for electricity generation, transport, and heating and cooling. In 2015, the renewable energy installed capacity by technology was 20,348 MW for hydroelectric, 23,030 MW for

[5] During the review, Spain noted that the contribution to electricity generation in 2016 of natural gas was 11.2 per cent and of other technologies was 8.0 per cent.

wind, 4,662 MW for solar photovoltaic, 2,299 MW for solar thermal and 748 MW for renewable thermal. It is expected that an additional 3,910 MW solar photovoltaic, 4,106 MW wind and 200 MW solid biofuel and biogas capacities will be installed before 2020 as a result of two auctions carried out in 2017.

44. **Energy efficiency**. Energy efficiency is promoted in Spain through the National Energy Efficiency Action Plan 2014–2020, which was updated in 2017 to the National Energy Efficiency Action Plan 2017–2020. Measures include the efficient vehicle incentive and efficient driving programmes, and the energy efficiency programme for small and medium industries. The Plan established a national objective for primary energy consumption of 122.6 Mtoe by 2020, which represents a 24.7 per cent reduction in comparison with the baseline scenario. The target for the Plan is a cumulative reduction in energy consumption by 15,979 ktoe over the period 2014–2020. The annual energy savings were 555.75 and 522.87 ktoe in 2014 and 2015, respectively, in comparison with the baseline scenario. During the review, Spain provided additional information on the cumulative emission reduction for the period 2014–2020 of 21,969.61 kt CO_2 eq, attributable to the measures already implemented in 2014–2015.

45. **Residential and commercial sectors**. Energy efficiency measures have been developed for both existing buildings and new builds in order to reduce emissions from the residential and commercial sectors. The technical building code, the Energy Retrofitting of Buildings Programme (named PAREER) and the energy certification of new and existing buildings are examples of these measures. The technical building code for the energy performance of buildings is updated every five years; the current version is from 2013 and an updated version will be available in 2018. PAREER promotes improvements in the energy performance of building envelopes, lighting and thermal installations, as well as the replacement of conventional heating systems with systems using solar and geothermal energy. Spain has outlined a long-term plan to mobilize investments in the renovation of both public and private residential and commercial building stock. A long-term strategy for energy renovation in the building sector was launched in 2014, and an updated version was prepared in 2017. Under the strategy, the impact of measures already implemented to promote energy efficiency in buildings is reviewed and new measures proposed; for example, improvements in energy building certification and an update to PAREER.

46. **Transport sector**. GHG emissions from the transport sector accounted for 24.8 per cent of total GHG emissions and 42.4 per cent of emissions from non-ETS sectors in 2015. Spain has implemented measures to promote alternative fuels and technologies, such as electric vehicles, through the Strategy to Promote Alternative Energy Vehicles for 2014–2020, which was complemented by the National Action Framework for Alternative Energy in Transport in 2016. The Strategy includes various kinds of measure that promote alternative fuel use in road transport (i.e. compressed natural gas, liquefied natural gas, liquefied petroleum gas, bioethanol, biofuels, hydrogen and electricity), innovation, industrialization, installation of recharging points and public awareness-raising. It also includes economic incentives such as the Plan to Promote Mobility with Alternative Energy Vehicles (MOVEA Plan), the Aid Programme for the Purchase of Alternative Energy Vehicles (MOVALT Vehicles Plan) and the Aid Programme for the Implementation of Electric Vehicle Charging Infrastructure (MOVALT Infrastructure Plan), which award grants for the purchase of alternative fuel vehicles for road transport and the installation of recharging points for electric vehicles. Royal Decree 1085/2015 on the promotion of biofuels established mandatory goals for biofuel use, with blending targets of 4.3 per cent for 2016, 5.0 per cent for 2017, 6.0 per cent for 2018, 7.0 per cent for 2019 and 8.5 per cent for 2020. Measures to promote energy efficiency in the transport sector are included in the National Energy Efficiency Action Plan 2017–2020. Spain's implemented measures to reduce emissions in this sector also include shifting the modes of transporting people and goods (i.e. shifting from road to rail and sea transport).

47. The addendum to the NC7 includes information on how Spain promotes and implements the decisions of ICAO and IMO to limit emissions from aviation and marine bunker fuels. The Party indicated that under EU legislation (2008) the inclusion of international civil aviation in the EU ETS was planned from 2012, but the scope of the EU ETS was later limited to flights within the European Economic Area pending a global

agreement under ICAO. At the end of 2017, a continuation of the limitation was established in preparation for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), adopted by ICAO in 2016 and to become operational in 2021. Spain stated that it has taken an active part in the ICAO negotiations; the Spanish representative at ICAO has acted as co-rapporteur. Moreover, in 2015, Madrid hosted the Global Aviation Dialogues of ICAO, at which the regulation of international aviation emissions was discussed. The number of air operators whose management is attributed to Spain is about 380, of which about 20 per cent meet the requirements to be included in the EU ETS and comply with its obligations. Regarding international marine transport, Spain indicated that EU regulation 2015/757 on the monitoring, reporting and verification of CO_2 emissions from maritime transport established the obligation for the CO_2 emissions of ships above 5,000 gross tonnage to be monitored, notified and verified, starting in 2018. This regulation will possibly be aligned with the rules on monitoring, reporting and verification agreed by IMO (of which Spain is a member). In this regard, Spain is waiting for the legislative proposal to be presented by the European Commission to tackle maritime CO_2 emissions. Meanwhile, it has incorporated the obligations derived from EU regulation 2015/757 into national law.

48. **Industrial sector**. Most emissions from the industrial sector are included in the EU ETS; therefore, the EU ETS is the main measure in this sector. Industries related to the production of cement, steel, ceramic products, chemical products, lime and paper are examples of those included in the EU ETS. At the national level, the Energy Efficiency Action Plan 2017–2020 includes efficiency measures that affect the industrial sector, such as energy efficiency programmes for small and medium industries.

(c) Policies and measures in other sectors

49. **Industrial processes**. The most important measure in this sector is the national tax on F-gases, which has been in force since January 2014 (Law 16/2013, Article 5). The tax applies to gases with a global warming potential greater than 150, and it includes HFCs, PFCs and SF_6. Tax rates are set on a weight basis (per kg of gas) so that they are proportional to the global warming potential of each gas. Over a period of three years after its implementation in 2014, Spain achieved a more than 30 per cent reduction in F-gas emissions in comparison with 2013. In addition, a voluntary agreement between MAPAMA and all agents that participate in the life cycle of SF_6 in the country (equipment manufacturers, electricity generation companies and waste management companies) was implemented in 2015 with the goal of reducing SF_6 emissions in the period 2015–2020.

50. **Agriculture**. The National Rural Development Programme and the rural development programmes of the autonomous communities are the most important measures in this sector, according to information provided by Spain during the review. Within the programmes, which cover the agriculture and forestry sectors, are measures such as post-fire forest restoration, improvement of crop management practices, reduction in the use of fertilizers, conservation of forest carbon, forest management and prevention of deforestation. Fertilization optimization is another important measure with untapped potential according to information provided by Spain during the review. It is expected that future capacity-building activities carried out by MAPAMA and future regulations related to improving fertilization practices will result in greater emission reductions in this sector.

51. **LULUCF**. Measures in the forestry sector are promoted through the Spanish Forest Plan, which was approved in July 2002. The Plan, projected to have a duration of 30 years (2002–2032), is in the process of being reviewed. The restoration of vegetation cover, increase of forest area and sustainable forest management are the main measures promoted by the Plan. Sustainable forest management measures aim to increase the sink capacity of forests and reduce CO_2 emissions due to fires.

52. **Waste management**. Law 22/211 on waste and contaminated soils established the general framework for promoting mitigation actions for reducing emissions from the waste sector. Among the most important measures in the waste sector, the National Programme on Waste Prevention 2014–2020 aims to achieve by 2020 a 10 per cent reduction in the weight of waste generated compared with the amount in 2010. Similarly, the More Food, Less Waste Strategy seeks to reduce the generation of waste from food. Other measures currently under implementation in Spain are the PIMA programme, which promotes the separation of waste

during its collection as well as its reutilization, and the State Waste Management Framework Plan 2016–2022, which has a target of recycling and processing for reuse 50 per cent of municipal waste and limiting to 35 per cent the municipal waste deposited in landfills by 2020.

(d) Minimization of adverse impacts in accordance with Article 2 and Article 3, paragraph 14, of the Kyoto Protocol

53. In the NC7 Spain reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts on other Parties, especially developing country Parties. During the review, Spain explained that its evaluation of impacts on other Parties was focused on possible impacts on developing countries. In its NC7 Spain identified the social, environmental and economic impacts on other Parties of the following aggregated measures: increase in the use of biofuels, introduction of renewable energy, reduction of emissions from the LULUCF sector, and reduction of emissions from the waste sector. The analysis was performed using a qualitative evaluation that described in general the main impacts of those measures.

54. Further information on how Spain strives to implement its commitments under Article 3, paragraph 14, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties was reported in its 2017 annual submission, which was referenced in the NC7. Spain reported on the assessment of economic and social consequences of response measures, adverse effects of climate change, the minimization of effects on international trade, and social, environmental and economic impacts on other Parties. The reporting included information on cooperation on the development of technologies, assisting developing country Parties that are highly dependent on the export of fossil fuels in diversifying their economies, and conducting relevant research. For example, Spain presented the following initiatives: reduction of market imperfections; suppression of subsidies associated with the use of environmentally unclean technologies or technologies dangerous to the climate; investment in research centres working on clean technologies, for example on carbon capture storage systems; investment in research and development in industries vulnerable to mitigation action policies, such as the petrochemical industry, which is intensive in its use of fossil fuels; and technology transfer and financial support provided to developing countries in order to promote the implementation of mitigation actions.

(e) Assessment of adherence to the reporting guidelines

55. The ERT assessed the information reported in the NC7 of Spain and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 9.

Table 9
Findings on policies and measures, including those in accordance with Article 2 of the Kyoto Protocol, from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 14 Issue type: completeness Assessment: encouragement	The ERT noted that Spain did not report in the NC7 whether its PaMs are innovative and/or effectively replicable by other Parties. During the review, Spain provided examples of innovative PaMs and highlighted the national tax on F-gas emissions and the Climate Projects under the Carbon Fund for a Sustainable Economy (FES-CO_2). Spain acknowledged that it could improve this aspect of its reporting in future NCs. The ERT encourages Spain to indicate in its next NC PaMs that are innovative and/or effectively replicable by other Parties.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
2	Reporting requirement specified in paragraph 15 Issue type: completeness Assessment: encouragement	The ERT noted that Spain reported in its NC7 only PaMs that are implemented. During the review, Spain provided to the ERT information on PaMs that have been adopted or are in the planning stage and that are not described in the NC7, including some that were already publicly known at the time of the submission of the NC7. The ERT encourages Spain to describe in its next NC all PaMs that have been adopted or are in the planning stage at the national, regional and local level.
3	Reporting requirement specified in paragraph 15 Issue type: transparency Assessment: encouragement	The ERT noted that in its NC7 Spain explained that measures for energy saving and efficiency in railway transport for 2014–2020 under the "ADIF" and "ADIF Alta Velocidad" PaMs may have an impact on international transport. During the review, Spain provided information on additional measures with impacts on international transport; for example, air traffic management measures to improve the efficiency of air transport, both national and international, and measures for the modal shift of international freight transport from road to other more sustainable modes of transport such as maritime and rail. The ERT encourages Spain to include in its next NC all planned, adopted and/or implemented PaMs that may have an impact on international transport.
4	Reporting requirement specified in paragraph 17 Issue type: transparency Assessment: recommendation	The ERT noted that Spain provided information on PaMs by sector but not subdivided by GHG. Information on PaMs by sector subdivided by GHG was provided in summary table 41 of the NC7. During the review, Spain acknowledged this requirement of the UNFCCC reporting guidelines on NCs. The ERT recommends that Spain organize in its next NC the information on PaMs by sector, subdivided by GHG.
5	Reporting requirement specified in paragraph 18 Issue type: transparency Assessment: encouragement	The ERT noted that the vehicle taxation measure (green tax) under Law 34/2007 was included in summary table 41 of the NC7 but not described in the PaMs section of the NC7. During the review, Spain explained that a description of this measure was not included given that it was included in the NC6. The ERT encourages Spain, in cases where a policy or measure has been maintained over time and is thoroughly described in a previous NC, to include a reference to the section of the previous NC where the information can be found as well as a brief description in the current NC, focusing on any alterations to the policy or measure or effects achieved.
6	Reporting requirement specified in paragraph 21 Issue type: transparency Assessment: encouragement	The ERT noted that the NC7 includes information on Spain's institutional arrangements to develop and implement PaMs, but the institutional arrangements for monitoring GHG emission reductions and a description of how the progress of PaMs is monitored and evaluated over time were not reported in detail, and only a short note was included indicating that the National Climate Council is in charge of elaborating, tracking and evaluating the general principles for the implementation of climate change mitigation policies in Spain. During the review, Spain informed the ERT that it is working on improving this aspect of its reporting. The ERT encourages Spain to report in its next NC a comprehensive description of the institutional arrangements for monitoring GHG mitigation policies in the context of how the progress of PaMs to mitigate GHG emissions is monitored and evaluated over time.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
7	Reporting requirement specified in paragraph 23 Issue type: transparency Assessment: encouragement	The ERT noted that Spain reported GHG emission reductions for only 26 of the 75 PaMs presented in the NC7. No justification or explanation for the missing mitigation effects was provided in the NC7, but some justifications were included in the BR3. The same issue was identified in the NC6. During the review, Spain informed the ERT that it is working on improving this aspect of its reporting, and provided additional estimates of mitigation impacts as well as further explanations of the challenges that Spain faces and needs to solve in its effort to assess more systematically the mitigation effects of its PaMs. The ERT encourages Spain to include in its next NC, as appropriate, a quantitative estimate of the impacts of individual PaMs or collections of PaMs, or to provide a clear explanation of the reason such information could not be reported due to its national circumstances, or to include a cross reference to the section of the BR where this information can be found.
8	Reporting requirement specified in paragraph 23 Issue type: transparency Assessment: encouragement	The ERT noted that Spain used the notation key "IE" ("I.O." in Spanish) for reporting several mitigation actions in the column "Estimate of mitigation impact" of summary table 41 of the NC7. However, no indication as to where the mitigation impact was reported for these mitigation actions was provided. During the review, Spain informed the ERT that it is working on improving this aspect of its reporting. The ERT encourages Spain to improve the transparency of its reporting by clearly noting under which policy or measure the emission reduction of a mitigation action is included when the notation key "IE" is used in the "Summary of policies and measures by sector" table of its next NC.
9	Reporting requirement specified in paragraph 24 Issue type: transparency Assessment: encouragement	The ERT noted that Spain reported the budget and funds allocated to develop the PaMs for only some of the PaMs in the NC7. The ERT also noted that information on the non-GHG mitigation benefits of PaMs and on how the policy or measure interacts with other PaMs at the national level was not provided in the NC7. During the review, Spain acknowledged this requirement of the UNFCCC reporting guidelines on NCs. The ERT encourages Spain to provide in its next NC information on the costs of PaMs, on the non-GHG mitigation benefits of PaMs and on how the policy or measure interacts with other PaMs at the national level.
10	Reporting requirement specified in paragraph 25 Issue type: transparency Assessment: recommendation	The ERT noted that information on the modification by PaMs of longer-term trends in GHG emissions was presented implicitly in the description of PaMs in the NC7. Explicit information on how PaMs modify longer-term GHG emission trends was not provided for all measures. The same issue was identified in the NC6. During the review, Spain informed the ERT that it is working on improving this aspect of its reporting. The ERT recommends that Spain provide in its next NC explicit information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

1. Projections overview, methodology and results

(a) Technical assessment of the reported information

56. Spain reported updated projections for 2020 and 2030 relative to actual inventory data for 2015 under the WEM scenario. However, the projections were constructed in coherence with the GHG inventory of the 2016 annual submission of Spain. The WEM scenario reported by Spain includes implemented and adopted PaMs until 2014. These PaMs were included through the estimation of their impact on past trends of subsector activity data and apparent emission factors. For a limited number of PaMs from 2015 and 2016, individual impact assessments were made, and thus they are included in the scenario. Spain provided a definition of its WEM scenario, explaining that it includes policies such as the Renewable Energy Action Plan 2011–2020 and the Energy Efficiency Action Plan 2014–2020; various EU directives and regulations (e.g. for large combustion facilities and for ecodesign); the PIMA programme; national regulations for new buildings; and the Strategy to Promote Alternative Energy Vehicles for 2014–2020. The definition indicates that the WEM scenario was prepared according to the UNFCCC reporting guidelines on NCs. Spain did not report a WAM or WOM scenario.

57. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) for 1990–2030 (and 2050). The projections are also provided in an aggregated format for each sector as well as for the Party total using global warming potential values from the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

58. Spain did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides.

59. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and were not included in the totals. Spain reported some information on factors and activities affecting emissions for each sector.

(b) Methodology, assumptions and changes since the previous submission

60. The methodology used for the preparation of the projections is different from that used for the preparation of the emission projections for the BR2 and NC6. Spain reported supporting information to further explain the methodologies and the changes made since the NC6 and BR2. Notably, Spain indicated the reduction in the number of activity variables used in the model from several hundreds to 111, which was based on the estimated evolution of the various sources of emissions. During the review, Spain clarified that the number of activity variables was reduced to improve the operationality of the model used and the robustness of its results. Also, the Party mentioned that it sees the current method as transitory and that it expects to be able to base its projections on sectoral models. The methodology is now mostly based on a statistical analysis of past trends using ARIMA[6] models at the sectoral level, while the projections presented in the NC6 were obtained through the aggregation of a macroeconomic model and disaggregated models for subsectors. During the review, Spain noted that there were large uncertainties of key assumptions used in the projections, including the prediction of economic growth.

61. To prepare its projections, Spain relied on population and GDP growth as key underlying assumptions. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections analysis. Spain provided information in CTF table 5 on the key variables and assumptions used in the preparation of the projection scenarios, along with sectoral key underlying assumptions, such as energy consumption in the main energy subsectors and other relevant activity data for the

[6] Autoregressive integrated moving average.

agriculture and waste sectors. Regarding the macroeconomic context, Spain assumed a slight decrease in its population (by 2.2 per cent in the period 2015–2030 and 5.8 per cent in 2015–2050) and at the same time strong growth in its GDP (by 28.8 per cent in the period 2015–2030 and 65.0 per cent in 2015–2050).

62. Spain provided information on sensitivity analyses, which were conducted to characterize the impact of revising its GDP growth estimates. Over the period 2015–2030, an additional increase of 10 points in GDP would lead to an additional increase in emissions of 3.3 Mt CO_2 eq (or about 1 per cent of the emissions in 2030).

(c) Results of projections

63. The projected emission levels under the WEM scenario and information on the Kyoto Protocol targets and the quantified economy-wide emission reduction target are presented in table 10 and the figure below.

Table 10
Summary of greenhouse gas emission projections for Spain

	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
Kyoto Protocol base year[b]	283 361.70	NA	–1.6
Quantified emission limitation or reduction commitment under the Kyoto Protocol (2013–2020)[c]	NA	NA	NA
Quantified economy-wide emission reduction target under the Convention[d]	NA	NA	NA
Inventory data 1990[e]	287 828.15	1.6	NA
Inventory data 2015[e]	335 661.52	18.5	16.6
WOM projections for 2020[f]	NE	NE	NE
WEM projections for 2020[f]	332 994.13	17.5	15.7
WAM projections for 2020[f]	NE	NE	NE
WOM projections for 2030[f]	NE	NE	NE
WEM projections for 2030[f]	330 453.35	16.6	14.8
WAM projections for 2030[f]	NE	NE	NE

[a] "Base year" in this column refers to the base year used for the target under the Kyoto Protocol, while for the target under the Convention the base year for Spain is 1990 and the changes in relation to that year are shown in the last column.

[b] The Kyoto Protocol base-year level of emissions is provided in the initial review report, contained in document FCCC/IRR/2016/ESP.

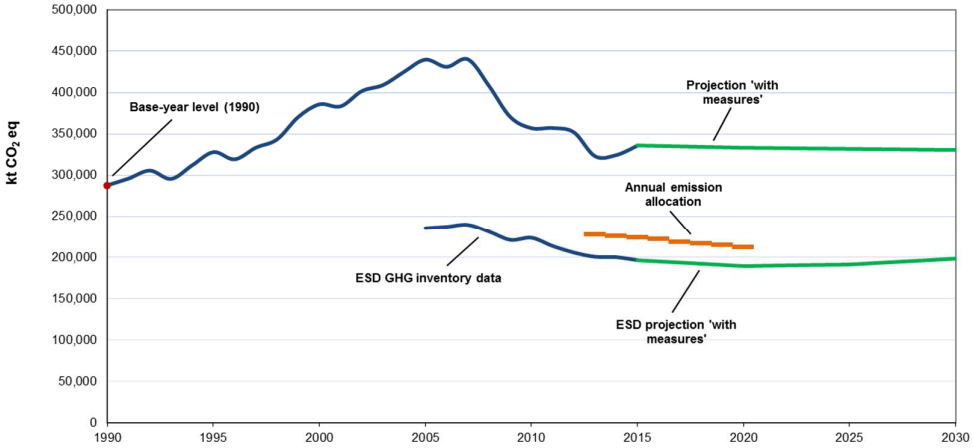
[c] The Kyoto Protocol target for the second commitment period (2013–2020) is a joint target of the EU and its 28 member States and Iceland. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. Spain's target for non-ETS sectors is to reduce emissions by 10 per cent. The value presented here is based on annex II to European Commission decision 2013/162/EU and as adjusted by Commission implementing decision 2013/634/EU, which established the assigned amount for the EU member States, and divided by eight (years) to calculate the annual emission level, as well as on decision 2017/1471, which updated the targets for 2017–2020.

[d] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.

[e] From Spain's BR3 CTF table 6.

[f] From Spain's NC7 and/or BR3.

Greenhouse gas emission projections reported by Spain



Sources: (1) data for 1990–2015: Spain's 2017 annual inventory submission, version 7; total GHG emissions excluding LULUCF; (2) data for 2016–2030: Spain's NC7 and BR3; total GHG emissions excluding LULUCF.

64. Spain's total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 332,994.13 and 330,453.35 kt CO_2 eq, respectively, under the WEM scenario, which represents an increase of 15.7 and 14.8 per cent, respectively, above the 1990 level. The 2020 projections suggest that Spain will continue contributing to the achievement of the EU target under the Convention (emission reduction by 20 per cent below the 1990 level by 2020).

65. Spain's target for non-ETS sectors is to reduce its total emissions by 10 per cent below the 2005 level by 2020 (see para. 38 above). Spain's AEAs, which correspond to its national emission target for non-ETS sectors, change nearly linearly from 227,563.76 kt CO_2 eq in 2013 to 212,390.48 kt CO_2 eq for 2020. According to the projections under the WEM scenario and information provided by Spain during the review, emissions from non-ETS sectors are estimated to reach 189,068.95 kt CO_2 eq by 2020. The projected level of emissions under the WEM scenario is 11.0 per cent below the AEAs for 2020. The ERT noted that this suggests that Spain expects to meet its target under the WEM scenario (see para. 38 above).

66. Spain presented the WEM scenario by sector for 2020 and 2030, as summarized in table 11.

Table 11
Summary of greenhouse gas emission projections for Spain presented by sector

	GHG emissions and removals (kt CO_2 eq)			*Change (%)*	
		2020	*2030*	*1990–2020*	*1990–2030*
Sector	*1990*	*WEM*	*WEM*	*WEM*	*WEM*
Energy (not including transport)	154 287.53	176 674.94	168 161.54	14.5	9.0
Transport	58 966.57	87 074.69	95 677.82	47.7	62.3
Industry/industrial processes	29 994.07	32 530.08	31 952.53	8.5	6.5
Agriculture	34 755.16	28 443.86	27 331.27	–18.2	–21.4
LULUCF	–25 143.73	–33 048.67	–29 739.14	31.4	18.3
Waste	9 824.80	8 270.79	7 330.43	–15.8	–25.4
Other (specify)	–	–	–	–	–
Total GHG emissions without LULUCF	**287 828.15**	**332 994.13**	**330 453.35**	**15.7**	**14.8**

Source: Spain's BR3 CTF table 6.

67. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the agriculture and waste sectors, amounting to projected reductions of 6,311.30 kt CO_2 eq (18.2 per cent) and 1,554.01 kt CO_2 eq (15.8 per cent) between 1990 and 2020, respectively. However, under the WEM scenario, emissions in the energy sector (including transport) are expected to increase by 50,495.53 kt CO_2 eq (23.7 per cent) between 1990 and 2020 and, within the energy sector, those in the transport subsector by 28,108.12 kt CO_2 eq (47.7 per cent). The pattern of projected emissions reported for 2030 under the same scenario is slightly different as emissions in the waste sector are projected to reach a plateau shortly after 2020 after significantly decreasing during the period 2010–2020. There is also projected to be a significant further increase in emissions from the transport subsector, and a continuation of the reduction in LULUCF removals that began in 2007, which is due mostly to the fact that tree plantation activities were more significant during the period 1993–2002 than in more recent years. Between 1990 and 2030, the projected emission reductions in the agriculture sector are 7,423.89 kt CO_2 eq (21.4 per cent) and in the waste sector are 2,494.37 kt CO_2 eq (25.4 per cent), while in the energy sector (including transport), for the same period, emissions are projected to increase by 50,585.26 kt CO_2 eq (23.7 per cent) and, within the energy sector, those in the transport subsector by 36,711.25 kt CO_2 eq (62.3 per cent).

68. Spain presented the WEM scenario by gas for 2020 and 2030, as summarized in table 12.

Table 12
Summary of greenhouse gas emission projections for Spain presented by gas

	GHG emissions and removals (kt CO_2 eq)			*Change (%)*	
		2020	*2030*	*1990–2020*	*1990–2030*
Gas	*1990*	*WEM*	*WEM*	*WEM*	*WEM*
CO_2	231 309.75	281 549.10	282 503.53	21.7	22.1
CH_4	35 168.64	29 878.01	28 470.36	–15.0	–19.0
N_2O	17 081.85	12 628.83	12 872.44	–26.1	–24.6
HFCs	3 039.92	8 622.57	6 286.12	183.6	106.8
PFCs	1 164.38	93.93	99.41	806 595.4	853 659.1
SF_6	63.61	221.69	221.49	248.5	248.2
NF_3	0.00	0.00	0.00	NA	NA
Total GHG emissions without LULUCF	**287 828.15**	**332 994.13**	**330 453.35**	**15.7**	**14.8**

Source: Spain's BR3 CTF table 6.

69. For 2020 the most significant reductions are projected for CH_4 and N_2O emissions: 5,290.63 kt CO_2 eq (15.0 per cent) and 4,453.02 kt CO_2 eq (26.1 per cent) between 1990 and 2020, respectively. However, during the review, Spain explained that approximately half of the CH_4 reductions are due to an adjustment to the inventory of the 2017 annual submission, which could not be properly included in the projections because they were calculated on the basis of the GHG inventory of the 2016 annual submission. In addition, CO_2 and HFC emissions are projected to increase by 50,239.35 kt (21.7 per cent) and 5,582.65 kt CO_2 eq (183.6 per cent) between 1990 and 2020, respectively.

70. For 2030 the most significant reductions are also projected for CH_4 and N_2O emissions: 6,698.28 kt CO_2 eq (19.0 per cent) and 4,209.41 kt CO_2 eq (24.6 per cent) between 1990 and 2030, respectively. In addition, CO_2 and HFC emissions are projected to increase by 51,193.78 kt (22.1 per cent) and 3,246.20 kt CO_2 eq (106.8 per cent) between 1990 and 2030, respectively.

(d) Assessment of adherence to the reporting guidelines

71. The ERT assessed the information reported in the NC7 of Spain and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 13.

Table 13
Findings on greenhouse gas emission projections reported in the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 28 Issue type: completeness Assessment: encouragement	The ERT noted that in the NC7 Spain did not report a WOM or WAM scenario, while these scenarios were reported in Spain's NC6. In the NC7 Spain reported that a WAM scenario has not been developed because additional mitigation measures will be subject to studies as part of the elaboration of its Roadmap 2030 and National Integrated Energy and Climate Plan. During the review, Spain explained that it did not develop a WOM scenario as it considered that the results of such a scenario could be difficult to interpret, and that a WAM scenario was not developed because existing measures are sufficient to reach the country's 2020 target. The ERT encourages Spain to include in its next NC a WOM and WAM scenario or to clearly explain the reasons for not including such scenarios in the NC.
2	Reporting requirement specified in paragraph 32 Issue type: transparency Assessment: encouragement	For the WEM projection scenario, the starting point should generally be the latest year for which inventory data are available in the NC. The ERT noted that Spain used 2014 as the starting point for its WEM projections and, in general, inventory data from the 2016 annual submission for developing its WEM projection scenario, while providing inventory data for up to 2015 (based on the 2017 annual submission) in the NC7. Spain explained in the NC7 that the inventory data from the 2017 annual submission became available too late for its projections analysis. It also explained that the absence of data on recalculations for the inventory, when elaborating the projections, led to a small discrepancy for the agriculture sector between the inventory and the projections. In response to a question from the ERT during the review, Spain explained that the absence of data on recalculations has likely resulted in an underestimation in the projections for the agriculture sector of approximately 3 Mt per year for 2015–2050 (thus including the period 2015–2030). The ERT encourages Spain to use in its next NC the latest year for which inventory data are available as the starting point for its WEM projection scenario, and, if relevant, for the WAM projection scenario, and to address any methodological issue, such as the absence of data on recalculations, that may lead to an underestimation or overestimation of the projection scenarios.
3	Reporting requirement specified in paragraph 44 Issue type: transparency Assessment: encouragement	The ERT noted that the projections report referenced in Spain's NC7, where more detailed information related to the model and approach used in the projections analysis is provided, was not available at the time of the review. In response to a question from the ERT during the review, Spain provided an updated weblink to the report. The report includes a summary of the projections, additional information on the approach used and a complete list of the activity data used. The ERT encourages Spain to include in its next NC references to documents containing more detailed information related to the model and approach used for its projection scenarios and to ensure that the references remain accessible over time.
4	Reporting requirement specified in paragraph 45 Issue type: completeness Assessment: encouragement	The ERT noted that Spain did not report on the main differences in results between the projections presented in the NC7 and those presented in previous NCs. During the review, Spain provided to the ERT information on the differences in the results of the WEM projections between its NC7 and NC6. The ERT encourages Spain to report in its next NC on the main differences in the results between projections in the current NC and those in previous NCs.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
5	Reporting requirement specified in paragraph 46 Issue type: transparency Assessment: encouragement	The ERT noted that, while the sensitivity of the projections to underlying assumptions should be discussed qualitatively and, where possible, quantitatively, Spain only reported in its NC7 a sensitivity analysis of its projections to the impact of changes in the assumed growth of GDP. The ERT also noted that, in the report on the technical review of the NC6, Spain was encouraged to improve the transparency of its reporting by exploring ways of complementing the textual description of the analysis of sensitivities with a tabular or graphical presentation, providing a quicker overview of the sensitivities of the sectoral and total emissions to the identified parameters with the most impact. The ERT further noted that Spain did not report a tabular or graphical overview of the sensitivities of the sectoral and total emissions projections to GDP growth. In addition, Spain did not report on the impact of other important underlying assumptions that influence its projection estimates with the most impact. During the review, Spain acknowledged the need to improve the transparency of its reporting on sensitivity analyses. The ERT encourages Spain to report in its next NC on the sensitivity of its projections to main underlying assumptions in addition to GDP growth, and reiterates the previous encouragement to improve the transparency of its reporting by exploring ways to complement the textual description of sensitivities by providing a quick overview of the sensitivities of the sectoral and total emissions projections to the identified underlying assumptions with the most impact.
6	Reporting requirement specified in paragraph 47 Issue type: transparency Assessment: encouragement	The ERT noted that Spain did not report information on tax levels and international fuel prices among the key variables in the table of key underlying assumptions for its projections analysis. During the review, Spain explained that those variables were not included in its reporting given that they were not used as inputs to the models used to derive the projections. The ERT noted, however, that the results of the projections may not be relevant if changes in those variables over the projection period were not consistent with the trends over the historical period used to calibrate the models. The ERT thus noted that similar trends were implicitly assumed for the evolution of tax levels and international fuel prices over the projection period as the trends observed over the calibration period. The ERT encourages Spain to report in its next NC information on tax levels and international fuel prices as key underlying variables, in addition to other key underlying assumptions, even if those variables only implicitly affect the results of the projections.
7	Reporting requirement specified in paragraph 48 Issue type: transparency Assessment: encouragement	The ERT noted that in the table of key underlying assumptions in the NC7, Spain included information on factors and activities specific to sectors, especially the agriculture and waste sectors. The ERT also noted, however, that the information provided by Spain on waste generation in the table was not consistent with Spain's official statistics for 2010 and 2015. During the review, Spain clarified that this variable was not directly used to construct the projections and, therefore, this error did not affect the results of the projections. The ERT encourages Spain to ensure in its next NC that the information provided on the evolution of the variables included in its report on projections is consistent with its official statistics, and, if appropriate, to explain any discrepancies.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs and on BRs.

2. Assessment of the total effect of policies and measures

(a) Technical assessment of the reported information

72. In the NC7 Spain did not present the estimated and expected total effect of implemented and adopted PaMs or an estimate of the total effect of its PaMs, in accordance with the WEM scenario, compared with a situation without such PaMs.

73. In response to a question from the ERT during the review regarding the assessment of the total effect of PaMs, Spain explained that the effect of all implemented PaMs has not been quantified yet and that it is working on improving this aspect of its reporting so that it can fully provide the required information. In particular, within the framework of the development of the National Integrated Energy and Climate Plan, Spain is making a significant effort to improve its emission projections, construction of scenarios and assessment of the impacts of the various PaMs.

74. Spain indicated the main challenges that it has identified and needs to solve for reporting the estimated and expected total effect of implemented and adopted PaMs:

(a) Some measures establish general or strategic frameworks whose aggregated positive effects in reducing GHG emissions are difficult to calculate. The scope of these measures is wide and it is thus difficult to place their impacts clearly into separate sectors. Furthermore, cross-cutting measures have impacts in different sectors and very often overlapping impacts;

(b) The calculation of impacts of measures is carried out in a conservative manner, allocating the mitigation effects to a shorter period of time than that in which mitigation effects could be expected. For this reason, mitigation impacts are not properly presented in long-term projections;

(c) In some cases, such as EU ETS implementation, difficulties related to the fact that measures are integrated into a supranational system arise;

(d) For other measures, their impacts have been taken into account when elaborating the WEM scenario, and they are incorporated directly into the activity variables, which hinders the possibility of comparing scenarios;

(e) Finally, for a set of measures with extensive information on their implementation available, and thus included in the list of PaMs reported, data of sufficient quality to assess their impact have not yet been identified.

75. Table 14 is filled with the notation key "NE" as Spain did not report the total effect of its PaMs and so it is not possible to provide an overview of this effect.

Table 14
Projected effects of Spain's planned, implemented and adopted policies and measures by 2020 and 2030

	2020		*2030*	
Sector	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Effect of planned measures (kt CO_2 eq)*	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Effect of planned measures (kt CO_2 eq)*
Energy (without transport)	NE	NE	NE	NE
Transport	NE	NE	NE	NE
Industrial processes	NE	NE	NE	NE
Agriculture	NE	NE	NE	NE
Land-use change and forestry	NE	NE	NE	NE
Waste management	NE	NE	NE	NE
Total	**NE**	**NE**	**NE**	**NE**

Source: Information provided by Spain to the ERT during the review.
Note: The total effect of implemented and adopted PaMs was not estimated by Spain.

(b) Assessment of adherence to the reporting guidelines

76. The ERT assessed the information reported in the NC7 of Spain and identified an issue relating to completeness and adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table 15.

Table 15
Findings on the assessment of the total effect of policies and measures from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 39 Issue type: completeness Assessment: recommendation	The ERT noted that Spain did not report information on the total effect of implemented and adopted PaMs in its NC7. During the review, Spain explained that it is working on improving this aspect of its reporting, in particular within the framework of the development of the National Integrated Energy and Climate Plan. Furthermore, Spain explained that cross-cutting measures overlap and that the impacts of some measures have been incorporated directly in the activity variables under the WEM scenario, which hinders the possibility of estimating the total effect of implemented and adopted PaMs by comparison of scenarios. Recognizing the difficulties indicated by Spain, the ERT recommends that Spain present in its next NC the estimated and expected total effect of implemented and adopted PaMs. The ERT notes that such an estimate could be provided by clarifying whether the approach taken to define the total effect is conservative, considering that the effects of all PaMs could not be included within the total effect. Depending on the approach taken to establish this effect, Spain could also indicate that the provided estimate might be an overestimation of the total effect of PaMs owing to the fact that it is impossible to evaluate the extent of an overlap between adopted and implemented PaMs. The ERT notes that the inclusion of a list of PaMs that have not been taken into account when estimating the total effect of implemented and adopted PaMs would further improve the transparency of the reporting.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

3. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

(a) Technical assessment of the reported information

77. In the NC7 Spain provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. The ERT noted that Spain does not plan to use the market-based mechanisms to meet its Kyoto Protocol target.

78. In its NC7 Spain explained that it defined supplementarity as the level above 50 per cent of the difference between the projected emissions and the Kyoto Protocol target (regarding the EU ETS). The Party also explained, regarding the share of non-ETS sectors, that all EU member States can use in a given year credits from market-based mechanisms until they reach a figure equivalent to 3 per cent of their emissions in 2005. This limit for Spain would amount to a total of 7.14 million CERs and ERUs. If these units are not used in a given year, this quota may be transferred to other EU member States or carried over for own use until 2020. A limited number of EU member States, including Spain, may use an additional amount of credits equivalent to 1 per cent of their emissions in 2005 derived from projects undertaken in the least developed countries or small island developing States. This additional quota would be equivalent to 2.38 million CERs and ERUs. This additional quantity of credits can be neither used nor transferred.

(b) Assessment of adherence to the reporting guidelines

79. The ERT assessed the information reported in the NC7 of Spain and recognized that the reporting is complete and transparent. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

D. Provision of financial and technological support to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Financial resources, including under Article 11 of the Kyoto Protocol

(a) Technical assessment of the reported information

80. In its NC7 Spain reported information on the provision of financial support required under the Convention and its Kyoto Protocol, including on financial support provided, committed and pledged, allocation channels and annual contributions.

81. Spain indicated what "new and additional" financial resources it has provided and clarified how it has determined such resources as being "new and additional". By Spain's definition, contributions are considered to be "new and additional" when the support is given to activities that are new and specific to climate change.

82. The Spanish policy on development cooperation is framed in the Fourth Master Plan for Spanish Development Cooperation (2013–2016) for the period reported in the NC7. The Plan addresses climate change and the environment and highlights the importance of addressing specific actions but also of integrating them into all actions of the Spanish cooperation. Spain recently approved the Fifth Master Plan for Spanish Development Cooperation for the period 2018–2021, with the 2030 Agenda for Sustainable Development and the Paris Agreement as its core elements. In its NC7 Spain described how its resources address the adaptation and mitigation needs of non-Annex I Parties. It also described how those resources assist non-Annex I Parties to mitigate and adapt to the adverse effects of climate change, facilitate economic and social response measures, and contribute to technology development and transfer and capacity-building related to mitigation and adaptation. Spain reported information on the assistance that it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them to meet the costs of adaptation to those adverse effects. Spain noted in its NC7 and in the information provided to the ERT during the review that it considers the following countries to be particularly vulnerable: Bolivia (Plurinational State of), Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Paraguay and Peru in Latin America and the Caribbean; Mauritania, Morocco, State of Palestine and the Sahrawi population in Northern Africa and the Middle East; Equatorial Guinea, Ethiopia, Mali, Mozambique, Niger and Senegal in sub-Saharan Africa; and Philippines in Asia. In its NC7, Spain reported a contribution of USD 0.22 million to the Adaptation Fund in the period 2013–2016.

83. With regard to the most recent financial contributions aimed at enhancing the implementation of the Convention by developing countries, Spain reported that its climate finance has been allocated on the basis of agreements with the recipient countries for bilateral support, and on the basis of information provided by multilateral organizations that takes into account the needs of developing countries for multilateral support. Spain clarified that, in the case of OOF, each institution managing the funds includes in each instrument its own specific requirements. In the particular case of funds managed by AECID, the country association framework, which is an agreement between Spain and the recipient country, sets out how the needs for support are identified by the recipient country and AECID. Table 16 includes some of the information reported by Spain on its provision of financial support.

Table 16
Summary of information on provision of financial support by Spain in 2013–2016
(Millions of United States dollars)

Allocation channel of public financial support	*Year of disbursement*			
	2013	*2014*	*2015*	*2016*
Official development assistance[a]	2 281.13	2 295.44	1 732.22	4 613.30
Climate-specific contributions through multilateral channels, including:	0.66	52.78	12.35	81.09
Global Environment Facility		11.76	3.66	6.97
Least Developed Countries Fund			0.00	0.00
Special Climate Change Fund			0.00	0.00
Adaptation Fund		0.22	0.00	0.00
Green Climate Fund			1.11	1.11
Trust Fund for Supplementary Activities			0.00	0.00
Financial institutions, including regional development banks			6.36	72.36
United Nations bodies	0.66	1.00	1.22	0.65
Other		39.80		
Climate-specific contributions through bilateral, regional and other channels	337.30	523.85	498.26	563.72
Other				

[a] *Sources*: (1) Query Wizard for International Development Statistics, available at http://stats.oecd.org/qwids/; (2) BR3 CTF tables; (3) table 7.1 in annex 4 to Spain's NC7 for 2013 and revised table 7.2 in annex 4 to its NC7 for 2014 on provision of financial support, provided by Spain during the review.

84. Spain explained in its NC7 that the amount of bilateral financial support it provides is much greater than the amount of multilateral support. In the period 2013–2016, multilateral contributions amounted to only 7.7 per cent of bilateral contributions. Spain also explained that only since 2015 has there been information available on the proportion of financial support provided by Spain that multilateral organizations allocate to climate change activities. This information, since 2015, corresponds to support provided to large infrastructure projects, which is particularly relevant to renewable energy projects. Spain further explained that complementarity with private support is promoted in contributions to OOF; however, there is not yet an agreed methodology for the quantification of private contributions. The ERT noted that tables 8.1–8.4 of annex 4 to the Party's NC7 follow the requirements of table 5 of the UNFCCC reporting guidelines on NCs, but in some cases it was not possible to identify the region or countries and project details or descriptions of the financial support provided by Spain. The ERT also noted inconsistencies between the NC7 and the BR3 in the information reported for the years included in both reports (2015 and 2016): some financial support activities (representing USD 1.2 million) were presented as bilateral in the NC7 but as multilateral in the BR3. Further, the ERT identified inconsistencies and errors in the conversion from euros to United States dollars in tables 6.1–6.4, 7.1–7.4 and 8.1–8.4 of annex 4 to the NC7 for 2014 and 2016. These inconsistencies and errors were corrected and clarified during the review.

(b) Assessment of adherence to the reporting guidelines

85. The ERT assessed the information reported in the NC7 of Spain and identified issues relating to transparency and adherence to the UNFCCC reporting guidelines on NCs. The findings are described in table 17.

Table 17
Findings on financial resources, including under Article 11 of the Kyoto Protocol, from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 53 Issue type: transparency Assessment: encouragement	The ERT noted that in some cases in tables 8.1–8.4 of annex 4 to the NC7, which correspond to table 5 of the UNFCCC reporting guidelines on NCs, it was not possible to identify the region or countries and project details or descriptions of the financial support provided and activities carried out by Spain. During the review, Spain explained that most of the official development assistance through bilateral and regional contributions were gathered and presented by country, region and sector and that more detailed information can be found on the website of the Development Assistance Committee of the Organisation for Economic Co-operation and Development. In some cases, information related to country or region was not available when analysing the contributions, so it was not presented in tables 8.1–8.4 of annex 4 to the NC7. The ERT encourages Spain to include in its next NC all the required information on financial support provided in accordance with the UNFCCC reporting guidelines on NCs, or to clearly explain why it was not possible to obtain or provide such information.
2	Reporting requirement specified in paragraph 53 Issue type: transparency Assessment: encouragement	The ERT noted that decision 19/CP.18, paragraph 5, encourages developed country Parties to ensure consistency, to the extent possible, between the information provided in their BRs and NCs. The ERT also noted inconsistencies between Spain's NC7 and BR3 in the information on financial support for the years included in both reports (2015 and 2016): some financial support activities (representing USD 1.2 million) were presented as bilateral in the NC7 but as multilateral in the BR3. During the review, Spain clarified and corrected the inconsistencies. The ERT encourages Spain to ensure consistency, to the extent possible, in accordance with decision 19/CP.18, paragraph 5, between its NC and BR in the information on financial support provided by adopting the same criteria to classify the financial support activities for both reports.
3	Reporting requirement specified in paragraph 53 Issue type: transparency Assessment: encouragement	The ERT identified inconsistencies and errors in the conversion from euros to United States dollars in tables 6.1–6.4, 7.1–7.4 and 8.1–8.4 of annex 4 to the NC7 for 2014 and 2016. During the review, Spain presented revised tables of annex 4 to the NC7 with the identified issues resolved. The ERT encourages Spain to ensure accuracy and consistency in its next NC in the information on financial support provided.

Note: Paragraph numbers listed under reporting requirement refer to the relevant paragraphs of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

2. Technology development and transfer, including information under Article 10 of the Kyoto Protocol

(a) Technical assessment of the reported information

86. In its NC7 Spain provided information on steps, measures and activities related to technology transfer, access and deployment benefiting developing countries, including information on activities undertaken by the public and private sectors. Spain provided examples of support provided for the deployment and enhancement of the endogenous capacities and technologies of non-Annex I Parties. Detailed information on the activities related to technology transfer was included in tables 10.1–10.4 of annex 4 to the NC7. The ERT noted that this information did not include data on total funding and years of operation per activity, and that it did not include success and failure stories. During the review, Spain

explained that it was not feasible to provide data on total funding and years of operation per activity, and that all activities undertaken were considered success stories.

87. The ERT noted that Spain reported on its PaMs in relation to technology transfer, in particular on measures taken to promote, facilitate and finance the transfer and deployment of climate-friendly technologies. Spain did not include information on success and failure stories related to technology development and transfer in its NC7. The Party highlighted the REGATTA project, implemented by UNEP and supported mainly by Spain, the main objective of which is to strengthen capacity-building and knowledge-sharing in relation to climate change technologies and experience for adaptation and mitigation in Latin America and the Caribbean. Other examples of technology transfer activities described by Spain relate to marine meteorology, wind power and solar energy technologies, and energy efficiency.

88. Spain provided information on steps taken to promote, facilitate and finance the transfer of technology to developing countries and to build their capacity in order to facilitate implementation of Article 10 of the Kyoto Protocol. In the addendum to the NC7, Spain explained how it has taken into account the need for adequacy and predictability in the flow of this support. In particular, Spain highlighted the recently approved Fifth Master Plan for Spanish Development Cooperation for the period 2018–2021. While the Plan encompasses its own new holistic vision in line with the 2030 Agenda for Sustainable Development, it also expresses Spain's clear support for the commitments adopted internationally regarding the role that cooperative actors have to play in helping partner countries' efforts and, in the case of climate change, focusing on the implementation of nationally determined contributions under the Paris Agreement, both of which are related to mitigation and adaptation objectives, needs and priorities.

89. In its NC7 Spain provided a list of the public organizations in charge of activities related to technology transfer in the country. Each organization has its own mechanism to track its actions and programmes. Both hard and soft technologies are covered. Examples of activities developed by public organizations include those related to marine meteorology, wind power and solar energy technologies, and development of sustainable energy generation systems. The Party explained that, while technology transfer activities are predominantly managed by public organizations, some activities are implemented by private institutions, and examples were presented in the NC7, such as support for the development of solar energy technologies and technology cooperation between companies in Ibero-America. As an illustration of how different Spanish initiatives work together, Spain explained that, for example, the REGATTA project works in the transfer of technologies taking into account the priorities identified by RIOCC.

(b) Assessment of adherence to the reporting guidelines

90. The ERT assessed the information reported in the NC7 of Spain and identified an issue relating to completeness and adherence to the UNFCCC reporting guidelines on NCs. The finding is described in table 18.

Table 18

Findings on technology development and transfer, including information under Article 10 of the Kyoto Protocol, from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 55	The ERT noted that the information provided in the NC7 on technology transfer activities did not include data on total funding and years of operation per activity and that it did not include success and failure stories.
	Issue type: completeness	During the review, Spain explained that it was not feasible to provide data on total funding and years of operation per activity as data were not available at the time of the preparation of the NC7, and that all activities are considered success stories.
	Assessment: recommendation	The ERT recommends that Spain report in its next NC, where feasible, all the information on technology transfer activities required as in table 6 of the UNFCCC reporting guidelines on NCs, including success and failure stories, or clearly explain why it is not feasible to do so.

Note: Paragraph numbers listed under reporting requirement refer to the relevant paragraphs of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

E. Vulnerability assessment, climate change impacts and adaptation measures

1. Technical assessment of the reported information

91. In the NC7 Spain provided the required information on the expected impacts of climate change in the country; the adaptation policies covering regional, sectoral and cross-sectoral vulnerabilities and considerations; and an outline of the action taken to implement Article 4, paragraph 1(b) and (e), of the Convention with regard to adaptation. Spain provided a description of climate change vulnerability and impacts, particularly impacts on hydrological resources, coastal areas and biodiversity. Among the expected impacts, the reduction in water supply and acute variability in precipitation affecting hydropower production and thereby annual emissions (see para. 14 above) are of particular concern. Other significant impacts include coastal erosion and soil degradation, as well as the impacts of extreme weather events, leading to flooding and forest fires, and heatwaves. Spain highlighted the adaptation response actions taken and planned at different levels of government, in particular by the autonomous communities in accordance with PNACC, as well as numerous projects funded by the PIMA Adapta programme.

92. Spain was one of the first European countries to develop a national adaptation policy with the adoption of PNACC in 2006, which provided direction to government agencies on enhancing preparedness for climate change. Currently in its third work programme (2014–2020), PNACC takes a systemic approach to adaptation, advances work on regional scenarios and impact assessment, reinforces innovation and research and development efforts to include technology implementation, and furthers policy coordination. Fifteen of the seventeen Spanish autonomous communities have adopted regional action plans or adaptation strategies, thus covering 97 per cent of the population and almost the entire Spanish territory. In addition, entities in the Spanish Federation of Municipalities and Provinces are increasingly elaborating and implementing adaptation strategies and measures. Progress has also been made on scaled-down climate change scenarios, including mapping applications for use by regional planners. To address the impact of extreme events, Spain counts on the Consorcio de Compensación de Seguros, a public insurance scheme dating back to the Spanish Civil War that is now used effectively to cover extraordinary risks resulting from climate change. Table 19 summarizes the information on vulnerability and adaptation to climate change presented in the NC7 of Spain.

Table 19
Summary of information on vulnerability and adaptation to climate change reported by Spain

Vulnerable area	*Examples/comments/adaptation measures reported*
Agriculture and food security	*Vulnerability*: Combined effects of high temperatures and low and irregular precipitation regimes leading to increased incidence of pests and crop disease; impacts on animal health and productivity. *Adaptation*: Adoption in 2016 of the National Rural Development Programme, which prioritizes the transition to resilient agriculture, silviculture and food systems; high-resolution assessments of impacts on the sector and planning tools, including those for extensive livestock farming and the apiculture and viticulture subsectors, for improved decision-making.
Biodiversity and natural ecosystems	*Vulnerability*: Changes in the structure and function of ecosystems, affecting phenology and species interaction and leading to a reduction in biodiversity; expansion of invasive species and pests; changes in marine biogeochemical cycles; permanent aquatic ecosystems turning seasonal or disappearing; displacement of animal species and reduction in their distribution. *Adaptation*: Development of various methodological tools to integrate adaptation into ecosystem restoration and management; comprehensive assessments of flora and vegetation, vertebrate fauna and invasive species to address knowledge gaps and identify adaptation options; creation and recuperation of amphibian habitats; creation of ecological corridors; development of the Global Change Monitoring Programme within the National Parks Network.

Vulnerable area	*Examples/comments/adaptation measures reported*
Coastal zones	*Vulnerability*: Expected sea level rise of between 0.5 and 1.0 m by 2100; severe impacts on river deltas and beaches as well as flooding in lowland areas. *Adaptation*: Approval in 2016 of the Climate Change Adaptation Strategy of the Spanish Coastal Zones and elaboration of coastal protection strategies for high-risk areas, as well as implementation of various specific projects, including for coastal and sand dune restoration, low estuary stabilization, and improvement of the monitoring and evaluation of erosion.
Drought and flooding	*Vulnerability*: Mediterraneanization of the north of the country and increased aridity in the south. *Adaptation*: Development and implementation of flood risk reduction plans for urban areas (e.g. in Navarra); identification of adaptation strategies for groundwater systems.
Fisheries	*Vulnerability*: Changes in marine trophic levels and species distribution, and a possible increase in the number of invasive species; reduction in ocean productivity; increased incidence of toxic phytoplankton and parasites in cultivated species. *Adaptation*: Adoption of the Strategic Plan for Aquaculture 2014–2020, which specifically addresses climate change impacts.
Forests	*Vulnerability*: Changes in the behavioural patterns of pests and diseases; changes in forest fire regimes; modification of the physiology of most forest species. *Adaptation*: Comprehensive assessment reports on forests and biodiversity to understand vulnerability and improve decision-making; development and dissemination of methodological tools addressing wildfires and climate change in Spain; implementation of adaptive forest management practices.
Human health	*Vulnerability*: Extreme temperatures affecting morbidity and mortality; geographical expansion of established vector diseases or establishment of subtropical vectors. *Adaptation*: Adoption in 2017 of the National Plan on Preventive Actions to Address the Impacts of Excessive Temperatures on Health, which defines reference thresholds and risk levels with associated prevention measures and includes an interministerial commission to coordinate action; public awareness campaigns through the LIFE SHARA project.
Infrastructure and economy	*Vulnerability*: Tourism sector negatively affected by low water, sea level rise and higher temperatures. *Adaptation*: Further elaboration of the EU floods directive and the Spanish Water Act to include land-use limitations and improved urban planning; engagement of the private sector in adapting to climate change through the PIMA Adapta programme; coverage of extreme events under an original public–private insurance scheme.
Water resources	*Vulnerability*: Significant reduction in water resource availability (up to 22 per cent reduction by 2100 under some scenarios) and increased inter-annual precipitation variability, with notable impacts on energy sources; hydroelectricity production expected to be compromised in four hydrographic regions owing to water scarcity. *Adaptation*: Correction of hydrological plans for water basins (2015–2021) to take into account the effects of climate change on water resources and development of an inventory of transversal barriers in the hydraulic public domain; ecological restoration of fluvial and lacustrine systems; climate change monitoring, management measures and adaptation plans for natural river reserves.

93. Spain provided a detailed description of international adaptation activities, including numerous initiatives through RIOCC, particularly its RIOCCADAPT project, which aims to identify, review and evaluate vulnerability and adaptation actions in RIOCC member countries. The final RIOCCADAPT report, expected in 2019, is expected to be a resource for regional decision makers and/or other national and international actors. Spain also provided information on bilateral cooperation with developing countries on adaptation, including various initiatives on water access, sanitation and agricultural risk management, supported by the Spanish Research Centre for the Management of Agricultural and Environmental Risks and AEMET.

2. Assessment of adherence to the reporting guidelines

94. The ERT assessed the information reported in the NC7 of Spain and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

F. Research and systematic observation

1. Technical assessment of the reported information

95. Spain provided information on its general policy and funding relating to research and systematic observation and both domestic and international activities, including contributions to the Global Climate Observing System and the Intergovernmental Panel on Climate Change. During the review, Spain also provided information on the identification of opportunities for and barriers to free and open international exchange of data and information and on action taken to overcome such barriers.

96. Spain has implemented and planned international and domestic policies and programmes on climate change research, systematic observation and climate modelling that aim to advance capabilities to predict and observe the physical, chemical, biological and human components of the Earth's system over space and time. General objectives are set out in the Spanish Strategy for Science, Technology and Innovation 2013–2020, a national framework aligned with the EU Horizon 2020 programme, in which Spain is the frontrunner in project leadership. Climate change and efficient resource management are specifically identified as research, development and innovation priorities in the most recent State Plan for Scientific and Technical Research and Innovation 2017–2020. Recent programmes under the Plan cover agrifood, forestry research and innovation, transport, rural development and national parks. The network of Spanish research centres and stations is vast, and projects range from those making use of citizen science (such as the global mosquito alert) to those undertaken by the Spanish research stations in Antarctica.

97. In terms of activities related to systematic observation, Spain reported on national plans, programmes and support for ground- and space-based climate observing systems, including satellite and non-satellite climate observation. The systematic observation network under AEMET includes four WMO centennial stations, and the Izaña Atmospheric Research Center, which has one of the longest series of observations of CO_2 and CH_4 in the free troposphere. The Spanish Institute of Oceanography is actively involved in systematic oceanic observation and in international initiatives aimed at advancing an integrated approach to understanding long-term variability in marine ecosystems through the Global Ocean Observing System's Argo programme. During the review, Spain also reported on challenges related to the maintenance of a consistent and comprehensive observation system, noting, for example, the difficulties of incorporating oceanographic data into international databases given different data formats, and of coordination among the large number of institutions involved in the research and observation of oceans.

98. The NC7 reflects actions taken to support capacity-building and the establishment and maintenance of observation systems and related data and monitoring systems in developing countries. Spain has provided funding and support for scientists from developing countries working on global climate change research, particularly through the activities carried out by AEMET in collaboration with AECID. Most of these activities are in African and Latin American countries, where they occur mainly through the regional network around CIMHET, supported by AEMET. AEMET also hosts, together with the Barcelona Supercomputing Center, the Regional Centre for North Africa, the Middle East and Europe of the WMO Sand and Dust Storm Warning Advisory and Assessment System. The Doñana Biological Station in the Doñana Biological Reserve, which serves as a global change observatory, contributes with biodiversity monitoring relevant to Iberian and African species thanks to its position as a bridge between Europe and North Africa.

99. Support to developing countries is provided through many programmes under RIOCC and CIMHET and through the UNEP REGATTA project. Other initiatives worthy of note include those undertaken by the Spanish Institute of Oceanography, which enhance oceanography capacities in West African countries and are focused on the effects of climate change on the Canary Current Large Marine Ecosystem (with the active participation of researchers from Cabo Verde, Gambia, Guinea, Guinea-Bissau, Mauritania, Morocco and Senegal), as well as those undertaken by the Atlantic International Research Center, which are aimed at integrating space, climate, ocean and data sciences through North–South and South–North cooperation.

2. Assessment of adherence to the reporting guidelines

100. The ERT assessed the information reported in the NC7 of Spain and identified issues relating to completeness and transparency in adhering to the UNFCCC reporting guidelines on NCs. The findings are described in table 20.

Table 20
Findings on research and systematic observation from the review of the seventh national communication of Spain

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 58 Issue type: transparency Assessment: recommendation	The ERT noted that, while information on action taken to support capacity-building related to research and systematic observation in developing countries can be inferred from some programme descriptions in the NC7, this matter was not addressed directly in the corresponding chapter of the NC7. During the review, Spain provided additional information on this issue and informed the ERT that it is working on improving this aspect of its reporting. The ERT recommends that Spain include in its next NC more explicit information on action taken to support capacity-building related to research and systematic observation in developing countries in the chapter on research and systematic observation.
2	Reporting requirement specified in paragraph 62 Issue type: completeness Assessment: encouragement	The ERT noted that Spain did not identify in the NC7 opportunities for and barriers to free and open international exchange of data and information or action taken to overcome those barriers. During the review, Spain provided information on this issue, noting, inter alia, the efforts of the Spanish Institute of Oceanography relating to the incorporation of data into various international databases, which is often constrained by the specific data formats of each system. The ERT encourages Spain to include in its next NC information on the identification of opportunities for and barriers to free and open international exchange of data and information and to report on action taken to overcome those barriers.
3	Reporting requirement specified in paragraph 64 Issue type: completeness Assessment: encouragement	The ERT noted that the NC7 did not include summary information on support provided for developing countries to establish and maintain observing systems and related data and monitoring systems. This information was also found to be missing from the NC6. During the review, Spain provided additional information on this issue, highlighting the activities carried out by AEMET in collaboration with AECID. The ERT encourages Spain to include in its next NC relevant summary information on support provided for developing countries to establish and maintain observing systems and related data and monitoring systems.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs.

G. Education, training and public awareness

1. Technical assessment of the reported information

101. In the NC7 Spain provided information on its actions relating to education, training and public awareness at the domestic and international level. The Party provided information on the general policy on education, training and public awareness; primary, secondary and higher education; public information campaigns; training programmes; education materials; resource or information centres; the involvement of the public and non-governmental organizations; and its participation in international activities. A broad array of public and private institutions, including the central and autonomous community governments, municipalities, non-governmental organizations, the mass media and private enterprises, is

involved in multiple initiatives. In recent years, the amount of web pages and information accessible online related to climate change has vastly expanded, complemented by numerous publications and public awareness campaigns. New curricula for secondary education specifically address climate change, and various projects, education support tools, workshops and courses have been incorporated into the learning process at various levels and in diverse contexts. Public participation is channelled through the National Climate Council, a collegial body created for that purpose, and is inscribed in various normative processes, including the elaboration of the draft law on climate change and energy transition and the domestic review of NCs. Initiatives worthy of note on knowledge- and information-sharing include the LIFE SHARA project and the AdapteCCa Platform for exchange and consultation of information on adaptation to climate change in Spain.

2. Assessment of adherence to the reporting guidelines

102. The ERT assessed the information reported in the NC7 of Spain and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on NCs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

III. Conclusions and recommendations

103. The ERT conducted a technical review of the information reported in the NC7 of Spain in accordance with the UNFCCC reporting guidelines on NCs. The ERT concludes that the reported information mostly adheres to the UNFCCC reporting guidelines on NCs and that the NC7 provides an overview of the national climate policy of Spain.

104. The information provided in the NC7 and its addendum includes all elements of the supplementary information under Article 7 of the Kyoto Protocol. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol was provided by Spain in its 2017 annual submission.

105. Spain's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 16.6 per cent above its 1990 level, whereas total GHG emissions including LULUCF were 13.0 per cent above its 1990 level, in 2015. The increase in total emissions of 52.8 per cent over the period 1990–2007 was driven mainly by strong economic and population growth, while the economic downturn and population stabilization that followed in the period 2008–2014, together with the mitigation PaMs implemented by Spain, contributed to the subsequent decrease in emissions.

106. Spain's main policy framework relating to energy and climate change is the EU 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. Key legislation supporting Spain's climate change goals includes renewable energy and energy efficiency legislation. The mitigation actions with the most significant mitigation impact are the Climate Projects; the Renewable Energy Action Plan 2011–2020; the Energy Efficiency Action Plan 2014–2020 and the Energy Efficiency Action Plan 2017–2020; the Royal Decree on the promotion of biofuels; and the national tax on F-gases.

107. The GHG emission projections provided by Spain include those under the WEM scenario. In the WEM scenario, emissions are projected to be 15.7 per cent above the 1990 level by 2020. On the basis of the reported information, the ERT concludes that Spain expects to meet its 2020 target under the WEM scenario and to contribute to the EU meeting its 2020 target. Spain's target for non-ETS sectors is to reduce its total emissions by 10 per cent below the 2005 level by 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to be 11.0 per cent below the AEAs for 2020. On the basis of the reported information, the ERT concludes that Spain expects to meet its target for non-ETS sectors.

108. The projections indicate that Spain is on track to contributing to the EU Kyoto Protocol target for the second commitment period under the WEM scenario, and that GHG emissions are not expected to exceed the expected contribution of Spain to the EU target for

the second commitment period of the Kyoto Protocol (2013–2020), as well as to the EU target for 2020 under the Convention.

109. The NC7 contains information on how the Party's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. Spain is not planning to make use of the Kyoto Protocol mechanisms to meet its Kyoto Protocol target.

110. Spain has continued to provide climate financing to developing countries in line with its climate finance programmes, such as the Master Plans for Spanish Development Cooperation. Spain's contributions totalled USD 2,056 million in the period 2013–2016, with contributions increasing by 24.8 per cent in the period 2015–2016 relative to 2013–2014, and its public financial support in 2015 and 2016 totalled USD 510.61 and USD 631.21 million per year, respectively. For those years, Spain's support provided for mitigation action was higher than its support provided for adaptation. The biggest share of financial support went to projects in the energy sector (renewable energy and reduction of energy losses from transmission lines), followed by the transport and the water and sanitation sectors. Spain reported information on technology transfer activities, providing a list of the main organizations participating in technology transfer and highlighting key examples. Among others, the following areas of technology development and transfer were covered: meteorology, renewable energy technologies and development of sustainable energy systems. In particular, Spain highlighted the REGATTA project, implemented by UNEP and supported mainly by Spain, which aims to share knowledge on climate change technologies and experience in the Latin American and Caribbean region.

111. Spain was one of the first European countries to develop a national adaptation policy with the adoption of PNACC in 2006. With the further development of regional action programmes by most of the Spanish autonomous communities, adaptation plans and strategies cover 97 per cent of the population and almost the entire Spanish territory. Of particular concern among the expected impacts of climate change in Spain are the reduction in water supply and acute variability in precipitation affecting hydropower production, coastal erosion and soil degradation, as well as the impacts of extreme weather events, leading to flooding and forest fires, and heatwaves. Numerous projects to address those impacts have been funded by the PIMA Adapta programme, including flood risk reduction plans for some urban areas, ecological restoration in coastal zones, rivers and estuaries, and climate change monitoring networks in national parks and nature reserves. International adaptation activities and support are realized mainly through RIOCC, particularly its RIOCCADAPT project.

112. Spain's general objectives for research and systematic observation are set out in the Spanish Strategy for Science, Technology and Innovation 2013–2020, a national framework aligned with the EU Horizon 2020 programme, in which Spain is the frontrunner in project leadership. Climate change and efficient resource management are specifically identified as research, development and innovation priorities, and recent programmes focus on agrifood, forestry research and innovation, transport, rural development and national parks. The network of Spanish research centres and stations is vast, and various institutions, in particular AEMET and the Spanish Institute of Oceanography, are active participants in international systematic observation initiatives. Funding and support for scientists from developing countries working on global climate change research and systematic observation are provided by Spain particularly through the activities carried out by AEMET in collaboration with AECID. Most of those activities take place in North and West African countries and in Latin America.

113. In Spain, a broad array of public and private institutions, including the central and autonomous community governments, municipalities, non-governmental organizations and private enterprises, is involved in activities for education, training and public awareness on climate change. The amount of web pages and information accessible online on the subject has greatly expanded in recent years, new curricula for secondary education specifically address climate change, and frequent campaigns, notably through the LIFE SHARA project, are launched to strengthen and improve coordination and build the capacity to address climate change. Public participation is channelled through the National Climate Council and is inscribed in various normative processes, including in the elaboration of the draft law on climate change and energy transition.

114. In the course of the review, the ERT formulated the following recommendations for Spain to improve its adherence to the UNFCCC reporting guidelines on NCs and its reporting of supplementary information under the Kyoto Protocol:[7]

(a) To improve the completeness of its reporting by:

(i) Presenting the estimated and expected total effect of implemented and adopted PaMs (see issue 1 in table 15);

(ii) Reporting, where feasible, all the information on technology transfer activities required as in table 6 of the UNFCCC reporting guidelines on NCs, including success and failure stories, or clearly explaining why it is not feasible to do so (see issue 1 in table 18);

(b) To improve the transparency of its reporting by:

(i) Including the emission trend tables given in the common reporting format (table 10) as required by the UNFCCC reporting guidelines on NCs, or, if these tables are presented only in the BR and the CTF tables, providing an explicit reference to them (see issue 1 in table 5);

(ii) Providing an up-to-date description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol, or an explicit reference to a document containing an up-to-date description of its national system (see issue 1 in table 6);

(iii) Providing explicitly the name and contact information of the registry administrator in accordance with paragraph 32(a) of the reporting guidelines for supplementary information (see issue 1 in table 7);

(iv) Organizing the information on PaMs by sector, subdivided by GHG (see issue 4 in table 9);

(v) Providing explicit information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals (see issue 10 in table 9);

(vi) Including more explicit information on action taken to support capacity-building related to research and systematic observation in developing countries in the chapter on research and systematic observation of the NC (see issue 1 in table 20).

IV. Questions of implementation

115. During the review the ERT assessed the NC7, including the supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol, and reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol with regard to timeliness, completeness, transparency and adherence to the UNFCCC reporting guidelines on NCs. No question of implementation was raised by the ERT during the review.

[7] The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

2017 GHG inventory submission of Spain. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/submissions/national-inventory-submissions-2017.

2018 GHG inventory submission of Spain. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018.

BR3 of Spain. Available at https://unfccc.int/files/national_reports/national_communications_and_biennial_reports/application/pdf/189024563_spain-br3-1-es_3br.pdf.

BR3 CTF tables of Spain. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories". Annex to decision 24/CP.19. Available at http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at http://unfccc.int/resource/docs/cop5/07.pdf.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex to decision 15/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex III to decision 3/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf.

"Guidelines for review under Article 8 of the Kyoto Protocol". Annex to decision 22/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf.

"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". Annex to decision 13/CP.20. Available at http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf.

NC7 of Spain. Available at http://unfccc.int/files/national_reports/annex_i_natcom_/application/pdf/68037591_spain-nc7-1-7cn.pdf.

Annexes to the NC7 of Spain. Available at http://unfccc.int/files/national_reports/annex_i_natcom_/application/pdf/68037591_spain-nc7-1-anexos_de_la_7cn.pdf.

Addendum to the NC7 of Spain. Available at https://unfccc.int/sites/default/files/resource/8390467251_Spain-NC7-2-Adenda%20rev%207CN%20INFO%20ADICIONAL%20PK%20.pdf.

Report on the individual review of the annual submission of Spain submitted in 2016. FCCC/ARR/2016/ESP. Available at https://unfccc.int/sites/default/files/resource/docs/2017/arr/esp.pdf.

Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Spain. FCCC/IRR/2016/ESP. Available at https://unfccc.int/sites/default/files/resource/docs/2017/irr/esp.pdf.

Report of the technical review of the sixth national communication of Spain. FCCC/IDR.6/ESP. Available at https://unfccc.int/sites/default/files/resource/docs/2014/idr/esp06.pdf.

Revisions to the guidelines for review under Article 8 of the Kyoto Protocol. Annex I to decision 4/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf.

"UNFCCC biennial reporting guidelines for developed country Parties". Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Elisa de Santos (MAPAMA), including additional material. The following documents[1] were provided by Spain:

Ministerio de Agricultura y Pesca, Alimentacion y Medio Ambiente. 2017. *Proyecciones de emisiones de gases a la atmosfera. Edicion 2015–2050. Sumario de resultados*. (Projection of gases emissions. 2015–2050 edition. Summary of results.) Available at http://www.mapama.gob.es/es/calidad-y-evaluacion-ambiental/temas/sistema-espanol-de-inventario-sei-/espana-2017-proyeciones-informeresumen-corregido-junio2017_tcm30-378888.pdf.

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[1] Reproduced as received from the Party.

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