



COMPLIANCE COMMITTEE

CC/ERT/ARR/2013/27
30 July 2013

**Report of the individual review of the annual submission of
Monaco submitted in 2012**

Note by the secretariat

The report of the individual review of the annual submission of Monaco submitted in 2012 was published on 29 July 2013. 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 decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2012/MCO, 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.



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Report of the individual review of the annual submission of Monaco submitted in 2012*

* In the symbol for this document, 2012 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction and summary	1–5	3
II. Technical assessment of the annual submission.....	6–129	9
A. Overview	6–30	9
B. Energy.....	31–47	13
C. Industrial processes and solvent and other product use	48–61	17
D. Agriculture.....	62	20
E. Land use, land-use change and forestry.....	63–71	21
F. Waste	72–79	22
G. Adjustments	80–110	24
H. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol.....	111–129	30
III. Conclusions and recommendations	130–141	34
A. Conclusions	130–140	34
B. Recommendations.....	141	36
IV. Adjustments.....	142–144	38
V. Questions of implementation	145	38
Annexes		
I. Documents and information used during the review.....	39	
II. Acronyms and abbreviations	41	

I. Introduction and summary

1. This report covers the centralized review of the 2012 annual submission of Monaco, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 17 to 22 September 2012 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Ms. Daniela Romano (Italy) and Mr. Tinus Pulles (Netherlands); energy – Ms. Ana Carolina Azzaradel (Brazil) and Ms. Inga Konstantinaviciute (Lithuania); industrial processes – Mr. Domenico Gaudioso (Italy) and Mr. Koen Smekens (Belgium); agriculture – Mr. Sergio González (Chile) and Mr. Renato Rodrigues (Brazil); land use, land-use change and forestry (LULUCF) – Ms. Ana Blondel (Canada) and Mr. Thiago Mendes (Brazil); and waste – Ms. Medea Inashvili (Georgia) and Mr. Sabin Guendehou (Benin). Mr. Guendehou and Mr. Pulles were the lead reviewers. The review was coordinated by Mr. Vitor Góis Ferreira (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Monaco, which made no comment on it.

3. In 2010, the main greenhouse gas (GHG) in Monaco was carbon dioxide (CO₂), accounting for 93.7 per cent of total GHG emissions¹ expressed in CO₂ eq, followed by nitrous oxide (N₂O) (3.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 2.5 per cent of the overall GHG emissions in the country, while methane (CH₄) accounted for the remaining 0.6 per cent. The energy sector accounted for 96.0 per cent of total GHG emissions, followed by the industrial processes sector (2.5 per cent) and the waste sector (1.4 per cent). The agriculture sector was reported as not occurring (“NO”) and Monaco reported CO₂ and N₂O emissions from the solvent and other product use sector as not estimated (“NE”). Total GHG emissions amounted to 87.89 Gg CO₂ eq and decreased by 18.5 per cent between the base year² and 2010.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO₂, CH₄ and N₂O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Tables 3–5 provide information on the most important emissions and removals and accounting parameters that will be included in the compilation and accounting database.

¹ In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO₂ eq excluding LULUCF, unless otherwise specified.

² “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The base year emissions include emissions from Annex A sources only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year^a to 2010

		<i>Gg CO₂ eq</i>							<i>Change (%)</i>		
		<i>Greenhouse gas</i>	<i>Base year^a</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>Base year–2010</i>
Annex A sources ^b	CO ₂	105.37	105.37	111.81	112.77	98.59	90.00	85.34	82.38	-21.8	
	CH ₄	0.66	0.66	0.80	0.81	0.63	0.60	0.57	0.55	-16.3	
	N ₂ O	1.75	1.75	2.75	3.41	3.14	3.03	2.91	2.73	55.9	
		0.01	NA, NE, NO	0.01	2.63	1.84	1.95	2.12	2.16	28 587.2	
	HFCs										
	PFCs	NE, NO	NE, NO	NE, NO	NE, NO	0.06	0.02	0.02	IE, NE, NO	NA	
KP-LULUCF	SF ₆	0.10	0.16	0.10	0.10	0.08	0.08	0.08	0.08	-15.9	
	Article 3.3 ^c	CO ₂					NA	NA	NA		
		CH ₄					NA	NA	NA		
		N ₂ O					NA	NA	NA		
	Article 3.4 ^d	CO ₂	NA				NA	NA	NA	NA	
		CH ₄	NA				NA	NA	NA	NA	
		N ₂ O	NA				NA	NA	NA	NA	

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, IE = included elsewhere, NA = not applicable, NE = not estimated, NO = not occurring.

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

^b This table does not reflect the adjusted estimates for one category in the industrial processes sector (see chapter II.G below) after the adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the Party’s submission of 30 October 2012, which was subject to said adjustment. The adjustment led to an increase in the estimate of total greenhouse gas emissions for 2010 of 0.31 Gg CO₂ eq.

^c Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation. Only the inventory years of the commitment period must be reported.

^d Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 2
Greenhouse gas emissions by sector and activity, base year^a to 2010

		Gg CO ₂ eq							Change (%)		
		Sector	Base year ^a	1990	1995	2000	2005	2008	2009	2010	Base year–2010
Annex A	Energy	107.02	107.02	114.24	115.81	101.20	92.51	87.60	84.41	-21.1	
	Industrial processes ^b	0.10	0.16	0.10	2.72	1.99	2.04	2.22	2.24	2 043.8	
	Solvent and other product use	NE	NE	NE	NE	NE	NE	NE	NE	NA	
	Agriculture	NO	NO	NO	NO	NO	NO	NO	NO	NA	
	Waste	0.75	0.75	1.12	1.18	1.17	1.11	1.23	1.25	65.8	
	LULUCF	NA	-0.01	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	NA	
Total (with LULUCF)		NA	107.92	115.45	119.70	104.34	95.65	91.02	87.87	NA	
Total (without LULUCF)		107.88	107.94	115.46	119.71	104.35	95.66	91.05	87.89	-18.5	
Other ^c		NA	NA	NA	NA	NA	NA	NA	NA	NA	
KP-LULUCF	Article 3. ^d	Afforestation and reforestation						NA	NA	NA	
		Deforestation						NA	NA	NA	
		Total (3.3)						NA	NA	NA	
	Forest management						NA	NA	NA		
Article 3. ^e	Cropland management	NA						NA	NA	NA	
	Grazing land management	NA						NA	NA	NA	
	Revegetation	NA						NA	NA	NA	
	Total (3.4)	NA						NA	NA	NA	

Abbreviations: KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated, NO = not occurring.

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO₂, CH₄ and N₂O, and 1995 for HFCs, PFCs and SF₆. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

^b This table does not reflect the adjusted estimates for one category in the industrial processes sector (see chapter II.G below) after the adjustment procedures under decision 20/CMP.1 were applied. It reflects the estimates contained in the Party’s submission of 30 October 2012, which was subject to said adjustment. The adjustment led to an increase in the estimated total greenhouse gas emissions for 2010 of 0.31 Gg CO₂ eq.

^c Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

^d Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

^e Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation. For cropland management, grazing land management and revegetation, the base year and the inventory years of the commitment period must be reported.

Table 3
Information to be included in the compilation and accounting database in t CO₂ eq for the year 2010, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	438 960	439 475		441 020
Annex A emissions for current inventory year				
CO ₂	82 380			82 380
CH ₄	549			549
N ₂ O	2 729			2 729
HFCs	2 053	2 156	309	2 465
PFCs	NA, NE, NO			NA, NE, NO
SF ₆	81			81
Total Annex A sources	87 792	87 895	309	88 204
Activities under Article 3, paragraph 3, for current inventory year				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported		NA		NA
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported		NA		NA
3.3 Deforestation for current year of commitment period as reported		NA		NA
Activities under Article 3, paragraph 4, for current inventory year^c				
3.4 Forest management for current year of commitment period				
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

^a “Adjustment” is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b “Final” includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 4
Information to be included in the compilation and accounting database in t CO₂ eq for the year 2009

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	85 339			85 339
CH ₄	571			571
N ₂ O	2 913			2 913
HFCs	2 017	2 124		2 124
PFCs	16			16
SF ₆	82			82
Total Annex A sources	90 939	91 045		91 045
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	NA			NA
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NA			NA
3.3 Deforestation for current year of commitment period as reported	NA			NA
Activities under Article 3, paragraph 4, for 2009^c				
3.4 Forest management for current year of commitment period				
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviation: NA = not applicable.

^a “Adjustment” is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b “Final” includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 5
Information to be included in the compilation and accounting database in t CO₂ eq for the year 2008

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	89 999			89 999
CH ₄	596			596
N ₂ O	3 025			3 025
HFCs	1 856	1 945		1 945
PFCs	16			16
SF ₆	82			82
Total Annex A sources	95 574	95 664		95 664
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported		NA		NA
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported		NA		NA
3.3 Deforestation for current year of commitment period as reported		NA		NA
Activities under Article 3, paragraph 4, for 2008^c				
3.4 Forest management for current year of commitment period				
3.4 Cropland management for current year of commitment period				
3.4 Cropland management for base year				
3.4 Grazing land management for current year of commitment period				
3.4 Grazing land management for base year				
3.4 Revegetation for current year of commitment period				
3.4 Revegetation in base year				

Abbreviations: NA = not applicable

^a “Adjustment” is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b “Final” includes revised estimates, if any, and/or adjustments, if any.

^c Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2012 annual inventory submission was submitted on 29 March 2012; it contains an almost complete set of common reporting format (CRF) tables for the period 1990–2010 (CRF table 2(II).F was not provided: see paras. 51 and 56 below) and a national inventory report (NIR) (submitted on 4 April 2012). Monaco also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were not submitted. Monaco is not required to submit the SEF tables because it has not yet transferred or acquired any Kyoto Protocol units. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Monaco officially submitted revised emission estimates on 30 October 2012 in response to the list of potential problems and further questions raised by the expert review team (ERT) during the review week, including information on KP-LULUCF activities. The Party submitted revised CRF tables including CRF table 2(II).F and estimates of actual emissions of HFCs from consumption of halocarbons and SF₆ (refrigeration and air-conditioning equipment and aerosols/metered dose inhalers). The values in this report are those submitted by the Party on 30 October 2012.

8. The ERT also used previous years' submissions during the review. In addition, the ERT used the standard independent assessment report (SIAR), parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.³

9. During the review, Monaco provided the ERT with additional information. The documents concerned are not part of the annual submission but are in many cases referenced in the NIR. The full list of materials used during the review is provided in annex I to this report.

Completeness of inventory

10. The inventory covers all sectors existing in the country, is complete in terms of years and geographical coverage and is generally complete in terms of categories and gases.

³ The SIAR, parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), and 6(c) and (k)), under the auspices of the international transaction log administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry.

It covers all mandatory⁴ source and sink categories for the period 1990–2010, except HFC emissions from domestic refrigeration (refrigeration and air-conditioning equipment) and foam blowing. The ERT proceeded with the calculation, recommendation and application of adjustments for these two subcategories (see chapter II.G below).

11. The Party reported all emissions from the agriculture sector as “NO” and, under the LULUCF sector, only reported estimates of CO₂ and N₂O emissions from settlements remaining settlements and N₂O emissions from nitrogen fertilization of forest land (although the information thereon in the CRF tables is incomplete; see para. 71 below), which the ERT considers to be in accordance with the land occupation of Monaco: a city-state of 202 ha. However, the ERT concluded that the estimates of CO₂ emissions from settlements remaining settlements could have been underestimated (see para. 69 below).

2. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Overview

12. The ERT concluded that the national system continued to perform its required functions.

13. The Party described the changes of the national system since the previous annual submission and these changes are discussed in chapter II. H.3 of this report.

Inventory planning

14. The NIR described the national system and institutional arrangements for the preparation of the inventory. The Direction de l’Environnement, within the Département de l’Equipement, de l’Environnement et de l’Urbanisme, has overall responsibility for the national inventory, including the collection of activity data (AD) and background information, the selection of methodologies and emission factors (EFs), the identification of key categories, the assessment of uncertainties and the establishment of quality assurance/quality control (QA/QC). Data for the preparation of the inventory are collected by the Direction de l’Environnement from several private and public companies and government institutions, the most important of which are: the Société Monégasque de l’Électricité et du Gaz (SMEG); the Société Monégasque d’Assainissement; the Division des Statistiques of the Direction de l’Expansion Economique; the Service de l’Aviation Civile; and the Direction de l’Aménagement Urbain. The cooperation with the Centre Interprofessionnel Technique d’Etudes de la Pollution Atmosphérique (CITEPA) of France, providing technical support to the Direction de l’Environnement, has continued to be used in the preparation of the inventory.

Inventory preparation

Key categories

15. Monaco has reported a tier 1 key category analysis, both level and trend assessment, as part of its 2012 annual submission. The key category analysis performed by the Party

⁴ Mandatory source and sink categories under the Kyoto Protocol are all source and sink categories for which the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* provide methodologies and/or emission factors to estimate GHG emissions.

and that performed by the secretariat⁵ produced similar results. Monaco has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

16. The ERT reiterates the recommendations made in the previous review report that Monaco include, in its NIR, the full list of categories considered in the key category analysis, instead of presenting tables showing the identified key categories only, and indicate how it uses the key category analysis to prioritize inventory improvements, in order to increase transparency.

17. In its NIR Monaco has shown that it uses the results of the key category analysis to prioritize the development and improvement of the inventory.

18. Monaco has not identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, since emissions and removals from such activities were reported as not applicable (“NA”).

Uncertainties

19. Monaco has reported a tier 1 uncertainty analysis in its 2012 annual submission, including the LULUCF sector. The estimated combined uncertainty for the overall GHG inventory for 2010 was 6.7 per cent, while the uncertainty associated with the overall emission trend was 1.5 per cent, which are similar to the uncertainty estimates reported in the previous annual submission. Monaco used mostly default uncertainty values from the IPCC good practice guidance. The ERT noted that such an approach is in accordance with the IPCC good practice guidance, but encourages Monaco to develop country-specific uncertainties, in particular for AD, for its next annual submission.

20. As identified in previous review reports, Monaco presents the uncertainties as standard deviations, rather than using the 95 per cent confidence interval as recommended in the IPCC good practice guidance. This means that the reported uncertainty values calculated are around half of the uncertainty values that would be estimated if the 95 per cent confidence interval were used. Responding to a question raised by the ERT during the review, Monaco indicated that, although reporting 95 per cent confidence intervals would require a significant modification of the national calculation tools, it is working on the adaptation of such tools, and the Party indicated that it plans to implement this improvement for its next annual submission. The ERT again reiterates the recommendation made in the previous review report that Monaco use the 95 per cent confidence interval to report uncertainties, as recommended in the IPCC good practice guidance, to enable comparability with the reporting of other Parties.

21. Furthermore, as noted in previous review reports, Monaco does not include in the NIR information on procedures for using the results of the uncertainty analysis as a tool to prioritize inventory improvements. Responding to a question raised by the ERT during the review, Monaco indicated that information on the prioritization of improvement activities

⁵ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where Monaco performed a key category analysis, the key categories presented in this report follow Monaco’s analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

based on the uncertainty analysis will be provided in the next annual submission. The ERT, therefore, again reiterates the recommendation that Monaco use the results of the uncertainty analysis to improve the accuracy of the inventory for future annual submissions.

Recalculations and time-series consistency

22. In its original 2012 annual submission of 29 March 2012, Monaco did not report any recalculations. In response to the list of potential problems and further questions raised by the ERT during the review, Monaco submitted for the first time estimates of actual emissions of HFCs from consumption of halocarbons and SF₆ (refrigeration and air-conditioning equipment and aerosols/metered dose inhalers). The magnitude of the impact of the recalculations is an increase in the estimate of total GHG emissions for 2009 by 0.11 Gg CO₂ eq, or 0.1 per cent, excluding the LULUCF sector (5.0 per cent of GHG emissions from the category consumption of halocarbons and SF₆).

23. The ERT noted that Monaco reported in chapter 10 of the NIR that recalculations for the LULUCF and waste sectors were performed as a follow-up on the 2010 annual review report. The ERT noted that this comment is a leftover from the Party's 2011 NIR and does not reflect the 2012 annual submission, for which recalculations were not made for the LULUCF sector. Therefore, the ERT recommends that Monaco ensure that the NIR properly reflects the recalculations made for the latest annual submission, and that it improve the necessary QC procedures to avoid such incorrect reporting in next annual submissions.

Verification and quality assurance/quality control approaches

24. The NIR reports that Monaco has a QA/QC plan in place, which is in accordance with the IPCC good practice guidance. The description of the QA/QC is included in annex 8 to the NIR. The plan includes general QC procedures (tier 1), which are implemented during the preparation of the inventory. No tier 2 QC procedures are mentioned. As an important QA procedure, an external review of the 2007 inventory was carried out in 2009 by CITEPA, which also prepared a report on the review. In the 2012 NIR, Monaco stated that a similar review by CITEPA would take place during 2012. The ERT commends this activity and underlines the importance of the review conducted by CITEPA to ensure the quality of Monaco's inventory. The ERT recommends that the Party report on the conclusions drawn from the above-mentioned review exercise in its next annual submission.

Transparency

25. Monaco has not increased transparency in its 2012 annual submission, and the vast majority of the information contained in the NIR is simply an update of the information contained in the previous annual submission (see para. 28 below).

26. In terms of its structure, the NIR follows, in general, the outline included in annex I to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) (i.e. the main chapters follow the outline, but the subchapters are in some cases aggregated). The ERT recommends that Monaco continue improving the transparency of its inventory, as discussed in detail in the sectoral chapters of this report.

Inventory management

27. Monaco has a centralized archiving system, which includes the archiving of disaggregated EFs and AD, and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. All data and copies of the documents used for the preparation of the inventory are archived at the Direction de l'Environnement.

3. Follow-up to previous reviews

28. Monaco reports in chapter 10 of the NIR on the improvements made to the inventory, including recalculations, as a follow-up on the 2010 annual review report, which is mostly a copy of what was reported in the 2011 annual submission. The Party did not follow the previous recommendations concerning the transparency of the information related to the key category analysis, the uncertainty analysis and sector-specific methodologies, since the information in the NIR is mostly the same as in the previous annual submission. The ERT concluded that the Party did not follow any additional recommendations made in previous review reports between its 2011 and 2012 annual submissions. Therefore, the ERT recommends that the Party enhance the process by which it implements the recommendations made in previous review reports and increase the transparency of the reporting thereon by indicating when the recalculations and other changes were made. Recommendations included in the previous review report that were not implemented for the 2012 annual submission are reiterated in the sector chapters of this report.

4. Areas for further improvement identified by the expert review team

29. During the review, the ERT identified a number of areas for improvement. These are listed in table 12 below.

30. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report and in table 12 below.

B. Energy

1. Sector overview

31. The energy sector is the main sector in the GHG inventory of Monaco. In 2010, emissions from the energy sector amounted to 84.41 Gg CO₂ eq, or 96.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 21.1 per cent. The key driver for the fall in emissions is the 28.2 per cent reduction between 1990 and 2010 in emissions from the residential sector, caused by the decrease in energy use and the shift from consumption of liquid to gaseous fuels. Within the sector, 38.6 per cent of the emissions were from other sectors (residential and commercial/institutional, with agriculture/forestry/fisheries reported as “NO”), followed by 31.0 per cent from transport, 30.4 per cent from energy industries and less than 0.1 per cent from fugitive emissions and other (biomass used for navigation).

32. Monaco has not made any recalculations for the energy sector between the 2011 and 2012 annual submissions.

33. Monaco reported in CRF table summary 3 and in the NIR the use of a tier 1 methodology, together with IPCC default EFs, to estimate emissions for all gases and categories in the energy sector. In addition, in CRF table summary 3, Monaco reported the

notation key for default (“D”) for EFs for all gases and categories. However, as identified in previous review reports, the ERT found that the description in the NIR of the methodology for estimating CH₄ and N₂O emissions from road transportation is consistent with a tier 2 approach (i.e. using a simple model, taking into consideration the number of vehicles by class type and annual mileage, as explained on pages 78–84 of the NIR). Also, according to the description provided in the NIR, Monaco uses: country-specific EFs to estimate CO₂ emissions from natural gas distribution (fugitive emissions), which were established by comparing the measurements of total gas sold and consumed; EFs from CITEPA to estimate emissions from consumption of biomass in navigation (category other), and EFs from the *EMEP/EEA air pollutant emission inventory guidebook*.⁶ Some such issues of inconsistency in the reporting were already identified in the previous review report. The ERT strongly reiterates the recommendation made in previous review reports that Monaco revise its reporting in the NIR and CRF table summary 3 and improve consistency between the NIR and the CRF tables in its next annual submission.

34. The ERT noted that, in the NIR, no information on the specific QA/QC procedures performed for the energy sector is provided. In order to increase transparency and accuracy, the ERT recommends that Monaco include information on the QA/QC procedures implemented for the energy sector in its next annual submission.

2. Reference and sectoral approaches

Comparison of the reference approach with the sectoral approach and international statistics

35. CO₂ emissions from fuel combustion were calculated using the reference approach and the sectoral approach. For 2010, estimated CO₂ emissions according to the sectoral approach were 0.31 per cent higher than those calculated using the reference approach. The ERT noted that Monaco, as in its previous annual submission, reported the apparent consumption of municipal solid waste for incineration as “NO” in CRF table 1.A(b) for the entire time series, but included corresponding emission estimates in CRF table 1.A(c) under other fuel. The ERT reiterates the recommendation made in the previous review report that Monaco report the aforementioned consumption and related emissions in a consistent way in CRF tables 1.A(b) and 1.A(c).

36. The comparison of Monaco’s estimates with international data from the International Energy Agency (IEA) was not possible for the review, because data for Monaco are included as part of the French submission to IEA and not reported separately.

International bunker fuels

37. As stated in the NIR (page 29), in order to separate emissions from international and domestic navigation, Monaco used a survey performed in 2005, which targeted the owners of boats in the ports of Monaco. The results of the survey showed that 91.0 per cent of the total fuel consumption was due to international navigation. In response to a question raised by the ERT during the review, Monaco explained that the separation of emissions between international and national navigation is based on the 2005 survey results for the whole time series. The ERT recommends that Monaco repeat the survey regularly in order to confirm or update the percentage identified in 2005 and to enhance the accuracy of the allocation of emissions between international and domestic navigation.

⁶ Formerly referred to as the EMEP/CORINAIR emission inventory guidebook. The EMEP/EEA air pollutant emission inventory guidebook (formerly referred to as the EMEP CORINAIR emission inventory guidebook) is published by the European Environment Agency and available at <<http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009>>.

38. As reported in the NIR (page 28), the estimation of CO₂ emissions from international aviation is based on the fuel sold at Monaco's heliport. As Monaco is a small country with no airports, the emissions reported for international aviation result from the movement of helicopters, occurring mainly between the city of Nice (France) and Monaco. These emissions increased by 10.1 per cent between 1990 and 2010. The ERT identified large inter-annual changes in the estimated CO₂ emissions from international aviation (ranging from a decrease of 21.0 per cent between 2008 and 2009 to an increase of 15.8 per cent between 1999 and 2000). This issue has already been identified in previous review reports. Therefore, the ERT reiterates the recommendation made in previous review reports that Monaco include, in its next annual submission, more detailed explanations of the corresponding emission trends and inter-annual variations.

Feedstocks and non-energy use of fuels

39. In its 2010 annual submission, Monaco changed the notation key used to report the use of lubricants from "NO" to "NE" in CRF table 1.A(d). Monaco reports the use of all other fuel types, the carbon stored in non-energy uses and CO₂ emissions for lubricants as "NO". No explanatory information is provided in the NIR or in CRF table 1.A(d). As indicated in the previous review report, in response to the question raised by the ERT as to whether the Party had checked the use of these fuels, Monaco responded that the notation keys used to report the use of lubricants and bitumen would be checked for its next annual submission. However, in its 2012 annual submission, the notation key used to report the use of lubricants remains "NE", and the ERT concluded that the reporting is not transparent. Therefore, the ERT reiterates the recommendation made in the previous review report that Monaco explain, in the NIR of its next annual submission, the disposal of lubricants in the country, as well the associated allocation of emissions.

3. Key categories

Stationary combustion: liquid, gaseous and other fuels – CO₂, CH₄ and N₂O⁷

40. CO₂ emissions from the incineration of municipal solid waste (MSW) and sludge with energy recovery have been reported as emissions from the consumption of other fuels in the category public electricity and heat production. The emissions were estimated using the tier 1 method and default values for the fossil fraction and carbon content of the fuels from the IPCC good practice guidance. In the NIR (page 26), it is stated that, in 2011, Monaco tried to conduct a survey to review the waste composition and provide data to the Direction de l'Environnement, but it was unsuccessful. The NIR explains that Monaco is analysing the possibility of evaluating the characteristics of MSW on the basis of the components of the waste and their characteristics. In fact, since the beginning of 2009, a new counting system categorizing urban waste into 12 categories has started at the waste incineration plant. The ERT encourages Monaco to maintain its efforts to collect information on the composition of the MSW incinerated and use it in the calculation of the associated emission estimates for its next annual submission.

41. The inter-annual changes in the estimated CO₂ emissions from the incineration of MSW and sludge (reported as consumption of other fuels in public electricity and heat production) range from -27.5 per cent (2005/2006) to 36.6 per cent (2006/2007). Overall, the emissions decreased by 6.6 per cent between 1990 and 2010, but not following a simple trend: emissions increased by 66.7 per cent between 1990 and the maximum value in 2001 and thereafter decreased by 44.1 per cent. As indicated in the 2010 annual review report,

⁷ Not all emissions related to all gases under this category are key categories, particularly CH₄ and N₂O emissions. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

Monaco explained that the high inter-annual variations in emissions in the periods 2005/2006 and 2006/2007 can be explained by the fact that in 2006 the waste incineration plant was temporarily closed. In addition, the Party stated that the amount of waste incinerated has decreased in recent years, as Monaco has started to separate and recycle MSW, thereby reducing the amount of waste incinerated. During the review, Monaco provided additional information on the methodology that it uses to estimate emissions from incinerated MSW, including the EFs used, which were obtained from the EMEP/EEA Air Pollutant Emission Inventory Guidebook. The ERT reiterates the recommendation made in previous review reports that Monaco improve the transparency of its reporting and include in the NIR of its next annual submission explanatory information on emission trends and the data and EFs used for the quantity of waste incinerated.

42. According to information in the NIR (annex II), Monaco estimated CO₂ emissions from combustion of natural gas from other sectors and from public electricity and heat production using a CO₂ EF (56.72 t/TJ) provided by SMEG. This value differs from the IPCC default value (56.1 t/TJ); however, in CRF table summary 3, Monaco reported the notation key “D”. In response to a question raised by the ERT during the review, Monaco indicated that it will change the reported information in CRF table summary 3. The ERT recommends that Monaco provide in its next annual submission explanatory information on the country-specific EF used and improve consistency between the NIR and CRF table summary 3.

43. In 2010, emissions from residential and commercial/institutional accounted for 38.6 per cent of the total emissions from the energy sector. The trend in the emissions shows an overall decrease of 28.2 per cent between 1990 and 2010. The previous review report indicated that Monaco clarified that the decreasing emission trend observed in the residential sector is due to the fact that the domestic use of light fuel oil in new buildings has been forbidden since 16 September 2003 and that citizens decided to change their heating systems from light fuel oil to natural gas. In the previous review report it was recommended that Monaco include this explanation in the NIR of its 2012 annual submission. However, Monaco failed to implement the recommendation and therefore the present ERT reiterates the recommendation made in the previous review report that Monaco include the aforementioned explanatory information in its next annual submission.

44. The previous review report also identified that Monaco had not reported separate data on natural fuel consumption (for liquid and gaseous fuels) for the commercial/institutional category, but instead reported the corresponding emissions as included elsewhere (“IE”) under residential. Therefore, in the previous review report it was recommended that Monaco investigate the possibility of obtaining separate data for its next annual submission. In response to a question raised by the ERT during the 2011 review on whether Monaco had investigated the possibility of a split between the emissions from residential and commercial/institutional, Monaco answered that, after analysis, it appeared that the split would have no impact on the quantity of emissions estimated and that it preferred to focus its resources on other issues. The ERT acknowledges that the split would not have an impact on the total sectoral emission estimates, but argues that it would improve the transparency of the inventory in relation to these important categories and would enhance comparability with other Parties. Therefore, the ERT reiterates the recommendation made in the previous review report that Monaco report emissions for the commercial/institutional category separately from emissions for the residential category in its next annual submission.

Road transportation: liquids fuels – CO₂, CH₄ and N₂O⁸

45. Monaco estimated CO₂ emissions from road transportation on the basis of the amount of fuel sold and using default EFs from the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). CH₄ and N₂O emissions were estimated on the basis of information on the vehicle stock per type of vehicle/technology (which is used to allocate the fuel sold), using net calorific values and EFs from the Revised 1996 IPCC Guidelines, except for biofuels, for which the EFs were from CITEPA. This is consistent with the tier 2 approach from the IPCC good practice guidance. The ERT reiterates the recommendation made in the previous review report that Monaco change the description of the methodology for estimating N₂O and CH₄ emissions from road transportation in CRF summary table 3 and in the NIR from tier 1 to tier 2.

46. The trend in the estimated CO₂ emissions from road transportation shows an overall decrease of 28.7 per cent, from 32.34 Gg in 1990 to 23.04 Gg in 2010. The 2010 annual review report indicated that Monaco clarified that the decrease is due to an increase in the use of public transportation, but this information was not included in the Party's 2011 or 2012 NIR. Furthermore, the ERT identified from data provided in CRF table 1.A(a) that the decrease in emissions is also due to the increasing percentage of biofuels used each year. The ERT therefore reiterates the recommendation made in the previous review report that Monaco provide more information on this emission trend in its next annual submission.

47. Estimated N₂O emissions from road transportation increased by 197.2 per cent between 1990 and 2010, because of the significant increase in the EF for passenger cars running on gasoline equipped with a catalytic converter (the implied emission factor for this type of vehicle is 0.05 g/km, or 20 kg/TJ, according to table 1-36 of the Revised IPCC 1996 Guidelines): the N₂O EF for passenger cars running on gasoline increased 7.7-fold between 1990 and 2010, from 1.70 t/TJ to 13.10 t/TJ. In 2010, N₂O emissions from road transportation accounted for 58.8 per cent of the total N₂O emissions from the energy sector. The ERT strongly reiterates the recommendation made in the previous review report that Monaco include more information on the underlying reasons for the trend in the N₂O emissions from road transportation in the NIR of its next annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

48. In 2010, emissions from the industrial processes sector amounted to 2.24 Gg CO₂ eq, or 2.5 per cent of total GHG emissions, while emissions from the solvent and other product use sector have been reported as "NE". Since the base year, emissions have increased by 2,043.8 per cent in the industrial processes sector. The key driver for the rise in emissions in the industrial processes sector is the increase in emissions from consumption of halocarbons and SF₆. Within the industrial processes sector, all reported emissions were from consumption of halocarbons and SF₆, in particular HFCs and PFCs from air-conditioning and refrigeration and SF₆ emissions from electrical equipment.

49. Monaco did not report any recalculations for the industrial processes sector between the 2011 and 2012 annual submissions in its original 2012 annual submission of 29 March 2012. However, during the review, in response to the list of potential problems and further questions raised by the ERT during the review, Monaco submitted revised estimates of

⁸ Not all emissions related to all gases under this category are key categories, particularly CH₄ emissions. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

actual HFC emissions from aerosols/metered dosed inhalers (consumption of halocarbons and SF₆) for the period 1995–2010. The revised estimates made for 2010 resulted in an increase of the estimated emissions from the industrial processes sector of 0.10 Gg CO₂ eq, or 4.8 per cent of the total sectoral emissions (0.1 per cent of the total GHG emissions, excluding LULUCF, for 2010).

50. The ERT noted that the NIR of the Party's 2012 annual submission has not improved in its transparency in comparison with the previous annual submission, and that the recommendations formulated in the previous review report have not been addressed, in particular the recommendation that Monaco provide further explanation of the data collection process for the category consumption of halocarbons and SF₆. In fact, explanations in relation to that category are only briefly mentioned in the NIR, and a complete description of the methods used to obtain data and perform the calculations is missing. The ERT also noted that explanations of trends and sector-specific uncertainty analysis and QA/QC procedures are not included in the NIR. The ERT recommends that the Party improve the transparency of its reporting by providing the necessary information in its next annual submission.

51. The ERT considered that the reporting in the CRF tables of the Party's original 2012 annual submission of 29 March 2012 was not in accordance with the UNFCCC reporting guidelines, since no information was provided in CRF table 2(II).F. During the review, in response to questions raised by the ERT, Monaco commented that it had experienced problems with the CRF Reporter and could not provide the detailed CRF table 2(II).F. However, in its submission of revised estimates of 30 October 2012, the Party provided information in that table for the complete time series from 1990 to 2010.

2. Key categories

Consumption of halocarbons and SF₆ – HFCs, PFCs and SF₆

52. Monaco reported estimates of actual HFC emissions from refrigeration and air-conditioning equipment only for 1994 onwards, actual SF₆ emissions from electrical equipment for 1995 onwards, and PFC emissions from refrigeration and air-conditioning equipment for 1995 onwards (emissions for the period 1995–2000 were reported as “NO”). Estimates of actual emissions for previous years of the time series for all gases were reported as “NE”. The NIR does not explain why the time series of emission estimates is not complete for the period 1990–2010, nor does it provide the results of the efforts made so far to complete the time series (e.g. the NIR mentions that a survey was conducted for that purpose in October 2007, but it does not discuss the results of that survey). Responding to a question raised by the ERT during the review in order to clarify this issue, the Party responded that reliable data could not be obtained from the survey. Therefore, the ERT recommends that Monaco increase its efforts to provide emission estimates for the whole time series in its next annual submission and enhance the transparency of the NIR.

53. For the years between 2001 and 2009 the Party has provided quantitative estimates of actual PFC emissions from refrigeration and air-conditioning equipment, but has reported such emissions as “NO” for 2010 without any explanation in the NIR. Monaco explained during the review, in response to questions raised by the ERT, that reporting the emissions as “NO” is justified due to the absence of equipment maintenance using PFCs in 2010. The ERT recommends that Monaco include this explanation in the NIR of its next annual submission.

54. The ERT concluded that the NIR is not transparent enough for a complete assessment of the methodology used to estimate emissions from consumption of halocarbons and SF₆, in particular the methods used to collect AD. The NIR explains only that the IPCC tier 1a method, together with IPCC defaults, was used and that the amounts

of substances used are based on inquiries made to the companies whose activity relates to the use of equipment (SMEG for electrical equipment, concessionaires of equipment for transport refrigeration, and companies dealing with air-conditioning and refrigeration equipment). The Party did not provide information, neither in the NIR nor during the review, on the quantity of HFCs, PFCs or SF₆ in stocks and the EFs used by type of equipment. Therefore, the ERT strongly reiterates the recommendation made in the previous review report that Monaco report on the methodology applied to estimate emissions for the individual categories in its next annual submission.

55. In CRF table 2(I) Monaco has reported potential emissions of HFCs and PFCs from refrigeration and air-conditioning equipment as “IE”, allocating them under total potential emissions of halocarbons and SF₆ imported in products. The ERT encourages Monaco to provide separate estimates of total potential emissions of HFCs and PFCs for this category in CRF table 2(I), or to clarify in the NIR of its next annual submission why potential emissions imported in bulk cannot be separated from potential emissions imported in products.

56. The ERT noted that, in its original 2012 annual submission of 29 March 2012, Monaco did not provide information on consumption of halocarbons and SF₆ in CRF table 2(II).F, and that actual HFC emission estimates were only reported with values for the category refrigeration and air-conditioning equipment in CRF tables 2(I) and 2(II). This lack of information prevented the ERT from assessing the inventory for this category. The ERT also noted that actual emissions from aerosols/metered dose inhalers were reported as “NO”, with the explanation that data were not available. The ERT included this issue in the list of potential problems and further questions raised by the ERT during the review week and requested that the Party provide detailed methodological descriptions for the subcategories, submit revised emission estimates, including a complete CRF table 2(II).F, and provide estimates of actual emissions from aerosols/metered dose inhalers. The Party responded to the ERT and provided revised CRF tables on 30 October 2012:

(a) For the subcategory domestic refrigeration, Monaco informed the ERT that corresponding equipment is not produced in the country and that emissions could result only from imported equipment. However, the Party could not indicate which species of HFCs were imported in products and could not include the necessary information in CRF table 2(II).F. The ERT concluded that the information provided by the Party was incomplete and not transparent and that the emissions could have been underestimated. Therefore, the ERT calculated, recommended and applied adjustments for HFC emissions from domestic refrigeration (see paras. 85–98 below). The ERT strongly recommends that Monaco estimate emissions for this subcategory for its next annual submission;

(b) Monaco confirmed that halocarbon emissions from fire extinguishers do not occur in the country, as the systems in use in the territory use CO₂, water and powder. The ERT concluded that the reporting of the emissions as “NO” is appropriate;

(c) Monaco provided revised estimates of HFC emissions for the category aerosols/metered dose inhalers. The ERT concluded that the potential underestimation of emissions had been resolved;

(d) Monaco reported HFC emissions from foam blowing as “NE”, with the justification that no data are available in the country. Since methodologies exist in the IPCC good practice guidance for this subcategory, and this is a common source of emissions in developed country Parties, the ERT concluded that Monaco’s emissions inventory could have been underestimated and calculated, recommended and applied adjustments for HFC emissions from foam blowing (see paras. 99–110 below). The ERT strongly recommends that Monaco estimate emissions for this subcategory for its next annual submission.

57. The ERT noted that the time series of emissions for this category and the ratio of potential to actual emissions show very high inter-annual changes. For instance, for total actual HFC emissions from refrigeration and air-conditioning equipment the time series is very instable, as evident in the following inter-annual changes: 1995/1996 (+5,259.3 per cent); 1996/1997 (-97.3 per cent); 1997/1998 (+2,078.9 per cent); 1998/1999 (-50.8 per cent); 1999/2000 (+2,130.8 per cent); 2000/2001 (-85.9 per cent); 2001/2002 (+142.8 per cent); 2002/2003 (+32.5 per cent); 2003/2004 (+45.3 per cent); 2004/2005 (+3.1 per cent); 2005/2006 (-65.6 per cent); and 2006/2007 (+212.2 per cent). The Party explains in the NIR that the emission trend follows the results of the annual surveys of the national companies operating in the country and provided limited explanations for the changes, such as the small size of the country and its openness to foreign suppliers. Given that this is a key category, the ERT recommends that Monaco improve the reported information on the trend analysis and describe the QA/QC procedures that ensure the quality of the AD used to prepare the estimates in its next annual submission.

58. In the NIR, Monaco reports that it exports all recuperated fluorinated gases (F-gases) and decommissioned products containing F-gases to France and therefore reports no emissions from disposal of F-gases. During the review, responding to a question raised by the ERT, Monaco indicated that there are no agreements with France to ensure that such emissions are accounted for in France. The ERT recommends that Monaco establish contact with France in order to ensure that the emissions are accounted for, and report on the results of these contacts in the NIR of its next annual submission.

3. Non-key categories

Solvent and other product use – CO₂ and N₂O

59. As identified in previous review reports, Monaco reports CO₂ and N₂O emissions from the solvent and other product use sector as “NE” for the whole time series. The ERT reiterates the encouragement contained in previous review reports for Monaco to explore approaches available in the scientific literature to estimate emissions for the categories that do not have methodologies prescribed in the Revised 1996 IPCC Guidelines or in the IPCC good practice guidance.

60. The ERT found that, in spite of reporting non-methane volatile organic compound (NMVOC) emissions from paint application, degreasing and dry cleaning and other (printing industry and wood preservation), CO₂ emissions are not reported for the same categories. Therefore, the ERT encourages Monaco to include emission estimates for CO₂ for these categories in its next annual submission and to report on the methodology applied.

61. The ERT noted that, in spite of mentioning in the NIR a survey on N₂O used for anaesthesia, emissions are reported as “NE” for the category use of N₂O for anaesthesia. During the review, responding to a question raised by the ERT, Monaco indicated that the results of the study were available only in mid-2012 and that no use of N₂O for anaesthesia is recorded. The ERT recommends that Monaco report on the outcomes of the survey in its next annual submission, revise the notation keys used and regularly trace potential usage by updating the survey.

D. Agriculture

62. Monaco has indicated in its NIR that there is no livestock production, pasture management or farmland for agriculture in the country. The Party has reported all categories in this sector as “NO” in the CRF tables.

E. Land use, land-use change and forestry

1. Sector overview

63. In 2010, net removals from the LULUCF sector amounted to 0.02 Gg CO₂ eq. Since 1990, net removals have increased by 63.2 per cent (although net emissions were reported for the years 2002–2004). The key driver for the rise in removals is the creation of additional urban green areas in the country since 1990. The category settlements remaining settlements is the only LULUCF category reported by Monaco, while emissions and removals for all other categories are reported as “NO”.

64. Monaco has not made any recalculations for the LULUCF sector between the 2011 and 2012 annual submissions.

65. The reporting on the LULUCF sector is in general transparent. However, noting that Monaco reports CH₄ and N₂O emissions from the incineration of ‘green waste’ under biomass consumption as fuel in the energy sector (see para. 69 below), in the previous review report it was strongly recommended that Monaco improve the description of the use of biomass in the NIR, improve the consistency of the information reported between the NIR and the CRF tables and ensure consistency in the reporting and allocation of emissions and carbon stock changes between the LULUCF, waste and energy sectors. The ERT noted that the Party’s NIR has not improved since its 2011 annual submission and recommends that the Party rectify this for its next annual submission.

66. The method used for estimating CO₂ and N₂O emissions from settlements remaining settlements is an IPCC tier 1 method, together with default EFs from the IPCC good practice guidance for LULUCF (appendix 3a.4 on settlements). The inventory for the LULUCF sector is generally complete, but the ERT noted that, owing to the lack of transparency referred to in paragraph 65 above, CO₂ emissions from incineration of ‘green waste’ may not have been included in the inventory, and therefore the ERT recommends that the Party enhance the completeness of its reporting (see para. 69 below).

2. Non-key categories

Settlements remaining settlements – CO₂ and N₂O

67. For 2010, Monaco identified 6,537 trees in its territory and 27.55 ha public and 16.82 ha urban green areas. This category was responsible for net removals of 0.02 Gg CO₂ in 2010: removals of CO₂ were estimated at -0.04 Gg CO₂ eq and emissions of N₂O from nitrogen fertilization amounted to the other 0.02 Gg CO₂ eq. This net sink had only a small effect on Monaco’s total estimated emissions for 2010 (less than 0.1 per cent).

68. The method used for estimating the increase in biomass by trees is a tier 1a methodology based on the estimation of the area covered by the projection of tree canopies on the ground (crown cover) multiplied by an IPCC default EF, which is the annual rate of increase in carbon per unit of crown area. As indicated in the previous review report, Monaco stated that the computation of crown projections was based on the consideration of similar geometrical shapes (e.g. cone, half sphere or column, i.e. cylinder). Monaco is considering using aerial photographs to improve the estimation of crown projections, but the Party indicated that it is not yet ready to implement this improvement because of its complexity. The ERT, therefore, reiterates the recommendation made in the previous review report that Monaco advance in the development of the suggested remote-sensing methodology for estimating crown cover area and report on progress made in its next annual submission.

69. Monaco only reported gains in living biomass; losses are reported as “NA”. Responding to the previous ERT, Monaco explained that biomass loss is reported as “NA” because only trees that are 20 years old or younger are considered in the estimates and, for these trees, representing about 15 per cent of Monaco’s tree population, the methodology assumes that carbon losses are zero. However, in the NIR (page 41) Monaco reported that the ‘green waste’ resulting from the maintenance of public parks and gardens (2,016 t in 2010) was incinerated at Monaco’s waste incineration plant. This waste consists mainly of cut grass (lawn) and some quantity of wood resulting from pruning trees. Monaco clarified to the ERT during the review that these quantities were not included in the total amount of waste incinerated in 2010, but were included in biomass consumption in the category public electricity and heat production for the period 1990–2010. In addition, the ERT noted that, in the calculation of the carbon balance of the category settlements remaining settlements, Monaco does not consider CO₂ emissions from the carbon in the trimmings and other biomass removed and combusted for energy. Since, under the sector energy, CO₂ emissions from biomass are reported as a memo item, the ERT concluded that these CO₂ emissions were not included in the national totals and that the inventory could have been underestimated. The ERT recommends that Monaco enhance the completeness of its LULUCF sector, and the consistency of the estimated emissions reported for the energy, LULUCF and waste sectors, by reporting CO₂ emissions from carbon loss due to trimmings and other removals under the LULUCF sector and that it recalculate the LULUCF sector in its next annual submission.

70. As identified in previous review reports, Monaco reported the carbon stock changes in dead organic matter and net carbon stock changes in soils as “NE”. The ERT reiterates the recommendation made in the previous review report that Monaco provide estimates for these carbon pools, in accordance with the IPCC good practice guidance for LULUCF, in its next annual submission.

71. In the previous review report it was noted that Monaco reported under the category settlements remaining settlements N₂O emissions due to fertilization in parks and gardens, but reported the corresponding AD and emissions as “NO” in CRF table 5(I). During the review, the Party informed the ERT that this information will be included in CRF table 5(I) in its next annual submission. The ERT recommends that Monaco include such information in its next annual submission.

F. Waste

1. Sector overview

72. In 2010, emissions from the waste sector amounted to 1.25 Gg CO₂ eq, or 1.4 per cent of total GHG emissions. Since 1990, emissions have increased by 65.8 per cent. The key driver for the rise in emissions is the increase in emissions from waste incineration. Within the sector, 66.4 per cent of the emissions were from wastewater handling, followed by 33.6 per cent from waste incineration. Emissions from solid waste disposal on land were reported as “NO”.

73. Monaco has not made any recalculations for the waste sector between the 2011 and 2012 annual submissions.

74. The inventory for the waste sector is complete. It covers emissions from all waste management practices existing in the country. The information provided in the NIR is, in general, transparent, allowing the ERT to understand how emissions were estimated, but some issues remain to be resolved, some of which were already identified in the previous review report, such as the explanation of emission trends and the methodologies used to estimate N₂O emissions from sewage sludge. The ERT reiterates the recommendation made

in the previous review report that the Party enhance the transparency of the reporting in these areas. In addition, the ERT recommends that Monaco improve the transparency of the reporting on methodological issues related to the emission estimates for household waste incineration (see paras. 78 and 79 below).

75. No category was identified as a key category in the waste sector, owing to the small contribution of the sector to the Party's total GHG emissions.

2. Non-key categories

Wastewater handling – N₂O

76. Monaco estimated and reported N₂O emissions from human sewage. From the information included in CRF table 6.B, Monaco used the default method from the Revised 1996 IPCC Guidelines. Data on protein consumption (82.5 g/person/day in 2010) is country-specific and determined by the Direction de l'Action Sanitaire et Sociale on the basis of the consumption by different age and gender classes in the country. CO₂ emissions from aerobic treatment of wastewater were not included in the inventory, in line with the IPCC good practice guidance, as the carbon is of biogenic origin.

77. Monaco indicated in the NIR that its wastewater treatment plant treats wastewater from Monaco and neighbouring municipalities of France. The Party also indicated that nearly 90 per cent of the wastewater is treated in aerobic conditions (resulting in no CH₄ emissions), without clarifying how the remaining 10 per cent is handled. According to the previous review report Monaco indicated that the remaining 10 per cent of the wastewater is discharged directly into the sea in periods of heavy rainfall and that the sludge from wastewater treatment is transported to an incineration plant where it is burned. The sludge for incineration is transported a distance of only 20 m via an underground hermetically sealed canalization and therefore it is unlikely that emissions occur during the sludge transport. Monaco included this information in its 2012 NIR and the ERT commends the Party for having implemented the corresponding recommendation made in the previous review report and for having enhanced the transparency of its NIR.

Waste incineration – CO₂, CH₄ and N₂O

78. In CRF table 6.C, Monaco reported CO₂, CH₄ and N₂O emissions from incineration of household waste and sludge. Emissions from waste incineration are reported under the energy sector, except for emissions from the incineration of sludge. However, this information is not in the NIR. In response to a recommendation made in the previous review report, Monaco informed the ERT during the review that it reports under the energy sector emissions resulting from the incineration of household waste. Responding to the ERT during the review, Monaco clarified that only non-CO₂ emissions from incineration of sludge are accounted for under the waste sector, as the sludge has a low calorific value and high water content and is burnt only for elimination purposes. The ERT recommends that the Party include this information in the NIR of its next annual submission.

79. CO₂ emissions from the incineration of sludge are not accounted for in the estimate of total emissions, as the carbon is reported to be of biogenic origin. However, the composition of household waste incinerated was not provided in the NIR and it was not clear to the ERT whether CO₂ emissions from carbon of fossil origin included in MSW were included in the inventory. In response to questions raised by the ERT during the review, Monaco indicated that, in order to estimate emissions from waste incineration, it considered the composition of household waste incinerated to be equivalent to the average composition of household waste in France, and, for that type of waste, Monaco applied the default EFs from the IPCC good practice guidance. The Party used EFs from EMEP/CORINAIR to estimate emissions from sludge incineration and considered all

emissions as biogenic given that no fossil carbon is contained in the sludge. The ERT recommends that Monaco include all of this information in its next annual submission in order to enhance transparency.

G. Adjustments

80. The ERT identified underestimations in the emission estimates and recommended and applied adjustments in the industrial processes sector for 2010. In accordance with the guidance for adjustments under Article 5, paragraph 2, of the Kyoto Protocol (decision 20/CMP.1) (hereinafter referred to as the guidance for adjustments), the adjustments to the industrial processes sector were prepared by the ERT in consultation with Monaco. In addition, in accordance with the Article 8 review guidelines, the ERT officially notified Monaco of the calculated adjustments.

81. The underestimations leading to adjustments in the industrial processes sector in 2010 include: HFC emissions from domestic refrigeration and HFC emissions from foam blowing.

82. The adjusted estimate for GHG emissions from the industrial processes sector in 2010 amounts to 2.55 Gg CO₂ eq, compared with 2.24 Gg CO₂ eq as originally reported by Monaco in its 2012 annual submission. The calculation and the application of the adjustments leads to an increase in estimated total GHG emissions from Annex A sources by 0.4 per cent (0.31 Gg CO₂ eq), from 87.89 Gg CO₂ eq as reported by Monaco to 88.20 Gg CO₂ eq as calculated by the ERT.

83. In its response to the draft annual review report, Monaco failed to notify the secretariat of its intention to accept or reject the calculated adjustments.

84. The ERT notes that Monaco may submit revised estimates for the parts of its inventory to which adjustments were applied, in conjunction with its next inventory, or at the latest with the inventory for the year 2012. The revised estimates will be part of the review under Article 8 and if accepted by the ERT the revised estimates will replace the adjustments.

1. Domestic refrigeration – HFCs

The original estimate

85. In its original 2012 annual submission of 29 March 2012 Monaco did not provide detailed information on consumption of halocarbons and SF₆ in CRF table 2(II).F and only estimates of total actual HFC emissions were reported for the category refrigeration and air-conditioning equipment in CRF tables 2(I) and 2(II) (not disaggregated by gas). The ERT included this issue in the list of potential problems and further questions raised by the ERT during the review week and requested the Party to provide detailed methodological descriptions for the calculation of emission estimates for the subcategory and to submit revised emission estimates, including a complete CRF table 2(II).F. Responding to the ERT, the Party indicated that, for the category domestic refrigeration, equipment is not produced in the country, but emissions may result from imported equipment. Although Monaco submitted revised CRF tables on 30 October 2012, it could not indicate which species of HFCs were imported in products and could not include the necessary information in CRF table 2(II).F.

86. Moreover, the ERT noted that the NIR did not include a transparent description of the methodology used to calculate the estimates reported.

The underlying problem

87. The ERT concluded that Monaco did not provide sufficient transparent information in the NIR and in the CRF tables to enable the assessment of the accuracy of the estimates of HFC emissions from domestic refrigeration, and the additional information provided by the Party in response to the list of potential problems and further questions raised by the ERT during the review week indicated that HFC emissions for the subcategory domestic refrigeration could not be estimated. The ERT concluded that the emissions in the inventory could therefore have been underestimated.

88. The ERT noted that methodological guidance from the IPCC good practice guidance (page 3.79) indicates that “good practice is to use the tier 2 actual method for all sub-source categories within this source category [...]. If an inventory agency is unable to implement actual methods for all sub-source categories, it is good practice to calculate and report potential estimates for all sub-source categories”.

The recommendation to the Party

89. The ERT recommended that Monaco use the guidance from the IPCC good practice guidance (chapter 3.7) to collect relevant AD and EFs and prepare emission estimates, and that it provide transparent and complete data to estimate emissions for the subcategories of consumption of halocarbons and SF₆. In cases where the relevant activities and gases do not occur, the ERT recommended that the Party report the notation key “NO” and provide all relevant supporting information. The ERT also recommended that the Party provide a complete CRF table 2(H).F and provide detailed and transparent information on the underlying methodology used to collect AD and estimate emissions for all subcategories.

The rationale for adjustment

90. The ERT assessed the information provided by Monaco and concluded that the information and estimates provided by the Party are not transparent. The ERT considered that Monaco could be underestimating the emissions in its inventory by not providing transparent and clear information to show that HFC emissions for the subcategory domestic refrigeration were estimated for all species of gas.

91. The ERT noted that, in accordance with decision 20/CMP.1, annex, paragraph 19, an adjustment procedure should be initiated if the information provided by the Party is not sufficiently transparent.

The assumptions, data and methodology used to calculate the adjustment

92. In accordance with the guidance for adjustments, the ERT should calculate the adjustment at the level at which the problem was identified. In the case of Monaco, the problem was identified in relation to the estimate of HFC emissions from stocks of domestic refrigeration.

93. In accordance with the guidance for adjustments, the ERT calculated the adjustment using the average emission rate from a cluster of countries based on a driver (basic adjustment method number 5 in table 1 of the annex to decision 20/CMP.1), taking into consideration the lack of country-specific AD and EFs for Monaco. The Parties included in Annex I to the Convention (Annex I Parties) selected to comprise the cluster, namely France, Spain, Greece and Switzerland, were the countries neighbouring Monaco and others located in more or less the same geographical conditions for which reviewed emission estimates were available (this excluded Italy from the cluster, since data was not available for this sub-category).

94. For domestic refrigeration, only emissions of HFC134a were considered to calculate the adjustment, as this substance is often the only one reported by most Parties. In addition, only emissions from stocks were used, taking into consideration the dimension of the territory of Monaco and the fact that the Party stated during the review that no production within its boundaries occurs and that all disposal occurs in France.

95. Total population data, available from the World Bank, were used as the driver to estimate emissions for the adjustment. Total population was used as a proxy for the number of dwellings which have refrigeration appliances, which is common practice.

96. The underlying data and the estimates from the cluster using the driver of total population are provided in table 6 below.

The adjustment estimate

97. Tables 6 and 7 show the steps for the calculation of the adjustment.

Table 6

Background table for the calculation of the adjustment for HFC134a emissions from domestic refrigeration

Party	Total population		Domestic refrigeration stock HFC 134a emissions in t		Domestic refrigeration stock HFC 134a emissions in Gg CO ₂ eq		Domestic refrigeration stock HFC134a emission factor in kg CO ₂ eq per capita	
	2008	2009	2008	2009	2008	2009	2008	2009
France	64 370 515	64 720 232	0.206	0.196	0.268	0.254	0.004	0.004
Greece	11 237 094	11 282 760	0.144	0.158	0.187	0.205	0.017	0.018
Spain	45 555 716	45 908 594	50.374	56.752	65.486	73.778	1.437	1.607
Switzerland	7 647 675	7 743 831	0.297	0.140	0.386	0.183	0.051	0.024
weighted average							0.377	0.413

Table 7

Description of the calculation of the adjustment for HFC emissions from domestic refrigeration

Parameter/estimate	Value	Unit	Source
Category: domestic refrigeration – HFC 134a			
Party's estimate of emissions of HFC134a from domestic refrigeration	Not reported		CRF table 2(II).F
Average HFC134a emissions from domestic refrigeration (stocks) per capita for a cluster of Parties (2008 and 2009)	0.40	kg CO ₂ eq/capita	Calculated by the ERT (see table 6 above)
Input parameter for calculation of adjustment: population in Monaco in 2010	35 407	inhabitants	World Bank
Calculated estimate for HFC134a emissions from domestic refrigeration (stocks)	0.01	Gg CO ₂ eq	Calculated by the ERT
Conservativeness factor	1.21		Table 2 of appendix III to decision 20/CMP.1

Parameter/estimate	Value	Unit	Source
Adjusted calculated conservative estimate for HFC134a emissions from domestic refrigeration (stocks)	0.02	Gg CO ₂ eq	Calculated by the ERT
Total aggregated GHG emissions (excluding LULUCF) as reported by the Party	87.89	Gg CO ₂ eq	CRF table 10, Monaco's 2012 annual submission of 30 October 2012 (v2.1)
Total aggregated GHG emissions (excluding LULUCF) after application of adjustment	87.91	Gg CO ₂ eq	Calculated by the ERT
Difference between original and adjusted total aggregated GHG emissions	0.02	Gg CO ₂ eq	Calculated by the ERT
	0.02	%	Calculated by the ERT

Abbreviations: CRF = common reporting format, ERT = expert review team, HFC = hydrofluorocarbon, LULUCF = land use, land-use change and forestry.

Conservativeness of the expert review team's calculation of the adjustment

98. In line with decision 20/CMP.1, paragraph 5, conservativeness was ensured by applying a conservativeness factor of 1.21 (emission estimates for consumption of halocarbons and SF₆) from table 2 of appendix III to decision 20/CMP.1. The ERT therefore considers that the resulting adjusted values are conservative.

2. Foam blowing – HFCs

The original estimate

99. In its original 2012 annual submission of 29 March 2012 Monaco did not provide detailed information on consumption of halocarbons and SF₆ in CRF table 2(II).F. The ERT included this issue in the list of potential problems and further questions raised by the ERT during the review week and requested the Party to provide detailed methodological descriptions for the calculation of emission estimates for the subcategory and to submit revised emission estimates, including a complete CRF table 2(II).F. Responding to the ERT, the Party submitted revised CRF tables on 30 October 2012, where actual HFC emissions for the category foam blowing were reported as “NE”, with the justification that no relevant data were available. In addition, Monaco indicated that foams are not produced in the country, but are imported.

The underlying problem

100. The ERT concluded that the emissions in Monaco's inventory were underestimated since emissions from foam blowing were not included, although relevant methodologies are available in the IPCC good practice guidance. In addition, the ERT noted that it is very likely that such emissions occur, because activities resulting in these emissions are common in Annex I Parties with similar economic and social structures.

101. The ERT noted that methodological guidance from the IPCC good practice guidance (page 3.79) indicates that “good practice is to use the tier 2 actual method for all sub-source categories within this source category [...] If an inventory agency is unable to implement actual methods for all sub-source categories, it is good practice to calculate and report potential estimates for all sub-source categories”.

The recommendation to the Party

102. The ERT recommended that Monaco use the guidance in the IPCC good practice guidance (chapter 3.7) to collect relevant AD and EFs and prepare emission estimates, and that it provide transparent and complete data to estimate emissions for subcategories of consumption of halocarbons and SF₆. In cases where relevant activities and gases do not occur, the ERT recommended that the Party report the notation key “NO” and provide all relevant supporting information. The ERT also recommended that the Party provide detailed and transparent information on the underlying methodology used to collect AD and estimate emissions for all subcategories.

The rationale for adjustment

103. The ERT assessed the information provided by Monaco and concluded that the emissions had been underestimated for 2010, since HFC emissions from foam blowing were not estimated. The ERT noted that, in accordance with decision 20/CMP.1, paragraph 3, an adjustment procedure should be initiated if the information provided by the Party is found to be incomplete and/or prepared in a manner that is not consistent with the Revised 1996 IPCC Guidelines or the IPCC good practice guidance.

The assumptions, data and methodology used to calculate the adjustment

104. In accordance with the guidance for adjustments, the ERT should calculate the adjustment at the level at which the problem was identified. In the case of Monaco, the problem was identified in relation to the estimate of total actual HFC emissions from foam blowing.

105. In accordance with the guidance for adjustments, the ERT calculated the adjustment using the average emission rate from a cluster of countries based on a driver (basic adjustment method number 5 in table 1 of the annex to decision 20/CMP.1), taking into consideration the lack of country-specific AD and EFs for Monaco. The Annex I Parties selected to comprise the cluster, namely France, Spain, Italy and Switzerland, were the countries neighbouring Monaco and others located in more or less the same geographical conditions for which reviewed emission estimates were available (this excluded Greece from the cluster, since data was not available for this sub-category).

106. For foam blowing, emissions of HFC134a and HFC152a were considered. Although some of the cluster countries also report HFC227ea emissions from foam blowing, the latter compound has not been included in the adjustment calculation since not all cluster countries report data thereon. In addition, only emissions from stocks were used, taking into consideration the dimension of the territory of Monaco and the fact that the Party stated during the review that no production within its boundaries occurs and that all disposal occurs in France.

107. Gross domestic product (GDP) data, available from the World Bank, were used as the driver to estimate emissions for the adjustment. GDP was chosen as a proxy for the economic and social development status of the countries. The calculation of the adjustment did not exclude the recent trends in the cluster countries: declining GDP due to the economic crisis starting in 2008, and shifting from the use of foam blowing agents towards substances not included in the Revised 1996 IPCC Guidelines (and thus a decline in the use of those included).

108. The underlying data and the estimates from the cluster using the driver of GDP are provided in tables 8 and 9 below.

The adjustment estimate

109. Tables 8–10 show the steps for the calculation of the adjustment.

**Table 8
Background table for the calculation of the adjustment for HFC134a emissions from foam blowing**

Party	Gross domestic product in current billion USD		Foam blowing stock HFC 134a emissions in t		Foam blowing stock HFC 134a emissions in Gg CO ₂ eq		Foam blowing stock HFC134a emission factor in kg CO ₂ eq per USD	
	2008	2009	2008	2009	2008	2009	2008	2009
France	2 832	2 620	34.43	39.08	44.76	50.81	0.016	0.019
Italy	2 307	2 111	122.79	133.43	159.63	173.46	0.069	0.082
Spain	1 593	1 456	52.26	45.43	67.94	59.06	0.043	0.041
Switzerland	524	509	0.62	0.46	0.81	0.60	0.002	0.001
weighted average							0.032	0.036

**Table 9
Background table for the calculation of the adjustment for HFC152a emissions from foam blowing**

Party	Gross domestic product in current billion USD		Foam blowing stock HFC 152a emissions in t		Foam blowing stock HFC 152a emissions in Gg CO ₂ eq		Foam blowing stock HFC152a emission factor in kg CO ₂ eq per USD	
	2008	2009	2008	2009	2008	2009	2008	2009
France	2 832	2 620	280.08	303.02	39.21	42.42	0.014	0.016
Spain	1 593	1 456	52.26	45.43	7.32	6.36	0.005	0.004
Switzerland	524	509	0.62	0.46	0.09	0.06	0.000	0.000
weighted average							0.006	0.007

**Table 10
Description of the calculation of the adjustment for HFC emissions from domestic refrigeration**

Parameter/estimate	Value	Unit	Source
Category: foam blowing – HFC 134a and HCF152a			
Party's estimate of emissions for HFC134a and HCF152a from foam blowing	Not reported		CRT table 2(II).F
Average HFC134a emissions from foam blowing (stocks) per capita for a cluster of Parties (2008 and 2009)	0.03	kg CO ₂ eq/USD	Calculated by the ERT (see table 8 above)
Average HFC152a emissions from foam blowing (stocks) per capita for a cluster of Parties (2008 and 2009)	0.01	kg CO ₂ eq/USD	Calculated by the ERT (see table 9 above)
Input parameter for calculation of adjustment: GDP in	5.95	USD	World Bank

Parameter/estimate	Value	Unit	Source
Monaco in 2010			
Calculated estimate for HFC134a and HFC152a emissions from foam blowing (stocks)	0.24	Gg CO ₂ eq	Calculated by the ERT Table 2 of appendix III to decision 20/CMP.1
Conservativeness factor	1.21		
Adjusted calculated conservative estimate for HFC134a and HFC152a emissions from foam blowing (stocks)	0.29	Gg CO ₂ eq	Calculated by the ERT
Total aggregated GHG emissions (excluding LULUCF) as reported by the Party	87.89	Gg CO ₂ eq	CRF table 10, Monaco's 2012 annual submission of 30 October 2012 (v2.1)
Total aggregated GHG emissions (excluding LULUCF) after application of adjustment	88.19	Gg CO ₂ eq	Calculated by the ERT
Difference between original and adjusted total aggregated GHG emissions	0.29	Gg CO ₂ eq	Calculated by the ERT
	0.33	%	Calculated by the ERT

Abbreviations: CRF = common reporting format, ERT = expert review team, GDP = gross domestic product, HFC = hydrofluorocarbon, LULUCF = land use, land-use change and forestry.

Conservativeness of the expert review team's calculation of the adjustment

110. In line with decision 20/CMP.1, paragraph 5, conservativeness was ensured by applying a conservativeness factor of 1.21 (emission estimates for consumption of halocarbons and SF₆) from table 2 of appendix III to decision 20/CMP.1. The ERT therefore considers that the resulting adjusted values are conservative.

H. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

111. Monaco has submitted estimates for afforestation, reforestation and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol and did not elect any activity under Article 3, paragraph 4, of the Kyoto Protocol. Monaco has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol annually.

112. Monaco has selected the definition of forest using the following single minimum values: 10 per cent for tree cover, 0.5 ha for land area and 5 m for tree height. These values are in line with decision 16/CMP.1, annex, paragraph 1(a). However, Monaco indicated in the NIR of its 2012 annual submission that there are no areas in Monaco that meet the definition of forest, since potential areas include only public parks and public and private gardens, which are not forests but settlements. For that reason, the Party has reported all carbon stock changes and emissions as "NO" in table NIR-1 and has reported "NA" for AD, carbon stock changes and emissions/removals in the remaining tables. In table NIR-2 the Party has reported the total area of the country as "other". In response to questions raised by the ERT during the review week, Monaco explained that it reports CO₂ emissions from biomass combustion under the energy sector and, therefore, considers these emissions

to be covered in the inventory. Monaco also explained that “trees are replaced regularly” and that the “turnover balances the aging of the trees”.

113. The ERT considered that, owing to the features of the selected forest thresholds, there is the possibility that part of the parks and gardens in Monaco should be classified as ‘forest’ in accordance with the definition of forest selected by the Party. However, it was not possible for the ERT to verify this, since Monaco applied a ‘counting trees’ approach and no transparent geographical distribution information was provided either in the NIR or during the review in response to questions raised by the ERT. In addition, on the basis of information provided in the Party’s 2012 annual submission, the ERT noted that Monaco’s green areas increased from 38.91 to 44.38 ha between 1990 and 2010. However, since no transparent geographical distribution information and/or descriptions were provided by the Party, it is not possible to conclude whether afforestation and reforestation, and deforestation occur in Monaco.

114. The ERT concluded that the Party has not provided sufficient information in accordance with the requirements of decisions 15/CMP.1 and 16/CMP.1 and therefore that it could not conclude whether afforestation and reforestation, and deforestation occur in Monaco. The ERT considered that not including deforestation could have led to an underestimation of CO₂ emissions. For that reason, in the list of potential problems and further questions raised by the ERT, the Party was requested to provide reliable and verifiable data (such as city maps, aerial photographs, satellite imagery or similar) and descriptions showing which areas fall or do not fall under the forest definition and demonstrating that there is no deforestation occurring.

115. In response to the list of potential problems and further questions raised by the ERT, Monaco provided copies of several official maps: a general map of specific green areas of Monaco; aerial photography of Monaco in 1991, 1995, 1999, 2004 and 2009; and general maps of tree implantation in Monaco. In addition, the Party explained that the succession of aerial photographs shows that the total surface area of green spaces has always been the same, and only small changes (generally an increase) in the planted areas can be observed. The total surface area of green spaces is updated each year by the Direction de l’Aménagement Urbain and it includes all fixed green planted areas of the city (road borders, the surrounding of buildings, gardens and planted roofs, either public or private). The evolution of areas results from new green spaces accompanying the construction of new buildings, which involve, by law (Article 56 of Sovereign Order No. 3.647 of 9 September 1966), a minimum of 35 to 65 per cent green planted areas (most of these new areas are green roofs). The ERT welcomes the detailed information provided, indicating that the total green area of Monaco’s territory has increased since 1991 and that deforestation could not have been underestimated.

116. However, the ERT reminded Monaco that the rules for reporting under the Kyoto Protocol are different from those for reporting on the LULUCF sector under the Convention, and that an area identified as settlements remaining settlements under the Convention may be identified as afforestation/reforestation or deforestation land under the Kyoto Protocol, taking into consideration the definition of forest. On the basis of the provisions of decisions 15/CMP.1 and 16/CMP.1, the Party should report on KP-LULUCF on the basis of the forest definition adopted by it and the units of land chosen to assess the mandatory activities of afforestation, reforestation and deforestation.

117. Monaco indicated to the ERT during the review that it will prepare revised estimates once data on trees are available. The ERT strongly recommends that Monaco, for its next annual submission, revise its reporting, and in particular the KP-LULUCF CRF tables, using the same forest definition to identify units of land subject to afforestation, reforestation and deforestation. If such units of land are identified, Monaco should prepare and report estimates of carbon stock changes for all pools, in accordance with the IPCC

good practice guidance for LULUCF. The ERT also recommends that, if Monaco identifies that none of the KP-LULUCF activities occur in the territory, further explanation be provided in the NIR and areas and carbon stock changes be reported as “NO”.

118. The Party has not made any recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

119. Monaco has not reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. However, the ERT noted that Monaco is not required to report on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, because its national registry has not yet transferred or acquired any Kyoto Protocol units. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j).

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

120. Monaco has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3. The ERT noted that Monaco has reported all activities as “NA” in the accounting table of the KP-LULUCF tables.

121. Table 11 shows the accounting quantities for KP-LULUCF as reported by Monaco and the final values after the review.

Table 11

Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO₂ eq

	2012 submission ^a		2010 and 2011 submissions ^b		"Net" accounting quantity ^c
	As reported	Revised estimates	Final	Final	
Afforestation and reforestation	NA	NA	NA	NA	NA
Deforestation	NA	NA	NA	NA	NA
Forest management	NA	NA	NA	NA	NA
Article 3.3 offset ^d	NA	NA	NA	NA	NA
Forest management cap ^e	NA	NA	NA	NA	NA
Cropland management	NA	NA	NA	NA	NA
Grazing land management	NA	NA	NA	NA	NA
Revegetation	NA	NA	NA	NA	NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable.

^a The values included under the 2012 submission are the cumulative accounting values for 2008, 2009 and 2010 as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2010.

^b The values included under the 2010 and 2011 submissions are the final accounting values as a result of the 2011 review and are included in table 4 of the 2011 annual review report (FCCC/ARR/2011/MCO, page 19).

^c The “net” accounting quantity is the quantity of Kyoto Protocol units that Monaco shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2012[2011?] submission and where the quantities issued or cancelled based on the 2011 review have been subtracted (“net” accounting quantity = final 2012 – final 2010 and 2011).

^d “Article 3.3 offset”: For the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 Mt carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

^e In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6 shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

122. Based on the information provided in table 11 for afforestation/reforestation activities, Monaco shall not issue or cancel any Kyoto Protocol units in its national registry.

123. Based on the information provided in table 11 for deforestation activities, Monaco shall not issue or cancel any Kyoto Protocol units in its national registry.

National registry

124. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its findings that the national registry, although it does not yet have a live connection with the ITL, continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

125. However, the SIAR identified the following problems: the national registry has not fulfilled the requirements regarding the public availability of information in accordance with decision 13/CMP.1, annex, chapter II.E. The ERT recommends that Monaco make all non-confidential information available on a functional public website, in accordance with decision 13/CMP.1, annex, paragraphs 44, 45 and 48, and report on the results in its next annual submission. Monaco responded to a comment made in the previous review report indicating that, once the national registry is online, the information will be made publicly available and will be accessible via the user interface.

Calculation of the commitment period reserve

126. Monaco has reported its commitment period reserve in its 2012 annual submission. Monaco reported its commitment period reserve to be 438,960 t CO₂ eq, based on the national emissions in its most recently reviewed inventory (87.79 Gg CO₂ eq). Responding to the list of potential problems and further questions raised by the ERT during the review week, Monaco reported its commitment period reserve to be 439,475 t CO₂ eq, based on the recalculated national emissions in its most recently reviewed inventory (87.90 Gg CO₂ eq). The ERT disagrees with this figure, since it calculated, recommended and applied adjustments for Monaco. The commitment period reserve, based on the revised emission

estimates submitted on 30 October 2012 and including adjustments, was calculated by the ERT to be 441,020 t CO₂ eq.

3. Changes to the national system

127. Monaco reported that there has been a change in its national system since the previous annual submission. The Party described in its NIR that it renewed the assistance mission with CITEPA in 2010. The ERT concluded that Monaco's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1. It recommends that Monaco report, in its next annual submission, any change(s) in its national system in accordance with decision 15/CMP.1, annex, chapter I.F.

4. Changes to the national registry

128. Monaco reported that there have been no changes in its national registry since the previous annual submission. The ERT concluded that Monaco's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

129. Monaco provided information on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol in its 2012 annual submission. In addition to the information reported in the previous annual submission, Monaco included, in its 2012 annual submission, a list of national policies and measures put in place. Monaco indicated that, given the nature of its policies and measures, it has not been possible to determine their adverse impacts on developing countries. The Party added that, therefore, specific measures have not been put in place to minimize them. The ERT concluded that, taking into account the additional information provided, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

130. Monaco made its annual submission on 29 March 2012. The annual submission contains the GHG inventory (comprising the CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, changes to the national system and the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

131. The ERT concludes that the inventory submission of Monaco has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and Monaco has submitted a complete set of CRF tables for the years 1990–2010 and an NIR; these are complete in terms of geographical coverage, years and sectors, and generally complete in terms of categories and gases. HFC emissions from domestic refrigeration and from foam blowing were reported as “NE”. In addition, the ERT concluded that CO₂ emissions from settlements remaining settlements could have been underestimated.

132. The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1.

133. Monaco's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the ERT concluded that the estimates for the subcategories HFC emissions from domestic refrigeration and HFC emissions from foam blowing are not in line with the IPCC good practice guidance and led to an underestimation of the Party's submission for the commitment period. In accordance with the provisions of decisions 20/CMP.1 and 22/CMP.1, the ERT calculated, recommended and applied adjustments for four of the subcategories of the noted category (see chapter II.G above).

134. Monaco did not report any recalculations in its original 2012 annual submission of 29 March 2012. However, in response to the list of potential problems and further questions raised by the ERT during the review week, it submitted revised estimates of actual emissions of HFCs from consumption of halocarbons and SF₆.

135. Monaco has reported all activities under Article 3, paragraph 3, of the Kyoto Protocol as "NA", because there are no areas in its territory that meet the adopted definition of forest, considering that potential areas include only public parks and public and private gardens, which are not forests but settlements. The ERT considered that such reporting may not be in accordance with decisions 15/CMP.1 and 16/CMP.1, since there is the possibility that part of the parks and gardens in Monaco could be classified as 'forest' in accordance with the definition of forest selected by the Party. The ERT concluded that emissions and removals from afforestation and reforestation, and deforestation could occur in Monaco.

136. Monaco has not made any recalculations for the KP-LULUCF activities between the 2011 and 2012 annual submissions.

137. Monaco has not reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decision 14/CMP.1 and in accordance with decision 15/CMP.1, annex, chapter I.E. However, Monaco is not required to report on its accounting of Kyoto Protocol units, because its national registry has not yet transferred or acquired any Kyoto Protocol units.

138. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1.

139. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the CMP. However, the ERT identified that the national registry has not fulfilled the requirements regarding the public availability of information in accordance with decision 13/CMP.1, annex, chapter II.E. The ERT noted that Monaco indicated that, once the national registry is online, the information will be made publicly available and will be accessible via the user interface.

140. Monaco has reported information under decision 15/CMP.1, annex, chapter I.H, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", as part of its 2012 annual submission. The ERT concluded that the information provided is complete and transparent.

B. Recommendations

141. The ERT identifies issues for improvement as listed in table 12 below.

Table 12
Recommendations identified by the expert review team

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
National system	Key categories	Include the full list of categories considered in the key category analysis in the national inventory report (NIR), instead of the list of identified key categories only	16
	Uncertainty analysis	Use the 95 per cent confidence interval to report uncertainties	20
		Use the results of the uncertainty analysis to improve the accuracy of the inventory	21
	Recalculations and follow-up to previous reviews	Improve and update annually the information on recalculations and the follow-up of recommendations made in previous review reports	23 and 28
	Quality assurance/quality control (QA/QC)	Ensure the accuracy of the information provided in the NIR	23 and 33
		Report in the NIR on the conclusions from QC studies, in particular those conducted by CITEPA, and include information on QA/QC procedures implemented for all sectors	24, 34 and 50
Energy	Transparency	Improve consistency between the NIR and the common reporting format (CRF) tables	33 and 42
	QA/QC	Include information on the QA/QC procedures implemented for the energy sector	34
	Reference approach	Improve the consistency of the reporting between CRF tables 1.A(b) and 1.A(c) on the consumption of solid waste for incineration	35
	International bunker fuels	Repeat the survey used to separate emissions from international and domestic navigation regularly	37
		Include more detailed information on emission trends and annual variations due to international aviation (movement of helicopters)	38
		Enhance the transparency of the reporting on feedstocks and non-energy use of fuels	39
	Stationary combustion – CO ₂	Improve the transparency of the reporting on the emission factors and activity data used and on the trends and annual variations in emissions	41–43
	Stationary combustion – CO ₂ , CH ₄ and N ₂ O	Report emissions for the commercial/institutional category separately from emissions for the residential category	44
	Road transportation – CO ₂ , CH ₄ and N ₂ O	Change the description of the methodology for estimating N ₂ O and CH ₄ emissions reported in CRF summary table 3 and in the NIR from tier 1 to tier 2	5
	Road transportation – CO ₂ and N ₂ O	Improve the transparency of the explanation of the emission trend	46 and 47

<i>Sector</i>	<i>Category</i>	<i>Recommendation</i>	<i>Paragraph reference</i>
Industrial processes	Transparency	Improve transparency by including a complete description of the methods used to obtain data and perform calculations, and an explanation of trends and sector-specific uncertainty analysis and QA/QC	50, 52–55 and 57
	Consumption of halocarbons and SF ₆ – HFCs, PFCs and SF ₆	Provide emission estimates for the complete time series	52
		Provide emission estimates for individual species of HFCs resulting from domestic refrigeration and foam blowing	56
		Ensure, by establishing contact with France, that emissions from the disposal of recuperated fluorinated gases (F-gases) and decommissioned products containing F-gases that are sent to France are included in the emission estimates of France	58
Solvent and other product use	Solvent and other product use – N ₂ O	Report on the outcomes of the survey on the use of N ₂ O for anaesthesia	61
Land use, land-use change and forestry (LULUCF)	Transparency	Improve the transparency of the reporting, in particular on the incineration of green waste	65
	Settlements remaining settlements	Consider the carbon loss due to trimmings and other removals and report revised estimates of changes in carbon stock for settlements remaining settlements	68
	Settlements remaining settlements – CO ₂ and N ₂ O	Advance in the development of the suggested remote-sensing methodology for estimating crown cover area and report on progress made	69
		Consider the carbon loss due to trimmings and other removals and report revised estimates of changes in carbon stock and CO ₂ emissions	70
		Estimate and report carbon stock changes in the dead organic matter and soil pools	71
		Report estimates of N ₂ O emissions due to fertilization in parks and gardens	
Waste	Transparency	Enhance the transparency of the reporting of methodologies and trends, in particular for N ₂ O emissions from sewage sludge and emissions from household waste incineration	74, 78 and 79
KP-LULUCF		Report KP-LULUCF activities using reliable and verifiable data consistent with the definition of forest and estimate carbon stock changes in accordance with the IPCC good practice guidance for LULUCF.	116 and 117

IV. Adjustments

142. The ERT concludes, based on the review of the 2010 inventory, that for the subcategories HFC emissions from domestic refrigeration and HFC emissions from foam blowing under consumption of halocarbons and SF₆ the reporting of emission estimates is not fully in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, as required by Article 5, paragraph 2, of the Kyoto Protocol. The ERT recommended that Monaco submit revised estimates or provide further justifications for its calculations for the identified subcategories as a way of resolving the identified potential problems. The ERT, following the review of the additional information provided by Monaco during and after the review, concluded that it did not satisfactorily correct the problem through the submission of acceptable revised estimates and decided to calculate and recommend two adjustments in accordance with the guidance for adjustments.

143. Monaco, in its communication of 25 June 2013, failed to notify the secretariat of its intention to accept or reject the calculated adjustments. In accordance with the Article 8 review guidelines, this failure was considered as acceptance by Monaco of the adjustments, and the ERT applied the calculated adjustments.

144. The application of adjustments by the ERT resulted in a change in the estimate of the 2010 emissions from the industrial processes sector – from 2.24 Gg CO₂ eq, as originally reported by Monaco, to 2.55 Gg CO₂ eq, or 13.8 per cent. This in turn resulted in a change in the estimated total emissions of Monaco for 2010 – from 87.89 Gg CO₂ eq, as originally reported by Monaco, to 88.19 Gg CO₂ eq, or 0.4 per cent.

V. Questions of implementation

145. No questions of implementation were identified by the ERT during the review.

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at
[<http://www.ipcc-nngip.iges.or.jp/public/2006gl/index.html>](http://www.ipcc-nngip.iges.or.jp/public/2006gl/index.html).

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at
[<http://www.ipcc-nngip.iges.or.jp/public/gl/invs1.htm>](http://www.ipcc-nngip.iges.or.jp/public/gl/invs1.htm).

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at
<http://www.ipcc-nngip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at
[<http://www.ipcc-nngip.iges.or.jp/public/gpqlulucf/gpqlulucf.htm>](http://www.ipcc-nngip.iges.or.jp/public/gpqlulucf/gpqlulucf.htm).

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories”. FCCC/SBSTA/2006/9. Available at
[<http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>](http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf).

“Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. FCCC/CP/2002/8. Available at
[<http://unfccc.int/resource/docs/cop8/08.pdf>](http://unfccc.int/resource/docs/cop8/08.pdf).

“Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol”. Decision 19/CMP.1. Available at
[<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>](http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14).

“Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol”. Decision 15/CMP.1. Available at
[<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>](http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54).

“Guidelines for review under Article 8 of the Kyoto Protocol”. Decision 22/CMP.1. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

Status report for Monaco 2012. Available at
[<http://unfccc.int/resource/docs/2012/asr/mco.pdf>](http://unfccc.int/resource/docs/2012/asr/mco.pdf).

Synthesis and assessment report on the greenhouse gas inventories submitted in 2012. Available at <<http://unfccc.int/resource/webdocs/sai/2012.pdf>>.

FCCC/ARR/2011/MCO. Report of the individual review of the annual submission of Monaco submitted in 2011. Available at
[<http://unfccc.int/resource/docs/2012/arr/mco.pdf>](http://unfccc.int/resource/docs/2012/arr/mco.pdf).

UNFCCC. *Standard independent assessment report*, parts I and II. Available at
[<http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>](http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php).

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Bastien Nicaise and Mr. Philippe Antognelli (Ministry of the Environment of Monaco), including additional material on the methodologies and assumptions used. The following documents¹ were also provided by Monaco:

GEOMONACO. 2009. Aerial photography of Monaco in 2009: High resolution urban Image True Orthorectified done in 2009 by Principality of Monaco: Ministry of State, Departement of Equipement, Environnement and Urbanism, Direction of Prospective, Urbanism and Mobility©GEOMONACO

IGN. 1991. *Aerial photography of Monaco in 1991: Aerial photography of Monaco*

Done by: IGN (Institut Géographique National) IGN1991FR4722_1 ©IGN Paris – 1991

IGN. 1995. *Aerial photography of Monaco in 1995: Aerial photography of Monaco*. Done by: IGN (Institut Géographique National) IGN1995fr5103-2 and IGN1995fr5103-4 ©IGN Paris - 1995

IGN. 1999. *Aerial photography of Monaco in 1999: Orthophotography of Monaco. BD ORTHO® - 1010-174; 1010-173 ; 1009-170; 1009-17; 1009-172 ; 1009-173; 1009-174; 1009-175; 1008-171; 1008-172; 1008-173; 1008-174 ; 1008-175.*

Done by: IGN (Institut Géographique National) ©IGN Paris – 1999

IGN. 2004. *Aerial photography of Monaco in 2004 Orthophotography of Monaco. BD ORTHO® - 06-2004-1005-0175-LA3-C10 BD ORTHO® - 06-2004-1010-0175-LA3-C10*
Done by: IGN (Institut Géographique National)

©IGN Paris - 2004)

MSDEEU. 2012. *General map of specific green areas of Monaco. GIS of trees implantation situation 2012 by Principality of Monaco*: Ministry of State, Departement of Equipement, Environnement and Urbanism, Direction of Urban Planning (Aménagement Urbain)

MSDEEU. 2012. *General map of trees implantation in MonacoGIS of trees ilmplantation situation 2012 by Principality of Monaco*: Ministry of State, Departement of Equipement, Environnement and Urbanism, Direction of Urban Planning (Aménagement Urbain)

¹ Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
F-gas	fluorinated gas
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
NA	not applicable
NE	not estimated
NO	not occurring
N ₂ O	nitrous oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report
TJ	terajoule (1 TJ = 10 ¹² joules)
UNFCCC	United Nations Framework Convention on Climate Change