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MONACO

REPORT OF THE INDIVIDUAL REVIEW OF THE GREENHOUSE GAS INVENTORY SUBMITTED IN THE YEAR 2004[1]

I. OVERVIEW

A. Introduction

1. This report covers the centralized review of the 2004 greenhouse gas (GHG) inventory submission of Monaco, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with decision 19/CP.8 of the Conference of the Parties. The review took place from 18 to 22 October 2004 in Bonn, Germany, and was conducted by the following team of nominated experts from the roster of experts: Generalists – Mr. Newton Paciornik (Brazil) and Mr. Bernd Gugele (European Community), Energy – Ms. Maria Lidén (Sweden), Ms. Tetyana Gordiyenko (Ukraine) and Ms. Karen Treanton (International Energy Agency, IEA), Industrial Processes – Ms. Ionela Draghici (Romania) and Mr. Teemu Oinonen (Finland), Agriculture – Ms. Lilian Portillo (Paraguay) and Mr. Len Brown (New Zealand), Land-use Change and Forestry (LUCF) – Ms. Kathryn Bickel (USA) and Mr. Michael Gytarsky (Russian Federation), Waste – Mr. Oscar Paz Rada (Bolivia) and Mr. Faouzi Ahmed Senhaji (Morocco). Mr. Newton Paciornik and Mr. Michael Gytarsky were the lead reviewers. The review was coordinated by Mr. Javier Hanna (UNFCCC secretariat).

2. In accordance with the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Annex I Parties", a draft version of this report was communicated to the Government of Monaco for comment prior to its publication.

B. Inventory submission and other sources of information

3. In its 2004 submission, Monaco has submitted common reporting format (CRF) tables for the year 2002 and a national inventory report (NIR). Where needed, the expert review team (ERT) also used the previous year's submission, additional information provided during the review and other information. The full list of materials used during the review is provided in annex 1 to this report.

C. Emission profiles and trends

4. In the year 2002, the most important GHG in Monaco was carbon dioxide (CO_2), contributing 95.4 per cent to total[2] national GHG emissions expressed in CO_2 equivalent, followed by nitrous oxide (N_2O) – 3.6 per cent – and methane (CH_4) – 0.8 per cent. Potential emissions of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) taken together contributed 0.2 per cent of overall GHG emissions in the country; emissions of sulphur hexafluoride (SF_6) are not reported. The Energy sector accounted for 98.7 per cent of total national GHG emissions, Waste for 1.1 per cent and Industrial Processes for 0.2 per cent (potential emissions of HFCs and PFCs). Total GHG emissions in 2002 amounted to 96.36 Gg CO_2 equivalent and were 31.7 per cent higher than 1990 levels. The emissions of the Energy

[1] In the symbol for this document, 2004 refers to the year in which the inventory was submitted, and not to the year of publication.
[2] In this report, the term total emissions refers to the aggregated national GHG emissions expressed in terms of CO_2 equivalent excluding LUCF, unless otherwise specified.

and Waste sectors increased by 31.1 per cent and 61.0 per cent, respectively, from 1990–to 2002, and total N_2O emissions increased by 109.1 per cent over the same period.

D. Key sources

5. Monaco has not reported a key source analysis in its 2004 submission. The key source analysis performed by the secretariat[3] identified five key sources: three in the Mobile Combustion category (CO_2 from Road Vehicles, Water-borne Navigation and Aircraft) and two in Stationary Combustion (CO_2 from Oil and Gas).

E. Main findings

6. The methodologies for estimating GHG emissions are generally consistent with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC Guidelines) and the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and are briefly referred to in the NIR. The NIR does not follow the structure outlined in the UNFCCC reporting guidelines and offers very limited information. The documentation in the NIR could be improved in order to increase the transparency of the report and adhere more closely to the UNFCCC reporting guidelines. Efforts should be made to make the inventory more complete, to provide a key source analysis and an uncertainty analysis, and to implement quality assurance/quality control (QA/QC) procedures as required by the UNFCCC reporting guidelines. The ERT further noted that fossil fuel related-CO_2 emissions from municipal solid waste (MSW) incineration are not reported.

F. Cross-cutting topics

Completeness

7. Monaco has provided CRF tables only for the year 2002. It has not reported tables 2(II).F, 4.E, 7, 8(a), 8(b) and 9 either by filling in data or by using the appropriate notation keys. The notation keys are only used in a limited way. Emissions from Solvent and Other Product Use and Agriculture are not reported, nor are emissions and removals from LUCF. The NIR does not include a description of institutional arrangements for the annual inventory preparation. Only potential emissions of HFCs and PFCs are reported for 2001 and 2002. The reporting should consist of actual and potential emission estimates of HFCs, PFCs and SF_6 for all inventory years.

Transparency

8. Generally, calculation methods are not well documented in the NIR and sufficient back-up information is not provided to enable to ERT to replicate the calculations. Sources of activity data (AD) and emission factors (EFs) are not always given. To improve the transparency of its reporting, the ERT encourages Monaco to document its methods, EFs and data in its next inventory submission.

Recalculations and time-series consistency

9. No recalculations have been reported in the NIR or identified by the ERT.

Uncertainties

10. Uncertainty estimation has not been included in the NIR due to lack of time. The ERT recommends that Monaco provide an uncertainty estimate in its future submissions.

[3] The secretariat had identified, for each individual Party, those source categories which are key sources in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance. Key sources according to the tier 1 trend assessment were also identified for those Parties providing a full CRF for the year 1990. Where the Party has performed a key source analysis, the key sources presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key source assessment conducted by the secretariat.

Verification and quality assurance/quality control approaches

11. No QA/QC procedure has been undertaken. The ERT recommends that Monaco establish QA/QC procedures for future submissions.

Follow-up to previous reviews

12. This is the first time Monaco's GHG inventory has been reviewed.

G. Areas for further improvement

Identified by the Party

13. The NIR does not identify areas for improvement. In its response to the 2004 previous review stages, Monaco indicated that CRF tables 8(a), 8(b) and 9 will be completed in the next inventory submission.

Identified by the ERT

14. The overall areas for improvement identified by the ERT include: the use of the NIR structure provided in the UNFCCC reporting guidelines and more complete adherence to them; review of the use of the notation keys; a more complete documentation of methods, AD and EFs; the provision of an uncertainty assessment for each category estimated and an uncertainty analysis; and the establishment of a QA/QC system in line with the IPCC good practice guidance.

15. Recommended improvements relating to specific source/sink categories are presented in the relevant sector sections of this report.

II. ENERGY

A. Sector overview

16. In 2002, fuel combustion in the Energy sector contributed 98.7 per cent of total national GHG emissions. Emissions from fuel combustion increased by 31.1 per cent (from 72.55 to 95.15 Gg CO_2 equivalent) between 1990 and 2002, mainly caused by an increase in CO_2 emissions from Transport (by 28.2 per cent) and combustion in the Residential source category (by 36.1 per cent). The ERT noted that Fugitive Emissions are reported as not occurring ("NO"); however, there could be some emissions associated with the Distribution of Oil Products and with the Transmission and Distribution of natural gas and Other Leakage. The ERT further noted that Monaco has not attempted to make a split between domestic and international emissions from Civil Aviation and Navigation, and that the documentation on CO_2 emissions from Municipal Solid Waste (MSW) combustion, is insufficient. The ERT encourages Monaco to enhance its reporting of Fugitive Emissions and emissions from Civil Aviation and Navigation and MSW combustion in its next inventory submission.

17. All the IPCC source categories and gases are addressed. Time series from 1990 to 2001 are provided in the CRF trend tables. However, the CRF tables are provided only for 2002, and not for the earlier years. The notation keys have not been used systematically. For example, liquid fuels in Public Electricity and Heat Production should be reported as "NO". Emissions and AD should also be reported for very small sources, for instance, lubricants in table 1.A(d). If no estimates are made, the notation key "not estimated" ("NE") should be applied and explanations should be provided in CRF table 9. The ERT encourages Monaco to use the notation keys in accordance with the UNFCCC reporting guidelines.

B. Reference and sectoral approaches

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

18. The reference approach is only provided for 2002. The difference between the reference and sectoral approaches is small (0.93 per cent) and an explanation is given in the CRF.

International bunker fuels

19. All fuel used for navigation and local fishing is currently reported as domestic navigation. In its response to the 2004 previous review stages, Monaco indicated that it will separate out the international component in its future inventory submissions. The ERT encourages Monaco to document the domestic/international split in the NIR. Normally, local fishing should be reported under the Agriculture/Forestry/Fisheries source category and not under Navigation. The notation key "included elsewhere" ("IE") might be more appropriate than "NO" for Agriculture/Forestry/Fisheries.

Feedstocks and non-energy use of fuels

20. No feedstocks or non-energy use of fuels are reported in table 1.A(d), which is consistent with table 1.A(b). The ERT encourages Monaco to report on feedstocks or non-energy use of fuels, particularly from the use of lubricants and bitumen, in its next inventory submission.

C. Key sources

Stationary combustion: other fuels – CO_2

21. In the CRF, Monaco has entered "0.00" for CO_2 emissions from combustion of MSW (other fuels) in the Energy Industries category. The plant in Monaco produces district heating and cooling using municipal waste (and natural gas if necessary). Reporting under the UNFCCC refers to the IPCC Guidelines, and according to the IPCC Guidelines, for waste incineration the carbon in the incinerated waste should be separated into biomass and fossil-fuel based fractions. The fossil fuel-based CO_2 emissions portion of incinerated waste (possibly around 50 per cent) should be considered and reported. The ERT suggests that Monaco should determine what percentage of the waste is fossil fuel-related and include the resulting CO_2 emissions in its inventory.

Road transportation: liquid fuels – CO_2

22. The CO_2 implied emission factor (IEF) for gasoline (74.62 t/TJ) is higher than that for diesel oil (72.25 t/TJ) for the category Road Transportation. Usually the opposite is the case. In response to the ERT's questions, Monaco indicated that it used EFs taken from the IPCC Guidelines and volumetric mass information from the Institut Français du Pétrole, and that it will review this information before the next inventory. The ERT encourages Monaco to provide documentation on the EFs and net calorific values used in the NIR.

23. In the NIR, Monaco states that all of the fuel for the Compagnie des Autobus de Monaco was bought outside the country (in France). According to the IPCC Guidelines, emissions should be calculated according to fuel sold in the country, so these emissions should have been accounted for in France. In response to the ERT's questions, Monaco indicated that these emissions would be removed from its next inventory.

III. INDUSTRIAL PROCESSES AND SOLVENT USE

A. Sector overview

24. Industrial production is very limited in Monaco. Important sources of GHGs, such as cement, lime, ammonia, nitric acid, iron and steel, and aluminium production, are not present in the country. Potential sources of emissions reported are thus related to the consumption of products containing GHGs (HFCs and PFCs).

25. The NIR includes limited documentation of existing emission sources. Details for certain sources (e.g., Road Paving with Asphalt, Consumption of Halocarbons and SF_6) are not clear because the notation keys have not been used sufficiently and the explanations for those sources that are not estimated are not adequate. Monaco should use the notation keys in accordance with the UNFCCC reporting guidelines.

The transparency of the reporting would be improved by including explanations for sources not estimated in table 9 (Completeness) of the CRF.

B. Key sources

26. Based on the secretariat's analysis, there are no key sources in the Industrial Processes sector.

C. Non-key sources

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

27. According to Monaco's response to the 2004 previous review stages, a study was carried out to determine the volume of imports and use of HFCs and PFCs. On the basis of the results of this enquiry, Monaco reports potential emissions of HFCs and PFCs. These emissions are related mainly to category 2.F.1 Refrigeration and Air Conditioning. The ERT noted that potential emissions of HFCs and PFCs, reported in table 5 of the NIR are not the same as the corresponding figures in the CRF table 2(I).

28. The ERT would also expect to see emissions from other uses of HFCs, PFCs and SF_6, such as foam products containing HFC blowing agents, fixed fire-fighting systems containing HFC extinguishants, aerosols, metered dose inhalers and one-component foam cans containing HFCs as blowing agents, as well as SF_6 from electrical equipment (e.g., gas-insulated switchgear and circuit breakers). The ERT further noted that estimates for all sources in the Consumption of Halocarbons and SF_6 category should cover both actual and potential emissions.

Solvent and other product use – NMVOCs, N_2O, CO_2

29. In its response to the 2004 previous review stages, Monaco explained that the data needed to quantify emissions from Solvent and Other Product Use are not available. The ERT encourages Monaco to make such data available and to prepare an inventory of emissions for this source category.

IV. AGRICULTURE

A. Sector overview

30. Monaco has noted in its NIR that there is no agricultural activity in the country. All the CRF tables apart from table 4.E have been filled in with the correct notation key "NO". The ERT encourages Monaco to use the appropriate notation key in table 4.E ("NO").

V. LAND-USE CHANGE AND FORESTRY

A. Sector overview

31. Emissions and removals from LUCF are not estimated because the IPCC default parameters were found not to be appropriate for conditions in Monaco, as it has only grasslands and urban trees in parks. The notation keys are not used appropriately ("NO" is used instead of "NE"). The ERT noted that the IPCC tier 1 method includes an option for reporting on urban trees and grasslands. The IPCC Guidelines also provide default AD to facilitate reporting on grasslands. To improve the completeness of the report and to prove that the sector is not a source, the ERT encourages Monaco to undertake a tier 1 estimation of GHG emissions and removals for the LUCF sector in its next inventory submission.

VI. WASTE

A. Sector overview

32. In 2002, the Waste sector emitted 1.03 Gg CO_2 equivalent, contributing 1.1 per cent to Monaco's total GHG emissions. Emissions of CH_4 and N_2O from sludge incineration and emissions of N_2O from Human Sewage are reported. Emissions from MSW are reported in the Energy sector, as incineration of MSW in Monaco is used only to produce energy (electricity and heat). Emissions of CH_4 from the Waste sector (accounting for 6.1 per cent of national CH_4 emissions) increased by 33.8 per cent from 1991 to

2002 and decreased by 4.4 per cent from 2001 to 2002 (CH_4 emissions in 1990 are not reported). Emissions of N_2O from the Waste sector (accounting for 28.2 per cent of national N_2O emissions) increased by 53.4 per cent from 1990 to 2002.

33. The CRF tables (6.A, 6.B and 6.C), the documentation provided and the additional information boxes are only partially complete. In some cases the notation keys are not correctly used (e.g., the notation key "IE" is used for N_2O emissions from Industrial Waste water in table 6, and for CH_4 and N_2O emissions, total organic product, and CH_4 recovered/flared for the category Industrial Waste Water in table 6.B; but there is no indication that these emissions are included in other categories). The ERT encourages Monaco to complete all the CRF tables and provide more explanations in the NIR of its next submission.

34. CH_4 emissions from Domestic and Commercial Waste water treatment are not reported and no explanation is given to support the statement that these emissions do not occur.

35. The unusual trend and fluctuations of CH_4 and N_2O emissions observed and reported in the 2004 previous review stages have been explained by the Party. The ERT recommends that the Party provide documentation to support that explanation in its future submissions.

B. Non-key sources

Waste-water handling

36. This source category has not been described correctly with the proper quantitative split between domestic, commercial and Industrial Waste water. The ERT recommends that the Waste-water Handling source category be treated more comprehensively (e.g., waste-water and sludge treatment, percentage of aerobic and anaerobic systems, etc.). The CRF tables and additional information boxes should be completed. The ERT encourages the Party to present this information in its next submission.

37. The value given in the additional information table of the CRF for degradable organic component (29,200 kg biochemical oxygen demand (BOD)/1000 person/yr) is not supported by any reference or documentation, although that the value is outside the usual range.

Waste incineration

38. Emissions of CO_2 (biogenic), CH_4 and N_2O have been reported. The methodology used for CO_2, being country-specific, has not been reported. The CORINAIR method has been used for estimating CH_4 and N_2O emissions, but the EFs have not been reported. The ERT recommends the Party to include more complete information about the AD and emissions from the biogenic part of solid waste incinerated in its next submission.

ANNEX 1: MATERIALS USED DURING THE REVIEW

A. Support materials used during the review

2003 and 2004 Inventory submissions of Monaco. 2004 submission including a set of CRF tables for 1990–2002 and an NIR.

UNFCCC secretariat. "2004 Status report for Monaco" (available on the secretariat web site <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/inventory_review_reports/application/pdf/mco04.pdf>).

UNFCCC secretariat. "Synthesis and assessment report of the greenhouse gas inventories submitted in 2004. Part I": FCCC/WEB/SAI/2004 (available on the secretariat web site <http://unfccc.int/resource/webdocs/sai/2004.pdf>) and Part II – the section on *Monaco* (unpublished).

UNFCCC secretariat. Review findings for Monaco (unpublished).

UNFCCC secretariat. "Handbook for review of national GHG inventories". Draft 2004 (unpublished).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", "Part II: UNFCCC reporting guidelines on national communications" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/1999/7 (available on the secretariat web site <http://www.unfccc.int/resource/docs/cop5/07.pdf>).

UNFCCC secretariat. "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC Reporting guidelines on annual inventories" and "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention." FCCC/CP/2002/8 (available on the secretariat web site <http://unfccc.int/resource/docs/cop8/08.pdf>).

UNFCCC secretariat. Database search tool – *Locator* (unpublished).

IPCC. *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, 2000* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gp/english>]

IPCC/OECD/IEA. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, volumes 1–3, 1997* (available on the following web site: <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>).

B. Additional materials

Responses to questions during the review were received from Mr. Andre Veglia (Direction de l'environnement, de l'urbanisme et de la construction) including additional material on the methodology and assumptions used.

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