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## **Report on the individual review of the annual submission of Monaco submitted in 2022\***

**Note by the expert review team**

### *Summary*

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2022 annual submission of Monaco, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 19 to 24 September 2022 in Bonn.

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\* In the symbol for this document, 2022 refers to the year in which the inventory was submitted, not to the year of publication.



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## Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AAU	assigned amount unit
AD	activity data
Annex A source	source category included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
Article 8 review guidelines	“Guidelines for review under Article 8 of the Kyoto Protocol”
BOD	biochemical oxygen demand
C <sub>3</sub> F <sub>8</sub>	octafluoropropane
CER	certified emission reduction
CH <sub>4</sub>	methane
CITEPA	Technical Reference Center for Air Pollution and Climate Change (France)
CM	cropland management
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
Convention reporting adherence	adherence 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 greenhouse gas inventories”
CPR	commitment period reserve
CRF	common reporting format
DC	degradable organic component
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
HWP	harvested wood products
IE	included elsewhere
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP reporting adherence	adherence to the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
KP-LULUCF	activities under Article 3, paragraphs 3–4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
N	nitrogen
N <sub>2</sub> O	nitrous oxide
NA	not applicable
NE	not estimated
NF <sub>3</sub>	nitrogen trifluoride
NIR	national inventory report
NMVO	non-methane volatile organic compound
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation

SEF	standard electronic format
SF <sub>6</sub>	sulfur hexafluoride
SIAR	standard independent assessment report
TOW	total organic load in wastewater
UNFCCC Annex I inventory reporting guidelines	“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”
UNFCCC review guidelines	“Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”
WDR	wetland drainage and rewetting
Wetlands Supplement	<i>2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands</i>

## I. Introduction

1. This report covers the review of the 2022 annual submission of Monaco, organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention” (annex to decision 13/CP.20). The review took place from 19 to 24 September 2022 in Bonn and was coordinated by Rocio Lichte, Javier Hanna Figueroa and Claudia do Valle (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for Monaco.

Table 1

### Composition of the expert review team that conducted the review for Monaco

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Riccardo De Lauretis	Italy
	Robert Sturgiss	Australia
Energy	Sander Akkermans	Netherlands
	Ulrich Elsenberger	Germany
	Leonidas Osvaldo Girardin	Argentina
	Benon Bibbu Yassin	Malawi
IPPU	Menouer Boughedaoui	Algeria
	Mauro Meirelles de Oliveira Santos	Brazil
	Jacek Skośkiewicz	Poland
	Erhan Unal	Türkiye
Agriculture	Kadir Aksakal	Türkiye
	Paulo Cornejo	Chile
	Yurii Pyrozhenko	Ukraine
LULUCF and KP-LULUCF	Savitri Garivait	Thailand
	Mattias Lundblad	Sweden
	Koki Okawa	Japan
Waste	Maryna Bereznytska	Ukraine
	Hlobsile Sikhosana	Eswatini
Lead reviewers	Menouer Boughedaoui	
	Robert Sturgiss	

2. The basis of the findings in this report is the assessment by the ERT of the Party’s 2022 annual submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that Monaco resolve identified findings, including issues<sup>1</sup> designated as problems.<sup>2</sup> Other findings, and, if applicable, the encouragements of the ERT to Monaco to resolve related issues, are also included in this report.

<sup>1</sup> Issues are defined in decision 13/CP.20, annex, para. 81.

<sup>2</sup> Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

4. A draft version of this report was communicated to the Government of Monaco, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.
5. Annex I presents the annual GHG emissions of Monaco, including totals excluding and including LULUCF, indirect CO<sub>2</sub> emissions, and emissions by gas and by sector, and contains background data on emissions and removals from KP-LULUCF, if elected by the Party, by gas, sector and activity.
6. Information to be included in the compilation and accounting database can be found in annex II.

## II. Summary and general assessment of the Party’s 2022 annual submission

7. Table 2 provides the assessment by the ERT of the Party’s 2022 annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2

### Summary of review results and general assessment of the 2022 annual submission of Monaco

Assessment		Issue/problem ID#(s) in table 3 or 5 <sup>a</sup>	
Date of submission	Original submission: NIR, 13 April 2022; CRF tables (version 1), 11 April 2022; SEF tables, 29 March 2022		
Review format	Centralized		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	G.7
	(c) Development and selection of EFs?	No	
	(d) Collection and selection of AD?	No	
	(e) Reporting of recalculations?	No	
	(f) Reporting of a consistent time series?	No	
	(g) Reporting of uncertainties, including methodologies?	No	
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness? <sup>b</sup>	No	
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	NA	The Party did not report any insignificant categories as “NE”
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	

Assessment	Issue/problem ID#(s) in table 3 or 5 <sup>a</sup>		
Have any issues been identified related to the national registry:			
(a) Overall functioning of the national registry?	No		
(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	No		
Have any issues been identified related to the reporting of information on AAUs, CERs, ERUs and RMUs and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	No		
Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of the reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?	No		
Have any issues been identified related to the following reporting requirements for KP-LULUCF:			
(a) Reporting requirements of decision 2/CMP.8, annex II, paragraphs 1–5?	No		
(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14?	No		
(c) Reporting requirements of decision 6/CMP.9?	No		
(d) Country-specific information to support provisions for natural disturbances in accordance with decision 2/CMP.7, annex, paragraphs 33–34?	NA		
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	No	G.1
Adjustments	Has the ERT applied any adjustments under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Has the Party submitted a revised estimate to replace a previously applied adjustment?	NA	Monaco does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

<sup>a</sup> Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

<sup>b</sup> Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

### III. Status of implementation of recommendations included in the previous review report

8. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 15 September 2022,<sup>1</sup> and had not been resolved by the time of publication of the report on the review of the Party's 2021 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3  
Status of implementation of recommendations included in the previous review report for Monaco

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
General			
G.1	CPR (G.1, 2021) (G.2, 2019) (G.18, 2017) KP reporting adherence	Improve QA/QC procedures to review the calculation of the inputs for determining the CPR, including the assigned amount and the relevant modalities in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18.	<p>Not resolved. The Party reported in its NIR (chap. 12.6, pp.328–329) the calculation and inputs for determining the CPR and assigned amounts, as included in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Monaco (FCCC/IRR/2017/MCO), and the methodology for calculating the CPR according to the relevant decisions referred to in the recommendation. However, the Party has not used the corrected value for the CPR based on the assigned amount from document FCCC/IRR/2017/MCO and for the comparison of the value calculated as 90 per cent of the assigned amount with the most recently reviewed inventory, but used GHG emissions for 2019 reported in the 2021 submission. In addition, the Party used a value that does not match the reviewed emission estimate for 2019, namely 82 618 t CO<sub>2</sub> eq instead of 82 539 t CO<sub>2</sub> eq.</p> <p>During the review, the Party provided a revised calculation of the comparison using the correct 2019 emission estimate from the 2021 submission. The ERT calculated that 100 per cent of eight times Monaco's most recently reviewed 2020 inventory (i.e. the emissions excluding LULUCF and including indirect CO<sub>2</sub>, in the submission currently under review) results in 560 292 t CO<sub>2</sub> eq. Therefore, Monaco's CPR is 557 777 t CO<sub>2</sub> eq (i.e. 90 per cent of the Party's assigned amount), as this is the lower of these two values.</p> <p>The ERT concludes that this potential problem of a mandatory nature does not influence the Party's ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised by the ERT.</p>

<sup>1</sup> FCCC/ARR/2021/MCO.



<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
G.2	Inventory planning (G.5, 2021) (G.6, 2019) (G.5, 2017) (G.5, 2015) (18, 2014) (12(c), 2013) (16, 2012) Convention reporting adherence	Provide information concerning the implementation of the QA/QC plan, in particular regarding the prioritization of inventory improvements on the basis of the key category analysis and uncertainty assessment.	Resolved. The Party reported in NIR table 48 (p.294) a plan for 2023–2026 of inventory improvements based on a key category analysis and uncertainty assessment, as suggested by the previous ERT to resolve outstanding elements of the previous recommendations. The plan includes prioritized improvements for the energy, LULUCF and waste sectors.
G.3	National system (G.8, 2021) (G.15, 2019) Transparency	Provide in the NIR a national system diagram with a narrative of the overall institutional arrangements that support inventory planning, preparation and management.	Resolved. The Party included in its NIR (chap. 1.2.1, pp.27–28) a diagram (figure 1) outlining the overall institutional arrangements for the national inventory system and a table (table 1) listing the main entities involved and their general functions.
G.4	Notation keys (G.10, 2021) (G.18, 2019) Transparency	Update CRF table 9 to reflect the explanations for reporting “IE” and “NE” in the inventory.	Addressing. The Party provided in its NIR (chaps. 1.7.5–1.7.6, p.54) explanations for reporting “IE” and “NE” in the inventory. In CRF table 9, however, only the sources reported as “IE” were listed and explained, not the sources reported as “NE”.  During the review, the Party indicated that explanations for sources reported as “NE” (categories 1.B.2.a.5 and 2.D.2) will be provided in the CRF in the next annual submission.  The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included in CRF table 9 a list of sources not estimated and an explanation for reporting them as “NE”.
G.5	QA/QC and verification (G.11, 2021) (G.12, 2019) (G.14, 2017) Convention reporting adherence	Provide in the NIR explanations of changes made in response to recommendations from previous reviews, including UNFCCC technical expert reviews.	Resolved. The Party provided in its NIR (chap. 10.5, pp.295–311) a table indicating the status of implementation of the recommendations from previous reviews, including an explanation of how the recommendations have been addressed.
G.6	Recalculations (G.12, 2021) (G.8, 2017) (G.11, 2015) (13, 2014) Convention reporting adherence	Report the recalculations under each category and include a clear explanation of the reasons for the recalculations made in the course of previous reviews, clearly distinguishing them from the recalculations made for the purpose of the current annual submission.	Resolved. The Party improved the sections on recalculations reported for each category in the sectoral chapters by providing a description of the recalculations made. Moreover, the Party improved the summary tables on the recalculations by adding a column explaining the reasons for the recalculations for each category in the current submission compared with those made in the previous submission (NIR chap. 10.1, pp.291–292).
Energy			
E.1	Fuel combustion – reference approach – biomass – CO <sub>2</sub> (E.1, 2021) (E.4, 2019) (E.12, 2017)	Correct the error in total biomass consumption reported for the reference approach.	Resolved. The Party reported values for total biomass consumption for the reference approach (CRF table 1.A(b)) that match the values reported under category 1.A (fuel combustion) for the sectoral approach (CRF table 1.A(a)s1). For example, for 2020, 554.39 TJ was reported for both approaches. The inconsistency identified in the review report of

ID#	Issue/problem classification <sup>a, b</sup>	Recommendation from previous review report	ERT assessment and rationale
	Convention reporting adherence		the 2021 submission for 2019 was also corrected and the same value (639.78 TJ) was reported for both approaches.
E.2	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO <sub>2</sub> (E.2, 2021) (E.6, 2019) (E.3, 2017) (E.6, 2015) (37, 2014) (35, 2013) (39, 2012) Comparability	Revise the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) in a consistent manner under the energy and industrial processes sectors.	Addressing. The Party reported in CRF table 1.A(d) for lubricants 0.03 kt CO <sub>2</sub> emissions as carbon excluded from the reference approach for 2020. The reporting is consistent with the reporting under the IPPU sector in CRF table 2(I).A-Hs2, where 0.03 kt CO <sub>2</sub> is also reported from lubricants. However, the ERT noted that it appears that these emissions are still not considered in the reference approach, because in CRF table 1.A(b), “NO” is reported in the column “Carbon excluded”. During the review, the Party acknowledged the need for consistency between CRF tables 1.A(b) and 1.A(d) and noted that it intends to address this recommendation in the next annual submission by reporting carbon from lubricants used for non-energy purposes in CRF table 1.A(b).
E.3	Feedstocks, reductants and other non-energy use of fuels – liquid fuels – CO <sub>2</sub> (E.3, 2021) (E.7, 2019) (E.3, 2017) (E.6, 2015) (37, 2014) (35, 2013) (39, 2012) Transparency	Explain in the NIR the use and disposal of lubricants in the country.	Addressing. The Party provided in its NIR (chap. 3.3.5.4.2, pp.129–130, and chap. 19.2.2.10, p.373 (annex 3.B)) detailed information on how AD for lubricants were determined and how they were attributed to the energy and IPPU sectors. However, Monaco did not include in the NIR information on how lubricants are disposed of.  During the review, the Party explained that all hazardous waste is collected by private companies and exported to France for appropriate treatment, in line with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and Monaco’s legislation on waste management, and provided the ERT with some data reported under the Basel Convention. The Party indicated that it plans to provide more complete information on this issue in the NIR of its next annual submission.  The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided in the NIR information on the disposal of lubricants.
E.4	1.A Fuel combustion – sectoral approach – liquid fuels – CO <sub>2</sub> (E.4, 2021) (E.15, 2019) Transparency	Provide in the NIR a description of the biofuel authenticity assurance system to demonstrate the verifiability of biofuels delivered from France to Monaco, and consequently the accuracy of the assumptions made regarding the shares of biogenic and fossil carbon in liquid biofuels.	Addressing. The Party informed the ERT during the previous review (i.e. of the 2021 submission) that it was not possible to obtain precise information from the French customs authorities on this matter and that it plans to carry out a fuel analysis in 2022, resources permitting. In the improvement plan of its current NIR (table 48, p.294), the Party indicated that it will update the characteristics of liquid fuels following the 2022 fuel analysis, which is reported as being under way (chap. 10.5, p.299).  The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided in the NIR information on the fuel analysis.
E.5	1.A Fuel combustion – sectoral approach – other fossil fuels – CO <sub>2</sub> (E.5, 2021) (E.16, 2019) Transparency	Include in the NIR a description of the methodology, assumptions and AD used to estimate the CO <sub>2</sub> emissions from the fossil fraction of biodiesel.	Resolved. The Party provided in its NIR (chap. 19.2, pp.367–368 (annex 3.B)) a description of the methodologies, assumptions and AD used to estimate CO <sub>2</sub> emissions from the fossil fraction of biofuels, including biodiesel. The Party indicated that biofuels were separated from petroleum products in order to report them in the CRF tables as “Other fossil fuel”. The mass, volume and energy percentages of biofuels incorporated in fuel mixtures (gasoline plus biogasoline and diesel plus biodiesel) were calculated, enabling the Party to separate data for agrofuels and petroleum products and to apply respective country-specific EFs in emission estimation. This allowed emissions for category 1.A.3.b (road

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
			transportation) to be estimated, applying the tier 2 methodology, at a disaggregated level (i.e. by vehicle type, vehicle engine, vehicle size and emission standard) on the basis of fleet data (age) and fuel sold in Monaco.
E.6	1.A.1.a Public electricity and heat production – other fossil fuels – CO <sub>2</sub> (E.9, 2021) (E.19, 2019) Transparency	Include in the documentation box of CRF table 1.A(a)s4 information in accordance with footnote 4 to that table (i.e. “which fuels were included under other fossil fuels with a reference to the section of the NIR where further information is provided”).	Resolved. The Party reported in the documentation box of CRF table 1.A(a)s4 that waste was included under other fossil fuels. The Party included also explanatory information in the NIR (pp.75 and 80).
E.7	1.A.4.a Commercial/institutional – liquid fuels – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (E.16, 2021) (E.22, 2019) Completeness	Identify how the fuels used in the Monaco Grand Prix are marketed (whether they are imported by France, imported in bulk by the race companies to Monaco and/or accounted for in the country that produced and sold them to the race companies) and calculate the emissions to be accounted for in Monaco’s inventory.	Resolved. The Party reported in its NIR (chap. 3.3.6.2, p.158) that the fuel used during the Formula 1 Monaco Grand Prix is not sold in Monaco and that the racing teams bring, from outside Monaco, the fuel to be used in their vehicles during the race. Therefore, the emissions associated with these fuels are accounted for by the countries that sold the fuels. The ERT considers that the recommendation has been addressed.
<b>IPPU</b>			
I.1	2. General (IPPU) (I.10, 2021) Convention reporting adherence	Develop and implement QA/QC procedures for more categories in the IPPU sector.	Resolved. The Party reported in its NIR (pp.186, 191, 210 and 225) that it conducted category-specific QA/QC procedures for the following five categories: 2.D.1, 2.D.3 (for urea consumption), 2.F.1.b, 2.F.1.f and 2.G.3.a. The ERT noted that this constitutes an increase in the number of categories to which Monaco applies category-specific QA/QC procedures since the previous annual submission. During the review, the Party further clarified that QA/QC is conducted for each category of the IPPU sector.
I.2	2.D.1 Lubricant use – CO <sub>2</sub> and N <sub>2</sub> O (I.6, 2021) Transparency	Explain in the NIR the type of correction made to the number of buses used as input to the vehicle tool and whether the data on buses operating in Monaco was updated or a correction made to the vehicle tool.	Resolved. The Party reported in its NIR (chap. 4.2.4.2.5 and figure 118, p.187, and on p.302) that changes in the data on the diester bus fleet and diesel bus fleet between 2009 and 2019 necessitated recalculations for the 2022 submission.
I.3	2.D.2 Paraffin wax use – CO <sub>2</sub> (I.7, 2021) Transparency	Report in the NIR information on the reasoning behind the change in the net calorific value that led to the recalculation.	Resolved. The Party reported in its NIR (chap. 4.2.4.2.1, p.188, and chap. 4.2.4.3.5, p.189) that recalculations were made owing to the change in paraffin wax consumption in Monaco and the use of the IPCC default net calorific value from the 2006 IPCC Guidelines (vol. 2, table 1.2) for paraffin wax in calculating emissions.
I.4	2.F Product uses as substitutes for ozone-depleting substances – PFCs (I.4, 2021) (I.4, 2019)	Include information on the trend in the use of PFCs (under categories 2.F.1.a and 2.F.1.f) and ensure that the information collected on PFCs is complete and, even if no emissions from manufacturing are	Resolved. The Party reported in its NIR (chap. 4.2.6.3, p.222) that the only PFC emitted in Monaco is C <sub>3</sub> F <sub>8</sub> , which is found mixed into refrigerants R134a and R403b, and showed that it includes all emissions from stocks and disposal (equation 7.9, p.223). C <sub>3</sub> F <sub>8</sub> emissions from stocks and disposal show significant inter-annual changes, which were explained in the NIR (chap. 4.2.5.6, p.223) as occurring owing to the small size of the country compared

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	(I.4, 2017) (I.4, 2015) (49, 2014) (62, 2013) Transparency	occurring, ensure that all emissions from stock and disposal are included or an explanation for the lack of emissions is provided.	with the relatively large impacts of large-scale building projects (e.g. hotels and residences). The Party stated in its NIR (p.206) that the destruction of stationary air-conditioning equipment occurs in specialized facilities in France. The NIR (figure 152, p.224) shows C <sub>3</sub> F <sub>8</sub> emissions from stocks and disposal of this equipment over the time series, as well as information on the trend in the use of PFCs (figures 150–151, pp.222–224), providing additional explanation compared with the previous NIR.
I.5	2.F.1 Refrigeration and air conditioning – HFC-134a (I.8, 2021) Transparency	Include in the NIR the information provided during the review of the 2021 submission on how hotels are considered in the inventory and provide data on fluorinated gases charged in new equipment, including references for such data from CITEPA.	Resolved. The Party included the information provided during the review of the 2021 submission and reported in its NIR (chap. 4.2.6.1, p.208) that, considering both the quantity and type of refrigeration and air-conditioning equipment in hotels in Monaco and information from the national GHG inventory of France, an average charge of 0.05 kg per hotel refrigerator (the same value as in France’s inventory) was determined as appropriate for use in estimating emissions for this category. Furthermore, the Party provided in the NIR (chap. 4.2.6.1, p.209) data on the share of refrigerants R-134a, R-12 and R-600a in new equipment, referring to CITEPA as the source of the data.
I.6	2.F.4 Aerosols – HFC-132a and HFC-227ea (I.9, 2021) Transparency	Provide information in the NIR on the source of data for estimating HFC emissions from metered dose inhalers, and develop and implement QA/QC procedures for reporting on emissions from metered dose inhalers (category 2.F.4.a).	Resolved. The Party reported in its NIR (chap. 4.2.6.5, p.228) that there are no statistical data relating to the quantity of aerosols and inhalers used in Monaco, so French AD and a population ratio are used to estimate AD for Monaco. The Party also stated in its NIR (p.228) that there are no specific QA/QC procedures for this source category. However, this category is covered under the generic QA/QC procedures.  The ERT considers that the recommendation has been addressed.
Agriculture		No agricultural practices occur in Monaco.	
LULUCF			
L.1	4. General (LULUCF) (L.1, 2021) (L.1, 2019) (L.1, 2017) (L.1, 2015) (61, 2014) (74, 2013) Transparency	Provide more transparent information on the calculation of emissions from the burning of biomass of green waste to ensure the consistency of the information reported, and on the allocation of emissions and carbon stock changes between the LULUCF, waste and energy sectors.	Addressing. The Party reported in its NIR (chap. 6.1.2.1.1.3, p.248) information detailing the origin of green waste subject to incineration contributing to heat and electricity production, the emissions of which are reported for in the energy sector (under category 1.A.1.a).  During the review, the Party informed the ERT that inventory developments aimed at assessing the types and quantities of the solid waste incinerated are under implementation.  The ERT considers that this recommendation has not been fully addressed because the Party has not yet provided information in the NIR on the allocation of emissions across sectors and how their consistency is ensured.
L.2	4. General (LULUCF) (L.2, 2021) (L.2, 2019) (L.2, 2017) (L.4, 2015) Comparability	Report fully completed CRF tables and resolve the inconsistent use of the notation keys (e.g. in CRF table 4(IV), for indirect N <sub>2</sub> O emissions from managed soils, “NO” is reported instead of “NE”).	Resolved. The Party reported fully completed CRF tables in its 2022 submission and reported in CRF table 4(IV) indirect N <sub>2</sub> O emissions from managed soils as “NE” and provided the corresponding explanation in its NIR (chap. 6.1.2.1.2, p.249). The lack of explanations on the notation key “NE” in CRF table 9 is covered by ID# G.4 above.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
L.3	4. General (LULUCF) (L.10, 2021) Accuracy	Correct the inconsistency in land areas reported in CRF tables 4.1 and 4.E considering the recent increase in the total national land area and include in the NIR a clear explanation of the change in the land area of the territory.	Resolved. The Party described in its NIR (chap. 6.1.2, pp.244–250) that the increase in the surface land area of the territory corresponded to the extension of Port Hercule since 2020, which required the construction of a platform reclaimed from the sea, a semi-floating dyke and a lee breakwater. Thus, the land area increased to 0.2084 kha in 2020. The Party corrected the value reported in CRF tables 4.1 and 4.E, accordingly.
L.4	4.E.1 Settlements remaining settlements – CO <sub>2</sub> (L.3, 2021) (L.4, 2019) (L.6, 2017) (L.7, 2015) Transparency	Include aerial/satellite information (a) to transparently demonstrate that any increase in biomass from growing crown cover is not a land-use change to settlements; (b) to demonstrate that any increase in crown cover does not meet the forest definition; and (c) to improve the accuracy of the measurement of crown cover.	Resolved. The Party reported in its NIR (chap. 11.2, pp.318–325) on the use of aerial/satellite information to document the changes in land-use and associated biomass increase and described how the aerial/satellite images improved the accuracy of the measurement of crown cover (c). The Party demonstrated that any increase in biomass from growing crown cover is not a land-use change to settlements (a) and, therefore, it can be concluded that any increase in crown cover does not meet the forest definition (b).
L.5	4.E.1 Settlements remaining settlements – CO <sub>2</sub> (L.4, 2021) (L.5, 2019) (L.7, 2017) (L.8, 2015) Transparency	Include the right uncertainty values for AD (an incorrect value of 50 per cent uncertainty was applied) and document the methodology by which expert judgment is used to determine uncertainty values for this category.	Resolved. The Party reported in its NIR (chap. 6.3, p.260) the corrected uncertainty assessment values (of 16 per cent) and a detailed explanation of how these values were obtained.
L.6	4.E.1 Settlements remaining settlements – CO <sub>2</sub> (L.5, 2021) (L.6, 2019) (L.10, 2017) Transparency	Include in the NIR information on the area of crown cover change, in particular the definition of the “tree crown cover” land-use category and the related threshold criteria for conversion from “tree crown cover” to “other settlements”, together with a clear explanation of any fluctuations.	Resolved. The Party described in its NIR (chap. 6.2, p.251) the methodology used for calculating the carbon stock change in growing tree biomass. In chapter 6.1.2.1.1 (pp.244–247) of the NIR the Party provided information on “tree crown cover” and “other settlements” and on the conversion from “tree crown cover” to “other settlements”, and explained the fluctuations.  Furthermore, the Party provided additional information during the review in relation to a study aimed at consolidating inventory data for trees in Monaco and carbon storage associated with the evolution of wooded areas and their composition. The results of that study are currently being validated by the Party.  The ERT considers that the recommendation has been addressed.
L.7	4(IV).1 Atmospheric deposition – N <sub>2</sub> O (L.8, 2021) (L.13, 2019) (L.16, 2017) Accuracy	Report the values of AD in the correct cells of CRF tables 4(I) and 4(IV) to ensure comparability and consistency between the estimates of direct and indirect N <sub>2</sub> O emissions from soils.	Resolved. According to p.308 of the NIR and the response of the Party during the review, the corrections to the AD in CRF tables 4(I) and 4(IV) were implemented. The Party provided in its NIR (chap. 6.1.2.1.2, p.249) information on direct and indirect N <sub>2</sub> O emissions from soils related to the use of fertilizer.  The ERT considers that the recommendation has been fully addressed.
L.8	4(IV).1 Atmospheric deposition – N <sub>2</sub> O	Correct the reporting of the implied EF in CRF table 4(IV) for atmospheric deposition by using the default EF for N volatilization	Resolved. The correct default EF for N volatilization and re-deposition of 0.01 kg N <sub>2</sub> O-N/kg N from the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.3) was reported in CRF

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
	(L.12, 2021) Comparability	and re-deposition of 0.01 kg N <sub>2</sub> O-N/kg N, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 11, table 11.3).	table 4(IV). The Party described in its NIR (chap. 6.1.2.1.2, p.249) the methodology used for estimating direct and indirect emissions of N <sub>2</sub> O due to the use of fertilizers. During the review, the Party confirmed that the transcription error in CRF table 4(IV) was corrected in the 2022 submission.
L.9	4(V) Biomass burning – CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O (L.11, 2021) Accuracy	Report in CRF table 4(V) the CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions using the notation key “NO” with a clear justification in the NIR that activities of biomass burning on site do not occur in Monaco.	Resolved. The Party reported the CO <sub>2</sub> , CH <sub>4</sub> and N <sub>2</sub> O emissions from biomass burning as “NO” in CRF table 4(V) and provided in its NIR (chap. 6.1.2.1.1.3, p.248) detailed information to document the burning of biomass in green waste, including a clear explanation that biomass burning on site does not occur in Monaco.
L.10	4.G HWP – CO <sub>2</sub> (L.9, 2021) (L.14, 2019) (L.13, 2017) Accuracy	Implement a tier 1 method to estimate whether the HWP contribution is significant. In case it is significant, report the HWP contribution and the volumes of imported wood products in CRF tables 4.Gs1 and 4.Gs2 respectively.	Resolved. The Party reported in its NIR (chap. 6.2.3, p.259) that it made an estimation of the HWP contribution using a tier 1 method to assess if the HWP contribution is significant, following the recommendation made by the ERT during previous reviews. The Party clarified that Monaco has no domestic production of wood products and that the volume of imported HWP is hardly quantifiable. Therefore, “NO” was reported for this category. The ERT considers that Monaco provided sufficient information to resolve this issue.
Waste			
W.1	5.D Wastewater treatment and discharge – CH <sub>4</sub> (W.6, 2021) Transparency	Provide information in the NIR on the relationship between the BOD removed as sludge (kt DC) reported in CRF table 5.D and the amount of sludge (t) reported in the NIR.	Resolved. The Party described in its NIR (chap. 7.5.4.2, p.278) the calculation of the “S factor” (BOD removed as sludge, in kt DC), as reported in CRF table 5.D, and provided in NIR figures 189–190 (pp.278–280) indicative data representing the quantities of sludge (kt wet weight) generated by water treatment. Further, the Party reported in the NIR (chap. 7.5.1.3, p.269) on sludge incinerated or exported for agricultural recovery.
W.2	5.D.1 Domestic wastewater – CH <sub>4</sub> (W.3, 2021) (W.7, 2019) Transparency	When applying the higher-tier method, report in the NIR the methods and data used, as well as the recalculation performed in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party described in its NIR (chap. 7.5.3.1, p.271) the methods and data used that allowed the application of a higher-tier method (tier 3). The Party indicated in the NIR (chap. 7.5.9, p.286) that no recalculations were made for this category for the current submission.
W.3	5.D.1 Domestic wastewater – CH <sub>4</sub> (W.4, 2021) (W.8, 2019) Transparency	Explain in the NIR: (a) the improvements made in the collection of the AD (volume of treated and untreated wastewater) for the calculation of TOW and how the consistency of the time series is ensured for the years (i.e. 2008 and 2011) in which large amounts of data are missing from the daily database; (b) why estimated CH <sub>4</sub> and N <sub>2</sub> O emissions decreased as a result of improved AD collection (on volume of wastewater treated); and (c) any	Resolved. The Party explained in the NIR (chap. 7.5.8, p.285) the improvements made to the collection of AD for this category, which involved data obtained from the daily self-monitoring of the wastewater treatment plant, and explained how these improved AD resulted in lower levels of emissions of CH <sub>4</sub> and N <sub>2</sub> O. The Party also reconstructed data that were not available in the time series, as shown in a diagram in its NIR (chap. 7.5.7, p.285). The Party did not perform recalculations for this category for the current submission. The ERT considers that the Party provided sufficient information to resolve this issue.

<i>ID#</i>	<i>Issue/problem classification<sup>a, b</sup></i>	<i>Recommendation from previous review report</i>	<i>ERT assessment and rationale</i>
		recalculations performed for the next submission in accordance with paragraphs 43–45 of the UNFCCC Annex I inventory reporting guidelines.	
W.4	5.D.2 Industrial wastewater – CH <sub>4</sub> (W.5, 2021) (W.5, 2019) (W.6, 2017) Comparability	Use the notation key “IE” instead of “NO” in CRF table 5.D for industrial wastewater and describe in CRF table 9 that these emissions are included together with domestic wastewater.	Resolved. The Party corrected CRF table 5.D for the category industrial wastewater by reporting the CH <sub>4</sub> emissions as “IE” instead of “NO”. In CRF table 9, the Party indicated that these emissions are included under category 5.D.1 (domestic wastewater).
KP-LULUCF			
KL.1	General (KP-LULUCF) – CO <sub>2</sub> (KL.1, 2021) (KL.2, 2019) (KL.2, 2017) Accuracy	Include a comprehensive time-series analysis of land areas in the NIR.	Resolved. The Party reported in its NIR (chap. 6, figure 172, table 40, p.245) on its time-series analysis of land areas.
KL.2	General (KP-LULUCF) – CO <sub>2</sub> (KL.2, 2021) (KL.3, 2019) (KL.3, 2017) Comparability	Report the FM cap in the CRF accounting table.	Addressing. The Party reported the FM cap in the CRF accounting table; however, the reported value of 3.59 kt CO <sub>2</sub> eq for the FM cap is incorrect. The corrected value as included in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Monaco (FCCC/IRR/2017/MCO) is 27.809 kt CO <sub>2</sub> eq.  The ERT concludes that the error in the reporting does not influence the Party’s ability to fulfil its commitments for the second commitment period of the Kyoto Protocol, as for FM, emissions and removals are reported as ‘NO’ for all years of the commitment period, and therefore this issue was not included in the list of potential problems and further questions raised by the ERT.
KL.3	General (KP-LULUCF) (KL.3, 2021) KP reporting adherence	Report the total area of the country under “Other” in CRF table NIR 2 for each year of the second commitment period so the value in the cell of row “Total area at the end of the current inventory year” corresponds to the total land area of the country, as required by the relevant Kyoto Protocol guidelines.	Addressing. During the review, the Party clarified that after verification the total area of the country was not reported in CRF table NIR-2 (i.e. KP-LULUCF), but it will report it in its next submission. However, the area was reported in CRF table 4.1 (i.e. land-transition matrix for the LULUCF sector). Regarding the values for the total area reported in table 4.1, see ID# L.3 above.  The ERT considers that the information provided by Monaco is sufficient to clarify how the Party reports the total land area of the country and concludes that the error in the reporting does not influence the Party’s ability to fulfil its commitments for the second commitment period of the Kyoto Protocol and therefore this issue was not included in the list of potential problems and further questions raised by the ERT.

<sup>a</sup> References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

<sup>b</sup> Reports on the reviews of the 2016, 2018 and 2020 annual submissions of Monaco were not available at the time of this review. Therefore, 2016, 2018 and 2020 are excluded from the list of review years in which issues could have been identified.

#### IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2022 annual submission of Monaco, and had not been addressed by the Party by the time of publication of this review report.

Table 4

##### Issues and/or problems identified in three or more successive reviews and not addressed by Monaco

<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
General		
G.1	Improve QA/QC procedures to review the calculation of the inputs for determining the CPR, including the assigned amount and the relevant modalities in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18.	4 (2017–2022)
G.4	Update CRF table 9 to reflect the explanations for reporting “IE” and “NE” in the inventory.	3 (2019–2022)
Energy		
E.2	Revise the reporting of feedstocks and non-energy use of fuels in CRF table 1.A(d) in a consistent manner under the energy and industrial processes sectors.	8 (2012–2022)
E.3	Explain in the NIR the use and disposal of lubricants in the country.	8 (2012–2022)
E.4	Provide in the NIR a description of the biofuel authenticity assurance system to demonstrate the verifiability of biofuels delivered from France to Monaco, and consequently the accuracy of the assumptions made regarding the shares of biogenic and fossil carbon in liquid biofuels.	3 (2019–2022)
IPPU	No issues identified.	
Agriculture	No issues identified.	
LULUCF		
L.1	Provide more transparent information on the calculation of emissions from the burning of biomass of green waste to ensure the consistency of the information reported, and on the allocation of emissions and carbon stock changes between the LULUCF, waste and energy sectors.	7 (2013–2022)
Waste	No issues identified.	
KP-LULUCF		



<i>ID#</i>	<i>Previous recommendation for issue</i>	<i>Number of successive reviews issue not addressed<sup>a</sup></i>
KL.2	Report the FM cap in the CRF accounting table.	4 (2017–2022)

<sup>a</sup> Reports on the reviews of the 2016, 2018 and 2020 annual submissions of Monaco have not yet been published. Therefore, 2016, 2018 and 2020 were not included when counting the number of successive years for this table.

## V. Additional findings made during the individual review of the Party’s 2022 annual submission

10. Table 5 presents findings made by the ERT during the individual review of the 2022 annual submission of Monaco that are additional to those identified in table 3.

Table 5  
Additional findings made during the individual review of the 2022 annual submission of Monaco

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
General			
G.7	CRF tables	<p>The Party reported national total emission estimates with and without LULUCF in CRF tables 10s1 and 10s6, with indirect CO<sub>2</sub> reported as “NA” throughout even though indirect CO<sub>2</sub> emissions had been estimated and reported in the GHG inventory together with direct emissions. The ERT noted that this is not in accordance with the mandatory requirement set out in paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, which states that for Parties that decide to report indirect CO<sub>2</sub> the national totals are to be presented with and without indirect CO<sub>2</sub>. The Party reported in CRF table 6 the indirect CO<sub>2</sub> emissions as “NE” for IPPU and as “NE/NO” for sector other (sector 6). During the review, the Party explained that it reported CO<sub>2</sub> emissions resulting from the oxidation of NMVOCs under direct CO<sub>2</sub> emissions. In addition, the Party provided, for the entire time series, national total GHG emissions, with and without LULUCF, including and not including those indirect CO<sub>2</sub> emissions that had been reported as direct CO<sub>2</sub> emissions, as requested by the ERT. Monaco further stated that it will address this issue for the next annual submission.</p> <p>The ERT recommends that the Party report the national total emission estimates with and without indirect CO<sub>2</sub> emissions in the relevant CRF tables in accordance with paragraph 29 of the UNFCCC Annex I inventory reporting guidelines and make any necessary revisions in CRF table 6 and the respective IPPU sectoral tables.</p>	Yes. Convention reporting adherence
	Energy	No findings for the energy sector additional to those included in table 3 were made by the ERT during the review.	
	IPPU	No findings for the IPPU sector additional to those included in table 3 were made by the ERT during the review.	
	Agriculture	No agricultural practices occur in Monaco.	
	LULUCF	No findings for the LULUCF sector additional to those included in table 3 were made by the ERT during the review.	
	Waste	No findings for the waste sector additional to those included in table 3 were made by the ERT during the review.	

<i>ID#</i>	<i>Finding classification</i>	<i>Description of finding with recommendation or encouragement</i>	<i>Is finding an issue/problem?<sup>a</sup></i>
KP-LULUCF		No findings for KP-LULUCF additional to those included in table 3 were made by the ERT during the review.	

<sup>a</sup> Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

## **VI. Application of adjustments**

11. The ERT did not identify the need to apply any adjustments for the 2022 annual submission of Monaco.

## **VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol**

12. Table I.5 presents the accounting quantities for KP-LULUCF reported by Monaco and the final values agreed by the ERT.

## **VIII. Questions of implementation**

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2022 annual submission.

## Annex I

### Overview of greenhouse gas emissions and removals and data and information on activities under Article 3, paragraphs 3–4, of the Kyoto Protocol, as submitted by Monaco in its 2022 annual submission

1. Tables I.1–I.4 provide an overview of the total GHG emissions and removals as submitted by Monaco.

Table I.1  
**Total greenhouse gas emissions and removals for Monaco, base year–2020**  
 (kt CO<sub>2</sub> eq)

	<i>Total GHG emissions excluding indirect CO<sub>2</sub> emissions</i>		<i>Total GHG emissions and removals including indirect CO<sub>2</sub> emissions<sup>a</sup></i>		<i>Land-use change (Article 3.7 bis as contained in the Doha Amendment)<sup>b</sup></i>	<i>KP-LULUCF (Article 3.3 of the Kyoto Protocol)<sup>c</sup></i>	<i>KP-LULUCF (Article 3.4 of the Kyoto Protocol)</i>	
	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>	<i>Total including LULUCF</i>	<i>Total excluding LULUCF</i>			<i>CM, GM, RV, WDR</i>	<i>FM</i>
FMRL								NA
Base year <sup>d</sup>	103.06	103.17	NA	NA	NA		NO	
1990	102.63	102.74	NA	NA				
1995	105.60	105.72	NA	NA				
2000	106.46	106.56	NA	NA				
2010	88.79	88.88	NA	NA				
2011	86.45	86.54	NA	NA				
2012	89.08	89.17	NA	NA				
2013	91.21	91.29	NA	NA			NO	NO
2014	85.45	85.52	NA	NA			NO	NO
2015	88.47	88.43	NA	NA			NO	NO
2016	86.61	86.68	NA	NA			NO	NO
2017	83.54	83.61	NA	NA			NO	NO
2018	86.90	86.97	NA	NA			NO	NO
2019	83.35	83.29	NA	NA			NO	NO
2020	69.96	70.04	NA	NA			NO	NO

*Note:* Emissions and removals reported for the sector other (sector 6) are not included in the total GHG emissions.

<sup>a</sup> The Party did not report indirect CO<sub>2</sub> emissions in CRF table 6.

<sup>b</sup> The value reported in this column relates to GHG emissions from conversion of forests (deforestation) in 1990 as contained in the report on the review of the Party's report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol.

<sup>c</sup> Activities under Article 3, para. 3, of the Kyoto Protocol, namely AR and deforestation.

<sup>d</sup> “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O and NF<sub>3</sub> and 1995 for HFCs, PFCs and SF<sub>6</sub>. Monaco has not elected any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

Table I.2

**Greenhouse gas emissions and removals by gas for Monaco, excluding land use, land-use change and forestry, 1990–2020**(kt CO<sub>2</sub> eq)

	CO <sub>2</sub> <sup>a</sup>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF <sub>6</sub>	NF <sub>3</sub>
1990	98.23	2.20	2.23	NO, IE	NO, IE	NO	0.08	NO
1995	101.20	1.21	2.80	0.43	NO, IE	NO	0.09	NO
2000	100.29	1.43	3.16	1.59	NO, IE	NO	0.09	NO
2010	77.72	1.25	4.13	5.66	0.03	NO	0.09	NO
2011	74.94	1.16	3.97	6.35	0.03	NO	0.09	NO
2012	77.99	1.30	3.95	5.85	NO, IE	NO	0.09	NO
2013	78.75	1.27	4.07	7.08	0.03	NO	0.09	NO
2014	73.81	1.31	3.70	6.60	0.01	NO	0.09	NO
2015	76.08	1.36	3.67	7.24	NO, IE	NO	0.09	NO
2016	74.58	1.33	3.42	7.22	0.01	NO	0.11	NO
2017	72.99	1.36	2.91	6.23	0.01	NO	0.11	NO
2018	74.69	1.33	3.14	7.67	0.00	NO	0.12	NO
2019	71.37	1.08	2.92	7.80	0.00	NO	0.12	NO
2020	60.79	0.72	2.75	5.65	NO, IE	NO	0.12	NO
<b>Percentage change 1990– 2020</b>	<b>–38.1</b>	<b>–67.3</b>	<b>23.5</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>50.8</b>	<b>NA</b>

Note: Emissions and removals reported for the sector other (sector 6) are not included in this table.

<sup>a</sup> Monaco did not report indirect CO<sub>2</sub> emissions in CRF table 6.

Table I.3

**Greenhouse gas emissions and removals by sector for Monaco, 1990–2020**(kt CO<sub>2</sub> eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1990	101.65	0.38	NO, NA	–0.11	0.71	NO
1995	104.22	0.83	NO, NA	–0.12	0.67	NO
2000	103.37	2.13	NO, NA	–0.10	1.06	NO
2010	80.11	7.75	NO, NA	–0.09	1.01	NO

	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
2011	77.24	8.42	NO, NA	-0.09	0.88	NO
2012	80.30	7.84	NO, NA	-0.08	1.03	NO
2013	81.22	9.01	NO, NA	-0.08	1.06	NO
2014	76.24	8.14	NO, NA	-0.07	1.14	NO
2015	78.77	8.52	NO, NA	0.04	1.14	NO
2016	77.28	8.30	NO, NA	-0.07	1.10	NO
2017	75.50	6.98	NO, NA	-0.07	1.13	NO
2018	77.46	8.35	NO, NA	-0.07	1.15	NO
2019	73.92	8.47	NO, NA	0.06	0.90	NO
2020	63.18	6.29	NO, NA	-0.07	0.56	NO
<b>Percentage change 1990–2020</b>	<b>-37.8</b>	<b>1 551.9</b>	<b>NA</b>	<b>-35.8</b>	<b>-20.6</b>	<b>NA</b>

Note: Monaco did not report indirect CO<sub>2</sub> emissions in CRF table 6.

Table I.4

**Greenhouse gas emissions and removals from activities under Article 3, paragraphs 3–4, of the Kyoto Protocol by activity, base year–2020, for Monaco**  
(kt CO<sub>2</sub> eq)

	<i>Article 3.7 bis as contained in the Doha Amendment<sup>a</sup></i>	<i>Activities under Article 3.3 of the Kyoto Protocol</i>		<i>FM and elected activities under Article 3.4 of the Kyoto Protocol</i>				
	<i>Land-use change</i>	<i>AR</i>	<i>Deforestation</i>	<i>FM</i>	<i>CM</i>	<i>GM</i>	<i>RV</i>	<i>WDR</i>
FMRL				NA				
Technical correction				NA				
Base year <sup>b</sup>	NA				NO	NO	NO	NO
2013		NO	NO	NO	NO	NO	NO	NO
2014		NO	NO	NO	NO	NO	NO	NO
2015		NO	NO	NO	NO	NO	NO	NO
2016		NO	NO	NO	NO	NO	NO	NO
2017		NO	NO	NO	NO	NO	NO	NO
2018		NO	NO	NO	NO	NO	NO	NO
2019		NO	NO	NO	NO	NO	NO	NO
2020		NO	NO	NO	NO	NO	NO	NO
<b>Percentage change base year–2020</b>					<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

<sup>a</sup> The value reported in this column relates to 1990.

<sup>b</sup> Monaco has not elected to report on any activities under Article 3, para. 4, of the Kyoto Protocol. For activities under Article 3, para. 3, of the Kyoto Protocol and FM under Article 3, para. 4, only the inventory years of the commitment period must be reported.

2. Table I.5 provides information on the Party's accounting quantities for reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.5  
**Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol for Monaco**

(kt CO<sub>2</sub> eq)

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantities <sup>d</sup>	
	Base year <sup>b</sup>	2013	2014	2015	2016	2017	2018	2019	2020	Total <sup>e</sup>			
A.1. AR		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Excluded emissions from natural disturbances		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Excluded subsequent removals from land subject to natural disturbances		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
A.2. Deforestation		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
B.1. FM											NO		NO
Net emissions/removals		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		
Excluded emissions from natural disturbances <sup>d</sup>		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Excluded subsequent removals from land subject to natural disturbances		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
Any debits from newly established forest		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO

GHG source/sink activity	Net emissions/removals										Accounting parameters	Accounting quantities <sup>a</sup>
	Base year <sup>b</sup>	2013	2014	2015	2016	2017	2018	2019	2020	Total <sup>c</sup>		
FMRL <sup>e</sup>											NA	
Technical corrections to FMRL											NA	
FM cap											3.59 <sup>f</sup>	NO
B.2. CM (if elected)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
B.3. GM (if elected)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
B.4. RV (if elected)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO
B.5. WDR (if elected)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO		NO

<sup>a</sup> The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.

<sup>b</sup> Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year as established in decision 9/CP.2.

<sup>c</sup> Cumulative net emissions and removals for all years of the commitment period reported in the annual submission under review.

<sup>d</sup> The Party indicated that it does not intend to exclude emissions from natural disturbances.

<sup>e</sup> As inscribed in the appendix to the annex to decision 2/CMP.7 in kt CO<sub>2</sub> eq per year.

<sup>f</sup> The value of 3.59 kt CO<sub>2</sub> eq for the FM cap indicates the value as reported by Monaco in the CRF. This value is, however, not correct. The corrected value as included in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Monaco is 27.809 kt CO<sub>2</sub> eq. For the purposes of accounting and the fulfilment of the Party's commitment under the second commitment period of the Kyoto Protocol, this does not have any impact. See also ID# KL.2

3. Table I.6 provides an overview of key data from Monaco's reporting under Article 3, paragraphs 3–4, of the Kyoto Protocol.

Table I.6

**Key data for Monaco under Article 3, paragraphs 3–4, of the Kyoto Protocol from its 2022 annual submission**

<i>Parameter</i>	<i>Data</i>
Periodicity of accounting	(a) AR: commitment period accounting (b) Deforestation: commitment period accounting (c) FM: commitment period accounting (d) CM: not elected (e) GM: not elected (f) RV: not elected (g) WDR: not elected
Elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None
Election of application of provisions for natural disturbances	No
3.5% of total base-year GHG emissions, excluding LULUCF	3.476 kt CO <sub>2</sub> eq (27.809 kt CO <sub>2</sub> eq for the duration of the commitment period)
Cancellation of AAUs, CERs and ERUs and/or issuance of RMUs in the national registry for:	
1. AR	NA
2. Deforestation	NA
3. FM	NA



## Annex II

### Information to be included in the compilation and accounting database

Tables II.1–II.8 include the information to be included in the compilation and accounting database for Monaco. Data shown are from the Party's annual submission, including the latest revised estimates submitted, adjustments (if applicable) and the final data to be included in the compilation and accounting database.

Table II.1

#### Information to be included in the compilation and accounting database for 2020, including on the commitment period reserve, for Monaco (t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>CPR</b>	557 751			557 777
<b>Annex A emissions</b>				
CO <sub>2</sub>	60 789	–	–	60 789
CH <sub>4</sub>	720	–	–	720
N <sub>2</sub> O	2 754	–	–	2 754
HFCs	5 649	–	–	5 649
PFCs	NO, IE	–	–	NO, IE
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	124	–	–	124
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>70 037</b>	–	–	<b>70 037</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.2

#### Information to be included in the compilation and accounting database for 2019 for Monaco (t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	71 372	–	–	71 372
CH <sub>4</sub>	1 077	–	–	1 077
N <sub>2</sub> O	2 916	–	–	2 916
HFCs	7 802	–	–	7 802
PFCs	0	–	–	0
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	124	–	–	124
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>83 291</b>	–	–	<b>83 291</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.3

**Information to be included in the compilation and accounting database for 2018 for Monaco**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	74 692	–	–	74 692
CH <sub>4</sub>	1 335	–	–	1 335
N <sub>2</sub> O	3 142	–	–	3 142
HFCs	7 674	–	–	7 674
PFCs	0	–	–	0
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	124	–	–	124
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>86 968</b>	–	–	<b>86 968</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.4

**Information to be included in the compilation and accounting database for 2017 for Monaco**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	72 987	–	–	72 987
CH <sub>4</sub>	1 356	–	–	1 356
N <sub>2</sub> O	2 909	–	–	2 909
HFCs	6 232	–	–	6 232
PFCs	10	–	–	10
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	113	–	–	113
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>83 607</b>	–	–	<b>83 607</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.5

**Information to be included in the compilation and accounting database for 2016 for Monaco**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
CO <sub>2</sub>	74 584	–	–	74 584
CH <sub>4</sub>	1 333	–	–	1 333
N <sub>2</sub> O	3 412	–	–	3 412
HFCs	7 224	–	–	7 224
PFCs	10	–	–	10
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	113	–	–	113
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>86 682</b>	–	–	<b>86 682</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.6

**Information to be included in the compilation and accounting database for 2015 for Monaco**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	76 080	–	–	76 080
CH <sub>4</sub>	1 355	–	–	1 355
N <sub>2</sub> O	3 672	–	–	3 672
HFCs	7 237	–	–	7 237
PFCs	NO, IE	–	–	NO, IE
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	88	–	–	88
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>88 434</b>	–	–	<b>88 434</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.7

**Information to be included in the compilation and accounting database for 2014 for Monaco**(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	73 813	–	–	73 813
CH <sub>4</sub>	1 309	–	–	1 309
N <sub>2</sub> O	3 704	–	–	3 704
HFCs	6 595	–	–	6 595
PFCs	10	–	–	10
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	87	–	–	87
NF <sub>3</sub>	NO	–	–	NO

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Total Annex A sources<sup>a</sup></b>	<b>85 519</b>	–	–	<b>85 519</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

Table II.8

**Information to be included in the compilation and accounting database for 2013 for Monaco**  
(t CO<sub>2</sub> eq)

	<i>Original submission</i>	<i>Revised submission</i>	<i>Adjustment</i>	<i>Final value</i>
<b>Annex A emissions</b>				
CO <sub>2</sub>	78 753	–	–	78 753
CH <sub>4</sub>	1 270	–	–	1 270
N <sub>2</sub> O	4 074	–	–	4 074
HFCs	7 077	–	–	7 077
PFCs	31	–	–	31
Unspecified mix of HFCs and PFCs	NO	–	–	NO
SF <sub>6</sub>	86	–	–	86
NF <sub>3</sub>	NO	–	–	NO
<b>Total Annex A sources<sup>a</sup></b>	<b>91 292</b>	–	–	<b>91 292</b>
<b>Activities under Article 3, paragraph 3, of the Kyoto Protocol</b>				
AR	NO	–	–	NO
Deforestation	NO	–	–	NO
<b>FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol</b>				
FM	NO	–	–	NO

<sup>a</sup> The sum of the values for the individual gases and groups of gases may not match the total owing to rounding.

## **Annex III**

### **Additional information to support findings in table 2**

#### **Missing categories that may affect completeness**

No mandatory categories from the 2006 IPCC Guidelines were identified as missing.

## Annex IV

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl>.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at <https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/>.

#### B. UNFCCC documents

##### Annual review reports

Reports on the individual reviews of the 2012, 2013, 2014, 2015, 2017, 2019 and 2021 annual submissions of Monaco, contained in documents FCCC/ARR/2012/MCO, FCCC/ARR/2013/MCO, FCCC/ARR/2014/MCO, FCCC/ARR/2015/MCO, FCCC/ARR/2017/MCO, FCCC/ARR/2019/MCO and FCCC/ARR/2021/MCO respectively.

##### Other

Report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Monaco. Available at <https://unfccc.int/documents/65155>.

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <https://unfccc.int/documents/510888>.

Annual status report for Monaco for 2022. Available at [https://unfccc.int/sites/default/files/resource/asr2022\\_MCO.pdf](https://unfccc.int/sites/default/files/resource/asr2022_MCO.pdf).

#### C. Other documents used during the review

Responses to questions during the review were received from Jérémie Carles (Department of the Environment of Monaco), including additional material on the methodology and assumptions used.

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