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**Report of the individual review of the annual submission of
Switzerland submitted in 2011***

* In the symbol for this document, 2011 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

A. Overview

1. This report covers the centralized review of the 2011 annual submission of Switzerland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 19 to 24 September 2011 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Takeshi Enoki (Japan) and Mr. Dennis Rudov (Belarus); energy – Mr. Tomas Gustafsson (Sweden), Ms. Agnieszka Janowska (European Union) and Ms. Inga Valuntiene (Lithuania); industrial processes – Mr. Kiyoto Tanabe (Japan) and Mr. Hongwei Yang (China); agriculture – Ms. Britta Hoem (Norway) and Ms. Tajda Mekinda-Majaron (Slovenia); land use, land-use change and forestry (LULUCF) – Mr. Kevin Black (Ireland) and Mr. Robert de Ligt (Australia); and waste – Ms. Sirinthornthep Towprayoon (Thailand) and Ms. Medea Inashvili (Georgia). Mr. Tanabe and Mr. Yang were the lead reviewers. The review was coordinated by Ms. Sevdalina Todorova and Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Switzerland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Emission profiles and trends

3. In 2009, the main greenhouse gas (GHG) in Switzerland was carbon dioxide (CO₂), accounting for 84.6 per cent of total GHG emissions¹ expressed in carbon dioxide equivalent (CO₂ eq), followed by methane (CH₄) (7.4 per cent) and nitrous oxide (N₂O) (6.0 per cent). Hydrofluorocarbons (HFCs) accounted for 1.6 per cent and perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 0.4 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.3 per cent of total GHG emissions, followed by the agriculture sector (10.8 per cent), the industrial processes sector (6.2 per cent), the waste sector (1.2 per cent), the solvents and other product use sector (0.4 per cent) and the sector other (sector 7) (0.03 per cent). Total GHG emissions amounted to 51,937.94 Gg CO₂ eq (and 51,950.94 Gg CO₂ eq when sector 7 is included) and decreased by 2.2 per cent between the base year² and 2009.

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

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

² “Base year” refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from Annex A sources only.

Table 1
Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year to 2009^a

		<i>Gg CO₂eq</i>								<i>Change</i>	
		<i>Base year^d</i>	<i>1990</i>	<i>1995</i>	<i>2000</i>	<i>2005</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>Base year–2009 (%)</i>	
		<i>Greenhouse gas</i>									
Annex A sources ^b		CO ₂	44 689.44	44 689.44	43 479.79	44 092.86	46 270.68	43 794.53	45 285.52	43 948.74	–1.7
		CH ₄	4 698.43	4 698.43	4 285.97	3 920.93	3 783.54	3 791.01	3 874.33	3 824.93	–18.6
		N ₂ O	3 480.30	3 480.30	3 356.43	3 228.47	3 095.40	3 122.58	3 139.21	3 093.92	–11.1
		HFCs	0.02	0.02	178.74	471.92	783.28	823.24	855.76	854.32	3 792 110.3
		PFCs	100.21	100.21	14.69	68.78	33.15	29.15	39.96	34.70	–65.4
		SF ₆	143.62	143.62	97.73	157.79	212.56	185.73	237.97	181.32	26.3
KP-LULUCF	Article 3.3 ^c	CO ₂							241.39	241.36	
		CH ₄							NO	NO	
		N ₂ O							0.02	0.02	
	Article 3.4 ^d	CO ₂	NA						–681.49	–1 153.33	NA
		CH ₄	NA						0.27	0.31	NA
		N ₂ O	NA						0.17	0.20	NA

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

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

^b The category “other” is not included in the Annex A sources under the Kyoto Protocol and is therefore not included in the total emissions in this table.

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

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

Table 2
Greenhouse gas emissions by sector and activity, base year to 2009^a

	Sector	Gg CO ₂ eq								Change
		Base year ^a	1990	1995	2000	2005	2007	2008	2009	Base year–2009 (%)
Annex A	Energy	42 140.84	42 140.84	41 684.70	42 473.22	44 380.71	41 899.00	43 411.38	42 255.55	0.3
	Industrial processes	3 385.65	3 385.65	2 657.86	2 916.09	3 415.71	3 402.76	3 490.18	3 221.04	-4.9
	Solvent and other product use	467.77	467.77	366.87	272.09	219.77	218.34	216.92	217.03	-53.6
	Agriculture	6 128.27	6 128.27	5 875.87	5 551.01	5 508.86	5 595.43	5 687.52	5 630.15	-8.1
	Waste	989.49	989.49	828.05	728.32	653.56	630.71	626.75	614.16	-37.9
	LULUCF	NA	-2 725.00	-3 460.73	1 441.88	-373.29	568.85	574.13	88.56	NA
	Total (with LULUCF)	NA	50 387.02	47 952.62	53 382.62	53 805.34	52 315.09	54 006.88	52 026.50	NA
	Total (without LULUCF)	53 112.03	53 112.03	51 413.35	51 940.74	54 178.63	51 746.24	53 432.74	51 937.94	-2.2
	Other ^b	10.96	10.96	11.90	12.87	12.95	12.98	12.99	13.00	18.6
KP-LULUCF	Article 3.3 ^c	Afforestation and reforestation						-15.18	-16.94	
		Deforestation						256.58	258.31	
		Total (3.3)						241.40	241.37	
	Article 3.4 ^d	Forest management						-681.05	-1 152.82	
		Cropland management	NA					NA	NA	NA
		Grazing land management	NA					NA	NA	NA
		Revegetation	NA					NA	NA	NA
		Total (3.4)	NA						-681.05	-1 152.82

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

^a “Base year” for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The “base year” for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol is 1990.

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

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

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

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

Table 3

Information to be included in the compilation and accounting database in t CO₂ eq

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>	<i>Accounting quantity^c</i>
Commitment period reserve	218 554 562			218 554 562	
Annex A emissions for current inventory year					
CO ₂	43 848 404	43 948 745		43 948 745	
CH ₄	3 822 857	3 824 932		3 824 932	
N ₂ O	3 093 920			3 093 920	
HFCs	854 323			854 323	
PFCs	34 696			34 696	
SF ₆	181 324			181 324	
Total Annex A sources	51 835 525	51 937 940		51 937 940	
Activities under Article 3, paragraph 3, for current inventory year					
3.3 Afforestation and reforestation on non-harvested land for current year of commitment period as reported	-16 937	-16 937		-16 937	-16 937
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NO	NO		NO	0
3.3 Deforestation for current year of commitment period as reported	258 310	258 310		258 310	258 310
Activities under Article 3, paragraph 4, for current inventory year^d					
3.4 Forest management for current year of commitment period	-1 155 544	-1 152 820		-1 152 820	-1 152 820
3.4 Cropland management for current year of commitment period					
3.4 Cropland management for base year					
3.4 Grazing land management for current year of commitment period					
3.4 Grazing land management for base year					
3.4 Revegetation for current year of commitment period					
3.4 Revegetation in base year					

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

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

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

^c "Accounting quantity" is included in this table only for Parties that chose annual accounting for activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, if any.

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

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2011 annual inventory submission was submitted on 15 April 2011; it contains a complete set of common reporting format (CRF) tables for the period 1990–2009 and a national inventory report (NIR). Switzerland also submitted information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2011 and resubmitted in 12 May 2011. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Switzerland officially submitted revised emission estimates on 3 November 2011 in response to the list of potential problems and further questions raised by the expert review team (ERT) during the course of the review. The values in this report are those submitted by the Party on 3 November 2011.

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

9. During the review, Switzerland provided the ERT with additional information and documents which are not part of the annual submission. The full list of information and documents used during the review is provided in annex I to this report.

Completeness of inventory

10. The inventory covers all source and sink categories for the period 1990–2009 and is complete in terms of years and geographical coverage. During the review the ERT noted that the reporting does not include CH₄ emissions from natural gas in road transportation and CH₄ emissions from carbide production, and that CO₂ emissions from organic soils under forest management are reported as not occurring (“NO”). In response to the list of potential problems and further questions raised by the ERT during the review week, Switzerland provided these missing estimates (see paras. 51, 68 and 121 below).

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

Overview

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

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

12. The Party described the changes of the national system since the previous annual submission. The changes relate to: a revision in the contractual arrangements with the data providers; the archiving of recalculated information; a recertification of the quality management system; and a revision in the approval process of the inventory. The changes in the national system are discussed in chapter II.H.3 of this report.

Inventory planning

13. The Federal Office for the Environment (FOEN) under the Federal Department of the Environment, Transport, Energy and Communications (DETEC) has overall responsibility for the national inventory in Switzerland. Within FOEN, the National Inventory System Supervisory Board (NISSB) oversees the inventory preparation process. The GHG inventory core group, consisting of representatives of the different divisions of FOEN and representatives of external organizations (Infras, EBP, Meteotest/SigmaPlan) carry out the actual inventory compilation and drafting of the NIR. A GHG inventory working group, which consists of technical personnel involved in the inventory preparation process or representing institutions that supply data, meets at least once a year to take stock of the state of the inventory, discuss priorities in inventory development and address issues from domestic or international reviews. Individual data suppliers are responsible for data collection and also the selection of methods. Switzerland also has a quality assurance/quality control (QA/QC) officer who is responsible for the enforcement of the defined quality standards of the inventory.

14. Based on the recommendation made by the previous review report, Switzerland has included a table in the NIR showing the improvements requested by the ERT that it has implemented. In addition, Switzerland informed the ERT that it has put an increasing emphasis on the implementation of recommendations from previous review reports in its inventory development planning. The results from the expert peer review or the UNFCCC reviews are the main drivers for the improvements. The process of prioritizing the areas of improvement is then done by the GHG inventory core group and it takes the necessary steps to implement the possible recalculations to the inventory. The ERT commends Switzerland for the efforts made to take into account, to the extent possible, all key recommendations in the review reports. The ERT recommends that Switzerland not only use the results of the expert peer review and the UNFCCC reviews as a methodological improvement identification tool, but also use the results of the key category analysis and uncertainty assessment.

Inventory preparation

Key categories

15. Switzerland has reported key category tier 1 and tier 2 analyses, both level and trend assessments, for both the base year and 2009 as part of its 2011 submission. The key category analysis performed by the Party and that performed by the secretariat⁴ produced similar results for tier 1 analysis owing to the different levels of disaggregation being used by Switzerland (e.g. in the energy sector). The Party provides comparison of the results of

⁴ The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

tier 1 and 2 analysis within the NIR and based the NIR on its tier 2 analysis. Switzerland has included the LULUCF sector in its key category analysis, which was performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF).

16. Switzerland has also conducted a key category analysis for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory, as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF. The key category analysis for the KP-LULUCF activities is included in CRF table NIR 3 and in the NIR. Two of the activities in the sector – forest management and deforestation – were identified as key categories in 2009. The description of the key category analysis and its results are transparently documented in the NIR. However, there is no discussion on how it is used to prioritize the development and improvement of the inventory.

Uncertainties

17. Switzerland has performed a tier 1 uncertainty analysis as part of its 2011 submission, while it conducts a tier 2 uncertainty analysis every two years (most recently for the inventory year 2008). The uncertainty analysis is consistent with the IPCC good practice guidance and the description and results are transparently explained in the NIR. For the level analysis, the overall uncertainty of the national emissions without LULUCF is 3.4 per cent and 3.5 per cent with LULUCF. For the trend analysis, the uncertainty without LULUCF is 2.0 per cent and 22.0 per cent with LULUCF. The uncertainty of the trend for emissions with LULUCF is high compared with previous years' submissions (5.0 per cent in 2007 and 9.8 per cent in 2008). The ERT encourages Switzerland to investigate the reasons for any major differences in the results of the uncertainty analysis and describe the findings in its next annual submission.

18. Uncertainty assessment was conducted for each category. Detailed explanation of the quantitative uncertainty analysis is provided in the NIR for the key categories and for non-key categories. However, for some non-key categories Switzerland conducted only a semi qualitative uncertainty assessment using the terms “high”, “medium” and “low” quality, with only a brief explanation in the NIR. The ERT, therefore, encourages Switzerland to perform a quantitative uncertainty assessment for all categories in its next annual submission. In addition, the ERT noted that, in the update of the tier 1 uncertainty analysis, the new emission data were updated but the uncertainty estimates for activity data (AD) and emission factors (EFs) have not been re-evaluated. The ERT recommends that the Party update the uncertainties together with the update of the AD and EFs and report on these in its next annual submission.

Recalculations and time-series consistency

19. Recalculations have been performed and reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by Switzerland of the time series 1990 to 2008 have been undertaken to take into account improvements in AD (including several fuel consumption statistics in the energy sector; nitric acid production; carbide production in the industrial processes sector; open burning of branches in the agriculture sector; and the use of AD from the AREA database in the LULUCF sector), EFs (including the CO₂ EF for fuel combustion in the energy sector, the N₂O EF for nitric acid production and the CO₂ EF for carbide production in the industrial processes sector), and

parameters (e.g. revisions to the territorial model for road transportation, input data from the AGRAMMON model and carbon stock data in the LULUCF sector). In addition, Switzerland has made recalculations stemming from the reallocation of emissions (e.g. petroleum coke has been reallocated from solid fuels to liquid fuels and emissions from gas compressor stations have been reallocated from natural gas production/processing (1.B.2.b(ii)) to other transportation in the energy sector). The ERT noted that many of the recalculations have stemmed from new data for part of the time series (e.g. AD for iron foundries for 2005–2008 in the energy sector, AD from iron and steel production for 2005 and 2006, AD for use of SF₆ in aluminium and magnesium foundries for 2004 to 2008, chipboard production for the years 2005 to 2008 in the industrial processes sector, new data updates for 2007 to 2008 in the agriculture sector, gross growth of productive forest for 1995 to 1996 in the LULUCF sector). The major changes, and the magnitude of the impact, include: a decrease in estimated total GHG emissions in the base year (0.1 per cent) and an increase in 2008 (0.05 per cent). The ERT welcomes these recalculations but recommends that Switzerland implement QA/QC procedures to ensure that time-series consistency is maintained for all recalculated categories.

20. Sufficient rationale for these recalculations is mostly provided in the NIR and CRF table 8(b), with some exceptions (e.g. pulp, paper and print industries, nitric acid production). The ERT recommends that Switzerland improve the transparency of the NIR by including, especially for significant recalculations, the underlying rationale for the change in method, AD or EF, why it would lead to an improvement of the emission inventory, and quantified revised emission estimates at a more disaggregated level.

Verification and quality assurance/quality control approaches

21. Switzerland has a detailed QA/QC plan in place in accordance with decision 19/CMP.1 and the IPCC good practice guidance, described in a supplementary report entitled *Description of the Quality Management System*, which it submitted together with the NIR. The plan has been implemented, which has resulted in the identification of errors and improvements to the inventory. The ERT noted that the data suppliers are responsible for the quality of sectoral data in addition to being responsible for checking the appropriate choice of methods, AD and EFs in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and the IPCC good practice guidance. The ERT recommends that Switzerland ensure that QC measures are in place to check methodological improvements and encourages the Party to review more rigorously the higher-tier methods that have been used in the inventory.

22. The ERT commends Switzerland for improving the transparency of the NIR by including more information on the QC procedures (e.g. energy sector). There are, however, still several errors in the CRF reporting (e.g. no updated information for N₂O emissions from gasoline and diesel oil, where use of the default method is reported in CRF summary 3, although since 2010 a country-specific method (tier 3) has been used) and differences between data in the CRF tables and the NIR and no specific QA/QC procedures were applied for the KP-LULUCF activities. The ERT reiterates the recommendation of the previous review report that Switzerland apply further QA/QC procedures before submitting its annual submission to the UNFCCC. The ERT recommends that the Party also apply and report on QA/QC procedures for the KP-LULUCF activities and encourages the Party to apply tier 2 QC procedures in accordance with the IPCC good practice guidance, at least for key categories, in its next annual submission.

Transparency

23. The NIR submitted by Switzerland is generally transparent. However, the ERT recommends that Switzerland improve the documentation on recalculations, as mentioned in paragraph 20 above. In addition, the ERT recommends that Switzerland improve the transparency of the NIR by providing more detail on the methods and EFs used, in order to enable reviewers to fully assess the underlying assumptions and rationale for choices of data, methods and other inventory parameters and particularly for the country-specific EFs that deviate significantly from the IPCC default values and for EFs that change significantly over time.

Inventory management

24. Switzerland has a centralized archiving system, managed by FOEN. The system includes the archiving of disaggregated EFs and AD and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. The actual inventory is compiled in a database called EMIS (Emissions Information System), from which the relevant parameters are exported into the CRF reporter. During the review, the Party provided the ERT with the requested additional archived information in a timely manner.

3. Follow-up to previous reviews

25. The ERT commends Switzerland for the improvements undertaken in response to recommendations from previous review reports, including: the inclusion of the energy balance in the NIR; the reporting of emissions from marine bunkers; the improvement of the estimation of feedstocks and non-energy use of fuel in the reference approach; additional information for livestock types; the revision of AD for field burning of residues; the improvement of the deforestation area data; and the improvement of the description of information on minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

26. However, a number of recommendations from previous review reports have not yet been fully implemented, including those related to the improvement of the transparency of reporting where expert judgements and country-specific EFs are used, and the provision of recalculated data at a more disaggregated level in the NIR. The ERT noted that the pending recommendations from the previous reviews are included in the improvements plan. The ERT welcomes these planned improvements and recommends that the Party report on their progress in its next annual submission. Pending recommendations from previous reviews are reiterated in the sectoral chapters of this report.

4. Areas for further improvement

Identified by the Party

27. The 2011 NIR identifies several areas for improvement, including:

- (a) Improvement of the fuel consumption and EFs for small aircraft in civil aviation;
- (b) Improvement of the emission estimates from helicopters in civil aviation;
- (c) Improvement of the estimation of emissions on border lakes in marine bunkers;
- (d) Verification of the EF for SF₆ from electrical equipment;

- (e) Elimination of the existing double counting between the data for Switzerland and Liechtenstein for consumption of halocarbons and SF₆;
- (f) Revision of the energy intake estimates of non-cattle animals, particularly mules and asses;
- (g) Reduce the uncertainty of the AD for land areas by gradually increasing the sample size in the AREA database.

Identified by the expert review team

28. During the review, the ERT identified cross-cutting issues for improvement. These are listed in paragraph 150 below.

29. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

B. Energy

1. Sector overview

30. The energy sector is the main sector in the GHG inventory of Switzerland. In 2009, emissions from the energy sector amounted to 42,255.55 CO₂ eq, or 81.3 per cent of total GHG emissions. Since 1990, emissions have increased by 0.3 per cent. The key driver for the rise in emissions is increased transport, in particular the use of diesel road vehicles. The rise in emissions is, however, offset by the decreased use of fossil fuels in residential heating and in manufacturing industries and construction. Within the sector, 39.0 per cent of the emissions were from transport, followed by 37.9 per cent from other sectors, 13.8 per cent from manufacturing industries and construction and 8.5 per cent from energy industries. Fugitive emissions from fuels accounted for 0.5 per cent and other (military) accounted for 0.3 per cent.

31. The Party has made recalculations for the energy sector between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD and EFs. The impact of these recalculations on the energy sector is an increase in emissions of 0.1 per cent for 2008. The ERT noted that the recalculations are consistently applied over the time series and the ERT commends the Party for the improvements in the estimates. The main recalculations took place in the following categories:

- (a) Manufacturing industries and construction, transport and other sectors due to a correction of natural gas consumption AD;

- (b) Other (manufacturing industries and construction) (CO₂, CH₄ and N₂O) due to new information on the AD and EFs used in brick and tile production.

32. Recalculations are generally documented in the NIR, but the ERT recommends that Switzerland improve the transparency of the NIR and facilitate future reviews, by including, especially for significant recalculations, the underlying rationale for the changes in methods, AD or EFs, why the recalculations would lead to an improvement of the emissions inventory, and also provide quantified revised emission estimates, as prescribed by the IPCC good practice guidance.

33. The CRF tables are largely complete for all years (1990 to 2009) in terms of gases, categories, years and geographical coverage. The Swiss energy statistics include all fossil fuel consumption (except natural gas) of the Principality of Liechtenstein. The Swiss energy statistics are, therefore, corrected before the Party's national emissions are estimated. There are a few categories for which Switzerland has used the incorrect notation key "NO" although emissions from the categories are likely to occur and there are default

IPCC methodologies, as follows: CH₄ from natural gas in road transportation (see para. 51 below); N₂O from flaring of gas and refining/storage of oil (see para. 53 below); and CO₂ and CH₄ from oil transport (see para. 52 below). The ERT recommends that Switzerland report emissions from these categories using the IPCC default methods and EFs from the IPCC good practice guidance or justify in the NIR of its next annual submission that these emissions do not occur. In response to the list of potential problems and further questions raised by the ERT during the review week Switzerland provided revised estimates for road transportation, improving the completeness of the category reporting (see para. 51 below).

34. The NIR is broadly transparent and generally provides explanations for the methodologies, AD and EFs used. For manufacturing industries and construction, the production methods are only briefly described and the ERT reiterates the recommendation of the previous review report that the Party further improve the transparency of the NIR by including, in an annex to the NIR, information on the production methods for the manufacturing industries and construction.

35. National EFs are mostly referenced in the NIR, but in some cases they are not fully justified (e.g. the low EF for CH₄ (96.83 kg/TJ in 2009 from biomass in residential and the high 2009 CO₂ implied emission factor (IEF) (73.90 t/TJ) for gasoline in road transportation). In response to questions raised by the ERT during the review, Switzerland provided several national documents supporting the EFs and explained that it intends to provide more information in English in future annual submissions. The ERT supports the Party's effort and reiterates the recommendation of the previous review report that, to further improve the transparency of the NIR, Switzerland include brief summaries of the scientific rationale behind the national EFs used, especially for EFs that significantly deviate from the IPCC default values for key categories, as prescribed by the IPCC good practice guidance.

36. The ERT also noted several instances where the IEFs for Switzerland show significant changes over time (e.g. in road transportation the overall trend of N₂O IEFs for gasoline is decreasing and the 2009 value (1.14 kg/TJ) is 60.65 per cent lower than the 1990 value (2.89 kg/TJ), which is the second highest decrease reported by Parties (range of -61.8 to +815.1 per cent)). In response to questions raised by the ERT during the review, Switzerland provided the detailed underlying information on changes in country-specific EFs over time, which mostly explained the variations and differences. The ERT commends Switzerland for producing such detailed information and recommends that Switzerland increase the transparency of its next annual submission by including, especially for key categories, information on country-specific EFs that significantly change over time together with associated AD.

37. The ERT commends Switzerland for improving the transparency of the NIR by including more information on the QC procedures carried out within the energy sector. There are, however, still several errors in the CRF reporting (see paras. 42, 45 and 46 below) and differences between data in the CRF tables and the NIR that have not been addressed properly (e.g. biomass for public electricity and heat production). In addition, some recalculations are not described at all in the 2011 NIR (e.g. in pulp, paper and print industries), indicating that the QA/QC procedures are in need of further strengthening. The ERT, therefore, reiterates the recommendation of the previous review report that Switzerland apply further QA/QC procedures before submitting its annual submission to the UNFCCC.

38. The ERT commends Switzerland for its efforts to improve the inventory since the last submission. In particular, several improvements have been carried out in response to the recommendations in the previous review report: correcting discrepancies between the CRF tables and the NIR on the differences between the reference approach and sectoral approach; including an energy balance; including for the first time emissions from marine

bunker fuels; reporting other fuels as feedstocks and non-energy use of fuels in the CRF tables; and reporting petroleum coke as liquid consumption in the category other (manufacturing industries and construction). However, the ERT noted that there are several instances for which the recommendations of the previous review report are pending and reiterated them in the category-specific sections below. In addition, the previous ERT noted that the basis for several EFs is expert judgements (e.g. fugitive emissions of CO₂ and CH₄ from refining/storage of oil and flaring of oil), which are not properly explained in the NIR. No further information has been provided in the 2011 annual submission and the ERT thus reiterates the recommendation of the previous review report that Switzerland improve the transparency further by providing explanations for the basis of the expert judgements applied in the energy sector.

2. Reference and sectoral approaches

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

39. Emissions of CO₂ from fuel combustion in Switzerland were calculated using both the reference approach and the sectoral approach in accordance with the IPCC good practice guidance. For 2009, there is a 2.1 per cent difference in CO₂ emissions. Switzerland has made brief explanations of the differences in the CRF tables and the NIR, but no quantified justifications are provided. In response to questions raised by the ERT, Switzerland explained that there are ongoing improvements to the reference approach and that the results will be implemented in the Party's 2012 annual submission. The ERT commends Switzerland for its efforts to reconcile the deviations and recommends that Switzerland report on any differences larger than 2 per cent in both qualitative and quantitative analyses in its next annual submission.

40. Switzerland reports coking coal as included elsewhere ("IE") in the reference approach without specifying where it is included. In response to questions raised by the ERT during the review, Switzerland explained that the coking coal is included in other bituminous coal. The ERT recommends that the Party improve the transparency of its next annual submission by including this information.

41. The ERT noted several inconsistencies between the data sent to the International Energy Agency (IEA) and the data in the CRF tables (e.g. in 2009 the total apparent consumption in the CRF tables is lower than that of the IEA by 5.4 per cent, mostly due to higher imports of gasoline and the oil products that are missing in the CRF tables, as well as discrepancies in stock changes for gas/diesel oil). During the review, Switzerland explained that most of the divergences in liquid fuels are due to the use of different net calorific values in the IEA data and in the CRF tables. The ERT, therefore, encourages Switzerland to further investigate any significant differences between the IEA data and the CRF tables and report on any progress in its next annual submission.

42. In addition, the ERT noted that small discrepancies occur between CRF table 1.C and table 1.A(b) for jet kerosene (international aviation bunkers) in 2006 and 2007 (e.g. 53,542.92 TJ and 53,529.82 TJ, respectively, in 2007), and larger differences for gas/diesel oil (international marine bunkers) for all years because no data are reported in table 1.A(b), although data are reported in table 1.C (353.57 TJ in 2009). In response to questions raised during earlier stages of the review, Switzerland confirmed a mistake in table 1.A(b). The ERT recommends that Switzerland reconcile the differences and report the correct figures in its next annual submission.

International bunker fuels

43. Switzerland reports fuel consumption and emissions from international aviation based on a country-specific model (in line with the tier 3a method from the 2006 IPCC

Guidelines for National Greenhouse Gas Inventories (hereinafter referred to as the 2006 IPCC Guidelines)) using detailed flight traffic data and engine information, separating domestic and international flights. Modelled total fuel consumption for (domestic and international) aviation is compared with fuel sales data. The fuel sales data available do not differentiate between domestic and international aviation. In the NIR, it is stated that the modelled fuel consumption overestimates actual fuel consumption by about 3 per cent. In order to avoid underestimation of emissions in civil aviation, the modelled consumption is reported, while the international fuel consumption is reduced accordingly to match the total fuel sales data. The factor between the calculated international fuel consumption and corrected international fuel consumption is used to scale the bunker emissions linearly. The ERT reiterates the recommendation of the previous review report that the Party include in its next annual submission information (in tabular form) on the differences between the modelled data and the fuel sales to further facilitate future reviews.

44. In response to a recommendation in the previous review report, emissions from marine bunker fuels are reported for the first time by Switzerland. Emissions are based on AD from the Swiss customs administration and the Swiss organization for the compulsory stockpiling of oil products (CARBURA) together with country-specific EFs. The methods used are in line with the IPCC tier 1 approach. The ERT commends Switzerland for its effort to make the inventory reporting complete.

Feedstocks and non-energy use of fuels

45. Switzerland reports data on lubricants, bitumen and other fuels (gasoline, diesels, paraffin and waxes, petroleum coke and white spirit) used as feedstocks and non-energy use of fuels in the NIR and in CRF table 1.A(d). The ERT noted that data on other fuels are reported for the first time in response to a recommendation in the previous review report and commends Switzerland for this improvement. However, the carbon stored from other fuels is not accounted for in the reference approach and thus has bearing on the issue raised in paragraph 39, above, concerning the difference between the reference approach and sectoral approach. In response to questions raised during the review, Switzerland explained that it is aware of the problem and that it will try to resolve it in due time. The ERT supports this action and reiterates the recommendation of the previous review report that Switzerland properly document the data used for feedstocks and non-energy use of fuels. The ERT further recommends that Switzerland report the fuels now included under “other” in a disaggregated way, including the additional information in the CRF tables on the allocation of the emissions of the non-energy use of fuels and report correct figures of carbon stored in the reference approach in its next annual submission.

46. In addition, the ERT noted that the fractions of carbon stored for all feedstocks and non-energy use of fuels increased from 1990 (1 per cent) to 2009 (20 per cent). During the review, Switzerland informed the ERT that the correct fraction of carbon stored is 1 for all fuels in Switzerland, that the incorrect fractions do not affect the calculations and that the Party will revise the CRF tables in its next annual submission. The ERT recommends that Switzerland document and report on the rationale for the applied fractions of carbon stored as well as report the correct figures for all feedstocks and non-energy use of fuels in its next annual submission.

3. Key categories

Stationary combustion: biomass and other fuels – CO₂, CH₄ and N₂O⁵

47. In Switzerland, most waste is used for incineration with energy recovery and reported in the energy sector, and only waste for managed disposal on land and incinerated without energy recovery is reported in the waste sector, in line with the IPCC good practice guidance. As waste is an important commodity in Switzerland, total production of waste needs to be closely monitored to avoid omission or double counting of emissions. The ERT, therefore, recommends that Switzerland include in its next NIR information on the yearly production of waste from different categories in order to balance the input and output of waste in the country.

48. Switzerland applies a biogenic to fossil fuel ratio in MSW of 60:40 for all years, based on an analysis by the Federal Office for the Environment's (FOEN) waste section. Switzerland states in the 2011 NIR that there are ongoing efforts to collect information on the organic fraction of waste incinerated in the energy sector. As this is the third largest contributor to the uncertainty in the national total emissions, the ERT strongly supports this action and reiterates the recommendation of the previous review report that Switzerland apply the results of the study in the next annual submission, or if the results are not completed, provide any provisional results indicating the ratios.

49. Related to MSW, Switzerland reports "special waste" as other fuels in stationary combustion without giving an explanation of the content of this waste in the NIR. In response to questions raised by the ERT during the review, Switzerland explained that special waste includes, for example, hazardous waste with high calorific values, wastewater and sludge with organic load, inorganic solids and dusts. In order to improve the transparency of the NIR, the ERT recommends that Switzerland include this explanation in its next annual submission.

Stationary combustion: solid fuels – CO₂, CH₄ and N₂O⁶

50. The consumption of solid fuels in stationary combustion in Switzerland is decreasing and the 2009 value (5,635 TJ) is 61.8 per cent lower compared with the 1990 value (14,763 TJ). There are also large inter-annual variations ranging from -37.8 to 54.0 per cent. In response to questions raised by the ERT, the Party stated that solid fuels in stationary combustion mainly consist of coal for the cement industry and the inter-annual variations are following the yearly production of cement and clinker. During the review, Switzerland provided information on AD in Switzerland, explaining that, to some extent, coal has been substituted with energy obtained from the incineration of waste. The ERT recommends that Switzerland include in its next annual submission tabular (or graphical) information on the fuels used for cement production together with the production data and any other information that could affect the use of fuels over time (e.g. increased recycling of dust).

⁵ Not all emissions related to all gases and fuels under this category are key categories. However, since the calculation procedures for and issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

⁶ Not all emissions related to all gases under this category are key categories, particularly CH₄ and N₂O emissions. However, since the calculation procedures for and issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

4. Non-key categories

Road transportation: gaseous fuels – CH₄

51. Switzerland has reported CH₄ emissions from natural gas in road transportation as “NO” for 2003–2009 even though AD are reported and CH₄ EFs are provided in the 2011 NIR. In response to the list of potential problems and further questions raised by the ERT during the review week, Switzerland submitted estimates of the CH₄ emissions from natural gas in road transportation for 2003–2009 using documented and justified country-specific EFs. As a result, emissions increased by 0.21 Gg CO₂ eq in 2009. The ERT agrees with the revised emission estimates and recommends that Switzerland apply these EFs in its next annual submission together with the supportive documentation.

Oil and natural gas: liquid fuels – CO₂, CH₄ and N₂O

52. Switzerland uses the notation key “NO” for fugitive emissions of CO₂ and CH₄ from oil transport, even though it is evident that there are refinery activities in the country. There is no information provided in the NIR to support the reporting that no CH₄ emissions occur from oil transport in Switzerland. During the review, the Party explained that it has been in contact with the refineries and that, according to information received directly from the Swiss refinery, the tightness of the pipelines has to be tested regularly in the framework of the national security system for the pipelines and that no leakages have ever been detected. The ERT recommends that Switzerland include, in its next annual submission, verifiable information supporting the assertion that no CH₄ emissions from oil transport occur in the country.

53. Switzerland used the notation key “NO” for N₂O emissions from flaring of oil even though AD are reported. There is no information provided in the NIR that such emissions are not applicable for Swiss conditions. The ERT, therefore, strongly recommends that Switzerland report, in its next annual submission, N₂O from flaring of oil using national EFs or default EFs provided by the IPCC good practice guidance or provide justifiable information supporting that no N₂O emissions from flaring of oil are applicable to Switzerland.

C. Industrial processes and solvent and other product use

1. Sector overview

54. In 2009, emissions from the industrial processes sector amounted to 3,221.04 Gg CO₂ eq, or 6.2 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 217.03 Gg CO₂ eq, or 0.4 per cent of total GHG emissions. Since the base year, emissions have decreased by 4.9 per cent in the industrial processes sector, and decreased by 53.6 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial processes sector are a decrease of cement production due to the economic situation, the cessation of aluminium production in 2006, a decrease in emissions of non-methane volatile organic compounds (NMVOCs) from the solvent and other product sector due to regulation and taxation which resulted in a decrease of indirect emissions of CO₂ from decomposition of NMVOC in the atmosphere. However, consumption of halocarbons and SF₆ increased significantly. Within the industrial processes sector, 57.5 per cent of the emissions were from mineral products, followed by 32.0 per cent from consumption of halocarbons and SF₆, 5.3 per cent from metal production and 5.1 per cent from chemical industry.

55. The Party has made recalculations for the industrial processes sector between the 2010 and 2011 submissions in response to the 2010 annual review report, following

changes in AD and EFs, and in order to rectify identified errors. The impact of these recalculations on the industrial processes sector is a decrease of 0.1 per cent. The main recalculations took place in the following categories:

- (a) N₂O emissions from nitric acid production due to use of a new country-specific EF bases on measurements and corrections made to the errors in AD;
- (b) HFC emissions from consumption of halocarbons and SF₆ due to the use of new EFs and new parameters in the calculation models.

56. The Party has made recalculations for the solvent and other product use sector between the 2010 and 2011 submissions following changes in AD and EF for NMVOC emissions from impregnation of mineral wools and due to reallocation of indirect CO₂ emissions (see para. 69 below). The impact of these recalculations on the solvent and other product use sector is a decrease in emissions of 46.6 per cent for 2008.

57. The ERT noted some issues relating to completeness and transparency in the industrial processes sector as well as in the solvent and other product use sector in Switzerland's inventory. With regard to completeness, CH₄ emissions from carbide production were missing, as explained in paragraph 68 below. With regard to transparency, methods and data used to calculate emission estimates are generally not explained sufficiently in the NIR. The explanation of rationale and methods for recalculations are also insufficient in the NIR. The ERT reiterates the recommendation from the previous review report that Switzerland provide information on the AD and EFs used, including the rationale for their use, in the NIR of its next annual submission.

58. Switzerland has addressed some of the recommendations from previous review reports, such as the correction of the use of notation keys for CO₂ emissions from pig iron, sinter, coke in iron and steel production and ferroalloys, as well as the recalculation of CO₂ emissions from carbide production based on rechecked AD and EFs. However, Switzerland has not fully implemented some other recommendations, such as the improvement of the method and/or explanations of the method used for estimating CO₂ emissions from brick and tiles production, as explained in detail in the paragraphs on each category, below.

2. Key categories

Cement production – CO₂

59. Switzerland calculates CO₂ emissions from cement production based on clinker production with a country-specific EF which takes into account the composition of raw material (tier 2 method). The country-specific EF used is constant at 0.525 t CO₂/t clinker for 1990–2004, and fluctuates between 0.528 t CO₂/t clinker and 0.531 t CO₂/t clinker from 2005 onwards and the value of 0.529 t CO₂/t clinker is reported in 2009. Throughout the time series, the EF used is higher than the IPCC default value (0.51 t CO₂/t clinker). Switzerland explains in the NIR that the correction factor for cement kiln dust is 1.00 because no cement kiln dust is lost in cement plants in Switzerland. Switzerland also calculates CO₂ emissions from blasting operations during the digging of limestone using a country-specific method, and adds them to CO₂ emissions from clinker production. The ERT commends Switzerland for its effort to include these emission estimates, which are not necessarily required to be reported, and encourages Switzerland to provide more information in its next annual submission on these emissions (e.g. the measurement data used for developing the country-specific EFs) to enhance the transparency of the inventory.

Limestone and dolomite use – CO₂

60. Switzerland has calculated CO₂ emissions from brick and tile production based on the produced amount (tonnes of bricks and tiles) multiplied by an EF of 0.08 t CO₂/t bricks

and tiles. This approach is based on a statement from the industry, which claims that 4–12 per cent of the amount produced is emitted as CO₂. The previous review report recommended that Switzerland either provide a detailed justification for this assumption or estimate CO₂ emissions from brick and tile production in accordance with the Revised 1996 IPCC Guidelines. The current ERT found that this recommendation was not implemented, but also noted that a planned improvement on this issue is briefly mentioned in the NIR.

61. In response to a question raised by the ERT during the review, Switzerland informed the ERT that FOEN has established an agreement with the Swiss association of brick and tile manufacturers to provide information on raw materials used. Switzerland further explained that, in 2012, it should receive data of the carbonate-containing raw material employed and their respective CO₂ EFs, as well as related background information for the production years 2011 and 2012. The association is also expected to provide more information about the carbonate content of the raw material for the time period 1990–2010. Switzerland informed the ERT of its plan to perform a recalculation for the entire time series between 1990 and 2011 for the submission in 2013 based on the information from the association. The ERT welcomes this effort. The ERT recommends that Switzerland implement the recalculation as planned and report on the progress in this effort in the NIR of its next annual submission.

Consumption of halocarbons and SE₆ – HFCs

62. This category has been identified as a key category according to both level and trend assessments. Refrigeration and air-conditioning equipment accounts for the largest share of emissions, making up 70 per cent of the total emissions from this category. Switzerland calculates actual emissions of HFCs from refrigeration and air-conditioning equipment using individual emission models for each of the various equipment types in which country-specific EFs are used.

63. During the review week, Switzerland reported that the disposal loss EFs for mobile air-conditioning equipment are not correctly applied in the calculation models. Namely, the disposal loss EFs are mistakenly multiplied with the initial charge, not with the remaining refrigerant fraction at the end of the equipments' lifecycle. This results in an overestimation of the emissions from disposal. Switzerland informed the ERT that it will correct the error and recheck the assumptions for the emission models for mobile air-conditioning equipment in order to make sure that the calculation models and the NIR description are consistent in all details. The ERT welcomes this plan, and recommends that Switzerland implement it and report its results in the next annual submission.

Solvent and other product use – N₂O

64. Switzerland reports N₂O emissions from use of N₂O for anaesthesia and from aerosol cans in this sector. However, the method and data used to calculate these N₂O emissions are not presented in the NIR. In response to a question raised by the ERT, Switzerland explained that these N₂O emissions are calculated using the number of inhabitants as AD, and provided the ERT with the data for the EFs in terms of g N₂O/inhabitant. The ERT noted that the EFs for aerosol cans are constant throughout the time series from 1990 to 2009, but the EFs for anaesthesia decreased from 1990 to 2004 and increased after 2004. Switzerland explained that the data for N₂O use in anaesthesia were taken from sales information from a private company for the years 1990, 2001, 2002, 2003 and 2004, and also that projections were made for the year 2020 based on the information obtained from a distributor of anaesthesia. The EFs for the years from 1991 to 2000 were estimated by interpolation of data for 1990 and 2001, and for the years after 2004 by interpolation of data for 2004 and 2020. The ERT recommends that Switzerland make efforts to collect data/information to verify the emission estimates for the recent years

(in particular since 2008) and make recalculations if necessary in the next annual submission.

3. Non-key categories

Nitric acid production – N₂O

65. Switzerland made a recalculation for this category, which resulted in estimates of N₂O emissions that are lower than those previously reported by more than 60 per cent throughout the time series from 1990 to 2008. However, the EF is reported as confidential (“C”) and the explanation about this recalculation in the NIR is not sufficiently transparent to justify the remarkable decrease in the estimates of N₂O emissions. In response to a question raised by the ERT during the review, Switzerland explained that there are two reasons for this recalculation. One reason is that the emission estimates in the previous submission were found to be overestimates owing to incorrect use of AD. The other reason is that a new country-specific EF has been developed on the basis of measurements made in 2009. The new, confidential, EF is lower than the 5 kg N₂O/t nitric acid produced EF which was previously used by Switzerland. Having been given access to the confidential data during the review week, the ERT appreciates this explanation and agrees to it. The ERT encourages Switzerland to improve its explanation of the recalculations in the NIR to enhance transparency, while paying due attention to the confidentiality of data obtained from plant operators.

Carbide production – CO₂

66. Following a recommendation of the previous review report, Switzerland investigated the method and data used to calculate CO₂ emissions from silicon carbide production, and found that incorrect AD were used in the previous submissions from 1990 to 2007. In addition, Switzerland has successfully obtained data for silicon carbide production data and CO₂ emissions for the years 2008 and 2009 from the company producing silicon carbide. Therefore Switzerland has made recalculation for this category, which resulted in an increase in the reported amount of CO₂ emissions for the entire time series from 1990 to 2008. For example, CO₂ emissions in 2008 are reported to be 20.53 Gg in the 2011 submission while they were reported to be 14.94 Gg in the 2010 submission. The ERT commends the Party for these improvements.

67. The ERT was provided with access to the confidential EF and found that the IEFs for the years 2008 and 2009 are lower than the EFs used for the years before 2008 by more than 40 per cent. As mentioned in paragraph 66 above, the data for silicon carbide production and CO₂ emissions for the years 2008 and 2009 were directly obtained from the company producing silicon carbide while the data for the previous years were estimated using assumptions that are not entirely clear. The ERT concluded that this is not likely to have resulted in an underestimation of the emissions in 2008 and 2009, and that it is likely to be an overestimation of the emissions for the years before 2008. The ERT encourages Switzerland to collect more information, particularly on silicon carbide production and CO₂ emissions for the years before 2008, with a view to ensuring time-series consistency and report on progress in its next annual submission.

Carbide production – CH₄

68. Switzerland use the notation key “NO” for CH₄ emissions from carbide production, but did report CO₂ emissions from silicon carbide production. According to the Revised 1996 IPCC Guidelines, petrol coke use in the silicon carbide process may result in CH₄ emissions, and EFs of 10.2 kg/t petrol coke and 11.6 kg/t carbide production are suggested. In response to the list of potential problems and further questions raised by the ERT during

the review week, Switzerland submitted revised CRF tables including estimates of CH₄ emissions from carbide production calculated using the IPCC default EF (11.6 kg/t carbide production). As a result, emissions from this category increased by 2.83 Gg CO₂ eq in 2008 and 1.86 Gg CO₂ eq in 2009. The ERT agrees with the revised emission estimates and recommends that Switzerland apply these EFs in its next annual submission.

Solvent and other product use – CO₂

69. Indirect emissions of CO₂ due to the decomposition of NMVOC in the atmosphere were reported by Switzerland in the sector “other” (sector 7), even though the emissions were emitted from the solvent and other product use sector. However, such emissions had been included in the reporting of the solvent and other product use sector in previous submissions and in the Party’s initial report for determining the assigned amount for the first commitment period. The sector other is not included in Annex A to the Kyoto Protocol (and, therefore, emissions from it are not counted for the purpose of the Kyoto Protocol accounting for the first commitment period), but the solvent and other product use sector is included. Therefore the reallocation of emissions from this sector to the sector other results in an underestimation of total national GHG emissions for the purposes of accounting under the Kyoto Protocol. In response to the list of potential problems and further questions raised by the ERT during the review, Switzerland submitted the revised CRF tables in which the indirect emissions of CO₂ from NMVOC are included in the solvent and other product use sector instead of the sector other. As a result, emissions from the solvent and other product use sector increased by 101.07 Gg CO₂ eq in 2008 and 100.34 Gg CO₂ eq in 2009. The ERT agrees to this revision of CRF tables, and recommends that Switzerland continue reporting them in the solvent and other product use sector in future annual submissions.

D. Agriculture

1. Sector overview

70. In 2009, emissions from the agriculture sector amounted to 5,630.15 Gg CO₂ eq, or 10.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 8.1 per cent. The key driver for the fall in emissions is explained by the Party as a reduction in the number of cattle and a reduced input of mineral fertilizers due to the introduction of the “Required standards of Ecological Performance (REP)”. Within the sector, 45.2 per cent of the emissions were from enteric fermentation, followed by 37.5 per cent from agricultural soils and 17.1 per cent from manure management. The remaining 0.3 per cent were from field burning of agricultural residues.

71. Switzerland has made recalculations for the agriculture sector between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD. The impact of these recalculations on the agriculture sector is a decrease in emissions of 0.03 per cent for 2008. The main recalculation took place in the category field burning of agricultural residues (20.0 and 8.0 per cent increase in 1990 and 2008, respectively), where new AD for open burning of branches in agriculture is used. The ERT commends the Party for the thorough documentation of the recalculations made, both in the NIR and in CRF table 8(b).

72. The ERT noted that Switzerland has changed the data source for population of cattle from agricultural census by surveys (which is the source used for the other animal species) to the Swiss federal animal traffic database (TVD). In response to questions raised by the ERT during the review, Switzerland explained that the new data source would be used for 2009 and onward. Switzerland also explained that the total number of cattle in the animal traffic database is slightly different and in another format than in the earlier used data source. The ERT recommends that Switzerland include further information for the change

in the data source in the next NIR and consider whether it is necessary to recalculate the time series for the cattle population data to ensure time-series consistency.

73. The 2011 annual submission of Switzerland is complete. Switzerland reports emissions from rice cultivation and prescribed burning of savannahs using the notation keys “NO” and “NA”. For field burning of agricultural residues, Switzerland reports “NO/NA” for the default subcategories and includes a country-specific subcategory “branches in agriculture and forestry”.

74. Methodologies and EFs used in the inventory are transparently described in the NIR. However, the ERT noted that it is not clear how the split between mature dairy, mature non-dairy and young cattle is done. In response to questions raised by the ERT during the review, Switzerland explained that cattle over 1 year are included in the category “young cattle”, including the bulls used for breeding purposes, and that the category mature non-dairy cattle only includes mature suckler cows in the CRF tables. To enhance the transparency in the CRF tables, the ERT encourages the Party to reorganize its livestock categorization and include only cattle under 1 year in the category “young cattle”.

75. The ERT noted that there are no pending recommendations from previous review reports that are not addressed or included in the improvement plans of the Party. The ERT noted that the previous review report had commented that Switzerland uses a high value for gross energy intake (GEI) for mules and asses (see para. 77 below). Switzerland has mentioned in its 2011 NIR that a revision of this value as a planned improvement. Switzerland has also mentioned plans for standardizing the data format and delivery of agricultural statistics with the Swiss Federal Statistical Office and for the revision of the energy intake estimates of non-cattle animals, particularly mules and asses. The ERT welcomes these planned improvements and recommends that the Party report on their progress in the next annual submission.

2. Key categories

Enteric fermentation – CH₄

76. Switzerland uses a tier 2 methodology for all animal categories with country-specific EFs developed in line with the IPCC good practice guidance.

77. The previous ERT noted that the GEI rate (96.07–127.48 MJ/head/day) for the category mules and asses is high in the Swiss inventory compared with the values reported by the other Parties (60.00–143.14 MJ/head/day). In response to questions raised by the ERT during the review, Switzerland stated that asses, ponies and smaller horses are treated as horses between 1 and 2 years (weight of 200 kg) whereas mules are treated as horses between 2 and 3 years (weight of 300 kg) in the calculations. The ERT considers this approach is overly conservative mainly because the original feeding recommendations for horses are very high. The ERT reiterates the recommendation in the previous review report that Switzerland investigate the appropriateness of this GEI rate and document the outcome in its next annual submission.

Manure management – CH₄ and N₂O

78. Switzerland uses a tier 2 methodology for estimating CH₄ emissions from manure management for all animal species in line with the IPCC good practice guidance. GEI values for cattle used for the calculation of the country-specific daily volatile solids excreted are consistent with the GEI values used for estimating CH₄ from enteric fermentation in cattle. The IPCC default values from the IPCC good practice guidance and the Revised 1996 IPCC Guidelines are used for the MCFs. The ERT commends Switzerland for the improvements in the documentation of the appropriateness of the MCFs

used in the different manure management systems in the NIR, which have been made in response to a recommendation in the previous review report.

Agricultural soil emissions – N₂O

79. Switzerland uses a constant area estimate for histosols for all years (17,000 ha). The estimate for cultivated histosols in the agricultural sector is based on a literature study conducted by Leifeld et al., 2003.⁷ During the review, in response to questions raised by the ERT Switzerland stated that the estimate of organic soils reported under cropland and grassland in the LULUCF sector is based on two categories of the digital soil map. For the 2011 submission the amount of organic soils under cropland and grassland estimated in the LULUCF sector was close to 17,000 ha. Furthermore, if the digital soil map is superimposed with the data of the Swiss land use statistics 1992/1997 (ASCH2⁸), organic soils under cropland and grassland would amount approximately 17,600 ha. The ERT recommends that the Party ensure that the histosol area used for calculating direct N₂O emissions from agricultural soils is consistent with the area used in the LULUCF sector and also recommends that Switzerland include relevant documentation in its next annual submission to improve the consistency of its reporting.

80. In the 2011 NIR Switzerland states that the fraction of synthetic fertilizer nitrogen (N) that volatilizes as ammonia (NH₃) (Frac_{GASF}) has declined considerably due to a reduction of the use of urea and sewage sludge, which both have a high NH₃ EF. The ERT recommends that Switzerland report the Frac_{GASF} as specified in CRF table 4.D as “Fraction of synthetic fertilizer N applied to soils that volatilizes as NH₃ and nitrogen oxides (NO_x). In the specific case of Switzerland synthetic fertilizers would encompass urea and other synthetic fertilizers but not sewage sludge and compost. Both NH₃ and NO_x emissions should be included in the Frac_{GASF} as reported in CRF table 4.Ds2. Furthermore, the ERT recommends that the Party include, in its next annual submission, further relevant information as necessary to explain the differences between the country-specific approach and the IPCC good practice guidance approach (tier 1b). The Party is also recommended to give a clear description in the CRF documentation box of the Frac_{GASF} and Frac_{GASM} reported, and an oversight in the NIR of all the separate NH₃ EFs used in the calculations.

3. Non-key categories

Field burning of agricultural residues – CH₄ and N₂O

81. In response to a recommendation in the previous review report, Switzerland revised the AD for open burning of branches, which is the only emission source under the category field burning of agricultural residues. More complete information about the AD is now given in the NIR, and a time series based on expert estimate has been given for the amount of branches burned. Information about crop statistics, which are used for the calculation of emissions from crop residues, has been moved from CRF table 4.F to the NIR following a recommendation in the previous review report. The ERT welcomes these improvements since the last submission.

⁷ Leifeld, J, Bassin, S, Fuhrer, J. 2003. Carbon stocks and carbon sequestration potentials in agricultural soils in Switzerland. Schriftenreihe der FAL 44. Zürich-Reckenholz. Available at <<http://www.environment-switzerland.ch/climate/reporting/00545/01913/index.html?lang=en>>.

⁸ Swiss Land Use Statistics, second survey 1992/97

E. Land use, land-use change and forestry

1. Sector overview

82. In 2009, net emissions from the LULUCF sector amounted to 88.56 Gg CO₂ eq, compared with a net removal of 2,725.00 Gg CO₂ eq in the base year. This represents a decrease in the absolute emissions/removals by 103.2 per cent. The key driver for the fall in removals is a reduction in the sink capacity of the forest land remaining forest land due to natural disturbance and timber harvests. Within the sector, a net removal of 1,148.29 Gg CO₂ eq was from forest lands, followed by emissions of 413.22 Gg CO₂ eq from croplands, 345.96 Gg from settlements, 338.79 Gg from grasslands, 14.03 Gg from wetlands and 124.84 Gg from other lands.

83. The Party has made recalculations for the LULUCF sector between the 2010 and 2011 submissions in response to the 2010 annual review report, in order to rectify identified errors and to reflect modifications to the area for different land uses. The impact of these recalculations affected all categories in the LULUCF sector and increased net emissions by 170.0 per cent for 2008. The main recalculations took place in the following categories:

(a) Modification to the AD from the AREA database has led to recalculations due to changes in all land use category areas for the LULUCF sector most significant for grassland category;

(b) Forest land (land converted to forest land), due to the correction of an error for living biomass carbon stock changes;

(c) Forest land (wildfires in forest lands), due to a correction in the amount of burned biomass.

84. Switzerland uses tier 3 geographically explicit land use data from the AREA database to transparently and consistently report land-use transitions for the LULUCF sector and for reporting of areas under KP-LULUCF.

85. The reporting of carbon stock changes across all land-use categories is generally complete. Where it is assumed that emissions/removals do not occur, supporting documentation is provided to justify these assumptions (e.g. for the net carbon stock changes in mineral and organic soils for forest land; biomass for cropland remaining cropland; dead organic matter (DOM) in most land areas and conversion categories; direct N₂O from nitrogen (N) fertilization; non-CO₂ emissions of wetlands; CO₂ from agricultural lime application to grassland; and biomass burning for all categories except forest land). The ERT concluded that some further information is needed to support some of the notation keys (e.g. "NO" for biomass burning) and that the emissions from organic forest soils (reported as "NO") should be reported in the next annual submission (see para. 89 below).

86. The AD and methods used for estimating carbon stock changes in all land use categories are transparently documented in the NIR. The ERT noted the inclusion in the NIR of new information verifying the assumptions used in calculating soil carbon stock changes and on carbon stocks for all pools prior to and after land-use transitions (see para. 91 below). The ERT acknowledges that these improvements enhance the transparency of the reporting of carbon stock changes for the LULUCF sector.

87. The ERT noted that Switzerland has addressed most of the previous recommendations and has provided additional information on soil carbon sampling and modelling to justify the approach used for reporting soil carbon stock changes. However, the Party has not yet provided a rationale to support the assumption that wildfires only occur in forest lands or an explanation of why fires in lands converted to forest land are reported in the forest land remaining forest land category. The ERT reiterates the

recommendation of the previous review report that Switzerland provide information to support these assumption in its next NIR.

2. Key categories

Forest land remaining forest land – CO₂

88. The gains–losses (tier 2) methodology used to estimate biomass stock changes in forest land is well described in the NIR. Switzerland uses a three-year moving average to account for inter-annual variations brought about by climatic and other disturbance effects. The AD for the entire time series (forest area based on AREA database), country-specific biomass expansion factors and other conversion factors for different forest subcategories used in the calculation of biomass and DOM carbon stock changes are transparently documented in the NIR and CRF tables. The derived IEFs for biomass (0.17 Mg C/ha) and DOM (0.14 Mg C/ha) are within the range of those reported for other reporting Parties (biomass range –0.02 to 1.4 Mg C/ha; DOM range –0.001 to 0.35 Mg C/ha), particularly the neighbouring Parties. The ERT considers that the Party’s use of, and reporting of, methods and AD is in line with the IPCC good practice guidance for LULUCF.

89. Emission/removals for mineral soils are reported as “NO”. The ERT commends the Party for the ongoing and planned improvement to the country-specific soils model that enable assumptions to be transparently verified. Similarly, emissions from drained organic soils are consistently reported as “NO” for both forest land remaining forest land and forest management activities under KP-LULUCF, although it was confirmed by the Party during the review that emissions could actually occur (see para. 111 below). The ERT recommends that the Party report emissions from this pool in CRF table 5.A in its next annual submission.

Land converted to forest land – CO₂

90. Carbon stock changes in mineral soil are reported as “NO” in this category, but are reported for afforestation and reforestation areas under Article 3, paragraph 3, of the Kyoto Protocol. Similarly, the emissions from organic soils are reported as “NO” for emissions due to previous drainage of land before 1990. The ERT recommends that the Party harmonize the reporting of pools to ensure consistent reporting under both the Convention and under the Kyoto Protocol.

91. The previous ERT requested a table clearly showing carbon stocks for different pools before and after transitions and different land-use categories into forest land to improve the transparency of the reporting. Following these recommendations the Party has now included additional tables and information to improve transparency. The ERT commends the Party for this improvement.

3. Non-key categories

Wetlands – CO₂

92. Over the time series there is a 482 per cent change in emission/removals for the category wetlands and this transition goes from a removal of 3.67 Gg CO₂ eq in 1990 to a net emission of 14.03 Gg CO₂ eq in 2009. The ERT could not determine the factors causing this change. The ERT recommends the Party to provide transparent information explaining the changes in emissions/removals from wetlands over the time series.

93. The ERT noticed that biomass stock changes in wetlands include groups of trees using unproductive forest land carbon stock values. It is unclear from the NIR how groups of trees are distinguished by forest land in the AREA database. There is a potential risk of

double counting of emissions/removals in the LULUCF sector if the land use definitions and AD used cannot distinguish between groups of trees and forest land. The ERT, therefore, recommends that the Party provide clarification, in its next annual submission, of how the methods used for the spatial representation of all lands can distinguish between tree groups under wetlands and forest parcels under forest lands.

N₂O emissions from disturbance associated with land-use conversion to cropland – N₂O

94. Tier 1 methods and EFs, and AD from the AREA database are used to estimate N₂O emissions from disturbance associated with land-use conversions to cropland are transparently documented in the NIR. The Party reports only N₂O emissions from mineral soils for conversions of forest land and grassland into cropland. It is not clear in the NIR why emissions for other land conversions are reported as “NO”, when areas are reported in CRF table 5(III). The ERT recommends that the Party either include documentation on the notation key or report emissions in these categories using tier 1 approaches (e.g. using equation 3.3.14 and information in the IPCC good practice guidance for LULUCF) in its next annual submission.

F. Waste

1. Sector overview

95. In 2009, emissions from the waste sector amounted to 614.16 Gg CO₂ eq, or 1.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 37.9 per cent. The key driver for the fall in emissions is the prohibition on disposal of organic waste to landfill and the promotion of waste recycling. Within the sector, 39.0 per cent of the emissions were from wastewater handling, followed by 34.5 per cent from solid waste disposal on land, 19.4 per cent from other and 7.1 per cent from waste incineration.

96. The Party has made recalculations for the waste sector for the entire time series in order to rectify identified errors. The impact of these recalculations on the waste sector is a decrease in emissions of 3.6 per cent for the inventory year 2008. The main recalculations took place in solid waste disposal on land due to the replacement of the rounded number used in the previous submission by exact figures. The ERT concluded that the recalculations are explained and that the methods are consistently applied over the time series.

97. The inventory of the waste sector covers: CH₄ emissions from managed waste disposal on land; CH₄ and N₂O emissions from domestic and industrial wastewater; and CO₂, CH₄ and N₂O emissions from waste incineration. The other emissions and AD are reported as “NO” or “IE”.

98. The information of methods used, AD, EFs and assumptions in the NIR and the CRF tables are generally complete and transparent. However, the ERT noted some issues that could be further improved, as follows: the reporting of category other (waste) in the CRF tables could be further disaggregated to the subcategories it covers to ensure transparency of reporting (see para. 104 below). In addition, the ERT noted that the use of the notation keys in the CRF tables should be revisited and recommends that Switzerland replace the notation key “IE” by the actual AD for industrial wastewater and change the notation key “NO” for recovery to “IE”, in order to indicate that the recovery is already accounted for in the reported emissions for industrial wastewater.

99. The ERT noted that some of the recommendations in the previous review report have been implemented, such as the inclusion of the additional information to CRF table 6.A. However, some recommendations are still pending and are, therefore, reiterated in the category-specific sections below.

2. Key categories

Solid waste disposal on land – CH₄

100. For estimating the emissions for this key category Switzerland used the IPCC first order decay model for a multiphase system with three different types of waste (MSW, construction waste and sewage sludge). There were no unmanaged landfills in Switzerland and emissions were only for managed landfills. The reporting also includes gas from flaring, while the recovery amount for cogeneration or heating purposes was subtracted from the reported emissions and the resultant emissions were reported in the energy sector. The ERT noted that 2009 is the first year that AD for waste disposal at solid waste disposal sites is reported as “NO” as a result of the continuous application of the waste legislation (Swiss Waste Management (BUS 1986) and the Waste Concept for Switzerland (SAEFL 1992)).

101. The NIR reported that the value for degradable organic carbon (DOC) of MSW is based on country-specific waste composition. In the previous review report it was recommended that Switzerland include further information on the yearly waste composition and DOC calculation in the next annual submission. The ERT acknowledges that this information has been provided in the NIR, table 8-4.

102. Methane recovery in CRF table 6.A is currently reported as “NO”, while it is actually already accounted for in the reported net emission estimates (see para. 100 above). The ERT recommends that Switzerland report the actual values for both emissions and recovery to allow cross-checks with the data reported in the energy sector or, at a minimum, use the correct notation key “IE” with the relevant explanation in its next annual submission.

Wastewater handling – N₂O

103. Switzerland reported N₂O emission from wastewater handling, using the IPCC default method and including the emissions from domestic and commercial wastewater. The ERT found that the same value for protein consumption for the years 1990–2007 has been used in the 2011 submission despite the recommendation of the previous review report that the Party use protein consumption on a yearly basis from the Food and Agriculture Organization of the United Nations (FAO) database, FAOSTAT. In response to questions raised by the ERT during the review, Switzerland explained that it plans to do so in the next annual submission. The ERT reiterates the recommendation of the previous review report that the Party use the year-specific data from FAOSTAT database in the next submission in order to improve the accuracy of the estimates and recommends that Switzerland include year-specific data for protein consumption for the time series in the NIR and add relevant information in the documentation box of CRF table 6.B accordingly.

Other (waste) – CH₄

104. The CH₄ emissions from composting and digesting organic waste were identified as a key category by trend. The Party used a country-specific method with statistical data to estimate emissions and emissions accounted for 118.92 Gg CO₂ eq in 2009 which is a 225.4 per cent increase from the base year, explained by the prohibition on disposal of organic waste to landfill. Since the CRF does not contain a separate reporting table for category 6.D, the ERT recommends that Switzerland add further information on the category in the documentation box in CRF table 6 and report emissions of each subcategory separately in order to improve transparency of reporting.

3. Non-key categories

Wastewater handling – CH₄

105. CH₄ emissions from wastewater handling are reported from industrial wastewater and domestic and commercial wastewater. Industrial wastewater from industrial processes was pretreated on site before being fed into the sewage system. Switzerland reported onsite pretreatment-related emissions under industrial wastewater and final treatment of all wastewater in domestic and commercial wastewater. A country-specific method was used for both categories. The ERT noted that the EF used in industrial wastewater treatment was from EMIS in terms of emissions per inhabitant. The EF was not sufficiently documented in the NIR and the ERT recommends that Switzerland describe in more detail the information on the acquisition of country-specific EFs in its next annual submission. The ERT further recommends that the Party revise its reporting of the industrial wastewater, including information on the AD and also the additional information, as requested in CRF table 6.B.

Waste incineration – CO₂, CH₄ and N₂O

106. Emissions from waste incineration with energy recovery were reported in the energy sector (fuel combustion activities) in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. The category includes incineration of hospital waste, illegal waste, insulation materials from cables and crematoria. For the estimation, Switzerland used the tier 2 method with country-specific EFs from the EMIS 2011/6C database and the core inventory of air emissions (CORINAIR). Emissions decreased from the base year by 38.9 per cent. Since 2002, due to the closure of the hospital waste incinerator, all hospital waste was incinerated in MSW incineration plants. The ERT commends the efforts of Switzerland for ensuring completeness of its reporting for the sector.

G. Other sectors

107. Switzerland reported emissions of CO₂, carbon monoxide (CO), NO_x, NMVOC and sulphur dioxide (SO₂) from fire-damaged estates and fire-damaged motor vehicles under this sector (sector 7). The total emissions from this sector amounted to 13.00 Gg CO₂ in 2009, and have increased by 18.6 per cent since 1990. The methodology used is described in chapter 9 of the NIR. The ERT commends Switzerland for its efforts to develop emission estimates from this category in its annual submission. The ERT noted that CH₄ and N₂O emissions from these categories are assumed to be zero and are reported as “NO”. The ERT believes that some emissions of CH₄ and N₂O should occur and, therefore, the ERT reiterates the encouragement made in the previous review report that Switzerland report CH₄ and N₂O emissions from this category in its next annual submission or use the notation key “NE” instead.

108. In the inventory submitted on 15 April 2011, Switzerland included in this sector the indirect emissions of CO₂ due to atmospheric decomposition of NMVOC emitted from the solvent and other product use sector. The ERT noted that, in previous inventory submissions (including the initial report for determining the assigned amount for the first commitment period) Switzerland had included those emissions in the solvent and other product use sector, not in the sector other. In view of the fact that emissions reported under this sector are not accounted for under the Kyoto Protocol, the ERT considers that the reallocation of the indirect emissions of CO₂ from the solvent and other product use sector to the sector other results in an underestimation of total national GHG emissions during the first commitment period under the Kyoto Protocol. In response to the list of potential problems and further questions raised by the ERT during the review, Switzerland submitted

revised CRF tables in which the indirect emissions of CO₂ from NMVOC are included in the solvent and other product use sector instead of in this sector (see also para. 69). The ERT agrees to this revision of the CRF tables, and recommends that Switzerland continue to report these emissions in the solvent and other product use sector in its future annual submissions.

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

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

Overview

109. Switzerland provided the general, land-specific and activity-specific information for activities under Article 3, paragraph 3 and 4, of the Kyoto Protocol in line with the requirements of the annex to decision 15/CMP.1.

110. Switzerland has reported afforestation, reforestation and deforestation under Article 3, Paragraph 3, of the Kyoto Protocol and has reported forest management, which it has elected, under Article 3, paragraph 4 of the Kyoto Protocol. Switzerland chose to account annually for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The forest definition chosen by Switzerland is: minimum land area of 0.0625 ha; minimum tree crown cover of 20 per cent; and minimum tree height of 3 m or a potential to reach 3 m in situ. The ERT concluded that emission/removals from different pools are generally complete and transparently reported. The Party provides justification on why certain pools are omitted from the KP-LULUCF inventory (e.g. mineral soils). This is in line with the requirements of the IPCC good practice guidance for LULUCF and the annex to decision 15/CMP.1.

111. Switzerland reports emissions from drained organic soils under afforestation, reforestation and forest management as “NO”. According to the IPCC good practice guidance for LULUCF, the reporting of emissions from organic soils is mandatory if the lands are drained or have been previously drained. In response to questions raised by the ERT during the review, the Party informed the ERT that drainage of forest land is prohibited by law according to the Swiss Forest Act (1991) and the Article on the Protection of Bogs and Fens (1987). However, it acknowledged that drainage of these lands has occurred prior to the introduction of these acts, but there is currently no AD to determine the extent of drainage of organic soils. The ERT recommended that the Party update its submission to reflect complete inclusion of organic soils under forest management, and the Party included these estimates in the submitted CRF tables (see para. 121 below).

112. The Party uses information from the national forest inventory (NFI) and the AREA spatial database in the national system for the land-use transition matrix. The same system is used for estimating the representation of area for the identification of the LULUCF categories under the Convention and the activities elected under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The ERT noted that the AREA spatial database that is used to extrapolate temporal and geographical representation to obtain full coverage of land covers 59 per cent of the total area in the 2011 submission, compared with 47 per cent in the 2010 submission. The Party stated that it is envisaged that complete coverage will be obtained by its 2013 annual submission. The ERT welcomes these developments and concludes that the AREA system is sufficient to ensure that these land areas are identifiable in line with paragraph 20 of the annex to decision 16/CMP.1. In addition, the ERT considers the resolution used to detect activities relating to afforestation, reforestation and deforestation

and forest management areas (0.0625 ha) to be consistent with the minimum area as set out in the forest definition.

113. Litter carbon stock change is not included in the afforestation and reforestation or forest management activities in the 2011 submission, however it is included in emissions from wildfires. The Party's justification for this, that the pool does not represent a net source, is provided with the area information based on the NFI data and experimental information. However, the ERT considers that it is plausible that, in some cases, harvesting of lands in forest management could lead to net emissions from the litter pool, due to lower litter inputs and higher decomposition rates, particularly in the years following the previous rotation or in cases when the age class structure of the forest management areas may change. The IPCC good practice guidance for LULUCF (page 3.35) encourages countries "experiencing significant changes in forest types or disturbance or management regimes in their forests to develop country-specific methods." In the text and figures (e.g. fig 11.4) of the NIR, there is evidence of significant disturbance events in the AD of the managed forest category. In response to questions raised by the ERT during the review, Switzerland indicated that a study is on-going and that changes in the litter carbon pools for forest management activities will be integrated in the NIR following completion of the study in autumn 2012. The ERT welcomes this plan. In response to the draft review report, Switzerland explained to the ERT why the litter pool in the afforestation area is not considered a source of emissions, The ERT recommends that Switzerland include this explanation in the next NIR and clearly justify why tier 1 approach is used and the emissions from the litter pool in afforestation area are assumed to be zero. Switzerland also informed the ERT on its plans for the next years to obtain better data for changes of all carbon pools of afforestation area. The ERT encourages Switzerland to accelerate these efforts so that it can clearly demonstrate that the litter pool in afforestation area is not a source.

114. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions in response to the 2010 annual review report and in order to rectify identified errors. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) Net emission from afforestation, reforestation and deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol have increase by 75.8 per cent due to: (i) a correction to the biomass increment of afforestation (from 9.31 to 3.82 Gg); (ii) an increase in the deforested area (from 4.65 kha in the previous submission to 7.97 kha in the 2011 submission for 2008); and (iii) recalculation of emissions from organic soils following deforestation due to drainage;

(b) Net removals from forest management under Article 3, paragraph 4, of the Kyoto Protocol decreased by 19.9 per cent due to (i) corrections to the biomass increment and to the dead wood pool and (ii) because the mass of available fuel for wild fires was corrected by taking into account also losses in the litter and dead wood pool.

115. The relationship between forest land reported under LULUCF table 5.A and those reported for activities under KP-LULUCF forests is not transparently documented. The NIR does document that some forest land areas reported under the Convention are excluded from the afforested and forest management areas, since the regeneration of these areas is 'not directly human induced' in accordance with the IPCC good practice guidance for LULUCF and decision 16/CMP.1. However, the ERT could not determine how the areas reported under the Convention relate to those under the KP-LULUCF reporting. In particular, it is not clear why, under the KP-LULUCF reporting, the area under forest management is higher than that reported under forest land remaining forest land in CRF table 5.A. The ERT recommends the Party to include a table transparently showing the

relationship between land use reporting under the Convention and under the Kyoto Protocol in its next annual submission.

116. The ERT noted that a detailed description of uncertainty assessments for KP-LULUCF activities is included in the NIR. The ERT welcomes this information, but noted that naturally regenerating forest land is excluded from the assessment. It is, therefore, unclear how the exclusions of these areas may influence the overall uncertainty of the reporting under Article 3, paragraph 4, of the Kyoto Protocol. The ERT encourages Switzerland to include such information in its next annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO₂

117. The emissions and removals of CO₂ from afforestation and reforestation activities under Article 3, paragraph 3, of the Kyoto Protocol are determined using the same methodologies as for the LULUCF reporting, which are transparently documented in the NIR. The ERT also notes the exclusion of some areas which are not deemed to be a direct result of human-induced activity in accordance with the annex to decision 16/CMP.1 The ERT commends the Party for its transparent reporting of different forest subcategories in the CRF tables.

118. During the review, the Party provided evidence that the drainage of forest organic soils in the afforestation and reforestation category are prohibited by law, so CO₂ emissions for this pool are reported as “NO” (also see para. 111 above). The ERT noted that the Party does not exclude the possibility that all land-use categories, with the exception of wetlands converted to forest land since 1990, could have been previously drained.⁹ The ERT was, however, unable to determine the areas of land-use categories converted to forest land due to the lack of transparent documentation on the relationship between the areas of land-use categories reported under the Convention and those reported as subjected to afforestation and reforestation activities under the Kyoto Protocol. The ERT recommends that the Party obtain AD of drained and previously drained land areas to ensure that emissions for this pool are not omitted, unless sufficient information can be provided to demonstrate that this pool does not represent a net source.

Deforestation – CO₂

119. In response to a recommendation in the previous review report, Switzerland has used the data on deforestation area from the AREA spatial database consistently with the afforestation and reforestation activity. The methodology employed to calculate carbon stock changes in different pools is clearly presented in the NIR. The IEFs for deforestation activities are within the ranges reported by Parties with similar forest types. The ERT acknowledges these improvements and commends the Party on its transparent reporting of emissions/removals for this forest activity.

120. In the NIR, the Party describes how harvesting followed by replanting or regeneration is distinguished from deforestation. The Party provided further information during the review, documenting that deforestation only occurs when a loss of forest vegetation cover is permanent. It also mentioned that forests with temporary non-forest cover are reclassified into separate categories under managed forest land with no forest cover (e.g. harvested and regenerating forest, forests harvested for the laying of pipelines and electricity cables). However, the ERT is still unable to clarify what is meant by “non-permanent” because no temporal definition is provided (i.e. it could represent one or 100 years). In addition, the Party does not document the measures undertaken to check whether

⁹ See IPCC good practice guidance for LULUCF, p. 3.60.

these unstocked areas do in fact recover to be classified as forest areas again. For example, if an NFI plot is revisited over three inventory cycles and a previously fully stocked area is temporarily an unstocked area and this consequently remains a temporary unstocked area, is this deemed as deforestation or an open area within a forest boundary. The ERT, therefore, reiterates the recommendations of the previous review report that Switzerland provide more transparent information on: the definition what is meant by “permanently”; the conditions used to determine whether the construction of pipelines, roads or electricity cables does not constitute deforestation; and provide a clearer temporal definition on how deforestation is distinguished from harvesting followed by forest regeneration in accordance with paragraph 8(b) of the annex to decision 15/CMP.1.

Activities under Article 3, paragraph 4, of the Kyoto Protocol

Forest management – CO₂ and N₂O

121. Based on the information provided by Switzerland during the review, the ERT concluded that organic soil drainage on pre-1990 forest land under forest management is likely to occur and the omission of this pool from the inventory presents an underestimation of CO₂ emissions. This is not in line with the IPCC good practice guidance for LULUCF and the annex to decision 15/CMP.1. The ERT acknowledges that this represents a small area (1.09 kha) and that no AD are available. However, the Party has not provided any transparent and verifiable information that emissions from these soils are not a net source, in accordance with paragraph 6(e) of the annex to decision 15/CMP.1. During the review, the ERT recommended that the Party estimate CO₂ emission for the 1.09 kha of managed forest lands, assuming all organic soils were drained prior to 1990 and to use the tier 1 default methodology and EF. In response to the list of potential problems and further questions raised by the ERT during the review week, Switzerland provided estimates for CO₂ emissions from the organic soil pool in managed forest lands, which resulted in a reduction of the overall removals from forest management by 2.72 Gg.

122. Emissions/removals for mineral soils are reported to as “NO” in managed forests. During the previous review, the ERT had recommended that the Party either estimate soil carbon stock changes under the forest management activity or provide strong evidence that these pools are not a net source of CO₂. In the 2011 submission, the Party has provided transparent evidence verifying that mineral soils under forest management are not a net source and, therefore, need not be accounted for in this pool, in accordance with paragraph 6(e) of the annex to decision 15/CMP.1. However, the ERT encourages the Party to include statistical hypothesis testing or probability analysis on the existing soils database to show that these conclusions are statistically justifiable, given the limited number of observation (i.e. sample plots).

123. Emissions of N₂O from drainage of forest soils under forest management have been reported as “NO”. During the review, the Party acknowledged that drainage of both organic and mineral soils did occur prior to the introduction of the Swiss Forest Act. The ERT encourages the Party to collect relevant AD on the drainage of forest land and apply tier 1 methodologies to estimate N₂O emission from these activities using the IPCC good practice guidance for LULUCF (Appendix 3a2). The ERT also recommends that the Party change the notation key (“NO”) in table 5 (KP-II).2 to “NE” because this activity is occurring but it is not estimated.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

124. Switzerland has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the SIAR on the SEF tables and the SEF comparison report.¹⁰ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings and recommendations contained in the SIAR.

125. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with chapter I.E of the annex to decision 15/CMP.1, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements set out in paragraph 88(a-j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

126. The Party has implemented the recommendations of the previous review report, namely, the Party explicitly reported in the NIR non-occurrence of notifications and non-replacements during the reporting period, and also improved the information on confidentiality and the information on Article 6 projects (by providing the public information referred to in paragraphs 44–48 of the annex to decision 13/CMP.1 on its website).

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol

127. Switzerland has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

128. Table 4 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 4

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

	2011 submission ^a		2010 submission ^b	"Net" accounting quantity ^c
	As reported	Revised estimates	Final	
Afforestation and reforestation	-32 113	-32 113	-35 243	3 130
Deforestation	514 888	514 888	172 587	342 301

¹⁰ The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

	2011 submission ^a		2010 submission ^b	"Net" accounting quantity ^c	
	As reported	Revised estimates	Final	Final	
Forest management	-1 839 318	-1 833 870	-1 833 870	-854 106	-979 764
Article 3.3 offset ^d	0		0	0	0
Forest management cap ^e	-1 839 318	-1 833 870	-1 833 870	-854 106	-979 764
Cropland management	NA		NA	NA	NA
Grazing land management	NA		NA	NA	NA
Revegetation	NA		NA	NA	NA

Abbreviation: NA = not applicable.

^a The values included under the 2011 submission are the cumulative accounting values for 2008 and 2009 as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2009.

^b The values included under the 2010 submission are the final accounting values as a result of the 2010 review and are included in table 4 of the 2010 annual review report (FCCC/ARR/2010/CHE, page 31).

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

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

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

129. Based on the information provided in table 4 for the activity afforestation/reforestation, Switzerland shall cancel 3,130 assigned amount units (AAUs), emission reduction units (ERUs), certified emission reduction units (CERs) and/or removal units (RMUs) in its national registry.

130. Based on the information provided in table 4 for the activity deforestation, Switzerland shall cancel 342,301 AAUs, ERUs, CERs and/or RMUs in its national registry.

131. Based on the information provided in table 4 for the activity forest management, Switzerland shall issue 979,764 RMUs in its national registry.

National registry

132. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and has been submitted in accordance with the annex to decision 15/CMP.1. The ERT further noted from the SIAR and its finding that the national

registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry also has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

Calculation of the commitment period reserve

133. Switzerland has reported its commitment period reserve in its 2011 annual submission. Switzerland reported that its commitment period reserve has not changed since the initial report review (218,554,562 t CO₂ eq), as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

134. Switzerland reported that there are changes in its national system since the previous annual submission, including: a change of contractor for providing data on the split of the energy consumption for the industrial and other sectors; an improved recalculations log that is automatically compiled in a log file; an expanded role for the quality management system which includes the national registry; and the expanded mandate of the NISSB which now also covers the national registry. The ERT concluded that, taking into account the reported changes in the national system, Switzerland's national system continues to be in accordance with the requirements of national systems set out in decision 19/CMP.1.

4. Changes to the national registry

135. Switzerland provided information on changes to its national registry in its annual submission. Switzerland reported a change of name and contact information of the registry administrator designated by the Party. The ERT concluded that, taking into account the confirmed change in the national registry, Switzerland's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. The ERT recommends that the Party report in its next annual submission any change(s) in its national registry, particularly any changes made in its registry database, infrastructure and/or procedures to support a user authentication mechanism as suggested by the ITL Administrator's Change Advisory Board, in accordance with chapter I.G of the annex to decision 15/CMP.1.

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

136. Switzerland reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, in its 2011 annual submission, but it did not identify the changes in its reporting compared with that in its previous annual submission in accordance with decision 15/CMP.1. The ERT recommends that Switzerland include such information in its next annual submission.

137. Switzerland provides information on the context of implementing climate change response measures and indicates that it is not assumed that Swiss climate change policies have any significant adverse economic, social and environmental impacts on developing countries. The ERT noted that, as a response to the previous review report, Switzerland has provided a more detailed description of its policies, including examples and details of policies, actions and projects that relate to the elements listed in decision 15/CMP.1, annex, paragraph 24 (a–f). The ERT welcomes this additional information.

138. The ERT concluded that the information provided in the NIR is generally complete and transparent and recommends that the Party, in its next annual submission, report any changes in its information provided under Article 3, paragraph 14, compared with the previous submission as required by paragraph 25 of the annex to decision 15/CMP.1.

III. Conclusions and recommendations

139. Switzerland made its annual submission on 15 April 2011. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol units, and changes to the national system and the national registry and minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol). This is in line with decision 15/CMP.1.

140. The ERT concludes that the inventory submission of Switzerland has been prepared and reported generally in accordance with the UNFCCC reporting guidelines. The inventory submission is generally complete and the Party has submitted a complete set of CRF tables for the years 1990–2009 and an NIR; these are complete in terms of geographical coverage, years and sectors, as well as generally complete in terms of categories and gases. Some of the categories, particularly in energy sector (CH₄ emissions from natural gas use in road transportation), industrial processes sector (CH₄ emissions from carbide production), and solvent and other product use sector (indirect emissions of CO₂ due to atmospheric decomposition of NMVOC) were not estimated or reported appropriately. In response to the list of potential problems and further questions raised by the ERT during the review week, Switzerland provided estimates for the missing categories which led to increase of reported emissions from categories included in Annex A to the Kyoto Protocol by 102.42 Gg CO₂ eq.

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

142. The Party's inventory is generally in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT noted that Switzerland made some improvements following the recommendations of previous reviews (e.g. reporting emissions from marine bunker fuels for the first time) and the ERT commends Switzerland for these improvements. On the other hand, the ERT noted there remains some room for further improvement to make the inventory more transparent and in line with Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF by including information on materials used for production of brick and tiles in the industrial processes sector (see paragraphs 60 and 61 above) as well as by including estimates of CO₂ emissions from organic soil drainage on pre-1990 forest land under the forest management under the Kyoto Protocol with supporting information (see paragraph 121 above).

143. The Party has made recalculations for the inventory between the 2010 and 2011 submissions in response to the 2010 annual review report and following changes in AD and EFs. The impact of these recalculations on the national totals is an increase in emissions of 0.1 per cent for 2008. The main recalculations took place in the following sectors/categories:

(a) Manufacturing industry and construction, other sectors, oil and natural gas fugitive emissions (energy sector).

(b) N₂O from chemical industry and HFCs from consumption of halocarbons and SF₆ (industrial processes sector);

(c) Forest land and grassland (LULUCF sector).

144. The ERT concluded that the emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol were generally estimated and reported completely and transparently. The ERT detected the omission of CO₂ emissions from organic soils under forest management. In response to the list of potential problems and further questions raised by the ERT during the review week, Switzerland provided estimates for the missing pool which decreased the net removals from forest management by 2.72 Gg.

145. The Party has made recalculations for the KP-LULUCF activities between the 2010 and 2011 submissions. The impact of these recalculations on each KP-LULUCF activity for 2008 is as follows:

(a) Afforestation /reforestation – net removals decreased by 56.9 per cent;

(b) Deforestation – net emissions increased by 48.7 per cent;

(c) Forest management – net removals decreased by 19.9 per cent.

146. Switzerland has reported information on its accounting of Kyoto Protocol units in accordance with chapter I.E of the annex to decision 15/CMP.1, and used the required reporting format tables as required by decision 14/CMP.1.

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

148. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions.

149. Switzerland has reported information under chapter I.H of the annex to decision 15/CMP.1, “Minimization of adverse impacts in accordance with Article 3, paragraph 14” as part of its 2011 annual submission. However, Switzerland did not provide information on changes in its reporting of the minimization in comparison with the previous annual submission. The information was provided on 15 April 2011. The ERT concluded that the information is generally transparent and complete.

150. The ERT identifies the following cross-cutting issues for improvement:

(a) Further enhance the documentation on the recalculations in the NIR by including the underlying rationale for the change in methods, AD or EFs, and quantified revised emission estimates at a more disaggregated level (see para. 20 above);

(b) Further improve the transparency in the NIR, by providing more detail on the methods and EFs used, particularly for the country-specific EFs that significantly deviate from the IPCC default values and that significantly change over time and by enhancing of the explanation of the time series trends (see para. 23 above);

(c) Improve the cross-sectoral information between the energy and waste sectors (e.g. incineration with energy recovery); and also between the agriculture and LULUCF sectors (organic soils) (see paras. 47 and 79 above);

(d) Perform a quantitative uncertainty assessment for all categories, particularly for all key categories, instead of using default uncertainty values based on qualitative assessment (see para. 18 above);

- (e) Strengthen the QC procedures before the inventory submission (see para. 22 above);
- (f) Use the key category analysis and uncertainty analysis for the prioritization of inventory improvements (see para. 16 above);
- (g) Provide information on any changes that have occurred, compared with previous submissions as required by paragraph 25 of the annex to decision 15/CMP.1. (see para. 138 above).

151. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of the information on each sector presented in Switzerland's annual submission. The key recommendations are that Switzerland:

- (a) Improve the completeness of the reporting by further justifying that N₂O from flaring of gas and refining/storage of oil, as well as CO₂ and CH₄ from oil transport do not occur, or by including estimates of those emissions in the next submission, in the energy sector;
- (b) Correct the errors and recheck the assumptions for the emission models on mobile air-conditioning equipment in order to ensure that the calculation models and the NIR description are consistent in all details, for the industrial processes sector;
- (c) Include in the solvent and other product use sector the indirect emissions of CO₂ due to atmospheric decomposition of NMVOC emitted from the same sector;
- (d) Justify the country-specific Frac_{GASF} value and trend by providing a more transparent explanation of the country-specific approach used for its estimating in agriculture sector;
- (e) Justify the assumption that wildfires only occur in forest lands, and include litter in emissions from wildfires, for the LULUCF sector;
- (f) Include, in the next NIR, information to support the estimates of CO₂ emissions from organic soils from forest management which were provided during the review;
- (g) Obtain AD for drained and previously drained land areas and report consistent emissions from organic soils across both the LULUCF sector and KP-LULUCF activities;
- (h) Improve the transparency of the definitions under deforestation for the KP-LULUCF activities;
- (i) Improve the transparency by including information on yearly waste composition and DOC calculation, by providing the necessary additional information to the CRF tables, by disaggregating the reporting of the country-specific category in the CRF tables and by correcting the use of the notation keys in the waste sector.

IV. Questions of implementation

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

Annex I

Documents and information used during the review

A. Reference documents

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

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

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

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

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

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

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

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

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

Status report for Switzerland 2011. Available at <http://unfccc.int/resource/docs/2011/asr/che.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2011. Available at <http://unfccc.int/resource/webdocs/sai/2011.pdf>.

FCCC/ARR/2010/CHE. Report of the individual review of the greenhouse gas inventory of Switzerland submitted in 2010. Available at <http://unfccc.int/resource/docs/2011/arr/che.pdf>.

UNFCCC. *Standard Independent Assessment Report*, parts I and II. Available at http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Regine Roethlisberger (FOEN), including additional material on the methodology and assumptions used.

The following documents¹ in English were also provided by Switzerland:

Daniel Bretscher and Jens Leifeld. 2008. *Uncertainty of agricultural CH₄ and N₂O emissions in Switzerland*.

T. J. van der Weerden & S. C. Jarvis. 1997. *AMMONIA EMISSION FACTORS FOR N FERTILIZERS APPLIED TO TWO CONTRASTING GRASSLAND SOILS*. Institute of Grassland and Environmental Research, North Wyke, Okehampton, Devon, EX20 2SB, UK. *Environmental Pollution*, Vol. 95, No. 2, pp. 205–211, 1997.

Lukas Mathys (Sigmaplan). 2010. *Deforestation under Kyoto Protocol*. Documentation of implementation.

FOEN, Forest Division, Fedele Giacomo, Rogiers Nele, Volz Richard. 2010. *Deforestations in Switzerland as reported under the Kyoto Protocol Art. 3.3*.

FOEN, Climate division. 2011. Description of the Quality Management System. Supplement to Switzerland's Greenhouse Gas Inventory 1990-2009.

¹ Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
CER	certified emission reduction units
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
DOM	dead organic matter
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
FAO	Food and Agriculture Organization of the United Nations
GEI	gross energy intake
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	Land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kg	kilogram (1 kg = 1,000 grams)
LULUCF	land use, land-use change and forestry
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NE	not estimated
N ₂ O	nitrous oxide
NH ₃	ammonia
NIR	national inventory report
NMVO	non-methane volatile organic compounds
NO	not occurring
NO _x	nitrogen oxides
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
RMU	removal unit
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report
SO ₂	sulphur dioxide
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change