Advance Version

COMPLIANCE COMMITTEE

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23 May 2011

Report of the individual review of the annual submission of Switzerland submitted in 2010

Note by the secretariat

The report of the individual review of the annual submission of Switzerland submitted in 2010 was published on 23 May 2011. For purposes of rule 10, paragraph 2, of the rules of procedure of the Compliance Committee (annex to decision 4/CMP.2, as amended by decision 4/CMP.4), the report is considered received by the secretariat on the same date. This report, FCCC/ARR/2010/CHE, contained in the annex to this note, is being forwarded to the Compliance Committee in accordance with section VI, paragraph 3, of the annex to decision 27/CMP.1.

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Report of the individual review of the annual submission of Switzerland submitted in 2010*

* In the symbol for this document, 2010 refers to the year in which the inventory was submitted, and not to the year of publication.

Contents

I. Introduction and summary

1. This report covers the in-country review of the 2010 annual submission of Switzerland, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 6 to 11 September 2010 in Bern, Switzerland, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Rob Sturgiss (Australia); energy – Ms. Sumana Bhattacharya (India); industrial processes – Ms. Sina Wartmann (Germany); agriculture – Mr. Paul Duffy (Ireland); land use, land-use change and forestry (LULUCF) – Mr. Aleksi Lehtonen (Finland); and waste – Ms. Violeta Hristova (Bulgaria). Ms. Bhattacharya and Mr. Duffy were the lead reviewers. The review was coordinated by Mr. Tomoyuki Aizawa (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), 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.

3. In 2008, the main greenhouse gas (GHG) in Switzerland was carbon dioxide (CO_2), accounting for 84.7 per cent of total GHG emissions [1] expressed in carbon dioxide equivalent (CO_2 eq), followed by methane (CH_4) (7.3 per cent) and nitrous oxide (N_2O) (6.1 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 1.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.2 per cent of total GHG emissions, followed by the agriculture sector (10.7 per cent), the industrial processes sector (6.5 per cent), the waste sector (1.2 per cent) and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 53,403.10 Gg CO_2 eq and increased by 0.4 per cent between the base year[2] and 2010.

4. Tables 1 and 2 show GHG emissions from Annex A sources, emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

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.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[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 2008[a]

			Gg CO_2 eq							*Change*
		Greenhouse gas	*Base year*[a]	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A sources[b]		CO_2	44 710.29	44 710.29	43 511.94	44 118.05	46 204.29	45 744.54	43 793.09	45 233.00	1.2
		CH_4	4 679.51	4 679.51	4 246.65	3 919.52	3 803.44	3 797.05	3 798.56	3 887.21	–16.9
		N_2O	3 532.68	3 532.68	3 395.33	3 316.36	3 219.33	3 234.28	3 248.76	3 265.99	–7.5
		HFCs	0.02	0.02	168.58	417.83	673.59	674.40	693.04	707.12	3 138 689.7
		PFCs	100.21	100.21	14.69	87.86	51.38	55.13	52.77	64.42	–35.7
		SF_6	143.62	143.62	95.00	204.70	244.29	205.50	210.42	245.35	70.8
KP-LULUCF	Article 3.3[c]	CO_2								137.34	
		CH_4								NO	
		N_2O								NO	
	Article 3.4[d]	CO_2	NA							–854.55	NA
		CH_4	NA							0.01	NA
		N_2O	NA							0.00	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 2008

			Gg CO_2 eq								*Change*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2005*	*2006*	*2007*	*2008*	*Base year–2008 (%)*
Annex A		Energy	42 112.36	42 112.36	41 655.87	42 415.01	44 351.81	43 907.14	41 918.43	43 356.29	3.0
		Industrial processes	3 482.95	3 482.95	2 775.17	3 085.29	3 427.54	3 385.89	3 408.13	3 490.38	0.2
		Solvent and other product use	467.93	467.93	367.33	272.73	220.23	218.22	218.80	217.04	–53.6
		Agriculture	6 108.82	6 108.82	5 809.99	5 557.55	5 525.68	5 547.95	5 602.11	5 689.18	–6.9
		Waste	994.26	994.26	823.83	733.74	671.06	651.70	649.17	650.22	–34.6
		Other[d]	10.96	10.96	11.90	12.87	12.95	12.97	12.98	12.99	18.5
		LULUCF	NA	–2 961.85	–3 558.27	990.44	–782.67	706.68	145.45	212.62	NA
		Total (with LULUCF)	**NA**	**50 204.48**	**47 873.91**	**53 054.76**	**53 413.65**	**54 417.58**	**51 942.10**	**53 615.71**	**NA**
		Total (without LULUCF)	**53 166.32**	**53 166.32**	**51 432.19**	**52 064.31**	**54 196.32**	**53 710.90**	**51 796.65**	**53 403.10**	**0.4**
KP-LULUCF	Article 3.3[b]	Afforestation & reforestation								–35.24	
		Deforestation								172.59	
		Total (3.3)								**102.10**	
	Article 3.4[c]	Forest management								–854.11	
		Cropland management	NA							NA	NA
		Grazing land management	NA							NA	NA
		Revegetation	NA							NA	NA
		Total (3.4)	**NA**							**–854.11**	**NA**

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] 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.

[c] 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.

[d] 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.

Table 3
Information to be included in the compilation and accounting database in tonnes of CO_2 equivalent

	As reported	*Adjustment*[a]	*Final*[b]	*Accounting quantity*[c]
Commitment period reserve	218 554 562		218 554 562	
Annex A emissions for current inventory year[d]	53 223 874		53 403 096	
CO_2	45 064 018		45 233 003	
CH_4	3 876 974		3 887 210	
N_2O	3 265 990		3 265 990	
HFCs	707 118		707 118	
PFCs	64 422		64 422	
SF_6	245 351		245 351	
Total Annex A sources	**53 223 874**		**53 403 096**	
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	–35 243		–35 243	–35 243
3.3 Afforestation and reforestation on harvested land for current year of commitment period as reported	NO		NO	0
3.3 Deforestation for current year of commitment period as reported	82 184		172 587	172 587
Activities under Article 3, paragraph 4, for current inventory year[e]				
3.4 Forest management for current year of commitment period	–850 168		–854 106	–854 106
3.4 Cropland management for current year of commitment period	NA		NA	0
3.4 Cropland management for base year	NA		NA	
3.4 Grazing land management for current year of commitment period	NA		NA	0
3.4 Grazing land management for base year	NA		NA	
3.4 Revegetation for current year of commitment period	NA		NA	0
3.4 Revegetation in base year	NA		NA	

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 adjustments.

[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] 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.

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

6. The GHG inventory is generally in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) and 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. The expert review team (ERT) noted that in some cases where country-specific methods and emission factors (EFs) are used, transparency could be improved by providing clearer or more detailed explanation in the national inventory report (NIR).

7. The 2010 inventory submission is generally of a high quality and shows significant improvement in the major issues (see para. 35). However, the ERT identified a need for further improvements in the following areas:

(a) The enhancement of the transparency of the NIR through the provision of additional information on methods, sources of data and activity data (AD);

(b) The enhancement of the transparency of the recalculations for each category through the provision of recalculated data at a more disaggregated level in the NIR;

(c) The enhancement of the quality assurance/quality control (QA/QC) system through the development of tools, for example, to provide systematic analysis of the comparability between inventory submissions and the completeness of sectoral emission estimates;

(d) More effective consideration of recommendations of previous review reports by the national system;

(e) The inclusion of an energy balance for Switzerland in the NIR;

(f) The need to ensure the successful completion of the AREA (Swiss land-use statistics) database image interpretation in order to fulfil the requirements of the Kyoto Protocol without the use of extensive extrapolation techniques.

8. By submitting the revised inventories and supplying the additional information requested by the ERT, Switzerland has demonstrated sufficient capacity to comply with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

9. Switzerland has submitted supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol generally in accordance with chapter I of the annex to decision 15/CMP.1.

10. Switzerland has chosen to account for activities under Article 3, paragraph 3, of the Kyoto Protocol annually. Switzerland has elected forest management and chosen annual accounting. Switzerland has reported information on activities under Article 3, paragraph 3, of the Kyoto Protocol and elected activities under Article 3, paragraph 4, of the Kyoto Protocol generally in accordance with decisions 15/CMP.1, 16/CMP.1 and 6/CMP.3.

11. 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 has used the standard electronic format (SEF) tables as required by decision 14/CMP.1.

12. The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1; however, the ERT identified issues that will need to be addressed by the Party, including: the clarification of the roles of the various agencies

involved in the preparation of the inventory; ensuring that the recommendations of the ERT are explicitly addressed; and implementing further enhancements to the QA/QC system.

13. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

14. Switzerland has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its NIR. The ERT encourages Switzerland to further expand on the information currently provided in the NIR by including examples and details of policies, actions and projects that relate to the elements listed in decision 15/CMP.1, in its next annual submission.

15. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission in the industrial processes sector (see para. 20 below) and the transparency of information in relation to the EFs used in the energy sector (see para. 43 below) and in the industrial processes sector (see para. 61 below). Subsequent to the review, Switzerland provided additional information to the ERT including the provision of revised estimates.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

16. The 2010 annual inventory submission was submitted on 15 April 2010; it contains a complete set of common reporting format (CRF) tables for the period 1990–2008 and an 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 SEF tables were submitted on 15 April 2010. The value in this report are those submitted by the Party on 22 October 2010. The annual submission was submitted in accordance with decision 15/CMP.1.

17. Switzerland officially submitted revised emission estimates on 22 October 2010 in response to questions raised by the ERT during the course of the in-country visit. Where necessary, the ERT also used the previous year's submission during the review.

18. 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]

[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 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.

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

Completeness of inventory

20. Switzerland's inventory is complete in terms of sectors, gases and geographical coverage for the years 1990–2008. The ERT notes, however, that for certain energy categories, a small amount of emissions that should be attributed to Liechtenstein have been attributed to Switzerland. The inventory is generally complete with respect to categories for the period 1990–2008, except for the following categories for which Switzerland did not estimate emissions in its 2010 submission:

(a) CO_2 from limestone and dolomite use;

(b) CO_2 from soda ash production and use;

(c) CO_2 from glass production.

21. After the in-country review, estimates or the revised use of notation keys for these categories were provided by Switzerland in response to the list of potential problems and further questions formulated by the ERT during the in-country review.

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

Overview

22. Switzerland described the changes in the institutional arrangements and national system since the previous annual submission in its NIR. The changes relate to a change in the structure of the Federal Office for the Environment (FOEN), revisions to the quality management system (QMS) and a change in the contract arrangement governing the supply of data/modelling in the energy sector. Changes in the national system are described in chapter II.G.3.

23. The ERT concluded that the national system continues to perform its required functions in accordance with Article 5, paragraph 1, of the Kyoto Protocol.

Inventory planning

24. During the review, Switzerland explained the national system for the preparation of the inventory. FOEN has overall responsibility for the national inventory. Within FOEN, the National Inventory System Supervisory Board (NISSB) oversees the inventory preparation process. The annual cycle for inventory preparation includes regular meetings of the NISSB, the GHG Inventory Working Group and the GHG Inventory Core Group. The preparation of the inventory involves considerable outsourcing of tasks to external consultants. This practice appears to have led to a certain number of discrepancies between the NIR, the CRF and, in some cases, actual estimation practices. To ensure the effective management of decisions in relation to data collection, choice of methods and the preparation of the NIR, the ERT encourages Switzerland to clarify the allocation of the roles of specific contributors to the preparation of the inventory and to strengthen its centralized QC system.

25. In some sectors, such as the industrial processes sector, data collection from companies is undertaken on a voluntary basis which may have led, in some cases, to lower-quality data being utilized in the inventory. The ERT recommends that Switzerland take

additional steps to ensure that effective cooperation with data suppliers is maintained and, where appropriate, that the Party consider the establishment of relevant data standards to underpin data quality.

26. The effectiveness and reliability of the institutional, procedural and legal arrangements for estimating and timely reporting of GHG emissions are sound. In particular, planned inventory improvements are mapped to recommendations made in previous review reports and are included in the report entitled *Description of the Quality Management System* provided to the ERT during the review. Nevertheless, given the number of unresolved recommendations from previous review reports (see section II.C below) and the time taken to action certain recommendations, the ERT recommends that Switzerland review its institutional arrangements to ensure that all recommendations of the review reports are explicitly addressed by the appropriate decision makers in the national system in a timely manner.

Inventory preparation

Key categories

27. Switzerland has reported key category tier 1 and tier 2 analyses, both level and trend assessments as part of its 2010 submission. The key category analysis performed by the Party and that performed by the secretariat[4] produced different results. Differences can be explained by the more disaggregated approach used by Switzerland for categories in the stationary combustion of the energy sector and the industrial processes sector. This has the effect of identifying categories at a lower level of disaggregation as key categories, while at the same time excluding minor subcategories. Switzerland has included the LULUCF sector in its key category analysis, which was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

28. Switzerland identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol as described in section 11.6.1 and table 11–3 of the NIR. The Party's approach relies on key category analysis (with LULUCF, KP–CRF table association and qualitative assessment).

Uncertainties

29. Switzerland provided both tier 1 and tier 2 uncertainty analyses consistent with the IPCC good practice guidance. The tier 1 analysis indicates an overall uncertainty of 3.4 per cent for the level of national emissions without LULUCF and 3.5 per cent with LULUCF. The uncertainty estimates using the tier 2 analysis are consistent with the tier 1 estimates, and result in an overall uncertainty for the level of 3.5 per cent without LULUCF and 3.6 per cent with LULUCF. The estimated uncertainty in the trend in the national inventory is 3.3 per cent and 6.7 per cent for total GHG emissions without and with LULUCF, respectively. With regard to the tier 2 analysis, the estimated uncertainty in the trend is again consistent with the tier 1 estimates, and results in 3.4 per cent and 4.5 per cent for total GHG emissions without and with LULUCF, respectively. Critical to the results of the tier 2 analysis are the assumptions made about cross-correlations, which are provided for certain fuels combusted across particular energy categories. Sensitivity analyses on the

[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 IPCC good practice guidance for LULUCF. 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.

importance of these cross-correlation assumptions have been presented, which provide a useful quality check.

Recalculations and time-series consistency

30. Recalculations have been performed and generally reported in accordance with the IPCC good practice guidance. The ERT noted that recalculations reported by the Party of the time series 1990–2007 have been undertaken to take into account improvements in AD (including wood consumption and waste fuel consumption for the production of ceramics, glass wool, brick and tiles, container glass, asphalt and mineral wool in the energy sector; nitric acid production in the industrial processes sector; milk production and gross energy intake (GEI) rate for dairy cattle in the agriculture sector; and the increase of available AREA AD for land-use change estimates and agricultural lime application in the LULUCF sector), EFs (CH_4 EFs for biomass combustion, and CO_2 EFs for cement and lime production in the industrial processes sector), and parameters (adaptation of a new ammonia inventory for Switzerland using the Swiss ammonia model AGRAMMON for the agriculture sector, and a range of improvements in the LULUCF sector).

31. The changes resulted in an increase in estimated total GHG emissions in 1990 of 0.48 per cent with LULUCF and a reduction of 0.75 per cent without LULUCF, and an increase in 2007 of 2.3 per cent for total GHG emissions with LULUCF and of 0.9 per cent without LULUCF. Time-series consistency has been preserved. The trend in total GHG emissions between 1990 and 2007 is little changed by the recalculations, with a minor reduction from a 2.7 per cent decrease between 1990 and 2007 in the previous submission to a decrease of 2.5 per cent in the 2010 submission. Nonetheless, a sufficient rationale for the individual recalculations has not always been provided in the NIR or in CRF table 8(b). The ERT recommends that Switzerland improve the transparency of its recalculations and that it report the complete time series of recalculated emissions at a more disaggregated level, with a discussion on each category or sector in the NIR.

Verification and quality assurance/quality control approaches

32. Switzerland has a detailed QA/QC plan in place in accordance with decision 19/CMP.1 and the IPCC good practice guidance, which it submitted together with the NIR. The plan is comprehensive and detailed; nonetheless, some weaknesses have been observed in the inventory emission estimates at the sectoral level due to a number of system issues that Switzerland should address (see paras. 23–25 above). To achieve improvements in the transparency, completeness and consistency of inventory estimates, the ERT encourages Switzerland to enhance its QA/QC plan in order to:

(a) Ensure that all ERT recommendations are explicitly addressed;

(b) Implement additional QC tools such as inter-Party comparisons of implied emissions factors (IEFs) or carbon balances to ensure the complete allocation of fuels between the energy, industrial processes and waste sectors;

(c) Establish explicit quality objectives for targeted QC variables;

(d) Consider the application of measurement standards to measurements undertaken by companies and used in inventory estimates;

(e) Consider the implementation of QA procedures by independent experts.

Transparency

33. In general, Switzerland's inventory is transparent; however, the ERT considers that it could be improved through the inclusion of more detailed information in the NIR. The ERT noted that in some cases sufficient information in relation to relevant technologies in

use, the basis for the EFs chosen and the quality of the AD obtained is not provided and it also noted a number of occasions where the text of the NIR is self-contradictory. Consequently, the ERT recommends that Switzerland enhance the transparency of its inventory by including additional information in the NIR of its next annual submission in relation to the selection of methods, the basis for the EFs chosen, and contextual information on the technologies in use and the quality of the AD obtained.

Inventory management

34. Switzerland has an excellent centralized archiving system managed by FOEN using custom-built software known as Emissions Management Information System (EMIS). The system archives disaggregated EFs and AD, and documents 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. During the review, the ERT was provided with the requested additional archived information.

35. Switzerland maintains an updated Inventory Development Plan (IDP) which lists 99 issues (some of which are relatively minor in nature) for development. Given that the current NIR documents 43 improvements that have been undertaken for this submission, the ERT notes that the rate of development does not appear to be keeping pace with the number of tasks identified, and recommends that Switzerland give consideration to reviewing the amount of resources it allocates to the inventory development task.

3. Follow-up to previous reviews

36. Switzerland is to be commended for the major improvements undertaken for this submission. Responses to recommendations from previous review reports include: the recalculation of data on milk production and the GEI rate for dairy cattle (see para. 79 below); the reallocation of fuels between energy categories (petroleum coke) (see para. 53 below) and military fuel consumption (see para. 44 below), the improvement of the EF for cement and lime production (see para. 64 below) and recalculations in the LULUCF sector.

37. Switzerland's IDP tracks the allocation of the recommendations of previous review report to various agencies within the Swiss national system. Nonetheless, a number of recommendations from previous review reports have not yet been implemented, including:

(a) The inclusion of non-energy use of fuels in the calculation of the reference approach (see para. 52 below);

(b) The review of the EFs for ammonia production (see para. 67 below) and nitric acid (see para. 68 below).

38. The ERT recommends that Switzerland strengthen its inventory management procedures to ensure that recommendations from previous review reports are explicitly addressed in a timely manner.

4. Areas for further improvement

Identified by the Party

39. The 2010 NIR identified several areas for improvement, including:

(a) The inclusion of improved fuel consumption data and EFs for small piston aircraft and helicopters in civil aviation;

(b) The update to country-specific EFs used to estimate emissions from fuel combustion in road transportation;

(c) The reporting of crop nitrogen values and dry matter contents for crops in agricultural soils;

(d) Reductions in the uncertainty of AD relating to land-use change through the gradual increase in the AREA sample size prepared by the Swiss Federal Statistical Office (SFSO);

(e) The reporting of AD for composting; and

(f) The standardization of the AD format and delivery of agricultural statistics at the SFSO.

40. In its response to the questions raised by the ERT during the review, Switzerland indicated that it is working to enhance its reporting of activities under Article 3, paragraph 14, of the Kyoto Protocol.

Identified by the expert review team

41. The ERT identified the following cross-cutting issues for improvement, including;

(a) The enhancement of the transparency of the NIR through the provision of additional information on methods, sources of data and AD;

(b) The enhancement of the transparency of the recalculations for each category through the provision of recalculated data at a more disaggregated level in the NIR (see para. 29 above);

(c) The enhancement of the QA/QC system (see para. 31 above);

(d) More effective consideration of the recommendations of previous review reports by the national system;

(e) The inclusion of an energy balance for Switzerland in the NIR;

(f) The need to ensure the success of the AREA database image interpretation in order to fulfil the requirements of the KP-LULUCF reporting.

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

B. Energy

1. Sector overview

43. The energy sector is the main sector in the GHG inventory of Switzerland. In 2008, emissions from the energy sector amounted to 43,356.29 Gg CO_2 eq, or 81.2 per cent of total GHG emissions. Since 1990, the total emissions from the energy sector have increased by 3.0 per cent. The key drivers for the rise in emissions have been population growth and the growth in the economy, which has had a direct impact on the increase in activities related to road transportation and civil aviation. The increasing number of heating degree days is leading to increased fuel combustion in the residential and commercial categories. Within the energy sector, 38.3 per cent of the emissions were from the transport category, followed by 37.5 per cent from other sectors, 14.8 per cent from manufacturing industries and construction, 8.5 per cent from energy industries, 0.6 per cent from oil and natural gas, and 0.3 per cent from other, which includes military emissions. GHG emissions from energy industries, transport, and manufacturing industries and construction have increased by 44.7 per cent, 13.8 per cent and 0.4 per cent, respectively, over the period 1990–2008.

GHG emissions from other sectors, other and oil and natural gas have decreased by 9.0 per cent, 44.3 per cent and 46.4 per cent, respectively.

44. The CRF tables are complete for all years from 1990 to 2008 in terms of gases and categories and the appropriate notation keys have been used. The NIR is generally transparent and provides explanations of the methodologies, AD and EFs used to estimate emissions. For the energy sector, Switzerland has used a combination of country-specific and IPCC methods as well as EFs, and has transparently documented in its NIR how the EFs are derived and validated. Switzerland could further improve the transparency of its reporting by including explanations for the basis of the expert judgements such as: (a) uncertainty estimations for non-CO_2 emissions; (b) the EFs for nitrogen oxide (NO_x) from heat-only boilers are country-specific; however, expert judgement used to estimate the fraction of low-NO_x burners is not explained; and (c) the basis of expert judgement for updating the country-specific EFs of CH_4, N_2O, carbon monoxide (CO) and non-methane volatile organic compounds (NMVOC) due to fuel combustion for the recent years and by cross-checking the information generated in the CRF with the corresponding information documented in the NIR.

45. The ERT welcomes the efforts made by Switzerland in reallocating certain fuels and subcategories, as suggested in the previous review report. For example, in the category petroleum refining, petroleum coke is now reported under liquid fuels instead of under solid fuels. The time series for liquid and solid fuels has been recalculated accordingly without affecting total emissions. In the category public electricity and heat production, wood used in district heating no longer appears in the CRF tables, and the use of renewable waste from wood products in combined heat and power units and plants is reported instead. GHG emissions from off-road vehicles, and construction machinery and industry vehicles have been shifted from other (mobile) to other (manufacturing industries and construction). In addition, though military aviation has been shifted from other (transport) to other (mobile), the documentation box in the CRF table still does not indicate the change made. The emissions from off-road vehicles for professional and hobby gardening activities have been shifted from military off-road under other (mobile) to agriculture, forestry and fisheries under other sector as mobile off-road.

46. The ERT appreciates the efforts made by Switzerland regarding the recalculations of some categories. For example, the use of wood reported under stationary combustion has been restructured and recalculated for the entire time series. In public electricity and heat production, the fuel type wood for district heating does not appear anymore and the new fuel type wood for combined heat and power units and plants for renewable waste from wood products are reported. The AD for natural gas have been recalculated for 2007 due to an update of statistical AD associated with natural gas heat-only boilers. Further, the AD for other fuels have been recalculated for the years 2005 and 2006 due to a change in data in the amount of municipal solid waste (MSW) incinerated. In the 2010 submission, biogenic CO_2 emissions from the share of organic matter in MSW are reported in the CRF tables in the biomass fuel category and, consequently, the time series for biomass has been recalculated. Due to the availability of new AD for iron foundries and steel plants in the category iron and steel, emissions have been recalculated for the years 2004–2007 and 2003–2007, respectively. The AD for natural gas-only boilers in the commercial/institutional category have been recalculated for the year 2007 due to updated statistical data. The recalculations of CO_2 have resulted in a reduction in emissions for 1990 of 18.60 Gg, from 41,252.87 Gg in the 2009 submission to 41,234.27 Gg in the 2010 submission, or a reduction of 0.05 per cent. The 2007 emissions also show a decrease due to the recalculations, resulting in a reduction in emissions of 27.84 Gg, from 41,357.63 Gg in the 2009 submission to 41,329.79 Gg in the 2010 submission, registering a decrease of 0.07 per cent.

47. The ERT is of the opinion that the QA/QC procedures and verification need to be further strengthened with built-in cross-checks to enable the seamless and accurate reporting of numbers reported in the CRF and then reproduced in the NIR. The ERT noted that the description in the NIR of the QA/QC procedures and verification could be enhanced to improve the transparency of reporting.

48. Although the information on the justification of the various methodologies used, including the EFs and AD selected, appears in the EMIS database, it should also be included in the NIR. The ERT recommends that Switzerland provide a description of the production methods for the manufacturing industries in the annex to the NIR in its next annual submission, in order to enable a more transparent review of the energy and the industrial processes sectors.

2. Reference and sectoral approaches

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

49. Emissions of CO_2 from fuel combustion were calculated using both the reference approach and the sectoral approach. For the year 2008, there is a difference of 2.1 per cent in CO_2 emissions as reported in the NIR. However, table 1.A(c) in the CRF reporter shows a difference of 6.5 per cent in CO_2 emissions between the two approaches. This is due to the fact that, although the Party has included emissions from waste combustion in CRF table 1.A(c) under solid or other fuel types, it does not appear in CRF table 1.A(b) in other solid fossil. There is therefore a discrepancy between the percentage difference reported between the reference and the sectoral approaches in the NIR (tables 3–4 and figures 3–5) compared to CRF table 1.A(c). The ERT recommends that Switzerland correct this discrepancy. The total apparent consumption of fuel in the CRF tables in 2008 is higher with respect to the International Energy Agency (IEA) estimates by 4 per cent. The Party has indicated to the ERT that investigations are being carried out to resolve this discrepancy by the 2011 submission.

50. Further, the ERT noted that coking coal use in the reference approach in CRF table 1.A(b) is reported as included elsewhere ("IE"). The ERT recommends that the Party specify in the CRF tables where it is included.

International bunker fuels

51. Switzerland has reported that emissions from aviation bunkers are estimated using a country-specific method which is consistent 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 individual flight data by airport, allowing for an accurate distinction between domestic and international flights. The difference in fuel consumption for domestic and international between modelled consumption (using the country-specific method – the bottom-up approach) and the actual fuel sales data is approximately 3.0 per cent in 2008 compared to 4.0 per cent in 2007. The ERT recommends that Switzerland continue to make efforts to close this gap and report the trend analysis of these differences, in line with the recommendation of the previous review report. The ERT also recommends that a table be provided in the NIR under this section which details the modelled consumption of fuel and the actual sales data for both bunker and domestic consumption, as a lower modelled consumption with respect to actual fuel sales would indicate an "underestimation" of consumption for international aviation and a corresponding "overestimation" of fuel consumption for domestic aviation and emissions.

52. For marine bunkers, all fuel consumption is considered to be domestic. However, the ERT noted that on the river Rhine, some of the boats cross the border and go abroad (Austria, France, Germany, and the Netherlands). Although this quantity might be small,

part of the fuel bought in Switzerland for international navigation therefore has to be considered as bunker fuel. Further, the ERT notes that the price for commercial diesel use is one of the lowest among the countries listed above (Institut Français des Relations Internationales (IFRI), 2008), after Austria. Therefore, the ERT recommends that Switzerland investigate the possibility of including bunker fuel consumption in navigation and, if necessary, that it report thereon in its inventory.

Feedstocks and non-energy use of fuels

53. Switzerland has stated in its NIR that it uses data on feedstocks and non-energy use of fuels, such as LPG, petroleum coke, bitumen, lubricants, naphtha, gas/diesel oil, paraffin wax and white spirit from the Swiss Petroleum Association, and all are reported as "other" fuel in CRF table 1.A(d). However, in the CRF tables, the ERT noted that "other" in CRF table 1.A(d) is reported as not applicable ("NA"), while the Party has reported carbon stored from bitumen and lubricants in this table. The ERT reiterates the recommendation of the previous review report that Switzerland document the corresponding data in the CRF as well, as this has implications on the net fuel consumption in the reference approach and also helps to understand if the emissions from non-energy use of fuels are allocated correctly under other sectors or if they are allocated at all.

3. Key categories

Stationary combustion: liquid and other fuels – CO_2

54. The ERT noted that petroleum coke consumption in the category other (manufacturing industries and construction) is still reported as solid fuel in the 2010 submission, even though this reallocation and change of classification of fuel to liquid fuel were recommended in the previous review report. The ERT was informed during the in-country review that Switzerland plans to report petroleum coke as liquid fuel in this category in future submissions. The ERT recommends that Switzerland complete this action and report thereon in its NIR and in the CRF tables in its next annual submission.

55. Regarding public electricity and heat production, Switzerland estimates GHG emissions from the incineration of other fuels (waste) for energy by considering the biogenic to fossil fuel ratio in MSW as 60:40. In the previous review report, it is indicated that Switzerland considers that the proportion of MSW of biogenic origin in this ratio, according to a preliminary study, should be lower. Switzerland has since taken an initiative to measure this ratio in its incineration plants, which will capture the biogenic to fossil fuel ratio of waste generated domestically and that of imported waste (e.g. MSW from Germany has a fossil fuel to biogenic ratio of 1:1 (see page 144 of the NIR of the 2010 submission of Germany)). The ERT appreciates this initiative, and reiterates the recommendation that Switzerland include the results of this initiative and use them in its next annual submission with regard to the estimation of GHG emissions from waste incineration as it falls within a key category (energy industries).

4. Non-key categories

Stationary combustion: biomass – CO_2, CH_4 and N_2O

56. The ERT noted the efforts made by the Party to include new AD for biomass (wood) for the whole time series for the categories commercial and institutional, and residential based on the revised statistics and documented in the EMIS database (EMIS 2010/1A solid fuels/wood). The net calorific values (NCVs) and EFs for biomass fuel are, however, taken to be constant for the entire time series, based on a limited number (around two or three) of measurements carried out in 1999, 2001 and 2008, as no update of these values is available.

57. The biomass consumption reported in public electricity and heat production includes biomass other than MSW in the form of wood biomass for district heating and power units, in plants for renewable waste from wood products, landfill gas for cogeneration, and wood for fermentation engines. The total biomass consumption in public electricity and heat production does not match the total biomass consumption reported in the Party's NIR. The Party has indicated that this discrepancy has already been corrected in the EMIS database and will be corrected in its next annual submission. The ERT recommends that Switzerland provide the relevant information included in the EMIS database in its NIR of its next annual submission. As indicated in paragraph 54 above, Switzerland is currently studying the ratio of biogenic to fossil composition of waste incinerated in MSW incineration plants used for energy supply. The ERT encourages Switzerland to use and report the results of the new ratio regarding the biogenic part of waste in MSW incineration plants as soon as data are available.

Stationary combustion: other fuels – N_2O

58. The N_2O IEF of other fuel, from waste incineration of MSW, in public electricity and heat production is the highest (6.95 kg/TJ) among the neighbouring countries of Switzerland (Austria, Germany, France and Italy), which range from 2 to 4 kg/TJ. The ERT encourages the Party to investigate the reasons for this difference, and, if possible, to rectify and document the results in future submissions.

5. Areas for further improvement

Identified by the Party

59. The following areas for further improvement were identified by the Party:

(a) The inclusion of improved fuel consumption data and EFs for small piston aircraft and helicopters in civil aviation;

(b) The update to country-specific EFs used to estimate emissions from fuel combustion in road transportation.

Identified by the expert review team

60. The following areas for further improvement were identified by the ERT:

(a) The inclusion of an energy balance for Switzerland in the NIR;

(b) The improvement of the transparency of reporting by including explanations for the basis of the expert judgements;

(c) The provision of a table on civil aviation which details the modelled consumption of fuel and the actual sales data for both bunker and domestic operations in the NIR;

(d) An investigation into the possibility of including bunker fuel consumption in navigation and to report thereon in its inventory;

(e) The documentation of all the types of feedstock used in the CRF, as this has implications on the net fuel consumption in the reference approach;

(f) Presenting the latest results of its study undertaken to determine the biogenic to fossil fuel ratio in MSW once available;

(g) Matching the total biomass consumption in public electricity and heat production reported in the NIR and the CRF tables.

C. Industrial processes and solvent and other product use

1. Sector overview

61. In 2008, emissions from the industrial processes sector amounted to 3,490.38 Gg CO_2 eq, or 6.5 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 217.04 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have increased by 0.2 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 development in emissions in the industrial processes sector are the decreases in metal production (–32.5 per cent) and in mineral production (–26.5 per cent), as well as the increase in the consumption of halocarbons and SF_6 (571.5 per cent). Within the industrial processes sector, CO_2 emissions accounted for 65.3 per cent of total emissions, HFCs, PFCs and SF_6 taken together accounted for 29.1 per cent of total emissions, while N_2O accounted for 5.3 per cent and CH_4 for 0.1 per cent of total emissions. Emissions from mineral products accounted for 56.8 per cent of the total sectoral emissions, followed by 29.1 per cent from the consumption of halocarbons and SF_6, 8.8 per cent from chemical industry and 5.3 per cent from metal production.

62. The ERT found the transparency of the NIR for the industrial processes sector to be low, as the AD and EFs used are frequently not provided, and only a reference to the EMIS database is made. Justifications for the choice of estimation methods and EFs used are not provided for most categories. The ERT strongly recommends that Switzerland provide information on the AD and EFs used, including the rationale for their use, in the NIR of its next annual submission.

63. CO_2 emissions from limestone and dolomite use and from soda ash production and use were reported as not occurring ("NO"). The ERT found that the energy consumption for the production of fine ceramics, bricks and tiles, glass, glass wool and rock wool are reported in the energy sector. Furthermore, the production amounts for these activities are available in the EMIS database. Therefore, the ERT found that CO_2 emissions from limestone and dolomite use and from soda ash production and use occur in the country but were not estimated. Switzerland, in response to the list of potential problems and further questions formulated by the ERT, provided estimates for these categories. Fine ceramics, bricks and tiles, and rock wool were reported under limestone and dolomite use, and glass and glass wool were reported under other (mineral products). The ERT found the estimates for fine ceramics, glass, glass wool and rock wool to be in line with the Revised 1996 IPCC Guidelines. For bricks and tiles, the ERT found that the approach used was not fully transparent and recommends that Switzerland provide additional information in its next annual submission (see para. 66 below). The CO_2 emission estimates for the production of fine ceramics, bricks and tiles, glass, glass wool and rock wool amount to 83.22 Gg CO_2 and 2.4 per cent of total emissions in the industrial processes sector.

64. Notation keys have been incorrectly used in a number of cases (e.g. "IE" instead of "NO"; reported for CO_2 emissions from pig iron, sinter, coke and ferroalloys which do not occur). The ERT recommends that Switzerland correctly and consistently use notation keys and that the Party provide transparent explanations, especially where the notation key "IE" is used.

2. Key categories

Cement production – CO_2

65. CO_2 emissions from cement production are estimated based on the production amount of clinker provided by industry. For 2003–2008, a country-specific EF calculated on the basis of the content of carbonates in the raw material is applied. This EF varies

between 525 and 529 kg CO_2/t clinker. No information on the annual changes in the composition of the raw material is available for 1990–2002. For this time period, an EF of 525 kg CO_2/t clinker was used as a conservative approach aiming to avoid an overestimation of base year emissions.

Iron and steel production – CO_2

66. CO_2 emissions from iron and steel production in Switzerland occur only in electric arc furnaces. Emissions are estimated using the amount of steel produced and a country-specific EF of 140 kg CO_2/t steel is used. CO_2 emissions from pig iron, sinter, coke and ferroalloys do not occur, but are reported as "IE". The ERT recommends that Switzerland report CO_2 emissions from these activities as "NO" in its next annual submission.

3. Non-key categories

Limestone and dolomite use – CO_2

67. In its 2010 submission, Switzerland reported CO_2 emissions from limestone and dolomite use as "NO". In response to the list of potential problems and further questions formulated by the ERT, Switzerland has calculated CO_2 emissions from brick and tile production based on the produced amount (tonnes of bricks and tiles) multiplied by an EF of 0.08 t CO_2/t bricks and tiles. This approach is based on a statement of industry which claims that 4–12 per cent of the amount produced is emitted as CO_2. The NIR does not provide a transparent justification for this assumption. The ERT recommends that Switzerland either provide a detailed justification for this assumption or estimate CO_2 emissions from brick and tile production in accordance with the Revised 1996 IPCC Guidelines.

Ammonia production – CO_2

68. In its 2010 submission, Switzerland used the IPCC tier 1a approach for the estimation of CO_2 emissions from ammonia (NH_3) production. The EF used was reported by industry and is 0.008 t/t NH_3, which is the lowest reported by all Annex I Parties (0.008 – 39.07 t/t NH_3). The default EF in the Revised 1996 IPCC Guidelines is 1.5 t CO_2/t NH_3. The ERT found that CO_2 emissions from ammonia production were underestimated. The ERT recommended that the Party estimate CO_2 emissions from ammonia production in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Switzerland received information from industry stating that NH_3 is produced in a highly interrelated production chain, which does not allow for the allocation of emissions to single products, and that emissions from NH_3 production would be best allocated to emissions from ethylene production. In response to the list of potential problems and further questions formulated by the ERT, Switzerland submitted revised estimates for emissions from ammonia production: CO_2 emissions from this category were reported as "IE" and included under ethylene production. This led to an increase of 98.75 Gg CO_2 meaning an increase in emissions of 647.1 per cent in the category chemical industry.

Nitric acid production – N_2O

69. Switzerland has used an EF of 5 kg N_2O/t nitric acid to estimate N_2O emissions from nitric acid production. No justification for the choice of the EF is provided in the NIR. The EMIS database provides information stating that nitric acid production occurs in a low pressure plant. The IPCC good practice guidance mentions default values of 4–5 kg N_2O /t nitric acid produced for low-pressure plants. The ERT therefore understands that the estimation approach used by Switzerland does not lead to an underestimation. The ERT

recommends that Switzerland provide detailed justification for the use of this EF in its next annual submission.

Carbide production – CO_2

70. AD for the whole time series are reported as confidential ("C"). During the in-country review, Switzerland disclosed the data to the ERT. Constant production values have been used for the periods 1990–1994 and 1995–2008. A constant EF has been used for the whole time series. Both AD and emission data have been provided by industry, which also provided Switzerland with updated AD and an EF for 2008 in February 2010. Switzerland has no information concerning the reasons for the change in the EF. The ERT strongly recommends that Switzerland validate the appropriateness of the change of EF and conduct a recalculation in the 2011 submission, if necessary, in order to ensure time-series consistency.

Other (chemical industry) – CO_2

71. In response to the list of potential problems and further questions formulated by the ERT related to emissions from ammonia production (see para. 67 above), Switzerland has allocated emissions from the production of acetylene, cyanic acid and NH_3 produced in the only national chemical production plant together and has reported them under ethylene production, which also takes place at the installation. This is because these products are produced in a highly interrelated production chain which does not allow for the allocation of emissions to single products. Production data (ethylene production in t) and the EFs used are installation-specific. As no installation-specific EFs for the years 1990–1999 are available, the average value of EFs from 2000 to 2009 with a value of 2.93 t CO_2/t ethylene is used. The ERT considers that the process used for the determination of the plant-specific EF is not fully transparent. The ERT therefore encourages Switzerland to include the basic approach and the relevant information for the determination of the EFs in its next annual submission.

Other (chemical industry) – CH_4

72. Switzerland reported CH_4 emissions from ethylene production as "IE". During the review, Switzerland provided additional information clarifying that CH_4 from the ethylene production process is captured and combusted at the installation. CH_4 emissions from ethylene production do not therefore occur. In its revised CRF submission, Switzerland therefore changed the notation key to "NO".

4. Areas for further improvement

Identified by the Party

73. No areas for further improvement were identified by the Party.

Identified by the expert review team

74. The following areas for further improvement were identified by the ERT:

(a) The enhancement of the transparency of the NIR through the provision of additional information on methods, sources of data and AD;

(b) The correct and consistent use of notation keys and the provision of transparent explanations, especially where the notation key "IE" is used.

D. Agriculture

1. Sector overview

75. In 2008, emissions from the agriculture sector amounted to 5,689.18 Gg CO_2 eq, or 10.7 per cent of total GHG emissions. Between 1990 and 2008, emissions decreased by 6.9 per cent. The key driver for the reduction in emissions is a decrease in the cattle population and a reduction in synthetic fertilizer use due to the introduction of the "Required standard of ecological performance" (REP). Within the sector, 45.2 per cent of the emissions were from enteric fermentation, followed by 37.6 per cent from agricultural soils, 17.0 per cent from manure management and 0.2 per cent from field burning of agricultural residues. Since 2004, emissions from agriculture have begun to increase again due to an increase in the mature dairy cattle population.

76. Switzerland's 2010 submission includes substantial recalculations in the agriculture sector, in particular CH_4 emissions from enteric fermentation, CH_4 and N_2O emissions from manure management and N_2O emissions from agricultural soils for the full time series. Recalculations were documented in chapter 6 of the NIR and referenced in CRF table 8(b). The ERT welcomes the revisions made by Switzerland in the agriculture sector, which followed previous review report recommendations, in particular, the revision of the GEI rate for the cattle population and milk production data. The impact of these recalculations in 1990 is an increase of 3.5 per cent and in 2007 is an increase of 4.8 per cent in the total emissions from the agriculture sector.

77. Switzerland has undertaken specific QA/QC activities in the agriculture sector – these are documented at the Agroscope Reckenholz-Tänikon Research Station (ART, 2010a), a data provider under the Swiss national system. The activities include the comparison of Swiss livestock data with the data of the Food and Agriculture Organization of the United Nations (FAO) and the assessment of Swiss IEFs compared with IPCC default EFs. Additional QC activities such as counterchecking agricultural emission estimates are conducted by INFRAS.

78. The ERT noted from Switzerland's tier 1 uncertainty analysis in annex A.7.1 to the NIR that the AD and EF uncertainty for N_2O from manure management and agricultural soils are the same value. The ERT recommends that Switzerland investigate the appropriateness of this AD uncertainty in its next annual submission and revise it if necessary.

2. Key categories

Enteric fermentation – CH_4

79. Switzerland has used a tier 2 methodology and EFs based on equation 4.14 of the IPCC good practice guidance to estimate emissions from enteric fermentation for all animal species. Detailed animal population data are provided from statistics published by the Swiss Farmers Union (SBV). The Party has used detailed country-specific data on nutrition, GEI and CH_4 conversion rates (Y_m) to estimate appropriate EFs for each animal category.

80. In response to a recommendation from the previous review report, Switzerland revised milk production data for mature dairy cattle and GEI rates for young cattle categories. The effect of these changes was a considerable increase in the GEI rates for the total cattle population and, therefore, higher CH_4 emissions from this key category. The ERT commends Switzerland for carrying out these recalculations and documenting the changes in its NIR.

81. During the review, the ERT noted that the GEI rate for mules and asses used by Switzerland (96.07–127.48 MJ/head/day) is the highest among all reporting Parties (60.00–

127.48 MJ/head/day) and is similar to the GEI rate for horses. The ERT recommends that Switzerland investigate the appropriateness of this GEI rate and document the outcome in its next annual submission. The ERT also recommends that Switzerland complete CRF table 4.A by providing additional information on livestock for which a tier 2 approach is used in its next annual submission.

Manure management – CH_4 and N_2O

82. Switzerland has used a tier 2 method and EFs based on equation 4.17 of the IPCC good practice guidance to estimate CH_4 emissions from this key category. The revision of GEI rates by livestock species, as requested in a previous review report, has resulted in recalculations of CH_4 in manure management. Switzerland has also provided additional information on the allocation of manure to different animal waste management systems (AWMS) in tables 6–11 of the NIR. The ERT welcomes the improvements Switzerland has made since its last submission.

83. Switzerland states in section 6.3.2.1 of the NIR that it uses the IPCC default values for methane conversion factors (MCF) from the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. In Switzerland, the following livestock types are kept in deep litter AWMS: calves, sheep and goats. In tables 6–10 of the NIR, Switzerland states that an MCF of 3.9 per cent is used for deep litter AWMS. The ERT noted that the MCF used by Switzerland for deep litter AWMS is not consistent with the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance. In response to the list of potential problems and further questions formulated by the ERT related to this issue, Switzerland submitted revised estimates of CH_4 from manure management using an MCF of 10 per cent for livestock in deep litter manure management systems based on the Revised 1996 IPCC Guidelines. The ERT agreed with these revised estimates. This led to an increase of 10.24 Gg CO_2 meaning an increase in emissions of 1.1 per cent in the subcategory manure management. The ERT recommends that Switzerland document the appropriateness of the MCFs used in the different manure management systems in its next annual submission.

84. Switzerland has used a country-specific method based on the Swiss NH_3 model AGRAMMON to estimate N_2O emissions from this key category. In response to a recommendation from the previous review report, Switzerland has revised nitrogen (N) excretion rates (Nex) for livestock, manure management system distributions and NH_3 EFs, $Frac_{GASM}$ and $Frac_{GASF}$ in this submission based on the new ammonia inventory based on AGRAMMON (2009). Information on Nex and manure management distribution systems are given in tables 6–11 and 6–14 of the NIR. The ERT commends Switzerland for adopting these improvements as recommended in the previous review report.

Indirect emissions – N_2O

85. Switzerland has used an emission rate of 2 per cent for volatilization of NH_3 from all mineral fertilizer types other than urea in its NH_3 model. The ERT encourages Switzerland to investigate the type of mineral fertilizers used in the country and apply appropriate individual emission rates for volatilization by fertilizer type in its next annual submission.

3. Non-key categories

Field burning of agricultural residues – CH_4 and N_2O

86. Switzerland has estimated emissions from the open burning of branches in agriculture and forestry under this category. No other agricultural residue burning takes place in Switzerland. The data on the quantity of dry matter burned is provided in CRF table 4.F and in table 6–23 of the NIR, the same value of 70 Gg of dry matter is used for all years from 1990 to 2008. The ERT recommends that Switzerland provide additional

information on how these AD are derived in its next annual submission. The ERT also recommends that Switzerland only provide AD on the burning of agricultural residues in CRF table 4.F and that it include the additional information on all other crop statistics, residue/crop ratios and dry matter fractions in a table in the NIR of its next annual submission.

4. Areas for further improvement

Identified by the Party

87. Switzerland has stated in the NIR that it intends to meet with the person responsible for agricultural statistics at the SFSO in order to standardize the AD format and delivery in future. The ERT welcomes this planned improvement.

Identified by the expert review team

88. No areas for further improvement were identified by the ERT.

E. Land use, land-use change and forestry

1. Sector overview

89. In 2008, net emissions from the LULUCF sector amounted to 212.62 Gg CO_2 eq, while net removals in 1990 were –2,961.85 Gg CO_2 eq. The key driver for the fall in removals is increased storm damage and logging. Within the sector, net removals of 837.66 Gg CO_2 eq were from forest land, followed by 364.18 Gg CO_2 eq of emissions from cropland, 216.92 Gg CO_2 eq of emissions from grassland, 14.61 Gg CO_2 eq of emissions from wetlands, 338.2 Gg CO_2 eq of emissions from settlements and 116.37 Gg CO_2 eq of emissions from other land.

90. Emissions and removals in the LULUCF sector fluctuate heavily between years due to the variation in the forest sink, which is driven by the varying degree of logging and natural mortality. Switzerland provided a complete and transparent inventory for the LULUCF sector concerning emissions and sinks that were reported. Switzerland applied a simple tier 1 approach for estimating carbon stock changes in forest soils and in agricultural mineral soils.

91. Switzerland has used the AREA database to estimate national land-use changes. This high-quality database includes the land-use information for three different time periods with the grid of 100 m by 100 m. The enlarged coverage of the AREA database, which was used to derive land-use change, as required under both the Convention and the Kyoto Protocol, is a major improvement compared to Switzerland's 2009 submission.

2. Key categories

Forest land remaining forest land – CO_2

92. Biomass estimation methods for tree vegetation (living biomass) are appropriate, consisting of country-specific biomass expansion factors (BEFs), and follow the guidance given in the IPCC good practice guidance for LULUCF.

93. The soil carbon stock change of mineral soils has been assumed to be a sink. The Party has provided limited justification for this in the NIR, arguing that increased litter input to the soil quarantines soil carbon sink. The ERT notes that Switzerland has not provided evidence to prove that decomposition has not increased simultaneously, offsetting the increased litter input. Due to the substantial forest area in Switzerland, the ERT

recommends that Switzerland develop higher-tier level modelling or repeated measurements to estimate soil carbon or provide appropriate evidence that soil carbon is a sink.

Cropland remaining cropland – CO_2

94. Cropland remaining cropland is a major source of emissions in the LULUCF sector. Switzerland reported emissions from agricultural lime application using IPCC default factors. Switzerland applied a simple tier 1 approach for estimating carbon stock changes in mineral soils. The ERT reiterates the recommendation of previous review reports that Switzerland develop appropriate methods (repeated measurements or modelling) to estimate the soil carbon stock change for cropland remaining cropland.

Land converted to forest land – CO_2

95. In the NIR, Switzerland has described the methodology used to estimate emissions and sinks of land-use changes. This method takes into account original carbon stock, carbon stock after land-use conversion, biomass gains, biomass losses, and lengths of transition periods that vary according to the land-use conversion type. In its NIR, Switzerland has provided information on an equation (section 7.1.3.2) that is used for carbon stock change estimation. This equation is rather complex due to fact that it is applied for various land-use transitions. The ERT recommends that Switzerland increase the transparency of the NIR of its next annual submission by including a table where carbon stocks before and after conversion are provided by individual land-use classes and pools. The same table could then be used to illustrate the differences between land-use change estimation for reporting requirements under the Convention and under the Kyoto Protocol.

3. Non-key categories

Biomass burning – CO_2

96. In the NIR, the Party has described the reporting of emissions from biomass burning with methods provided in the IPCC good practice guidance for LULUCF. Switzerland mentions that CO_2 emissions from biomass burning are reported under forest land. The ERT recommends that the Party provide a rationale to explain the assumptions used and reasons for including CO_2 emissions from biomass burning under forest land.

97. The notation key “IE” has been used in the reporting in CRF table 5(V) concerning wildfires under forest land. In the comments of the CRF table concerning wildfires relating to the use of the notation key “IE”, the Party refers to table 5.A. Switzerland also described in the NIR that these emissions are mapped automatically by the national forest inventory (NFI) and are therefore included as a reduced sink under forest land. The ERT recommends that Switzerland provide a more transparent description in the NIR concerning the allocation in its next annual submission with regard to biomass burning and wildfires.

4. Areas for further improvement

Identified by the Party

98. Switzerland has reported in its NIR that it will improve carbon stock change estimation due to land-use changes. The Party has also reported that it will improve soil carbon stock change estimation by utilizing research results that are expected in the near future. The ERT acknowledges that the Party is improving its estimation methods, but is also concerned that these improvements are being implemented at this late stage.

Identified by the expert review team

99. The ERT recommends that Switzerland allocate more resources to soil carbon research on lands under forestry and agriculture, including emissions and sinks of soils due to land-use changes. National expertise on soil carbon modelling and sampling should be utilized to support the reporting requirements under the Convention.

F. Waste

1. Sector overview

100. In 2008, emissions from the waste sector amounted to 650.22 Gg CO_2 eq, or 1.2 per cent of total GHG emissions. Since the base year, emissions have decreased by 34.6 per cent. The key driver for the fall in emissions is the ban on landfilling and the implementation of waste recycling policies in the country. Within the sector, 39.7 per cent of the emissions were from solid waste disposal on land, followed by 35.8 per cent from wastewater handling, 17.8 per cent from other (waste) and 6.6 per cent from waste incineration.

101. The information provided in the NIR and the CRF tables is complete and generally transparent (see paras. 102 and 103 below). The methods and AD used are time-series consistent. Recalculations were performed for all the years of the period 1990–2007 for all categories in accordance with the recommendations in the previous review report, due to an update of the AD of the MSW quantity disposed of in landfills and in order to eliminate mistakes related to an error in the EF used in domestic and commercial wastewater. The impact of these recalculations in 2007 is a decrease of 2.1 per cent and an increase of 0.02 per cent in 1990 in the total emissions from the waste sector.

102. An uncertainty analysis of the GHG emissions from the waste sector was performed based on both tier 1 and tier 2 uncertainty analyses, using expert judgement assessment. The tier 1 analysis indicates an uncertainty of 60.0 per cent for the CH_4 emissions from solid waste disposal on land and 50.0 per cent for CH_4 emissions from other. The uncertainty estimates using the tier 2 analysis are consistent with the tier 1 estimates, and result in an uncertainty of 57.8 for CH_4 emissions from solid waste disposal on land and 49.6 per cent for CH_4 emissions from other. The tier 1 analysis indicates an uncertainty of 100.0 per cent for the N_2O emissions from wastewater handling and 80.0 per cent for N_2O emissions from waste incineration. Category-specific QA/QC procedures and verification activities implemented include: the cross-check of AD; the verification of country-specific parameters; the comparison between the current and the previous submission time series; and the cross-check of AD in EMIS commentaries and in primary sources. However, QC procedures should be further enhanced (see paras. 103 and 109 below).

2. Key categories

Solid waste disposal on land – CH_4

103. Emissions of CH_4 from solid waste disposal on land are a key category by level and trend assessment and amounted to 258.3 Gg CO_2 eq in 2008. The IPCC first order decay (FOD) method and country-specific EFs were used to estimate emissions of CH_4 in this category. AD and background information on waste management in Switzerland are described in the NIR. However, the NIR does not contain information about the degradable organic carbon (DOC) calculation. During the review, Switzerland provided the ERT with information on the EMIS database, where the DOC calculation is well described. The ERT recommends that Switzerland include the relevant explanations and more detailed information about the DOC calculation in the NIR of its next annual submission.

104. As indicated in paragraph 102 above, additional information on the parameters used for the FOD method is described in the NIR. However, CRF table 6.A for the year 2008 does not contain the required additional information. The ERT recommends that Switzerland include the required additional information in the CRF tables and that it enhance QC procedures to avoid that type of mistake.

105. In its 2010 submission, Switzerland has recalculated CO_2 emissions and CH_4 recovery from solid waste disposal sites (SWDS). The impact of these recalculations in 2007 is a decrease of 0.02 per cent in the total emissions from SWDS. The explanation for the recalculations has not been sufficiently clearly described in the NIR. During the review, Switzerland provided a satisfactory explanation for the recalculations. The ERT recommends that Switzerland include more detailed information on the performed recalculations (e.g. CO_2 emissions and CH_4 recovery) in the NIR of its next annual submission.

Wastewater handling –N_2O[5]

106. Switzerland reported N_2O emissions from wastewater handling, which amounted to 203.18 Gg CO_2 eq. Switzerland recalculated N_2O emissions from human sewage in accordance with changes in AD (the number of inhabitants for 2007 was slightly modified). The impact of the recalculations in 2007 on N_2O emissions is an increase of 0.03 per cent. The ERT noted that the value for protein consumption remains constant for the period 1990–2007. The ERT noted that the data on protein consumption for Switzerland for the period 1990–2007 is available in the FAO Statistical Database (FAOSTAT). The ERT recommends that Switzerland use year-specific values for protein consumption for the complete time series from FAOSTAT in order to improve accuracy in its next annual inventory submission.

Other – CH_4

107. Switzerland reported CH_4 and N_2O emissions from waste composting and digestion of organic waste, which amounted to 116.03 Gg CO_2 eq. A country-specific method has been used for this estimation, which covers the emissions from the composting and digestion plants for organic waste, using statistical data. The EFs are country-specific based on measurements and expert estimates. The amount of waste composted in individual households (backyard composting) is assumed to represent 10.0 per cent of the total amount of waste treated in composting plants. The ERT commends Switzerland for its efforts to improve the completeness of the inventory by including this category in its estimates.

3. Non-key categories

Waste incineration – CO_2, CH_4 and N_2O

108. The category waste incineration includes emissions from the incineration of hospital waste, illegal waste incineration and the incineration of insulation material from cables, sewage sludge and crematoria. The emissions from this category amounted to 43.15 Gg CO_2 eq. A country-specific method and country-specific EFs are used in the emission estimates, which is in line with the IPCC good practice guidance.

109. The emissions from the combustion of waste for energy recovery are included in the energy sector under public electricity and heat production, which is in line with the Revised 1996 IPCC Guidelines.

[5] Not all emissions under this category are identified as key categories, but only N_2O emissions. However, since the issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

Wastewater handling – CH_4

110. Switzerland reported CH_4 and N_2O emissions from wastewater handling, which amounted to 29.54 Gg CO_2 eq. A country-specific method based on the CORINAIR methodology is used to estimate GHG emissions from wastewater handling. In response to a recommendation from a previous ERT, Switzerland reported emissions from industrial wastewater separately from domestic and commercial wastewater. The information on the AD and EFs used is described in the NIR. However, the required AD were not presented in the CRF tables and the notation key "IE" was not appropriately used. The ERT recommends that Switzerland include the required AD in the CRF tables of its next annual submission and enhance QC procedures to avoid that type of mistake.

111. Emissions of CH_4 from wastewater handling were recalculated based on the recommendations to report emissions from industrial wastewater separately from domestic and commercial wastewater from the previous review report for the entire time series. The impact of the recalculations on CH_4 emissions is an increase of 3.5 per cent in 2007 and an increase of 3.0 per cent in 1990 from wastewater handling.

4. Areas for further improvement

Identified by the Party

112. Switzerland has planned improvements in the category other in order to ensure more reliable backyard composting AD.

Identified by the expert review team

113. The ERT identified the following areas for improvement: increasing the transparency of the inventory through the inclusion of more information on the parameters, AD and EFs used, and the accuracy of the inventory through the use of year-specific data; and the improvement of QA/QC procedures and verification activities related to inconsistency between the CRF tables, the NIR and EMIS (the Swiss national air pollution database).

G. Other sectors

114. Switzerland has reported for the first time emissions of CO_2, CO, NO_X and sulphur dioxide (SO_2) from fire damage estates and fire damage motor vehicles under this sector. CH_4 and N_2O emissions from these categories are assumed to be zero and are reported as "NO". The total emissions from this sector amounted to 12.99 Gg CO_2 in 2008, and have increased by 18.5 per cent since 1990. The methodology used is clearly described in chapter 9 of the NIR. The ERT commends the efforts of Switzerland to develop emission estimates from this category in its annual submission. Additionally, the ERT would like to point out that these emissions are reported under the sector other, and are therefore not accounted for under the Kyoto Protocol. The ERT believes that some emissions of CH_4 and N_2O should occur and, therefore, the ERT encourages Switzerland to report CH_4 and N_2O emissions from this category in its next annual submission or use the notation key not estimated ("NE") instead.

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

115. Switzerland has used the NFI and AREA data to report emissions and removals under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. The reporting follows the principles of the IPCC good practice guidance for LULUCF applying mostly country-specific parameters (e.g. BEFs). The units of land subject to activities under Article 3, paragraphs 3 and 4, are recorded in the AREA database. Information on spatial assessment units has also been provided in the NIR. Switzerland has also identified carbon pools that were not accounted for, because it assumes they were sinks (e.g. soils under forest management under Article 3, paragraph 4, of the Kyoto Protocol). The Party has provided information in the NIR in accordance with paragraph 3(a) of decision 15/CMP.1.

116. The AREA database contains sample-based data about land use and land-use change in Switzerland. This high-resolution mapping is ongoing and, to date, approximately 60 per cent of the land area of Switzerland has been identified for land use and land-use change for three different time periods which includes three sets of aerial photos, respectively. This database provides statistics on the land-use of Switzerland using a grid measuring 100 m^2. Currently, the AREA database is used to extrapolate land-use change both geographically and temporally to reach full coverage of the country. The system for compiling land-use statistics is established and functions well, although only 60 per cent of the land area of Switzerland has been mapped so far. By 2013, Switzerland is planning to increase the coverage to 100 per cent of the national territory and conduct a recalculation of the KP-LULUCF sector based on the AREA database with complete coverage. Switzerland has defined a forest area of 625 m^2 as the minimum spatial assessment unit for forest.

117. Switzerland has reported emissions and removals from afforestation, deforestation and forest management activities. Under Article 3, paragraph 4, of the Kyoto Protocol, Switzerland has reported the carbon stock changes of tree biomass and dead wood in forest management, but it assumes that soil carbon and litter pools were sinks and therefore do not need to be reported.

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

Afforestation and reforestation – CO_2

118. The emission and removal estimates due to afforestation activity are appropriate and the method used is thoroughly described in the NIR under the Convention LULUCF reporting, section 7.1.3.2. However, the ERT recommends that Switzerland provide further detail on the estimates of emissions and removals on afforested and reforested land by adding a table with carbon stocks before and after conversion in order to transparently list the most common afforestation and reforestation changes and the resulting emissions and removals by land-use, region, etc. The ERT welcomes Switzerland's ongoing and future plans to study the impact of afforestation in Alpine regions on soil carbon.

Deforestation – CO_2

119. The deforestation area reported under Article 3, paragraph 3, of the Kyoto Protocol is based on the forestry statistics in the current submission for 2008 and is approximately 50 per cent of the area for deforestation that has been obtained from the recent AREA inventory database (based on a 100 m by 100 m grid of aerial photos). The ERT strongly

recommends that Switzerland use the deforestation area from the AREA database. The use of different data sources for reporting afforestation and reforestation, and deforestation is not appropriate, especially when both afforestation and reforestation and land areas can be derived from the AREA database. In response to the list of potential problems and further questions formulated by the ERT, Switzerland submitted revised estimates of emissions from deforestation, correcting the underestimations provided in the submission. This led to an increase of 90.40 Gg CO_2 in 2008 meaning an increase in emissions of 110.1 per cent in this activity.

120. In the NIR (page 314), Switzerland provided information that demonstrates that activities under Article 3, paragraph 3, are directly human-induced. According to the NIR, temporary deforestations are excluded from Article 3, paragraph 3, emission estimates. Although it is true that vegetation recovers after the building of pipelines and power lines, the ERT invites the Party to provide evidence that vegetation cover remains. The ERT also invites Switzerland to provide a more transparent description in the NIR that the building of power lines and underground pipelines is not deforestation and can be treated as managed forest. In the NIR, these lands are just mentioned, but a more thorough description is needed in order to increase transparency.

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

Forest management – CO_2, CH_4 and N_2O

121. Switzerland has reported the carbon stock change of biomass as an aggregated value including above- and below-ground biomass for lands under forest management by combining NFI data with country-specific BEFs. Those BEFs have been applied by NFI regions, species groups and altitudinal ranges. Switzerland has also indicated in the NIR that it is currently estimating separate BEFs for logging and natural mortality.

122. Switzerland did not account litter and soil carbon stock change estimates by assuming that litter and soils are a sink (see para. 92 above; the Party included in the NIR information demonstrating that these pools are sinks). The ERT found this information to be insufficient. During the review, the ERT recommended that the Party either estimate litter and soil carbon stock change under the forest management activity or provide strong evidence that these pools are not a net source of carbon.

123. In response to the list of potential problems and further questions raised by the ERT, Switzerland submitted documentation to prove that its soils are not a net source of carbon. This documentation included repeated measurements of soil organic carbon concentration (Swiss Soil Monitoring Network (NABO) data) and a reference to the Perrouch et al. (1999) paper. The repeated measurements (NABO data) span from 1985 to 2006 and the Perrouch et al. paper reports soil carbon stock changes up to 1985, while soil carbon sinks and sources during 2008 should be reported under the Kyoto Protocol. Switzerland provided information that confirms the ability and national expertise of the Party to estimate soil carbon sinks and emissions for future submissions and, therefore, the ERT did not proceed with adjustments. The ERT strongly recommends that Switzerland combine similar research that has already been undertaken (e.g. Perrouch et al.) with updated NFI data and weather data and perhaps with several different soil carbon models. This research would allow Switzerland to estimate whether soils are currently losing or accumulating carbon and thereafter it would allow soil carbon stock change reporting or to provide transparent and verifiable information that the pool is not a net source.

124. The ERT noted that erroneously the same value was reported for CH_4 and N_2O as for CO_2 emissions from biomass burning under forest management. In the response to the list of the potential problems, Switzerland submitted revised estimates for these emissions. This led to a decrease of emissions from the three gases from biomass burning of 3.94 Gg

CO_2 eq in 2008, which is equivalent to 0.5 per cent of removals of this activity. The ERT agreed with the revised estimates.

125. Biomass burning estimates include CO_2, N_2O and CH_4 emissions from woody biomass from wildfires and CO_2 emissions are assumed to be included in the NFI measurement of increment (reflected by reduced growth). The emission estimates of wildfires do not contain the emissions from the litter layer, which may result in a minor overestimation of forest management removals. The ERT recommends that the Party estimate emissions resulting from the litter layer under biomass burning.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

126. 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 included in the SIAR on the SEF tables and the SEF comparison report.[6] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the main findings contained in the SIAR.

127. 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. 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.

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

128. Switzerland has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. The accounting table was revised during the course of the review due to revised estimates submitted in response to the list of potential problems and further questions raised by the ERT during the review. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

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

130. Based on the information provided in table 4, Switzerland shall issue 716,763 removal units in its national registry.

[6] The SEF comparison report is prepared by the 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.

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 tonnes of CO_2 equivalent

Activity	*Accounting quantity*	
	As reported	*Final*
Afforestation and reforestation	–35 243	–35 243
Deforestation	82 184	172 587
Forest management	–850 168	–854 106
Article 3.3 offset[a]	0	0
Forest management cap	–850 168	–854 106
Cropland management	NA	NA
Grazing land management	NA	NA
Revegetation	NA	NA

Abbreviations: NA = not applicable.

[a] 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 (GHG) 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 GHG 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.

National registry

131. 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 ERT further noted from the SIAR that the national registry continues to fulfil the requirements regarding the public availability of information in accordance with section II.E of the annex to decision 13/CMP.1. However, the ERT reiterates the recommendation from the SIAR that Switzerland make a statement in its public website on which information it considers confidential and report thereon in its next annual submission.

Calculation of the commitment period reserve

132. Switzerland has reported its commitment period reserve in its 2010 annual submission. The Party reported that its commitment period reserve has not changed since the initial review report (218,554,562 t CO_2 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

133. Switzerland reported a number of changes to its national system in its 2010 NIR, including changes to staff allocation within FOEN, upgrades to the national emissions database and a change to the process for the calculation of key categories as well as an update to the QA/QC plan reflecting the results of a QMS audit in November 2009. The ERT concluded that, taking into account the confirmed 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

134. Switzerland reported that there have been no major changes to its national registry since the previous annual submission. The ERT concluded that the Party'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.

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

135. Switzerland has reported information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, as requested in chapter I.H of the annex to decision 15/CMP.1, in its 2010 annual submission.

136. The reported information is considered generally complete and transparent. Switzerland stated in its NIR that it is implementing climate change response measures in all sectors for different gases. Switzerland also supports cooperation programmes in developing countries aimed at energy diversification and efficiency by providing financial incentives for technology transfer. The ERT recommends that Switzerland improve the transparency of the information by further expanding on the information currently provided by 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).

III. Conclusions and recommendations

137. Switzerland made its annual submission on 15 April 2010. 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.

138. The ERT concludes that the inventory submission of Switzerland has been prepared and reported in accordance with the UNFCCC reporting guidelines. The inventory submission is complete and the Party has submitted a complete set of CRF tables for the years 1990–2008 and an NIR; these are complete in terms of geographical coverage, gases, years and sectors, as well as generally complete in terms of categories. Estimates for some elements of the categories, particularly in the industrial processes sector (limestone and dolomite use, soda ash production and use, and glass production) were not estimated. During the review, estimates or the revised use of notation keys for these categories were provided by Switzerland in response to the list of potential problems and further questions formulated by the ERT during the in-country review.

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

140. Switzerland'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. Switzerland undertook significant improvements for this submission including in relation to: the recalculation of data on milk production and the GEI rate for dairy cattle; the

reallocation of fuels between energy categories (petroleum coke and military fuel consumption); the CO_2 EF for cement and lime production; and recalculations in the LULUCF sector. After the in-country review, in response to the list of potential problems and further questions formulated by the ERT, Switzerland submitted revised estimates for the following categories;

(a) CO_2 emissions from limestone and dolomite use;

(b) CO_2 emissions from soda ash production and use;

(c) CO_2 emissions from ammonia production;

(d) CH_4 emissions from ethylene production;

(e) CH_4 emissions from manure management.

141. The Party elected forest management and has chosen annual accounting. The Party provided revised estimates after during the review which improved the accuracy of the inventory including in relation to CO_2 emissions from deforestation and CO_2, CH_4 and N_2O emissions from biomass burning under forest management.

142. 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.

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

144. 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.

145. Switzerland has reported the information requested in 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 2010 annual submission. The information was provided on 15 April 2010.

146. In the course of the review, the ERT formulated a number of recommendations relating to the information presented in Switzerland's annual submission. The key recommendations are that Switzerland:

(a) Enhance the transparency of the NIR through the provision of additional information on methods, sources and AD;

(b) Enhance the transparency of recalculations for each category through the provision of recalculated data at a more disaggregated level in the NIR;

(c) Enhance the QA/QC system, including, for example, through the systematic analysis of the comparability and completeness of sectoral emission estimates;

(d) Clarify the roles of the various agencies involved in the preparation of the inventory, and ensure that the recommendations of the ERT are explicitly addressed;

(e) Provide more effective consideration of recommendations of previous review reports by the national system;

(f) Include an energy balance for Switzerland in the NIR;

(g) Take the necessary steps to ensure the success of the AREA database image interpretation in order to fulfil the requirements of the KP-LULUCF reporting without extensive extrapolation for covering the area of the national territory;

(h) Make a statement in its public website on which information it considers confidential and report thereon in its next annual submission;

(i) Expand on the information currently provided by including examples and details of policies, actions and projects that relate to the elements listed in decision 15/CMP.1 regarding information on minimization of adverse impacts in accordance with Article 3, paragraph 14.

IV. Questions of implementation

147. 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 2010. Available at <http://unfccc.int/resource/docs/2008/asr/ che.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2010. Available at <http://unfccc.int/resource/webdocs/sai/2010.pdf>.

FCCC/ARR/2009/CHE. Report of the individual review of the greenhouse gas inventory of Switzerland submitted in 2009. Available at <http://unfccc.int/resource/docs/2009/ 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 methodologies and assumptions used. The following document[1] was also provided by Switzerland:

Dr. Carla Riccarda Soliva. 2006. *Dokumentation der Berechnungsgrundlage von Methan aus der Verdauung und dem Hofdünger landwirtschaftlicher Nutztiere.*

[1] Reproduced as received from the Party.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
BEF	biomass expansion factor
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
FAO	Food and Agriculture Organization of the United Nations
FOD	first order decay
GEI	gross energy intake
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
IDP	inventory development plan
IE	included elsewhere
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
LULUCF	land use, land-use change and forestry
m^2	square metre
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NCV	net calorific values
NE	not estimated
Nex	nitrogen excretion
NFI	national forest inventory
NH_3	ammonia
NMVOC	non-methane volatile organic compounds
N_2O	nitrous oxide
NO	not occurring
NO_X	nitrogen oxide
NIR	national inventory report
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
QMS	quality management system
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report

SO_2	sulphur dioxide
SWDS	solid waste disposal site
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change