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**Report on the individual review of the annual submission of
Switzerland submitted in 2014***

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Switzerland, coordinated by the UNFCCC secretariat, in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 1 to 6 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Gebru Jember Endalew (Ethiopia) and Mr. Tomas Gustafsson (Sweden); energy – Mr. Darío Gómez (Argentina), Mr. James Aidan Kennedy (Ireland) and Mr. Michael Strogies (Germany); industrial processes and solvent and other product use – Ms. Elsa Hatanaka (Japan), Mr. Thapelo Clifford Mohale Letete (South Africa) and Mr. Andrew Neal (New Zealand); agriculture – Mr. Kingsley Kwako Amoako (Ghana) and Mr. Amnat Chidthaisong (Thailand); land use, land-use change and forestry (LULUCF) – Mr. George Mitri (Lebanon), Mr. Lucio Santos (Colombia) and Mr. Harry Vreuls (Netherlands); and waste – Mr. Cristóbal Félix Díaz Morejón (Cuba) and Mr. Takefumi Oda (Japan). Mr. Gómez and Ms. Hatanaka were the lead reviewers. The review was coordinated by Ms. Kyoko Miwa (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Switzerland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team’s (ERT’s) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised “Guidelines for the preparation of national communications by Parties include in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories” (hereinafter referred to as the UNFCCC Annex I inventory reporting guidelines) adopted through decision 24/CP.19. Therefore, when preparing the 2015 annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Switzerland was carbon dioxide (CO₂), accounting for 84.0 per cent of total GHG emissions¹ expressed in CO₂ equivalent (CO₂ eq), followed by methane (CH₄) (7.2 per cent) and nitrous oxide (N₂O) (5.9 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) collectively accounted for 2.9 per cent of the overall GHG emissions in the country. The energy sector accounted for 80.6 per cent of total GHG emissions, followed by the agriculture sector (10.8 per cent), the industrial processes sector (7.0 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 51,478.56 Gg CO₂ eq and decreased by 2.8 per cent between the base year² and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

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

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

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.
6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year^a to 2012

		Gg CO ₂ eq								Change (%)		
		Greenhouse gas	Base year	1990	1995	2008	2009	2010	2011	2012	Base year – 2012	
Annex A sources		CO ₂	44 628.35	44 628.35	43 671.55	45 434.43	44 267.00	45 910.50	41 834.73	43 237.94	–3.1	
		CH ₄	4 637.61	4 637.61	4 393.95	3 877.93	3 812.92	3 799.94	3 752.01	3 717.44	–19.8	
		N ₂ O	3 477.64	3 477.64	3 303.58	3 053.28	3 018.02	3 093.24	3 027.41	3 021.07	–13.1	
		HFCs	0.02	0.02	181.66	1 041.98	1 083.10	1 138.16	1 195.50	1 245.04	5 526 448.3	
		PFCs	100.21	100.21	14.69	39.39	35.54	37.14	39.98	33.08	–67.0	
		SF ₆	143.62	143.62	97.73	244.72	187.12	154.77	164.37	223.99	56.0	
KP-LULUCF	Article 3.3 ^b	CO ₂				81.74	162.22	197.10	201.51	204.73		
		CH ₄				NO	NO	NO	NO	NO		
		N ₂ O				0.01	0.01	0.01	0.01	0.00		
	Article 3.4 ^c	CO ₂	NA				–1 204.00	–1 420.26	–2 020.81	–2 067.51	–2 236.89	NA
		CH ₄	NA				1.01	0.80	0.47	3.17	0.42	NA
		N ₂ O	NA				0.23	0.18	0.11	0.72	0.10	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, 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 The 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 cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

^c Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year^a to 2012

		<i>Gg CO₂ eq</i>								<i>Change (%)</i>
		<i>Base year</i>	<i>1990</i>	<i>1995</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<i>2012</i>	<i>Base year–2012</i>
Annex A sources	Energy	42 010.69	42 010.69	41 929.88	43 650.10	42 529.97	44 032.42	39 978.10	41 500.74	–1.2
	Industrial processes	3 319.61	3 319.61	2 626.21	3 534.82	3 446.09	3 633.77	3 642.19	3 628.22	9.3
	Solvent and other product use	470.17	470.17	353.75	201.97	201.39	199.24	201.88	199.91	–57.5
	Agriculture	6 092.10	6 092.10	5 819.28	5 645.18	5 586.99	5 636.52	5 571.60	5 538.57	–9.1
	Waste	1 094.88	1 094.88	934.05	659.64	639.28	631.80	620.22	611.12	–44.2
LULUCF		NA	–1 921.31	–3 139.68	–774.99	–812.60	–934.26	–1 897.43	–1 128.92	NA
Total (with LULUCF)		NA	51 066.14	48 523.49	52 916.73	51 591.10	53 199.49	48 116.57	50 349.64	NA
Total (without LULUCF)		52 987.45	52 987.45	51 663.17	53 691.72	52 403.70	54 133.75	50 014.00	51 478.56	–2.8
Other ^b		12.13	12.13	13.08	14.10	14.10	14.10	14.10	14.10	16.2
KP-LULUCF	Article 3.3 ^c Afforestation and reforestation				–22.17	–24.33	–23.34	–19.62	–17.13	
	Deforestation				103.92	186.56	220.45	221.14	221.87	
	Total (3.3)				81.74	162.23	197.10	201.52	204.73	
	Article 3.4 ^d Forest management				–1 202.77	–1 419.28	–2 020.23	–2 063.62	–2 236.38	
	Cropland management	NA			NA	NA	NA	NA	NA	NA
	Grazing land management	NA			NA	NA	NA	NA	NA	NA
	Revegetation	NA			NA	NA	NA	NA	NA	NA
Total (3.4)		NA			–1 202.77	–1 419.28	–2 020.23	–2 063.62	–2 236.38	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

^a The base year for Annex A sources is the base year under the Kyoto Protocol, which 1990 for all gases. The base year for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

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

^c Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

^d Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 15 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Switzerland also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Switzerland submitted revised emission estimates on 16 October 2014 in response to the list of potential problems and further questions raised by the ERT. The values used in this report are those submitted by Switzerland on 16 October 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Questions of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Switzerland. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3

The expert review team's overall assessment of the annual submission

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
The ERT's findings on completeness		
Annex A sources ^a	Complete	Mandatory: none Non-mandatory: none
Land use, land-use change and forestry ^a	Complete	Mandatory: none Non-mandatory: Non-CO ₂ emissions from drainage of soil and wetlands (peatland); CH ₄ and N ₂ O emissions from settlements and other land; and CO ₂ , CH ₄ and N ₂ O emissions from harvested wood products (see para. 50 below)

<i>Issue</i>	<i>Expert review team assessment</i>	<i>General findings and recommendations</i>
KP-LULUCF	Complete	The ERT encourages the Party to estimate emissions from all non-mandatory categories
The ERT's findings on recalculations and time-series consistency		
Transparency of recalculations	Sufficiently transparent	Please see paragraphs 36 and 43 below for category-specific recommendations
Time-series consistency	Sufficiently consistent	
The ERT's findings on QA/QC procedures		
	Sufficient	Switzerland has elaborated a QA/QC plan and has implemented tier 1 QA/QC procedures in accordance with that plan Please see paragraph 12 below for a cross-cutting recommendation
The ERT's findings on transparency		
	Sufficiently transparent except for the LULUCF and waste sectors and KP-LULUCF activities	The ERT commends the Party for the improvements in transparency (see para. 18(a) below). The ERT notes that there are some areas where transparency can be further improved. Please see paragraphs 13, 36, 39, 40, 46, 47, 50, 51, 53, 54, 55, 57, 60, 61, 65, 67, 68, 71, 73 and 74 below

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, 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, NE = not estimated, QA/QC = quality assurance/quality control.

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the *IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

12. The ERT noted discrepancies between the NIR and the information included in CRF summary table 3. For example, for manufacturing industries and construction, CRF summary table 3 reports the use of a tier 1 method (using the notation key “D” (default)) to estimate N₂O emissions, while the NIR (page 129) indicates the combined use of tier 2 and tier 3 methods. In response to a question raised by the ERT during the review, Switzerland explained that the notation key used in CRF summary table 3 for manufacturing industries and construction should be changed to “CS” (country-specific). The ERT recommends that Switzerland report the same and correct information in the CRF tables and the NIR and improve the quality control (QC) procedures at the final stage of the inventory compilation process of its annual submission.

13. The ERT noted that there are gaps in the information provided by Switzerland in CRF table 8(b) (recalculation – explanatory information) for the years 1990–2008 and CRF table 9(a) (completeness – information on notation keys) for the years 1990–2012. In response to a question raised by the ERT during the review, Switzerland explained that the explanatory information on recalculations and notation keys provided for some years in the CRF tables is often applicable to the entire time series and is therefore not repeated in the

tables of other years. The ERT recommends that Switzerland improve the transparency of its reporting by filling in all requested information in the CRF tables.

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

14. The NIR and additional information provided by the Party during the review described the national system for the preparation of the inventory. As indicated by the Party in response to questions raised by the ERT during the review, there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Switzerland submitted in 2013,³ remains relevant.

15. In the supplementary information on the quality assurance/quality control (QA/QC) system (“Description of the quality management system”) in the NIR, Switzerland states that data suppliers are responsible for tier 1 QC procedures, documented in checklists. In response to a question raised by the ERT during the review on the availability of the QC checklist for N₂O emissions from road transportation, the Party responded that the documentation (checklists) of QC procedures are filled in by the lead authors of the NIR after confirming the correctness of emission factors (EFs), activity data (AD) and emission data. Then, the data from the data supplier are transferred to the central inventory database, the Swiss national air pollution database (EMIS). The ERT recommends that Switzerland make the description of its QA/QC system more transparent by updating section 2.1 of the NIR (“Responsibilities and coordination of QA/QC activities”) with relevant information. The ERT also recommends that Switzerland confirm that national statistics agencies have implemented adequate QC procedures equivalent to those in table 8.1 of 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 report on the progress made in this regard in its NIR.

Inventory preparation

16. Table 4 contains the ERT’s assessment of Switzerland’s inventory preparation process.

Table 4

Assessment of inventory preparation by Switzerland

<i>Issue</i>	<i>Expert review team assessment</i>	<i>ERT findings and recommendations</i>
<i>Key category analysis</i>		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including and excluding LULUCF
Approach followed?	Both tier 1 and tier 2	

³ FCCC/ARR/2013/CHE, paragraphs 10 and 11.

<i>Issue</i>	<i>Expert review team assessment</i>	<i>ERT findings and recommendations</i>
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
<i>Assessment of uncertainty analysis</i>		
Approach followed?	Both tier 1 and tier 2	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Tier 1: Level = 7.5% Trend = 8.8%	
Quantitative uncertainty (excluding LULUCF)	Tier 1: Level = 3.9% Trend = 3.1%	

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

Inventory management

17. There were no changes to the inventory management process carried out by Switzerland for the 2014 annual submission, as indicated by the Party in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Switzerland submitted in 2013,⁴ remains relevant.

⁴ FCCC/ARR/2013/CHE, paragraph 15.

5. Follow-up to previous reviews

18. The ERT noted that all previous outstanding recommendations have been addressed by Switzerland in its 2014 annual submission and that the Party has resolved the underlying issues concerning all recommendations, except for some outstanding issues (see paras. 27 and 50 below). The ERT identified major improvements in the 2014 annual submission that have been implemented largely in response to the previous recommendations and the ERT commends Switzerland for its continuous efforts to improve its inventory. For example, improvements include:

(a) Enhanced transparency in all sectors and in the reporting of KP-LULUCF activities (e.g. due to improved information on: the methodological description of oil systems and flaring in the energy sector; the plant-specific N₂O EF for nitric acid production in the industrial processes sector; the conversion factors used for the calculation of energy requirements for CH₄ emissions from enteric fermentation in the agriculture sector; the identification of references for the sources of information used, including for the AD, EFs and parameters used in the LULUCF sector; the composition of municipal solid waste (MSW) and construction waste in the waste sector; and the assumptions and expert judgement used for mineral soils for CO₂ emissions from afforestation and reforestation in relation to KP-LULUCF activities);

(b) Improved completeness of the inventory (e.g. in the energy sector for CO₂ and CH₄ emissions from natural gas production);

(c) Improved accuracy of the emission estimates (e.g. in the industrial processes sector for CO₂ emissions from cement production due to the correction and recalculation of the CO₂ EF used for blasting agents);

(d) In relation to the reporting of KP-LULUCF activities, improvements include: enhanced comparability of CO₂ emissions and afforestation and reforestation due to the implementation of the same methods for the LULUCF sector and the KP-LULUCF activities; and the use of the correct notation keys for losses in living biomass in units of land harvested.

19. Recommendations for issues the ERT identified during the 2014 annual review are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

20. The energy sector is the main sector in the GHG inventory of Switzerland. In 2012, emissions from the energy sector amounted to 41,500.74 Gg CO₂ eq, or 80.6 per cent of total GHG emissions. Since 1990, emissions have decreased by 1.2 per cent. The key driver for the fall in emissions is the decrease in emissions from other sectors, which was partially offset by an increase in emissions from transport and energy industries. Within the sector, 39.4 per cent of the emissions were from transport, followed by 36.8 per cent from other sectors, 13.3 per cent from manufacturing industries and construction and 9.8 per cent from energy industries. Fugitive emissions from fuels accounted for 0.5 per cent. The remaining 0.3 per cent were from other (fuel combustion).

21. Switzerland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Switzerland between the 2013 and 2014 annual submissions were in the following categories: manufacturing industries and construction, and other sectors. The recalculations were made in response to recommendations made in the 2013 annual review report and following changes in AD and

EFs. Compared with the 2013 annual submission, the recalculations decreased emissions in the energy sector by 11.56 Gg CO₂ eq (0.03 per cent), and decreased total national emissions by 0.02 per cent. The recalculations are listed in the NIR and in CRF table 8 but not all of them were adequately explained, in particular those associated with changes in the CH₄ and N₂O EFs for liquefied petroleum gas (LPG) and in the N₂O EF for waste incineration (see paras. 34 and 36 below, respectively).

22. Switzerland has addressed all of the recommendations made in the 2013 annual review report, except for the disaggregation of the reporting of fuels used for non-energy purposes⁵ (see para. 27 below). The issues that have been addressed by Switzerland include: (i) updating of the CO₂ EF for refinery gas,⁶ from 59.3 t/TJ to 59.8 t/TJ (NIR, page 122); (ii) providing documentation on the CO₂ EFs for solid fuels and correcting an error in the reporting⁷ (NIR, pages 110–111); (iii) communicating correct data for charcoal production to the Food and Agriculture Organization of the United Nations⁸ (NIR, page 52); (iv) reporting and documenting emissions from oil pipelines⁹ in CRF table 1.B.2 and in the NIR (page 176); (v) estimating and reporting CO₂ and CH₄ emissions from natural gas production from 1990 to 1994¹⁰ in CRF table 1.B.2 and in the NIR (pages 178–180); (vi) reassessing the emissions from the Swiss gas industry,¹¹ which led to a recalculation of the entire time series (NIR, pages 178–180); (vii) improving the description of the methodology used to estimate emissions from venting and flaring¹² (NIR, pages 180–182). The ERT commends Switzerland for these improvements.

23. The 2013 annual review report recommended that Switzerland use the results of a study aimed at reassessing the CO₂ EFs and net calorific values (NCVs) for liquid fuels in the 2015 annual submission.¹³ Switzerland has indicated in its 2014 NIR (page 52) that the results of this study were expected in mid-2014. In response to questions raised by the ERT during the review with regard to the availability of the results from this study and their use in the 2015 annual submission, Switzerland informed the ERT that the study, commissioned by the Federal Office for the Environment and the Swiss Federal Office for Energy (SFOE), examined a consistent set of NCVs and CO₂ EFs for the main petroleum products. The Party further indicated that: (i) the Swiss energy statistics were revised in spring 2014 and the NCV was changed for 2013 onwards to the new values; (ii) accordingly, the corresponding CO₂ EFs will be used for 2013 onwards; (iii) previous measurements of both NCVs and CO₂ EFs were made in the period 1998–1999; (iv) the former values are used for the inventory years prior to 1998; (v) for the period 1999–2012, the NCVs and CO₂ EFs are linearly interpolated between 1998 and 2003; and (vi) the actual differences between the old and the new values are relatively small. Switzerland provided the ERT with the new CO₂ EFs: gasoline (73.8 t CO₂/TJ), diesel oil (73.3 t CO₂/TJ), kerosene (72.8 t CO₂/TJ) and gas oil (73.7 t CO₂/TJ). The ERT acknowledges the information provided by the Party and recommends that Switzerland implement it, as intended, providing all the necessary documentation to support the recalculations.

⁵ FCCC/ARR/2013/CHE, paragraph 28.

⁶ FCCC/ARR/2013/CHE, paragraph 29.

⁷ FCCC/ARR/2013/CHE, paragraph 30.

⁸ FCCC/ARR/2013/CHE, paragraph 37.

⁹ FCCC/ARR/2013/CHE, paragraph 40.

¹⁰ FCCC/ARR/2013/CHE, paragraph 42.

¹¹ FCCC/ARR/2013/CHE, paragraph 43.

¹² FCCC/ARR/2013/CHE, paragraph 44.

¹³ FCCC/ARR/2013/CHE, paragraph 24.

2. Reference and sectoral approaches

24. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraph 27 below.

Table 5

Review of reference and sectoral approaches

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross references</i>
Difference between the reference approach and the sectoral approach	Energy consumption: 3.54 PJ, 0.62% CO ₂ emissions: 362.61 Gg CO ₂ , 0.89%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	
Are differences with international statistics adequately explained?	Yes	
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	No	27

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

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

25. No problems were identified.

International bunker fuels

26. No problems were identified.

Feedstocks and non-energy use of fuels

27. Switzerland has reported in its NIR (page 96) that the *Swiss Overall Energy Statistics* (SFOE, 2013)¹⁴ report feedstocks and non-energy fuel use on an aggregated level only and do not provide a detailed breakdown of specific petroleum products. In the 2014 annual submission, Switzerland has reported the use of naphtha and LPG separately for the first time. The Party indicates in its NIR (page 97) that a reassessment of the disaggregation of feedstocks is envisaged in the course of the implementation of the new UNFCCC Annex I inventory reporting guidelines for the 2015 annual submission. The ERT welcomes this planned improvement and reiterates the recommendation made in previous review reports that Switzerland disaggregate the reporting of fuels used for non-energy purposes.

¹⁴ Available at <http://www.bfe.admin.ch/php/modules/publikationen/stream.php?extlang=de&name=de_551182741.pdf&endung=Schweizerische%20Gesamtenergiestatistik%202012>.

3. Key categories

Stationary combustion: gaseous fuels – CO₂

28. In response to a recommendation in the list of potential problems and further questions raised by the ERT in 2013,¹⁵ Switzerland changed the CO₂ EF for natural gas from the value previously used (55.0 t/TJ) to the default value (56.1 t/TJ) provided in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines). In the 2014 annual submission, the Party has used the same default IPCC value (56.1 t/TJ) for the CO₂ EF. The ERT notes that the uncertainty of the CO₂ EF has been derived from data on measurements of the NCVs of natural gas in the grid and that Switzerland imports natural gas from Denmark, France, Germany, Italy, the Netherlands and Norway. In response to a question raised by the ERT during the review regarding the possibility of estimating country-specific CO₂ EFs, the Party indicated that the IPCC default value used is largely consistent with the CO₂ EF used by the countries from which natural gas is imported, which report an implied emission factor (IEF) ranging from 55.3 to 56.9 t/TJ. Switzerland further explained that the national inventory team is in contact with the Swiss Gas and Water Industry Association to obtain the relevant data to derive a country-specific CO₂ EF for the period 1990–2014 and that this newly derived EF will be used to estimate and report the emissions in the 2015 annual submission. The ERT agrees with the view of Switzerland regarding the consistency between the IPCC default CO₂ EF and the CO₂ EFs used by the Parties from which natural gas is imported, welcomes this planned improvement and recommends that the Party implement it in the annual submission.

Stationary combustion: biomass fuels – CH₄

29. The EFs used by Switzerland to estimate CH₄ emissions from wood combustion under the category residential are based on measurements of volatile organic compounds (VOCs) of a series of wood combustion plants at various conditions. The CH₄ EFs are then calculated using a factor α of 0.3 ($\alpha = \text{CH}_4/\text{VOC}$) based on measurements of log wood stoves and boilers. Switzerland has obtained this type of technology-based CH₄ EF for 1990 and 2008 for 16 technologies. Similarly, the CH₄ EFs for the period 2008–2012 are estimated on the basis of a modelled CH₄ EF for 2035, by using interpolation between the measured CH₄ EF for 2008 and the modelled CH₄ EF for 2035. For all technologies, the CH₄ EFs for 2035 are lower than those for 2008, which are lower than those for 1990. In response to a question raised by the ERT during the review, Switzerland indicated that this model assumes that in 2035 all installations will be using currently best available technologies (as of 2010). Switzerland also provided the ERT with the specific reference used for this estimation¹⁶ and the spreadsheets showing the CH₄ EFs for 1990, 2008 and 2035, and indicated that, based on the information provided, the Party is convinced that a linear decrease in the Swiss CH₄ EF model between 1990, 2008 and 2035 is justified. However, the ERT, in studying the Swiss air pollution control policy, did not find sufficient evidence of programmed annual retirement of old units and annual incorporation of best available technologies to justify the linear interpolation between the values for 1990 and 2007 and the use of modelled scenario data for 2035 to estimate the EFs for the period 2009–2012. The ERT is of the view that the linear interpolation between the measured CH₄ EF for 2008 and the modelled CH₄ EF for 2035, whose derivation has not been documented thoroughly by the Party, is not in line with the IPCC good practice guidance (chapter 7,

¹⁵ FCCC/ARR/2013/CHE, paragraphs 31 and 32.

¹⁶ Nussbaumer, T and Boogen, N. 2010. Emissionsfaktoren von Holzfeuerungen – Aktualisierung des Arbeitsblatts Emissionsfaktoren Feuerungen und Vorabklärungen zur Bestimmung des Kondensatanteils, Verenum im Auftrag des Bundesamts für Umwelt, (BAFU).

page 7.21). The ERT further notes that a linear interpolation between two values separated by 27 years is not in line with IPCC good practice guidance. The ERT considers that the use of an annually decreasing series of CH₄ EFs between 2008 and 2035 leads to a potential underestimation of CH₄ emissions during the first commitment period of the Kyoto Protocol. In its list of potential problems and further questions raised by the ERT, the ERT recommended that Switzerland provide thorough documentation to justify its approach to developing the CH₄ EFs, including the annual rate of retirement of old units and the incorporation of new technologies, or, if Switzerland could not provide this documentation, estimate the CH₄ emissions from wood combustion under the category residential for all years of the first commitment period using the CH₄ EFs obtained for 2008. In its response, Switzerland submitted revised emission estimates using the CH₄ EFs for 2008 for the entire first commitment period (2008–2012). The ERT considers that the revised emission estimates resolved the issue. The revised emission estimates increased the CH₄ emissions from the category residential by 0.01 per cent (4.45 Gg CO₂ eq) for the entire first commitment period (2008–2012).

30. Switzerland has estimated the CH₄ EFs for the years between 1991 and 2007 by linearly interpolating the values for 1990 and 2008, obtaining a linearly decreasing time series of CH₄ EFs. During the review, in response to a question raised by the ERT, Switzerland indicated that this trend is also in line with the Swiss air pollution control policy with increased requirements since 2007. In this regard, the ERT notes that it is unlikely that the values between 1990 and 2006 would be in line with a control policy enacted in 2007. In response to the list of potential problems and further questions raised by the ERT (see para. 29 above) Switzerland indicated that a more detailed investigation into the temporal development of the CH₄ EFs and the technology implementation for the period 1991–2007 will be discussed in the GHG inventory core group and options for further improvements will be explored. The ERT acknowledges this planned improvement.

Oil and natural gas: gaseous fuels – CO₂ and CH₄

31. Switzerland has indicated in its NIR (page 180) that an error in the CH₄ EF for natural gas pipelines was detected during the internal review of the 2014 annual submission and that this error led to an underestimation of the emissions based on an EF with too low a value used for the calculation (0.1752 m³/year/km). Switzerland further indicated that this error was detected too late to be taken into account for the 2014 annual submission and that the error will be corrected for the next annual submission. In response to questions raised by the ERT during the review regarding the subcategory for which emissions have been underestimated and requesting quantitative information on the correct value of this EF, the value that has been used and the magnitude of the underestimation, Switzerland informed the ERT that the EF for transit pipelines was erroneously assumed to be equal to the EF for high-pressure steel cathode protected and that the revised estimate for transmission losses (based on the correct EF) is approximately 350 t CH₄ (7.35 Gg CO₂ eq) higher than the estimate reported for 2012 in the 2014 annual submission. This issue was included in the list of potential problems and further questions raised by the ERT.

32. Switzerland has reported major accidents and isolated events under other leakage in CRF table 1.B.2. The Party has indicated in its NIR (page 178) that estimates of fugitive emissions have been reassessed in 2013 based on a recent study introduced by Quantis (2014).¹⁷ During the review, Switzerland provided the ERT with a copy of this study. The ERT notes that the Quantis report indicates that two accidents occurred, one in 2010 and

¹⁷ Quantis. 2014. *Methanemissionen der Schweizer Gaswirtschaft. Zeitreihe 1990 bis 2012. Schlussbericht*. Quantis im Auftrag des Schweizerischen Vereins des Gas- und Wasserfaches (SVGW) und des Bundesamts für Umwelt (BAFU).

another in 2011. The ERT further notes that Switzerland estimated and reported the emissions associated with the accident in 2010 but did not report the emissions associated with the accident in 2011. In response to a question raised by the ERT during the review regarding the lack of emission estimates associated with the accident in 2011, Switzerland informed the ERT that a preliminary version of the Quantis study was used during the preparation of the 2014 inventory submission and that in this preliminary version, the reporting of the accidents was incomplete. As a consequence, the event of 2011, implying a release of 500 t CH₄ (10.5 Gg CO₂ eq) was not considered since it was reported in the final version of the Quantis report, which became available after the 2014 submission. The ERT considers that not reporting the emissions that occurred during the accidental release in 2011 constitutes a potential underestimation. This issue was included in the list of potential problems and further questions raised by the ERT.

33. Switzerland submitted revised emission estimates for both of the potential problems (see paras. 31 and 32 above) and the ERT considers that the revised estimates resolved the issues. The combined results for both revised emission estimates increased the CO₂ and CH₄ emissions from the subcategory natural gas by 6.3 per cent (54.56 Gg CO₂ eq) for the entire first commitment period (2008–2012).

4. Non-key categories

Stationary combustion: liquid fuels – CH₄ and N₂O

34. Until the 2014 annual submission, Switzerland reported emissions from combustion of LPG together with emissions from combustion of gas oil since the Party was unable to discriminate between the two fuels used under the categories manufacturing industries and construction, and commercial/institutional (other sectors) (see para. 27 above). In the 2014 annual submission, Switzerland has estimated and reported disaggregated CH₄ and N₂O emissions from these two fuels for the first time, using the default tier 1 EFs provided in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred as the 2006 IPCC Guidelines). The values of the default tier 1 EFs provided in the 2006 IPCC Guidelines are 1 kg CH₄/TJ and 0.1 kg N₂O/TJ while the corresponding values in the Revised 1996 IPCC Guidelines are higher, namely 2 kg CH₄/TJ and 0.6 kg N₂O/TJ. In response to questions raised by the ERT during the review regarding the Party's choice of non-CO₂ EFs for LPG, Switzerland indicated that it considers that the tier 1 default EFs provided in the 2006 IPCC Guidelines are most appropriate because they provide specific values for LPG. The ERT is of the view that the Revised 1996 IPCC Guidelines contain tier 1 values that are applicable to any oil-derived product, such as LPG, and notes that the lead reviewers, at their 6th meeting, clearly indicated that when Parties use new information from the 2006 IPCC Guidelines or elsewhere that leads to lower emission estimates than in previous annual submissions, the ERT should ensure that the Party justifies in its annual submission the use of this new information in accordance with the IPCC good practice guidance. Furthermore, the ERT notes that the IPCC good practice guidance considers a split by fuel as a tier 1 approach for non-CO₂ gases while for a tier 2 approach, a split by technology is required. The ERT notes that by choosing the default tier 1 EFs provided in the 2006 IPCC Guidelines without providing additional information supporting the claim that LPG is not individually covered in the Revised 1996 IPCC Guidelines is not in line with the IPCC good practice guidance. Furthermore, the ERT was of the view that Switzerland was potentially underestimating CH₄ and N₂O emissions that occurred during the first commitment period of the Kyoto Protocol, since the Revised 1996 IPCC Guidelines constitute the basis of the agreed methodologies to estimate emissions and removals for this period (decision 2/CP.3). This issue was included in the list of potential problems and further questions raised by the ERT. The ERT recommended that Switzerland provide technology-based information that justifies that emissions of CH₄ and N₂O arising from the combustion of LPG using current technologies and practices in Switzerland are

best represented by the tier 1 default EFs provided in the 2006 IPCC Guidelines. If Switzerland were unable to provide the information described above, and the only data available regarding these emission estimates are on the amount of LPG combusted, then the ERT recommended that Switzerland estimate the CH₄ and N₂O emissions using the tier 1 default EFs provided in the Revised 1996 IPCC Guidelines. In response to the list of potential problems and further questions raised by the ERT, Switzerland submitted revised emission estimates which were calculated based on IPCC default EFs, and the ERT considers that the revised estimates resolved the issue. The revised emission estimates increased the CH₄ and N₂O emissions from the category manufacturing industries and construction by 0.01 per cent (3.74 Gg CO₂ eq) for the entire first commitment period (2008–2012).

Stationary combustion: biomass fuels – N₂O

35. The ERT notes that the N₂O EF (1.6 kg/TJ) for wood combustion under the subcategory residential (other sectors) in the Swiss national GHG inventory is the lowest among reporting Parties across the entire time series and lower than the tier 1 default value provided in the Revised 1996 IPCC Guidelines (4 kg/TJ). In response to issues identified at previous stages of the review process, Switzerland indicated that the revision of the model used to derive the country-specific EFs for wood combustion – including the N₂O EF – was ongoing. In response to questions raised by the ERT during the review requesting further information on this work and an explanation of how the Party ensures that these emissions are not underestimated, Switzerland informed the ERT that, based on two available measurements in the literature with N₂O EF values ranging between 0.3 and 8 kg/TJ, the inventory experts have suggested values of 2 kg/TJ and 6 kg/TJ as the most reasonable values for wood and wood waste combustion, respectively, and that, on this basis, the Party decided to use the IPCC tier 1 default value of 4 kg/TJ for the 2015 annual submission onwards. The ERT considers that the use of the value of 1.6 kg/TJ to estimate N₂O emissions from wood combustion without providing supporting information for this choice leads to an underestimation of these emissions throughout the time series. Furthermore, the view of the ERT is confirmed by the decision by Switzerland to change the value of this EF for the 2015 annual submission. This issue was included in the list of potential problems and further questions raised by the ERT. The ERT recommended that Switzerland estimate N₂O emissions from wood under the subcategory residential for all years between 1990 and 2012 using the IPCC tier 1 default value of 4 kg/TJ. In response to the list of potential problems and further questions raised by the ERT, Switzerland submitted revised emission estimates using the IPCC tier 1 default value of 4 kg/TJ and the ERT considers that the revised estimates resolved the issue. The revised emission estimates increased the N₂O emissions from the subcategory residential by 0.13 per cent (69.54 Gg CO₂ eq) for the entire first commitment period (2008–2012).

36. Switzerland has undertaken extensive recalculations for the energy sector in its 2014 annual submission, including recalculations due to changes in the EFs for different types of biomass fuels. In particular, the ERT notes that the values of the N₂O EFs for waste (of fossil and biogenic origin) used under electricity and heat production have dropped significantly. In its 2013 annual submission, Switzerland selected values of 5.5 kg/TJ and 5.8 kg/TJ for the N₂O EF for waste of fossil and biogenic origin, respectively, while the 2014 annual submission reports values of 2.6 kg/TJ and 2.4 kg/TJ for the N₂O EF for the two types of waste fuels. In response to questions raised by the ERT during the review with regard to the underlying reasons supporting these changes, Switzerland explained that the recalculations were triggered by: revised data from data providers (e.g. SFOE); recommendations and encouragements from the 2013 annual review report (e.g. a revision of the N₂O EF for biogas); and newly commissioned studies to further improve the inventory (e.g. a revision of the N₂O EF for waste incineration). With regard to N₂O emissions from waste incineration, the Party further informed the ERT that in the period

2010–2011, measurements were made in five municipal waste incineration plants (MWIPs) to determine the N₂O EFs for the two different DeNOx systems used in these plants: selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). From these measurements, country-specific N₂O EFs for plants equipped with SCR and SNCR were estimated in 2013. For plants without any DeNOx systems, the EFs have been taken from the *Handbook on Emission Factors for Stationary Sources* (SAEFL, 2000).¹⁸ From these values, a time series of weighted EFs has been calculated for 1990, 1994, 1998, 2004, 2008 and 2012, taking into account the equipment status of each MWIP in Switzerland and the amount of waste that has been burned in a particular plant. The full time series of N₂O EFs for the period 1990–2012 was obtained by interpolating values in between the years for which weighted averages have been calculated. Switzerland provided the ERT with the weighted N₂O EFs in MWIPs for the entire time series (1990–2012), which range from 2.00 g N₂O/GJ (in 2004) to 5.26 g N₂O/GJ (in 1990) and indicated that the overall decreasing trend of N₂O EFs for MWIPs reflects the increased use of improved DeNOx equipment and that a table with the N₂O EFs for MWIPs will be included in the next annual submission. The ERT acknowledges the thorough information provided by Switzerland during the review and recommends that the Party include the table containing the N₂O EFs for MWIPs, with brief and relevant explanatory information in its NIR.

C. Industrial processes and solvent and other product use

1. Sector overview

37. In 2012, emissions from the industrial processes sector amounted to 3,628.22 Gg CO₂ eq, or 7.0 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 199.91 Gg CO₂ eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have increased by 9.3 per cent in the industrial processes sector, and decreased by 57.5 per cent in the solvent and other product use sector. The key driver for the rise in emissions in the industrial processes sector is the increase in the consumption of halocarbons as a replacement for chlorofluorocarbons in many technical applications. The key drivers for the decrease in emissions in the solvent and other product use sector are the introduction of non-methane volatile organic compound emission limit values by the Ordinance on Air Pollution Control¹⁹ (1985) and the introduction of the Incentive Tax on VOCs²⁰ in 2000 (1997). Within the industrial processes sector, 53.7 per cent of the emissions were from mineral products, followed by 40.5 per cent from consumption of halocarbons and SF₆, 4.6 per cent from chemical industry and 1.2 per cent from metal production. The remaining 0.03 per cent were from other (industrial processes). Emissions from other production were reported as “NA” (not applicable) and emissions from production of halocarbons and SF₆ were reported as “NA, NO (not occurring)”.

38. Switzerland has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector and the solvent and other product use sector. The most significant recalculation made by Switzerland between the 2013 and 2014 annual submissions was in the following category: metal production. The recalculation was made following changes in CO₂ EFs based on new data from Swiss steel plants (see para. 41 below). Compared with the 2013 annual submission, the recalculation decreased emissions in the industrial processes sector by 127.41 Gg CO₂ eq (3.4 per cent) for 2011, and

¹⁸ Swiss Agency for the Environment, Forests and Landscape (SAEFL).

¹⁹ Ordinance of 16 December 1985 on Air Protection. See <<http://www.admin.ch/opc/fr/classified-compilation/19850321/index.html>>.

²⁰ Ordinance of 12 November 1997 on the Incentive Tax on Volatile Organic Compounds (OVOC). See <<http://www.admin.ch/opc/fr/classified-compilation/19970460/index.html>>.

decreased total national emissions by 0.26 per cent. The recalculation was adequately explained.

2. Key categories

Limestone and dolomite use – CO₂

39. Switzerland has reported CO₂ emissions from limestone and dolomite use in the production of fine ceramics, rock wool, and bricks and tiles. Following the recommendation made in previous review reports, Switzerland has applied an updated EF (117,000 g CO₂/t) to calculate its emission estimates for limestone and dolomite use in brick and tile production.²¹ Due to the absence of data on the carbonate containing raw materials from the industry, Switzerland used representative analyses of the carbonate content of the brick earth carried out by the industry in 2012. As described in the NIR (page 192) Switzerland denominates clay to the limestone and dolomite containing input for brick and tile production. In response to questions raised by the ERT during the review regarding the composition of this clay and how it relates to the emissions from limestone and dolomite use, Switzerland explained that the clay contains limestone and dolomite, and that geogenic emissions result from the limestone and dolomite in the clay. The ERT recommends that Switzerland specify that the clay contains limestone and dolomite in its NIR, thus explaining the allocation of emissions under this category.

3. Non-key categories

Nitric acid production – N₂O

40. N₂O and nitrogen oxide (NO_x) emissions from nitric acid production are estimated using plant-specific EFs based on measurements undertaken at the single nitric acid plant in Switzerland. In response to a recommendation made in the previous review report,²² Switzerland included, in the 2014 NIR, details of the measurements used to calculate the plant-specific EFs to justify their use in the emission estimates. In response to a question raised by the ERT during the review regarding why only a value for 2009 was used, Switzerland answered that the emission measurement undertaken in 2009 is the only available plant-specific measurement of N₂O emissions. Since no modifications have been made to the production line since a denitrification system and automatic control system for the ammonia addition were installed in 1988 and 1990, respectively, a constant EF for the entire time series is justifiable. The Party also explained that the NO_x EF is the mean value based on three plant-specific measurements undertaken in 2007, 2009 and 2012. The ERT recommends that Switzerland increase the transparency of its reporting by including the above information in its NIR.

Iron and steel production – CO₂

41. In 2014, the CO₂ EF used by the Party for iron and steel production was completely revised using new data from the two Swiss steel plants, avoiding double counting of emissions, since the previous CO₂ EFs were based on measurements at the flue gas chimneys which included emissions from natural gas burned for energy purposes (NIR, page 206). The ERT commends Switzerland for this improvement, which resulted in a decrease in the EF by more than a factor of 10 (revised from 140 kg/t to 7.1 kg/t for 2011). In response to a question raised by the ERT during the review noting that the new values resulted in Switzerland having the lowest IEF among reporting Parties for iron and steel production, Switzerland responded with further details of the method used to calculate the

²¹ FCCC/ARR/2013/CHE, paragraph 51.

²² FCCC/ARR/2013/CHE, paragraph 52.

EF and reiterated that all emission sources were taken into account; therefore, the EF was appropriate. Following this response, the ERT also noted that the IEF in CRF table 2(I).A-G for combined iron and steel production simply appeared to be low compared with other reporting Parties because Switzerland has no primary iron and steel production (i.e. no reduction of iron occurs and therefore no carbonaceous materials such as coke or natural gas are consumed as reductants). In Switzerland, only secondary steel production occurs, which is steel production from recycled steel scrap, with relatively low emissions. The ERT acknowledges this clarification and encourages Switzerland to provide information on the carbon content of input materials to explicitly explain the link between exclusive secondary steel production and the low CO₂ EFs used.

D. Agriculture

1. Sector overview

42. In 2012, emissions from the agriculture sector amounted to 5,538.57 Gg CO₂ eq, or 10.8 per cent of total GHG emissions. Since 1990, emissions have decreased by 9.1 per cent. The key driver for the fall in emissions is the reduction in the number of cattle and the reduced input of mineral fertilizers. Within the sector, 45.1 per cent of the emissions were from enteric fermentation, followed by 37.2 per cent from agricultural soils. Manure management accounted for 17.7 per cent. Emissions from rice cultivation and field burning of agricultural residues were reported as “NA, NO”, emissions from prescribed burning of savannas was reported as “NA” and emissions from other (agriculture) were reported as “NO”.

43. Switzerland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Switzerland between the 2013 and 2014 annual submissions were in the following categories: agricultural soils and manure management. The recalculations were made following changes in AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the agriculture sector by 31.93 Gg CO₂ eq (0.6 per cent), and decreased total national emissions by 0.06 per cent. The Party mentioned in the NIR that these recalculations were made due to an error correction in the AD for compost for the years 2008–2011, due to the revision of the nitrogen excretion rate for mature dairy cattle to ensure consistency with the AGRAMMON model,²³ and due to updated manure system distribution data. Additional information documents provided by the Party during the review show details of the updates in AD, which the ERT considers sufficient as the basis for the recalculations (Bretscher, 2013,²⁴ and Flisch et al., 2009²⁵).

2. Key categories

Enteric fermentation – CH₄

44. Switzerland has used a tier 2 methodology to estimate CH₄ emissions for all animal categories, with a country-specific EF developed in line with the IPCC good practice guidance. During the review, the ERT noted that the use of country-specific parameters leads to significantly lower emission estimates than the estimates calculated by using the IPCC default parameters. Based on supporting information obtained by the ERT during the

²³ An Internet-based model used for the estimation of ammonia emissions. Available at <<http://www.agrammon.ch/agrammon-model/>>.

²⁴ Bretscher D. 2013. *Agricultural CH₄ and N₂O Emissions in Switzerland. QA/QC*. Agroscope Reckenholz Tänikon Research Station (ART), Federal Department of Economic Affairs. pp. 28–34.

²⁵ Flisch et al. 2009. Grundlagen für die Düngung in Acker- und Futterbau (GRUDAF), Agrarforschung.

review in response to questions raised, including a comparative assessment between the Swiss estimation method and the IPCC tier 2 default method (Bretscher, 2013), and other documents (Soliva, 2006,²⁶ Zeitz et al., 2012²⁷), the ERT considers that the basis for deriving these parameters is scientifically sound and consistent with the IPCC good practice guidance. The ERT commends Switzerland for its efforts to improve its inventory and encourages the Party to improve transparency by including in the NIR a summary of the supporting information regarding the country-specific EF.

45. Switzerland has used the IPCC default values for the methane conversion rate (Y_m) of 6.0 per cent for both mature dairy cattle and mature non-dairy cattle, and 5.7 per cent for young cattle in its CH₄ emission estimates for cattle. However, the ERT noted that in the reference document provided by the Party (Zeitz et al., 2012), some country-specific Y_m values are available. In this document, the Y_m values are indicated as 7.1 per cent and 8.1 per cent for dairy cows and suckler cow–calf pairs, respectively, and between 4.5 per cent and 5.4 per cent for fattening bulls during fattening. In response to a question raised by the ERT during the review requesting clarification as to why the Party did not apply these factors for its calculation of CH₄ emissions, Switzerland explained that these Y_m values are considered to be preliminary and, therefore, they were not included in the 2014 annual submission. During the review, Switzerland also explained that the above research (Zeitz et al., 2012) is a part of the extended research programme aiming to develop an empirical model to estimate CH₄ emissions from enteric fermentation based on the biochemical composition of the feed ratio. The Party also provided information on its plan to review feed digestibility as well as nitrogen excretion and incorporate their results into a model that simultaneously estimates CH₄ emissions from enteric fermentation, manure management and nitrogen excretion. The methane conversion factor (MCF) values will also be reviewed as part of the programme. The model will be available in early 2015 and will be further calibrated using appropriate country-specific parameters. The ERT commends Switzerland for these efforts and encourages the Party to reflect the result of the investigation on the Y_m values in its CH₄ emission estimates in the annual submission.

Manure management – CH₄

46. Switzerland mentioned in its NIR (page 258) that fattening calves, sheep and goats are mainly kept in deep litter systems. Three main animal waste management systems (AWMS) (liquid, solid/deep litter and pasture) are reported in the NIR (page 259, table 6-10). However, solid manure and deep litter AWMS are not separated in those tables in the NIR, despite the large difference in the MCF applied by the Party (1 per cent for solid manure and 10 per cent for deep litter). Therefore, it was not clear to the ERT which MCF values were applied for the respective AWMS in estimating the CH₄ emissions from fattening calves, sheep and goats. In response to the ERT's request for the provision of evidence to support this calculation, Switzerland provided the calculation spreadsheet which shows that the MCF values for solid manure and deep litter were applied separately (Bretscher, 2013²⁸). To improve transparency, the ERT recommends that Switzerland report the deep litter AWMS for fattening calves, sheep and goats separately from the solid storage AWMS in the 2015 annual submission.

²⁶ Soliva CR. 2006. "Report to the attention of IPCC about the data set and calculation method used to estimate methane formation from enteric fermentation of agricultural livestock population and manure management in Swiss agriculture." Institute of Animal Science. Animal Nutrition, ETH Zurich.

²⁷ Zeitz JO, Soliva CR and Kreuzer M. 2012. Swiss diet types for cattle: how accurately are they reflected by the Intergovernmental Panel on Climate Change default values? *Journal of Integrative Environmental Sciences*. 9.

²⁸ Available at <<http://www.bafu.admin.ch/climatereporting/00545/01913/index.html?lang=en>>.

Agricultural soils – N₂O

47. Switzerland has used a country-specific method to estimate N₂O emissions from agricultural soils. The Party uses the IULIA model, an IPCC-derived method that uses the same EFs (from table 4.12 of the IPCC good practice guidance), but adjusts the AD to the particular situation of Switzerland. The IULIA model has been updated with new parameters derived from the AGRAMMON model, based on the results of extensive farm surveys (see para. 43 above). The ERT considers that the methodology used is consistent with the IPCC good practice guidance. However, the comparison between the country-specific methodology and the IPCC methodology was carried out only once in 2000, which indicated that the difference in estimated N₂O emissions was 15 per cent lower using the country-specific method compared with the IPCC method. In response to a question raised by the ERT during the review as to whether such a difference could be constant over time up to the current inventory year, Switzerland provided a comparison table which shows the results of the N₂O emission calculation based on the IPCC method and the IULIA model for the 2014 annual submission. The difference was 16 per cent lower using the country-specific method compared with the IPCC method. The ERT considers that, taking into account the sufficient supporting documents on the country-specific input parameters used for the model and the consistency of the results of the comparison between the IPCC and country-specific methods, the explanation provided by Switzerland is justified. The ERT recommends that Switzerland provide such information in future annual submissions.

E. Land use, land-use change and forestry

1. Sector overview

48. In 2012, net removals from the LULUCF sector amounted to 1,128.92 Gg CO₂ eq. Since 1990, net removals have decreased by 41.2 per cent, despite the gains in the carbon stock of living biomass in all land uses and due to land-use changes. The key drivers for the fall in removals are: the losses in the carbon stock of living biomass in all land uses and due to land-use changes; the net carbon stock changes in dead organic matter on forest land remaining forest land and on forest land converted to non-forest land; and the balance of carbon emissions and removals (i.e. use of soils and land-use changes, agricultural lime application and wildfires). Within the sector, 2,652.16 Gg CO₂ eq of net removals were from forest land. Net emissions were reported from cropland (733.10 Gg CO₂ eq), settlements (336.62 Gg CO₂ eq) and grassland (303.82 Gg CO₂ eq). Other lands accounted for net emissions of 112.28 Gg CO₂ eq, and wetlands accounted for 37.41 Gg CO₂ eq. Emissions from other (LULUCF) were reported as “NE” (not estimated)”.

49. Switzerland has made recalculations between the 2013 and 2014 annual submissions for this sector. The recalculations made were mainly owing to the revision of the methodological approach for calculating carbon stock change (NIR, chapter 7.1.3.2) and to a minor degree following changes in AD because of the completion of the Swiss land-use statistics (AREA) surveys in 2013. The recalculations affected all categories in the LULUCF sector. Compared with the 2013 annual submission, the recalculations decreased removals in the LULUCF sector by 1,513.52 Gg CO₂ eq (44.4 per cent) for 2011. The recalculations were adequately explained.

50. Switzerland has addressed almost all of the recommendations made in previous review reports in relation to the LULUCF sector. For reporting in the CRF tables, Switzerland allocates forest lands into different forest types: afforestation, productive forest and unproductive forest, based on AREA categories. Full coverage of the AREA land-use statistics is provided in the NIR (chapter 7.2.2.1). The presentation of the methods, AD and other parameters used has been improved in terms of the descriptions and the rationale for their use, using relevant references in response to the recommendations made in the 2013

annual review report.²⁹ Also, the methodology for calculating the carbon stock changes was improved in response to the recommendation made in the previous review report, and supplementary information was provided to explain the reasons for not reporting certain carbon pools under afforestation³⁰ and the soil organic carbon changes in mineral soils for unproductive forests.³¹ However, the ERT noted that the transparency of the reporting could be further improved by providing additional information on the various assumptions used for the LULUCF sector inventory (e.g. the approach used for representing land areas (see para. 51 below) and for assessing the growing stock and changes in the growing stock for afforestation (see para. 55 below).

51. In its approach used to represent land areas and report on the land-use databases used for the preparation of the inventory, Switzerland has aggregated the 46 land-use categories and 27 land-cover categories reported by the Swiss land-use statistics (AREA) into 18 combination categories, in order to implement the main categories proposed by the IPCC and the country-specific subdivisions. In response to questions raised by the ERT during the review regarding the definitions of the country-specific subdivisions and the assumptions used with respect to the optimal distinction of biomass densities, carbon turnover and soil carbon content, Switzerland indicated that the subdivisions were defined in 2006 in an evaluation process involving experts from various institutions and consultants. The ERT recommends that Switzerland improve the description of the process that led to the definition of the combination categories in its 2015 annual submission, thereby increasing the transparency with respect to AD in its LULUCF sector.

52. The ERT noted significant variations in the ratios of coniferous and deciduous species in mixed forests throughout three different periods (1985–1994, 1995–2005 and 2006–2012) reported by Switzerland in its NIR (page 303, table 7-13). In response to questions raised by the ERT during the review, the Party explained that the uncertainty of the data in the fourth national forest inventory (NFI 4) for the period 2006–2012 is higher than the uncertainty for the previous NFIs due to the considerably lower number of plots measured and evaluated for NFI 4, which is a continuous survey containing newly available data up to 2012. The ERT also noted that the uncertainties for the ratios of specific regions are high (e.g. a standard error of 29–40 per cent for NFI region 3 – altitude below 600 m; and a standard error of 44 per cent for NFI region 2 – altitude above 1,200 m). In response to further questions raised by the ERT during the review, Switzerland indicated that according to the continual NFI 4 sampling design the coverage increases successively year by year. For the 2015 annual submission, around 700 additional plots that were surveyed and evaluated during the last period of fieldwork will be added to the data. Total coverage will increase to approximately 56 per cent. The ERT recommends that Switzerland provide more accurate ratios of both coniferous and deciduous species in mixed forests and of specific regions, reflecting the release of new NFI data (i.e. ratios derived for specific regions and for the separation between coniferous and deciduous forests) in its annual submission.

53. The meteorological data that drive the soil carbon model Yasso07, used by Switzerland to estimate temporal changes in carbon stocks in soil organic carbon, organic soil horizons and dead wood for productive forests, consist of annual values for temperature, precipitation and temperature amplitude. As explained by Switzerland in response to questions raised by the ERT during the review, these data are obtained from the Swiss Meteorological Agency (SMA) for each NFI plot on which Yasso07 is run. The point data corresponding to the location of the NFI sites are obtained from spatially interpolated data

²⁹ FCCC/ARR/2013/CHE, paragraphs 70 and 71.

³⁰ FCCC/ARR/2013/CHE, paragraph 71.

³¹ FCCC/ARR/2013/CHE, paragraph 74.

provided by SMA. The interpolated data are based on measured data from the network of climate stations across Switzerland. In response to questions raised by the ERT during the review, Switzerland clarified that SMA does not currently provide uncertainty estimates of the interpolation procedure, and therefore it was not possible to estimate the uncertainty associated with the climate data. Switzerland also informed the ERT that uncertainty estimates are expected to become available in the future in the form of ensemble data sets, which can then be used in a Monte Carlo approach to assess the uncertainty of simulated decomposition of litter and dead wood using the Yasso07 model. The ERT encourages the Party to obtain such data to assess the uncertainty associated with the climate data. Also, the ERT encourages Switzerland to provide transparent information on the future application and parameterization of the model.

2. Key categories

Forest land remaining forest land – CO₂

54. In response to the recommendation made in the previous review report,³² Switzerland provide a table in the NIR (page 311) showing how the ratio of above- and below-ground living biomass is applied to each NFI region to enable a comparison of the order of magnitude in gains and losses of above- and below-ground biomass. Both pools are merged for the reporting under the Convention and are reported separately under the Kyoto Protocol. In response to the recommendation made in the previous review report,³³ Switzerland has provided an explanation of unproductive forests supported with references (NIR section 7.3.4.9). Due to the lack of availability of specific information related to carbon stocks in organic soils under forest land, the Party adopted the value calculated for cropland and permanent grassland based on an approach which uses measured carbon stocks in Swiss organic soils. Although the references of the studies providing the basis for this approach are indicated in the NIR,^{34,35} the ERT recommends that Switzerland incorporate, in the relevant section of the NIR, more detailed information from the supporting documents and the relevant references behind this reasoning.

Land converted to forest land – CO₂

55. Switzerland has reported in its NIR (page 323) that to simulate the development of growing stock on intermediate and poor sites, the growing stock was assumed to develop at a rate that is one third slower on intermediate sites, and two thirds slower on poor sites. In response to questions raised by the ERT during the review, Switzerland indicated that the estimated values for the growing stock and changes in the growing stock for afforestation on intermediate and poor sites are based on expert judgement because of the lack of data from the NFI. The Party also informed the ERT that a research project is currently under way at the Swiss Federal Institute for Forest, Snow and Landscape Research, focusing on the growing stock of sites which were converted from non-forest land to forest land / of afforestation. The ERT recommends that Switzerland incorporate all necessary information and references in combination with the expert judgement used to support the values reported in the Party's GHG inventory and reflect the realistic dimension for activities reported as afforestation in its NFI. This may comprise: a further elaboration of the ongoing

³² FCCC/ARR/2013/CHE, paragraph 72.

³³ FCCC/ARR/2013/CHE, paragraph 74.

³⁴ Leifeld, J, Bassin, S, Fuhrer, J. 2003. Carbon stocks and carbon sequestration potentials in agricultural soils in Switzerland. Schriftenreihe der FAL 44. Zürich-Reckenholz. Available at <<http://www.bafu.admin.ch/ghginv-ref>>.

³⁵ Leifeld, J, Bassin, S, Fuhrer, J. 2005. Carbon stocks in Swiss agricultural soils predicted by land-use, soil characteristics, and altitude. *Agriculture, Ecosystems & Environment*. 105 (1/2): pp. 255–266. Available at <<http://dx.doi.org/10.1016/j.agee.2004.03.006>>.

study; and a comparison with neighbouring countries which may provide indicative values (e.g. Austria), among others.

Land converted to settlements – CO₂

56. For land-use changes involving buildings and construction, Switzerland has reported in its NIR (page 356) that only 50 per cent of the difference between the carbon stocks before and after the change is reported as a source or sink, respectively. The reasons for this include, among others, the fact that the soil organic matter on construction sites is stored temporarily and is later used for replanting in the surrounding area or for vegetating dumps. Switzerland has chosen this criterion to reflect a domestic soil protection measure which has been adopted since 1998. In response to a question raised by the ERT during the review regarding the applicability of such a criterion for the years prior to 1998, Switzerland indicated that it regarded this approach as very close to the real conditions in the period prior to 1998, as supported by the presence of pre-existing legal instruments in force since 1986 and the traditionally very high awareness regarding soil fertility in Switzerland. The ERT encourages Switzerland to incorporate these explanations into its NIR.

3. Non-key categories

Direct N₂O emissions from nitrogen fertilization of forest land – N₂O

57. Switzerland has reported N₂O emissions from the use of fertilizers in forests as “NO” in CRF table 5(I) and, in the documentation box, has referred to the NIR, which describes the Ordinance on Chemical Risk Reduction of 2005 (the most recent legal document which prohibits the use of fertilizers, including liming, in forests) as a justification. However, the ERT considered that this situation might not have been valid prior to the adoption of the legal instrument in 2005. In response to questions raised by the ERT during the review as to whether the non-use of fertilizers and liming was valid in the period prior to 2005, Switzerland considered the situation to have been valid since 1990, taking into account previous legal documents prohibiting the use of fertilizers (i.e. the Law on Forests). The ERT recommends that Switzerland document all relevant and supporting information to cover the whole time series in this regard in its annual submission to improve the transparency of its reporting.

F. Waste

1. Sector overview

58. In 2012, emissions from the waste sector amounted to 611.12 Gg CO₂ eq, or 1.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 44.2 per cent. The key driver for the fall in emissions is the implementation of waste legislation which prohibits the landfilling of MSW and enforces the recycling and/or thermal treatment of waste with energy recovery as a mandatory requirement. Within the sector, 40.8 per cent of the emissions were from wastewater handling, followed by 29.1 per cent from solid waste disposal on land, 22.8 per cent from other (waste) and 7.3 per cent from waste incineration.

59. Switzerland has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Switzerland between the 2013 and 2014 annual submissions were in the following categories: wastewater handling and waste incineration. The recalculations were made due to the revision of N₂O EFs for 2008 onwards following the change of the calculation method used for protein consumption provided by the Swiss Farmers Association and the revision of AD for burning of natural residues in forestry and agriculture, respectively. Compared with the 2013 annual submission, the recalculations decreased emissions in the waste sector by 33.23 Gg CO₂ eq

(5.7 per cent) for 2011, and had a negligible impact on total national emissions. The recalculations were adequately explained in the NIR.

60. Switzerland has largely used country-specific methodologies with a view to improving the quality of the emission estimates. The ERT acknowledges that Switzerland has improved the descriptions in relation to methodological information for wastewater handling in the NIR of the 2014 annual submission in response to recommendations made in previous review reports. However, Switzerland generally does not report the methodologies used to estimate emissions with sufficient documentation on the EFs for waste incineration, composting and digesting, referring only to one non-disclosed source of “EMIS (Swiss national air pollution database) comments”. In response to questions raised by the ERT during the review, Switzerland provided information related to the waste sector which summarizes the detailed methodologies used to derive the EFs from other literature and the assumptions used. In order to enhance the transparency of the NIR, the ERT recommends that Switzerland provide additional detailed information related to the original data sources and estimation methods used for the EFs, as documented in the EMIS comments, in the NIR.

61. Switzerland did not provide sufficient information on the data reported as included elsewhere (“IE”) in the cell comments of the CRF tables (e.g. for the AD, emissions and recovery for the subcategory industrial wastewater in CRF table 6.B); therefore it is not clear where the emissions and AD reported as “IE” have been allocated. In order to ensure transparency, the ERT recommends that Switzerland provide, in the cell comments of the CRF tables, the information on where the emissions and AD have been included for each use of the notation key “IE” for the whole time series.

62. The ERT commends Switzerland for improving the documentation in the NIR on waste management practices and on waste streams, such as the amount of thermal disposal (e.g. waste fuels used in industry, incineration with and without energy recovery) and import/export of waste, in response to the recommendations made in the previous review report.³⁶

2. Key categories

Solid waste disposal on land – CH₄

63. Switzerland used a first-order decay method with a combination of IPCC default and country-specific parameters to estimate CH₄ emissions from solid waste disposal on land. All waste disposal sites in the country are categorized as managed according to the IPCC classification and are further divided into three different categories according to the type of waste managed (i.e. MSW, construction waste and sewage sludge). In response to a recommendation made in the previous review report,³⁷ Switzerland reported information on the composition of MSW and construction waste used to derive the degradable organic carbon for each waste type.

64. Switzerland has estimated the amount of CH₄ recovered from landfill gas as the sum of the amount of CH₄ flared and the amount of CH₄ used in cogeneration units. This amount of CH₄ recovered is subtracted from the amount of CH₄ generated in landfills to estimate the CH₄ emissions. During the review, in response to questions raised by the ERT, Switzerland provided a detailed explanation of the methodology used to derive the AD for the CH₄ recovered. Although the amount of CH₄ used in cogeneration is derived from the

³⁶ FCCC/ARR/2013/CHE, paragraph 78.

³⁷ FCCC/ARR/2013/CHE, paragraph 79.

Swiss statistics of renewable energies (SFOE, 2013a),³⁸ the amount of CH₄ flared is assumed to be 10 per cent of the total amount of CH₄ occurring in waste disposal sites, based on expert judgement from no reliable data. Noting that the IPCC good practice guidance (chapter 5, page 10) states that “Reporting based on metering of all gas recovered for energy utilisation and flaring is consistent with good practice. The use of undocumented estimates of landfill gas recovery potential is not appropriate, as such estimates tend to overestimate the amount of recovery”. Also, noting that the reported amounts of CH₄ flared are not based on the metered data, the ERT is of the view that the reported amounts of CH₄ flared are undocumented estimates of landfill gas recovery and, therefore, the subtraction of the undocumented amount of CH₄ flared is not in line with the IPCC good practice guidance. The ERT included this issue in its list of potential problems and further questions raised by the ERT and recommended that Switzerland either report the amount of CH₄ recovered by flaring together with references documenting the amount of recovered CH₄ that is flared, or estimate the CH₄ emissions from solid waste disposal on land considering the amount of CH₄ flared to be zero (the default value provided in the IPCC good practice guidance), for the entire time series. In response to the list of potential problems and further questions raised by the ERT during the review, Switzerland submitted revised estimates assuming the amount of CH₄ flared to be zero. The impact of these revised emission estimates was an increase in CH₄ emissions from solid waste disposal on land by 12.5 per cent (122.96 Gg CO₂ eq) for the entire first commitment period (2008–2012). The ERT considers that the revised emission estimates resolved the issue. The ERT encourages Switzerland to conduct a further investigation to obtain relevant data to derive estimates of the amount of CH₄ flared.

Other (waste) – CH₄ and N₂O³⁹

65. For the category other (waste), Switzerland has reported, in CRF table 6, disaggregated CH₄ and N₂O emissions from composting and digesting, and precursors from car shredding, in response to the recommendation made in the previous review report.⁴⁰ However, Switzerland inconsistently used two different terms in the NIR (“fermentation” and “digesting”) for the source of digesting. Also, the NIR does not include detailed information on the EFs for composting and digesting. In addition, the category description for the subcategory car shredding is not sufficiently detailed in the NIR. To ensure transparency and consistency, the ERT recommends that Switzerland improve the documentation in the NIR, standardize the terminology used and provide detailed information on the EFs and descriptions for all sources under the category other (waste) in the NIR.

3. Non-key categories

Wastewater handling – CH₄

66. Switzerland estimates CH₄ emissions from wastewater handling using country-specific methodologies, which uniquely apply the population as AD. Although the definition of the country-specific EFs associated with energy units for recovered biogas is quite complicated, the NIR provides a detailed explanation of the methodology used to

³⁸ Available at http://www.bfe.admin.ch/php/modules/publikationen/stream.php?extlang=de&name=de_219304565.pdf.

³⁹ Not all emissions related to all gases under this category are key categories, particularly N₂O emissions. However, since the calculation procedures for issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

⁴⁰ FCCC/ARR/2013/CHE, paragraph 81.

estimate the emissions, in response to the recommendation made in the previous review report.⁴¹ The ERT commends Switzerland for this improvement.

67. In the NIR, Switzerland states that 96.8 per cent of inhabitants are connected to public wastewater treatment plants, and emissions from the wastewater of the inhabitants not connected to public wastewater treatment plants are not considered, as their contribution is of minor importance. During the review, in response to a question raised by the ERT, Switzerland provided an additional explanation as to why their contribution is of minor importance: alternative treatment systems in remote and sparsely populated regions often treat wastewater under aerobic conditions as well as centralized wastewater treatment plants, and the sludge from these small-scale treatment installations is either dealt with by centralized wastewater treatment plants or MWIPs. The ERT considers the explanation provided by Switzerland to be reasonable. To enhance the transparency of the emission estimates for this category, the ERT recommends that Switzerland provide further explanatory information in its annual submission by including the above information related to the emissions from the wastewater of the inhabitants not connected to public wastewater treatment plants.

Waste incineration – CO₂, CH₄ and N₂O

68. Switzerland estimates emissions from incineration of hospital waste, illegal waste, insulation material from cables, sewage sludge, crematoria and residues in agriculture and forestry by using country-specific EFs. However, the NIR does not provide sufficient information for each EF (e.g. the assumption used for the CO₂ EF for MSW incineration plants; the original data source used for the CH₄ and N₂O EFs, etc.). In response to a question raised by the ERT during the review, Switzerland explained that the EFs and their sources are described in more detail in the EMIS database, and provided the relevant documents to the ERT (see also para. 60 above). To enhance the transparency of the documentation, the ERT recommends that Switzerland provide detailed information on the EFs used for this category, as provided in the EMIS comments, in the NIR of its annual submission.

G. 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

69. Table 6 provides an overview of the information reported and parameters selected by Switzerland under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6

Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

<i>Issue</i>	<i>Expert review team assessment, if applicable</i>	<i>Findings and recommendations</i>
Assessment of Switzerland's reporting in accordance with the requirements in paragraphs 5–9 of the annex	Sufficient	

⁴¹ FCCC/ARR/2013/CHE, paragraph 80.

Issue	Expert review team assessment, if applicable	Findings and recommendations
to decision 15/CMP.1		
Activities elected under Article 3, paragraph 4, of the Kyoto Protocol	Activities elected: forest management Years reported: 2008, 2009, 2010, 2011, 2012	The ERT considers that increases in the forest management area subsequent to 1990 are possible, given the justifications provided by Switzerland (see para. 74 below)
Period of accounting		Annual accounting
Switzerland's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	A full coverage of the AREA database is provided in the NIR. The ERT had concerns about the possibility of excluding deforested areas when interpreting the Party's definitions of non-permanent conversions due to forest management practices in relation to limited tree loss (NIR, section 11.2.3) (see para. 73 below)

Abbreviations: ERT = expert review team, NIR = national inventory report.

70. Section G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 71–74 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting of these activities in the 2015 annual submission.

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

Afforestation and reforestation – CO₂

71. Switzerland has improved the methodologies used to ensure consistency between the reporting under both the Convention and the Kyoto Protocol. More precisely, Switzerland provided a table in the NIR showing the relationship between the area of forest land reported under the Convention and that reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol (page 412, table 11-5). The explanation of the linkage between the reporting of land converted to forest land under the Convention and afforestation/reforestation activities under Article 3, paragraph 3, of the Kyoto Protocol was provided in terms of the AD and methodology used for the emission/removal calculations. However, the ERT noted that the methodology followed for identifying afforested land and natural regeneration areas using photo-interpretation together with a limited data set may not accurately identify the full extent of these two categories in line with Article 3, paragraphs 3 and 4, of the Kyoto Protocol. In response to a question raised by the ERT during the review on how the application of photo-interpretation can ensure the exclusion of natural regeneration given the adopted scale of sampling, Switzerland provided supporting information on the characterization of directly human-induced afforested areas

and natural regeneration areas. The ERT considered the information provided on the promotion of trees in natural regeneration stands and on natural regeneration on abandoned land (e.g. grassland), and concluded that those areas are not accounted for as afforestation under Article 3, paragraph 3, of the Kyoto Protocol, and, therefore, the issue was resolved.

72. Switzerland has estimated and reported the gains and losses in the carbon stock changes in below-ground biomass for the period 2010–2012 in KP-LULUCF CRF table 5(KP-I)A.1.2, which were reported as “IE” in the previous annual submission. However, for the years 2008–2009, the notation key “IE” is still used to report the gains and losses in the 2014 annual submission. In response to questions raised by the ERT during the review, Switzerland explained that new data have been prepared and reported in response to the encouragement made in the 2013 annual review report,⁴² and that the notation key for the years 2008–2009 should be “NO” as harvesting of land did not occur prior to 2010.

Deforestation – CO₂

73. The definition of the non-permanent conversions due to forest management practices, natural dynamics or hazards includes spatially limited tree loss when conversion is caused by an alteration of the surrounding stand, but the change does not affect the tree cover at the sample point. In this case, the ERT had concerns about the possibility of excluding deforested areas when interpreting the Party’s definitions of non-permanent conversions due to forest management practices in relation to limited tree loss (NIR, section 11.2.3). In response to questions raised by the ERT during the review, Switzerland explained that this criterion is tailored to the country-specific silvopastoral system, namely grassland with tree cover, and no land-use change actually took place on those sites. The ERT agrees that the emissions were not underestimated. However, considering that the accurate determination of this specific type of tree loss and land use/land cover is very challenging, the ERT is of the view that the transparency can be improved by incorporating relevant information on how all elements of the forest definition of these areas under the Kyoto Protocol are still fulfilled.

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

Forest management – CO₂

74. Switzerland reported in KP-LULUCF CRF table NIR-2 an increasing area of forest management as the sum of: the total area at the beginning of the current inventory year minus the total area of land subject to forest management in the year preceding the inventory year and which was deforested in the inventory year; and the area of forest management which was converted from “other” in the previous inventory year to forest management in the current inventory year. In response to a question raised by the ERT during the review to clarify what was included under “other” in the forest management area reported in KP-LULUCF CRF table NIR-2, Switzerland informed the ERT that the converted area from “other” encompasses the land which becomes forest through natural regeneration (by fulfilling the criteria of forest definition under the Kyoto Protocol) and which has not been accounted for under Article 3, paragraph 3, of the Kyoto Protocol as it was not considered to be directly human-induced. In response to further questions raised by the ERT during the review requesting the Party to provide evidence that the area of forest management in Switzerland is increasing since 1990 or to provide updated area data related also to the emissions/removals under forest management, Switzerland provided supporting material and relevant references that indicate that the forest management area is expanding. In reference to the land-use change matrix (NIR, table 7-9) these conversions mainly occur

⁴² FCCC/ARR/2013/CHE, paragraphs 72 and 86.

on former grassland due to the abandonment of land (NIR, chapter 11.1.3, page 408). The ERT deliberated on the temporal occurrence of increase in the forest management area and whether this would be acceptable in accordance with Article 3, paragraph 4, of the Kyoto Protocol (decision 16/CMP.1). Consequently, the ERT considers that increases in the forest management area subsequent to 1990 are possible given the justifications provided by Switzerland.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

75. 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 standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.⁴³ The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

76. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, 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 referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

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

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

78. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7

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

			2014 annual submission ^a	2010, 2011, 2012 and 2013 annual submissions ^b	Net accounting quantity ^c
	As reported	Revised estimates	Final	Final	
Afforestation and reforestation					
Non-harvested land	–104 279		–104 279	–91 196	–13 083

⁴³ The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

			2014 annual submission ^a	2010, 2011, 2012 and 2013 annual submissions ^b	Net accounting quantity ^c
	<i>As reported</i>	<i>Revised estimates</i>	<i>Final</i>	<i>Final</i>	
Harvested land	-2 325		-2 325	-19 887	17 562
Deforestation	953 928		953 928	798 324	155 604
Forest management	-8 942 277		-8 942 277	-9 166 667	224 390
Article 3.3 offset ^d	0		0	0	0
Forest management cap ^e	-9 166 667		-9 166 667	-9 166 667	0
Cropland management	NA	NA	NA	NA	NA
Grazing land management	NA	NA	NA	NA	NA
Revegetation	NA	NA	NA	NA	NA

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

^a The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

^b The values included under the 2010, 2011, 2012 and 2013 annual submissions are the final accounting values as a result of the 2013 review and are included in table 7 of the 2013 annual review report (FCCC/ARR/2013/CHE, pages 28–29) in the column “2013 annual submission”, “Final”. This column is applicable only for Parties that elected annual accounting.

^c The “net accounting quantity” is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission and where the quantities issued or cancelled based on the 2013 annual review report have been subtracted (“net accounting quantity” = final 2014 – final 2013 annual review report).

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

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

79. Based on the information provided in table 7 for the activity afforestation and reforestation, Switzerland shall: for non-harvested land, issue 13,083 removal units (RMUs) in its national registry; and for harvested land, cancel 17,562 assigned amount units (AAUs), emission reduction units (ERUs), certified emission reduction units (CERs) and/or RMUs in its national registry.

80. Based on the information provided in table 7 for the activity deforestation, Switzerland shall cancel 155,604 AAUs, ERUs, CERs and/or RMUs in its national registry.

81. Based on the information provided in table 7 for the activity forest management, Switzerland shall cancel 224,390 AAUs, ERUs, CERs and/or RMUs in its national registry.

Calculation of the commitment period reserve

82. Switzerland has reported its commitment period reserve in its 2014 annual submission. Switzerland reported that its commitment period reserve has not changed since the initial report review (218,554,562 t CO₂ eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT agrees with this figure.

3. Changes to the national system

83. Switzerland reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

84. Switzerland reported that there are no changes in 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 decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

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

85. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Switzerland provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

86. In its NIR, Switzerland describes several activities related to the minimization of adverse impacts on developing countries, including: the progressive reduction or phasing-out of market imperfections; fiscal incentives; tax and duty exemptions and subsidies in all GHG-emitting sectors; energy price reforms (as a member of the Friends of Fossil-Fuels Subsidy Reform group); removing subsidies associated with the use of environmentally unsound and unsafe technologies; strengthening the capacity of developing country Parties for improving efficiency in upstream and downstream activities relating to fossil fuels; and assisting developing country Parties that are highly dependent on the export and consumption of fossil fuels to diversify their economies.

87. Switzerland reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The Party described the changes in its NIR related to the information regarding capacity-building and technology transfer, and minor editorial changes. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent.

III. Conclusions and recommendations

A. Conclusions

88. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Switzerland, in accordance with the Article 8 review guidelines.

Table 8

Expert review team's conclusions on the 2014 annual submission of Switzerland

<i>Issue</i>	<i>Expert review team assessment</i>	<i>Paragraph cross references for identified problems</i>
The ERT concludes that the inventory submission of Switzerland is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources ^a	Complete	
LULUCF ^a	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Switzerland has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	See paragraph 27 above
Switzerland's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	See paragraph 15 above for category-specific recommendations
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Switzerland has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
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	Yes	
Did Switzerland provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = *IPCC Good Practice Guidance for 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, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

^a The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

89. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified.

Table 9

Recommendations identified by the expert review team

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
Cross-cutting	QA/QC	Report the same and correct information in the CRF tables and the NIR and improve the QC procedures at the final stage of the inventory compilation process	No	12
	Transparency	Improve the transparency of the reporting by filling in all requested information in the CRF tables	No	13
		Make the description of the QA/QC system more transparent by updating the section of the NIR on “Responsibilities and coordination of QA/QC activities” with relevant information	No	15
		Confirm that national statistics agencies have implemented adequate QC procedures and report on the progress made	No	15
Energy	General	Use the results of a study aimed at reassessing the CO ₂ EFs and net calorific values (NCVs) for liquid fuels	Yes	23
	Feedstocks and non-energy use of fuels	Disaggregate the reporting of fuels used for non-energy purposes	Yes	27
	Stationary combustion: gaseous fuels – CO ₂	Implement the plan to estimate country-specific CO ₂ EFs	No	28
	Stationary combustion: biomass fuels – N ₂ O	Include the table with N ₂ O EFs for municipal waste incineration plants, with brief and relevant explanatory information in the NIR	No	36
Industrial processes and solvent and other product use	Limestone and dolomite use – CO ₂	Specify that the clay contains limestone and dolomite in its NIR, thus explaining the allocation of emissions under this category	No	39

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
	Nitric acid production – N ₂ O	Include information supporting the use of a constant EF for the entire time series	No	40
Agriculture	Manure management – CH ₄	Report the deep litter AWMS for fattening calves, sheep and goats separately from the solid storage AWMS	No	46
	Agricultural soils – N ₂ O	Provide a comparison table which shows the results of the N ₂ O emission calculation based on the IPCC method and the IULIA model	No	47
LULUCF	General	Improve the description of the process that led to the definition of the combination categories in its 2015 annual submission, thereby increasing the transparency with respect to AD in the LULUCF sector	No	51
		Provide more accurate ratios of both coniferous and deciduous species in mixed forests and of specific regions, reflecting the release of new data from the national forest inventory	No	52
	Forest land remaining forest land – CO ₂	Incorporate in the NIR more detailed information from the supporting documents and the relevant references behind the reasoning of the decision to adopt a country-specific value for the carbon stock changes in organic soils for cropland and permanent grassland	No	54
	Land converted to forest land – CO ₂	Incorporate in the NIR all necessary information and references in combination with the expert judgement used to support the values reported in the Party's GHG inventory and reflect the realistic dimension for activities reported as afforestation in its national forest inventory	No	55
	Direct N ₂ O emissions from nitrogen fertilization of forest land – N ₂ O	Document all relevant and supporting information on the use of fertilizers in forests to cover the whole time series	No	57
Waste	General	Provide additional detailed information related to the original data sources and estimation methods used to derive the EFs, which are documented in the EMIS comments	No	60
		Provide, in the cell comments of the CRF tables, the information on where the emissions and AD have been included for each use of the notation	No	61

<i>Sector</i>	<i>Category/cross-cutting issue</i>	<i>Recommendation</i>	<i>Reiteration of previous recommendation?</i>	<i>Paragraph cross references</i>
		key “IE” for the whole time series		
	Other (waste) – CH ₄ and N ₂ O	Improve the documentation in the NIR, standardize the terminology used and provide detailed information on the EFs and descriptions for all sources	No	65
	Wastewater handling – CH ₄	Include in the NIR information related to the emissions from wastewater of the inhabitants not connected to public wastewater treatment plants	No	67
	Waste incineration – CO ₂ , CH ₄ and N ₂ O	Provide in the NIR detailed information on the EFs used	No	68

Abbreviations: AD = activity data, AWMS = animal waste management system, CRF = common reporting format, EF = emission factor, EMIS = Swiss central inventory database, GHG = greenhouse gas, IE = included elsewhere, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, NO = not occurring, QA/QC = quality assurance/quality control.

IV. Questions of implementation

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

Annex I

Information to be included in the compilation and accounting database

Table 10

Information to be included in the compilation and accounting database in t CO₂ eq for 2012, including the commitment period reserve

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	218 554 562			218 554 562
Annex A emissions for 2012				
CO ₂	43 237 935	43 237 941		43 237 941
CH ₄	3 688 258	3 717 443		3 717 443
N ₂ O	3 006 620	3 021 073		3 021 073
HFCs	1 245 040			1 245 040
PFCs	33 077			33 077
SF ₆	223 985			223 985
Total Annex A sources^c	51 434 915	51 478 559		51 478 559
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	-15 886			-15 886
3.3 Afforestation and reforestation on harvested land for 2012	-1 248			-1 248
3.3 Deforestation for 2012	221 867			221 867
Activities under Article 3, paragraph 4, for 2012^d				
3.4 Forest management for 2012	-2 236 379			-2 236 379
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 11

Information to be included in the compilation and accounting database in t CO₂ eq for 2011

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2011				
CO ₂	41 834 714	41 834 731		41 834 731
CH ₄	3 710 374	3 752 008		3 752 008
N ₂ O	3 014 194	3 027 409		3 027 409
HFCs	1 195 498			1 195 498
PFCs	39 984			39 984
SF ₆	164 367			164 367
Total Annex A sources^c	49 959 130	50 013 996		50 013 996
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	-18 888			-18 888
3.3 Afforestation and reforestation on harvested land for 2011	-734			-734
3.3 Deforestation for 2011	221 138			221 138
Activities under Article 3, paragraph 4, for 2011^d				
3.4 Forest management for 2011	-2 063 617			-2 063 617
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

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

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

^c The values for “Total Annex A sources” in the columns “As reported”, “Revised estimates” and “Final” may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 12

Information to be included in the compilation and accounting database in t CO₂ eq for 2010

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2010				
CO ₂	45 910 490	45 910 501		45 910 501
CH ₄	3 763 154	3 799 937		3 799 937
N ₂ O	3 077 399	3 093 239		3 093 239
HFCs	1 138 165			1 138 165
PFCs	37 143			37 143
SF ₆	154 769			154 769
Total Annex A sources^c	54 081 120	54 133 753		54 133 753
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	-23 000			-23 000
3.3 Afforestation and reforestation on harvested land for 2010	-343			-343
3.3 Deforestation for 2010	220 446			220 446
Activities under Article 3, paragraph 4, for 2010^d				
3.4 Forest management for 2010	-2 020 232			-2 020 232
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviation: Annex A sources = source categories included in Annex A to the Kyoto Protocol.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 13

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

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2009				
CO ₂	44 266 992	44 267 001		44 267 001
CH ₄	3 776 219	3 812 920		3 812 920
N ₂ O	3 003 401	3 018 019		3 018 019
HFCs	1 083 103			1 083 103
PFCs	35 538			35 538
SF ₆	187 122			187 122
Total Annex A sources^c	52 352 375	52 403 703		52 403 703
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	-24 335			-24 335
3.3 Afforestation and reforestation on harvested land for 2009	IE, NO			IE, NO
3.3 Deforestation for 2009	186 561			186 561
Activities under Article 3, paragraph 4, for 2009^d				
3.4 Forest management for 2009	-1 419 280			-1 419 280
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Table 14

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

	<i>As reported</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2008				
CO ₂	45 434 420	45 434 427		45 434 427
CH ₄	3 839 862	3 877 925		3 877 925
N ₂ O	3 038 573	3 053 277		3 053 277
HFCs	1 041 981			1 041 981
PFCs	39 391			39 391
SF ₆	244 717			244 717
Total Annex A sources^c	53 638 943	53 691 718		53 691 718
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	-22 171			-22 171
3.3 Afforestation and reforestation on harvested land for 2008	IE, NO			IE, NO
3.3 Deforestation for 2008	103 916			103 916
Activities under Article 3, paragraph 4, for 2008^d				
3.4 Forest management for 2008	-1 202 769			-1 202 769
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, IE = included elsewhere, NO = not occurring.

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

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

^c The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

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

Annex II

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 for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks 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 2014. Available at
<http://unfccc.int/resource/docs/2014/asr/che.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/CHE. Report of the individual review of the annual submission of Switzerland submitted in 2013. Available at
<http://unfccc.int/resource/docs/2014/arr/che.pdf>.

Standard independent assessment report template, parts 1 and 2. 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 R  thlisberger (Federal Department of the Environment, Transport, Energy and Communications), including additional material on the methodology and assumptions used. The following documents¹ were also provided by Switzerland:

Amon et al. (2001). *Emissions of NH₃, N₂O and CH₄ from dairy cows housed in a farmyard manure tying stall (housing, manure storage, manure spreading)*, Nutrient Cycling in Agroecosystems 60: pp. 103–113.

Bretscher, D., 2013. Agricultural CH₄ and N₂O emissions in Switzerland. QA/QC. Agroscope Reckenholz T  nikon Research Station (ART), Federal Department of Economic Affairs.

Flisch et al. 2009: AGRAR Forschung – GRUDAF 2009, Grundlagen f  r die D  ngung im Acker- und Futterbau, pp. 7–11, 15–16, 52–55, and 89–92.

Hindrichsen et al. (2005). *Methane emission, nutrient degradation and nitrogen turnover in dairy cows and their slurry at different milk production scenarios with and without concentrate supplementation* Agriculture, Ecosystems and Environment 113 (2006) pp.150–161.

Kupper (et al. 2013). *Ammoniakemissionen in der Schweiz 1990–2010 und Prognose bis 2020 (Ammonia emissions for Switzerland 1990 to 2010 and previsions until 2020)*, Im Auftrag des Bundesamts f  r Umwelt (BAFU).

K  lling et al. (2003). *Ammonia, nitrous oxide and methane emissions from differently stored dairy manure derived from grass- and hay-based rations*, Nutrient Cycling in Agroecosystems 65: pp. 13–22.

K  lling et al. (2002). Methane emissions of differently fed dairy cows and corresponding methane and nitrogen emissions from their manure during storage, Environmental Monitoring and Assessment 79 pp.129–150.

Kyu-Hyun Park (2006). Greenhouse gas emissions from stored liquid swine manure in a cold climate, Atmospheric Environment 40 (2006) pp.618–627.

Moller, et al. (2004). *Biological Degradation and Greenhouse Gas Emissions during Pre-Storage of Liquid Animal Manure*, Journal of Environmental quality Col.22 pp. 27–36.

Quantis (2014). *Methanemissionen der Schweizer Gaswirtschaft. Zeitreihe 1990 bis 2012. Schlussbericht*. Quantis im Auftrag des Schweizerischen Vereins des Gas- und Wasserfaches SVGW und des Bundesamts f  r Umwelt BAFU.

Schmid et al. (2000). *Lachgasemissionen aus der Schweizer Landwirtschaft*, Schrittenreihe der FAL (33) 2000, pp.1–44, and 74–77.

Soliva, C.R, (2006). Report to the attention of IPCC about the data set and calculation method used to estimate methane formation from enteric fermentation of agricultural livestock population and manure management in Swiss agriculture. Institute of Animal Science. Animal Nutrition, ETH Zurich.

Sommer et al. (2004). *Algorithms for calculating methane and nitrous oxide emissions from manure management*, Nutrient Cycling in Agroecosystems 69: pp. 143–154.

¹ Reproduced as received from the Party.

Zeitz, et al (2012) *Swiss diet types for cattle: how accurately are they reflected by the Intergovernmental Panel on Climate Change default values?* Journal of Integrative Environmental Sciences 2012, pp. 1–18.

Annex III

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
AREA	Swiss land-use statistics
AWMS	animal waste management system
CER	certified emission reduction
CH ₄	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
EMIS	Swiss national air pollution database
ERT	expert review team
ERU	emission reduction unit
g	gram
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs and SF ₆ without GHG emissions and removals from LULUCF
GJ	gigajoule (1 GJ = 10 ⁹ joule)
HFCs	hydrofluorocarbons
IE	included elsewhere
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
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
m ³	cubic metre
MCF	methane conversion factor
MSW	municipal solid waste
MWIP	municipal waste incineration plant
N ₂ O	nitrous oxide
NA	not applicable
NCV	net calorific value
NE	not estimated
NFI	national forest inventory
NIR	national inventory report
NO	not occurring
NO _x	nitrogen oxide
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10 ¹⁵ joule)
QA/QC	quality assurance/quality control
RMU	removal unit
SCR	selective catalytic reduction
SEF	standard electronic format
SF ₆	sulphur hexafluoride
SIAR	standard independent assessment report

SNCR	selective non-catalytic reduction
t	tonne
TJ	terajoule (1 TJ = 10 ¹² joule)
UNFCCC	United Nations Framework Convention on Climate Change
VOC	volatile organic compound
Y _m	methane conversion rate
