



UNITED
NATIONS



Framework Convention
on Climate Change

Distr.
GENERAL

FCCC/IRR/2007/CHE
17 August 2007

ENGLISH ONLY

Report of the review of the initial report of Switzerland

According to decision 13/CMP.1, each Annex I Party with a commitment inscribed in Annex B to the Kyoto Protocol shall submit to the secretariat, prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later, a report (the ‘initial report’) to facilitate the calculation of the Party’s assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol, and to demonstrate its capacity to account for emissions and the assigned amount. This report reflects the results of the review of the initial report of Switzerland conducted by an expert review team in accordance with Article 8 of the Kyoto Protocol.

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I. Introduction and summary

A. Introduction

1. This report covers the in-country review of the initial report of Switzerland, coordinated by the United Nations Framework Convention on Climate Change (UNFCCC) secretariat, in accordance with the guidelines for review under Article 8 of the Kyoto Protocol (decision 22/CMP.1). The review took place from 5 to 10 March 2007 in Berne, Switzerland, and was conducted by the following team of nominated experts from the roster of experts: generalist – Ms. Mirja Kosonen (Finland); energy – Mr. Pavel Fott (Czech Republic); industrial processes – Ms. Marisol Bacong (Philippines); agriculture – Mr. Tomoyuki Aizawa (Japan); land use, land-use change and forestry (LULUCF) – Mr. Xiaoquan Zhang (China); waste – Ms. Maria Paz Cigaran (Peru). Ms. Maria Paz Cigaran and Mr. Tomoyuki Aizawa were the lead reviewers. In addition the expert review team (ERT) reviewed the national system, the national registry, and the calculations of the Party's assigned amount and commitment period reserve (CPR), and took note of the LULUCF parameters and the elected Article 3, paragraphs 3 and 4, activities. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat) and Mr. Harald Diaz-Bone (UNFCCC secretariat).

2. In accordance with the "Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (the UNFCCC review guidelines), a draft version of this report was communicated to the Government of Switzerland, which provided comments that were considered and incorporated, as appropriate, in this final version of the report.

B. Summary

1. Timeliness

3. Decision 13/CMP.1 requests Parties to submit their initial report prior to 1 January 2007 or one year after the entry into force of the Kyoto Protocol for that Party, whichever is later. The initial report was submitted on 10 November 2006, which is in compliance with decision 13/CMP.1. With the initial report Switzerland submitted a greenhouse gas (GHG) inventory that had been revised since its original 2006 GHG inventory submission of 13 April 2006. The Party submitted revised emission estimates to the ERT on 7 March 2007 and officially resubmitted its 2006 GHG inventory submission to the UNFCCC secretariat on 20 April 2007.

2. Completeness

4. Table 1 below provides information on the mandatory elements that were included in the initial report and revised values of the assigned amount and the commitment period reserve provided by Switzerland resulting from the review process, as well as the parameters used to define forest land. These revised estimates are based on the revision of the estimates of carbon dioxide (CO₂) emissions from other sectors (see paragraph 55), which change the estimates of total GHG emissions, including a revision of the base year emissions – from 52,749,223 tonnes CO₂ equivalent as originally reported by the Party to 52,790,957 tonnes CO₂ equivalent.

5. Switzerland has provided most of the information on the national registry system required by decision 13/CMP.1, section I of decision 15/CMP.1, and relevant decisions of the Conference of the Parties serving as the Meeting of the Parties (CMP). Missing elements relate to the national registry system and, in particular, to the issues addressed in paragraph 32(j) of the annex to decision 15/CMP.1. The ERT recommends that Switzerland provide more detailed information, including the results of any test procedures as mentioned in paragraph 32(j) of the annex to decision 15/CMP.1, in its next inventory submission under the Kyoto Protocol.

3. Transparency

6. The initial report is generally transparent, but the inventory information contained in the common reporting format (CRF) and the national inventory report (NIR) is not always entirely so. During the review the ERT identified the following areas where transparency needs to be further improved: a description should be included of the methodology used for international bunkers, and references are needed to support the emission factors (EFs) used for non-key categories in the energy sector; documentation is needed on the EFs used for ammonia production (industrial processes) and the technology used, and on the EFs used for aluminium production, nitric acid production, and iron and steel production; the reporting of carbon emissions from organic soil, carbon stock changes for land converted to different land cover types under grassland and settlement should be improved; and references should be provided to the original sources of activity data (AD), EFs and methodologies in the waste sector. During the in-country review Switzerland provided the ERT with very useful additional information, including information on the transparency issues (see annex I.B to this report).

Table 1. Summary of the reporting on mandatory elements in the initial report

Item	Provided	Value/year/comment
Complete GHG inventory from the base year (1990) to the most recent year available (2004)	Yes	Base year (1990) to 2004
Base year for HFCs, PFCs and SF ₆	Yes	1990
Agreement under Article 4	No	Not applicable
LULUCF parameters	Yes	Minimum tree crown cover: 20% Minimum land area: 0.0625 ha Minimum tree height: 3 m
Election of and accounting period for Article 3, paragraphs 3 and 4, activities	Yes	Article 3, paragraph 3, activities: Afforestation and reforestation, and deforestation are to be accounted annually. Article 3, paragraph 4, activities: Forest management is elected and is to be accounted annually.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8	Yes	242 645 000 tonnes CO ₂ eq.
Calculation of the assigned amount in accordance with Article 3, paragraphs 7 and 8, revised value		242 838 402 tonnes CO ₂ eq.
Calculation of the commitment period reserve	Yes	218 380 000 tonnes CO ₂ eq.
Calculation of the commitment period reserve, revised value		218 554 562 tonnes CO ₂ eq.
Description of national system in accordance with the guidelines for national systems under Article 5, paragraph 1	Yes	
Description of national registry in accordance with the requirements contained in the annex to decision 13/CMP.1, the annex to decision 5/CMP.1 and the technical standards for data exchange between registry systems adopted by the CMP	Yes	The Party has provided most of the information with regard to the registry (see also paragraph 5).

4. Emission profile in the base year, trends and emission reduction target

7. In the base year (1990 for all gases), the most important GHG in Switzerland was CO₂, contributing 84.4 per cent to total¹ national GHG emissions expressed in CO₂ equivalent, followed by methane (CH₄), 8.3 per cent, and nitrous oxide (N₂O), 6.9 per cent (see figure 1). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆) taken together contributed 0.5 per cent of overall GHG emissions in the base year. The energy sector accounted for 79.8 per cent of total GHG emissions in the base year, followed by agriculture (11.2 per cent), industrial processes (6.2 per cent) and waste (2.0 per cent) (see figure 2). Total GHG emissions (excluding LULUCF) amounted to 52,791 Gg CO₂ equivalent in the base year, and increased by 0.6 per cent to 53,085 Gg CO₂ equivalent in 2004. The

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

time series is consistent throughout the period 1990–2004 for all sectors and gases. Tables 2 and 3 show GHGs by gas and by sector, respectively.

Figure 1. Shares of gases in total GHG emissions, base year

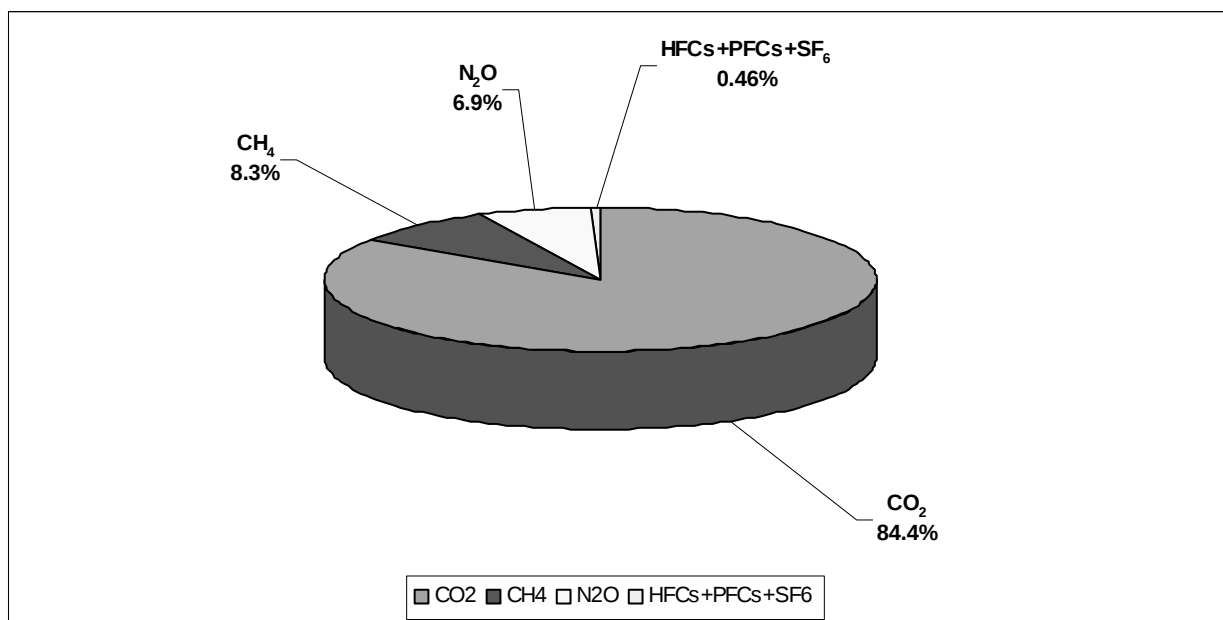
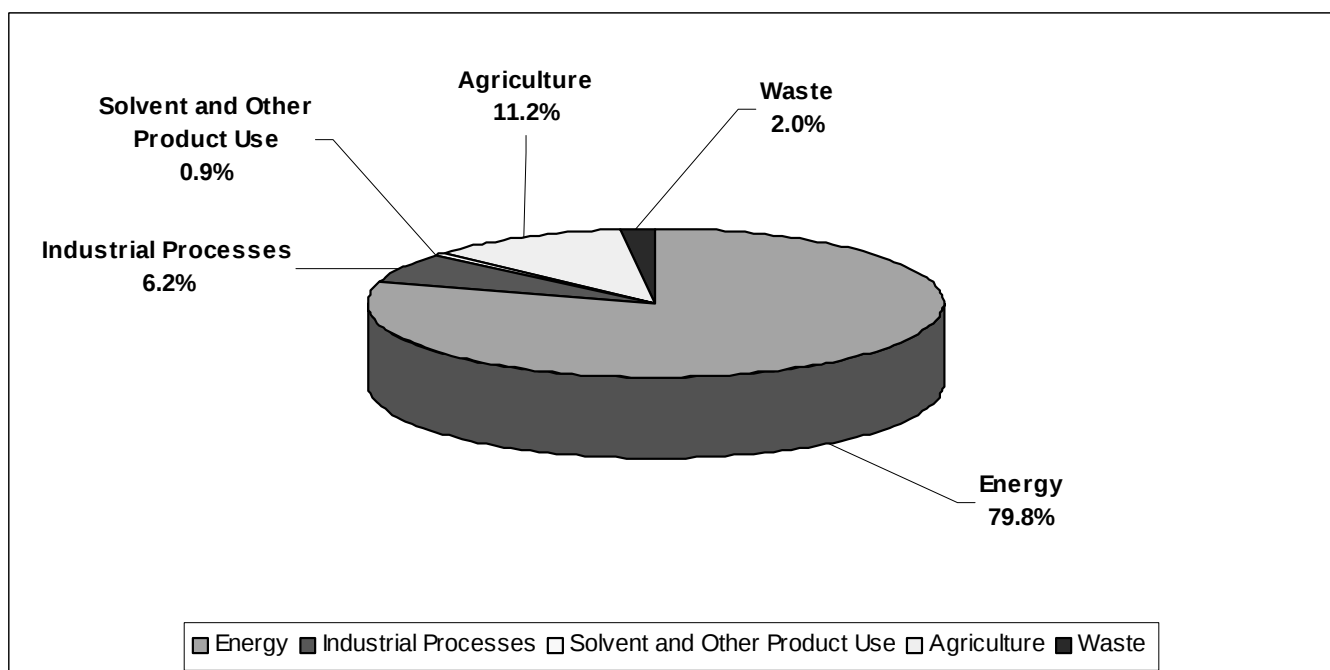


Figure 2. Shares of sectors in total GHG emissions, base year



8. Switzerland's quantified emission limitation is 92 per cent as stipulated in Annex B to the Kyoto Protocol.

Table 2. Greenhouse gas emissions by gas, 1990–2004^a

GHG emissions	Gg CO ₂ equivalent								Change KP BY–2004 (%)
	Base year Kyoto Protocol	1990	1995	2000	2001	2002	2003	2004	
CO ₂	44 553.3	44 553.3	43 355.5	43 933.8	44 716.3	43 818.0	44 912.5	45 345.7	1.8
CH ₄	4 370.4	4 370.4	3 983.1	3 691.6	3 707.3	3 647.5	3 601.3	3 549.5	–18.8
N ₂ O	3 623.4	3 623.4	3 493.9	3 422.9	3 402.1	3 400.2	3 315.4	3 320.1	–8.4
HFCs	0.0	0.0	151.8	417.9	492.2	502.5	538.5	617.4	2 740 367.5
PFCs	100.2	100.2	14.7	93.1	52.5	50.5	89.5	76.7	–23.4
SF ₆	143.6	143.6	81.3	185.8	233.9	209.3	193.8	175.1	21.9

Note: BY = Base year; KP = Kyoto Protocol, LULUCF = Land use, land-use change and forestry.

^a Switzerland submitted revised estimates for all years after the initial review on 20 April 2007. These estimates differ from Party's GHG inventory submitted in 2006.

Table 3. Greenhouse gas emissions by sector, 1990–2004^a

Sectors	Gg CO ₂ equivalent								Change KP BY–2004 (%)
	Base year Kyoto Protocol	1990	1995	2000	2001	2002	2003	2004	
Energy	42 133.7	42 133.7	41 686.5	42 463.8	43 222.8	42 345.6	43 459.7	43 795.0	3.9
Industrial processes	3 258.0	3 258.0	2 527.2	2 819.5	2 946.5	2 890.2	2 899.5	3 051.2	–6.3
Solvent and other product use	466.4	466.4	367.4	280.9	270.3	258.5	249.6	236.3	–49.3
Agriculture	5 903.2	5 903.2	5 638.2	5 408.8	5 417.7	5 394.2	5 282.4	5 258.1	–10.9
LULUCF	NA	–1 704.2	–3 201.2	1 262.9	–655.0	–514.6	1 868.7	–821.0	NA
Waste	1 029.5	1 029.5	861.1	772.2	747.0	739.5	759.8	743.9	–27.7
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	51 086.7	47 879.1	53 007.9	51 949.3	51 113.4	54 519.6	52 263.5	NA
Total (without LULUCF)	52 791.0	52 791.0	51 080.4	51 745.1	52 604.2	51 628.0	52 651.0	53 084.5	0.6

Note: BY = Base year; KP= Kyoto Protocol, LULUCF = Land use, land-use change and forestry; NA = Not applicable.

^a Switzerland submitted revised estimates for all years after the initial review on 20 April 2007. These estimates differ from Party's GHG inventory submitted in 2006.

II. Technical assessment of the elements reviewed

A. National system for the estimation of anthropogenic GHG emissions by sources and sinks

9. Switzerland's national system has been set up in accordance with the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The initial report describes in a transparent way the legal basis of the national system, indicates the single national entity, and reports the allocation of specific responsibilities for the inventory development process, including inventory planning, inventory preparation and inventory management. The process for approving the inventory is established, and the quality assurance/quality control (QA/QC) plan is presented. The national system for performing the general and specific functions required by the guidelines is in place.

10. Table 4 shows which of the specific functions of the national system are included and described in the Party's initial report.

Table 4. Summary of reporting on the specific functions of the national system

Reporting element	Provided	Comments
Inventory planning		
Designated single national entity*	Yes	See section II.A.1
Defined/allocated specific responsibilities for inventory development process*	Yes	See section II.A.1
Established process for approving the inventory*	Yes	See section II.A.1
Quality assurance/quality control (QA/QC) plan*	Yes	See section II.A.2
Ways to improve inventory quality	Yes	See section II.B.3
Inventory preparation		
Key category analysis*	Yes	See section II.B.1
Estimates prepared in line with the IPCC Guidelines and IPCC good practice guidance*	Yes	See section II.B.2
Sufficient activity data and emission factor collected to support methodology*	Yes	See section II.B
Quantitative uncertainty analysis*	Yes	See section II.B.2
Recalculations*	Yes	See section II.B.2
General QC (tier 1) procedures implemented*	Yes	See section II.A.2
Source/sink category-specific QC (tier 2) procedures implemented	Yes	See section II.A.2
Basic review by experts not involved in inventory	Yes	See section II.A.2
Extensive review for key categories	Yes	See section II.A.2
Periodic internal review of inventory preparation	Yes	See section II.A.2
Inventory management		
Archive inventory information*	Yes	See section II.A.3
Archive at single location	Yes	See section II.A.3
Provide ERT with access to archived information*	Yes	See section II.A.3
Respond to requests for clarifying inventory information during review process*	Yes	See section II.A.1

* Mandatory elements of the national system.

1. Institutional, legal and procedural arrangements

11. During the in-country visit, Switzerland explained the institutional arrangements, as part of the national system, for preparation of the inventory. The Federal Office for the Environment (FOEN) in the Federal Department of the Environment, Transport, Energy and Communications (DETEC) is the designated single national entity for preparation of the inventory. Other agencies and organizations as well as private institutes and companies are involved in the preparation of the inventory: the federal offices within the DETEC (for energy statistics, aviation emissions); the Agroscope Reckenholz-Tänikon, Research Station (ART) (for emissions from and removals by agriculture and LULUCF (cropland)); the FOEN Forest Division (for emissions from and removals by LULUCF); and

private companies such as Carbotech (for synthetic gas emissions), Sigmaplan/Meteotest (for LULUCF data compilation), EBP/Infras (for the NIR, uncertainty analysis and key category analysis), and CEPE/Basics (for energy data in the industry and commercial sectors). The overall responsibility for the national GHG inventory, as well as issues related to reporting, QA/QC, and general issues, lies with the FOEN (Climate, Economics, Environmental Observation Division). The Air Pollution Control and Non-Ionizing Radiation Division of the FOEN manages the national air pollution database (EMIS) and archives all emissions data for the GHG inventory. The FOEN's experts in environmental matters support the full-time inventory personnel. In the process of inventory compilation and in the production of the NIR there is wide-ranging cooperation with all partners. The EMIS database in the FOEN Air Pollution Control and the Non-Ionizing Radiation Division compiles all inventory data inputs from different internal data sources as well as from outside data suppliers. Information on QA/QC activities, decisions reached by the experts (minutes), reviews, results of key category analysis and uncertainty analysis, as well as inventory development, is documented and archived in the FOEN Internal Document Management system. All the information needed to reconstruct and interpret inventory data and to describe the inventory system and its functions is accessible at a single location at the FOEN.

12. Switzerland has decided to account for afforestation (A), reforestation (R), deforestation (D) and forest management (FM) activities annually, and to identify ARD land and FM lands with the support of aerial photographs with 100 m x 100 m grids, which is recommended by the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF), and pursuant to paragraph 8(c) of the annex to decision 13/CMP.1.

13. In Switzerland there is an established process for the official consideration and approval of the inventory, including responding to any issues raised by inventory reviews and assessing recalculations. The FOEN is the organization responsible for the inventory compilation, and the FOEN Directorate officially approves the inventory submission after it has been approved by the Supervisory Board for the national inventory system (a special inventory body). Additional information on inventory management, including information on external contractors, was provided during the in-country review by the GHG Inventory Core Group.

2. Quality assurance/quality control

14. Switzerland has developed and partially implemented a QA/QC plan in accordance with the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). This includes general QC procedures (tier 1) as well as source/sink category-specific procedures (tier 2) for key categories and for those individual categories in which significant methodological and/or data revisions have occurred.

15. The Party has submitted a description of the QA/QC system which was implemented for the 2006 inventory compilation process. It includes tier 1 quality control activities and standard operating procedures for quality assessment, including sector-specific reviews, before the annual inventory is submitted. The energy and industrial processes sectors as well as CH₄ emissions from the agriculture sector were subject to domestic review in 2006. An internal study was conducted on discrepancies between the inventory estimates and those published by the International Energy Agency (IEA) regarding CO₂ emissions from the energy sector. The internal review of the NIR was done by the GHG Inventory Core Group.

16. A detailed description of the QA/QC system is included as an annex to the initial report. This annex explains in detail the responsibilities in the quality management system that are allocated to the inventory bodies and the partners in the annual inventory compilation process. Switzerland is considering certification of its quality management system according to the International Organization for Standardization (ISO) standard 9001:2000. Quality policy follows the IPCC good practice guidance

(chapter 8), and it is based on the PDCA (Plan – Do – Check – Act) cycle. One central element in the inventory quality management is the regular meetings of the Supervisory Board for the national inventory system, the GHG Inventory Core Group, the GHG Inventory Working Group, and the meetings of the sectoral GHG inventory groups (for agriculture, LULUCF). These meetings provide the opportunity for interaction on the inventory quality policy. A second element is checklists for data suppliers and members of the GHG Inventory Core Group. Prior to the annual submission the GHG Inventory Core Group performs the review. External experts are mandated to review selected key categories. The Supervisory Board for the national inventory system then scrutinizes the inventory officially before the FOEN Directorate approves it. As yet, however, the QA/QC system is not fully implemented.

3. Inventory management

17. Switzerland has a centralized archiving system under development. It is designed as a part of the FOEN Internal Document Management system, and it covers the compilation of all documents relevant to quality issues. Each document is identified by the assignment of a universal resource locator (URL). In the FOEN the QA/QC officer checks the quality management documentation. Another officer, the National Inventory Compiler, completes and corrects the archiving of GHG data.

18. The inventory data used for calculations are archived in the EMIS database. This procedure was implemented for the first time for the 2006 submission.

B. Greenhouse gas inventory

19. In conjunction with its initial report, Switzerland has submitted a complete set of CRF tables for the years 1990–2004. The Party submitted revised emission estimates to the ERT on 7 March 2007 and officially resubmitted its 2006 GHG inventory submission to the UNFCCC secretariat on 20 April 2007. Where needed the ERT also used previous years' submissions, including the CRF tables for the years 1990–2003.

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

1. Key categories

21. Switzerland has reported a key category tier 1 analysis for the year 2004, both level and trend assessment, as part of its inventory submission in conjunction with the initial report submission. Switzerland has not included the LULUCF sector in its key category analysis, but presented to the ERT an analysis from the 2007 submission that included LULUCF for 2005. During the review the Party explained that the results of the analysis have had an effect on the inventory planning in the context of allocating resources. In the quality control procedures priority is given to the key categories. Switzerland does not report a key category analysis for the base year (1990) in its inventory submission, but during the review it did provide the ERT with the base year key category analysis prepared for the 2007 submission.

22. The key category analysis performed by the secretariat² for the base year identified 20 key categories. For 2004, the Party identified 25 key categories compared to the 19 key categories identified

² The secretariat identified, for each Party, those source categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC *Good Practice Guidance for Land Use, Land-use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) for the base year or base year period as well as the latest inventory year. Key categories according to the tier 1 trend assessment were also identified. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

by the secretariat according to the level assessment. According to the trend assessment the Party indicates 37 key categories compared to the 28 categories identified by the secretariat. During the review the Party presented its key category analysis for the base year, as well as the level and trend analysis for 2005 including LULUCF on the basis of new inventory data, which will be submitted in 2007.

23. For 2004, the main differences between the Party's and the secretariat's key category analysis arise from the fact that LULUCF is not included in the level and trend assessment undertaken by the Party, and from the more disaggregated analysis performed by the Party, particularly for the stationary combustion and mobile subsectors, which account for some 70 per cent of total estimated emissions.

24. According to the quality management plan, key category analysis will be one criterion in deciding the focus of the different expert reviews during inventory preparation.

2. Cross-cutting topics

25. The inventory is in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. In the development phase of the inventory database (EMIS), the ERT recommends Switzerland to improve the transparency of the NIR and the CRF, as described in the sectoral sections of this report below on energy, agriculture, industrial processes and waste.

26. The inventory has been compiled in accordance with Article 7, paragraph 1, and decision 15/CMP.1.

Completeness

27. The inventory submitted with the initial report covers all years from 1990 to 2004, and all sectors and gases, as well as actual and potential emissions of HFCs, PFCs and SF₆. Its geographic coverage has been corrected by separating Liechtenstein out from the national emission estimates. The inventory reports all sectors, source and sink categories, with some minor deficiencies in the LULUCF sector. The Party assumes carbon stock changes in forest soils for forest land remaining forest land and mineral soil for cropland remaining cropland to be zero, because of lack of data. The ERT recommends Switzerland to make efforts to improve the estimates for carbon stock changes in forest soils, and for mineral soil for cropland remaining cropland.

28. CRF tables 9(a) and 9(b) have not been filled in. New categories, and emissions from composting and digestion of organic waste, are included in the inventory for the first time. An NIR has been submitted including information on key categories, methods used, data sources, uncertainty estimates, QA/QC procedures, verification activities and so on. A supplement to the NIR provides a detailed description of the QA/QC and verification procedures used in the preparation of the GHG inventory.

Transparency

29. The documentation in the NIR gives a good basis for the review of the inventory. There is an ongoing development process in the documentation, where information technology (IT)-based methods are applied for data processing and inventory archiving, supported by QA/QC activities. This improvement follows the recommendations of previous reviews. The level of transparency is improving with the integration of the EMIS system into the inventory compilation process, along with the implementation of the quality management system. The EMIS database stores documentation referred to and original data sources used in the inventory compilation. However, the NIR generally cites EMIS as the source of information or data, and Switzerland is encouraged to include references to the original sources of information or data in the NIR. During the in-country visit additional information was made available to the ERT, including confidential material.

30. The ERT found that the use of the notation keys “not estimated” (“NE”) and “included elsewhere” (“IE”) is not always transparent, and corresponding explanations in CRF table 9(a) are not provided. The ERT encourages Switzerland to provide explanations of all cases when the notation keys are used.

31. Methodologies are generally well described in the NIR, but in a number of cases the information reported is not sufficient to explain the assumptions made in choosing methodologies or estimating AD and EFs (e.g., in energy, industrial processes, agriculture, waste). The ERT recommends that Switzerland improve the documentation on methodology in the NIR, particularly for the key categories.

Consistency

32. The inventory submitted by Switzerland is time-series consistent. However, the reporting of methods used and EFs in a number of cases is not consistent between the NIR and the CRF (e.g. in the industrial processes and waste sectors).

Comparability

33. The ERT appreciated that Switzerland has included the LULUCF reporting tables in its 2006 submission in accordance with decision 13/CP.9. The inventory is generally comparable with those of other Parties, except for some specific cases which are addressed in the relevant sector sections of this report.

Accuracy

34. The inventory is accurate as defined in the “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories” (the UNFCCC reporting guidelines), with the exception of some categories in the LULUCF sector. Due to the attribution of a conversion period of one year for land converted to forest land (see paragraph 92), CO₂ removals for forest land remaining forest land tend to be overestimated and CO₂ removals for land converted to forest land tend to be underestimated throughout the whole time series.

Recalculations

35. The Party’s national system can ensure that recalculations of previously submitted estimates of GHG emissions by sources and removals by sinks are prepared in accordance with the IPCC good practice guidance. In its 2006 inventory submission, Switzerland has provided information on a suite of recalculations that are the result of the implementation of a broad inventory improvement plan.

36. The ERT noted that recalculations had been undertaken by the Party of the time series from the base year to 2003, as indicated in the NIR. The recalculations mainly arise from the reallocation of waste incineration emissions to the energy sector; the updating of other data; new modelling of domestic aviation and waste-water handling; the recalculation of emissions from industrial processes in the context of development of the EMIS database; improvements to the SF₆ emission estimates; and the recalculation of emissions from burning branches. The net effect of these recalculations (including the separating out of Liechtenstein emissions from the Switzerland inventory) is an increase in emissions of 0.58 per cent for the year 1990 (NIR, page 222) and 0.76 per cent for 2003 (NIR, page 221). The major quantitative changes are connected with the reallocation of waste incineration and increased emissions from LULUCF as well as from solvent and other product use. The rationale for these recalculations is provided in the NIR. They follow partly from the recommendations of previous reviews and partly from the implementation of a comprehensive improvement plan during the development of the EMIS database.

Uncertainties

37. The Party has provided a tier 1 uncertainty analysis and a tier 2 analysis for the key categories, as well as analyses for total inventory uncertainty (without LULUCF) following the IPCC good practice guidance. The results of the total uncertainty analysis have been compared by the Party with those of some other countries, and this comparison has confirmed that the accuracy of the inventory is satisfactory. Regarding the tier 2 uncertainty analysis, no documentation is presented on expert evaluations. According to the tier 1 analysis, the total uncertainty of the inventory has increased slightly, amounting to 3.34 per cent on the level assessment and to 2.43 per cent on the trend assessment. According to the tier 2 analysis, the total uncertainty is 3.98 per cent. The Party explained during the review that tier 2 uncertainty analyses for the key categories will affect the focus of the inventory improvement plan. The Party is encouraged to extend the uncertainty analysis and to integrate it into its inventory planning.

3. Areas for further improvement identified by the Party

38. The NIR identifies several areas for improvement. These relate in particular to:

- (a) Building on the quality management system and implementing the ISO 9001 certification;
- (b) Improving the archiving system for documentation;
- (c) Reviewing the EF for CO₂ from clinker;
- (d) Completing work on the estimation of above-ground and below-ground carbon stocks.

4. Areas for further improvement identified by the ERT

39. The ERT identified the following areas for improvement in addition to those already identified by Switzerland:

- (a) Improving transparency by:
 - (i) Providing references to the original sources of AD, EFs and methodologies in the NIR, and not to EMIS alone;
 - (ii) Documenting expert judgement uncertainty estimates in accordance with the IPCC good practice guidance for the uncertainty analysis;
 - (iii) Filling in tables 9(a) and (b) (completeness), presenting a clear explanation of the categories reported as "IE" and "NE";
- (b) Improving its key category analysis by addressing the LULUCF categories as well, as Switzerland indicated during the in-country visit.

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

5. EnergySector overview

41. In 1990, the energy sector accounted for 79.8 per cent of the total GHG emissions of Switzerland. CO₂ accounted for 98.0 per cent of total sectoral emissions. Total emissions from the sector were 3.9 per cent higher in 2004 than in 1990, mainly due to an increase in emissions from transport. In 1990, other sectors (mainly residential) and transport (mainly road transportation) were the

largest categories, contributing 42.4 and 34.6 per cent, respectively, to the total emissions of the energy sector.

42. AD for the energy sector are taken from the official Swiss national energy balance. Additional procedures using energy-economic modelling and bottom-up data are used to allocate AD to the categories of the CRF tables. Switzerland uses country-specific calorific values and CO₂ EFs which are considered as constant for the whole inventory time series (1990–2004).

43. The oxidation factor is set to 1 for all fuel types, which is justified in the NIR by the following arguments: (a) almost all solid fuels are used in cement kilns where sufficiently long contact time and high temperatures ensure almost complete oxidation; and (b) as for other liquid and gaseous fuels, the very good condition of Swiss boilers supports good oxidation and prevents the formation of soot. For liquid and gaseous fuels, the assumption of an oxidation factor = 1, which might slightly overestimate emissions, is conservative, because consumption of liquid fuels is stagnating and consumption of gaseous fuels increased substantially over the period 1990–2004.

44. For the energy sector, the 2006 submission is complete and in most cases it is transparent, with only minor transparency issues identified in the international bunkers and non-key categories. To improve time-series consistency from 1990 on, Switzerland has undertaken numerous recalculations during the last three years, including: (a) the separating out of energy sector emissions from Liechtenstein from the Swiss inventory; (b) the reallocation of emissions from waste incineration to the energy sector; (c) the implementation of a higher-tier method to estimate emissions from aviation, making it possible to separate domestic aviation from international bunkers in an exact way; and (d) the allocation of emissions that were previously aggregated in manufacturing industries and construction to the relevant subcategories (1.A.2.a–f). Sector-specific QA/QC procedures have improved since the last submission. Examples include a comparison of the results produced by the old system used to calculate emissions with the figures in the national emissions database (EMIS); an annual comparison of AD using relevant outputs of the Federal Office of Energy; and a peer assessment of the energy sector inventory by an independent company.

45. The key category analysis undertaken by the Party for 2004 is more disaggregated than the secretariat's analysis, with 21 categories in the energy sector identified as key, while the secretariat's analysis identified 10 categories as key. In 1990, seven categories are identified as key in the secretariat's analysis. Switzerland has provided sector-specific uncertainty analysis for CO₂ emissions from fuel combustion; however, the uncertainties of the EFs are not considered in this analysis. The Party is encouraged to improve the documentation of the uncertainty analysis to include EFs.

Reference and sectoral approaches

46. Switzerland reports CO₂ estimates from the reference approach and the sectoral approach for all years of the inventory time series. The difference between the two approaches in 1990 was 0.85 per cent for CO₂ emissions; the corresponding difference for apparent energy consumption was 1.9 per cent. The difference in CO₂ emissions for all years of the time series is less than 2 per cent.

47. The total apparent consumption (reference approach) reported by Switzerland for 1990 is conservative when it is compared with equivalent data from the IEA. The apparent consumption reported by the Party is 7 per cent lower than that of the IEA. The IEA explains this difference as being due to (a) the higher calorific values used in the IEA analysis, and (b) the fact that it takes into account liquid fuels (in 2004, other kerosene, naphtha, lubricants, refinery feedstocks and other oils) in the reference approach, while these are not reported by Switzerland. The Party is taking measures to supplement its reference approach and to harmonize its reporting for the UNFCCC and the IEA by incorporating all relevant liquid fuels. The growth rate for apparent consumption in the period 1990–2004 is 7 per cent according to Switzerland's 2006 submission, compared to –1 per cent following from the IEA results, which indicates the conservativeness of Switzerland's estimate of the trend.

International bunker fuels

48. A new, higher-tier method has improved Switzerland's capacity to differentiate international (air) bunkers from domestic aviation fuel consumption data. This method is based on flight movement statistics and has resulted in a revision of the inventory time series. This advanced method, developed in cooperation with the Federal Office of Civil Aviation, was taken from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (where it is called tier 3a). However, these have not yet been approved by the relevant UNFCCC bodies (the Subsidiary Body for Scientific and Technological Advice (SBSTA) and the CMP). As yet, therefore, this can be considered only a national method, and as such it should be more transparently explained in the NIR. In 1990 the estimated international bunker fuel is reported to be 92.4 per cent of combined international and domestic aviation fuel used, and in 2004 it is estimated as 96 per cent. The Party explained the difference in the share between 1990 and 2004 to be related to the fact that some international flights from Zurich in the early years of the time series incorporated a stopover in Geneva.

Feedstocks and non-energy use of fuels

49. Switzerland has not reported in CRF table 1.A(b) apparent consumption (imports, exports and stock change) of fuels that are used as feedstocks; only bitumen is reported as a feedstock in this table. However, naphtha, petroleum feedstocks and lubricants appear in the IAE energy balance for the Party. Switzerland has not implemented a recommendation from the previous (2005) review that it should investigate this issue further, but it has indicated that it intends to report more liquid products in its 2008 inventory submission.

50. CO₂ emissions from the consumption of natural gas in the process of producing hydrogen from the synthesis of ammonia by steam re-forming are reported under manufacturing industries and construction. The Party is recommended to report these emissions in the industrial processes sector (ammonia production) in accordance with the IPCC good practice guidance.

Country-specific issues

51. Municipal solid waste (MSW) incineration in subsector public electricity and heat production can be considered as a country-specific category because of its dominant share among fuels consumed in subcategory public electricity and heat production (77.4 per cent in 1990 and 85 per cent in 2004, these figures including special wastes). The CO₂ EF is based on the following parameters: (a) the fraction of carbon (C) content is based on measurements by the environmental offices of the different cantons, and the results were statistically analysed and documented in the EMIS database (370 kg C/t waste in 1990, and 350 kg C/t waste kg C/t waste in 2004); (b) the fraction of fossil carbon is 40 per cent, which is the IPCC default value, and this is constant from 1990 to 2004; and (c) the efficiency of combustion is 0.99 (which is within the range given by the IPCC good practice guidance), and this is also constant from 1990 to 2004. The ERT commends Switzerland for its use of CO₂ EFs that are based on measurements of the carbon content of MSW and recommends it to evaluate and present in the NIR the relevant statistical parameters (such as standard deviation) that are needed for uncertainty evaluation.

Key categoriesStationary combustion: liquid fuels – CO₂

52. Most emissions from stationary combustion of liquid fuels occur in the sectors other (contributing 42.4 per cent to total GHG emissions from the energy sector in 1990) and manufacturing industries and construction (contributing 14.4 per cent of total sectoral emissions in 1990). The ERT commends the approach used by Switzerland to disaggregate liquid fuel consumption in stationary categories into the CRF categorization – by energy-economic modelling, also taking into account bottom-up analysis; this is explained in detail in annex A2.4 to the NIR. This approach is applied

consistently for all years in the inventory time series. The net calorific values (NCVs) and the CO₂ EFs are kept constant for all years of the time series for the relevant fuel oils (gas oil, residual fuel oil) (see annex A2.2 to the NIR, tables 174 and 175). The NIR explains that these values are based on measurements taken in 1998 (the source cited is EMPA 1999), which falls almost exactly in the middle of the period 1990–2004. The ERT considered the use of constant NCVs and CO₂ EFs, which are within the expected ranges presented in the IPCC methodology, to be acceptable here because there are only small fluctuations in the chemical composition of fuels in Switzerland, as the Swiss experts explained during the review. The Party is recommended to repeat such measurements at regular intervals in order to improve the accuracy of the inventory, and to obtain more reliable information on the uncertainties of these parameters.

53. The information concerning the NCVs and the CO₂ EFs that is given in annex A2.2 to the NIR should be presented in a more detailed and transparent way, including the number of analyses for each fuel type and the year in which the analysis was undertaken.

Road transportation: liquid fuels – CO₂

54. Emissions of CO₂ from road transportation are calculated from energy statistics on the amount of gasoline and diesel oil sold in the country. This is consistent with the IPCC methodology. Moreover, these amounts are verified using equivalent values derived from the bottom-up approach that are based on transport statistics (vehicle stocks, vehicle miles travelled, etc.). This verification process reveals a difference (positive for gasoline and negative for diesel oil) which is explained by the Party as being related to “tank tourism”. Switzerland is encouraged to extend the reporting of data in table 44 of the NIR for the whole time series, and to provide further information to support this explanation of the difference, including an assessment of the uncertainty of the transport statistics parameters.

Stationary combustion: gaseous fuels – CO₂

55. During the in-country visit, Switzerland submitted revised estimates and supporting data concerning the 1990 emission estimates for other sectors as an error was identified in the existing calculation procedure regarding CO₂ emissions. This error arose from an assumption that fugitive losses during the transmission and distribution of natural gas should be subtracted from the amount of gas that is combusted, generating CO₂ emissions. Switzerland confirmed that the amount of natural gas combusted is based on end-use metered data, which are not affected by fugitive gas losses. The ERT accepted the revised estimate, which resulted in an estimate of 41,303 Gg CO₂ emissions for the energy sector (41.7 Gg CO₂ more than the reported estimate) for 1990. The ERT encourages Switzerland to include in its next inventory submission the corresponding recalculation tables 8(a) and 8(b) for the whole time series where this underestimation error is corrected.

Non-key categories

56. In many instances the NIR describes the CH₄ and N₂O EFs as country-specific, even though during the review the ERT identified them as IPCC or CORINAIR default values. Switzerland is recommended to ensure that the correct attribution of the source of an EF (or method) is reported in the NIR, and that it is always consistent with CRF table summary 3, for all gases.

6. Industrial processes and solvent and other product use

Sector overview

57. In the base year (1990), total emissions from the industrial processes sector in Switzerland amounted to 3,258 Gg CO₂ equivalent, corresponding to 6.2 per cent of total national emissions. Total emissions from solvent and other product use in 1990 amounted to 466.4 Gg CO₂ equivalent. Total GHG emissions from industrial processes decreased by 6.3 per cent between 1990 and 2004, while emissions from solvent and other product use decreased by 49.3 per cent over the same period.

58. CO₂ is the dominant GHG in both industrial processes and solvent and other product use, contributing 86.9 per cent and 76.5 per cent, respectively, to total sectoral emissions in 1990. N₂O contributed 23.5 per cent of total emissions of the solvents and other product use sector. HFCs, PFCs and SF₆ taken together contributed 7.5 per cent of total sectoral emissions in 1990. The changes in emissions of HFCs, PFCs and SF₆ in 2004 compared to the 1990 level are +2,740,367 per cent, -23.4 per cent and +21.9 per cent, respectively.

59. The GHG inventory is complete for all years of the time series. The 2006 NIR and CRF tables are complete, covering all categories under the industrial processes and solvent and other product use sectors. Uncertainty analysis has been performed using both tier 1 (for all categories) and tier 2 (for key categories) methods.

60. The CRF and the NIR are not fully consistent where the following are concerned: the methods and EFs reported; the categories in which some emissions are reported (e.g. the NIR indicates that asphalt roofing emissions are reported in category Other (2.G), while the relevant CRF table indicates that they are reported under other (mineral products)); and the occurrence and non-occurrence of activities and emissions (e.g. production of ethylene and PVC and emissions from plaster). It is recommended that the Party update the CRF tables and make them fully consistent with the NIR, and vice versa.

61. Recalculations have been undertaken for all categories and for the entire time series as a result of the setting up of a new Swiss national air pollution database (EMIS) and the revision of numerous AD and EFs such as: decreases and increases in AD (e.g. lime production, road paving with asphalt, plaster production, nitric acid production, organic chemical production, steel production, and production of other chemicals); and increases in EFs (e.g. the CO₂ EF for lime production). For synthetic gases, improvements to the consistency of AD and EFs are reported, with the use of data models and import statistics to apply the tier 2 methodology. In solvent and other product use, recalculations have been done to account for indirect CO₂ emissions from non-methane volatile organic compounds (NMVOCs) and CO₂ emissions from post-combustion of NMVOCs. Recalculation of the base year (1990) industrial processes emissions has resulted in a decrease in the estimates of CO₂ emissions from the sector (by 9.8 Gg), an increase in the figures for N₂O emissions (by 75.1 Gg CO₂ eq.), and a decline in the figures for SF₆ emissions (by 35.3 Gg CO₂ eq.).

62. Quality control has been carried out using the general procedures (tier 1) recommended in the IPCC good practice guidance. However, QC by the National Inventory Compiler and the NIR's lead authors needs improvement, in particular regarding the transcribing of data from the EMIS database to the NIR, of the CRF compiler to the CRF tables, and of data tables and texts within the NIR. It is recommended that the Party undertake a thorough review of its internal documentation and the organization of the EMIS database to ensure that updated AD, EFs and background information are reported in the NIR and the CRF tables. A quality assurance plan to check and verify category-specific AD and the EFs of key categories should be implemented.

Key categories

Cement production – CO₂

63. In 1990, CO₂ emissions from cement production accounted for 77.5 per cent of total industrial processes emissions. Between 1990 and 2004, CO₂ emissions from cement production fell by 32.1 per cent, mainly due to changes in the production capacities of cement plants. Emissions from cement production are calculated using the tier 2 method. The CO₂ EF reported is 525 kg per tonne of clinker (provided by the World Business Council for Sustainable Development). The Party indicates a plan to use country-specific data on the lime (CaO) content of clinker and to account for possible non-carbonate feeds. However, it is not clear when this plan will be implemented.

64. Switzerland is recommended to report CO₂ emissions from the blasting operation during the extraction of limestone for cement production in source category Other (2.G) (industrial processes) separately.

Solvent and other product use – CO₂

65. Solvent and other product use generated a total of 357.0 Gg CO₂ emissions in 1990, contributing 0.9 per cent of total national GHG emissions (excluding LULUCF). CO₂ emissions from solvent and other product use decreased by 47.9 per cent between 1990 and 2004, primarily due to restrictions on the use of volatile organic compounds (VOCs) and the introduction of a VOC tax in 2000. The AD and EFs for NMVOCs are country-specific and are based on data on consumption of solvents supplied by industry and expert estimation, as documented in the EMIS database. This methodology is consistent with the IPCC good practice and the Revised 1996 IPCC Guidelines.

66. CO₂ emissions from this sector are from the destruction of NMVOCs in exhaust gases from solvents and other compounds for paint application, degreasing and dry cleaning, chemical products, manufacture and processing, and other applications, as required by Swiss regulations. The CO₂ EFs are based on the average carbon content of NMVOC emissions reported in the Netherlands. The Party is encouraged to use a country-specific carbon content of NMVOC emissions and production-based NMVOC emissions data to estimate CO₂ emissions.

67. The uncertainty of total CO₂ emissions from category 3 is estimated to be 50 per cent based on expert estimation. The Party is encouraged to continue to improve the quality of its data on the consumption and production of solvents in order to reduce the uncertainty of the AD.

Non-key categories

Ammonia production – CO₂

68. In 1990, there were CO₂ emissions amounting to 0.32 Gg CO₂ equivalent from a total ammonia production of 40 kilotonnes per year. A country-specific approach has been used for calculating the CO₂ emissions, by multiplying annual ammonia production with a country-specific EF. The EF is not provided in the NIR but the CRF indicates an implied emission factor (IEF) of 0.008 tonne of CO₂ per tonne of ammonia (NH₃) produced. This is much lower than the suggested range in the Revised 1996 IPCC Guidelines of 1.5 to 1.6 tonne CO₂ per tonne NH₃. The Party is encouraged to include more information on the source(s) of CO₂ emissions and its country-specific EFs in the NIR.

69. The NIR reports that ammonia production is assumed to be constant between 1990 and 2004. The Party is encouraged to review the AD and check their consistency at the industry level.

7. Agriculture

Sector overview

70. In 1990, emissions from the agriculture sector in Switzerland amounted to 5,903.2 Gg CO₂ equivalent, or 11.2 per cent of total national GHG emissions (excluding LULUCF), the agriculture sector being the second most important source of emissions after the energy sector. Over the period 1990–2004, emissions from the sector decreased by 10.9 per cent, mainly due to a decrease of CH₄ and N₂O emissions caused by the reduction of the cattle population and reduced input of mineral fertilizers. GHG emissions from the sector consist of CH₄ and N₂O, which account for 51.5 per cent and 48.5 per cent of total sectoral emissions, respectively. CH₄ emissions from enteric fermentation are the largest category, followed by N₂O emissions from agricultural soils.

71. All GHGs and sources in the agriculture sector are reported by Switzerland for all years of the inventory time series. The notation keys have been used where necessary; rice cultivation and prescribed

burning of savannas do not occur in Switzerland and are correctly reported as “not occurring” (“NO”). A comprehensive assessment of nitrogen (N) flow analysis for agricultural soils has been undertaken, which has considerably improved the completeness of the accounting of emissions in this subsector with the inclusion of N₂O emissions from agricultural soils. CRF tables 8(b) and 9(a) are not filled in, even though the NIR gives a summary description of the recalculations and the completeness of this part of the inventory. The ERT recommends that Switzerland fill in these cells of the CRF in its next inventory submission.

72. The information included in the CRF additional information tables and the documentation boxes ensures transparency; however, not all explanations are provided for CRF table 4.Ds2. The NIR does provide detailed summarized information on country-specific methods. Transparency could be improved by including descriptions of each coefficient.

73. Recalculations have been performed for enteric fermentation, manure management and field burning of agricultural residues for the whole time series. Together they result in a 2.9 per cent (178.9 Gg CO₂ eq.) decrease in the estimate of emissions from the sector in 1990, and a 1.7 per cent (90.0 Gg CO₂ eq.) decrease in the estimate for 2003. In the latest submission from Switzerland, dairy cattle and non-dairy cattle have been further subdivided according to a recommendation from the 2004 review report, and the feed intake data for each disaggregated cattle type have been modified to account for the changed livestock classification. CH₄ emissions from field burning of agricultural residues have been recalculated with updated EFs, and N₂O from this category has been reported for the first time by the Party in response to a recommendation from the 2004 review report. For the base year, the recalculations pertain to CH₄ from enteric fermentation and manure management, resulting in a 5.7 per cent decrease when compared to the previous (2005) submission of the 1990 CRF, and to N₂O from manure management and agricultural soils, resulting in a 0.1 per cent increase when compared to the previous submission of the 1990 CRF. Switzerland provided the ERT with information on the recalculations, and it is recommended that this information be reported in CRF table 8(b).

74. Category-specific QA/QC procedures have been conducted for enteric fermentation and manure management with the help of external experts and the organizations relevant to the inventory preparation process. However, for agricultural soils, category-specific QA/QC procedures are only partially applied; there are only internal QC checks. The ERT recommends Switzerland to improve category-specific QA/QC procedures for all key categories of the agriculture sector.

75. Uncertainty assessment has been conducted and background information is provided subcategory by subcategory. However, the results of the uncertainty analysis do not seem to be used for setting the priorities of the inventory development plan. Switzerland is therefore encouraged to use the results of the uncertainty analysis when establishing the inventory development plan.

76. Switzerland informed the ERT that the estimation process related to nitrogen flow using the IULIA model (from the Institut für Umweltschutz und Landwirtschaft) is to be reviewed in 2007.

Key categories

Enteric fermentation – CH₄

77. Emissions from this category amounted to 2,474.8 Gg CO₂ equivalent in 1990, representing 41.9 per cent of the total GHG emissions of the agriculture sector. The largest source was dairy cattle under Cattle (Option A), representing 68.8 per cent, followed by breeding cattle, representing 17.4 per cent. The IPCC tier 2 method has been used for the estimation. The livestock classification scheme used by Switzerland reflects country-specific conditions, and the Party is encouraged to provide more detailed descriptions of each classification in the NIR. Emissions from non-dairy cattle, suckler cow calves and milk-fed calves are reported as “IE” and “NO” from 1990 to 1998. The ERT recommends that Switzerland improve the completeness of its reporting by explaining its use of the

notation key “IE” in CRF table 9(a), and providing information on the categories that are reported as “NO, in the NIR.

78. The methods used to establish country-specific EFs are well described in the NIR. AD are taken from national statistics, which are provided by the Swiss Farmers’ Union. There are notable differences between the data from national statistics and the data of the Food and Agriculture Organization of the United Nations (FAO). Even though data from national statistics should be accurate, the reason for the differences should be assessed as part of a category-specific QA/QC procedure.

The ERT recommends Switzerland to assess its national AD against the FAO data, in line with the category-specific QA/QC of the IPCC good practice guidance (page 4.22, chapter 4.1.3).

79. Under Other (livestock) in CRF tables 4, 4.A and 4.B(a), the disaggregation of the different kinds of livestock is very detailed. This reporting, with this level of disaggregation, may be a cause of misunderstanding. The ERT recommends Switzerland to reconsider how these very detailed disaggregated data are aggregated to be put into the CRF.

Manure management – CH₄ and N₂O

80. Emissions from this category amounted to 1,005.6 Gg CO₂ equivalent in 1990, representing 17.0 per cent of the total GHG emissions of the agriculture sector. Emissions from this source consist of CH₄ and N₂O, which amounted to 557.4 and 448.2 Gg CO₂ equivalent, respectively, in 1990. In 1990, the largest source of CH₄ was dairy cattle under Cattle (Option A), representing 66.7 per cent of CH₄ emissions from this category, and the largest source of N₂O was solid storage and dry lot, representing 90.6 per cent of N₂O emissions from this category.

81. An IPCC tier 2 method is used for estimating CH₄ emissions and a country-specific method based on the IULIA model is used for N₂O emissions. Both methods are in line with the IPCC good practice guidance. CH₄ emissions have been recalculated due to an improvement in the livestock classification. The establishment of country-specific EFs is well described in the NIR. The AD are consistent with the AD used for enteric fermentation. Category-specific QA/QC procedures have been conducted; however, the Party has not undertaken a comparison of the country-specific EFs and the IPCC default EFs. The ERT recommends Switzerland to undertake this comparison as part of the category-specific QA/QC procedure for this category and to archive the results.

Agricultural soils – N₂O

82. Emissions from this category amounted to 2,408.9 Gg CO₂ equivalent in 1990, representing 40.8 per cent of the total GHG emissions of the agriculture sector. This category consisted of direct soil emissions, indirect emissions, pasture, range and paddock manure, and other (use of sewage sludge as fertilizers). Direct soil emissions were the larger subcategory in 1990, representing 57.7 per cent of total GHG emissions from agricultural soils, followed by indirect emissions from soils, 34.0 per cent. Country-specific methods are used and they are in line with the IPCC good practice guidance. The estimating is based on a relationship diagram based on the IULIA model, which is described in figure 28 of the NIR. EFs and related coefficients are clearly described in the NIR. AD are taken from national statistics and originate in the Swiss Farmers’ Union. In this category, category-specific QA/QC procedures have been conducted only to a limited extent. The ERT recommends the Party to improve its category-specific QA/QC procedures and to perform a comparison of the country-specific EFs and the default IPCC EFs.

83. The ERT identified data gaps in the CRF tables. However, during the in-country visit Switzerland provided the ERT with calculation worksheets that included data for a number of parameters for which the notation keys are used in the CRF table (e.g. Fra_{CN_{CRO}}). The ERT presumes that an error of conversion unit occurred when the data were exported to EMIS. The ERT recommends the Party to

conduct comparisons (e.g. of units) between EMIS and the result of the original calculation processes as a part of routine QA/QC and to archive the result.

84. N₂O emissions reported under other (4.D.4) amounted 24.0 Gg CO₂ equivalent in 2004. For the period 1990–1994, “IE” is reported in CRF table 4.A, but this is not properly explained in CRF table 9(a). The ERT recommends that Switzerland provide the corresponding explanation in the NIR and the CRF.

Non-key categories

Field burning of agricultural residues – CH₄ and N₂O

85. CH₄ and N₂O emissions from this category are reported. Constant values are reported for the whole time series. The ERT encourages Switzerland not to report the same values for all years but to calculate year by year. However, this may seem to be a low priority because the amount of emissions from this category is small.

86. Switzerland has included crop production in the CRF even though it produces no GHG emissions. This information helps to cast light on the conditions of agriculture in Switzerland. The ERT encourages the Party to continue to report this information in its future submissions.

8. Land use, land-use change and forestry

Sector overview

87. In 1990, the LULUCF sector in Switzerland represented a net sink of 1,704.2 Gg CO₂ equivalent, offsetting 3.3 per cent of total national GHG emissions.

88. The CRF for 1990 includes estimates of CO₂ emissions/removals for all six land-use categories in the LULUCF sector, and N₂O emissions from disturbance associated with land-use conversion to cropland, as well as N₂O and CH₄ emissions from wildfire in forests. Carbon stock changes in living biomass, dead organic matter and soils as well as CO₂ emissions from the agricultural application of lime are reported under the relevant categories.

89. Land use and land-use change matrices for 18 land-use/cover types have been established for 1990, based on the Swiss Land Use Statistics (AREA) of the Swiss Federal Statistical Office, which has a comprehensive QA/QC system, supported by aerial photographs interpreted stereographically into a 100 m x 100 m grid. For the purposes of the inventory, the land-use/cover categories are further disaggregated into five regions, three altitudinal zones and two soil types. Tier 2 methods from the IPCC good practice guidance for LULUCF and country-specific EFs are largely used.

90. Except for organic soil in cropland and grassland, the carbon stock changes in dead organic matter and soils are assumed to be zero for land remaining [X] land under all six land-use categories. The organic matter above mineral soil is reported for mineral soils, which is not consistent with the IPCC good practice guidance for LULUCF. The Party does not carry out quantitative uncertainty analysis for categories in the LULUCF sector. The ERT therefore recommends the Party to report organic matter above mineral soil for dead organic matter, and to quantify the uncertainties of the key categories in its future submissions.

Key categories

Forest land remaining forest land – CO₂

91. Annual net CO₂ removals for forest land remaining forest land in 1990 amounted to 3,545 Gg CO₂. Carbon stock changes in living biomass are transparently estimated and reported for two forest types and three altitudinal zones in five regions. The carbon stock changes in living biomass of unproductive forests are (conservatively) assumed to be zero.

92. The attribution of a conversion period of one year for land converted to forest land is not consistent with the IPCC good practice guidance for LULUCF, which defines the land-use conversion period as 20 years or longer. The Party's current attribution of a conversion period of one year tends to overestimate CO₂ removals for forest land remaining forest land in 1990. The ERT recommends the Party to explore further whether the available historical data would support the use of a minimum of 20 years as the conversion period to distinguish the subcategories under forest land.

93. The Party uses a biomass expansion factor (BEF) for stocking to estimate the increment of living biomass. This is not consistent with the IPCC good practice guidance for LULUCF, which defines BEF₁ for increment and BEF₂ for stocking separately. Given that the IPCC default value for BEF₁ is lower than BEF₂, the Party's use of BEF₂ for increment tends to overestimate the increase in carbon stock of living biomass in 1990. The ERT therefore recommends the Party either to improve its method or to use appropriate BEF values in its future submissions.

94. Carbon stock changes in soils and dead organic matter for forest land remaining forest land are assumed to be zero based on the tier 1 method in the IPCC good practice guidance for LULUCF. The ERT acknowledges that carbon stock change in dead wood for 1990 will be estimated and reported in a future submission. At the same time, the ERT recommends the Party to make efforts to improve the estimates of carbon stock changes in forest soils.

Cropland remaining cropland – CO₂

95. Cropland remaining cropland in Switzerland was a net source of 564 Gg CO₂ in 1990. The tier 2 method in the IPCC good practice guidance for LULUCF and country-specific factors are used for calculating carbon emissions from organic soil, but they are not transparently documented in the NIR. Carbon stock changes in both living biomass and mineral soils are assumed to be zero. The ERT therefore recommends Switzerland to estimate and report carbon stock changes in mineral soils for this category and to improve the documentation in the NIR.

Land converted to grassland and land converted to settlements – CO₂

96. Land converted to grassland and land converted to settlements were net sources of 615 Gg CO₂ and 468 Gg CO₂, respectively, in 1990. Tier 2 methods in the IPCC good practice guidance for LULUCF and country-specific parameters are used in these categories. Carbon stock changes in all carbon pools for land converted to three land-cover types and two soil types under grassland, and for land converted to four different land-cover types under settlement, are estimated and reported. The ERT recommends the Party to improve its documentation in the NIR concerning the estimation of carbon stock changes in these categories.

Non-key categories

Land converted to forest land – CO₂

97. Annual increase and decrease in living biomass are estimated and reported. Carbon stock changes due to land being converted to forest land are conservatively assumed to be zero for all carbon pools. Due to the attribution of a conversion period of one year for land converted to forest land, the AD for land converted to forest land are underestimated. As a result, the CO₂ removals for this category tend to be underestimated.

Land converted to cropland – CO₂

98. Tier 2 methods in the IPCC good practice guidance for LULUCF and country-specific parameters are used in this category. However, the documentation on the method used for estimating carbon stock changes in soils that is provided in the NIR is not transparent. The ERT recommends the Party to improve its documentation in the NIR for this pool.

Grassland remaining grassland – CO₂

99. Tier 2 methods in the IPCC good practice guidance for LULUCF and country-specific EFs are used for estimating carbon emissions from organic soil, but they are not transparently documented in the NIR. Carbon stock changes in both living biomass and mineral soils are assumed to be zero. The ERT therefore recommends Switzerland to estimate and report carbon stock changes in living biomass and mineral soils for this category and to improve the documentation in the NIR.

Biomass burning – CH₄ and N₂O

100. The country-specific EF for CH₄ emissions from forest fire is much higher than the IPCC default value. The ERT therefore recommends the Party to reconsider this EF in its future submissions.

9. WasteSector overview

101. In 1990, the waste sector contributed an estimated 2.0 per cent to the total GHG emissions of Switzerland and 17.3 per cent of total CH₄ emissions, while in 2004 it contributed to 1.4 per cent to total GHG emissions. From 1990 to 2004, total emissions from the sector decreased by an estimated 27.7 per cent (285.7 Gg), mainly due to (a) a change in the regulatory framework which requires all combustible waste that is not recycled to be incinerated in appropriate plants since 1 January 2000, and (b) a law on energy recovery (MSW incinerators are obliged to use the energy of incineration). As a result, most of the emissions from waste (more than 60 per cent in 1990 and more than 75 per cent in 2004) are reported in the energy sector.

102. The emission estimates for the waste sector are complete for the whole time series. Emissions from digestion and composting are reported for the first time in category other (6.D). Some subcategories are not included in the estimates of emissions from waste-water handling (more information is provided below: see paragraph 111). The following categories were reported as “included elsewhere” in the set of CRF tables 6, but no explanation is provided in CRF table 9(a): CH₄ from industrial waste water (included in domestic waste water; an explanation is provided in the NIR); N₂O from industrial waste water; and N₂O and CH₄ from incineration of biogenic wastes (included in non-biogenic wastes, as explained during the review). For the sake of transparency, the Party should include the explanation for the allocation of these emissions in the CRF and in the NIR.

103. Switzerland applies methodologies to key and non-key categories that are generally in line with the IPCC guidelines. Descriptions of methodologies used, data sources and some parameters are provided in the NIR, but not in enough detail for the ERT to be able to replicate and understand the emission estimates. The general reference for data sources is EMIS and not the original source, which reduces the transparency of the inventory for this sector. During the in-country review, however, all the background documentation and original sources were provided and were checked by the ERT. The ERT strongly recommends Switzerland to provide a more detailed description of the methodologies used, including the assumptions made and the rationale for them, especially for the key categories. It is further recommended that a table be included as an annex to the NIR with data for the most important parameters, the original reference source of each, and an explanation of how they are selected or, if applicable, how they are estimated. More details are provided for each category below.

104. Some minor gaps in the CRF and inconsistencies between the NIR and the CRF relating to the reporting of methods and EFs used were identified for the years 1990 and 2004. These include CO₂ emissions from waste incineration – no information is provided in CRF table summary 3; and CH₄ emissions from solid waste disposal sites (SWDS) – the NIR describes the application of the IPCC tier 2 methodology, while in the CFR a country-specific method is reported. These should be corrected for the Party's next inventory submission.

105. Recalculations have been performed in the waste sector for all subcategories. They resulted in a 50 per cent decrease in estimated emissions for 1990 and a 54.9 per cent decrease in estimated emissions for 2003. The explanation is provided in the NIR and in CRF tables 8(a) and (b), but some important details that Switzerland provided during the in-country review are not included: the main reason for the changes for CH₄ emissions from SWDS and N₂O from waste-water handling was a change in the methodologies.

106. Some major improvements have been introduced for this sector: (a) a change of methodology for estimating CH₄ emissions from SWDS (from a country-specific to the IPCC tier 2 method, the first order decay method); (b) the estimation of emissions from composting and digestion in category other (6.D); and (c) the correct allocation of emissions from waste incineration with energy recovery to the energy sector.

107. QC checks are in place for AD in the waste sector. A review of the entire sector is planned, to be performed during 2007. After this, it is expected that improvements will be made for selected parameters.

Key categories

Solid waste disposal sites – CH₄

108. Emissions from this category amounted to 702.17 Gg in 1990 and 348.73 Gg in 2004, representing 68.2 per cent and 46.9 per cent of the total GHG emissions of the waste sector, respectively. Default IPCC values have been used for the following parameters: the methane correction factor (MCF), the degradable organic carbon fraction (DOC_f), fraction of CH₄ in landfill gas (F) and oxidation factor (OX). The degradable organic carbon (DOC) for the three wastes landfilled (MSW, sewage sludge and construction waste) has been provided only for 2004. The composition of waste, the values for the constant *k* used for the time series and the assumptions underlying the figures used have not been provided. All this information is, however, available in EMIS at the FOEN in a background paper entitled *Kehrichtdeponien (landfills), from January 13, 2006* (available only in German). The ERT recommends Switzerland to include the following information with references to the original source in the NIR (or as an annex to it): (a) the assumptions made and methodology used for estimating parameters, such as DOC, *k*, waste composition and historical AD; (b) the values used for waste composition, DOC and *k* by types of wastes; (c) waste management practices for the periods before 1990, and for selected years of the time series (1990 and the previous year's submission included); and (d) the sources of information on CH₄ recovery (including the part flared).

109. In CRF table 6.A (additional information), the reported values of DOC and *k* correspond to those for MSW, and not to those for construction wastes and sewage sludge. The ERT recommends the Party either to explain in the documentation box what kind of waste the values refer to or to provide weighted average values, if applicable.

Non-key categories

Waste-water handling – CH₄ and N₂O

110. Switzerland uses a tier 1 country-specific method based on CORINAIR to estimate CH₄ emissions from waste-water handling, by multiplying the number of inhabitants connected to waste-water treatment plants by an EF that is country-specific, based on measurements and expert estimates (based on studies carried out in 1993). Emissions from industrial waste water are included in domestic and commercial waste water because most industrial waste water is treated in the municipal waste-water treatment plants. Waste water from industrial pre-treatment plants is not included because it is considered negligible (this explanation is not, however, provided in the NIR). Emissions per capita are among the lowest of European countries. The ERT recommends Switzerland to revise the EF and

compare its methodology with those used in countries where conditions are similar, since these emissions could be underestimated. It also recommends that the source for the percentage of the population that is connected to waste-water treatment plants and the EFs be provided in the NIR.

111. The IPCC default methodology for estimating N₂O from human sewage is used to estimate emissions from domestic waste water using default EFs, although this is not clearly explained in the NIR or reported in the corresponding CRF table 6.B. Switzerland should include this information in its next inventory submission.

Waste incineration – CO₂, CH₄ and N₂O

112. EFs are provided for 2004, but not for the years 1990–2003. References to documentation to explain their use or the estimation process, as applicable, are not included in the NIR. The IEF for CO₂ decreases constantly and sharply (by 71 per cent since 1990), while the AD go up slightly from 1990 to 2004, but the waste incinerated was mostly biogenic in composition in 2004, since it comes basically from sludge (illegal waste remains constant, while hospital waste is no longer incinerated and cable is no longer recycled). It would be helpful to include the sources of the AD or the assumptions used for estimating them in the Party's next NIR.

C. Calculation of the assigned amount

113. The assigned amount pursuant to Article 3, paragraphs 7 and 8, has been calculated in accordance with the annex to decision 13/CMP.1.

114. Switzerland's base year is 1990 and the Party has chosen 1990 as its base year for HFCs, PFCs and SF₆. Switzerland's quantified emission limitation is 92 per cent as included in Annex B to the Kyoto Protocol.

115. Based on Switzerland's base year emissions, as reported in its initial report (52,749 Gg CO₂ equivalent) and its Kyoto Protocol target (–8 per cent), the Party calculated its assigned amount to be 242,645,000 tonnes CO₂ equivalent.

116. During the course of the review, Switzerland submitted revised estimates of its base year inventory, which resulted in a recalculation of the assigned amount. Based on the revised estimates, the Party calculates its assigned amount to be 242,838,402 tonnes CO₂ equivalent. The ERT agrees with this figure.

D. Calculation of the commitment period reserve

117. The calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 18/CP.7.

118. Based on its calculated assigned amount in its initial report, 242,645,000 tonnes of CO₂ equivalent, Switzerland calculated its CPR to be 218,380,000 tonnes CO₂ equivalent.

119. During the course of the review, Switzerland submitted revised estimates of its base year inventory, which resulted in a recalculation of the commitment period reserve. Based on the revised estimates, the Party calculates its CPR to be 218,554,562 tonnes CO₂ equivalent. The ERT agrees with this figure.

E. National registry

120. Table 5 summarizes the information provided by Switzerland on the mandatory reporting elements on the national registry system, as stipulated by decision 15/CMP.1, which describes how its national registry performs the functions defined in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. Switzerland did not provide results of any test procedures as described in

paragraph 32 (j) of the annex to decision 15/CMP.1. The information provided on the national registry system is generally transparent and largely follows the requirements of the relevant guidelines.

121. During the initial review, the ERT was provided with additional and updated information on the national registry of Switzerland, including the procedural guidance of the national registries. In the initial report, all the information required to be reported is included, with few exceptions. However, two things – a description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units, and a list of the information that is publicly accessible by means of the user interface to the national registry – need to be described in much more detail. The ERT recommends the Party to provide this information in its next inventory submission under the Kyoto Protocol.

122. The ERT was also informed about the procedures and security measures set up to minimize discrepancies, terminate transactions and correct problems, and minimize operator error. These included examples of the principal procedures and measures.

123. The ERT acknowledged the effort made by Switzerland to put in place adequate security measures for the registry to prevent unauthorized manipulations and prevent operator error. There are three steps in the internal testing – Gaming, Testing and Production. Switzerland's national registry server is located in the Swiss Federal Office of Information Technology, Systems and Telecommunications (FOITT). SeringasTM has been chosen as the software for the national registry system. The ERT gained the overall impression that Switzerland attaches proper importance, and allocates sufficient resources, to the development, operation and maintenance of the registry.

Table 5. Summary of reporting on the national registry system

Reporting element	Provided / referenced	Comments
Registry administrator		
Name and contact information	Yes	
Cooperation with other Parties in a consolidated system		
Names of other Parties with which Switzerland cooperates, or clarification that no such cooperation exists	Yes	Liechtenstein and Monaco
Database structure and capacity of the national registry		
Description of the database structure	Yes	Seringas™ system
Description of the capacity of the national registry	Yes	
Conformity with data exchange standards (DES)		
Description of how the national registry conforms to the technical DES between registry systems	Yes	Covered in the Independent Assessment Report (IAR) ^a
Procedures for minimizing and handling of discrepancies		
Description of the procedures employed in the national registry to minimize discrepancies in the transaction of Kyoto Protocol units	Yes	
Description of the steps taken to terminate transactions where a discrepancy is notified and to correct problems in the event of a failure to terminate the transaction	Yes	
Prevention of unauthorized manipulations and operator error		
An overview of security measures employed in the national registry to prevent unauthorized manipulations and to prevent operator error	Yes	Covered in the IAR
An overview of how these measures are kept up to date	Yes	
User interface of the national registry		
A list of the information publicly accessible by means of the user interface to the national registry	Yes	Covered in the IAR
The Internet address of the interface to Switzerland's national registry	Yes	< https://www.national-registry.ch >
Integrity of data storage and recovery		
A description of measures taken to safeguard, maintain and recover data in order to ensure the integrity of data storage and the recovery of registry services in the event of a disaster	Yes	Covered in the IAR
Test results		
The results of any test procedures that might be available or developed with the aim of testing the performance, procedures and security measures of the national registry undertaken pursuant to the provisions of decision 19/CP.7 relating to the technical standards for data exchange between registry systems.	Partially	Covered in IAR. See paragraph 128.

^a Pursuant to decision 16/CP.10, once registry systems become operational, the administrator of the international transaction log (ITL) is requested to facilitate an interactive exercise, including with experts from Parties to the Kyoto Protocol not included in Annex I to the Convention, demonstrating the functioning of the ITL with other registry systems. The results of this exercise will be included in an independent assessment report (IAR). They will be also included in its annual report to the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

124. During the in-country visit, the ERT was informed that the internal operational test of the registry for network connection was completed on 2 October 2006. The Party informed the ERT that the initialization process was expected to be completed during the spring of 2007 subject to delivery of the United Nations version of the Seringas software. Information on the registry is publicly available at <<https://www.national-registry.ch>>.

125. The ERT took note of the results of the technical assessment of the national registry, including the results of standardized testing, as reported in the independent assessment report (IAR) that was forwarded to the ERT by the administrator of the international transaction log (ITL), pursuant to decision 16/CP.10, on 9 August 2007. The IAR identified some minor issues concerning documentation, and the Party informed the ERT that it will rectify these issues before the registry is fully operational with the ITL, and not later than the end of 2007.

126. The ERT reiterated the main findings of the IAR, including that the registry has fulfilled sufficient obligations regarding conformity with the data exchange standards (DES). These obligations

include having adequate transaction procedures, adequate security measures to prevent and resolve unauthorized manipulations, and adequate measures for data storage and registry recovery.

127. The IAR identified some minor limitations in the registry's state of readiness, including the following: the disaster recovery plan is incomplete and the disaster recovery test plan had not been submitted to the ITL operator; the application logging document does not allow for easy monitoring of the application; the test report indicates that the test plan has not yet been completed in full; and the operational plan does not elaborate plans for reviewing and enhancing registry capacity over time. These minor limitations are to be rectified before the registry is fully operational with the ITL, and not later than the end of 2007.

128. Based on the results of the in-country visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that Switzerland's national registry is sufficiently compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1, noting that registries do not have obligations regarding operational performance or public availability of information prior to the operational phase.

F. Land use, land-use change and forestry parameters and election of activities

129. Table 6 shows the Party's choice of parameters for forest definition as well as elections for Article 3, paragraphs 3 and 4, activities in accordance with decision 16/CMP.1.

Table 6. Selection of LULUCF parameters

Parameters for forest definition		
Minimum tree cover	20%	
Minimum land area	0.0625 ha	
Minimum tree height	3 m	
Elections for Article 3, paragraphs 3 and 4, activities		
Article 3, paragraph 3 activities	Election	Accounting period
Afforestation and reforestation	Mandatory	Annual
Deforestation	Mandatory	Annual
Article 3, paragraph 4 activities		
Forest land management	Elected	Annual
Cropland management	Not elected	Not applicable
Grazing land management	Not elected	Not applicable
Revegetation	Not elected	Not applicable

130. The revised parameters chosen for the definition of forest are within the agreed values in decision 16/CMP.1. In addition, Switzerland has adopted the minimum width of 25 metres to define its forests following the IPCC good practice guidance for LULUCF.

131. The parameters chosen for forest definition for reporting under the Convention and the Kyoto Protocol are not consistent with what Switzerland has reported to the FAO. For reporting to the FAO, the parameters for forest definition of the National Forest Inventory (NFI) are applied. The difference between the two definitions affects very small areas of forest. Such areas are classified as forest according to the definition given under Article 3, paragraphs 3 and 4, but as non-forest according to the NFI definition. Excluding these areas when estimating growing stock and increment does not significantly alter the estimates of growing stock and increment.

132. To improve the transparency of its reporting and to be consistent with the definition of forest as defined by decision 16/CMP.1, the Party rephrased its definition of afforestation during the review process as follows: “Afforestation is the conversion to forest of an area not fulfilling the definition of forest for a period of at least 50 years if the conversion is a direct human-induced activity”. It also rephrased its definition of deforestation as follows: “Deforestation is the permanent conversion of an area fulfilling the definition of forest to an area not fulfilling the definition of forest as a consequence of a direct human influence”. The Party also provided clarification for the definition of forest management by “excluding afforestation”.

III. Conclusions and recommendations

A. Conclusions

133. The expert review team concluded that the information provided by Switzerland in its initial report is complete and has been submitted in accordance with the relevant provisions of paragraphs 5, 6, 7 and 8 of the annex to decision 13/CMP.1, section I of the annex to decision 15/CMP.1, and relevant decisions of the CMP; that the assigned amount pursuant to Article 3, paragraphs 7 and 8, of the Kyoto Protocol is calculated in accordance with the annex to decision 13/CMP.1, and is consistent with the Party’s reviewed and submitted revised inventory estimates; and that the calculation of the required level of the commitment period reserve is in accordance with paragraph 6 of the annex to decision 11/CMP.1.

134. Switzerland has made significant improvements since last year’s submission, most of them in response to recommendations made during the review of the 2005 inventory submission. Some major improvements include: the ongoing implementation of the EMIS database and the QA/QC and archiving IT system; the separation of emissions from Liechtenstein from the national estimates; the allocation of emissions from waste incinerated for energy purposes to the energy sector; recalculations in all sectors due to updating of methodologies, AD or EFs, as explained in chapter 9 of the NIR; and a change in the methodology from tier 1 to tier 2 for CH₄ emissions from solid waste disposal sites.

135. Switzerland’s national system is prepared in accordance with the guidelines for national systems under Article 5, paragraph 1 of the Kyoto Protocol (decision 19/CMP.1) and can perform the general and specific functions required by these guidelines. In its initial report, Switzerland has submitted a complete set of CRF tables for the years 1990–2004 and a comprehensive NIR. The inventory covers all categories for the whole period 1990–2004 and it is complete in terms of geographical coverage. The main areas for further improvement are indicated in the recommendations below.

136. Based on Switzerland’s base year emissions (52,790,957 tonnes CO₂ equivalent, including the revised estimates provided in the energy sector) and its Kyoto Protocol target of –8 per cent, the Party calculates its assigned amount to be 242,838,402 tonnes CO₂ equivalent and its commitment period reserve to be 218,554,562 tonnes CO₂ equivalent. The ERT agrees with these figures.

137. Switzerland has decided to account for afforestation, reforestation, deforestation activities (Article 3, paragraph 3 activities, mandatory) and forest management activities (Article 3, paragraph 4 activity, elected) annually.

138. Switzerland’s revised choice of the parameters to define forest is in accordance with decision 16/CMP.1. This includes minimum tree cover of 20 per cent, minimum land area of 0.0625 ha, and minimum tree height of 3 metres at maturity in situ.

139. Based on the results of the in-country visit and the technical assessment, as reported in the independent assessment report, the ERT concluded that the national registry is sufficiently compliant with the registry requirements as defined by decisions 13/CMP.1 and 5/CMP.1.

B. Recommendations

140. In the course of the review, the ERT formulated a number of recommendations relating to the completeness and transparency of Switzerland's information presented in the initial report and the inventory submission. A recommendation was also made relating to the choice of parameters to define forest to ensure that Switzerland's choice is compliant with decision 16/CMP.1. This latter recommendation was implemented by the Party during the review process with the submission of revised parameters to the ERT. The key recommendations³ are that Switzerland:

- (a) Further develop a formal basis for the national system, especially the mandate of the GHG Inventory Core Group. The ERT also recommends that Switzerland develop a risk analysis on the staff and other resources needed for unexpected changes in the partners involved in compiling the inventory;
- (b) Finish implementation of its QA/QC system, including the archiving and documentation system, and pursue ISO 9001 certification, as planned by the Party;
- (c) Rectify minor issues identified in the IAR concerning documentation before the national registry is fully operational with the ITL, and not later than the end of 2007;
- (d) Improve the transparency of the NIR, by: referring to the original sources of data and not only to the EMIS database; reporting explanations of the use of the notation key "IE" in CRF table 9(a); describing all assumptions or estimations made for methodologies and parameters used, especially for key categories; and providing information on recalculations in the corresponding tables 8(a) and 8(b);
- (e) Document the use of expert judgement for uncertainty analysis following the IPCC good practice guidance;
- (f) Provide a key category analysis including the LULUCF categories for its next inventory submission.

C. Questions of implementation

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

³ For a complete list of recommendations, the relevant sections of this report should be consulted.

Annex I

Documents and information used during the review

A. Reference documents

IPCC. Good practice guidance and uncertainty management in national greenhouse gas inventories, 2000. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gp/english/>>.

IPCC. Good practice guidance for land use, land-use change and forestry, 2003. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm/>>

IPCC/OECD/IEA. Revised 1996 IPCC Guidelines for national greenhouse gas inventories, volumes 1–3, 1997. Available at <<http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm/>>.

UNFCCC. 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/2004/8. Available at <<http://unfccc.int/resource/docs/2004/sbsta/08.pdf>>.

UNFCCC. 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>>.

UNFCCC. Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol. FCCC/KP/CMP/2005/8/Add.3. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>>.

UNFCCC. Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol. FCCC/KP/CMP/2005/8/Add.2. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>>.

UNFCCC. Guidelines for review under Article 8 of the Kyoto Protocol. FCCC/KP/CMP/2005/8/Add.3. Available at <<http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>>.

UNFCCC secretariat. Status report for Switzerland. 2006. Available at <<http://unfccc.int/resource/docs/2006/asr/che.pdf>>.

UNFCCC secretariat. Synthesis and assessment report on the greenhouse gas inventories submitted in 2006. FCCC/WEB/SAI/2006. Available at <http://unfccc.int/resource/docs/webdocs/sai/sa_2006.pdf>.

UNFCCC secretariat. Switzerland: Report of the individual review of the greenhouse gas inventory submitted in the year 2005. FCCC/WEB/IRI/2004/CHE. Available at <<http://unfccc.int/resource/docs/2006/arr/che.pdf>>.

UNFCCC secretariat. Switzerland: Independent assessment report of the national registry of Switzerland. Reg_IAR_CH_2007_1. Will be available at <www.unfccc.int>.

B. Additional information provided by the Party

Switzerland provided the ERT responses to questions raised by the ERT before, during and after the in-country visit, which was completed on 10 March 2007.

Brassel, P. and Lischke, H. 2001. *Swiss National Forest Inventory: Methods and Models of the Second Assessment*. WSL Swiss Federal Research Institute, CH-8903 Birmensdorf.

Bretscher, Daniel provided Agriculture calculation worksheets and background information.

Bundesamt für Umwelt, Wald und Landschaft (BUWAL). 2006. *Abfallstatistik 2004*. Berne.

Bundesamt für Umwelt, Wald und Landschaft (BUWAL). 1996. *Luftschadstoff-Emissionen aus natuerlichen Quellen in der Schweiz*. Schriftenreihe Umwelt Nr. 257, p. 19.

Eidgenossische Forschungsanstalt für Wald, Schnee und Landschaft, WSL, Birmensdorf Bundesamt für Umwelt, Wald und Landschaft, BUWAL. *Schweizerisches Landesforstinventar--Ergebnisse der Zweitaufnahme 1993–1995*. Verlag Paul Haupt, Berne.

Filliger, Paul provided responses to questions raised by the ERT's waste expert concerning the CO₂ IEFs for waste incineration, waste-water handling, and the allocation of waste emissions to the energy and agriculture sectors.

Filliger, Paul provided a one-page document on recalculations performed, and highlighted a transcription error in the original pages of the NIR.

Filliger, Paul sent by email a notification of a revised estimate concerning the energy sector, and a Microsoft Excel spreadsheet was attached to the notification that included a revised time series of the CO₂ emission estimates for natural gas pipelines.

Filliger, Paul sent by email a response to the ERT's request for further information about the notification of the revised estimate.

Filliger, Paul sent responses to questions raised by the ERT's industrial processes expert concerning ammonia production; aluminium production technology; and the VOC tax legislation. The request also sought access to confidential data on fluorinated gases, which was granted by the Bundesamt für Umwelt (BAFU)/FOEN.

Lauber, K. and Wagner, G. 1996. *Flora Helvetica*. Verlag Paul Haupt, Berne.

Leifeld, J. et al. 2005. Greenhouse gas emissions from Swiss agriculture since 1990: implications for environmental policies to mitigate global warming. *Environmental Science & Policy* 8, pp. 410–417.

Leifeld, J. Bassin, S. and Fuhrer, J. 2005. Carbon stock in Swiss agricultural soils predicted by land-use soil characteristics and altitude. *Agriculture, Ecosystems and Environment* 105, pp. 255–266.

Menzi, H. et al. 1997. *Ammoniak-Emissionen in der Schweiz: Ausmass und technische Beurteilung des Reduktionspotentials*.

Nauser, Markus permitted access to legal documents pertaining to the national inventory system, including agreements and contracts.

Official text of the VOC tax (<http://www.admin.ch/ch/d/sr/c814_018.html>).

Schellenberger, Andreas provided documents and checklists pertaining to the quality management system.

Schellenberger, Andreas sent by email responses to questions raised by the ERT's energy expert prior to the review. Responses were also provided for questions raised during the energy session concerning the CO₂ and N₂O EFs for solid waste.

Schellenberger, Andreas provided responses to questions from the ERT's LULUCF expert on Switzerland's LULUCF definitions.

Schmid, M. et al. 2000. Emissions de protoxyde d'azote de l'agriculture Suisse, *Schriftenreihe der FAL* 33.

Schmid, S., Zierl, B. and Bugmann, H. 2006. Analyzing the carbon dynamics of central European forests: comparison of Biome-BGC simulations with measurements. *Reg. Environ. Change* 6, pp. 167–180.

Soliva CR et al. 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.

Soliva CR et al. 2006. Dokumentation der Berechnungsgrundlage von Methan aus der Verdauung und dem Hofduenger landwirtschaftlicher Nutztiere, im Auftrag des *Bundesamtes für Umwelt* (BAFU).

Statistische Erhebungen und Schätzungen, Statistiques et évaluations, 2005.

Swiss Federal Research Station for Agroecology and Agriculture (FAL), Institute of Environmental Protection and Agriculture (IUL) Liebefeld, CH-3003 Berne, Switzerland, and Swiss Federal Research Station for Agricultural Economics and Engineering (FAT), CH-8356 Tänikon, Switzerland. 1998. *Ammonia Emissions in Switzerland: Present situation, development, technical and economic assessment of abatement measures, recommendations.*

Volz, Richard and Thurig, Esther provided photocopies of reference documents concerning plant species heights.

Walther, U. et al. 1994. *Grundlagen für die Düngung im Acker- und Futterbau.*

Walther, U. et al. 2001. *AGRAR Forschung - Grundlagen für die Düngung im Acker- und Futterbau*, Juni 2001.

Annex II**Acronyms and abbreviations**

AD	activity data	IPCC	Intergovernmental Panel on Climate Change
ARD	afforestation, reforestation and deforestation	ISO	International Organization for Standardization
AREA	Swiss Land Use Statistics	IT	information technology
BEF	biomass expansion factor	ITL	international transaction log
CH ₄	methane	kg	kilogram (1 kg = 1 thousand grams)
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol	kgoe	kilograms of oil equivalent
CO ₂	carbon dioxide	LULUCF	land use, land-use change and forestry
CO ₂ eq.	carbon dioxide equivalent	m ³	cubic metre
CPR	commitment period reserve	Mg	megagram (1 Mg = 1 tonne)
CRF	common reporting format	MSW	municipal solid waste
DES	data exchange standards	Mt	million tonnes
DOC	degradable organic carbon	Mtoe	millions of tonnes of oil equivalent
EF	emission factor	N ₂ O	nitrous oxide
ERT	expert review team	NA	not applicable
EU	European Union	NCV	net calorific value
F-gas	fluorinated gas	NE	not estimated
FAO	Food and Agriculture Organization of the United Nations	NFI	National Forest Inventory
FM	forest management	NIR	national inventory report
FOEN	Federal Office for the Environment	NMVOC	non-methane volatile organic compound
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	NO	not occurring
GJ	gigajoule (1 GJ = 10 ⁹ joule)	PFCs	perfluorocarbons
GWP	global warming potential	PJ	petajoule (1 PJ = 10 ¹⁵ joule)
HFCs	hydrofluorocarbons	QA/QC	quality assurance/quality control
IAR	independent assessment report	SF ₆	sulphur hexafluoride
IE	included elsewhere	SO ₂	sulphur dioxide
IEA	International Energy Agency	SWDS	solid waste disposal sites
IEF	implied emission factor	Tg	teragram (1 Tg = 1 million tonnes)
		TJ	terajoule (1 TJ = 10 ¹² joule)
		UNFCCC	United Nations Framework Convention on Climate Change
		VOC	volatile organic compound
