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Report of the technical review of the sixth national communication of Switzerland

Parties included in Annex I to the Convention are requested, in accordance with decision 9/CP.16, to submit a sixth national communication to the secretariat by 1 January 2014. In accordance with decision 7/CMP.8, Parties included in Annex I to the Convention that are also Parties to the Kyoto Protocol shall include in their sixth national communication supplementary information under Article 7, paragraph 2, of the Kyoto Protocol. In accordance with decision 15/CMP.1, these Parties shall start reporting the information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention for the first year of the commitment period. This includes supplementary information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.

This report presents the results of the technical review of the sixth national communication and supplementary information under the Kyoto Protocol of Switzerland conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" and the "Guidelines for review under Article 8 of the Kyoto Protocol".

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Contents

I. Introduction and summary

A. Introduction

1. For Switzerland the Convention entered into force on 21 March 1994 and the Kyoto Protocol on 16 February 2005. Under the Convention, Switzerland made a commitment to reducing its greenhouse gas (GHG) emissions by 20 per cent by 2020 below the 1990 level, which is consistent with its national target to reduce emissions by 20 per cent with domestic action. Under the Kyoto Protocol, Switzerland committed itself to reducing its GHG emissions by 8 per cent compared with the base year[1] level during the first commitment period, from 2008 to 2012. For the second commitment period of the Kyoto Protocol, from 2013 to 2020, Switzerland committed to reduce its GHG emissions by 15.8 per cent below the base year level.

2. This report covers the in-country technical review of the sixth national communication (NC6) of Switzerland, coordinated by the secretariat, in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention" (decision 23/CP.19) and the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1).

3. The review took place from 7 to 12 April 2014 in Bern, Switzerland, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: Mr. Manuel Estrada (Mexico), Mr. Matej Gasperic (Slovenia), Mr. Didier Goetghebuer (Belgium) and Ms. Baasansuren Jamsranjav (Mongolia). Mr. Goetghebuer and Ms. Jamsranjav were the lead reviewers. The review was coordinated by Ms. Barbara Muik (secretariat).

4. During the review, the expert review team (ERT) reviewed each section of the NC6. The ERT also reviewed the supplementary information provided by Switzerland as a part of the NC6 in accordance with Article 7, paragraph 2, of the Kyoto Protocol. In addition, the ERT reviewed the information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, which was provided by Switzerland in its 2013 annual submission and previous submissions under Article 7, paragraph 1, of the Kyoto Protocol.

5. In accordance with decisions 23/CP.19 and 22/CMP.1, a draft version of this report was communicated to the Government of Switzerland, which did not provide any comments to this final version of the report.

B. Summary

6. The ERT conducted a technical review of the information reported in the NC6 of Switzerland in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications" (hereinafter referred to as the UNFCCC reporting guidelines on NCs). As required by decision 15/CMP.1, supplementary

[1] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sectors/source categories listed in Annex A to the Kyoto Protocol.

information required under Article 7, paragraph 2, of the Kyoto Protocol[2] is provided in the NC6 (see para. 111 below). The supplementary information on the minimization of adverse impacts referred to in paragraph 4 above is complete and transparent.

7. Switzerland considered all recommendations provided in the report of the in-depth review of the fifth national communication (NC5) of Switzerland.[3] The ERT commended Switzerland for its coherent and consistent reporting. During the review, Switzerland provided further relevant information (see paras. 12, 20, 22, 24, 71, 81, 89, 91, 95, 99, 105 and 107 below).

1. Completeness and transparency of reporting

8. The NC6 is mostly complete and mostly transparent**.** Gaps and issues related to the reported information identified by the ERT are presented in table 1 below.

2. Timeliness

9. The NC6 was submitted on 3 February 2014, after the deadline of 1 January 2014 mandated by decision 9/CP.16. Switzerland informed the secretariat about its difficulties with the timeliness of its NC6 on 16 December 2013 in accordance with paragraph 79 of the annex to decision 23/CP.19 and paragraph 139 of the annex to decision 22/CMP.1. The ERT noted with concern the delay in the submission of the NC6.

3. Adherence to the reporting guidelines

10. The information reported by Switzerland in its NC6 is mostly in adherence with the UNFCCC reporting guidelines on NCs as per decision 4/CP.5 (see table 1).

[2] Decision 15/CMP.1, annex, chapter II.
[3] FCCC/IDR.5/CHE.

Table 1
Assessment of completeness and transparency issues of reported information in the sixth national communication of Switzerland[a]

Sections of national communication	*Completeness*	*Transparency*	*Reference to paragraphs*	*Supplementary information under the Kyoto Protocol*	*Completeness*	*Transparency*	*Reference to paragraphs*
Executive summary	Complete	Transparent		National systems	Complete	Transparent	
National circumstances	Complete	Transparent		National registries	Complete	Transparent	
Greenhouse gas inventory	Complete	Transparent		Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Complete	Transparent	
Policies and measures (PaMs)	Complete	Transparent		PaMs in accordance with Article 2	Complete	Mostly transparent	57
Projections and total effect of PaMs	Complete	Mostly transparent	81	Domestic and regional programmes and/or arrangements and procedures	Complete	Mostly transparent	24
Vulnerability assessment, climate change impacts and adaptation measures	Complete	Transparent		Information under Article 10	Complete	Transparent	
Financial resources and transfer of technology	Mostly complete	Transparent	89	Financial resources	Mostly complete	Transparent	89
Research and systematic observation	Complete	Transparent		Minimization of adverse impacts in accordance with Article 3, paragraph 14	Complete	Transparent	
Education, training and public awareness	Complete	Transparent					

[a] A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in the chapter on conclusions and recommendations.

II. Technical review of the reported information in the national communication and supplementary information under the Kyoto Protocol

A. Information on greenhouse gas emissions and national circumstances relevant to greenhouse gas emissions and removals, including other elements related to the Kyoto Protocol

1. Information on relevant national circumstances

11. In its NC6, Switzerland has provided a detailed description of the national circumstances and elaborated on the framework legislation and key policy documents on climate change. Further information on the review of the institutional and legislative arrangements for the coordination and implementation of policies and measures (PaMs) is provided in chapter II.B below. Table 2 illustrates the national circumstances of Switzerland by providing some indicators relevant to GHG emissions and removals.

Table 2
Indicators relevant to greenhouse gas emissions and removals for Switzerland

	1990	*2000*	*2005*	*2010*	*2011*	*Change 1990–2011 (%)*	*Change 2010–2011 (%)*
Population (million)	6.80	7.21	7.50	7.79	7.87	15.7	1.0
GDP (2005 USD billion using PPP)	231.14	257.62	274.90	305.74	311.63	34.8	1.9
TPES (Mtoe)	24.36	25.00	25.94	26.20	25.37	4.1	–3.2
GHG emissions without LULUCF (Mt CO_2 eq)	53.05	51.86	54.38	54.25	50.16	–5.4	–7.5
GHG emissions with LULUCF (Mt CO_2 eq)	49.89	50.63	50.18	51.85	46.75	–6.3	–9.8
GDP per capita (2005 USD thousand using PPP)	33.99	35.73	36.65	39.25	39.60	16.5	0.9
TPES per capita (toe)	3.58	3.47	3.46	3.36	3.22	–10.0	–4.2
GHG emissions per capita (t CO_2 eq)	7.80	7.19	7.25	6.96	6.37	–18.3	–8.5
GHG emissions per GDP unit (kg CO_2 eq per 2005 USD using PPP)	0.23	0.20	0.20	0.18	0.16	–29.9	–9.3

Sources: (1) GHG emissions data: Switzerland's 2013 GHG inventory submission; (2) Population, GDP and TPES data: International Energy Agency.

Note: The ratios per capita and per GDP unit are calculated relative to GHG emissions without LULUCF; the ratios are calculated using the exact (not rounded) values and may therefore differ from a ratio calculated with the rounded numbers provided in the table.

Abbreviations: GDP = gross domestic product, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, PPP = purchasing power parity, TPES = total primary energy supply.

12. During the review, Switzerland provided additional information on the national circumstances, elaborating on their relationship with GHG emissions. The ERT noted that economic growth and population increase are the main factors affecting total final energy consumption and thus GHG emissions in Switzerland. Furthermore, the ERT noted that

emissions from the residential and commercial sectors are influenced by the number of heating degree days and variations in heating demand in winter.

13. Electricity generation in Switzerland is almost carbon dioxide (CO_2)-free, as close to 60 per cent of electricity is generated from hydropower and close to 40 per cent from nuclear power. This leads to low emissions per capita (6.37 t CO_2 eq) and per gross domestic product (GDP) unit (0.16 kg CO_2 eq per USD) compared with other Parties included in Annex I to the Convention (Annex I Parties). Although the population and GDP increased by 15.7 per cent and 34.8 per cent, respectively, between 1990 and 2011 in Switzerland, per capita and per GDP emissions decreased during the same period by 18.3 per cent and 29.9 per cent, respectively. This decrease can be attributed largely to an unusually warm winter in 2011 as well as to energy efficiency improvements in the residential and commercial sectors.

2. Information on the greenhouse gas inventory, emissions and trends

14. Switzerland has provided a summary of information on GHG emission trends for the period 1990–2011. This information is consistent with the 2013 national GHG inventory submission of April 2013. However, the ERT noted that there is some inconsistency with the first biennial report (BR1) in which GHG emissions and emission trends are based on the submission of September 2013. The difference is 153 kt CO_2 eq, or 0.3 per cent, in 2011 of total GHG emissions in Switzerland. The difference is explained in the common tabular format tables. The ERT encourages Switzerland to harmonize the reported GHG emission figures in its next biennial report and national communication (NC).

15. Summary tables, including trend tables for emissions in CO_2 eq (given in the common reporting format tables), are provided in an annex to the NC6.

16. Total GHG emissions[4] excluding emissions and removals from land use, land-use change and forestry (LULUCF) decreased by 5.4 per cent between 1990 and 2011, in which year emissions decreased to the lowest value over the period, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 6.3 per cent over the same period. As CO_2 forms the majority of total GHG emissions (84.2 per cent in 1990 and 83.7 per cent in 2011), the CO_2 emissions trend between 1990 and 2011 runs largely parallel to total GHG emissions excluding LULUCF. Over the period 1990–2011, CO_2 emissions decreased by 6.0 per cent, largely because of an unusually warm winter in 2011 as well as energy efficiency improvements in the residential and commercial sectors.

17. Methane (CH_4) emissions decreased by 20.1 per cent, mainly owing to a reduction in livestock and the banning of the disposal of municipal solid waste in landfills. Emissions of nitrous oxide (N_2O) decreased by 11.1 per cent because of a reduction of emissions in manure management. Emissions of fluorinated gases (F-gases) accounted for 0.5 per cent of total GHG emissions in 1990 and 2.7 per cent in 2011. F-gas emissions increased by 464.0 per cent over the period 1990–2011, albeit from very low levels.

18. An analysis of the drivers of GHG emissions trends in each sector is provided in chapter II.B below. Table 3 provides an overview of GHG emissions by sector from 1990 to 2011.

[4] In this report, the term “total GHG emissions” refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding land use, land-use change and forestry, unless otherwise specified.

Table 3
Greenhouse gas emissions by sector in Switzerland, 1990–2011

Sector	GHG emissions (kt CO_2 eq)				Change (%)		Share[a] by sector (%)	
	1990	2000	2010	2011	1990–2011	2010–2011	1990	2011
1. Energy	42 083.22	42 403.64	44 050.12	39 989.66	–5.0	–9.2	79.3	79.7
A1. Energy industries	2 503.76	2 997.51	4 108.25	3 911.91	56.2	–4.8	4.7	7.8
A2. Manufacturing industries and construction	6 106.38	5 789.78	5 877.95	5 376.25	–12.0	–8.5	11.5	10.7
A3. Transport	14 347.47	15 645.21	16 256.01	16 082.65	12.1	–1.1	27.0	32.1
A4.–A5. Other	18 129.39	17 161.77	17 199.2	14 043.26	–22.5	–18.3	34.2	28.0
B. Fugitive emissions	91.36	62.94	53.23	52.23	–42.8	–1.9	0.2	0.1
2. Industrial processes	3 380.95	2 938.03	3 748.40	3 769.60	11.5	0.6	6.4	7.5
3. Solvent and other product use	470.11	258.55	197.56	199.43	–57.6	0.9	0.9	0.4
4. Agriculture	6 092.10	5 495.70	5 647.19	5 603.54	–8.0	–0.8	11.5	11.2
5. LULUCF	–3 155.63	–1 227.06	–2 404.73	–3 410.94	8.1	41.8	–5.9	–6.8
6. Waste	1 010.98	748.31	596.92	586.99	–41.9	–1.7	1.9	1.2
7. Other	12.13	14.05	14.21	14.22	17.2	0.1	0.0	0.0
GHG total with LULUCF	**49 893.86**	**50 631.23**	**51 849.67**	**46 752.49**	**–6.3**	**–9.8**	**NA**	**NA**
GHG total without LULUCF	**53 049.50**	**51 858.29**	**54 254.39**	**50 163.44**	**–5.4**	**–0.5**	**100.0**	**100.0**

Note: The changes in emissions and the share by sector are calculated using the exact (not rounded) values and may therefore differ from values calculated with the rounded numbers provided in the table.

Abbreviations: GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] The shares of sectors are calculated relative to GHG emissions without LULUCF; for the LULUCF sector, the negative values indicate the share of GHG emissions that was offset by GHG removals through LULUCF.

3. National system

19. Switzerland provided in its NC6 a description of how its national system is performing the general and specific functions defined in the guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol (decision 19/CMP.1). The description includes all the elements mandated by decision 15/CMP.1. The ERT took note of the review of the changes to the national system as reflected in the report of the individual review of the GHG inventory of Switzerland submitted in 2013.

20. The Federal Office for the Environment (FOEN) of the Federal Department of the Environment, Transport, Energy and Communications (DETEC) is the single national entity with overall responsibility for the national inventory system. During the review, Switzerland provided additional information, elaborating on how Switzerland's national inventory system is managed, on the National Inventory System Supervisory Board, on the GHG Inventory Core Group, and on planning, documentation and archiving of the GHG inventory. The ERT noted the well-established data flow in inventory preparation and was informed by Switzerland that earlier agreements for data acquisition on F-gases and the LULUCF sector will be replaced by four-year agreements (with an option for extension to eight-year agreements).

4. National registry

21. In its NC6, Switzerland has provided information on the national registry in accordance with the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1. The ERT took note of the changes to the national registry as reflected in the report of the individual review of the GHG inventory of Switzerland submitted in 2013.

22. During the review, Switzerland provided additional information, elaborating on Kyoto Protocol units in the national registry at the end of 2012. There were high numbers of certified emission reductions (CERs) and emission reduction units (ERUs) in entity holding accounts because of the large number of traders due to the early commencement of the national registry. Furthermore, Switzerland provided information on how the national registry is monitored for discrepancies and how discrepancies are recorded. The ERT noted the internal procedures used to monitor the system and record the discrepancies and changes, and that the procedures are reviewed regularly.

5. Domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol

23. Switzerland has reported in its NC6 comprehensive and well-organized information on domestic and regional programmes and/or legislative arrangements and procedures related to the Kyoto Protocol.

24. However, the NC6 does not include some information required by the UNFCCC reporting guidelines on NCs on domestic and regional legislative enforcement and administrative procedures that Switzerland has in place to meet its commitments under the Kyoto Protocol, including procedures for addressing cases of non-compliance under domestic law. Furthermore, Switzerland did not report any provisions to make information on these enforcement and administrative procedures publicly accessible. However, during the review, Switzerland provided comprehensive information on enforcement and administrative procedures at the level of individual instruments and measures together with information on the legal basis for enforcement and administrative procedures, including responsibilities for the implementation of enforcement procedures. The ERT commends Switzerland for the additional information provided and recommends that Switzerland, to increase transparency, include this information in its next NC, together with information on how Switzerland is making the information on these procedures available to the public.

25. The overall responsibility for climate change policymaking lies within FOEN of the Federal Department of the Environment, Transport, Energy and Communications, and a number of national institutions are involved in the implementation of this policy.

26. Implementation of the Kyoto Protocol is underpinned by the National Strategy and Action Plan for Sustainable Development (2008) and the CO_2 Act (2000), which defines measures to limit CO_2 emissions from fossil fuel use for transport and heating.

27. Coordination of climate change policy is the responsibility of FOEN. Other government offices are also involved in policymaking, especially the offices for energy, transport, agriculture, forestry, finance and foreign affairs. The federal administration is generally responsible for the policymaking process, but cantons also actively participate in the process through consultations and they have responsibilities in policy implementation.

28. It should be noted that Switzerland is a representative democracy, with strong formal and informal elements of direct democracy. Therefore, the Swiss people are sovereign and ultimately the supreme political authority, which can exercise decision-making power by popular initiative or referendum.

29. Public access to information is enabled by FOEN and other institutions involved in climate change policymaking publishing information on the Internet. All climate change

relevant PaMs are made publicly available in the official languages of Switzerland. New laws and revisions of existing laws go through a public consultation process, calls for which are posted on the Internet. Whenever a new law is under parliamentary discussion, information relating to it is available on the Internet. Furthermore, parliamentary discussions in the two chambers are accessible to the public.

30. Switzerland provided a description of national legislative arrangements and administrative procedures that seek to ensure that the implementation of activities under Article 3, paragraph 3, and elected activities under Article 3, paragraph 4, of the Kyoto Protocol also contribute to the conservation of biodiversity and the sustainable use of natural resources. Switzerland has a long tradition of sustainable forest management, backed by the federal Forest Act, which ensures the conservation of forests and their sustainable management, prohibiting deforestation and clear-cutting. Furthermore, Switzerland has adopted the Forest Policy 2020, which includes a vision, objectives and measures for sustainable management of forests in Switzerland.

B. Policies and measures, including those in accordance with Article 2 of the Kyoto Protocol

31. Switzerland has provided in its NC6 comprehensive and well-organized information on its package of PaMs implemented, adopted and planned in order to fulfil its commitments under the Convention and its Kyoto Protocol.

1. Policies and measures related to implementation of commitments under the Convention

32. In its NC6, Switzerland reported on its PaMs adopted, implemented and planned in achieving its commitments under the Convention. Switzerland provided information on PaMs by sector and by gas and a description of the principal PaMs. Switzerland has also provided information on how it believes its PaMs are modifying longer-term trends in anthropogenic GHG emissions and removals, in accordance with the objective of the Convention. The NC6 contains a set of PaMs similar to those in the NC5, but upgraded.

33. The NC6 does not include some information required by the UNFCCC reporting guidelines on NCs on the costs of PaMs and on the non-greenhouse gas mitigation benefits of PaMs. The ERT notes that some PaMs, such as the building programme under the CO_2 levy and the Climate Cent, include resources for their implementation. The ERT encourages Switzerland to include information on the costs of PaMs and on the non-greenhouse gas mitigation benefits of PaMs in its next NC.

34. In the wake of the incident at the Fukushima Daiichi nuclear power plant, Japan, in 2011, Switzerland decided to gradually phase out the generation of electricity from nuclear power. This decision triggered an adjustment of Switzerland's energy policy. The ERT noted that electricity production in Switzerland is currently almost CO_2-free, given that almost 40 per cent of electricity is produced from nuclear power and almost 60 per cent from renewable sources. As it is expected that in the future emissions from electricity and heat generation will increase, Switzerland is already putting in place PaMs to offset those GHG emissions. Switzerland will replace the electricity produced in nuclear power plants by increased energy efficiency measures, new and additional renewable electricity production and electricity produced from highly efficient power plants using natural gas.

35. Switzerland has discontinued some of its PaMs and replaced them with adapted PaMs in order to better achieve its objectives. The Climate Cent for transport fuels (0.015 Swiss francs (CHF) per litre), running from 2005 to 2012, has been replaced by the carbon offset obligation, starting in 2013, and binding those responsible for releasing fossil fuels

for consumption by motor vehicles to compensate for 5–40 per cent of transport-related CO_2 emissions. Furthermore, CO_2 emission targets for newly registered vehicles have replaced the voluntary agreement between Swiss automobile importers and DETEC, and the regulatory system for refrigerants with synthetic GHGs, implemented in 2003, was amended in November 2012 to introduce a partial ban on refrigerants with synthetic GHGs.

2. Policy framework and cross-sectoral measures

36. The key framework climate and energy policy is based on Article 74 (protection of the environment) and Article 89 (energy policy) of the Federal Constitution. The CO_2 Act is the national legislation in place to enable the emission target under the Convention to be reached. The Act was reinforced in 2013 to comply with the new emission target for Switzerland and to cover all gases and sectors under the Kyoto Protocol for the period 2013–2020. The CO_2 Act sets an overall emission target of a 20 per cent reduction in emissions by 2020 compared with 1990, which shall be achieved with domestic measures only. The Act allows Switzerland to increase its target of up to a 40 per cent reduction in emissions (domestic and by using carbon credits from market-based mechanisms), provided that other developed countries commit themselves to comparable emission reductions and that developing countries contribute adequately, according to their responsibilities and capabilities.

37. In Switzerland's transition to a low carbon economy, the Energy Strategy 2050 has an important role in combating climate change, as more than 80 per cent of GHG emissions in Switzerland come from fuel combustion. The strategy, which has targets for electricity generation and heat production from renewable sources, is a major policy instrument to increase energy efficiency and the use of renewable energy, and in turn bring about a reduction in the use of fossil fuels in line with the CO_2 Act. Switzerland has also adopted policy documents in other sectors. The Agricultural Policy 2014–2017 will contribute to sustainable farming and additional emission reductions in this sector. The Forest Policy 2020 formulates provisions for the optimal coordination of the ecological, economic and social demands on forests and defines 11 policy objectives.

38. Switzerland is also implementing a cap-and-trade system as a cross-sectoral measure for stationary combustion emissions and for the majority of industrial processes, and in the future also for aviation. The Swiss emissions trading scheme (ETS) is, for the period 2013–2020, a replica of the European Union emissions trading system (EU ETS). Switzerland is aiming to link its ETS with the EU ETS because the national scheme could lack liquidity, reflected in the higher costs and lower cost-effectiveness of the scheme, due to the very small number of installations and the low total volume of emissions (approximately 5 Mt CO_2 eq) in Switzerland. The ERT noted that linking the Swiss ETS with the EU ETS could create a discrepancy between the concept of cross-border emissions trading and the domestic emissions reduction requirement. Electricity producers in Switzerland need to (in accordance with the CO_2 Act) offset up to 50 per cent of their emissions with domestic compensation, meaning through implementation of additional mitigation actions in Switzerland. However, this domestic compensation could not be recognized under the EU ETS because electricity producers in the European Union (EU) need to buy 100 per cent of their emitted amount of CO_2 eq on the EU ETS market. Therefore, the ERT noted that appropriate derogation will need to be applied in order to avoid a situation in which new fossil power plants would need to partially offset their emissions twice.

39. A significant part of the PaMs are deferred for implementation to the cantonal level, while some measures, particularly in the waste sector, are deferred to local/municipal level. Switzerland provided comprehensive information on PaMs at the national and cantonal levels. Table 4 provides a summary of the reported information on the PaMs of Switzerland.

Table 4
Summary of information on policies and measures reported by Switzerland

Sectors affected	*List of key policies and measures*	*Estimate of mitigation impact (kt CO_2 eq)*
Policy framework and cross-sectoral measures		
	Revised CO_2 Act	2 000
	Emissions trading scheme (cap and trade)	800
	CO_2 levy	2 000
Energy		
Energy supply	Obligation to offset emissions from gas-fired power plants	750
Renewable energy	National Building Refurbishment Programme part B	2 000
Energy efficiency in residential and commercial sectors	National Building Refurbishment Programme part A	900
	Building codes with cantons	1 750
Transport		
	Obligation for compensation for transport fossil fuel importers	1 500
	Carbon dioxide emission regulations for new passenger cars	700
Industrial sectors		
	Ordinance on chemical risk reduction	990
Agriculture		
	Agricultural Policy 2014–2017	400
Forestry		
	Wood Action Plan	–1 200
Waste management		
	Technical ordinance on waste	180

Notes: (1) The greenhouse gas reduction estimates given for some measures are reductions in carbon dioxide or carbon dioxide equivalent for 2020; (2) A negative number in the table signifies emission increases due to a policy or measure.

3. Policies and measures in the energy sector

40. Between 1990 and 2011, GHG emissions from the energy sector decreased by 5.0 per cent (2,093.56 kt CO_2 eq), mainly owing to emission reductions in the residential and commercial sectors and in the industrial sector, where emissions from fuel combustion showed significantly decreasing trends (22.5 per cent or 4,086.13 kt CO_2 eq and 12.0 per cent or 730.13 kt CO_2 eq, respectively). Those trends have outweighed the trends of increasing emissions in the transport sector (12.1 per cent or 1,735.18 kt CO_2 eq) and the energy industries (56.2 per cent or 1,408.15 kt CO_2 eq).

41. ***Energy supply***. Total primary energy supply (TPES) in Switzerland was 25.4 Mtoe in 2011, 4 per cent higher than in 1990. Of this, renewable energy contributed 21 per cent, including mainly hydropower (11 per cent) and biofuels (including waste) (9 per cent). The remainder of the primary energy supply was dominated by oil (40 per cent), followed by nuclear (28 per cent) and natural gas (11 per cent). Per capita TPES between 1990 and 2011

showed a notably decreasing trend of 10.0 per cent. Electricity production in Switzerland is almost completely CO_2-free as 60 per cent of electricity is produced from renewable sources and 40 per cent from nuclear power. Despite energy efficiency measures, electricity consumption in Switzerland is increasing (25 per cent between 1990 and 2011); however, it has to be noted that in the same period the population of Switzerland increased by 15.7 per cent.

42. Due to the incident at the Fukushima Daiichi nuclear power plant, in 2011, Switzerland decided to gradually phase out the generation of electricity from nuclear power. This decision triggered a significant adjustment of Switzerland's energy policy and also projects a partial shift towards highly efficient fossil fuel electricity production. Three allowances for building new nuclear power plants (at the end of the current power plant lifetimes) were revoked by the federal government. In the future, a significant share of the phased out nuclear-generated electricity will be replaced by new and additional renewable electricity production and highly efficient natural gas electricity production, and above all, by energy efficiency. In 2008, Switzerland implemented an obligation to offset emissions from gas fired combined cycle power plants. Additional fossil fuel electricity production in Switzerland will require a 100 per cent offset of emissions through domestic and international mechanisms. The ERT encourages Switzerland to improve transparency in its next NC by providing more information on PaMs that will ensure penetration of renewable energy and energy efficiency in order to meet electricity demand during and after the nuclear phase out.

43. ***Renewable energy sources***. Renewable energy sources (in particular hydropower) are already highly utilized and comprise almost 60 per cent of electricity production in Switzerland. The solar and wind contribution to electricity generation is still small (0.6 per cent); however, supported by the Swiss Energy Programme, it has grown strongly. Between 1990 and 2012, solar energy production increased from 1.0 to 320 GWh and wind from 0 to 88 GWh. According to the 'with existing measures' scenario, Switzerland is planning to increase capacity of solar production to 528 GWh (1.9 PJ) and wind production to 667 GWh (2.4 PJ) by 2020. In order to cope with the trend of increasing total final consumption, Switzerland has adopted the National Building Refurbishment Programme, in two parts, Programme A and Programme B, the latter of which is also addressing the switch from fossil fuels to renewable energy sources (e.g. solar, geothermal, heat pumps). By 2020, Switzerland will be financing this subprogramme with CHF 100 million per year and is planning to mitigate up to 2 Mt CO_2.

44. ***Residential and commercial sectors***. Due to the increasing population in Switzerland, urban areas are expanding, but emissions from the residential and commercial sectors are steadily decreasing. The cornerstone of emission reductions in these sectors is the CO_2 levy. This levy was introduced in 2008, and has increased from CHF 12 per t CO_2 in 2008 to CHF 60 per t CO_2 in 2014 – and could further increase up to a maximum of CHF 120 per t CO_2, if interim targets for CO_2 emissions from heating and process fuels are not met. The CO_2 levy is applied to heating and process fuels and is equally refunded per capita to the Swiss population and to the business community in proportion of wages paid, except for CHF 300 million per year, which is earmarked for the National Building Refurbishment Programme. This programme is partly funded by the cantons and is co-managed by the federal government and the cantons. The funds for the programme are split between two subprogrammes: two thirds is dedicated to refurbishing existing buildings (Programme A), and up to one third is used to subsidize renewable heating systems, use of waste heat and services engineering (Programme B). The ERT commends Switzerland for the successful implementation of this programme.

45. In addition to the National Building Refurbishment Programme, the Conference of Cantonal Energy Directors in 2008 adopted strict revised building codes for new buildings.

In most cantons the revised building codes were implemented at the beginning of 2010 through relevant regulations. The building codes of the cantons in the energy sector are being revised and by 2018, the cantons have to put the new building codes into cantonal legislation, with the following measures: (1) new buildings are to be self-supporting from 2020 onwards; (2) the refurbishment of existing buildings is to be intensified; and (3) the procedures for the use of renewable energy are to be simplified.

46. ***Transport sector***. The transport sector accounts for 32.1 per cent of total GHG emissions in Switzerland, and GHG emissions from this sector increased by 12.1 per cent between 1990 and 2011. Switzerland has set a sectoral target for the transport sector of a 10 per cent reduction in emissions by 2020 compared with 1990. A significant shift in freight transport of goods from road to rail has arisen from an objective in Article 84 of the Federal Constitution limiting transalpine road transport to 650,000 trucks per year by 2009. This volume restriction has not been reached in 2009 and is planned to be achieved in 2018, two years after the opening of the St Gotthard rail tunnel. Rail infrastructure is partly funded by the heavy vehicle fee. The fee is set according to the maximum weight and emission standards of the individual truck, which supports renewal of the vehicle fleet and above all significantly contributes to the shift of freight from road to rail.

47. Acknowledging the increased emissions in the transport sector, Switzerland has adapted and upgraded its PaMs in the sector, and in particular strengthened requirements for specific fuel consumption of newly registered motor vehicles. The Parliament amended the CO_2 Act in 2011 to include CO_2 emission targets for newly registered vehicles. The new requirements came into effect in spring 2012 and are based on EU regulation. In the first phase (by 2015), a fleet average of 130 g CO_2 per km was set. A target of 95 g CO_2 per km by 2020 for new cars and a new target of 175 g CO_2 per km by 2017 (147 g CO_2 per km by 2020) for light commercial vehicles underwent public consultation in 2013. In 2013, Switzerland also introduced a compulsory energy label for new cars, which informs customers about fuel consumption and CO_2 intensity. The energy label evaluates the energy efficiency of motor vehicles according to certain defined categories, A to G, and evaluation criteria are adapted in intervals of a year to follow technological development in the automotive sector.

48. Switzerland has strengthened the mechanism for compensation of CO_2 emissions from transport fuel use. From 2014, the revised CO_2 Act obliges oil importers to directly offset a part of the CO_2 emissions from transport fuel use through climate change abatement programmes. The Swiss Federal Council determined the share of compensation, which is increasing over time and will reach 10 per cent in 2020. Because compensation must be domestic, the ERT noted the challenges that Switzerland faces in order to find new and additional mitigation actions by 2020 for 1.5 Mt CO_2 eq, which should not already be included in any of the emission scenarios of Switzerland.

49. ***Industrial sector***. The industrial sector in Switzerland produces only 10.7 per cent of total GHG emissions and is showing a decreasing trend – a 12 per cent reduction from 1990 to 2011 – mainly due to a decrease in emissions from cement, pulp and paper production. The CO_2 Act sets a sectoral target for industry (including industrial processes) of a 15 per cent reduction in emissions by 2020 compared with 1990. From 2013, the majority of emissions are covered by the Swiss ETS. Smaller installations not included in the scheme but with emissions of at least 100 t CO_2 per year can apply for contractual emissions reduction and therefore they could also be exempt from the CO_2 levy.

4. Policies and measures in other sectors

50. Between 1990 and 2011, GHG emissions from industrial processes (including solvent and other product use), agriculture and waste decreased by 7.2 per cent (792.49 kt

CO_2 eq), mainly owing to emission reductions in agriculture, waste and solvent and other product use.

51. ***Industrial processes.*** Between 1990 and 2011, GHG emissions from the industrial processes sector increased by 11.5 per cent (388.75 kt CO_2 eq), mainly owing to a sharp increase in consumption of halocarbons and sulphur hexaflouride (SF_6), which led to a strong increase in hydroflourocarbon (HFC), perflourocarbon (PFC) and SF_6 emissions (464.0 per cent or 1,131.33 kt CO_2 eq). This outweighed emission reductions in mineral production (24.6 per cent or 663.45 kt CO_2 eq) due to lower clinker production and metal production (38.4 per cent or 134.97 kt CO_2 eq). Emissions from the solvent and other product use decreased by 57.6 per cent (270.68 kt CO_2 eq) between 1990 and 2011.

52. Within the sector, only F-gases (HFCs, PFCs and SF_6) had a trend of strongly increasing emissions (up to the year 2005) and in 2011 they accounted for approximately 2.7 per cent of GHG emissions in Switzerland. Refrigerants are the predominant emission sources. Switzerland expects to stabilize the increasing trend with amendments to the ordinance on chemical risk reduction, which provides measures to control F-gases in almost all sectors. In 2005, Switzerland imposed a ban on F-gases in certain household appliances such as refrigerators, freezers and air conditioners. A ban on the use of F-gases in mobile air conditioners will come into force when permitted by the state of the technology and when prescribed obligatory maintenance actions such as periodic checks for leakage and record-keeping are implemented. In 2012, Switzerland expanded the ban on the use of F-gases to larger refrigeration heat pumps and air-conditioning units with more than 3 kg of F-gases and with cooling capacity of more than 40, 80, 400 or 600 kW, depending upon the sector of use. The ban entered into force at the end of 2013.

53. ***Agriculture***. Agriculture is in Switzerland responsible for 11.2 per cent of total GHG emissions. Between 1990 and 2011, GHG emissions from the agriculture sector decreased by 8.0 per cent (488.56 kt CO_2 eq), mainly owing to emission reductions in agricultural soils (9.5 per cent or 222.19 kt CO_2 eq), manure management (12.4 per cent or 140.03 kt CO_2 eq) and enteric fermentation (4.8 per cent or 126.34 kt CO_2 eq). Switzerland adopted a new Agricultural Policy 2014–2017, which aims to increase the value added of Swiss agricultural products and decrease the impact of agricultural activities on the environment. The key element of the Agricultural Policy 2014–2017 is further development of the direct payment system. The new system will provide subsidies for ensuring food security, which is dependent on land use, rather than supporting more intensive livestock farming by a payment per head. Switzerland thus expects to gradually decrease livestock by 10 per cent by 2020, which will contribute GHG emission reductions of up to 0.4 Mt CO_2 eq. Furthermore, Switzerland is subsidizing measures for more efficient use of natural resources through a resource programme.

54. ***LULUCF***. The LULUCF sector was a net removal of 3,410.94 kt CO_2 eq in Switzerland in 2011 and net GHG removal increased by 255.31 kt CO_2 eq since 1990. The trend was mainly driven by an increase in removals in croplands, which outweighed decreasing removals in forests. Strong year to year variations throughout the period 1990–2011 were observed. For example, LULUCF became a net source in 2001 as a result of the winter storm Lothar at the end of 1999, which caused great damage to the forest stands and increased harvesting. Switzerland has a long tradition of sustainable forest management, with bans on clear-cutting and deforestation unless an equal area is afforested. Switzerland's forests are ageing due to low harvesting rates; Switzerland has thus adopted a new Forest Policy with 11 policy objectives and is implementing the Wood Action Plan with the main aim being to increase harvesting rates and ensure cascading use of wood. The ERT noted that if the action plan is fully implemented, the LULUCF sector will transform from a net sink to a net source of GHG emissions.

55. ***Waste management***. Between 1990 and 2011, GHG emissions from the waste sector decreased by 41.9 per cent (429.99 kt CO_2 eq), mainly owing to a sharp decrease in emissions from solid waste disposal during this period (74.1 per cent or 516.68 kt CO_2 eq). Waste generation data closely correlate with GDP and population growth. In 2010, the average Swiss person generated 690 kg of waste, which is the second highest rate in Europe. In Switzerland, municipal solid waste is not permitted to be deposited on land and is therefore incinerated in one of 26 nationwide incineration plants. Only non-combustible materials from the incineration process can be deposited in landfills. Switzerland implemented a ban on the export of waste to countries that are not members of the Organisation for Economic Co-operation and Development. Recycling in Switzerland increased in the period 1990–2011 and the high share of recycled waste (approximately 50 per cent in 2011) is significantly contributing to the stabilization of GHG emissions from waste incineration, despite the growth in the Swiss population over the past decade. Population growth is also affecting to a small extent the increasing trend in wastewater management, where emissions increased between 1990 and 2011 by 16.8 per cent.

5. Policies and measures related to implementation of commitments under the Kyoto Protocol

56. Switzerland reported on its package of PaMs adopted, implemented and planned in achieving its commitment under the Kyoto Protocol.

57. The NC6 includes information on how Switzerland promotes and implements the International Civil Aviation Organization decisions to limit emissions from aviation bunker fuels. The ERT notes the national circumstances of Switzerland regarding maritime transportation; however, the ERT recommends that Switzerland also identify the steps it has taken to promote and/or implement any decision by the International Maritime Organization (IMO) to limit or reduce GHG emissions from marine bunker fuels and provide this information in its next NC to increase transparency.

58. In its NC6, Switzerland reported information on how it strives to implement PaMs under Article 2 of the Kyoto Protocol in such a way as to minimize adverse effects, including the adverse effects of climate change and effects on international trade and social, environmental and economic impacts, on other Parties, especially developing country Parties. Furthermore, Switzerland reported that it assumes that its climate change policies have no significant adverse economic, social and environmental impacts in developing countries. The NC6 outlines Switzerland's activities aimed at minimizing adverse impacts; for example, strengthening the capacity of developing country Parties to improve efficiency in upstream and downstream activities relating to fossil fuels (e.g. cleaner production projects), assisting developing country Parties in diversifying their economies (e.g. promoting access to Swiss markets by granting preferential tariffs) and conducting relevant studies.

59. Further information on how Switzerland strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, as reported in the 2013 annual submission, is presented in chapter III.B below.

C. Projections and the total effect of policies and measures, including information on supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

60. The projections of GHG emissions in Switzerland have been fully revised since the NC5. In the wake of the incident in Fukushima, Switzerland decided to gradually phase out

nuclear power generation. In order to provide consistent scenarios for shaping future energy and climate policies, the recently established energy scenarios (Prognos 2012) are used as a framework for the GHG projections. Independent scenarios were developed for the agriculture and the LULUCF sectors.

1. Projections overview, methodology and key assumptions

61. The GHG emission projections provided by Switzerland in the NC6 include a 'with measures' scenario that encompasses currently implemented and adopted policies, a 'with additional measures' scenario and a 'without measures' scenario until 2030, presented relative to actual inventory data for 1990, 2010 and 2011. Projections are presented on a sectoral basis, using the same sectoral categories used in the PaMs section and on a gas-by-gas basis for all the following GHGs: CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case). Projections are also provided in an aggregated format for each sector as well as for a national total, using global warming potential values. Emission projections related to fuel sold to ships and aircraft engaged in international transport were reported separately and not included in the totals. Switzerland does not have any international maritime transport. Emissions projections for indirect GHGs are not presented.

62. Switzerland defined the three scenarios reported in the NC6. All scenarios have a consistent set of key parameters (population, GDP, energy prices, levels of production in industry) and the same assumptions about the phasing out of the nuclear power plants (–3 TWh eq in 2020 and –16 TWh eq in 2030 compared with 2010). As stipulated by the CO_2 Act, the CO_2 emissions of gas power plants will need to be compensated for in full (50 per cent domestic compensation, 50 per cent international). Furthermore, importers of fossil fuels for transport are legally required to compensate for part of the associated CO_2 emissions. Compensation needs to be made through domestic projects. The rate of compensation for transport fuels is set at 2 per cent for 2014–2015, 5 per cent for 2016–2017, 8 per cent for 2018–2019 and 10 per cent for 2020. The effect of domestic compensation measures is not explicitly taken into account in the energy scenarios and therefore not reflected in the emissions. However, the domestic effect of compensation projects is shown in the totals in tables 5 and 6 in the NC6.

63. The 'with measures' scenario reflects more or less the current state of legislation but it does not fully reflect all the measures implemented in the final version of the CO_2 Act. For the 'with measures' scenario, it is assumed that the gradual phasing out of nuclear power generation will be compensated for mainly through energy efficiency, renewable energy sources (+4 TWhE in 2020 and +9 TWhE in 2030 compared with 2010) and gas-fired power stations as required (+1 TWhE in 2020 and +6 TWhE in 2030 compared with 2010). The other measures and instruments to mitigate emissions in the energy sector are the continuation and intensification of the building programme (CHF 300 million from 2014, CHF 600 million from 2015) and building codes, incentives for improving electricity efficiency, the CO_2 levy on heating and process fuel (CHF 76 per t from 2016, CHF 96 per t from 2018), emission standards for new vehicles (130 g per km by 2015, 95 g per km by 2020), and 10 per cent share of biofuel in 2020 and 13 per cent in 2030 in the transport sector.

64. In the industrial sector, emissions are assumed to decrease due to progress in energy efficiency and due to a structural change towards less energy-intensive branches of industry. The evolution of process-related GHG emissions in industry follows assumptions from industrial production and the reinforcement of legislation. Emissions of GHG in the waste sector continue to decrease as a result of the ban on landfilling. In the agricultural sector, subsidies are decoupled from the area of land cultivated and livestock but rather tied to ecological standards, thus reducing incentives for intensifying agricultural production.

Regarding forest management, the scenario follows the objectives given in Switzerland's Forest Policy 2020, aiming at constant living biomass levels in forests.

65. The 'with additional measures' scenario is a long-term target scenario to reduce emissions to 1–1.5 t CO_2 per capita in 2050. In this scenario, the underlying assumption is that no large-scale fossil fuel power plants will be built after 2020. The balance between electricity demand and supply will be met by more electricity efficiency and the same level of renewable energy source use as in the 'with measures' scenario, and imports will be used as required. Other assumptions are an increase in the building refurbishment rate (2 per cent per year), strengthened building codes, incentives for improving electricity efficiency, and a faster increase in the CO_2 levy on heating and process fuel. Compared with the 'with measures' scenario, the 'with additional measures' scenario assumes the same emission standards for new vehicles; however, the share of rail transport (passengers and freight) increases more quickly and biofuels are introduced earlier, assuming 20 per cent by 2020 and 33 per cent by 2030. The required PaMs have not yet all been put in concrete terms but it is assumed that they will be developed in order to reach the set target.

66. The starting point of the 'without measures' scenario is the year 2010. This means that the 'without measures' scenario presented here is not completely without measures but rather comprises a continuation of the PaMs as of 2010 and a moderate further evolution of these PaMs as predetermined by the energy scenarios. The 'without measures' scenario assumes that electricity demand will increase considerably and that there is no incentive for extending renewable energy production, therefore only moderate growth is assumed. Electricity demand is met by increasing numbers of gas-fired power stations (+4 TWh eq in 2020 and +13 TWh eq in 2030 compared with 2010). Other measures currently implemented are continued at the present level with technological advances diffusing autonomously, leading to a slow gradual improvement of energy efficiency.

67. In general, Switzerland presented relevant information on factors and activities that affect emission levels for each sector for the years 1990 to 2030 in its NC6. However, the ERT noted that although Switzerland did provide some relevant information on the factors and activities influencing GHG emissions from the transport sector, other relevant factors for this sector were not sufficiently described to fully understand the projected evolution of emissions. The ERT therefore encourages Switzerland to provide a more complete assessment and description of, for example, the differences in fuel prices between Switzerland and neighbouring countries influencing 'tank tourism' and trends in the evolution of passengers by car in its next NC.

68. The ERT also noted that Switzerland will need to track the evolution of the key drivers (especially for energy efficiency, transport and domestic compensation) underlying the projections and the realized emission reduction effects of the PaMs and adjust the projections accordingly.

69. Switzerland reported on the changes to the methodology compared with the NC5 and provided the explanation that the available energy scenarios have changed as a result of the decision to phase out nuclear power generation. In order to provide consistent scenarios for shaping future energy and climate policies, energy scenarios (Prognos 2012) are used as a framework for the GHG projections presented in the NC6. The relevant parameters that define the energy scenarios are also used to derive the resulting GHG emissions where applicable. Independent scenarios were developed for the agriculture and the LULUCF sectors.

70. The NC6 does not include a sensitivity analysis of the key assumptions (e.g. phasing out of nuclear power, international energy prices). In addition, in the 'with additional measures' scenario, biofuels in transport are introduced: up to 20 per cent by 2020 and 33 per cent by 2030. The ERT noted that the EU has recently decided to reduce the use of

biofuels because the conversion factor to transform energy coming from the sun in crops (photosynthesis) is very low (less than 0.5 per cent) and the yield of the conversion of crops in biofuel is poor. Thus the ERT encourages Switzerland to include a sensitivity analysis of the key assumptions and on the future levels of biofuels in transport.

2. Results of projections

71. Switzerland has an emission reduction target of 8 per cent below 1990 for the first commitment period of the Kyoto Protocol (48.6 Mt CO_2 annual mean for the period 2008–2012). According to the NC6, the mean emissions over the period 2008–2012 (preliminary estimate for 2012) are in the order of 52.3 Mt CO_2 eq per year. Coming from the last and still provisional information communicated during the review, removal units that Switzerland expects to use for meeting its commitment (net carbon sequestration effect of forests) are estimated to be 1.6 Mt CO_2 eq per year. Emissions reduction certificates acquired abroad from clean development mechanism (CDM) and joint implementation (JI) projects will amount to about 3.1 Mt CO_2 eq per year. Emission allowances (assigned amount units (AAUs)) of 0.6 Mt CO_2 eq per year will be carried over to the second commitment period (banking by private entities subject to the Swiss ETS). According to these last estimates, the net emissions for 2008–2012, including emissions trading and carbon sequestration, will be 48.2 Mt CO_2 eq per year. The over-fulfillment (0.4 Mt CO_2 eq per year) will possibly be carried over by the Government to the second commitment period of the Kyoto Protocol.

72. The target of the revised CO_2 Act is a 20 per cent domestic reduction by 2020 compared with 1990. The Kyoto Protocol target for the second commitment period is an average reduction in emissions of 15.8 per cent in the period 2013–2020 compared with 1990. In the second commitment period, Switzerland plans to concentrate on domestic measures and not on the purchase of carbon credits from abroad. During this period, forest sequestration is expected to shift from a CO_2 sink to a CO_2 source, which will pose an additional challenge for Switzerland to meet its target. Regarding other PaMs, the obligation to partially compensate for emissions from fossil fuel use in transport on the one hand and the CO_2 levy and the building programme on the other hand are considered key for a future reduction of emissions in these two important sectors. To reach the target of the CO_2 Act, Switzerland could adapt its CO_2 levy in the coming years.

73. Emissions related below by gas and by sector are without the domestic compensation effect. For projections by gas, under the 'with measures' scenario CO_2 emissions are expected to decrease overall by approximately 13 per cent between 1990 and 2020, with a further 15 per cent reduction between 2020 and 2030. CH_4 emissions are expected to decrease by 24 per cent from 1990 to 2020, but a small increase of 2 per cent is expected from 2020 to 2030. N_2O emissions are expected to decrease overall by 16 per cent in the period 1990–2020 but increase 2 per cent in the period 2020–2030. Total F-gas emissions are projected to strongly increase, by 448 per cent, between 1990 and 2020 and then decrease by 26 per cent between 2020 and 2030. Within F-gases, the increase in HFC emissions is expected to peak in 2011 and afterwards decrease, while PFC emissions are projected to decrease and SF_6 emissions are projected to remain stable.

74. For projections by sector, under the 'with measures' scenario energy emissions are expected to decrease overall by approximately 15 per cent between 1990 and 2020, with a further 11 per cent reduction between 2020 and 2030. Transport emissions are expected to decrease by approximately 9 per cent between 1990 and 2020, with a further 21 per cent reduction between 2020 and 2030. Industrial processes emissions are expected to decrease by approximately 1 per cent between 1990 and 2020, with a further 19 per cent reduction between 2020 and 2030. Agriculture emissions are expected to decrease by approximately 13 per cent between 1990 and 2020, and then stay at the same level. Waste emissions are

expected to decrease by approximately 41 per cent between 1990 and 2020, and then increase by almost 20 per cent between 2020 and 2030. In the 'with measures' scenario, total emissions with domestic compensation (1.5 Mt CO_2 eq per year) are expected to decrease by 15 per cent between 1990 and 2020, with a further reduction of 6 per cent between 2020 and 2030.

Table 5
Summary of greenhouse gas emission projections for Switzerland

	Greenhouse gas emissions (kt CO_2 eq per year)	*Changes in relation to the base year[a] level (%)*	*Changes in relation to the 1990 level (%)*
Kyoto Protocol base year[b]	52 790	0.0	–0.5
Kyoto Protocol target for the first commitment period (2008–2012)	48 570	–8.0	–8.4
Kyoto Protocol target for the second commitment period (2013–2020)[c]	44 450	–15.8	–16.2
Quantified economy-wide emission reduction target under the Convention[c]	42 230	–20.0	–20.0
Inventory data 1990[d]	53 049	0.5	0.0
Inventory data 2011[d]	50 163	–5.0	–5.4
Average annual emissions for 2008–2012[e]	52 300	–0.9	–1.4
'Without measures' projections for 2020[e, f]	50 500	–4.3	–4.8
'With measures' projections for 2020 [e, f]	45 000	–14.8	–15.2
'With additional measures' projections for 2020[e,f]	41 500	–21.4	–21.8
'Without measures' projections for 2030[e, f]	48 000	–9.1	–9.6
'With measures' projections for 2030[e, f]	37 900	–28.2	–28.6
'With additional measures' projections for 2030[e, f]	30 100	–43.0	–43.3

[a] Base year in this column refers to the base year used for the targets under the Kyoto Protocol, while for the target under the Convention it refers to the base year used for that target.

[b] The Kyoto Protocol base year level of emissions is provided in the initial review report contained in document FCCC/IRR/2007/CHE.

[c] The Kyoto Protocol target for the second commitment period and the quantified economy-wide emission reduction target are based on preliminary data for the base year.

[d] Switzerland's 2013 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry.

[e] Switzerland's sixth national communication and/or first biennial report.

[f] The 'with measures' and 'with additional measures' projections include domestic compensation.

75. Regarding projections for the LULUCF sector, in order to preserve the sustainability of the forests, harvesting rates must increase dramatically. Thus, the LULUCF sector is projected to become a net source of CO_2 in 2020 and 2030 instead of a net sink as in 2011.

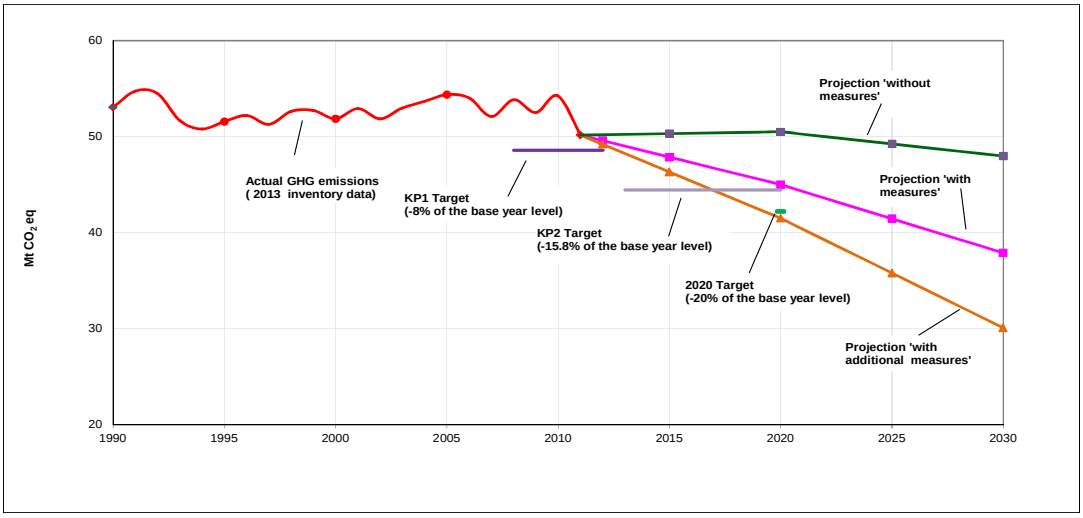
76. In the 'with additional measures' scenario, total emissions with domestic compensation are expected to decrease by 21.8 per cent between 1990 and 2020, with a further reduction of 21.5 per cent between 2020 and 2030. This scenario reaches the target of 20 per cent domestic reduction in 2020, but at the present time it is not based on concrete PaMs. It relies on strong efficiency improvements, a decrease in emissions by the transport sector (in addition to a modal shift from car and truck to train and electric cars, and an increased biofuel share) and a successful domestic compensation programme. Switzerland plans to strengthen the existing PaMs in order to reach the emission reduction target defined in the CO_2 Act.

77. The ERT noted that Switzerland will face some challenges in meeting its emission reduction targets. These include the implementation of key PaMs to drastically change the trend of underlying activities in the transport sector – such as the number of passenger cars and the mileage driven – where emissions are projected to decrease between 2015 and 2030 compared with a significant increase in the period 1990–2011; the identification of areas for domestic compensation for emissions coming from gas-fired power plants and transport fuels; and adaptation of the CO_2 levy considering the results of the upcoming assessment (in 2015) to determine whether the target is being reached.

78. In the longer term (after 2020), Switzerland will have to face the progressive phasing out of nuclear power generation (approximately 3 TWhE in 2019, and an additional 6 TWhE in 2022, 8 TWhE in 2029 and almost 9 TWhE in 2034) and its replacement with improved efficiency, additional renewable energy sources and some highly efficient electricity production from natural gas. In addition, GHG emission reductions in industry, buildings and transport are quite often linked with an increase in electricity consumption (electric furnaces, heat pumps, electric cars). From 2020 onwards, the double challenge for Switzerland will be to decrease electricity consumption by increased energy efficiency and at the same time keep emissions from the electricity supply sector at a very low level, while also taking into account population growth.

79. The projected emission levels under different scenarios and information on the Kyoto Protocol targets and quantified economy-wide emission reduction target are presented in table 5 above and the figure.

Greenhouse gas emission projections



Sources: (1) Data for the years 1990–2011: Switzerland's 2013 greenhouse gas inventory submission; the emissions are without land use, land-use change and forestry; (2) Data for the years 2011–2030: Switzerland's sixth national communication and first biennial report; the emissions are without land use, land-use change and forestry.

Note: The target for the second commitment period of the Kyoto Protocol is based on preliminary estimates of the base year emissions for the first commitment period of the Kyoto Protocol and quantified emission limitation or reduction objective included in annex I to decision 1/CMP.8. The initial assigned amount for the second commitment period will be established after the initial review for the second commitment period of the Kyoto Protocol.

Abbreviations: GHG = greenhouse gas, KP1 = first commitment period of the Kyoto Protocol, KP2 = second commitment period of the Kyoto Protocol.

3. Total effect of policies and measures

80. In its NC6, Switzerland presents a rough estimate of the total effect of implemented and adopted PaMs in 2010 and estimates of the expected total effect of its PaMs in 2020 and 2030, in accordance with the 'with measures' definition, compared with a situation without such PaMs. Information is presented in terms of GHG emissions partially avoided or sequestered, by gas and by sector (on a CO_2 eq basis), for only 2020 and 2030. It also presents relevant information on factors and activities for each sector for the years beyond 2010.

81. The effects of PaMs implemented before 2010 are not taken into account in the 'with measures' and 'with additional measures' scenarios for 2020 and 2030. Although Switzerland reports the total effect of PaMs in 2010, the ERT noted that the figure is derived with a different method than that for the 2030 scenario. The total effect of domestic measures is estimated between 3.9 and 5.3 Mt CO_2 eq per year (2010). A detailed estimation of the effect of the different measures in 2010 was communicated during the review. However, this additional information does not provide the effect of PaMs by gas for 2010 and earlier years. The ERT recommends that Switzerland report the historical total effect of its PaMs in accordance with the UNFCCC reporting guidelines on NCs in its next NC. The ERT also recommends that the Party use a consistent approach for estimating the total effect of implemented and adopted PaMs, by sector and by gas, for past and future years.

82. Switzerland reported that the total estimated effect of adopted and implemented PaMs is 5.5 Mt CO_2 eq in 2020. According to the information reported in the NC6, domestic compensation in the 'with existing measures' scenario contributes approximately 1.5 Mt CO_2 eq in 2020. This effect is not taken into account in the sectoral discussion of the effects of PaMs below.

83. PaMs implemented in the transport sector will deliver the largest emission reductions (1.4 Mt CO_2 eq), followed by the effect of PaMs implemented in the energy sector. The most effective PaMs and drivers behind GHG emission reductions are described in chapter II.B above. Table 6 above provides an overview of the total effect of PaMs as reported by Switzerland, with an additional line for domestic compensation.

Table 6
Projected effects of planned, implemented and adopted policies and measures in 2020 and 2030

Sector	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of implemented and adopted measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*	*Effect of planned measures (kt CO_2 eq)*	*Relative value (% of 1990 emissions)*
	2020				*2030*			
Energy (without CO_2 from transport)	1 207	4.4	1 313	4.7	3 785	14.2	4 298	15.3
Transport – CO_2	1 383	9.6	2 262	15.8	2 332	15.8	3 447	24.0
Industrial processes	1 088	28.2	135	2.6	1 868	38.8	309	7.7
Agriculture	386	6.6	0	0	369	7.0	758	11.5
Land-use change and forestry	–1 650	–[a]	–950	–[a]	–2 111	–[a]	–1 550	–[a]
Waste management	–51	–0.5	0	0	–202	–20.0	0	0
Domestic compensation	1 500	–[b]	–200[c]	–[b]	2 800	–[b]	–1 000[c]	–[b]
Total without LULUCF	**5 512**	**10.4**	**3 510**	**6.6**	**10 952**	**19.0**	**7 812**	**14.7**

Source: Switzerland's sixth national communication and first biennial report.

Notes: (1) The total effect of implemented and adopted policies and measures is defined as the difference between the 'without measures' and 'with measures' scenarios; the total effect of planned policies and measures is defined as the difference between the 'with measures' and 'with additional measures' scenarios; (2) Domestic compensation is taken into account in the total; however, it is not assigned to a specific sector or gas.

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] Value not relevant because LULUCF was a sink in 1990 and in some scenario becomes a source.

[b] Value not relevant because "domestic compensation" is not related to a specific sector.

[c] Domestic compensation effect is estimated to be higher in the 'with measures' than the 'with additional measures' scenario.

4. Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17 of the Kyoto Protocol

84. Switzerland in its NC6 provided information on how its use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action, for the first commitment period. For 2010, Switzerland reported an estimation of the total effect of the quantified domestic measures, which was estimated to be 3.9–5.3 Mt CO_2 eq. The effect of the domestic measures is therefore greater than the total amount of CO_2 credits purchased from abroad (3.1 Mt CO_2 eq per year) and Switzerland considers the use of the mechanisms supplemental to domestic action.

85. Switzerland may use carbon credits generated from the mechanisms under the Kyoto Protocol (CERs and ERUs) and from the new market-based mechanisms under the Convention to reduce its emissions over the period 2013–2020. The exact amount of carbon credits is not yet known. The revised CO_2 Act for the 2013–2020 period defines Switzerland's 20 per cent reduction target as domestic; however, carbon credits will play a role in the case of fossil fuel thermal power plants, the ETS, companies exempted from the CO_2 levy that are not participating in the ETS, and the sanction mechanism under the domestic compensation obligation for importers of fossil fuels for transport.

86. Under the Kyoto Protocol, Switzerland does not plan to buy AAUs from other countries but does not exclude the use of AAUs from other countries through the linking of its ETS with other schemes. Switzerland may use a limited amount of its own carried over AAUs for compliance in the second commitment period of the Kyoto Protocol. For a possibly higher target than 20 per cent reduction by 2020 compared with 1990, carbon

credits will also be used by Switzerland for a maximum of three quarters of the additional emission reductions beyond the 20 per cent reduction target, as planned in the CO_2 Act for the 2013–2020 period.

D. Provision of financial resources and technology transfer to developing country Parties, including information under Articles 10 and 11 of the Kyoto Protocol

1. Finance, including "new and additional" resources and resources under Article 11 of the Kyoto Protocol

87. In its NC6, Switzerland provided information on provision of support required under the Convention and its Kyoto Protocol.

88. The NC6 does not include some information required by the UNFCCC reporting guidelines on NCs on how Switzerland has determined that the financial resources provided to developing countries pursuant to Article 4, paragraph 3, of the Convention are "new and additional" and on how Switzerland has taken into account the need for adequacy and predictability in the flow of such resources.

89. During the review, Switzerland explained that it takes into account the need for adequacy and predictability in the flow of financial resources by (1) making more funds available over time and by mobilizing the private sector to carry out climate-friendly investments in developing countries, and (2) through, for example, the Swiss Parliament's decision in 2011 to increase the level of official development assistance (ODA) to 0.5 per cent of gross national income (GNI) by 2015, which took into consideration the need for Switzerland to honour its fast-start finance commitment and thus guarantees that more funds will be devoted to cooperation on climate change. The ERT commends Switzerland for its increased financial support to developing countries and recommends that Switzerland include a clarification on how it has determined that the financial resources it has provided are "new and additional" in its next NC. In addition, the ERT encourages Switzerland to provide information on how it has taken into account the need for adequacy and predictability in the flow of financial resources to developing countries, pursuant to Article 4, paragraph 3, of the Convention, in its next NC.

90. In its NC6, Switzerland provided details on measures taken to give effect to its commitments under Article 4, paragraphs 3, 4 and 5, of the Convention as required by the UNFCCC reporting guidelines on NCs and under Article 11 of the Kyoto Protocol, as required by the "Guidelines for the preparation of information required under Article 7 of the Kyoto Protocol". Switzerland has indicated what "new and additional" financial resources it has provided pursuant to Article 4, paragraph 3, of the Convention but did not clarify how it has determined such resources as being "new and additional" (see para. 89 above).

91. Switzerland has reported information on the assistance it has provided to developing country Parties that are particularly vulnerable to the adverse effects of climate change to help them to meet the costs of adaptation to those adverse effects. Furthermore, Switzerland has provided information on other financial resources related to the implementation of the Convention provided through bilateral, regional and other multilateral channels, including the Global Environment Facility (GEF). In reporting the financial resources through bilateral and regional channels, table 1 in the NC6 does not follow table 5 of the UNFCCC reporting guidelines on NCs. This issue was also raised in the previous review report. During the review, Switzerland explained that the reporting entities manage this information in ways that do not align exactly with table 5. The ERT reiterates the encouragement for Switzerland to provide more transparent information on bilateral

assistance and provision of financial resources as listed in table 5 of the UNFCCC reporting guidelines on NCs in its next NC, in order to more easily identify trends in the provision of financial resources to developing countries and supported sectors.

92. Switzerland has also provided information on its financial contribution to the Adaptation Fund, established in accordance with decision 10/CP.7. Between 2009 and 2012 Switzerland provided supplemental contributions of CHF 3.4 million to the Adaptation Fund. With regard to the most recent financial contributions to enhance the implementation of the Convention by developing countries, in February 2011 the Swiss Parliament decided to increase the level of ODA to 0.5 per cent of GNI. As part of this decision, a new and additional amount of CHF 125 million was allocated with immediate effect to Switzerland's fast-start finance. This amount was added in equal parts to the international cooperation budgets of the Swiss Agency for Development and Cooperation and the State Secretariat of Economic Affairs (SECO). An additional amount of CHF 15 million is allocated to fast-start finance as part of the Swiss contribution to the Fifth Replenishment of the GEF. This brings the additional fast-start finance from public sources to CHF 140 million. Table 7 summarizes information on financial resources and technology transfer.

Table 7
Summary of information on financial resources and technology transfer for 2009–2012
(Millions of Swiss francs)

Allocation channel of public financial support	*Years of disbursement*			
	2009	*2010*	*2011*	*2012*
Official development assistance	NR	2 400	2 700	2 800
Multilateral climate change funds	12.20	11.78	5.70	12.48
Multilateral financial institutions including multilateral development banks	0	11.76	20.77	5.08
Specialized United Nations bodies	2.51	2.67	4.88	3.47
Other	0.57	0.78	0.39	0.40
Total multilateral institutions and programmes	**15.27**	**26.99**	**41.74**	**21.43**
Africa	5.80	9.52	11.34	21.13
Asia	19.36	23.49	33.59	30.94
Europe and Commonwealth of Independent States	3.67	4.22	4.32	5.97
Latin America	11.54	15.48	17.57	24.05
Middle East and North Africa	0.24	0.07	0.45	0.17
Global programmes and projects	29.92	35.79	38.61	60.70
Total bilateral and multi-bilateral channels	**70.53**	**88.57**	**105.88**	**142.97**
Total provision of financial support through all channels	**85.80**	**115.55**	**147.63**	**164.40**

Abbreviation: NR = not reported.

2. Technology transfer, including information under Article 10 of the Kyoto Protocol

93. Switzerland has provided in its NC6 information on activities related to the transfer of technology and notable activities by the public and private sectors. Under the Swiss foreign policy on energy of 2008 (renewed in 2012) the Swiss Federal Council has mandated the relevant ministries to (a) increase their engagement in promotion of renewable energy and energy efficiency in the programmes of development cooperation; (b) foster public–private partnerships for sustainable energy projects; and (c) increase relevant contributions to multilateral development banks. The focus is on access to modern energy infrastructure, including renewable energy, rural electrification, energy efficiency in industry and in the buildings and construction sector, and reducing deforestation. As a leading clean technology export nation, Switzerland has significant levels of climate finance from private sources. Efforts are currently under way to quantify potentially eligible private climate finance flows for future reporting purposes. Initial studies mentioned in the NC6 point to very large potential amounts, while noting the difficulties in defining private climate finance.

94. Switzerland also reported activities related to technology transfer, including success and failure stories, and its activities for financing access by developing countries to 'hard' or 'soft' environmentally sound technologies. Furthermore, Switzerland has reported in textual format on the steps taken by governments to promote, facilitate and finance the transfer of technology, and to support the development and enhancement of endogenous capacities and technologies of developing countries. The NC6 underlines the work of the interdepartmental platform Renewable Energy and Energy Efficiency Promotion in International Cooperation, which, as well as enhancing knowledge and coherence, offers seed money and technical advice to promising climate change initiatives during the pre-competitive phases of project development, for technology and market testing.

95. The NC6 also mentions Switzerland's Global Programme Climate Change, which includes as a focus area increasing technology transfer and innovation in developing and threshold countries in the field of mitigation. The ERT noted that the initiatives to promote private engagement in technology transfer mentioned in the NC5, such as Business Network Switzerland and the Swiss export insurance scheme, were not mentioned in the NC6. During the review, Switzerland confirmed that these initiatives continue. The ERT encourages Switzerland to enhance its reporting on the ways in which it encourages private activities related to the promotion, facilitation and financing of the transfer of, or access to, environmentally sound technologies, in its next NC.

96. In its NC6, Switzerland has provided information on the fulfillment of its commitments under Article 10 of the Kyoto Protocol. The chapter on financial resources and transfer of technology in Switzerland's NC6 does not provide references to information about the activities and programmes undertaken in fulfillment of its commitments under Article 10. However, a table is included in annex 1, including references to the relevant chapters of the NC6. In order to enhance transparency, the ERT encourages Switzerland to clearly identify the activities, actions and programmes undertaken to fulfill its commitments under Article 10 in the section on financial resources and transfer of technology in its next NC.

E. Vulnerability assessment, climate change impacts and adaptation measures

97. In its NC6, Switzerland has provided the required information on the expected impacts of climate change in the country and on adaptation options, including information on the method and results of the first case study on the assessment of climate-related risks

and opportunities at the national level, and on adaptation strategies. The ERT commends Switzerland for the progress made in assessment of the impacts of climate change and in development of the national adaptation strategy and adaptation measures in an action plan. Table 8 summarizes the information on vulnerability and adaptation to climate change presented in the NC6.

Table 8
Summary of information on vulnerability and adaptation to climate change

Vulnerable area	*Examples/comments/adaptation measures reported*
Agriculture and food security	*Vulnerability*: changes in temperature and precipitation have both positive and negative impacts (e.g. longer vegetation periods, increasing incidence of pests, increasing water demand). Changes in the nature of extreme weather events could challenge agriculture by, for example, reducing the reliability of harvests *Adaptation*: adaptation measures for agriculture are defined in the action plan
Biodiversity and natural ecosystems	*Vulnerability*: changes in the composition of plant and bird species (e.g. an increase in thermophilous species) *Adaptation*: adaptation measures for biodiversity management are defined in the action plan
Forests	*Vulnerability*: changes in tree growth and composition of forests (e.g. more drought-tolerant species). Forest products and services could be reduced *Adaptation*: the adaptation strategy and Forest Policy 2020 focus on three forest categories which are considered to be at high risk. Adaptation measures for forestry are defined in the action plan
Human health	*Vulnerability*: the projected increase in the frequency and intensity of heatwaves poses a high risk to human health. Additional effects of climate change are expected from the increase in occurrence of other extreme events such as floods, mudslides and, possibly, storms *Adaptation*: federal and cantonal authorities have developed measures to inform the population about expected heatwaves and protective measures to be taken. Adaptation measures for health at the national level are defined in the action plan
Tourism	*Vulnerability*: the number of ski resorts may decline because of temperature increase. Changes in the natural landscape (e.g. rivers running dry in late summer) and natural hazards (e.g. melting permafrost, more intense precipitation) may affect mountain tourism *Adaptation*: three central fields of action requiring adaptation to climate change are identified: development of tourism supply, hazard minimization and communication. Adaptation measures for tourism are defined in the action plan
Water resources	*Vulnerability*: changes in the hydrological cycle (e.g. less run-off) and increases in water temperature and occurrence of extreme events may affect water resources management *Adaptation*: adaptation measures for water management are defined in the action plan

98. Swiss Climate Change Scenarios CH2011, published in 2011, provides a new assessment of how climate may change in Switzerland over the twenty-first century (CH2011, 2011). The ERT noted that the report serves a basis for climate change impact studies in Switzerland. The mean temperature will likely increase in all regions and seasons. The mean precipitation in summer will likely decrease by the end of the century all over the country, while winter precipitation will likely increase in southern Switzerland.

99. The ERT noted that assessment of climate-related risks and opportunities has commenced and will be completed by 2016. The NC6 reported the results of the first case study carried out in the canton of Aargau. The impacts were assessed in nine areas, and two climate scenarios and a socio-economic and demographic scenario for a 2060 time horizon serve as the basis for the assessment. During the review, the ERT was informed that a study to assess the impact of climate change in Switzerland quantitatively has been finalized and the report (*Towards Quantitative Scenarios of Climate Change Impacts in Switzerland*) has recently been published (CH2014-Impacts, 2014).

100. Article 8 of the revised CO_2 Act is the legal basis for adaptation in Switzerland. To seize the opportunities arising from climate change, minimize the risks, and improve the adaptive capacity of society, economy and environment, Switzerland has developed a national adaptation strategy consisting of two parts. Nine sectors that need adaptation actions were identified (health, agriculture, forest, energy, tourism, infrastructure and buildings, water management, biodiversity, open spaces and green areas) and sectoral sub-strategies were presented in the first part of the adaptation strategy. In the second part, adaptation measures were presented and coordinated in a joint action plan that was adopted on 9 April 2014. Switzerland reported that the implementation phase of the pilot programme for putting the national adaptation strategy into practice started in 2014 and will conclude in 2017.

101. In its NC6, Switzerland reported information on the provision of support to adaptation activities in developing countries. Through its bilateral, regional and multilateral development cooperation, Switzerland supported multiple climate change adaptation-related projects, such as the Climate Change Adaptation Program Peru, Adapting to Climate Change in China, the study Economics of Adaptation to Climate Change, and World Bank programmes such as the Commodity Risk Management Group and Technical Assistance for Disaster Risk Financing and Insurance.

F. Research and systematic observation

102. Switzerland has provided information on its actions relating to research and systematic observation (RSO), and addressed both domestic and international activities, including the World Climate Programme, the International Geosphere–Biosphere Programme, the Global Climate Observing System (GCOS), and the Intergovernmental Panel on Climate Change. The NC6 also reflects action taken to support related capacity-building in developing countries. Furthermore, Switzerland has provided a summary of information on GCOS activities.

103. Many research organizations and institutions in Switzerland are involved in climate-related research in areas such as energy, transport, agriculture, forestry and adaptation. The research projects are funded mainly by the National Science Foundation and the EU. Switzerland's research on climate change was led by two National Centres of Competence in Research (NCCR): NCCR Climate and NCCR North-South. The ERT noted that many of the activities of NCCR Climate, which stopped officially its activities in October 2012, are continued by the Oeschger Centre for Climate Change Research at the University of Bern and the Center for Climate Systems Modeling at the Swiss Federal Institute of

Technology in Zürich, and that the NCCR North-South has been affiliated with the Centre for Development and Environment at the University of Bern.

104. The ERT acknowledged Switzerland's contribution to systematic observation, particularly GCOS activities. The Party hosts international data and calibration centres such as the World Glacier Monitoring Service and the World UV Calibration Center, and submits data to international data centres regularly. A report published in 2011 (*Swiss GCOS Data in International Data Centers*) provides an overview of the availability of Swiss data in international data centres (Swiss GCOS Office, 2011). Furthermore, the ERT noted that MeteoSwiss Payerne became part of the GCOS Reference Upper Air Network, which provides long-term and high quality upper air data.

105. During the review, Switzerland provided additional information, elaborating on the Capacity Building and Twinning for Climate Observing Systems project, which is financed by the Swiss Agency for Development and Cooperation. The project started in 2011 aiming to improve the capacity to measure essential climate variables from atmospheric and terrestrial domains in several countries in Africa, Asia and South America. The second phase of the project will be implemented in 2014–2016.

G. Education, training and public awareness

106. In the NC6, Switzerland has provided information on its actions relating to education, training and public awareness at both the domestic and international level. Many climate-related activities are jointly supported by federal, cantonal, communal and private sector agencies.

107. The NC6 presents a variety of activities for education and awareness-raising, for example: publication of brochures and reports for general readers; websites that provide a broad range of information on climate, climate change and energy; an educational initiative by SwissEnergy; and Swiss Global Change Day organized by ProClim. The Oeschger Centre for Climate Change Research at the University of Bern and the Center for Climate Systems Modeling at the Swiss Federal Institute of Technology in Zürich promote the education of young researchers and encourage exchanges between students and researchers (e.g. through the Swiss Climate Summer School). During the review, Switzerland provided information on education21, a foundation created in 2012 to coordinate and promote education for sustainable development. Sustainable development has been integrated into school curricula.

108. The ERT noted a number of ongoing private sector initiatives related to climate change such as climate labels and an initiative to promote research and development in clean technology launched in 2010 by the Commission for Technology and Innovation. According to the NC6, 65 collaborative projects related to resource protection, resource management, sustainable mobility, efficient energy systems, and renewable energy were funded by the commission in 2012.

109. At the international level, Switzerland reported on its effort to foster exchange on climate matters among Organisation internationale de la Francophonie countries (e.g. at meetings of the organisation) and on funding of the pilot phase during 2011–2013 of the 'CC: Learn' initiative in five countries (Benin, Dominican Republic, Indonesia, Malawi and Uganda).

110. However, the ERT noted that the NC6 contains limited information on training activities and no information on participation of public and non-governmental organizations in the preparation or domestic review of NCs. The ERT therefore encourages Switzerland to report and provide more information on these activities in its next NC.

III. Summary of reviewed supplementary information under the Kyoto Protocol

A. Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

111. Supplementary information provided by Switzerland under Article 7, paragraph 2, of the Kyoto Protocol in its NC6 is complete and mostly transparent. The supplementary information is located in different sections of the NC6. Table 9 provides an overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol as well as references to the NC6 chapters in which this information is provided. The technical assessment of the information reported under Article 7, paragraph 2, of the Kyoto Protocol is contained in the relevant sections of this report.

Table 9
Overview of supplementary information under Article 7, paragraph 2, of the Kyoto Protocol

Supplementary information	*Reference to the sixth national communication*
National registry	Chapter 3.5
National system	Chapter 3.4
Supplementarity relating to the mechanisms pursuant to Articles 6, 12 and 17	Chapters 4.4.2 and 5.3
Policies and measures in accordance with Article 2	Chapter 4
Domestic and regional programmes and/or legislative arrangements and enforcement and administrative procedures	Chapter 4.2
Information under Article 10	Chapters 3.4, 4.3, 6.3, 7.4, 8 and 9
Financial resources	Chapter 7

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

112. Switzerland reported the information requested in section H, "Minimization of adverse impacts in accordance with Article 3, paragraph 14", of the annex to decision 15/CMP.1 as a part of its 2013 annual submission. During the review, Switzerland provided the ERT with the additional information on how it strives to implement its commitments under Article 3, paragraph 1, of the Kyoto Protocol in such a way as to minimize adverse social, environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention. The ERT considers the reported information to be complete and transparent.

113. The 2013 and previous national inventory report presented several initiatives of Switzerland aimed at minimizing adverse impacts. Through various projects, Switzerland promotes eco-efficient means of production (e.g. optimization of energy use and raw materials) and supports developing countries in improving efficiency in industrial production. Switzerland assists developing countries in diversifying their trade and economies through a number of activities such as the Swiss Import Promotion Programme and the Generalized System of Preferences. In its 2013 annual submission, Switzerland

reports that the technical assistance of SECO for trade promotion amounted to CHF 42 million in 2010 (non-reimbursable grant contributions).

114. A research project was conducted to assess the possible conflicts and synergies between the expansion of renewable energy production and land management, and the report, published in 2012, offers several approaches at the national, cantonal and communal levels. Furthermore, a study on the assessment of the social and environmental impacts of the use of second generation biomass fuels (report published in 2010) provides a number of recommendations, including the development of methods to record and prevent undesirable and indirect side-effects of biofuels.

IV. Conclusions and recommendations

115. The ERT conducted a technical review of the information reported in the NC6 of Switzerland in accordance with the UNFCCC reporting guidelines on NCs. The ERT concludes that the NC6 provides a good overview of the national climate policy of Switzerland. The information provided in the NC6 includes all elements of the supplementary information under Article 7 of the Kyoto Protocol with the exception of some information on financial resources.

116. Switzerland's emissions for 2011 were estimated to be 5.4 per cent below its 1990 level excluding LULUCF and 6.3 per cent below including LULUCF. Emission trends were driven by economic and population growth; however, this was more than compensated for by an unusually warm winter in 2011 and improvements in the energy efficiency of buildings. Switzerland's per capita and per GDP unit emissions are low compared with other Annex I Parties because its electricity generation is almost CO_2-free, being sourced from hydropower (60 per cent) and nuclear power (40 per cent).

117. In the NC6, Switzerland presents GHG projections for the period from 2010 to 2030. Three scenarios are included: baseline ('without measures') scenario; 'with measures'; and 'with additional measures'. The projected reductions in GHG emissions under the baseline scenario, in relation to 1990, and under the 'with measures' and 'with additional measures' scenarios, are 4.8, 15.2 and 21.8 per cent, respectively. The projections indicate that Switzerland can meet its Kyoto Protocol target for the second commitment period (15.8 per cent reduction over 2013–2020 compared with 1990) under the 'with additional measures' scenario.

118. Switzerland will face several challenges in meeting its 2020 targets, especially its national target, which, according to national legislation, is planned to be achieved by domestic actions only. These challenges include the implementation of key PaMs to drastically change the trend of underlying activities in the transport sector; the identification of areas for domestic compensation for emissions coming from gas-fired power plants and transport fuels; and adaptation of the CO_2 levy. Regarding longer-term emission reductions after 2020, Switzerland plans to phase out electricity produced by nuclear power plants and replace it with improved efficiency, additional renewable energy sources and highly efficient electricity production from natural gas. This, together with the expected population growth and increased electricity consumption due to GHG mitigation PaMs in industry, buildings and transport, will pose additional challenges.

119. Based on the comparison of the target with the average annual emissions for 2008–2012 as reported in the NC6 (52.3 Mt CO_2 annual mean), Switzerland is in a position to meet its Kyoto Protocol target for the first commitment period (8 per cent reduction) by considering its net carbon sequestration effect of forests and making use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol.

120. Switzerland is planning to make use of the Kyoto Protocol mechanisms to meet its Kyoto Protocol target. The NC6 contains information on how Switzerland's use of the mechanisms under Articles 6, 12 and 17 of the Kyoto Protocol is supplemental to domestic action. In addition to an estimated net carbon sequestration effect of forests (1.6 Mt CO_2 eq per year), emissions reduction certificates acquired abroad from CDM and JI projects will amount to about 3.1 Mt CO_2 eq per year, and 0.6 Mt CO_2 eq per year AAUs will be carried over to the second commitment period of the Kyoto Protocol (banking by private entities subject to the Swiss ETS). Thus, the net emissions for 2008–2012, including emissions trading and carbon sequestration, will be 48.2 Mt CO_2 eq per year. The over-fulfillment (0.4 Mt CO_2 eq per year) will possibly be carried over by the Government to the second commitment period. Switzerland estimated the total effect of implemented and adopted PaMs in 2010 to be 3.9–5.3 Mt CO_2 eq; thus the effect of the domestic measures is considered to be greater than the total amount of CO_2 credits purchased from abroad.

121. In Switzerland the CO_2 Act provides the legislative framework to comply with the national emission reduction target and the targets under the Convention and its Kyoto Protocol. Major accompanying policy instruments are the Energy Strategy 2050, the Agricultural Policy 2014–2017 and the Forest Policy 2020. Key PaMs include levies, regulations, ordinances and the Swiss ETS; however, the latter covers only a small amount of emissions. Due to its emission profile, most PaMs – including the CO_2 levy, the National Building Refurbishment Programme (which targets both energy efficiency and fuel switching in the residential and commercial sectors) and building codes – target the energy sector, with emphasis on buildings.

122. Switzerland is planning a complete phase out of electricity produced in nuclear power plants and replacement of this electricity with energy efficiency, new and additional renewable energy production and efficient gas-fired power plants. Switzerland has obligations in place for importers of fossil fuels for transport and for gas-fired power plants to compensate for part of the related emissions. Switzerland has implemented policies for a modal shift in transport from road to rail, made significant investments to cope with increased freight transport, and adopted CO_2 emission regulations for new passenger cars.

123. Regarding agriculture and land use, the new Agricultural Policy 2014–2017 includes subsidies for ensuring food security instead of supporting more intensive livestock farming. The Forest Policy aims at preserving the sustainability of forests, for which harvesting rates must increase significantly. The LULUCF sector, which was a sink during the years 1990–2011, is thus expected to progressively become a source of GHG emissions.

124. During the period 2009–2012, the flow of financial resources provided by Switzerland increased from CHF 85.8 million to CHF 164.4 million. During this period, the contributions made through multilateral channels decreased, but this was more than compensated for by the enhancement in bilateral and regional provision of support. Under the Swiss foreign policy on energy of 2008 the Swiss Federal Council has mandated the relevant ministries to (a) increase their engagement in promotion of renewable energy and energy efficiency in the programmes of development cooperation; (b) foster public–private partnerships for sustainable energy projects; and (c) increase relevant contributions to multilateral development banks. Among the concrete steps taken by Switzerland to promote technology transfer are the establishment of the interdepartmental platform Renewable Energy and Energy Efficiency Promotion in International Cooperation, and Switzerland's Global Programme Climate Change. Moreover, as a leading clean technology export nation, Switzerland has significant levels of climate finance from private sources.

125. Switzerland has developed a national adaptation strategy – a framework for coordinated actions in responding to climate change at the federal level. Sectors vulnerable to climate change have been identified, and sectoral adaptation measures have been defined in the action plan (the second part of the national adaptation strategy, which was adopted on

9 April 2014). Assessment of climate change risks and opportunities as well as pilot programmes implementing the adaptation strategy in practice are ongoing. New climate change scenarios for Switzerland published in 2011 provide the basis for climate change impact studies, and a quantitative assessment of the impacts of climate change has been finalized recently.

126. In its NC6, Switzerland presents its activities and initiatives related to RSO as well as to education, training and public awareness. The ERT acknowledges that Switzerland is among the leading countries in the field of systematic observation and welcomes its support to developing countries to establish and maintain observing systems. Numerous activities related to education and public awareness have been carried out in Switzerland, and many of them are jointly supported by federal, cantonal, communal and private sector agencies.

127. Supplementary information under Article 7, paragraph 1, of the Kyoto Protocol on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol is provided by the Party in its 2013 annual submission.

128. In the course of the review, the ERT formulated several recommendations relating to the completeness and transparency of Switzerland's reporting under the Convention and its Kyoto Protocol. The key recommendations[5] are that Switzerland:

(a) Improve completeness of reporting by including in the next NC a clarification of how it has determined that the financial resources it has provided are "new and additional";

(b) Improve the transparency of reporting by including in the next NC the following information:

(i) Additional information regarding domestic and regional legislative arrangements, in particular regarding enforcement and administrative procedures linked to its domestic and regional legislative arrangements;

(ii) The steps it has taken to promote and/or implement any decisions by IMO in order to limit or reduce GHG emissions;

(iii) The historical total effect of its PaMs in accordance with the UNFCCC reporting guidelines on NCs;

(iv) Estimates for the total effect of implemented and adopted PaMs, by sector and by gas, for past and future years that use a consistent approach.

V. Questions of implementation

129. During the review, the ERT assessed the NC6, including supplementary information provided under Article 7, paragraph 2, of the Kyoto Protocol and reviewed information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol, with regard to timeliness, completeness, transparency and adherence to the reporting guidelines on NCs. No question of implementation was raised by the ERT during the review.

[5] The recommendations are given in full in the relevant sections of this report.

Annex

Documents and information used during the review

A. Reference documents

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

"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/CP/1999/7. Available at <http://unfccc.int/resource/docs/cop5/07.pdf>.

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

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

"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention". Annex to decision 23/CP.19. Available at <http://unfccc.int/resource/docs/2013/cop19/eng/10a02.pdf#page=20>.

FCCC/SBI/2011/INF.1. Compilation and synthesis of fifth national communications. Executive summary. Note by the secretariat. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01.pdf>.

FCCC/SBI/2011/INF.1/Add.1. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Policies, measures, and past and projected future greenhouse gas emission trends of Parties included in Annex I to the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a01.pdf>.

FCCC/SBI/2011/INF.1/Add.2. Compilation and synthesis of fifth national communications. Note by the secretariat. Addendum. Financial resources, technology transfer, vulnerability, adaptation and other issues relating to the implementation of the Convention by Parties included in Annex I to the Convention. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf01a02.pdf>.

FCCC/SBI/2011/INF.2. Compilation and synthesis of supplementary information incorporated in fifth national communications submitted in accordance with Article 7, paragraph 2, of the Kyoto Protocol. Note by the secretariat. Available at <http://unfccc.int/resource/docs/2011/sbi/eng/inf02.pdf>.

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

FCCC/IRR/2007/CHE. Report of the review of the initial report of Switzerland. Available at <http://unfccc.int/resource/docs/2007/irr/che.pdf>.

FCCC/IDR.5/CHE. Report of the in-depth review of the fifth national communication of Switzerland. Available at <http://unfccc.int/resource/docs/2010/idr/che05.pdf >.

Sixth national communication of Switzerland. Available at <http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/che_nc6_opt.pdf>.

2013 GHG inventory submission of Switzerland. Available at <http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php>.

B. Additional information provided by Switzerland

Responses to questions during the review were received from Ms. Marjorie Perroud (Federal Department of the Environment, Transport, Energy and Communications, Federal Office for the Environment, Climate Unit), including additional material on updated policies and measures, greenhouse gas projections and recent climate policy developments in Switzerland. The following documents[1] were also provided by Switzerland:

CH2011. 2011. *Swiss Climate Change Scenarios CH2011*. Zurich, Switzerland: C2SM, MeteoSwiss, ETH, NCCR Climate and OcCC.

CH2014-Impacts. 2014. *Toward Quantitative Scenarios of Climate Change Impacts in Switzerland.* Bern: OCCR, FOEN, MeteoSwiss, C2SM, Agroscope and ProClim.

Prognos 2012. *Die Energieperspektiven für die Schweiz bis 2050 – Energienachfrage und Elektrizitätsangebot in der Schweiz 2000-2050*. Prognos AG im Auftrag des Bundesamtes für Energie, Basel.

Swiss Confederation. 2012. *Adaptation to Climate Change in Switzerland. Goals, Challenges and Fields of Action.* First part of the Federal Council's Strategy. Adopted on 2 March 2012. Bern: Federal Office for the Environment. Available at <http://www.bafu.admin.ch/publikationen/publikation/01673/index.html?lang=en>.

Swiss GCOS Office. 2011. *Swiss GCOS Data in International Data Centers (GCOS Switzerland)*. Zurich, Switzerland: MeteoSwiss. Available at <http://www.gcos.ch/>.

[1] Reproduced as received from the Party.