

Informal Data Submission of Switzerland

2 October 2009

Subject: List of data/information for facilitation of further consideration of the LULUCF options

Ad-Hoc Working Group on further commitments for Annex I Parties under the Kyoto Protocol AWG-KP 9 Land-use, land-use change and forestry LULUCF

The AWG-KP encouraged Parties to make informal data submissions before its ninth session providing country-specific information on LULUCF and specifically on the forestry sector. Switzerland welcomes this opportunity to provide those data as well as to assess the implications of the accounting options under discussion.

Data on emissions and removals

In the base year 1990 the entire LULUCF sector, including forest management as well as agricultural activities, amounted to 2.4 Mt of CO₂ of removals from sinks¹. Almost all Swiss forests are managed and Swiss forests were in the base year 1990 a sink amounting to 3.5 Mt of CO₂. The agricultural sector was in 1990 a source of 0.6 Mt of CO₂. Switzerland's total CO₂ emissions in 1990 amounted to 50.4 Mt CO₂ including LULUCF and 52.7 Mt CO₂ excluding LULUCF.

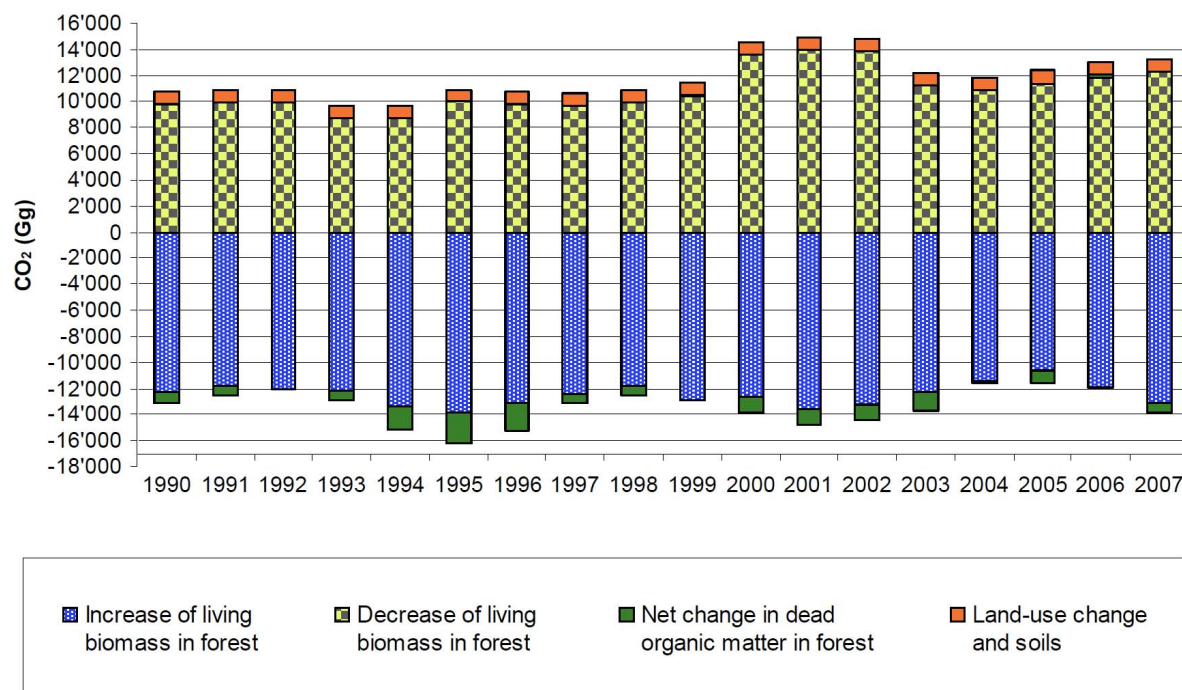


Figure 1: (i) CO₂ removals due to the increase (growth) of living biomass on forest land, (ii) CO₂ emissions due to the decrease (harvest and mortality) of living biomass on forest land, (iii) net CO₂ emissions and removals due to changes in dead organic matter on forest land, and (iv) net CO₂ emissions due to land-use changes, use of soils, and agricultural lime application, 1990–2007. Note that except for 1999 and 2006 net changes in dead organic matter are a sink of carbon (Switzerland's National Inventory Report 1990-2007).

¹ All estimates were made in accordance with KP accounting rules and IPCC Good Practice Guidance. However, numbers are given both in Mt and Gg (1 Mt corresponds to 1'000 Gg of CO₂ or CO₂-eq)

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Since 1990 the net balance from the LULUCF sector has been fluctuating between removals of 5.5 Mt of CO₂ and emissions of roughly 1.1 Mt of CO₂ with an average of 1.5 Mt of CO₂ of removals between 1990 and 2007 (see Figure 1).

Based on the three national forest inventories plus forest and wood sector data Switzerland has developed models that allow to hindcast as well as to project into the future the development of emissions from sources and removals from sinks in the forestry sector. Those models allow also to factor in climatic effects and to consider the effects from various harvesting and management scenarios for the future (Table 1).

Table 1: Mean reported and projected values for forest and agricultural sector in Mt CO₂ eq.*

Category Activity	1990	2000	2004	2007 [‡]	2010	2015	2020
Afforestation	-0.03	-0.05	-0.06	-0.07	-0.80	-0.90	-1.00
Deforestation	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Forest Management	-3.49	-0.39	-0.83	-1.75	0.41	0.27	0.95
Cropland Management	0.61	0.59	0.58	0.58	- [†]	- [†]	- [†]
Grazing land management	0.02	0.09	0.09	0.09	- [†]	- [†]	- [†]
Wetland management	0.00	0.02	0.02	0.01	- [†]	- [†]	- [†]
Settlements	0.40	0.35	0.35	0.33	0.33	0.32	0.31
Total LULUCF	-2.36	0.74	0.29	-0.66	-[†]	-[†]	-[†]

* Positive values refer to net emissions, negative ones to net removals. Values are either from “Switzerland’s National Inventory Report 1990-2007” or national projection scenarios for the forest sector.

[‡] Data from last year for which data are available as from latest NIR made to the UNFCCC secretariat on 15th April 2009. All later years are projections based on model calculations.

[†] No projections available

Uncertainty estimates were made according to IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry 2003. They amount to 40% for the activities Forest Management and Deforestation and 45% for afforestation. The uncertainty for Cropland Management, Grazing land management, and Wetland management amounts to 40%, 50%, and 56%, respectively. The uncertainty for cropland remaining cropland is 30% (activity data) and 25% (emission factor). The corresponding values for grassland remaining grassland and wetland remaining wetland are 5 and 50% (GL) and 25 and 50% (WL). The uncertainty in the Settlements sector is estimated to amount to 50%.

In 2007 the change in the national Green-house gas balance relative to 1990 was +0.49% including LULUCF and -2.74% excluding LULUCF.

Inter-annual variability

Inter-annual variability is very high in Switzerland (Figure 1) and depends mainly on climate variability, harvesting and changes in the dead wood pool. The variability in CO₂ removals or emissions from living biomass ranges from highest removals in 1994 of 4.5 Mt of CO₂ to a small source of emissions in 2000 of 0.8 Mt CO₂. Changes in dead organic matter vary between no changes in 1999 and net removals of -2.4 in 1995. Due to extreme events such as storm Vivian in 1990 and storm Lothar in 1999, the inter-annual variability is still considerable, despite having calculated all forest carbon pools using three-year moving

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averages. Calculations for agriculture do not include inter-annual variability as fixed biomass and soil carbon values are used for the different land-use categories.

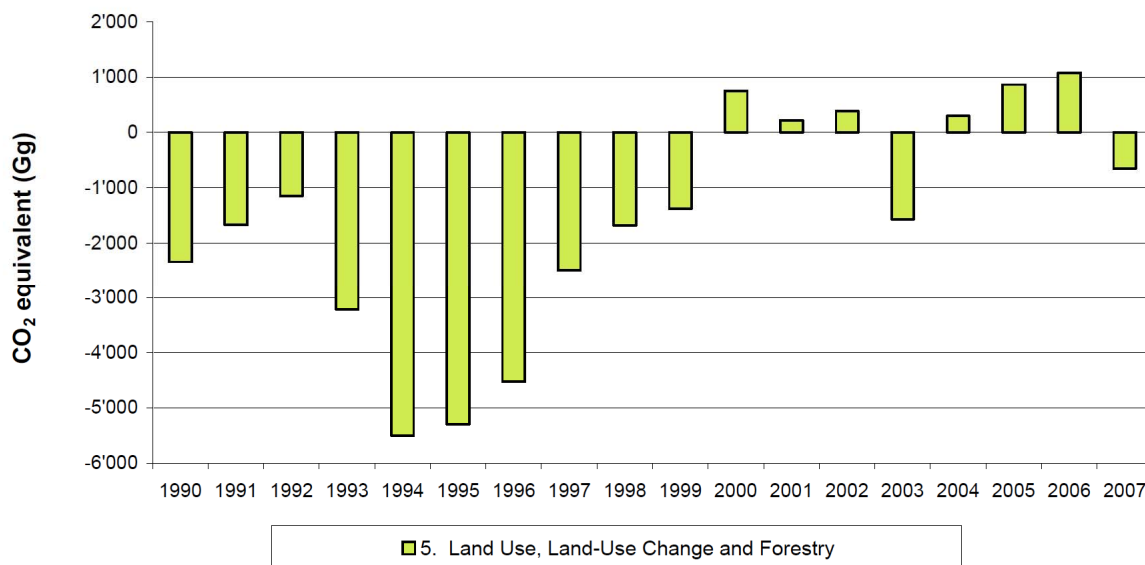


Figure 2: Switzerland's net CO₂ balance of source category 5 "Land Use, Land-Use Change and Forestry" 1990–2007 (in Gg CO₂-eq²). Positive values refer to emissions, negative values refer to removals.

"Force Majeure" events since 1990

Between 1990 and 2007 two major storm events, named Vivian (1991) and Lothar (1999) occurred in Switzerland. These storm events were followed by bark beetle infestations which were a direct result of the damages caused by the storms. Thus, the CO₂ released because of the storms includes the bark beetle infestations.

Magnitude of storm events Vivian and Lothar and total Swiss CO₂ emissions and removals in 1990

	Vivian	Lothar
Total volume of timber impacted [Mm ³] by storm events and bark beetle infestations	6.9	17.3
Total emissions from above impacts [Mt CO ₂]	9.5	23.8
Magnitude relative to total 1990 emissions (%) including LULUCF	18.8	47.2
excluding LULUCF	18.0	45.2

Harvested Wood Products

Depending on the accounting approach, an increase in HWP stock could result in temporary removals of 0 to -0.5 Mt CO₂ eq³. The uncertainty of these estimations, however, is very high.

² 1'000 Gg correspond to 1 Mt

³ Taverna et al. (2007) The CO₂ Effects of the Swiss Forestry and Timber Industry. Environmental Studies, no. 0739. Federal Office for the Environment, Bern, (page 58).

Information on future emissions and removals from Forest Management

The present age structure in Swiss forests is the result of a Swiss Forest Policy that has successfully promoted the increase in forest stocks. Wood Policy has for years promoted more harvesting to avoid the underutilization of the renewable resource wood. Only recently has this policy lead to some changes in harvesting intensity, but this trend is now expected to continue at least in the near future. According to recent projections, Switzerland's forests are therefore likely to become a net source of emissions, perhaps by as early as 2013. With continued trends in consumption, projections indicate that harvesting will equal total yearly gross-increment possibly by 2025.

Accounting Approaches:

Discount rate, forest sector only: As Switzerland has proposed earlier and is proposing now, a discount rate is to be applied to removals from sinks, to factor out windfall effects and emissions from sources to factor out natural disturbances (see also previous submissions). If applied to the period from 1990 to 2007, on average a discount rate of e.g. 85% would have resulted in an annual reduction of the removals by sinks of about 1.4 Mt of CO₂. The projected mean annual net emission for 2013-2020 is 0.5 Mt of CO₂. With, the application of a discount rate of e.g. again 85% this would reduce the emissions to 0.07 Mt of CO₂. If a storm comparable to the Hurricane Lothar occurs, this would result in emissions of roughly 24 Mt of CO₂. Applying a discount rate of 85% reduces these debits to 3.6 Mt CO₂.

Bar approach, forest sector only: A 1990 historic reference level from forest land amounts to - 3.5 Mt of CO₂ of removals from sinks. Depending on the options of the bar approach, debits would be 0.5, 3.8, or 4.0 Mt of CO₂, respectively. A base period 2001-2005 historic reference level from forest land amounts on average to -1.1 Mt of CO₂ of removals from sinks. Depending on the options of the bar approach, debits would be 0.5, 1.5, or 1.6 Mt of CO₂, respectively. A base period 2008-2012 historic reference level from forest land is likely to amount on average to -0.4 Mt of CO₂ of removals from sinks. Depending on the options of the bar approach, debits would be 0.5, 0.9, or 0.9 Mt of CO₂, respectively.