

# Greenhouse gas dynamics of different forest management and wood use scenarios in Switzerland

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## Abstract

An increased use of wood products and an adequate management of forests can help to mitigate climate change. However, planning horizons and response time to management actions in forestry are usually long and the respective GHG effects related to the use of wood depend on the availability of wood. Therefore, an integral long-term strategic approach is required to formulate the most effective forest and wood management strategies for the mitigation of climate change.

The greenhouse gas (GHG) dynamics related to the production, use and disposal of wood products are manifold and show a complex time pattern. On the one hand, wood products can be considered as a carbon pool, as is the forest itself. On the other hand, an increased use of wood – though related to fossil fuel emissions from the production of wood products – can lead to the substitution of usually more energy-intensive materials and to the substitution of fossil fuels when the thermal energy of wood is recovered. Country-specific import/export flows of wood products and their alternative products as well as their processing stage have to be considered if substitution effects are accounted for on a national basis.

We will present an integral model-based approach to evaluate the GHG impacts of various forest management and wood use scenarios, with the following key characteristics: 1) combined consideration of climate relevant aspects of forestry and the use and disposal of wood; 2) consideration of pool effects in buildings and all possible energetic and material-related substitution effects related

to the use of wood; 3) consideration of material substitution effects on a building products level based on a potential analysis; 4) use of scientifically based independently compiled life cycle assessment data for all products; 5) current practice assumptions on substituting products; 6) consideration of all carbon pools in the forest, including soil organic carbon; 7) spatial distinction of GHG effects occurring within the country and abroad, taking into account the foreign trade balance; 8) calibration of the model with data sets for the wood pool in buildings since 1900; 9) adaptability of the models and data to other countries.

Our approach allows us to understand the complex temporal and spatial GHG emission and removal patterns including trade-offs of different forest management and wood use strategies. The following recommendations have been developed on the basis of our models in order to optimize the contributions of the forestry and timber sector to mitigate climate change: (1) the maximum possible, sustainable increment should be generated in the forest; (2) this increment should be harvested continuously; (3) the harvested wood should be processed in accordance with the principle of cascade use, i.e. first be used as a material as long as possible (4) waste wood that is not suitable for further use should be used to generate energy.

## Literature

Taverna, R., P. Hofer, F. Werner, E. Kaufmann and E. Thürig. 2007. CO<sub>2</sub> Effects of the Swiss Forestry and Timber Industry. Environmental Studies No 0739, Federal Office for the Environment (BAFU), Bern.

**Werner, F., R. Taverna, P. Hofer, E. Kaufmann and E. Thürig.** 2009. National and global greenhouse gas dynamics of different forest management and wood use scenarios: a model-based assessment. *Environmental Science & Policy*, submitted.