Uncertainty Ranges and Correlations Assumed in Tier 2 Studies of Several European Countries

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Abstract

Tier 2 studies have been carried out since the end of the 1990's in various European countries, in response to the IPCC report 'Good practice Guidance and Uncertainty Management in National Greenhouse Inventories'. However, there is a lack of a clear overview of the assumptions, uncertainty ranges and correlations that are being used by the different countries. Such an overview can help to understand the differences in uncertainties reported in the national inventories and provide insights for future studies.

The goal of our research is twofold. Firstly, to compare the differences in uncertainty ranges, probability distribution functions and correlations used in the Tier-2 analyses of six European countries (Austria, Flanders (Belgian province), Finland, the Netherlands, Norway and the United Kingdom). Secondly, to assess the influence of the difference in the assumptions on the differences in the uncertainties of the total greenhouse gas emissions reported by the countries.

The comparison of uncertainties is not a straightforward task. First of all, Tier 2 studies are not conducted annually; the reference years for the countries differ. Furthermore, not all uncertainty ranges are directly comparable because the aggregation level at which they are reported differs by country. The comparison was done at the Dutch level of aggregation. The Flemish Tier 2 study used a more detailed level of aggregation; therefore the uncertainties were aggregated using simple error propagation techniques. The Austrian study was the only one taking systematic uncertainties explicitly into account. The uncertainties for the UK are provided by fuel type, e.g. coal or natural gas, but not on a sector or sub sector level.

Our conclusions on the first research goal are as follows:
- The uncertainty ranges used in the Dutch Greenhouse Gas Emission Inventory are well in the range of the uncertainty ranges found in other European studies;
- The comparison is somewhat blurred due to differences in aggregation level and inclusion of systematic uncertainties in Austria;
- Correlations seem somewhat under addressed in most European Tier 2 studies.

The Monte Carlo analysis for the Netherlands led to an uncertainty in the total greenhouse gas emissions of 3.9 % (2 σ) without the category LUCF and 4.1 % with LUCF[1]. These uncertainty ranges are on a similar level as the uncertainty ranges for Austria without LUCF and only random uncertainties, for Flanders with LUCF and for Finland without LUCF. The large uncertainty in the

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[1] A. Ramírez et al. (2007), Monte Carlo analysis of Uncertainties in the Netherlands Greenhouse Gas Emission Inventory for 1990-2004, this conference

British total emissions (14 % with LUCF) is a result of the large uncertainties in the N_2O-emissions, mainly from the sub sectors nitric acid, soils and wastewater handling. Austria takes into account the systematic uncertainties and has a higher share of non-CO_2 greenhouse gas emissions, this results in a higher uncertainty (11 % with LUCF). In Finland the larger uncertainty (15 %) is caused by a large uncertainty in land use change and forestry (LUCF). The uncertainties and the share of non-CO_2 greenhouse gases in the Norwegian study are larger than in the Netherlands, causing a larger uncertainty in the total greenhouse gas emissions (17 % without LUCF).

Concluding, the major differences in the uncertainties in the total greenhouse gas emissions of the countries compared in this study can be explained by the magnitude of the uncertainty in their total N_2O emissions and the relative shares of non-CO_2 greenhouse gases in each National inventory.