

# **A shortcut method for estimating non-energy use and related CO<sub>2</sub> emissions: The NEAT-SIMP model**

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## **Abstract**

The correct accounting of worldwide anthropogenic CO<sub>2</sub> (carbon dioxide) emissions is essential for effective climate protection. To date, major uncertainties still exist regarding emissions from the non-energy use of fossil fuels, which accounts for around 5.8% of the total worldwide primary energy supply (TPES) in 2000. In this article we present a simplified model approach (NEAT-SIMP) for estimating total non-energy use and related CO<sub>2</sub> emissions. We apply NEAT-SIMP for the year 2000 to the 10 largest non-energy users, which are not included in Appendix I under the UNFCCC (United Nations Framework Convention on Climate Change) and as cross-check to 3 selected Annex I countries. Among these countries, we identify China to be by far the largest consumer of fossil fuels for non-energy purposes (195 Mt CO<sub>2</sub> equivalents), followed by Korea (80 Mt CO<sub>2</sub>) and India (56 Mt CO<sub>2</sub>). Consequently, China is also the largest emitter of non-energy use CO<sub>2</sub> resulting among all countries studied (118 Mt CO<sub>2</sub>). Our model results on total non-energy use deviate from official IEA (International Energy Association) data, mainly because the latter are inconsistent with regard to the system boundaries for non-energy use. Comparing NEAT-SIMP emission estimates with reference estimates for Annex I countries (i.e., Germany, Italy, and the Netherlands) shows generally good accordance with data from the IPCC-SA (IPCC-Sectoral Approach). We therefore argue that applying NEAT-SIMP is suitable for obtaining first estimates on total non-energy use and related CO<sub>2</sub> emissions for developing and newly developed countries for which detailed estimates according to the IPCC guidelines are generally non-existent. The model has nevertheless its limitations regarding the accuracy of estimated product use emissions and in cases where countries differ substantially regarding feedstock use for

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chemical production (e.g., as is the case for South Africa, where coal rather than oil-based hydrocarbons are used as feedstock in the chemical industry). Based on these findings, we conclude that, in spite of existing uncertainties, NEAT-SIMP is a valuable, useful, and easily applicable tool to assess non-energy use and related CO<sub>2</sub> emissions for any country in the world.