



Global and regional temperature metrics under a two-basket approach

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Climate and environmental policies and assessments including the Life Cycle Assessments (LCA) commonly employ a single basket approach, in which emissions of non-CO₂ components are aggregated into their CO₂ equivalents through emission metrics. Such metrics entail various assumptions, which can give rise to a large difference in metric values particularly for near-term climate forcers (NTCFs) (e.g., Tanaka et al., 2013). The difficulties in equating emissions of CO₂ and NTCFs led to a proposal of a two-basket approach, which allows emission conversions among species with comparable atmospheric lifetimes (e.g., Cherubini et al., 2014). Here we explore the feasibility of a two-basket approach in the context of LCA. We extract from a LCA database several representative energy-related emissions occurring at four different locations of the world and calculate their effects on the global and regional radiative forcing and temperature change. Such results are also used to derive emission metrics such as the Global Warming Potential (GWP), Global Temperature change Potential (GTP), and Regional Temperature change Potential (RTP) and we test the performance of the metrics under a two-basket framework. Computations are performed by the Aggregated Carbon Cycle, Atmospheric Chemistry, and Climate model (ACC2) (Tanaka et al., 2013) combined with results shown in Collins et al. (2013).

References

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