

Supplementary material: Importance of fossil fuel emission uncertainties over Europe for CO₂ modeling

February 2, 2009

This supplementary material provides additional figures to illustrate the results of the paper “Importance of fossil fuel emission uncertainties over Europe for CO₂ direct and inverse modeling: Model intercomparison”.

1 Emission inventories

Figure 1 illustrates the spatial differences between “IER_hourly” and “EDG_hourly” emission maps. Figure 2 illustrate for two countries the temporal variation of the aggregated fluxes for the different emission maps.

2 FFCO₂ concentration time series

Figures 3 and 4 illustrate the differences in daytime mean simulated concentrations between the different simulations. Figures 5 and 6 illustrate the hourly concentration differences for two particular weeks in July and January.

3 Comparison with FFCO₂ based on ¹⁴CO₂ observations

Figure 7 compares model FFCO₂ simulations with observations derived from ¹⁴CO₂ measurements.

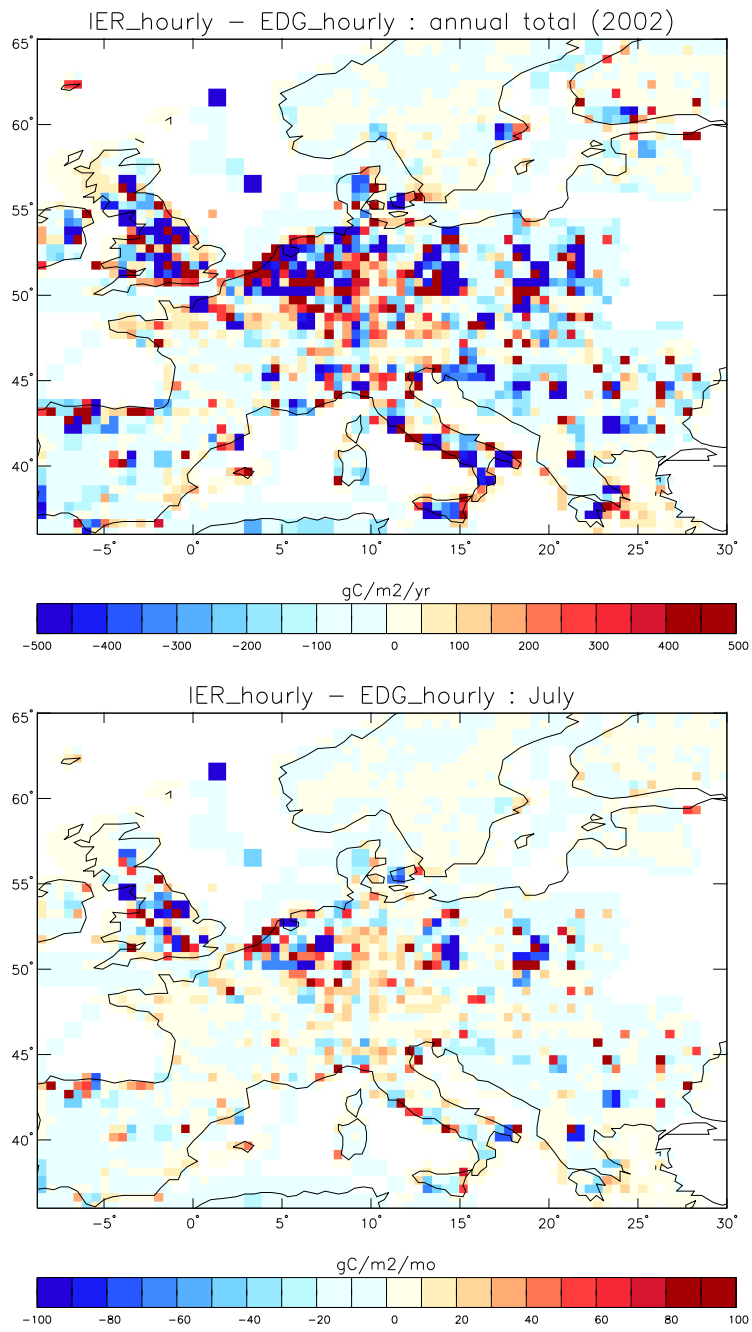


Figure 1: Annual (top) and July (bottom) differences in fossil fuel emissions between “IER_hourly” and “EDG_annual” estimates.

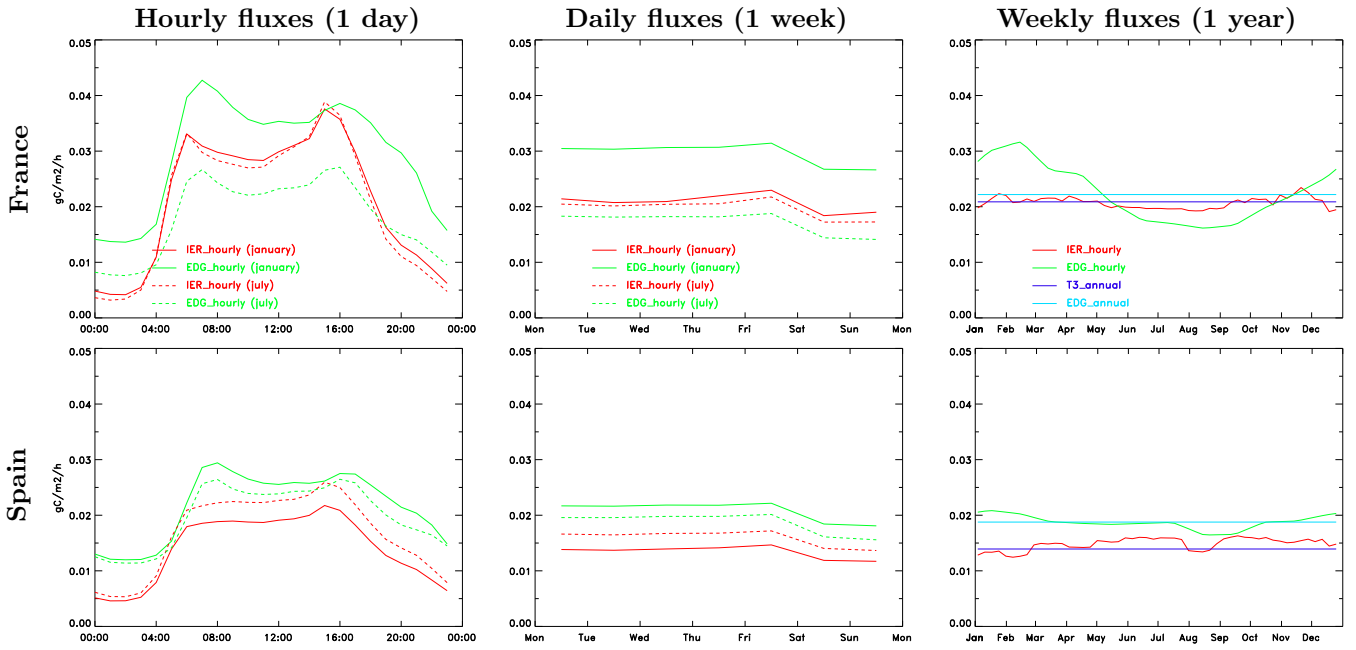


Figure 2: Temporal variation of the aggregated fluxes over different regions: France (top) and Spain (bottom). First and second columns represent the mean diurnal cycle and the mean weekly cycle, respectively, for “IER_hourly” and “EDG_hourly” in July and January; Third column represents the seasonal variations (weekly means) for the four emissions maps.

Schauinsland

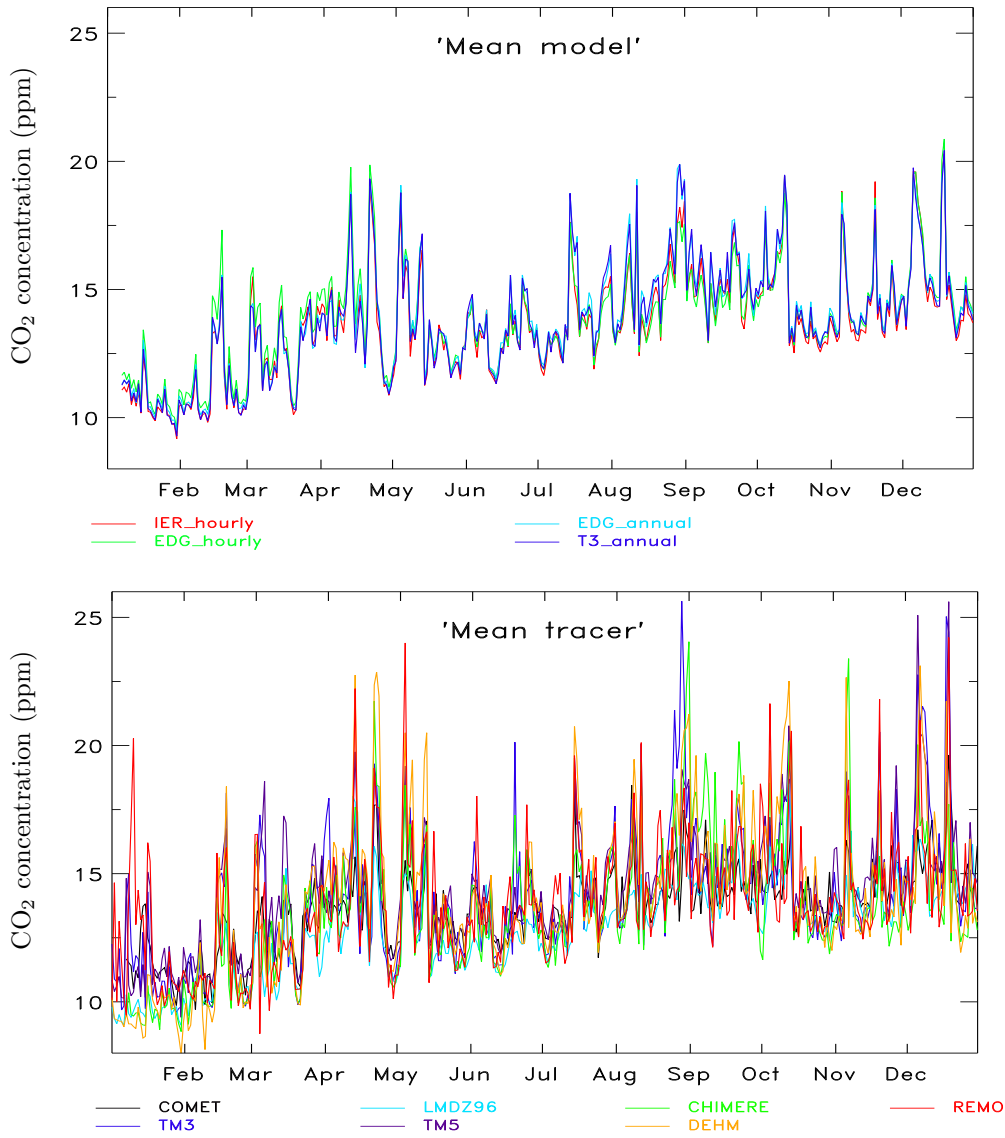


Figure 3: Daytime mean simulated concentration at Schauinsland (SCH): mean across all transport models for each emission map (top) and mean across all emission map for each transport model (bottom).

Schauinsland

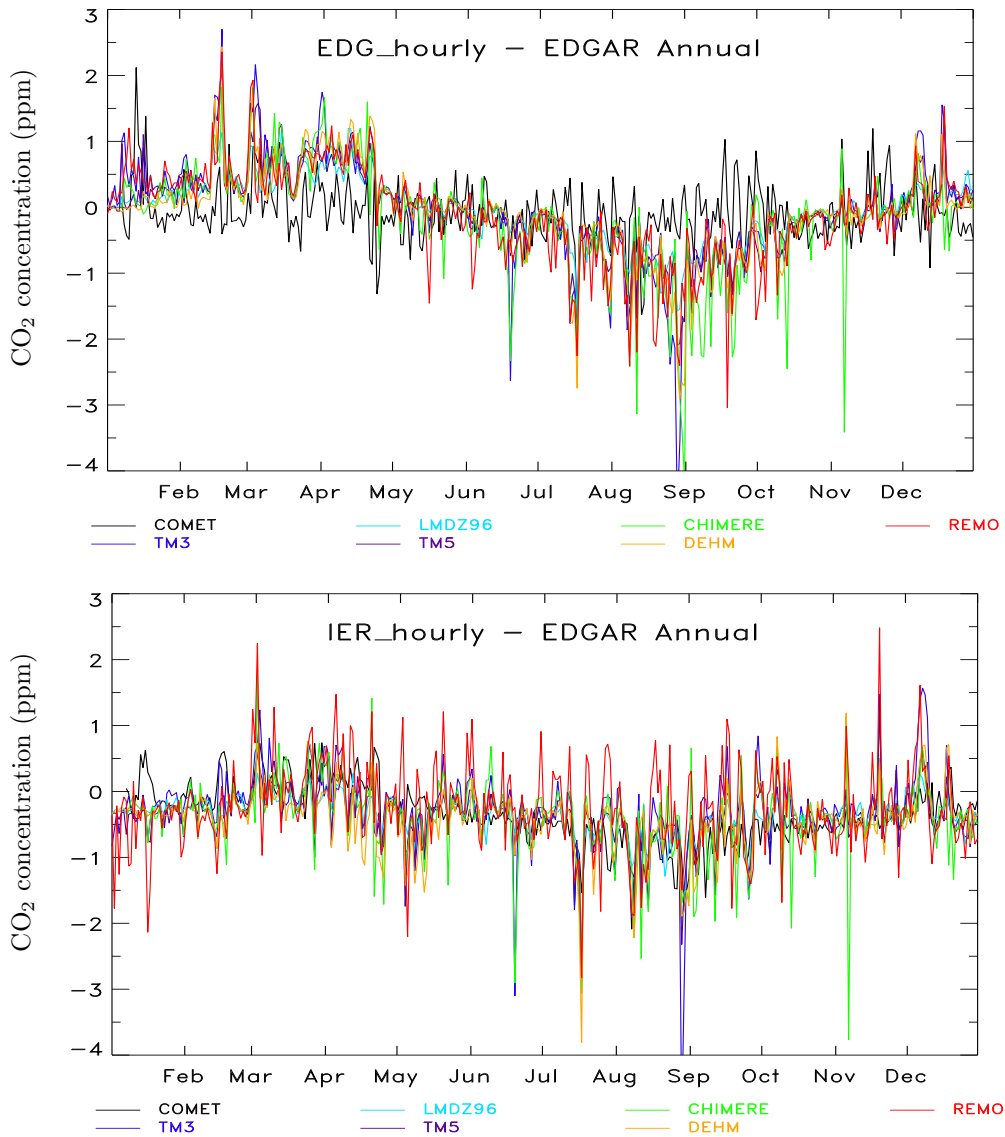


Figure 4: Daytime mean simulated concentration difference at Schauinsland (SCH) between “EDG_hourly” and “EDG_annual” fluxes (top) and between “IER_hourly” and “EDG_annual” fluxes (bottom).

Schauinsland

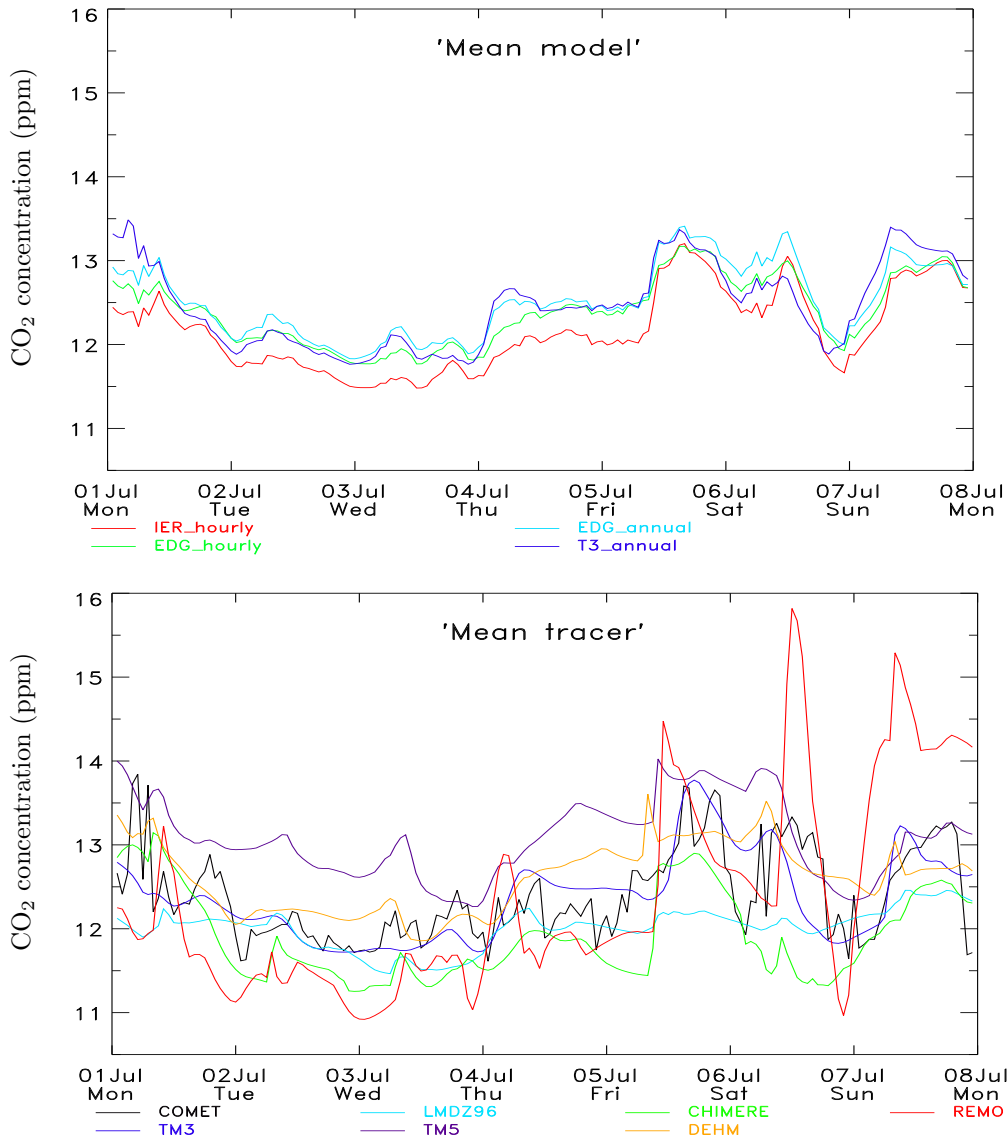


Figure 5: Hourly simulated concentrations at Schauinsland for 1 week in July: Top: Mean across all transport models for each emission map; Bottom: Mean across all emission maps for each transport model.

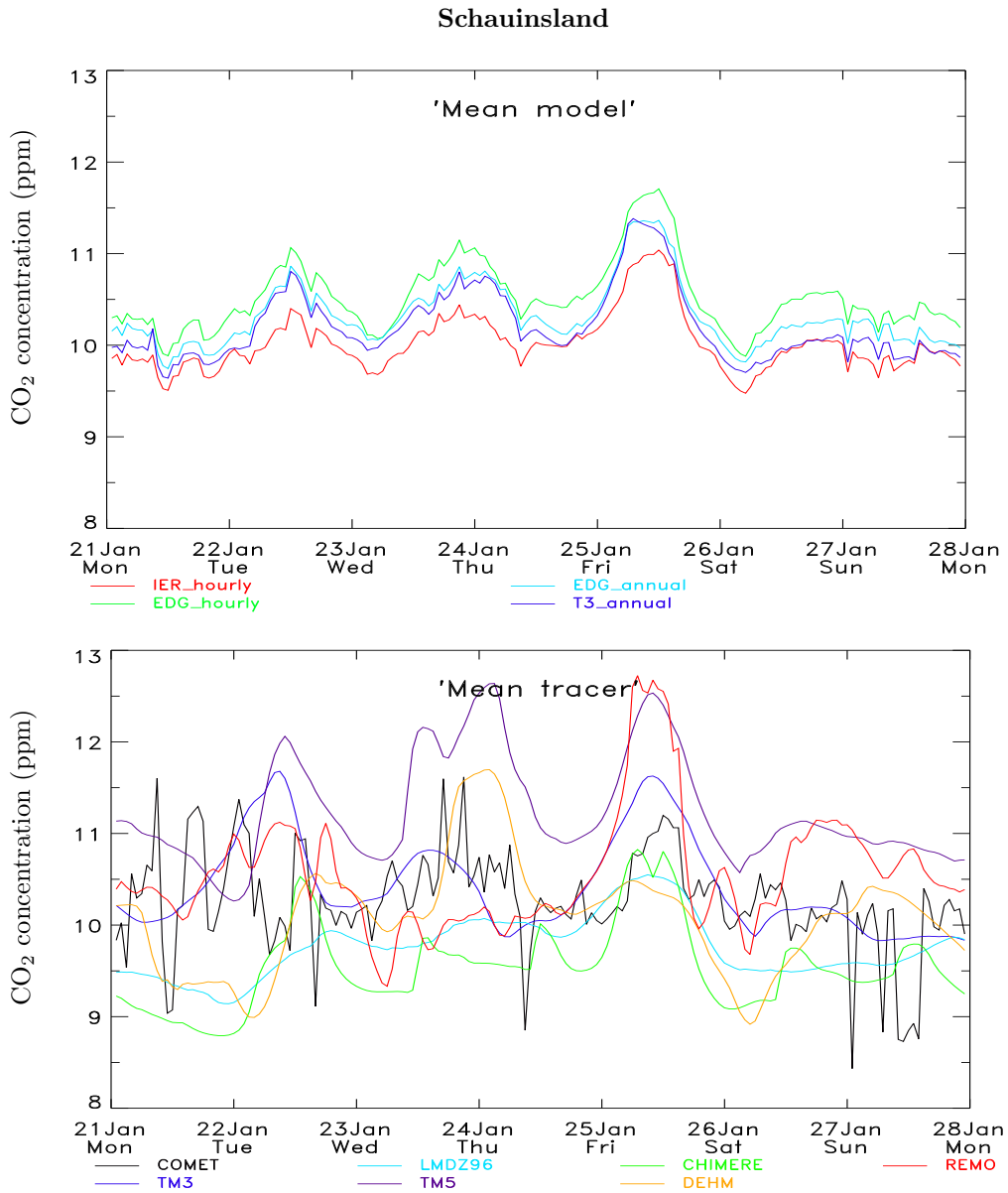


Figure 6: Hourly simulated concentrations at Schauinsland for 1 week in January: Top: Mean across all transport models for each emission map; Bottom: Mean across all emission maps for each transport model.

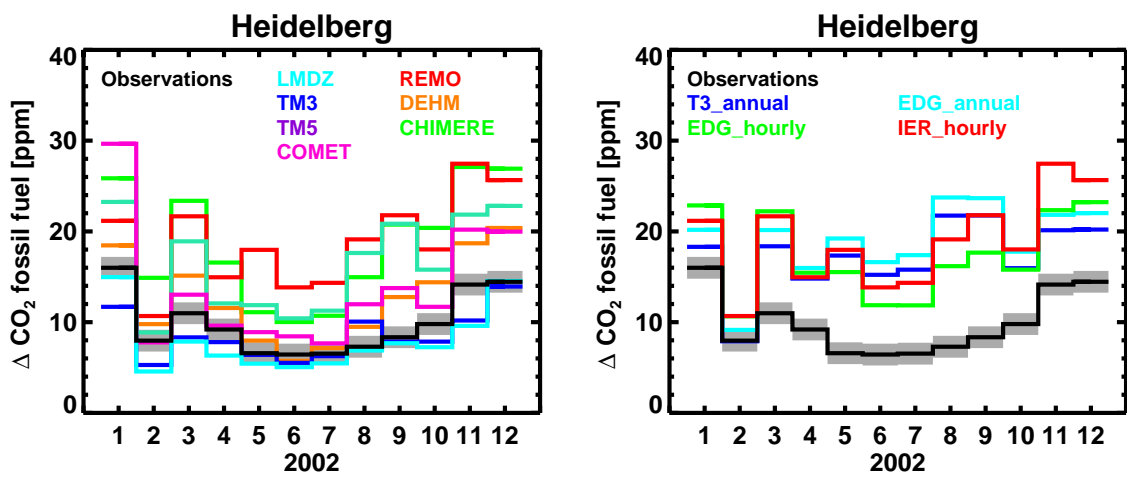


Figure 7: Comparison of monthly-integrated fossil fuel CO₂ (relative to Jungfraujoch) at Heidelberg based on ¹⁴CO₂ observations with simulations of all transport models using the “IER_hourly” emission map (left panel) and with simulations of the regional model REMO using the four different emission maps (right panel). An uncertainty estimate of observed monthly mean fossil fuel CO₂ is included (grey shading).