BOG Report

BOG 1 – Combustion CO_2

IPCC TFI Expert Meeting on Use of Atmospheric Observation Data in Emission Inventories

5-7 September 2022
WMO HQ, Geneva - Switzerland

IPCC TFI TSU

ipcc

INTERGOVERNMENTAL PANEL ON **climate change**

WMO   UNEP

Discussion Question #1

- ✓ **Assess and critique recent estimation techniques that utilise atmospheric observations as well as operational systems, platforms, instruments/sensors and methods/models for their potential to be used for the verification of national inventory sectoral emission estimates, consistent with the guidance provided in the 2019 Refinement**

BOG1 Question #1

- ✓ **Examples of utilising land-based, airborne and satellite data to estimate CO_2 emissions all yielding useful results in terms of verification**
- ✓ **Examples of both national and subnational applications**
- ✓ **No examples of estimates based on atmospheric observations that has the level of sectoral detail that is required in national emission inventories**
- ✓ **More potential for verification in countries with less developed statistical systems**
- ✓ **Can be used to identify gaps or areas for future improvements in the inventories**
- ✓ **While it may not be possible to significantly improve fossil CO_2 emission estimates for all countries, estimates derived using atmospheric observations can be used to build trust**

BOG1 Question #1

- ✓ **Challenge to distinguish between fossil and biogenic CO_2 – need to measure additional chemical or isotopic markers**
- ✓ **Probably a need to combine satellite data with land-based measurements**
- ✓ **Verifying emission trends might be easier than the emission level depending on the national circumstances**
- ✓ **Not clear what the uncertainties are of the estimates based on atmospheric observations – uncertainties need to be smaller or comparable to the inventory estimate for it to make sense for verification**
- ✓ **A lot of future work is planned and underway that will advance further the capabilities for atmospheric observations to provide more accurate verification**

Discussion Question #2

✓ **Assess and evaluate successful examples of:**
  ➢ **comparisons between atmospheric observations and national inventories that are consistent with good practice provided in the 2019 Refinement that have led to implemented or planned improvements in national inventories;**
  ➢ **available examples where emission factors derived from atmospheric observations have been incorporated into a bottom-up inventory framework**

BOG1 Question #2

- ✓ Some examples of good consistency between national inventories and estimates based on atmospheric observations – no known examples of where national inventories have been improved based on atmospheric measurements
- ✓ No known examples of atmospheric observations having been used to derive CO_2 emission factors for fuel combustion and applied in a national inventory
- ✓ Difficult for atmospheric observations to be used to derive emission factors for fuel combustion – could be different for other CO_2 emission sources, e.g. in connection with fugitive emissions from fuels
- ✓ Atmospheric observations could be used to identify incorrect fuel information, e.g. the share of biofuels in road fuels
- ✓ Atmospheric observations could be used to verify emissions from large point sources

Discussion Question #3

✓ **Assess the possibility that emerging datasets from atmospheric observations could be used to test and verify particular IPCC default values (emission factors) and associated uncertainties**

BOG1 Question #3

✓ **In terms of fuel combustion, it is unlikely that atmospheric observations could be used to verify IPCC default emission factors as the emission factors are based on carbon content in specific fuels**

Discussion Question #4

✓ **Discuss the use of gridding (spatial and temporal) of NGHGIs to allow comparison with atmospheric observation data**

BOG1 Question #4

- ✓ **Very useful – not necessarily just for modellers (e.g. local authorities and feedback to inventory compilers of gaps in knowledge)**
- ✓ **Lots of ongoing activities – important to share knowledge and data**
- ✓ **Requires a lot of data handling**
- ✓ **Balance between cost and benefit**
- ✓ **Important with close collaboration between inventory compilers and modellers**

Discussion Question #5

- ✓ **Discuss terminology and classifications of sources/sinks and associated natural and anthropogenic GHG fluxes to find a common understanding of consistency and differences in atmospheric observation data and GHG inventory estimates**

BOG1 Question #5

- ✓ Has not observed major issues at this meeting for CO2 from fuel combustion
- ✓ International transport is only included as a memo item in the national emission inventories
- ✓ Different methodological tiers – relevant for modellers to know, e.g. if using Tier 1 default EFs where full oxidation is assumed, If national or plant-specific EFs are used (Tier 2 or Tier 3), full oxidation may or may not be assumed
- ✓ Useful with a glossary
- ✓ Important to be clear on the difference between concentrations and emissions
- ✓ Very useful to have interactions between inventory compilers and modellers to enhance the common understanding of the issues

Thank you