UPDATE ON CONDENSABLES

JEROEN KUENEN

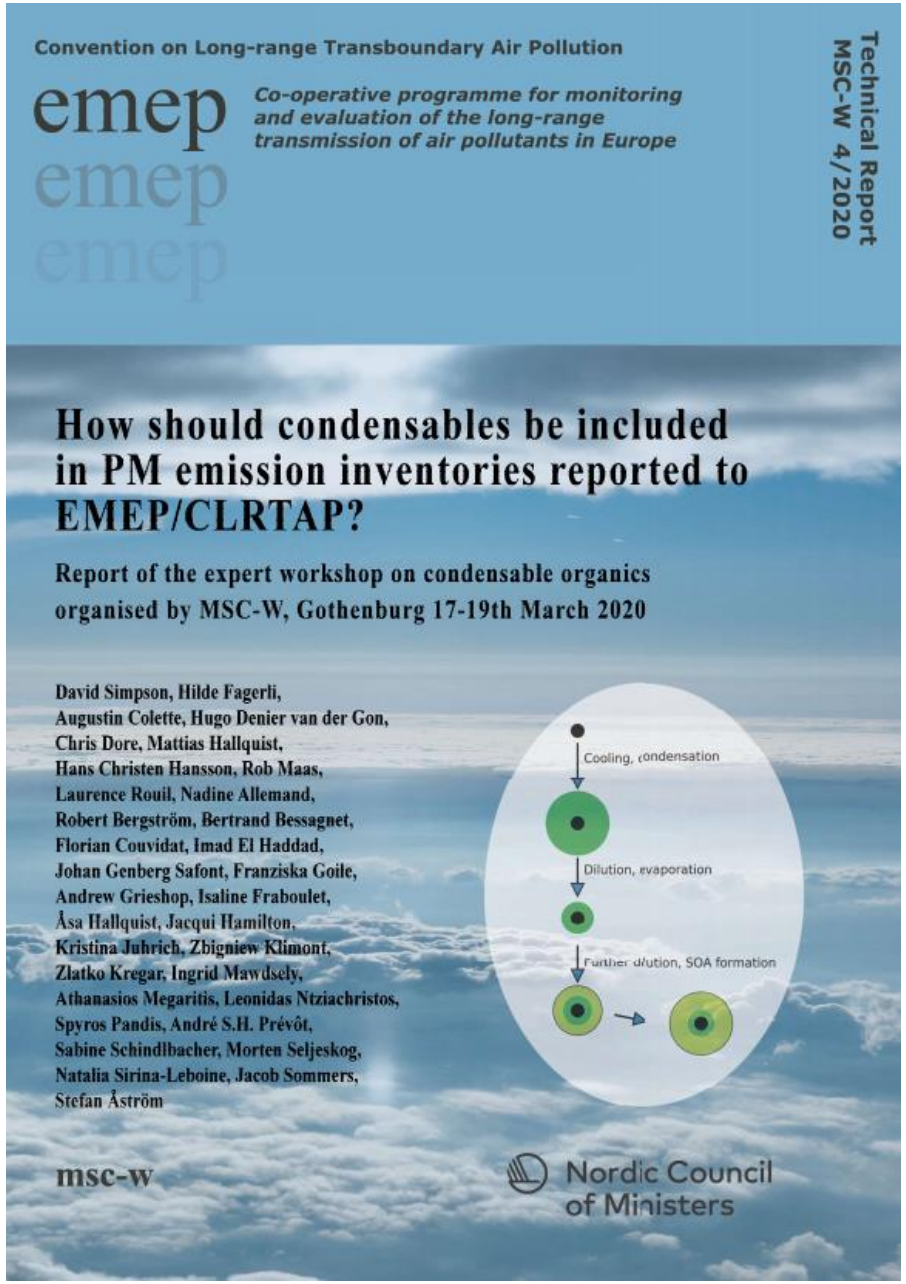
CONDENSABLES – THE ISSUE

- Condensable PM is formed directly after the emission, upon cooling of the hot flue gases
- Condensable PM needs to be included in models to assess the impacts of particulate matter as a whole
- Current emission inventories (in Europe as well as in individual countries) are a mix of “different PM’s” – dependent on measurement type or emission factor source, it may or may not include condensables
- These inconsistencies will lead to misleading modelling results and biases in the required distribution of abatement efforts across countries in IA models (e.g. GAINS)
- Given the developing discussion on condensables, awareness is rising and more countries do include condensables as part of their emission inventory
- But information is lacking in many instances, changing this takes time. Including condensables is not simply multiplying your emission inventory with a specific factor
- Politically also sensitive, large changes PM2.5 emissions will affect the pathway to reach NEC/Gothenburg ceilings
- A **dedicated workshop** was organised by EMEP/MSC-West on the topic (March 2020), attended by experts from various fields

CONDENSABLES WORKSHOP

- Key messages on the way forward for the next years:

1. Possible interim solution: countries report the condensable fraction separately from the solids using consistent (or at least clearly specified) methods would aid transparency. This might enable use of condensable EFs developed in some countries to gap-fill emissions in countries lacking in-country estimates of condensables.
2. Currently available scientific estimate (TNO Ref2 emissions) is a good no-regret step towards a harmonised emission methodology, but these top-down estimates should be increasingly replaced by national estimates once procedures for quantifying condensables in a more harmonised way are agreed on and implemented.
3. This needs detailed discussion among the emission inventory communities (e.g. TFEIP, TFTEI, national experts) as well as with modellers who will have to account for the complex issues regarding volatility within the condensables and PM fractions.
4. Longer term: how to deal with organic emission across the whole spectrum (low to high volatility)

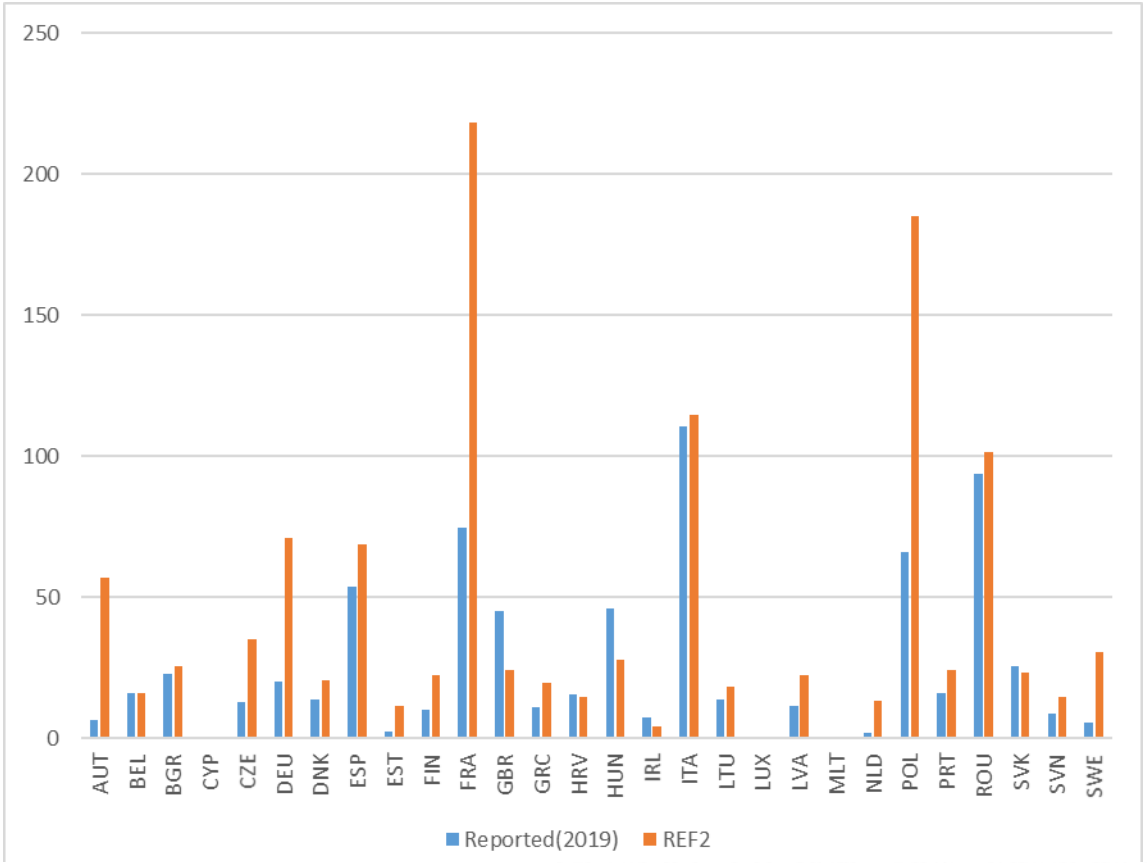


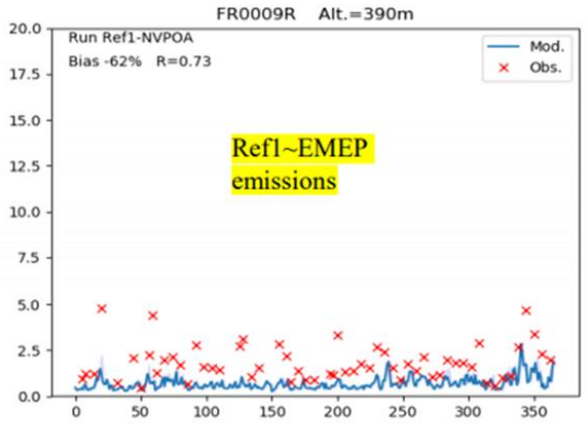
https://emep.int/publ/reports/2020/emep_mscw_technical_report_4_2020.pdf

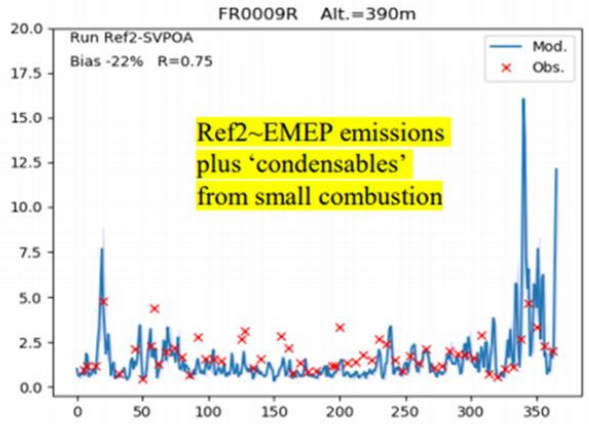
IMPACT ON EMISSIONS

- Alternative inventory (Ref2) developed for Europe, consistently including condensables for small combustion (GNFR C)
  - Fuel statistics, combined with appliance type split and emission factors based on the dilution tunnel approach
  - Following methodology in [Denier van der Gon et al., ACP, 2015]
- This alternative inventory has been used in multiple AQ modelling studies, showing significant improvements in comparison between modelled and measured PM levels
- Since 2020, for EMEP modelling reported data are replaced by REF2 to assess PM impacts and for the source receptor relations (GAINS model)

$PM_{2.5}$ emissions for 2015 (kton) from small combustion (GNFR C)

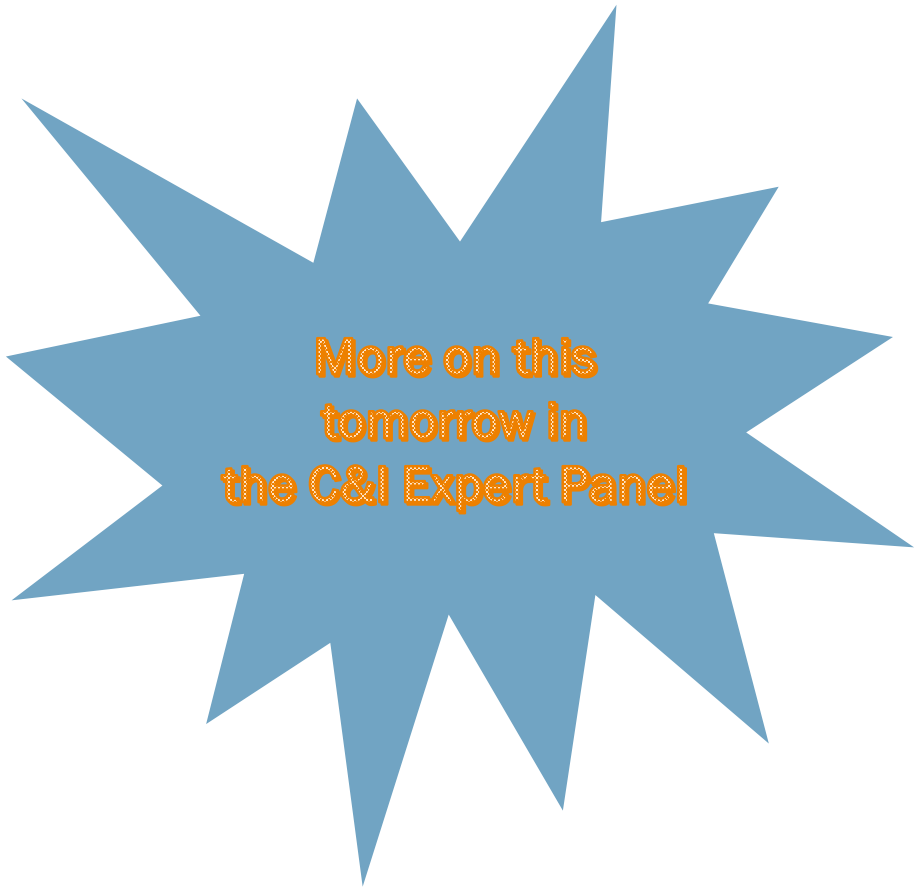






NEXT STEPS…

- Improve Ref2 for use with EMEP
- Incorporate country reported data where it can be confirmed that condensables are included
  - Assessment of reported emissions & activity data (IEF calculation)
  - Assessment of IIR: does this clearly state the inclusion of condensables in small combustion?
- Update the Guidebook as necessary



Please, clearly state in your IIR whether condensables are included (or not) for every relevant category!


THANK YOU FOR
YOUR TIME
TNO innovation for life