**POA emissions**

- Problems of OA emissions by now well known...
- Mainly semi-volatiles: SVOC
- Can be intermediate volatility VOC: IVOC
- Europe: Denier van der Gon et al., ACP, 2015, EMEP Reports 2015 2019, 2020, Ots et al., ACP, 2016, Jiang et al, 2019
- Basically, countries report apples and oranges!
Condensables “in” or “out” - it ain’t that easy!

- Emission factors depend on:
  - source
  - measurement conditions
  - Ambient temperature
  - Ambient $C_{OM}$
  - Operating conditions
  - etc.!

Needs pragmatic definitions!

Robinson et al., 2010, JAWMA
• Comparison to a consistent bottom-up highlights inconsistencies (yellow bars)
• TNO-newRC is the same method for all, but not the “truth” – Large uncertainties!... But equal
(Blue, orange and grey bars are official emissions for 2010. Yellow bars give TNOnewRWC)
Modelling of condensables, France (FR09)

Ref1-NVPOA

Ref2-SVPOA
The main questions:

- For which source categories are condensable organics important?
- How much condensables are produced from different:
  - combustion technologies?
  - measurement techniques?
- What is included in EMEP and other emission inventories?
- Can we specify the volatility distribution of condensables from major sources?
- Can we recommend a practical approach for inclusion (or exclusion) of condensables in (a) inventories, and (b) chemical transport models?

Workshop to bring together experts in:

- emission measurements,
- atmospheric chemistry,
- inventory experts, and
- Modellers

to systematically consider and recommend best approaches for dealing with semi-volatile emission with regard to PM2.5.

=> guidance for UN-ECE, EU
● ~35 experts, including: Chairs EMEP, TFIAM, TFMM, TFEIP, TFTEI
  ○ Centres: MSC-W, CEIP, CIAM; Inventories: TNO, CIAM, COPERT
  ○ European Commission, CONCAWE, US EPA
Key Messages (short version)

1. The current situation is untenable and unfair, in that the same activity produces very different PM emissions in national reporting.
2. Condensables should be included in future emission inventories and modelling.
3. If included, need to know how they are included!
4. The issues are complex! Emission factors depend on measurement technology and even weather!
5. Need to increase knowledge of activity data and condensables in national reporting and emissions methodologies.
6. Emission limit values for residential wood burning (eg EcoDesign) omit condensables. Need standards which are aimed at air quality issues.
Key Messages (short version)

7 Current PM-NMVOC split is artificial, and some organic compounds fall between the gaps. Ideally we would capture all compounds in emission inventories.

8 An interim solution might be to report PM component separately, e.g. EC, solid organic matter (OM), condensable OM, etc.

9 Don’t forget intermediate volatility compounds (IVOC))

10 Use of the TNO REF2 emissions is a good first no-regret step, but these should be replaced by national estimates in due course… see roadmap Fig.

11 Longer term: many activities needed!
   - See longer note
Key Messages (short version)

12 Roadmap
   • Next slides....

13 Policy makers to consider possible implications with respect to potential adjustments of policy targets and base-year emissions.

14 Process faces several competing challenges – e.g. speed versus practical difficulties and scientific completeness.
Roadmap – a cyclic approach?

Start with RWC and/or road transport

- First cycle 12 months?
- Top-down expert role in Year 1 can be large – e.g. TNO data set
- Invite improvement through a TFEIP cycle
- Repeat cycle when more data come in Year 2 or 3?
- Suggest milestones when data delivery is needed (e.g. EMEP meetings etc.)
- Needs guidance and support! Making the process depend on (only) voluntary contributions leads to a new fruit basket with apples & oranges and more….
- In parallel research programmes needed which fuels the progress & uptake of new things (e.g. from US)
- Needs activity/discussion among TFEIP, TFTEI and modellers.
Towards Transparency (essential) and choices (who does what?)

A flow chart as a way forward?

Towards Transparency (essential) and choices (who to do what?)

**Activity and statistics**

Allocate to appliance type (AT)
- e.g. 5 major categories (a-e)
- Open fire place, old stove, pellet stove etc.

Fuel specs?
- Pellets; dry wood, etc.?

How much wood (coal) used in residential combustion
- Country X in year Y?

Information needs to come from national agencies (reporting)

**Emission factors & emissions**

Spatial distribution of AT for country X;
- Fraction bad combustion

$A_a \times EF_a = \text{Emission}_a \pm y\%$

Uncertainty / range by type / by fuel quality

Emission of solid and condensable PM, various conditions & appliance types

Information from science / measurement programmes

**Expert (gap fill) and model modification & results**

Add volatility bins to CPM
- solid PM / EC + S/IVOC

Modify for ambient Temp.
- or climate zone?

Emission timing per hour
- e.g. HDD approach

Validate against observations incl. tracers

Measured concentrations PM,
- EC, BaP, BC, Levoglucosan etc.

Suggestion from Hugo Denier van der Gon

* Colours indicate different disciplinary groups; agencies; measurements; emission experts; modellers
Other comments

• Many countries will need help in implementing new methods for estimating condensables - this help should be available through comparison with data from similar countries, with Ref2 assumptions, the Guidebook, and from participants of this workshop.

• Much data and experience is available from the US EPA, and work towards consideration of this can begin now.

• Move towards more explicit PM emission split - SO4, EC, OM25_filt, OM25_condensables would help

• Generally - prepare for more detailed emission reporting requirements - nationally and in Guidebook.

• Don’t let the perfect be the enemy of the good!
The issues are COMPLEX!
Two days of (video) meeting are not enough!
The group of people assembled for the workshop is extremely well placed to tackle these issues in detail
Work has continued offline, addressing specific issues and other sources
Need for pragmatic solutions well understood
NMR report (covid-)delayed – now due end 2020
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Shame we missed Göteborg!