CCQM Workshop on Particle Metrology

Report from breakout group for Topic 1:
Particles suspended in air or other gases

Richard Brown

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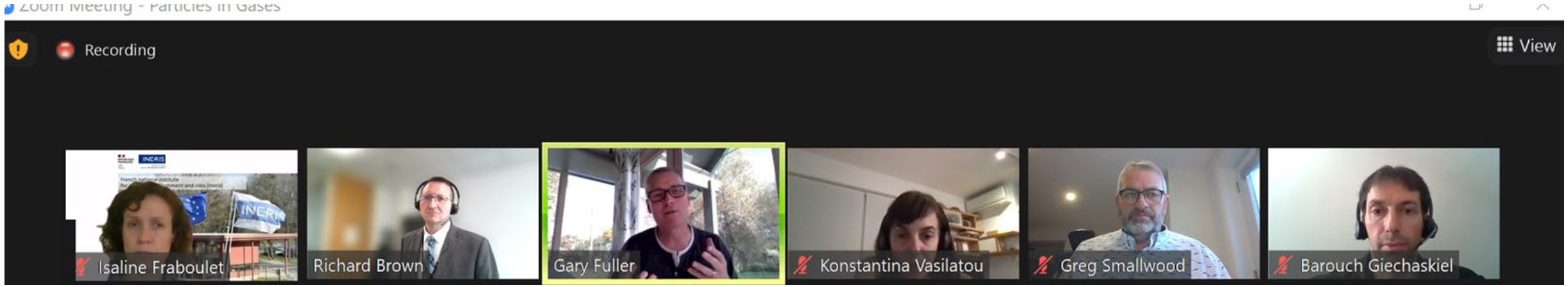
Particles suspended in air or other gases



5. PM Emissions from Residential Wood Combustion Appliances: Why and How to Characterize Condensables?

2. Five challenges of measuring $PM_{2.5}$ in the next decade

1. Overview of NMI/DI Measurement Capabilities and Activities

3. Metrology for Aerosol Emissions from Hydrocarbon Sources

4. Calibration procedures and challenges in the automotive field

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Perspectives

- There are many situations where lack of traceability and the high uncertainty of measurement are limiting factors
- For the stability and comparability of PM in gas measurements solving this is a necessary but not sufficient requirement
- The roles of sampling, real world measurement, experimental design and standardised methods should not be underestimated
- We may be able to provide traceability to SI units but we still need to grapple with effects of method defined measurands
- All particularly challenging as concentrations & regulatory limits get lower
- Undoubtedly there are some unknown unknowns

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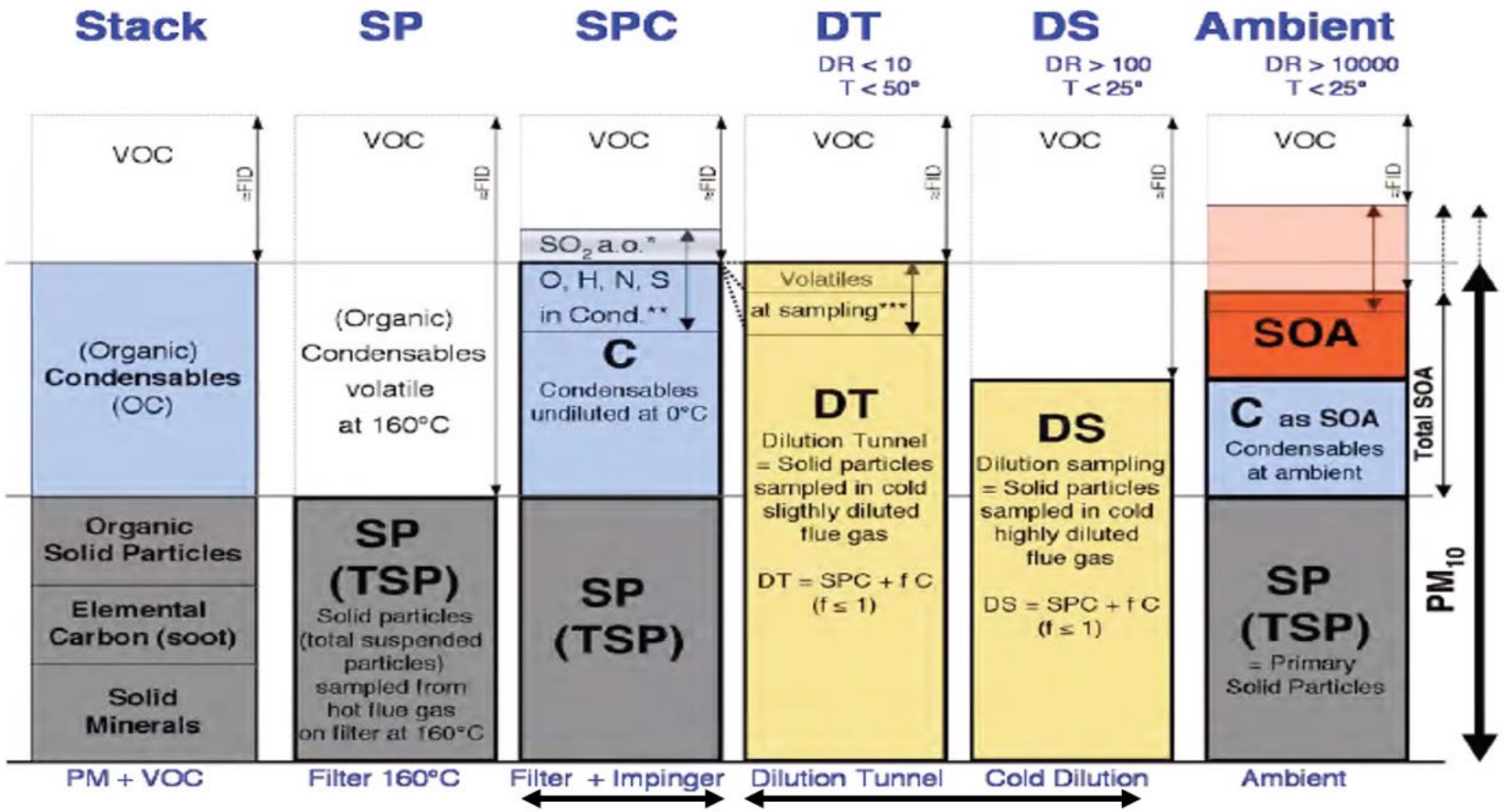
INERIS
maîtriser le risque pour un développement durable

Inclusion of condensables , a method dependant problematic



Source: Nussbaumer, 2008

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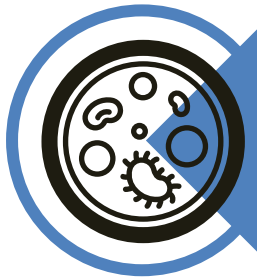
Measurement gaps and recommended actions

Extending and improving comparability (CCQM focus)



New metrological and scientific understanding (CCQM working with stakeholders)

Engagement with stakeholders and sectors (CCQM Task Groups)

Extending and improving comparability (CCQM focus)

- Traceability and uncertainty
  - Larger ranges (size and number)
  - Lower uncertainties
  - Traceability for emerging measurands (e.g. BC)
- Certified Reference Materials
  - Particle size & size distribution
  - Bioaerosols including pollen
  - Reference aerosols targeted to properties of interest
- Calibration Services
  - Optical properties of aerosols
  - Field calibration systems

New metrological and scientific understanding (CCQM working with stakeholders)

- Standard vocabularies and definitions
- Standardised methods
- Understanding method defined measurands, sampling & field measurement
- Microplastics in air
- Small sensors and hybrid measurement
- Validation of ML & AI techniques (e.g. for identifying pollen types)
- Measurements in harsh environments & condensables
- Compositional measurement of changing PM, high time resolution
- Intercomparison exercises

Engagement with stakeholders and sectors (CCQM Task Groups)

- Recommendation
  - **Create a Task Group on particles within CCQM GAWG to engage with stakeholders and address focussed challenges**
- Communities for engagement
  - Bioaerosol / pollen measurement community
  - Vehicle and aeroengine community
  - Stationary source emissions community
  - Researchers into air quality
  - Accreditation and standards bodies
  - Policy community (especially those developing PM and BC inventories & setting AQ limit values)
  - Photometry and radiometry community (for optical calibration)
  - Electrical science community (for electrometer calibration)