



Updates from FAIRMODE

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FAIRMODE colleagues

Modelling in the revised AAQD, highlights

There are **79 references** to modelling / modelling applications in the revised AAQD (in the current AAQDs there were 21 and 12 references, respectively).

‘Modelling application’ means application of a modelling system, understood as a chain of models and submodels, including all necessary input data, and any post-processing. (Art 2(24))

Clear requirement for Member States to **designate competent authorities** and bodies responsible for the promoting the accuracy of modelling applications. (Art 5(d))

In the absence of an EN standard on **modelling quality objectives**, Member States may choose the modelling applications they use, in accordance with Annex V. (Art 11, Annex V+VI)

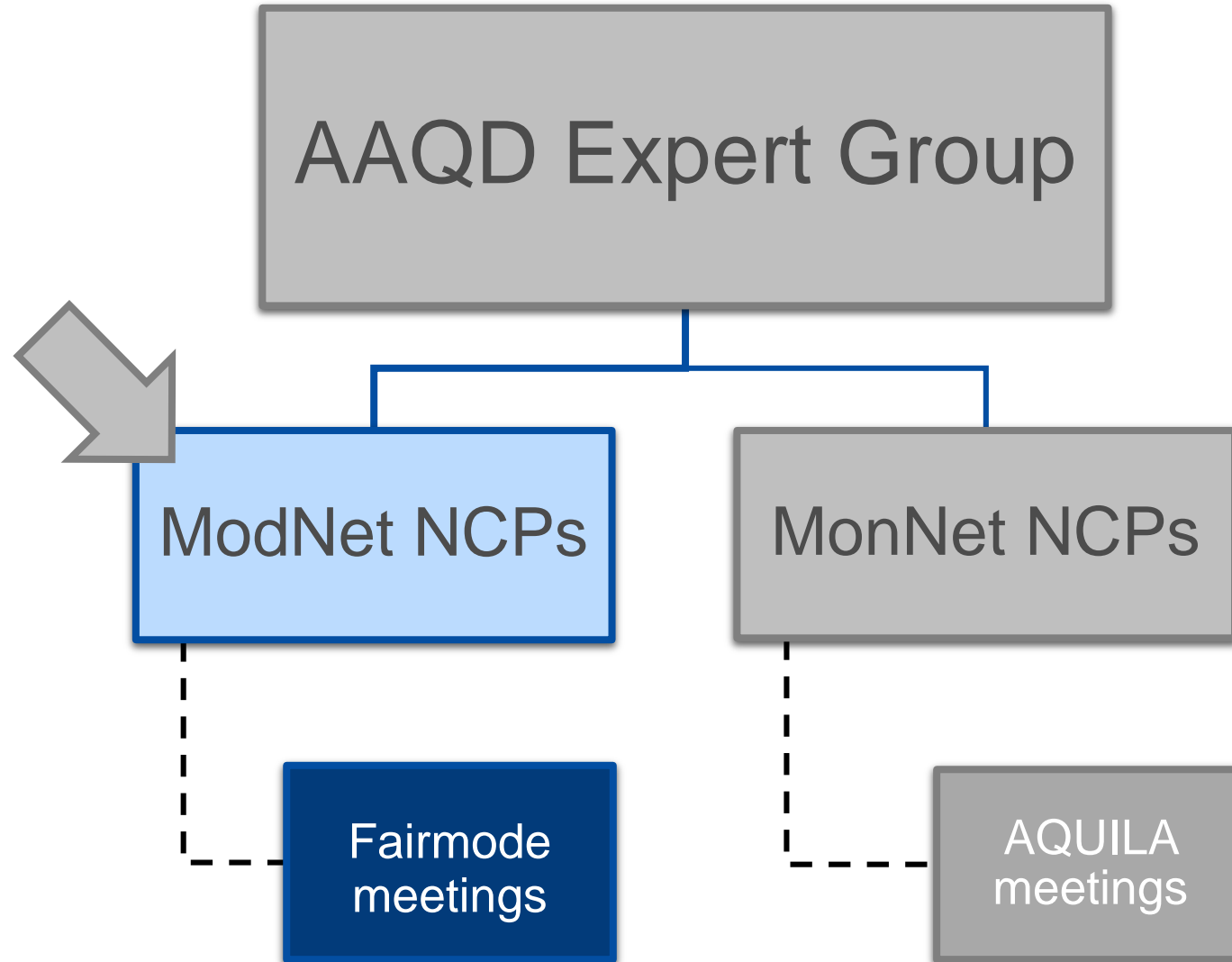
The Commission shall provide [...] **further technical details** for (a) modelling applications [...]; (b) determining the spatial representativeness of sampling points. (Art 8(7))

Towards (more) harmonised modelling

To promote and support the **harmonised use of scientifically sound air quality modelling**, the appropriate competent authorities and bodies shall ensure the following:

- a) that the designated reference institutions participate in the **European network of air quality modelling** set up by the Commission's Joint Research Centre;
- b) that **best practices in air quality modelling** identified by the network through scientific consensus are adopted in relevant applications of air quality modelling for the purposes of fulfilling legal requirements [...], without prejudice to model adaptations necessitated by singular circumstances;
- c) that the quality of relevant applications of air quality modelling is periodically checked and improved through **intercomparison exercises** organised by the Joint Research Centre;
- d) that the European network of air quality modelling be responsible for the **periodic review**, at least every 5 years, of the **ratio of modelling uncertainties** [...]

European network of air quality modelling



Current FAIRMODE structure

WG1 Source apportionment to support AQ management

- A.Clappier
- G.Pirovano

WG2 QA/QC of AQ assessment applications

- P.Thunis
- L.Tarrason

WG3 Quality control indicators for AQ forecasts

- A.Piersanti
- A. Monteiro

WG4 Microscale assessment

- F.Martin
- J.L. Santiago Del Rio

WG5 Planning

- S. Janssen
- J. Soares

WG6 Sensors and data-fusion

- S. Van Ratingen
- J.Wesseling

WG7 Compilation of high resolution emission inventories

- S.Lopez-Aparicio
- M.Guevara

WG8 Monitoring design, spat. rep. and exceed. indicators

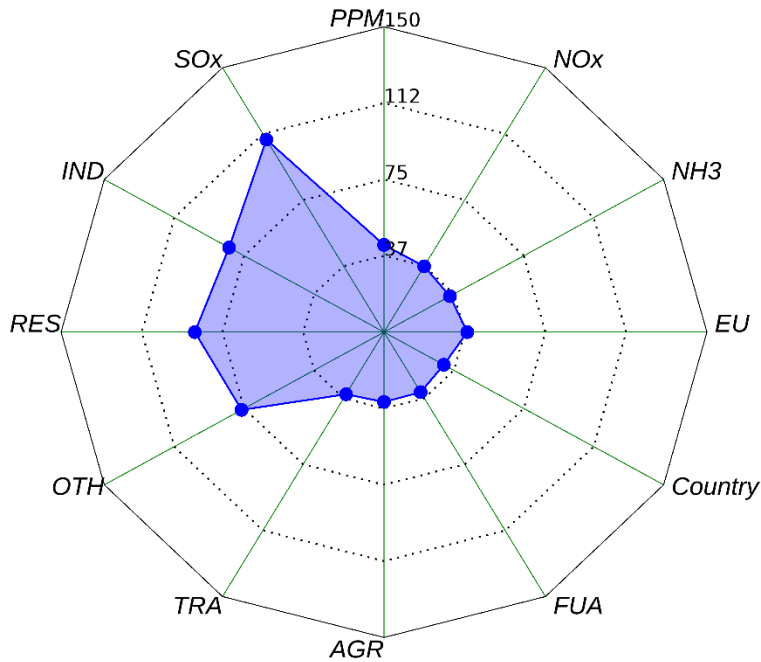
- M. Ross-Jones
- L.Tarrason

Current FAIRMODE structure



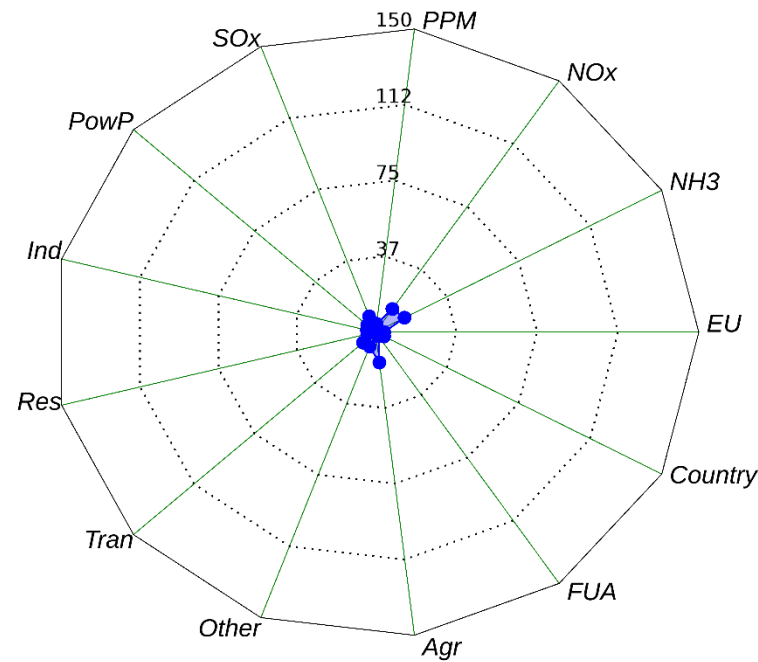
Robustness of source apportionment (across JRC PM2.5 Atlases)

Overall SA results



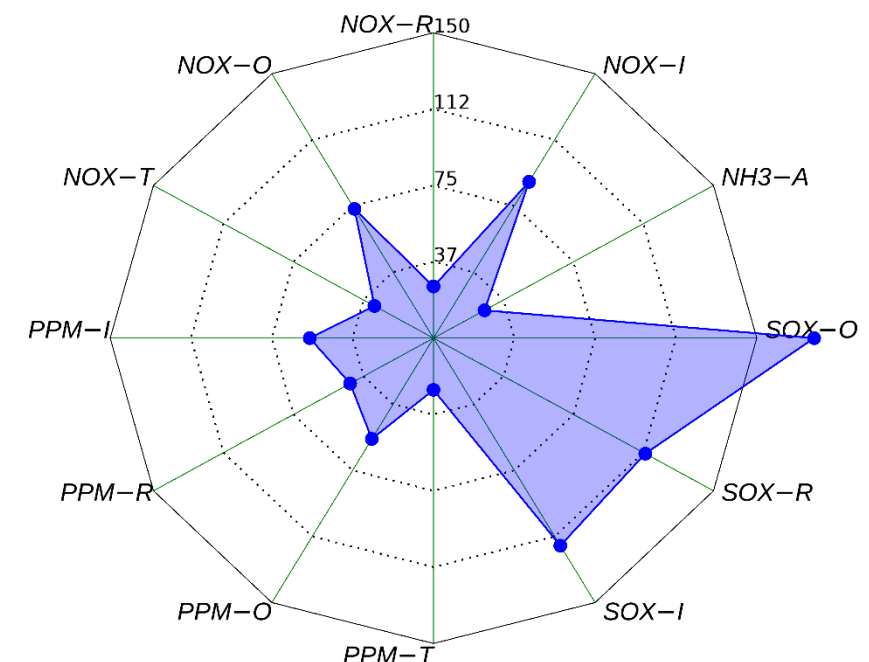
Variability

SA results (meteo only)



Variability

Emission input (EU scale)



Variability

- 25 cities with highest RPI in each category (scale, sector, emitted precursor)
- Spatial SA results are more robust than sectorial ones (higher variability for SO₂, industry and residential)
- Meteorology impacts on SA are negligible
- Most of the SA variability originates from the underlying emission inventories

Current FAIRMODE structure



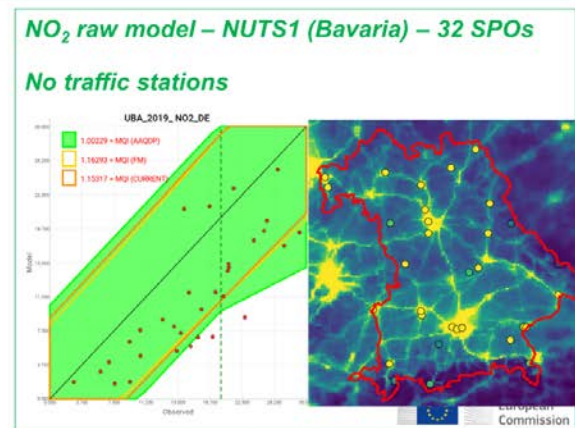
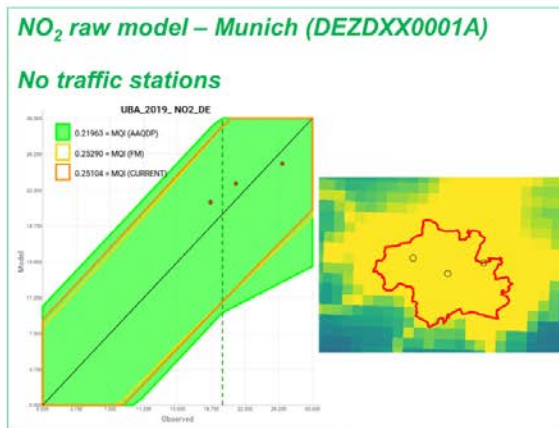
Robustness of the MQI

Focus on minimum number of stations (SPOs)

The MQO easier to fulfill with few stations, appears to stabilize at around 10 SPO when larger areas are considered

WG2 MQI robustness – Germany

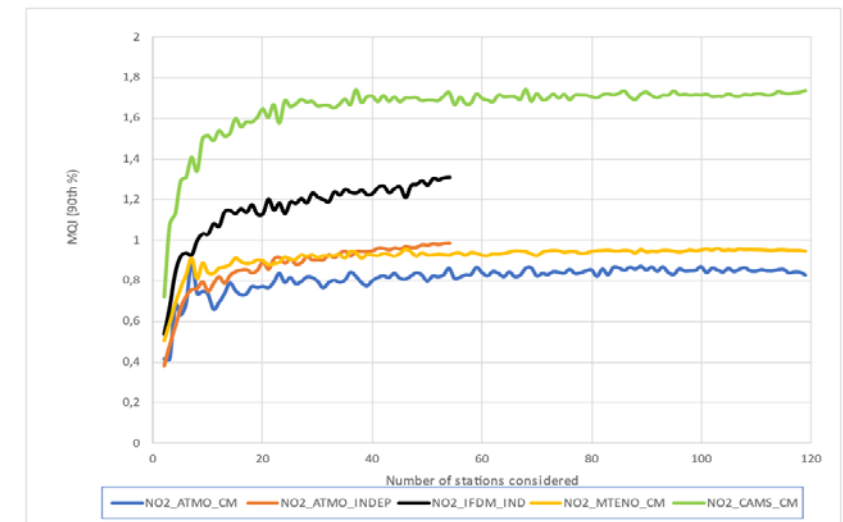
Robustness test I – MQI with respect to aggregation area (zone level vs. NUTS1)



WG2: Evaluation in Belgium

MQI for different stations and models

- stations Composite Mapper and Independent
- ATMO-Street, IFDM, METNO and CAMS



Robustness of the MQI

- ✓ The yearly MQO for PM_{2.5} is in general too easy to fulfill
- ✓ MQI not stringent enough for PM_{2.5} as it is formulated at the moment

WG2: Evaluation of the MQI - Norway

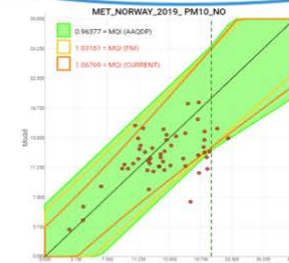
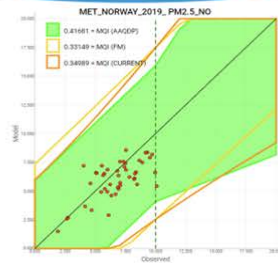
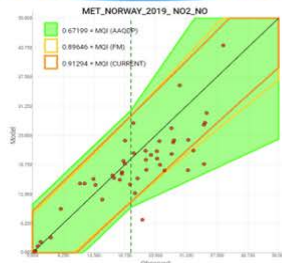
European models in Norway and local bottom-up modelling

Comparison in Norway of CAMS, EMEP, uEMEP-EU and uEMEP-NO MQI (AAQDP)

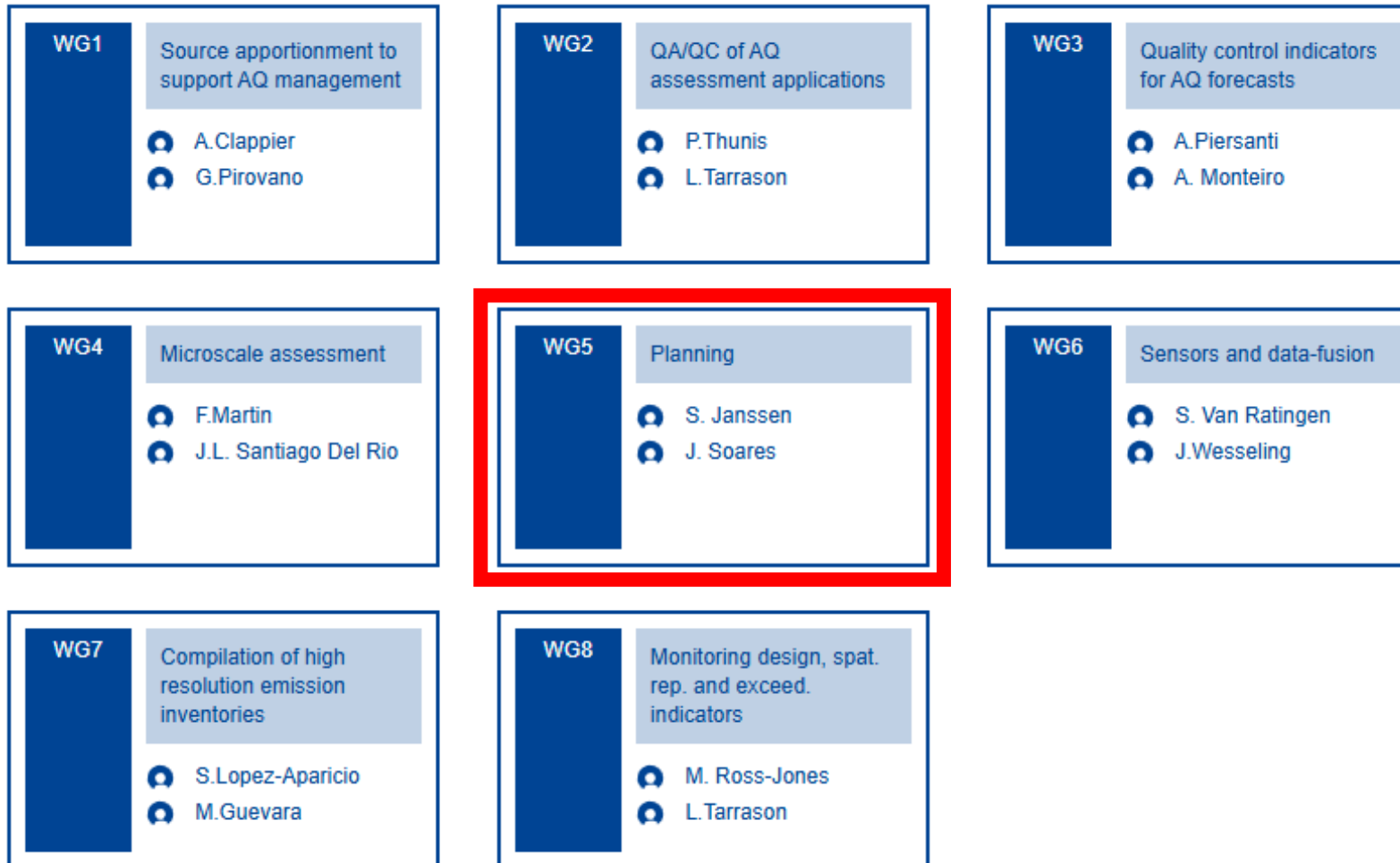
NO ₂	All	BG
CAMS	1.62	1.06
EMEP	1.75	1.45
uEMEP-EU	1.16	0.69
uEMEP-NO	0.67	0.47

PM _{2.5}	All	BG
CAMS	0.52	0.31
EMEP	0.86	0.57
uEMEP-EU	0.51	0.35
uEMEP-NO	0.42	0.21

PM ₁₀	All	BG
CAMS	1.51	0.75
EMEP	2.32	1.68
uEMEP-EU	1.67	1.15
uEMEP-NO	0.96	0.45



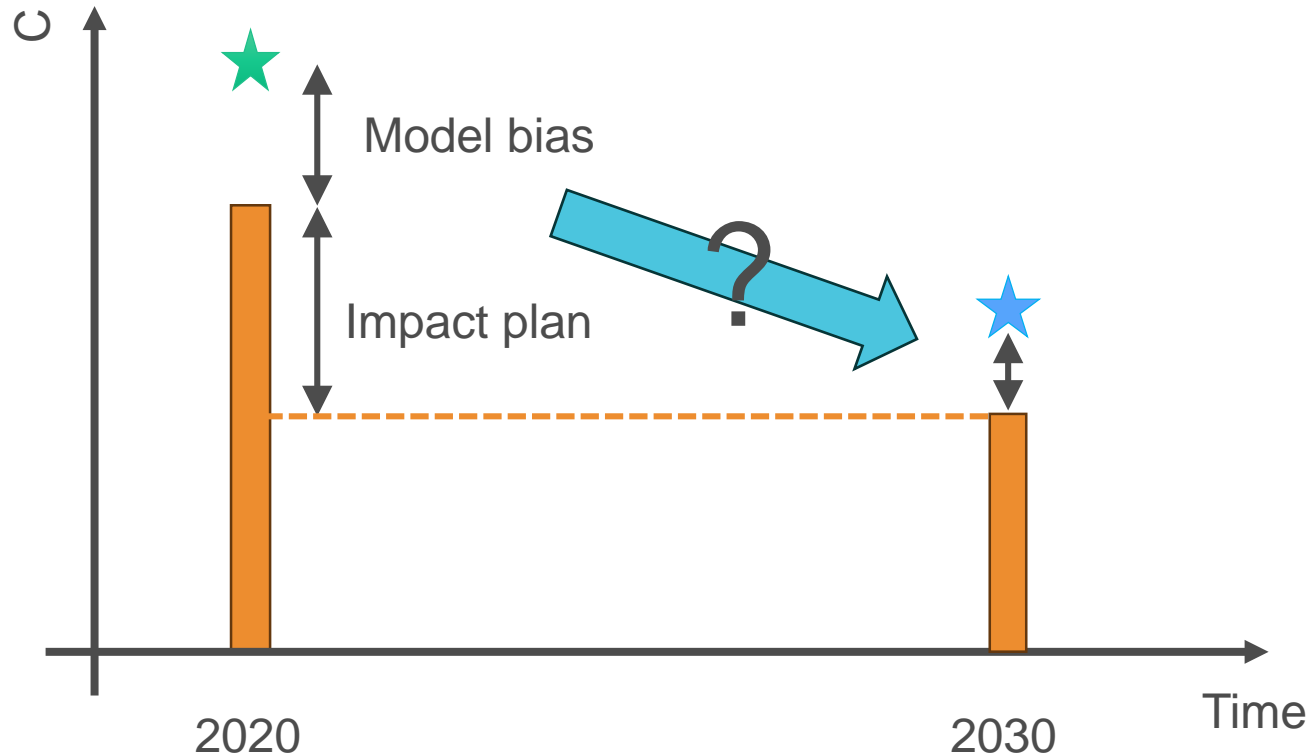
Current FAIRMODE structure



Bias projection

Additional issues:

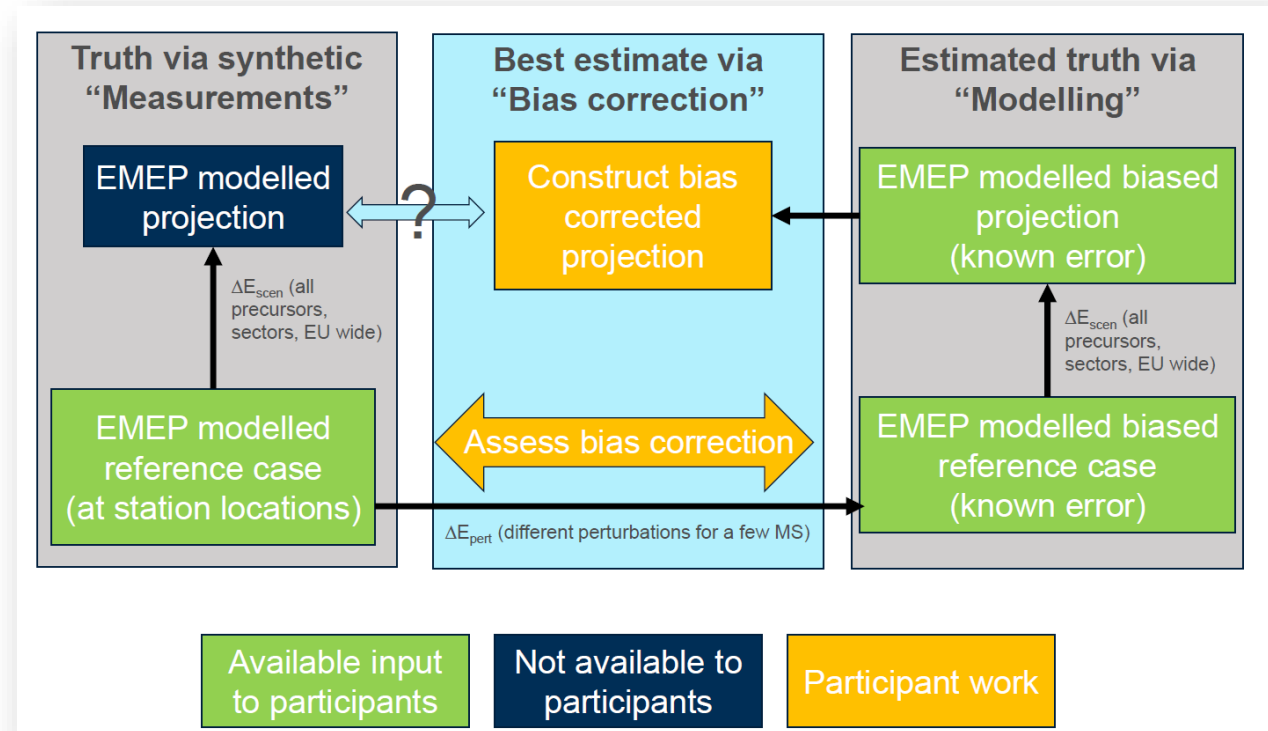
- How to define the bias?
- How to extrapolate it in space?



- ★ Observation
- ◆ Model
- ★ Best estimate future concentration

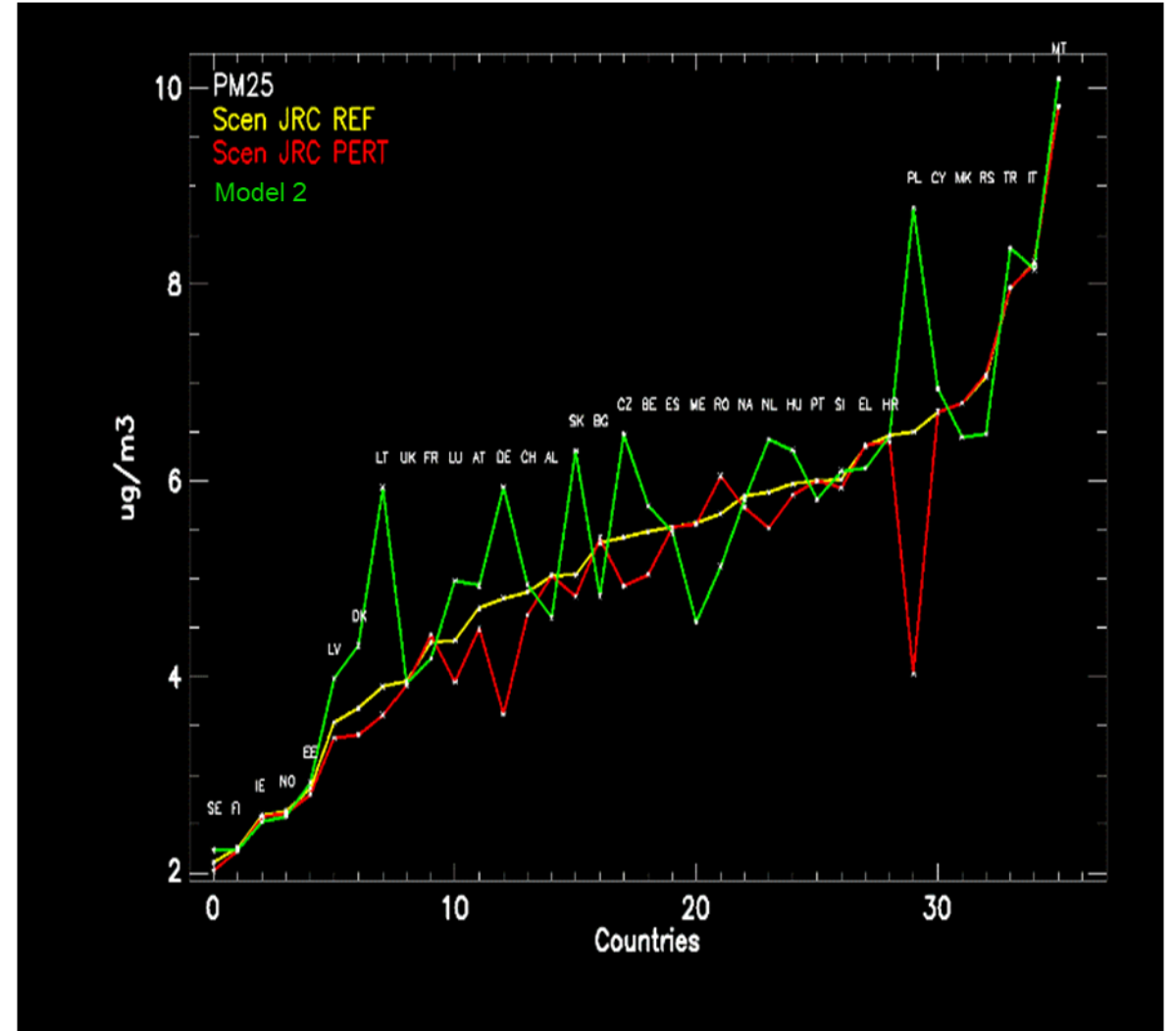
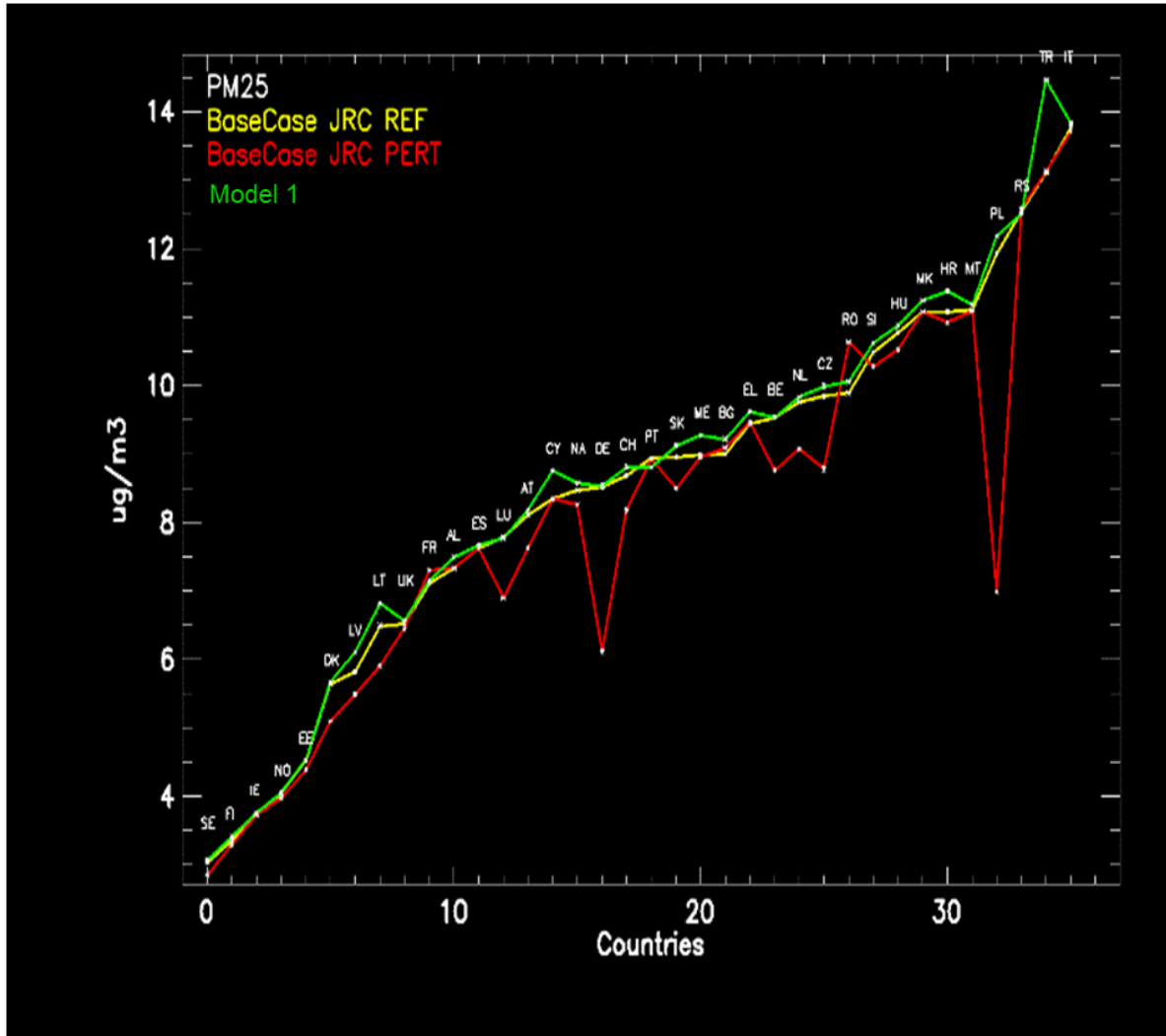
Benchmark exercise with synthetic data

- EMEP simulations for a REF and SCEN as “synthetic “truth”
- Synthetic truth for REF extracted at stations locations
- Perturbated EMEP simulations REF and SCEN as model equivalent
- Benchmark: Reconstruct truth for REF and SCEN via preferred bias correction/projection method



15 participants up to now

First (preliminary) results



Conclusions

- New AAQD -> new requests for the FAIRMODE network
- Updates on
 - WG1: impact of methodologies and of input, on SA
 - WG2: MQI evaluation
 - WG5: focus on bias projections