SR9 – Status Update, October 7 2024

Services to support the development of technical guidance documents in the field of air quality monitoring and modelling

CONTENTS

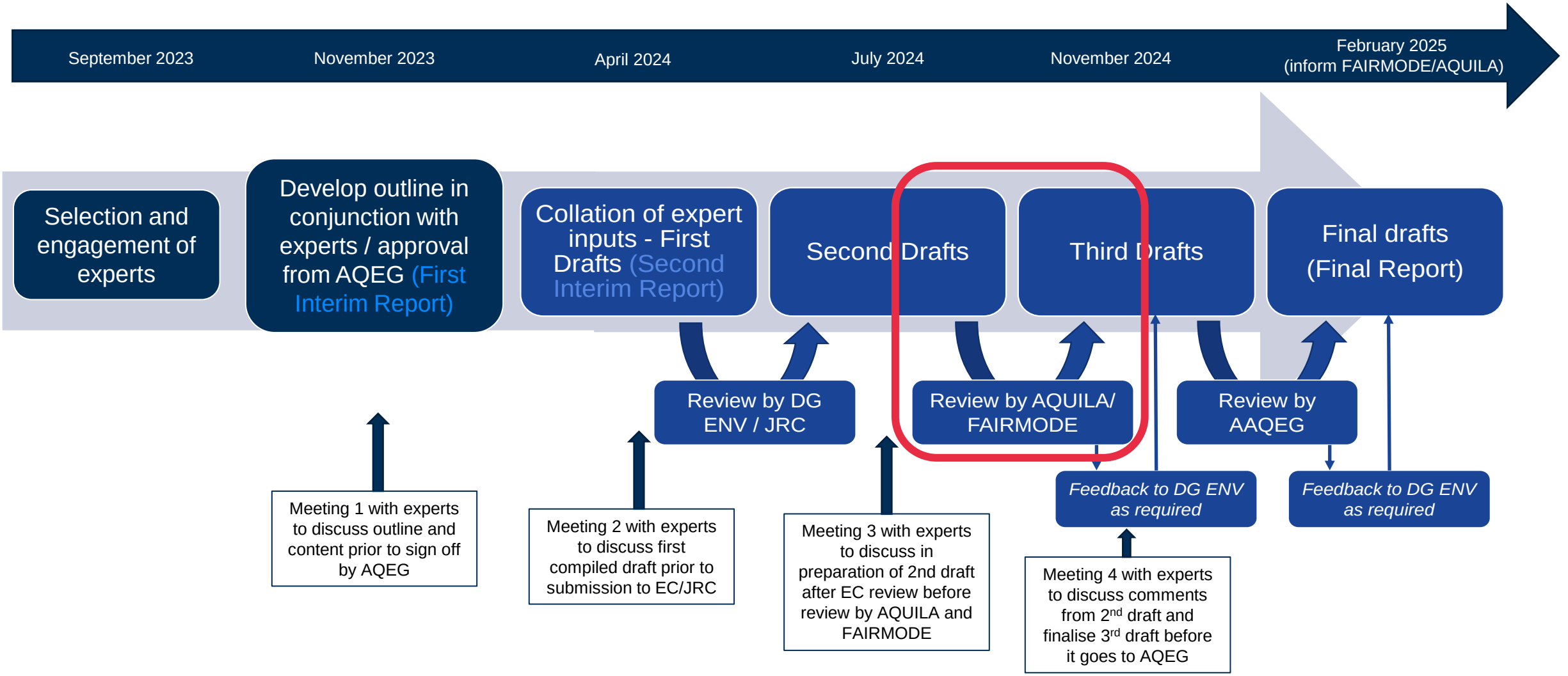
Objective

Support the European Commission in the development of two new guidance documents:

a) Technical guidance document on the use of reference methods and demonstration of equivalence, and the assurance of relevant data quality objectives (including for established and additional air pollutants) for air quality monitoring.

b) Technical guidance document on the use of modelling for various application domains under the Ambient Air Quality Directive, and the assurance of relevant data quality objectives for air quality assessments.

Progression of activities



Lead Authors & Contributing Experts

Chapter #	Chapter	Drafting Expert Lead Author
Spatial representativeness	2	Matthew Ross-Jones (EPA, SE)
Assessment of air pollutant concentrations	3	Alexandra Monteiro (UA, PT)
Source apportionment	4	Guido Pirovano (RSE, IT)
Planning	5	Bruce Denby (MetNo, NO)
Forecasting	6	Joanna Strużewska (IOS, PL)

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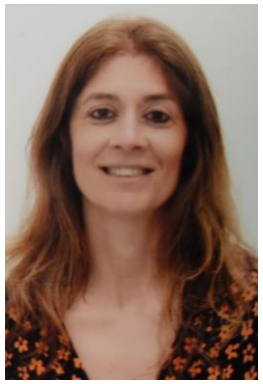
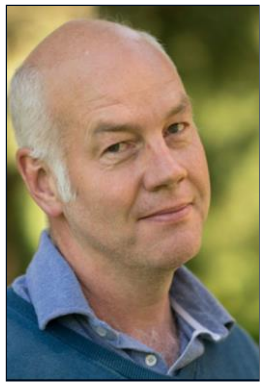
- *Christian Buens (DG ENV)*
- *Philippe Thunis (JRC)*

Matthew Ross-Jones



Alexandra Monteiro

Guido Pirovano



Bruce Denby

Joanna Strużewska

FAIRMODE & AQUILA Survey

- Second draft available for review by the FAIRMODE and AQUILA communities
- Survey was open from June 27 until September 4, 2024
- Feedback received from:
  - 23 FAIRMODE participants (NCP, modelling experts)
  - 6 AQUILA participant
  - DG ENV, JRC & EEA

Survey Feedback

- General feedback on layout, structure & content
  - Suggestions will be taken into account to improve structure and readability
  - But… intention was to have a Guide of 50p. Now +100p → not much room for further elaboration

- General feedback on “accessibility” of the document
  - Who is the targeted audience?
    → Practitioners within the MS responsible for implementation of the AAQD
    → Users of modelling results and modelling experts
    → But… certain background in AQ modelling will be required

- Detailed feedback on typo’s, missing elements, corrections...
  - Will be taken into account

- Identification of “open issues” per Chapter
  - Open for discussion in this FAIRMODE Technical Meeting

Discussion topics and agenda

Chapter	Topic	Working Group	Time slot
SR & Network design	• Spatial limitations of the SRA • Source related context of the SRA	WG8	7/10 – 9:30
	• Exceedance Situation Indicators	WG8	7/10 – 11:30
	• Network design	WG8	7/10 – 16:30
Assessment	• Min number of stations for validation • Spatial resolution	WG2	8/10 – 16:30
Source apportionment	• Stringency of the theoretical SA framework • Maturity of the recommendations	WG1	7/10 – 14:00
Planning	• Bias corrections for scenarios	WG5	8/10 – 9:00
	• Meteo variability • Uncertainty • Background projections	WG5	8/10 – 16:30
Forecast	• Appropriate spatial resolution of forecast • Formulation of the MQOf	WG3	8/10 – 14:00

General feedback

Emissions

- General feedback: “Not sufficient guidance on emissions”
- But… this is not intended as a Guidance Document on emission modelling

- Proposed solution:
  - Each Chapter will have a dedicated section on emission requirements
  - **WG7 (Session 8/10 – 9:00)** will discuss the emission requirements per model application area

General feedback

Appropriate spatial resolution of modelling systems

Pollutant	Context	Appropriate spatial resolution	Motivation
PM_{10} / $PM_{2.5}$	T / I / D	< 100 m	Capture street canyons and domestic and industrial hotspots
	U	100 m - 1 km	Capture urban patterns in absence of major hotspots
	R	1 km - 5 km	Capture regional patterns in absence of major hotspots
NO_2	T / I / D	< 100 m	Capture street canyons and domestic and industrial hotspots
	U	100 m – 1km	Capture urban patterns in absence of major hotspots
	R	1 km - 5 km	Capture regional patterns in absence of major hotspots
O_3	U / R	1 km - 5 km	Capture urban and regional patterns
SO_2	I	< 100 m	Capture hotspot locations
PAH / B(a)P, benzene	I / D	< 100 m	Capture hotspot locations
	U / R	1km – 5km	Capture urban and regional patterns in absence of major hotspots
Heavy metals	I	< 100 m	Capture hotspot locations

Next steps

- All written feedback is carefully being analysed by the drafting team
  - → We don’t have resources to provided detailed feedback to each respondent/comment
- Outcome of the FAIRMODE discussions will be incorporated in a new version
- New version (3rd draft) will be submitted to the EC and the Air Quality Expert Group for final review in Q4 2024
- Final publication Q1 2025 (~FAIRMODE Plenary Meeting)

Thanks for all your valuable comments and feedback!

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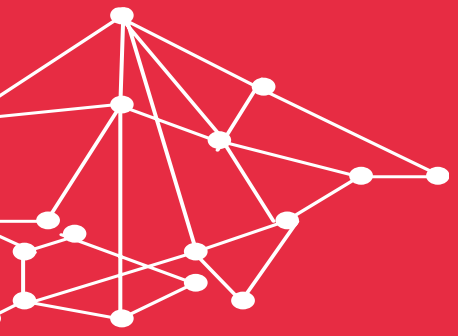

Summary of the WG discussions

WG8 – SPATIAL REPRESENTATIVENESS

- Source-related criteria of SRAs:
  - We're not yet ready to incorporate source apportionment in the SRA definition
  - So we keep the simple definition in the Guidance Document for time being
  - But FAIRMODE WG8 will start up an exercise to explore the possibilities → cooperation with WG1
- Geographic limits of the SRAs of regional background stations
  - Remains a lose end and remains up to the competent authorities to define (e.g. network, NUTS or climate/orographic/land use arguments)
  - FAIRMODE WG8 will further investigate various options
- Interannual variability of SRAs
  - In the AAQD no requirement for interannual analysis
  - We remove the request for a multiple year analysis (3-5 years) but include a requirement to check robustness of the SRAs (including interannual variability)

WG8 – EXCEEDANCE SITUATION INDICATORS

- Spatial extent of the exceedances: What to do when an exceedance is observed but not modelled?
  - Make sure the model is fit for purpose (firstly check if the underestimation is not due to fundamental missing elements in the modelling system)
  - Use SRA as first estimate for the ESI → should be handled with care since not the same indicator
  - Connection between ESI and planning phase is key → detailed ESI only requested at the start of AQP, as a basis for designing and implementing measures
- Population exposure: What to do when only coarse population density data is available? Recommendations for minimal spatial resolution?
  - Be pragmatic, it is only an indicator to trigger and follow up an AQ plan (that is the essence!)
  - Resolution of the AQ model and the population should be aligned for exposure estimates
  - 0.5 km as recommended minimum resolution for urban population data, based on Spanish studies
- Road length in exceedance: lack of a good definition
  - Although in the AAQD, relevance of this indicator still in question. Be pragmatic! E.g. keep to one road length regardless of how many lanes the road has.

WG8 – NETWORK DESIGN

- What kind of guidance is required when redundancy is identified?
  - It was mentioned that “redundancy” is not well defined. When are stations classified as similar/redundant? MoNET can give some information but even then it remains expert judgement.
  - Care should be taken when conveying a message to policy makers that stations could be shut down. Focus instead on "completeness" of networks and potential gaps in networks.
  - From a public information perspective, there is a request for even more stations
  - Make clear a network serves many different needs: compliance checking, exceedance situation estimation, trend analysis, population exposure, health impact assessment, model validation…
  - Stations with multiple pollutants are relevant for scientific research & model validation

- How to identify hotspots? How to prioritize hotspots?
  - Be pragmatic and look for “generic” hotspots that have high concentrations and also affect a broader group of citizens. Don’t go for small exceedance situations related to very specific sources

WG1 – SOURCE APPORTIONMENT

- Stringency of the theoretical framework: can limited resources be an argument to relax on fitness-for-purpose constrains?
  - No, this Guidance document should put the ambition level high enough (DG ENV request for this contract)
  - Remember, this Guidance is it not mandatory, it remains a guidance
- Maturity of the SA framework: is there enough consensus in the FAIRMODE community about the SA recommendations?
  - Concern: there seems to be a push for the use of tagging methods but it will be difficult to have a tagging method implemented in all European CTMs → It is worth mentioning that the guidance provide recommendations, not obligations → Tagging models are fit-for-purpose to support assessment, but it is not mandatory to perfom SA during the assessment phase
  - The SA fit-for-purpose tables could be simplified:
    - Remove conditions mentioned in the grid cells
    - Limit to linear/non-linear species?
    - Revise the Traffic Light colour codes
  - Chapter will be further reduced, particularly removing most of the aspects that could be referred to FAIRMODE guidance (e.g. definitions)

WG7: Summary (slide Suzana)

- Discussion about emissions in the **Technical guidance document on AQ modelling:**

- **"What are the most relevant emission needs/recommendations that the technical guidance document should emphasize for each application?**

  - **Assessment:** understanding of the source responsible of the exceedances will determine the sector that needs to be prioritize as at the highest quality in the emission inventory,
  - **Source apportionment:** emission source classification according to requirements (e.g., data on fuel type, exhaust vs non-exhaust, +++)
  - **Planning:** emphasis on the spatial component of the measures, inventories with detailed information that allows for emission reductions
  - **Forecasting:** reference year (closer to current year), possibility of using dynamic emissions (e.g., emission sectors that show are high correlation with meteorology)
  - **General issues**, e.g.:
    - terminology "top-down vs bottom-up" -> "hybrid, downscaled, local high-resolution emissions inventories".
    - Modelling applications required emissions that are gridded, vertically distributed, hourly and speciated emissions -> Need for additional reference/guiding/source

WG7 - EMISSIONS

- Excluding top-down emissions for planning:
  - Use other terminology for “top-down” emission inventory. TD or BU does not exits → in practice always hybrid EI
  - Depends on the sector: more detailed for very localized sectors, for other sectors a national total with downscaling might be sufficient!
- Use of EMEP/EEA Guidebook
  - Reference to WG7 work!
- QA/QC for emissions
  - Refer to WG7 tools (Composite Mapping, Diamant plot…)

WG7 – EMISSION REQUIREMENTS PER APPLICATION

- Resolution of the EI:
  - EI resolution requirements (from low → high): Forecast → Assessment → SA → Planning
  - Spatial scales: you have to go to the assessment to defined the appropriate spatial resolution for an EI
  - Sector split: depends on the exceedance observed in the assessment phase → this defines the SA & planning phase
  - Emission modelling is an iterative process: start with identification of the largest sources and try to refine gradually
- Domestic heating (25m)
  - Challenging → downscaling seems only option. But good proxy needed. Not easy!
- Forecast
  - Work with most recent emissions: CAMS “year-1” data set
  - Dynamic emissions taking into account effects of outdoor temperature to reflect daily fluctuations → not restricted to annual totals!
- Planning
  - Emission changes should be implemented at the fines source (activity) level possible
  - Locations of new future emissions might be unknown → challenge for some future scenarios
  - Spatial component of the emissions is important
- SA
  - Sector split/spatial detail should be aligned by the SA request

WG3 – FORECAST

- Spatial resolution of the forecast results
  - Alert & information thresholds are defined at stations representativeness for 100km²
  - Make clear what the requirements of the AAQD are. Higher resolution is formally not required but still possible.
  - Jenny Stocker (CERC) refers to city scale forecast applications that have similar performance as the assessment model. So resolution should not be an issue!
  - Model should also fulfil the assessment MQO.
- Is MQOf only performance indicator?
  - No, definitely room for other indicators
  - But based on CAMS experience the MQOf is appreciated because of its “simplicity/clarity”
  - Indicator suited for episode detection is only poorly developed in WG3.
- Need for common framework
  - Yes, it is needed. It is the objective of FAIRMODE.
- Human factor
  - Interpretation of the result → can also be evaluated (example in France, PrevAir)
- Data assimilation to improve performance
  - Can be used to improve initiation conditions → predictive power might limited → no consensus in WG3 (presentation Roberta)
  - Assimilation of lidar profiles / Sentinel 5 products might have much more predictive power → to be investigated
  - MOS product of CAMS has some skill (but only at station locations for time being)

WG2 – ASSESSMENT

- Minimum #stations: if #stations < 10
  - Up to competent authorities to accept
  - Options:
    - Add additional years to the validation process
    - Enlarge the domain to include more stations
  - Problem with temporal coverage (< 75%) that reduces the #stations → solution might be to have MQO for shorter time periods (e.g. MQO_monthly)
  - Point out that the issue is not yet closed → ongoing work in WG2 and CEN/WG43
  - Min number of stations should not be evaluated at level of the AQ zones but the whole modelling domain
  - More stations increase robustness of the MQI
- Short term and long term MQO should be met
  - Now there is an “or”, but should be an “and” in the text
  - We don’t have an MQO for percentiles yet → remains to be developed
- Evaluation of data fusion / data assimilation results
  - Rephrase how this is stated now in the text

WG5 – PLANNING

- Meteorology
  - Use of representative year → creates problems for the bias correction!! → could be an argument to stick to the reference year
  - 3 to 5 year averages give a sufficient/good representativeness of the meteo variability
  - Potental recommendation: “use assessment year, if scope to do so, go for 3 to 5 years”
  - What is a representative year? Not very well defined!
  - The impact for ozone remains to be verified
- Local vs reigonal/national AQ Plans
  - Mainly lack of coordination between governance levels
  - Common data sets such as emissions, background concentrations or boundary conditions might support further harmonisation → EC can play a role to define European wide emission and regional background data sets (e.g. CAO3)

Summary of the discussions on the Guidance Documents

GENERAL IMPRESSION

- Open and constructive discussions in all the Working Group
- For many topics, more clarity was obtained, although full consensus was not always reached

APPROPRIATE SPATIAL RESOLUTION OF MODELLING SYSTEMS

Context	Appropriate spatial res.	Motivation	PM10	PM2.5	NO2	O3	SO2	B(a)P, PAH, benzen	Heavy metals
Traffic	≤ 25 m	Capture street canyons and other traffic related hotspots	√	(√)	√				
Domestic	≤ 250 m	Capture domestic hotspots						√	
Industry	≤ 100 m	Capture industrial hotspots	√		√		√	√	√
Urban	≤ 2.5 km (?)	Capture urban patterns in absence of major hotspots	√	√	√	(√)			
Rural	≤ 10 km	Capture regional patterns in absence of major hotspots	√	√	√	√	√	√	√

NEXT STEPS

- The outcome of the discussions will be reflected in a new version of the Guidance Document
- Will be circulated the Air Quality Expert Group for a final review
- Thanks very much for all your input!