

CT7 – High-resolution emissions

Status of activities and recommendations

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FAIRMODE

Forum for air quality modelling in Europe

Outline

- Status of current activities
- Recommendations
- Discussion

CT7 activities

1. Identifying best practices and drafting recommendations for the compilation of high resolution emissions
2. Perform benchmarking activities for the compilation of high resolution emissions.
3. Elaborating recommendations for a common system to document the use of ancillary data and define the relevant meta-data that support high resolution emission inventories.
4. Providing relevant feedback to improve European inventories used for regulatory purposes (EMEP) and Copernicus Atmospheric Monitoring Services (CAMS-REG)



<https://fairmode.jrc.ec.europa.eu/ecmaps/>

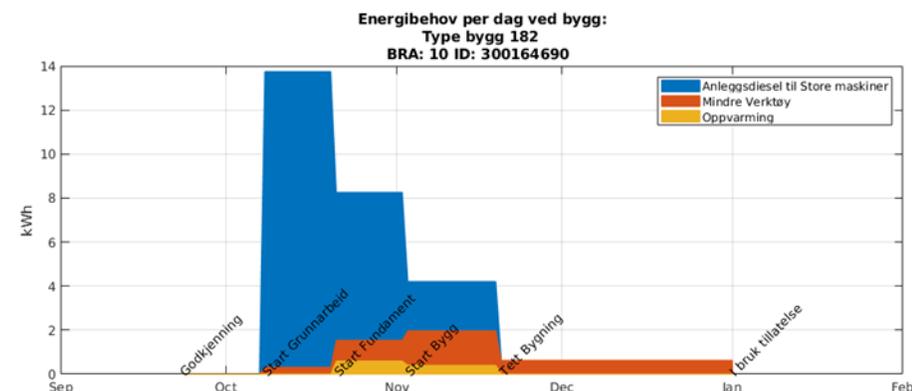
Activities supported through the composite map platform

Non-road mobile construction machinery (NRMM)

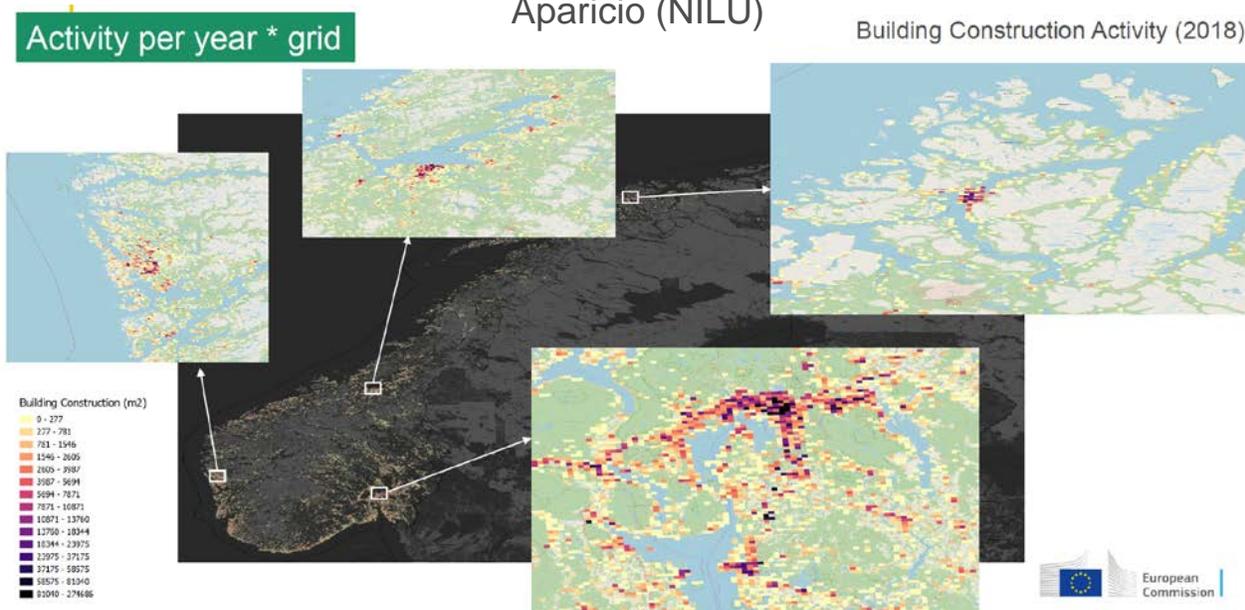
- The need to provide guidance for other sectors than traffic and residential heating has been brought by local and national agencies, and modelers.
- NRMM in construction has not been a priority sector, however it is becoming more important in urban areas.
- Questionnaire launched during 2021 to map current practices, the existing knowledge and identifying gaps among FAIRMODE

KEY CHALLENGES

- **Data compilation;** Multiple sources of activity data need to be collected and processed.
- **Emission factors;** knowledge on fleet composition and EF for new machinery
- **Spatial distribution;** additional challenge with future scenarios
- **Temporal distribution;** additional challenge when addressing meteorology driven emissions (non-exhaust)



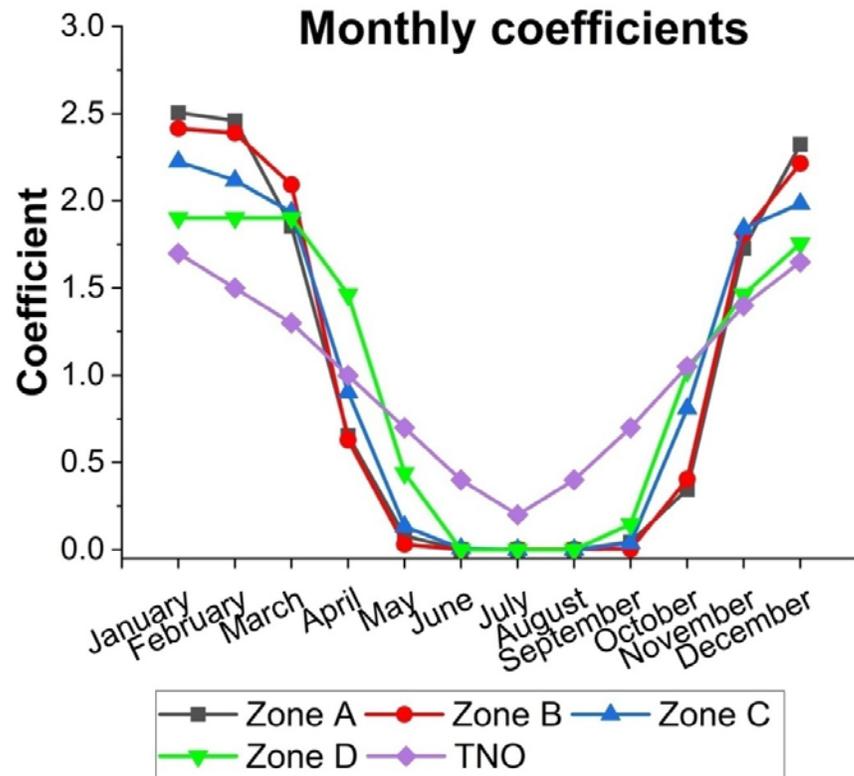
Susana López-Aparicio (NILU)



Temporal variability of emissions

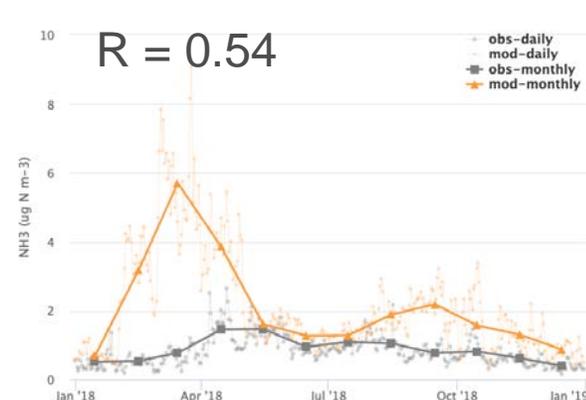
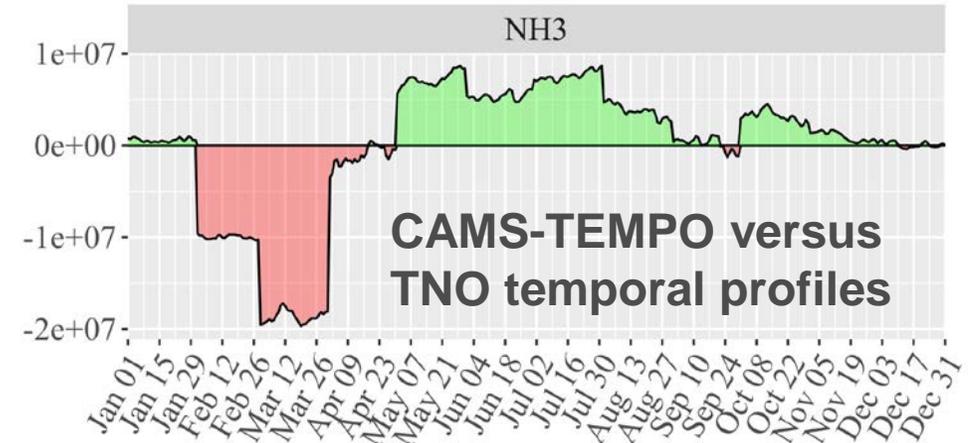
2021 FAIRMODE technical meeting: 6 lightning talks on this topic

Residential sector: Importance of the spatial variability on the residential heating season (linked to different climate zones and changes in outdoor temperature)

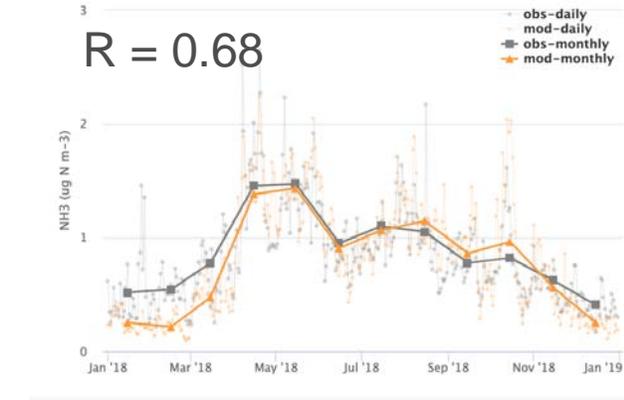


Sandy Fameli (NOA)

Agricultural sector: Impact of using dynamic versus static temporal profiles on NH3 emissions & concentrations



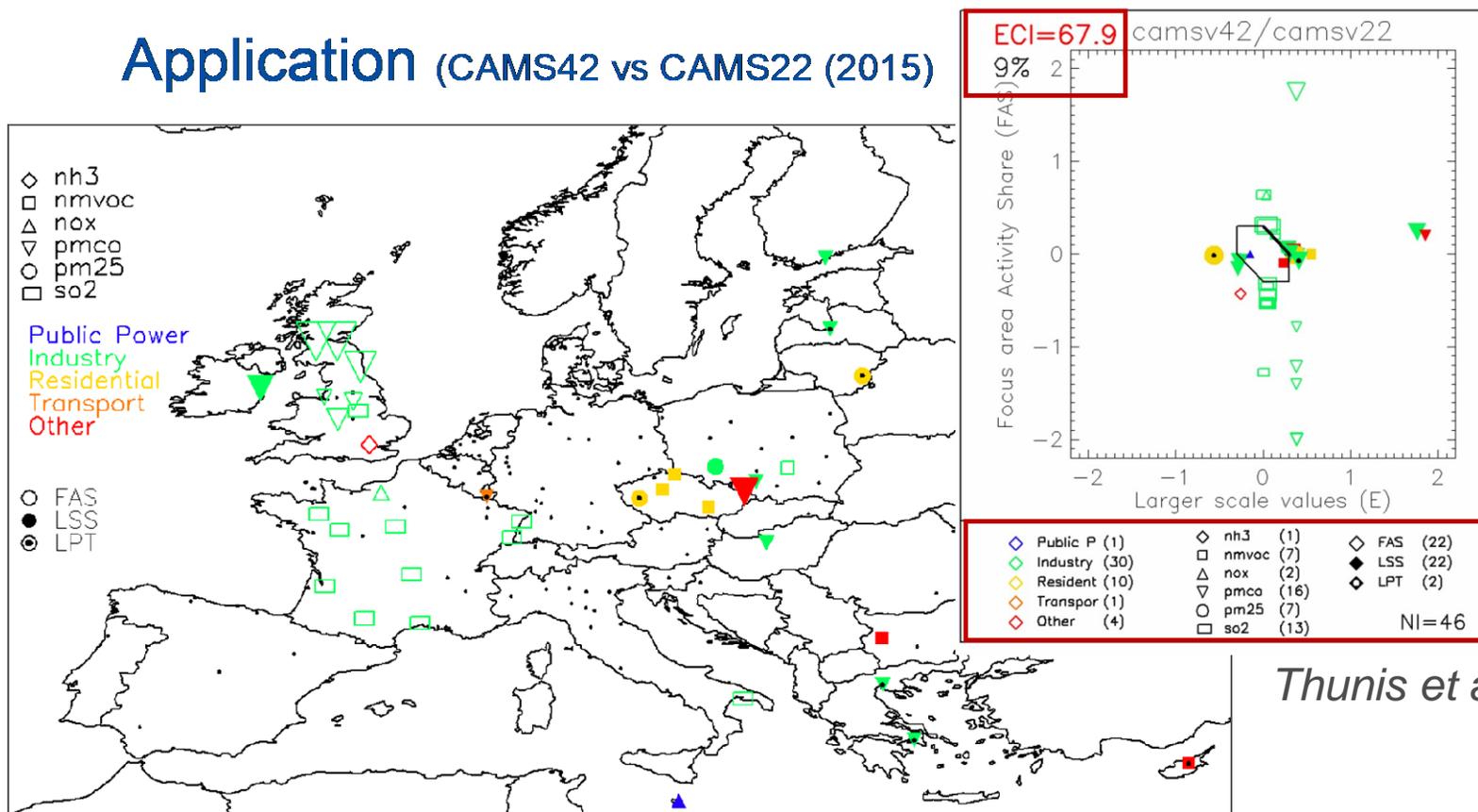
Marc Guevara (BSC)



Emission benchmarking activities

- New screening approach developed by JRC to flag large differences (inconsistencies) between emissions
- Flexible method: choice of sectors/species, areas of study, inconsistency threshold
- Possible uses: inventory vs. inventory / Inventory version vs. inventory version / Inventory version & year vs. inventory version & year

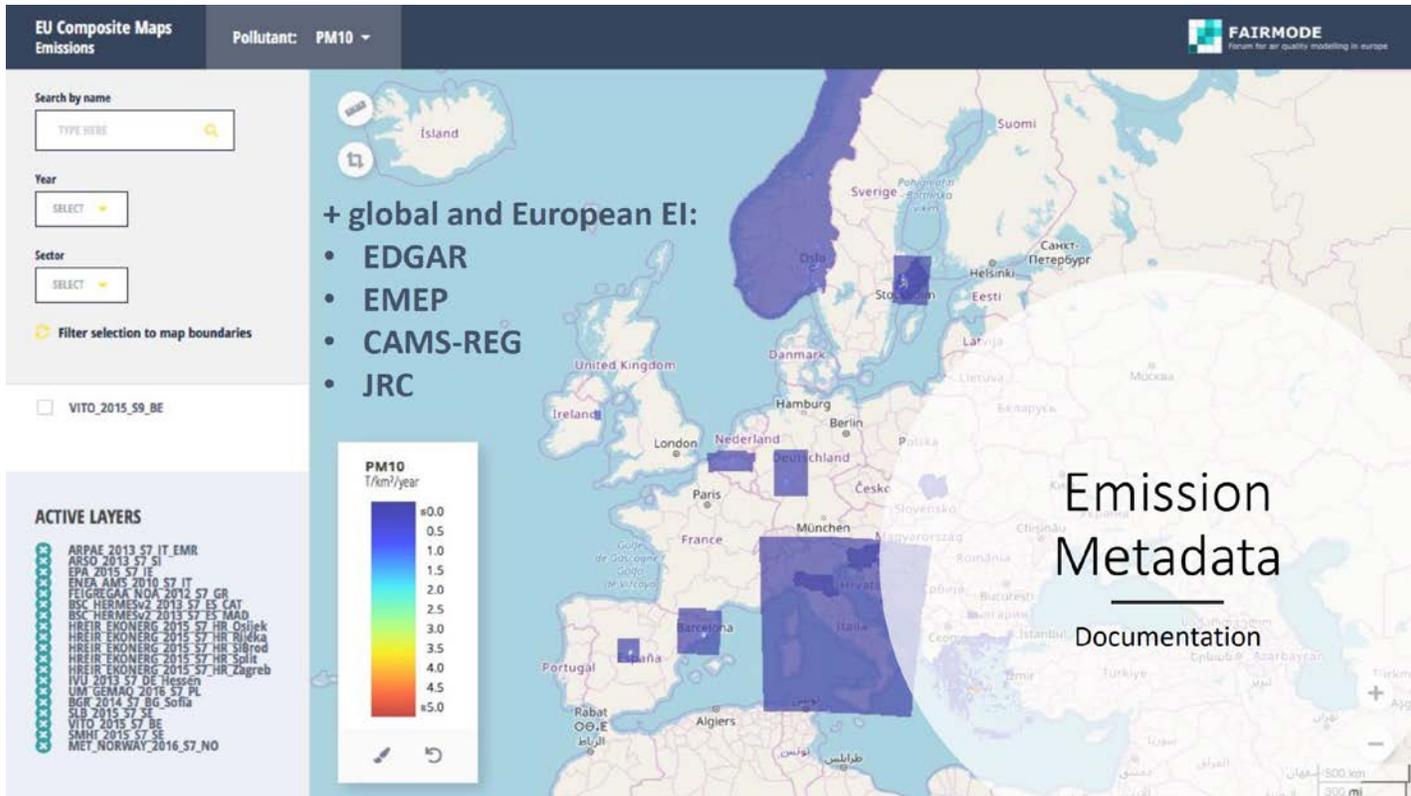
Application (CAMS42 vs CAMS22 (2015))



Thunis et al. (GMDD, 2021)

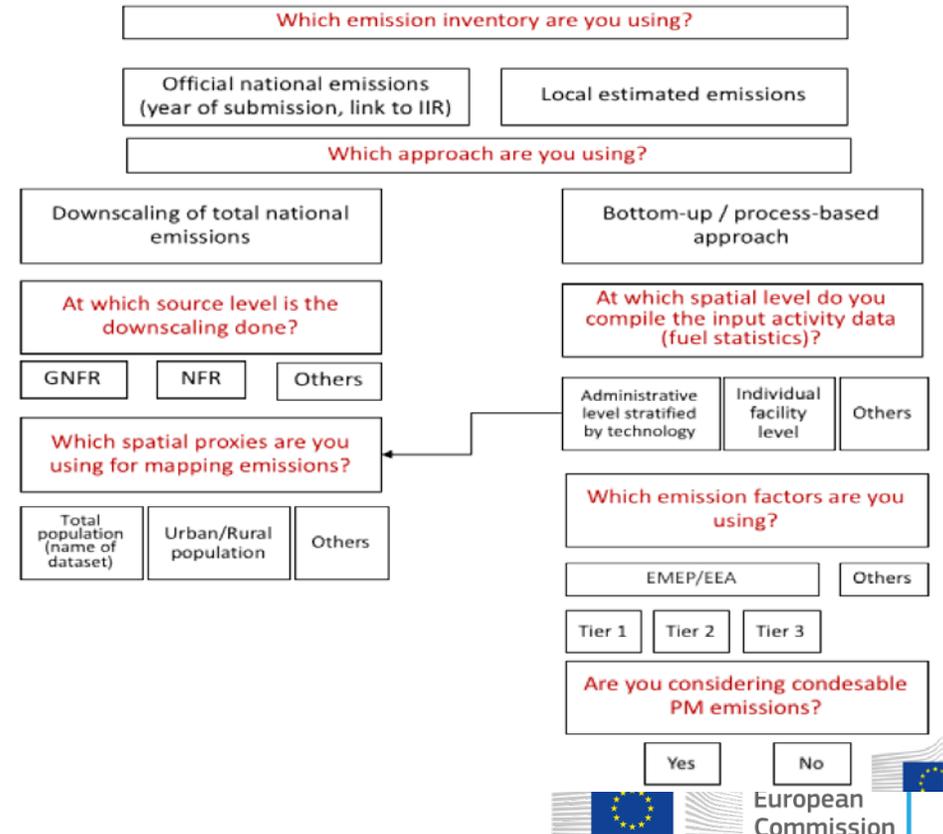
Emission metadata

- Emission Composite Map platform populated with multiple local and regional emission inventories during the last years
- Proposal for revised metadata request in Emission Composite Maps
 - Multiple choice - decision tree



<https://fairmode.jrc.ec.europa.eu/ecmaps/>

Decision tree – Residential/Commercial combustion



Synergies between FAIRMODE and TFEIP

- TFEIP is responsible for the on-going maintenance and improvement of the EMEP/EEA air pollutant emission inventory guidebook technical content
- The Guidebook is designed to facilitate reporting of emissions to the UNECE CLRTAP and the EU NECD.
- However, the Guidebook does not provide guidance for emission users (air quality modellers).
- There are two on-going initiatives to improve this aspect and to which FAIRMODE will cooperate:

1. Spatial mapping of emissions chapter

- General chapter review → Resulting in updated chapter for adoption by TFEIP in 2023 meeting
- Improve description of methodologies used in the Informative Inventory Reports (IIR)

2. Provide guidance for users (modellers) – initiative lead by J. Kuenen (TNO)

1. PM and NMVOC speciation
2. Temporal disaggregation of emissions
3. Height distribution

FAIRMODE:

- To provide identified practices from CT7 participants + lessons learned from modelling activities to assess quality of emissions under other CTs (e.g. source apportionment)
- To participate in the next TFEIP meeting (9-12 May 2022)
- Contribute to a better alignment between emission information need under NECD and AAQDs

CT7 recommendations

1. **High resolution emission metadata requirements**: FAIRMODE proposes to specify requirements for documenting the high resolution emission data that is used as input for local/urban air quality assessments and air quality planning under the AAQDs and link those to the information provided under national emission compilation in lower resolution scale prescribed under the National Emissions reduction Commitments (NEC) Directive.
2. **Guidance to compile high resolution emissions**: FAIRMODE can provide guidance on high resolution emission inventory compilation and can host a cooperation process for the development of user-checked methods to secure consistency with the national emission estimates compiled under the NEC Directive.
3. **Use of benchmarking for quality assessment of emissions**: FAIRMODE proposes to introduce benchmarking activities to establish the validity of the high resolution emission data used for local/urban air quality assessments and air quality planning.
4. **Nomenclature for classifying high resolution emission sources**: FAIRMODE recommends adopting the nomenclature used under the NEC Directive as a minimum disaggregation level for reporting high resolution emissions by sector, as basis for the local/urban air quality assessments and source allocation activities under the AAQDs.

Comments received

- A total of 30 comments received
 - **24 straightforward (solved)**
 - **2 straightforward (solved, but relevant to share with the community)**
 - **4 non-straightforward (solved, but need discussion)**

Thanks to all contributors for your positive and constructive feedback, which helped improving the quality of the document!



Comments received (straightforward)

Comments related to the role of FAIRMODE CT7:

C: *FAIRMODE should encourage development of new studies about emissions factors for different technologies*

A: the adequate framework to address this activity is not FAIRMODE, but Task Force on Emission Inventories and Projections (TFEIP), which has the objective of providing a technical forum to discuss, exchange information and harmonise emission factors, as well as conduct in-depth evaluation of emission factors and methodologies in current operation. However, we will establish a collaboration between FAIRMODE/TFEIP (i.e. to provide guidance for emission users).

C: *FAIRMODE should provide correspondence tables to convert other emission classifications (i.e. SNAP, NFR) to the recommended GNFR*

A: The TFEIP already provides a reporting codes tables with a mapping between nomenclatures that can be accessed from the [EMEP CEIP website](#)

Comments received (non-straightforward)

Comments related to the term fine scale emissions (what do we mean? How do we define it?)

- We have rephrased the term “fine scale emissions” to “high resolution emissions”
- We put the focus on the temporal and spatial resolution of emissions (but we do not define a specific number, e.g. 100mx100m, as this will be constrained by the model application and/or input data availability):

*"In order to ensure the representativeness and the quality of the assessment results required by the AAQDs, further focus is to be placed on the compilation of high resolution input data. This applies, in particular, to **emission data that needs to be compiled at high spatial (horizontal and vertical) and temporal resolution**. The different modelling applications under the AAQDs **require emissions at different spatial and temporal resolution to cover regional, urban/local, street/microscale applications**"*

- “High resolution” does not intend to be synonym of the method used to compile the emissions. The focus is on the different requirements of emission information under NECD and the AAQDs applications:

*“FAIRMODE recommends to document **what high resolution emission data is used as input for air quality modelling and what methods (i.e., bottom-up, hybrid or downscaled)** were used for the compilation of the high resolution emission information”*

“The requirements on emission data from NECD and the guidance under EMEP/EEA are too coarse—both spatially and temporally —to respond to the needs of high-resolution emission data needed to fulfil assessment requirements under the AAQDs.”

Comments received (non-straightforward)

Comments related to the need of a better alignment between emission needs from NECD and AAQDs applications

- We included the following two paragraphs:

“FAIRMODE proposes to specify requirements for documenting the high resolution emission data that is used as input for local/urban air quality assessments and air quality planning under the AAQDs and link those to the information provided under national emission compilation in lower resolution scale prescribed under the National Emissions reduction Commitments (NEC) Directive. This is to ensure enhanced transparency and comparability of the air quality results reported under the AAQDs. “

“FAIRMODE also recommends the elaboration of guidance for the compilation of high-resolution emission inventories to be used as basis for air quality modelling applications under the AAQDs. FAIRMODE can provide guidance on high resolution emission inventory compilation and can host a co-operation process for the development of user-checked methods to secure consistency with the national emission estimates compiled under the NEC Directive. (...). FAIRMODE recommends adopting the nomenclature used under the NEC Directive as a minimum disaggregation level for reporting fine scale emissions by sector, as basis for the local/urban air quality assessments and source allocation activities under the AAQDs.

Impact on legislation and associated guidance

FAIRMODE recommendation	Related changes in Legal provisions	Related Guidance needs	Links to other directives
Provide guidance on high resolution emission compilation	No changes needed	Guidance documents to support high resolution emission compilation are currently developed under FAIRMODE following GNFR nomenclature and promoting the use of benchmarking	Establish cooperation with experts in charge of the EMEP/CORINAIR emission Guidebook to secure consistency between national emission reporting under NECD and high-resolution emission estimates used under AAQDs
Introduce requirement for reporting high resolution emission metadata to document the emission data used in modelling applications under the AAQDs.	Commission's Implementing Decision 2011/850/EU (IPR decision) to be revised to secure that information on emission input to air quality modelling is provided	IPR guidance document to be revised to adjust to documentation requirements proposed by FAIRMODE following the GNFR and NFR nomenclatures High resolution emission metadata requirements are under development in FAIRMODE emission composite mapping	Documentation of high-resolution emissions used for air quality modelling to be linked to the information provided in the Informative Inventory Reports (IIR) under NEC Directive