Department
for Environment
Food & Rural Affairs

FAIRMODE – The Forum for Air Quality Modelling in Europe
Implications for the United Kingdom

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Outline

- Air quality management in Europe

- What is FAIRMODE?

- FAIRMODE guides and tools

- FAIRMODE and the Review of the Air Quality Directive

Air quality management in Europe

- Member States divided into air quality management zones for assessment and reporting.

- Air quality assessed using measurements and (sometimes) modelling

- Where exceedences of limits occur, Member States should prepare an air quality plan to ensure compliance as soon as possible.

- Directives set criteria for maximum uncertainty of measurement and modelling known as data quality objectives.

Modelling and the Air Quality Directive

- In the UK, air quality models are used to:
  - o Carry out compliance assessment
  - o Prepare plans and assess abatement measures
  - o Carry out source apportionment
  - o Forecast air pollution levels
- The number of monitors is reduced by up to 50% as models supplement the assessment.
- Models used to assess a range of pollutants – NO_x, NO_2, SO_2, PM_{10}, $PM_{2.5}$, Metals in PM_{10}, PAHs (B[a]P), Benzene, O_3.

What is FAIRMODE?

- FAIRMODE is a joint initiative of the European Commission's Joint Research Centre (JRC) and the European Environment Agency (EEA).

- Provides guidance and support to Member States on the use of air quality modelling for the Air Quality Directive (AQD)

- WG1 on Guidance on the use of models
  - Guidance on the use of models for the European Air Quality Directive (2011)
  - Guide on modelling Nitrogen Dioxide (NO_2) for air quality assessment and planning relevant to the European Air Quality Directive (2011)

- WG2 on Quality assurance of models
  - Model quality objectives template performance report& DELTA updates (2012; SG4)

FAIRMODE -organisation
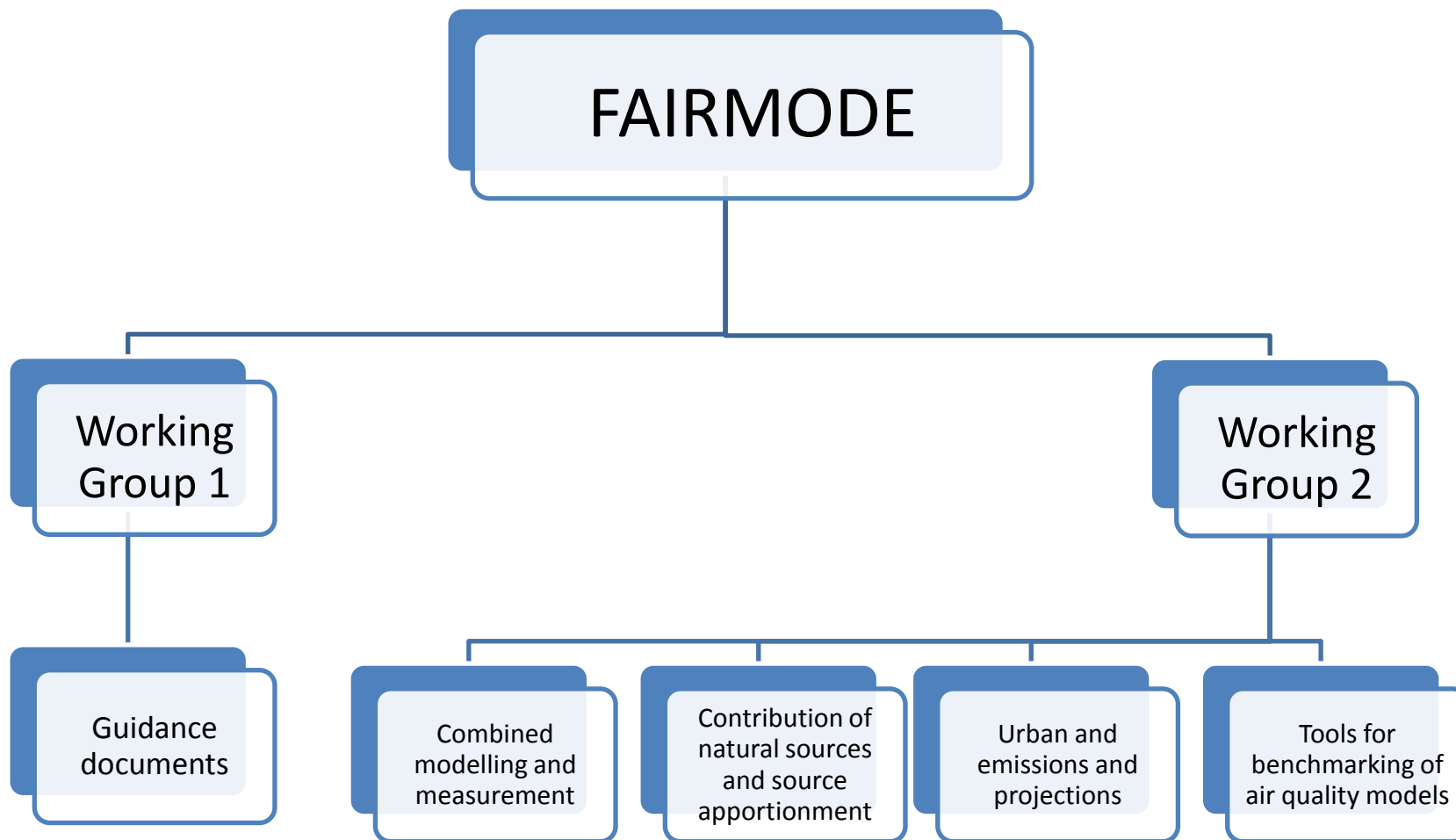
FAIRMODE – aim - to increase role of models:

- Very few (2 out 27) Member States report model data as part of compliance assessment for AQD

- Currently in AQD modelling is referred to as '*supplementary assessment*'

- Existing modelling practices are supported

- No requirement to harmonise to a single model.

- Members of FAIRMODE include research (70%) institutes and some competent authorities (30%)

- Hence, contrasting interest:
  - ➢ Research community focus on modelling processes
  - ➢ Competent authority emphasis on implementation

UK involvement in FAIRMODE

- **Model guidance documents**. Provided text to describe modelling methods used in UK.

- **Development of evaluation metrics:**. Highlighted weaknesses in use of proposed statistics.

- **Evaluation of DELTA tool**. Carried out a operational evaluation of tools.

- **FAIRMODE Recommendations**. Provided detailed feedback and participated in annual plenary meetings.
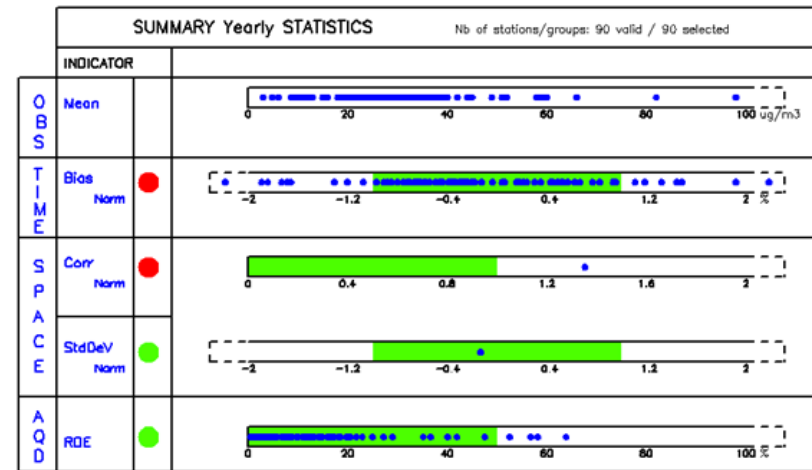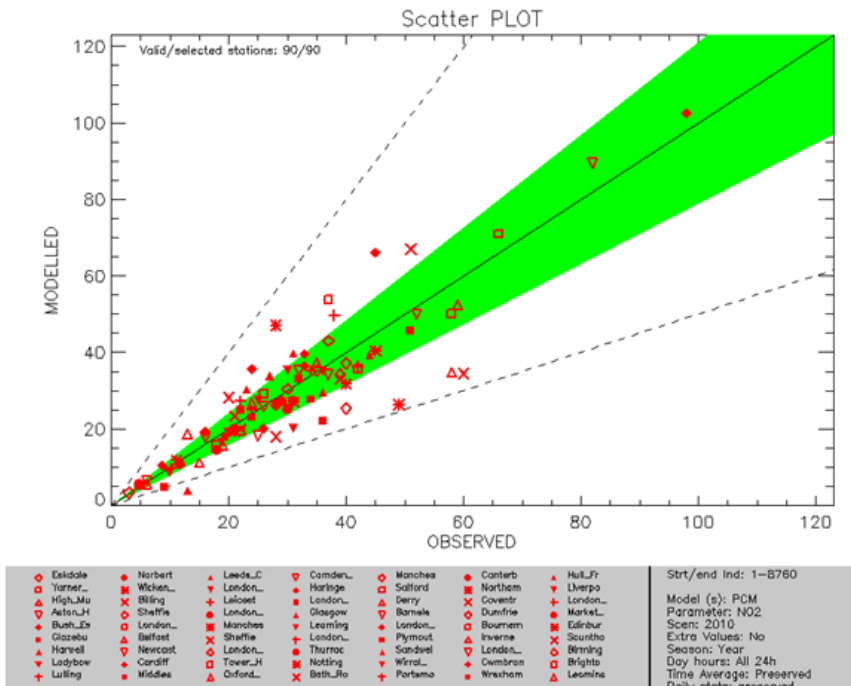
Contributions to subgroups 1 and 4

- **SG1: Combining measurements and modelling**.
- Station representativity can be an issue when comparing trends and effectiveness of measures.

- A qualitative methodology is used in UK to define stations types (eg, traffic, industrial or background)

- Station metadata is improving through new reporting requirements.

- A more quantitative methodology for station representativity is not required and is difficult to harmonise.

- **SG4: Tools for benchmarking of air quality models**

Tools to evaluate modelled annual mean concentration now available (scatter plots).

Contributions to subgroups 1 and 4

- **SG4: Alternative to relative directive error (RDE) required**

- 'In the vicinity of the limit value' is the key consideration for models used for compliance assessment .

- Guidance document (v6.2) defined RDE as:

$$(Observed_{LV} - modelled_{LV}) / Limit\ value$$

- This is too difficult to implement

- For example, results of compliance assessment will not be sensitive to greater model uncertainty at very low or very high concentrations
  - RDE allows greater model uncertainty at concentrations below the limit value
  - RDE does not allow greater model uncertainty at very high concentrations well above the limit value

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FAIRMODE recommendations to Commission

Recommendations made for the Review of the Air Quality Directive:

1. On the use of models for regulatory purpose and to support air quality policy

2. Model quality objectives

3. Forum of EU AQ regulatory modelling

4. Quality assurance and consistency of emission inventories.

1. On the use of models for regulatory purpose and to support air quality policy

•Air Quality Directive Revision should clarify the following applications of AQ models:

1. Assessment of air quality levels

2. Forecasting air quality levels for short term mitigation and public information warnings

3. Source apportionment to determine the origin of exceedances and to provide a knowledge basis for planning strategies.

4. Development and assessment of plans and measures to control AQ exceedances

Implications for the UK?

- UK keen to promote an even field for assessment and see more Member States use models.
- UK is one of only two member states using models for compliance assessment.
- Has the scientific advantage of providing a much more thorough and spatial resolved assessment of air pollution levels and population exposure.

2. Model Quality Objectives

Current text with AQD is ambiguous:

'*The uncertainty for modelling shall be interpreted as being applicable in the region of the appropriate limit value (or target value in the case of ozone)*'.

1. Recommendation to provide a revision of data quality objective for modelling
2. Recommend preparation of a guidance document for evaluating model quality objectives

Implications for the UK

- UK will continue to work with SG4 to develop tools and provide user experience.

- Tools need to work for the whole range of pollutants assessed under the Directive

- Tools need to allow focus on determination of uncertainty at the limit value/target value taking into account the spatial domain of the model.

- UK Pollution Climate Mapping model meets the data quality objectives set in the AQD.

3. Forum of EU AQ Regulatory Modelling

- AQ modelling in support to air quality policies requires a constant level of communication and competence building.

- Recommendation:
  - Competent bodies will be nominated by MS (similar to current process for measurement - AQUILA).

- Further actions will consider model evaluation, combining measurement and modelling and source apportionment.

Implications for the UK

- Engagement with MSs will assist FAIRMODE deliver its objectives.

- Continued competence building and exchange of best practice useful for all Member States.

- UK will continue to engage with FAIRMODE.

4. Quality assurance and consistency of emission inventories

- FAIRMODE recognises that emission inventories are not mentioned in the AQD and are often constructed at different scales.

- Recommendation:
    - Improve compilation, consistency and quality assurance of emission inventories.

- Further actions – support competence building

Implications for the UK

- Inventories need to meet multiple requirements.
- UK national atmospheric emissions inventory primary purpose is not ambient AQ modelling but provides an essential basis.
- UK experience as a centrally organised Member State will differ to others.
- Best practice guides and discussion on emissions factors will be useful for all.
- Current EU pilot project on 8 cities will provide interesting look at emissions inventory compilation

Summary

- FAIRMODE provides support and competence building for AQ modelling across Europe.

- The UK has engaged in several subgroups and is an influential member, being one of only two countries reporting modelled data.

- The UK would like to see more MSs reporting modelled data and is supportive of FAIRMODE's work.

- FAIRMODE's recommendations for the Review are considered and pragmatic and represent sensible next steps for the community.

Questions?
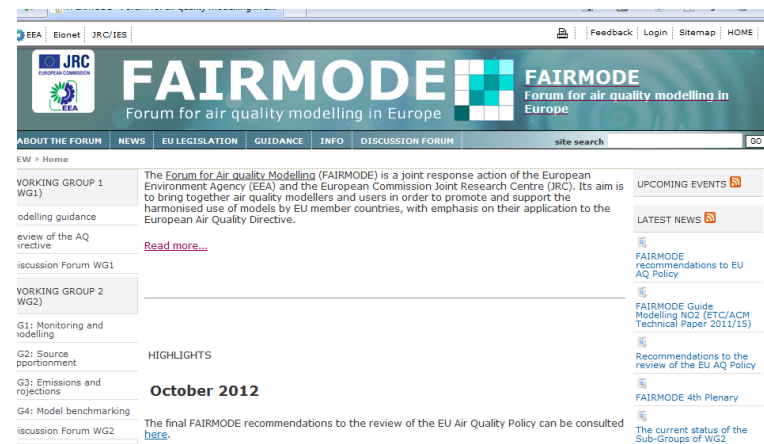
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- Useful links:
- FAIRMODE http://fairmode.ew.eea.europa.eu/
- Defra AQ Modelling : http://uk-air.defra.gov.uk/research/air-quality-modelling