



CT9

Effectiveness of measures and robustness of AQ projections

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How to tackle the issue of sensitivity of model responses to local emission reductions?

How to identify cost-effective measures for air quality improvement, also integrating NEC and AQD?

Outcome of the Ispra brainstorming

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How to tackle the issue of sensitivity of model responses to local emission reductions?

How to identify cost-effective measures for air quality improvement, also integrating NEC and AQD?

Outcome of the Ispra brainstorming

Discussion was structured on:

- Initial presentations
- Proposals for next steps
- First reflections

Proposals for next steps

- analyze the scientific literature, for methodologies for ‘cost-effective measures’ prioritization and ranking;
- build a database of available measures (with a particular focus on ‘non-technical’, or ‘behavioral’ measures, on top of technological ones);
- organize a practical activity on cost-effective measures. Preparing a ‘test case dataset’, to be used to see how participants prioritize cost-effective measures.

First reflections

- At national level:
 - Optimization approaches are useful to select cost-effective measures, whereas final selection of measures for implementation is often driven / determined by political factors;
 - Mainly technological measures (for 'non-technical measures' few data available)
- At regional scale:
 - Few optimization approaches exist and are routinely applied;
- At city scale
 - The set of available measures at city level is limited, mainly 'non-technical measures',
 - A detailed emission inventory is key to choose measures
 - Need of guidance on how to evaluate the impact of measures at city scale
 - Need of multi-scale/sector source apportionment, for source-specific contribution to background concentration. with additional hot-spot load

After questions, focus on inter-comparison...

- Do you have any comment / question on the brainstorming?
- Then Alexandra will report in details about the discussion on 'sensitivity of model responses' ...

Thank you



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CT9 - Effectiveness of measures and robustness of AQ projections

ISPRA Brainstorming outputs
Proposed intercomparison platform

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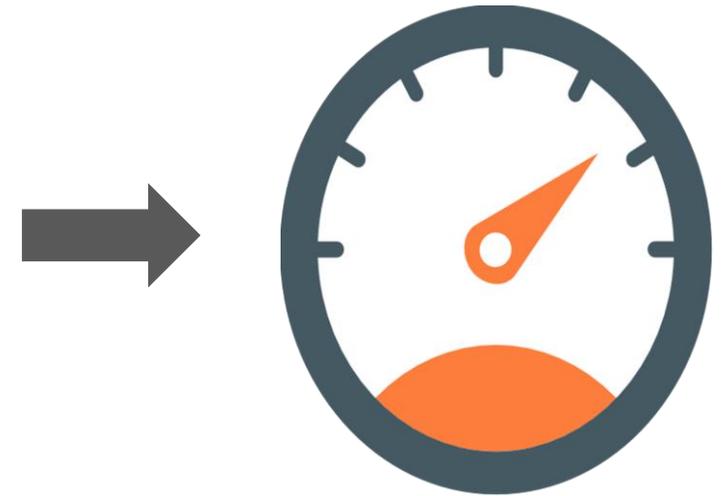
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- ❑ *Assess the sensitivity of model responses to emission reductions*
- ❑ *Assess how the ex-post assessment of air quality plans and the protocols developed by some modelling groups can support robustness*
- ❑ *Contribute to the harmonization of the specifications used to classify abatement measures that can be selected at the regional and local scales*
- ❑ *Provide overall support to model users (SHERPA, air quality models) in their planning activities (measures, emission and model scenarios)*



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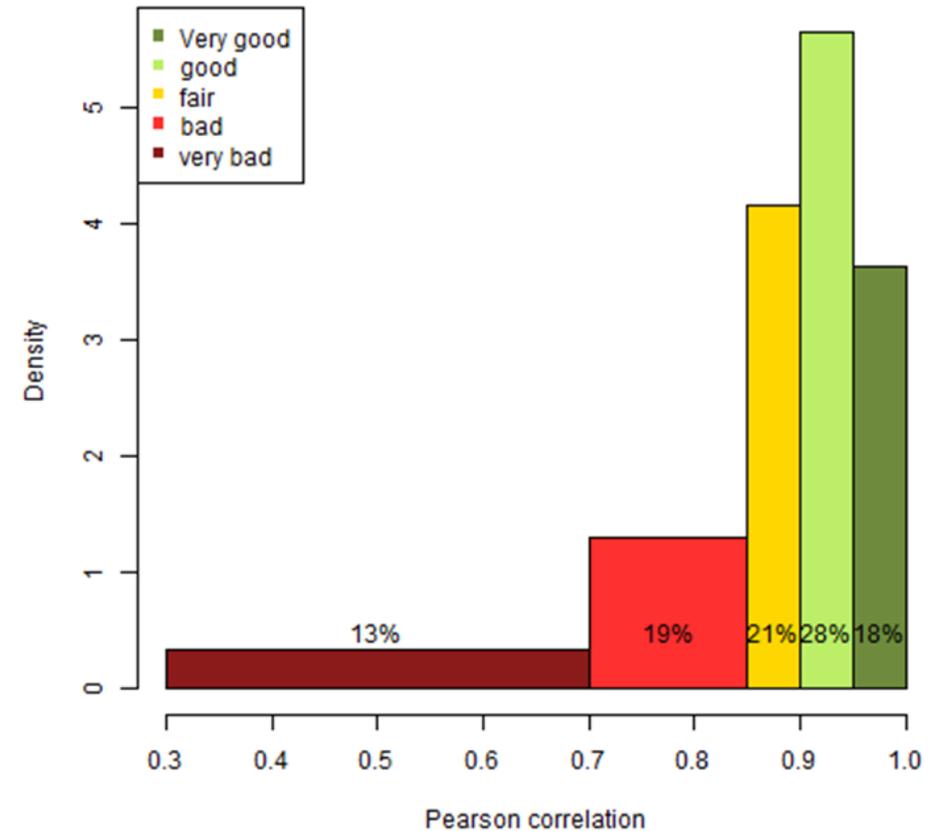
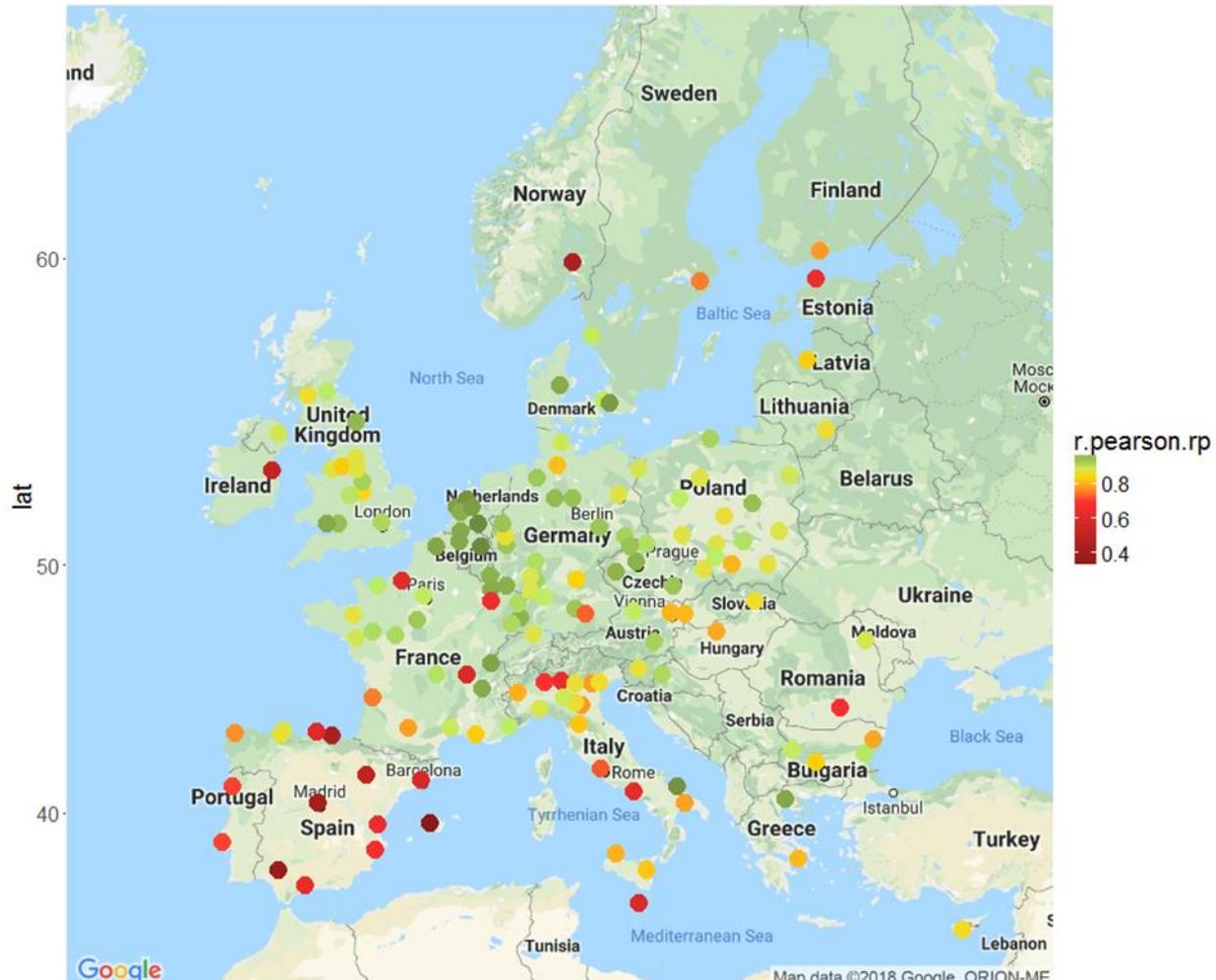
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Brainstorming meeting
(Ispra, January 2020)

CT9 Brainstorming proposal | background

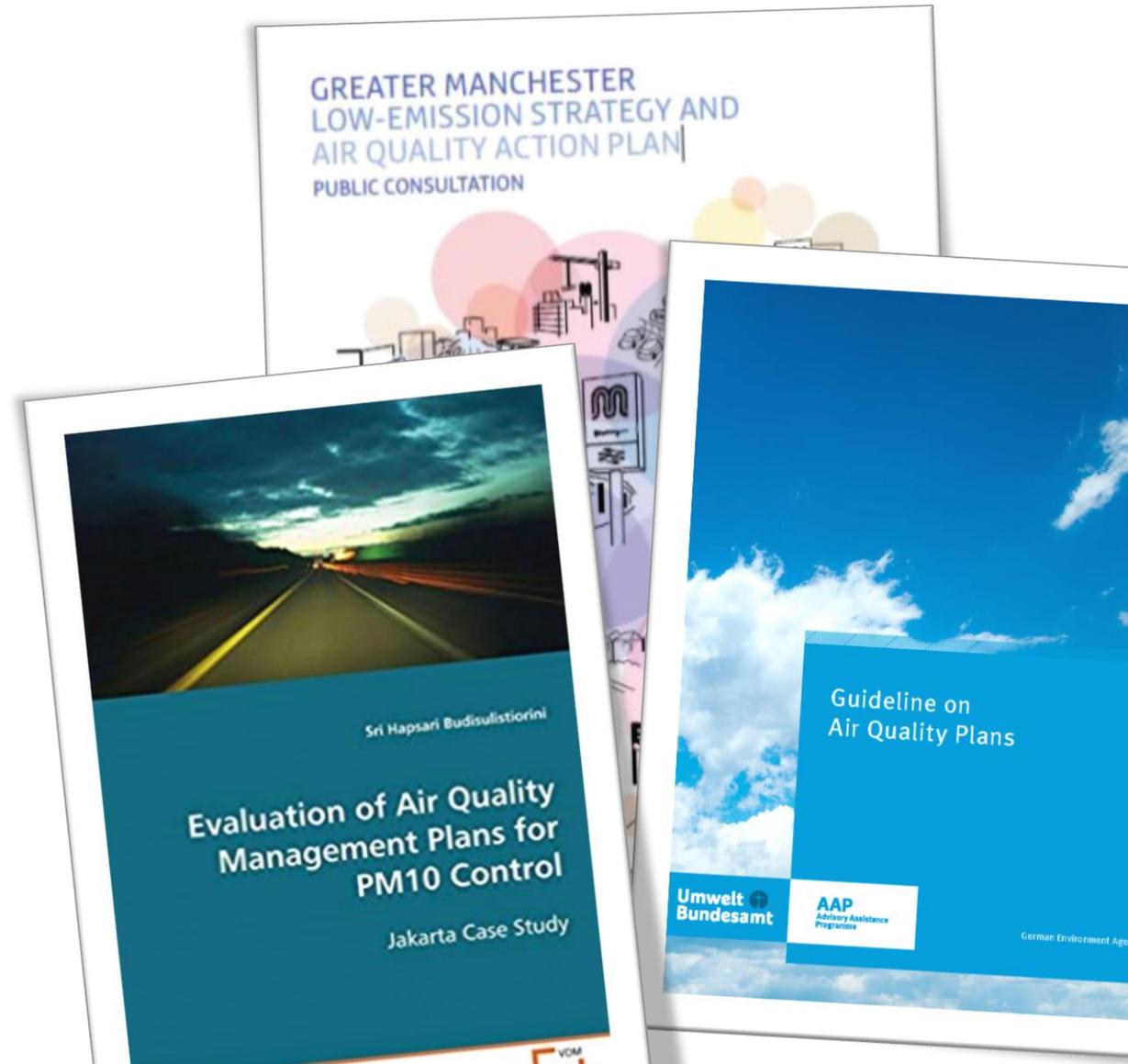
Comparison between SHERPA-CHIMERE and SHERPA-EMEP



CT9 Brainstorming proposal | the question

We use models to support policy makers in designing air quality plans!

How to assure that model responses to emission reduction scenarios are closer to REAL RESPONSES and to ensure robust policy making?



CT9 Brainstorming proposal | options

During the brainstorming meeting, several options have been proposed:

1. Check existing protocols applied by modelling groups
2. Retrieve information from past and current inter-comparison projects
3. Use ex-post assessment of air quality plans (base case simulations before/after a real AQP application)
4. Set-up a dedicated inter-comparison exercise

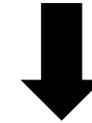


ONLY A DEDICATED INTER-COMPARISON WOULD PROVIDE THE NECESSARY INFORMATION

CT9 Brainstorming proposal | scope

Two sequential tasks:

- **Monitor and assess differences** among AQ modelling system responses to **emission changes**
- **Understand the differences** among modelling system responses to **emission changes**



- What is the impact of a given sectoral emission reduction measure on local concentration?
- What is the overall local contribution with respect to the background levels?
- How much meteorological variability impacts the potential benefits of an air quality plan?
- How robust are the air quality plan benefits if emissions or boundary conditions are modified?

Model responses tend to converge when a given exercise is organised but tend to naturally diverge afterwards....
Important to ensure continuity for this activity!



INTER-COMPARISON PLATFORM

CT9 Brainstorming proposal | goal

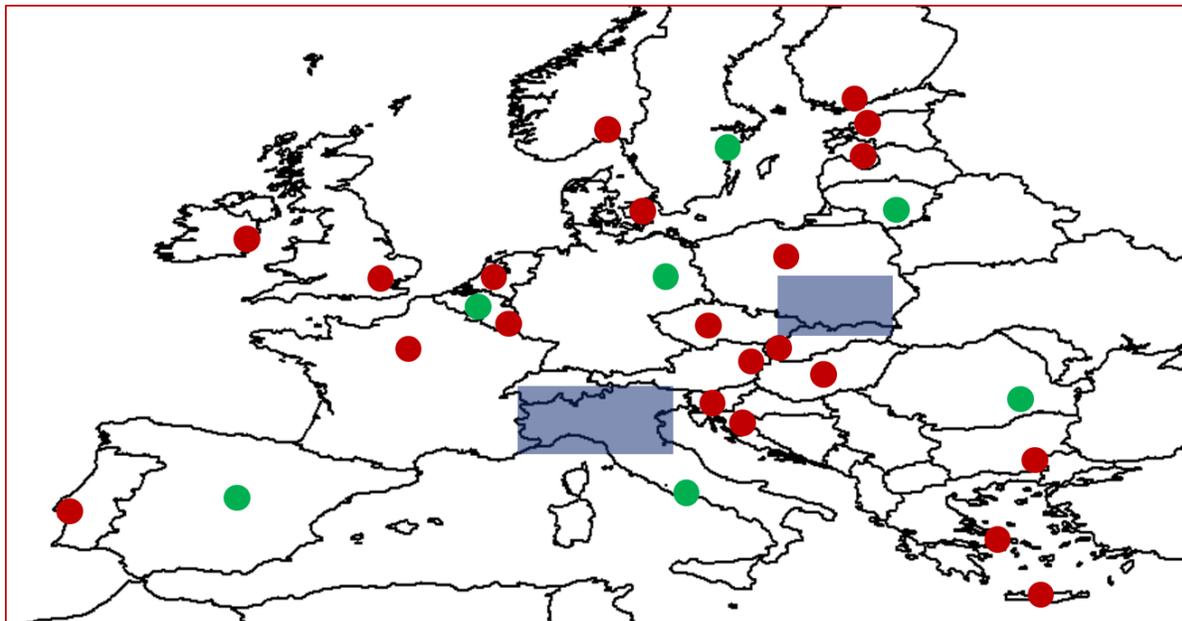
Find, discuss, explain and minimize model discrepancies

SPATIAL FOCUS

The focus of this inter-comparison is on the **urban and regional scales**

A wide set of cities in Europe (mostly EU capitals) plus a few regions could be defined.

Emission reductions and sensitivity tests applied on the entire urban or regional area.



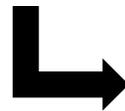
possible outlook of the
cities (circles) and regions (rectangles)
(current inter-comparisons are general
applied at EU)

CT9 Brainstorming proposal | goal

TEMPORAL FOCUS

Episodes vs long term averages?

- episodes will allow users to perform a larger number of sensitivity runs and easier to analyze and understand than yearly averages that sometimes include compensation processes
- but episodes generally lead to weaker signals which might hinder the analysis and yearly average concentrations are the most relevant output for legislation.



to address both

- episodes (for many **cities** and **regions**)
- yearly/seasonal averages for limited n° **cities**

POLLUTANTS FOCUS

PM10, PM2.5, O3 and NO2

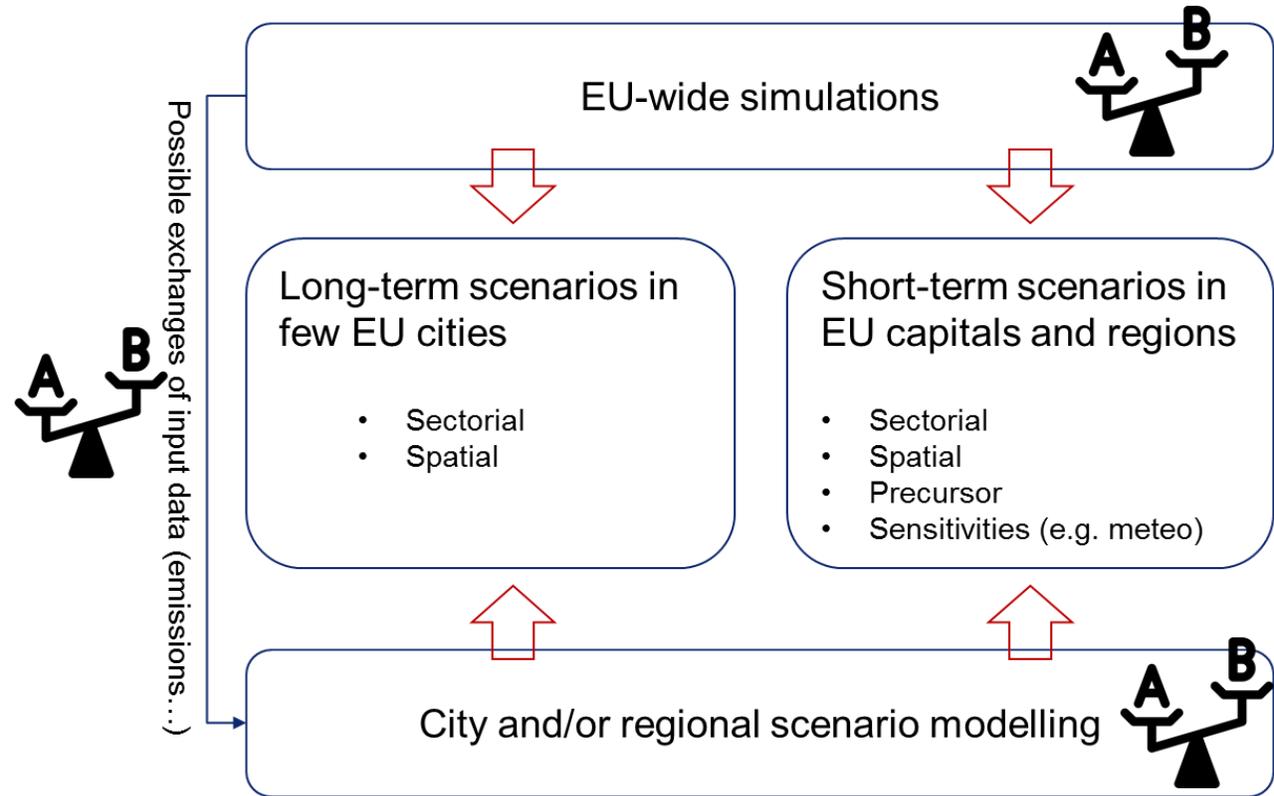
MODELLING SYSTEMS FOCUS

All modelling systems that can achieve the goals of the exercise

INDICATORS FOCUS

All relevant indicators if possible (absolute concentrations, potencies ($\Delta C / \Delta E$), exposure...)

CT9 Brainstorming proposal | steps



1. Generate **EU-wide results** with reductions performed

- for episodes
- long-term



2. Build a **one-way process to allow downloading specific city data** (BC, emissions, meteo) from EU wide input data for a potential sensitivity analysis with local scale models

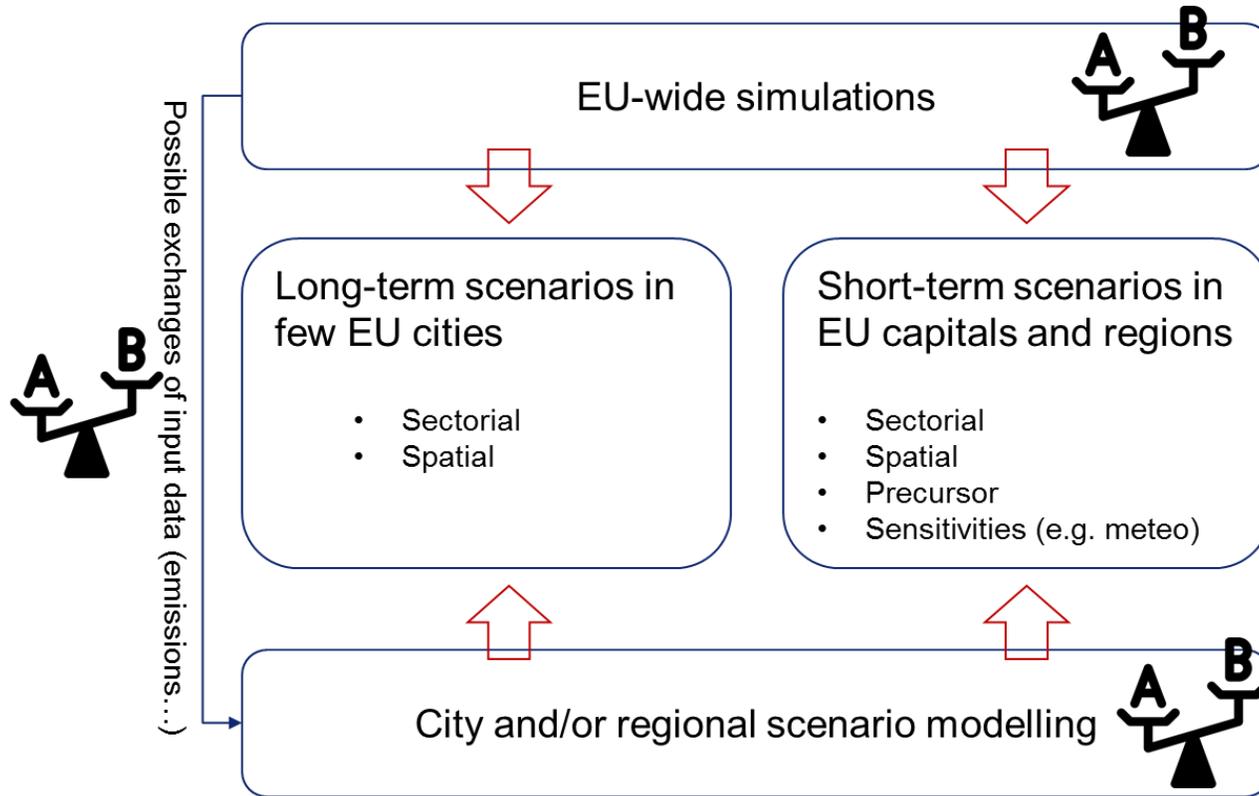
3. **Upload local modelling results** (region/city) in platform for comparison with EU (and local) wide responses

4. **Build interface** to visualize results (maps/point-to-point)



5. **Assessment** and understanding of differences

CT9 Brainstorming proposal | steps



This inter-comparison platform would allow:

- **understanding the variability** of models responses to emissions changes
- **guide member states/cities** in the application of emission reduction measures:
 - Model system vs model system (same/different scale)
 - Model vs model (with similar input data)
 - Model version vs. model version

intention is not to compare city responses among themselves but to compare model results over a given city.

CT9 Brainstorming proposal |



- important to have **model developers** on board (local and European scales)
- very important to involve/commit a few **local/urban scale modelling groups** simulating their cities
- SUGGESTIONS:
 - inter-comparison up to the **street level**: later stage??
 - include **BaP** as a possible pollutant

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Avoid re-inventing the wheel!

Scientific purpose:

Focus on local/urban scale modelling

Sectorial and geographical emission reduction – analysis

Joining local/expert modelling knowledge

more...?

Guidance purpose:

To understand why differences occur, and then to provide guidance to MS/cities

CT9 Brainstorming proposal |



1. Do you agree with this approach?
2. Are you willing to participate?
3. What do you will change?