

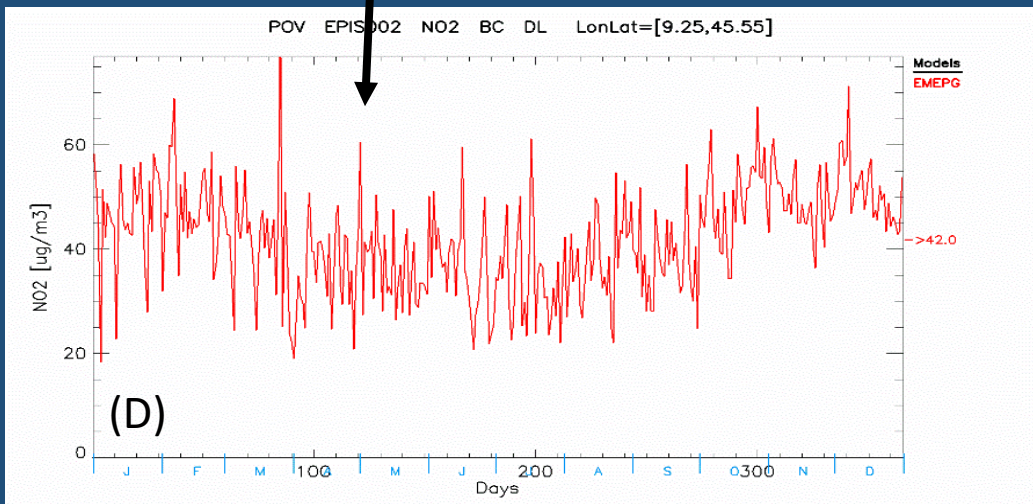
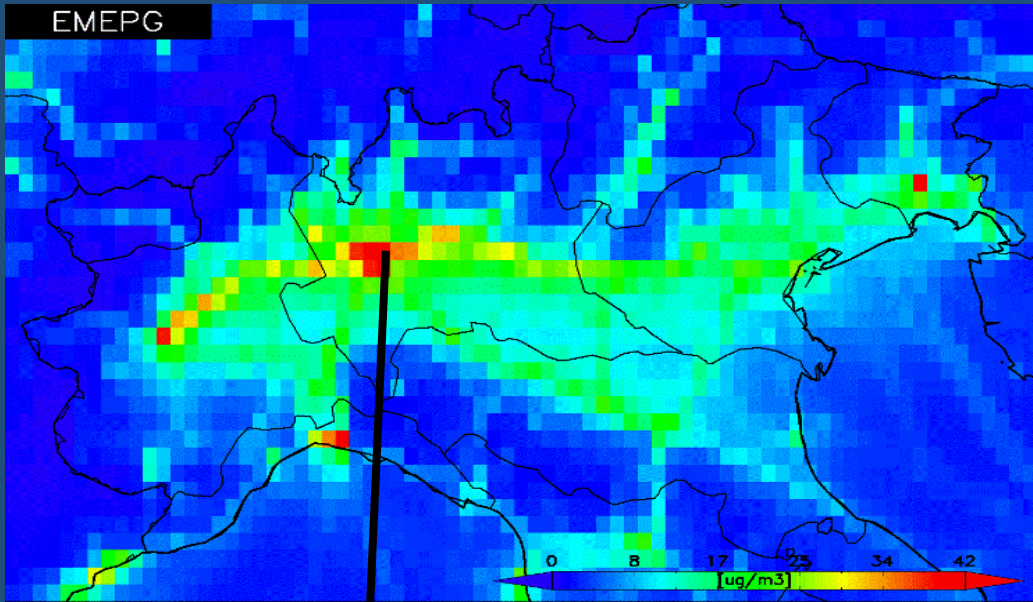
For the Analysis we developed a visualization Tool based on earlier model intercomparison activities, like CityDelta, EuroDelta, (HTAP) Hemispheric, POMI, Trend Analysis, ...

In WG9 the Tool allowed for the visualization of all the model results and emission inventories, including (multi-model) intercomparisons and comparisons to observations: 2D maps, Time series, Scatter plots, Dynamic evaluation (Potential, Potency), conversion to common grid, spatial and temporal zooming, seasonality, Day/Night,

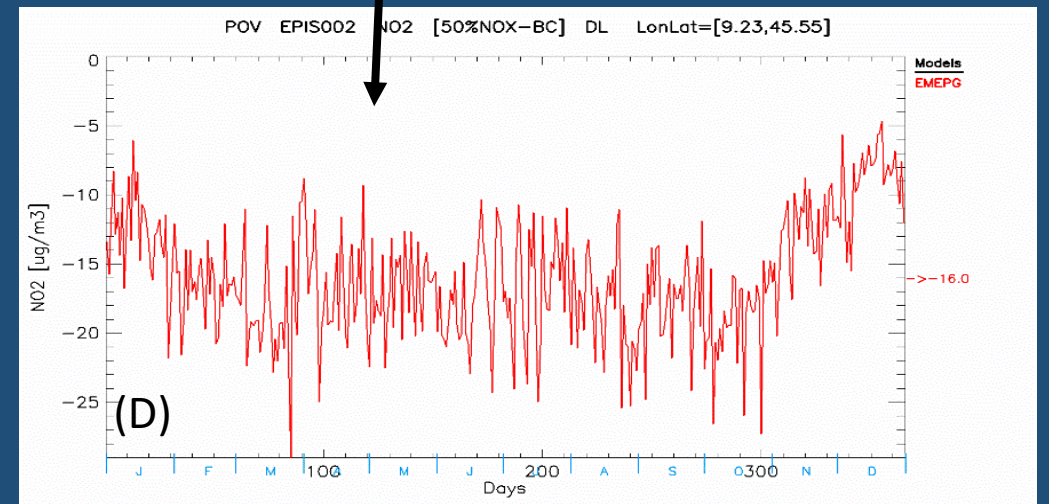
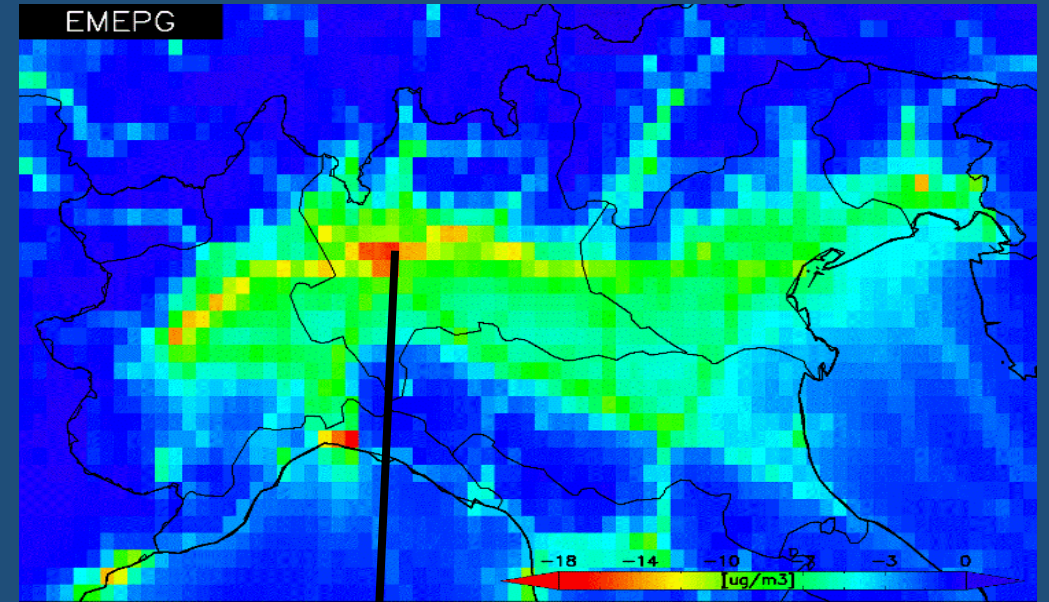
- Visualization Tool written in IDL
- Windows version (Linux version not fully tested)
- Freely available, No IDL license needed
- Simple installation: Tool (28 Mb) + DataBase (65 Gb)

An examples: EMEP + GNFR, NO2, PO Valley

Base Case (Y): 0 -> 42 $\mu\text{g}/\text{m}^3$

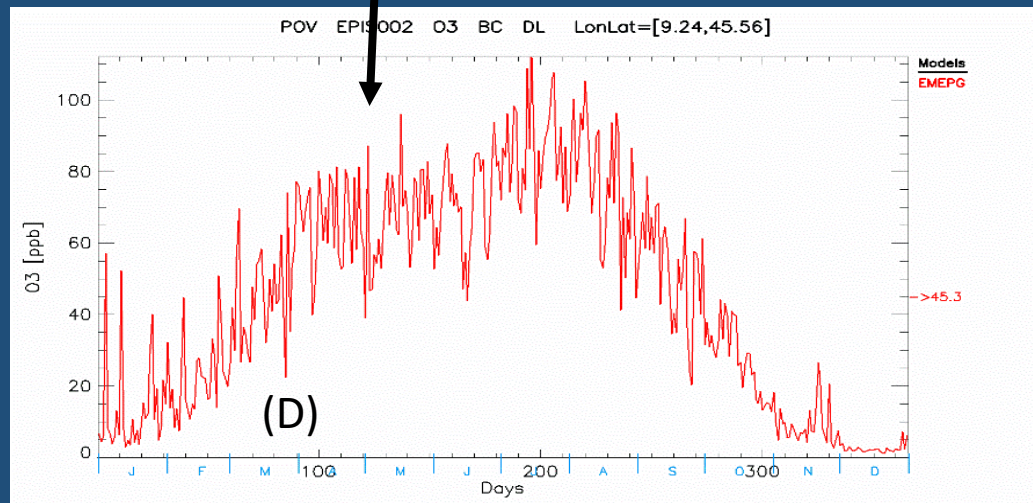
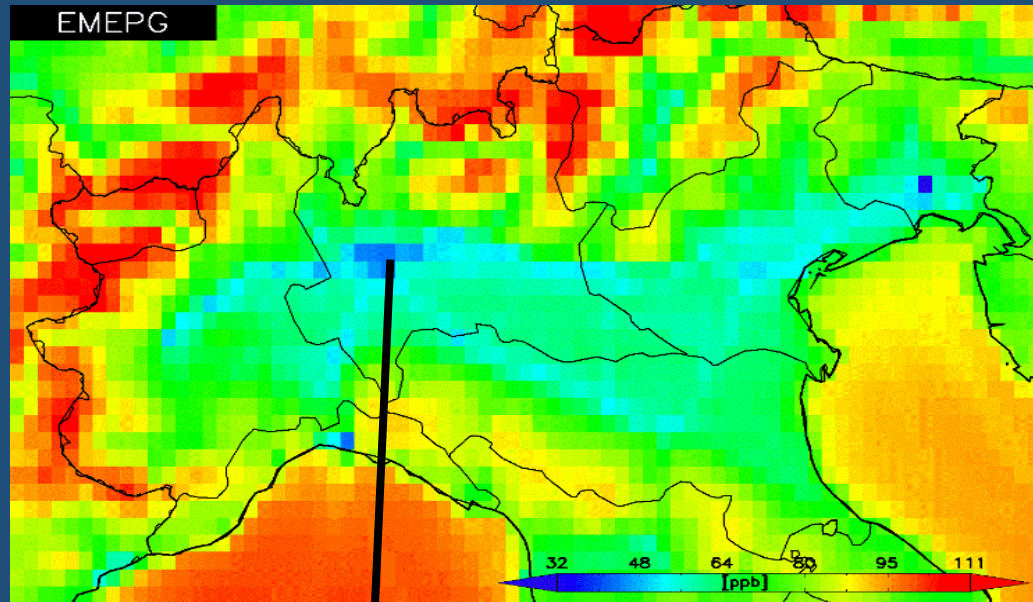


50%NOX red – BC (Y): -18 -> 0 $\mu\text{g}/\text{m}^3$

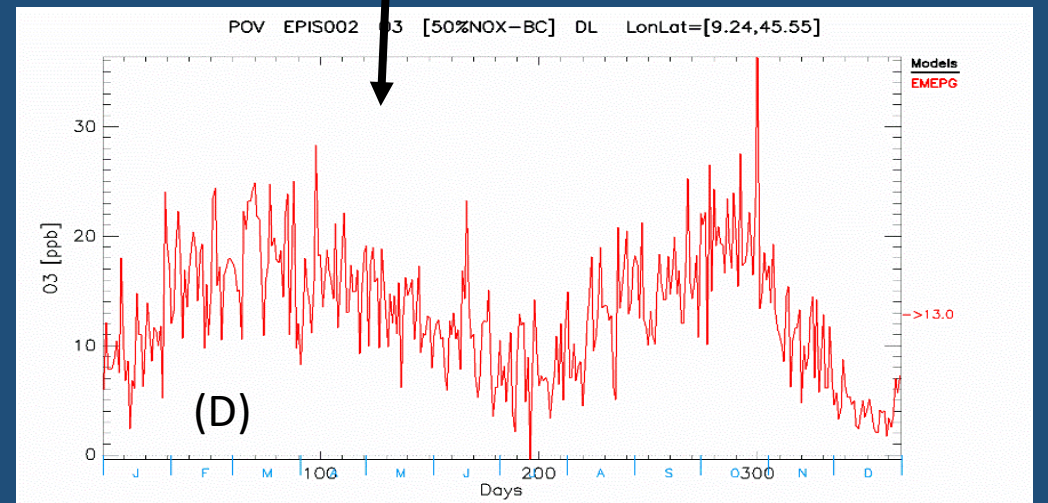
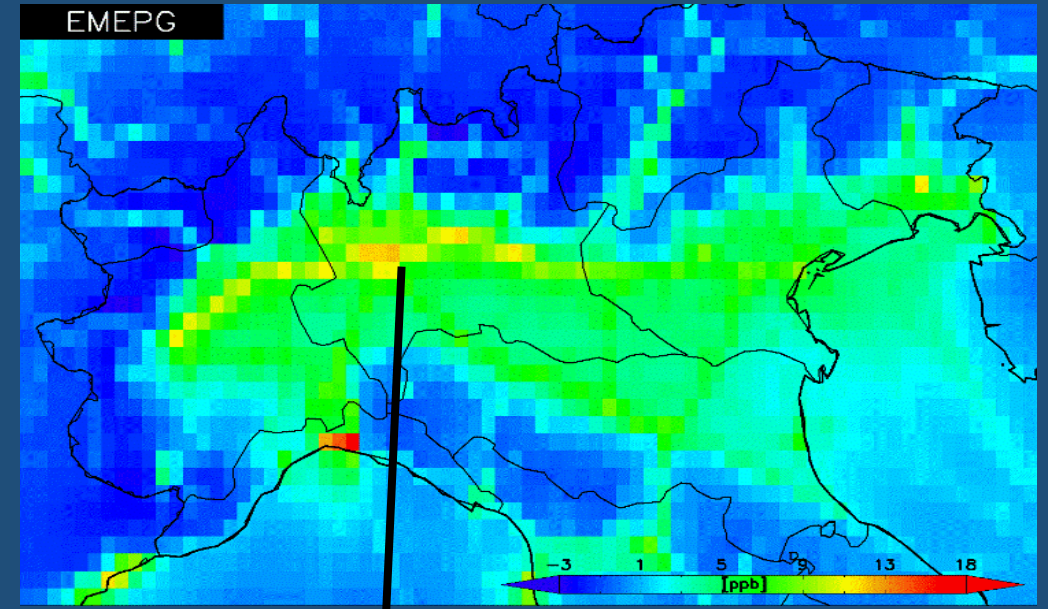


An examples: EMEPG + GNFR, O3, PO Valley

Base Case (Y): 32 -> 111 ug/m3

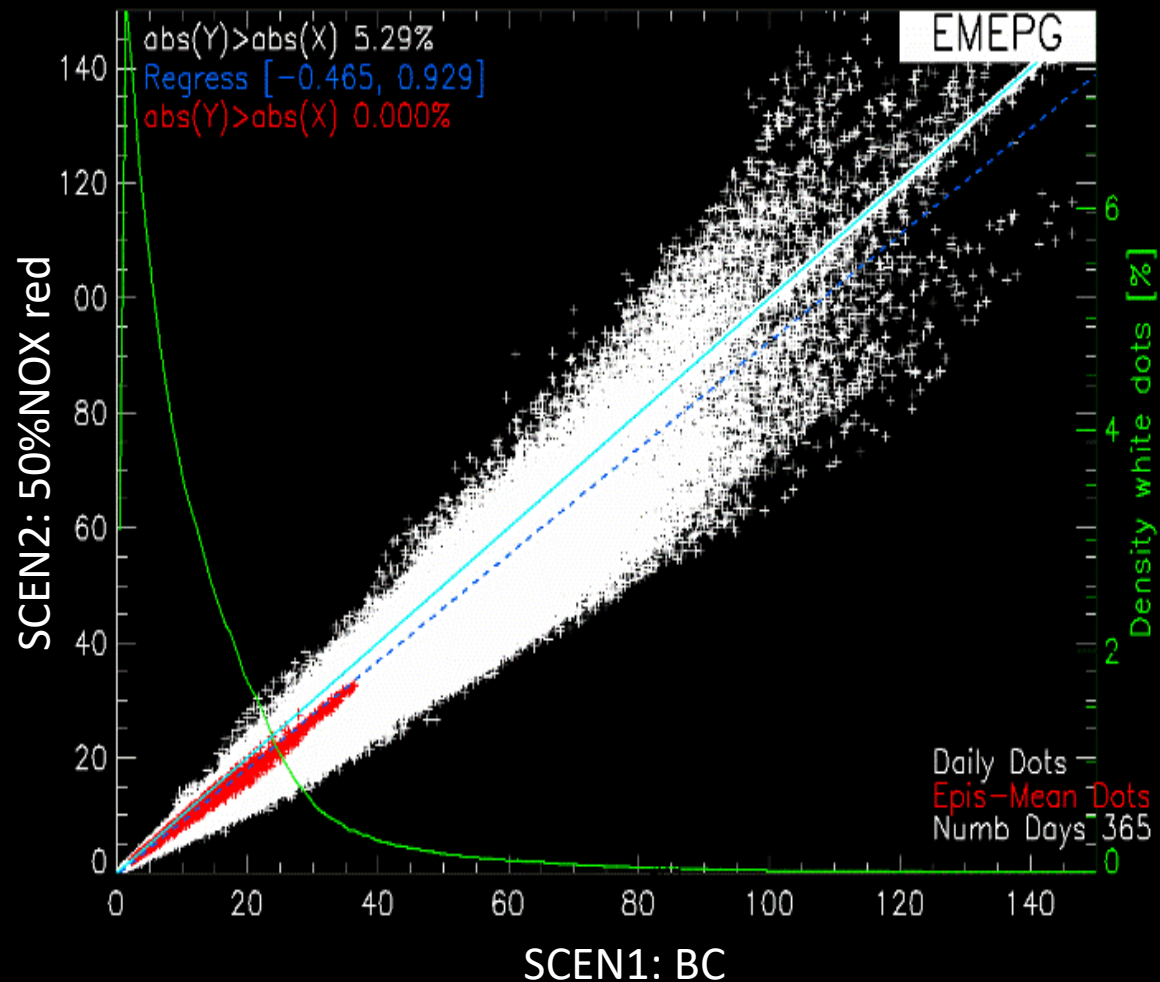


50%NOX red – BC (Y): -3 -> 18 ug/m3



An examples: EMEP + GNFR, O3, PO Valley

EMEPG POV EPIS002 PM10 [ug/m3] DL



Scatter 50%NOX red vs BC

ABSOLUTE POTENTIAL PM10

[ug/m3]

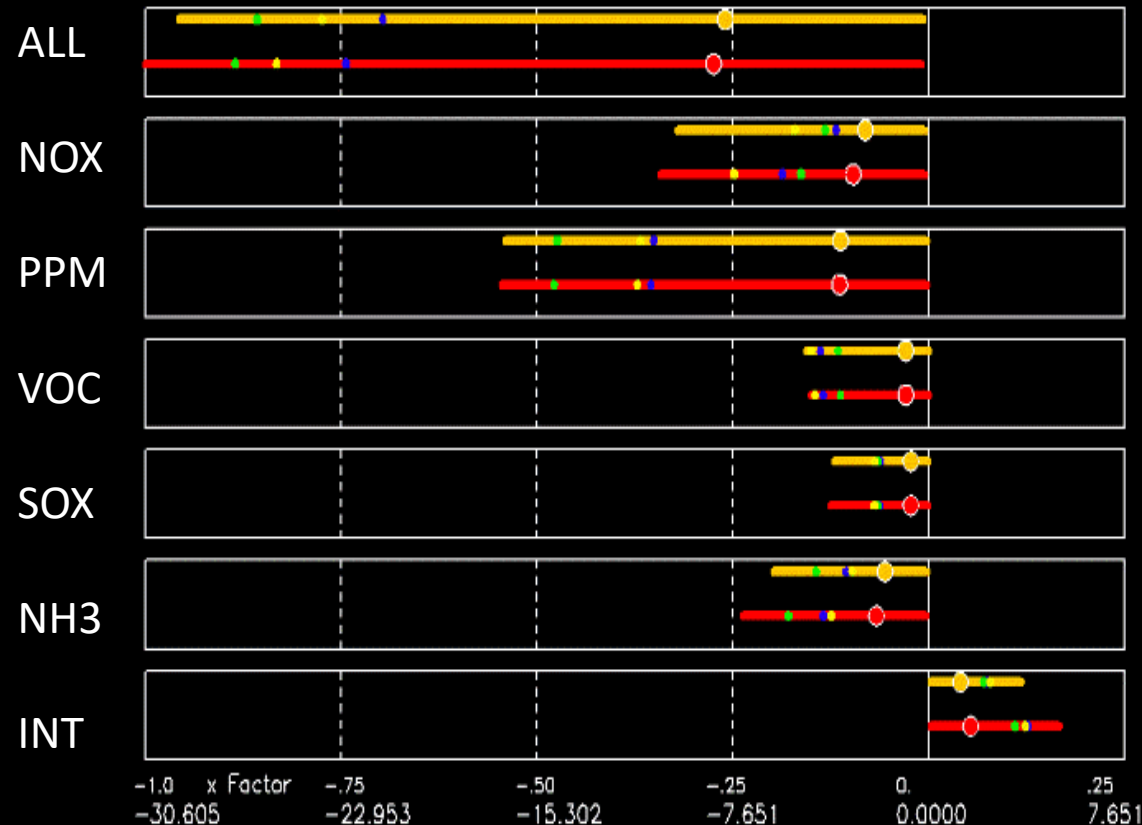
EMEPG POV EPIS002 DL

ALL = NOX+PPM+VOC+SOX+NH3

Area(POV) = 228462.2 km2

Factor = 30.605

● Min Mean Max: 25% E_Reduction
 ● Min Mean Max: 50% E_Reduction
 ● 95p 97p 98p (BaseCase)



Relative Potential

However:

- Users have to install the Tool (and subsequent updates) and Data locally on their machines, which hampers a direct comparison to similar results.
- It is written in IDL (traditional since the early days of CityDelta), probably better to change to R or Python.

The proposal:

- Is now to setup a Web application of the WG9 visualization tool
- No need to install tool and Data, no need to download
- Experience in HTAP intercomparison, where University of Jülich has produced a Web application based in the JRC IDL coding of the Tool.
- Very recent experience with the Sherpa Tool

- **If WG9 pretends to be a platform, then there must exist an easy-to-use visualization tool for direct intercomparison with results from other users**
- **With links to other WG***
- **Centralized management of Tool and updates of DataBase**
- **Benificial for user interaction**

FAIRMODE-WG9 PLATFORM

- All consolidated model results
- Visualization Tool



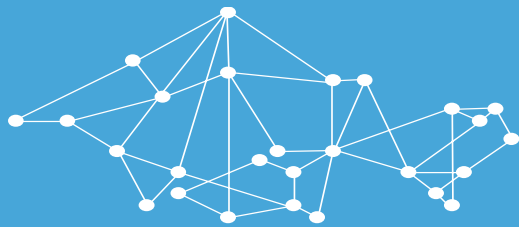


FAIRMODE

Forum for air quality modelling in Europe

WG9: CHALLENGES IN AIR QUALITY PLANNING

STIJN JANSSEN & BERTRAND BESSAGNET



- » The general steps leading to an AQ plan :
1. Observing an exceedance → this triggers the setup of an AQ plan
 2. Assessing the Exceedance Situation indicators (WG8) → severity of the exceedance
 3. Source Apportionment → understanding the sources (WG1, WG7)
 4. Defining a measure / package of measures (WG5)
 5. Quantifying the emissions change (WG5, WG7)
 6. **Quantifying the resulting concentration change (WG9)**

Article 19 increases the effectiveness of air quality plans to **ensure compliance** with air quality standards **as soon as possible**. This will be achieved by (a) requiring air quality plans to be drawn up before air quality standards enter into force in cases of non-compliance prior to 2030, (b) specifying that air quality plans must aim to keep the exceedance period as short as possible, and in any case no longer than 3 years for limit values, and (c) mandating regular updates of air quality plans if they do not achieve compliance.

A final amendment will require that air quality plans analyse the risk of exceeding alert thresholds. This will lead to greater **integration of short-term action plans** – required to address alert threshold exceedances – with **longer-term action plans**, saving resources and improving the measures taken.

Article 21 further clarifies and strengthens the arrangements for cooperation between Member States to address breaches of air quality standards due to **transboundary air pollution**, notably requiring swift exchange of information between Member States and with the Commission.

6. Annex 1: Details of measures to reduce air pollution under point 5

- (a) listing and description of all the measures set out in the air quality plan, including the identification of the competent authority in charge of their implementation;
- (b) quantification of emission reduction (in tonnes/year) of each measure under point (a);
- (c) timetable for implementation of each measure and responsible actors;
- (d) estimate of the concentration reduction as a consequence of each air quality measure, in relation to the exceedance concerned;
- (e) list of the information (including modelling and assessment results of measures) to reach the air quality standard concerned in accordance with Annex I.

- » Ensure compliance as soon as possible:
 - » Assessment of “hot spot” locations at all spatial scales
 - » Assessment of absolute concentration levels in the future (Y+1 → Y+3; 2030)
- » Integrate various spatial scales to account for long range transport
- » Integrate short-term and long term action plans
- » Evaluate impact of individual measures:
 - » Quantification of emission reduction
 - » Estimation of concentration reduction

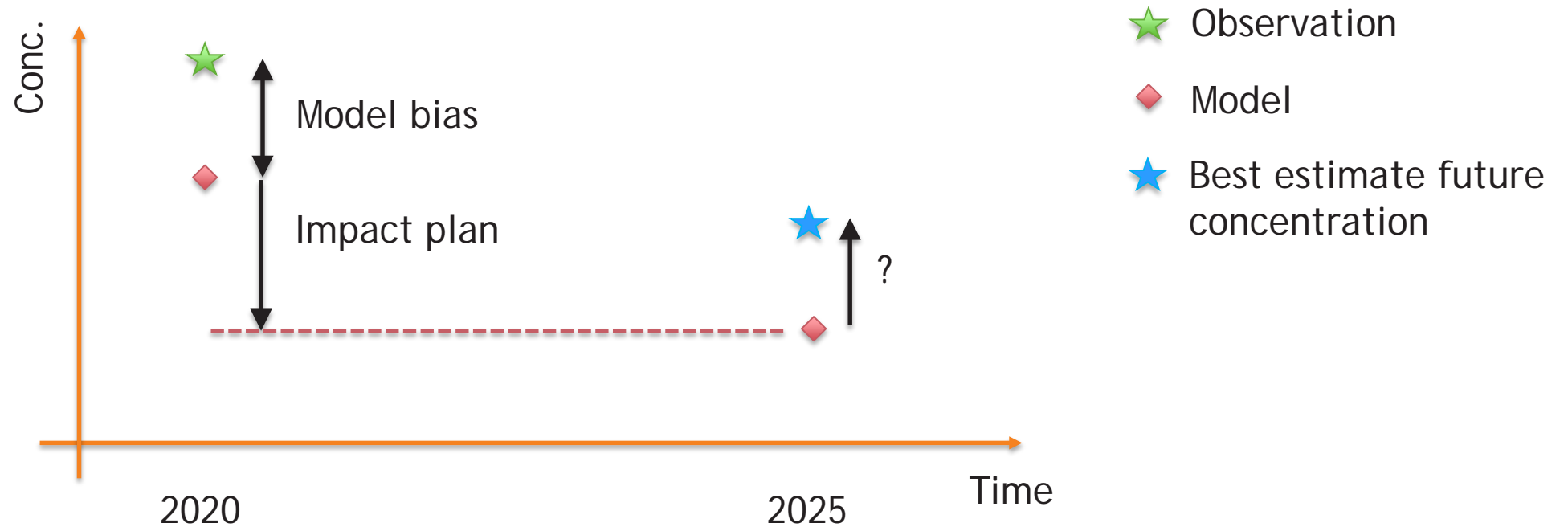
CHALLENGES IN MODELLING FOR AQ PLANNING

1. Do you calibrate the base case of your air quality plan with measurements? If so, how do you deal with this calibration in the scenario runs?
2. Do you integrate a local air quality plan in a national plan? Do you take into account air quality plans in neighboring regions or Member States? How is the integration performed?
3. Do you assess whether compliance is achieved after implementation of the air quality plan? How do you evaluate the remaining hot spot locations?
4. What is the time horizon of the model simulation? How do you evaluate whether compliance is reached “as soon as possible” as requested by the AAQD?
5. How do you deal with meteorological variation in the scenario runs for air quality planning?
6. Do you evaluate the impact of all measures individually, a set of measures or only the entire plan?
7. Do you evaluate the air quality plan at concentration levels or do you take into account health impacts as well?



1. CALIBRATION OF THE BASE CASE

- » Do you calibrate the base case of your air quality plan with measurements? If so, how do you deal with this calibration in the scenario runs?



WG9 panel discussion, Q1 – Czech approach and questions

- Mapped AQ for the reference year using station measurements and AQ model:

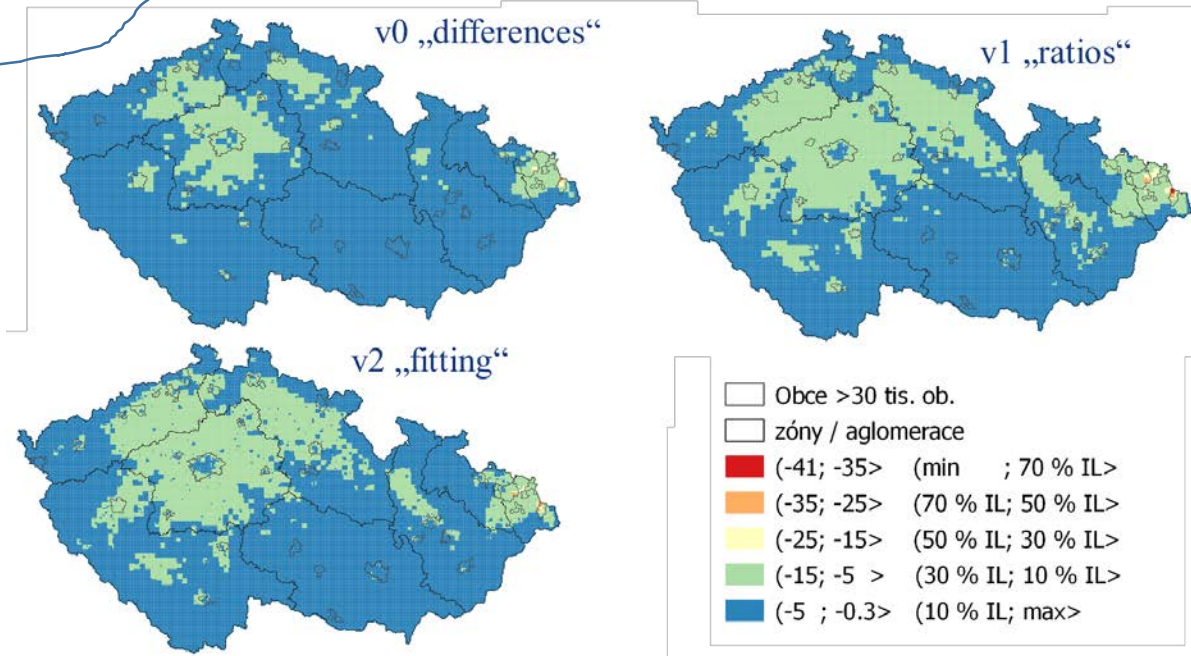
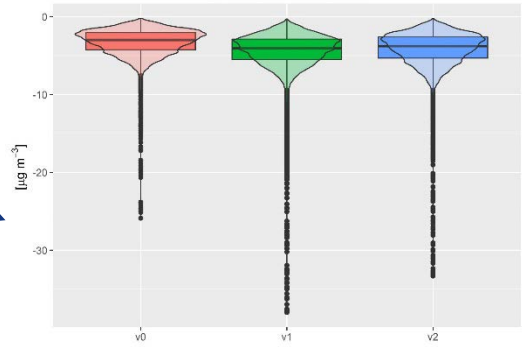
$$C_{ref} = f(obs, mod) = f_{fit_ref}(mod_{ref}) = a + b \cdot mod_{ref} + residuals$$

- Estimate of future AQ after application of AQP:

v0 - model difference: $C_{scen} = C_{ref} + mod_{scen} - mod_{ref}$

v1 - model ratios: $C_{scen} = C_{ref} \frac{mod_{scen}}{mod_{ref}}$ *Currently used in CZ*

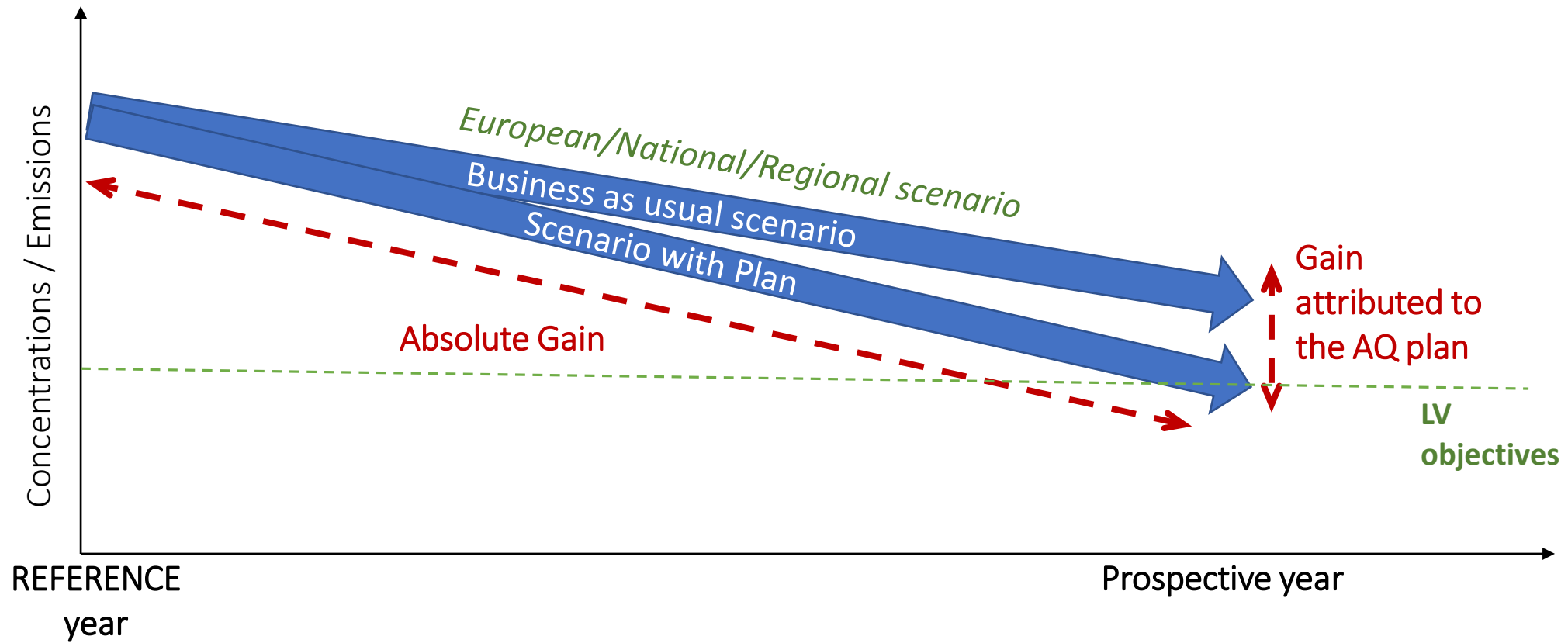
v2 - fitted (adjusted) model: $C_{scen} = f_{fit_ref}(mod_{scen})$



C_{ref} ... mapped concentrations (annual statistics) for the reference year
 mod_{ref} and mod_{scen} ... model results (annual statistics) for the reference year and scenario.
 Meteorology corresponds to reference year in both cases
 C_{ref} ... mapped concentrations for the reference year

2. LONG RANGE TRANSPORT

- » Do you integrate a local air quality plan in a national plan developed under the AAQD or NECD?
- » Do you take into account air quality plans in neighboring regions or Member States?
- » How is the integration performed?



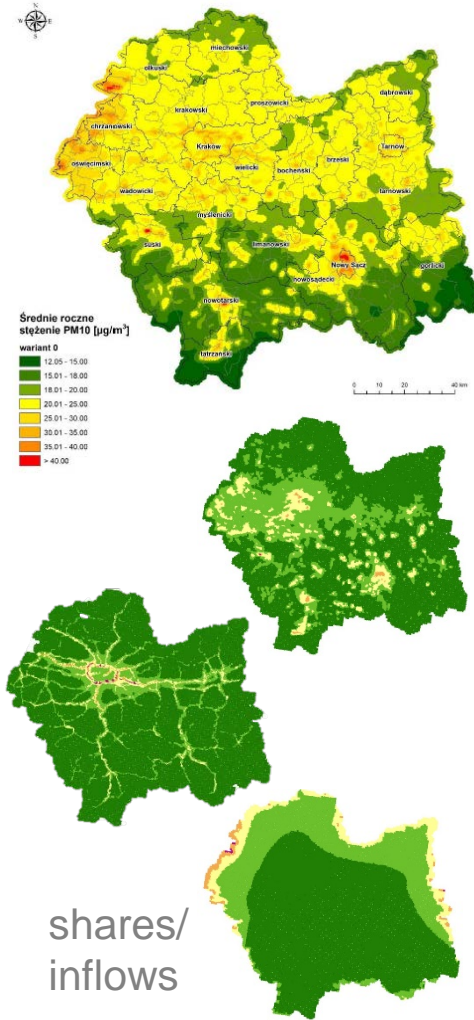
BAU scenarios

- ❖ European BAU: ECLIPSEV6b-CLE (GAINS)
- ❖ French national BAU (CITEPA emissions): PREPA-AME, distributed to French regional AQ agencies to be used as BC or background concentrations
- ❖ Regional BAU: based on regional scenario or based on national BAU (in % per emission subsector)

Difficulties: timing of national vs regional planning – part of the regional plan measures may already be accounted for in the national BAU or national BAU outdated/ Coordination is needed as well as regular updates

Question 2/3 -AQP- scenarios, neighbouring regions

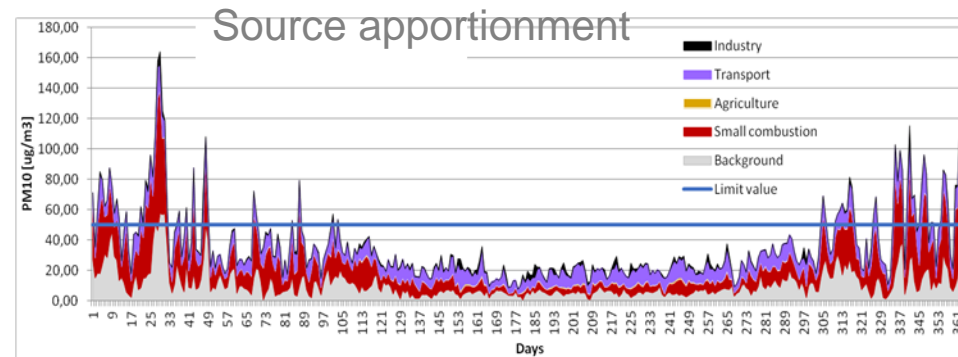
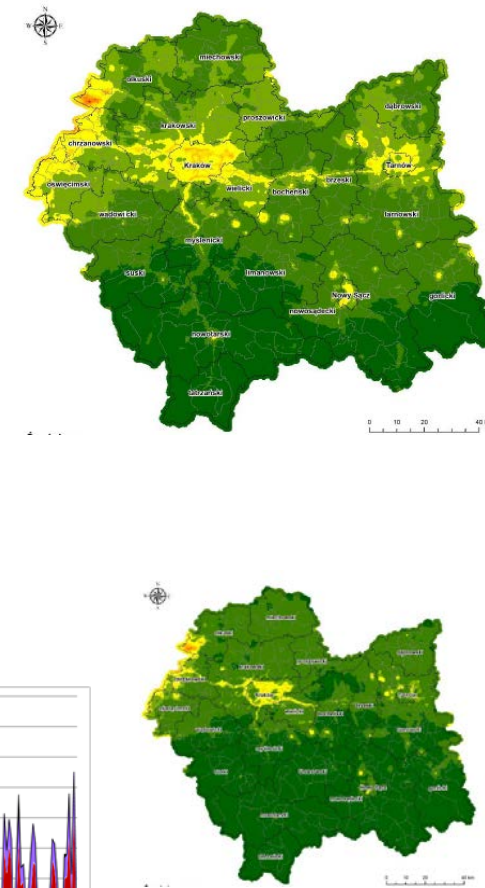
Baseline



Neighbouring counties

Powiaty	bocheński	brzeski	chrzanowski	dąbrowski	gorlicki	krakowski	limanowski	miechowski	myślenicki	nowosądecki
bocheński	14,813	0,617	0,077	0,055	0,075	0,63	0,24	0,07	0,547	0,25
brzeski	2,587	10,91	0,07	0,083	0,119	0,53	0,18	0,071	0,339	0,281
chrzanowski	0,026	0,017	16,048	0,009	0,008	0,699	0,025	0,07	0,085	0,017
dąbrowski	0,17	0,291	0,058	9,421	0,081	0,335	0,077	0,088	0,11	0,123
gorlicki	0,223	0,327	0,033	0,028	9,976	0,174	0,238	0,028	0,203	1,69
krakowski	0,088	0,048	0,37	0,02	0,013	20,1	0,072	0,067	0,268	0,039
limanowski	0,501	0,197	0,038	0,015	0,052	0,208	16,069	0,027	0,573	0,615
miechowski	0,087	0,071	0,208	0,035	0,021	1,348	0,056	17,678	0,089	0,055
myślenicki	0,137	0,058	0,093	0,015	0,011	0,918	0,128	0,028	20,191	0,039
nowosądecki	0,258	0,258	0,028	0,015	0,113	0,158	0,832	0,022	0,284	16,448
nowotarski	0,049	0,023	0,022	0,005	0,01	0,105	0,295	0,012	0,253	0,066
olkuski	0,033	0,021	0,314	0,011	0,008	0,576	0,03	0,227	0,065	0,023
oświęcimski	0,03	0,019	0,181	0,009	0,005	0,427	0,028	0,028	0,096	0,014
proszowicki	0,359	0,238	0,167	0,082	0,04	2,022	0,096	0,27	0,165	0,11
suski	0,084	0,038	0,069	0,01	0,007	0,28	0,096	0,018	0,6	0,025

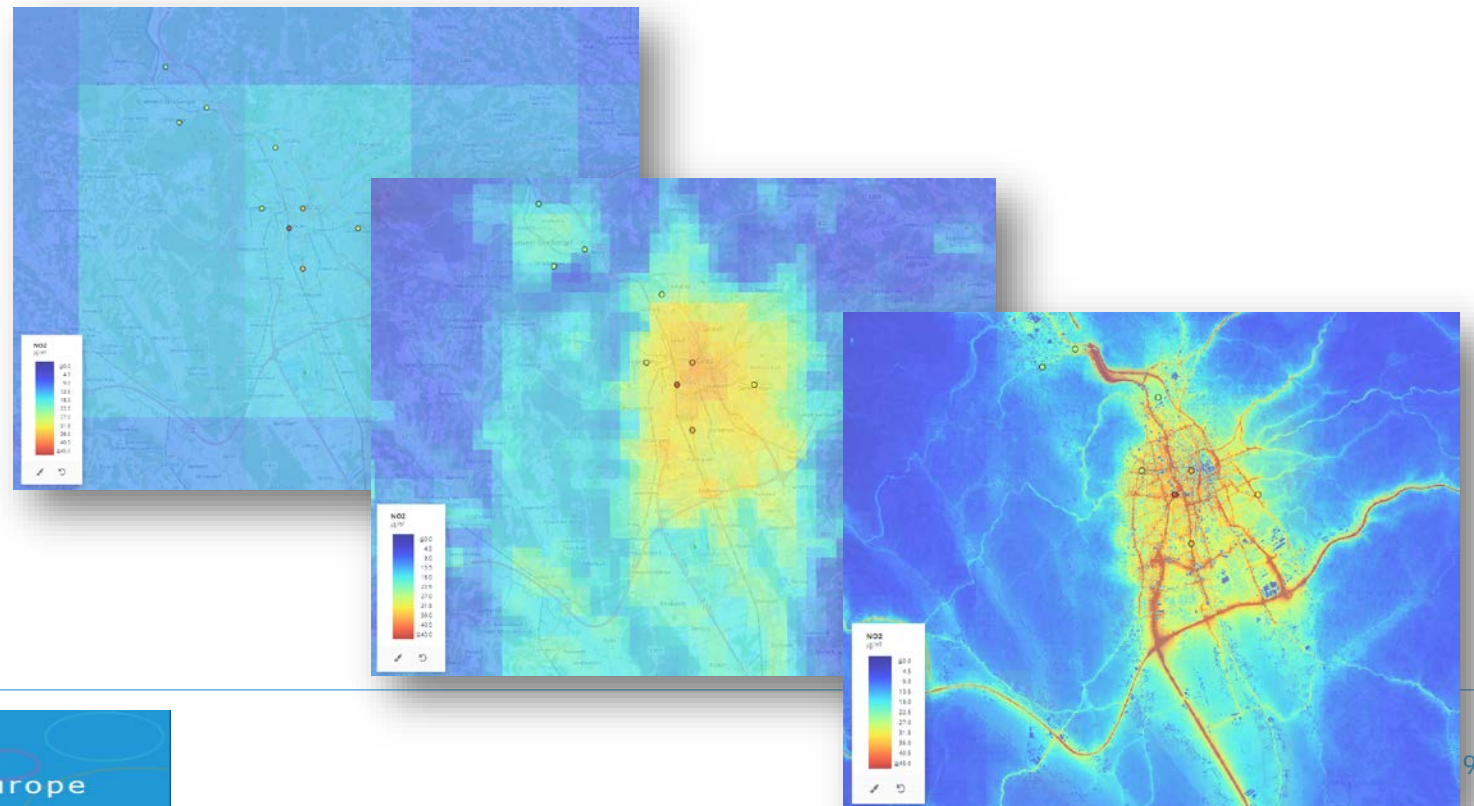
Scenarios



Source: AQP Malopolska

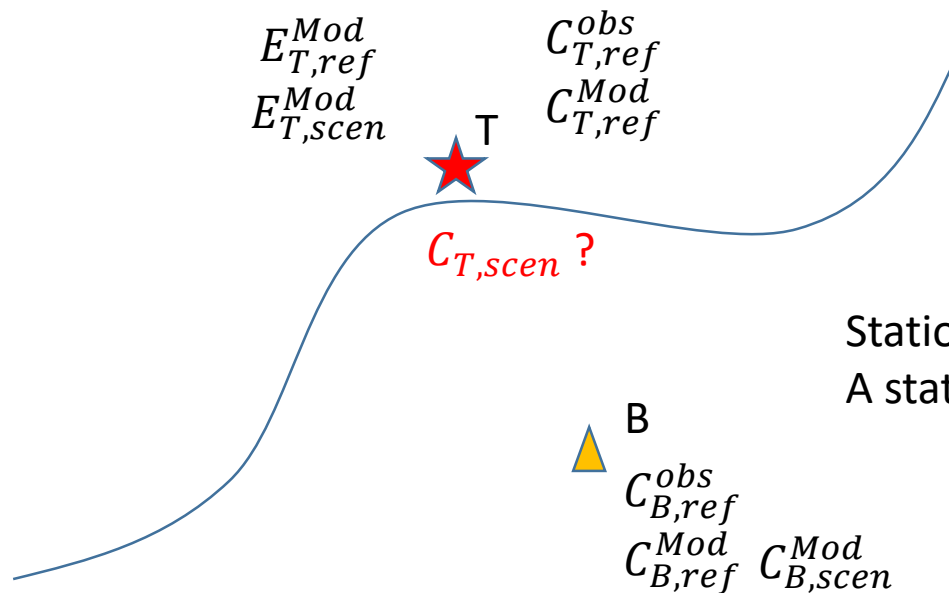
3. FUTURE COMPLIANCE ASSESSMENT

- » Do you assess whether compliance is achieved after implementation of the air quality plan?
- » How do you evaluate the remaining hot spot locations?



Possible first guess method to estimate scenario concentrations at traffic sites from CTM NO2 outputs

E: Traffic emissions
C: Concentrations



$$C_{T,scen} = (C_{T,ref}^{obs} - C_{B,ref}^{obs}) \times \frac{E_{T,scen}^{Mod}}{E_{T,ref}^{Mod}} + C_{B,ref}^{obs} \times \frac{C_{B,scen}^{Mod}}{C_{B,ref}^{Mod}}$$

Station T is supposed to be influenced by traffic only
A station B representative of the background of station T must exist

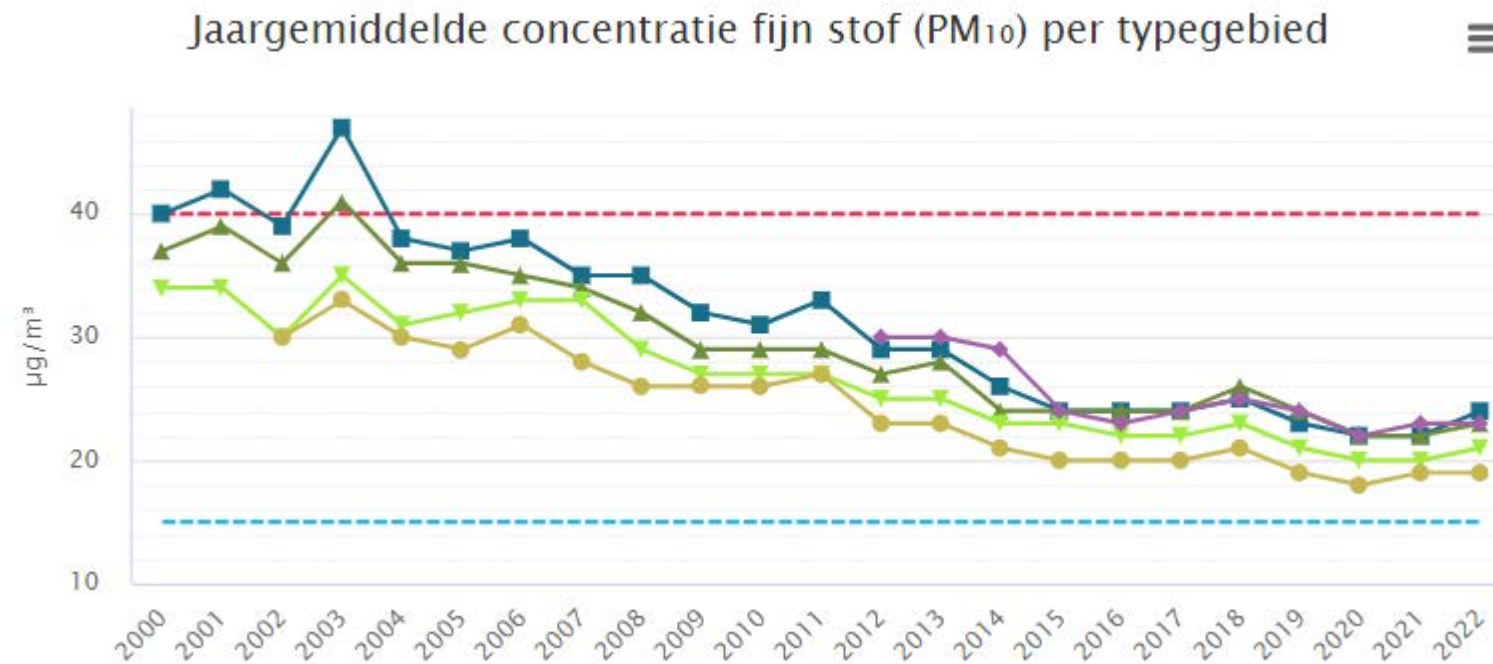
4. AS SOON AS POSSIBLE

- » What is the time horizon of the model simulation?
- » How do you evaluate whether compliance is reached “as soon as possible” as requested by the AAQD?



5. METEO VARIABILITY

- » How do you deal with meteorological variation in the scenario runs for air quality planning?



6. EVALUATION OF MEASURES

- » Do you evaluate the impact of all measures individually, a set of measure or only the entire plan?



7. EVALUATION OF THE PLAN

- » Do you evaluate the air quality plan at concentration levels or do you take in to account health impacts as well?



CHAPTER 6 – Planning

- **Role of modelling in the AAQD Planning process**

- Requirements for emission data
- Links with Assessment and SA

- **Model setup for Planning purposes**

- Adjustment (calibration) of reference case/year and it's further implementation in scenarios
- Boundary conditions for local scale scenarios, coupling local and regional/national AQ plans
- Assessment of future compliance, evaluation of remaining hot spots
- Time horizon of model simulation → compliance “as soon as possible”
- Meteorological variability in scenarios
- Evaluation of individual measures, plan as a whole

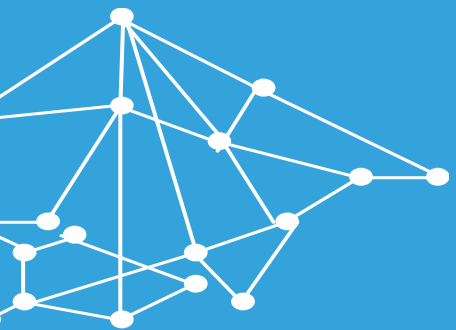
- **QA/QC process for Planning**

- Dynamic evaluation



Feedback @

<https://ec.europa.eu/eusurvey/runner/MODGUI>



Thanks for the discussion!

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N°	Topics
1	Calibration?
2	Long range?
3	Future compliance?
4	As soon as possible?
5	Meteo variability?
6	Measures vs plan?
7	Concentrations or exposure?