

Fairmode – WG5

Bias corrections in future scenarios

French reflexions

25th May 2024



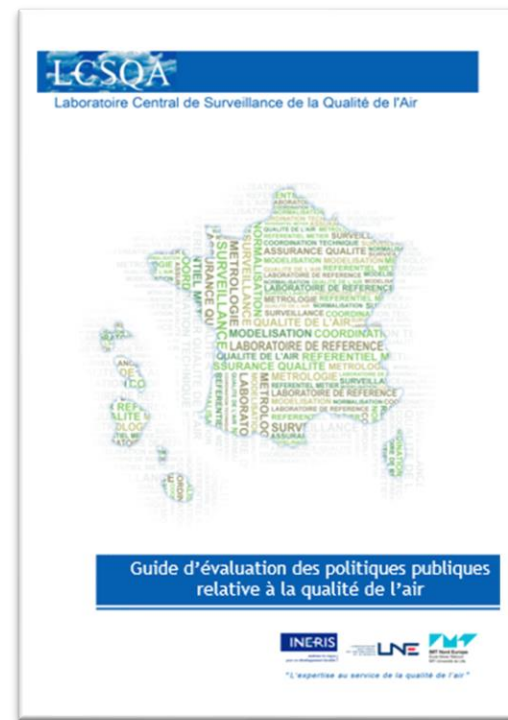
Groupement d'intérêt scientifique

A national methodological guide (2024, V2 – French ministry/AASQA/LCSQA) on AQP evaluation at regional level:

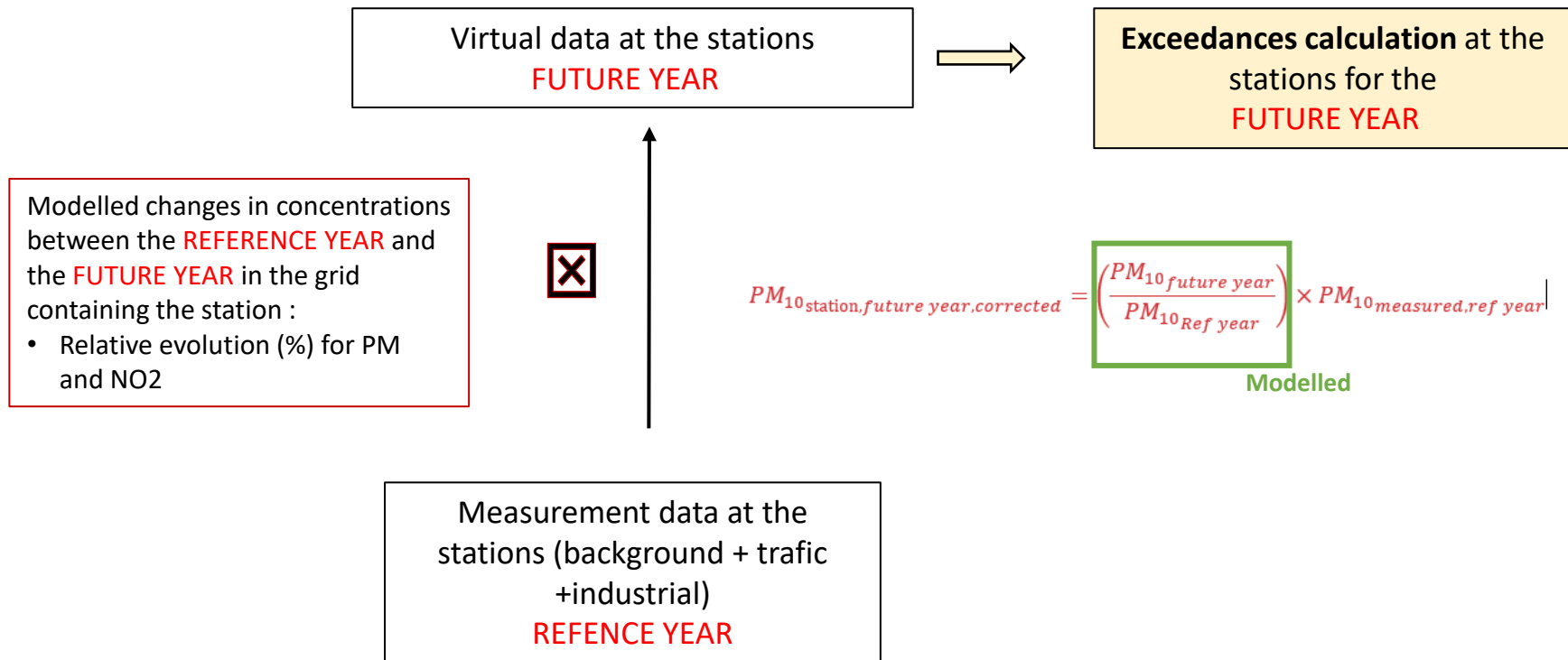
2 cases:

- For the reference year, biases between model and measurements are corrected over the whole domain through data fusion
 - the correction of cartographic bias is adapted to the prospective year
 - in addition, a specific method is applied to estimate prospective values at the stations

- No data fusion is conducted for the reference year due to a lack of measurement stations in the domain
 - a specific method is applied to estimate prospective values at the stations



PROSPECTIVE VALUES AT THE STATIONS :



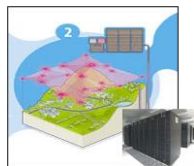
CARTOGRAPHIC BIAS CORRECTION FOR THE FUTURE YEAR

REF YEAR

Emissions
REF YEAR



AQ Model



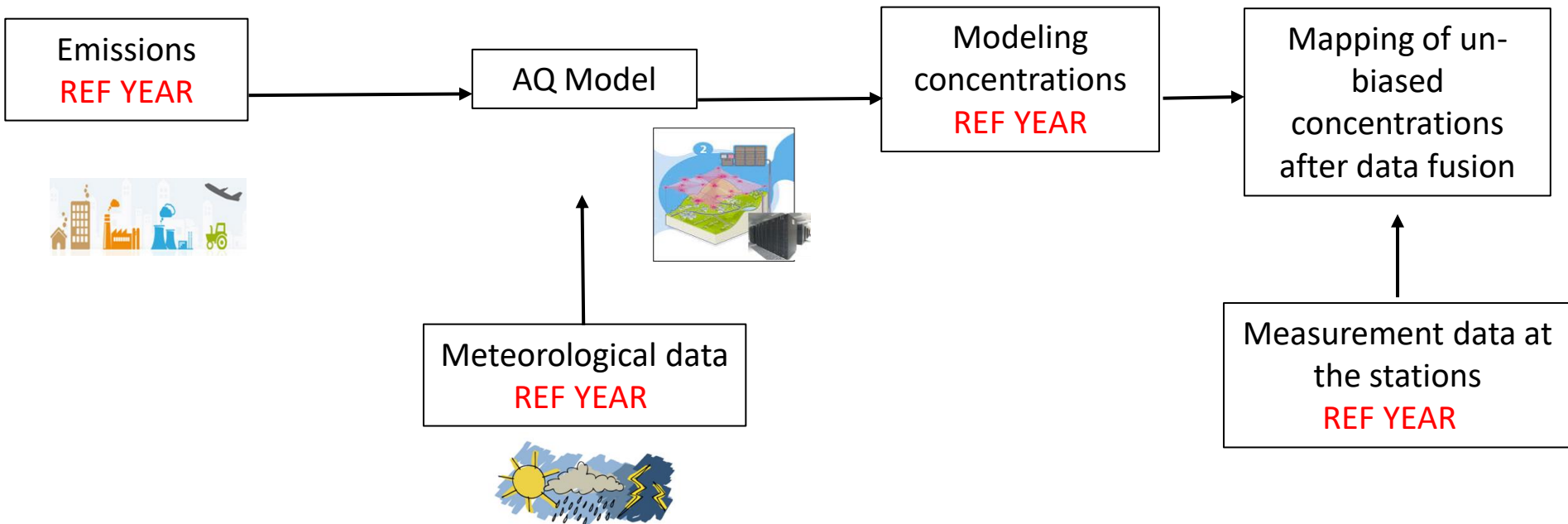
Meteorological data
REF YEAR



Modeling
concentrations
REF YEAR

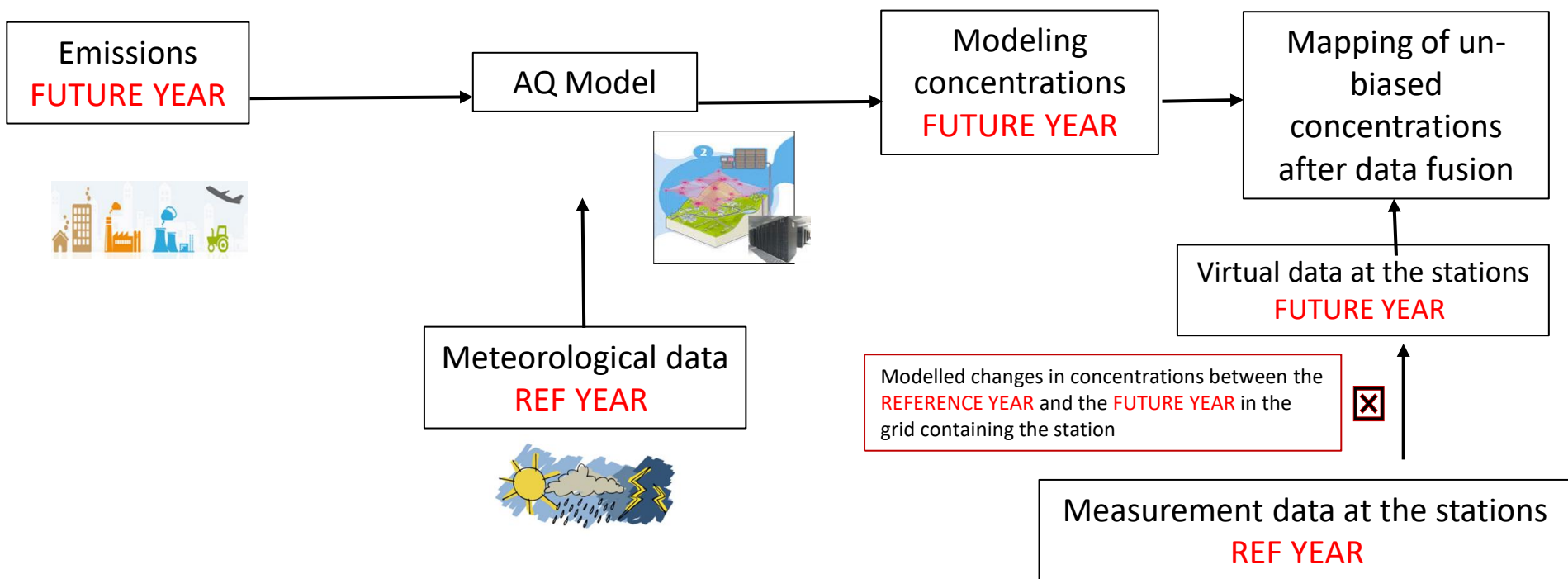
Mapping of un-
biased
concentrations
after data fusion

Measurement data at
the stations
REF YEAR

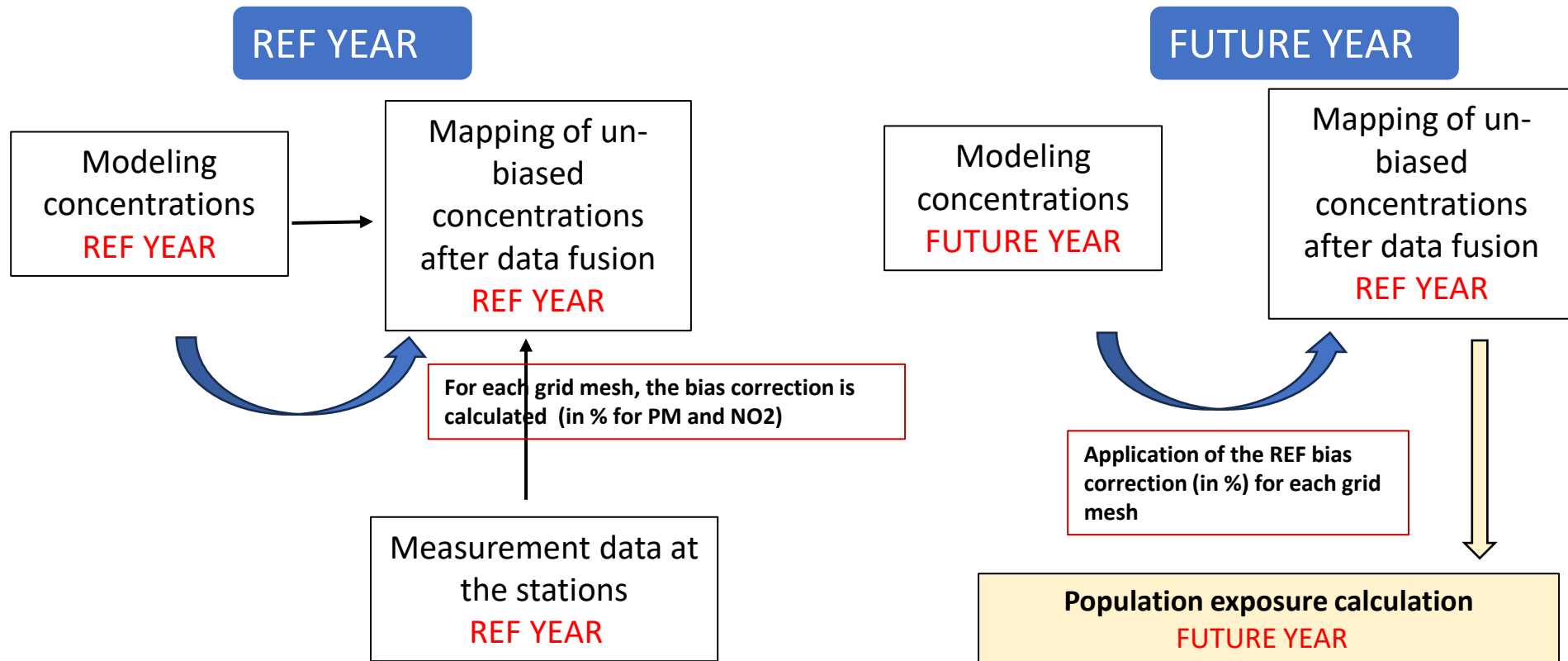


CARTOGRAPHIC BIAS CORRECTION FOR THE FUTURE YEAR

FUTURE YEAR

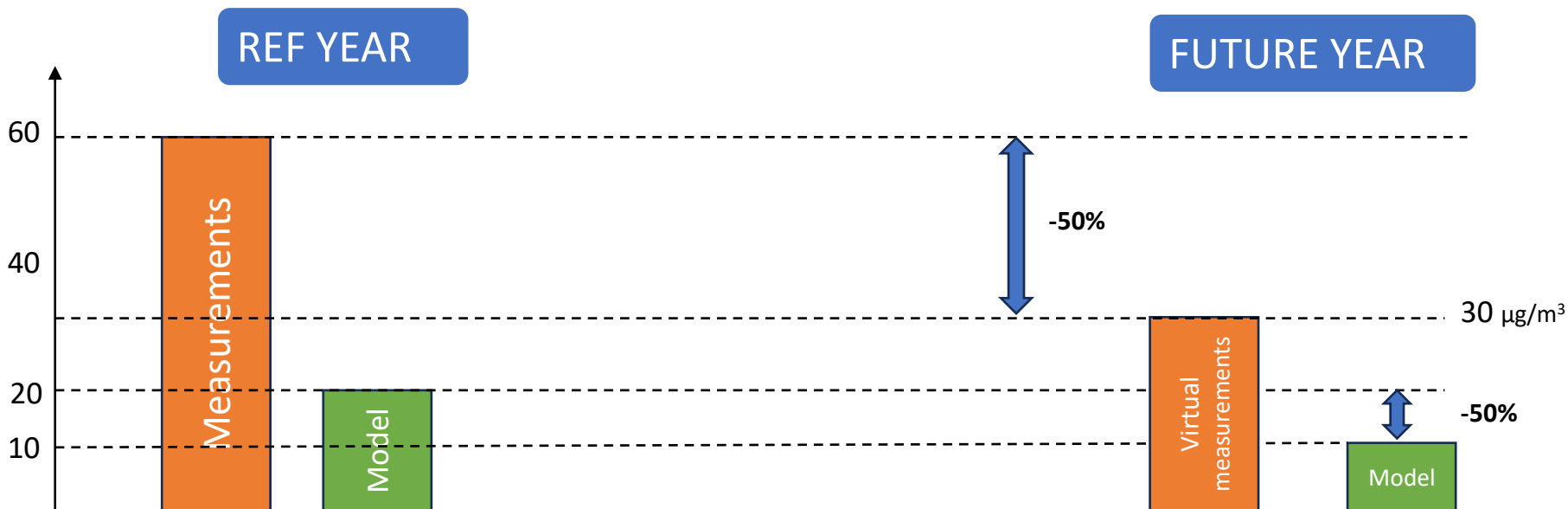


CARTOGRAPHIC BIAS CORRECTION FOR THE FUTURE YEAR: second method



REFLEXION ON THE METHOD :

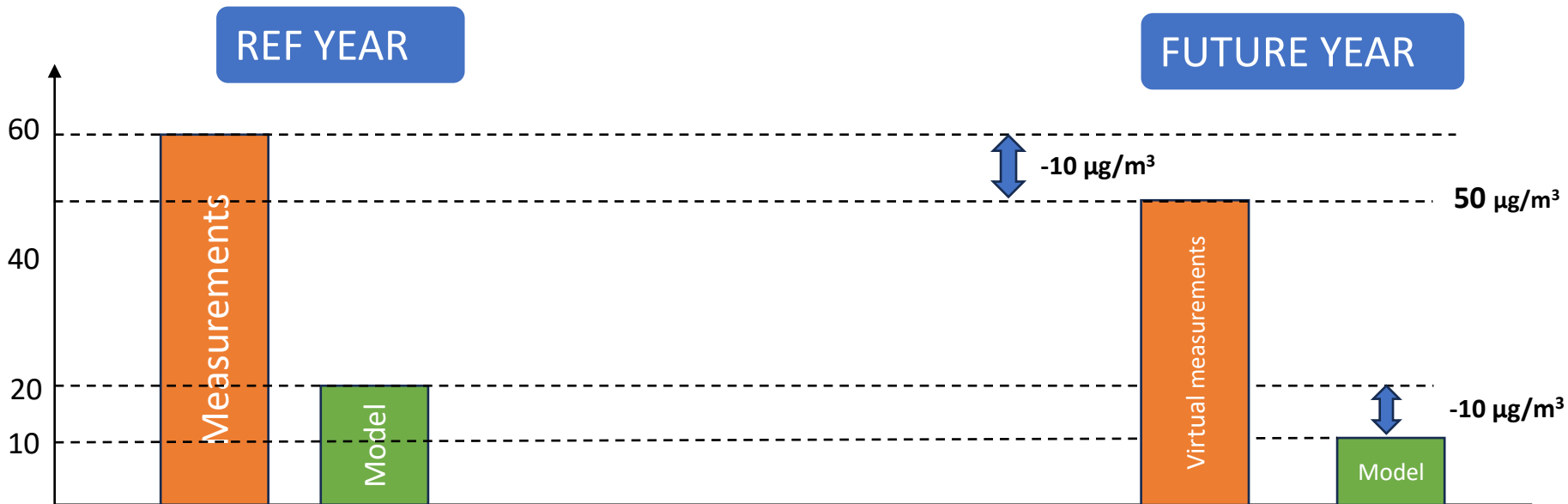
- Bias propagation for future scenario: **relative (%)** or absolute ?



Hypothesis: 1) the AQ model correctly reproduces the relative contributions of the emission sectors, although concentrations are underestimated 2) the bias also concerns the biogenic part

REFLEXION ON THE METHOD :

- Bias propagation for future scenario: relative (%) or **absolute** ?



Here, the bias is considered to be independent of the emission reductions in the scenario. Problem: Even with 100% emission reductions, concentrations can still be very high. On the other hand, negative values can also be estimated

REFLEXION ON THE METHOD :

- Bias propagation for future scenario: relative (%) or absolute ?

We could apply the propagation of the bias in relative terms (%) only to the mitigable part :

- 1) calculation of the modelled biogenic part in $\mu\text{g}/\text{m}^3$ for the reference year
- 2) removal of the biogenic part of the modelled concentrations and calculation of changes in concentrations in %

That would mean that the modelled biogenic fraction would not be corrected by the bias correction

- This method assumes that chemical regimes do not change too much: not suitable for long-term simulation (2050 ...) ... and who about ozone?
- For CTM with resolution $> 1\text{km}^2$, the road transport contribution at traffic station may be underestimate because emissions in the grid mesh is representative of emission sources at this resolution => underestimation of the reduction for future year ?