The European Commission's science and knowledge service

Joint Research Centre

WG3 recommendations

***C.A. Belis** EC-JRC ,*

G. Pirovano RSE SpA

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Background

According to the Annex XV of the Directive 2008/50/EC, information about sources is to be provided to establish the causes that determined an exceedance.

Source apportionment (SA) is the quantification of the contributions, in terms of both mass concentration (µg/m^3 or ng/m^3) and relative mass (%), is the mass transferred from pollution source categories (or geographical areas) to the observed or estimated level of one pollutant or a family of pollutants. Source apportionment is intended to analyse real situations (in the past). It can be performed by means of different methods the most common are incremental approach, receptor (RMs) and source oriented models (SMs). The output of source apportionment are contributions.

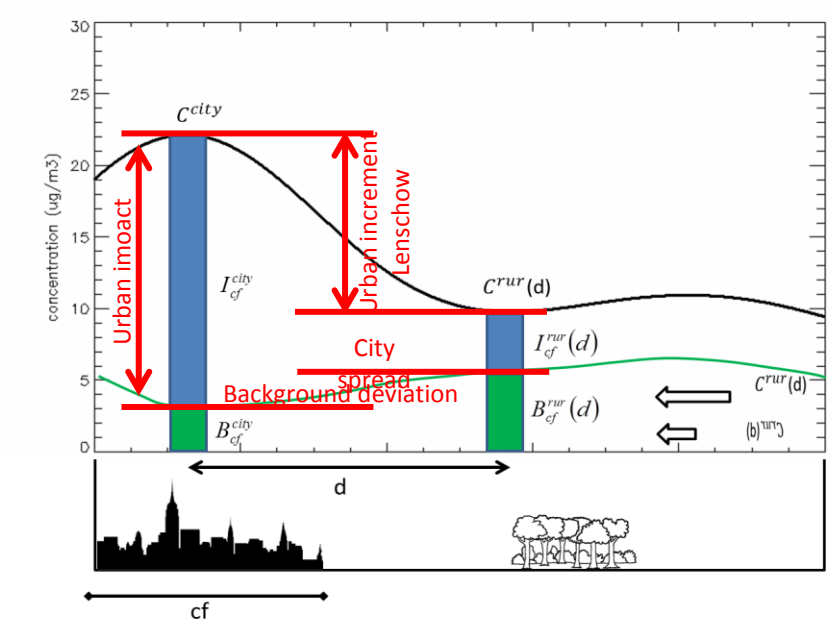
Source allocation is different from source apportionment. Source allocation is the estimation by means of sensitivity analysis (also known as brute force approach) of the variation on pollutant concentration that results from a change of one or more emission sources taking as reference a base case (real-world situation). The output of source allocation are impacts.

Background (cont.)

The Lenschow approach (or incremental approach) is the estimation of the geographical contributions by subtracting point estimations: regional, urban background and urban hot spot. This approach is based on the assumptions that:

a) the regional contribution is constant outside and inside the urban area, and

b) the city does not contribute to the regional background. Fail to meet the assumptions may lead to an underestimation of the contributions of the urban sources to levels. of pollutants in the same city.



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Challenges / issues

- Brute force approaches are frequently used for SA without accounting for non-linearities resulting in mass contributions estimates that are distorted, not in line with the SA definition.
- The Lenschow approach is often applied without checking whether the underlying assumptions are met.
- Even though state-of-the-art receptor models and CTMs can provide SA estimations in line with the requirements of the air quality policy, quality assessment and QA/QC protocols are not always applied (e.g. the ones developed under Fairmode WG1 for model performance evaluation and those of WG3 for SA validation).

Recommendations

1. The techniques to estimate the actual contributions from sources to atmospheric levels of pollutants should be in line with the SA definition.

2. CTM tagged approach and Receptor Models using state-of-the-art algorithms (tested in intercomparisons) and applying QA/QC procedures, like those indicated in the Fairmode guidelines for source apportionment, provide source contribution estimations in line with the SA definition.

3. Sensitivity approaches with the help of a CTM (so called brute force approach) can only be used for SA purposes when the linearity assumption has been checked and confirmed. When linearity is not a valid assumption, such methods should not be used to retrieve source contributions unless interactions terms are accounted for.

4. The application of the Lenschow or incremental approach is not recommended unless it can be demonstrated that a) the contribution of sources to the regional background and the urban background levels are comparable and b) the city emissions do not contribute significantly to the regional background level.

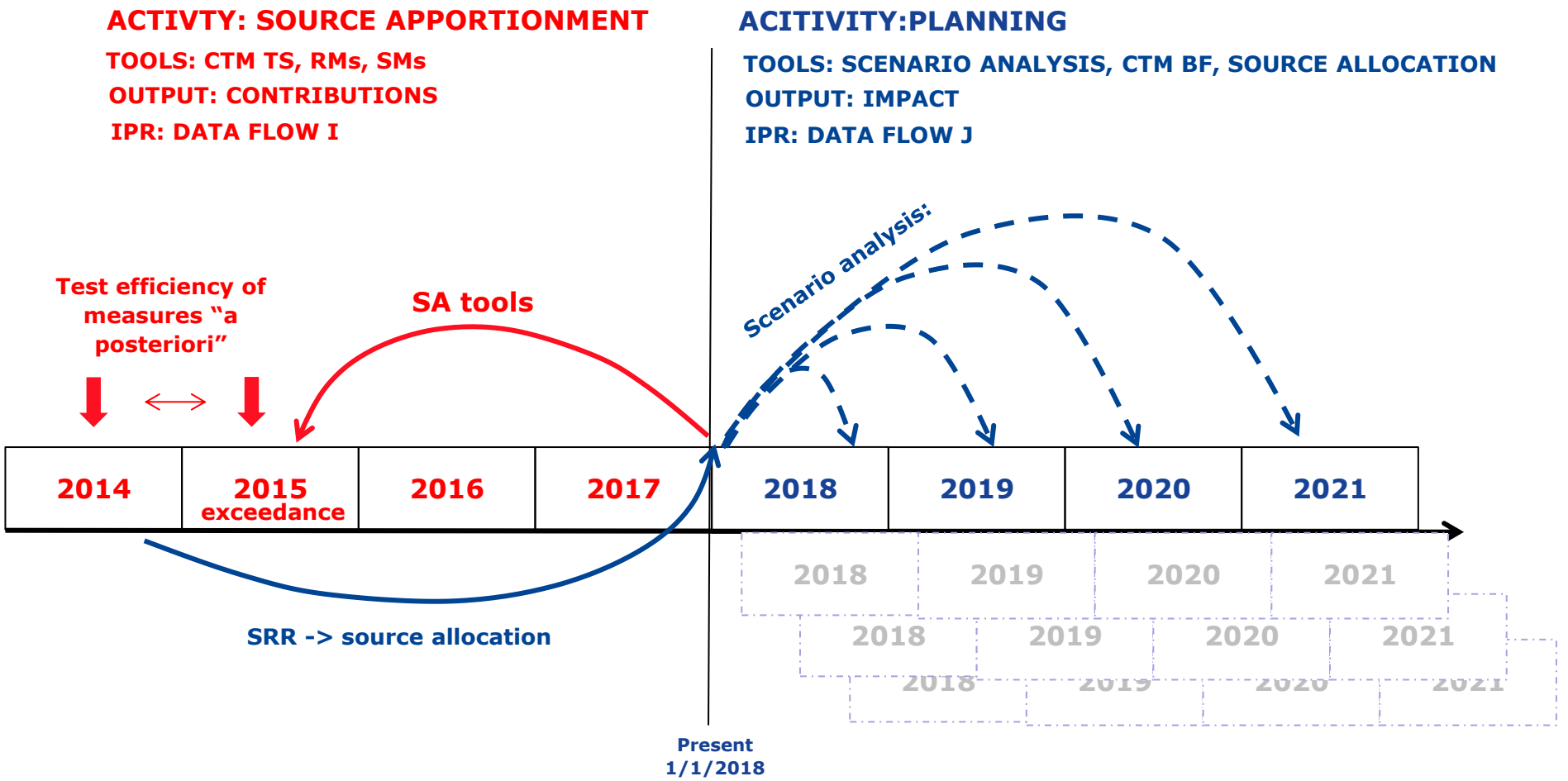
5. Use widely recognised classification of emission sources at the macro sector level (NFR-UNECE aggregation for gridding).

Implications

The application of the general SA recommendations to the IPR should be as follows:

1. With respect to source apportionment, MS should report the "contribution" of every source at a given site with the most suitable approach without imposing "a priori" the Lenschow approach because it does not have a general validity.
2. MS choose the source apportionment methodology most suitable for their situation, provided their performances and uncertainties have been tested (in intercomparison exercises or using benchmarking tools) and the Fairmode technical protocols are applied (see recommendation 2).
3. Adapt the classification of sources according to recommendation 5.

SOURCE APP. AND PLANNING IN THE CONTEXT OF THE AQ MANAGEMENT



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e-Reporting

HOW IT IS?

(I) ***Information on SOURCE APPORTIONMENT (Article 13)***

(1) Code(s) of exceedance situation (link to G)

(2) Reference year

(3) Regional background: total

(4) Regional background: from within Member State

(5) Regional background: transboundary

(6) Regional background: natural

(7) Urban background increment: total

(8) Urban background increment: traffic

(9) Urban background increment: industry including heat and power production

(10) Urban background increment: agriculture

(11) Urban background increment: commercial and residential

(12) Urban background increment: shipping

(13) Urban background increment: off-road mobile machinery

(14) Urban background increment: natural

(15) Urban background increment: transboundary

(16) Local increment: total

(17) Local increment: traffic

(18) Local increment: industry including heat and power production

(19) Local increment: agriculture

(20) Local increment: commercial and residential

(21) Local increment: shipping

(22) Local increment: off-road mobile machinery

(23) Local increment: natural

(24) Local increment: transboundary

HOW IT SHOULD BE?

1) Contributions for the following source categories (NFR aggregation for gridding):

- A_PublicPower
- B_Industry
- C_OtherStationaryComb
- D_Fugitive
- E_Solvents
- F_RoadTransport
- G_Shipping
- H_Aviation
- I_Offroad
- J_Waste
- K_AgriLivestock
- L_AgriOther
- M_Other

2) Contributions for the following area sources: city, region, national, long-range transport

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Thank you for your attention