Are all methodologies suited for planning purpose?

Guidance to IPR and recommendations

Baveno

26 February 2018

Background

In the last two years, WG3 & WG4 combined their effort to provide guidance and support MS with the e-reporting process, in particular data-flow I.

Data Flow H:
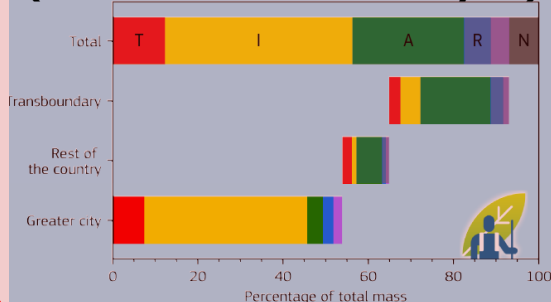**Air quality plans**

Data Flow I:
Source apportionment

Data Flow J:
Scenario for attainment year

Data Flow K:
Measures

Source allocation (based on scenario analysis)

Information on source apportionment (Art. 13)

1. Code(s) of exceedance situation (link to G)
2. Reference year

3. Regional background: total
4. Regional background: from within MS
5. Regional background: transboundary
6. Regional background: natural

7. Urban background increment: total
8. Urban background increment: traffic
9. Urban background increment: industry
10. Urban background increment: agriculture
…

16. Local increment: total
17. Local increment: traffic
18. Local increment: industry
…
24. Local increment: transboundary

Let's use a simple example to calculate the **urban contribution**

$PM = 3\ NH_4NO_3$

$3NH_3$

$8NO_x$

$2NO_x$

$PM = 2\ NH_4NO_3$

$7NH_3$

$10\ NO_x$

$10\ NH_3$
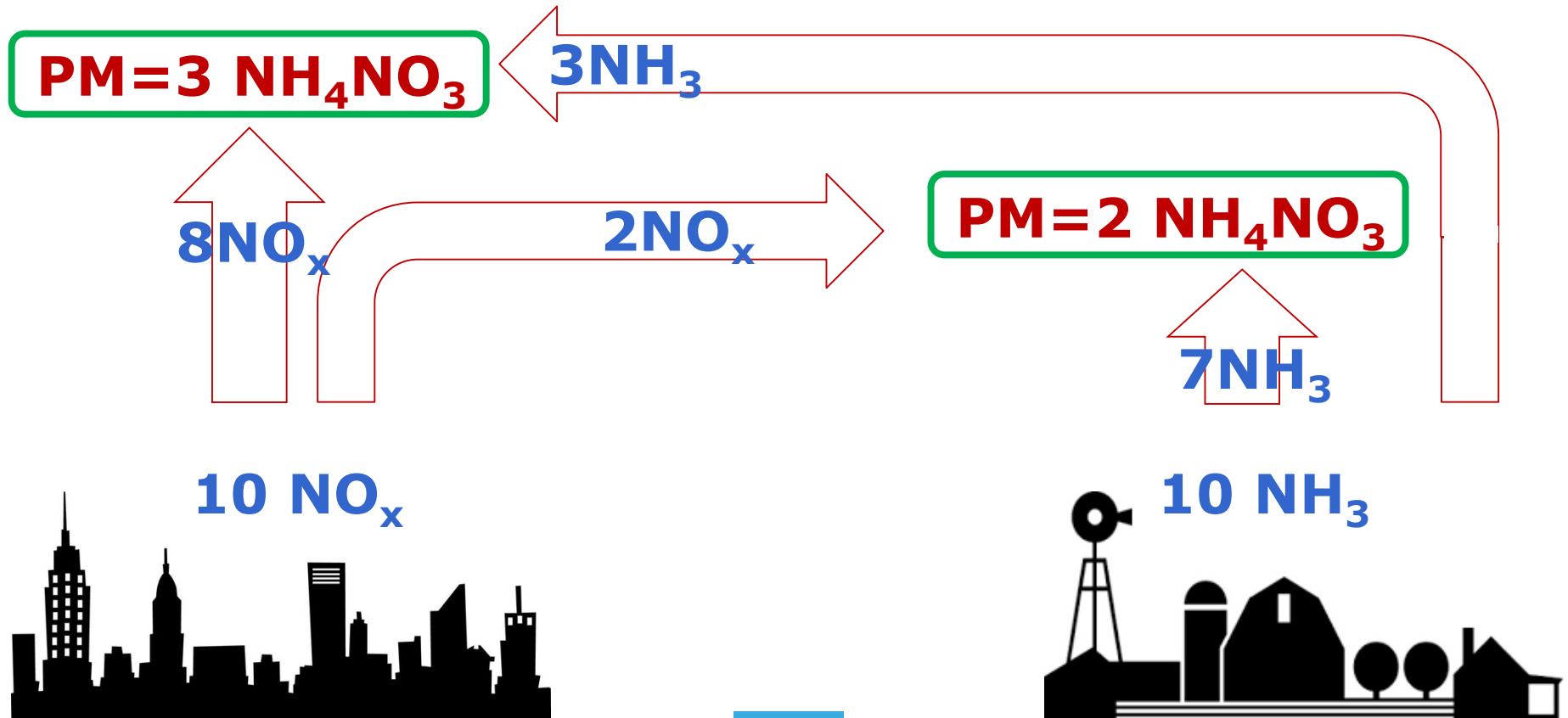
Contribution (Increment) = $\frac{(3-2)}{3}$ = 33%

Increment: <u>Concentration difference</u> between a city and a rural location

Inc=1

PM=3

PM=2

European Commission

Source apportionment: Pollutant mass that originates from a given precursor/sector/area (based on precursor mass ratio, e.g. $NH_3 \rightarrow NH_4$)

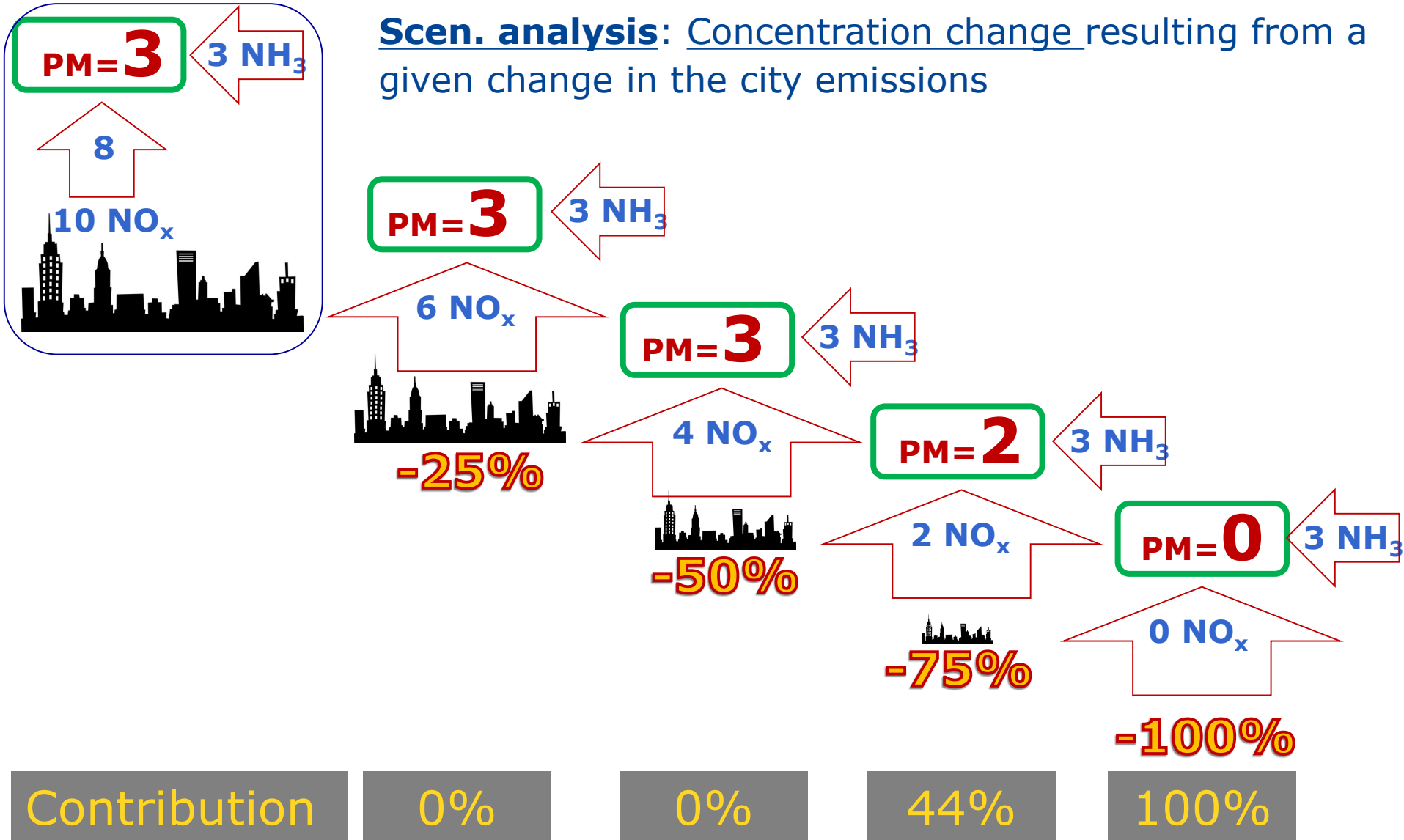$$PM = 3 \; NO_3 \; NH_4$$

NO_x

NH_3

Joint Research Centre

Contribution (Scen. Analysis) = $\frac{\Delta PM^{city}}{\Delta PM^{city\&rural}}$

Scen. analysis: <u>Concentration change</u> resulting from a given change in the city emissions

PM=**3** ← 3 NH$_3$

↑ 8

10 NO$_x$

PM=**3** ← 3 NH$_3$

6 NO$_x$

-25%

PM=**3** ← 3 NH$_3$

4 NO$_x$

-50%

PM=**2** ← 3 NH$_3$

2 NO$_x$

-75%

PM=**0** ← 3 NH$_3$

0 NO$_x$

-100%

Contribution	0%	0%	44%	100%

Joint Research Centre

In summary for secondary PM

Approach	Urban Contribution	
Incremental		**33%**
Apportionment		**78%**
Scenario Analysis	10%	**0%**
	25%	**0%**
	50%	**0%**
	75%	**44%**
	100%	**100%**

Source allocation

Src. Apportionment
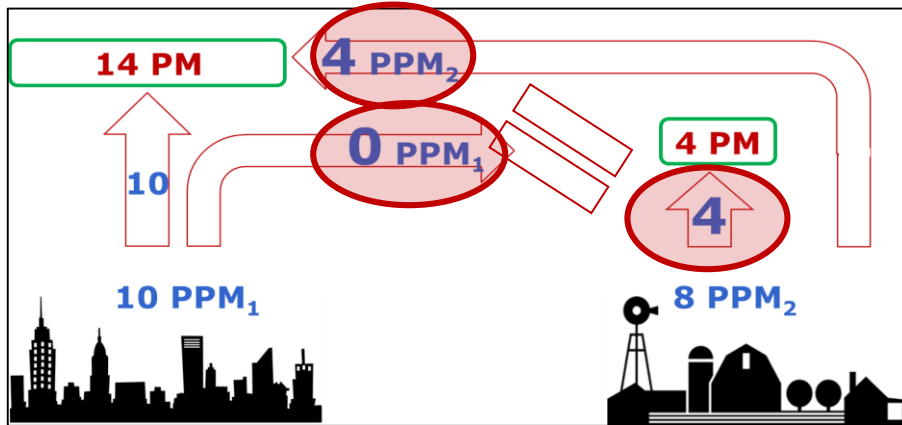
Src. Allocation ≠ Increment

For Primary PM

Src. Apportionment

Src. Allocation ≠ Increment
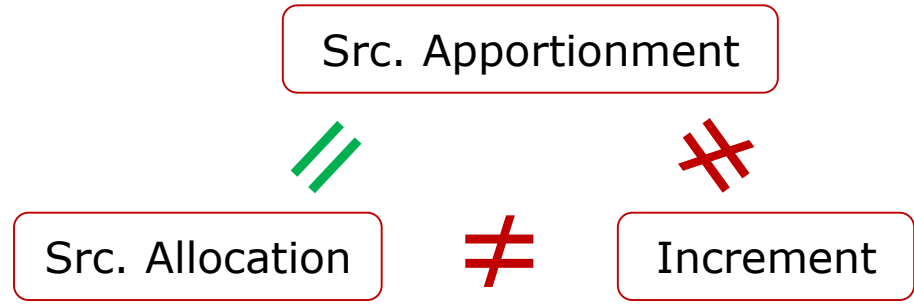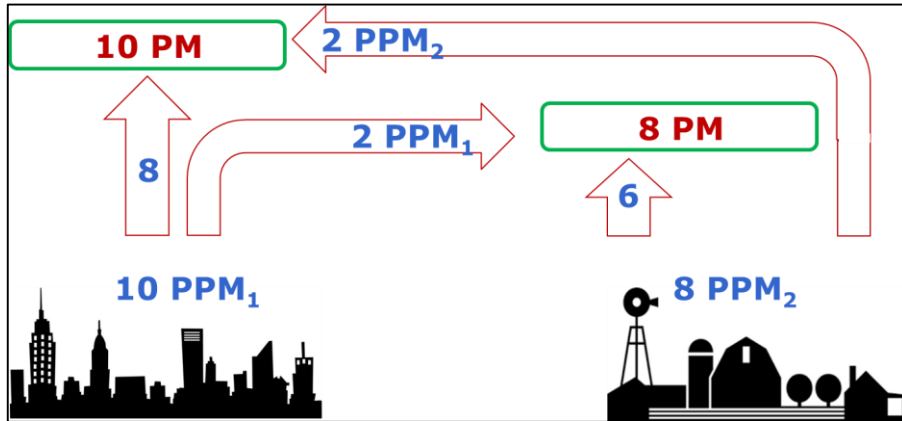
Approach	Urban Contribution	
Incremental		**20%**
Apportionment		**80%**
Scenario Analysis	25%	**80%**
	50%	**80%**
	75%	**80%**
	100%	**80%**

Source allocation

For Primary PM under very specific conditions *
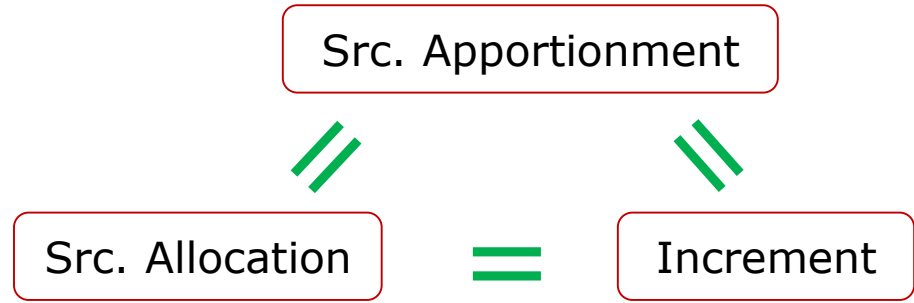
Approach		Urban Contribution
Incremental		**71%**
Apportionment		**71%**
Scenario Analysis	25%	**71%**
	50%	**71%**
	75%	**71%**
	100%	**71%**

Source allocation

Implications in terms of planning

➢ Fulfilment of the assumptions associated to the incremental approach is seldom assessed. **The incremental approach leads to an underestimation of the urban contribution that is city and pollutant specific** (20 to 50% for PM). It also highly depends on the selected pair of monitoring stations.

➢ Source apportionment leads to results that are similar to scenario analysis in the case of primaries but discrepancies can be as high as a factor 7-8 for some sectors involving mostly secondary PM (e.g. agriculture). The risk is to jump intuitively from source apportionment results to planning.

Agriculture

Src. apportionment   Scen. Analysis
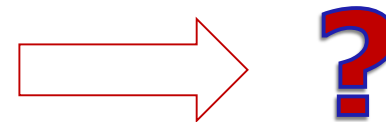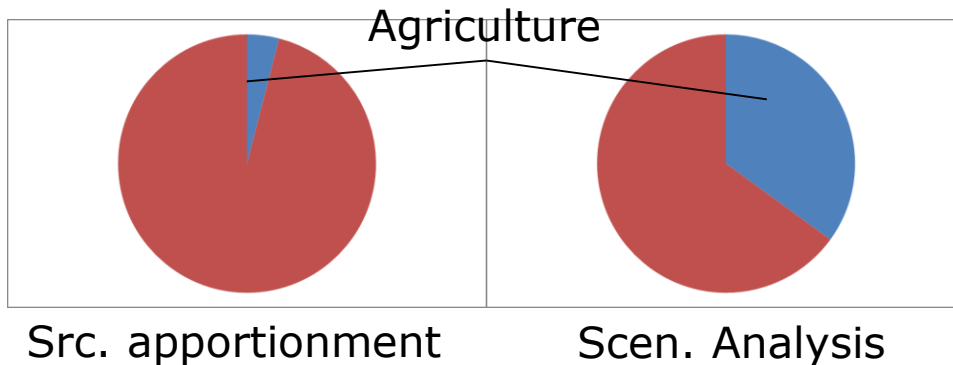
➢ Scen analysis provides information that is relevant to air quality planning but only for emission reductions that are not too large (applicability range).

WG4 Recommendations

I. What is the purpose?
II. Is my approach fit for the purpose?
III. Do I apply it in the appropriate way?
IV. Are my results of sufficient quality for policy?

I. **Purpose**: Provide information that is of direct relevance to assess the potential impacts of air quality plans

II. **Fit for purpose**:
- The incremental approach is not recommended, unless the validity of the underlying assumptions has been assessed (both for primary and secondary).
- For primary pollutants, src. apportionment is fit for the purpose but for secondary pollutants, it is not recommended.
- Scenario analysis based approaches (e.g. source allocation) are recommended

III. **Application**: For scenario-based approaches, an assessment of the associated non-linearities is recommended to provide information on their range of applicability.

European
Commission

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**Source allocation
(based on scenario analysis)**

Percentage of total mass

Which implications in terms of guidance?

Research
Centre