

Integrated Assessment Modelling and its applications in Flanders

- a summary of the IAM activities in Flanders -

1. Background

Integrated assessment as we use it in Flanders (northern region of Belgium) is understood as an interdisciplinary process. This means combining, interpreting and communicating knowledge from various scientific disciplines in such a way that the whole cause-effect chain of an environmental problem can be evaluated from a synoptic perspective with two characteristics: (i) it should have added values compared to single disciplinary assessment; and (ii) it should provide useful information to decision makers (Munn, 2002).

Along this line, VITO (Flemish Institute for Technological Research) contributed to the development of an integrated assessment approach to evaluate the impact of emissions from energy use and road transport on air quality on an urban and regional scale. These developments started in 1991 with the set up of a calculation framework for external costs (European project ExternE) and are still ongoing in order to extend and refine the methodology and its tools.

2. Methodology

The methodology used in integrated assessment studies in Flanders is the impact pathway methodology (figure 1). The impact pathway methodology follows the fate of pollutants along the steps of the DPSIR chain: Drive (human activities), Pressure (emissions), State (air quality, exposure), Impact (health, economics) and Response (policy).

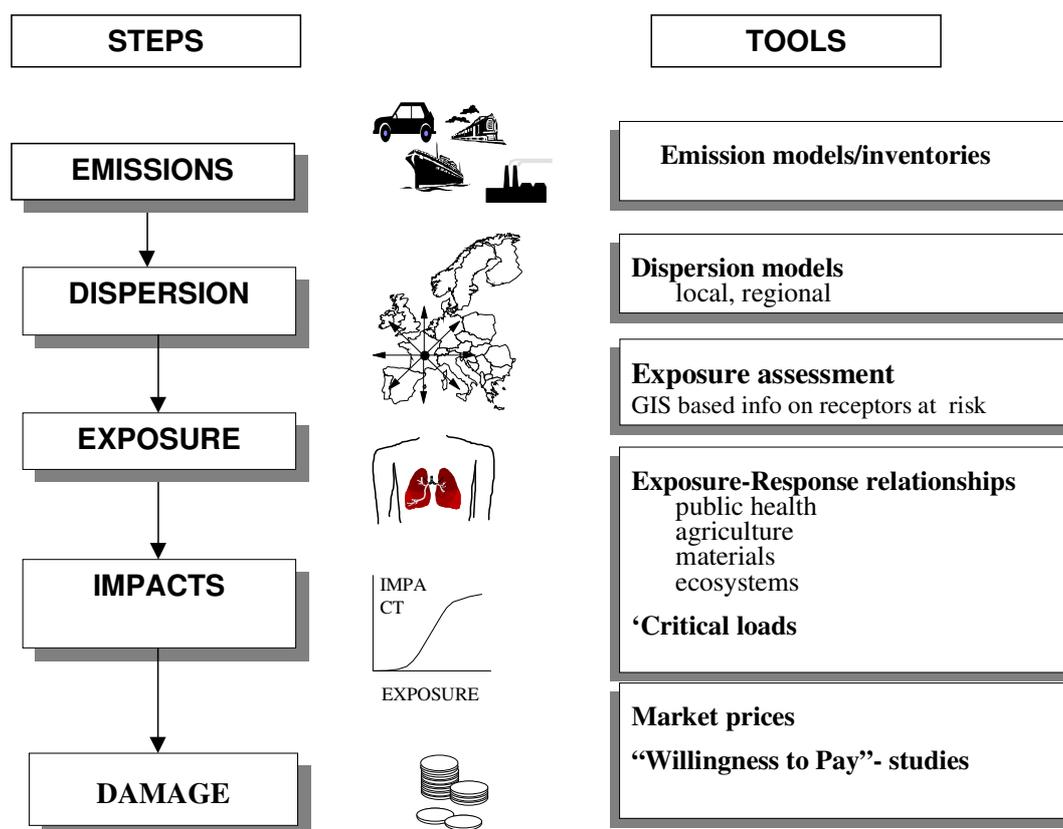


Figure 1: Presentation of the impact pathway methodology

Various environmental and economical models are used as tools to support and implement the different steps of figure 1. The common objective is to support decision makers in their request of making scientifically sound decisions and in their efforts to evaluate policies.

Short overview of models used at VITO:

- 'Environmental Cost Model' for air pollution in Flanders (conventional pollutants and GHG emissions): Markal-Answer with GAMS optimization;
- 'Environmental Cost Model' for water pollution in Flanders (Water Framework Directive): GAMS;
- Markal-Times Belgium for greenhouse gas reduction: VITO + KULeuven;
- Air quality models for assessments at European (BeEUROS), regional (OPS), urban (AURORA) and local (IFDM, Streetbox) scales;
- Models for critical loads of acidifying species and heavy metals;
- Exposure models and models for the evaluation of external costs.

From almost two decades of experience, VITO has proved that the methodology can be applied at different levels or scales, ranging from local assessments to national assessments and contributions to assessments on an European scale. In a next section a (non-exhaustive) overview is given of some typical application of the methodology in Flanders and Belgium.

3. Current activities and co-operations

Typical local scale applications

- Development of local transport management plans (e.g. addressing the policy question of how local urban concentrations and exposure in streets and backyards are affected by traffic emission reductions in surrounding street canyons and highways);
- Impact of long-term development scenarios in the Antwerp harbour (Europe's 2nd largest harbour wants to grow and expand, and has requested for additional space and infrastructure. A great concern to policy makers is how this will affect emissions, air quality and living conditions in surrounding cities).

Typical national/regional scale applications

- Achieving the NEC in Flanders (How can the emission ceilings for SO₂, NO_x, NH₃ and VOC in 2010 be attained and how to distribute emission reductions among industrial sectors in a cost effective manner?) using 'Environmental Cost Model';
- Complying with the (economic) requirements of the Water Framework Directive (cf. above for reaching good water quality in 2015 for COD, BOD, N) using 'Environmental Cost Model';
- Preparation and evaluation of the Gothenburg protocol (Evaluation of costs and benefits of reduction measures based on the analyses of RAINS and GAINS).

Typical European applications

- Support of Belgian energy & climate policy (Development and evaluation of energy & climate scenarios for 2020 and 2050)
- Support of Belgian positioning with respect to new AQ directives (e.g. for PM_{2.5})

Co-operations

We cooperate with Flemish, Belgian and European administrations through consultancy and research projects. Our experience and direct contacts with policy makers help us to continuously develop and refine our tools and methods. On a scientific base, we cooperate with Belgian & international universities, among others in European framework projects.

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