

## ENVIRONMENTAL EXPOSURE ASSESSMENT UNDER REACH

Piloting branch- and product-related emission estimation tools for manufacturers, importers and downstream users

### Tool for Additives used in Plastic Compounds (Pilot)

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#### The REACH Requirement

Under the REACH regulation, manufacturers and importers of dangerous substances (above 10 t/a) have to describe the conditions of safe use and to communicate these to their customers. For that purpose the manufacturer has to define suitable exposure scenarios and to carry out an exposure assessment for the whole life cycle of his substances. The direct customer and his subsequent customers each have to implement the conditions and measures communicated to them, or to adjust the scenario under their own responsibility, respectively.

#### The Challenge

Implementation of these requirements may be a difficult task for industry, due to a number of reasons:

- Manufacturers often do not know much about the uses and the conditions of use in their markets, in particular regarding uses beyond their direct customers. Also, the information available from EU and OECD Documents is not recognised and used by manufacturers yet.
- Many Downstream users are used to comply to emission limit values (if existing) but lack expertise and skills to carry out systematic exposure assessment and risk characterisation for all substances they handle.
- All actors in the supply chain do not yet have a common language and standard procedures to communicate on product safety up and down the chain.

#### The Approach

The German Federal Environmental Agency (UBA) has initiated two R&D projects aiming at the development of easy to use, IT supported tools. The tools are designed in a way that suppliers and users can contribute information on the conditions of use consecutively into a common framework. The branch-specific tools are developed in close co-operation with the respective industry sectors: textile finishing, plastic additives and photochemicals. The tools can be easily adjusted to the needs of other sectors since they are based on a set of generic formulas and a set of generic determinants for emissions:

- Amount of substance handled per day or year at a site or contained in an article
- Emission factor driven by the technical conditions of use (characterised by a number of life-cycle-stage or branch specific determinants)
- Emission reduction by on-site abatement or product integrated safety measures
- Emission reduction by external risk management measures, like municipal waste water treatment

The tools are designed for emission estimates, but they both include exposure assessment and risk characterisation for the water compartment. This is to illustrate the whole CSA process in the tool. The tools translate the OECD Emission Scenario Document (ESD) and the TGD emission calculation rules into a guided, stepwise emission estimation process and corresponding pick-lists with emission factors. The application of risk management measures has been additionally integrated into the tool.

## Emission Estimation Tool (EET) for Plastic Additives

The EET for additives in plastic is a flexible Java based web application using XML techniques to store all control data. Thus the tool could easily be adapted to other supply chains by adding their control data as XML documents. The tool can be found at <http://www.emissiontool.com>. It is open to the public and everyone is invited to try it out. The tool is not yet suitable to carry out a *full* exposure assessment under REACH though.

At each of the five life cycle stages, three levels of preciseness exist (iteration level 1-3). From level 1 to level 3, conservative defaults can be replaced consecutively with more specific information if needed.

In order to integrate a driver for iteration, at each life cycle stage and iteration level a PEC/PNEC ratio for the water compartment can be derived. If it is < 1, the assessment is finished. Fate and exposure is calculated based on the TGD rules for a local scenario and a regional scenario. Although not required by REACH, a regional background PEC is calculated in order to inform the individual company whether a risk at EU level may exist due to multiple emission.

The assessment process can also be carried out by the compounder or the converter, given the relevant substance information has been inserted. Once a user has identified himself as a compounder or converter the program adjusts itself to this user. Since the web application does not yet support interim storage of data, level 1 or 2 iteration cannot be handed over from the manufacturer to his customer. However, this is simply a matter of further development.

**Emission Tool**  
Tool for Emission Estimation according to the REACH System

Plastic Additives > Production (Manufacture of Plastics Additive) > Iteration 2

New substance Go back Less specific More specific Next stage

**Basic Approach**

**Emission days per year**  
How many days per year do the emissions occur? 300 d/a

**Intermittent release**  
Do substance releases occur only once per month (less than 12 days per year)?  
Rem.: If you check "yes", the PNEC value for the substance will be increased by a factor of 10 for the production life cycle stage, as the receiving environment has got time to recover.

no    
yes

**Refinement Options**

**Wastewater discharged to municipal STP**  
Which share of the wastewater is discharged to a municipal wastewater treatment plant (percentage)? 80 %

**Receiving surface water volume**  
What is the daily volume of the receiving surface water?  
Rem.: The present value is the default for local scenarios according to EU-TGD. 20000 m3/d

Evaluate

**Emission Amounts (Evaluation Results)**

**Emission amount (water), before municipal STP**  
The estimated daily amount of substance emitted to the water path is:  
Attn: All on-site measures are considered. Municipal STP is NOT considered in the emission amount, but will be part of the fate modelling below. 250 kg/d

**Parameters used in calculation:**  
Substance volume: 25000 t/a  
Default emission factor (water): 0.3 %  
Emission days per year: 300 d/a

**Emission amount (air)**  
The estimated daily amount of substance emitted to the air path is: 83.3 kg/d

**Parameters used in calculation:**  
Substance volume: 25000 t/a  
Default emission factor (air): 0.1 %  
Emission days per year: 300 d/a

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