Workshop “Improvements for emission inventories”
With focus on emissions from the use of solvents
Utrecht, Wednesday 17 February 2010, 10:00-16:30
Conference Center “Vergadercentrum Vredenburg”

Meeting Objective

The Task Force for Emission Inventories and Projections and its Expert Panel on Combustion & Industry have set up a Guidebook Maintenance and Improvement Plan (MIP) to facilitate further improvements to the EMEP/EEA Guidebook for emission inventories and projections. For the industrial sectors, one of the key factors in improving the emission estimation methodologies is the involvement of industrial experts. This meeting is a first step to actively cooperate with the industrial experts regarding emission inventories. The meeting objective is to explore the options for improving the solvent use chapters in the Guidebook and to explore to what extent specific data available within industrial organisations could be used by countries to improve emission inventories.

Agenda

09:30 – 10:00 Walk-in with coffee/tea

10:00 – 10:15 Opening and Setting the stage (Jeroen Kuenen, co-chair TFEIP Expert Panel on Combustion & Industry)

10:15 – 10:35 Task Force Emission Inventories and Projections and EMEP/EEA Guidebook: background and ongoing activities (Chris Dore, TFEIP chair)

10:35 – 11:00 NMVOC emissions from solvent use and EMEP/EEA Guidebook: coverage, improvements made in recent years and future improvements (focus on solvent industry) (Jeroen Kuenen)

11:00 – 11:30 Emission Inventories: The Solvents Mystery (John Pearson, chairman of the VOC group of the European Solvents Industry Group)

11:30 – 12:00 Recent work in the Expert Group on Techno Economical Issues (EGTEI), including solvent use in the French Emission Inventory (Nadine Allemand, CITEPA)

12:00 – 13:00 Lunch

13:00 – 13:30 National emission inventory for solvent use: The Netherlands (Kees Peek, Netherlands Environmental Assessment Agency)

13:30 – 14:00 National emission inventory for solvent use: Germany (Jochen Theloke, Stuttgart University)

14:00 – 14:30 National emission inventory for solvent use: Austria (Traute Köther, Umweltbundesamt Austria)

14:30 – 14:45 Coffee break

14:45 – 16:15 Discussion on possibilities for improvements in emission inventories for solvent use (chaired by Tinus Pulles, TNO, The Netherlands)

16:15 – 16:30 Conclusions and wrap-up
Meeting Report

The meeting was opened by Jeroen Kuenen from TNO (TFEIP Combustion & Industry Expert Panel co-chair) at 10:00 and all participants are welcomed. A special welcome is given to the members from the European Solvents Industry Group (ESIG). The scope and objective of the workshop are formulated along 4 main questions:

- Are the current (updated) methodologies to estimate emissions from the use of solvents good enough to see trends in the reported emissions?
- Are there new developments in the industry that need to be reflected in an updated Guidebook?
- Are new methods under development that may be useful for inclusion in the Guidebook?
- To what extent can countries use data available from other countries and/or from the industry?

Presentations

Chris Dore (Aether, UK, TFEIP chair) gave the audience a short introduction to the TFEIP and the Guidebook and presented the procedures for maintaining and improving the Guidebook. The Expert Panels within TFEIP are responsible for the scientific quality of the Guidebook methods, for that purpose the Expert Panels have workplans. Overall priorities in the Combustion & Industry Expert Panels are the involvement of industrial and other non-inventory experts and to use country specific studies for improvements.

Some questions are raised with regard to the definition of VOCs and the way how to report VOCs. Both are now prescribed by the reporting Guidelines / Guidebook, but may not be the most appropriate descriptions. This may change in the future but for now we have to deal with this. Marte O. Kittilsen (Norway) explained that they have a more advanced method to estimate VOCs from solvent use. Using data from Norway’s Product Register, they derive a balance of individual VOCs. The adoption of data from this detailed register lead to a significant increase in NMVOC emissions estimate. More information on the Norwegian methodology and results can be found in the report at [http://www.ssb.no/english/subjects/01/04/10/rapp_200914_en/](http://www.ssb.no/english/subjects/01/04/10/rapp_200914_en/) and [http://www.ssb.no/english/magazine/art-2009-04-03-01-en.html](http://www.ssb.no/english/magazine/art-2009-04-03-01-en.html)

Jeroen Kuenen (C&I EP co-chair) presented the reported emissions of NMVOC in the period 1990-2007. NMVOC emissions have decreased significantly, but the major part of this decrease is due to a decrease in NMVOC from road transport emissions. Reported emissions from the use of products (mainly solvents) show only a decrease in the last decade of the 20th century and then remain fairly constant with time. Given the introduction of EU policies to reduce emissions, this is not what is expected. Some more research into this issue could help clarifying if this is due to problems in reporting or perhaps more time is needed from the introduction of the EU policies for emissions to be more significantly reduced. Also, big differences exist between countries (more than a factor 20 between best and worst) in the per-capita emission of NMVOC from solvent use in the EU27.

He also explained how the new Guidebook is set up, the methodologies that are identified and, more specific, the methodologies as they are now in the Guidebook for emissions from solvent use. Old methodologies from the Guidebook were updated as far as possible with weighted averages from the GAINS model in Tier 1 and EGTEI methodologies in Tier 2. However, this does not cover all chapters and the question is whether the current methodologies are good enough.

The main problem in emission inventories for countries appear to be not the emission factors, but to gather all the necessary activity data to apply those methods, as well as the penetration of the various technologies in the country.

John Pearson (representing the European Solvents Industry Group) explained about tropospheric ozone concentrations, which depend non-linearly on the NOx and VOC concentrations. Reducing NOx or VOC only can results in an increase of tropospheric ozone, depending on how large the actual emissions are. This illustrates the importance of accurate emission inventories.

With regard to VOC inventories, biogenic, road transport and solvents emissions are the three large contributors. The historical emissions show a decrease in VOC emissions of road transport emissions, due to the introduction of the catalyst, but it is questionable whether the positive effect of the catalyst on the emissions after many kilometres still exists and VOC emissions from older cars may be much
higher than we think. Therefore, VOC emissions from road transport are underestimated by at least 50%. VOC emissions from solvents on the other hand are not so well understood and may be as much as 60% lower than we think. Current error margins in emission inventories are very high and there is a need to have more consistent inventories between countries.

Nadine Allemand (CITEPA, France) presented the Expert Group on Techno Economical Issues (EGTEI), which is mainly working on emission reduction techniques and the costs of these techniques. Their work is closely linked to the GAINS model. EGTEI is one of the working groups under de LRTAP Convention and has produced documents on reduction techniques for about 50 activities. As a second presentation, she presented the work in the French emission inventory. In France, facilities using more than 30 tons of solvent per year are obliged to report their NMVOC emissions as part of their permit. These reported emissions cover >80% of the facility level emissions. For the remaining part and the other sectors (non-industrial activities), Tier 2 methodologies are used, using paint statistics and distinguishing different products (solvent-based vs. water-based paints, etc.) The solvent content of all the products is updated regularly in cooperation with the solvent manufacturers. Only for domestic solvent use, a Tier 1 method is used since no data are available. This makes it the largest source as well. French NMVOC emissions have decreased since 1990 but need a further decrease to meet the NEC Directive. The main problems in the inventory is knowledge on solvent content of products, statistics on production, import and export and the decreasing level of detail in the statistics.

Kees Peek (Netherlands Environmental Assessment Agency) presented the Dutch system to estimate NMVOC emissions from solvents. Since 1974 the Netherlands has a PRTR system in which the NMVOC emissions from solvent use have decreased since 1990 due to the reduction of the solvent content in consumer products and paints. The Dutch emission inventory system has good cooperation with industrial branch organizations. In the paint application sector, annual statistics on sales are provided by the Dutch branch organization for paint producers (VVVF). Also for products containing solvent (sectors domestic and other product use), sales data are obtained from the branch organizations. The fraction NMVOC emitted to the air is available from other studies. In the printing industry, the government has an agreement with the industry from which data become available for the emission inventory. In another sector, degreasing, activity data are not available and emissions have been assumed constant in the period 2000-2007.

Jochen Theloke (University of Stuttgart, Germany) explained the German emission inventory for NMVOC emissions from solvent use. Solvent use is the largest source of NMVOCs in Germany. Mainly the domestic and other solvent uses are important (30% of the total NMVOC emissions from solvent use), as well as the application of paints. The German inventory contains more than 100 different solvent related activities. The German methodology uses a product-related calculation methodology, where the consumption of solvent borne products is calculated from production, import and export. The emissions are then calculated under taken into account a product group specific solvent content and an application specific emission factor. The German inventory works with a product related approach based mainly on public available input data. It has been regular plausibility checked by industrial stakeholders for as far as possible. This inventory has been permanently improved and actualized over the last years and forms the basis for all reporting requirements with regard to emissions from solvent use in Germany.

Traute Köther (Umwelbundesamt Austria) finally presented the national emission inventory for solvent use in Austria. NMVOC emissions in Austria show a decrease in the late 1980s, but remain more or less constant from 1990 onwards. The method is based on a mass balance per solvent and fractions of solvents emitted. The total NMVOC emission is the sum of the emissions from individual solvents. This bottom-up approach is combined with a top-down approach, based on total amounts of quantities of solvents produced in Austria and import and export statistics. The solvent contents of products is estimated using survey data. The bottom-up approach uses data from about 1300 companies, gathered by a survey, including information about solvent content of products, information
on the size of the company, what kind of solvents are used, application types and abatement equipment.

Discussion

After the presentations, the meeting discussed how to achieve the necessary improvements for emission inventories from solvent use. A mass balance would be a good method when the data are available, but in most cases this is not applicable. The alternative is simply using activity data multiplied by emission factor. The differences between countries also suggest that different methods in different countries lead to very different results.

To help improving the inventories, ESIG offers to:

- Investigate the Solvents Emissions Directive and the VOC reduction for each country therein;
- Review the report which states that 67% of the VOC in solvents goes into the air at some stage, the other 33% is not emitted.
- Stress in the industry the necessity to make sales data available for emission inventories. Without these data it will be very difficult to improve the emission inventories significantly. For instance, an independent party could collect these data from the industry and make them available to countries to overcome the problem of data confidentiality.

Another method to improve emission inventories is the introduction of QA/QC procedures that can check Tier 1 or Tier 2 estimates by use of for instance a mass balance approach. The total NMVOC emission can never be higher than the total amount of solvent used in the country (assuming all NMVOC containing products are included). This could help to improve the accuracy and reduce the uncertainty in the inventory.

A new inventory method for solvents requires:

- comparability between countries
- transparency
- reflect developments in the legislation (e.g. introduction of emission reducing legislation)
- quantify the uncertainty

The model as used in Norway would a much better situation, where statistics are available about all major product groups (except cosmetics, for this sector another model is used based on trade/production statistics), but this will be very difficult to apply in all countries because of the resources necessary. Additionally, issues remain with regard to emission factors following the introduction of abatement techniques. However, as a first step, the most important sectors from the Norwegian inventory could be selected and examined. If possible, some default methods for these specific products could be developed and used for the Guidebook. This work will be taken up by the Expert Panel together with Norway. This could also lead to a proposal for revision of the source categories included, since the sectors “Domestic solvent use” and “Other product use” (for which hardly any specific methodologies exist in the Guidebook) appear to be main sectors in many countries.

Also the system as used in France, with reporting obligations for bigger companies, could be a step forward for many countries.