Inventory of NMVOC emissions from solvent uses in France

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Content of the presentation

1. Emission inventory methodologies used
2. Emissions of NMVOC – some trends for France
3. What data useful to improve NMVOC emission inventories
Mandatory obligation to report NMVOC emissions from a solvent consumption of 30 t/year

I1: purchased solvent
I2: recovered solvents

I1 + I2 = solvents used

O1: Stack emissions
O4: uncaptured emissions to air

O5: Organic solvents and/or organic compounds lost due to chemical or physical reactions
O8: Organic solvents contained in preparations recovered for reuse
O9: other means

O2: Organic solvents lost in water, if appropriate taking into account waste-water treatment when calculating O5
O3: Organic solvents that remains as contamination or residue in output of products from the process
O6: Organic solvents contained in collected waste
O7: solvents, sold or intended to be sold as a commercially valuable product

Solvent balance for a plant
**Tier 3 methodology**

Use of plant data (with the solvent balance) available for the largest solvent uses in industry such as:

- car manufacturing, coil coating, other industrial uses of paints,
- printing industry,
- fine chemical industry for pharmaceutical application and non pharmaceutical application,
- fat edible oil,
- rubber processing,
- paint, ink and glue manufacturing,
- adhesive tapes.
Inventory methodologies used for solvent uses

**Tier 3 methodology**

For these activities, from 80 to 100% of solvent consumptions covered by plant data

For the remaining part of these activities, tier 2 methodologies used:

- Total activity level known by statistics, expert data for the solvent content of products,
- Rates of application of reduction techniques, rates of compliance to the regulation known by expert data, comparison with the activity known through plant data
Inventory methodologies used for solvent uses

**Tier 2 methodology**

Used for industrial or not industrial activities such as:

- do it your self paints, paints for construction and building, car repairing,
- domestic uses of glues, glues for construction and building,
- surface cleaning, dry cleaning,
- polyester, polyurethane, PVC and polystyrene processing
- wood preservation
Inventory methodologies used for solvent uses

**Tier 2 methodology**

**For domestic paint uses as example:**

Paint statistics
Distinction of different products such as traditional solvent based paints (different types), high solids, water based (different types), (through statistics of production),
Yearly (tentatively) update of the solvent content of these different products with help of experts from the paint manufacturer’s trade association
Inventory methodologies used for solvent uses

**Tier 1 methodology**

Used for domestic products (SNAP 060408),
What NMVOC emissions en 2007?

Emissions 2007: 1199 kt
Emissions 2008: 1086 kt

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<th>Residential and tertiary activities</th>
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Improvement of emission inventories
What NMVOC emission ceilings in 2010?

Emissions 2008: 1086 kt
Between the Gothenburg Protocol ceiling and the EU directive ceiling

Gothenburg Protocol
1100 kt in 2010

EU Directive 2001/81/EC
1050 kt in 2010
What reductions achieved?

Printing industries (SNAP 060304)

Consumption of inks
NMVOC emissions
What reductions achieved?

Car manufacturing (SNAP 060101)

Production of vehicles

NMVOC emissions
What reductions achieved?

Speciality chemistry (pharmaceutical and non pharma.)
SNAP 060306 and 060314

Speciality chemistry for pharmaceutical applications
Speciality chemistry for non pharmaceutical applications
What reductions done?
Production of tyres – SNAP 060305

![Graph showing the reduction in production of tyres and NMVOC emissions from 1998 to 2008.](image-url)
What reductions achieved?

Consumption of TRI (R45), C₂Cl₄ (R40) and CH₂Cl₂ (R40) in surface cleaning (SNAP 060201)
Difficulties encountered and how to improve emission inventories for solvent uses

Product containing solvent characteristics:
✓ the solvent content of product changes over time
✓ the knowledge of the solvent content of products (paints, inks, glues...) requires specific studies, expert opinions...
✓ uncertainty risk, need to update the data regularly, from year to year preferably

Information on the average solvent content of the different products put on the market, year per year, could be useful for emission inventory
Statistics of production, imports, exports:
✓ Slow but real decrease of the quality of statistics: disappearance for some activities, less detailed, units used not always compatible with needs (monetary unit instead of mass data)
(In 1990, production of 10 types of glues available, today no decomposition)
✓ Disappearance of statistics of chemical product processing
✓ Large discrepancies between the requirement of the EC or similar bodies for quality, transparency, accuracy, low uncertainty in emission inventories and means set up by the EC and other bodies, to provide statistics with the same characteristics of quality, accuracy and with a permanent character

Need for permanent statistics, adapted to the needs of emission inventories
Difficulties encountered and how to improve emission inventories for solvent uses

Solvent balances and solvent production/consumption data:

The situation:

- Set up of a global solvent balance for one activity not possible except if all plants can be covered by a mandatory requirement for reporting of the plant solvent balances
- Total inputs of solvent for the different activities covered in emission inventories, do not exist
Difficulties encountered and how to improve emission inventories for solvent uses

Solvent balance and solvent production/consumption:

What could be useful:
- If solvent productions, statistical data were available, it could be easier to check the accuracy, consistency and quality of emission inventories and update them consequently.
- This is of particular importance for industrial/non industrial activities for which no tier 3 method can be used.

(in France, the solvent uses in domestic products is the largest source of NMVOC (98 kt) from solvent uses (paints and glues not included). About 1,6 kg of NMVOC/inhab)

Need for solvent production data, and inputs in activities
Difficulties encountered and how to improve emission inventories for solvent uses

Expression of NMVOC emissions:
Units used to express NMVOC emissions not homogeneous from activity to activity

Solvents, storage, fuel distribution…:
NMVOC is the sum of different molecules which can be hydrocarbons, alcohols, ketones...

Combustion (43 % of total NMVOC emissions in France) :
It is not clear if emissions are expressed in carbon equivalent, CH₄ equivalent or C₃H₈ equivalent.
But they are not expressed in NMVOC
Difficulties encountered and how to improve emission inventories for solvent uses

Expression of emissions:

✓ CEN standard for monitoring of VOC emissions based on the flame ionisation detector which monitors the sum of VOC (including CH₄)
Some VOC are not detected or badly detected by FID (ketone, aldehyde...)

CH₄ has to be removed to have NMVOC but this is not mandatory in the standard

Risk to have total VOC instead of NMVOC

The concentration is expressed in C eq using C₃H₈ as reference gas,

Ratio concentration C₃H₈ eq/concentration C eq = 44 / 36 = 1.22

Risk to have an underestimation on NMVOC emissions from combustion
Thank you for your attention!

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