Use of the Norwegian model to develop methods for missing sources and improvements to the Guidebook

Marte O. Kittilsen
Senior executive officer, Statistics Norway
Norwegian NMVOC emissions

- Other
- Solvent and other product use
- Oil and gas extraction

Year:
- 2005
- 2006
- 2007
- 2008
Norwegian NMVOC emissions from sector 3

![Norwegian NMVOC emissions from sector 3](image)
The Norwegian model

Mass balance:

\[ consumption = production + import-export \]
\[ emission = consumption \times emission \text{ factor (fraction emitted)} \]

Previous model: Consumption of products
New model: Consumption of substances (NMVOCs)

\[ total \ emission = sum \ of \ emissions \ per \ substance \]
The Norwegian model

- Main source: The Norwegian Product Register
- Information given on:
  1. quantity of individual substances, given by CAS number
  2. the product type that the substance enters into
  3. the industrial sector (SIC/NACE) in which the product is used (including private households).
- For example: 403 tonnes of ethanol in disinfectants used in health and social work in 2008
- No assumptions on NMVOC content of products
- Specified emission factors, mainly from Sweden’s model
- Supplementary model for cosmetics
- Pharmaceuticals not yet included
Norwegian NMVOC emissions from 3.D


- **Ethanol**: 20%
- **Formic acid**: 12%
- **Naphtha**: 10%
- **Ethylene glycol**: 10%
- **2-propanol**: 8%
- **Ethenyl-benzene, styrene**: 6%
- **Unknown (cosmetics)**: 5%
- **Distillates (petroleum)**: 4%
- **Other substances**: 26%

<table>
<thead>
<tr>
<th>Substance</th>
<th>POCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>39.9</td>
</tr>
<tr>
<td>Formic acid</td>
<td>3.2</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>37.3</td>
</tr>
<tr>
<td>2-propanol</td>
<td>18.8</td>
</tr>
<tr>
<td>Ethenyl-benzene</td>
<td>14.2</td>
</tr>
<tr>
<td>Unknown (cosmetics)</td>
<td></td>
</tr>
<tr>
<td>Distillates (petroleum)</td>
<td></td>
</tr>
</tbody>
</table>
Norwegian NMVOC emissions from 3.D


- 79 % ethanol
- Disinfectants 10 %
- Ensilage means 11 %
- Solvents 12 %
- Other cleaning products 13 %
- Other products 26 %
- Anti-freezing agents 8 %
- Windscreen washing agents 7 %
- Preservatives 5 %
- Cosmetics 5 %
- Binding agents 3 %

- 86 % ethylene glycol
- 81 % ethanol
- 100 % formic acid

- 26 % Other products
- 13 % Other cleaning products
- 12 % Solvents
- 11 % Ensilage means
- 10 % Disinfectants
- 8 % Anti-freezing agents
- 7 % Windscreen washing agents
- 5 % Preservatives
- 5 % Cosmetics
- 3 % Binding agents
Uncertainty in the Norwegian model

• Uncertainty of emission level 2.5-4.6 %
• Uncertainty in both activity data and emission factors
• Continuous work on improvement of important emission factors and data quality

<table>
<thead>
<tr>
<th>Substance</th>
<th>Mean EF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solvents</td>
<td>0.2</td>
</tr>
<tr>
<td>Ensilage means</td>
<td>0.1</td>
</tr>
<tr>
<td>Disinfectants</td>
<td>0.8</td>
</tr>
<tr>
<td>Anti-freezing agents</td>
<td>0.5</td>
</tr>
<tr>
<td>Windscreen washing agents</td>
<td>0.9</td>
</tr>
<tr>
<td>Preservatives</td>
<td>0.6</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>0.7</td>
</tr>
<tr>
<td>Binding agents</td>
<td>0.4</td>
</tr>
<tr>
<td>Other cleaning products</td>
<td>0.2</td>
</tr>
</tbody>
</table>
Comparison to the Guidebook

• Several important sources in the Norwegian inventory not covered by the Guidebook:
  1. Disinfectants
  2. Ensilage means
  3. Anti-freeze agents
  4. Windscreen washing agents
  5. Cosmetics

• Solvents, other cleaning products and preservatives probably more or less covered
Suggestions for development of a new method for 3D

• Focusing on the most important products
  – EF must be checked
• Taking POCP-values into consideration?
• Are Norwegian conditions representative?
• Activity data must be accessible
Suggestions for development of a new method for 3D

• Disinfectants the hottest candidate
  – Large source
  – Mainly ethanol
  – International use pattern?
  – Accessible activity data?
## Suggestions for development of a new method for 3D

<table>
<thead>
<tr>
<th>Product groups:</th>
<th>Ensilage means</th>
<th>Disinfectants</th>
<th>Disinfectants</th>
<th>Anti-freezing agents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CN 2008</strong></td>
<td>29151100 Formic acid</td>
<td>38085000 Goods containing one or more of ...</td>
<td>38089490 Disinfectants</td>
<td>38200000 Anti-freezing preparations and prepared de-icing fluids (excl. prepared additive)</td>
</tr>
<tr>
<td><strong>CPA 2008</strong></td>
<td>20.14.32 Saturated acyclic monocarboxylic acids and their derivatives</td>
<td>20.20.19 Other pesticides and other agrochemical products</td>
<td>20.20.14 Disinfectants</td>
<td>20.59.43 Hydraulic brake fluids; anti-freezing preparations and prepared de-icing fluids</td>
</tr>
<tr>
<td><strong>PRODCOM</strong></td>
<td>20.14.32.50 Formic acid, its salts and esters</td>
<td>20.20.19.30 Goods of HS 38.08, containing one or more of the following substances...</td>
<td>20.20.14.90 Disinfectants put up in forms or packings for retail sale or as preparations or articleshalogenated compounds)</td>
<td>20.59.43.50 Anti-freezing preparations and prepared de-icing fluids</td>
</tr>
<tr>
<td><strong>SITC 4</strong></td>
<td>51374</td>
<td>59190</td>
<td>59140</td>
<td>59733</td>
</tr>
</tbody>
</table>
Suggestions for development of a new method for 3D

• Per capita emission rate is an option, e.g.:
  – 8.0 kg per capita from 3D
  – 6.2 kg per capita from products other than solvents and cleaning products (including windscreen cleaners)
  – 2.5 kg per capita from disinfectants, anti-freezing agents, windscreen cleaners and cosmetics
  – 0.9 kg per capita from disinfectants
Thank you for your attention!

Questions or suggestions?

For more information: kit@ssb.no