Substitution by an SME of Brominated Flame Retardants

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European Chemicals Agency, Helsinki
Why flame retardant?
CTF2000

- Development and production of **flame retardant formulations** for textile industry
- Global sales: EU, Turkey, Asia, South-America, Australia,…
- In EU: 1 of the 6 main suppliers, market share 15-20%

<table>
<thead>
<tr>
<th>CTF2000 NV</th>
<th>2006</th>
<th>2016</th>
<th>Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnover (€)</td>
<td>± 8,4 million</td>
<td>± 25 million</td>
<td>x 3</td>
</tr>
<tr>
<td>Volume (tonnes)</td>
<td>± 6.500</td>
<td>± 15.000</td>
<td>x 2,3</td>
</tr>
<tr>
<td>Employees</td>
<td>± 15</td>
<td>± 45</td>
<td>x 3</td>
</tr>
<tr>
<td>R&amp;D/Lab</td>
<td>± 4</td>
<td>± 15</td>
<td>x 3,75</td>
</tr>
</tbody>
</table>
Flame Retardant (FR) Formulation

\[ H_2O + FR \]

Water-based polymer
- Polymer A, B, C…

Additives
- O
- P
- Q
- R
- S
- ...

Others
...

Change **ONE** component = Change **COMPLETE** formulation!
Customers and Markets

[Images and logos related to customers and markets]
Roles in Reach

- Roles: Mainly ‘**Downstream User**’ (formulator)

<table>
<thead>
<tr>
<th>Downstream User</th>
<th>Total</th>
<th>SVHC (BrFR’s)</th>
<th>CoRAP</th>
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<tr>
<td>Raw Materials</td>
<td>+/- 350</td>
<td>2 (out!)</td>
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<td>+/- 400</td>
<td>&gt; 60 %</td>
<td>0 %</td>
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</tr>
<tr>
<td></td>
<td>+/- 450</td>
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<td>&gt; 75 %</td>
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- Roles: ‘**Registrant**’

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<th>2018</th>
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<td>Producer</td>
<td>/</td>
<td>1 substance</td>
<td>/</td>
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<tr>
<td>Importer</td>
<td>/</td>
<td>/</td>
<td>1 intermediate 1 substance</td>
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Responsible Use

- Minimization of emissions ➔ VECAP
  - BrFR Producer
  - **BrFR Formulator: 1st Certified Formulator**
  - BrFR Textile Coater

www.vecap.info
Avoid the Use of SVHC by early substitution

Timing of Substitution at CTF2000

⇒ Candidate listing

Process to list substances for authorisation (Annex XIV)

- Annex XV Dossier by ECHA/MS (art 59.2, 59.3)
- Candidate List (art 59.1)
- Prioritisation (art 58.3)
- Annex XIV (art 58.1)
Substitution of HBCDD

- 28/10/2008: HBCDD on Candidate List
- 30/04/2010: HBCDD last consumption

1.5 year
Substitution of Deca-BDE

- 19/12/2012: Deca-BDE on Candidate List
- 30/06/2015: Last consumption of Deca-BDE

Graph showing the consumed quantity of Deca-BDE from 2010 to 2016, with a period of 2.5 years.
Drivers and Challenges for Substitution

Main drivers:
- More sustainable products
- Pressure from our customers
- competitive advantage of substitution
- Authorization ?????

Main Challenges:
- Technical difficult → requires (re)formulation
- Alternatives more expensive → requires (re)formulation
- Requires Time & Money
Substitution of HBCDD

- **Use of HBCDD:**

- **Key features**
  - Many and specific

- **Alternatives** Multiple substitutions required:
  - Deca-BDE (↑ %) + Sb2O3 or other synergists (70%) temporary
  - Combination of Cl and P based (15%)
  - Halogen free solutions (PIN Flame Retardants) (15%)

- **Reduction of risk**
  - Formulation: 0 (emission free formulation)

- **Costs**
  - One time costs: 200,000 €
  - Average price increase raw material: Up to 10-20%
Substitution of Deca-BDE

Use of Deca-BDE:

Key features
- General purpose FR for many applications

Alternatives generally almost 1:1’ by EBP:
- EBP (95%): CoRAP
- Specialties (15%)

Reduction of risk
- Formulation: 0 (emission free formulation)

Costs
- One time costs: 325,000 €
- Average price increase raw material: Up to 20%
Use of EBP – CoRAP

Use of EBP:
- 280 formulation (>65 %): 1300 tpa (2017) ➔ ?

Key features
- General purpose FR for many applications

Alternatives
Multiple substitutions required:
- Brominated polymers (not on CL SVHC) (40%)
- Halogen free solutions (PIN Flame Retardants) (40%)
- Chlorinated substances (not on CL SVHC) (20%)

Reduction of risk
- Formulation: 0 (emission free formulation)

Costs
- One time costs: > 0.5 mio. €
- Average price increase raw material: Up to 20%
## Timetable substitution

### Overview

<table>
<thead>
<tr>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBCDD</td>
<td>x</td>
<td>x</td>
<td>SVHC</td>
<td>x</td>
<td>↓= 0</td>
</tr>
<tr>
<td>Deca-BDE</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>EBP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>HBCDD</td>
<td>POP</td>
<td></td>
<td>SUNSET DATE</td>
<td></td>
<td>➔ Annex XIV, nr 3</td>
</tr>
<tr>
<td>Deca-BDE</td>
<td>SVHC</td>
<td>x</td>
<td>x</td>
<td>↓= 0</td>
<td>➔ Annex XVII, nr 67</td>
</tr>
<tr>
<td>EBP</td>
<td>CoRAP</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
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What if?

- HBCDD, Deca-BDE and EBP at the same time on Annex XIV
  - No sequential substitution

- But:
  - No/Not enough alternatives at that time
  - R&D/reformulation/trials… not enough time!
  - Authorisation unavoidable
Conclusions

- Flame retardants are needed to achieve Fire safety
- CTF2000 NV formulates BrFR almost emission free (VECAP)
- HBCDD and Deca-BDE were substituted following candidate-listing
- Substitution:
  - a money (X00,000 euro) and time (y years) consuming process
  - involves complete supply chain
  - never 100% same technical excellence
  - often temporary solutions needed
  - This case: So far substitution of BrFR has happened
  - This case: So far a main objective (protection human health / protection environment) of Reach has worked