European standardization of Solid Recovered Fuels

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Workshop:
Processing routes for Solid Recovered Fuels
20 October, 2011
Dublin
Outline

- Objectives and Challenges
- Background
- Mandate 325 and CEN/TC 343 Solid Recovered Fuels
- Important issues and present status
In order to comply with Sustainable Development there is a trend towards Integrated Resource and Waste Management. European environmental and energy policies include measures to enhance recovery of residual waste as well as to promote energy from biomass and waste. Waste derived fuels are indigenous fuels that help achieve Security of Supply and the targets of the Kyoto Protocol.

European Standards for Solid Recovered Fuels will support the free trade of these fuels on the Internal Market. They will also be of help to equipment producers and permitting authorities, and they will help to build acceptance and trust among the public.
Objectives & Challenges

- The full implementation of the Landfill Directive (LD) significantly reduces the disposal of combustible waste in landfill.

- In Europe there is not enough incineration capacity to meet the targets of the LD. The use of waste derived fuels for the generation of heat and/or power or for the production of material products, e.g. clinker for cement, is a valid option.

- The Solid Recovered Fuels market needs to be developed rapidly with the help of pan-European procedures, which are accepted also by the permitting authorities.
Background

- **Fuel and Energy Recovery** 1997 - 1998
  EC JOULE-THERMIE: DIS-1375-97-FI
  Report available at jan.zeevalkink@mep.tno.nl

- **Waste to Recovered Fuel** 1999 - 2002
  EC Fifth Framework Program: NNE5-1999-533
  CBA available at www.gua-group.com/cba-wtrf

**CEN BT/TF 118 Solid Recovered Fuels** 2000 - 2002

- UNI 9903 *Non mineral refuse derived fuels RDF* 1992 (IT)
- SFS 5875 *Solid Recovered Fuel - Quality Control System* 2000 (FIN)
- RAL-GZ 724 *Quality Assurance of Solid Recovered Fuels* 2001 (D)
First step: **Develop a set of Technical Specifications (TSs), i.e. “pre-standards”**.

Second step: **Transform this set of TSs into European Standards (ENs)**.

These ENs shall be presented as a package, after validation of a minimum number of TSs as agreed between the Commission and CEN BT.
The standards shall include:

- All standards listed in the Work Programme developed by CEN TF 118 Solid Recovered Fuels (equal to those of CEN/TC 335 Solid Biofuels).

- A set of standards on the determination of the biodegradable fraction, as defined in Directive 2001/77/EC and/or the biogenic fraction of SRF and the higher and lower heating values of these fractions. CEN will provide the Commission … with a report on the relative difference between these two fractions of waste in order to decide whether there is a need to develop two different standards or only one.
CEN TC 343 Solid Recovered Fuels

- Established on 13 March 2002
- Secretariat held by the Finnish Standards Association
- Scope
  “Elaboration of Standards, Technical Specifications and Technical Reports on solid recovered fuels (RDF, etc.) prepared from non-hazardous waste to be utilised for energy recovery in waste-incineration or co-incineration plants, excluding those fuels that are included in the scope of CEN/TC 335 Solid Biofuels”
European Standardisation of Solid Recovered Fuels

Non-hazardous waste

Agreed acceptance criteria

Production and trade of Solid Recovered Fuels

Customer-specific requirements

Point of reception

Point of delivery

Use of classified fuel

CEN/TC 343
Organization

27 Work Items grouped in 5 Working Groups

1. Terminology and Quality Assurance (IT)

2. Fuel specifications and classes (SE)

3. Sampling and supplementary test methods (NL)

4. Physical/mechanical tests (D)

5. Chemical tests (IT)
Important issues

- WG1: Quality Management System based on ISO 9001
- WG2: Classification system and Specification template
- WG3: Determination of biodegradable/biogenic = biomass content
## Classification system of CEN/TS 15359

<table>
<thead>
<tr>
<th>Classification Property</th>
<th>Statistical Measure</th>
<th>Unit</th>
<th>Classes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Net calorific value (NCV)</td>
<td>Mean</td>
<td>MJ/kg/(ar)</td>
<td>≥ 25 ≥20 ≥15 ≥10 ≥3</td>
</tr>
<tr>
<td>Classification Property</td>
<td>Statistical Measure</td>
<td>Unit</td>
<td>Classes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Chlorine (Cl)</td>
<td>Mean</td>
<td>% (d)</td>
<td>≤0,2 ≤0,6 ≤1,0 ≤1,5 ≤3</td>
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<tr>
<td>Classification Property</td>
<td>Statistical Measure</td>
<td>Unit</td>
<td>Classes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>Median</td>
<td>mg/MJ (ar)</td>
<td>≤0,02 ≤0,03 ≤0,08 ≤0,15 ≤0,50</td>
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<tr>
<td></td>
<td>80th percentile</td>
<td>mg/MJ (ar)</td>
<td>≤0,04 ≤0,06 ≤0,16 ≤0,30 ≤1,00</td>
</tr>
</tbody>
</table>
Validation of a set of TSs

- 26 Technical Specifications (TS) were published by 2006.
- These were validated within the EU funded multi-stakeholder project QUOVADIS (Quality Management Organisation, Validation of Standards, Developments and Inquiries for SRF) lead by Cesi Ricerca, Italy.
- The validation focused on TSs on QMS, sampling, sample preparation as well as physical and chemical test methods, including inter-laboratory Round Robin and Robustness evaluations.
- A report is available at http://quovadis.ersweb.it
Present status of TC 343

- 6 Technical Reports (CEN/TRs) have been published.
  - 14980:2004 Report on relative difference between biodegradable and biogenic fractions of SRF
  - 15441:2006 Guidelines on occupational health aspects
  - 15508:2006 Key properties on solid recovered fuels to be used for establishing a classification system
  - 15591:2007 Determination of the biomass content based on the $^{14}$C method
  - 15716:2008 Determination of combustion behaviour
  - 15404:2010 Methods for the determination of ash melting behaviour by using characteristic temperatures
The following European Standards (EN) have been published:

- 15357 Terminology, definitions and descriptions
- 15358 Quality management systems
- 15359 Specifications and classes (decided on 2011-10-19)
- 15400 Method for the determination of calorific value
- 15402 Determination of content of volatile matter
- 15403 Determination of ash content
- 15407 Methods for the determination of C, H and N content
- 15408 Methods for the determination of S, Cl, F and Br content
- 15410 Methods for the determination of major elements
- 15411 Methods for the determination of trace elements
Present status of TC 343

(Published ENs cont.):
- 15414-3 Determination of moisture content using the oven dry method
- 15415-1 Determination of particle size distribution
- **15440 Methods for the determination of biomass content**
- 15442 Methods for sampling
- 15443 Methods for the preparation of the laboratory sample
- 15413 Methods for the preparation of the test sample from the laboratory sample
- 15590 Determination of potential rate of microbial self heating using the real dynamic respiration index
The following Technical Specifications have been published:

- 15401:2010 Determination of bulk density
- 15405:2010 Determination of density of pellets and briquettes
- 15406:2010 Determination of bridging properties of bulk material
- 15412:2010 Methods for the determination of metallic Al
- 15414-1:2010 Determination of total moisture by a reference method
- 15414-2:2010 Determination of total moisture by a simplified method

The following prENs have been sent to CEN/CMC for Formal Vote:

- 15415-2 Maximum projected length method for large dimension particles
- 15415-3 Method by image analysis for large dimension particle
Biomass content

EN 15440 SRF – *Methods for the determination of biomass content*

gives the following definitions:

- **3.2 biodegradable**
  material capable of undergoing biological anaerobic or aerobic decomposition under conditions naturally occurring in the biosphere
  NOTE definition on *biodegradable waste* in the Landfill Directive 1999/31/EC

- **3.3 biogenic**
  produced in natural processes by living organisms but not fossilized or derived from fossil resources

- **3.4 biomass**
  NOTE 1. This term is defined in several Directives and Decisions:
    a) RES-E Directive: “the biodegradable fraction of products, waste and residues from ....
    b) Decision on monitoring GHG: “non-fossilised and biodegradable organic material originating from plants, animals and micro-org. ...
EN 15440 specifies 3 normative determination methods based on:
- Selective dissolution in sulphuric acid and hydrogen peroxide,
- Manual sorting, or
- 14C content

It expresses the result by:
- Weight,
- Energy content, or
- Carbon content

It suggests method depending on the purpose of the measurement
It describes the methods in Normative Annexes A, B and C
It indicates limitations to the methods in informative Annex D
It lists materials considered as CO2-neutral in informative Annex E
It gives performance data obtained from inter-laboratory tests in informative Annex F
Example of a SRF in Finland (1/2)

- Class Code: NCV 3; Cl 2; Hg 1
- Origin: Commercial and Industrial waste
- Composition (ar): 45 % paper, 25 % plastics, 10 % wood, 20 % other

- **Biomass content:**
  - Biogenic Carbon, 60 % of total C
  - Emission Factor (ar), 31 tCO$_2$/TJ
### Example of a SRF in Finland (2/2)

<table>
<thead>
<tr>
<th>Property</th>
<th>Typical</th>
<th>Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCV, MJ/kg (ar)</td>
<td>18</td>
<td>&gt; 16</td>
</tr>
<tr>
<td>Moisture, % (ar)</td>
<td>&lt; 20</td>
<td></td>
</tr>
<tr>
<td>Ash, % (d)</td>
<td>&lt; 10</td>
<td></td>
</tr>
<tr>
<td>Cl, % (d)</td>
<td>0,4</td>
<td>&lt; 0,6</td>
</tr>
<tr>
<td>Hg, mg/kg (d)</td>
<td>&lt; 0,05</td>
<td></td>
</tr>
<tr>
<td>Al, metallic, % (d)</td>
<td>&lt; 0,1</td>
<td></td>
</tr>
</tbody>
</table>
Thank you for your attention