Future directions for dealing with IBA from EfW

Latest regulatory changes

28 February 2019

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ESWET Secretary General
Agenda

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Members

European Suppliers of Waste-to-Energy Technology

Future directions for dealing with IBA from EfW

28.02.2019
1. General considerations

Approximately 1.3 million tonnes of IBA come out of EfW plants in England and Wales each year (source: UK Environment Agency)

- Ferrous metals account for 7-15% of ashes (source: ISWA)
- Non-ferrous metals account for 1-2% of ashes (source: ISWA)
- Rest consists of minerals which can be entirely utilised, mostly for construction purposes

In a low carbon, circular economy everyone must contribute

IBA is huge potential barely tapped
1. General considerations

The fate of IBA is usually a result of legislation (ISWA)
1. General considerations

Incinerator Bottom Ash (IBA)

Metals

Minerals
2. Metals recovery
2. Metals recovery

General recycling principles

Definition of Municipal Waste

(a) mixed waste and separately collected waste from households, including paper and cardboard, glass, metals, plastics, bio-waste, wood, textiles, packaging, waste electrical and electronic equipment, waste batteries and accumulators, and bulky waste, including mattresses and furniture;

(b) mixed waste and separately collected waste from other sources, where such waste is similar in nature and composition to waste from households;

[...]
2. Metals recovery

Recycling of metals from bottom ashes

• For the purpose of calculating the 2025, 2030 and 2035 targets for preparing for re-use and recycling of municipal waste, Member States may take into account the recycling of metals separated after incineration of municipal waste.

• The Commission is in the process of adopting a methodology for calculating the weight of recycled metals separated from incineration bottom ash

(to be published by 31 March 2019)
2. Metals recovery

Methodology for calculating the weight of recycled metals

Recycled metals = Metals with minerals - Minerals
2. Metals recovery

Methodology for calculating the weight of recycled metals
2. Metals recovery

**Methodology for calculating the weight of recycled metals**

The share of municipal waste in all incinerated waste is above 75%.

\[
m_{\text{MSW IBA metal content}} = \frac{m_{\text{MSW}}}{m_{\text{w}}} \cdot m_{\text{total IBA metal content}}
\]
2. Metals recovery

Methodology for calculating the weight of recycled metals

IF municipal waste is less than 75%

Carry out a survey:
1) at least every five years
2) significantly changed waste composition

\[
m_{\text{MSW IBA metal content}} = \frac{m_{\text{MSW}} \cdot c_{\text{metals MSW}}}{m_{W} \cdot c_{\text{metals MSWI}}} \cdot m_{\text{total IBA metal content}}
\]
3. Minerals recovery
# 3. Minerals recovery: the HP14 issue

## General principles of hazardous waste classification

<table>
<thead>
<tr>
<th>Hazardous Properties</th>
<th>Hazardous Properties</th>
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<tbody>
<tr>
<td>HP1</td>
<td>Explosive</td>
</tr>
<tr>
<td>HP2</td>
<td>Oxidising</td>
</tr>
<tr>
<td>HP3</td>
<td>Flammable</td>
</tr>
<tr>
<td>HP4</td>
<td>Irritant — skin irritation and eye damage</td>
</tr>
<tr>
<td>HP5</td>
<td>Specific Target Organ Toxicity (STOT)/Aspiration Toxicity</td>
</tr>
<tr>
<td>HP6</td>
<td>Acute Toxicity</td>
</tr>
<tr>
<td>HP7</td>
<td>Carcinogenic</td>
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<tr>
<td>HP8</td>
<td>Corrosive</td>
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<tr>
<td>HP9</td>
<td>Infectious</td>
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<tr>
<td>HP10</td>
<td>Toxic for reproduction</td>
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<tr>
<td>HP11</td>
<td>Mutagenic</td>
</tr>
<tr>
<td>HP12</td>
<td>Release of an acute toxic gas</td>
</tr>
<tr>
<td>HP13</td>
<td>Sensitising</td>
</tr>
<tr>
<td>HP14</td>
<td>Ecotoxic</td>
</tr>
<tr>
<td>HP15</td>
<td>Waste capable of exhibiting a hazardous property listed above not directly displayed by the original waste</td>
</tr>
</tbody>
</table>
3. Minerals recovery: the HP14 issue

General principles of hazardous waste classification

Definition of Hazardous Property ‘HP14’ (or ‘Ecotoxic’):

Waste which present or may present immediate or delayed risks for one or more sectors of the environment (Annex III WFD)
The European List of Waste (LoW) (2000/532/EC) is the key document for classification of waste.

A Member State may consider waste as hazardous where, even though it does not appear as such on the LoW, it displays one or more of the properties listed in Annex III (Art. 7(2) WFD)

Conversely, where a Member State has evidence that specific waste that appears on the LoW as hazardous waste does not display any of the properties listed in Annex III, it may consider that waste as non-hazardous waste (Art. 7(3) WFD)
3. Minerals recovery: the HP14 issue

General principles of hazardous waste classification

Waste which fall under the definition of a hazardous waste should:

- Be channeled into appropriate waste treatment systems (Art. 17-20 WFD)
- Be labelled in accordance with International and Community standards
3. Minerals recovery: the HP14 issue

General principles of hazardous waste classification

- EU level: Annex III WFD
- Calculation methodology for assessing Ecotoxicity
- Spain
- Germany
- Austria
- Etc.

Future directions for dealing with IBA from EfW
3. Minerals recovery: the HP14 issue
The problem raised by the calculation methodology

- Total heavy metals (>5 g/cm³) content estimation

Above threshold => Ecotoxic
3. Minerals recovery: the HP14 issue
A proposed assessment method
3. Minerals recovery: the HP14 issue
A proposed assessment method

**Basis for assessing HP14 property**

- Check for solid/bound metals
- Make eluate check

bifa Umweltinstitut GmbH, ITM (University of Duisburg-Essen) and GKS (WtE plant in Schweinfurt)
3. Minerals recovery: the HP14 issue
A proposed assessment method

Four groups of metals

• Group 0: solid metals or alloying metals
• Group 1: “non-H410 substances” ions (“solid solution”) firmly embedded in the basic structure of the mineral, bound in a very stable manner; spinels (e.g. magnetite); silicates with layer, band or chain structure (pyroxene group, melilite group)
• Group 2: “releasable substances” oxides, hydroxides or carbonates that are sparingly soluble in water, acid soluble, soluble in strong complexing agents (EDTA)
• Group 3: “water-soluble salts” subordinate salts (partly react to hydroxides); oxo complexes (anions with Cu, Zn, Pb)

Only group 2 and 3 relevant for classification, leading bottom ash to be generally classified as non-hazardous
4. Outlook

How will Brexit benefit IBA in the UK?

- **Use** possibility opened by EU legislation to recycle metals from IBA
- **Develop** a realistic assessment method for material recycling

- **If not in the single market:**
  - **Difficult** import and export
    - of waste
  - **Difficult** export
    - of secondary raw material
  - **Increased** need of self sufficiency
Thank you for your attention!