

## ASH AND SLAG HANDLING

## 3.7. Analytics

**3.7.25. State regulation measures to encourage increase in coal ash utilization in Poland and European trends in coal ash utilization**

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**ABSTRACT**

The purpose of this paper is to identify European and state (Polish) legislation and standards referring to handling with ashes from combustions plants as well as to show some trends in treatment practices related to CCPs in Europe. There are identified two main pieces of legislation on ashes treatment: Waste Directive and REACH Regulation and benefits and disadvantages of using them. Further you can read about current trends in ash utilization in Europe. The results of this analysis can be used to find out what entrepreneurs from outside Europe shall do to be able to enter the European market.

**1. LEGAL ISSUES – WASTE DIRECTIVE AND REACH**

The main question for the companies dealing with Coal Combustion Products is what CCPs are according to European legislation? Are they waste or substances or maybe something between?

**1.1. Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain directives**

The definition of waste in the directive is: 'waste' means any substance or object which the holder discards or intends or is required to discard;

In article 4 a waste hierarchy is pointed. According to it, the following shall apply as a priority order in waste prevention and management legislation and policy:

- (a) prevention;
- (b) preparing for re-use;
- (c) recycling;
- (d) other recovery, e.g. energy recovery; and
- (e) disposal.

In the context the directive gives opportunities to treat some resources (having handled as waste so far) as non-waste.

The first step is to benefit from the new concept of Waste directive presented in its Article 5 referring to "by-products".

A substance or object, resulting from a production process, the primary aim of which is not the production of that item, may be regarded as not being waste referred to in point (1) of Article 3 but as being a by-product only if the some conditions are met:

- a) further use of the substance or object is certain
- b) the substance or object can be used directly without any further processing other than normal industrial practice

- c) the substance or object is produced as an integral part of a production process; and
- d) Further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

In Poland we have additional legal conditions for treating a resource as a by-product.

According to the Polish Act from 14.12.2013 *on waste*, a manufacturer of an article or substance is obliged to submit to the competent authority (a marshal from the voivodship where the production is conducted), an application for recognition of an article or substance as a by-product.

Application for recognition of an article or substance as a by-product includes:

- 1) the name or business name and address of the residence or business;
- 2) tax identification number (NIP) and the entrepreneur's registration number (REGON), if one has been ascribed;
- 3) the place of production of an article or substance provided for recognition as a by-product;
- 4) an indication of an article or substance provided for recognition as a by-product, and their weight;
- 5) a description of the manufacturing process of an article or substance, and the process in which they will be used.

Recognition of an article or a substance as a by-product occurs if the voivodship marshal does not oppose by decision within three months from the date of submitting an application.

The minister responsible for the environment may determine, by regulation, the detailed criteria for the recognition of an article or substance as a by-product in the interest of the environment, human life or health. By now Minister of Environment has not issued the mentioned regulation.

It is prohibited to store by-products and waste together, as well as to store by-products in places designed for the storage of waste or landfill.

So, as you see, there is a measure in European and Polish legislation to go out from waste legislation with CCPs and to treat them as by-products and consequently not to store them on landfills. It may be very profitable for the CCPs' companies, because costs of placing the CCPs on landfills are very high – approximately 50 PLN/Mg = 12 €/Mg. Operation of coal-fired

power plants is influenced by other European Directives (IPPC, LCP, IED) and Decisions which aim at reduced emissions into the environment. Fulfilling all these duties generates another costs and it is better to balance it with earning money on CCPs selling.

## 1.2. REACH - Regulation (WE) 1907/2006

However, if CCPs are not treated by the owner as waste, they are considered in the REACH's light as substances.

But placing ashes on a landfill is complexly much more expensive than meeting REACH main obligation – registration.

And an establishment producing CCPs becomes a MANUFACTURER in REACH system. It generates costs, but lower than placing CCPs on a landfill.

But what is REACH exactly?

REACH stands for Registration, Evaluation, Authorization and Restriction of Chemicals. It entered into force on 1 June 2007.

REACH is a regulation of the European Union, adopted to (as the preamble states) improve the protection of human health and the environment from the risks that can be posed by chemicals, while enhancing the competitiveness of the EU chemicals industry. It also promotes alternative methods for the hazard assessment of substances in order to reduce the number of tests on animals.

In principle REACH applies to all chemical substances; not only those used in industrial processes but also in our day-to-day lives, for example in cleaning products, paints as well as in articles such as clothes, furniture and electrical appliances. Therefore, the regulation has an impact on most companies across the EU.

REACH places the burden of proof on companies. To comply with the regulation, companies must identify and manage the risks linked to the substances they manufacture and market in the EU. They have to demonstrate to European Chemical Agency (ECHA) in Helsinki how the substance can be safely used, and they must communicate the risk management measures to the users. To do it they charge a set of analysis and on that basis they prepare a very comprehensive registration dossier. It is much more reliable than documentation under waste legislation. So, it is obviously safer for people and environment to treat CCPs as substances rather than waste.

If the risks cannot be managed, authorities can restrict the use of substances in different ways. In the long run, the most hazardous substances should be substituted with less dangerous ones.

REACH establishes procedures for collecting and assessing information on the properties and hazards of substances.

Companies need to register their substances and to do this they need to work together with other companies who are registering the same substance to reduce the number of analysis on animals.

ECHA receives and evaluates individual registrations for their compliance, and the EU Member States evaluate selected substances to clarify initial concerns

for human health or for the environment. Authorities and ECHA's scientific committees assess whether the risks of substances can be managed.

Authorities can ban hazardous substances if their risks are unmanageable. They can also decide to restrict a use or make it subject to a prior authorisation.

REACH impacts on a wide range of companies across many sectors, even those who may not think of themselves as being involved with chemicals.

In general, under REACH you may have one of these roles:

**Manufacturer:** A natural or legal person established within the EU who manufactures a substance to use it by themselves or to supply it to other people (even if it is for export) in one or more Member States.

**Importer:** A natural or legal person established within the Community who is responsible for import.

Importing means the physical introduction into the customs territory of the European Union.

**Downstream users:** A natural or legal person established within the EU other than the manufacturer or the importer, who uses a substance, either on its own or in a mixture, in the course of his industrial or professional activities. It may be an industrial user of chemicals or formulator of mixtures (e.g. a paint producer).

A distributor or a consumer is not seen as a downstream user.

Companies established outside the EU are not bound by the obligations of REACH, even if they export their products into the customs territory of the European Union. The responsibility for fulfilling the requirements of REACH, such as registration lies with the importers established in the European Union, or with the only representative of a non-EU manufacturer established in the European Union.

Each country of the European Economic Area (EEA) has established a national REACH and CLP helpdesk to provide information on REACH and CLP obligations.

The first and the most common and also difficult obligation of REACH Regulation is REGISTRATION.

REACH requires of manufacturers and importers of chemical substances ( $\geq 1$  tone/year) to obtain information on the physicochemical, health and environmental properties of their substances and use it to determine how these substances can be used safely.

Registration is compulsory only for certain actors in the supply chain:

- EU manufacturers and importers of substances on their own or in mixtures
- EU producers and importers of articles meeting the criteria explained in the article 7 of REACH Regulation.
- “Only representatives” established in the EU and appointed by a manufacturer, formulator or article producer established outside the EU to fulfil the registration obligations of importers.

Each “legal entity” established within the Community manufacturing or importing a substance is required to submit its **own** registration.

The registration requires i.a. comprehensive information about physicochemical features, human toxicology and ecotoxicology of the substances (details – see Table 1).

But substances recovered (as defined in the Waste Framework Directive 2008/98/EC) and recycled in the Community are exempted from the registration duty under Article 2 (2) (providing certain conditions):

- the same substance must have already been registered at manufacturing or import stage, either by a registrant in the same supply chain or by a registrant in another supply chain
- the substance must be the same, i.e. have the same chemical identity and properties, as the substance already registered
- the legal entity that did the recovery must ensure that information on the registered substance is available.

Table 1 REACH Information requirements – tests

Phys.-chem.	Toxicology	Eco-toxicology
Density Melting / Boiling point Water solubility Vapour pressure Partition coefficient Flash point Flammability Explosive properties Surface tension Oxidative properties Granulometry	Acute toxicity (oral) Skin irritation (in vitro) Eye irritation (in vitro) Skin sensitisation Mutagenicity (Ames test)	Akute Daphnia toxicity Algae toxicity Biotic degradation
Stability in organic solvents Identity of degradation products Dissociation constant Viscosity	Skin irritation (in vivo) Eye irritation (in vivo) In-vitro Cytogenicity In vitro mutagenicity (mammalian cells) Acute toxicity (dermal/inhalative) Subacute toxicity (28 d Test) Reproductive/developmental toxicity,(Screening test) Toxicokinetic	Short-term toxicity fish Respiration inhibition test Abiotic degradation Adsorption-/desorption
	Subchronic Toxicity (90 d test) Reproduktionstoxizität Developmental toxicity 2-generation-reproductive toxicity	Daphnia reproduction test Long-term toxicity fish Biotic degradation in water Biotic degradation in soil Biotic degradation in sediment Identification of degradation products Bioaccumulation in fish Short-term toxicity invertebrates Soil microorganismen Short-term toxicity plants
	Carcinogenicity	Environmental fate Long-term toxicity terr. invertebrates Long-term toxicity sediment organisms Long-term toxicity birds

## 2. CCPs – WHAT EXACTLY ARE THEY IN EUROPE?

Total production of CCPs in EU 27 is estimated to be ca. 140 million t/a. The CCPs' distribution is shown on Figure. 1.

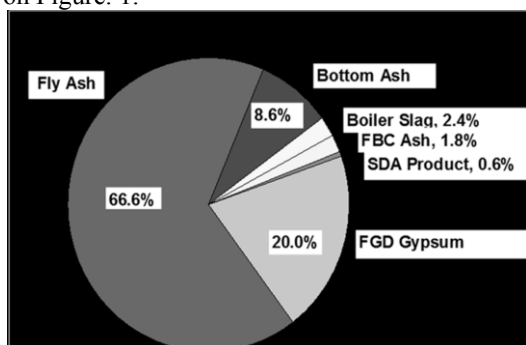


Figure 1. Production of CCPs' distribution in EU 27

If the above conditions are not met, the substance must be registered following the recovery operation and before being put to a new use.

The problem with ashes is simple in the above context of exemption they are not produced intentionally by anybody only in combustion plants as by-products.

By-products in REACH are obliged to be registered unless they are not placing on the market, so:

Each producer or importer of coal combustion products (CCPs) placed on the market as construction materials have to register their substances. European (including Polish) Combustions Plants with cooperation with companies using CCPs in other economy's sectors established special forums (predicted in REACH Regulation - SIEFS) or even commercial consortias to help each other to register CCPs. They have already submitted their registration dossiers in ECHA. The outputs from analysis conducted for making dossiers are simple: "zero emission" from CCPs.

### 2.1. Demands of the construction market

Downstream users of CCPs have of course some expectations as far as quality of these recourses is concerned:

- availability of huge amounts of material
- constant quality (continuous process)
- sufficient product properties (grain size distribution, surface)
- long term availability
- meeting of technical requirements
- environmental compatibility

### 2.2. Technical regulations on CCPs in Europe

Beneficial utilization of CCPs over decades led to their acceptance as construction materials by industries and authorities. Some standards and specifications for CCPs as construction materials, apart from above described legal regulations on ashes, have been estab-

lished. There are specific requirements for CCPs as cement raw materials:

- EN 197-1 for fly ash as constituent in blended cement
- EN 450 for fly ash for use as concrete addition
- prEN 13282 for hydraulic road binder
- EN 14227 for hydraulically bound mixtures
- EN 206 for concrete
- EN 13055 for lightweight aggregates
- EN 13242 for aggregates for asphalt
- EN 12620 for aggregates for concrete
- Quality criterias for FGD gypsum, published by EUROGYPSUM

European Standards are – once prepared – subject of revision in a five year term.

### 3. THE AIM OF ALL THE “HYPE” SOURROUNDING CCPs

#### 3.1. Use of CCPs in Europe

The CCPs are mainly utilised in:

- the building material industry,
- civil engineering,
- road construction,
- underground coal mining for construction work,
- recultivation and restoration purposes in open cast mines.

The majority of the CCPs is prepared intentionally to meet certain requirements of standards or other specifications with respect to utilisation in certain areas.

#### 3.2. The benefits from coal ash utilization

The advantages from use of ashes, not placing them on landfills are obvious:

- saving of natural resources during:
  - mining
  - processing
  - transport
- reduction of energy demand;
- reduction of emissions (CO<sub>2</sub>) needed for or result from manufacturing process of products which are replaced
- CCPs are fine grained raw materials
- CO<sub>2</sub> reduction in
  - cement production (0.7 to 1.2 kg CO<sub>2</sub> per kg clinker, depending on fuel)
  - concrete when fly ash is used as concrete additives
- saving of drying energy when fly ash is used to dry wet raw materials

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