

END-OF-WASTE CRITERIA FOR PULVERISED FUEL ASH & FURNACE BOTTOM ASH



SINGLE CASE DECISION FOR ELECTRICITY SUPPLY BOARD (ESB)

This document sets out end-of-waste criteria for pulverised fuel ash (PFA), sometimes referred to as coal fly ash, and furnace bottom ash (FBA) produced during the combustion of coal.



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Decision establishing End-of-Waste Criteria
under
Article 28 of the European Communities (Waste Directive) Regulations 2011
for
Pulverised Fuel Ash and Furnace Bottom Ash
produced by
Electricity Supply Board (ESB), Generation and Trading,
Moneypoint Generation,
Carrowdotia,
Killimer, Kilrush,
Co. Clare

Decision Date: 10th September 2019

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1. Introduction

Article 6 of the Waste Framework Directive, 2008¹ was transposed into Irish law by the European Communities (Waste Directive) Regulations 2011². Article 28(3) of the Regulation assigns responsibility to the Environmental Protection Agency to make certain decisions regarding end-of-waste.

1.1. What are end-of-waste criteria?

End-of-waste is a means of determining the point at which, for the purposes of waste regulation, a material need no longer be classified as waste after it has undergone a recovery, including recycling, operation and complies with specific criteria to be developed in accordance with the specific conditions as outlined in the Regulation.

1.2. Complying with the end-of-waste criteria

Compliance with the criteria as outlined in this document is sufficient to ensure that the pulverised fuel ash (PFA) and furnace bottom ash (FBA) may be used as a secondary raw material without the need for waste regulation or control.

1.3. When end-of-waste compliant material may become waste

The Electricity Supply Board (ESB) and users of PFA and FBA should note that, even if the end-of-waste criteria has been complied with, the material will become waste again, and subject to waste management controls if:

- 1.3.1. it is discarded or there is an intention or requirement to discard, for example if it is disposed of;
- 1.3.2. it is stored indefinitely with little possibility of being used;
- 1.3.3. it is mixed with other waste materials; or
- 1.3.4. the producer cannot provide documented evidence of compliance with these end-of-waste criteria.

1.4. Updating the criteria

These end-of-waste criteria may be reviewed and updated by the EPA at any stage based on the experience of practical applications, technological developments or legislative amendments. The EPA reserves the right to depart from the position outlined and to take appropriate action to avoid overall adverse environmental or human health impacts. If at any time the European Commission publishes generally applicable end-of-waste criteria for pulverised fuel ash (PFA) and furnace bottom ash (FBA), those European criteria may supersede these criteria and the EPA may withdraw this decision.

1.5. Exporting end-of-waste compliant material

These end-of-waste criteria are applicable in Ireland only. If exporting the material, it should be noted that countries of transit and/or destination may take a different view and the end-of-

¹ Waste Framework Directive - Directive 2008/98/EC on waste (WFD)

² Waste Directive Regulations - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011)

waste criteria may not be recognised. If the competent authority in the country of transit and/or destination considers the material to be waste, the shipment may, if required by that competent authority, be subject to the controls set out in the Waste Shipment Regulation³.

1.6. Application

Pulverised fuel ash and furnace bottom ash may only be used in bound applications.

1.7. Interpretation

This decision document is for the purposes of article 28 of the European Communities (Waste Directive) Regulations 2011 only and nothing in this document shall be construed as negating the Electricity Supply Board or users' statutory obligations or requirements under any other authorisations, enactments or regulations.

2. Decision and Reasons for the Decision

The EPA has decided, in accordance with article 28(3) of the European Communities (Waste Directive) Regulations 2011, that the pulverised fuel ash (PFA), sometimes referred to as coal fly ash, and furnace bottom ash (FBA) (as defined in the glossary) the subject of the application made by Electricity Supply Board, on the 17th April 2015 and produced at an EPA authorised facility operated by Electricity Supply Board Moneypoint will cease to be waste if it complies with the end-of-waste criteria set out in this document.

The EPA is satisfied, based on:

- the information provided by the applicant, including additional information;
- Standards for the production of aggregate, as referenced in Appendix A;
- Joint Research Centre, 2009 Final Report on "End-of-waste criteria";
- WRAP Quality Protocol for Pulverised Fuel Ash (PFA); and
- WRAP Pulverised fuel ash and furnace bottom ash, "A technical report on the manufacture of products from pulverised fuel ash (PFA) and furnace bottom ash (FBA)"

that, subject to compliance with the end-of-waste criteria, the pulverised fuel ash and furnace bottom ash conforms with the requirements of article 28(1)(a) & (b) of the Regulation and its use in bound applications will not lead to overall adverse environmental and human health impacts.

³ Waste Shipment Regulations - Waste Management (Shipments of Waste) Regulations, 2007 (SI No. 419 of 2007)

3. Materials Handling & Control

3.1. Waste Inputs

3.1.1. Inputs shall be restricted to furnace bottom ash and pulverised fuel ash (sometimes referred to as coal fly ash) as per the List of Waste codes 10 01 01 and 10 01 02 respectively.

- 10 01 01: bottom ash, slag and boiler dust (excluding boiler dust mentioned in 10 01 04)⁴
- 10 01 02: coal fly ash

3.1.2. Pulverised fuel ash or furnace bottom ash containing, or which has been contaminated by any substance listed in Annex IV of Regulation (EC) No. 850 of 2004 (on persistent organic pollutants) or asbestos shall be immediately moved to a designated quarantine area and stored pending consignment to an appropriately authorised waste management facility for appropriate disposal or recovery.

3.2. Treatment Process

3.2.1. PFA and FBA will be removed with the use of excavators and loaded directly into covered lorries for dispatch to users.

3.3. Quality of Pulverised Fuel Ash and Furnace Bottom Ash

3.3.1. The pulverised fuel ash and furnace bottom ash shall comply with a relevant product standard(s) and customer specification.

3.3.2. The relevant product standards are listed in Appendix A. As Standards are subject to regular review, it is the producer and user's responsibility to ensure that the latest version is referred to.

3.3.3. The recovered pulverised fuel ash and furnace bottom ash shall:

- i. comply with relevant provisions of the CLP⁵ regulation;
- ii. comply with relevant provisions of the REACH⁶ regulation;
- iii. comply with relevant provisions of the CPR⁷; and
- iv. comply with relevant provisions of the POPs⁸ Regulations.

⁴ Slag and boiler dust do not form part of the inputs approved under this decision document

⁵ Classification, Labelling and Packaging - Regulation (EC) No 1272/2008 (CLP)

⁶ Registration, Evaluation, Authorisation and Restriction of Chemicals - Regulation 1907/2006/EC (REACH)

⁷ Construction Products Regulation - Regulation (EU) No. 305/2011 (CPR)

⁸ Persistent Organic Pollutants - Regulation 850/2004/EC (POPs)

4. Demonstrating compliance with the decision establishing end-of-waste criteria

Electricity Supply Board shall be able to demonstrate compliance with the requirements of this decision. If unable to do so the pulverised fuel ash and furnace bottom ash will be considered a waste.

4.1. Records Management

In order to be able to demonstrate compliance with these end-of-waste criteria, the following records of production, testing and sale or supply of the pulverised fuel ash or furnace bottom ash shall be maintained and available for inspection.

4.1.1. Training

- i. Records shall be maintained which demonstrate that all relevant persons have been appropriately trained in all aspects of these criteria, including the product standards.

4.1.2. A "declaration of conformity" shall be completed for each batch of recovered pulverised fuel ash or furnace bottom ash leaving the facility. The declaration of conformity shall;

- i. include a description of the contents of the vehicle i.e. pulverised fuel ash or furnace bottom ash;
- ii. include a signed and dated declaration which declares that the material has achieved end-of-waste status in accordance with the EPA decision (decision title and date of decision);
- iii. state that the relevant provisions of POPs, REACH, CLP and CPR regulations have been complied with;
- iv. state that the relevant provisions of the appropriate product technical standards and specification have been complied with. Details of the name of the specific standard(s) and specification(s) which are being applied are to be included;
- v. state any restrictions on use;
- vi. state the date of supply;
- vii. state the customer's name and contact details;
- viii. state the quantity supplied by weight / volume;
- ix. be issued in electronic form;
- x. be issued prior to the recovered PFA or FBA leaving the facility;
- xi. be accompanied by or contain a link to an electronic copy of the safety data sheet for the pulverised fuel ash and furnace bottom ash; and
- xii. be retained for at least five years.

- 4.1.3. Environmental & Quality Management: The following procedures and records of quality assurance shall be maintained.
- i. A procedure for on-site pulverised fuel ash and furnace bottom ash storage and processing.
 - ii. A procedure for complying with customer specifications.
 - iii. A procedure for the identification and management of non-conforming ash.
 - iv. Details of the quality assurance system which is in place to comply with the relevant product standard(s);
 - v. A procedure for sampling and analysis of the recovered pulverised fuel ash and furnace bottom ash to establish the content and nature of any contaminant components. The procedure shall include:
 - a) the types of testing for each product;
 - b) the process for determining sampling frequencies, and
 - c) sampling and testing frequency.
 - vi. A procedure(s) for the use, control, calibration and maintenance of inspection, measuring and test equipment shall be set up and followed. Equipment shall be uniquely identified.
- 4.1.4. In order to demonstrate that the recovered pulverised fuel ash and furnace bottom ash do not pose a risk to the environment or human health, the producer shall make available:
- i. the results of any analysis carried out;
 - ii. interpretative reports including lab results;
 - iii. details of the test methods used;
 - iv. details of accreditation of the test method;
 - v. details of accreditation of laboratory;
 - vi. details and nature of any contaminants identified; and
 - vii. if contaminants are identified, details of the actions taken to correctly dispose of the non-conforming load(s) and corrective action(s) taken prior to dispatch and to prevent any such recurrence.
- 4.1.5. A register of non-conforming products, i.e. a product that does not meet the requirements the IS EN Standards or these criteria, shall be maintained. The register shall contain information as to the reasons for the non-conformance and the manner in which the non-conformance was rectified. The register should also include information on the outlet for the non-conforming product, i.e. re-introduced to the start of the process, disposed of, or recovered as waste.

- 4.1.6. CLP, REACH, POPs and CPR regulations: The producer shall maintain documentary evidence, for assessment by the relevant competent authority which demonstrates compliance, where appropriate, with the provisions of the CLP, REACH, POPs and CPR regulations. The producer shall ensure these matters are addressed in customer supply contracts.
- 4.1.7. Retention of Records: All records including controls, inspections and training shall be maintained for a minimum of 5 years.
- 4.1.8. Storage of Records: Records including any electronic media shall be stored and maintained in a manner that they are readily retrievable and protected against damage, deterioration or loss. Records shall be legible, identifiable and traceable to the process or product. All reviews and revisions of procedures are to be included in an annex to the most up to date version of that procedure.

5. Use and Restrictions on Use

Users of pulverised fuel ash and furnace bottom ash that are produced in compliance with these criteria shall take full account of any environmental impact resulting from such use.

To comply with these criteria, the following restrictions apply:

Use of pulverised fuel ash is restricted to bound applications i.e. it is used as an ingredient/component within a product and is fully bound within that product.

Use of furnace bottom ash is restricted to bound applications i.e. a lightweight aggregate in concrete, e.g. block manufacture.

These criteria do not affect the obligation of producers to hold and comply with a waste collection permit, certificate of registration, waste facility permit or waste/industrial emissions licence or any other National or European legislation which may apply when transporting, storing or processing waste. These criteria do not affect permitting or any other legal requirements that do not depend on the status of the material as a waste.

Appendix A: Approved standards and specifications for determining the quality of PFA and FBA in Bound applications

Material	Product Standard
Pulverised Fuel Ash and Furnace Bottom Ash	IS EN 13242: Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction.
Pulverised Fuel Ash and Furnace Bottom Ash	IS EN 13055-1: Lightweight aggregates. Lightweight aggregates for concrete, mortar and grout.
Pulverised Fuel Ash and Furnace Bottom Ash	IS EN 13055-2: Lightweight aggregates. Lightweight aggregates for bituminous mixtures and surface treatments and for unbound and bound applications.
Pulverised Fuel Ash	IS EN 13043: Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.
Pulverised Fuel Ash	IS EN 450-1: Fly ash for concrete. Definition, specifications and conformity criteria.
Pulverised Fuel Ash	IS EN 12620: Aggregates for concrete.
Pulverised Fuel Ash	BS EN 197-1: Cement. Composition, specifications and conformity criteria for common cements.

Appendix B: Glossary of Terms

Aggregate	A granular material of natural, manufactured or recycled origin used in construction.
Applicant	Electricity Supply Board (ESB), Generation and Trading, Moneypoint Generation, Carrowdotia, Killimer, Kilrush, Co. Clare
Authorised waste facility	A facility which has been granted a waste authorisation in the form of an Industrial Emissions licence, a waste licence, a waste facility permit or a certificate of registration.
Bound Applications	Where the pulverised fuel ash or furnace bottom ash are used as an ingredient/component within a product and is fully bound within that product.
Construction Products Regulations (CPR)	Construction Product Regulations 2013 (S.I. No. 225 of 2013) transposed the EU Regulation No. 305/2011 into Irish Law. The regulation lays down harmonised conditions for the marketing of construction products across Member States of the European Union.
Consignment	Each load of pulverised fuel ash (PFA) or furnace bottom ash (FBA) that leaves the facility.
Declaration of Conformity	A declaration that the pulverised fuel ash (PFA) and furnace bottom ash (FBA) conforms to end-of-waste criteria, product standards and specifications, it includes details of restriction on use of the recovered ash.
Facility	Electricity Supply Board (ESB), Generation and Trading, Moneypoint Generation, Carrowdotia, Killimer, Kilrush, Co. Clare
Factory Production Control	A management system focusing mainly on the production process which aims to ensure that product quality is consistently maintained to the required specifications.
Furnace Bottom Ash (FBA)	The residual solid material from the combustion of coal (at high temperatures, in excess of ~1000°C) in coal-fired power stations. FBA is the coarse ash that, in a molten state, adheres to the boiler tubes within the furnace and falls to the bottom of the furnace where it is cooled using high-pressure water jets and flushed from the bottom of the furnace.
Groundwater	Means all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Producer	Electricity Supply Board (ESB)
Pulverised Fuel Ash (PFA)	The residual solid material from the combustion of coal (at high temperatures, in excess of ~1000°C) in coal-fired power stations. PFA is the fine ash recovered from the gas stream. For the purposes of this document, PFA is defined as

including coal-combustion PFA and cenospheres. PFA can also be known as 'fly ash' or 'coal fly ash' within standards and scientific literature.

Recovery	As defined in the Waste Management Act 1996 as amended
Recycling	As defined in the Waste Management Act 1996 as amended
Surface Water	Means inland waters, except groundwater, transitional waters and coastal waters, except in respect of chemical status for which it shall also include territorial waters.
User	User means construction companies, manufacturers, contractors and all those organisations or individuals responsible for the end use of the pulverised fuel ash (PFA) and furnace bottom ash (FBA).
Waste	As defined in the Waste Management Act 1996 as amended