Sustainable Applications for MBM

Fact sheet FABRA-FS-011

SUSTAINABLE APPLICATIONS FOR MBM

OVERVIEW

MBM is the meat and bonemeal fraction derived by rendering of Category 1 & 2 animal by-products (ABP). The applications for MBM are stipulated in the ABP Regulations (*refer to factsheet Animal By-products – Regulatory Controls*[1]) and it must be combusted or incinerated after rendering to provide complete destruction of pathogens and protein. Alternatively, MBM can be deposited in an approved landfill.

COMMON APPLICATIONS

There are several options for co-incinerating MBM and they each have sustainability merits. MBM has a high calorific value and incineration without energy recovery is a waste of resource. MBM can be used in combustion processes as a fuel, such as in combined heat and power plants and cement kilns.

MBM is a biomass fuel and can replace fossil fuels

- Combustion in CHP Plants

MBM is used as a biomass fuel in combined heat and power plants (CHP) which produces heat energy for supply to onsite facilities or to neighbouring sites. The electricity generated by the CHP can also be fed into the Grid and used by neighbouring industrial processes. Applying high efficiency modern turbines at the CHP reduces heat loss during energy conversion. An additional environmental advantage of the CHP is that there is no waste if the zero net carbon ash material remaining is approved for use as a carbon neutral, high phosphate sustainable fertiliser which can be used in place of mined and non-renewable chemical fertilisers. Based on the supplied energy of a typical processing plant being about 23 GWh, it is possible to save up to 2 million litres of fossil oil equivalent, saving around 6,000 tonnes of CO_2 emissions into the environment.

- Combustion in power plants

MBM can simply be used as a low carbon biomass fuel in power plants as an alternative to fossil fuels, helping to decarbonise the power supply.

- Cement kiln fuel

MBM can also be used as a supplementary biomass fuel in cement kilns to replace fossil fuels and supplements other waste materials used as cemfuels.

CONSIDERATION OF SUSTAINABILITY

Each application has sustainability merits but consideration must also be given to the environmental emissions and the fate of the ash post combustion. This is summarised in Table 1.

Table 1 – Applications for MBM and Benefits

End Use	Details	Benefits
Biomass fuel for CHP and power stations	Low carbon alternative to fossil fuels[1]	Reduction in net CO_2 emissions in power generation and recovery of heat and power. Ash can be used as a sustainable fertiliser[2 3]
Biomass fuel for cement manufacture	Used as an alternative to fossil fuels and other waste streams	Reduction in net CO_2 emissions in cement manufacture. Lower emissions than other waste cemfuels (such as granulated tyres). Ash remains in the product[4], eliminating ash for disposal and can provide useful strength / hardening properties. Incorporating ash in the product lowers the fuel requirement for the process.

Notes
1 - Lower net carbon and less polluting emissions than coal
2 - Subject to Regulatory End of Waste Approval
3 - Otherwise, ash may need to be sent to an approved landfill
4 - Valuable phosphorus resource is locked into the product

REGULATORY LANDSCAPE

The Animal By-Product Regulations[2] determine the measures and conditions for combustion of specific animal by-products. However, the measures and conditions for the use of ABPs or derived products, other than on-farm poultry manure as a fuel in combustion plants were not established at that time. Regulations for use of MBM as a fuel in combustion plants were issued on 2 June 2020[3]. They set out rules and requirements, including specific emission limits values, for the use of MBM as a fuel in combustion plants with a total rated thermal input not exceeding 50 MWth within the framework of the legislation on animal by-products.

Up to this point MBM incineration was regulated under Environmental Permitting Regulations (EPR) as incineration of waste.

EMISSIONS

The primary emissions to air from the combustion or incineration of MBM are particulate matter and oxides of nitrogen and sulphur. Under waste incineration of MBM, the EPR requires emissions to air to be monitored for other parameters such as heavy metals, ammonia, acidic gases and dioxins.

USE OF ASH / END OF WASTE

The ash remaining after combustion or incineration of MBM is shown in Figure 1. This ash must be landfilled unless it meets the "End of Waste" Definition.

Figure 1 – Residual Ash

When assessing End of Waste applications, the Environment Regulator must make sure that the aims of the Waste Framework Directive (WFD), which include protection of the environment and human health, are not undermined. To achieve End of Waste[4] the applicant must provide sound justification against a series of criteria. This includes a full risk assessment for substances of potential concern in the material where the assessment finds the substances in a higher concentration or quantity than the non-waste equivalent, including when emitted to the environment.

Two types of ash are produced, bottom ash, generated from burning the MBM and fly ash, generated by the air pollution control plant used to scrub waste gases using sodium or calcium bicarbonates. Both ashes are useful and when combined, can produce fertiliser products with variable phosphorus and potassium levels suitable for different crops. The sustainability benefits of the ash as a fertiliser product are summarised in Figure 2:

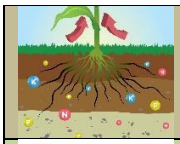	Around 24% P_2O_5 & 30% CaO Important trace elements such as magnesium, potash, sulphur & zinc
	Can offset 160kg CO_2 per tonne as an alternative to traditional fertilisers
	Insoluble phosphate content, with slow release of nutrients avoids diffuse water pollution association with fertiliser use

Figure 2 – Sustainability of Ash Fertiliser

THE ROUTE TO CARBON ZERO

The use of MBM as a renewable fuel helps organisations by directly replacing carbon from fossil fuel sources. As MBM is continually derived from the food supply chain this ensures a constant heat and power load is available whereas wind and solar power supplies are prone to interruptions in unfavourable weather patterns.

The fertiliser applications of the ash derived from burning MBM displace a significant carbon input to the farming sector. The other forms of ash are used in low carbon construction materials and as a soil conditioner.

The low-grade waste heat and carbon dioxide from the co-incineration process may offer opportunities for use in modern horticulture applications.

The ability to reuse all elements of MBM's properties means it can contribute significantly to assisting industries in their route to a net zero carbon world. The sustainable processing of MBM in a CHP is illustrated in Figure 3.

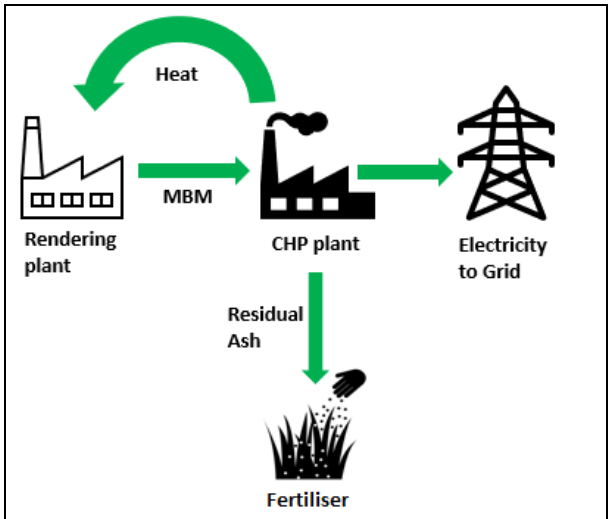

Figure 3 – Sustainable MBM Processing

REFERENCES

1. Animal By-products – Regulatory Controls Factsheet - FABRA-FS-006
2. Commission Regulation (EC) No 142/2011 implementing Regulation (EC) No 1069/2009
3. COMMISSION REGULATION (EU) 2020/735 - 2 June 2020 - amending Regulation (EU) No 142/2011 as regards the use of meat-and-bone meal as a fuel in combustion plants
4. Definition of Waste Service - https://www.gov.uk/government/publications/get-an-opinion-from-the-definition-of-waste-service