

Mechanical Biological and Mechanical Heat Treatment (MBT and MHT)

Fact Sheet 5

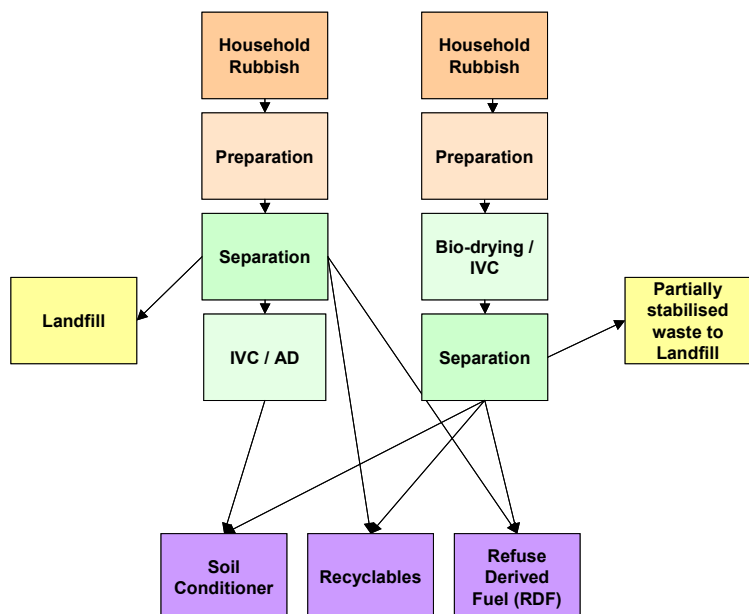
This fact sheet focuses on mechanical biological (MBT) and mechanical heat treatments (MHT). The treatments displayed are ways of separating your mixed rubbish or 'residual' waste, after household recycling has taken place. The waste is split into the biological parts (kitchen and garden waste) and the remaining parts (plastics, cans, glass etc.) and then treating them.

Your local authority might collect your garden (and perhaps kitchen waste) separately from your recyclables and residual waste (this is the name for the waste that hasn't been separated, it's often called 'black sack' rubbish). This collection system is good for separating recyclable and compostable material from your rubbish but it won't capture any materials that are left in your residual waste that might be potentially recyclable or compostable. Mechanical Biological Treatment (MBT) and Mechanical Heat Treatment (MHT) can capture and treat anything that's left in your rubbish bag.

Mechanical Biological Treatment

Mechanical Biological Treatment (MBT) is a term that is used to describe a number of different approaches to managing the residual waste. The main difference between the approaches is the stage at which the biological part of the waste (garden and kitchen waste) is treated – either before or after the mechanical separation of the waste.

The Process



Collection and Preparation

Your household rubbish will be collected from your kerbside and taken to the MBT plant. After being deposited in the facility it will be mixed and shredded (or similar) so that the waste is evenly mixed and of equal size.

Separation

The separation step can either come before the treatment of the biological part of the waste (mechanical biological treatment) or after (biological mechanical treatment). There are a number of different ways that the waste can be separated, here are a few of the more common methods:

- **Screens** can help to remove the larger pieces of waste,
- **Magnetic separation** can remove the ferrous metals (cans made of tin)
- **Eddy current separation** can remove the non ferrous metals (cans made of aluminium),
- **Optical separation** can separate certain types of plastics
- **Air classification** can help to separate light and heavy materials (paper for example).

Once separated some of the materials can go on for further recycling, for example the glass collected can go on to be used as low grade aggregate (a material often used in the construction of roads as a substitute for sand).

The materials recovered are of a lower quality than those materials collected separately as part of your kerbside recyclables collection and this can be a problem when looking for markets to sell the materials. It is always preferable in Wales that recyclables are collected separately from households, as this provides cleaner, better quality materials. These materials are more desirable and obtain a higher market value.



Photo: An MBT facility in Cologne

Biological Treatment

There are several biological treatment options for the biological (kitchen and garden) part of the waste, these include:

Biodrying/Biostabilisation

Air is forced through the waste to try and 'dry' it. This reduces the mass (weight and volume) of waste and starts to degrade (break down) the biological part of the waste. This process can make the waste easier to separate and can also give the waste a higher calorific value (energy content) as it removes nearly all of the non-combustible water, which means that it will produce more energy if it is burnt.

In Vessel Composting

The waste is enclosed in a vessel to be composted. As the process is enclosed the composting process can be speeded up by pumping air into the waste, by either increasing or decreasing the water content of the waste and by increasing or decreasing the temperature within vessel.

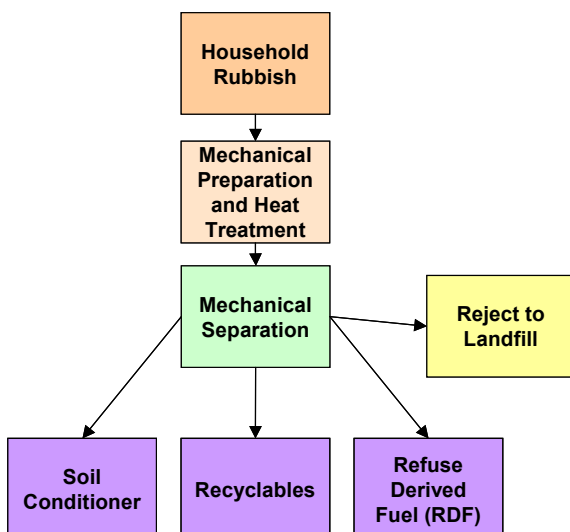
Anaerobic Digestion

The waste is fed into an enclosed vessel and heated. As the material heats and breaks down a biogas (a green gas) is produced. This gas is made of a mixture of (mostly) methane and carbon dioxide. The gas is captured as part of the process and can be used to generate either heat or electricity. The 'digestion' process also produces a digestate, which is a liquid with some of the green waste (woody fragments) remaining in it. The digestate can be filtered so that the solid and liquid parts are separated and then either recycled back into the process or used as a soil improver or added to compost.

Mechanical Heat Treatment

Mechanical Heat Treatment (MHT) is a term that is used to describe a number of different processes that involve the mechanical (separation) and thermal (heat) treatment of waste.

The Process



Collection and Preparation

Your household rubbish will be collected from your kerbside and taken to the MHT plant. After being deposited in the facility it will be mixed and shredded (or similar) so that the waste is evenly mixed and of equal size.

Heat Treatment

The most common method of heat treatment currently being used in this way is **Autoclaving**. This method is a steam treatment process that is often used for treating clinical (hospital) waste. Waste is processed for about an hour in a pressurised container to reduce the material to what is known as a 'flock'. Metals and glass will be partially cleaned by the process and can be removed and recycled. Plastics become deformed in the process and some types become suitable for recycling whereas others become very difficult to recycle. Once recyclables have been removed, the remaining material is used as fuel in a thermal heating process to produce energy & heat.

Separation

The separation step will follow a similar process to that described for MBT, which is a combination of screens, magnetic separation, eddy current separation, optical separation and air classification, all to allow recyclables to be extracted from the waste. The types of separation equipment used will be determined by the type of waste being accepted and the materials that are being targeted for extraction.

End Use

The MBT and MHT processes provide a number of end uses for the waste material that is processed. The quality of the end products will depend upon which process is used and in what order the stages are followed.

The biological material (e.g. soil conditioner) that can be recovered from the MBT and MHT process is of a lower quality compared to the products that would come from a separate biological treatment process, this is because it would be very difficult to remove a lot of the mixed waste material (plastics etc) from the product. As the material has been in contact with meat and fish while it was part of the mixed rubbish it would also have to be tested and approved under the Animal By-Products Regulations. The material could be used in landfill restoration or perhaps in engineering and in contaminated land clean-up.

The materials recovered from both MBT and MHT processes are of different quality. The material recovered from the MBT process is generally of poor quality and only some types can be recycled. MHT can produce some materials of better quality such as glass and tins and cans (metal), this is because they are steam cleaned as part of the

process which removes all the labels and glue that are usually stuck on them.

If material is of a very low quality or cannot be used as part of a fuel product (see below) it will have to go to landfill. However, this material will usually be stable and will not contribute to the landfill allowances.

Refuse Derived Fuel

Both MBT and MHT can be set up to produce a high energy (calorific value) fuel called RDF or Refuse (rubbish) Derived (made from) Fuel. This fuel must have a high amount of paper, plastics and card so that it is able to produce energy. The fuel can be burnt in regular combustion plants such as energy from waste facilities or cement kilns or in specially built facilities..

Location

Facilities of this type would again expect to have lots of vehicle movements (similar to a landfill site) both to and from the plant and so should be sited close to established road /rail infrastructure.



Photo: an MBT plant in Leicester

MBT and MHT Impacts

Any new house or industrial facility constructed will have some impact on the environment. This section considers some of the specific potential environmental impacts that the mechanical biological treatment and mechanical heat treatments discussed in this fact sheet might have.

Environmental Impacts and Benefits

Disposing of green waste and kitchen waste (biodegradable waste) in a landfill site can cause methane, which is one of the most powerful greenhouse gases. This is why targets have been set by the EU (European Union) that require us to divert the biodegradable part of our household rubbish away from landfill.

Odour / Dust / Litter

If the biological treatment process is not controlled carefully the waste being treated could smell as it is biodegrading (as with all biological treatment options).

All waste treatment facilities are strictly regulated and will have systems in place to limit odour. The MBT and MHT facilities are enclosed and would be fitted with ventilation and filter systems to prevent odour and dust from escaping.

The Environment Agency strictly monitors operation and good practise during operation. Good design of the plant during the planning stage can stop odour, dust and litter at the site.

Noise

The main noise coming from these facilities will be produced from vehicle movements and from the mechanical processing of the waste and air ventilation systems. As with all industrial facilities hours of operation will be limited to times of the day that will not cause a nuisance to the local community.

Vehicle Movements

Both MBT and MHT require some vehicle movements so that your waste can be collected either from the kerbside outside your house or from your local civic amenity site and taken to the site. All vehicle movements produce carbon dioxide, which is a greenhouse gas which is 21 times less potent than methane (produced in landfill sites as waste degrades anaerobically).

During the planning stages for the facility the number of proposed vehicle movements will be taken into consideration and the access to the site and its impact on the local community will also be assessed.

Vehicle movements from the site could be reduced if the facility was located with other waste management treatment facilities, or near to a rail line or canal. Alternatively, siting a manufacturing company next to such a facility would ensure a local demand for the products and limit onward transportation.

Emissions & Health

One of the emissions produced by all of these processes is carbon dioxide gas, released by vehicle movements needed to collect waste from the kerbside and from civic amenity sites. This can be reduced by using alternative fuel sources to power the collection vehicles.

Dust and Bio-aerosols (biological particles) could be produced as the waste is transferred from the collection vehicles into the facility and from movements within the facility. The impact of this is

limited by staff working at the facility wearing the correct protective equipment. The facilities are enclosed thus limiting emissions to the environment and have efficient ventilation systems.

Gases (carbon dioxide and methane) are produced during the Anaerobic Digestion process. These gases are captured and can be used for energy and heat production.

Emissions will be produced during the burning of the fuel, as with all thermal treatment options. The outputs will be controlled by existing legislation and emissions limits set in EU policy and monitored by the Environment Agency.

The Department for Environment, Food and Rural Affairs have recently commissioned a review of the effects of waste management. It concluded that although the information is incomplete and not ideal, the weight of evidence from studies so far indicates that present day practice for managing solid municipal waste has, at most, a minor effect on human health and the environment, particularly when compared to other everyday activities.

Visual Impact

As can be seen from the pictures these facilities look no different to other industrial facilities. The UK currently has a few MBT plants in operation and there are over 70 plants running in Europe, most of which are in Germany.

Planning conditions will suggest that any new facility built should be in keeping with the surrounding area whether that is an industrial estate or a rural setting.

Costs

If the biodegradable fraction (green waste and kitchen waste) of our rubbish cannot be diverted from landfill then the EU will fine the UK for every tonne of waste it continues to send to landfill. To avoid the fines and to find more sustainable ways of dealing with our waste local authorities are considering a number of different options to treat their waste.

There is no right or wrong combination of options and each local authority might have a different set of facilities depending on local circumstances. These facilities will cost a lot of money and it is important that all the options are evaluated when the decisions are made. The cheapest option is not necessarily the best and what seems like a good option for the present might not be a good choice for 10 or 20 years time.

The cost of a treatment facility can be dependant on many things: the cost of land, the current collection system, what other facilities your local

authority is considering and whether this option will work well with them are just a few of the considerations.

Where does this fit in?

This treatment will not act as a stand-alone treatment and will need other types of facilities to be able to treat its outputs. These treatment facilities can either be built on a site on their own or can be positioned next to each other on a larger site.

The location and type of facility that your local authority chooses will be dependent on a number of factors including available land, transport access, how close the site is to local houses and how much it will cost.

What can I do?

You are producing the waste that your local authority has to deal with and treat. To help your local authority and the environment there are a number of ways you can make a difference.

Firstly think about the rubbish that you produce at the moment, and consider how you could reduce it? Can you recycle or compost more of your waste?

Secondly, take an interest in what your local authority is considering. They will be making some tough decisions soon about how your waste will be treated over the next 20 to 30 years. Take part in any consultation process, find out more about what they are considering and tell your neighbours! We all produce rubbish and we need to start taking responsibility for how we dispose of it. To find out more about what your local authority are considering get in touch with them or read their proposed waste strategy. Your opinion counts!



Photo: Refuse Derived Fuel MBT plant in Italy

For additional information visit:
www.wasteawarenesswales.org.uk

