

WASTE TREATMENT METHODS

Opening questions for the reader before reading:

- Why is it important to know about waste treatment methods as a Zero Waste Ambassador?
- How do you think a municipality or waste company thinks about waste? Is it the same as you?
- What kind of waste treatment methods do you know?
- What are the main arguments that determine which waste treatment method is selected/proposed?
- What kind of waste treatment methods are in use in your municipality?
- What do you think makes a waste treatment method good or bad?

We are not placing zero waste into an empty space, but in an already existing infrastructure. A Zero Waste Ambassador should know the basics of waste management, e.g. waste hierarchy and technologies which are described in it. It's important to know the global, EU and national target values, to be informed about the roadmap of waste management and circular economy. It is necessary to link waste management with other sectors, be it transport, energy or construction. Municipalities, but also producers of our consumables have obligations and responsibilities which are set by law. Zero waste has to contribute to the legal responsibilities for municipalities or waste companies, zero waste has to become beneficial!



Before reading more into this chapter, think about why your municipality has selected the waste treatment options it has. What do you think were the reasons?

Future perspectives in Waste Management

Typical driving forces in waste management are:

- Public sanitation;
- Prevention of littering and illegal dumping on land and sea;
- Material and energy recovery;
- Savings and economic incentives;
- Producer responsibility;
- Need for remediation;
- Urbanisation.

Some of the new challenges:

- Achieving Sustainable Development Goals (SDGs) – these 17 UN-defined global goals are fundamental for mankind to preserve opportunities to live in dignity and prosperity across generations. The goals cover ecological, economic and social sectors.
- Lack of resources and secure supply chains – we are running out of metals which could actually be harvested from waste.
- Resource efficiency – we must improve utilisation of resources through smart products and eco-design.
- Climate change – proper management of biowaste and reduction of CO₂ and CH₄ will help to slow down the speed of climate change.
- Alternative energy sources – energy-rich waste fractions provide electricity and hot water in urban areas, and they replace fossil fuels.
- New waste streams – e-devices, flat screens and IT-equipment, smart clothes and houses, internet of things, nanomaterials etc., will require treatment methods which did not exist before.
- Globalisation – we need to learn the treatment of materials which do not exist in each of our countries.
- Ageing population – elderly people have different patterns of consumption.

- Circular economy, life-cycle thinking, and green jobs – to replace the linear production and consumption routes.
- Extended Producer Responsibility – to finance collection and treatment of particular waste streams.
- Artificial intelligence and robotics – to allow automated waste processing.
- Crisis waste management – permanent or temporary waste collection systems, e.g. for refugee camps or in war zones.
- Zero waste – to manage waste in a manner that there is no need for discarding wastes.
- Urban mining – to handle our entire urban environment as a future quarry of new materials, etc.
- Improving treatment plants facilities.
- Decreasing the gap between policy makers and citizens to avoid conflicts when taking important decisions (for example a new anaerobic treatment plant) – public debate.
- Avoiding “waste tourism” (waste made in a place but treated somewhere else because of the lack of treatment facilities).
- Bureaucracy.
- Non technological obstacles (laws and regulations).

Increased GDP will affect the amount of food waste along its production chain, and leftovers at homes. The organic fraction will be more dominant in municipal solid waste (MSW), and the greenhouse gas (GhG) challenge has to be faced. Sustainable and cost effective treatment of biowaste will be a combination of composting and anaerobic digestion (waste-to-bioenergy), and nutrient recycling will offer the best solution. Bio-refinement of functional compounds from organic wastes will boost, but it will take ages to incorporate it into the waste management system on a large scale. Cross-border transportation of waste materials will become inevitable and should be seen as everyday practice, provided that it is well controlled by authorities.

Integrated waste management

Integrated solid waste management means the strategic approach to sustainable management of solid wastes covering all sources and all aspects, like:

- Pattern of waste generation,
- Source separation and waste segregation,
- Collection and transfer,
- Secondary sorting,
- Treatment,
- Recovery and disposal in a combined way,
- Production of secondary raw materials with an emphasis on maximising resource use efficiency.

Waste is separated into several fractions and not one; quality is evaluated and upgraded whenever possible; and waste is used as material, rather than disposed of in landfills. Integrated waste management employs several waste control and disposal methods such as source reduction, recycling, reuse, energy recovery or just incineration; and finally sanitary landfilling, to minimise the environmental impact of waste streams.

WASTE TREATMENT

Waste treatment refers to any activity that enables material recovery.¹ The waste sector prepares waste for recovery or disposal by using mechanical, thermal, chemical or biological processes on waste. This also includes sorting and packaging of waste for transport.



By treatment we aim to make waste more easily manageable by:

- Reducing the quantity of the waste,
- Reducing the hazardousness of waste,
- Improving the amount and quality of recovered materials,
- Facilitating its management or disposal.

Reduction of volume is achieved by crushing, shredding, and compacting the waste.

Sorting into individual fractions takes place by:

- **Hand sorting** (hand-picking, manual sorting). It is widely practised, but slow, dirty, unpleasant, unefficient. However, it is flexible and easy to organise.
- **Mechanical sorting.** Sensor-based sorting in the near infrared spectrum (NIR) is well established in Europe.

Properties of waste can be altered by washing, moistening, drying (thermal, biological), melting and granulating. Baling and storing is required for logistic purposes. Baling includes compacting into uniform shapes, and wrapping to avoid quality loss during storage and transportation.

Waste treatment is not a goal by itself, but rather a preparation step that enables further mechanical treatment.

When reading about different waste treatment methods below, try to think about their advantages and disadvantages first yourself, before looking at the lists.

Every method has them, they might be advantages or disadvantages just from someone else's perspective (like an elected politician or the owner of a waste company).

¹ For waste management terminology, check the *Zero waste basics* chapter of this handbook.

BIOTREATMENT

Organic wastes are materials originating from living sources like plants, animals, and microorganisms that are biodegradable and can be broken down into simpler organic molecules. This happens in natural cycles in our environment. In urban areas, however, we cannot rely on natural processes and have to use technology. Organic waste recycling is the process in waste management where organic wastes are recycled into useful products.

Composting on a municipal scale requires segregating the organic waste from other waste materials to ensure a high-quality end product – compost.

Composting is the process of decomposition of organics by soil organisms resulting in the recycling of nitrogen, phosphorus, and other soil nutrients into humus-rich components.



Composting differs from the natural degradation process because input of oxygen and moisture, temperature, and degradation process as such is monitored and controlled by the operator. There are quality standards for the compost, and the facility has to meet the emission limits which are set by legislation. Compost is used as a fertiliser and soil improver, because it enriches soils with nitrogen, phosphorus, organic carbon, and microorganisms.

Several composting technologies are practised depending on the space, the volume of organic material to be composted, budget, climate etc:

- Windrow composting is the cheapest and simplest, where organic waste is placed in a large pile known as a windrow and periodically mixed to introduce oxygen and promote microbial activity.
- More sophisticated windrow systems rely on force aeration, and covering the pile against weather conditions.
- Another method is in-vessel composting, where the process is controlled by a composting chamber.
- Enclosed systems are much more expensive than windrow systems, but they require less land because of the faster processing time and better control over odours.

It is important to consider:

- Quality, types and availability of input materials (the biowaste).
- Siting and sizing of a composting facility.
- Technical issues, stormwater and odour management, climate considerations, birds and vermins.
- Benefits from composting for waste producers, and fee system.
- Market for compost and product certification.

Anaerobic digestion (AD) is a biological process of converting organic waste into two usable products – biogas and digestate, a semi-solid fertilizer.



The digestate can be used for agricultural purposes and the methane-rich biogas can be used to generate electricity and heat. Organics are placed in closed reactors where oxygen-free conditions are maintained. Anaerobic microorganisms convert biomass into biogas and nutrient-rich residue which is called digestate. Biogas produced by anaerobic digestion is a mixture of CH_4 , CO_2 , and small amounts of H_2 and H_2S . Usually, the process requires two to three weeks.

When to use composting, when anaerobic digestion?

Small scale composting can be easily applied everywhere, by anyone, and it can be practised anywhere. It is a perfect opportunity to start with treating organic waste. Windrow composting of garden waste in open air is common for beginners. To become economic, the scale of composting has to grow beyond 10,000 t/y throughout. Large scale composting requires equipment and space. Air treatment is a must in case of reactor composting.

Anaerobic digestion (AD) requires special heated reactors and relatively high and a steady flow of waste. The revenues depend on the gate fee² of input material, price of biomethane, and ease of utilising digestate. It requires skilled personnel and strict safety measures, because methane is explosive gas. To become economic, the scale of AD has to grow beyond 20,000 t/y throughout. Both liquid and solid state AD are widely used. Home-size AD reactors are not possible. Along with AD treatment, the mass of waste does not change significantly. It means that the treatment residues, the digestate, have to be further treated. Quite often it is dewatered and post-composted. After that it can be used as common compost.

Advantages of biotreatment:

- Separate collection and treatment of organic waste reduces GhG emissions from landfills.
- If organic waste is separated from waste stream, then the remaining material (e.g. packages) are cleaner, making material recovery easier.
- The end product of biotreatment (both compost or digestate) are fertilisers, and also are improving quality of soil.
- AD produces biogas, which is an alternative to fossil fuels and is easily marketed.
- Compost reduces demand of mineral fertilisers.
- Locally organised biotreatment creates jobs.



Disadvantages of biotreatment:

- Treatment of organic waste is costly.
- It requires equipment.
- It requires odour and leachate purification.
- There can be some difficulties in marketing compost/digestate.



² Gate fee is the fee paid at the reception to any waste treatment plant. It does not include transportation cost, but it does include the cost for processing of waste and taxes

- Regardless of the quality, the compost or digestate is still considered waste, and has to be marketed under waste regulations.
- Process, if in open air, is weather-dependent.
- AD requires highly skilled personnel, because the process is sensitive, and the biogas is explosive. Gas requires additional cleaning.

MECHANICAL-BIOLOGICAL TREATMENT

As the name suggests, **Mechanical-Biological Treatment (MBT)** contains elements of mechanical treatment of waste, and then biological treatment of the finest part of it, which is rich in organics. An MBT plant is a type of waste processing facility that combines a sorting facility with a form of biological treatment such as composting or anaerobic digestion.



MBT plants are designed to **process unsorted mixed household waste**. MBT systems enable the recovery of materials contained within the mixed waste and facilitate the stabilisation of the biodegradable component of the material. This component is either configured to recover the individual elements of the waste or produce a refuse-derived fuel that can be used for the generation of power. The main idea of MBT treatment is to degrade organic material in a well controlled environment to avoid GhG emissions. Compared to similar degradation processes which take place in landfill, emissions are better controlled. After the organic fraction is composted or anaerobically digested, it should be disposed of to landfill. The concept of MBT was developed in the late 80ies to offer an alternative to waste incineration of unsorted wastes.

Why is MBT used?

MBT was developed to treat unsorted waste. It required no change in collection, therefore it was attempted for less responsible municipalities.

Advantages:

- Robust technology, well automated.
- Organics degrade – less GhG emissions.
- Anaerobic degradation is possible too – CH₄ can be captured and used for energy.
- Plastic-rich fraction can be converted to refuse-derived fuel (RDF).
- The finest soil-like fraction is stabilised and it emits no GhG, so it can be landfilled under current regulations.
- MBT aims to minimise the need for landfilling and incineration.
- Available on a very large scale.
- Technology may be upgraded to handle sorted organic waste – once source-separation replaces mixed waste collection.



Disadvantages:

- No sorting is demoralising for society, incorrectly signalling that do-nothing is acceptable.
- In the case of MBT (as in the case of having an incinerator or a landfill) the policy makers feel no push to change waste into recycling.
- Large investments.
- Equipment is not long-lasting.
- No straightforward end use for fine fraction other than landfilling.
- Soil-like fine fraction is not equal to quality compost and cannot be used in agriculture.
- MBT cannot be considered as recovery of waste from 2027 in the EU.

Material recovery, biological treatment (MRBT) is an advanced modification of MBT, where focus is not just processing plastics and other combustibles to waste fuels, but separating waste stream to individual waste materials like plastic, paper, glass, wood etc. The remaining organic-rich part is still subject for biological treatment. For more information check Zero Waste Europe's [policy briefing on MRBT](#).



WASTE-TO-ENERGY

Wastes have been burned throughout the history of mankind. The incineration technology has developed dramatically since then. Even though there is no room for waste-to-energy in the Zero Waste hierarchy, it is currently still a reality in many places in Europe and elsewhere and when addressing this reality, we need to know what it is.

The most common technology is mass-burn. No pre-treatment is required and large volumes are incinerated 'as received'. Alternative to mass burning is incineration in rotary kiln and fluidized bed systems. One of the most important parameters is temperature: minimum for municipal waste is 850°C and for hazardous waste is 1100°C. The flue gas (gas from burning of waste) contains a wide range of particulate and gaseous contaminants and must be cleaned before released to the atmosphere. This is the most expensive part of waste incineration.

Incineration is not waste-free, because **ash is generated**. Typically ash makes up 25% of input waste. There is bottom ash and fly ash:

- The **bottom ash** is 90% of total ash content. It consists of non-combustible materials, such as sand, stones, glass, porcelain, metals, and traces of unburnt organics. Bottom ash makes 150 to 300 kg per 1 ton of waste incinerated.
- The amount of **fly ash** is 10% of total ash content. Fly ash is considered hazardous, and cannot be landfilled in municipal landfills.

Advantages:

- The process results in a significant reduction of the mass (up to 75-80%) and volume (up to 90%) of the waste, reducing the need for landfilling.
- Waste is sanitised and stabilised in minutes.
- Organic content of wastes reduces to minimum.
- Energy (heat and electric power) production is of priority.
- Waste incineration also contributes to savings in fossil fuel consumption, whereas restwaste from recycling can be incinerated.



Waste incineration is always a large-scale technology, which is both good and bad.

Disadvantages:

- Incineration seriously affects separate waste collection and other waste management technologies.
- Materials are lost for recycling, and organic carbon cannot be utilised in soils.
- Incineration is a major contributor to air pollution and a risk to public health.
- An incinerator is costly to build and maintain and once it exists, it has to work: it's not possible to switch on and off whenever we want.
- It's not an alternative to landfill (the result of the incineration goes to landfill in any case).



The combustible fractions of waste are food and green waste, paper, cardboard, plastics, rubber, wood – all well-recyclable materials. This is why incineration should not be an option unless other recycling methods have been exploited.

WASTE FUELS

Refuse-derived fuel (RDF) is a fuel produced by shredding and drying municipal solid waste, commercial and industrial waste.



RDF consists largely of combustible components of municipal waste such as plastics, wood, rubber, textile, but also some biodegradable waste. Inert mineral fraction (like construction and demolition waste) is removed; as well as most parts of wet organic fraction. Reject waste is disposed of in landfills, or further processed.

Advantages of RDF compared to incineration of unprocessed fuel:

- It is homogenous, its calorific value is high, moisture and ash content are low.
- It is possible to prepare waste fuels 'on demand' according to market requirements.
- Waste fuels can be produced everywhere, also in small quantities; it is storable and easy to transport, and it is also exportable.
- Standard for solid recovered fuels exist, significantly broadening its marketing possibilities.



Disadvantages of RDF:

- Its production is costly.
- Material is lost for recycling.
- Rejected fine fraction still requires disposal or further treatment.
- Any fuel which is made of waste is considered as waste, and rules for waste incineration apply – flue gases are still harmful to the environment.
- Storage requires great care, as organic-rich material is a subject for self-ignition.

Ferrous metals, aluminium and some individual plastic fractions may be removed for material recycling. Sometimes optional biodrying is applied to benefit from drying organic fraction, which should otherwise have been disposed of. **Biodrying** is a technology using heat produced in the initial stage of composting of biodegradable waste for augmenting its drying rate, whereas moist air is removed by ventilators. Excavated landfill plastic rarely requires biodrying as organic fraction has already been degraded. The number and the kind of processing steps correlate to the waste composition and the desired product quality.

Another type of RDF is **SRF – Solid recovered fuel**. SRF is distinguished from RDF as it is produced to meet a standard – the classification and specification requirements laid down in EN15359 (Standard from the European Standardisation Committee), CEN/343.



RDF is primarily utilised for energy production in incineration and co-incineration plants. SRF is typically used in the cement industry.

PLASTIC TO OIL AND GAS

Pyrolysis is thermochemical decomposition of organic material at high temperatures in the complete absence of air (or oxygen). Pyrolysis leads to synthetic liquid fuel similar to crude oil and by-products as solid carbon and combustible synthetic gases. Liquid products can be mixed with natural crude oil and further refined to gasoline and other petroleum products.

Gasification occurs in the presence of limited amounts of air that allows partial combustion of the material. Gasification leads to flammable synthesis gas (syngas), which is a mixture consisting primarily of hydrogen, carbon monoxide, and some carbon dioxide.



Syngas is a valuable commercial product, which can be used as an intermediate to create synthetic natural gas, methane, methanol, dimethyl ether and other chemicals. It can also be used directly to produce energy as a substitute to natural gas.

Synthetic oil and gas can be used as raw material for producing new plastics. Then it is called chemical recycling of plastics.

Advantages of pyrolysis:

- Energy can be obtained in a cleaner way than from conventional MSW incineration plants because of lower amounts of nitrogen oxides (NO_x) and sulphur oxides (SO₂) in flue gases.
- Most of pyrolysis' products – solid, liquid and gaseous – are energy-rich.
- The scale of pyrolysis' plant is more flexible than in case of mass-burn of wastes. Smaller volume is associated with smaller gas cleaning devices, which reduces investment and operation costs.
- Compared to solid waste or RDF, pyrolysis oil has high calorific value, it is well storable, easy to transport, and the potential market is worldwide.
- Oil can be further processed to other products too.



Disadvantages of pyrolysis:

- Its complexity and high energy demand.
- Equipment is sophisticated, costly.
- The result depends on the quality of waste. Municipal waste, however, is heterogeneous in composition and size.
- There are some environmental and safety risks too!



MUNICIPAL LANDFILL AS AN ENVIRONMENTAL PROBLEM

Landfilling has many negative environmental effects during its active operational phase and even after it has been closed. One should reduce disposal as much as possible, but we cannot totally avoid landfilling in the future. Ultimate recycling of waste is not possible due to economic, technical, environmental and health reasons. Therefore, we should improve the environmental performance of landfills and build sanitary landfills. Sanitary landfills are those where waste is isolated from the environment until it is safe.³

Additional reading about the environmental effects of landfills and basics of safe landfills:

“Landfill basics” chapter from [The Keep It Clean Plan](#) by Let's Do It Foundation.



³ [Landfill Directive 1999/31/EC](#) (amended by the [Directive 2018/850/EC](#)) and the [Council Decision 2003/33/EC](#) on acceptance criteria (WAC) set standards for the authorisation, design, operation, closure and aftercare of landfills.

LAST BUT NOT LEAST – RECYCLING

Recycling of waste is defined in the EU's [Waste Framework Directive](#) as “any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes.”



This includes the reprocessing (composting) of organics but importantly does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations. Often recycling is split into 2 categories:

1. Material recycling for materials such as paper, metals, plastics etc.
2. Recycling of organics via composting and digestion.

The issue of recycling and the role it plays within local zero waste programmes is much debated and one that we must tread carefully as Zero Waste Ambassadors. Therefore we have decided not to go into detail on the recycling process itself here, but rather focus on the different aspects of this debate. This is also because the necessary space and literature it would take to describe the recycling process of each material is far too long. However, we have included some links at the end of this chapter which can be useful to get to know the recycling processes for the key materials found within municipal solid waste.

At its core, true recycling is the foundation of a circular economy, which is why we advocate for effective separate collection systems so much. Effective separate collection, often done via the door-to-door system, is the best method for achieving high recycling rates, given that they result in more quantity of recyclables captured in better quality, therefore being easier to recycle.

With an increasing number of targets set by governments for the percentage of recycled content in products, and commitments by businesses to include a set % of recycled content in their own materials, it is clear that there needs to be a flow of high volume and quantity of recycled materials within the European market today.

So as Zero Waste Ambassadors, we must advocate for separate collection systems at the local level as this is the greatest way to improve recycling and reduce residual waste. This is most commonly our entry point into discussions on zero waste.

Of course though, recycling alone is not enough. Our work on increasing recycling must always be supported by advocacy on policies that prioritise the prevention of waste – tackling consumption and production patterns so that we reuse more materials in a circular manner.

Yet on the topic of recycling itself, what is clear today is that the **recycling system in Europe is not working**. It's not working for citizens, for municipalities, for recycling companies, for national governments, and – most importantly – it's not addressing the environmental problems we need to so urgently fix. This is particularly evident and important when discussing plastic recycling. In theory, all different types of plastics can be used again. The reality is vastly different though, with estimates suggesting that **only 9% of all plastic** ever generated worldwide has been recycled.



Why do you think so little of plastics gets recycled?

There are several reasons for that.

1. True recycling is not often what happens. Materials collected for recycling, especially plastics, often have the potential for one or two more lives before they end up as waste. For example, plastic bottles being recycled into socks or garden furniture – this is **downcycling**, meaning the quality of the end material is worse than that of new material and further recycling eventually becomes impossible. In most scenarios, they still also require a certain amount of virgin material – the material being used for the first time since its extraction and manufacturing – as well as an intensive amount of energy to be remade. Worse, there is an increasing trend to burn plastics for fuel and call this “chemical recycling.” When in fact this is just embedding an unsustainable treatment method within the system.
2. There is also a particular concern for recycled materials which come into contact with the foods we consume, such as plastic packaging. If recycled content is put into plastic packaging for what is called “**food contact materials**”, there is very little knowledge or regulation on where this recycled content came from and therefore the potential hazardous chemicals which may exist in this recycled material – which we then subsequently put into our bodies. There needs to be new regulation, ideally from the EU, that ensures all products and packaging, including those in contact with food, are durable, reusable, toxic-free and recyclable at the end of life, allowing to achieve a toxic-free circular economy.
3. European municipalities still use **different calculation methods for recycling**, even within one country, so the data gathered on recycling cannot be accurately compared from one country to another. Some include the discards from recycling as they were at least collected for recycling, even if they didn’t end up being recycled, whilst other reporting methodologies include fuel made from burning waste. As mentioned in the *Waste policy and advocacy* chapter, the EU has introduced new legislation (2020) to enforce a harmonised calculation methodology across Member States to help overcome this issue, although we won’t see the results of this bearing fruit for a couple of more years.
4. European countries still **export vast quantities of our waste to non-European countries**. This is often classified as recyclable materials but the reality is that it is dirty and unusable materials that European recycling companies and waste handlers do not want. Many of the countries who receive this waste, whether legally or too often illegally, have poor waste management infrastructure themselves and therefore are not able to treat the waste properly. This results in tonnes of plastic and other dirty types of waste being burnt, landfilled or dumped – damaging local communities and biodiversity in regions far away from Europe where the waste was initially generated.
5. Finally, there remains an issue with the **definition of recyclability** – or the lack of one. For example, if a product claims it is 100% recyclable, that does not mean it will of course be 100% recycled in the area where that product has been consumed. Due to a

lack of a harmonised definition of recyclability, recyclability claims are not necessarily based on real life conditions such as the availability of recycling infrastructure, market conditions and the financial viability of recycling operations. While waste prevention and reuse efforts must be prioritised, we cannot achieve a circular economy, as outlined in the Circular Economy Action Plan, without closing this huge gap between recyclability potential, actual collection and sorting, and final recycling. This requires European-level action to establish a clear harmonised definition of recyclability, to strengthen the enforcement of existing requirements in key EU legislation, such as the Packaging and Packaging Waste Directive, revised, which would help ensure that ambitious sector or product level standards for recyclability are established.

FINAL REMARKS

By knowing the pros and cons of every waste treatment method, you as the Zero Waste Ambassador can easily discuss the possible transformation of a municipality to a Zero Waste one. You just have to avoid a costly and outdated mindset. Recycling is a debatable issue but it remains a core part of the circular economy and is often the best entry point to focus on in initial discussions with municipalities. The limitations and failures of our current recycling system must be known and recognised within our work. As a result, focus more attention on the upper end of the waste hierarchy, and minimise landfilling and energy use. You cannot just reject – you have to replace these methods by offering viable solutions.

Additional reading and links on waste treatment and recycling:

[Decision Maker's Guides for Solid Waste Management Technologies](#)

[Mechanical-Biological Treatment: A guide for Decision Makers](#)

[European Biogas Association](#)

[European Composting Network, in particular its factsheets](#)

[The European Recycling Industries' Confederation \(EURIC\) factsheets](#)

[European Environment Agency's advocacy work on recycling](#)

[Plastics recycling](#)

[Paper/cardboard recycling](#)

[Glass recycling](#)



Ending questions for the reader to reflect upon:

- What parts in this chapter were most confusing or difficult for you to understand? Why do you think it was so?
- What would be the most important arguments for you when suggesting/selecting a waste treatment method?
- What waste treatment methods would you recommend to your municipality? Why?
- What are the main challenges around recycling in your municipality/region/country?
- What do you want to take with you from this chapter?
- If and what next steps do you want to take in your work regarding this topic?
- What do you want to know more about?

