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Part 3: Waste Management

Developed by Parpounas Sustainability Consultants

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Consortium

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ΜΙΛΕΤΙΑ ΒΙΩΣΙΜΗ ΚΟΙΝΩΝΙΚΗ ΑΝΑΠΤΥΞΗ

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What will you learn in this module?

Part 1: What is Waste Management ?

Part 2: Principles & Scope of EU Law

Part 3: Regulating waste in Cyprus

Part 4: Organic waste composting

Part 5: Managing plastic waste

Part 6: Managing Municipal waste in the rural areas

Part 7: Preparing a local waste management plan

Part 8: Managing Agricultural waste

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Learning Outcomes

- Understanding of waste management systems and the relevant legislation in the EU and Cyprus
- Understanding of the waste management system in Cyprus
- Understanding the waste management treatment methods for specific waste streams such as organic waste, plastic waste and agricultural waste
- Understanding of the waste management system for municipal waste in rural areas of Cyprus
- How to create a local waste management plan

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Part 1: What is Waste Management?

- Municipal solid waste – composition
- Waste Management principles
- The waste hierarchy

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What is Waste Management?

- Waste management means managing our waste well. For example, waste management could consist of minimizing waste, or it could consist of finding a good home for our waste – whether through recycling practices or by finding an environmentally friendly way to contain and dispose of that waste.
- Good waste management consists of both of these phenomena: making sure that there is only a minimum amount of waste to be disposed of in the first place, and then secondly disposing of it in the best possible way.
- Good waste management systems are so important for protecting human health, keeping our planet in good shape, and ensuring that all of our waste is put to good use. Here are 10 of the central reasons why it is so crucial to have adequate and effective waste management strategies in place at all times.

Protecting human health	Protecting confidential waste
Protecting marine life	Labelling hazardous waste correctly
Providing jobs	Treating each type of waste according to its properties
Protecting the planet from dangerous chemicals	Dealing with the visual aspect of waste
Finding new uses for waste	Promoting innovation

Source: https://importantindia.com/

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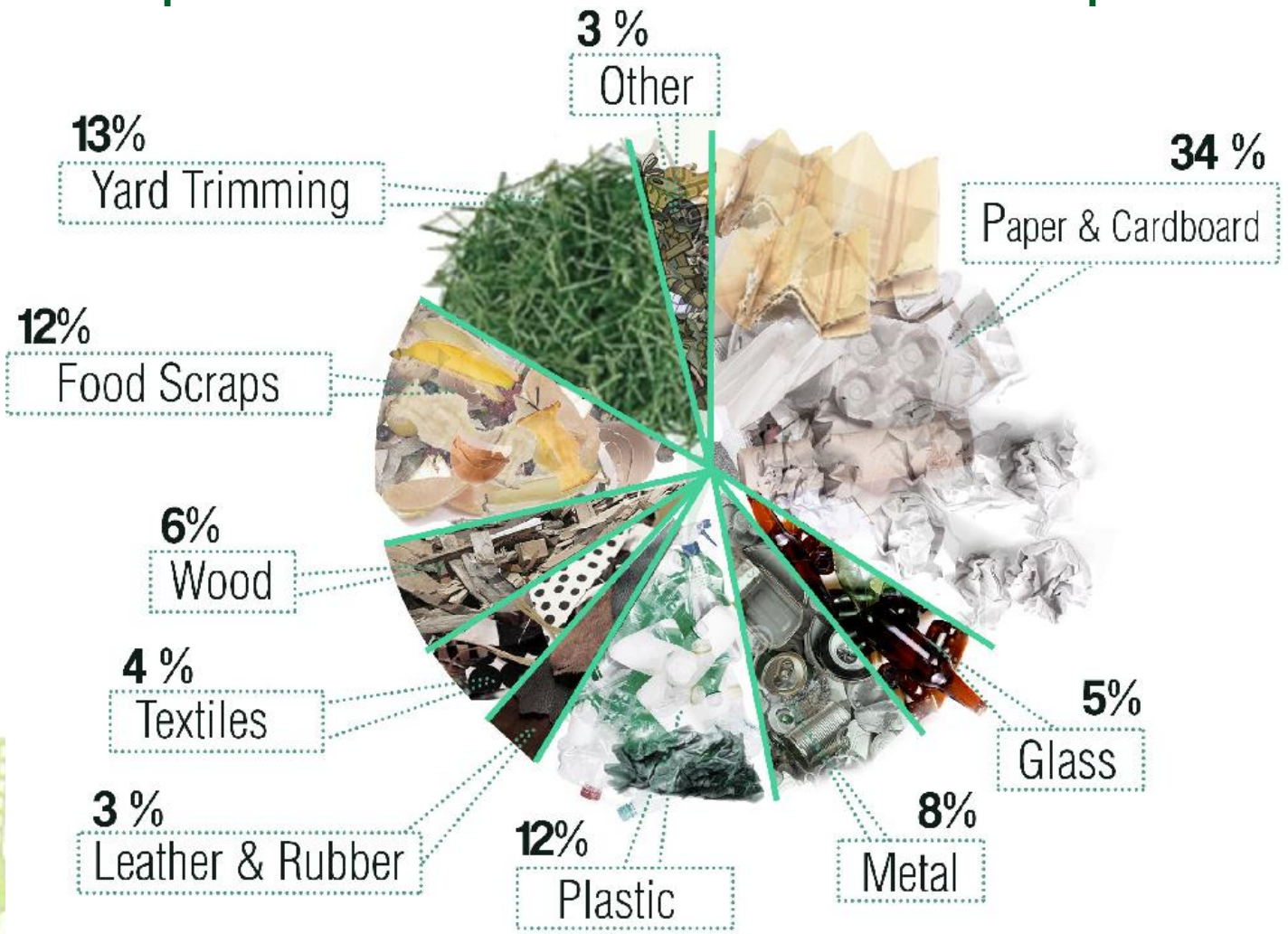
Municipal Solid Waste - Composition



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The waste is often hidden in the supply chain…

Over 80 kg

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Waste management Principles

Financial

- Costs & Budget setting
- Ownership of project
- Clear funding scope

Political

- Link between national & Local level
- Define roles
- Service quality

Legal

- Transposition
- Implementation
- Monitoring
- Reporting on Performance

Social

- Job Growth
- Skills acquired
- Skills transferred
- High education

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The Waste Hierarchy

A "priority order" for how to manage resources

Invented by Dutch politician Ad Lansink, and introduced in Holland in 1979

Became EU law in the Waste Framework Directive 2008

Deviation from the waste hierarchy can be justified by lifecycle analysis

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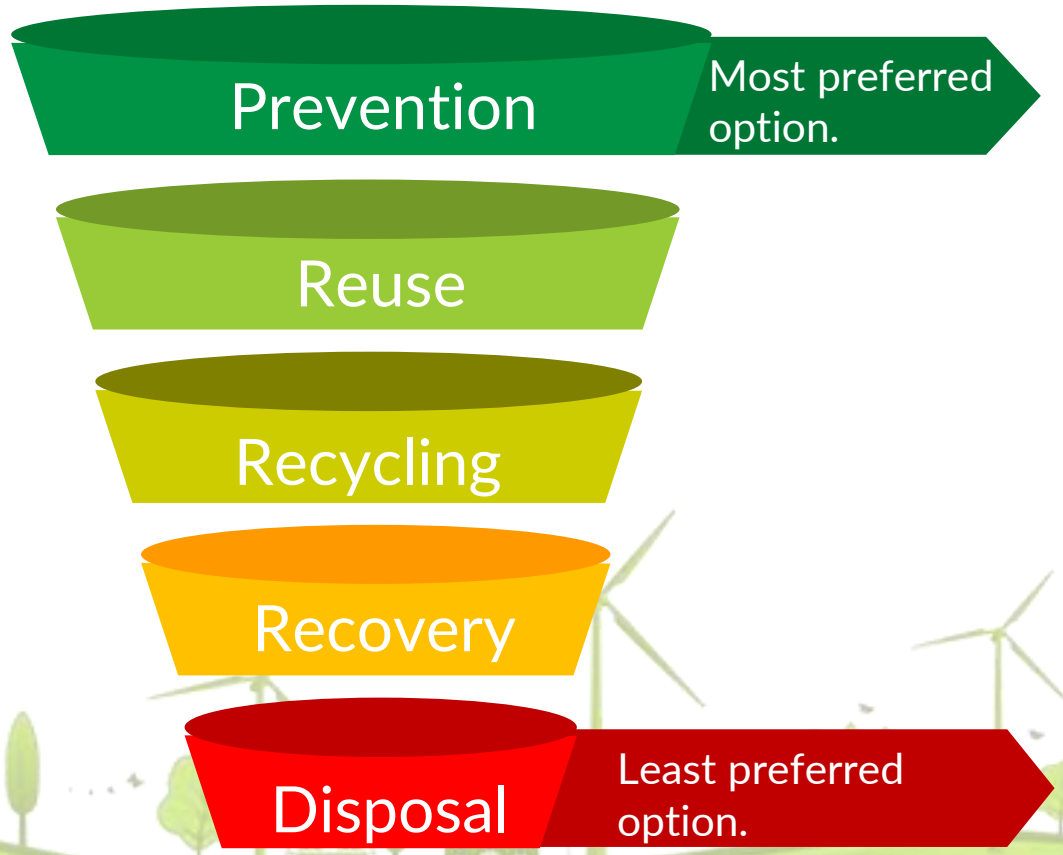
The Waste Hierarchy

Article 4 of the Waste Framework Directive requires MS to apply the waste hierarchy to waste policy and management



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Part 2: Principles & Scope of EU Law

- EU Environmental Law in Waste
- Transposition: Legislation in Cyprus
- Transposition: Plans & Programmes
- Separation at source: Separate collection
- Targets
- Packaging Recycling
- Landfill directive and Targets
- Landfill design
- Landfill limits
- Waste statistics in the EU: 2018
- Institutional Framework in Cyprus

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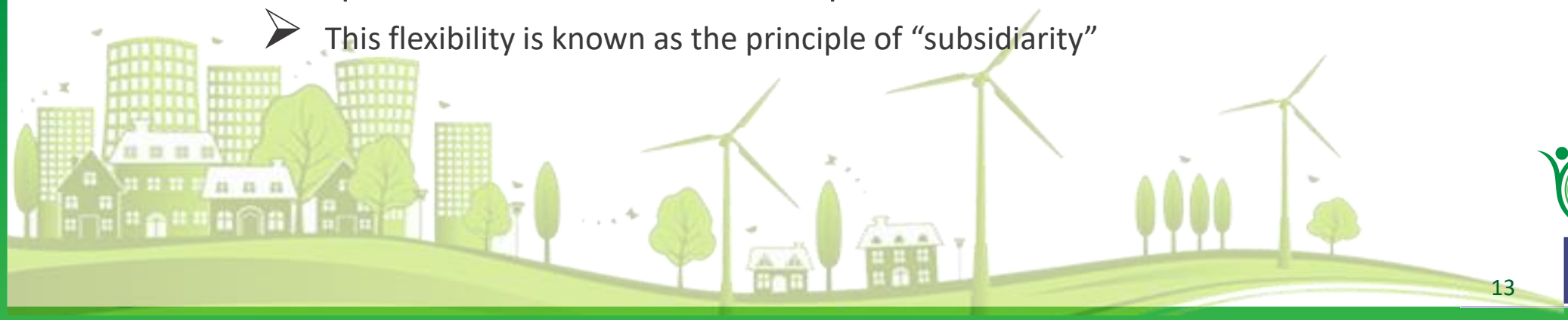
Principles & Scope of EU Law

- The European Union has developed a range of environmental legislation, which supports the functioning of the single market
  - Prevents Member States (MS) from undercutting one another on environmental standards
    - For example, by making it cheap to dispose of waste or to discharge effluent to water
  - Gradually increases minimum standards to be followed by all MS

- Directives produced by the EU must be "transposed" into national law of MS
  - Directives set objectives and quantitative/qualitative targets that MS must achieve
  - It is up to MS to decide how the requirements will be met
    - This flexibility is known as the principle of "subsidiarity"



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EU Environmental Law on Waste

The European Union has legislated across a wide range of issues affecting waste including:

- Waste, (2008/98/EC), with a focus on municipal waste
- Packaging and packaging waste (Directive 1994/62/EC)
- Landfill of waste (Directive 1999/31/EC)
- Batteries and accumulators, and waste batteries and accumulators (2006/66/EC)
- Waste electrical and electronic equipment (2012/19/EU)
- End of life vehicles (2000/53/EC)
- Industrial emissions (integrated pollution, prevention and control), (2010/75/EU), including from waste treatment
- Other wastes, such as
  - waste water
  - sewage sludge

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Transposition: Legislation in Cyprus

- The main legislation that sets the framework for waste management in Cyprus is the Waste Law N.185(I)/2011
  - This has been subject to several amendments

- Also important in national legislation are:
  - Packaging and packaging Waste Law N.32(I)/2002
  - The Landfill Regulations under the Waste Law (562/2003, 618/2007 and 147/2014)
  - Waste Batteries and accumulators Regulations under the Waste Law (125/2009, 79/2012)
  - WEEE Regulations under the Waste Law (668/2004, 378/2009, 73/2015)
  - Setting of Criteria and procedures for the acceptance of waste at Landfills decree of 2007 (282/2007)
  - The national Municipal Waste Management Plan

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Transposition: Plans & Programmes

- Waste Management Plans (WMP)
  - Municipal Waste Management Plan 2015-2021
  - Three other Waste Management Plans (for used oils, tyres and industrial/other waste) – 2016-2022
  - Currently the Waste Management Plan 2021 – 2027 is finalised

- Prevention of Waste Program (PWP)
  - Prevention of Waste Program 2015-2021
  - Currently, the Prevention Waste Program 2021 – 2027 is in the making

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Separation at Source: Separate Collection

- EU law reflects the evidence that collecting recyclable material in separate streams leads to higher quality recycling
- Article 10 of the Waste Framework Directive requires MS to take measures to:
  - ensure that waste undergoes recovery operations and
  - where necessary to achieve this, collect waste streams separately if technically, environmentally and economically practicable

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Separation at Source: Separate Collection

Article 11 of the Waste Framework Directive (Article 13 of Cyprus waste law) makes this requirement more specific:

- by 2015 separate collection shall be set up for at least the following: paper, metal, plastic and glass
- Collecting these materials mixed together is allowed, if separation is not necessary or practicable

- The Municipal Waste Management Plan requires Cypriot local authorities to implement separate collection for metal, plastic, paper and glass.
- Currently the Cypriot EPR system has separate collection for packaging waste and uses three dry recycling bins:
  - paper/cardboard
  - glass
  - plastic, metals, drink cartons (PMD)
  - Separating plastics from metals is relatively easy

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Targets

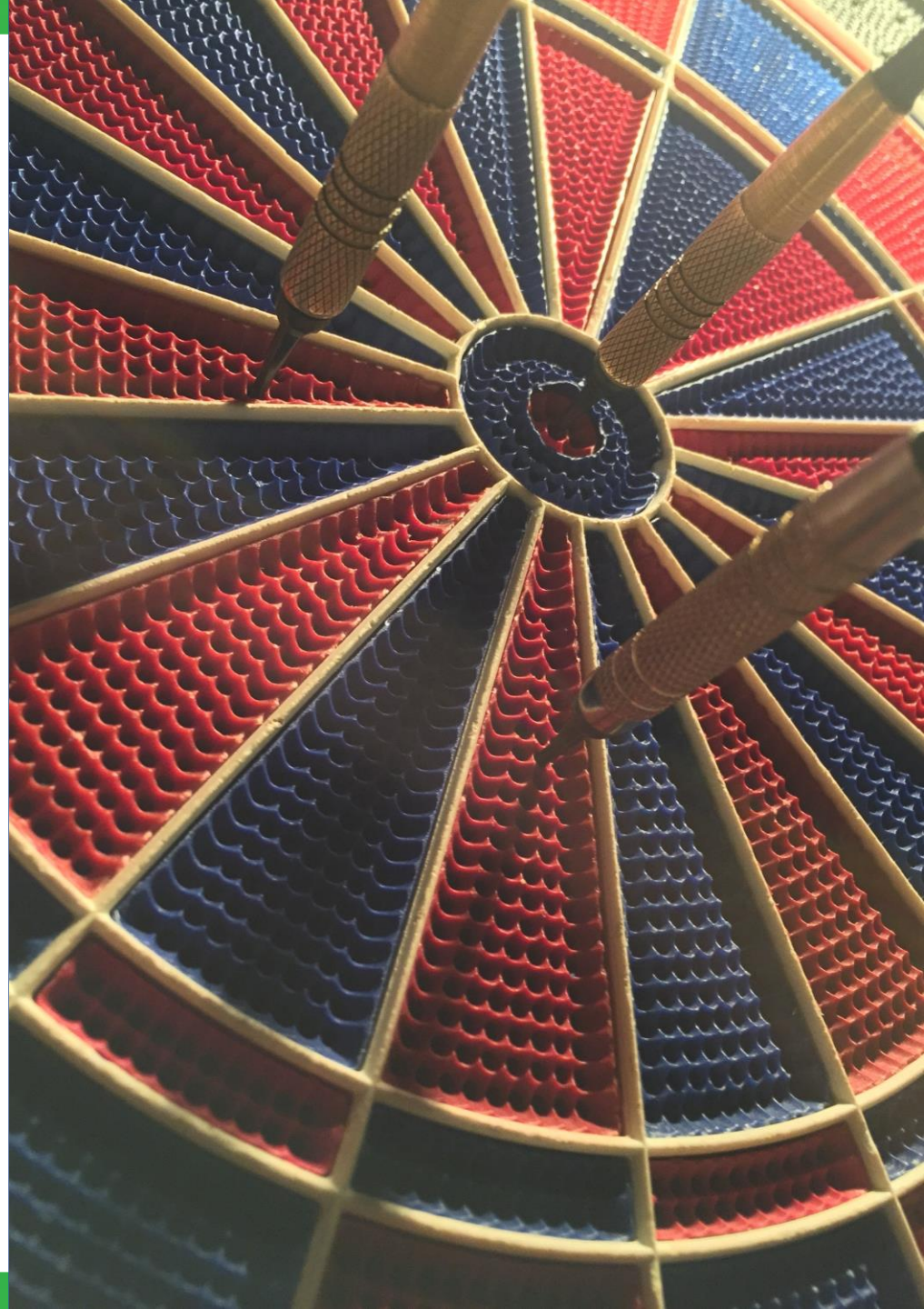
New municipal waste preparation for reuse / recycling targets are set:

- By 2025, a minimum of 55% by weight
- By 2030, a minimum of 60% by weight
- By 2035, a minimum of 65% by weight

An extra 5 years is allowed for countries (like Cyprus) that recycled less than 20% or landfilled more than 60% of municipal waste in 2013

The definition of municipal waste is widened to include household waste, and all similar waste from commercial and industrial sources

So, waste from businesses must also be monitored



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Packaging Recycling

Article 6 sets new targets for recycling

A MS can delay any of these targets by 5 years, subject to certain limits

Material	31 Dec 2025	31 Dec 2030
All Packaging	65%	70%
Plastic	50%	55%
Wood	25%	30%
Ferrous Metal	70%	80%
Aluminium	50%	60%
Glass	70%	75%
Paper and Cardboard	75%	85%

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Landfill Directive and Targets

- Under the Landfill Directive, MS were required to reduce the amount of biodegradable municipal waste that is landfilled:

By 2006, to 75% of 1995 levels

By 2009, to 50% of 1995 levels

By 2016, to 35% of 1995 levels (95.000 tn)

Biodegradable waste breaks down in landfills and releases methane, a powerful greenhouse gas

The EU brought infringement proceedings against Cyprus, which led to the closure and rehabilitation of several landfills

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Landfill Design

- Measures must be taken to control and manage methane
  - Neighbouring land use (e.g. Away from residential premises)
  - Geology and hydrogeology
  - Risks such as flooding or subsidence

- Measures must be taken to prevent the escape of leachate into groundwater or surface water
  - This includes making sure leachate is captured and treated

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Landfill Design

- Measures must be taken to control and manage methane
  - The site must be covered to prevent methane escaping
  - Methane must be either captured and used for energy, or flared
- Measures must be taken to prevent the site causing a nuisance due to issues with:
  - emissions of odours and dust
  - wind-blown materials
  - noise and traffic
  - birds, vermin and insects
  - fires

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Landfill Limits

- Under Article 3 of the Landfill Directive, Member States must ensure that:
  - by 2035 the amount of municipal waste landfilled is reduced to 10% or less of the total amount of municipal waste generated (by weight).
    - An extra 5 years is allowed for countries (like Cyprus) that recycled less than 20% or landfilled more than 60% of municipal waste in 2013
- Article 5a amends the rules to increase consistency in measurement of how much material is landfilled.

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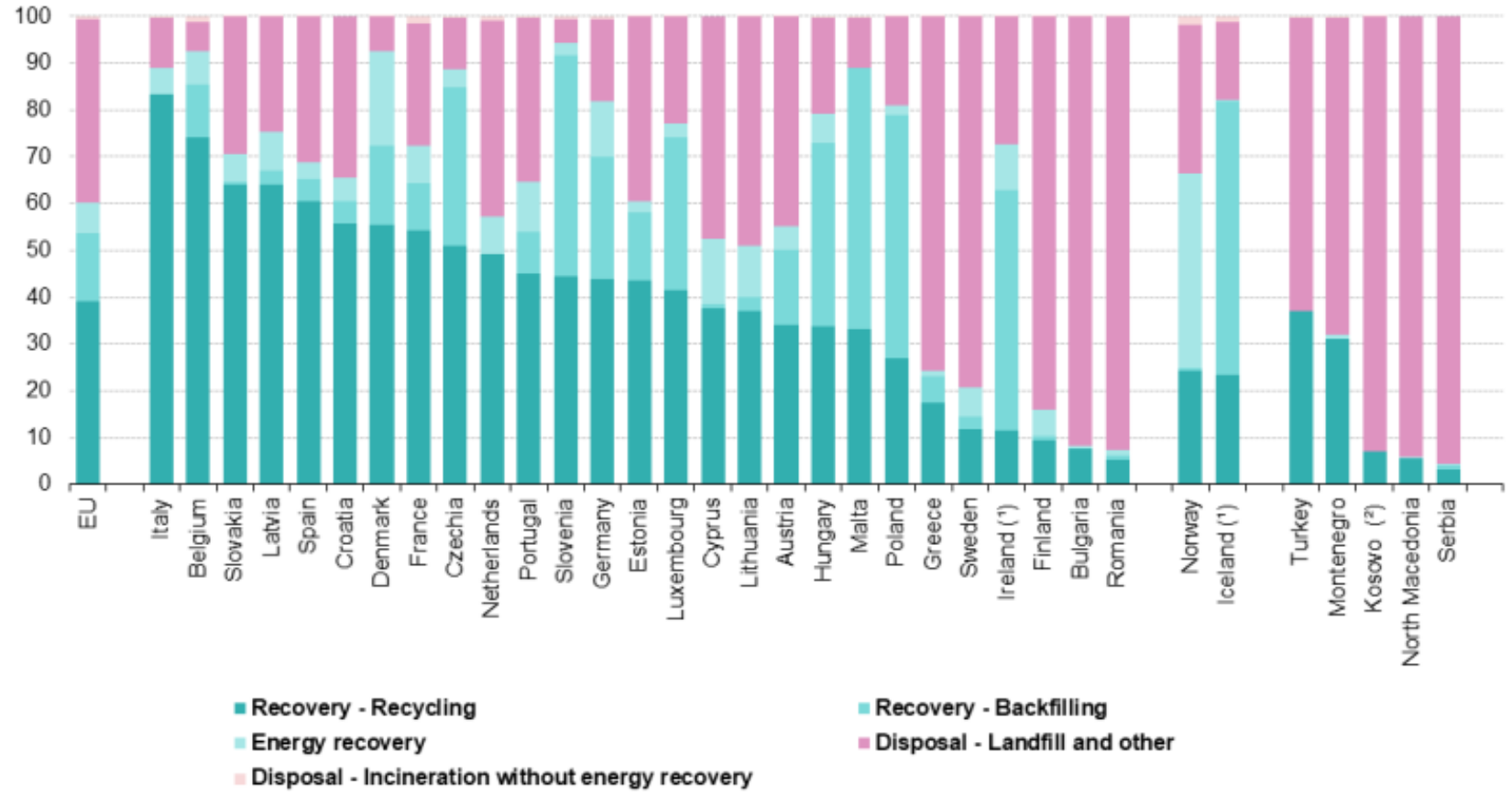
Waste statistics in the EU: 2020

Waste treatment by type of recovery and disposal, 2020
(% of total treatment)



(1) 2018 data
(2) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo Declaration of Independence.
Source: Eurostat (online data code: env_wastrt)

eurostat

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Institutional Framework in Cyprus

The body in charge of waste management in Cyprus is the Department of Environment within the Ministry of Agriculture, Rural Development and the Environment and is responsible for enforcement of rules regarding:

- municipal waste management
- waste collection (licensing)
- waste production (e.g., duty of care, waste hierarchy)
- infrastructure permitting (e.g. landfills, recycling facilities, waste treatment units for C&D waste and for garden waste)
- preparation of national waste management strategies (plans and programmes) for multiple waste streams
- any other national waste management obligations

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Part 3: Regulating Waste in Cyprus

- Extended Producer Responsibility
- EU Producer Responsibility: Requirements
- Producer Responsibility Schemes
- Local context – Packaging
- Packaging collection methods
- Producer Responsibility Schemes: Other waste
- Economic Instruments

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Regulating Waste in Cyprus

- The Department of Environment is responsible for regulating waste collections and waste treatment
- Under Article 24, a waste management license is required by any person whose operations (waste treatment facilities) fall under Annex I or II (recovery/disposal)
- According to Article 33, a person who:
  - is involved with the collection and transfer of waste products on professional basis
  - takes care of waste disposal procedures on behalf of third parties
  - personally, undertakes their own waste disposal processes, including recovery and disposal

  must be registered with the Waste Management Registry after approval from the competent Authority before starting its operations.
- A waste facility also needs licenses relating to air and water pollution
- When waste is transported, it must be accompanied by an Identification and Monitoring of Waste Product Transfer Form
- The Water Development Department is responsible for the closure and rehabilitation of landfills.

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Extended Producer Responsibility

- Article 8 of the Waste Framework Directive allows MS to take action to place extended responsibilities on producers
- This may involve producers arranging or financing:
  - acceptance of returned products and of the waste that remains after those products have been used
  - subsequent management of the waste
  - providing information to the public about re-using or recycling the products
- It may also involve encouraging the design of products to:
  - reduce their environmental impacts and the generation of waste in the course of their production and use
  - ensure that waste products can be recycled

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Extended Producer Responsibility

Where implemented, it incentivises producers to:

Prevent waste at source

- Design out waste
- Use recycled materials

Support the achievement of public recycling and materials management goals.

- Provide, or financially support waste collections
- Support systems such as Deposit Refunds

Promote environmentally beneficial product design

- Reusability
- Repairability
- Recyclability

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EU Producer Responsibility: Requirements

Producer responsibility schemes require waste producers to cover the costs of managing the waste resulting from their products

EU law requires producer responsibility schemes for:

- Packaging
- Waste electrical and electronic equipment (WEEE)
- Restriction of hazardous substances (RoHS)
- Batteries
- End of life Vehicles (ELVs)

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Producer Responsibility Schemes in Cyprus:

green-dot Cyprus

Green Dot Cyprus, established in 2006, is a collective management scheme for packaging waste:

- covers almost 85% of the population
- has 1312 (2021 data) registered members/producers.

There are also four separate management schemes for individual packaging waste streams

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Producer Responsibility Schemes:

- Green Dot Cyprus covers the costs of the development and operation of the packaging waste collection system as well as its downstream management
- Green Dot Cyprus supplies data on:
  - quantities of packaging placed on the market by their members/producers
  - quantities recycled
- It also undertakes awareness raising work

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Local context - Packaging:

green-dot Cyprus

Household Packaging Streams collected by Green Dot Cyprus

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Packaging Collection methods:

Door to Door
- Cities

Glass
everywhere

Bring Banks in Tourist and some rural areas with small population

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Producer Responsibility Schemes: Other waste

Cyprus has also other producer responsibility schemes, to enable producers to meet their legal obligations

- WEEE Cyprus works with the majority of enterprises that import electrical and electronic equipment

- AFIS is a compliance scheme for dry cell Batteries and Accumulators.

- There are two waste management schemes for waste tyres
  - E4C Ltd and RTM Tyres Ltd

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Economic Instruments

- Article 11 also says economic instruments, should be used to support measures such as:
  - source separation schemes
  - reuse and repair networks including preparation for reuse
  - pay-as-you-throw schemes
    - Municipality of Aglantzia installed a PAYT scheme in 2021
    - The Municipal Waste Management Plan foresees the promotion of PAYT systems on a broader scale
    - A recent set of Regulations makes the implementation of PAYT schemes and the separate collection of organic waste mandatory for local authorities by 2024

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Economic Instruments

Pay as you throw system in Aglantzia

Source: http://cybc.com.cy/video-on-demand/%cf%81%ce%b9%ce%ba-1/%cf%83%cf%80%ce%af%cf%84%ce%b9-%cf%83%cf%84%ce%b7-%cf%86%cf%8d%cf%83%ce%b7/episodes/%cf%83%cf%80%ce%af%cf%84%ce%b9-%cf%83%cf%84%ce%b7-%cf%86%cf%8d%cf%83%ce%b7-13-03-21/

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Part 4: Organic waste composting

- Why Process Segregated Organics?
- Key Technologies
- Open windrow composting
- In-vessel Composting
- Anaerobic Digestion
- Biowaste Collection Issues
- Economic Instruments

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Organic waste composting

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Desertification in Cyprus and the use of compost

Source: https://www.youtube.com/watch?v=_RIgOT1gQzk&ab_channel=%CE%95%CE%BA%CF%80%CE%BF%CE%BC%CF%80%CE%AE-%CE%A3%CF%80%CE%AF%CF%84%CE%B9%CF%83%CF%84%CE%B7%CE%A6%CF%8D%CF%83%CE%B7-%CE%A1%CE%99%CE%9A

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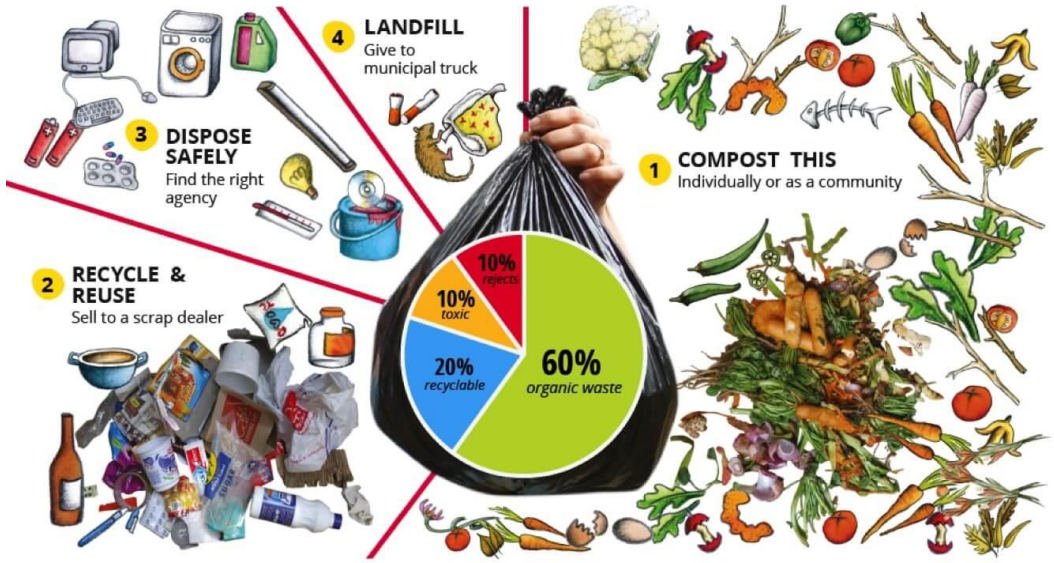
Why Process Segregated Organics?

- Contributes to EU MSW recycling targets
  - New calculation method excludes counting biowaste treated in mixed waste plants
- If we can collect them, we can optimise collection logistics
  - reduced frequency collection of mixed wastes
- If we can collect them really effectively, we can recycle the rest more easily
  - Drier – easier to sort
- We can generate one or more of:
  - Soil improver
  - Liquid fertiliser
  - Energy



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Key Technologies

- Open-air windrow composting (aerobic)
- In-vessel composting (aerobic)
- Anaerobic Digestion
- Others:
  - (Home / community composting)
  - (Advanced thermophilic aerobic digestion)
  - (Biochar)

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Key principles: Aerobic Composting

- Degradation of organic matter in ‘composting’ processes occurs through micro-organisms
- These need:
  - a favourable carbon: nitrogen ratio
  - sufficient moisture
  - adequate oxygen

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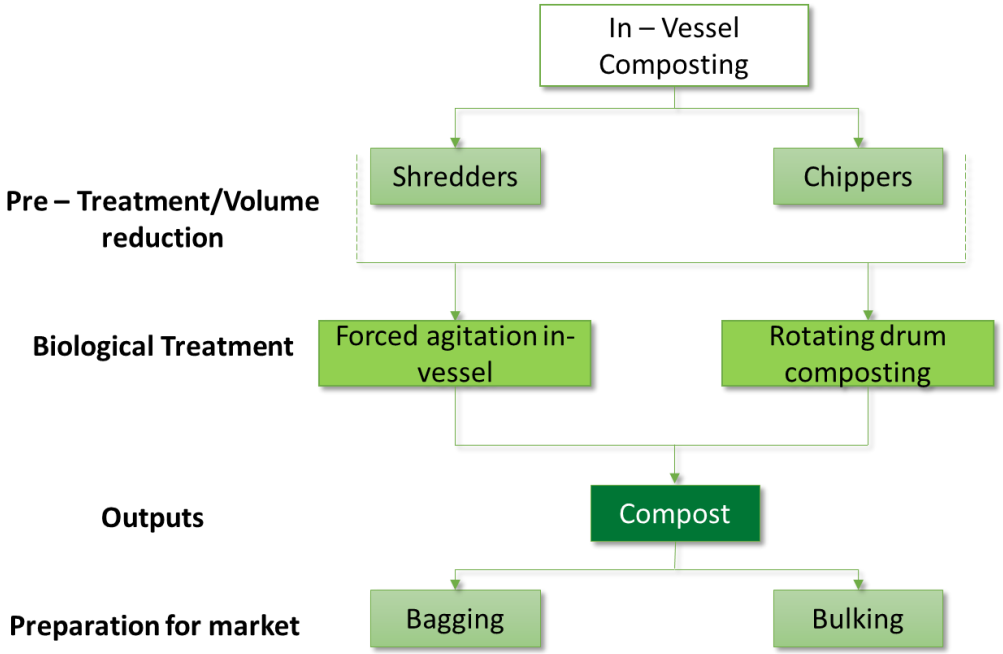
Open windrow composting



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Open windrow composting

Suitable only for green waste and paper/card

Outputs:

Compost, soil improver, mulch

Advantages:

+ Low cost
+ Simple technology, well established across the EU
+ Operates at a range of scales

Disadvantages:

− Odours and bio-aerosols produced (issues for site selection)
− Unsuitable for kitchen waste
− Market for compost required
− Uses land (esp. for maturing compost)

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Open Windrow Composting

Usually on concrete slab

(with drains to control ‘leachate’)

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Costs:

- Gate fees around €25 per tonne (cheap)
- Capital costs of the order of €120 per tonne
- No ‘typical scale’ – can be operated at small scale (low capital requirement, and some farmers already have necessary machinery to turn windrows)
- No energy generated (though could have low grade heat)

Commercial Composting unit in Cyprus

Source: https://www.youtube.com/watch?v=_RIgOT1gQzk&ab_channel=%CE%95%CE%BA%CF%80%CE%BF%CE%BC%CF%80%CE%AE-%CE%A3%CF%80%CE%AF%CF%84%CE%B9%CF%83%CF%84%CE%B7%CE%A6%CF%8D%CF%83%CE%B7-%CE%A1%CE%99%CE%9A

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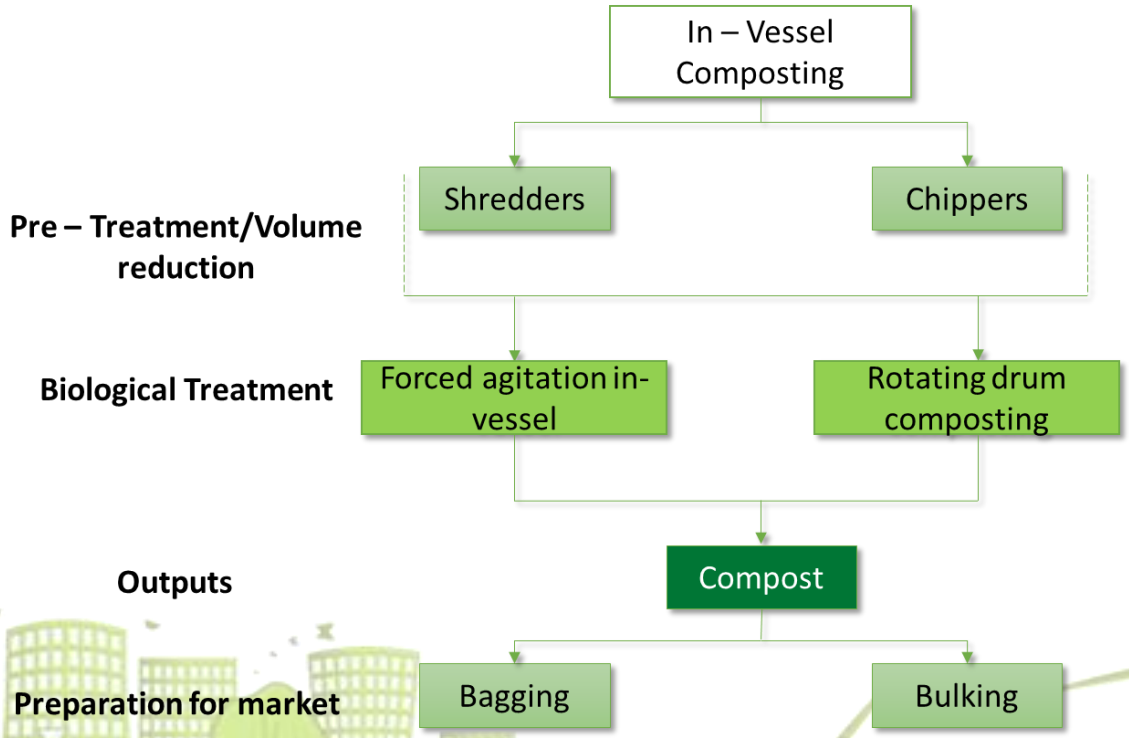
In-vessel Composting



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In-vessel Composting

Suitable for green *and* kitchen waste

Outputs:

- Compost and mulch from source segregated material
- Stabilised waste for landfill restoration and remediation

Advantages:

- Virtually all organic material can be recycled back to land
- Better control of odours
- Good quality of compost produced

Disadvantages:

- More complex and expensive than windrows
- Market for compost required

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In-vessel Composting

- **Costs:**
- Gate fees around €45 per tonne (cheap)
- Capital costs of the order of €50-€350 per tonne
  - Range of different technologies
- Typically built for circa 20kt – 40kt
- No energy generated (though could have low grade heat)
- Revenues can be significant with appropriate marketing

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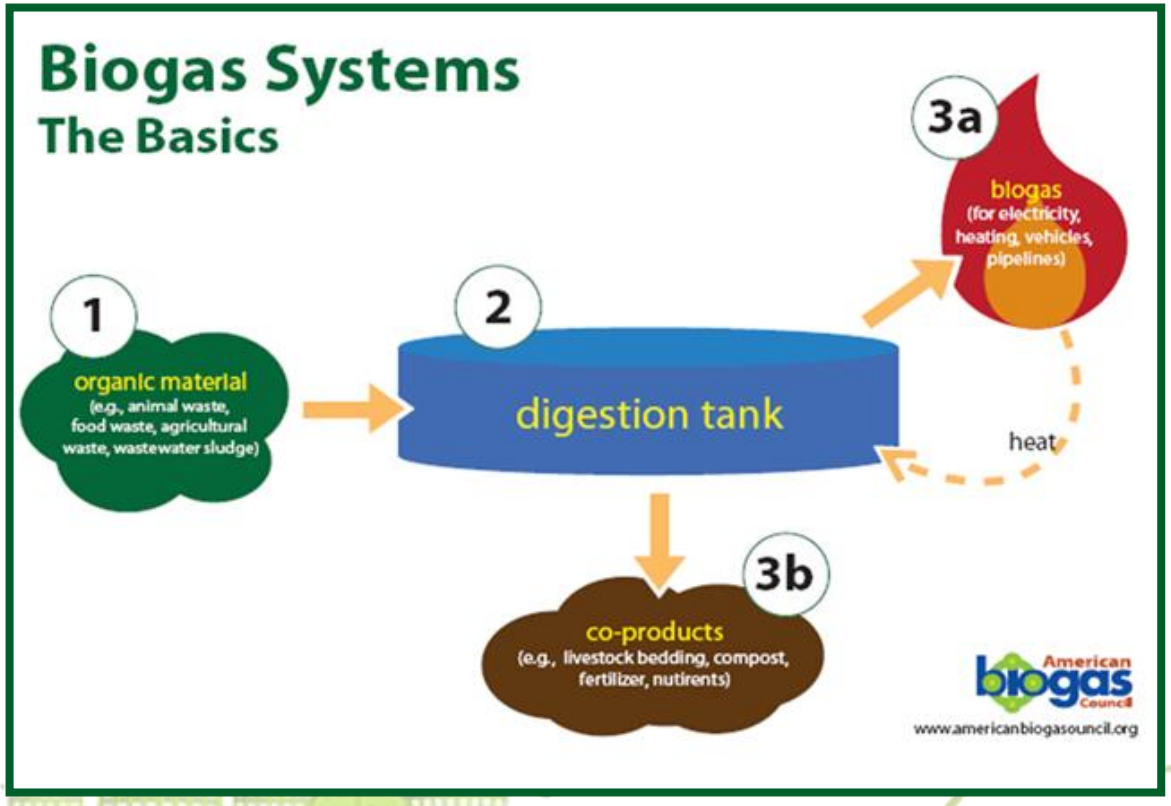
Anaerobic Digestion



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Anaerobic Digestion

To generate biogas

- Combined heat and power
- Compressed natural gas
- Gas clean up – into grid

Make soil improver / fertiliser (higher nutrient content)

- Digestate
- Liquor

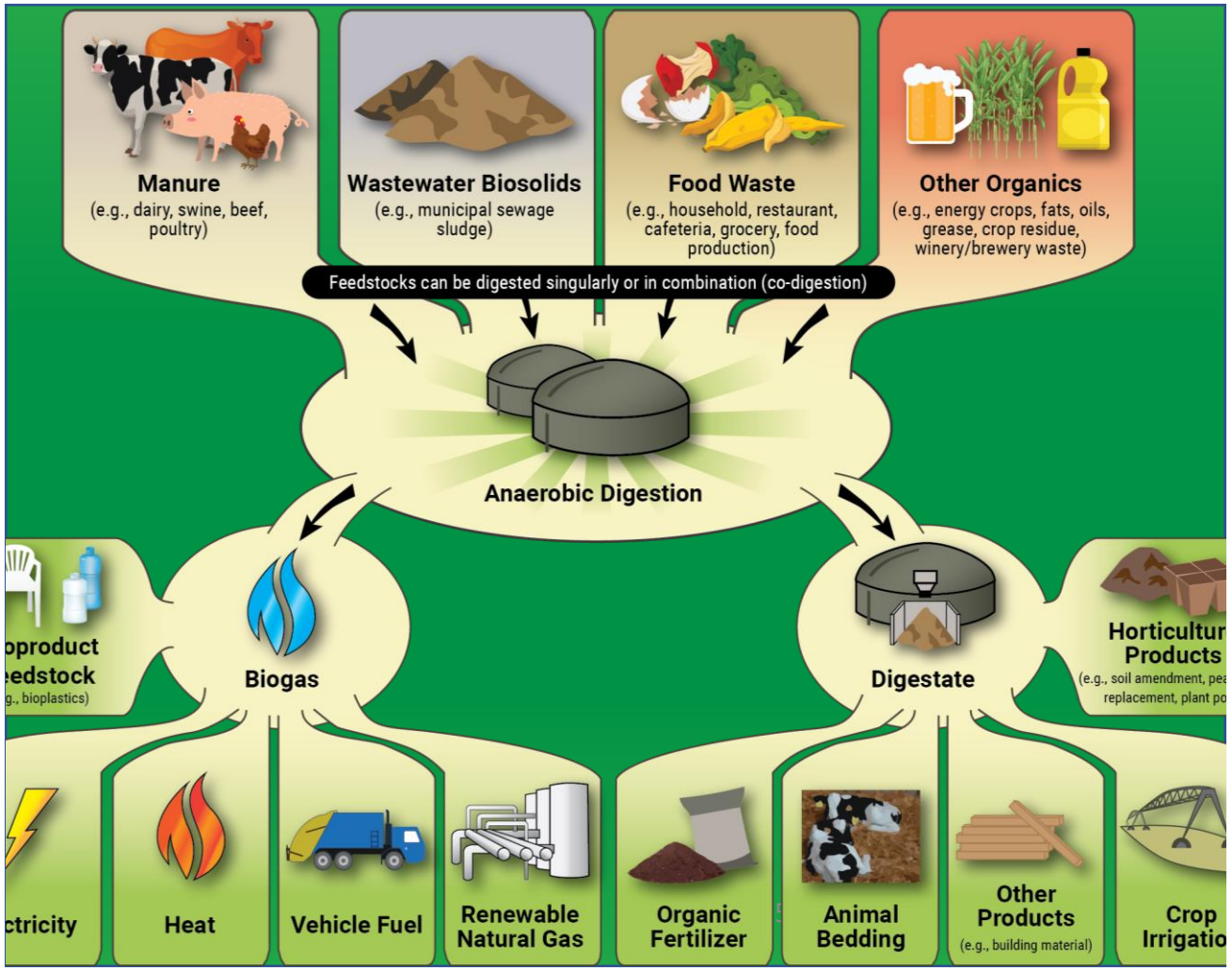
Post composting

- Blend with other soil improvers (incl. peat)

No need for structural material

Food waste only?

- YES (but process stability an issue)



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Anaerobic Digestion

- Enclosed system (Anaerobic = in absence of oxygen)
- Suitable for green, kitchen or mixed wastes
- Outputs:
  - Digestate, Liquor and Biogas (high methane content)

Advantages:

- Potential revenue from energy production
- Small-scale biogas plants possible - linked to community projects

Disadvantages:

- More expensive than composting, and more complex
- Markets for liquor and digestate soil conditioner required

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Anaerobic Digestion

Costs:

- Gate fees around €60 per tonne (cheap)
- Capital costs of the order of €350 - €400 per tonne
  - Range of different technologies
  - Typically built for circa 20kt – 40kt (maybe larger in future)
- Energy generated
- Energy revenues can be significant

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Biowaste Collection Issues

Garden Waste Vs Food Waste

- Garden waste collection more straightforward
  - Charged service is optimal
- Food waste more challenging
  - Public perceptions
  - Rapid degradation (especially in hot climates)
  - Smells

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Food Waste

1. Add to Garden Waste?

- Frequency of collection?
- Odours?
- Capture of food waste?
- Frequency of residual waste collection?

2. Collecting Separately

- Allows less frequent refuse collection
- Increases capture
- Allows for charging / constraints on garden waste
- Focuses investment on food waste element

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What Drives Performance

Food waste should be collected frequently and more frequently than residual

- Odour
- Convenience
- Practical incentive to participation
- Establishing habits

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Collection

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What drives performance: Containers

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Part 5: Managing plastic waste

- A European Strategy for Plastics in a Circular Economy
- Plastics in general
- Circular Economy: 2018
- Basic Targets for Plastics by 2030

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A European Strategy for Plastics in a Circular Economy

European Commission

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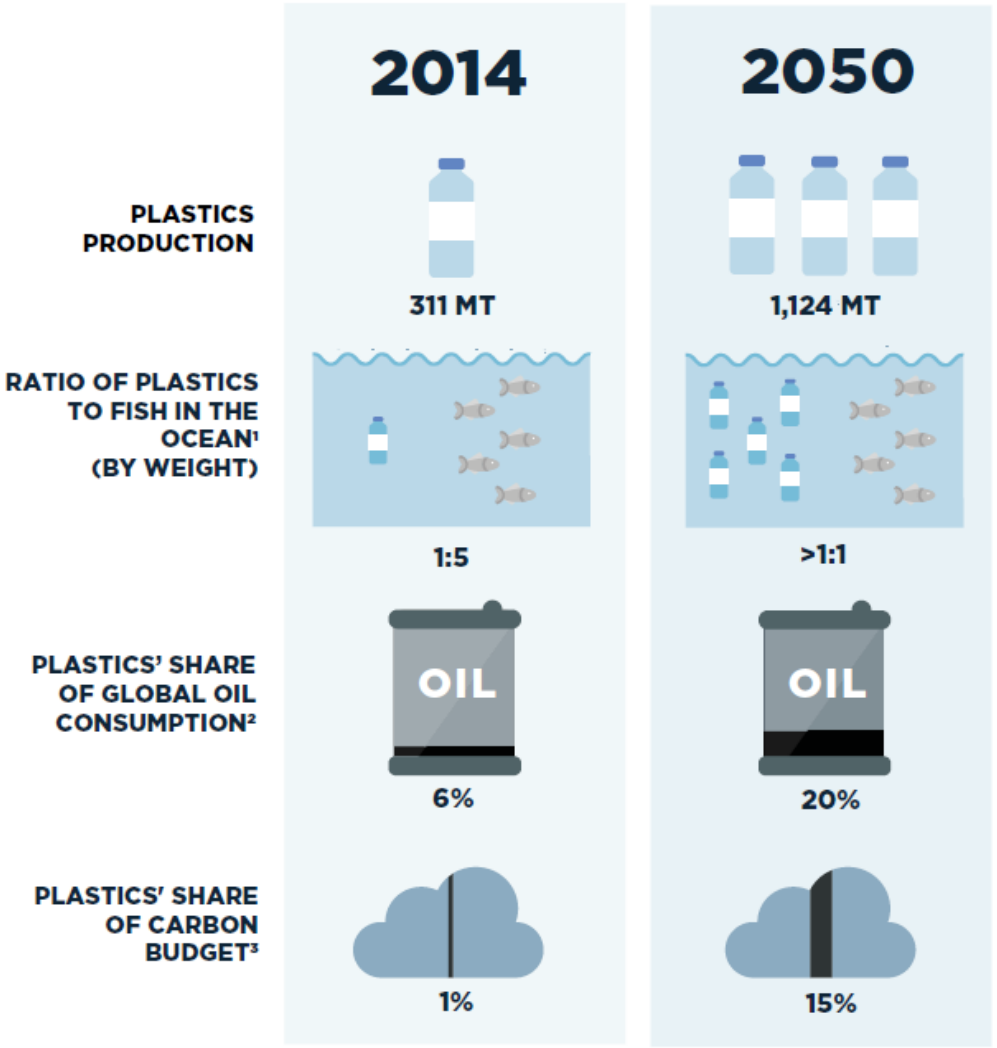
The Plastic Waste problems if we do nothing



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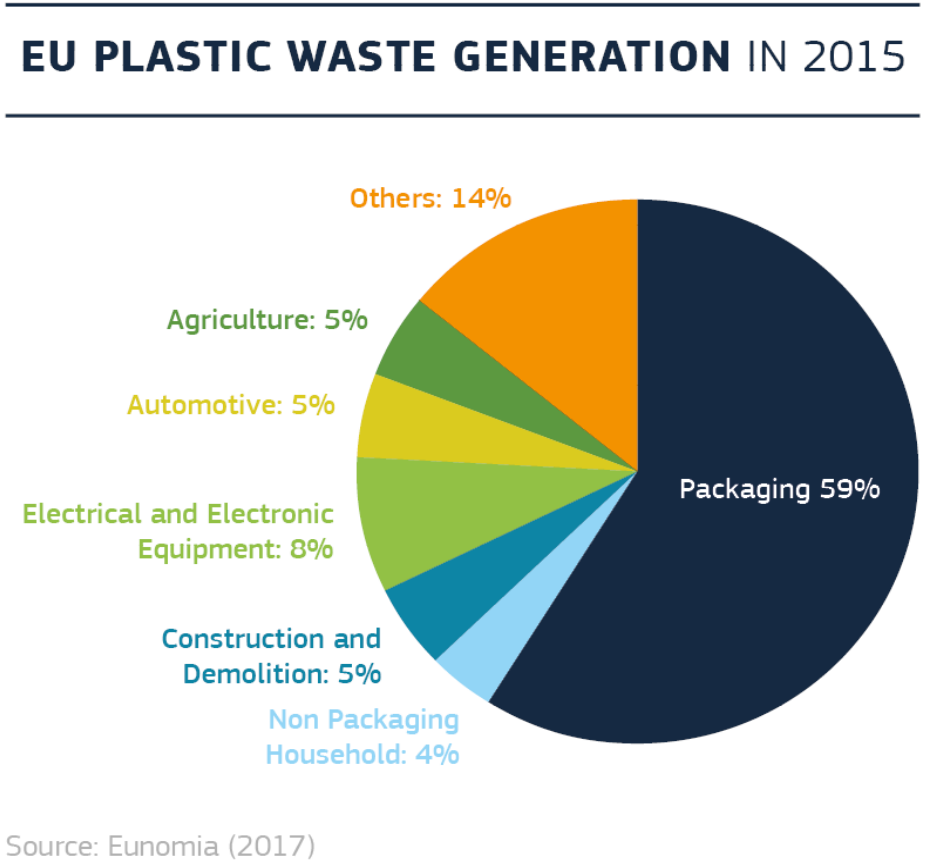
Plastics in general: Facts and Figures



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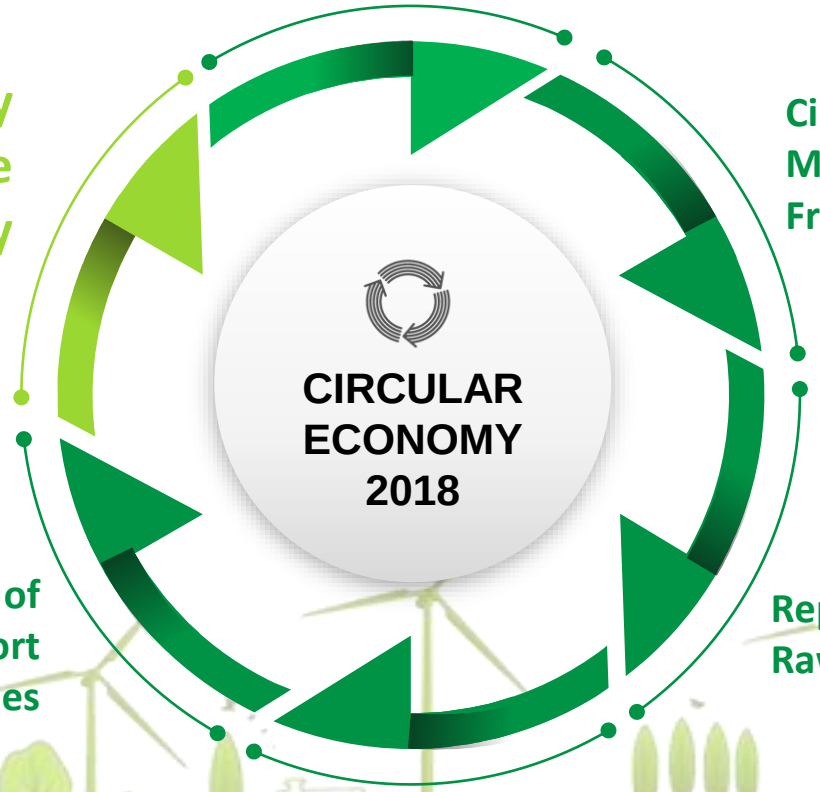
Circular Economy: 2018



Interface Chemicals Products Waste Legislation

A European Strategy for Plastics in the Circular Economy

Circular Economy Monitoring Framework

Revision of Directive on Port Reception Facilities

Report on Critical Raw Materials

Report on Oxo-degradable Plastics

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Plastics in general: Facts and Figures

- **Global production of plastics has increased twentyfold since the 1960s**, reaching 322 million tonnes in 2015. It is expected to double again over the next 20 years.
- In the EU, **the plastics sector employs 1.5 million people** and generated a turnover of EUR 340 billion in 2015.
- In the EU **Reuse and recycling of end-of-life plastics is very low**, particularly in comparison with other materials such as paper, glass or metals.
- **Around 25.8 million tonnes of plastic waste are generated in Europe every year.** Less than 30% is collected for recycling. A significant share leaves the EU to be treated in third countries, where different environmental standards may apply.

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Plastics in general: Environmental Implications

Only in the EU: The impact

In the EU, 150000 to 500000 tons of plastic waste enter the oceans every year. This represents a small proportion of global marine litter. Yet, plastic waste from European sources ends up in particularly vulnerable marine areas, such as the Mediterranean Sea and parts of the Arctic Ocean. Recent studies show plastics accumulate in the Mediterranean at a density comparable to the areas of highest plastic accumulation in the oceans.

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Who puts the plastic in oceans

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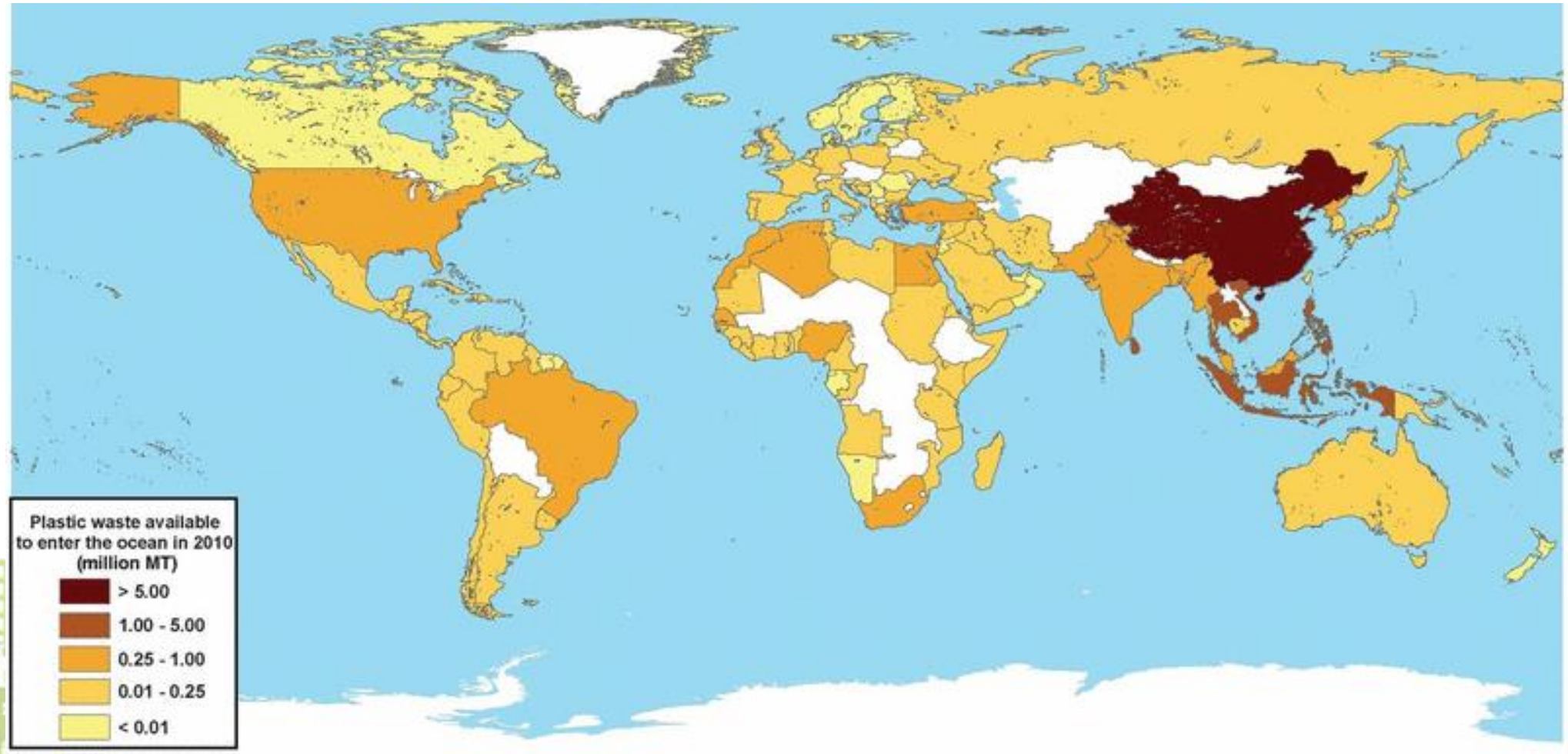
Plastic waste available to enter the oceans (million tonnes): 2010



Source: Jambeck et al (2015), sciencemag.org

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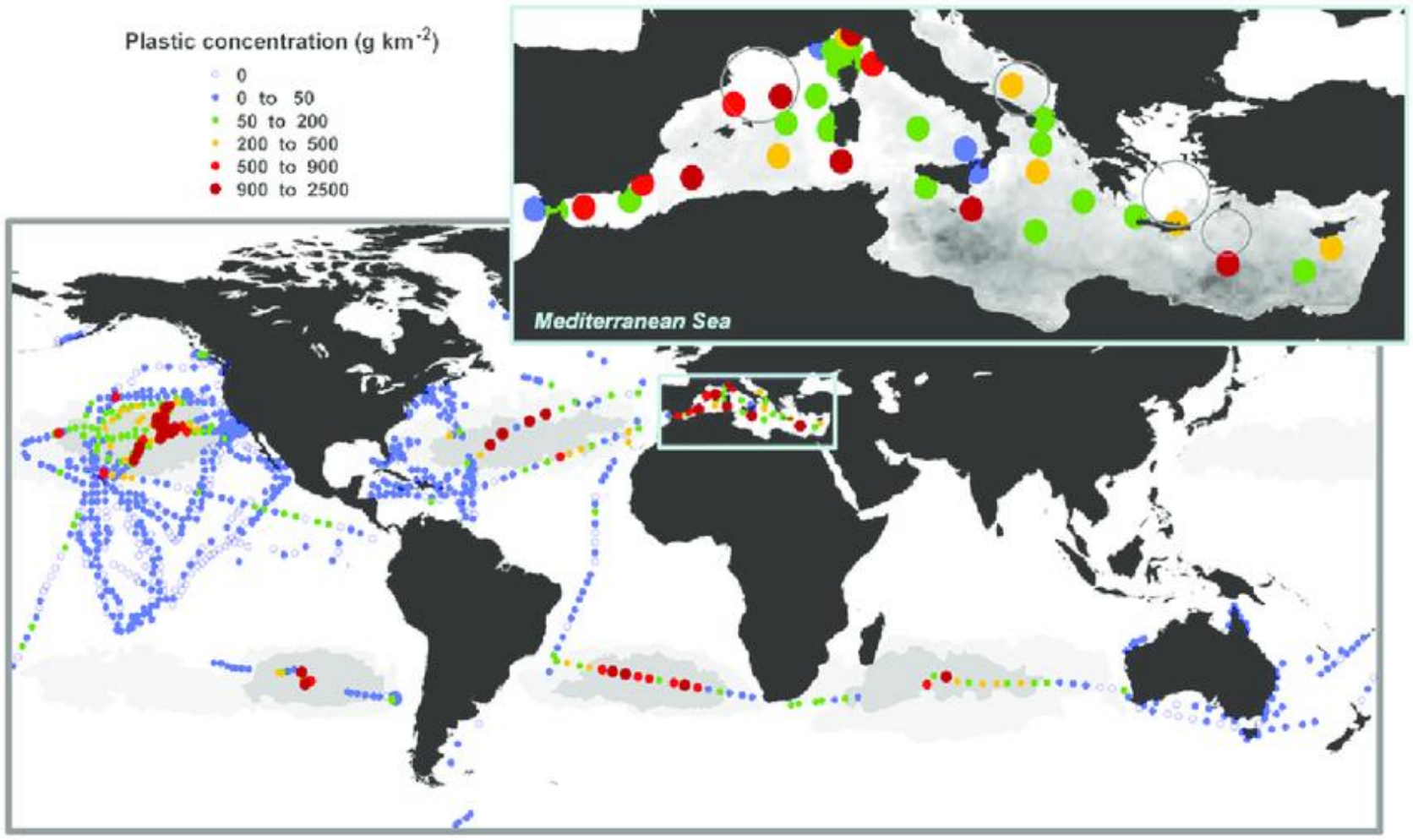
Concentrations of plastic debris in surface waters of the Mediterranean Sea compared to the plastic concentrations reported for the global ocean



Source: Cózar, Andrés & Sanz-Martín, Marina & Marti, Elisa & González-Gordillo, Juan & Úbeda, Bárbara & Gálvez, José & Irigoien, Xabier & Duarte, Carlos. (2015). Plastic Accumulation in the Mediterranean Sea.

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Plastics in general: Environmental Implications

This phenomenon is exacerbated by the **increasing amount of plastic waste generated each year**, and is also fueled by the growing **consumption of 'single-use' plastics**, i.e. packaging or other consumer products

These include **small packaging, bags, disposable cups, lids, straws and cutlery**, for which plastic is widely used due to its lightness, low cost, and practical features.

Source: Joint Research Centre, European Commission (2017)

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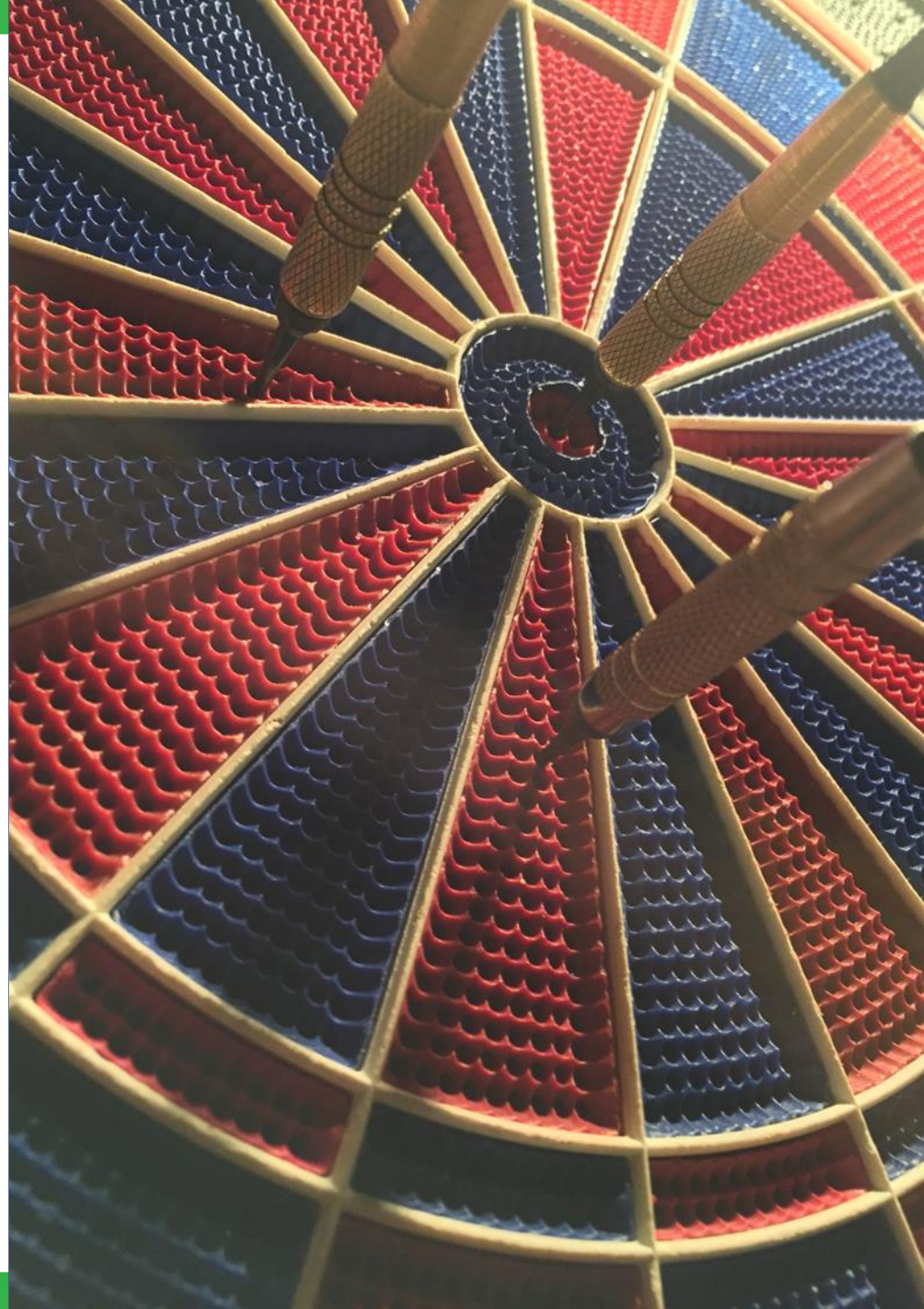
Basic Targets for Plastics by 2030

By 2030:

- All plastic packaging to be reusable or recyclable
- >50% of plastic waste to be recycled
- The infrastructure for sorting and recycling of plastic to quadrable from the figures of 2015

Through:

- Improved product design
- Promotion of recycled content
- Improved the sorting at source
- Increase of funding for research and innovation
- Promotion of international action



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But plastics is an essential part of our everyday life

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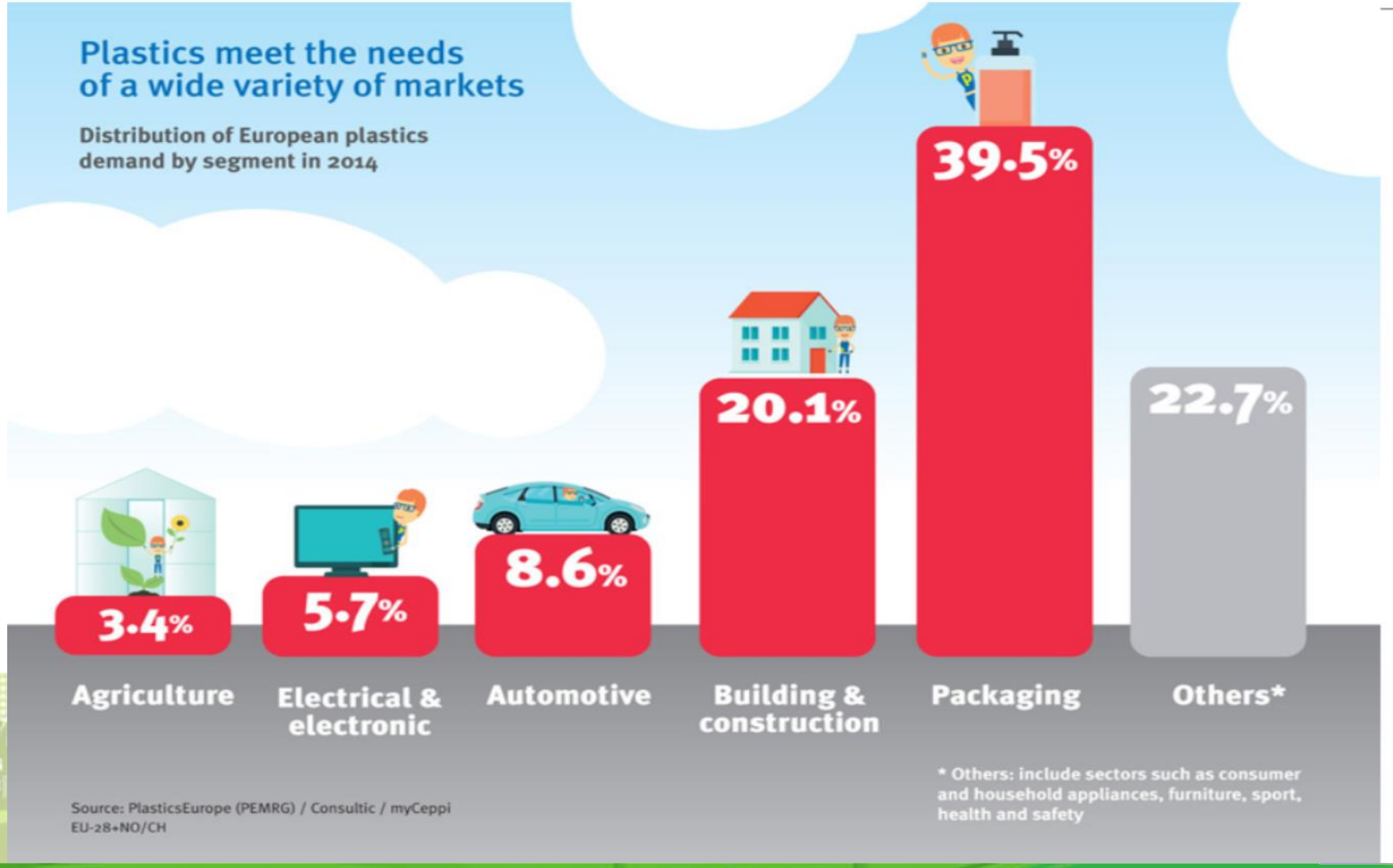
The biggest sectors that use plastics



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Yet, there are advantages in plastics

On average only 1 to 3% of the weight of a packaged product in plastics comes from the packaging:

- A plastic film of 2g packages 200g of cheese
- A plastic Bottle of 35g packages 1.5 liter of drinks

Inclusive the logistic packaging, it grows up to 3.56% on average

PLASTIC POUCHES
3.56%
IS PACKAGING

Without plastics, retailers' fleets would make **50% more journeys**

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Part 6: Managing Municipal waste in the Rural areas

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Managing Municipal waste in the rural areas

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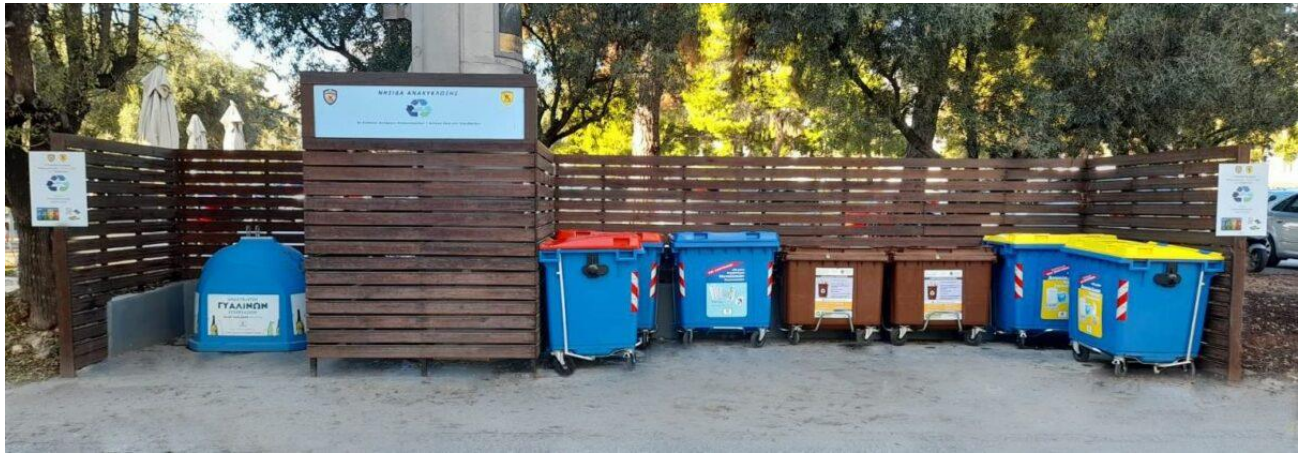
Managing Municipal waste in the rural areas



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Part 7: Preparing a local waste management plan

- Managing the Development of a Local Waste Management Plan
- The project Lifecycle

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Managing the Development of a Local Waste Management Plan

Structure of a Local WMP

Box 1.1 Elements in a waste management plan

Background

1. Overall waste problematics
2. EU legislation
3. National legislation
4. Description of national waste policy and prevailing principles
5. Description of objectives set up in specific areas
6. Inputs from the consultation process

Status part

1. Waste amounts, e.g.
   a) waste streams
   b) waste sources
   c) waste management options
2. Waste collection and treatment
3. Economy and financing
4. Assessment of previous objectives

Planning part

1. Assumptions for planning
2. Determination of objectives, e.g. for
   a) waste streams
   b) waste sources
   c) waste management options
3. Plan of action, including measures for achieving objectives
   a) collection systems
   b) waste management facilities
   c) responsibilities
   d) economy and financing

Source: European Topic Centre: http://ec.europa.eu/environment/waste/plans/pdf/wasteguide_final.pdf

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Where does a Local WMP fit?

- Revised Waste Framework Directive
  - The ‘Waste Hierarchy’
  - Recycling targets
  - Separate collection requirement
- National waste legislation
  - Supporting waste policies
- National Waste Strategy
- Local Waste Management Plans
- Local Waste Preventions Programmes

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A Local WMP Project

Developing a Local Waste Management Plan should be treated as a project, with the right support given to its development.

A project is temporary as it has a defined beginning and end in time, and therefore defined scope and resources.

And a project is also unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. So, a project team often includes people who don’t usually work together – sometimes from different organizations and across multiple geographies.

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The project Lifecycle

Closing
- Close Down of Project
- Evaluation of Impact of Project
- Identification and Communication of Lessons Learnt

Docs: Close down report

Executing
- Monitoring and Reporting of Progress
- Budget Reconciliation
- Change Management
- Evaluation of Impact Against Targets

Docs: Updating of Documents, Change Log

Initiating

Define the Project including:
- Project Rationale
- Project Objectives
- Scope
- Constraints
- Outcome and Impacts

Docs: PID, Risk Register, Project Plan, Stakeholder Analysis

Planning
- Detailed Planning of Activities, Resources and Costs.
- Development of Key Project Documents

Docs: Updating of Initiation Documents

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Part 8: Managing Agricultural waste

- Agricultural Waste
- Health and environmental Concerns
- Agricultural Waste Management: Ways to Control Solid Waste
- Energy Source
- How Can Farmers Contribute to Waste Management?
- Pesticides Packaging Management in Cyprus
- Collective System for their Management Cyprus: 2014

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Agricultural Waste Management

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Agricultural Waste

While agriculture produces food, it also produces waste. Agricultural Waste management is a necessary step in ensuring that the waste does not harm living creatures and the environment.

There is natural, animal, plant and chemical waste.

Since the quantity is usually huge and it is generally hazardous, then farmers have to follow certain regulations for their management

If no one manages the waste, then it can not only pollute water and air but also disrupt the process of farming.

During waste management, the waste is either reduced, recycled or repurposed.

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Farming activities produce waste, however, it is not the only source

At every step of the food chain, there will be wastage.

These include:

Food and Meat Processing

Crop and animal production results in some waste in abattoirs.

So, things like bones, banana peels, feathers and hoofs categorize as solid wastage.

Horticulture

This solid waste comes from the maintenance and cultivation of plants for aesthetic purposes.

Basically, they are a greater part of garnering than farming.

The waste is by pruning and grass cutting.

Animal Production/Livestock

Livestock will inevitably produce solid waste.

If you use livestock for farming then there will be animal litter, water, trough, animal carcasses.

Crop Production

Agricultural crop production does lead to wastes such as crop residues and husks.

This happens when you farm crops for food or domestic production.

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Farming activities produce waste, however, it is not the only source

Industrial Waste

Besides food production, farming produces industrial raw materials and domestic products.

As a result, they also lead to wastage.

The production of paper utilizes agricultural products; hence, it produces waste.

Wood cuttings and processing produce it too.

On-Farm Medical

This kind of wastage is due to the use of drugs, vaccines and insecticides on animals.

Disposable needles, syringes or wrappers left from vaccines contribute to it.

Chemicals

This is one of the most likely wastages on agricultural land.

The use of pesticides, herbicides, insecticides and even incorrect use of synthetic fertilizers can pollute the environment.

For instance, farmers do not completely empty the pesticides and insecticides rather mishandle the containers and spill these chemicals in nearby ponds or fields.

This poses environmental hazards, food poisoning risks and water pollution, harming animals, humans and sea life.

There are other more common wastages such as:

Kitchen waste

Organic Fertilizer bags

Waste oil

Manure and litter

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Importance of Agricultural Waste Management

- Improper disposal of waste can cause an environmental impact as well as affect humans and animals alike.
- There is a need to manage waste disposal as seemingly harmless things can get harmful if not disposed of responsibly.
- For instance, it can give rise to the problem of landfills and the emission of toxic gases from that area.
- Moreover, if pesticides and insecticides end up in rivers instead of fields then they can kill aquatic life.
- Though, they can also pollute drinking water, and kill animals who will drink from it.
- So, animal agriculture, crop production, animal production and the use of pesticides all result in environmental damage if you do not manage the waste.
- The world is shifting towards reducing the emissions of greenhouse gas.
- Animal production releases about 65 percent of nitrous oxide and 37 percent of methane.
- These are harmful greenhouse gases

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Health and environmental Concerns

- The agricultural wastage ends up being dumped in landfills.
- Eventually, it burns and emits a high amount of gases that pollute the environment and contribute to climate change.
- Moreover, these emissions also harm human health.
- What's surprising is that this waste can be easily recycled and it is also beneficial for soil fertility because of its high nutrient content.
- Therefore, recycling can contribute towards sustainable agricultural production.
- There is another important environmental concern due to the accumulation of wastage. **Floods!**
- Solid wastes from agriculture, livestock and farming block waterways.
- Farmers may carelessly dump solid wastes in waterways but blockage gives rise to floods.
- Municipal solid waste and sewage sludge is hazardous waste that harms public health but also puts everyone in danger.
- Consequently, there is huge damage to lives and properties.

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Agricultural Waste Management: Ways to Control Solid Waste

A popular way to recycle crop waste is by composting.

Kitchen waste or crop wastage can also come in use as animal feed, fertilizer and bioenergy.

It converts into animal feed by sterilization, bioenergy by anaerobic digestion and fertilizer by composting.

They actually make for good compost and fertilizer as they contain nutrients and organic matter.

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Energy Source

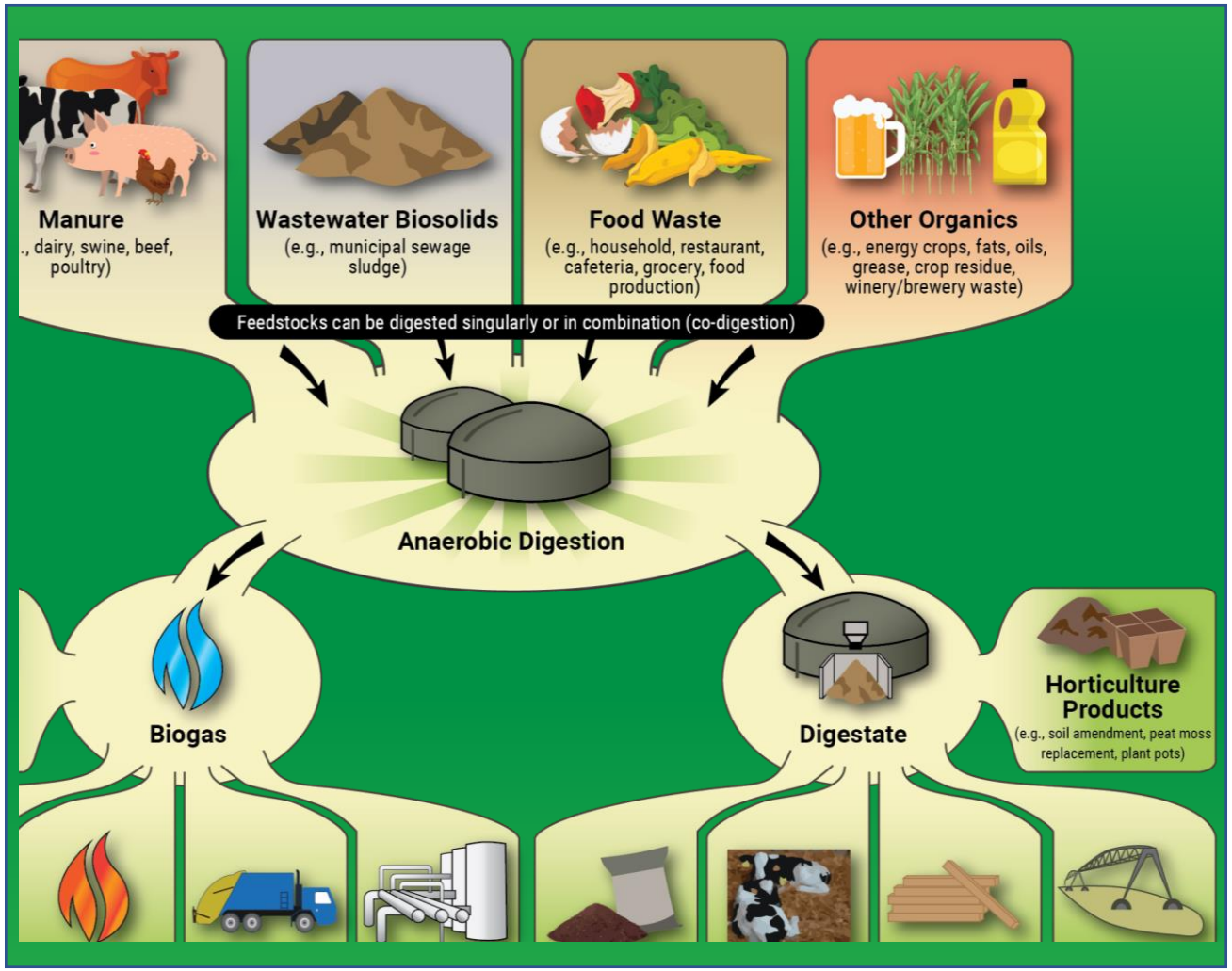
Anaerobic digestion helps convert agricultural wastage into green energy.

Bioenergy and Biofuel is a sustainable renewable source of energy that convert waste to energy.

Moreover, it also shows promise in reducing Carbon dioxide emissions.

The conversion of biomass into biofuel and alternative energy resources will decrease economic losses.

It will also overcome the release of gases by burning wastes as well as increase the production of energy.



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How Can Farmers Contribute to Waste Management?

Farmers play an integral role in controlling the wastes released by their work.

It begins by knowing your capacity and not buying more than your need.

That means you should analyze what products you use or do not use and are usually left behind.

Limit the amount of product you need so that you do not need to dump it.

Furthermore, whenever you have leftover pesticides or insecticides, do not sump them in waterways.

In fact, consider selling it or giving it to another farmer.

The same goes for surplus food products.

Either sell them in bulk at a lower price or donate them to charities and food banks.

But by all means, do not render them useless.

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How Can Farmers Contribute to Waste Management?

- Think carefully while planting crops.
- Do not invest your time and resources on plants that will not undergo a smooth harvest.
- If you cannot harvest these crops, then they will simply go to waste.
- Rather get involved in managing crop growth.
- You can do so by investing your resources in technologies that facilitate such growth.
- Moreover, you should always think about ways to recycle wastage.
- Composting too should be an essential part of crop production and farming.
- Furthermore, there should be collection systems for organized waste.
- This will help reduce waste generation and organize what is left to further sell, distribute or compost.

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Pesticides Packaging Management in Cyprus

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Collective System for their Management Cyprus: 2014

- 40 tons of plastic packages (mostly HDPE) in the market annually
- 47 shops were selected to act as collection points – eventually grew to more than 60
- Collection routes were planned
- Design of collection bags and communication material

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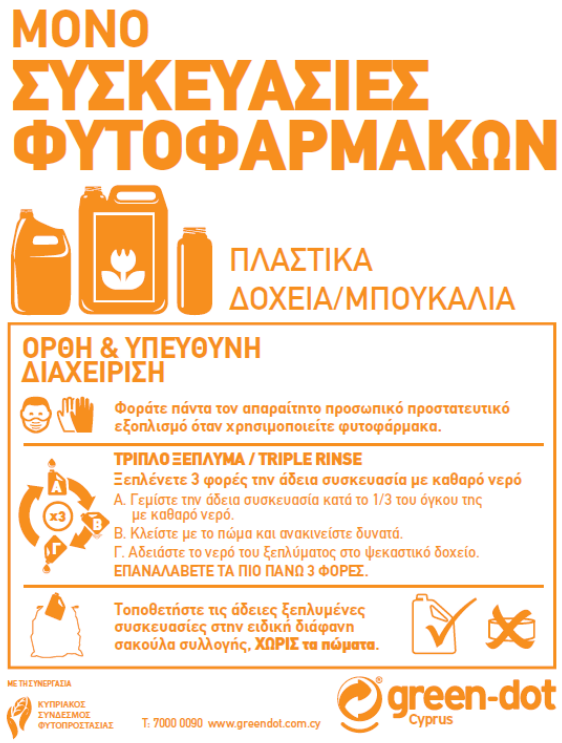
Bins and Bags



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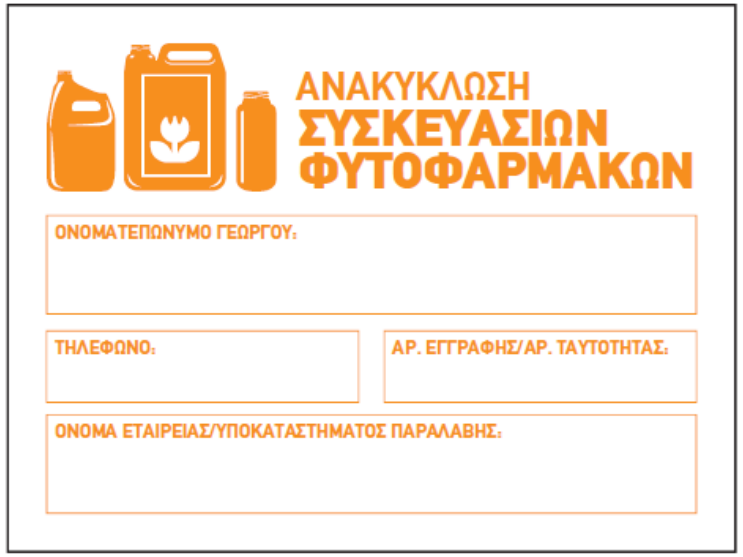
Documents



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Bin placement and collection

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License for pesticides' purchase

Source: https://www.youtube.com/watch?v=jD2mLdB__uc&t=27s&ab_channel=%CE%95%CE%BA%CF%80%CE%BF%CE%BC%CF%80%CE%AE-%CE%A3%CF%80%CE%AF%CF%84%CE%B9%CF%83%CF%84%CE%B7%CE%A6%CF%8D%CF%83%CE%B7-%CE%A1%CE%99%CE%9A

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Purchase and return of used pesticides' packaging

Source: https://www.youtube.com/watch?v=jD2mLdB__uc&t=27s&ab_channel=%CE%95%CE%BA%CF%80%CE%BF%CE%BC%CF%80%CE%AE-%CE%A3%CF%80%CE%AF%CF%84%CE%B9%CF%83%CF%84%CE%B7%CE%A6%CF%8D%CF%83%CE%B7-%CE%A1%CE%99%CE%9A

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Sorting and treatment

ENERCO
ENERGY RECOVERY LTD

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Cost to producers

	2006-2007	2008-2009	2010-2016	2017-2019
	€ per ton	€ per ton	€ per ton	€ per ton
Household				
Glass	19,03	25,27	29,06	27,61
Paper	26,67	40,99	47,14	44,78
Steel	82,95	82,95	95,39	90,62
Aluminium	15,96	18,59	21,38	20,31
PET	92,08	92,08	105,89	100,60
HDPE	92,08	92,08	105,89	100,60
Drink Cartons (Tetra Pak)	106,74	106,74	122,75	116,61
Other Recoverable	113,96	113,96	131,05	124,50
Other Non-Recoverable	136,76	136,76	157,27	149,41
Commercial/Industrial				
Paper	24,33	37,66	43,31	41,14
Plastic	23,68	32,99	37,94	36,04
Wood	8,59	10,80	12,42	11,80
Others	28,29	43,71	50,27	47,70
Pesticides				
Primary packaging that comes into contact with pesticides			400,00	380,00

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Results

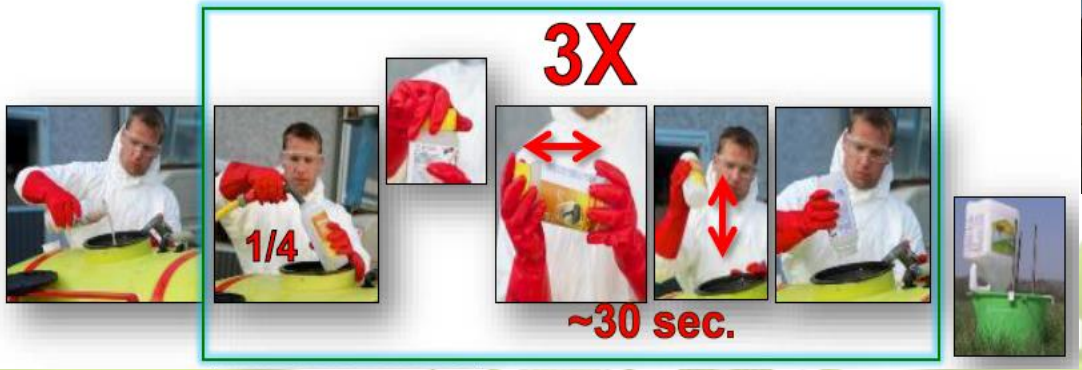
Collection Points

2014 : 47
2015: 52
2016: 59
2017: 68
2018: 67
2019: 63

2019 : 102 Bins

Year	% Collection
2015	4.1%
2016	14.3%
2017	21.7%
2018	33.3%

- ***Triple rinsing***



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Further Reading

- **Διαχείριση συσκευασιών φυτοπροστατευτικών φαρμάκων** - shorturl.at/ejLU1
- **Επιχειρηματική Κομποστοποίηση** - shorturl.at/nGQW7
- **"Οικιακή Κομποστοποίηση"**- https://eclass.upatras.gr/modules/document/file.php/CMNG2144/%CE%95%CE%A1%CE%93%CE%91%CE%A3%CE%99%CE%95%CE%A3%202020/%CE%9F%CE%9C%CE%91%CE%94%CE%91%2013%20-%20home_composting%20_final.pdf.
- **Τι είναι το «Πληρώνω Όσο Πετώ»** - https://www.aglantzia.org.cy/payasyouthrow2011/what_it_is.php
- **Στρατηγική Διαχείρισης Αποβλήτων** - http://www.moa.gov.cy/moa/environment/environmentnew.nsf/page20_gr/page20_gr?OpenDocument
- **Διευρυμένη Ευθύνη του Παραγωγού** - http://www.moa.gov.cy/moa/environment/environmentnew.nsf/page21_gr/page21_gr?OpenDocument
- **Ροές Αποβλήτων** - http://www.moa.gov.cy/moa/environment/environmentnew.nsf/page53_gr/page53_gr?OpenDocument
- **Δήμος Αγλαντζιάς - Διαχωρίζω και Κερδίζω** - https://aglantzia.org.cy/aigli/
- **Ανακύκλωση Συσκευασιών Φυτοφαρμάκων** - https://greendot.com.cy/recycling-of-pesticide-packages/

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Thank you!

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