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## Sustainable development combines economic growth, social progress and respect for the environment.



# Waste management in the product life-cycle



# Technogenic impact of waste management

- » Waste management is often seen as an industry possessing potential technogenic harm.
- » Uncontrolled dumping and improper waste handling causes a variety of problems, including:
  - > contaminating water,
  - > attracting insects and rodents,
  - > increasing flooding due to blocked drainage canals,
  - > safety hazards from fires or explosions.
- » Improper waste management also increases greenhouse gas (GHG) emissions, which contribute to climate change

### Waste management stages



## Trash vortex Should we care?





## Great pacific garbage patch



Estimated decomposition rates of common marine debris items





### Let's talk trash...

» <u>https://www.ted.com/talks/capt\_charles\_moor</u> <u>e\_on\_the\_seas\_of\_plastic?language=en</u>

# Global waste generation kg/day/cpapita



## What do we thorw away?

| Туре    | Sources  |  |  |  |  |  |  |
|---------|--|--|--|--|--|--|--|
| Organic | Food scraps, yard (leaves, grass, brush)<br>waste, wood, process residues  |  |  |  |  |  |  |
| Paper   | Paper scraps, cardboard, newspapers, magazines, bags,<br>boxes, wrapping paper, telephone books, shredded paper,<br>paper beverage cups. Strictly speaking paper is organic but<br>unless it is contaminated by food residue, paper is not<br>classified as organic. |  |  |  |  |  |  |
| Plastic | Bottles, packaging, containers, bags, lids, cups   |  |  |  |  |  |  |
| Glass   | Bottles, broken glassware, light bulbs, colored glass  |  |  |  |  |  |  |
| Metal   | Cans, foil, tins, non-hazardous aerosol cans, appliances<br>(white goods), railings, bicycles  |  |  |  |  |  |  |
| Other   | Textiles, leather, rubber, multi-laminates, e-waste, appliances, ash, other inert materials  |  |  |  |  |  |  |

## **Global waste composition**



### **Types of waste**



## Waste shipment



» Regulated by Basel convention» 185 parties







- » In Europe, we currently use 16 tons of material per person per year, of which 6 tons become waste.
- » The management of that waste continues to improve in the EU, still the European economy currently loses a significant amount of potential 'secondary raw materials' such as metals, wood, glass, paper, plastics present waste streams.
- » In 2015, total waste production in the EU amounted to 2,5 billion tons.
- » From this total only a limited share (36%) was recycled, with the rest was landfilled or burned, of which some 600 million tons could be recycled or reused.
- » Just in terms of household waste alone, each person in Europe is currently producing, on average, half of tone of waste. Only 40 % of it is reused or recycled and in some countries more than 70% still goes to landfill.

#### 7th EAP - three key objectives

- » to protect, conserve and enhance the Union's natural capital
- » to turn the Union into a resource-efficient, green, and competitive low-carbon economy
- » to safeguard the Union's citizens from environment-related pressures and risks to health and wellbeing

## Four so called "enablers" should help Europe to deliver on these goals

- better implementation of legislation
- better information by improving the knowledge base
- more and wiser investment for environment and climate policy
- full integration of environmental requirements and considerations into other policies

#### EU waste legislation



## Waste management as a causalloop diagram



## EU 2020 targets

- » Reduction of biodegradable waste sent to landfill as 35% of the 1995 level by 2020;
- » 50% preparing for re-use and recycling of certain waste materials from households and other origins similar to households, and 70% preparing for re-use, recycling and other recovery of construction and demolition waste.
- » A challenge for all or only Newer Member states?

#### Waste treatment in EU

#### Municipal waste treatment in 2017



### Municipal waste recycling rates in 32 European countries, 2001 and 2010



## Waste recycling (2014)

#### **RECYCLING RATES IN EUROPE**

|   | Germany     | 65% |   | EU average | 42% | :  | Czech Repub | lic <b>24</b> % |
|---|-------------|-----|---|------------|-----|----|-------------|-----------------|
| Ō | Austria     | 62% |   | Estonia    | 40% |    | Lithuania   | 21%             |
| Õ | Belgium     | 57% | Ō | France     | 39% | (  | Cyprus      | 21%             |
| 0 | Netherlands | 50% | 0 | Italy      | 38% | 0  | Greece      | 18%             |
| 0 | Luxembourg  | 47% | + | Finland    | 34% |    | Croatia     | 16%             |
| 0 | Slovenia    | 47% |   | Bulgaria   | 27% | 0  | Latvia      | 16%             |
|   | Sweden      | 47% | 0 | Portugal   | 27% | :0 | Slovakia    | 13%             |
|   | UK          | 46% |   | Spain      | 27% |    | Malta       | 13%             |
|   | Denmark     | 45% | 0 | Hungary    | 26% |    | Romania     | 1%              |
| 0 | Ireland     | 45% | - | Poland     | 25% | -  | So          | urce: Eurostat  |

# Economical gears in waste disposal (2012)



# Waste management cost per capita

| Country                  | % of GDP, 2010 | EUR per capita, 2010 |  |  |  |
|--------------------------|----------------|----------------------|--|--|--|
| Newer MS (since<br>2004) | 0.01 - 0.05    | 5-15                 |  |  |  |
| Belgium                  | 0.48           | 152.61               |  |  |  |
| Denmark                  | 0.66           | 283.47               |  |  |  |
| Netherlands              | 1.58           | 551.57               |  |  |  |
| Sweden                   | 0.36           | 133.37               |  |  |  |
| Austria                  | 0.75           | 247.17               |  |  |  |
| Germany                  | 0.32           | 93.42                |  |  |  |
| Switzerland              | 0.85           | 334.30               |  |  |  |



## Waste treatment option



Carpet Underlay

## Dumpsites vs. landfills





#### Dumpsites in Latvia. (Situation for 1996)



#### Landfills in Latvia (Situation for 2011)



## Waste to energy plants





#### Did you know that...?



## Key facts on food waste:

- » 1.3 billion tons of food are wasted every year
- » This amounts to US\$1 trillion dollars of wasted or lost food
- » If wasted food was a country, it would be the third largest producer of carbon dioxide in the world, after the United States and China
- » Just one quarter of all wasted food could feed the 795 million undernourished people around the world who suffer from hunger
- » Food waste generates 3.3 billions tons of carbon dioxide, which accelerates global climate change



## Key facts on food waste:

- » Food waste in rich countries (222 million tons) is approximately equivalent to all of the food produced in Sub-Saharan Africa (230 million tons)
- » A European or North American consumer wastes almost 100 kilograms of food annually, which is more than his or her weight (70 kilograms)
- » A European or North American consumer wastes 15 times more food than a typical African consumer
- » Lack of technology and infrastructure is the main cause of food waste in Africa, as opposed to household food waste in the developed world
- » Food waste in Europe alone could feed 200 million hungry people



Per capita food losses and waste (kg/year)



## Actions to be taken

#### Food Recovery Hierarchy

Source Reduction

Reduce the volume of surplus food generated

Most preferred

Feed Hungry People Donate extra food to food banks, soup kitchens and shelters

> Feed Animals Divert food scraps to animal feed

Industrial Uses Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

> Composting Create a nutrient-rich soil amendment

Landfill/ Incineration Last resort to disposal

## **EU Circular Economy action plan:**

- » elaborate a common EU methodology to measure food waste consistently in co-operation with Member States and stakeholders
- » create a new platform (EU Platform on Food Losses and Food Waste) involving both Member States and actors in the food chain in order to help define measures needed to achieve the food waste SDG, facilitate inter-sector co-operation, and share best practice and results achieved
- » take measures to clarify EU legislation related to waste, food and feed and facilitate food donation and the use of former foodstuffs and by-products from the food chain for feed production, without compromising food and feed safety
- » examine ways to improve the use of date marking by actors in the food chain and its understanding by consumers, in particular "best before" labelling.
- » <u>https://www.youtube.com/watch?v=IoCVrkcaH6Q</u>



Only 9 percent of all the plastic waste generated in 2012 was recovered for recycling.



## Let's talk plastics

## Historical insight

- » 1839 Polystyrene has been discovered;
- » 1900 development of cellophane
- » 1910 creation of rayon
- » 1930 introduction of scotch tape first transparent sticky tape made of cellulose
- » 1935 nylon was created
- » 1945 squeezable plastic bottles appear
- » 1958 Lego creates pegged blocks from cellulose acetate
- » 1969 Neil Armstrong places a nylon flag on the moon







## **Historical insight**

- » 1976 plastic is recognized as most commonly used material in the world
- » 1982 first artificial heart made of polyurethane is implanted
- » 1990 US plastics industry comprises 1.5 million employees
- » 2001 Apple introduces first iPod made of polystyrene & other plastics
- » 2008 Nike releases "Trash Talk" sneakers, made of scraps of polyurethane foam
- » 2015 Polartec (recycled textile solution company) announces their billionth recycled plastic bottle enough to create approx. 27 million new fleece jackets.













### Marine littering – cause of unsustainable consumption

Proportion of marine litter categories on reference beaches



Figure 8 in OSPAR Commission (2007); See also OSPAR Commission (2009).

- Annually over 8 million t of plastics reach the oceans;
- Plastic bottles require ~450 years to biodegrade in water;
- 260 spiecies worldwide are at risk of consuming plastics with hazard to their lives;
- Annually over 100 000 marine inhabitants: whales, turtles, dolphines suffer from plastic waste



Image by David Jones, Just One Ocean



70% from marine litter are single use plastic (43%) + fishing gear (27%)

#### **Proportional distribution**

| Rank | Product  |  |  |  |  |  |
|------|--|--|--|--|--|--|
| 1    | Beverage containers, caps & lids                     |  |  |  |  |  |
| 2    | Tobacco product filters                              |  |  |  |  |  |
| 3    | Cotton bud sticks                                    |  |  |  |  |  |
| 4    | Packets and wrappers (such as for crisps and sweets) |  |  |  |  |  |
| 5    | Sanitary items                                       |  |  |  |  |  |
| 6    | Plastic bags   |  |  |  |  |  |
| 7    | Cuttlery, stirers, straws                            |  |  |  |  |  |
| 8    | Cups for beverages & lids                            |  |  |  |  |  |
| 9    | Balloons & sticks                                    |  |  |  |  |  |
| 10   | Food container                                       |  |  |  |  |  |

## Single use plastic Directive proposal





- to prevent and reduce the impact or certain plastic products on the environment, in particular the aquatic environment, and on human health
- to promote the transition to a circular economy with innovative business models, products and materials, also contributing to the efficient functioning of the internal market.



#### **Foresees:**

- Consumption reduction (part A)
- Restrictions on placing on the market (part B)
- Product requirements (part C)
- Marking requirements (part D)
- Extending producer responsibility (fishing gear + part E)
- > PET bottle 76% separate collection target (part F) for 2025
- » and 90% in 2030.

|                                      | Consumption | Market      | Product     | Marking      | Extended | Separate   | Awareness |
|--------------------------------------|-------------|-------------|-------------|--------------|----------|------------|-----------|
|                                      | reduction   | restriction | design      | requirements | producer | collection | raising   |
| Food containers                      | x           |             | requirement |              | x        | objective  | X         |
| Cups for                             | A           |             |             |              | A        |            | <u>л</u>  |
| beverages                            | x           |             |             |              | X        |            | X         |
| Cotton bud sticks                    |             | X           |             |              |          |            |           |
| Cutlery, plates,<br>stirrers, straws |             | х           |             |              |          |            |           |
| Sticks for balloons                  |             | X           |             |              |          |            |           |
| Balloons                             |             |             |             | Х            | X        |            | X         |
| Packets &                            |             |             |             |              | x        |            | x         |
| wrappers                             |             |             |             |              | A        |            | A         |
| Beverage                             |             |             |             |              |          |            |           |
| containers, their                    |             |             | X           |              | X        |            | X         |
| caps & lids                          |             |             |             |              |          | 37         |           |
| - Beverage boules                    |             |             | X           |              | X        | X          | X         |
| filters                              |             |             |             |              | х        |            | x         |
| Sanitary items:                      |             |             |             |              |          |            |           |
| - Wet wipes                          |             |             |             | X            | X        |            | X         |
| - Sanitary towels                    |             |             |             | X            |          |            | X         |
| Lightweight                          |             |             |             |              | x        |            | x         |
| plastic carrier bags                 |             |             |             |              | ~        |            | ~         |
| Fishing gear                         |             |             |             |              | X        |            | X         |



#### **Foresees:**

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- Restrictions on placing on the market (part B)
- Product requirements (part C)
- Marking requirements (part D)
- Extending producer responsibility (fishing gear + part E)
- > PET bottle 76% separate collection target (part F) for 2025
- » and 90% in 2030.

- **Producer responsibility schemes** to be expanded to part E and fishing gear.
- » <u>PR schemes will have</u>:
- general minimum requirements,
- particular additional requirements for
- » financial guarantees and marine cleanup.





### **! NOT against use of plastics**

Different scenarios have been evaluated:

Need to limit the consumption of single use items, which are partly or fully made of plastics;

Need to collect and regenerate fishing gear, which is partly or fully produced of plastics.

**Definition of plastics**: Polymere, according to REACH definition, except natural polymeres, which have not been chemically modified







#### Criterias for actions





#### Thank you for your attention

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