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WOOD in CIRCLE

Waste Management

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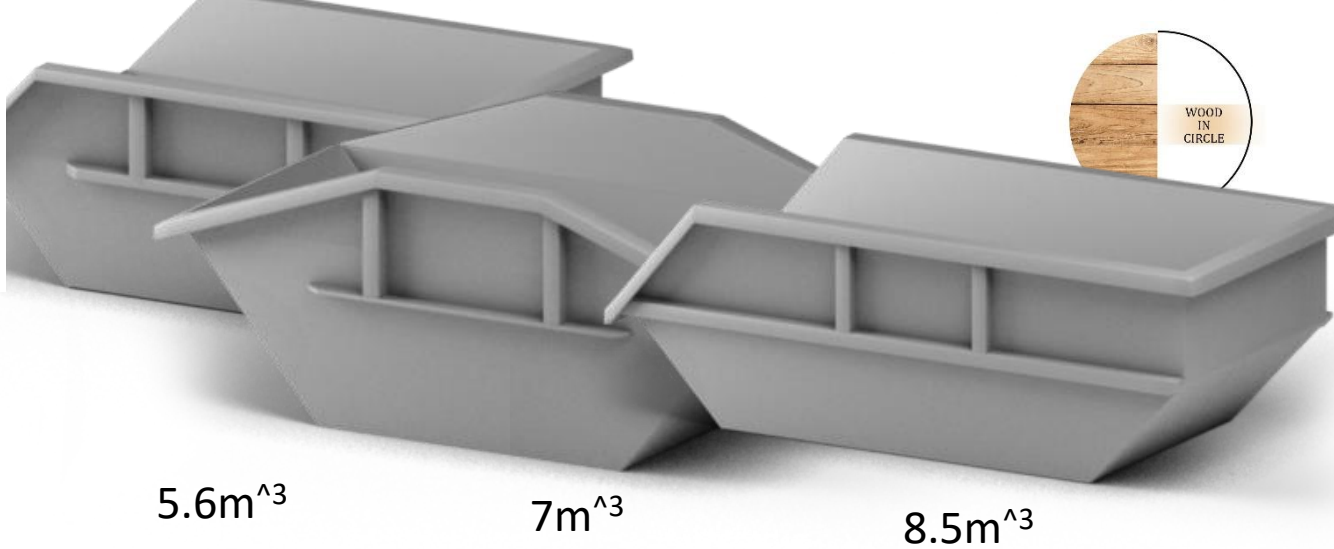
For Discussion - Waste in General

- Please name most common waste: _____ ?
- What are consequences of this waste? _____
- What management domain it would be? _____

Waste as cost vs. income /revenue source = changing landscape for waste management

Waste Containers – Paid Service Usual Concern in Construction– Solid Waste, Sample



Usual planning points (Service provider offer sample)

- Service companies provide installation and removal of containers with a volume of 5.5 to 30 m3.

- Container rental free of charge for the first *xx calendar days.
- Container rental is not required on public holidays.
- The price is also affected by the location of the service. (Transport fees)

IMPORTANT!
When applying for the removal of construction waste, the width of the gate, trees and other obstacles shall be assessed.
The installation of construction containers on the **carriageway** or **pavement** must be agreed with the **municipality**.

Is that all it takes ?

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Drivers to Companies to Optimize the Waste Management

- Legal compliance
- Risk minimization
- Disposal security
- Implementation of waste minimization measures
- Cost reduction
- Positive image
- Motivation
- Certification requirement EMAS, ISO 14001

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Waste Management …
Simply arranging containers in the company, is it!?

1. Legal compliance with relevant regulations (Waste)
2. Setting up Company(Project)-specific waste logistics (Processes/ Procedures)
   a) Determine waste streams according to type of waste, waste volumes and costs
   b) Identify weak points of waste logistics
   c) Determine minimization and cost reduction potentials
3. Information/motivation/awareness (HR/Strategy)
4. Continuous controlling (Controls/QA)
   a) Define, implement and monitor measures

Waste Management Targets

«DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008

- 2. In order to comply with the objectives of this Directive, and move towards a European recycling society with a high level of resource efficiency, Member States shall take the necessary measures designed to achieve the following targets:

  (a) by 2020, the preparing for re-use and the recycling of waste materials such as at least paper, metal, plastic and glass from households and possibly from other origins as far as these waste streams are similar to waste from households, shall be increased to a minimum of overall 50 % by weight;

  (b) by 2020, the preparing for re-use, recycling and other material recovery, including backfilling operations using waste to substitute other materials, of **non-hazardous construction and demolition** waste excluding naturally occurring material defined in category 17 05 04 in the list of waste shall be increased to a minimum of 70 % by weight.

*There are specific Waste material types identifed: paper, metal, plastic and glass,....

Article 14 Costs

1. In accordance with the **polluter-pays principle**, the costs of waste management shall be borne by the original waste producer or by the current or previous waste holders.

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32008L0098

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Nr.	Waste categories	Value %, Base Year	Waste management targets by years,%				
			2023	2025	2029	2030	2035
Directive 2008/98/EK							
1.	A separate collection system has been set up:						
1.1.	bio-waste	-	X				
1.2.	textile waste	-		X			
1.3.	household hazardous waste	-		X			
2.	Quantities of municipal waste recycled (% of generated)	43,8 (2018)		55	-	60	65
Directive 1994/62/EK							
3.	Total quantities of packaging waste recycled (% of generated), including:	58,82 (2018)		65		70	
3.1.	Plastic	35,81 (2018)		50		55	
3.2.	A tree	27,31 (2018)		25		30	
3.3.	Metals	71,34 (2018)		70		80	
3.4.	Aluminum			50		60	
3.5.	Glass	68,84 (2018)		70		75	
3.6.	Paper and cardboard	82,89 (2018)		75		85	
Directive 2019/904/ES							
4.	Volume of disposable plastic beverage packaging collected (% of the volume of relevant packaging placed on the market in the relevant year)			77	90		
Directive 1999/31/EK							
5.	Amount of municipal waste disposed of in landfills (% of the amount of municipal waste generated)	63,8 -2019					10

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Article 3 Definitions

For the purposes of this Directive, the following definitions shall apply:

1. A '**waste**' means **any substance or object** which the **holder discards** or intends or is required to discard;

6. **'waste holder'** means the **waste producer** or the natural or legal **person** who is in **possession** of the **waste**;

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shavings

Article 5 By-products

1. A substance or object, resulting from a **production process**, the primary **aim** of which is **not the production of that item**, may be **regarded as not being waste** referred to in point (1) of Article 3 but as being a by-product only if the following conditions are met:

   (a) <u>further use of the substance or object is certain</u>;

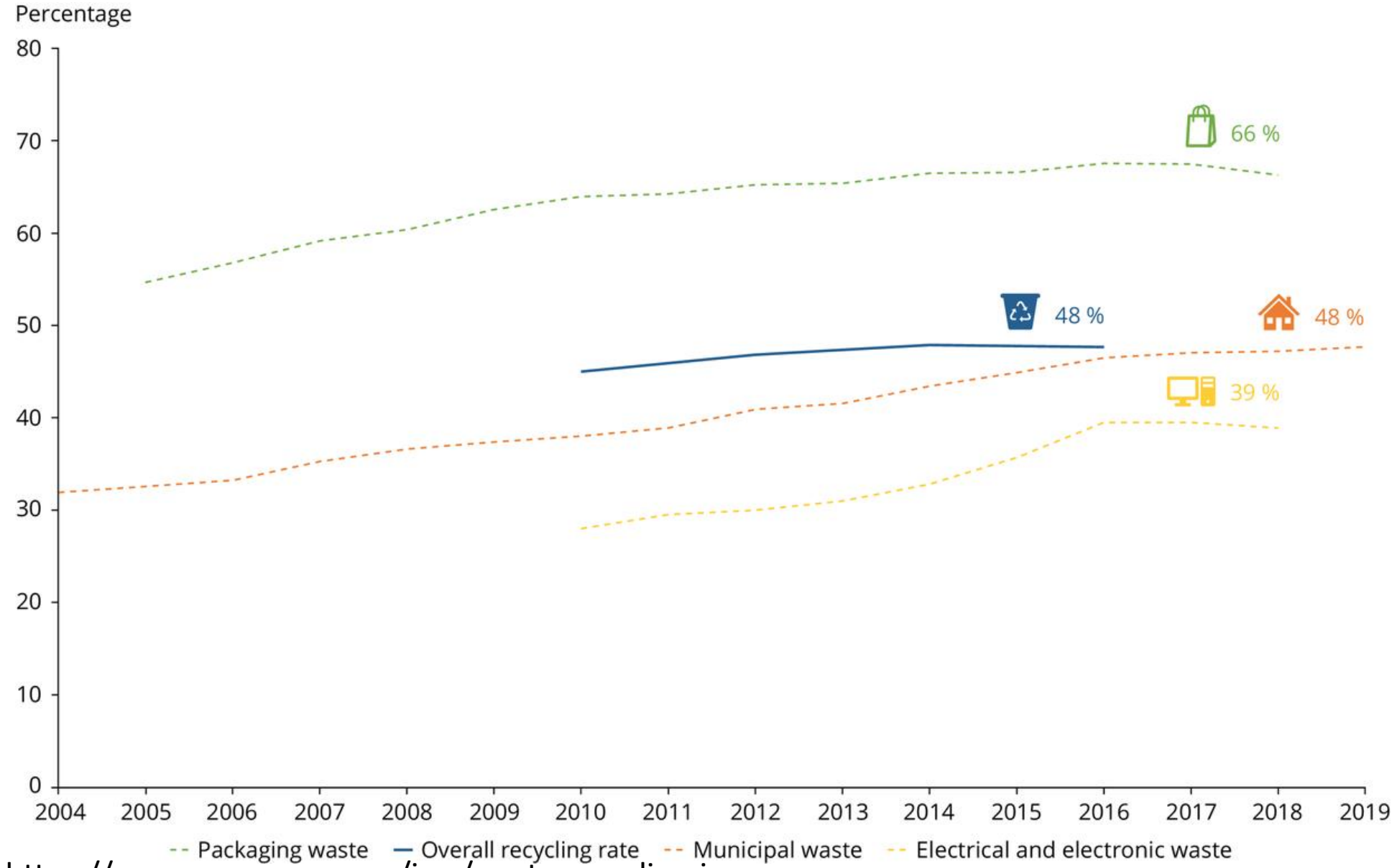
   b) the substance or object can be used directly without any further processing other than normal industrial practice;

   (c) the substance or object is produced as an **integral part of a production process**; and

   (d) further use is lawful, i.e. the substance or object fulfils all relevant product, environmental and health protection requirements for the specific use and will not lead to overall adverse environmental or human health impacts.

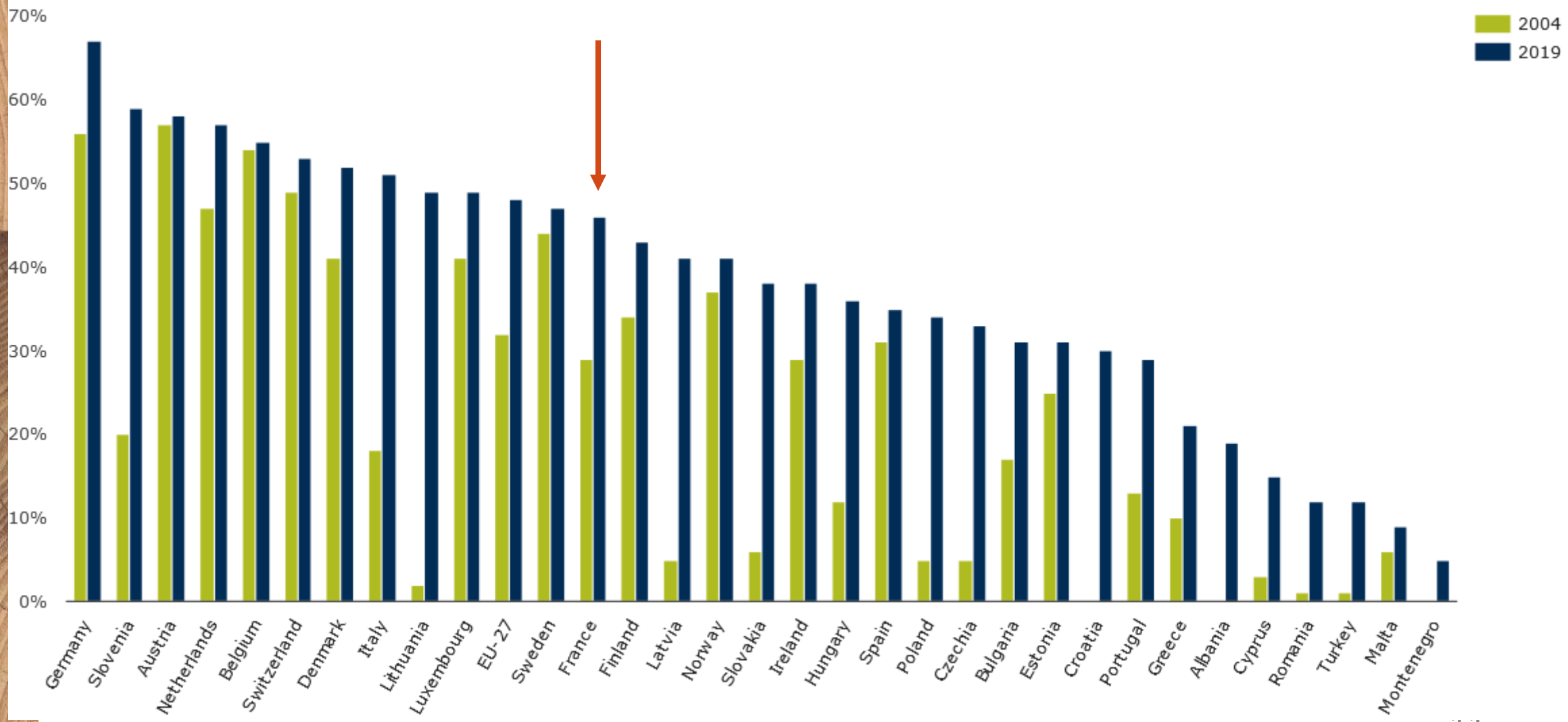
=> Innovations are changers

Waste recycling dynamics (2019)

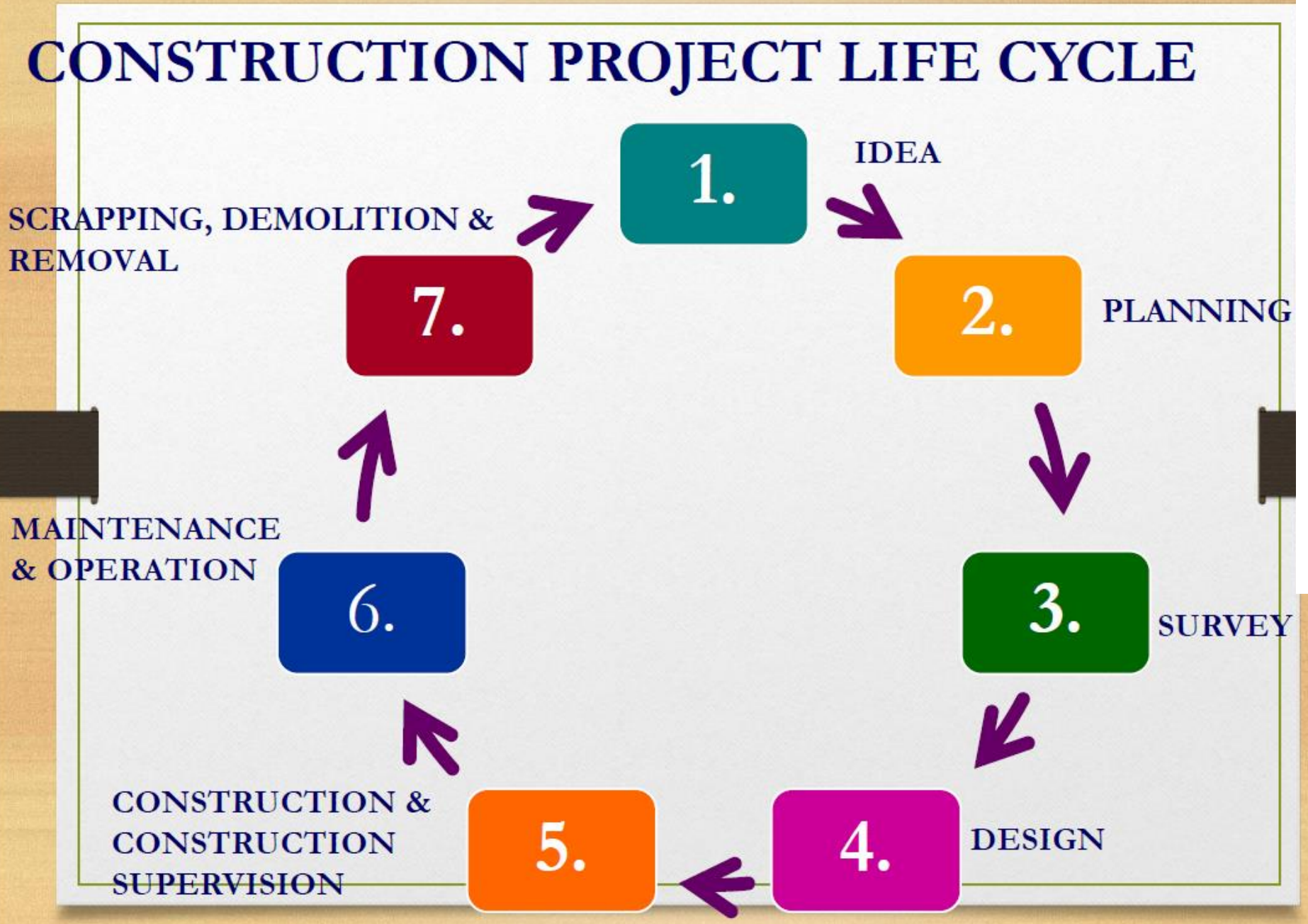


https://www.eea.europa.eu/ims/waste-recycling-in-europe

Waste Recycling Status (2019)



https://www.eea.europa.eu/ims/waste-recycling-in-europe



- Waste management in projects have to be done for **particular scope of work**, and alligned with general contractor waste management process
- Waste is also part of planning!
  - Unnecessary waste = poor planning (Processes /materials /execution) => cost increase

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Construction Waste

- **Construction waste** is defined as waste generated during **construction, renovation** and **demolition** of buildings, as well as **leftovers** and damaged **materials generated** during the construction **process** or materials that are used **temporarily** on the construction site.
- Construction waste from a residential house usually contains concrete, wood, metals, gypsum boards, oils, **chemicals** and roofing materials (Solid, Liquid, Gaseous – special cases).
- Due to their significant volumes, construction **waste** would **occupy** huge **landfill sites**.
- Construction waste may also contain substances that are hazardous to the environment and human health.
  - Improper disposal can cause soil contamination.
  - Precipitation can contaminate groundwater.
  - Penalties for unproper waste management
- The **initial dismantling process** is very important to **prevent** the disposal of any **hazardous** substances.

*** Construction** usually produces **cleaner** materials than **demolition** waste.

* Special containers are ordered for debris collection.

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Challenges of Recycle & Reuse of Construction Waste in Projects

- Insufficient Technologies and Facilities
- Time Consuming and Tedious (man-h)
- Lack of Standards (Definitions)
- Lack of Well-Recycling Market (Ecosystem)
- Lack of Fund and Support by the Government
- Insufficient Regulations (different classification in different industries)
- Risk of Contamination (Batch/container classified as Unsorted)
- Transformation and Disposing Costs (sorting/storing, handling,...)
- Collecting and Transport Costs (Service)
- Lack of Planning for Waste management (miss to plan)
- Lack of Awareness (also customer)

'Waste' means any object or substance which the holder discards or is required to dispose and which corresponds to the categories set out in the waste classification – check local requirements

The requirements in **general Waste menagement** specified **do not apply** to such waste (in essence) as:

- gaseous emissions into the atmosphere;
- radioactive waste;
- animal carcases and manure and other substances of natural origin arising from or are used in agriculture;
- sewage, except liquid waste;
- **explosives**;
- waste resulting from prospecting, extraction, treatment and storage of mineral resources processes.

Special treatement and waste management required for Hazardous waste!

"Hazardous waste" means waste which has one or more properties which make it hazardous to human life and health, to the environment or to the property of persons and which meet the **categories** of **hazardous** waste specified in the waste **classification** ";

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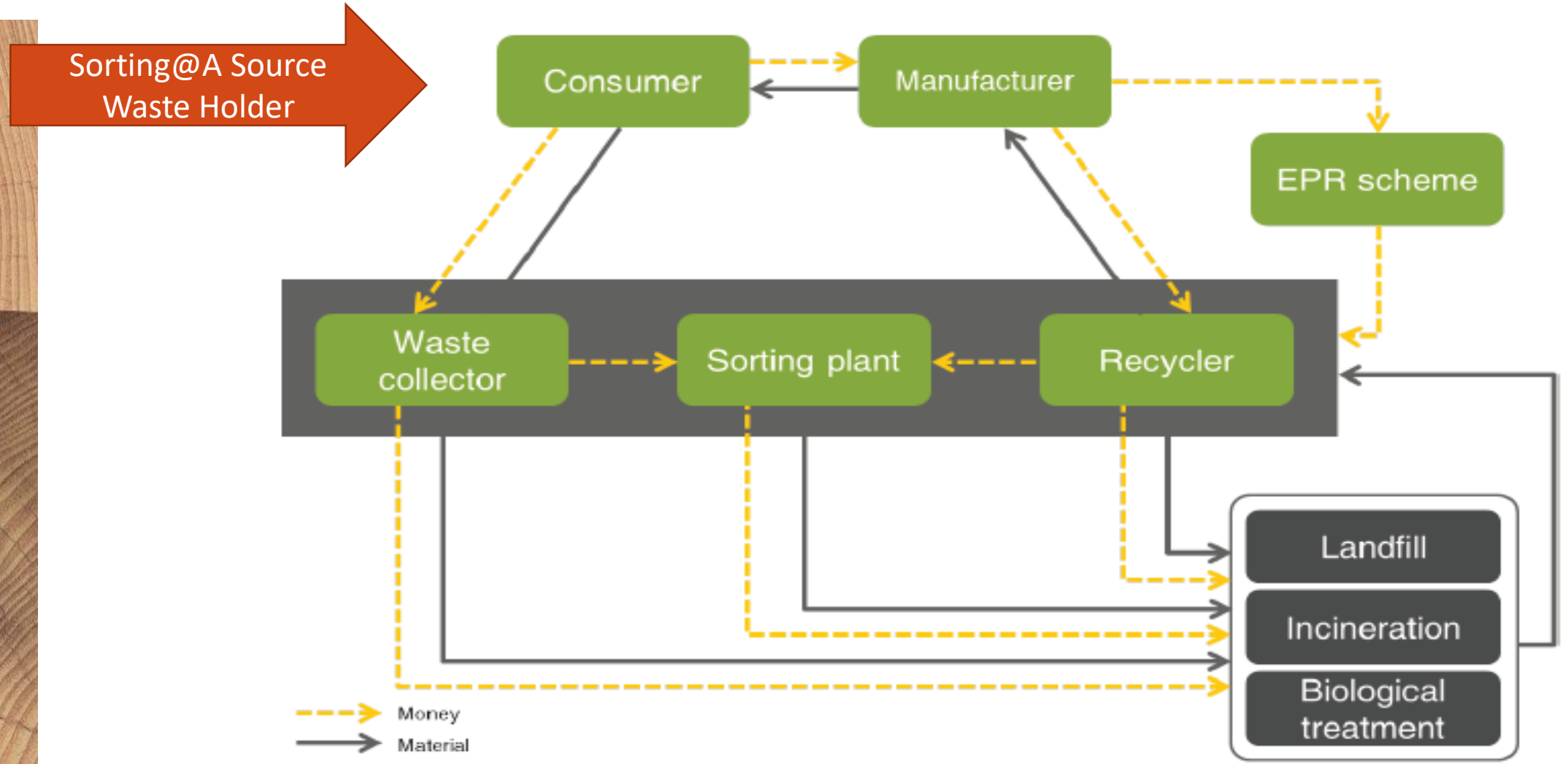
Waste Management Planning Aspects in Construction

- Mandatory process in construction
- Reusable material ownership Recycable, reusable Waste –Have to specify in agreements with client
  - Materials for demolition vs. leftovers
  - Reusable/recycable materils from particular process
    - Wood materials (Old Wood,reusable wood);
    - Metals;
    - Black earth (soil);
    - Sand(rubble, gravel)
    - other solid
- Proper management = Cost Saving/revenue opportunities

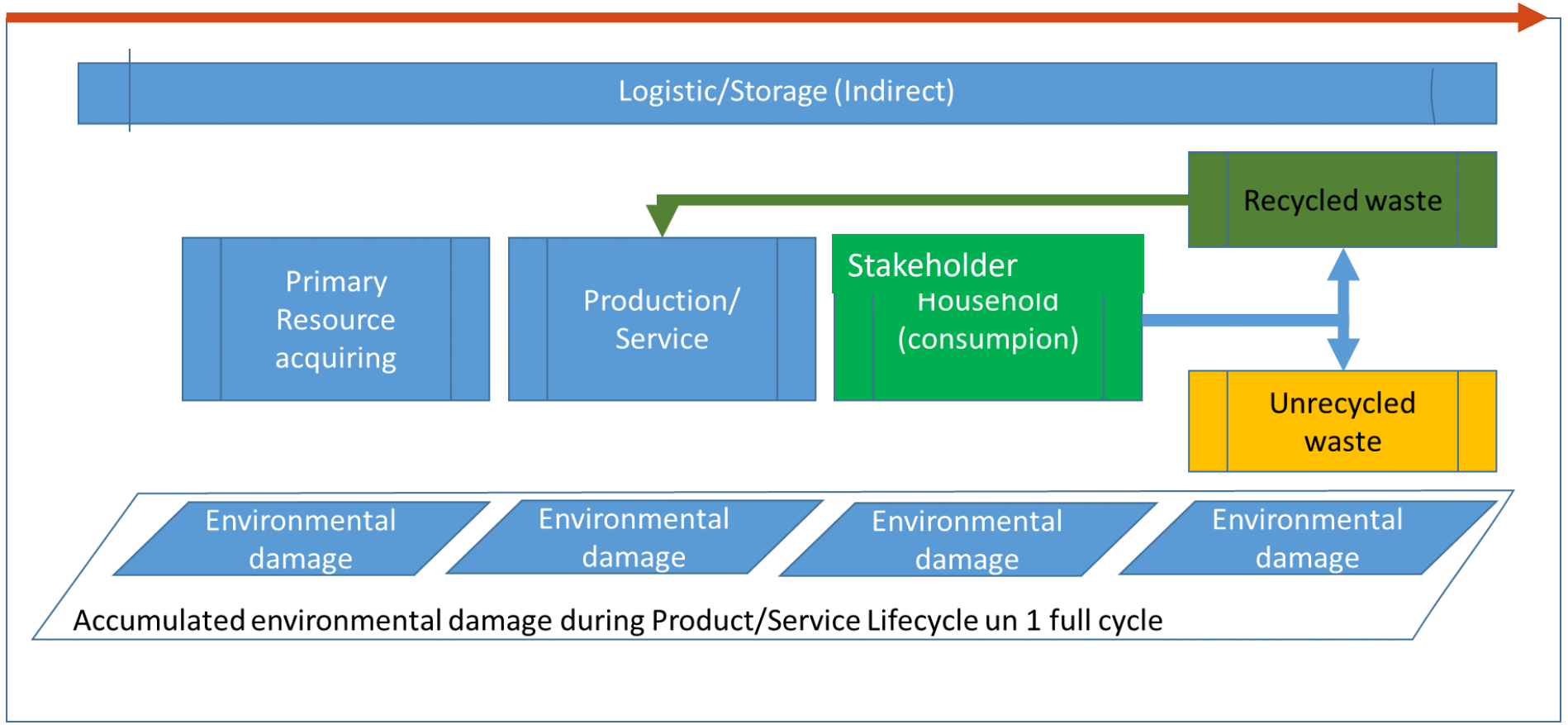
Generalized Waste Management ValueChain High Level Model (ISWA 2019)



ISWA - International Solid Waste Association

Simplified One Cycle Lifecycle Model for Waste Sorting for a Stakeholder (Household, Company or an Organization)

Simplified Value Chain



When economic value is generated, when consumed?

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Sample Economic Instruments to Stimulate Waste Sorting/Recycling

- Waste disposal & treatment fees (landfill & incineration) – ever increasing ....
- Pay-as-you-throw (PAYT) schemes
  - Sample - DEPOSIT-BASED SYSTEM - Decrees on the recycling of different **packages** come all the way from the EU.
  - No fees for Sorted Waste
- Producer responsibility schemes

Activity/Process/Stage Assesment Sample
Activity with Waste Processes Identified for Stakeholder

Material Components in product (Service aquisition)
- Solid
- Liquid
- Gaseous

Energy
- Electicity
- Fuels
- Effort

Residual Waste/ Environmental Impact In previous steps

Logistic waste

Governing
- Regulations
- Waste Operator service rules
- Waste operator charges for different waste types

Activity: Product/ Service use

Support
- Infrastructure:
  1) House
  2) Operator
- Instructions
- Environmental Awareness

Benefit (Quality of life) + Extended usable life of product

Waste
- Solid waste
  - Solid waste: Sorted
  - Solid waste: Un-Sorted
- Liquid waste
- Gaseous waste
- Dangerous/Special care waste

Trade-offs (Alternative costs)

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7 Steps in Waste Management Process (Operator as a Service)

- Collecting Wastes
- Sorting
- Storing
- Marking/Labeling
- Packing
- Transporting
- Final Disposal (recycling, reuse ....)

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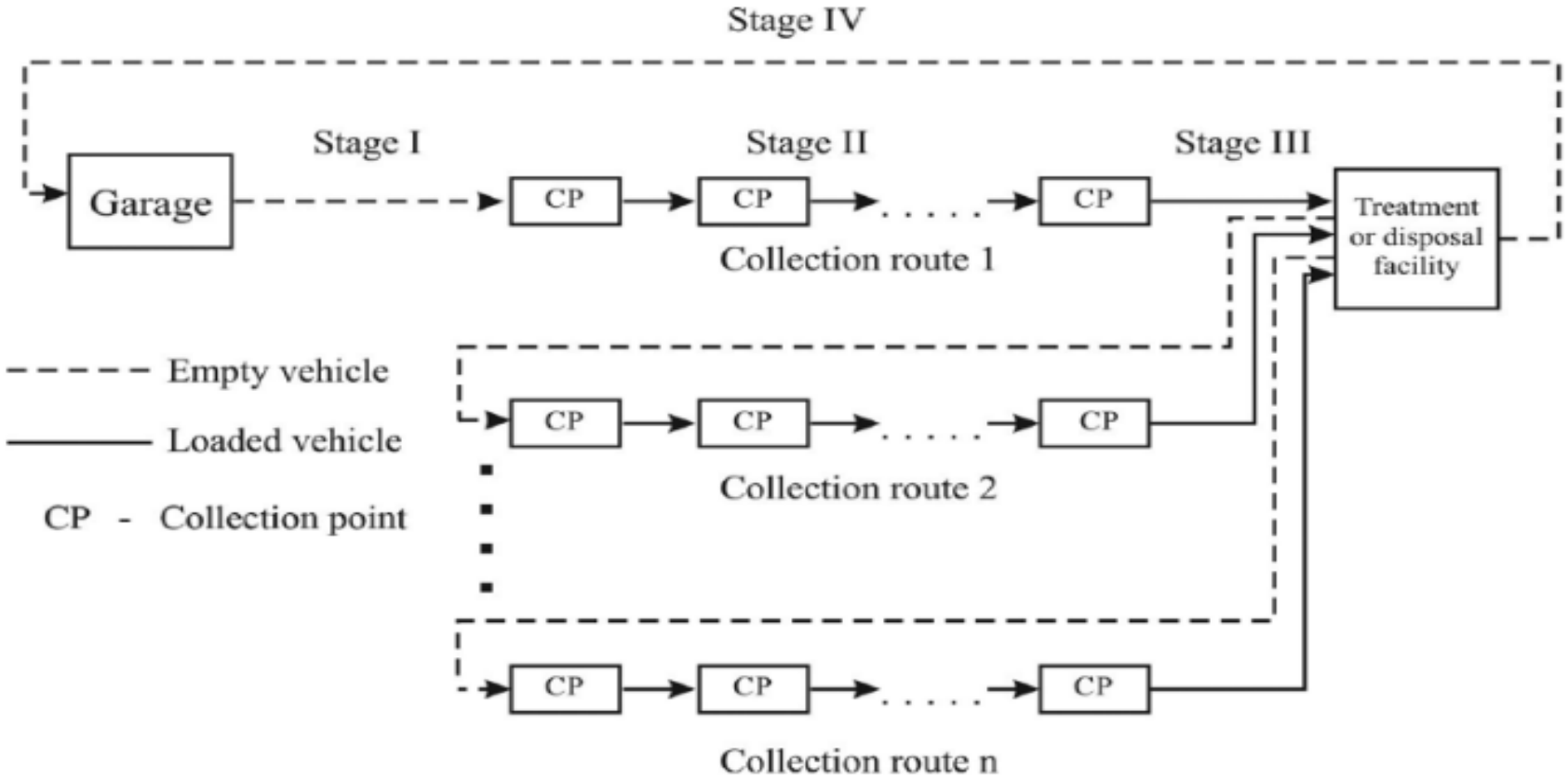
Collection route.(Boskovic et al. 2016)



- For operator **services** cost and price for **clients** calculation while limiting **assessment** to the cost and value chain aspect **of operator** and primarily **internal**,
- **Operator centralized** analysis recognizes manufacturing and costs for household as external

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Household /vs Production Company Waste

- The **waste sorting by manufacturers** are not analysed in depth as important differences:

1. High waste homogeneity input for waste sorting
2. Homogeneous waste management

- Resulting in better efficiency and are managed directly as imposes direct environmental costs (environmental/pollution related taxation/ regulative incentives).

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Sample discussion
What do You see
Where and «that do You see»

Who is responsible for waste?

Name waste ....

It tastes - Like sour Yogurt

Use Case – Food plastic Bottle steps before sorted waste ½ (Additional slides)

Primary product: Sour milk product
In picture: Recycable packaging
(Unsorted waste)

Case – consider what it requires prepare it as a sorted waste and attempt to identify «costs» in natural units

Use Case – Food plastic Bottle steps before sorted waste 2/2 (Additional slides) - Analysis

Primary product: Sorted waste (recycable plastics 2 colors)
In picture: Recycable packaging cleaned (required to be recognized as sorted waste)

<u>Resources:</u>

Time: 2 minutes
Supplies: Detergent, Brush, Plastic waste storage bin
Resources: Water ~ 4 Liters
Performer: Adult
Distance: For sorted plactic depositing 4 km, time needed 15 min (Car)

- Considerations – Needed to use Hot water to wash (energy)
- Under question – Need for lebel removal (additional effort /cost)
- Resource use in case of **activity performed** by a **Child (4Years old)**

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Waste Management Principles

- Good planning (Processes)
- Good design (both processes and material management)
- Reusable material composition and easy to sort
- Energy use minimal

Plan for constructed object waste management .... (Primary Design phase for main project)

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Construction waste can be divided into three main groups:

- Materials after demolition or removal of buildings - concrete and reinforced concrete structures, bricks, metal, wooden structures, ceramic products, tiles, etc.
- After road and street repairs - cement with binders, bitumen, **excavated earth**, etc.
- Hazardous «building» materials - asbestos, glass wool etc.

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Chornobyl ,Ukraine

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Safety Measures During Demolition of Buildings

- All staff will have a tour of the site and a toolkit to discuss methods and environments
- Fire and emergency plans are prepared and included in the health and safety instructions.
- Of course, measures are taken to reduce and monitor dust, noise and vibration.
- The entire workforce wears full Personal Protection equipment.
- Occupational health examinations are performed regularly for all demolition workers.

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Demolition Specific Challenges

- When it is not separated at source, construction and demolition waste can also contain small amounts of hazardous materials such as solvents and asbestos. These can pose particular risks to the environment and impede recycling (both building /situation).
- Sizing amounts to handle might be insignificant (designing /implemening processes = hight overhead)
- City area (narrow working area)
- Archeological findings
  - *Explosives /dangerous items
  - Graves
  - ….

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- What are 3 main Waste management aspects mentioned in presentation?
- Are they all ?

- What is one of first steps what is basis for proper scope implementation in a project (also for waste management)

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Thank you!
Questions?