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## Lecture 2: Collection and transport

# Practises in Household Waste Collection

**Waste collection** is organised by:

- Waste producer or property holder (Finnish Waste Act, Section 7)
- Garden waste, food waste and toilet waste can be composted on the property
  - rules how to do it
- Information to be given to the authority

## **Waste transport**

- Waste holder shall take care that transport is organised (WA, section 8)
- Waste transporter has to take the waste to a facility specified by waste holder or authority (WA, section 9)
- Municipality is responsible for organising waste transport (WA, section 10)
  - for all household wastes including septic tank and cesspit sludges
  - for enterprise wastes comparable to household wastes, if situated on a housing property
  - for public operators
  - Transport organised by municipality itself, or using services of a company
- Waste transport scheme = systems and activities organised by a municipality for waste transport. Waste holder shall subscribe to waste transport scheme.

# Waste Act

## ***Municipal waste management regulations (WA, section 17)***

Municipalities can issue local general regulations on more detailed implementation of the provisions of Ch.3 in WA and of Government general regulations issued under them.

Regulations may concern:

- 1) waste collection, sorting, storage, transport, dealing, recovery or disposal and the technical requirements for them
- 2) measures required to prevent hazard or harm to health or the environment
- 3) supervision of waste management.

***Government*** can issue general regulations concerning waste management implementation (WA section 18)

# Municipal waste management in Mikkeli (example)

Mikkeli and neighbouring municipalities founded a company (Metsä-Sairila) to organise waste management

Metsä-Sairila is responsible for all tasks of municipalities in waste management excluding

- Authority tasks like acceptance of local regulations and charges (payments)
- Authority decisions

## Responsibilities of Metsä-Sairila

- Recycling
- Hazardous wastes
- Composting of separately collected bio waste and sludge
- Planning, developing, coordination and information
  
- Also treatment facilities; enlargement ; after care of landfill site.

# How waste management is implemented

Waste transport schemes for household wastes and similar other wastes:

In densely populated area: Property owner makes an agreement with waste transporter (contractual waste transport scheme)

Sparsely populated area: Subscribing to waste transport scheme (announcement to Metsä-Sairila)

## Possibilities

- Waste collection sites.
  - About 60 in the region. Annual charges.
- Collection at the property
  - Agreement with a waste transporter
  - Forbidden to use of collection sites
- Two or more properties may combine their efforts and share a waste bin

# Waste collection

## Requirements for waste bins:

- Durable (weather and damage)
- Closed, sealed (rats, birds)
- Large enough
- Easy to empty
- Low noise when emptying

## Classification of bins

- Single use bags / reusable bins
- Surface waste bins / deep collection bins
- Waste bins (120 – 750 litres)
- Waste containers (4 - 12 m<sup>3</sup>)
  - Stationary
  - Hauled
- Hauled dumpsters (5 - 35 m<sup>3</sup>)



Waste management and recycling - Collection and transport

# Household waste collection

## Private household

Biowaste has to be collected separately or composted at home.

Typical private household system includes at least

- bin for mixed waste
- bin for biowaste

Other, recyclable waste is taken to collection sites.



# Housing company waste

## Mixed waste

- large bins to be emptied
- To reduce the volume of waste
  - Compressor or baler
- Also large containers used as storage for waste
  - Truck hauls the container to waste station to be emptied
  - Requires plenty of space to haul the container on the truck



## If more than 5 apartments:

- separate collection of also paper and cardboard

## If more than 18 apartments:

- waste bins in addition for glass, metal and liquid carton

## Color symbols

- Green □ paper      Grey □ mixed waste
- Brown □ biowaste      Yellow: liquid cartons





# Public waste collection sites

Waste collection at public sites is done at places, where

- Amount of waste is high
- Emptying is done seldom

Necessary to

- Have large bins
- Moderate temperatures around the year
- Odor has to be prevented

Typical places eg.

- Remote places
- Recreation areas
- Parking/resting areas
- Public buildings (schools...)

# Public waste collection sites

Modern solution is often deep collection bins (MOLOK)

- Most of the structure is hidden in the ground
- The wastes are in a bag that is lifted up and emptied into a truck
- Benefits
  - Small space demand
  - Emptying is easy
    - less space demanding
    - Possible even by boat
  - Hygienic for biowaste – temperature stays low even in summer
  - Quite fire safe

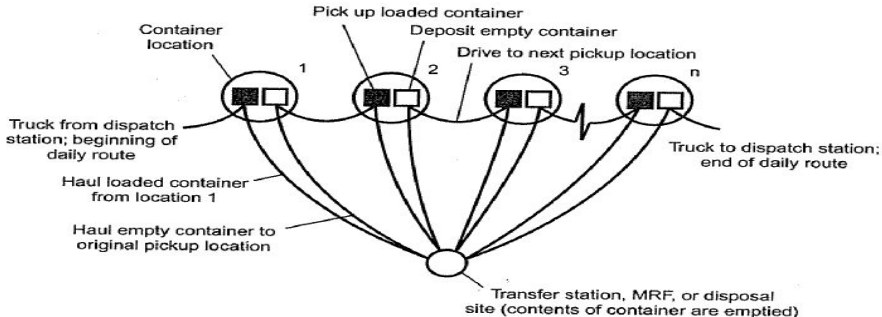
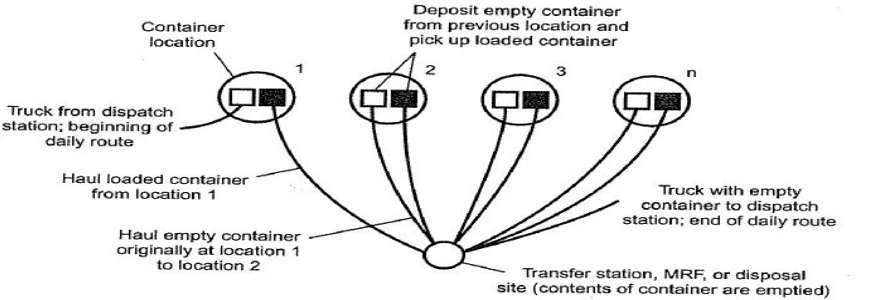
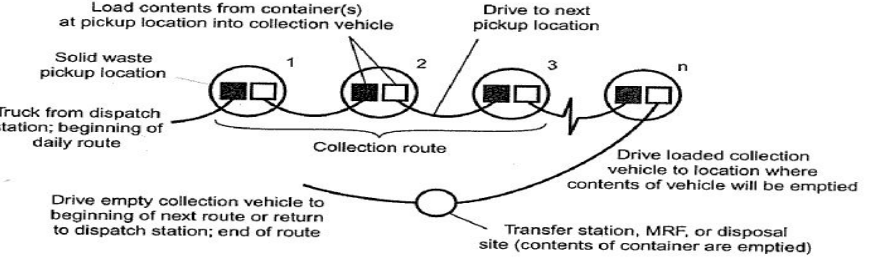


# Logistics in waste transport

The waste transport has to be planned economically

The collection system depends on the equipment.

**TABLE 7.4** Systems for the Collection of Solid Waste

Schematic of operational sequence	System description
<p>(a) Hauled container system (conventional mode)</p> 	<p>Containers used for the storage of wastes are hauled to an MRF, transfer station, or disposal site, emptied, and returned to their original location.</p>
<p>(b) Hauled container system (exchange container mode)</p> 	<p>Containers used for the storage of wastes are hauled to an MRF, transfer station, or disposal site, emptied, and returned to a different location in the exchange mode of operation. The exchange mode works best when the containers are of a similar size. In the exchange mode, the driver must begin the collection route with an empty container on the vehicle to be deposited at the first collection site.</p>
<p>(c) Stationary container system</p> 	<p>Containers used for the storage of wastes remain at the point of generation, except when they are moved to the curb or other location to be emptied. The collection vehicle is driven from pickup location to pickup location until it is loaded fully.</p>

# Waste collection trucks for option C



**FIGURE 7.2** Typical example of mechanized collection vehicle with mechanical articulated pickup mechanism used for the collection of domestic source separated and comingled waste placed in a dual compartment container (see insert) (courtesy Heil Environmental Industries, Ltd.). The large containers equipped with wheels are brought to the curb by the homeowner. In some locations, helpers are used to bring the loaded containers to the curb, and the homeowner is responsible for returning the container to its storage location.



(a)



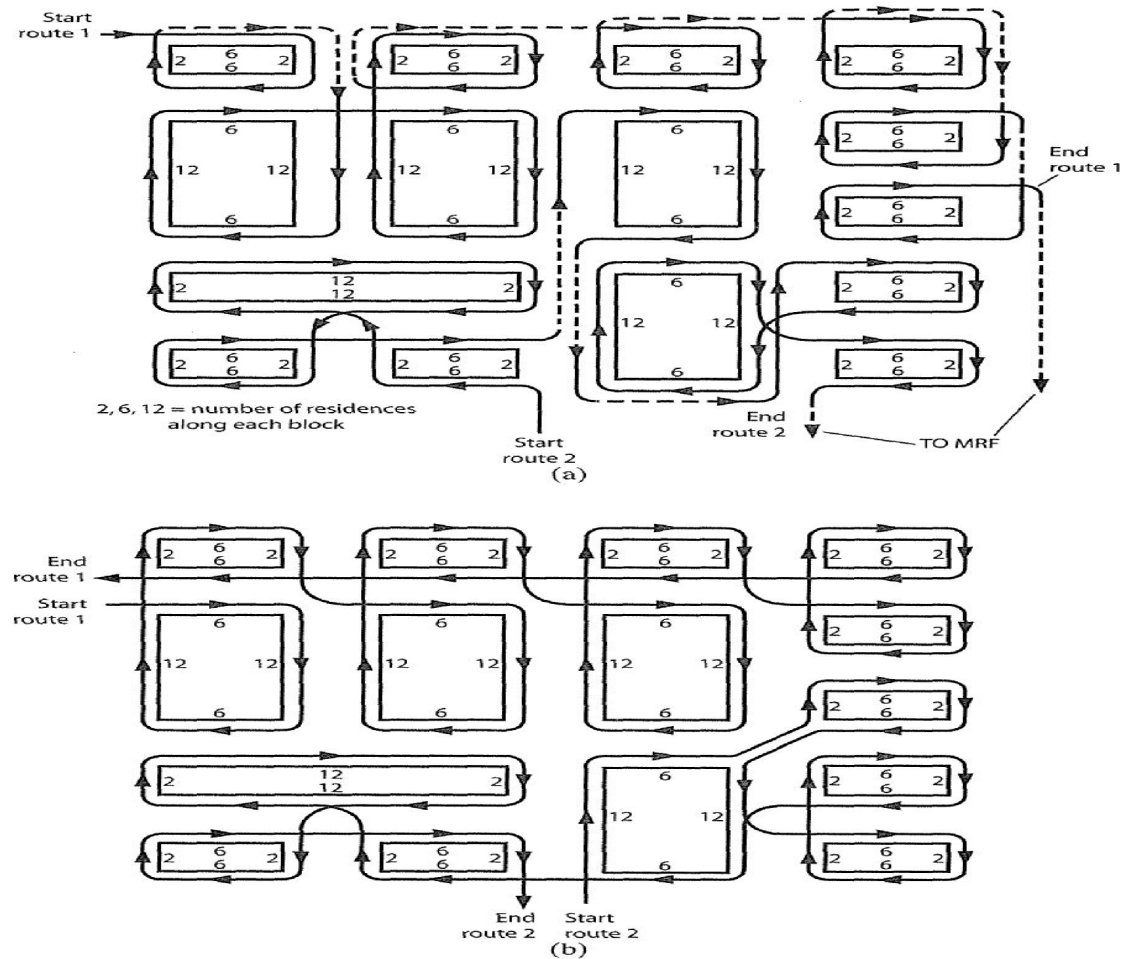
**FIGURE 7.3** Emptying containers used for both commingled and source-separated wastes at an apartment complex. In the situation shown in the photo, the collector is responsible for bringing the loaded containers to the collection vehicle to be unloaded.

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# Logistics and transport routes



**FIGURE 7.15** The effectiveness of the collection routes can be assessed by the amount of route overlap. (a) Route layout with overlap shown by the dotted lines. (b) Route layout without overlap.

# Cost of waste collection and transport

The cost in € is affected by

- Amount of waste generated
- Size of the bin ▫ how often it has to be emptied (notice regulations!)
- Price per emptying
- Price for transport
- Original investment

LCA, Life Cycle Analysis ▫ The environmental "cost"

- Emissions during the collection
- Emissions during the transport
- Total LCA of waste management should include also emissions from eg. landfill or composting