Interreg - IPA CBC
CCI 2014 TC 16 I5CB 009
ZEFFIROS
Zero-waste energy-efficient agricultural communities in the Greece-Republic of North Macedonia cross-border area

ARISTOTLE UNIVERSITY OF THESSALONIKI
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Circular Economy principles – Composting & Basic elements for the successful organization of a municipal composting management system

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SECTION A: Circular Economy principles – Composting

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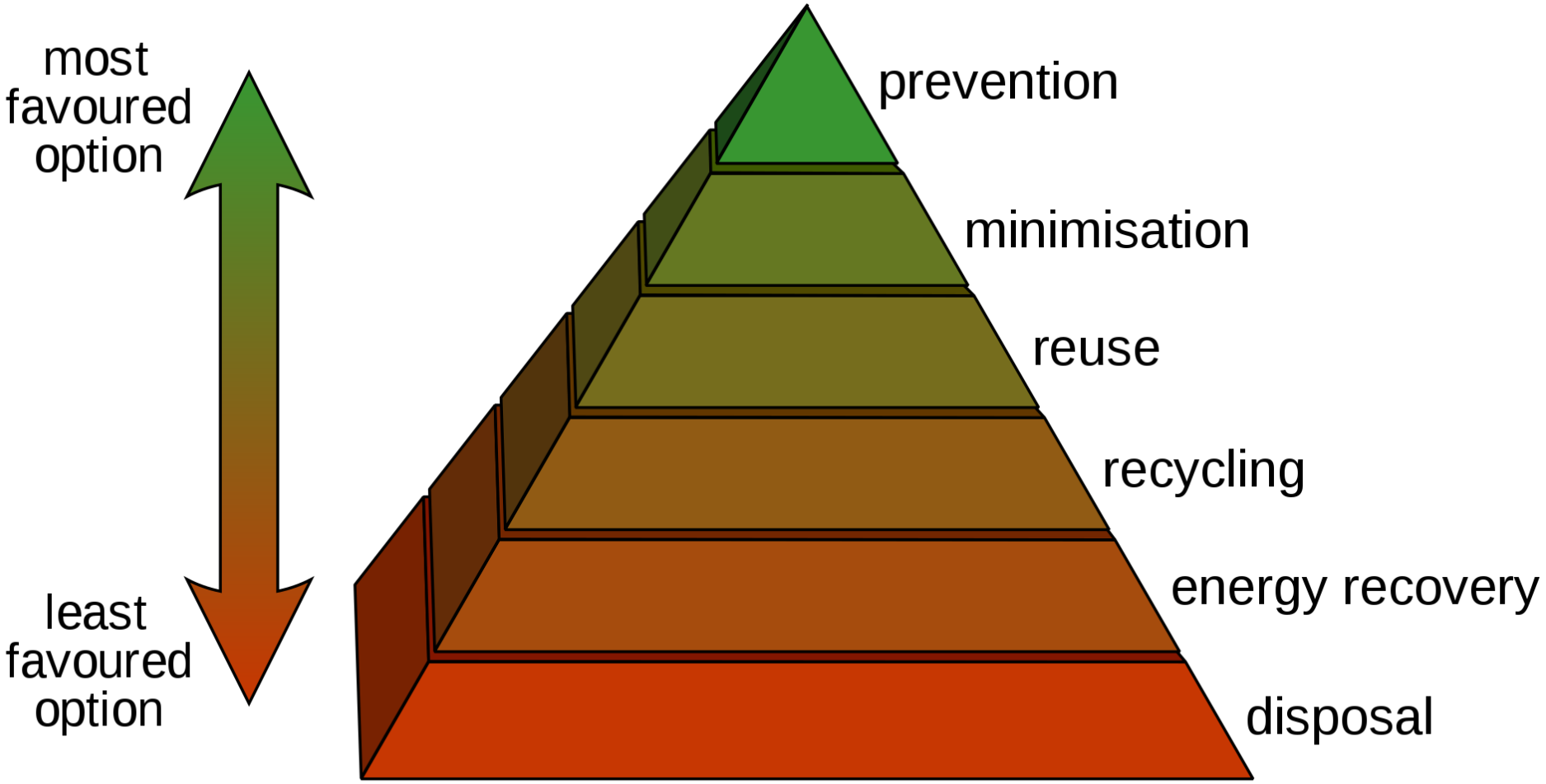
Waste management hierarchy



Solid waste objectives (1)

- Volume reduction - Prevention
- Recycling maximization and waste reuse
- Reduction of recyclable materials' incineration

Solid waste objectives (2)

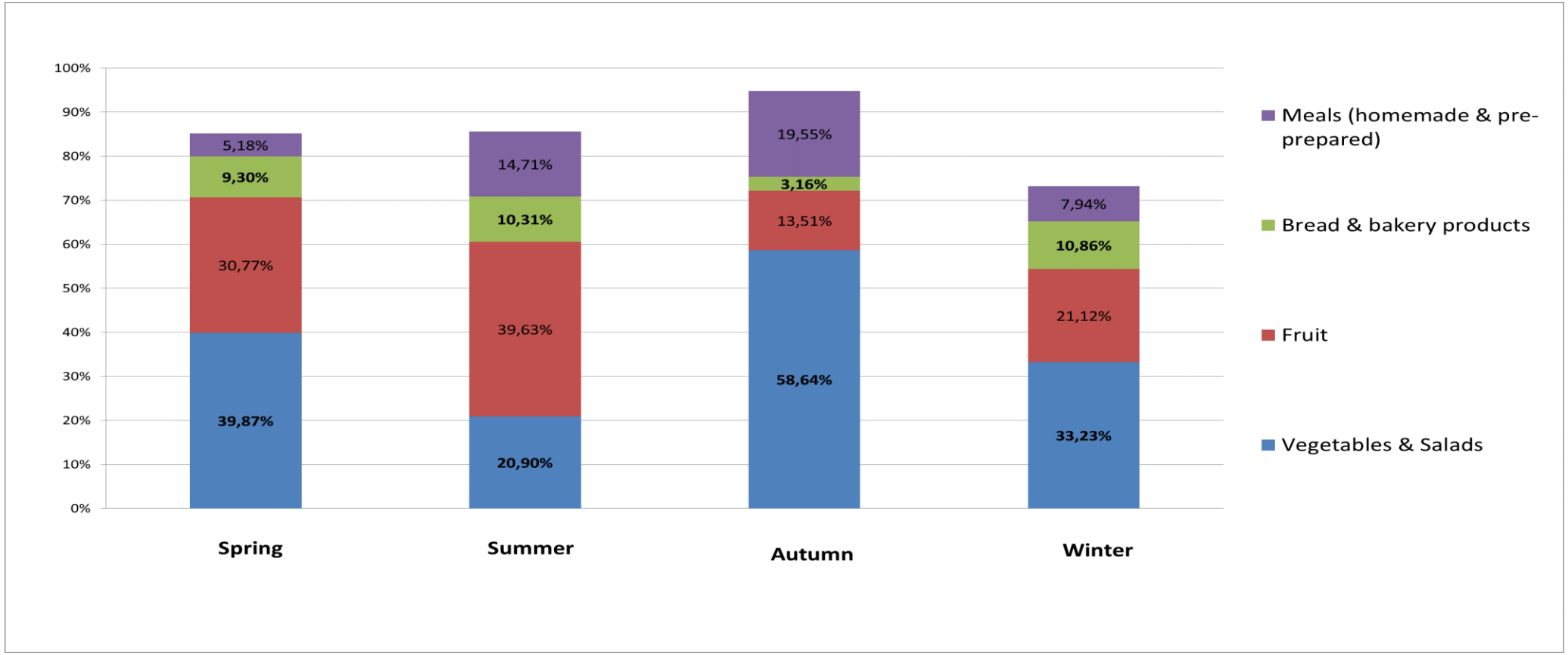
- Elimination of recyclable and usable waste landfilling
- Full implementation of waste policy
- Efficient use of resources – Circular economy

Circular economy

Zero waste municipalities

Biowaste

Composition of biowaste



Composting


Composting is the recovery of waste our kitchen and garden (biowaste) and their conversion
in useful fertilizer.
Just like in nature!

How can WE participate

Different kinds of composting

- **Home Composting**: composting of biodegradable materials and use of compost in gardens, belonging to the composting person
- **Community Composting**: composting by a group of people in an area (neighborhood, garden, school, municipal space ...) for the purpose of managing its own waste. The compost is then used by the community
- **Municipal/ Industrial Composting**: composting of biodegradable materials from a wider area to a central composting plant, in which private companies undertake the project. Compost can be used for their own needs or sold **UNDER CONDITIONS**

What can we use in the composting process

- fruit and vegetable residues
- food waste
- expired food
- scum and tea
- stained paper food (e.g. napkins)
- dead plants
- CUT GRASS
- BRANCHES AND LEAVES
- spoiled fruit
- weed weeds
- Soil
- wood ash
- Sawdust
- Manure
- Hair, feathers...

What to avoid in the composting process

- - metals, plastics, glass, fabrics...
- Paper
- Painting
- Medicines
- Oils
- Batteries
- Chemical
- dust from vacuum cleaners
- ash and remnants of novopans
- bones, meat
- Dairy
- - pet and human waste..

Means for home composting

Placing the bucket

Place the bucket so that:

- Have secured contact with the ground

- Not to be too far from the source of organic

- Have sufficient space around for mixing

- Be accessible and in rainy weather

- Not to be exposed to air, sun, rain

- Don't bother the neighbors

Doing it right..

Watering

Control

Use

Municipal composting

- Bins in front of buildings

- Collection by exclusive vehicles and trained personnel

What we need (1)

1. **Biodegradable bags**

   - Made of starch of plant origin
   - they behave like food
   - they melt during the composting process by leaving no traces in the compost, unlike the bags available in supermarkets (plastic, oxodegradable, photodegradable, dispersible, etc.)

What we need (2)

- Biodegradable is defined as a bag that meets the requirements of EN 13432 and EN 14995
- Practically it is a type of bag that is biodegradable and composted within a maximum of 2 months
- The size must be compatible with the kitchen bin in which it is to be placed
- On average at least 6 bags/week per household and 8 bags/week per shop – business are needed

What we need (3)

2. Small sorting bin at the source (7-10 lt) to which the biodegradable bag will be applied. Placed in the kitchen.

For shops – businesses, bucket capacity 30-50 lt

3. External collection bins
Brown color, 35 - 360 lt
Four-wheel bins up to 1,100 lt may be used for large producers

What we need (4)

4. Vehicles suitable for the collection of bio-waste, their transport and unloading

Process in a central composting unit (1)

Receipt

Removal of impurities

Process in a central composting unit(2)

Feeding

Process in a central composting unit (3)

Feeding channel

Process in a central composting unit(4)

Final removal of impurities

Final compost

Uses

- Community parks
- School gardens
- Community flower beds

Roles

Local Government develops the appropriate plans in order to:

- reduce waste production (prevention plans) and
- facilitate the recovery of materials (resource efficiency)

These practices are based on Sorting at Source with the aim of producing high purity products.

Citizens need to be actively involved, to separate the waste produced – materials

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SECTION B: Basic elements for the successful organization of a municipal composting management system

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Design of a Sorting at the Source System (1)

1. Selection of the participating areas
2. Counting the number of households within the boundaries of the area
3. Counting the number of shops and businesses within the boundaries of the area
4. Selection of materials to be sorted at source
5. Estimated quantities to be collected
6. System Manager Definition

Design of a Sorting at the Source System (2)

1. **Selection of the participating areas**

The whole of a municipality or only one district/region can be selected with the aim of gradually expanding the system

In addition, specific waste producers can be selected, e.g. large tourist complexes, hospitals, or school units

Design of a Sorting at the Source System (3)

2. Counting the number of households within the boundaries of the area

- The aim is to estimate the required bins
- For the measurement of the number of households within the boundaries of the area, in which the sorting system will be applied at the source, data from the Municipalities as well as data from energy provider concerning active electricity bills can be used
- Data from the Statistical Office can be used as well

Design of a Sorting at the Source System (4)

3. Counting the number of shops and businesses within the boundaries of the area

- The aim is to estimate the required bins
- Exploitation of elements of municipalities (e.g. table seat checks), data from the chambers concerned as well as data from energy providers

Design of a Sorting at the Source System (5)

4. **Selection of materials to be sorted at source**

- In the event that the common collection of food and garden waste is decided, the following should be assessed and taken into account:
  - Proportion of residents with garden
  - The production of green waste fluctuates with the largest quantities observed from spring to autumn

Design of a Sorting at the Source System (6)

5. Estimation of quantities to be collected

Approximately 4,00kg/ week are collected for each household

After 1 year can range between 25-50% of total households

Quantities P (kg/ week) of biowaste expected to be collected:

$$P=N \times 25\text{-}50\% \times 4$$

Where:

P: the quantities of biowaste expected to be collected per week (kg/ week)

N: the total number of households located in the served area

25-50%: the percentage of households estimated to be actively participating in the system one year after launch in the system

4kg/ week: specific coefficient of biowaste collected (Athens Biowaste)

For the assessment of the volume of biowaste collected it is recommended to use a specific weight of as much as 500kg/m3

Design of a Sorting at the Source System(6)

6. Appointment of a Manager

From the municipality's point of view, it is recommended that an official of the Waste Management Department be entrusted with the organization and coordination of the collection system and the awareness-raising campaign

Methods of Sorting at the Source (1)

1. Door to door

- Selection criteria:
  - The main characteristic of the Municipality is the detached houses with green garden or courtyard ("60% of the buildings)
  - The main characteristic of the Municipality is the detached houses and/or other houses with green garden or courtyard ("60% of the buildings").
  - Already applied in the Municipality door-to-door system for other waste streams successfully

Methods of Sorting at the Source (2)

2. Central bucket collection system

- This method is suitable for areas with high building density and limited space for the use of privately owned bins in each house/building
- Its disadvantage is that there is no direct connection of the bin to some households and thus does not create a sense of personal responsibility and there are higher rates of impurities and lower participation

Other design and implementation criteria (1)

- Biodegradable bag according to EN 13432 and EN 14995
- Community characteristics, number of households per building
- Vehicles suitable for bio-waste collection:
  - Have sufficient capacity to collect as much quantities as possible on one route/route
  - Their capacity does not exceed the quantity available to be collected in order to achieve operating cost savings
  - Be watertight and preferably closed, without excluding open vehicles
  - Have a bucket lifting mechanism

Frequency and Collection Program

Basic design parameters:

- Collection time
- Number of households and therefore buckets
- Seasonality
- Urban structure characteristics (density of housing, building)
- Characteristics of uses of the area (residential, rural, mixed)

Key success factors

- The main factors influencing participation are:
  - the type of area (urban, semi-urban, rural)
  - the standard of living/educational alike of the population
  - the correct, continuous and complete awareness raising of the public

Conclusions

Highlights:

- the proper design of the system for the collection, transport and exploitation of potentially recoverable materials and its complete integration into the overall waste management system
- the possibility of seamlessly promoting recovered materials in the respective markets
- the quality of the recovered materials
- prevention and timely treatment of possible organisational difficulties and operational problems
- informing and raising public awareness (development of environmental awareness) in order to achieve increased participation in material recycling programmes

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