

TM4. Waste management in Rural Communities

4.2. Biomass waste. Household waste

Assoc. prof. PhD. Ileana MANCIULEA, Assoc. prof. PhD. Cristina BOGATU

Transilvania University of Braşov

Faculty of Product Design and Environment

Department Product Design, Mechatronics and Environment

Email: i.manciulea@unitbv.ro, cristina.bogatu@unitbv.ro

Outline

- 4.2.1 Biomass waste
- 4.2.2 Biomass as renewable energy source
- 4.2.3 Household waste

4.2.1 Biomass waste

Biomass - the biodegradable fraction of products, waste and residues of biological origin from agriculture, forestry and related industries, including fishing and aquaculture, as well as the biodegradable fraction of industrial and municipal waste (Law 220/2008, republish in 2021)



Agriculture and forestry residues, energetic cultures



Municipal waste



Forestry and agro-food industries residues



Animal residues

Types of biomass

Energetic cultures

(e.g. energetic willow)



Bio-fuels



Biomass

Natural biomass

(e.g. wood, straw, etc)



Dry Biomass

(e.g. dried fruits, plants)



Wet Biomass

(e.g. animal manure, active sludge, organic waste, animal manure)



Biomass waste utilization:

1. Burning

(solid biomass: wood, straw, etc)

- To generate heat

2. Pyrolysis

(solid biomass: wood, straw, etc)

- To generate Singas (CO and H_2) \rightarrow heat

3. Anaerobic and aerobic fermentation

(wet biomass, vegetables rich in sugar)

- To generate biogas (CH_4) \rightarrow electricity
- To generate bio-ethanol ($\text{C}_2\text{H}_5\text{OH}$) from vegetables residues rich in sugar (sugar beat, sugar cane, cereals) \rightarrow electricity
- **To obtain bio-fertilizers by composting**

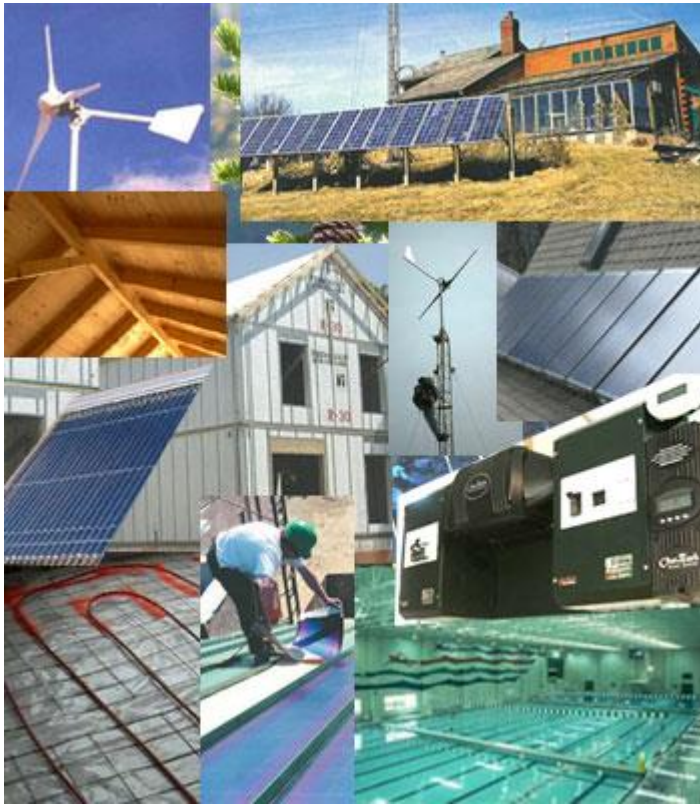
4. Transesterification of the vegetal oil

(from corn, rapeseeds, etc)

- To obtain bio-diesel (bio-fuels for compression ignition engines) and glycerin (used in cosmetics)

4.2.2 Biomass as renewable energy source

RENEWABLE ENERGY



*Green energy should
be used in our home!*

Energy based on conventional sources



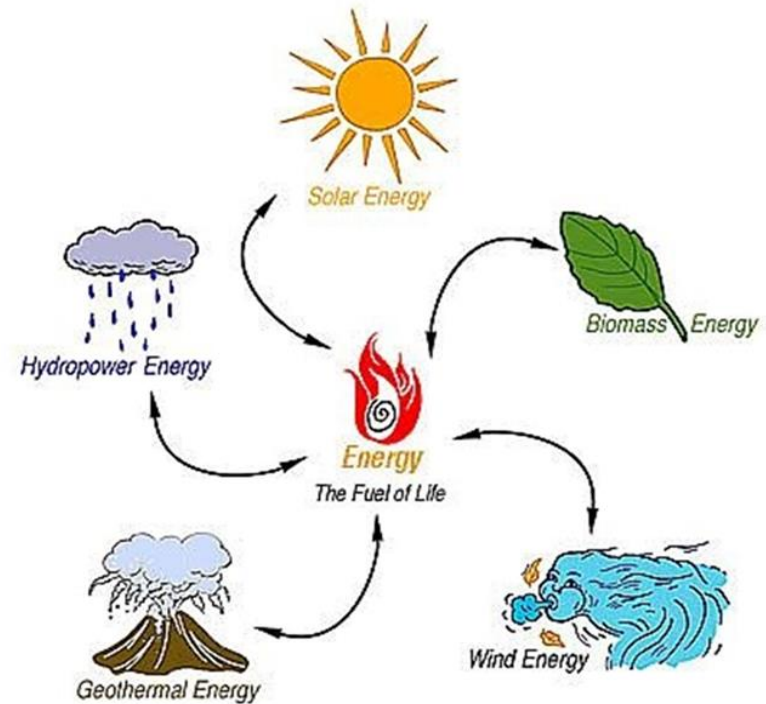
CONVENTIONAL ENERGY SOURCES

- Nuclear Energy
- Coal
- Oil
- Natural gases



UNCONVENTIONAL ENERGY SOURCES

- Solar Energy
- Wind Energy
- Geothermal Energy
- Hydropower Energy
- **Biomass Energy**



Renewable energy sources identified in Romania

Solar Energy



Wind energy



Biomass Energy



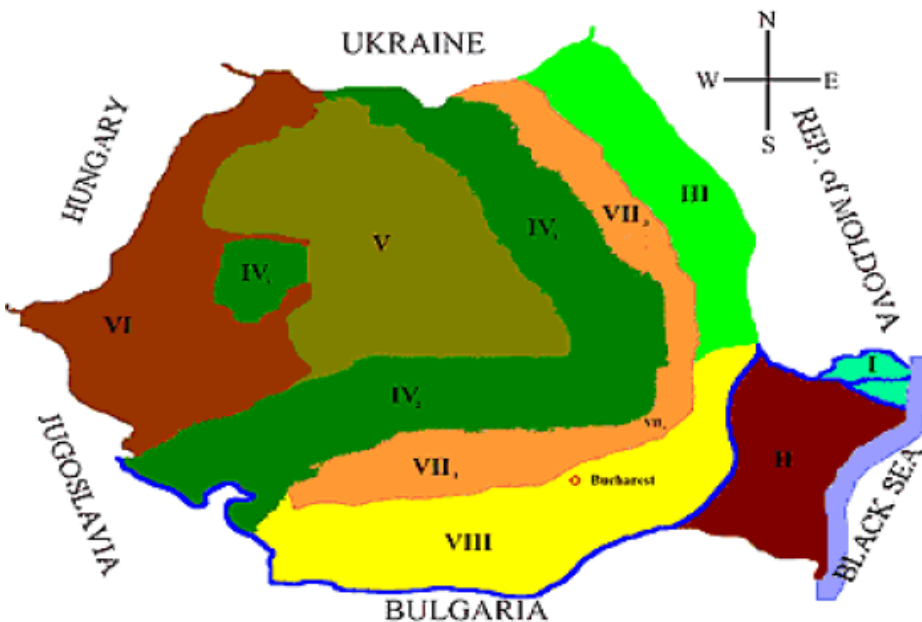
Hydropower Energy



Geothermal Energy



Territorial distribution of the renewable energy sources



I. Danube Delta

→ solar

II. Dobrogea

→ solar, wind

III. Moldavia

→ micro-hydropower, wind, biomass

IV. Carpathians

→ hydropower, wind, biomass

V. Transilvania

→ hydropower, biomass

VI. Western Plain

→ geothermal, wind

VII. Subcarpathians

→ hydropower, biomass

VIII. Southern Plain

→ geothermal, solar, biomass

4.2.2. Household waste

Household waste - organic and mineral residues resulting from household, commercial or industrial activity.

!!!! **Household waste** → valuable sources for metals extraction and processing, biodegradable organic materials, plastics, glass and textiles

Terms and definitions :

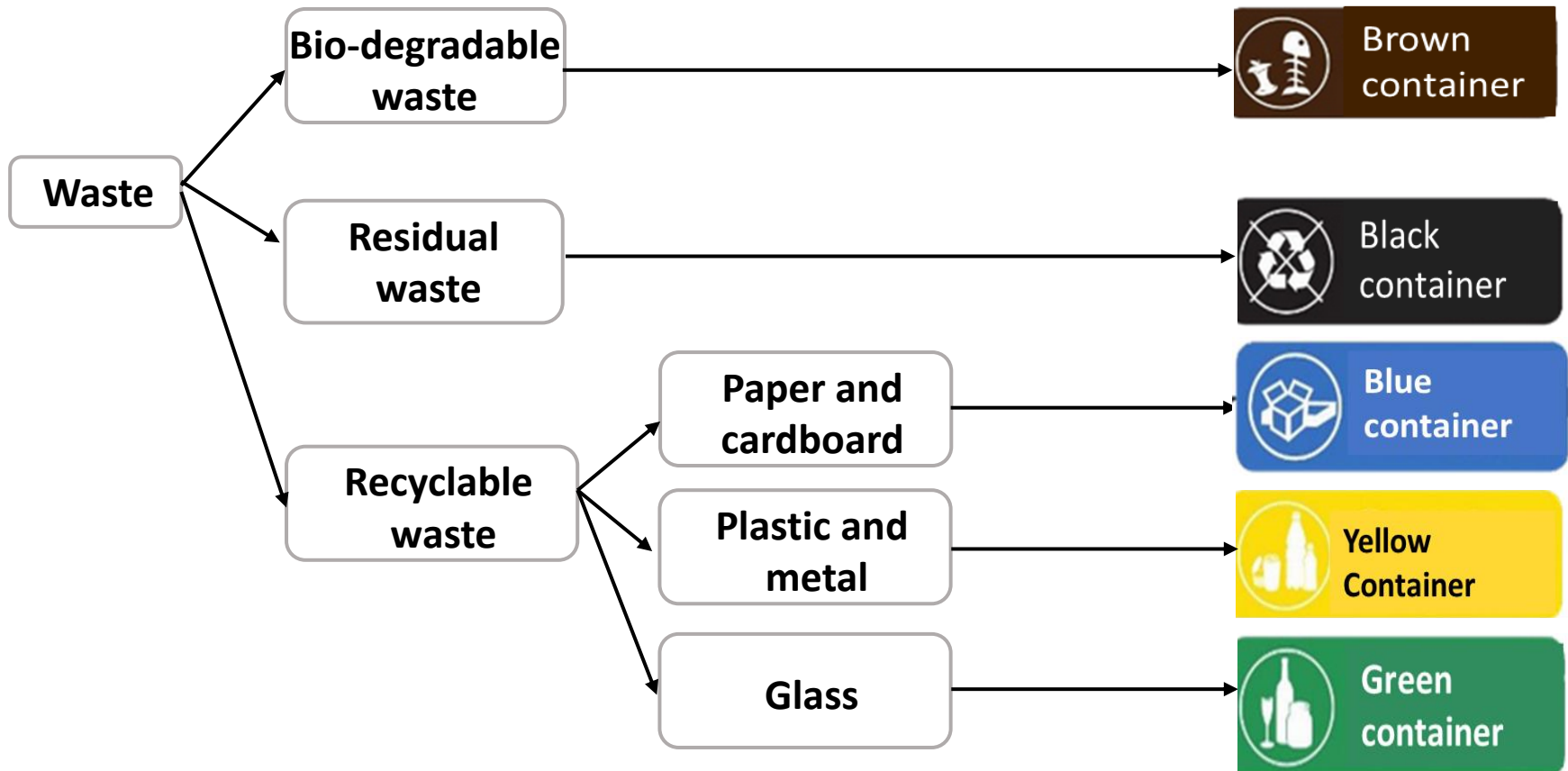
- **Waste** – any substances or object which is no longer useful and is discarded or is required to be discarded.

- **Recycling** - recovery process by which waste materials are reprocessed into useful products, materials or substances whether for the original or other purposes.
Almost all household waste components (paper, glass, plastic, metals) can be recycled.

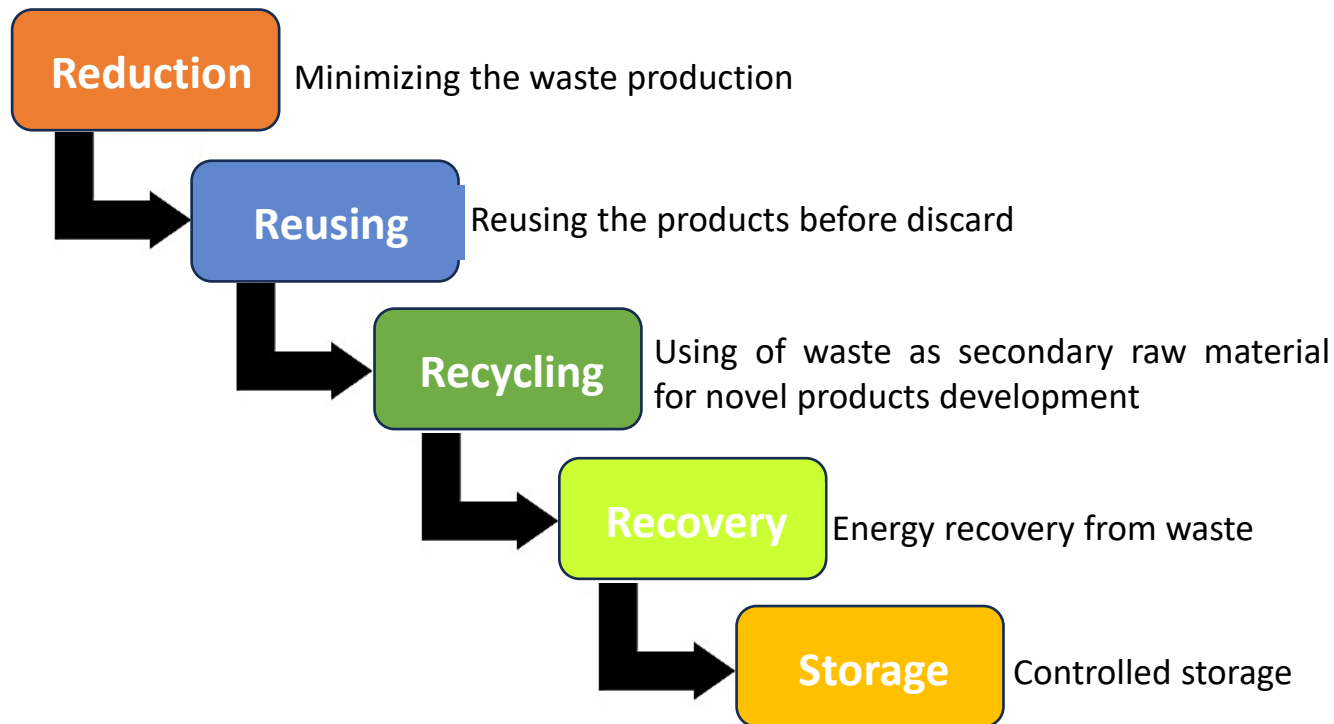
Selective waste collection is part of the recycling process meaning the separation of waste intended for recycling.

→ is a process available to everyone and involves storing waste in special places to be recycled.

Selective collection of waste and types of containers used for household waste

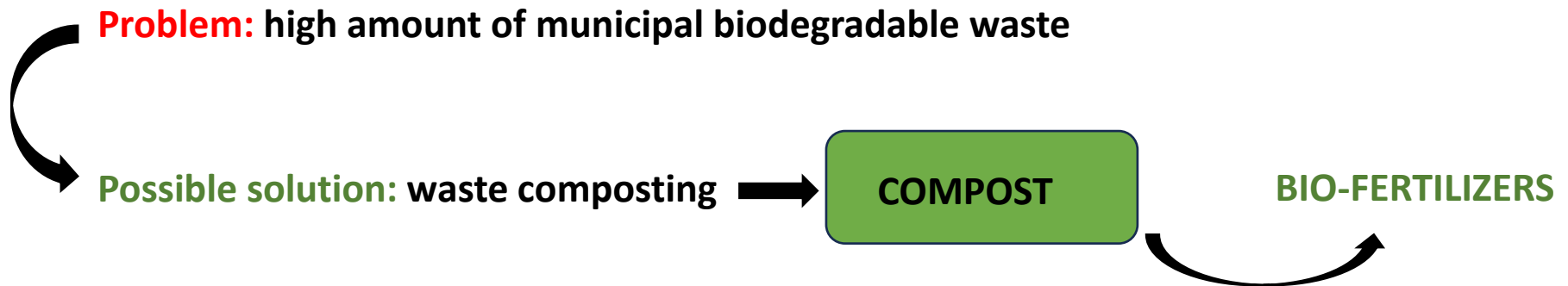


Integrated waste management in sustainable communities - hierarchical approach



According to Directive 2008/98/EC of the European Parliament and of the Council on waste, 2008

Waste recycling – Household waste recycling

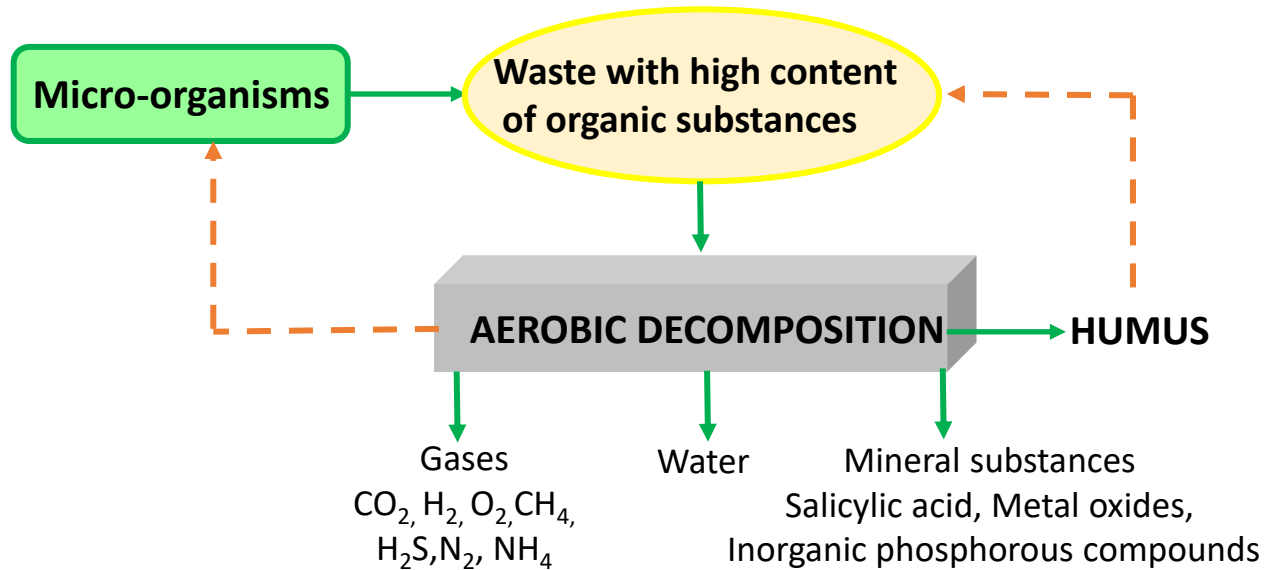


Composting: process of decomposition and transformation of solid organic substances (biodegradable waste) by microorganisms (bacteria and fungi) into a stable material called compost that is safe for humans, animals, plants

→ Compost can be used in agriculture as biofertilizer (replacing chemical fertilizers)



Composting



Schematic representation of the composting process

Waste that are recommended for composting:



Dried leaves



Animal waste



Ash(max 33%)



Yard trim



Food scraps



Feathers



Egg shells



Garden waste



Straw, cobs,
dried grass



Vegetation
residues

Materials that should be avoided in the composting process:

- **Cooked food and bread**
- **Fats, sauces and oil**
- **Meat and fish leftovers**
- **Dog or cat excrement**
- **Timber**
- **Disposable diapers**
- **Vacuum cleaner dust**
- **Fly ash**
- **Inorganic waste, plastic, glass**
- **Paper printed with ink (newspaper, etc.), colored or glossy**

Composting methods at home:



Plastic garden composter



Garden composter
with wooden walls

Composting methods at home:



Garden composter with wire fence walls

Thank you!



Transilvania
University
of Braşov

