Clean Cooking and waste to energy

Treatment of organic waste: anaerobic digestion

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No. 101037141. This material reflect only the views of the Consortium, and the EC cannot be held responsible for any use that may be made of the information in it.

In this video you will learn:

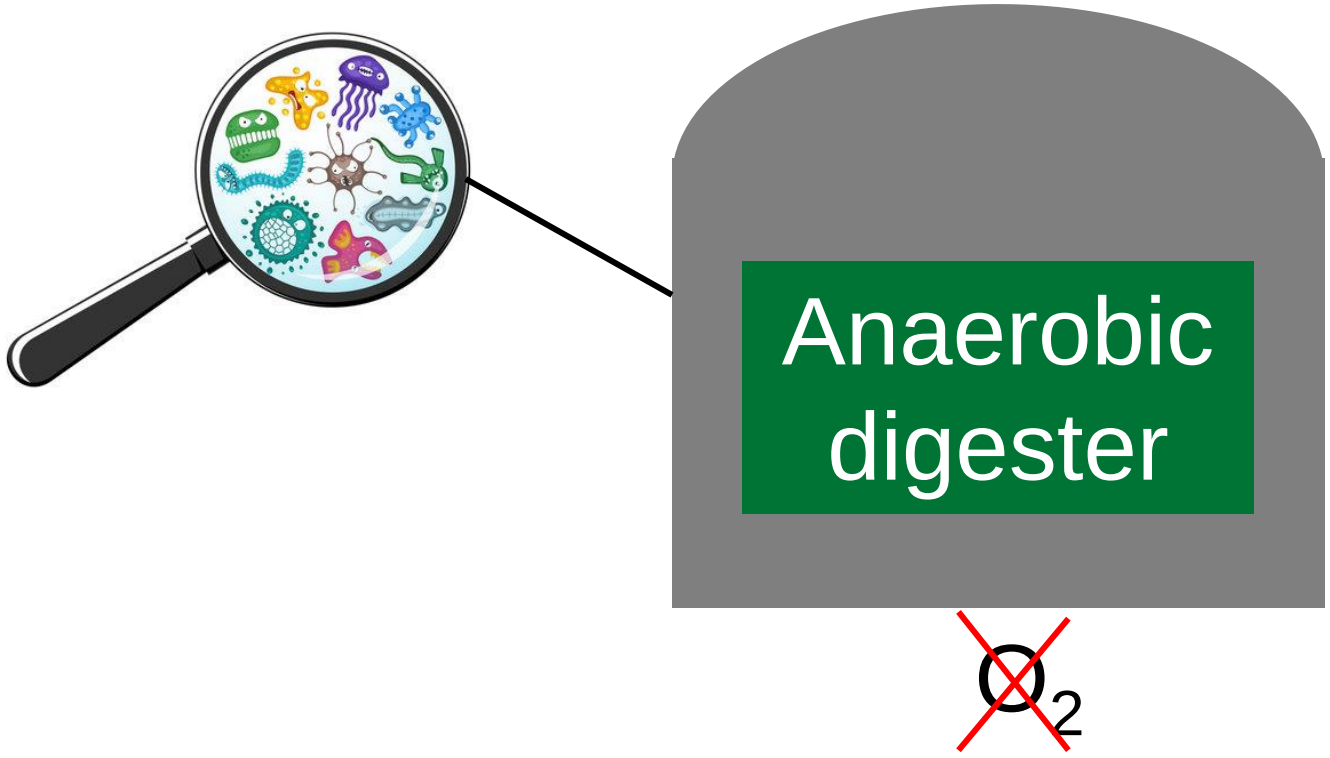
- What is the anaerobic digestion process
  - How to valorize organic wastes
    - Overview of anaerobic digestion process
      - Anaerobic digestion coupled to bioelectrochemical systems

- More than 125 million tons of municipal solid waste per year are produced in Africa
- 57% organic
- Disposed at landfills

Organic wastes can be used to produce energy through anaerobic digestion process

What is the anerobic digestion?

Anaerobic digestion process



Different types of organic wastes can be used to produce energy

Crops and residues

Wastewater

Food waste

Anaerobic digester

O_2

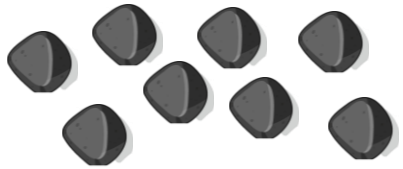
Manure

How microorganisms breakdown the organic matter?

4 stages: Hydrolysis, acidogenesis, acetogenesis and methanogenesis

Hydrolysis

Complex compounds



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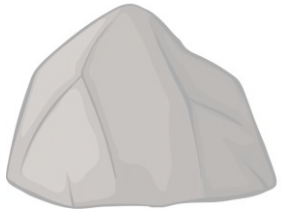
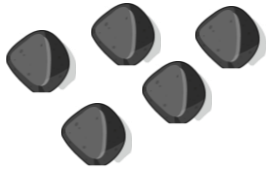
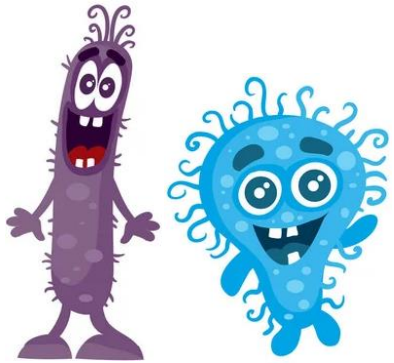
Hydrolysis

Complex compounds



Acidogenesis

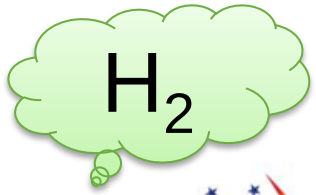


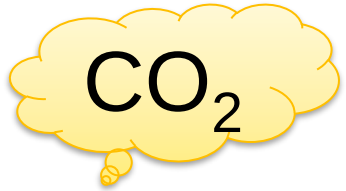


Alcohols

Volatile fatty acids

Organic acids





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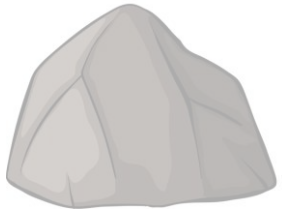
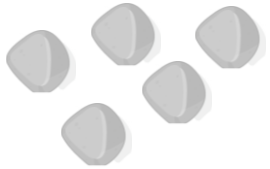
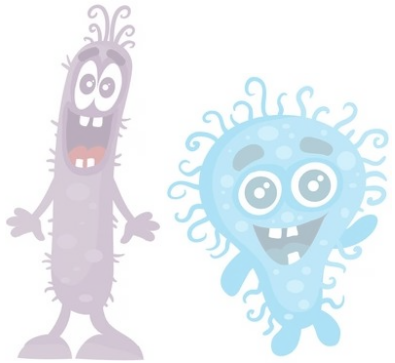
Hydrolysis

Complex compounds



Acidogenesis

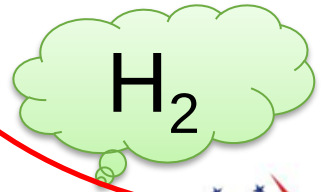


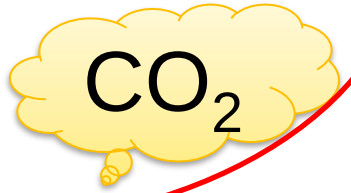


Alcohols

Volatile fatty acids

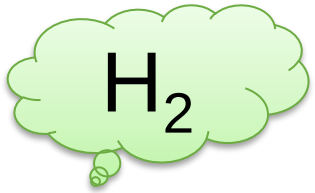
Organic acids

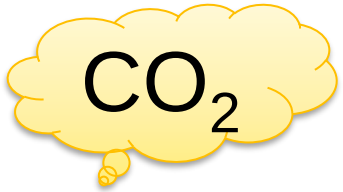




Acetogenesis

Acetic acid





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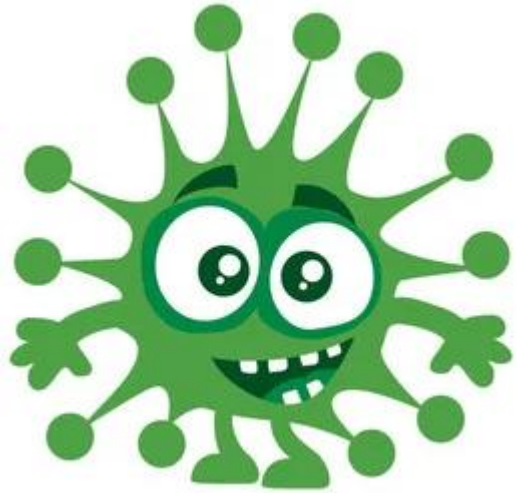
Methanogenesis

Acetic acid

H_2



BIOGAS

CH_4

CO_2

Overview of the anaerobic digestion process

Anaerobic digestion process

Food waste

Anaerobic digester

O_2

Biogas

Digestate

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Biogas uses

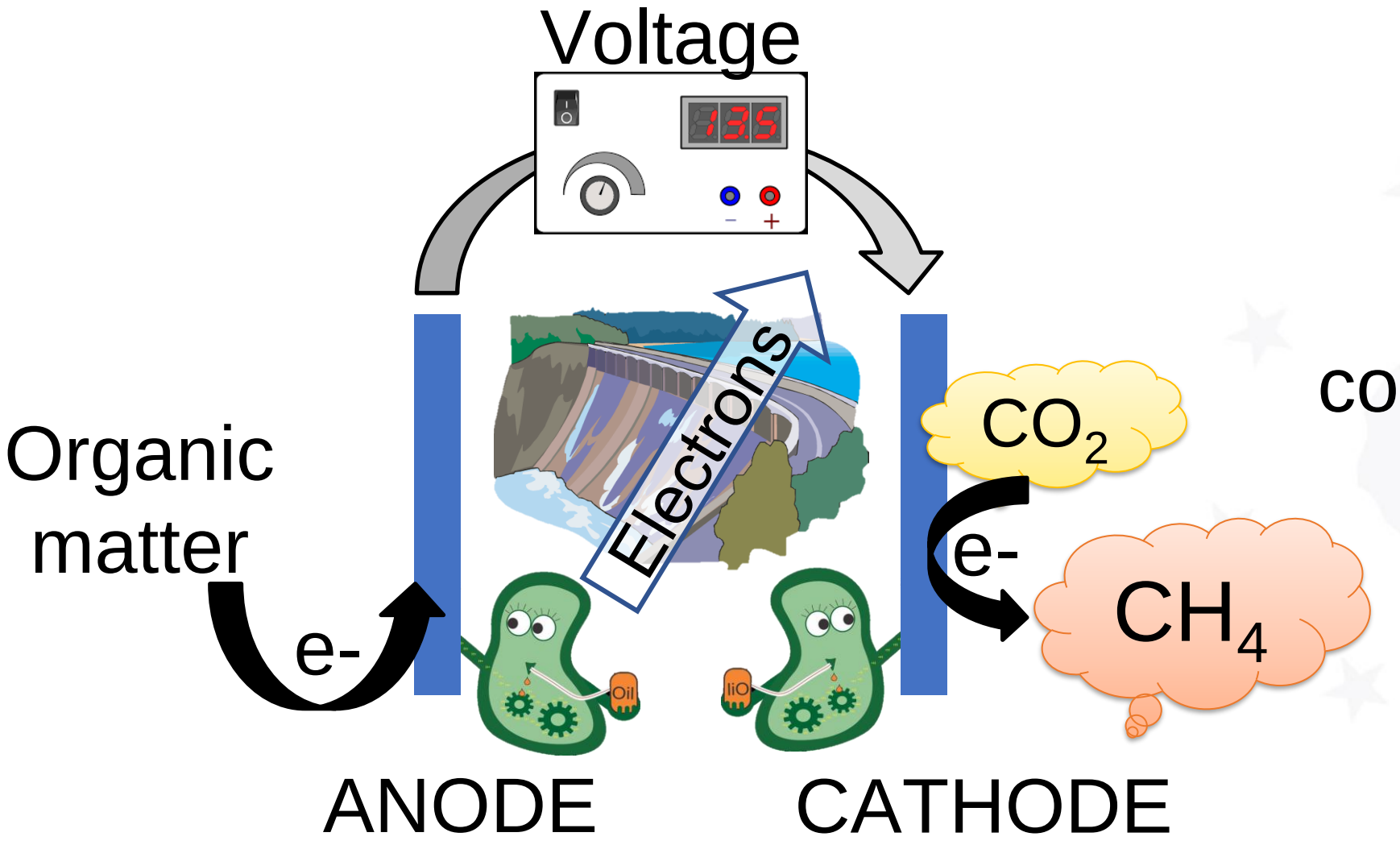
Biogas

Digestate uses

Digestate
(Nitrogen, phosphorus and potasium)

The anaerobic digestion can be improved applying external energy

Bioelectrochemically assisted anaerobic digestion systems



Higher CH_4 content in biogas

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Summary

- Wastes are resources not residues
- Anaerobic digestion process allows to obtain biogas (energy) and digestate (fertilizer) from wastes
- Bioelectrochemical systems allows to improve the methane production of anaerobic digestion processes.

THANK YOU

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