

Status of biogas production and application

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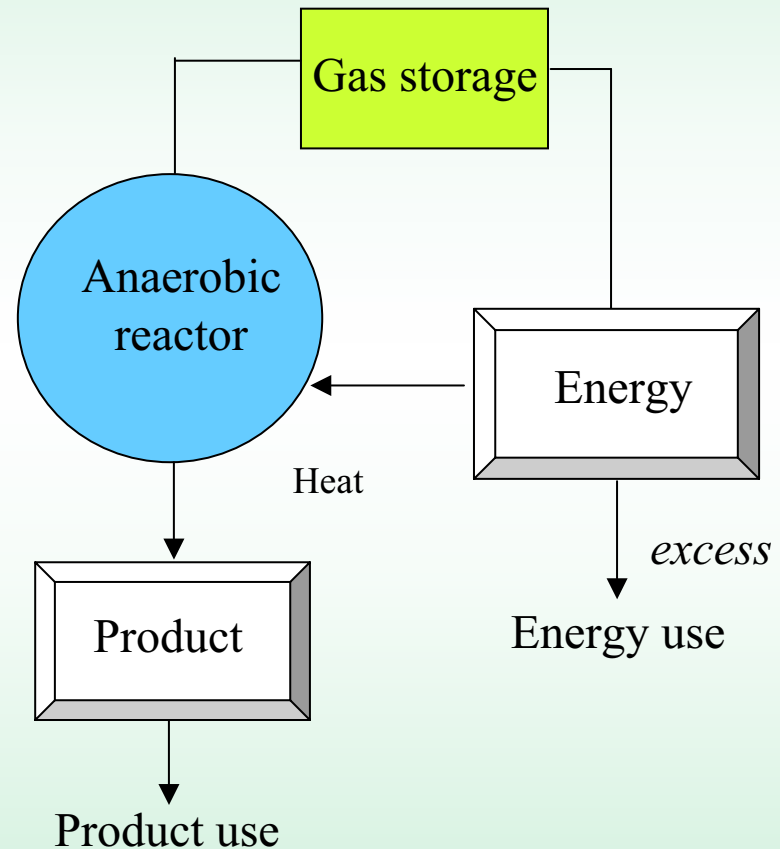


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Anaerobic digestion in its simplest form

- Closed reactor
- System of gas collection
- Production of biogas
- Production of digestate



Old technology - new applications

- The technology is well established
- Traditionally it has been used for waste stabilisation
- Currently the focus is on energy production
- To be cost-effective in this role may require
 - engineering and technical improvements and operational approaches to increase conversion efficiencies
 - Selection and/or the production of biomass feedstocks from a variety of sources
 - including novel and multi-use crops and agro-wastes from integrated farming systems, commercial and industrial wastes and by-products.



Biomass resources in Europe suitable for anaerobic digestion

- Animal slurries
- Agricultural residues
- Energy crops
- Biodegradable commercial and industrial waste
 - Food processing wastes and agro-industry wastes
- Sewage sludge
- Organic fraction of municipal solid waste



Anaerobic digestion and farming



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Benefits in using anaerobic digestion for agricultural and other wastes

- Provides a source of renewable energy
- Improves nutrient management and soil structure
- Can help to abate greenhouse gas emissions

So why are anaerobic digesters not a common site on farms across many parts of Europe ?



More importantly :

- How do we change the current situation?
- What drivers would be effective?
- What will be the benefits?

Incentives and disincentives to the adoption of AD technology

- Some examples of on-farm and centralised AD digestion facilities across Europe
 - What has made these schemes work
 - Why some schemes are running into difficulty
 - What are the benefits of the schemes
- How have EU and regional policies influenced these?

Austrian farm-based AD plant



Maize silage and agro wastes



Digestion plant

Electricity generation



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Danish CAD plant



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Manure management, power generation & district central heating



Västerås biogas plant (AGROPTI-gas)



Biogas – fuel for public service vehicles



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Centralised anaerobic digestion plant - UK



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Finland: small-scale integrated farming system





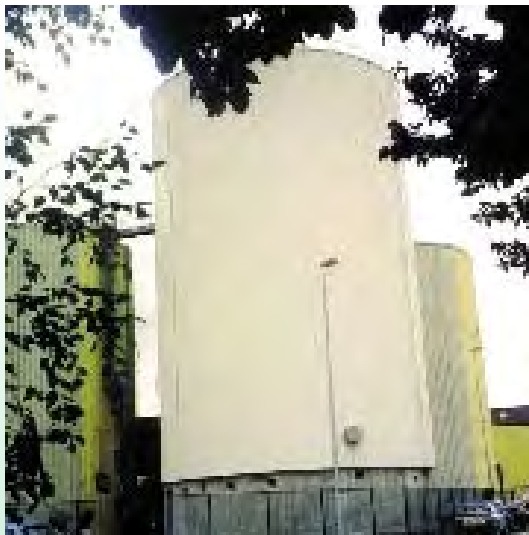
Municipal solid waste



MSW that can be digested

- Mixed household waste after pre-processing
- Source-segregated organic fraction of household waste
- Garden waste
- Market wastes
- Waste from certain municipally located industries eg. food processors and packagers

A selection of MSW digesters



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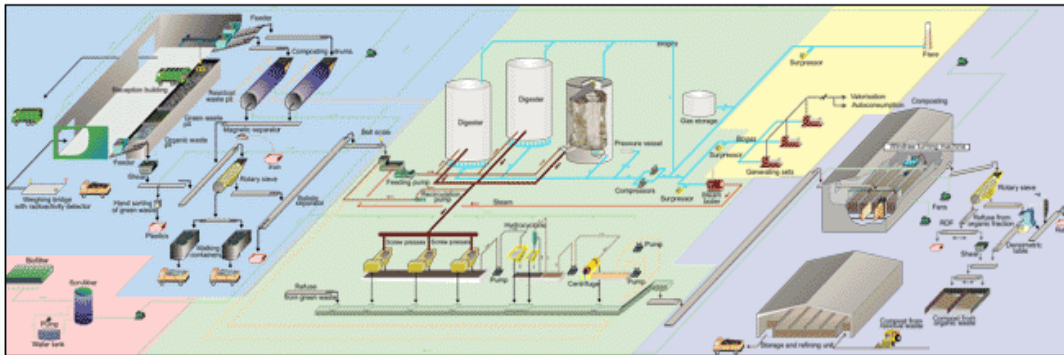
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Facts and figures (Luc De Beer,)

- Over 50 operational plants in Europe treating either MSW or market wastes
- Total annual throughput in excess of 1 million tonnes
- Increase of over 750% in a decade
- Average size of new projects greater than 50,000 tonnes/year
- Some plants now treating 100,000 tonnes per annum
- More than 150 plants worldwide, treating 5 million tonnes of waste and generating over 600MW of electricity

Residual waste treatment

The digester must be part of an integrated package



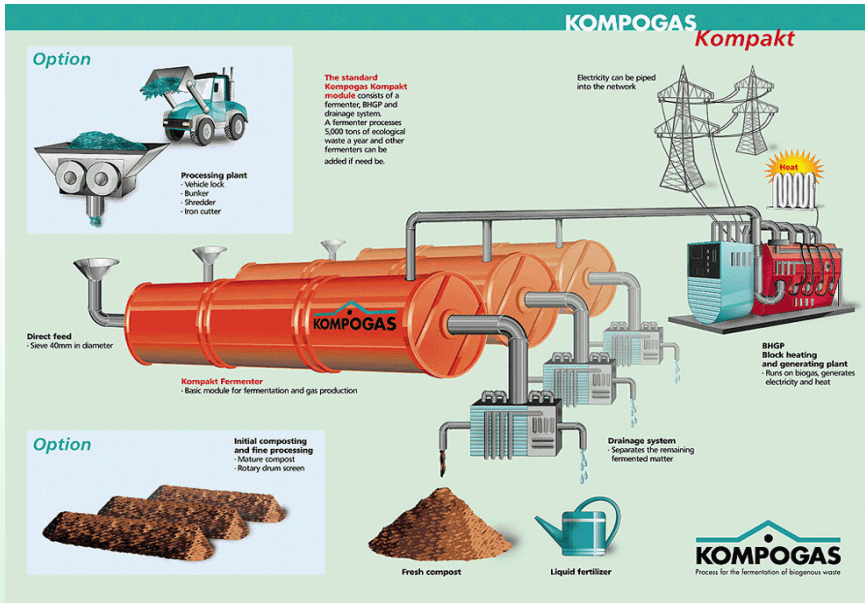
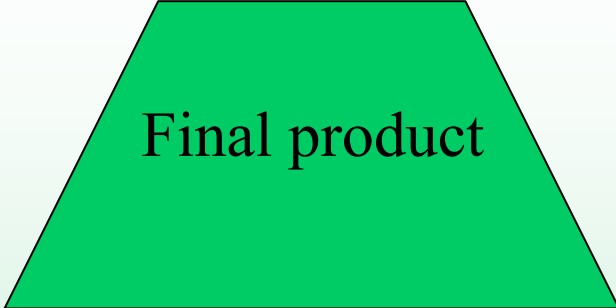
Grey waste
pre-treatment

Digester

Digester residue
treatment

Source segregated waste treatment

The pre-treatment and post treatment are minimised



Important factors in decision making

- Choice of feedstock = quality of product
- Energy balance
- Fertiliser value and markets for digestate
- Odour generation and gas cleaning
- Downstream processing, storage, and maturation of digestate
- Compliance to ABPR
- Proximity principal

Biogas yields (m^3 wet tonne $^{-1}$)

Manure & slurry	Biogas yield	Industrial & commercial waste residues	Biogas yield	Agricultural energy crops	Biogas yield
Dairy cattle	20	Potato distillery	35	Meadow grass	98
Fattening cattle	34	Vegetable processing	35	Maize silage	190
Pig	18	Rape seed cake	612	Grass silage	183
Poultry	93	Canteen waste (high fat)	90	Milled grain	597
		Canteen waste (low fat)	44	Corn cop mix (5.3% fibre)	391
		Flotation fat	108	Total plant grain silage	195

Thanks to:



EU 6th Framework programme for funding biogas research – lets have some more in FP7!



All our partners in the project for delivering some excellent work

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Task 37 for promoting biogas and doing an excellent job

Greenhouse gas reduction as an incentive?

- EU₁₅ agriculture contributes about 10% of GHG emissions
- Manure management is the only economically viable measure for reducing GHG
- This accounts for about 66.4 million tonnes of CO₂ equivalents each year.
- Current target price is €20 per tonne but this could rise to €65 by 2030