IEA Bioenergy Task 37

The contribution of AD in delivering renewable energy and the rôle of IEA Bioenergy Task 37

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IEA Bioenergy Task 37

Task 37 is part of the Bioenergy Agreement of the IEA

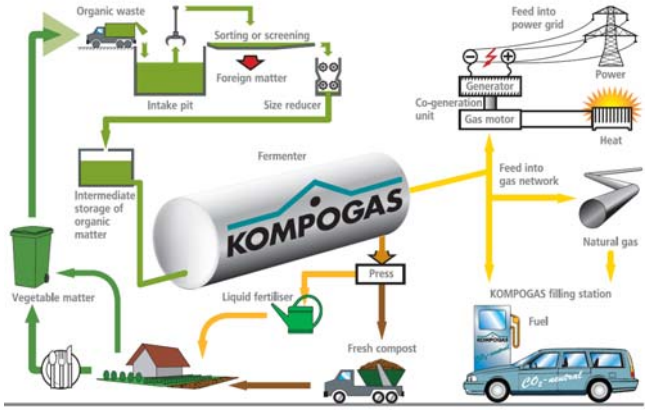
20 countries plus the European Commission participate in IEA Bioenergy

The following countries are member of Task 37 on Energy from Biogas and Landfill gas

- Switzerland: Arthur Wellinger, Task Leader
- Austria: Rudolf Braun
- Canada: Jody Anne Barclay
- EC (JRC): David Baxter
- Denmark: Jens Bo Holm-Nielsen
- Finland: Jukka Rintala
- France : Olivier Théobald
- Germany: Peter Weiland
- Sweden: Anneli Petersson
- The Netherlands: Mathieu Dumont
- U.K.: Clare Lukehurst

Focus

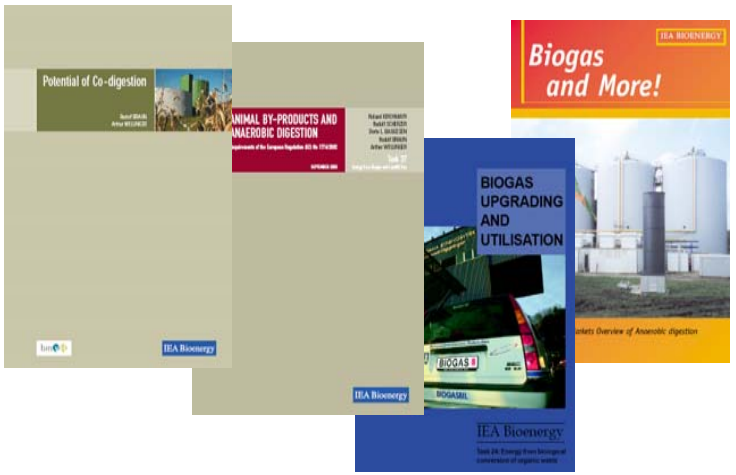
The anaerobic treatment of agricultural waste including energy crops, the organic fraction of municipal solid waste and organic rich industrial waste water to produce biogas and a digestate of a high quality.



Aim

Exchange and disseminate information on biogas production, upgrading and utilisation

Promote deployment of AD plants



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Task 37 – Key Activities and Achievements

- Stimulate R&D on gas upgrading
- Continuous education and information for decision makers
- Demonstration of new developments and lessons learned (Success Stories)
- Workshops and meetings with operators, industry and decision makers
- Promote biogas as a vehicle fuel and/or injection into gas

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The history of biogas
U.K. used to play an important rôle

- 1776 Description of biogas in Italy by A.Volta (Aria inflammabile nativa delle Paludi)
- 1804 Dalton gave correct formula of methane
- 1859 Biogas plant on lepper station in Bombay
- 1896 Installation delivering gas light in Exeter

Today Anaerobic Digestion (AD) is widely applied in industry, agriculture and infrastructre to

- upgrade waste water from household or industry
- stabilize sewage sludge
- treat the organic fraction of municipal solid waste
- improve fertilizer quality of animal waste
- digest energy crop to biogas (energy from biomass)

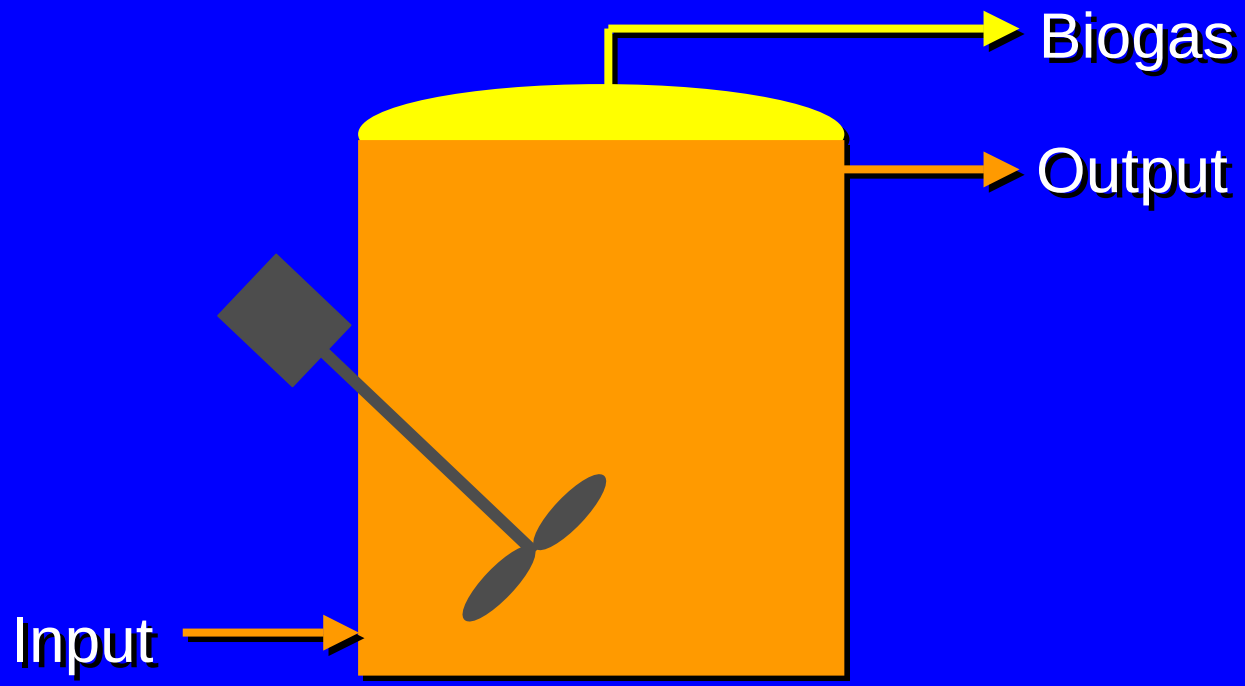
Upgrade of waste water from household and industry

There are more than 5000 digesters on WWTP in Europe

More than 2000 high-rate digesters are operated world wide for WWT from industry

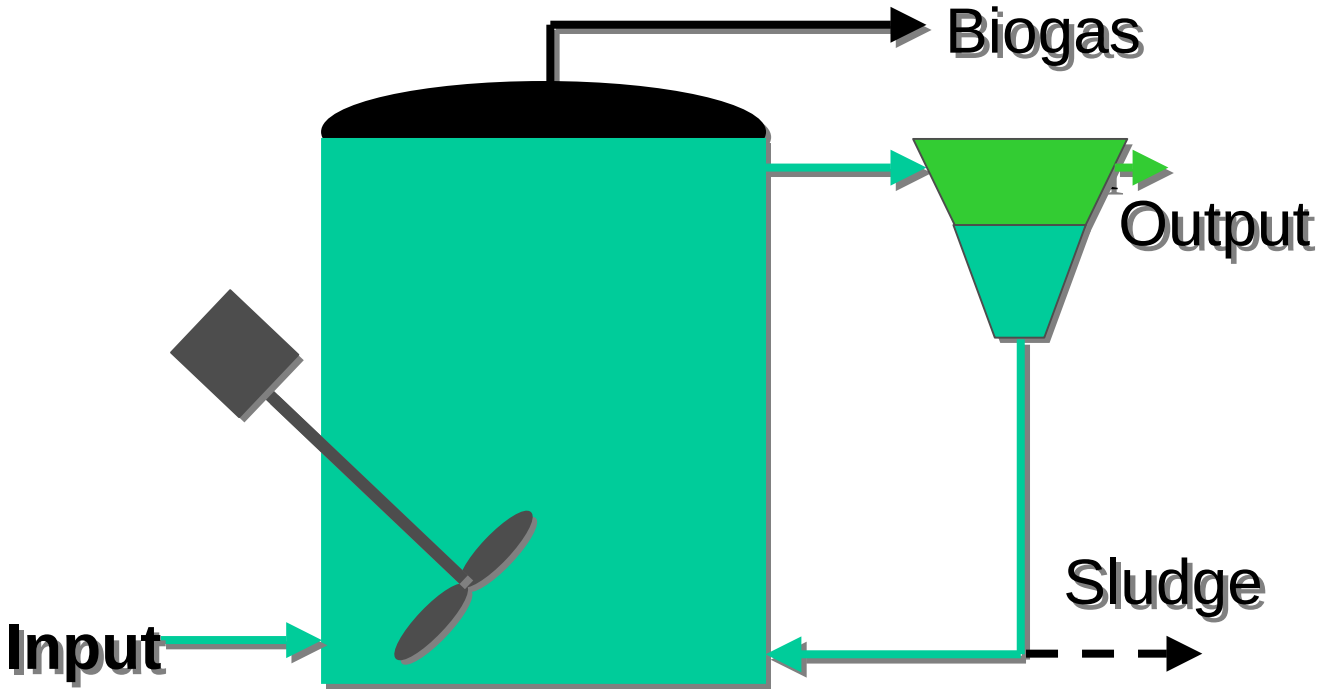
Basically 4 different systems are applied

Continuously stirred tank reactor



Upgrade of waste water from industry

Contact system



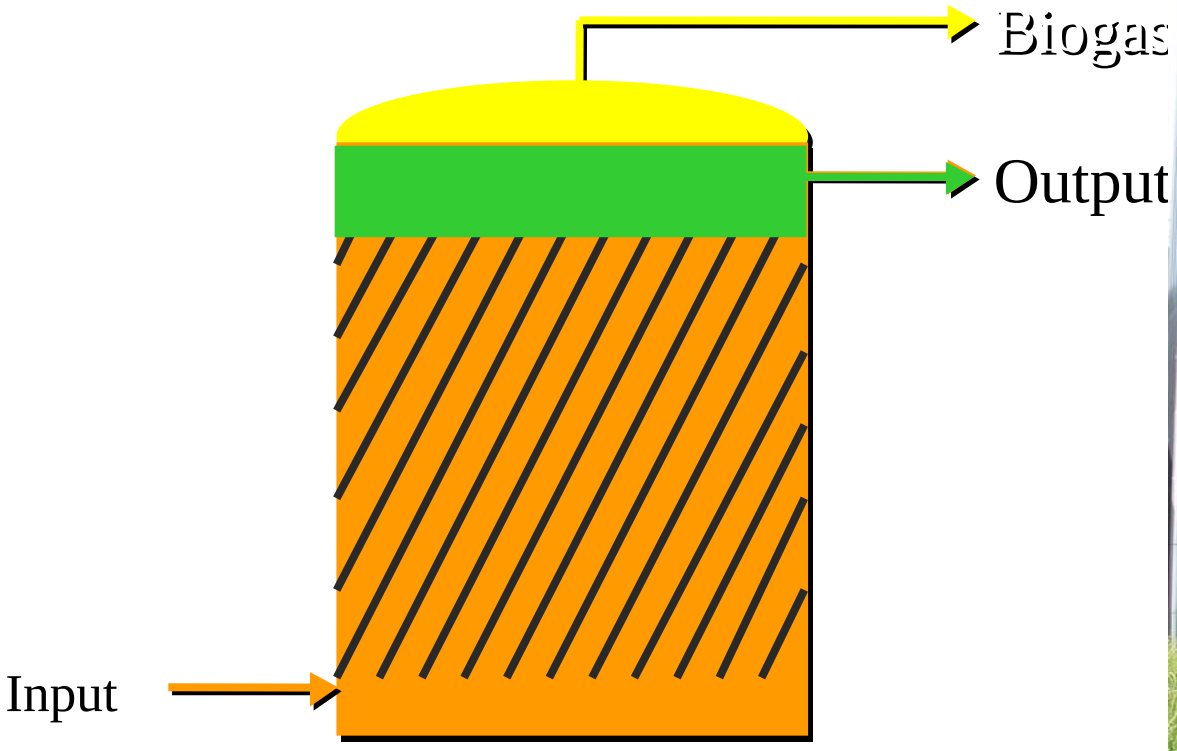
Bacterial rich sludge is recycled to the digester

Forster Vegetables, Dällikon

Digester

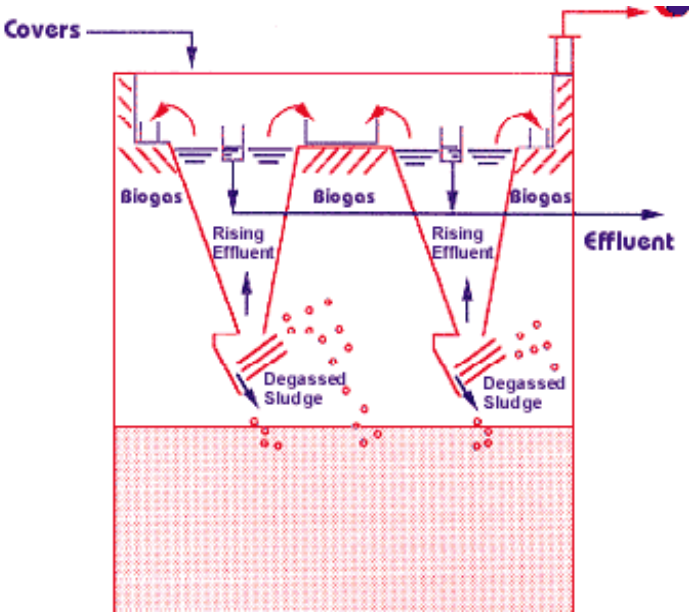
Settler

Anaerobic filter
on a brewery



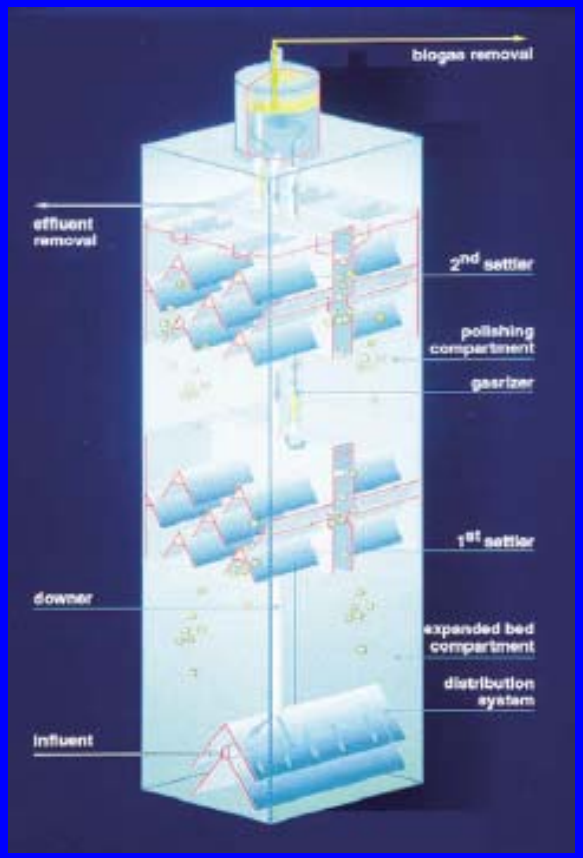
UASB cover 2/3 of all industrial WWTP

Rendering plant Bazenheid



Example of a EGSB System

Emmi Milk Ltd



Bacteria form pellets (granules) of 2 to 3 mm

AD for the treatment of source separated waste

In total there are about 210 plants with more than 2‘500 tpy of source separated waste:

thereof 140 plants with biowaste
(78 dry and 62 liquid digestion)
70 plants digesting manure together with organic industrial wastes or biowaste

Together, they treat **8m tons per year of organic waste**

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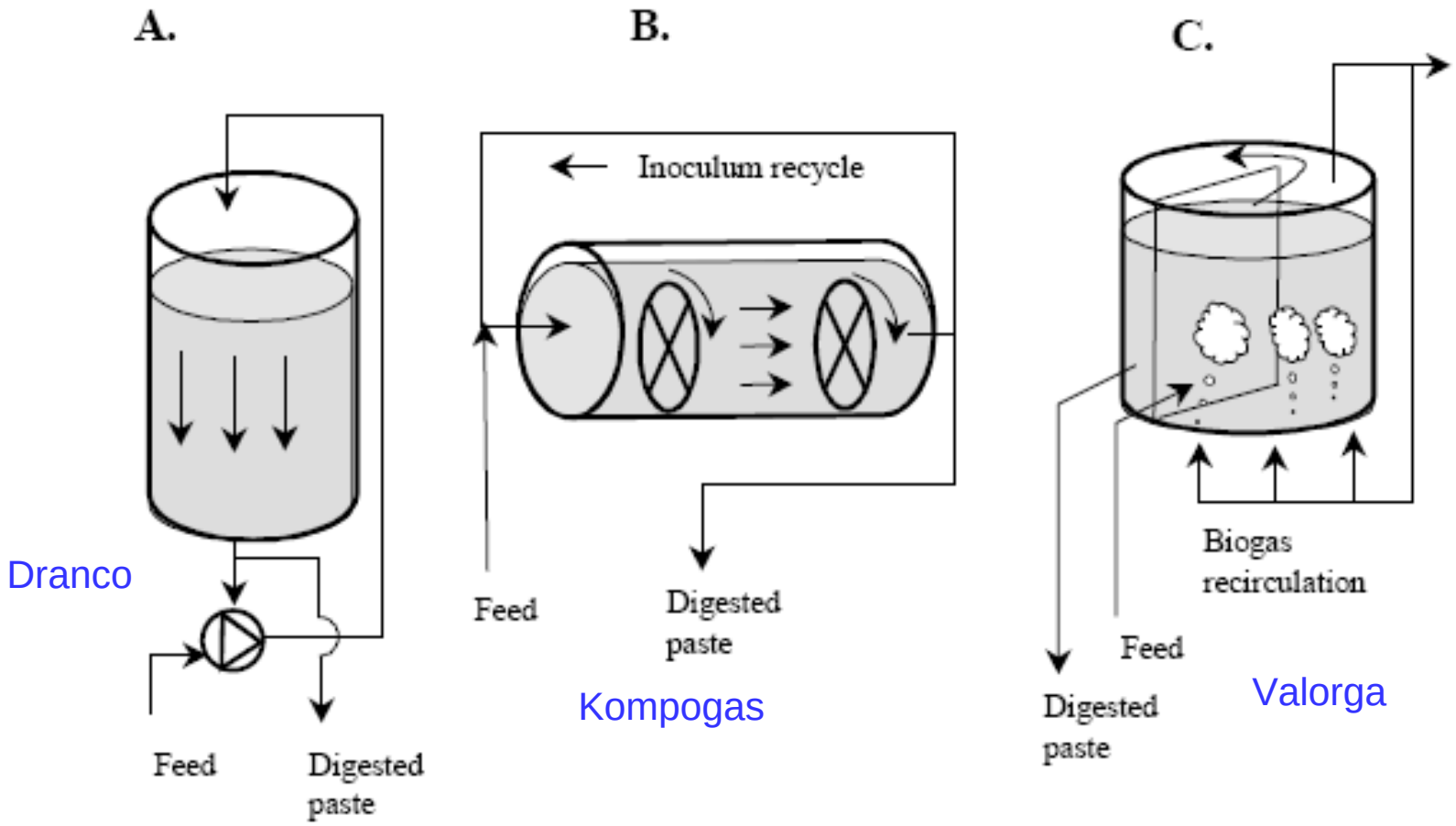
Dry fermentation systems

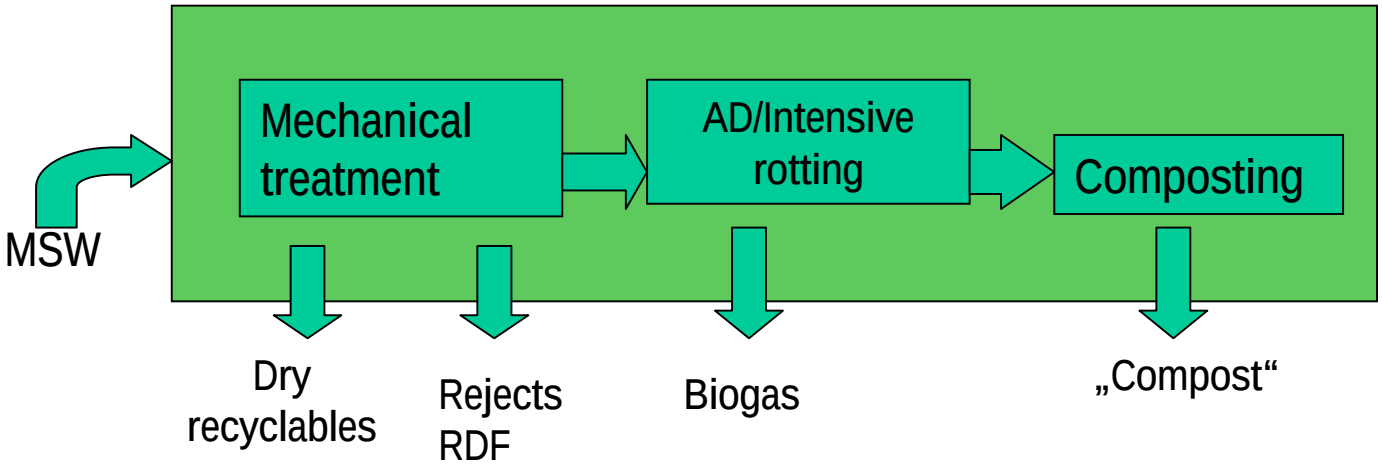


Dry fermentation

Co-digestion for an optimized productio

Wet fermentation

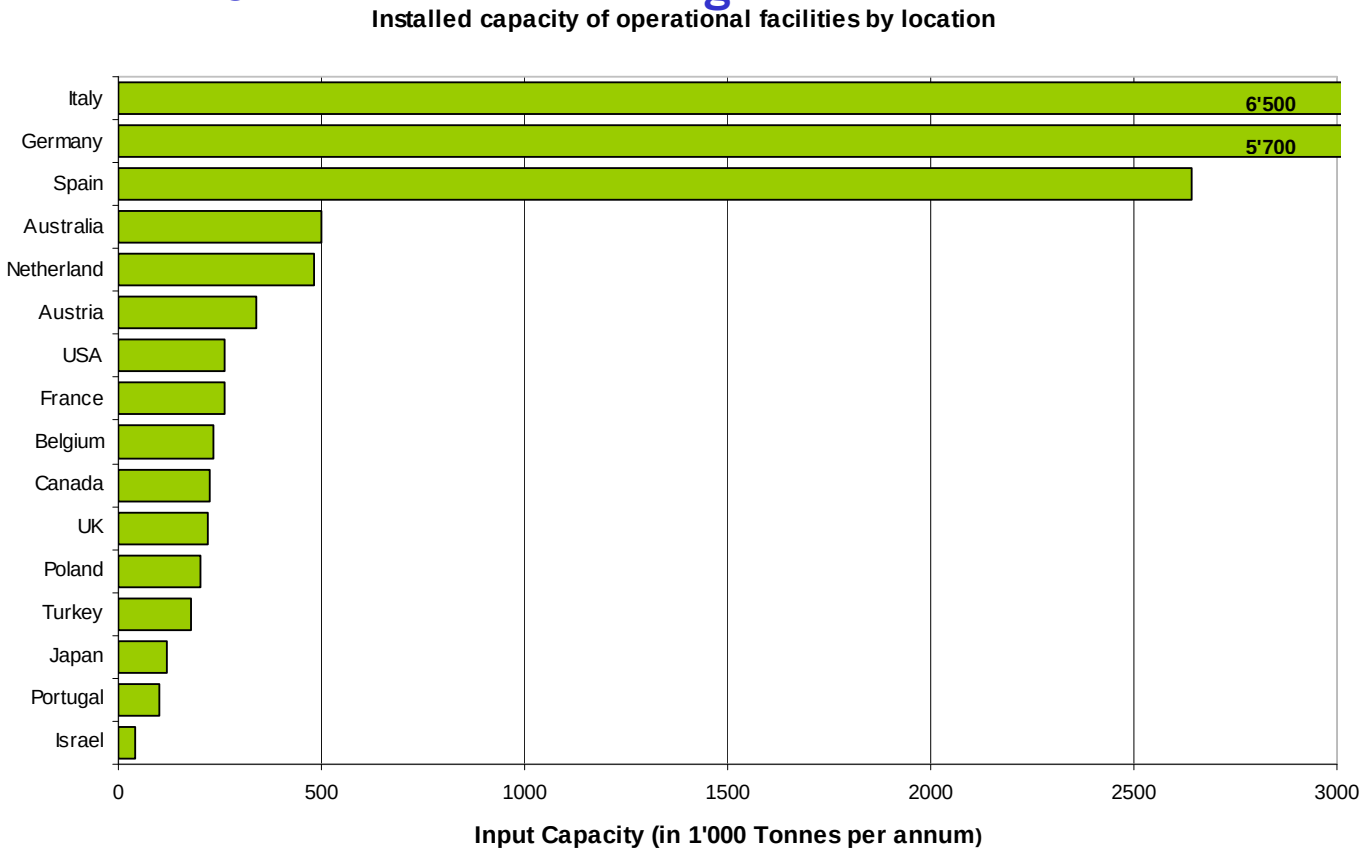
Typical process flow of a Mechanical Biological Treatment (MBT)



The same AD systems are applied as for Source separated waste

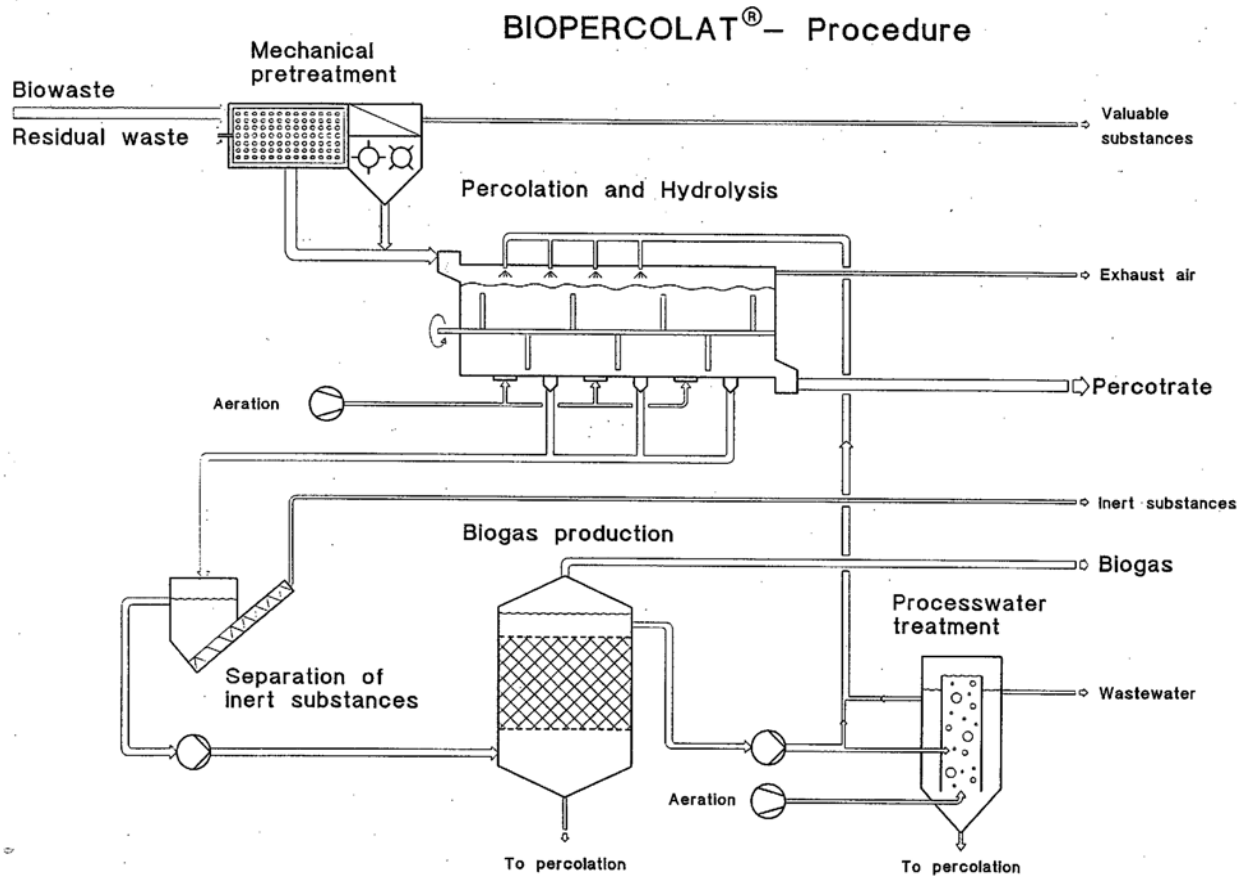
Treatment of full or gray MSW

Countries with the highest share of MBT



Total installed capacitiy > 20m tons

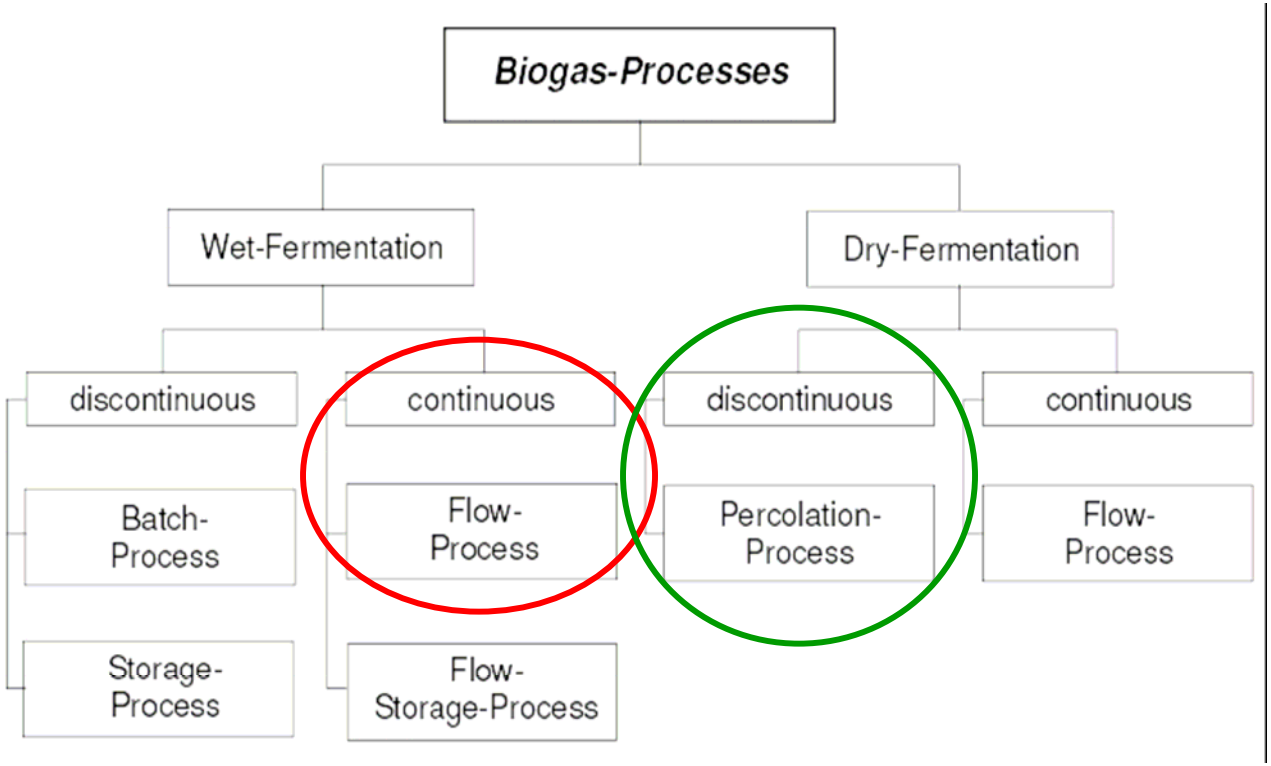
MBT with percolation



UR-3R Sydney (as built in Leicestershire)

Agricultural biogas production

a) With co-substrates
b) With energy crop



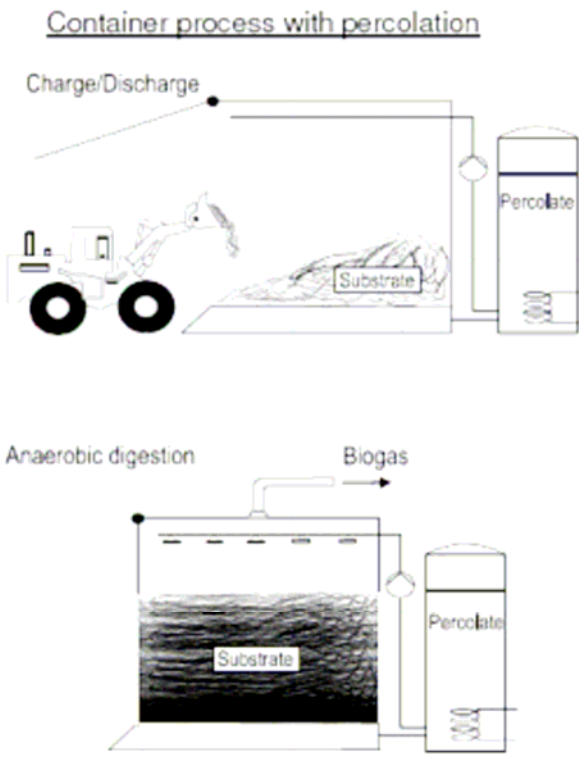
Source: Weiland

Rubber top digester

Large scale digester

Co-digestion

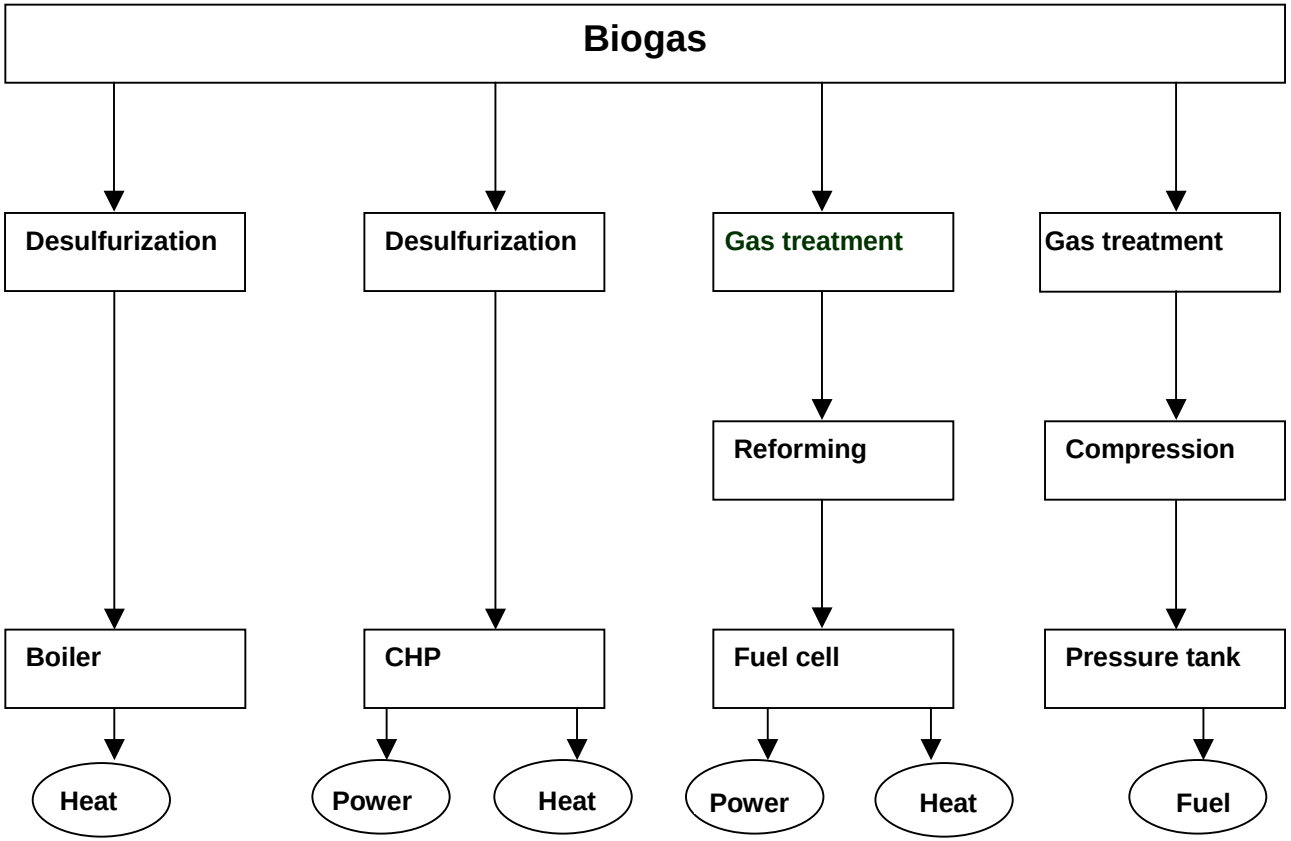
Improved fertilizer quality of animal wastes



Improved fertilizer quality of animal wastes

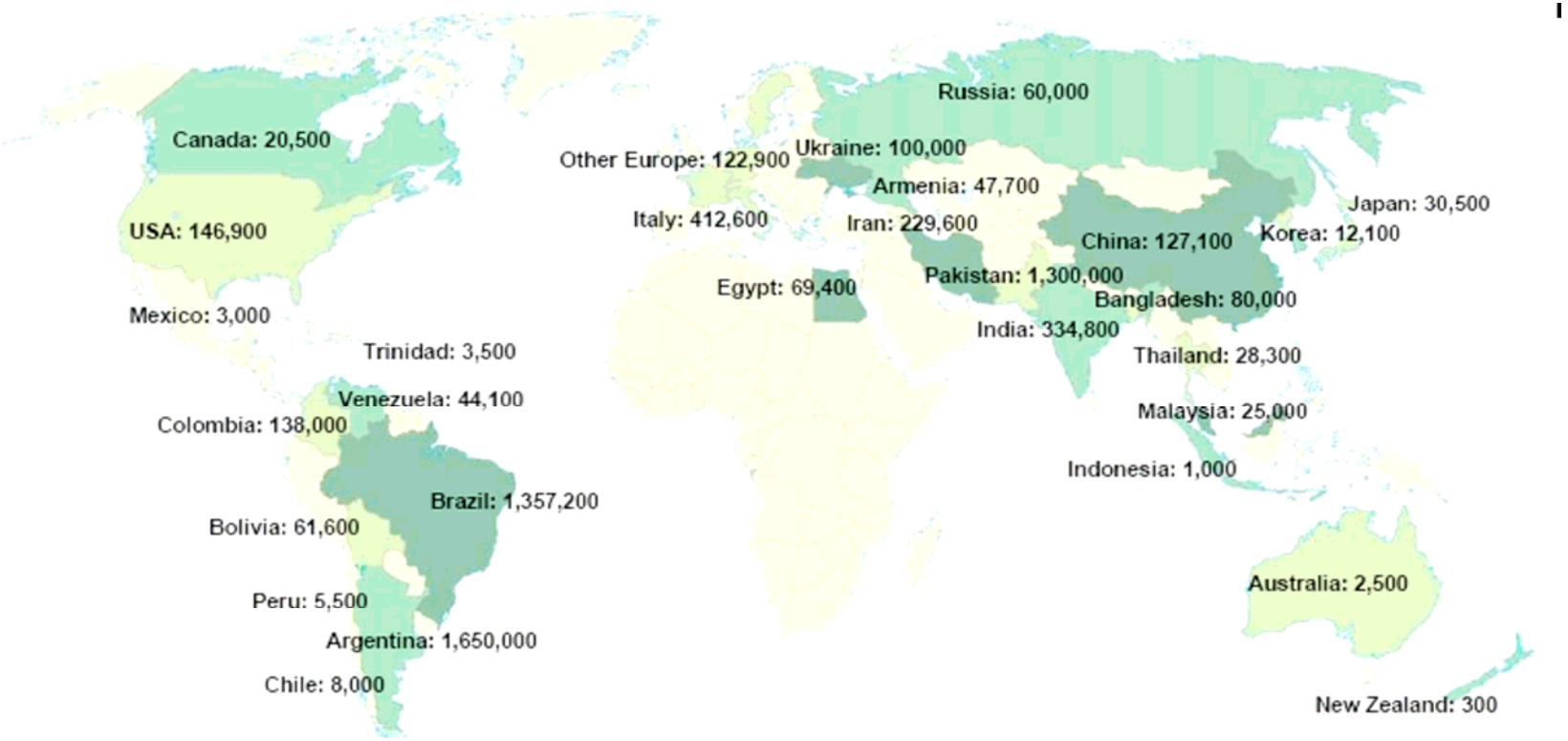
- better nutrient availability
- improved homogeneity
- less plant burning
- reduced C/N ratio
- odour reduction
- elimination of plant pathogens and weed seeds

Energy remains the major driving force of biogas production



Electricity production

Biomethane as fuel



6.4 million methane powered vehicles:

127,000 buses, 113,000 trucks, and 6,200,000 cars running on natural gas or biomethane

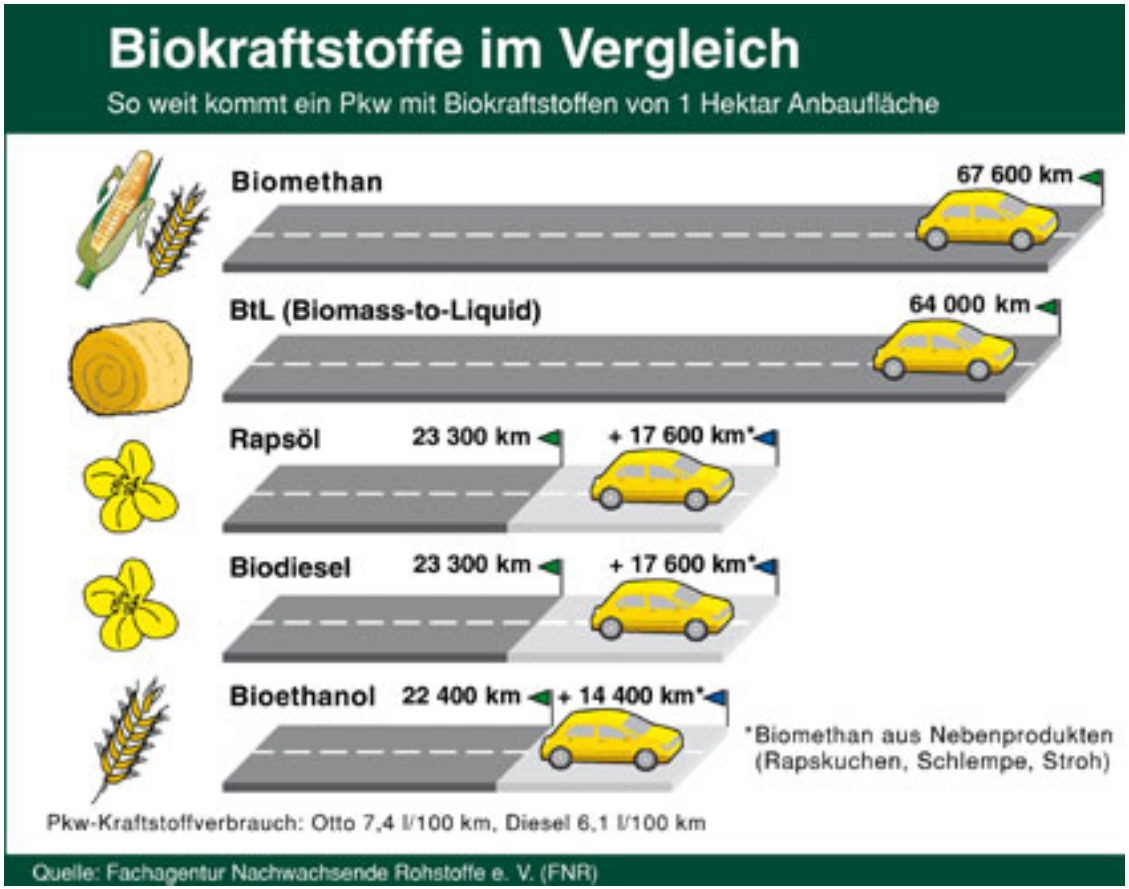
How does biogas compare to other bio-fuels?

Energy yield (Output/Input):

- EtOH from sugar cane (Brasil) 8.6-10.0
- EtOH from Maiz (USA) 1.34
- RME (Germany) 2.2-3.7
- Biogas from Gras (D) ca. 6
- Biogas from Maiz (D) ca. 8

Comparison of different bio-fuels

How far can a car run with different biofuels produced on 1ha of land



Source FNR


ZU VERMIETEN
Thank you !
BIOMÜLLVERWERTUNG
KOMPOGAS
KOMPOGAS
Mit kompogas erdgas weniger Abgas
IHR KÜCHENABFALL IST UNSER TREIBSTOFF
TG 127 912