

# *BIOGAS PRODUCTION AND USAGES IN SWEDEN*

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***BioMil AB***  

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*biogas, environment & recycling*

***BioMil AB***

# COMPANY PRESENTATION

Consultant company with engineering and environmental specialists

Unique expert knowledge in biogas systems

Office in **Lund**, Halmstad and Göteborg

Founded 1979 - over 30 years of experience

Over 200 references within the field of biogas

## **BioMil AB**

*biogas, environment & recycling*



**BioMil AB**

# *SERVICES*

- Studies and assessments
- Business & Project development
- Plant & Process design (detailed design)
- Procurement and commissioning
- Operating support
- R&D with in-house laboratory
- Education
- LCA, Life Cycle Assessment
- EIA, Environmental Impact Assessment

# EXAMPLES OF CLIENTS

- *Energy and waste management companies*
- *Municipalities*
- *Private companies*



**Region Skåne**



**FEDERATION OF  
SWEDISH FARMERS**



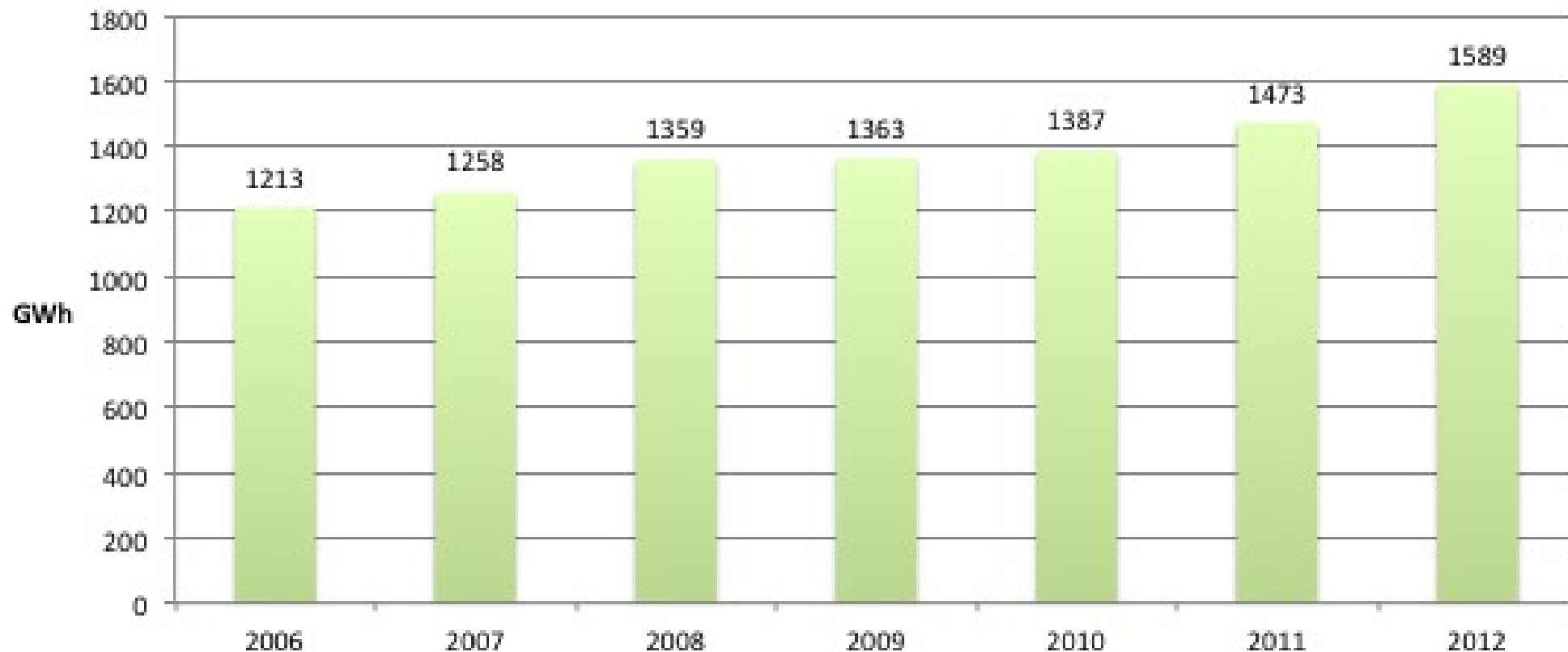
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# *BREIF HISTORY OF BIOGAS IN SWEDEN*

- 1960 - Biogas production at swedish waste water treatment plants to stabilize and reduce sludge
- 1970 - Oil crisis and biogas is now seen as an alternative energy source
- 1970/1980 - The pulp- and sugar industry starts to use anaerobic digestion for waste management
- 1980 - Biogas is started to be utilized from landfills
- 1990 - Co-digestion of household- and slaughterhouse waste.

# BIOGAS PRODUCTION IN SWEDEN

## Recent development of swedish biogas production

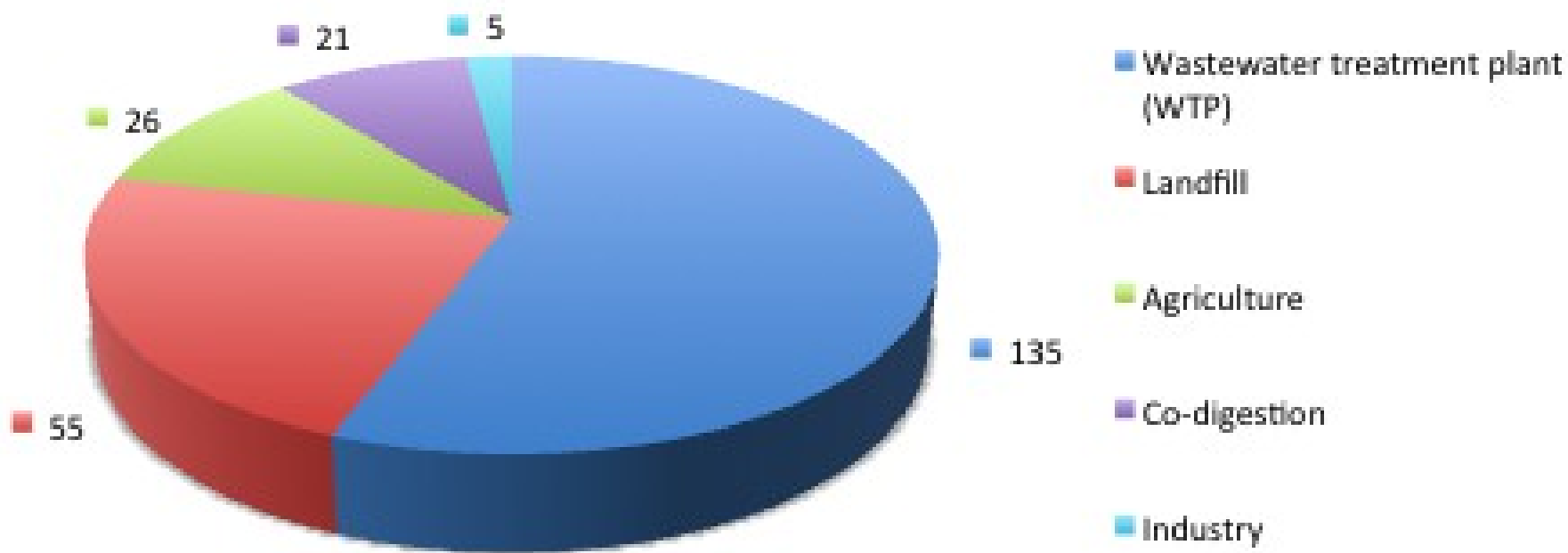


*Produktion och användning av biogas 2012, Energimyndigheten*

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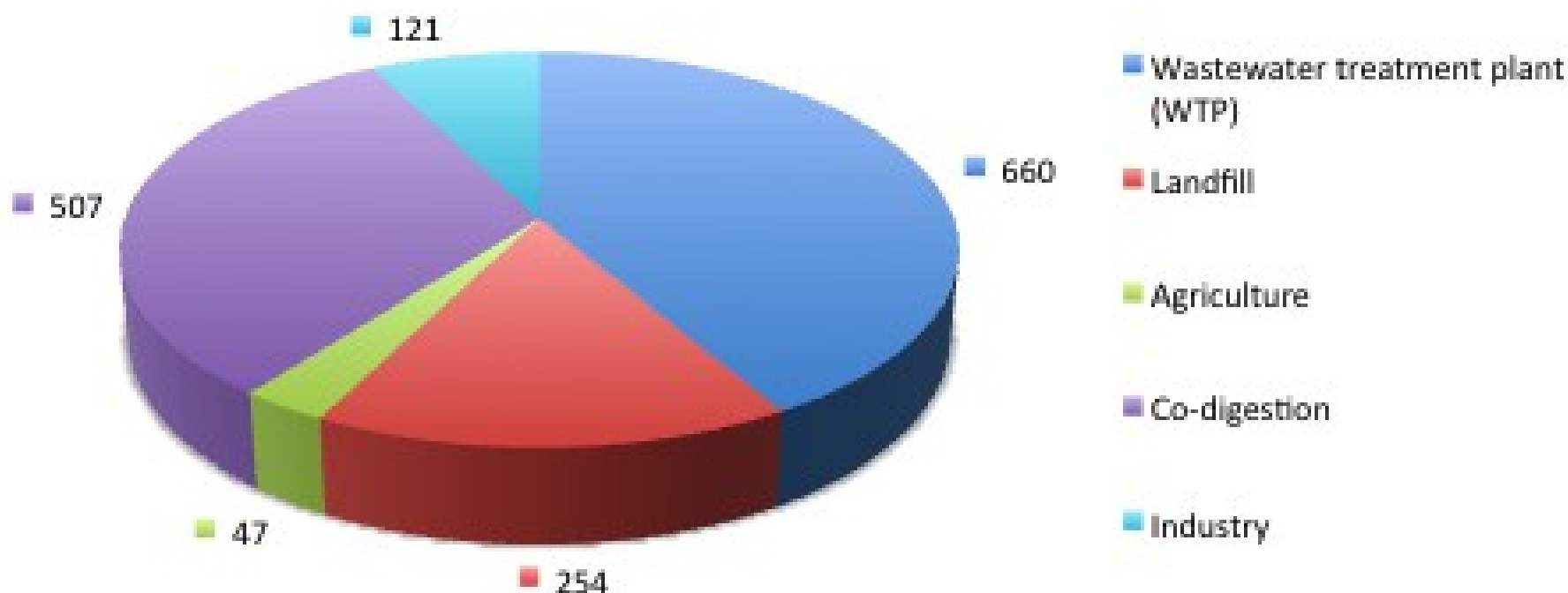
# BIOGAS PRODUCTION IN SWEDEN

## Number of biogas plants in Sweden (242 in total)



# BIOGAS PRODUCTION IN SWEDEN

**Amount of biogas produced 2013 in GWh/a  
(1 600 GWh in total)**



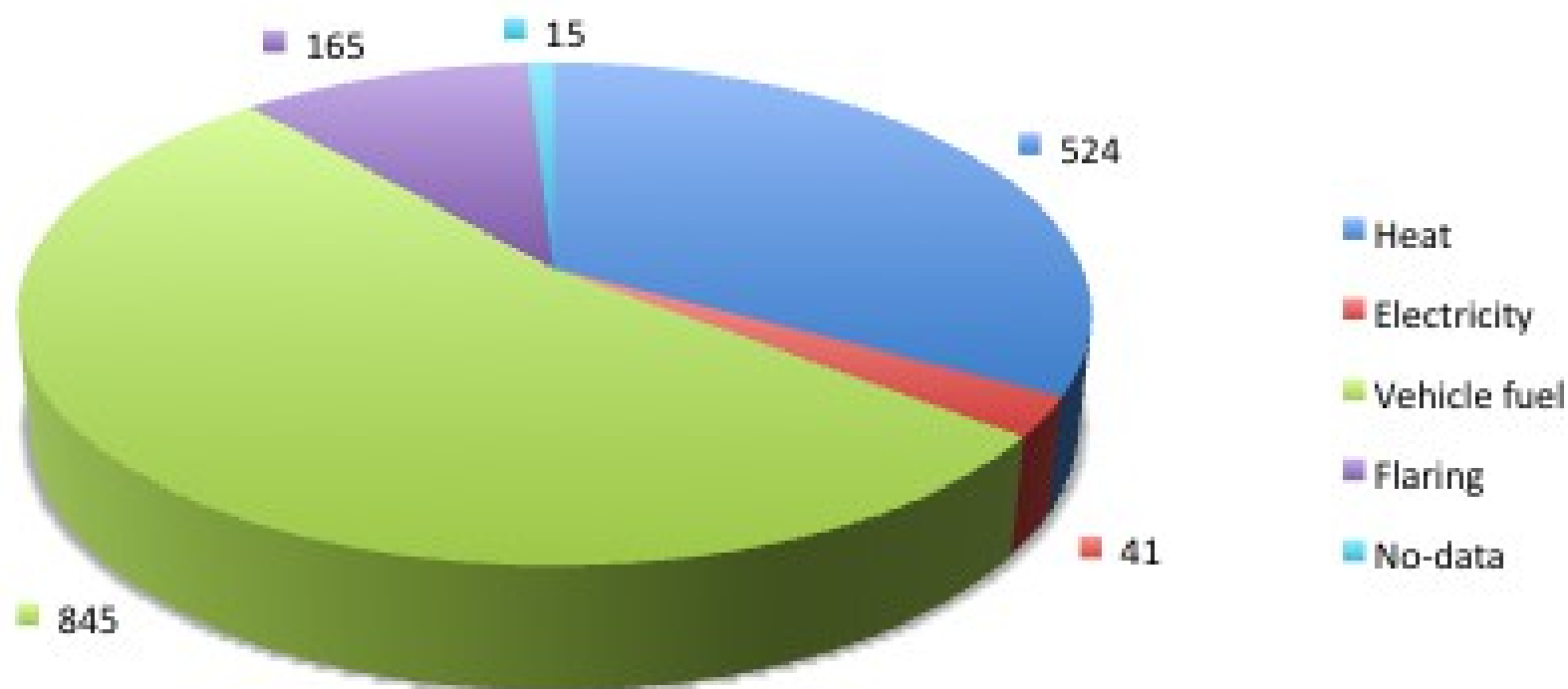
*Produktion och användning av biogas 2012, Energimyndigheten*

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# BIOGAS PRODUCTION IN SWEDEN

## Utilization of biogas in Sweden 2013 (GWh)



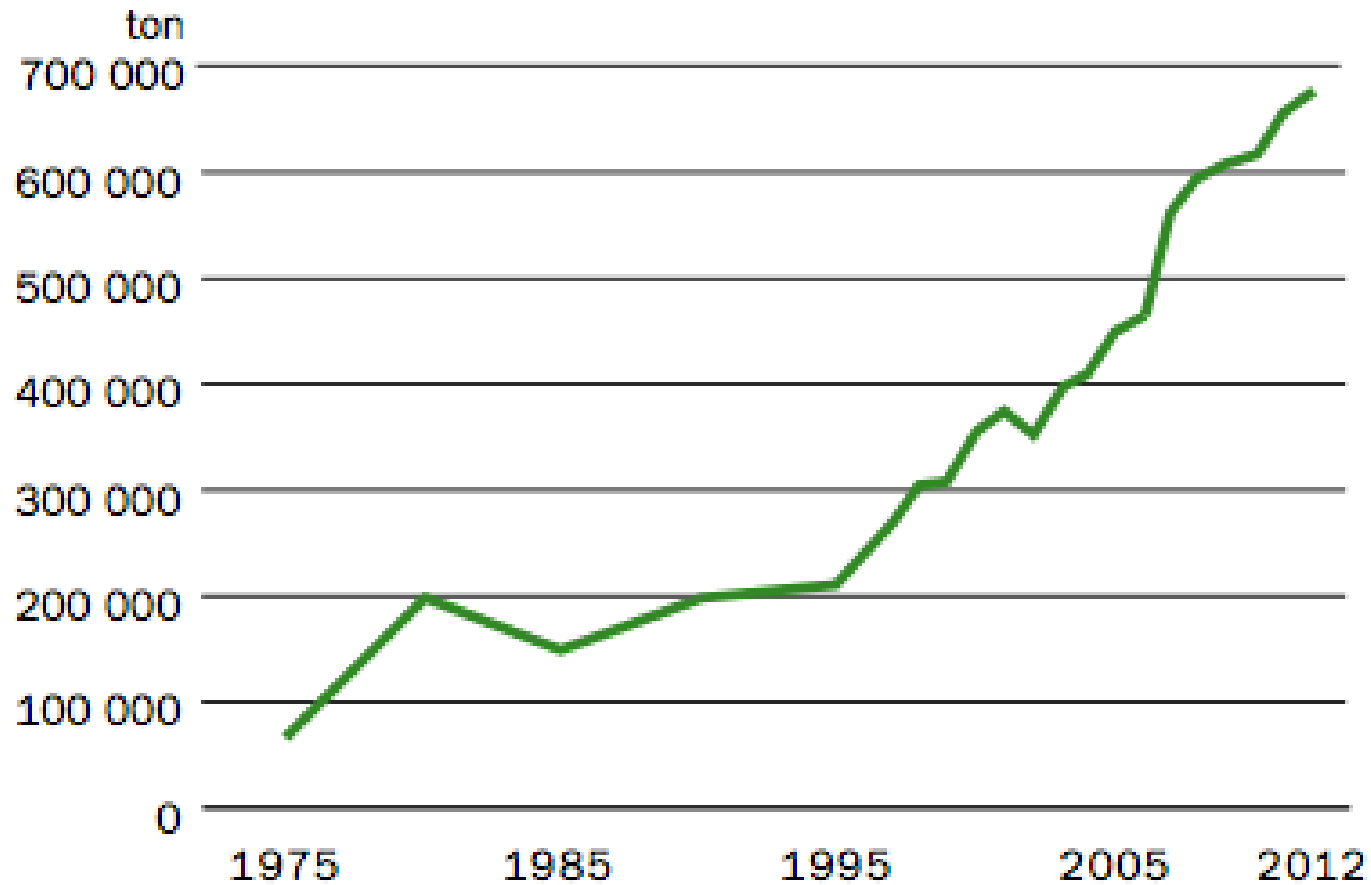
*Produktion och användning av biogas 2012, Energimyndigheten*

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# BIOLOGICAL RECYCLING

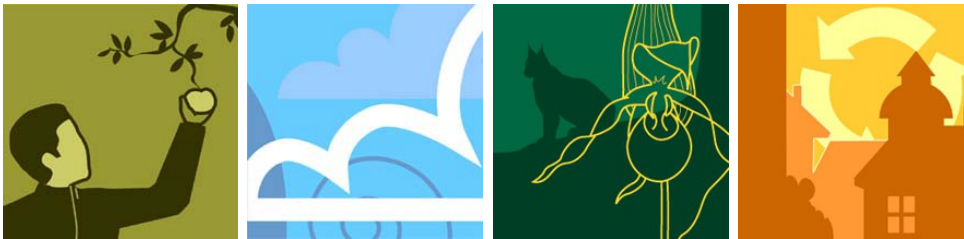
## Biological recycling of household waste in Sweden since 1975 - 2012

### BIOLOGISK ÅTERVINNING AV HUSHÅLLSAVFALL 1975 - 2012



# FOOD WASTE

- *Annually, about 1 million tons of food waste is generated from the Swedish food chain and approx. 70% is from the households <sup>1</sup>*
- *Important milestone in the national environmental quality objectives: **at least 50 % of food waste is recycled biological and at least 40 % should be treated so that energy is utilized by 2018***



<sup>1</sup> Jensen C, Stenmarck Å, Sörme L, Dunsö O. (2011). Matavfall 2010 från jord till bord. SMED Rapport Nr 99 2011

# BIOLOGICAL RECYCLING

Biological treatment of food waste	2010	2011	2012
Co-disgestion	103 580	132 380	185 540
Wastewater treatment plant	45 000	65 000	59 310
central compost plant	101 720	77 520	73 906
Home-composting	58 800	51 500	56 622
total	309 100	326 400	375 378
<b>Total to biogas production</b>	148 580	197 380	<b>244 850</b>

## Top 5 biogas plants in Sweden

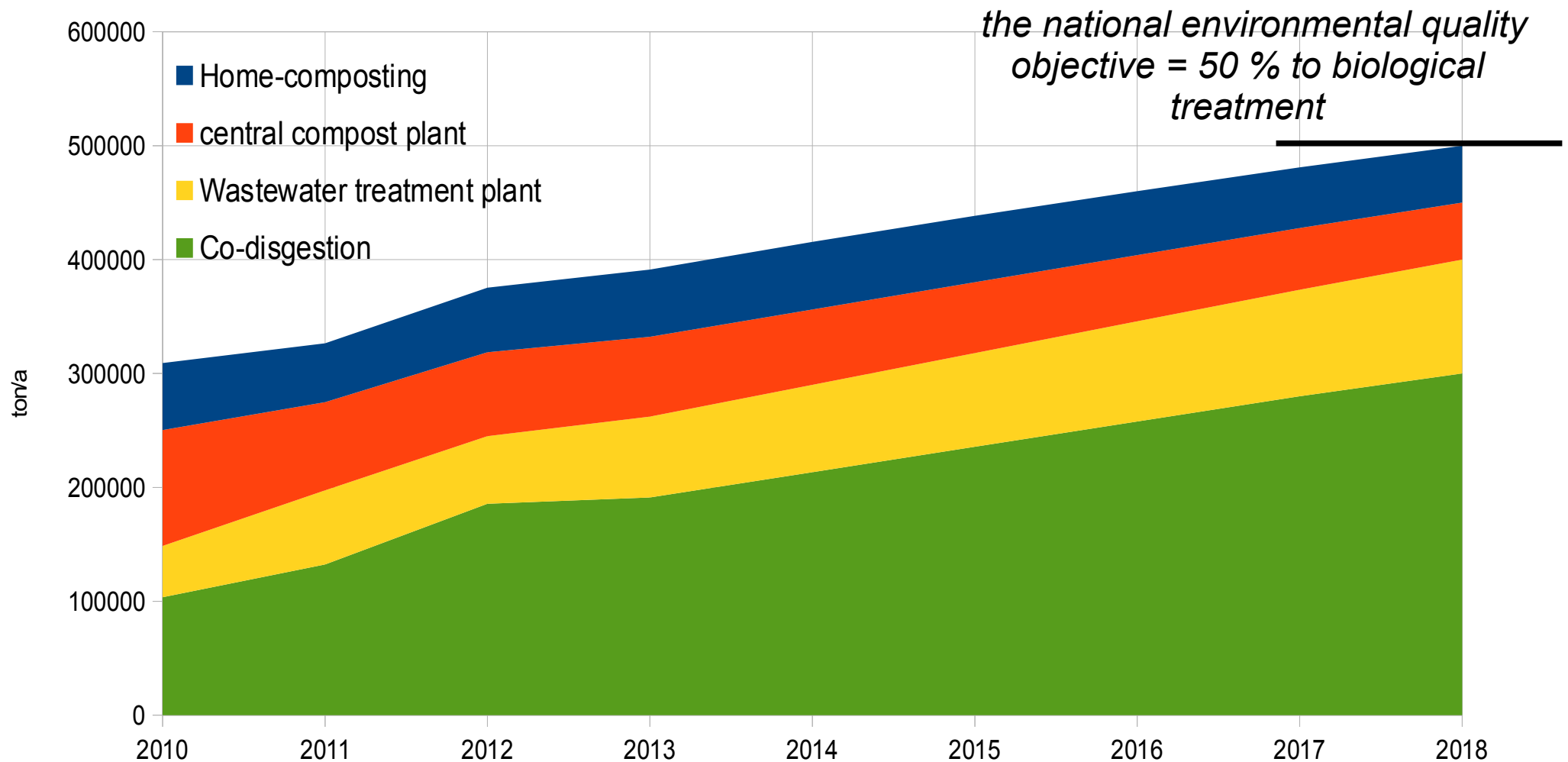
1 Borås	28 800	ton/y	foodwaste
2 Kristianstad	24 940	ton/y	foodwaste
3 Linköping	22 600	ton/y	foodwaste
4 Uppsala	21 500	ton/y	foodwaste
5 Helsingborg:	19 110	ton/y	foodwaste

*Svensk avfallshantering 2013, Avfall Sverige*

*Produktion och användning av biogas 2012, Energimyndigheten*

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# PREDICTION OF FUTURE INCREASE OF FOOD WASTE TO BIOGAS PRODUCTION

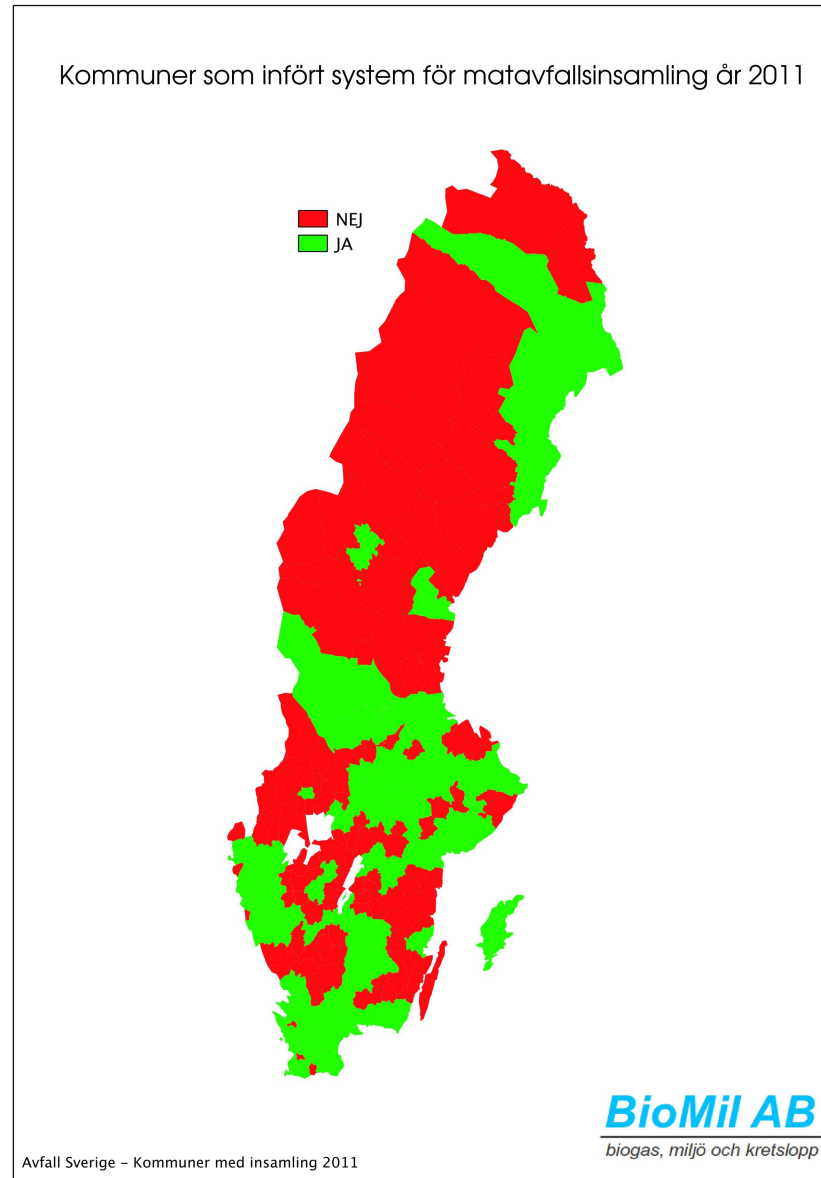


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# *CAN SWEDEN REALIZE THEIR GOAL?*

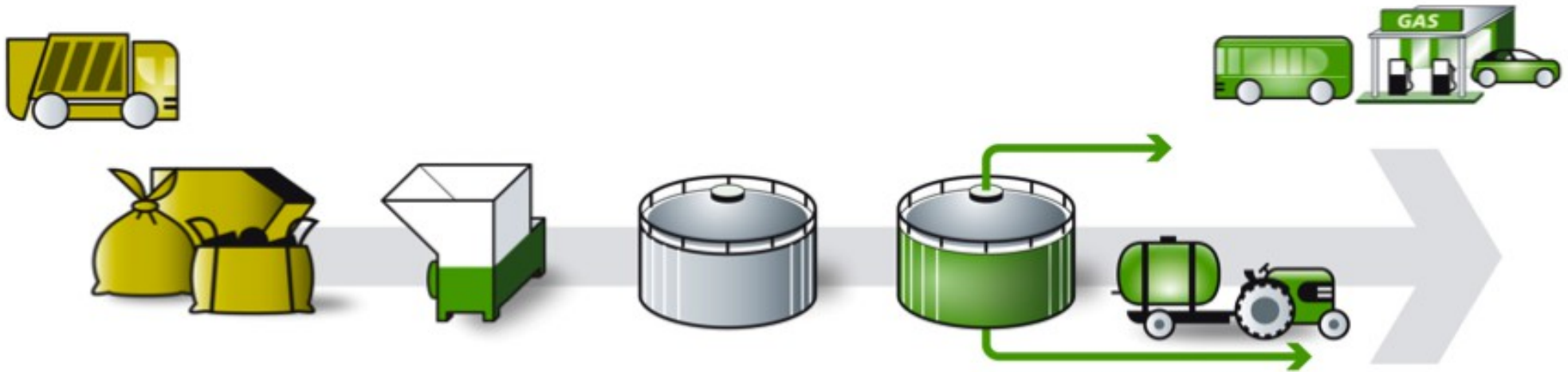
- The capacity of the biogas plants is already sufficient.
- More and more municipality has implemented systems that gives citizens the possibility to source-separate organic household waste (food waste). Today 60 % of the municipalities has a system but will soon increase to aprox 80%.
- Investments are being done in systems for pre-treatment before anaerobic digestion to increase the efficiency and lower the costs.

# *Municipalities with system for collection of source separated organic household waste*



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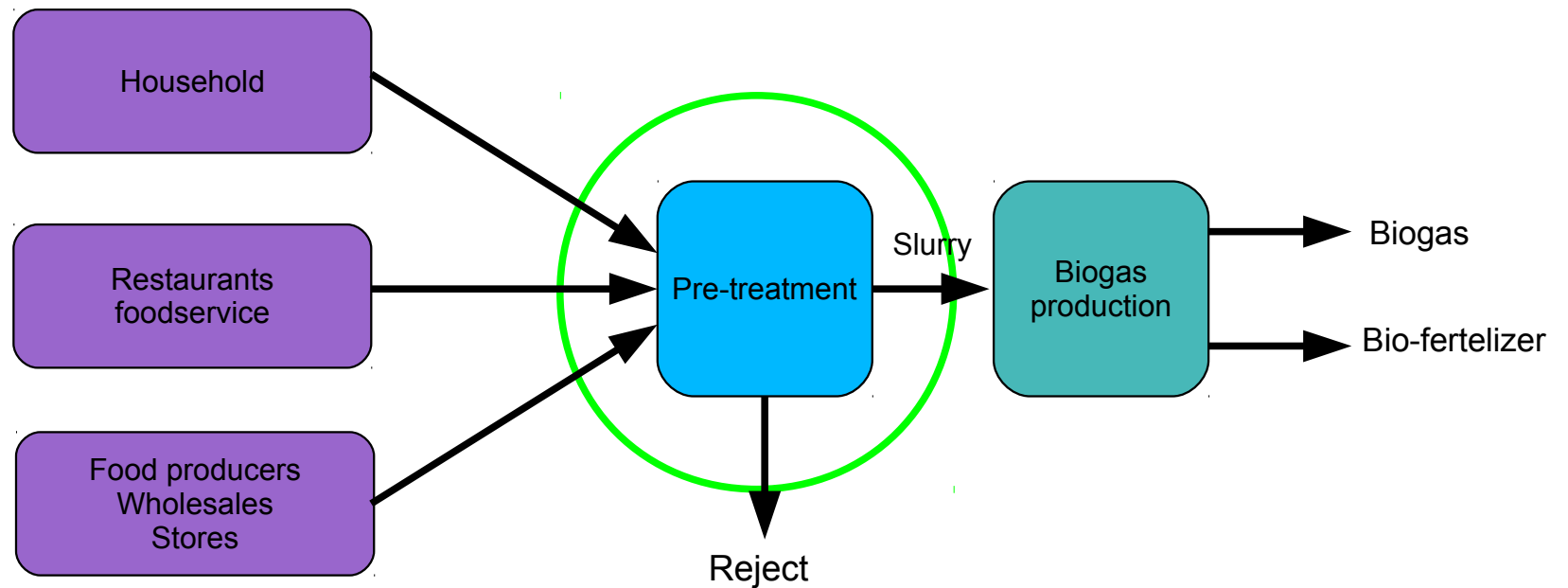
# BIOGAS FROM FOOD WASTE



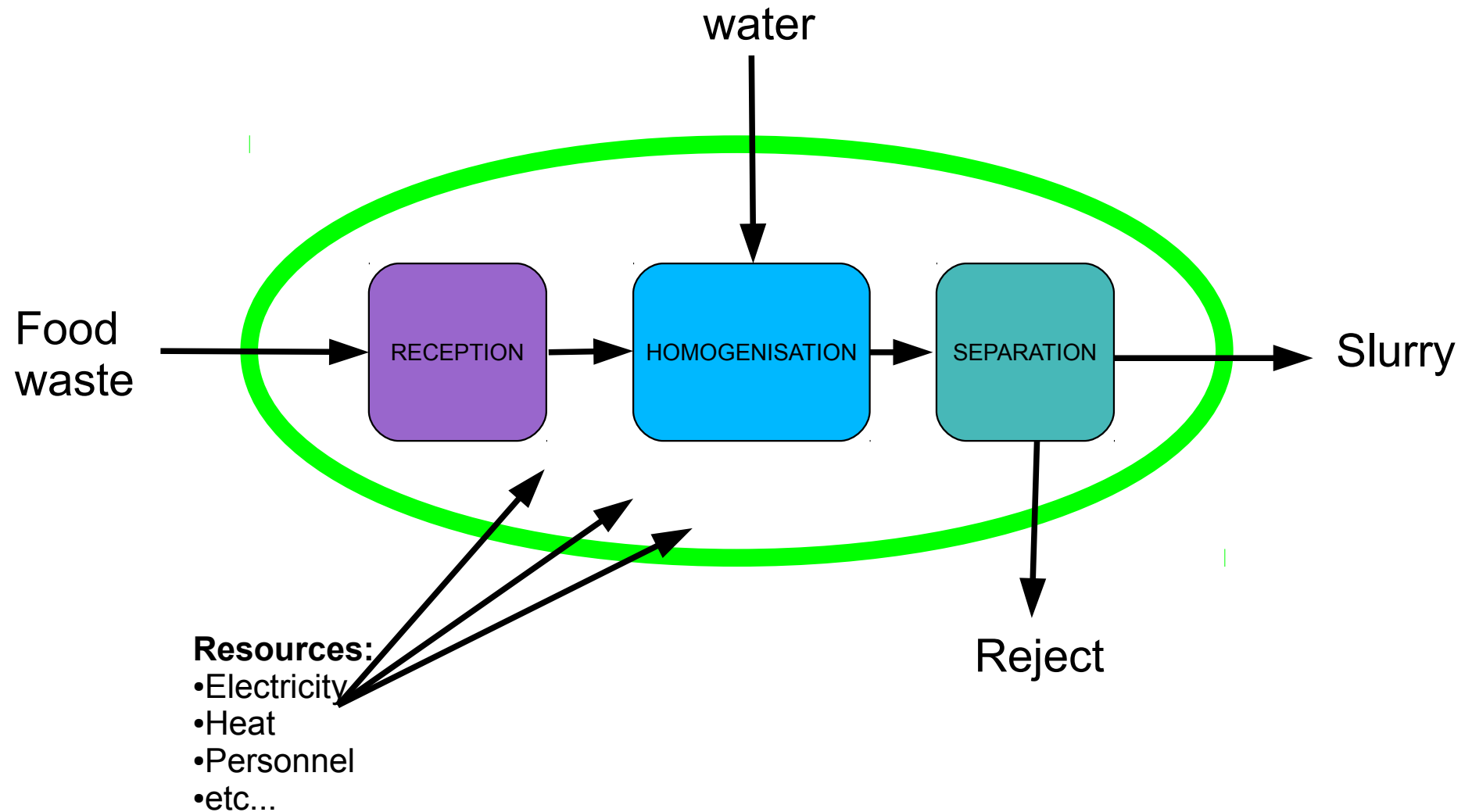
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# BIOGAS FROM FOOD WASTE



# PRE-TREATMENT OF FOOD WASTE



# *WHY PRE-TREATMENT OF FOOD WASTE BEFORE BIOGAS PRODUCTION?*

- To produce a slurry that are pumpable and more manageable for conventional wet digestion plant
- Separate undesirable materials such as plastic, metal, glass, sand, gravel, etc to ensure the quality of the bio-fertilizer and reduce the wear and maintenance cost for the AD-plant.

# NEW REPORT - "PRE-TREATMENT OF HOUSEHOLD WASTE FOR BIOGAS PRODUCTION"

- Financed by the *Swedish Board of Agriculture* to stimulate an increase of food waste that are being biological treated in AD-plants
- Status report and an inventory of existing technologies for pre-treatment of food waste
- The report has been conducted with and published by the *Swedish Waste Management and Recycling association*



FÖRBEHANDLING AV MATAVFALL  
FÖR BIOGASPRODUKTION  
- INVENTERING AV BEFINTLIGA TEKNIKER VID  
SVENSKA ANLÄGGNINGAR

RAPPORT B2013:01  
ISSN 1103-4092

AVFALL SVERIGE  
utveckling



# SWEDISH PRE-TREATMENT PLANTS

Name of the plant	City
Bodens kommun	Boden
Borås Energi & Miljö AB	Borås
Eskilstuna Energi & Miljö	Eskilstuna
Falköpings kommun	Falköping
Renova AB	Göteborg
HEM AB	Halmstad
NSR AB	Helsingborg
SRV Återvinning AB	Huddinge
JEBIO AB	Jönköping
Nårab	Klippan
Tekniska verken AB	Linköping
Sysav AB	Malmö
Skellefteå kommun	Skellefteå
Syvab	Stockholm
Uppsala Vatten & Miljö AB	Uppsala
Ragn-Sells AB	Vänersborg
Svensk Växtkraft AB	Västerås
Växjö kommun	Växjö

- About 20 pre-treatment plants for food waste to biogas production in sweden today
- The study investigates 9 different plants





# RESULTS

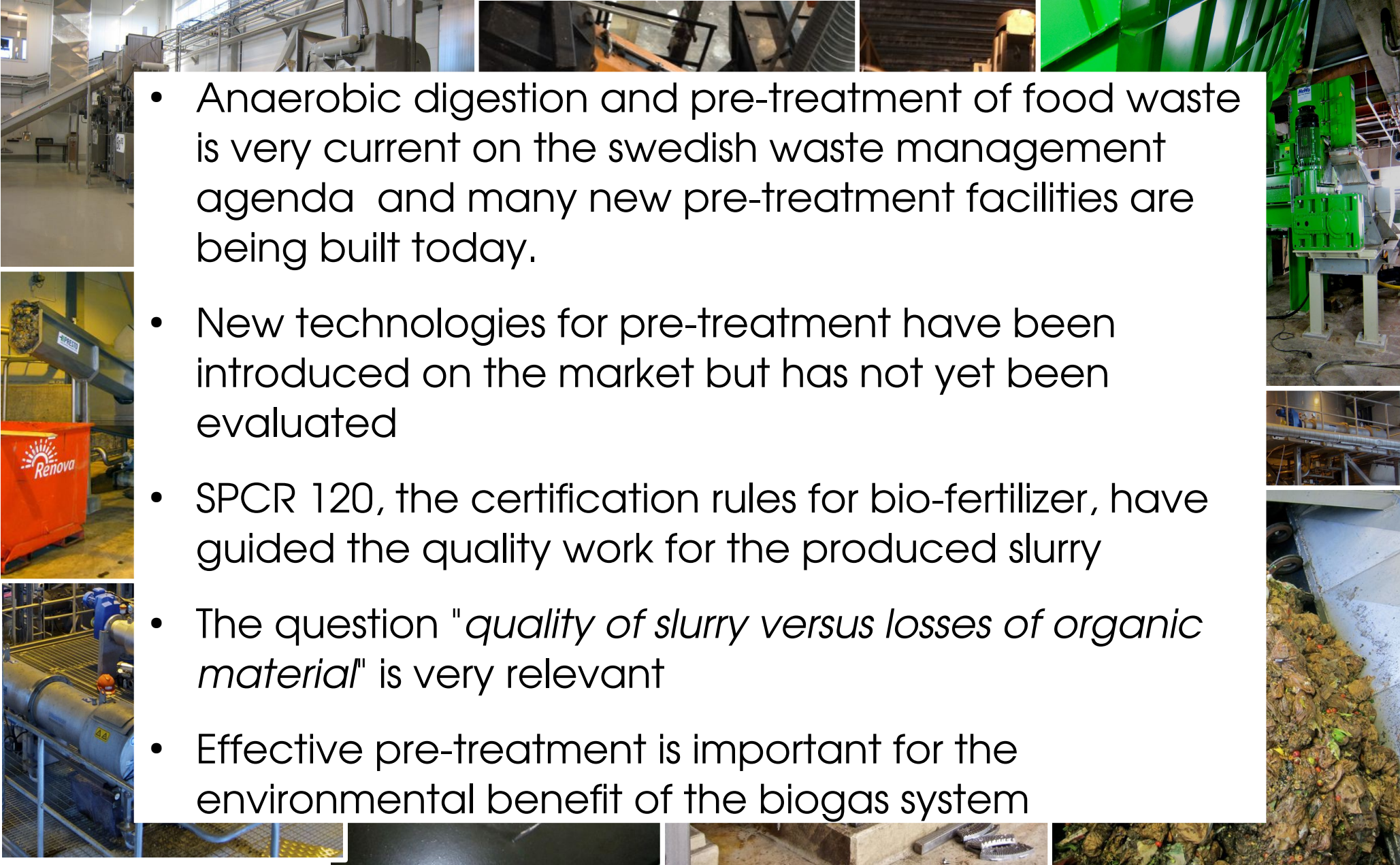
- There are a wide variety of techniques and plants difference a lot in both terms of capacity, technology and process lineup
- Some plants uses conventional techniques such as screw press, piston press or strainer to separate unwanted material but some new technologies have also been introduced to the market.





# RESULTS

- Anaerobic digestion and pre-treatment of food waste is very current on the Swedish waste management agenda and many new pre-treatment facilities are being built today.
- New technologies for pre-treatment have been introduced on the market but has not yet been evaluated
- SPCR 120, the certification rules for bio-fertilizer, have guided the quality work for the produced slurry
- The question "*quality of slurry versus losses of organic material*" is very relevant
- Effective pre-treatment is important for the environmental benefit of the biogas system



*Thank you for your attention*

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