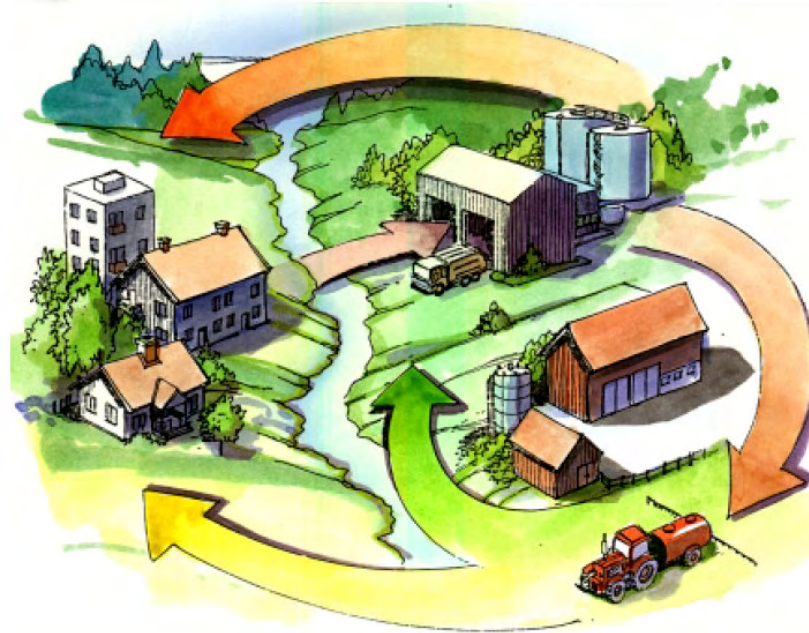




AGROPTI-gas

Demonstration of an optimised production system for biogas from biological waste and agricultural feedstock



A project implemented through financial assistance from funds of EUROPEAN COMMISSION – DG Tren 5th FW Programme





Main objectives

To demonstrate:

- Co-digestion of source-sorted municipal waste and energy crops in a large scale system
- Biogas from waste and crops as a competitive vehicle fuel
- Recycling of municipal waste as a high-quality organic fertiliser in conventional and organic farming including advantages for farmers to participate in such systems.



Why combine energy crops and organic waste?

The farmers perspective

- Improvement of soil fertility when e.g. grass/clover are introduced in cereal dominated crop rotation systems
- Improve economic conditions for biogas production by gate fee from waste
- Farmers will have new possibilities as hired contractors for coordinated harvest and ensiling

The municipalities perspective

- Better acceptance of digestate as organic fertiliser when farmers deliver feedstock
- Facilitates municipalities in reaching sustainable targets (e.g. CO₂-reduction, recycling of food waste)



Work package	
WP 1	Project coordination
WP 2	Procurement process
WP 3	Building
WP 4	Communication and information forum for urban-rural cooperation
WP 5	Socio-economic analysis
WP 6	Dissemination
WP 7	Evaluation of biogas process (biology/technology)
WP 8	Evaluation handling system
WP 9	Final report



Västerås biogas plant (AGROPTI-gas)

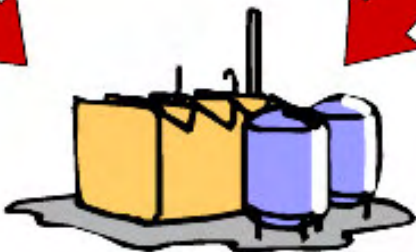
14 000 tonnes source-sorted
municipal solid waste

4 000 tonnes grease trap removal
sludge

5 000 tonnes ley crop



300 ha



N: 150 tonnes
P: 30 tonnes
K: 100 tonnes

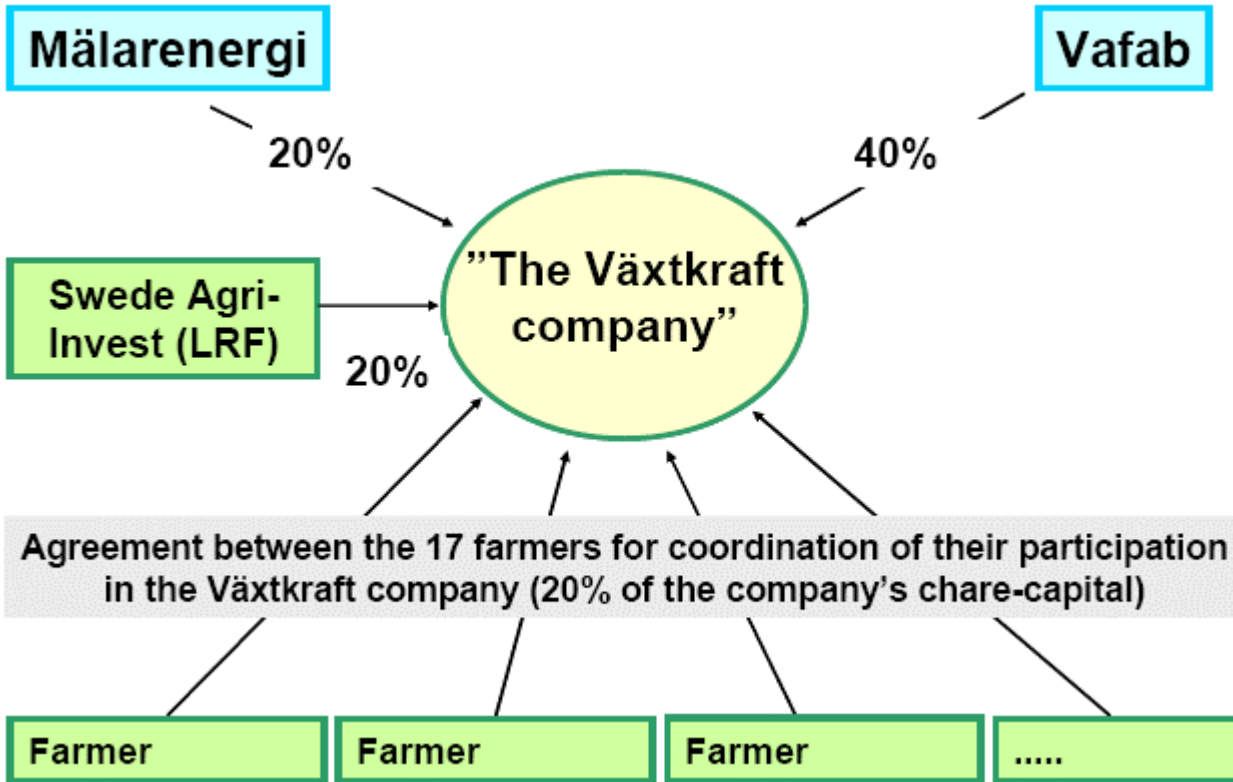
Vehicle fuel

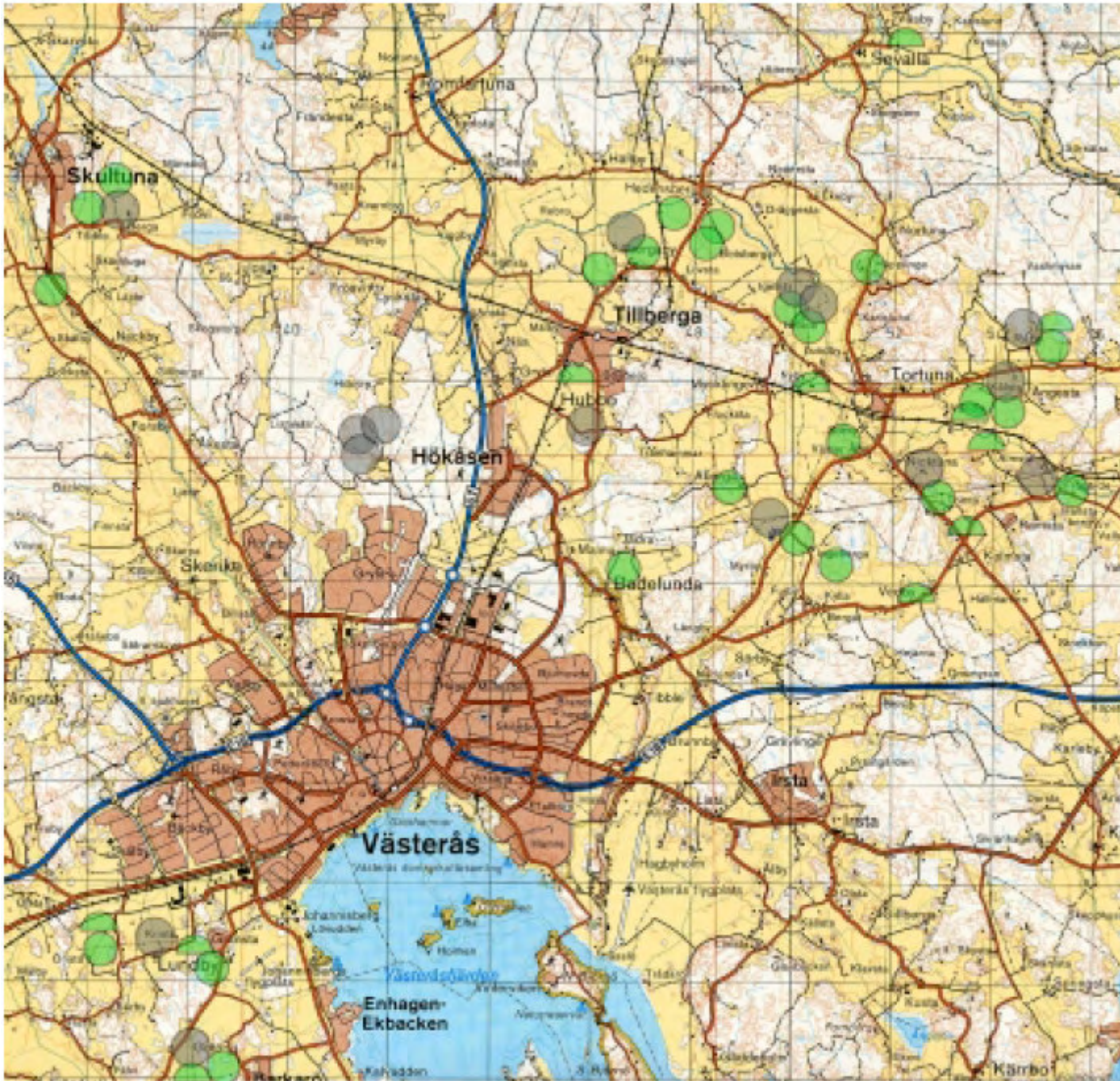
15 GWh = 1500 m³ petrol

23 GWh incl. sewage gas

Solid digestate: 6 500 t
Liquid digestate: 15 000 t







10 ha ley crop

10-20 km to
biogas plant

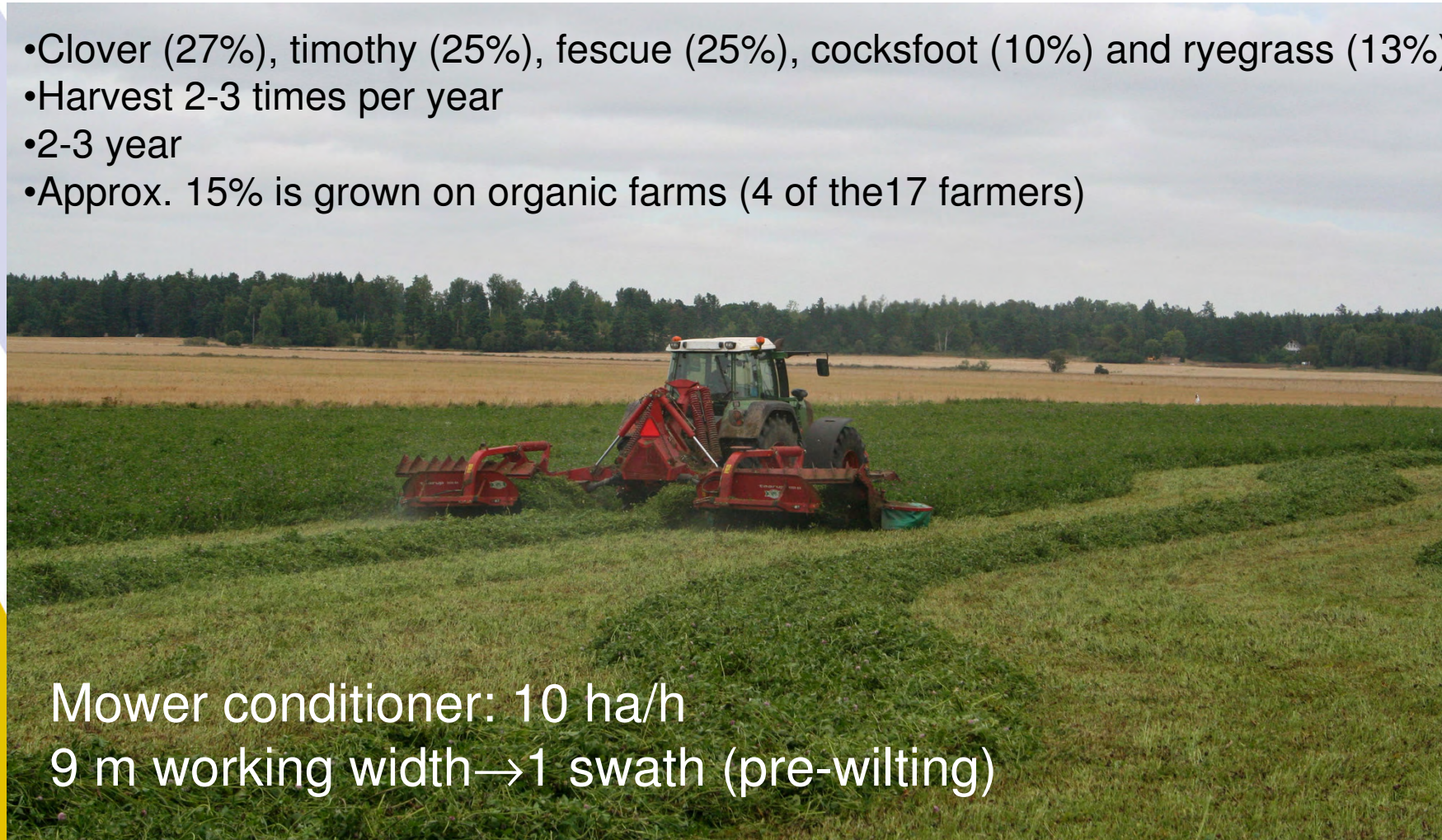


1000 m³
digestate storages





- Clover (27%), timothy (25%), fescue (25%), cocksfoot (10%) and ryegrass (13%)
- Harvest 2-3 times per year
- 2-3 year
- Approx. 15% is grown on organic farms (4 of the 17 farmers)



Mower conditioner: 10 ha/h
9 m working width → 1 swath (pre-wilting)

Precision chopping (15 mm) into 40 m³ containers
11 tonnes/container
1 container \Leftrightarrow 1 ha
Capacity of chopper: 7 containers/h



Loading containers to truck at the side of the field
3 containers/truck (max 40 tonnes)
ca 20-30 min for loading truck with 3 containers



2 trucks used for transport to biogas plant
4-5 containers/h
ca 20 min for transport to biogas plant

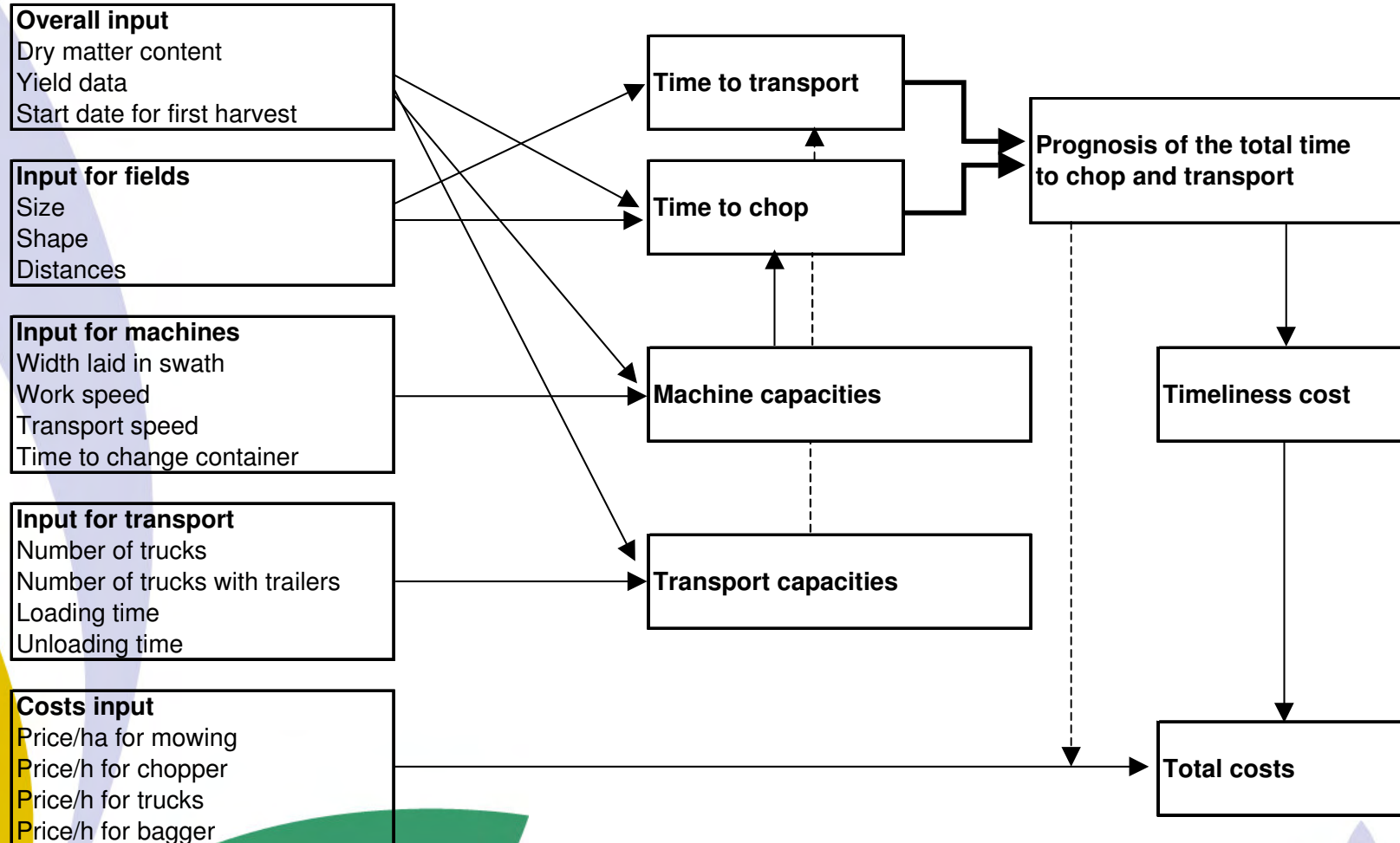




1st harvest: 3200 tonnes (340 ha) 7 active days
2nd harvest 2800 tonnes (300 ha) 6 active days
Total capacity ca 50 ha/d (10-16 h)



Model for energy crop handling





The AGROPTI-gas project includes:

- Biogas plant for treating organic waste and agricultural crops
- Plant for up-grading the biogas to vehicle quality and filling stations
- Pipelines for transportation of raw and purified biogas
- Storage for ensilage and system for harvesting and handling ley crop
- Storages and handling system for digestion residuals

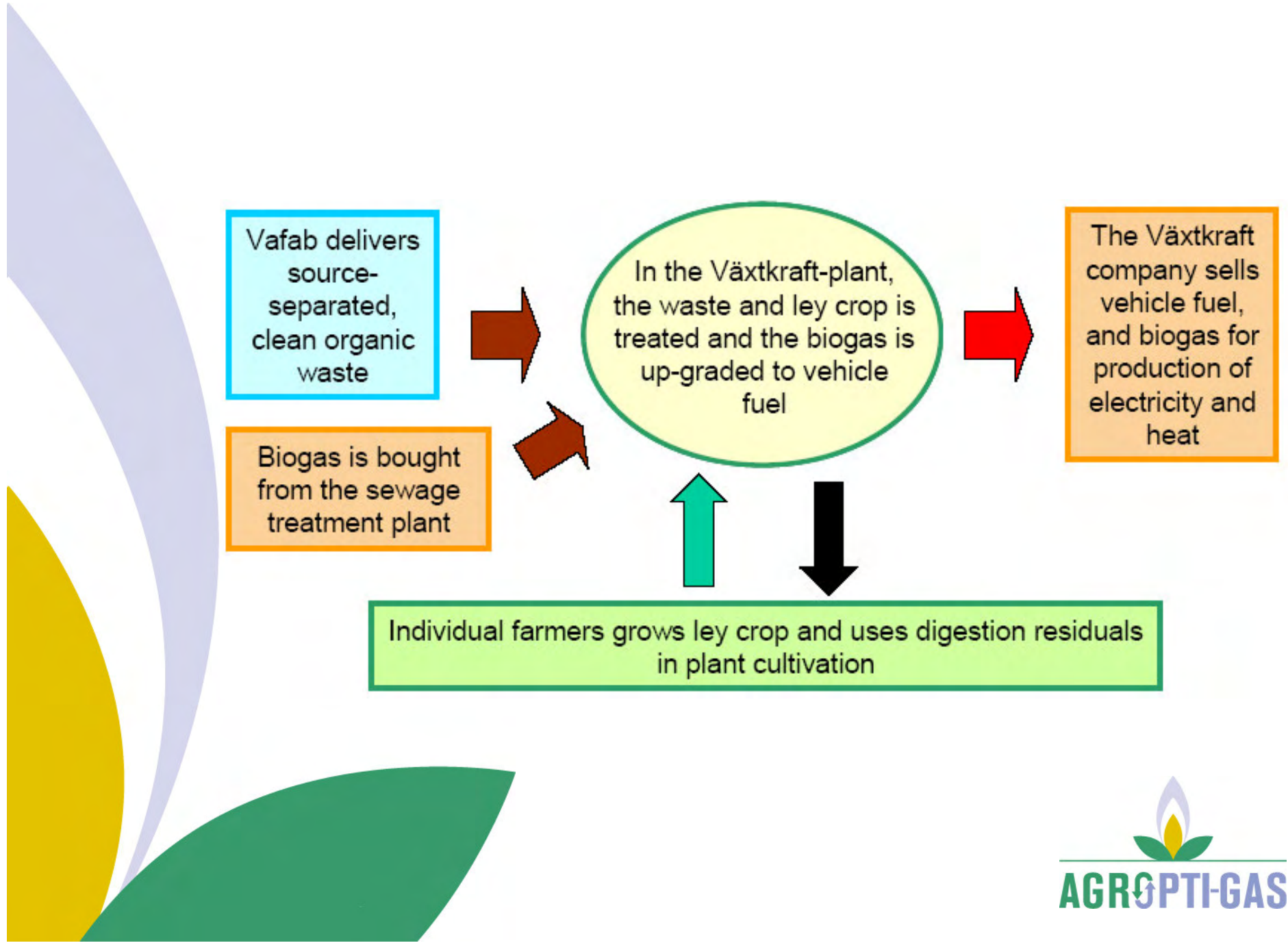


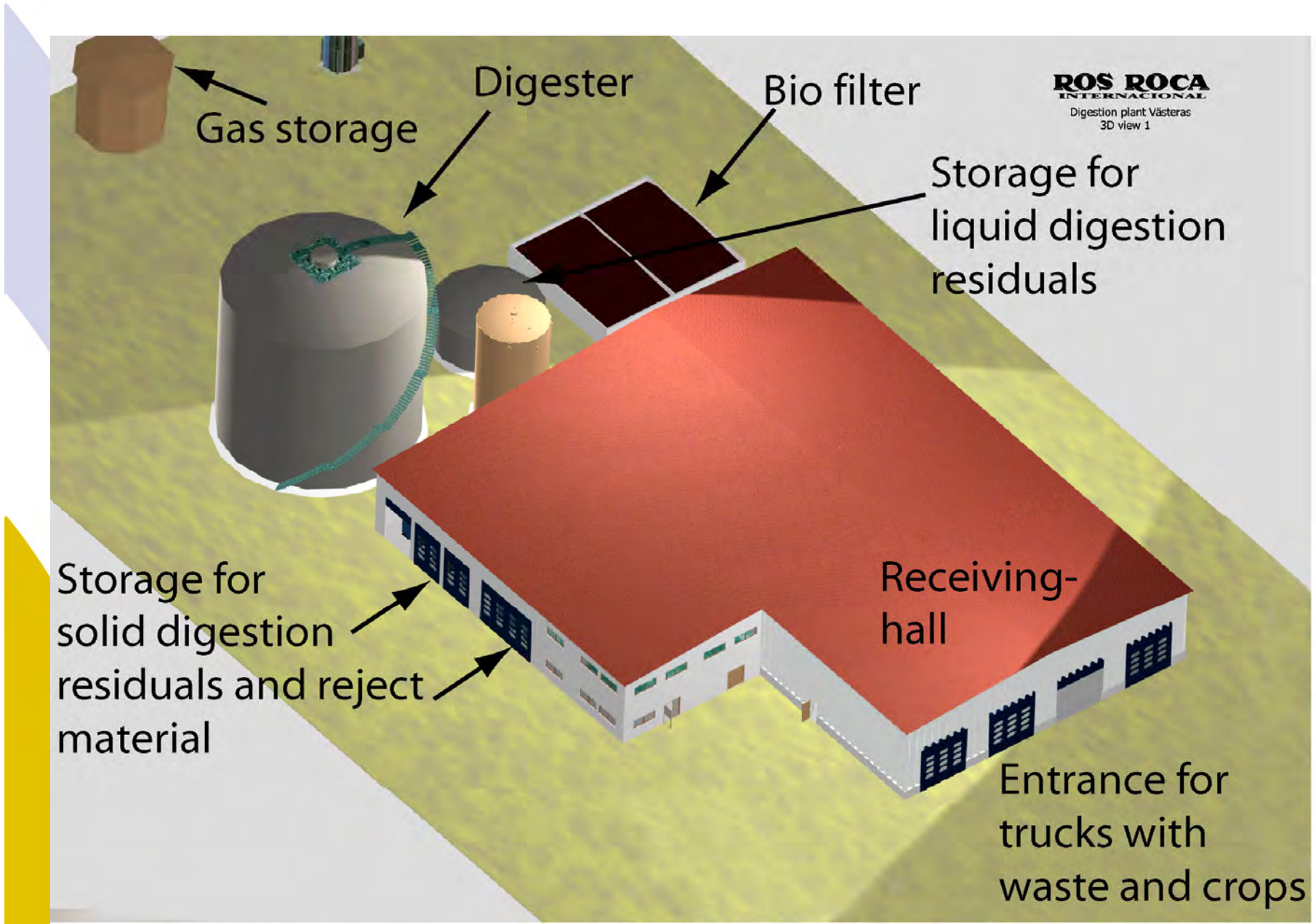
Source-sorted municipal solid waste



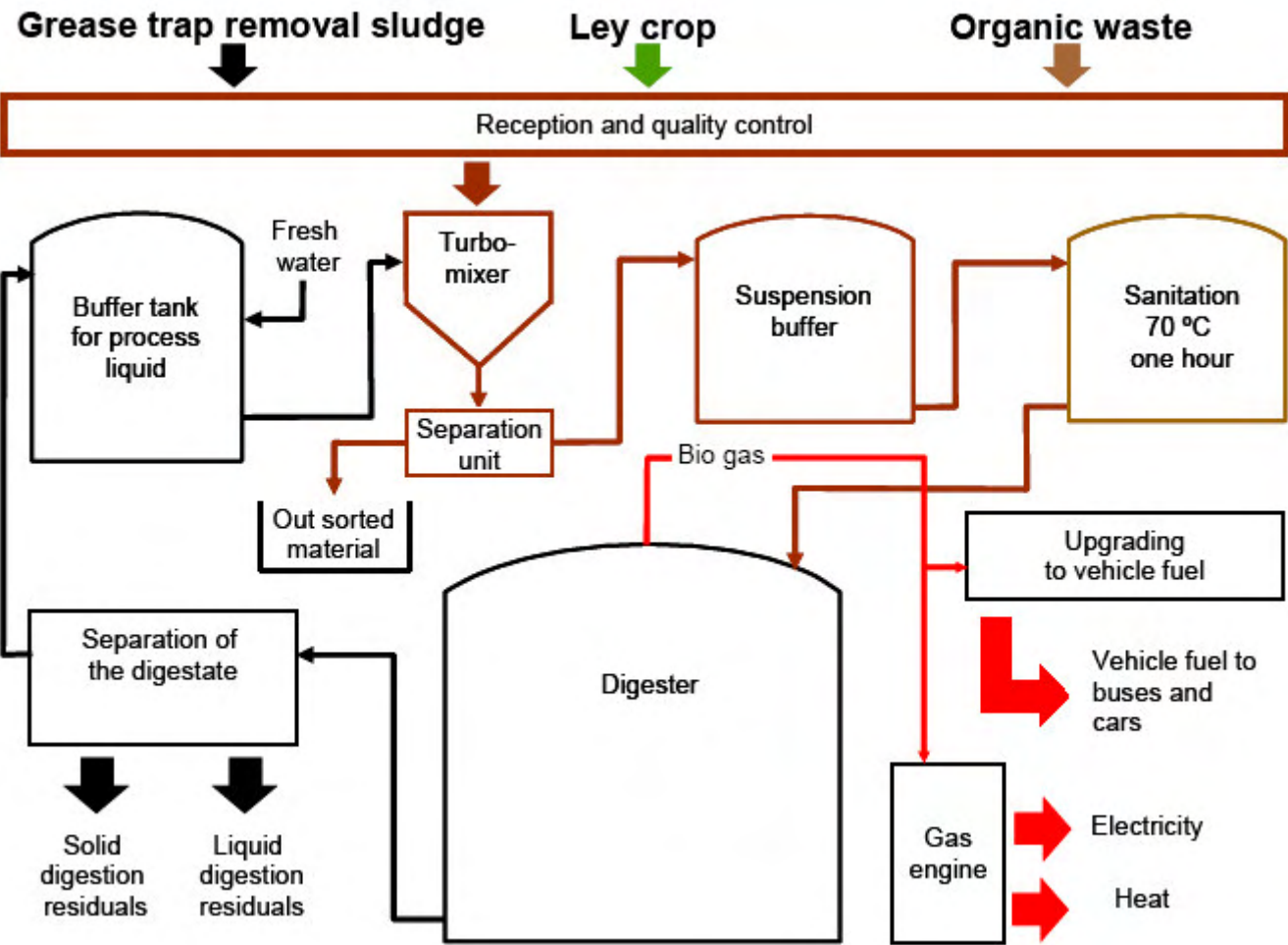
Ley crop grass/clover

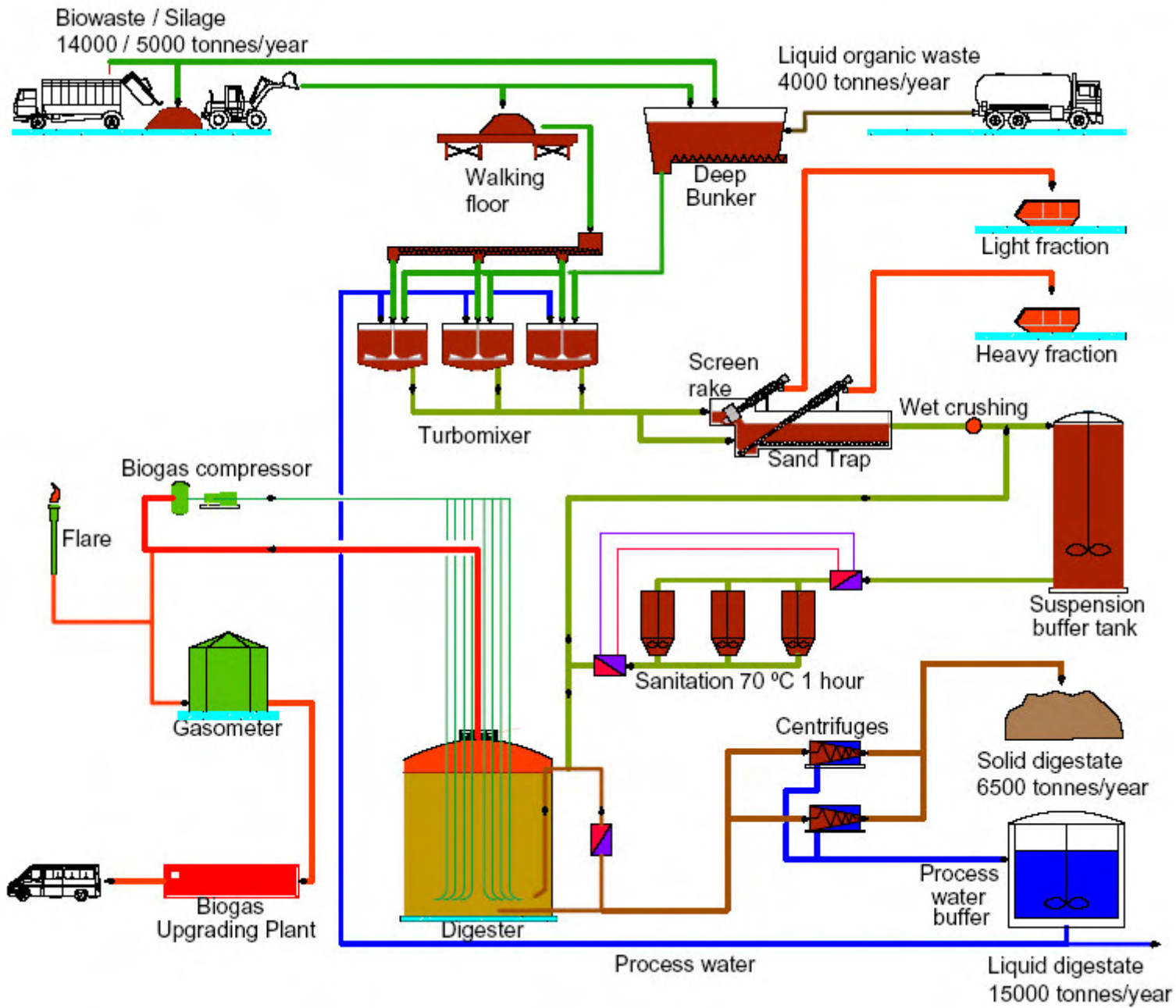






ROS ROCA
INTERNACIONAL
Digestion plant Västerås
3D view 1





Gryta, Biogas plant and plant for up-grading of the biogas to vehicle fuel

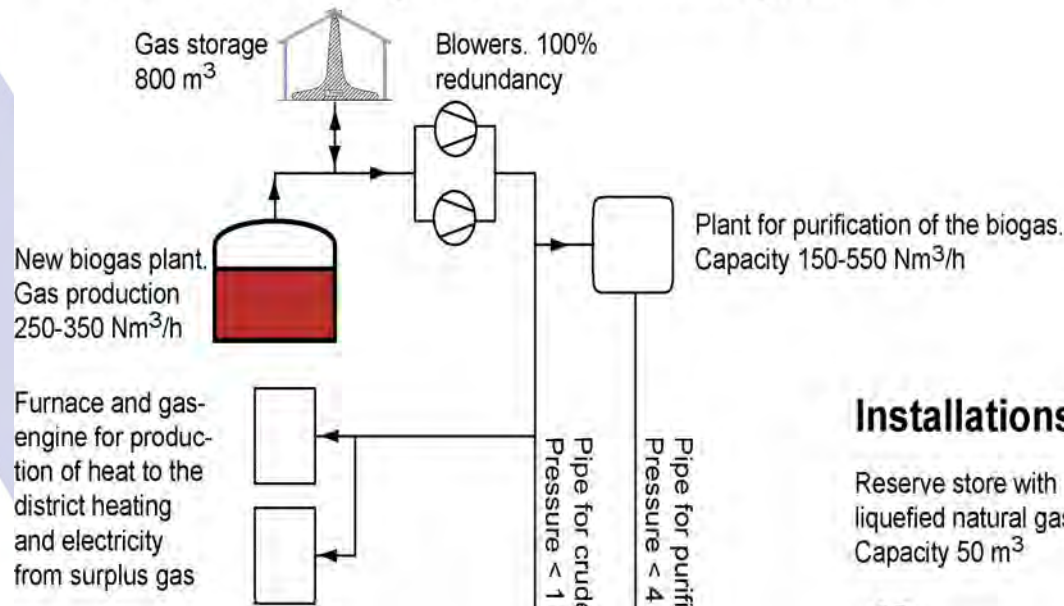


Bus depot, refuelling of buses, refuse collecting vehicles and cars

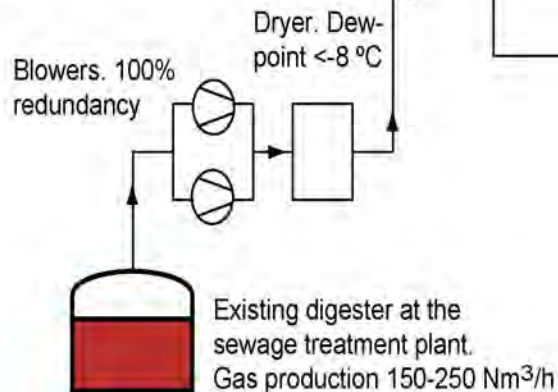
Sewage treatment plant



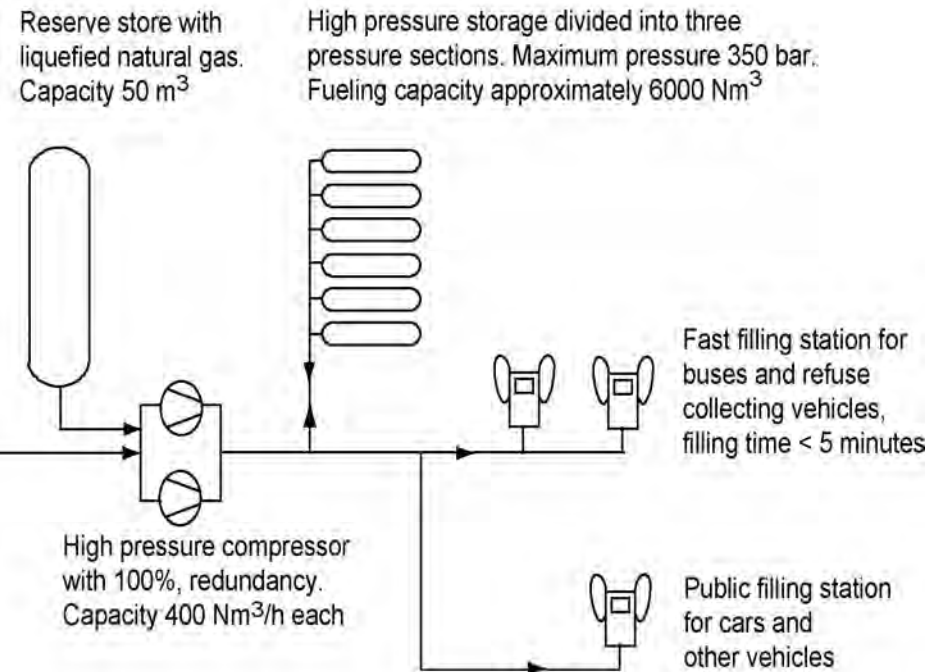
Installations at Gryta waste treatment plant

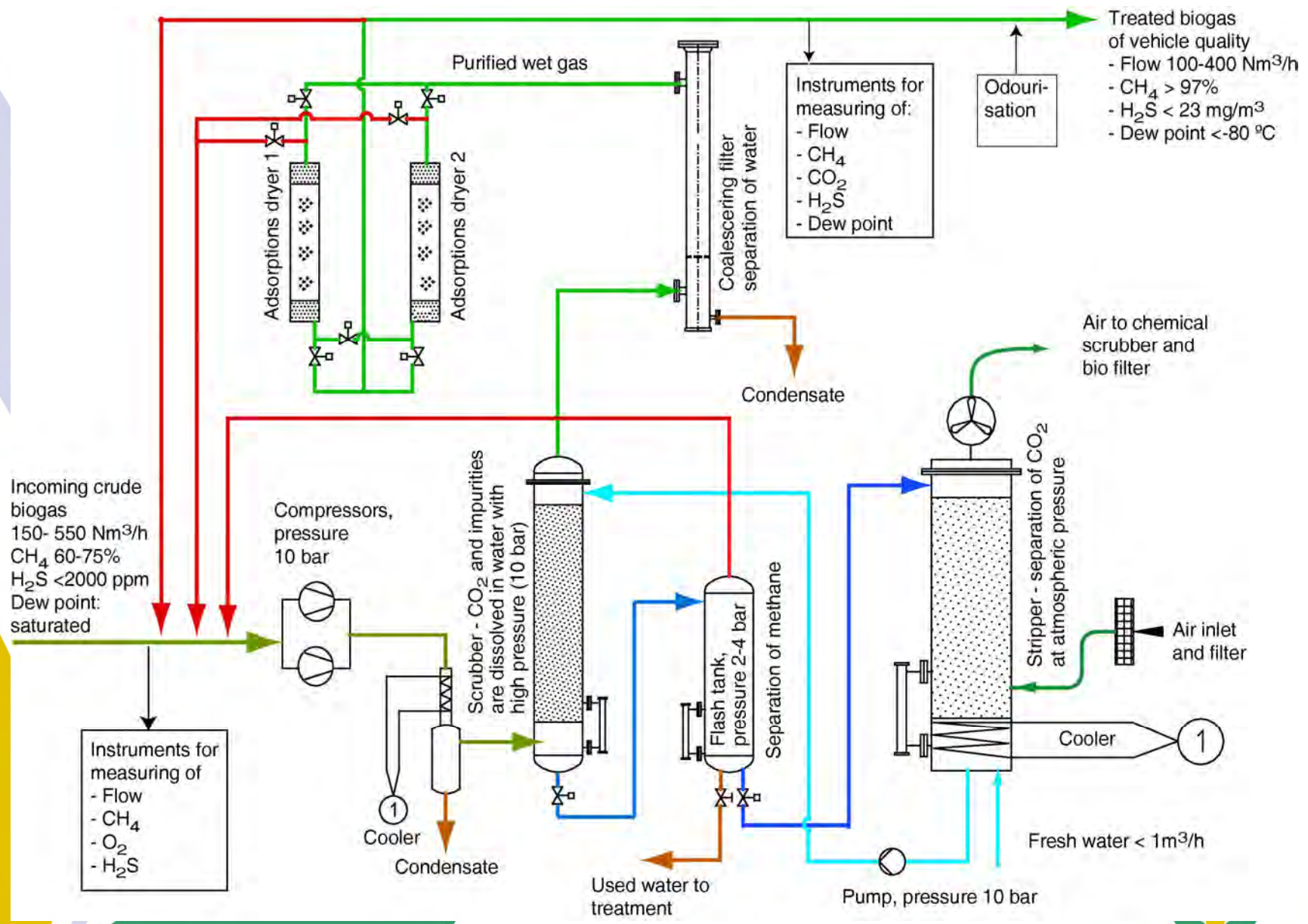


Installations at the sewage treatment plant



Installations at the bus depot



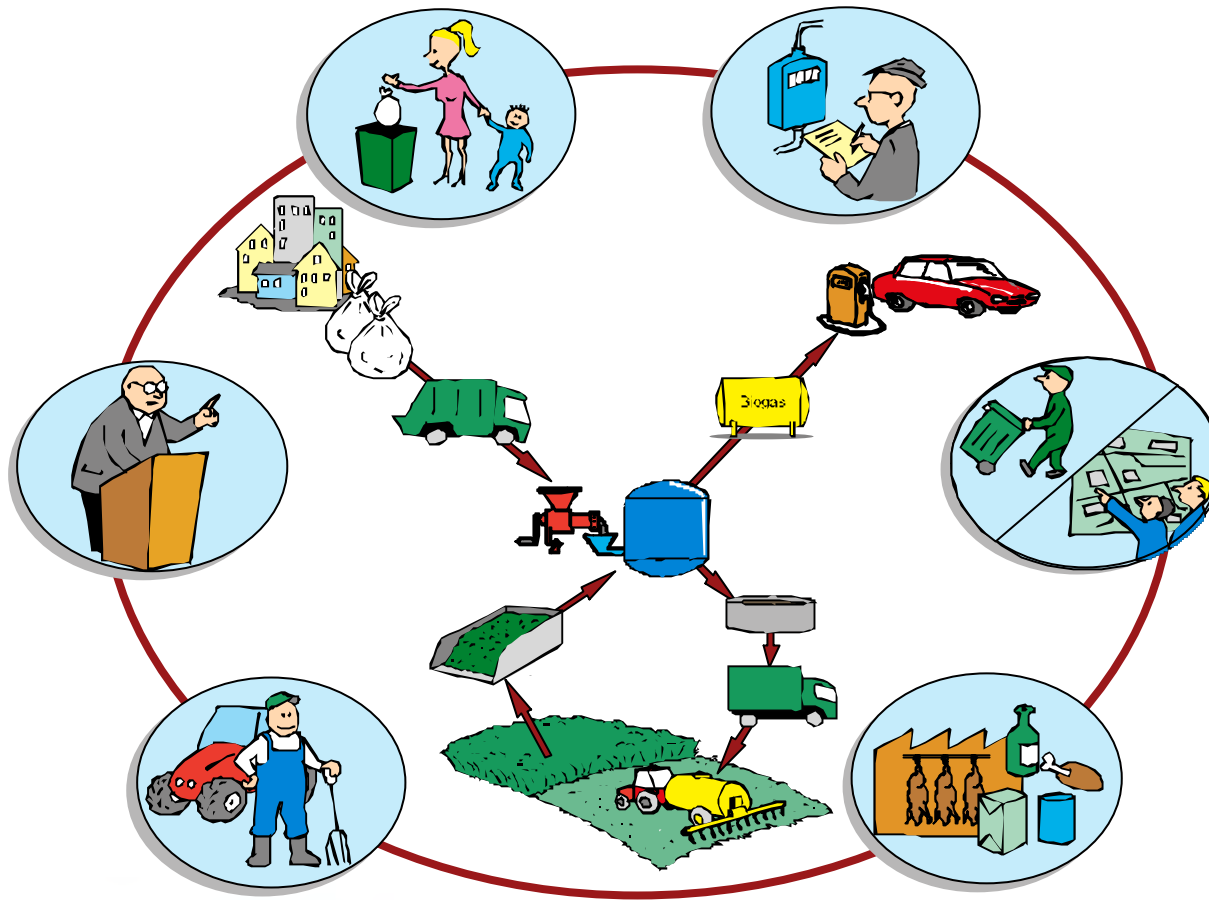


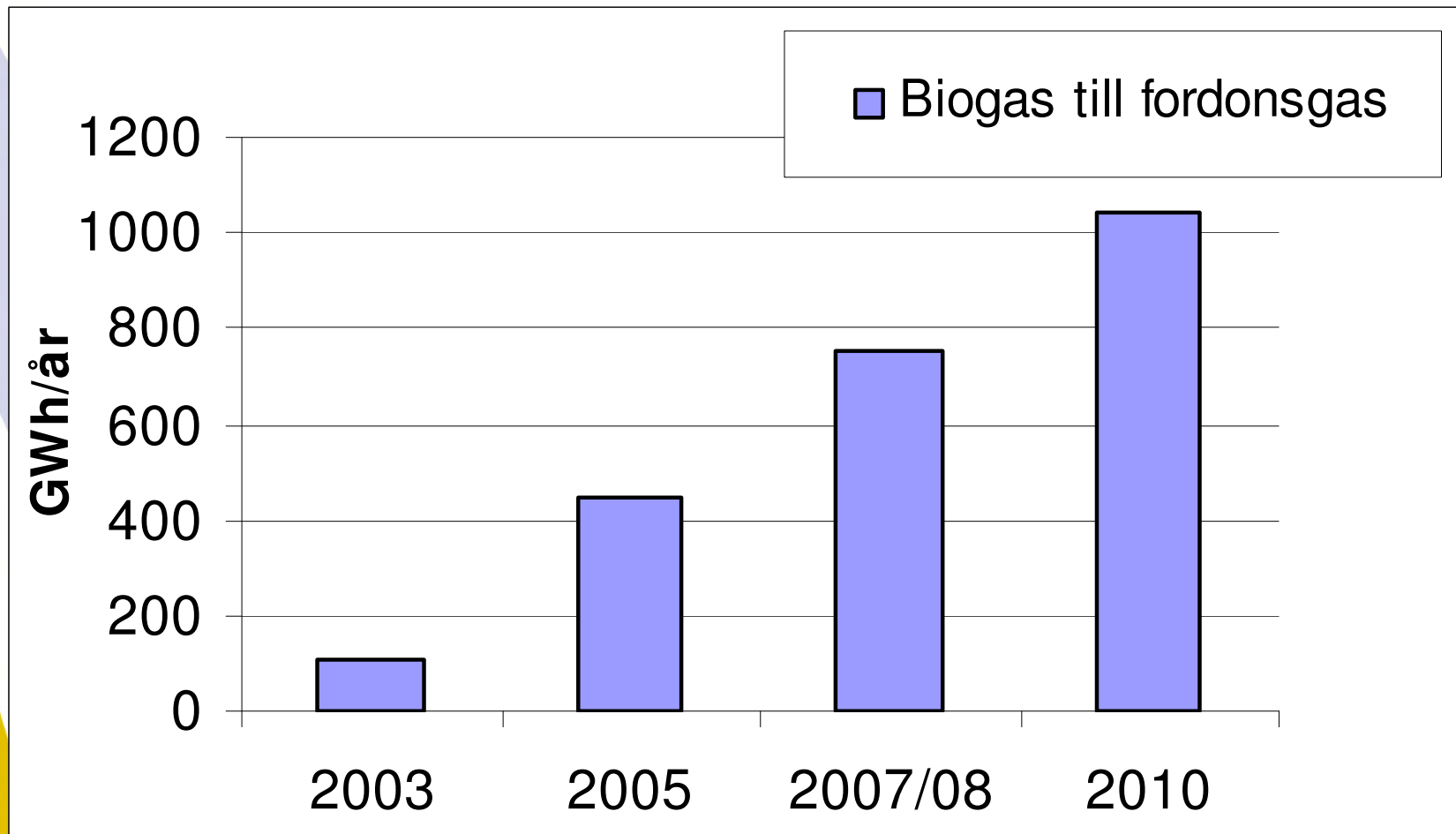
Digestion residuals

- Digestion residuals are obtained in one liquid and one solid phase
- Are accepted for the usage in organic farming and conventional farming
- Are stored close to the fields
- The Växtkraft company transports the digestion residuals to the storage facilities
- The farmers get digestion residuals in proportion to the acreage of ley crop
- The digestion residuals potential is utilized by using modern spreading technique
- It is up to the farmer how the digestion residuals are used

WP8. Hanteringssystem

- Utvärdera/dokumentera kapacitet och resursbehov i hanteringskedjan
- Identifiera “flaskhalsar” i olika delar av hanteringssystemet (fokus på vallgröda och biogödsel)
 - Samla data på utrustning, maskiner, geografisk data för enkel modell
 - Undersöka möjligheten att använda GIS-verktyg för beskrivning
 - Jämföra/verifiera framtagna bedömningar på flaskhalsar genom intervjuer





Model for energy crop handling

- Transport system design
- Distance from field to storage
- Dry matter content
- Dry matter yield
- Harvest time and costs
- Timeliness – comparing the value at the time of harvest to the value at optimal harvest time