Treatment of sludge from domestic on-site sanitation systems septic tanks and latrines - septage -

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Septage is domestic sludge from on-site sanitation and wastewater treatment systems

a) Latrines (faeces)

b) Septic tanks with soak pits

c) Grease traps (restaurants)

Why septage disposal? If:

a) No ground infiltration of the wastewater, due to blockage of the soak pit or high groundwater table cause overflow

b) Complaints about smell

c) Legal regulation for regular desludging

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A) The empting of the on-site tanks and haulage of the content is organized by private and municipal vacuum trucks; charges 2 – 10 USD/m³

B) In areas with high population density mostly the vacuum trucks don't have any or only difficult access to the septic tanks

C) Disposal or treatment in municipal sewage or special sludge treatment plants, but also very often discharged into rivers or environment

D) Mostly the sludge treatment plants do corresponding with the required standard, because of overload, wrong design and operation

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Septage accumulation in urban areas

- **300 – 1,000 l/(cap.*a) for the specific calculation**
  - 1.5 – 5.0 m³/(household * a)

  Influence parameter:
  - Ambient temperature → biodegradation
  - Design of the on-site system → size

- **60 – 100 l/(cap.*a)** for the calculation of the sludge accumulation in a **service area**
  - Service area of 300,000 people = 50 – 90 m³/d

  Influence parameter:
  - Density of sewer lines
  - Ground condition and climate
  - Urban structure (population density, trades, street and housing condition, etc.)
  - Legal regulations for operation of on-site sanitation systems

Faeces and septage characteristic

Origin	Public and private pit latrine	Septic tanks	Normal domestic waste water
Characteristic	High concentrated, low stabilized	Low concentrated, good stabilized	
COD [mg/l]	20,000 – 50,000	3,000 – 10,000	500 – 2,500
BOD/COD	0.2 – 0.1	0.2 – 0.1	0.5
NH4-N [mg/l]	2,000 – 5,000	300 – 1,000	30 – 70
TS	3.0 – 8.0%	0.5 - 3.0%	<1.0%
oTS	0.75 – 0.85%	0.6 – 0.7%	
Grease [% of oTS]	< 5 %	10 – 30%	200 – 700
Helm.egg [no./l]	20,000 – 60,000	4,000	300 – 2,000
Biogas [m³/kg oTS]	0,35 – 0,5	0,1 – 0,2	
Biogas [m³/m³]	8.0 – 10.0	0.5 – 2.0	0.1 – 0.3

Requirement on a sepatge treatment plant

- Central disposal and treatment station for faeces and septage
- Purification and desinfection of the wastewater (liquid fraction)
- Desinfection and processing of the solid fraction (bio-solid)

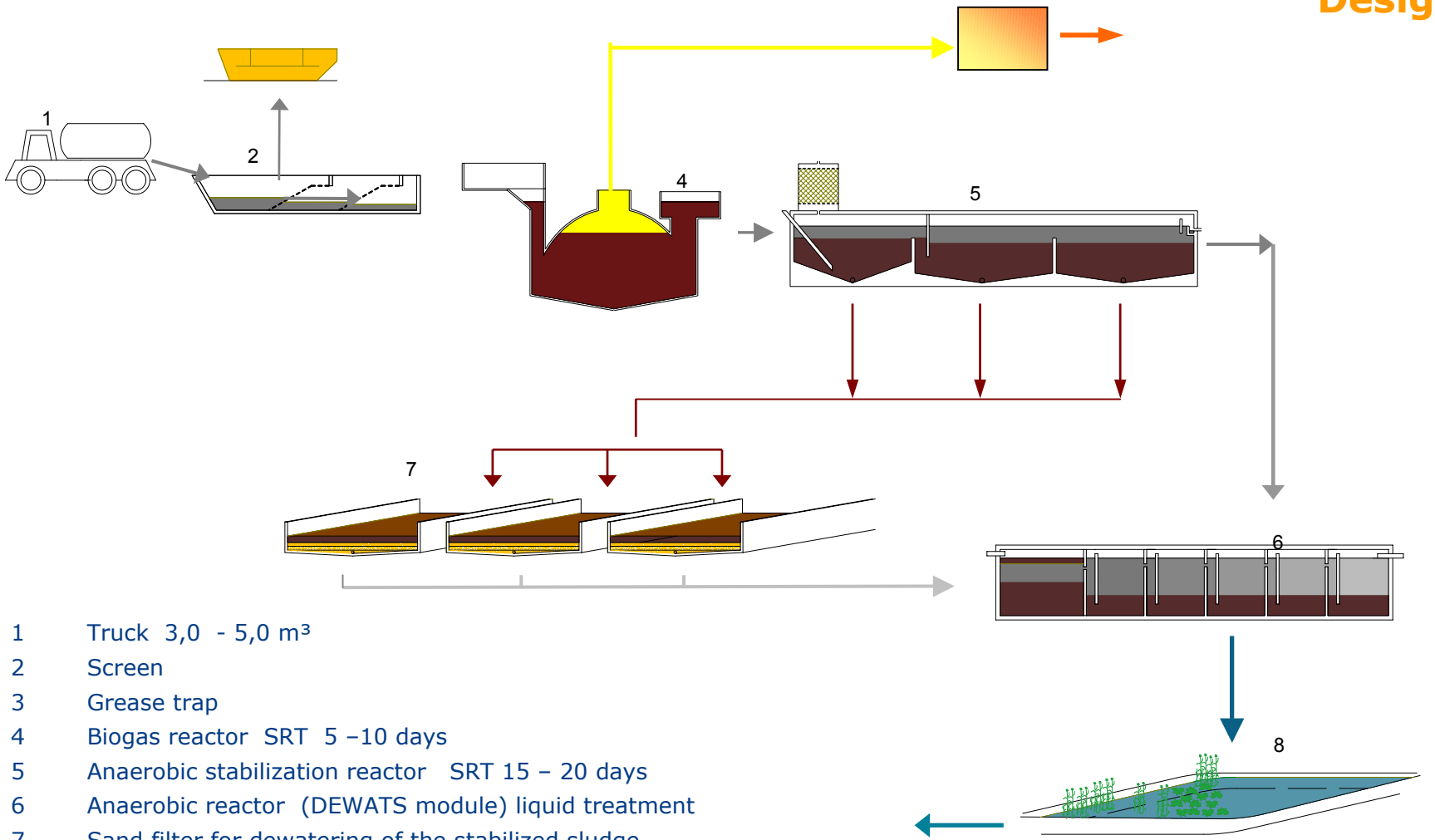
Mean emphasis

- Optional station for the treatment of organic industry sludge → **high biogas potential**

- No odour emission near residences
- No ground and surface water pollution

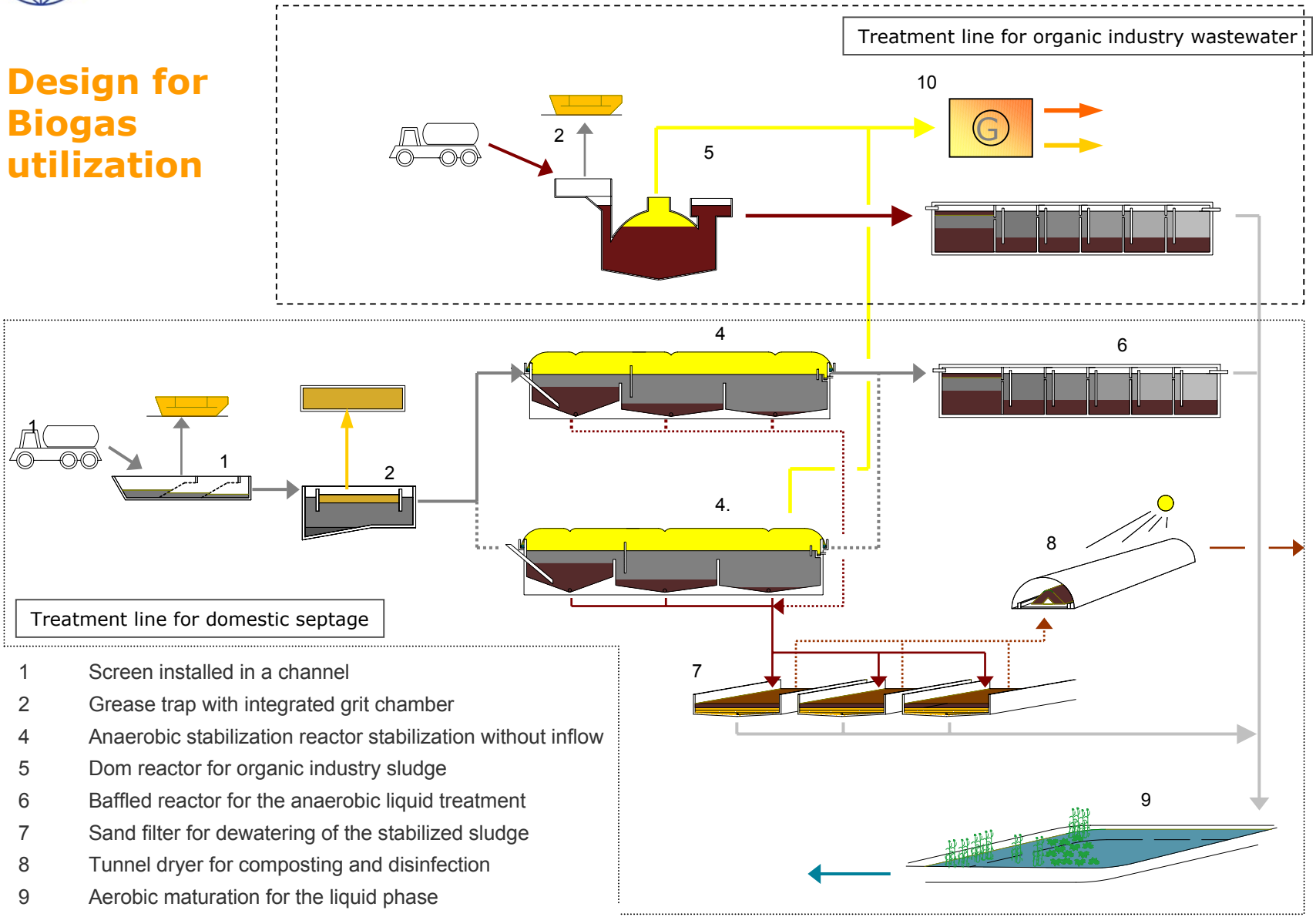
- Low maintenances

Standard Design

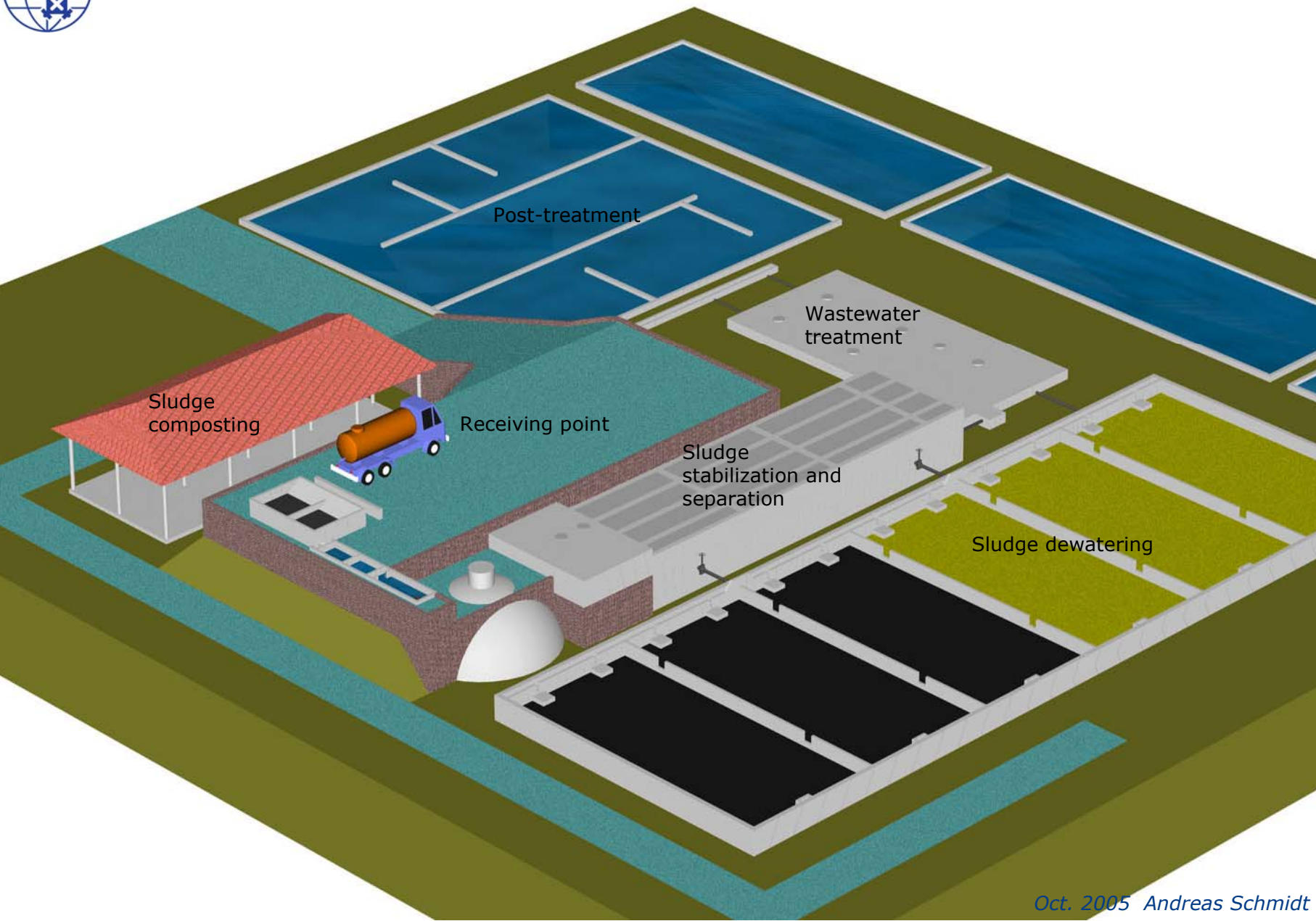


1 Truck 3,0 - 5,0 m³
2 Screen
3 Grease trap
4 Biogas reactor SRT 5 –10 days
5 Anaerobic stabilization reactor SRT 15 – 20 days
6 Anaerobic reactor (DEWATS module) liquid treatment
7 Sand filter for dewatering of the stabilized sludge
8 Aerobic gravel filter and maturation for wastewater treatment

Design for Biogas utilization



1	Screen installed in a channel
2	Grease trap with integrated grit chamber
4	Anaerobic stabilization reactor stabilization without inflow
5	Dom reactor for organic industry sludge
6	Baffled reactor for the anaerobic liquid treatment
7	Sand filter for dewatering of the stabilized sludge
8	Tunnel dryer for composting and disinfection
9	Aerobic maturation for the liquid phase
10	Biogas utilization for producing heat or electricity



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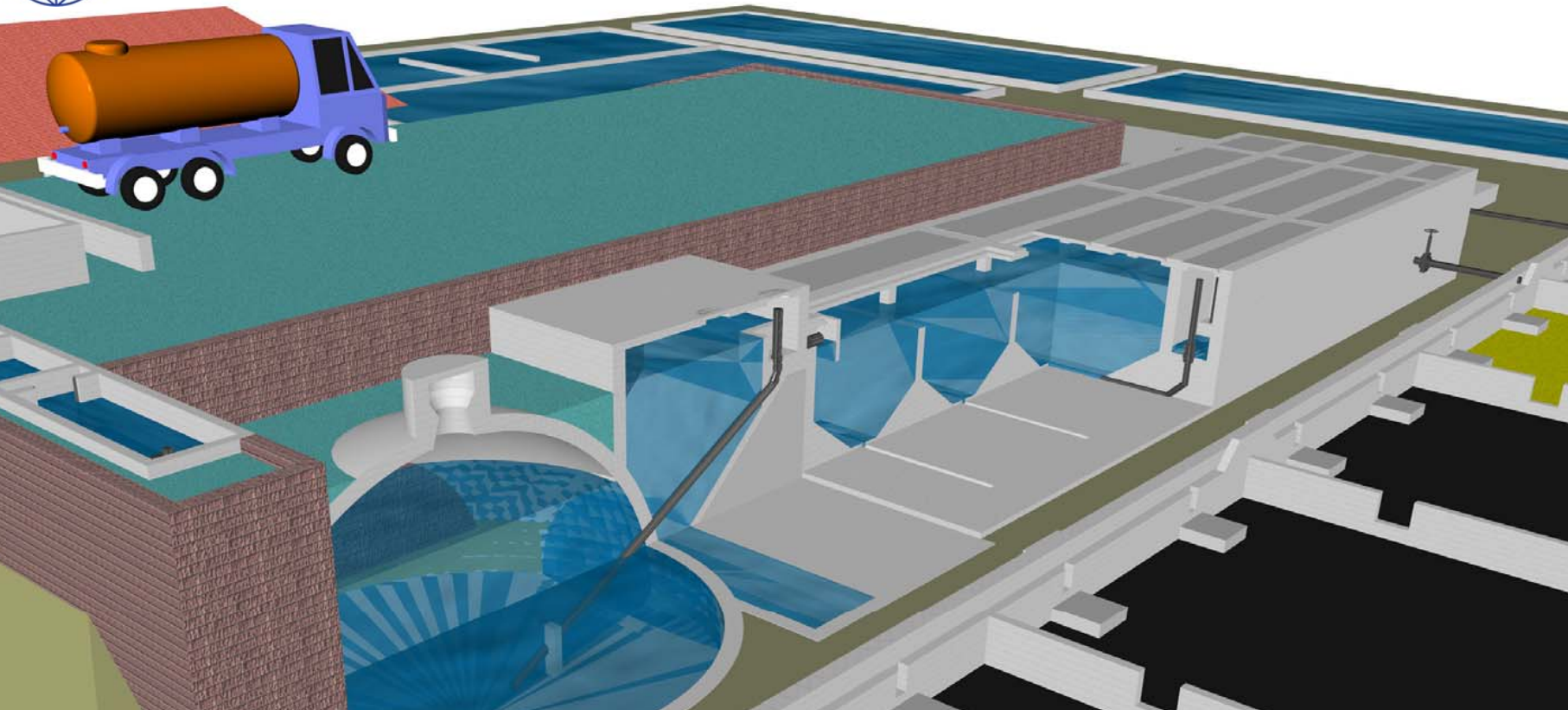

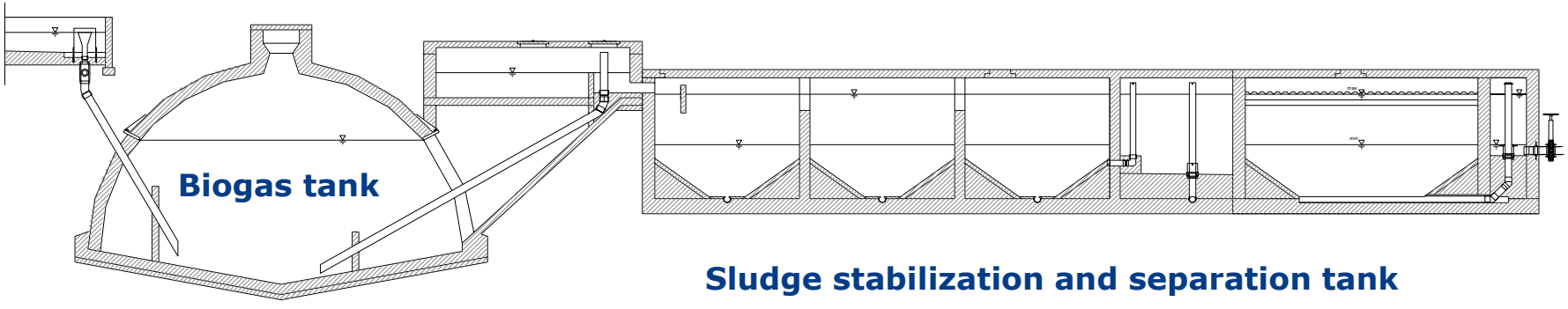

Sludge stabilization and separation tank

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Biogas reactor inside
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Used for Light

Incineration of market waste

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Dewatering and Drying of Wastewater Sludge

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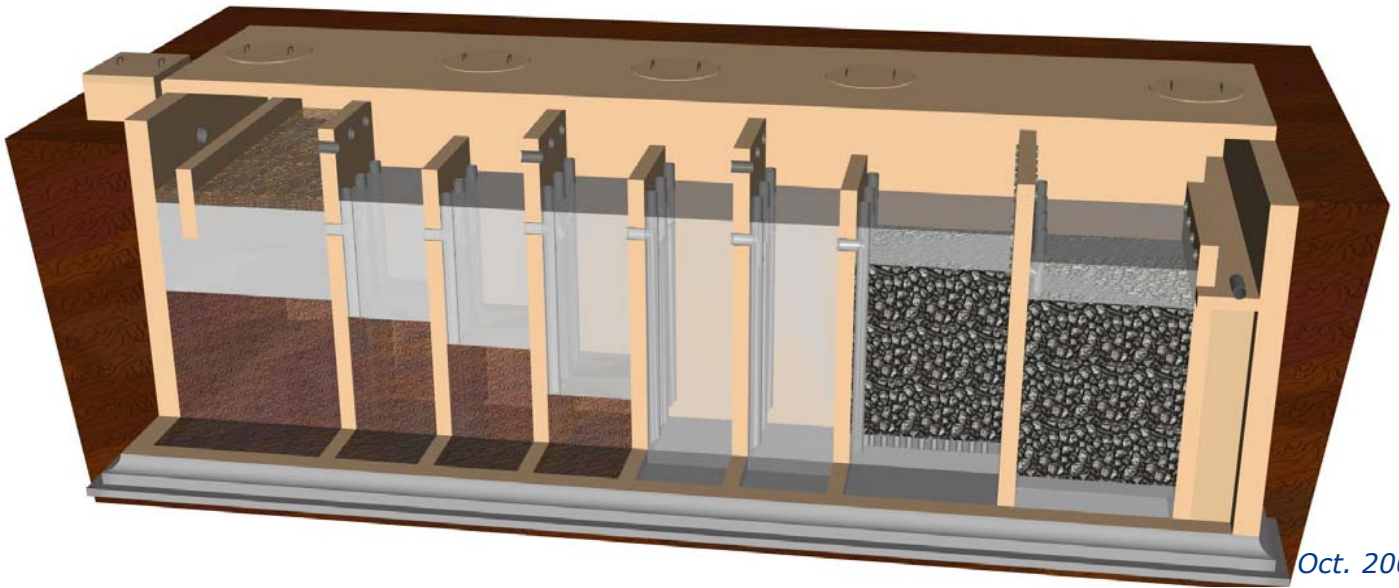
Anaerobic baffled reactor for wastewater treatment DEWATS module



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Input

Septage	18 Trucks per day	
	72 m³/d	
Industry Sludge	0 Trucks per day	
	0 m³/d	

Features of a basic ILPT-plant

- Screening		
- Grease Trap		
- Biogas plant	150	m³
- Stabilization Reactors	292	m³
- Sludge Drying Bed	820	m²
- Baffled Reactor	210	m³
- Aaerobic Gravel Filter	890	m²

Output

Screenings	0.20	to/d
Grease	0.45	to/d
Biogas	80	m³/d
Compost	1.2.	to/d
Water	67	m³/d