BORDA

DEWATS

What Happens When the Pit is Full ?

Developments in on-site Faecal Sludge Management

Experience with Urban Sludge Treatment in Indonesia

WRC Conference March 15th 2011

by Stefan Reuter & Andres Schmidt

1. BORDA
2. DEWATS
3. Municipal Sludge Treatment Plant

Mission

securing access to vital resources

fostering an intact environment

with renewable energy

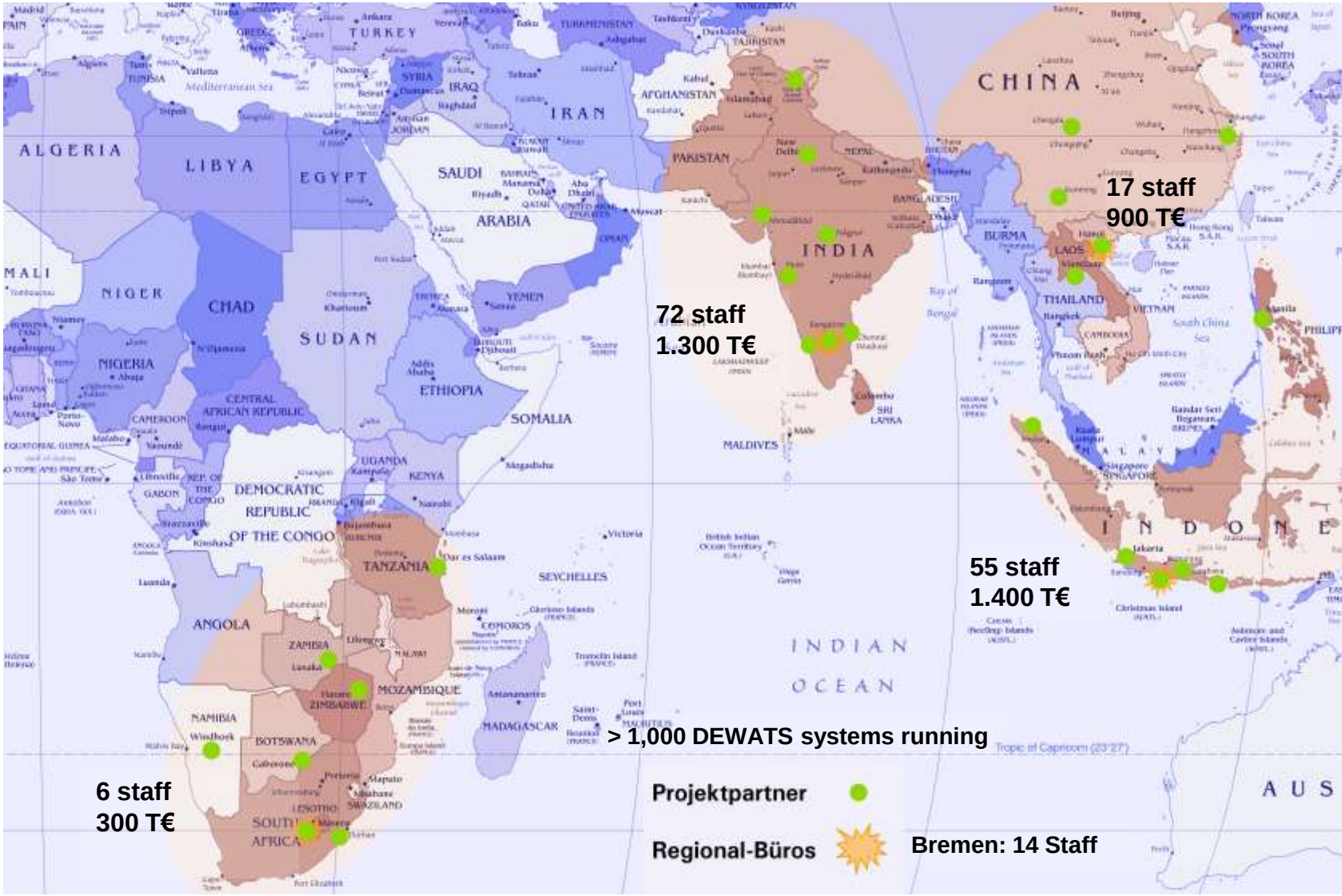
BORDA

... when it all started

1977

Biogas Technology Transfer India-Ethiopia

…and today


17 staff
900 T€
72 staff
1.300 T€
55 staff
1.400 T€
6 staff
300 T€
> 1,000 DEWATS systems running
Projektpartner
Regional-Büros
Bremen: 14 Staff
CHINA
INDIA
INDIAN OCEAN
TURKEY
IRAN
ALGERIA
LIBYA
EGYPT
SAUDI ARABIA
MALI
NIGER
CHAD
SUDAN
NIGERIA
ETHIOPIA
SOMALIA
KENYA
TANZANIA
ANGOLA
ZAMBIA
MOZAMBIQUE
NAMIBIA
BOTSWANA
SOUTH AFRICA
MADAGASCAR
SEYCHELLES
MALDIVES
PAKISTAN
AFGHANISTAN
BURMA
LAOS
THAILAND
VIETNAM
I N D O N E
A U S

Goal

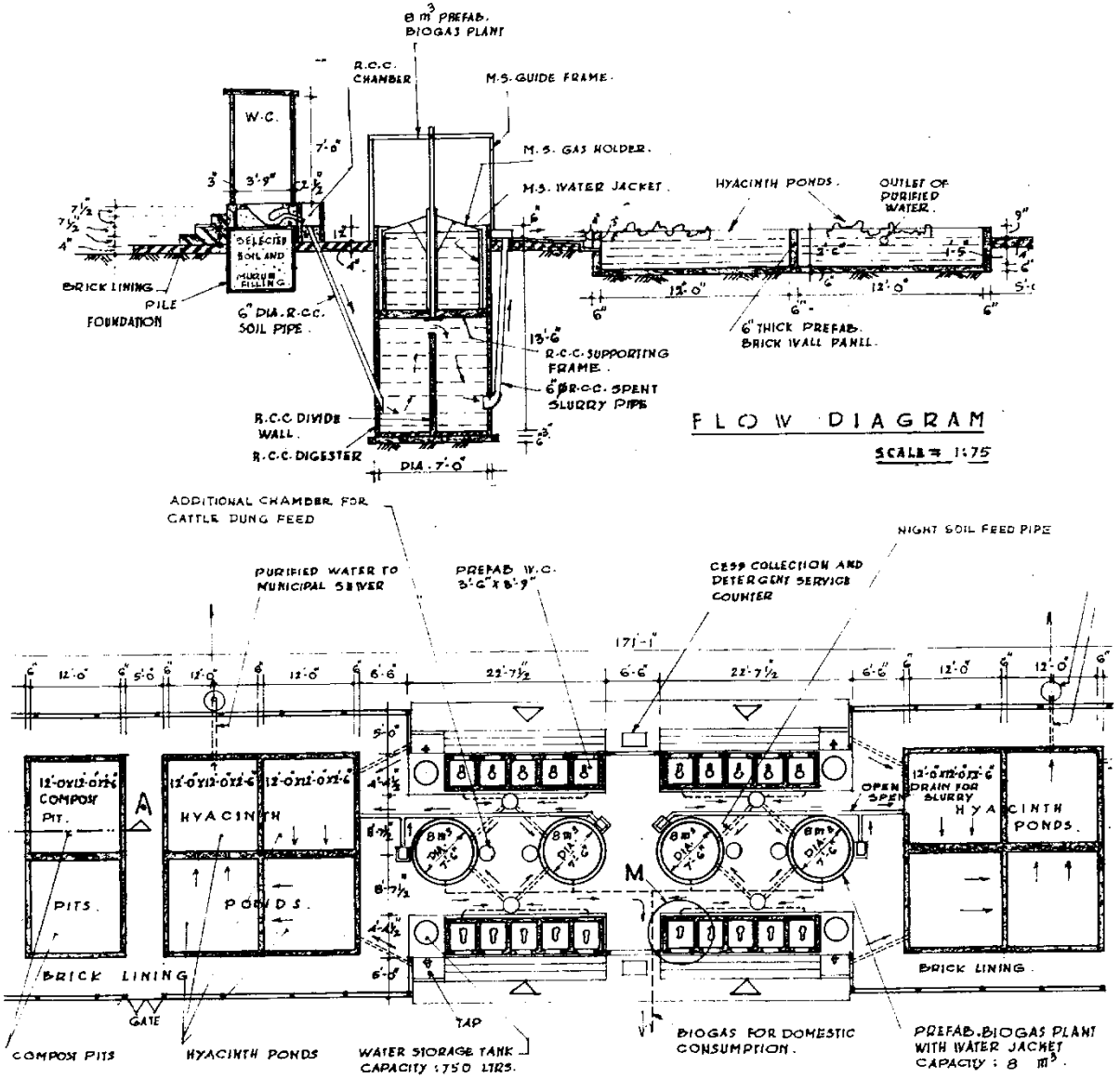
Facilitate

piloting & dissemination of basic needs services water, sanitation & energy

to people in poor urban and peri-urban areas

that can be self-sustained

…looking back



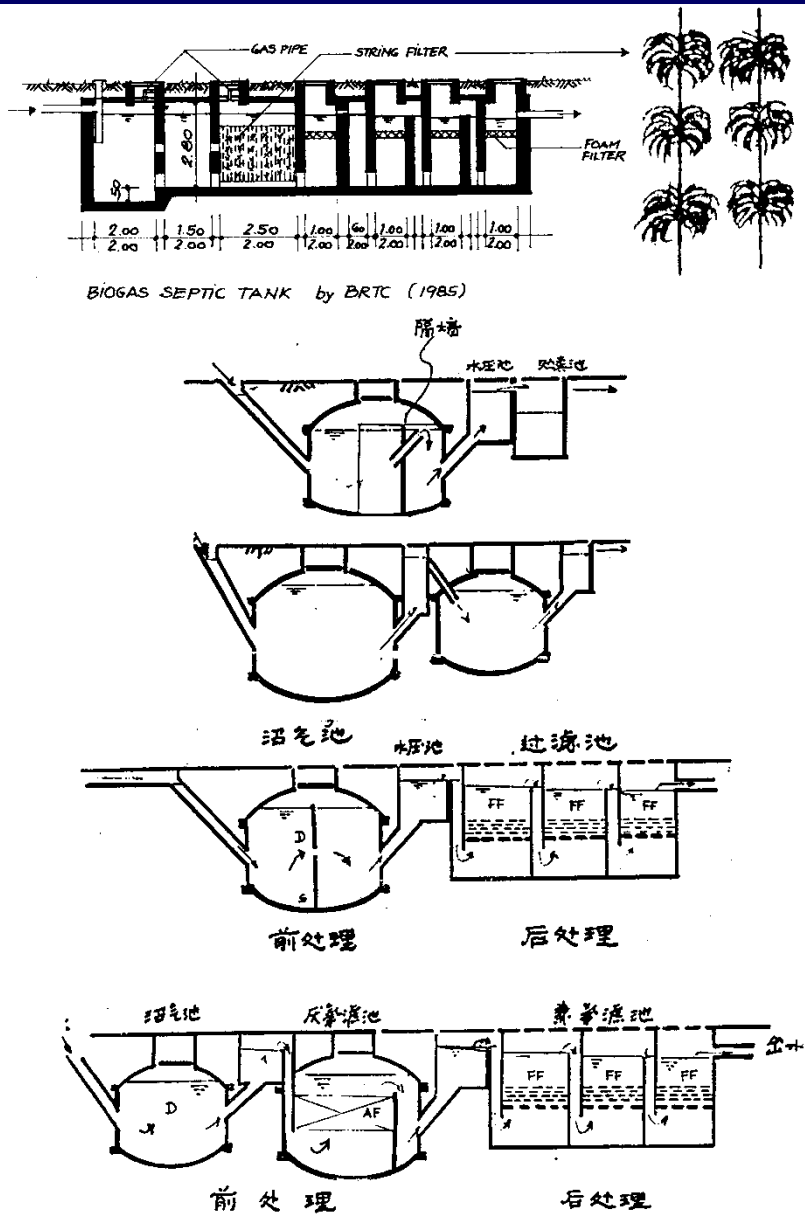
1983: Shivsadan Renewable Energy Research Institute, Sangli (Maharashtra/India)

Sludge is treated anaerobically for biogas production.

Final treatment is done with the help of water hyacinth ponds.

Water hyacinths were used for higher gas production, before it was given up because of too much work and energy input.

…looking back



From 1983, some biogas institutes and extension departments in China started research and development on using an- aerobic digestion to treat urban domestic wastewater in a decentralised way.

"Biogas septic tanks" in Sichuan Province

Top: Rectangular tank with nylon string filter and horizontal foam filter;

Bottom:

Integrated anaerobic filter with facultative filter as post- treatment [BRTC]

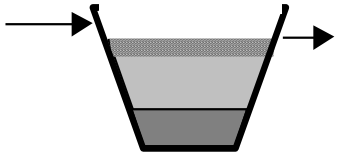
Sedimentation

Anaerobic digestion

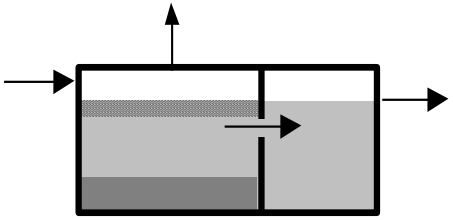
Aerobic and facultative decomposition

Post treatment

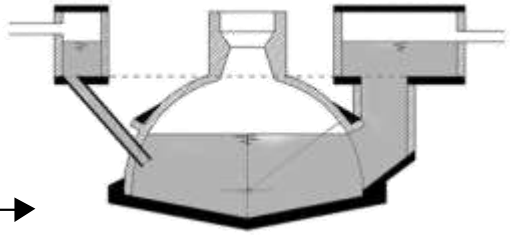
sedimentation pond



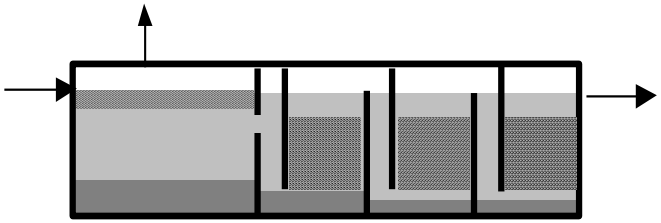
septic tank



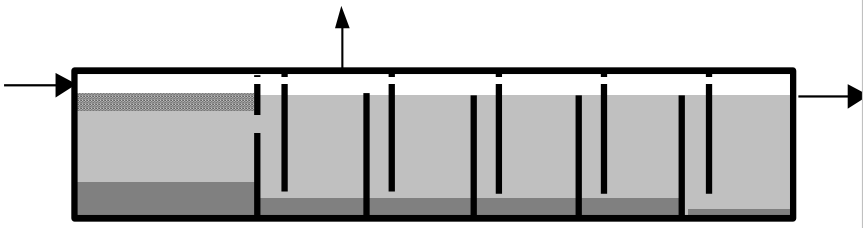
fixed dome biogas digester



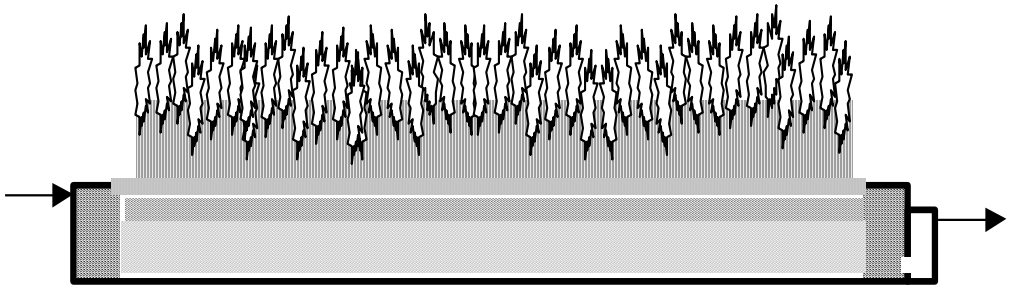
anaerobic filter



anaerobic baffled reactor



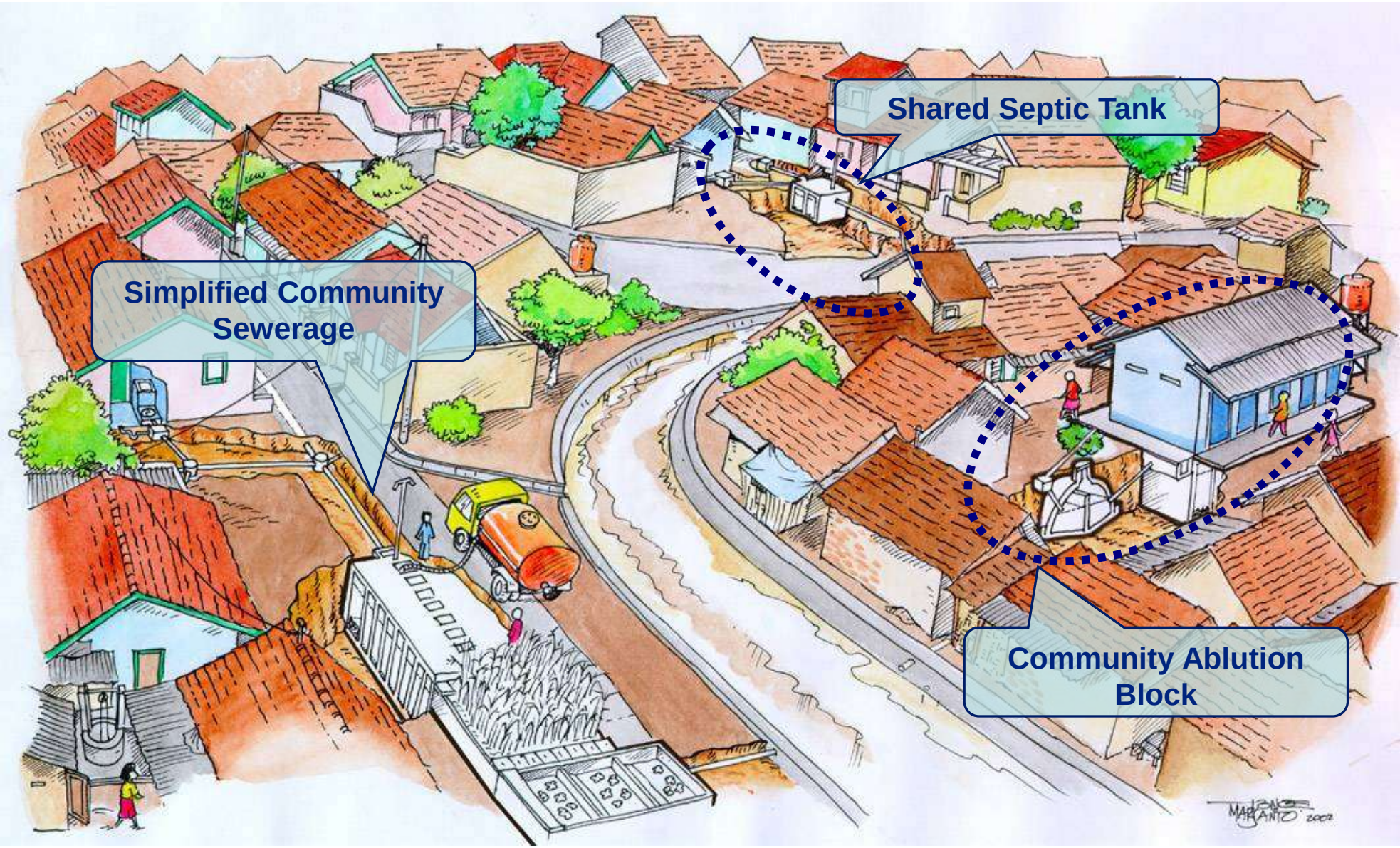
planted gravel filter



Modular and standardized

aerobic-facultative ponds and aerobic polishing ponds

Decentralised Wastewater Treatment Systems



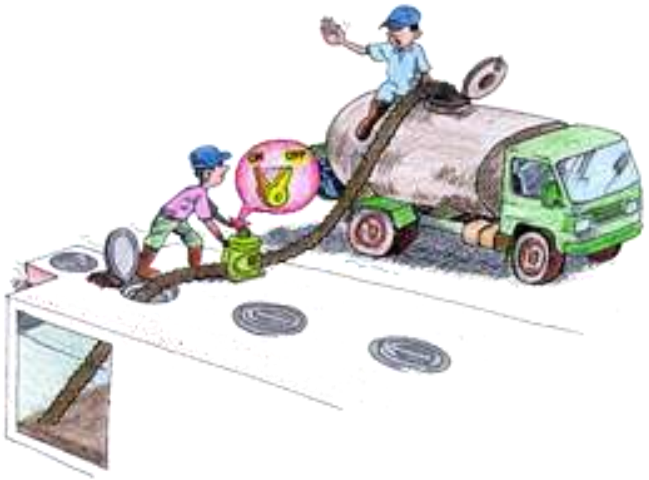
Service Packages

1. Agro-Industry
2. School Based Sanitation
3. Community Based Sanitation (CBS)
4. DEWATS for SME
5. Health Impact Assessment & Hygiene Education
6. Capacity Building
7. Municipal Sludge Treatment
8. Sanitation Mapping & City Wide Planning
9. Sanitation for Prisons
10. Sanitation or Real Estates
11. Emergency Sanitation
12. Sanitation for Hospitals and Hotels

Urban Sludge Management

WaterAid Gulper for pit emptying in Dar es Salaam

"Is all about conveying domestic sludge accumulated in decentralized or on-site sanitation facilities to a central places for safe disposal and treatment"



Sludge from typical on-site facilities:

- ✓ **Pit latrines**
- ✓ **Septic tanks**
- ✓ **Decentralized wastewater treatment plants**
- ✓ **Grease traps**

Urban Sludge Management

WaterAid Gulper in Tanzania


Vacuum tank Indonesia


Sludge disposal Tanzania

What is the situation in most of the countries world wide:

- ✓ **Empting of on-site facilities is responsibility of the individual owner**
- ✓ **Demand based desludging service is responsibilities of the municipality,**
- ✓ **Many municipalities involve private service provider**
- ✓ **Sludge disposal in municipality owned sewerage treatment works or sludge treatment plants**

Urban Sludge Management

Sludge disposal in Blitar/Indonesia

Sludge transport from pit latrines, eThekwini, South Africa

What are challenges in most of the countries world wide:

- ✓ **Often very limited access to the on-site sanitation facility**
- ✓ **Demand for de-sludging service depends on type of facility, ground condition, service price and willingness of the owner to maintain their on-site facility**
- ✓ **Transport is the main cost factor**
- ✓ **Disposal and treatment plants often pose threat to health of operators and polluting the environment**
- ✓ **Often trucks discharging sludge direct into the environment**
- ✓ **Lack of regulation and incentives for the private sector**

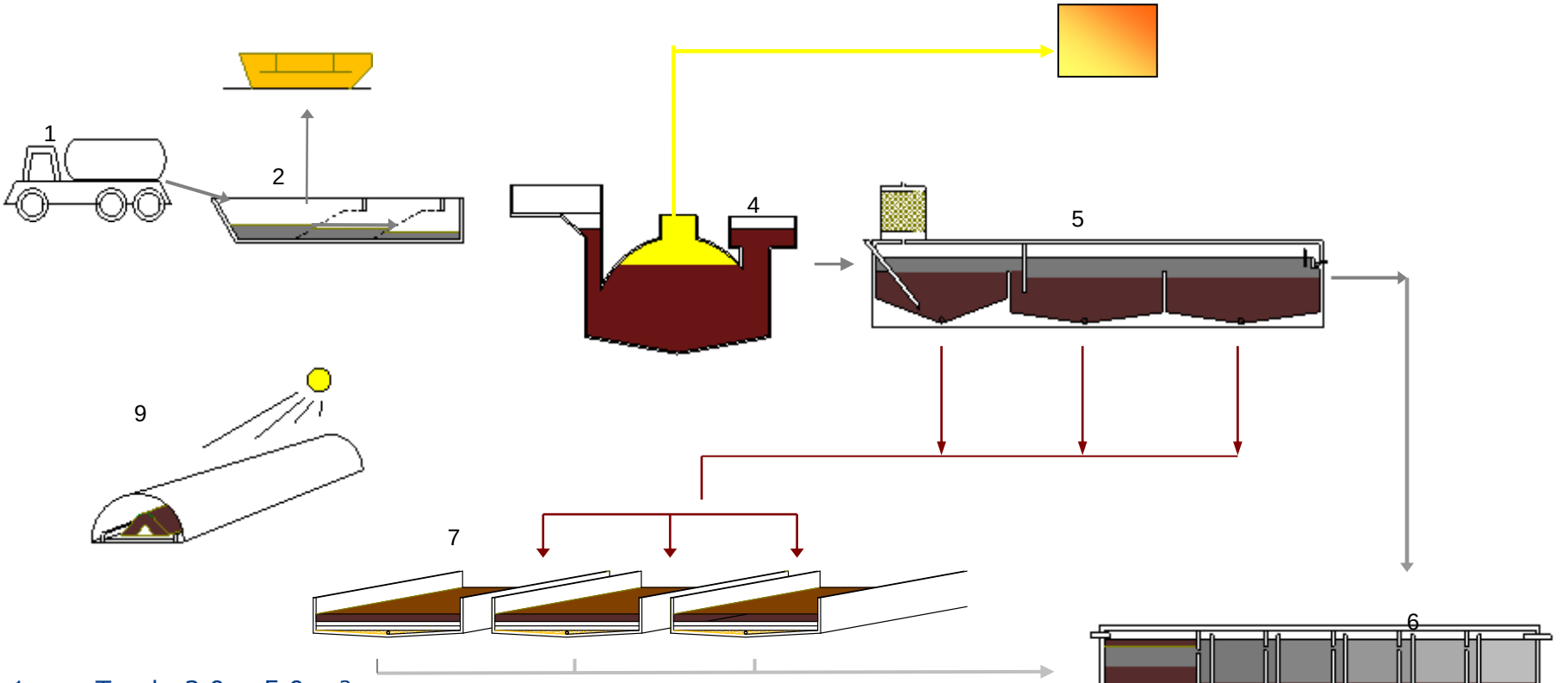
Municipal Sludge Treatment Plant (MSTP)

2005 the BORDA network developed a new sludge treatment system based on DEWATS principles as follows:

- ✓ **A closed system with minimum odour emission allows installation in urban areas, hence less transport**
- ✓ **Safe for human health and environment**
- ✓ **50% less space to pond systems**
- ✓ **No electric energy and low maintenance required**
- ✓ **Applicable for municipalities and small entrepreneurs**

Currently 2 municipal sludge treatment plants in operation (Mojokerto and Banda Aceh)

Municipal Sludge Treatment Plant (MSTP)



1 Truck 3,0 - 5,0 m³
2 Screen
3 G
4 Biogas reactor SRT 2 -5 days
5 Anaerobic stabilization reactor SRT 15 – 20 days
6 Anaerobic baffled reactor (DEWATS module) liquid treatment
7 Sand filter for dewatering of the stabilized sludge
8 Aerobic gravel filter
9 Composting plant

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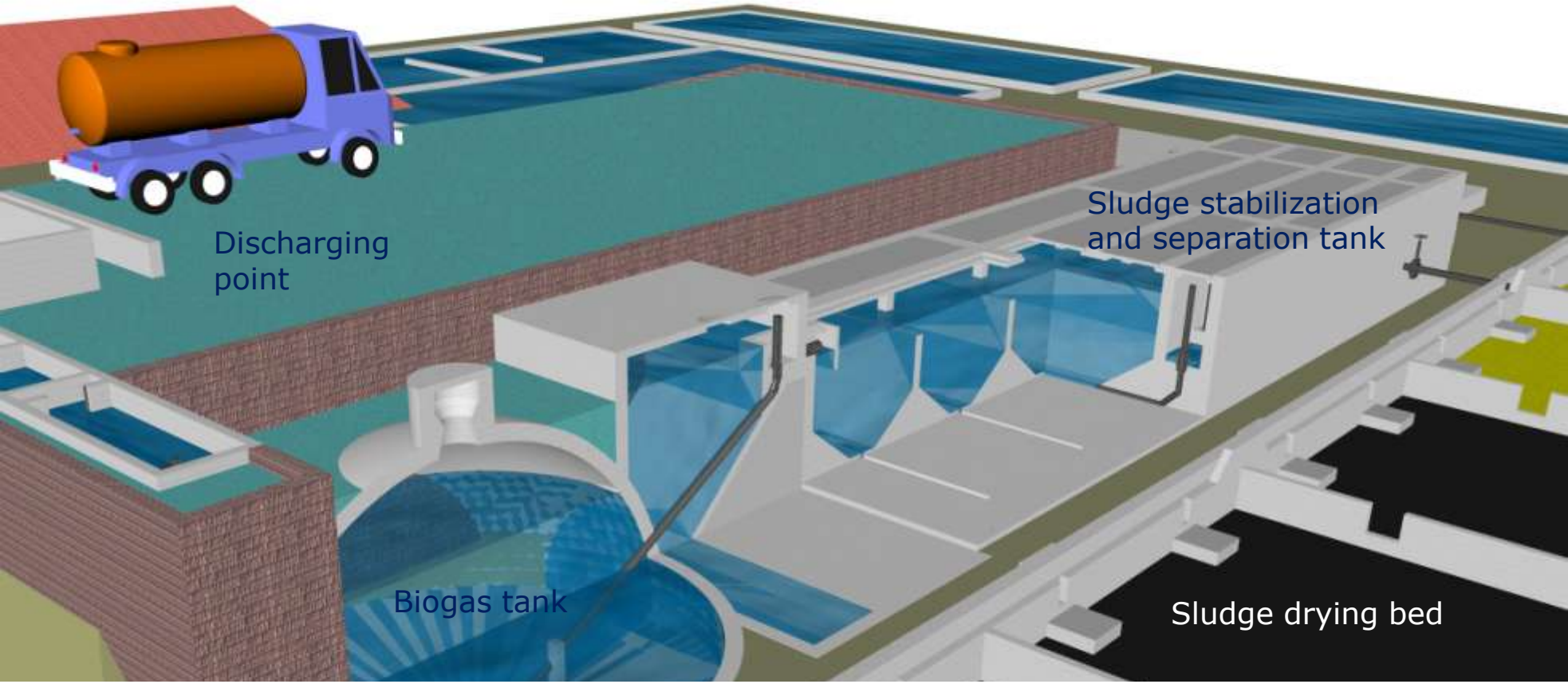

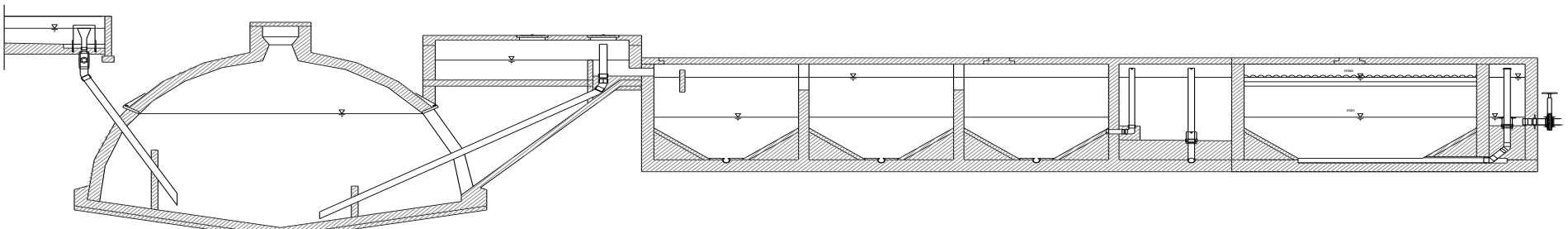

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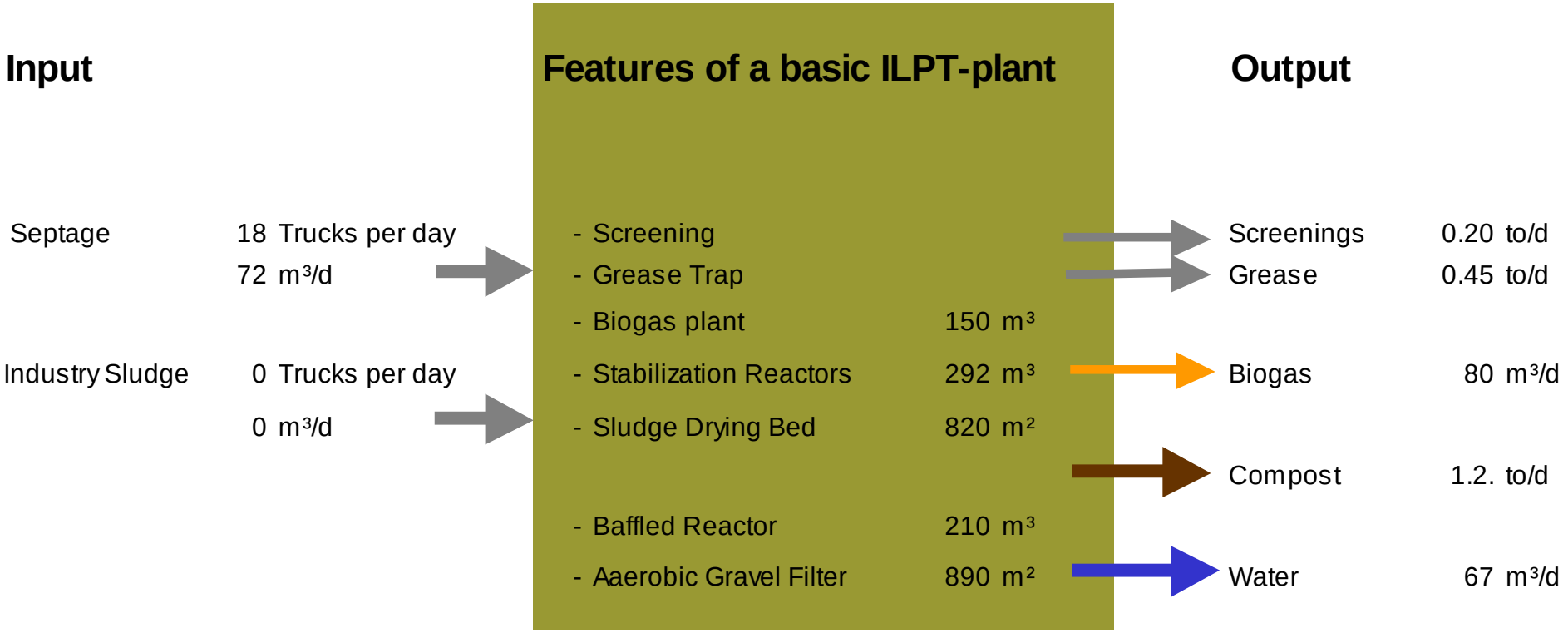

MSTP data:

- **Investment cost 2.000 – 3.000 USD per m³ (based on daily treatment capacity)**
- **Land requirement 60 – 75 m² per m³ (based on daily treatment capacity)**

Municipal Sludge Treatment Plant (MSTP)

Demand for further research and development:

- ✓ **Demand survey**
- ✓ **Optimization of the sludge drying and composting process**
- ✓ **Regulations and controlling instruments for urban sludge management**

Acknowledgements

- ✓ **eThekwini Municipality / EWS**
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Improved Sanitation for All