



Technology Options for Sustainable Wastewater Solutions

Sub-regional Conference on Wastewater Management: Promoting Innovations and Sustainable Investments

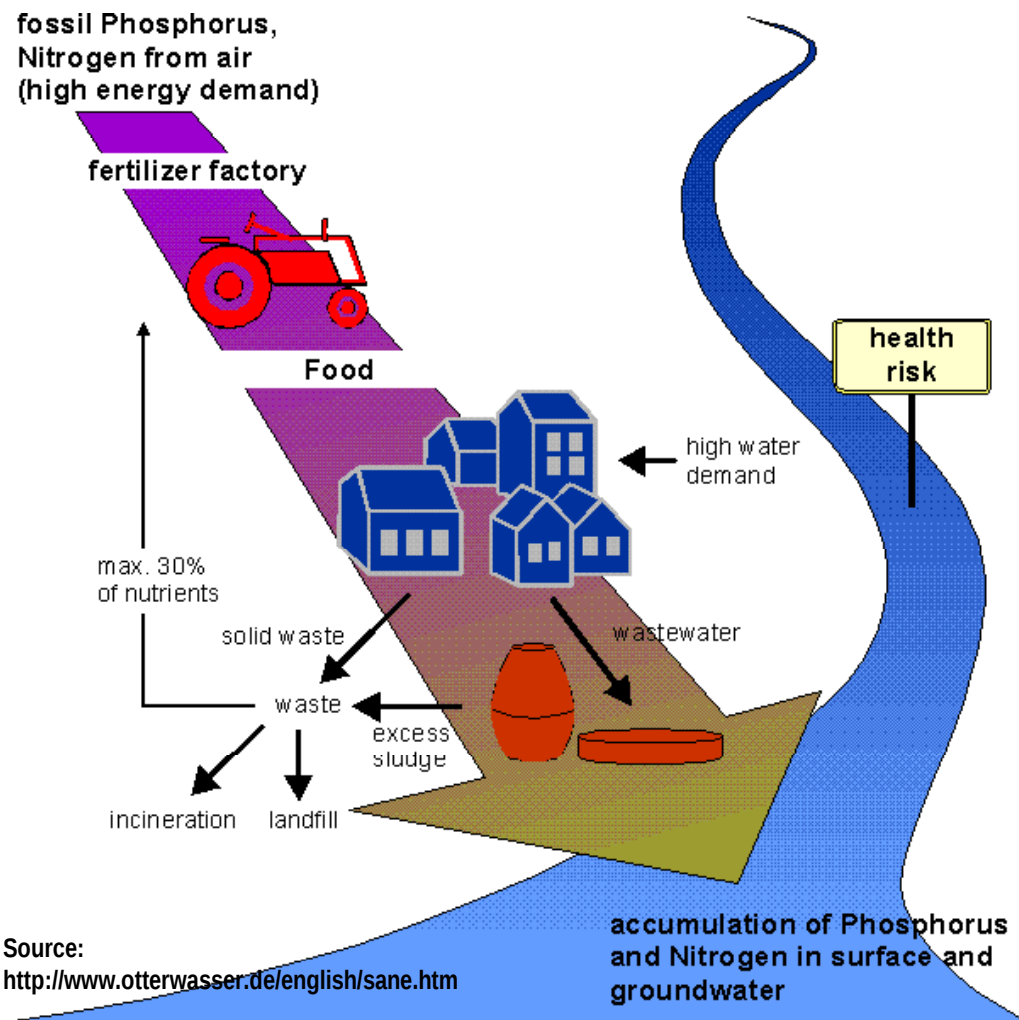
**Asian Development Bank, Manila
29-31 January 2013**

Dr. Andreas Hauser, Director of Water Services, TÜV SÜD



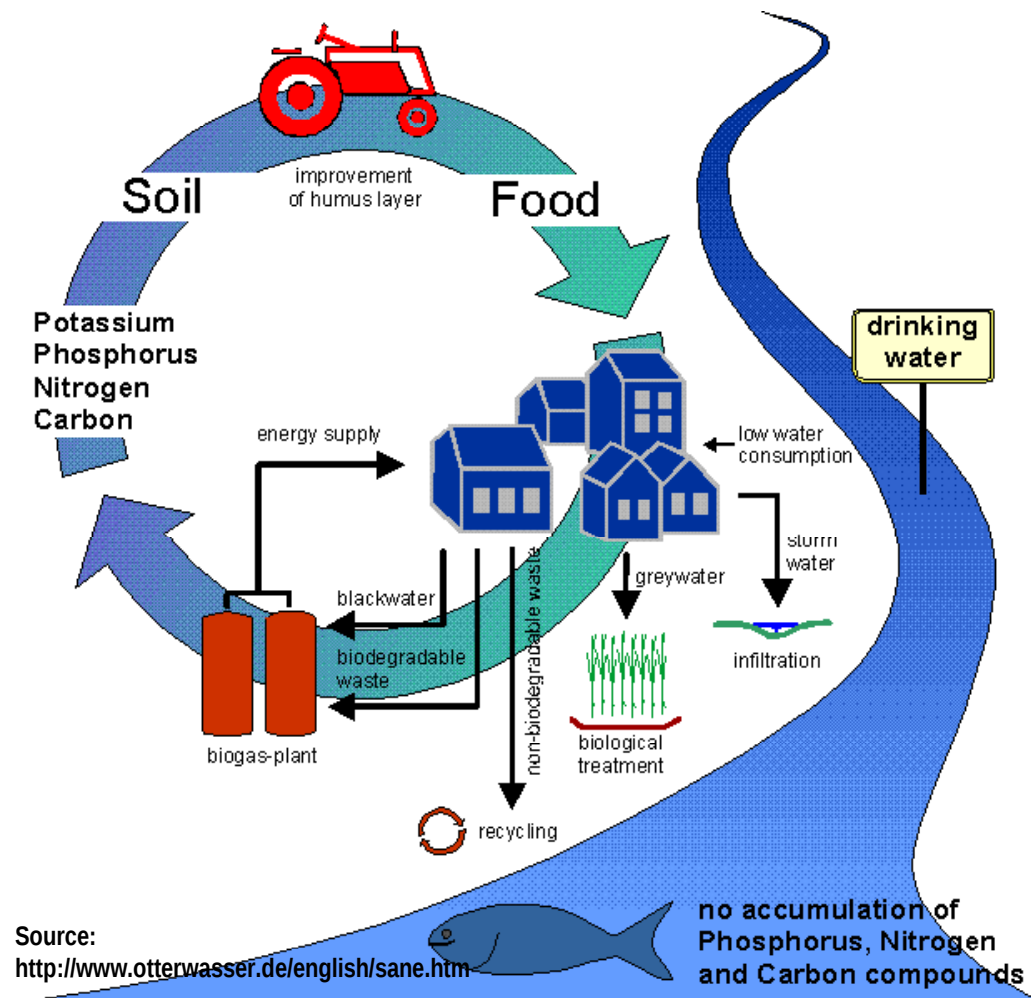
- From Conventional to Closed-Loop Sanitation Systems
- Aspects of Waste Water Solutions
- Energy Recovery
- Waste Water Treatment Solutions
- Innovative Waste Water Treatment Components
- Example of a Sustainable Urban Decentralised Waste Water Solution
- Conclusion
- Company Profile

Conventional Sanitation is not Sustainable



- Infiltration of nutrients
- Contamination by Chemicals (Emerging Contaminants)
- High Water Consumption
- High Energy Consumption

Closed-Loop Sanitation



Source:
<http://www.otterwasser.de/english/sane.htm>

- Recycle of nutrients
 - Re-use of water
 - Energy recovery from waste water
 - Alternative collection system
 - Advanced treatment technologies
 - Integrated Waste Water Management
- Technologies will be integrated
Water + Energy + Nutrients
- Solutions will be complex



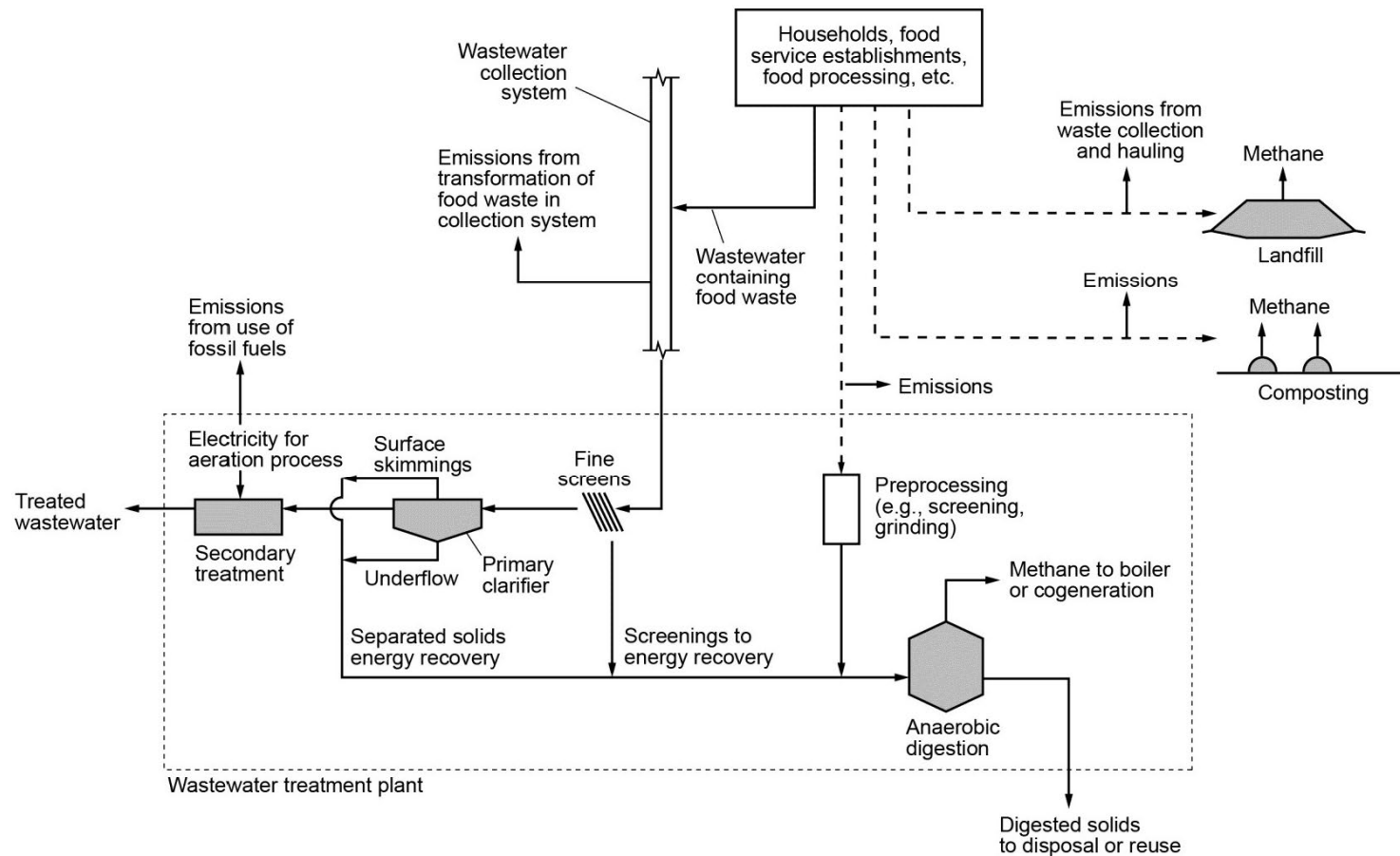
Water – Energy – Nutrients → Integrated Systems

- Treatment
 - Mechanical: filter, membranes
 - Chemical:
 - Biological: aerobic, anerobic
- Energy Conversion
 - Incineration
 - Gasification: syngas production
 - Anaerobic digestion
 - Bio-electrochemical systems
 - Thermal recovery
- Recycling of Nutrients
 - Phosphorus
 - Nitrogen
- System
 - central, decentralised
 - Integration: Power, Waste, Reuse/Recycle

Energy Recovery: Waste Water and Food Blending



Energy available in waste water is 2 to 4 times the amount required for treatment

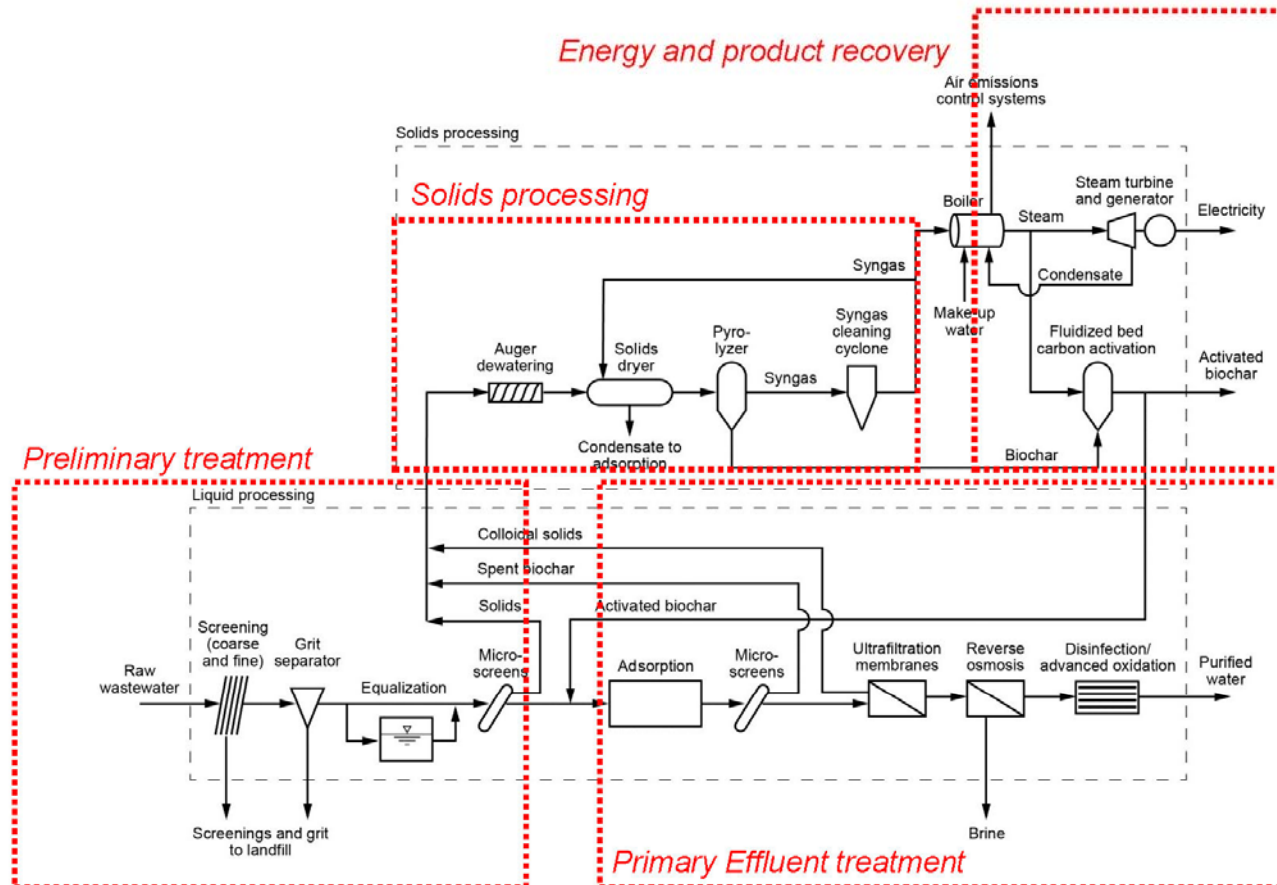


Source: George Tchobanoglous: *Wastewater Treatment Trends in the 21st Century that will impact water reuse projects*, 3rd Sede Boqer Conference, 2012

Conceptual Future WWTP Schematic



Integration of treatment, energy and product recovery

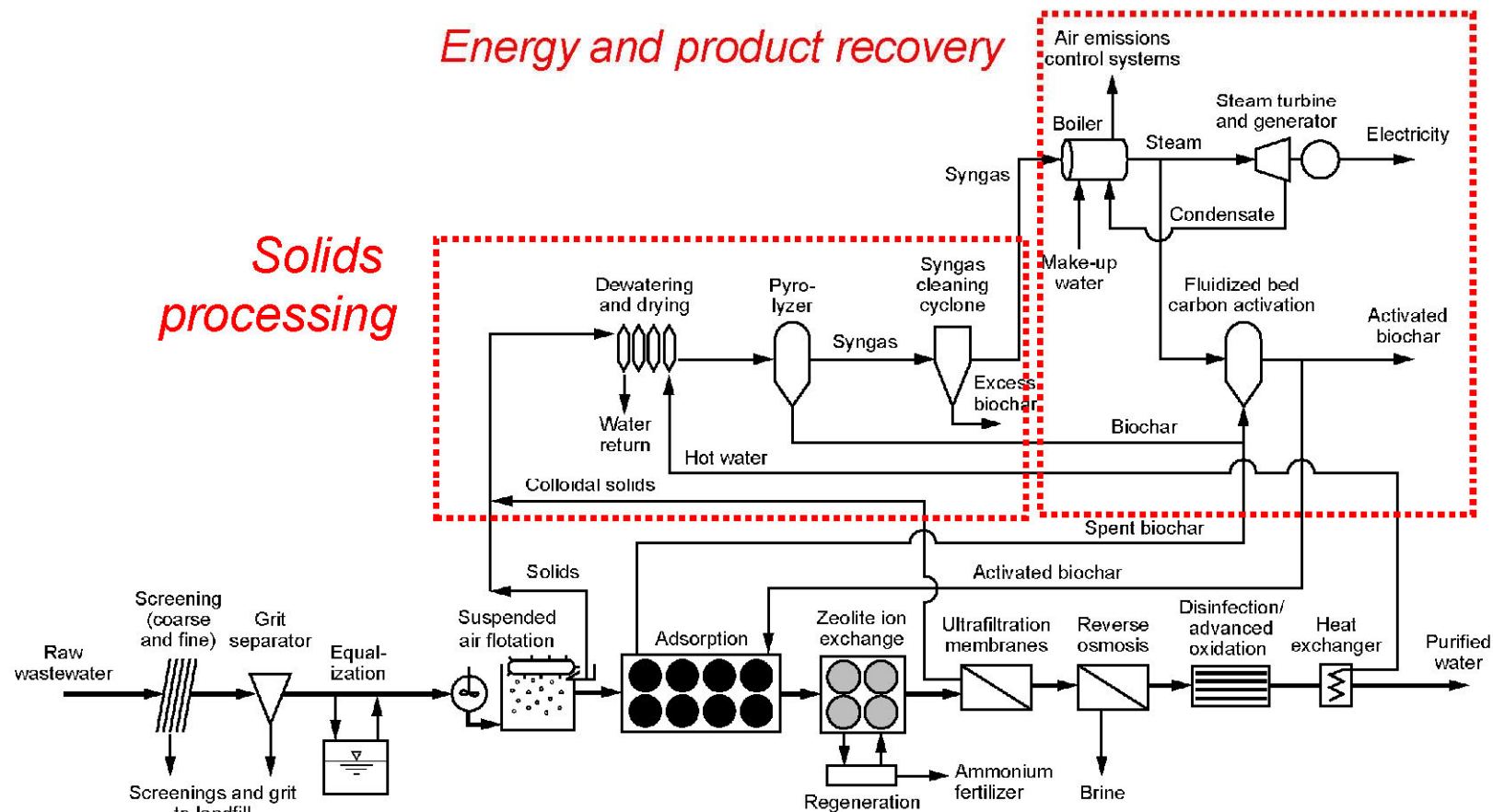


Source: George Tchobanoglous: *Wastewater Treatment Trends in the 21st Century that will impact water reuse projects*, 3rd Sede Boqer Conference, 2012

Conceptual Future WWTP Schematic without Biological Treatment



Integration of treatment, energy and product recovery



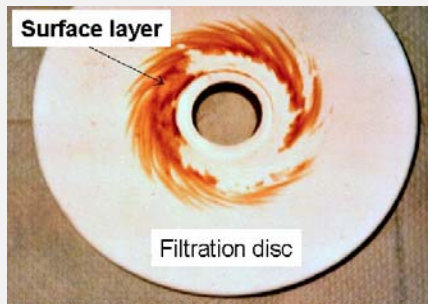
Source: George Tchobanoglous: *Wastewater Treatment Trends in the 21st Century that will impact water reuse projects*, 3rd Sede Boquer Conference, 2012

Innovative Waste Water Treatment Components

Innovative Components play out their full potential only, when deployed properly into complete System!

Membranes: Polymers, Ceramics

- High efficiency
- Enable Reuse



Bio-Sorption

- Concentration of bio-solids for energy conversion



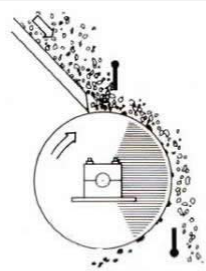
Pulse Power

- Pretreatment for fast biodegradation



Electromagnetic Separation

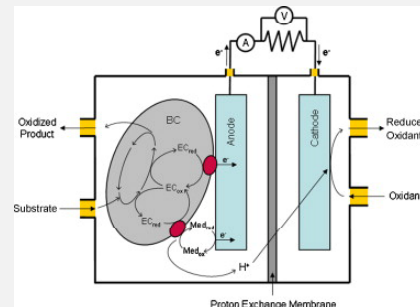
- Fast Separation of solids with small footprint



<http://www.agitomachinery.com/>

Microbial Fuel Cells

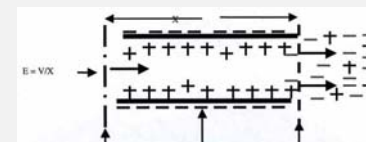
- Direct conversion from chemical into electrical energy



Cathodic limitations in microbial fuel cells:
An overview

Electro-Dewatering

- Fast and efficient dewatering of sludge

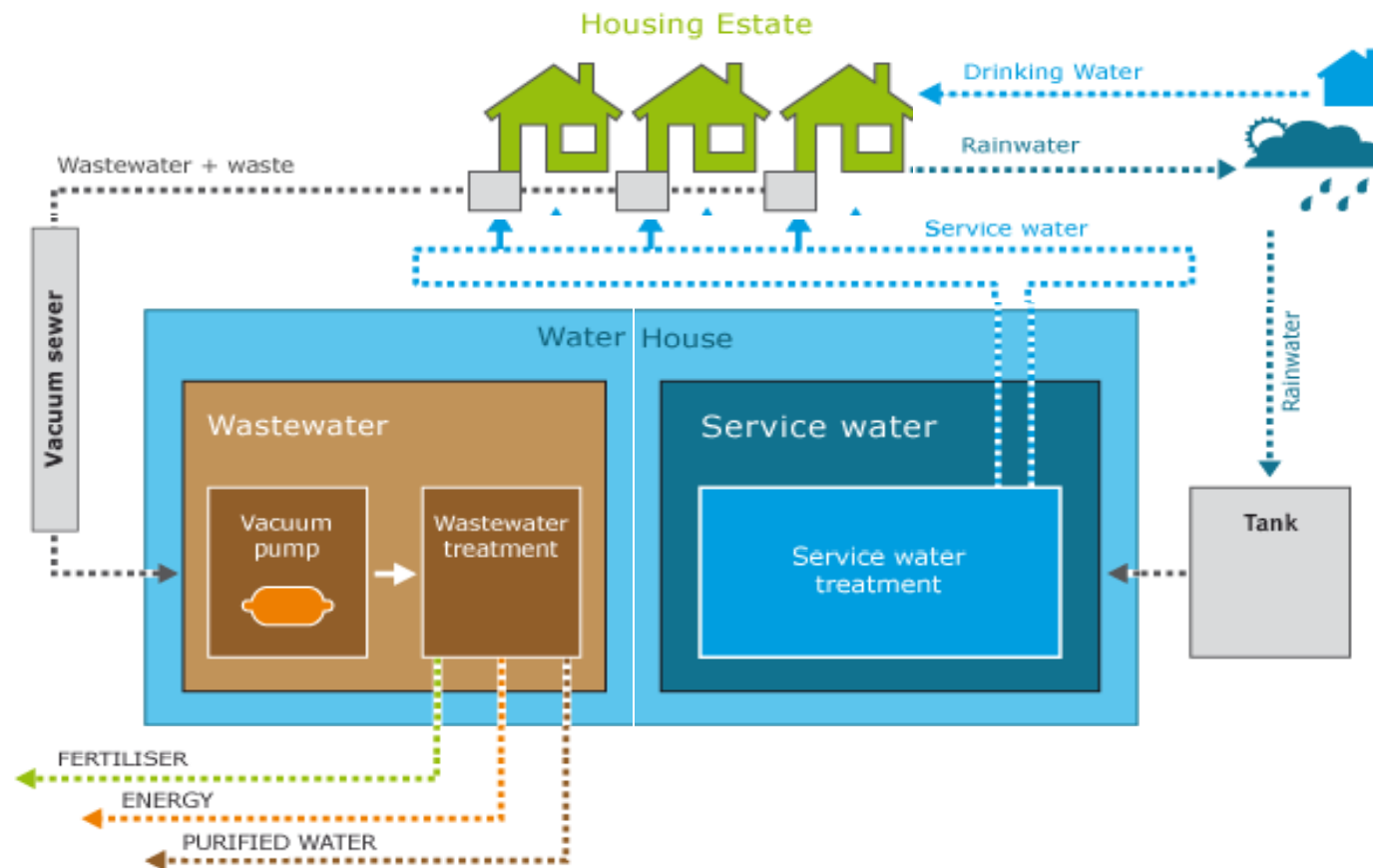


<http://w3.unisa.edu.au/iwri/futurestudents/honsprojects/electrokineticdewatering.asp>

Example: Decentralised Urban Waste Water Treatment ¹



The Concept



© 2008 Grafik by www.designal.de

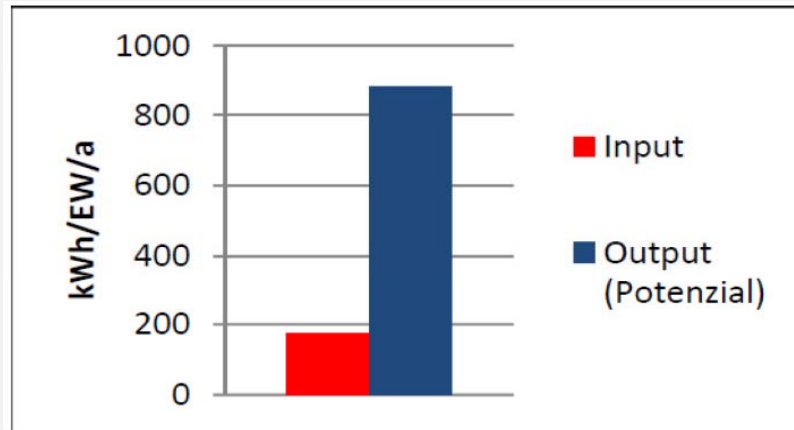
- innovative and flexible infrastructure system with high resource efficiency concerning energy, nutrients and water
- links water supply and wastewater disposal
- high degree of user comfort

1) Source: DEUS21, Fraunhofer IGB, Prof. Troesch, 2013. www.deus21.de

Example: Decentralised Urban Waste Water Treatment ¹



Results



Energy demand vs. Energy potential of anaerobic psychrophilic waste water treatment with DEUS 21 concept



Recycling and recovery of phosphor components is also possible:
Precipitation of Mg-ammonia-phosphate

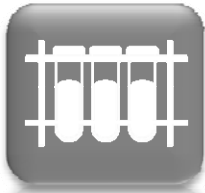


Waste Water Treatment facility

1) Source: DEUS21, Fraunhofer IGB, Prof. Troesch, 2013, www.deus21.de



- Sustainable solutions are complex and requirement specific
- Efficient waste water solutions integrate water, waste and energy as much as possible
- Different technologies from different vendors fit to different situations – there is no “one solution fits all”
- Consistency, interoperability, interchangeability must be ensured



Testing & product certification

Chemical, physical, mechanical, electrical and environmental testing and product certification.



Inspection

Product, system, building, plant and infrastructure inspection.



Auditing & system certification

Audits system certification in a variety of fields including quality, safety, energy, social compliance and environment.



Knowledge services

Safety, quality, risk, environmental protection and regulatory advisory.

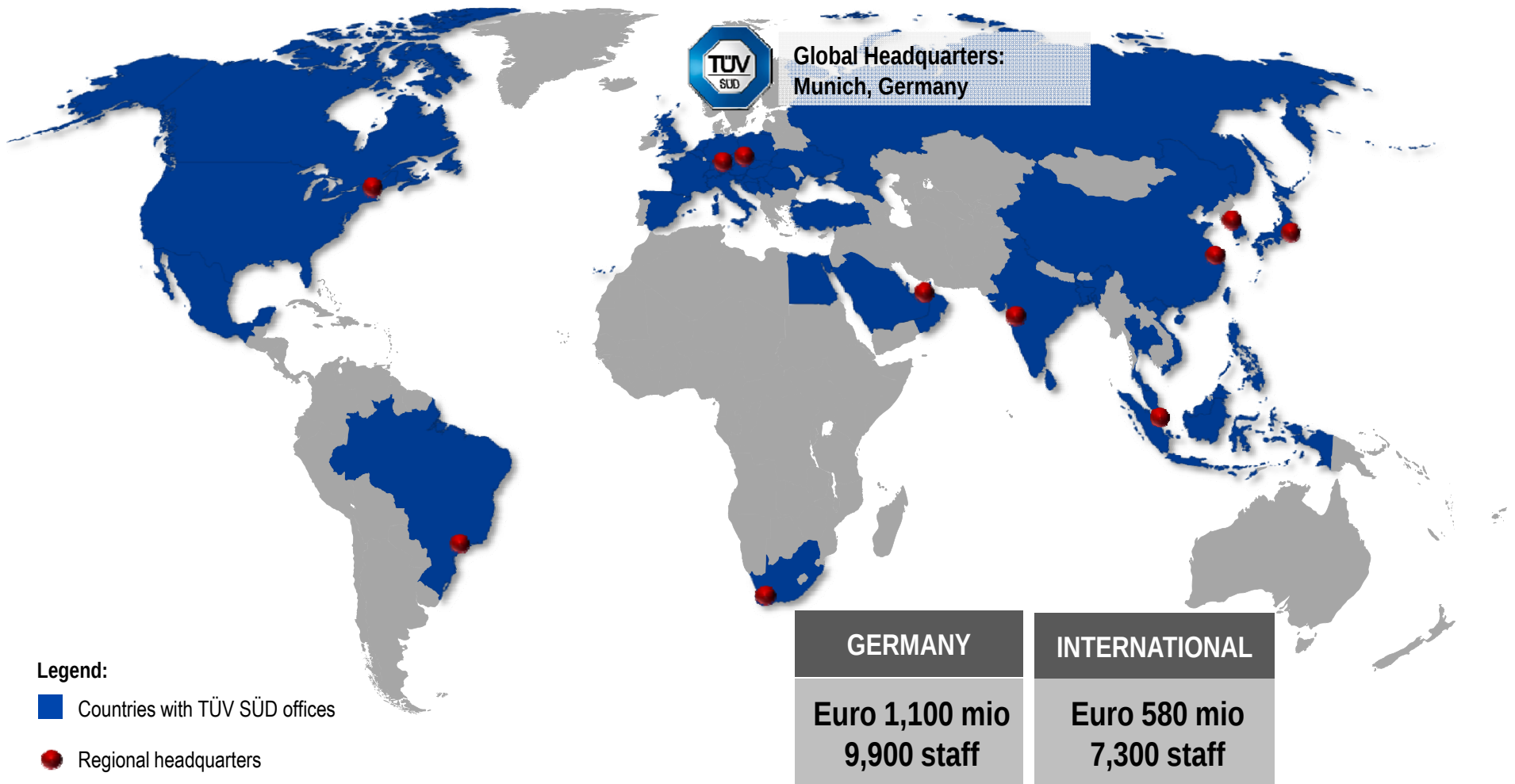


Training

Training in work safety, technical skills, management systems and executive programs.

The Company

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