

## FP6 T@W Project



### MUNICIPAL SOLID WASTE and BIOGAS WORKSHOP

# Avoided emissions from organic waste through alternative waste treatment processes

## LOTECOTEC (low temperature conversion technique) project

**MUNICIPAL SOLID WASTE and BIOGAS WORKSHOP****Avoided emissions from organic waste  
through alternative waste treatment processes****LOTECOTEC (low temperature conversion technique) project****Content**

- Introduction of ZREU
- CDM bioenergy projects
- LOTEKOTEC  
(low temperature conversion technique)

**ZREU**

**Mit Energie** ...begeistern...  
...gewinnen...  
...überzeugen



Zentrum für rationelle Energieanwendung und Umwelt GmbH

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**ZREU**

**Zentrum für rationelle Energieanwendung und Umwelt GmbH**

**Inspiring CONCEPTS** ▼ **Advanced TECHNOLOGIES** ▼ **Convincing SOLUTIONS**

T@W Facilitation Workshop, Bangkok

Daniel Caspari, 26 February 2008

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Regensburg/Germany

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## Partner in energy and environmental issues

- **National and international acting consultancy and engineering company**
- **Advisory services for public and private clients for over 20 years**
- **EU-organisation for the promotion of energy technologies and innovation**
- **Special areas of expertise:**
  - Efficient generation and use of energy
  - Renewable energy sources
  - Development and demonstration of innovative energy concepts and technologies



## Our business units ...

**Consulting &  
Concepts**

**Planning &  
Engineering**

**International  
Projects**

## Consulting & Concepts

### Areas

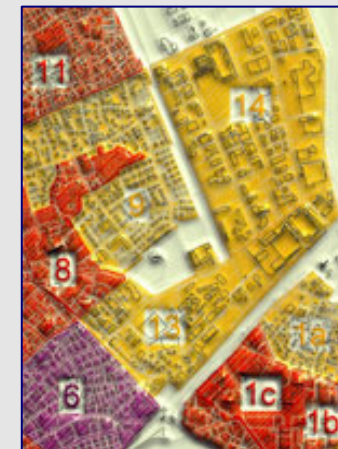
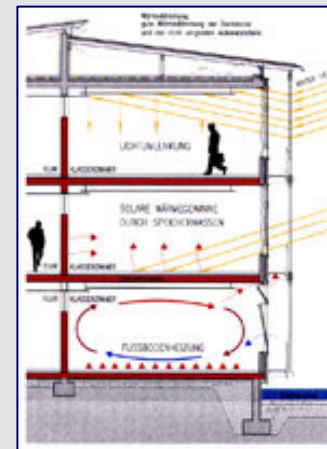
- Building equipment and energy systems - auditing, analysis, assessment and advice
- Efficient energy generation and use - concepts and feasibility studies
- Financing / TPF, tariffs & supply contracts (natural gas, electricity, heat supply, ...)
- CO<sub>2</sub>-emission trading / national allocation plan (inventories and balancing, CDM- / JI-projects, ...)

### Technologies

- Geothermal energy systems (ground-coupled heat pumps, electricity generation and heat networks)
- District heating systems
- Cogeneration, combined heat and power units
- Biomass
- Solar systems (solarthermal and photovoltaics)
- Climatisation, heat recovery
- Heat pumps / refrigeration

### Clients

- Local authorities, cities, public institutions / administrations
- Industry and commerce
- Spas, leisure and recreation centres



## Planning & Engineering

### Services

- Project design and conception
- Implementation planning and engineering
- Tender documents and bid evaluation
- Project management, site supervision

### Technical building equipment

- Heating systems, domestic hot water supply
- Ventilation, air conditioning and cooling
- Natural gas, water supply and waste water
- Measurement, control and monitoring technology

### Energy generation and use

- Heating systems
- Combined heat and power plants
- Heat pump systems
- District heating networks
- Energy management systems

### Buildings

- Schools, gymnasiums
- Spas (indoor, thermal and leisure spas)
- Administrative and municipal buildings, hospitals etc.
- Industrial and commercial buildings



### Renewable energy sources / innov. applications

- Geothermal energy – heating and cooling based on hydrothermal resources
- Biomass – wood chips and pellets, biogas, biofuels
- Solar systems – solarthermal and photovoltaics
- Activation of constructional building elements

## International projects

- RES implementation plans and strategies
- Studies and market-analysis
- Development and implementation of research & demonstration projects
- Co-ordination and management of complex multi-national projects
- Education and training, publication of technical brochures and handbooks
- Technology transfer and marketing
- Organisation of int. conferences, workshops and site visits
- Networking and international co-operation
- Awareness raising and targeted promotional campaigns
- Advice about European programmes and structural funds
- Project screening and proposal development (grant writing, applications in response to EC calls)
- Elaboration of fundraising strategies and plans
- Consultation processes and surveying of members, reporting



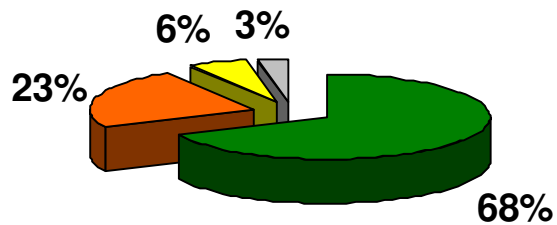
## CDM bio energy projects

- represent a major share of „renewable energies“
- are also part of further categories of the 15 CDM scopes, esp. „Waste Handling and Disposal“ e.g.:
  - landfill gas
  - biomass residues from a variety of agriculture processes
  - biogas (manure): e.g. Schmack Biogas programmatic VER project
  - avoided emissions from organic waste through alternative waste treatment processes:  
e.g. LOTEKOTEC (low temperature conversion technique)  
→ esp. Methane (CH<sub>4</sub>) projects are attractive for CDM/JI.
- increasing number of CDM bio fuel projects (including transport sector)

**Sewage sludge in Germany:  
9 Mio. t/a (containing 25% DM)**

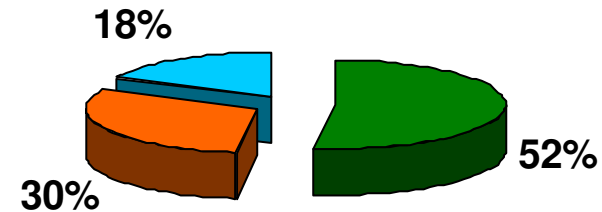
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**3.5 times the volume of the Cheops Pyramid  
(height: 146.5 m, length: 230 m)**



■ material recycling    ■ thermal recycling  
■ landfill                    ■ storage

source: Statistisches Bundesamt, 2001



■ material recycling    ■ thermal recycling  
■ new technologies

source: Kolb, Quo Vadis 2005 (forecast)

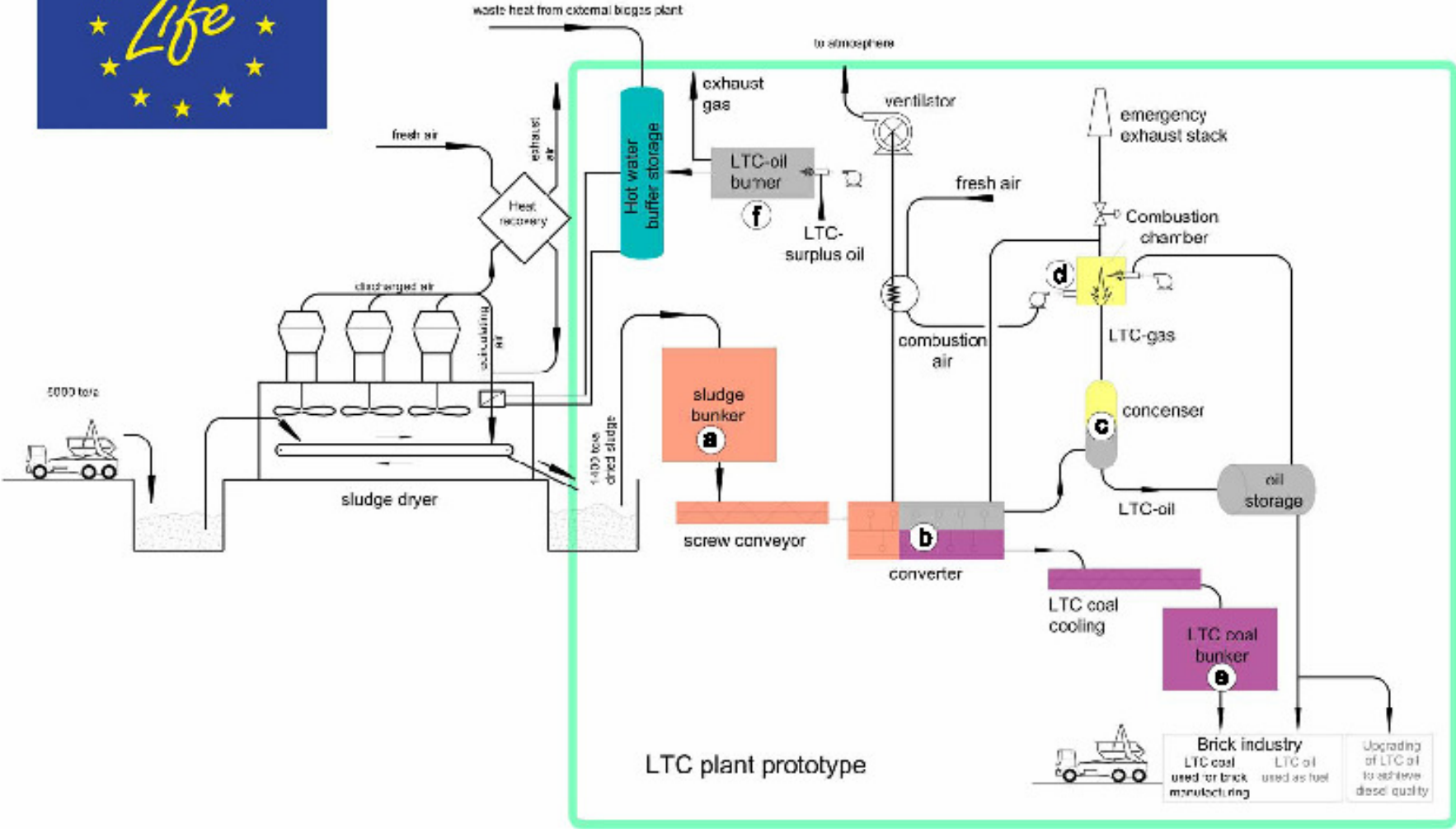
**A possible solution is demonstrated in the project:**

**LOTECOTEC**  
**(low temperature conversion technique)**

# LIFE demonstration project : Efficient disposal and recycling of sewage sludge by low temperature conversion (LOTECOTEC)



**lotecotec**



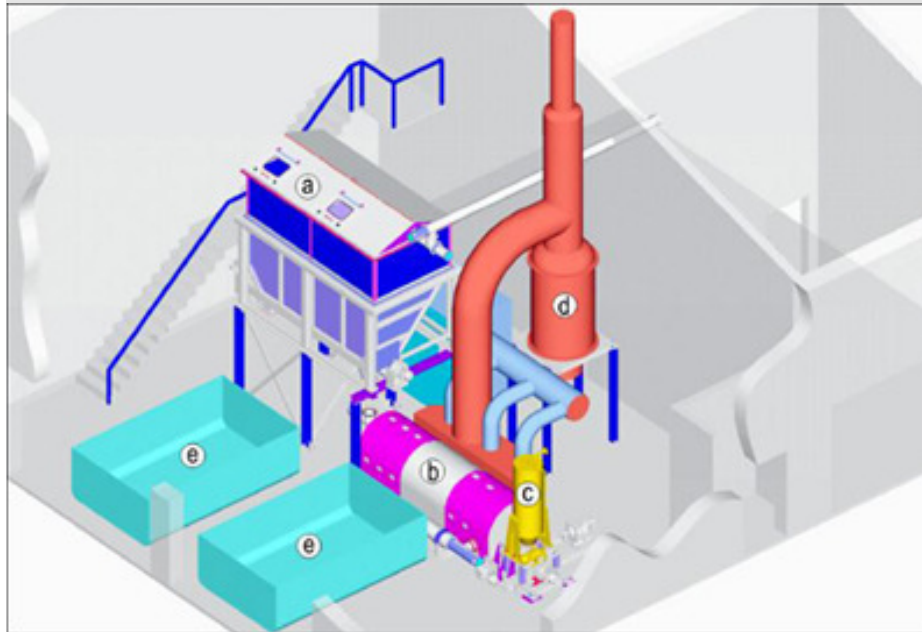
Delivery of dewatered sewage sludge (25% DM)

Thermal drying of the sludge (90% DM)

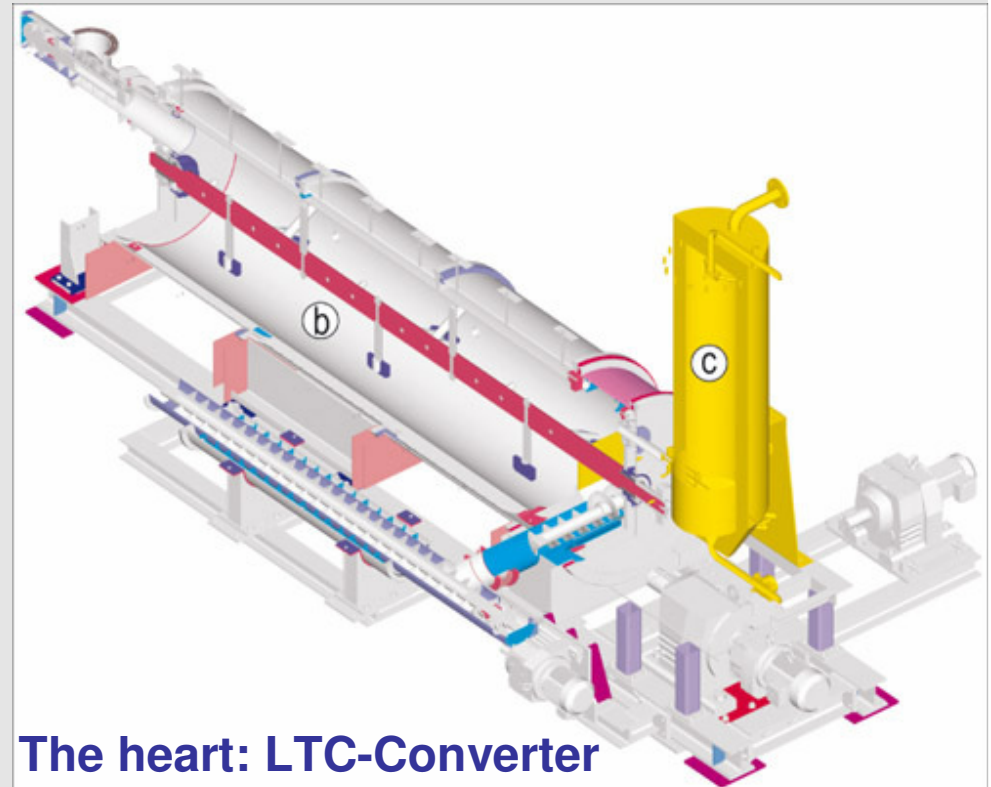
Low temperature conversion process (sludge conversion to LTC coal, oil and gas)

Refinement and further utilisation of LTC sub-products

# Low temperature conversion technique: 3D-schematic diagram of the entire plant

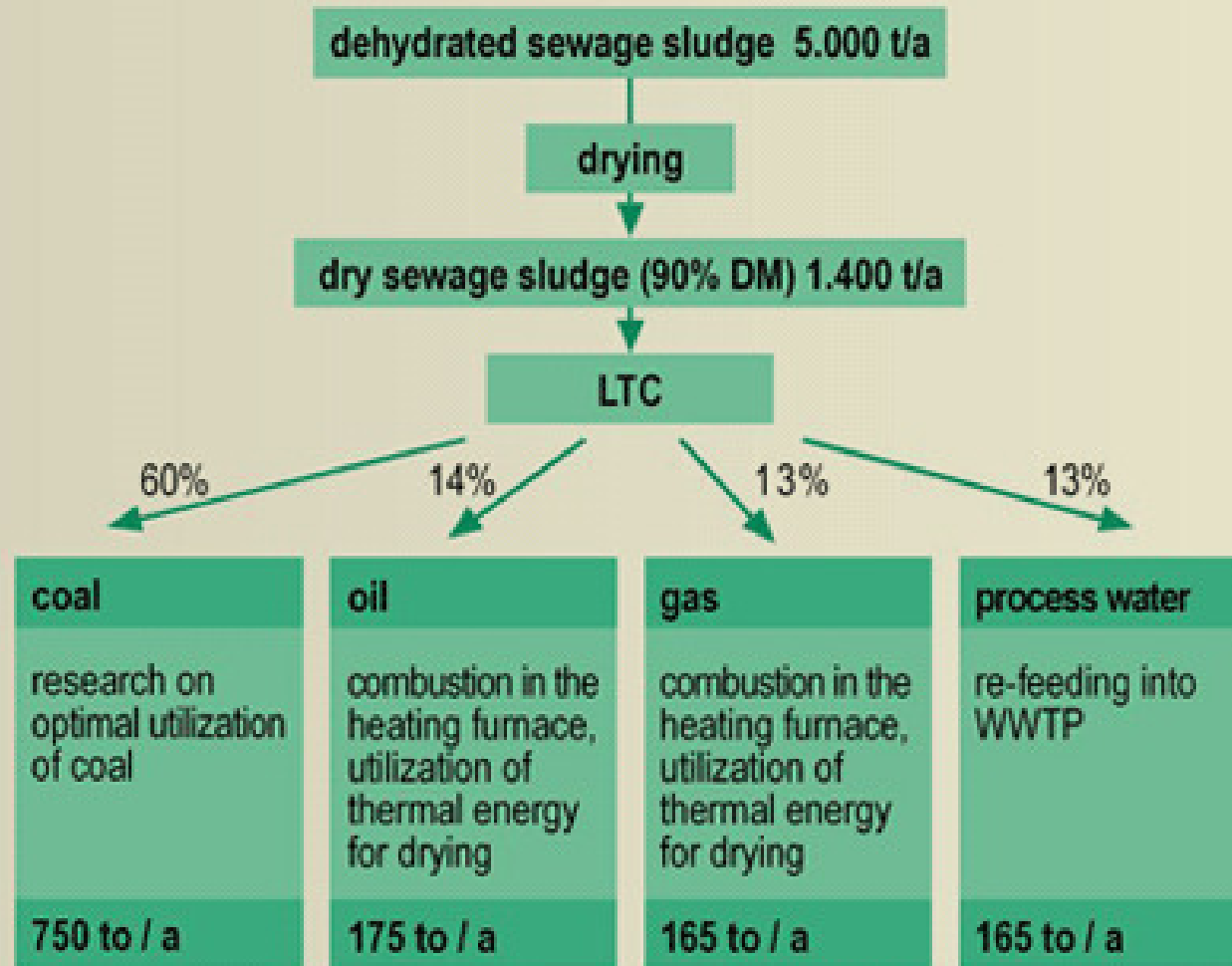


- Ⓐ sludge bin      Ⓑ LTC-converter      Ⓒ condenser
- Ⓓ combustion chamber      Ⓔ coal stockyard      Ⓕ LTC-oil-burner

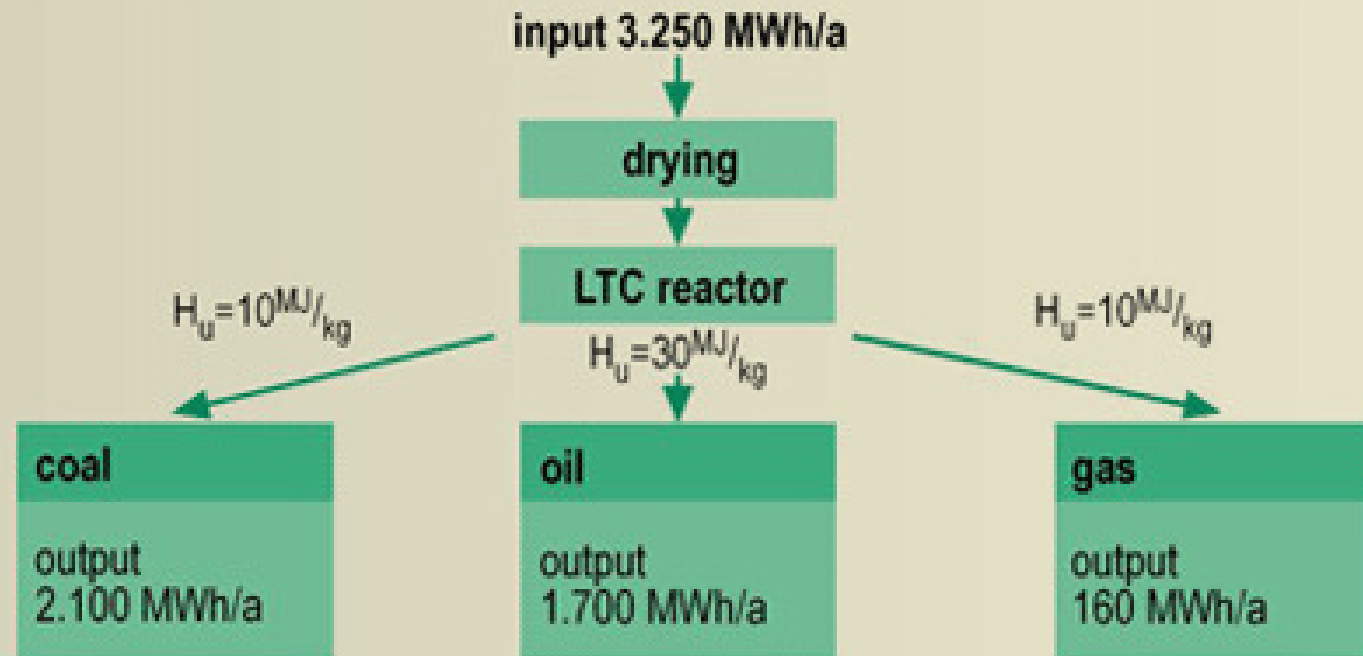


**The heart: LTC-Converter**

material balance



# energy balance



The sewage sludge produced by local and other waste water treatment plants is dried to 90% DM and in the LTC converter subsequently transformed into energy carriers/sources. As the resulting sub-products contain more energy than is needed for drying, the sewage sludge treatment plant could work self-sufficiently.

## Advantages of low temperature conversion:

- ✓ Increased independence for communities due to decentralized self-sufficient waste disposal
- ✓ No land application of sewage sludge, keeping bacteria, residual drugs etc. from the food chain
- ✓ Reduction of CO<sub>2</sub> emissions by working on a regional scale
- ✓ Recovery of phosphate from coal is possible, as the natural deposits of phosphate are declining

## Demonstration project **LOTECOTEC** project partners

### ↖ beneficiary:

VBA Pfattertal (sewage disposal association of Pfattertal)

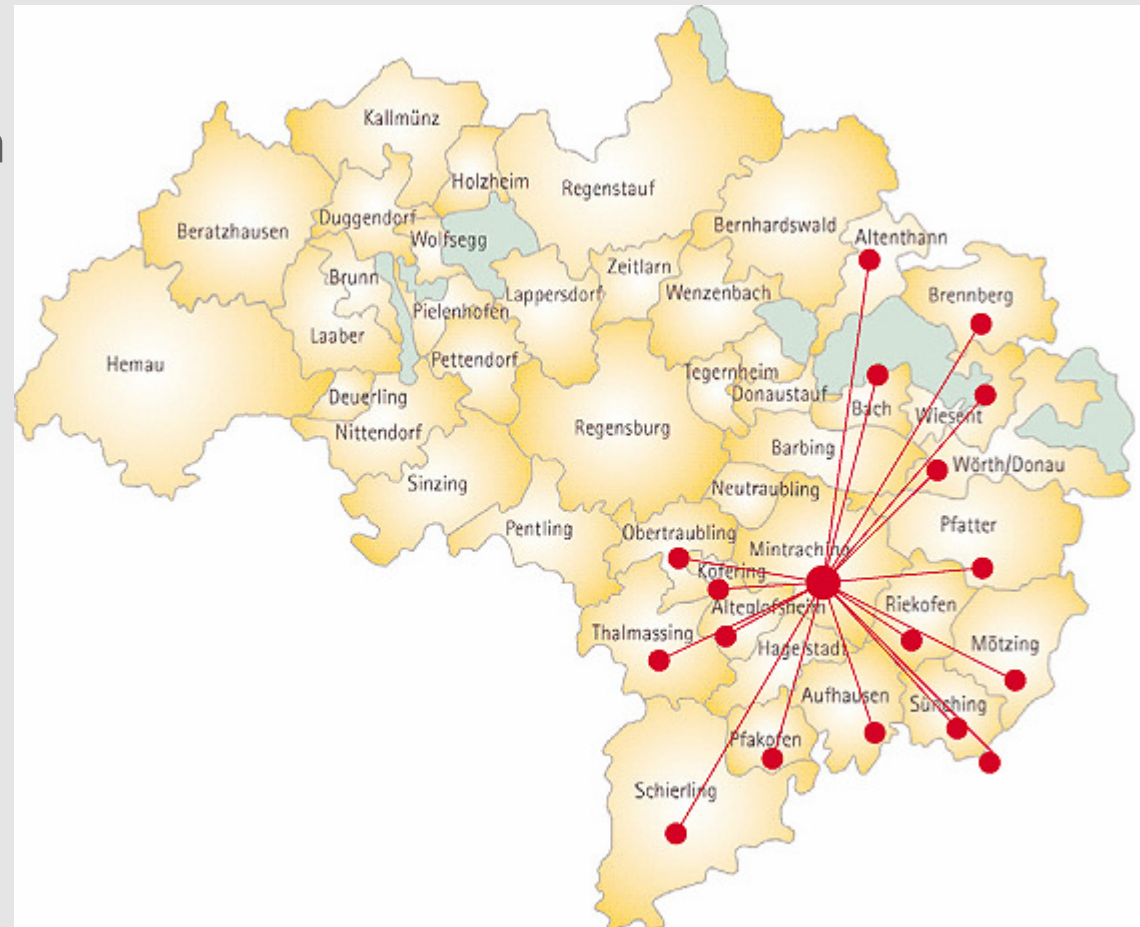
### ↖ Project partners:

- University of applied sciences Gießen-Friedberg,
- Tonwerk Venus GmbH (brick producer)
- ZWT Wasser und Abwassertechnik GmbH, Bayreuth  
(water and wastewater technologies)

Operating companies of  
waste water treatment  
plants in the south-eastern  
part of Regensburg  
County joined forces

16 communities and  
11 waste water treatment  
plants

Annual delivery of up to  
5,000 tonnes of dewatered  
sewage sludge (25,000  
tonnes of wet sludge)  
➔ dried to 90% DM



## Demonstration projekt **LOTECOTEC** project costs

- ↖ **Project duration:** 01. Nov. 2006 bis 31. Okt. 2009
  
- ↖ **Total project costs (incl. investment):** 4,25 Mio. Euro ≈ 202.5 Mio. THB
  
- ↖ **EU grant:** 1,16 Mio. Euro ≈ 55.3 Mio. THB

# Thank you very much for your attention

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