

FP6 T@W Project**BIOMASS and BIOGAS WORKSHOP****Sustainable Bio Energy technologies in
the CDM market****Lessons from registered CDM biogas project activities in Germany**

BIOMASS and BIOGAS WORKSHOP

Sustainable Bio Energy technologies in the CDM market

Lessons from registered CDM biogas project activities in Germany

Content

- Introduction of ZREU
- CDM bio energy projects
- Schmack Biogas programmatic VER project
- Technology of biogas production

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, 25 February 2008

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Regensburg/Germany

info@zreu.de
www.zreu.de

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

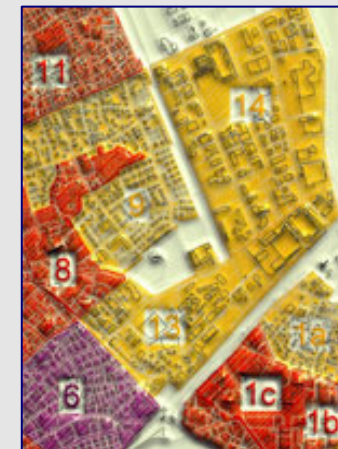
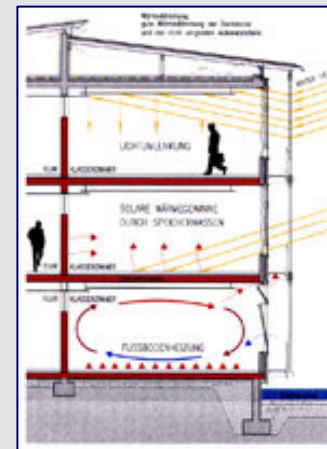
- Building equipment and energy systems - auditing, analysis, assessment and advice
- Efficient energy generation and use - concepts and feasibility studies
- Financing / TPF, tariffs & supply contracts (natural gas, electricity, heat supply, ...)
- CO₂-emission trading / national allocation plan (inventories 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 (CH₄) projects are attractive for CDM/JI.
- increasing number of CDM bio fuel projects (including transport sector)

Schmack Biogas programmatic VER project

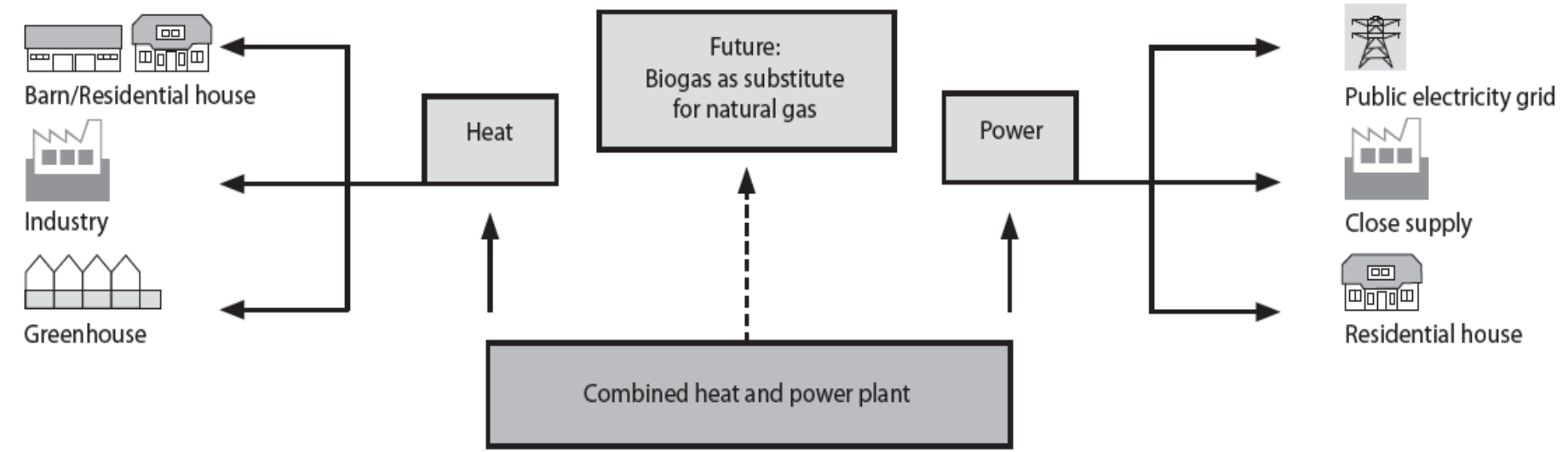
- Fermentation of manure from various stockbreeding farms
 - Avoiding Methane emissions instead of deploying the substrate untreated onto the fields
- Heat and power generation from biogas
 - Replacement of fossil fuels
 - Further indirect emission reductions
 - Not part of the project verification to avoid double-counting with the EU ETS and the German Feed-in Law (EEG)
- Pilot project
 - Development of a baseline and monitoring methodology
 - “Bundling” of decentral biogas plants in a “Programme of Activities (PoA)”



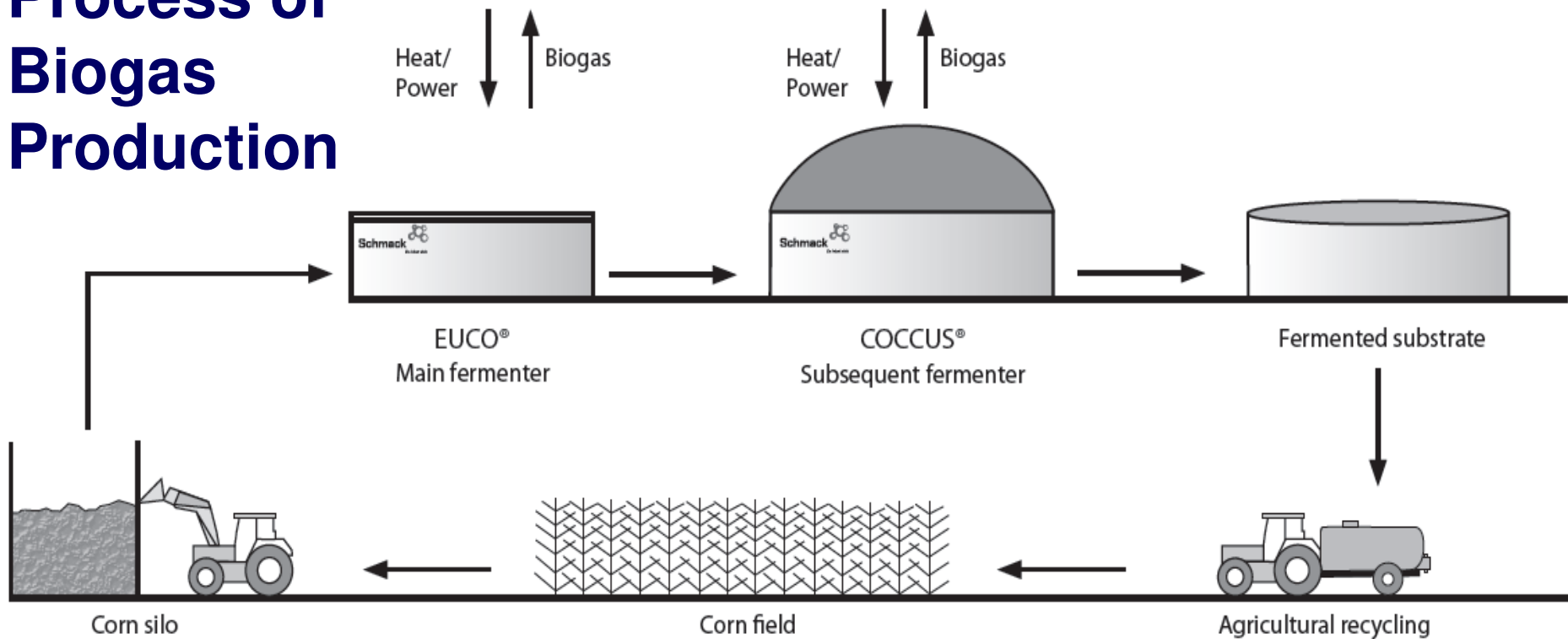
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Schmack Biogas programmatic VER project

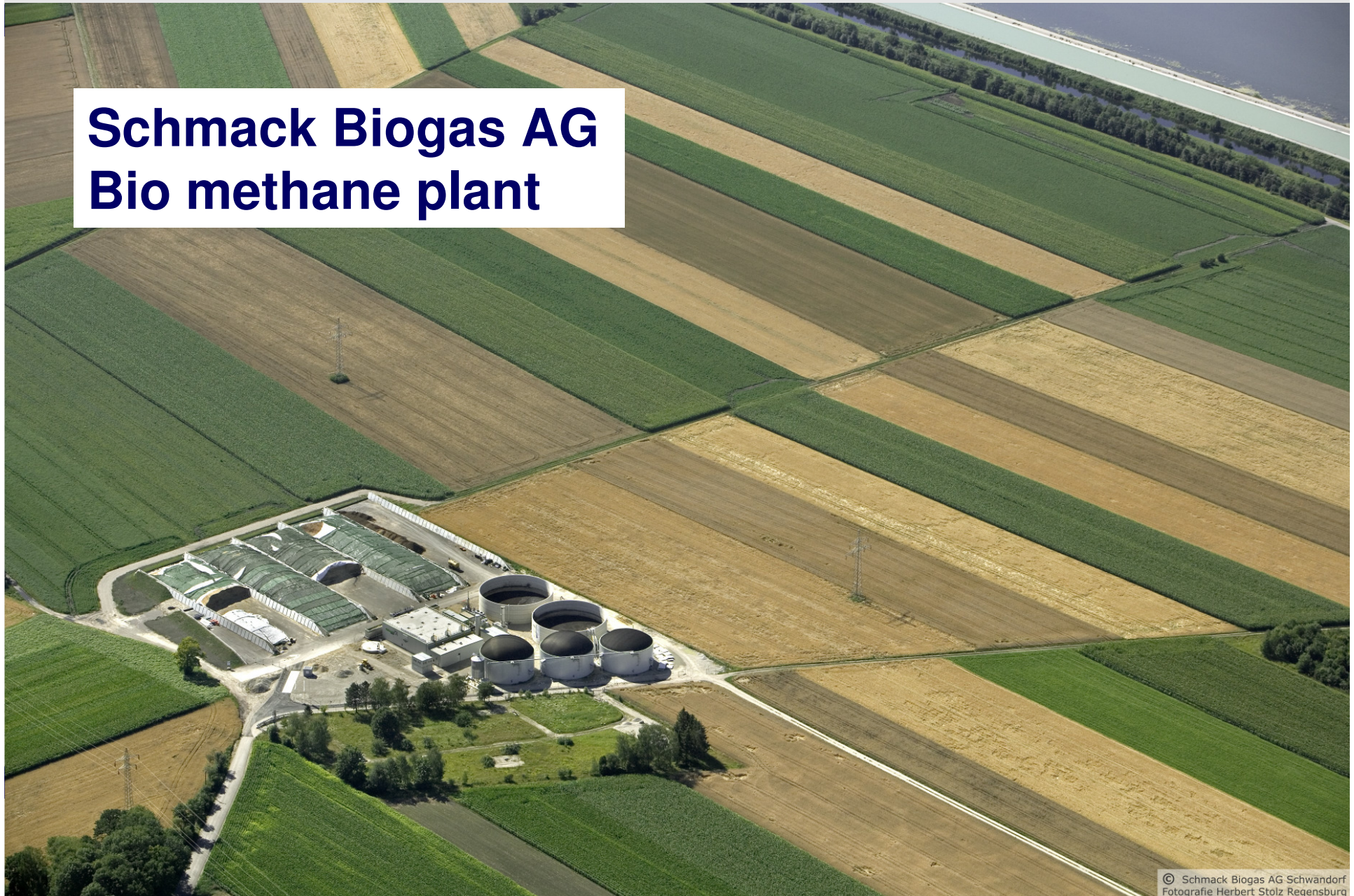
Project Data:	
Project title	Reduction of methane emissions by implementing and optimising the operation of biogas installations
Host Country	Germany
Type of certificate	Verified Emission Reduction (VER)
Crediting period	2001 - 2007
Installed capacity	40 – 1,250 kW
Emission reductions	20,000 – 25,000 t CO ₂ e/a, depending on the number of participating farmers, installed capacities and types of substrate
Project participants	Schmack Biogas AG and a varying number of biogas plant operators / support by FutureCamp



Process of Biogas Production



Schmack Biogas AG Bio methane plant



Animation of the typical, standardised construction of a Schmack biogas Plant

Insight into the technical and biological process within a biogas plant – from charging to feeding electricity into the network.

Download Animation: <http://www.schmack-biogas.com/wEnglisch/anlagen/animation.php?navid=32>

Theoretical Biogaspotential of different Energy plants at an area of 200 hectare (in Germany)

Energy Plant	Crop yield	Biogas output	CHP Plant size
Corn silage	9,000 t/solid cubic metre	1,600,000 m ³	360 kW _{el}
Sudan grass	11,000 t/solid cubic metre	1,240,000 m ³	300 kW _{el}
Grass silage	7,200 t/solid cubic metre	1,090,000 m ³	260 kW _{el}
Rye silage	5,200 t/solid cubic metre	746,000 m ³	170 kW _{el}

Assumptions: one annual crop, storage losses of the silage: 12%, CHP electrical efficiency: 35%, operating hours: 8,000

Source: Handreichung Biogasgewinnung und –nutzung (FNR, 2006);
Datensammlung Energiepflanzen (KTBL, 2006)

Key data for Biogas


1 m ³ Biogas	5.0 – 7.5 kWh _{total}
1 m ³ Biogas	1.5 – 3 kWh _{el}
CHP electrical efficiency	30 – 40 %
CHP thermal efficiency	40 – 60 %
CHP total efficiency	~ 85 %
CHP operating hours	7,500 – 8,000 /a
Specific investment	
- CHP gas engine 150 kW _{el}	900 €/kW _{el} ≈ 43,500 THB
- CHP gas engine 500 kW _{el}	560 €/kW _{el} ≈ 27,000 THB
- Biogasplant < 100 kW _{el}	5,000 – 3,000 €/kW _{el}
- Biogasplant 100 - 350 kW _{el}	3,000 – 2,000 €/kW _{el}
- Biogasplant > 350 kW _{el}	< 2,000 €/kW _{el} ≈ 100,000 THB

Source: Handreichung Biogasgewinnung und –nutzung (FNR, 2006), FAL

Thank you very much for your attention

**ZREU****Zentrum für rationelle Energieanwendung und Umwelt GmbH**

Dipl.-Wirtsch.-Ing. Daniel Caspari
Wieshuberstraße 3
D-93059 Regensburg

 +49 (0)941 464 19 - 15

 +49 (0)941 464 19 - 10

 caspari@zreu.de