The Project Site
Ostfildern / Scharnhauser Park
within POLYCITY

BIOMASS IN COMMUNITY
26 October 2006,
Gdansk, Poland

Community of Ostfildern in the Region of Stuttgart

<table>
<thead>
<tr>
<th>Inhabitants:</th>
<th>1998</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stadt Ostfildern</td>
<td>30,114</td>
<td>34,083</td>
</tr>
<tr>
<td>Scharnhauser Park</td>
<td>1,510</td>
<td>4,808</td>
</tr>
</tbody>
</table>
Former US Military base

Soldiers 3,000–5,000
Workers and commuters 2,000
Use Military base [GI]
not accessible 140 ha
sealed area 85 ha

Urban Development Site „Scharnhauser“

- Self-sustaining autarkic city quarter
- 3,500 Housing sites
- 2,000 working places

1. Compatible population density
2. Max. distance public transport 500 m
3. Sealing of soil equiv. to military use
4. Low energy buildings, district heating
The urban quarters of the Scharnhauser Park

**Quarter 1**
- Inhabitants: 2,285
- Average size of households: 2.23
- Development of inhabitants 2005: + 0%
- Share of foreigners: 20.9%
- Proportion of male/female: 51.2% / 48.8%
- Average Age: 32.0 years

**Quarter 2**
- Inhabitants: 916
- Average size of households: 2.98
- Development of inhabitants 2005: + 45.4%
- Share of foreigners: 9.2%
- Proportion of male/female: 51.6% / 48.4%
- Average Age: 28.6 years

**Quarter 3**
- Inhabitants: 1,667
- Average size of households: 2.18
- Development of inhabitants 2005: + 20.7%
- Share of foreigners: 13.2%
- Proportion of male/female: 51.1% / 48.9%
- Average Age: 33.3 years

Stage of Development in the Scharnhauser Park

As at 2005

- **Completed residential b.** ~ 4,800 residents
- Under construction
- **existing – commercial b.** 1,200 jobs
- **existing - light industrie**
Environmental Commitment I

Ecological Housing

Water Treatment
no effluent

Public Transport

RES
Biomass
biomass based
CHP with
wood chips

Environmental Commitment II

District heating network with
obliged accession

Concerted Action (round table)
for Urban Development

RE Solar thermal heating on houses
PV-installation in school
Project Aims for the Scharnhauser Park - Ostfildern

- Increase energy efficiency in housing sector
- Optimise heat use from biomass-plant
- Optimise integration of district heating network
- Combine and integrate supply and demand side

Project Participants Stuttgart / Ostfildern

City of Ostfildern
Operator Biomass CHP-Plant and District Heating Network

Project Planner Biomass CHP-Plant „Schuler”
Housing Society „Siedlungswerk”

UAS Stuttgart
ZAFH.NET

Public Economy Authority „WRS-Region Stuttgart”

University of Stuttgart IER
The Biomass Co-Generation plant

- Thermal power Biomass (boiler+eco) 6.6 MW
- Electrical power ORC-Module 1 MW
- Yearly total energy supply 27 GWh/a
- Yearly electrical energy supply ORC-Module 5.4 GWh/a
- Wood Chip demand 34,000 Sm³/a
- Fossil energy savings 3.5 Mio m³ Gas/a
- CO₂ Reduction 10,000 t/a

The biomass co-generation plant in detail

- Thermo-oil boiler
- Day bunker
- Wood supply
- Boiler
- Hydraulic floor and wood feed
- Economiser
- Cyclone & Electric filter

Ludger Eltrop; Till Jenssen
POLYCITY in Ostfildern
Plant with Organic Rankine Cycle (ORC)-Plant

**Advantages**
- Robust technology
- Low maintenance required
- Good performance at partial load
- Low temperature waste heat can be used for power generation

**Disadvantages**
- Relatively high specific investment costs
- Long term experiences with biomass still missing
- Organic thermal oil is inflammable and toxic
- Only limited electr. efficiency < 20%
- Due to low pressures

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Thermal driven production of cooling energy

The additional heat-consumption for producing cooling energy could amount approximately 16 GWh/a.
Integration of cold production into plant operation

Integration example: biomass CHP-plant Pfaffenhofen

- Boiler capacity: 26.8 MW
- Process steam for industry
- Electrical Capacity 6.1 MW
- Netto electricity prod. 40 GWh/year
- Netto heat prod. 102.6 GkWh/year
- Biofuel supply 250 t/day
- District heating network

Cold Supply
- 300 kW Li-Br Absorption cold device (-12°C) for hospital
- 700 kW Li-Br Absorption cold device (-6°C) for climaisation of two office buildings
- 650 kW NH₃-Absorption cold device (-6/14°C) for base- and peak-load compression cold devices (2x125 kW) and process cold for IT-Area and Climatisation of AMAP buildings

- Investment 36 Mio. EUR

Ludger Eltrop; Till Jenssen: POLYCITY in Ostfildern
Biomass fluidised bed power plant Güssing/Austria

8 MWth
2 MWel

The Güssing Model

BM-Produktion
Fernwärme
BM-Kraftwerk
Forschung
Tourismus
Arbeitsplätze
Biodiesel
Solar+PV

Parkettwerke
Effiziente und flexible KWK-Technologien

<table>
<thead>
<tr>
<th>Technologie</th>
<th>Wirkungsgrad</th>
<th>Investitionskosten</th>
<th>Kosten für Wartung</th>
<th>Emissionen</th>
<th>Gasreinigung</th>
<th>Verfügbarkeit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikro gas turbines</td>
<td>85%</td>
<td>niedrig</td>
<td>niedrig</td>
<td>effizient</td>
<td>effizient</td>
<td>2020 (?)</td>
</tr>
<tr>
<td>Stirling-Motor</td>
<td>2-15%</td>
<td>hoch</td>
<td>gut bei Teillast</td>
<td>hoch</td>
<td>hoch</td>
<td>2020 (?)</td>
</tr>
<tr>
<td>Fuel Cells</td>
<td></td>
<td></td>
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</table>

WG: Wärmegeneratoren

Perspective: small CHP installation

Energy production and energy use management

Forschungszentrum zafh.net
thermal cooling project with Elektror GmbH

- Used area: 3,500 m²
- Heating performance: 200 kW 55W/m²
- Cooling performance: 105 kW 30W/m²
- Heating demand: 75 MWh/a
- Cooling demand: 140 MWh/a
- External shading device
- Improved daylighting

20,000 m² space commercial sector
First project: company Elektror produces side channel blowers
Office space and product development

Surface geothermal pre-climatisation and heat exchange projects

Earth heat exchanger: 90 m length, 2 channels, PE-tube, depth 2.8 m, diameter DN 350 mm, volume flow 1,900 m³/h
Relaxation Turbine in the Water Supply System

- Falling height: 115 m
- Volume current: 70 l/s
- Electr. Capacity: 75 kW
- Energy production: 250 MWh/a

PV-Systems within Polycity

- Biomass plant: 35 kWp
- PV System Parkhaus: 4.95 kWp
Socio-economic investigations - public participation and peoples attitudes and concerns

Communication for innovative technologies?

Conflicts of aims
The questionnaire survey

- main aim: to derive information about the acceptance of the inhabitants in the Scharnhauser Park towards renewable energies and measures in the field of energy efficiency

- Open and closed questions

- In many items the respondent had the choice to express his/her accordance with a four-point likert scale: the arithmetic mean and the standard variation can indicate the

![Graph showing attitudes towards renewable energies in general]
Satisfaction with living conditions in the SchaPa

- Total
- Flat
- Security
- Cleaness
- Sense of community
- Public transport
- Shopping facilities
- Public services
- Facilities for freetime

Knowledge about the connection with the district heat network

- Very negative
- Very little
- Very much

Evaluation of district heat network

- Very much
- Very little
- Very negative

Knowledge about the connection with district heat network

- Very much
- Very little
- Very negative

Gesamt: 123 Befragte

Knowledge about the connection with district heat network

- Yes
- No
THANK YOU
FOR YOUR KIND
ATTENTION

POLYCITY

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