Combining new buildings and deep retrofit at Stadtwerk Lehen

A case study from Salzburg

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SIR – Salzburg Institute of regional planning and housing

- Non profit organisation in fields of spatial planning, housing, energy
- Consultancy, pilot projects, research
- Members of the association: all municipalities of Salzburg, city of Salzburg, federal state of Salzburg, housing associations, …
- Consultant for city of Salzburg: Spatial planning issues, energy strategy, innovative housing projects, …
Starting Situation

City of Salzburg

General development plan with focus on sustainability
Concrete figures for efficiency of buildings and use of renewable energy

District of Lehen

Masterplan for re-development of a district with structural problems
Chance by development of a demolished old commercial site
Objectives

Development of an energy concept

• focussing on supply concept with high share on renewables (>30%)
• considering existing district heating system
• based on high thermal standards for new buildings
• including existing building stock / opportunity for renovation / modernisation

Challenge

Involvement of all owners, tenants and stakeholders in the whole community
Key figures / core area

New Buildings
• 300 dwellings
• students’ hostel (97 apartments)
• Commercial buildings / laboratories

Buildings stock / Renovation
• 26 Buildings, > 500 dwellings
• 1950 - 1965

<table>
<thead>
<tr>
<th>Phase</th>
<th>Timeline</th>
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</thead>
<tbody>
<tr>
<td>Preparation phase</td>
<td>2005 – 2007</td>
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<tr>
<td>Planning phase</td>
<td>2007 – 2010</td>
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<tr>
<td>Construction phase</td>
<td>2009 – 2011 (for housing, commercial buildings will be finished later)</td>
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<tr>
<td>Completion</td>
<td>2013 (for housing, commercial buildings, renovation is ongoing)</td>
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Energy Concept

- Main system: district heating
- Solar collector fields on several buildings
- Central storage tank
- Central heat pump for increasing the efficiency of solar system?
- Heat distribution with own low-temperature-micro-net?
- Possibility for including existing buildings in the surroundings
- Efficient pumps, LED for public areas, PV, …
Optimization

- Variation of heat demand (time-table of realization; new buildings / existing buildings)
- With / without heat pump
- Collector area and pitch
- Size of storage tank
- Temperatures of micro net
- Different types of heat pump
- Specific solar yield
- Solar fraction
- Investment costs
- Primary energy demand / CO2- emissions
Results

- Specific solar yield: 423 kWh/m².a
- Solar fraction: 35%

Investment Costs
- Solution with electric heat pump means lowest additional investment costs

Primary Energy Demand
- Only electric heat pump and solution with double sized solar system can reduce primary energy demand compared to standard solution (but strongly depends on PEI of electricity)
Realization

- Micro net
- 2000 m² solar collector fields
- 200 m³ storage tank
- Heat pump
- District heating system
**Renovation**

**Focus**
- Strubergassensiedlung

**Starting situation**
- 26 buildings
- 1950 – 1965
- Individual heating systems (natural gas, wood, coal)
- No ideas about renovation

→ Modernization Concept as starting point for further discussion (Arch. Schulze-Darup)
Modernization Concept

Meeting tenants’ needs:

• More green

• Improved situation for car-parking (using underground parking area of new buildings)

• Individual balconies

• Less noise pollution (new orientation of buildings)

• State-of-art standards of the flats
Modernization Concept

Energy: Different renovation standards

• „Faktor 10“ – renovation
• Passivhouse-Standard (for addition of another storeys)
• Demolition and re-build
• Connection to micro-net
• In total: 80% reduction of heat demand

→ Calculation and optimization for each individual building: investment costs, primary energy demand
Result of Modernization Concept and Discussion process:

- 12 buildings are demolished and re-built again (using new buildings for substitution)
- Renovation of 14 buildings / 285 dwellings
  - 30-35 kWh/m².a
  - Connection with micro-net
Challenge: Process design with

- obligatory, ambitious targets
- a lot of players (city of Salzburg, local utility, housing associations, architects, planners)

→ Obligation for new buildings:

- Signed quality agreement (performance criteria, minimum requirements)
- Steering group with all signing parties (monthly meetings)
- Working groups (energy supply, renovation)
- Information activities

→ Extended for renovation projects
Monitoring
First results

for new residential buildings

11 months

1,550 m² solar collector field

Optimization is ongoing
Conclusions

New building projects might be used as initial starting point for renovation of further buildings around – **ambitious energy concepts**

Renovation of communities allows creation of win:win situations: improvement of energy standards, open space, infrastructure etc. – **instrument for forced renovation activities**

renovation of communities needs effort in process design and process steering – **role of urban planning**
Perspective

→ Analyses of building structure in city of Salzburg: renovation potential, ownership

→ Working Group „Renovation“: City of Salzburg, Housing associations, utility

Objectives

• Identification of renovation projects at community scale, prioritisation

• Common planning (creating win:win situations)

• Information exchange
Thank you for your attention!

... and thanks to those experts who were contributing to this Full Proposal

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