smart resilient cities
Infrastructure Systems

Next Generation Solutions

bmvit

System Competence

Federation of Austrian Industries

Austria's largest RTO

Applied Research

over 1,300 employees

8 Centers

2 Subsidiary Enterprises

143 m EUR total revenue

Tomorrow Today
WE ARE

In the era of massive global urbanisation the AIT is developing integrated strategies and implementation plans for a sustainable development of cities and regions worldwide.

An independent Urban Know-How Partner

Having extensive know-how and realisation experience AIT offers governmental as well as private businesses science-based solutions and capacity building to plan, realise and manage sustainable and smart habitats of tomorrow.
OUR MISSION

Driving urban innovation with national and local governments as well as for the private industry.
OUR EXPERTISE

- Responsive Cities & Regions
- Smart Spatial Planning
- Energy Conscious Cities & Regions
- Resilient Urban Systems

AIT RESEARCH & CONSULTING

AIT Urban Academy Capacity Building
## OUR EXPERTISE

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WE ENGAGE

We speak the urban tongue and seven world languages.

In cities and regions worldwide
CLIENTS & ENTERPRISES
COOPERATION PARTNERS
CITIES
SMART ITZ GOES
Scenarios for the Integrated and Cost-effective Refurbishment of a Social Housing Complex
INTRODUCTION

- Buildings consume 30-40% of energy
- Green building efforts (Leed, BREEAM, DGNB, etc.) mainly focus on new buildings (especially office buildings)
- The real challenge is the stock of residential buildings
- We were engaged in a research project funded by FFG in Austria that aimed to study the feasibility of ambitious redevelopment of a social housing project from the 1970 toward low CO2 emission standards.
- Feasibility: technical, economic, social, political, management aspects
INTRODUCTION

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THE AREA (GOETHESIEDLUNG)

- Salzburg, Itzling
- Constructed in the 1970s
- Operated by social housing companies (non-profit)
- Approx. 2,500 inhabitants
- Below average incomes
- Above average age
- Many retired inhabitants (first generation of inhabitants from the 1970s).
THE PROJECT PARTNERS

- Austrian Institute of Technology (project leader)
- Salzburg AG (Energy provider)
- Salzburg Wohnbau (RE manager)
- Heimat Österreich (RE manager)
- GSWB (RE manager)
- SIR (research)
- FH Salzburg (research)
- WU Wien (research)
THE CITY AS A KEY ACTOR

- In 2015 the City of Salzburg has defined ambitious goals in its Masterplan 2025 in climate and energy policy.
  - „Smart City Salzburg“
  - Increase of the refurbishing rate
  - Drastic reduction of CO2 emissions
  - Goethesiedlung one of the focus areas
- City owns the land, real estate companies have the right to use it in the current form, pay rent for it.
- City is responsible for changes in zoning and has to review all building activities.
THE RESEARCH PROJECT

- Investigate the status quo in the settlement (building conditions, infrastructure, social structure, stakeholders, framework conditions for actions)
- Develop a coordinated mission for the settlement in a process that involves all stakeholders (inhabitants, RE companies, city, energy provider, etc.)
- Develop alternative investment scenarios for transforming Goethesiedlung toward a low carbon social housing settlement
- Investigate the feasibility (technical, economic, social) of these scenarios
- Suggest a series of actions to RE companies and the city
Thermal status was better than expected. Most buildings have been renovated in recent years
- Fewer low hanging fruits than expected
- Fewer financial reserves than expected.
- There have been some studies on related topics in the last decade – all were just filed
- Warning: Our investigation may alert inhabitants and cause resistance and political action.
DEVELOP A COORDINATED MISSION

• We had to remove all plans to involve the inhabitants.
• Survey and interviews replaced by focus group discussion.
• No discussion process or presentation in the settlement.

Replaced by a folder that summarizes the results and suggested mission.
DEVELOP INVESTMENT SCENARIOS

3 Szenarios with 3 time horizons

• ECO (low cost, currently available in existing structure) 2020
• High Performance (major investment, based on current systems) 2040
• Future Performance (foreseeable future technology, rethink current systems, capital intensive) 2040+
DEVELOP INVESTMENT SCENARIOS
ECONOMIC FEASIBILITY STUDY

- For the investigation of feasibility we needed to
  - Assign costs (investment, operating costs) and effects (energy saved) to
  - Calculate present values of all the costs to
  - Calculate equivalent energy prices (price of 1kwh saved).

- No reliable cost estimates are available for the Future Performance variant → excluded.

- A quick check showed that the developed versions are not economically feasible.

- We created sub-variants (investigated variants):
  - ECO 1 (ECO variant from above)
  - ECO 2 (reduced version of ECO 1)
  - High Performance 1 (HP variant from above)
  - High Performance 2 (reduced version of HP1)
None of the variants can be financed from the energy savings
- ECO2 is close (96%)
- HP variants are far off (~30%)

**Investor-user-dilemma**
- Investments are paid by the RE companies (investor)
- Benefits (lower energy costs) go to tenants (user)

Highly regulated social environment
- Rent increases are impossible
- Raising the payment for the investment fund requires the agreement of all tenants.
Irrespective of the economic feasibility, financing the investment becomes a major issue.

Adding floors to the existing buildings or adding a building would bring additional income provided the city's rent for the land stays at the current level.

This implies a subsidy from the city as land owner.

We propose an „urban development fund“ that concentrates all financial sources.
GUIDING VISION

- Reduktion Heizwärmebedarf
- Wärmefbrückenreduktion
- Effizienzsteigerung
- Dachflächenutzung
- Attraktivierung Freiraum
- Allergie
- Flächenentsiegelung
- Obdachlos
- Fahrradstellplätze
- E-Mobility
- Wohnraumschaffung
- Neue Wohnformen
- Ergänzendes Raumangebot
- Medizinische Versorgung
- Siedlungsentwicklung
- Breitbandanschluss
CONCLUSIONS & SUGGESTED ACTIONS

• The ECO 2 variant should seriously be considered for implementation.
• Other variants should be checked for potential cost reductions

• All feasible variants will reduce the carbon footprint, but they will not lead to carbon neutrality
  • Replacing the existing heating system by other low / zero carbon sources of heat supply cannot be financed
  • Decarbonizing the district heating system is therefore key for zero carbon refurbishment of existing social housing complexes

• The city as key player needs to make decisions about:
  • When and how to bring their high ambitions to the ground
  • When and how to communicate the need for change (investments, financial contributions) to the inhabitants
  • How to support the RE companies in their need to finance the investments (economic incentives are not sufficient)