APPROACHES TOWARDS LOW ENERGY RESILIENT PUBLIC COMMUNITIES. CASE STUDY: University of Innsbruck (AUSTRIA), Technology Campus

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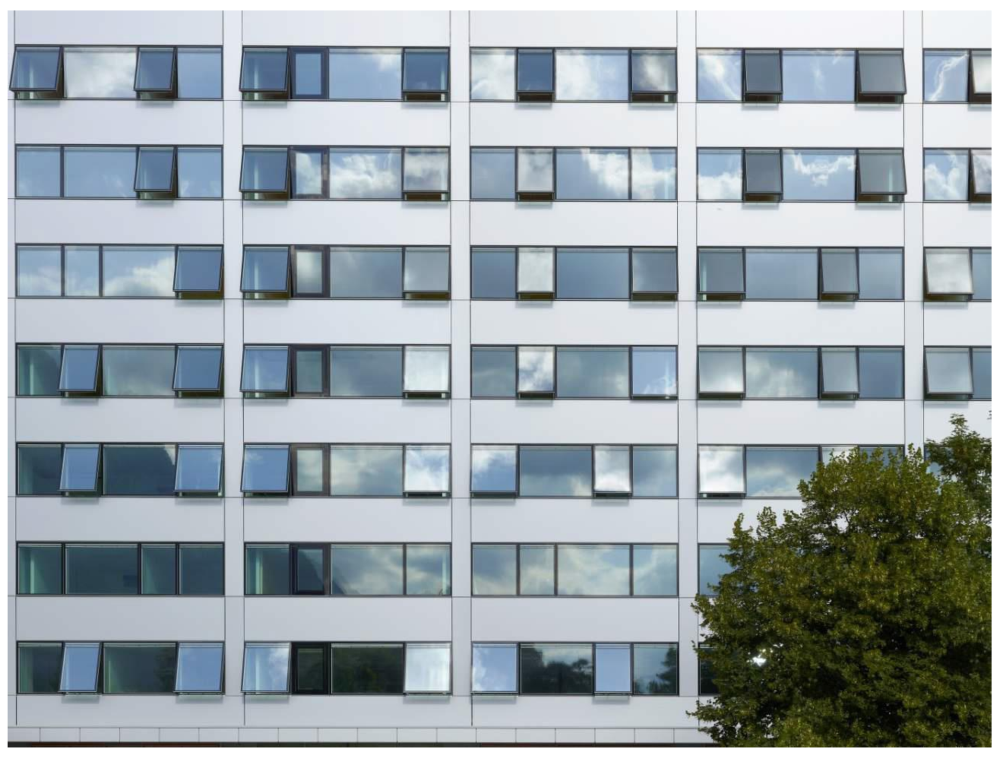

New façade of the building in focus of the renovation. Source: ATP architekten

Description of the case: An ensemble of public buildings built in the 60s, owned by the public BIG (federal property company) and used by the **University** of Innsbruck was to be renovated since some of the buildings components (windows…) had reached their end of life. It was clear that also high energy consumption and low comfort (overheating) were to be addressed in the renovation.

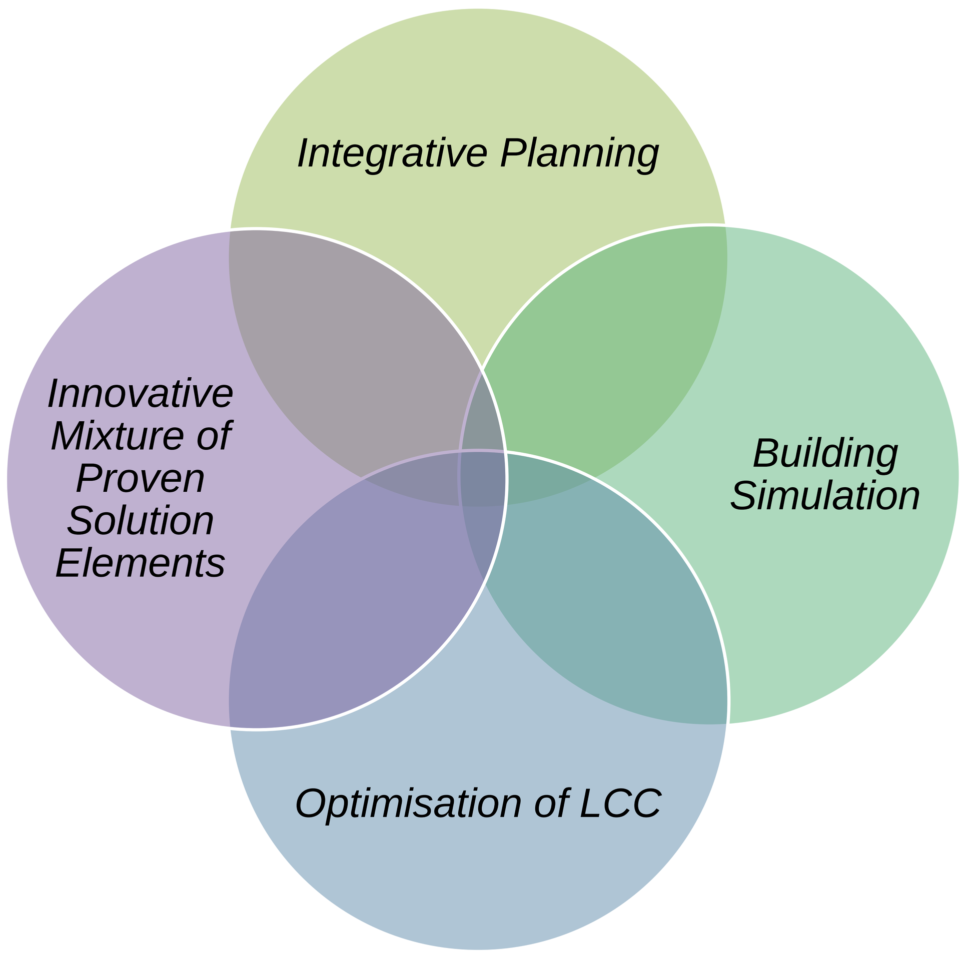

Fig x: Innovative tools used in the renovation project

General conclusions

- Renovation successful in terms of energy consumption of the buildings and achieved comfort
- LLC are still shown to be lower than in the business as usual case, depending on energy prizes and maintenance costs for automated windows. (Reduction in energy consumption lead to a 15 year amortization period).
- Involvement of a company that creates facade elements in an earlier development stage would have reduced planning efforts, since the first version could not be realized by companies at a reasonable cost.
- Integrated planning was successful in creating an innovative solution set-up that is expected to lead to lower LCC costs.

Resilience

The renovated campus buildings have increased resilience due to

- reduction of (peak) loads using efficient devices
- automated natural ventilation at night to avoid overheating
- Lower heat demand due to high quality insulation

Main Challenges and Approach

- **Involved Stakeholders**: In this case, the building owner (BIG) is not building manager or user, which means that risks and responsibility for using the building are not only on the decision maker.
- **Life cycle costs**: are shared among the involved stakeholders. Maintenance and investment costs of innovative features are difficult to tell in advance.
- The standard planning process usually used by BIG does not include life cycle costing and does not promote innovative solutions.
- Therefore, an **integral planning team** was selected to enable new innovative solutions..
- Life cycle cost calculations as well as **building simulation** done by an external project team help to control **economic feasibility**, energy consumption and **building comfort**.

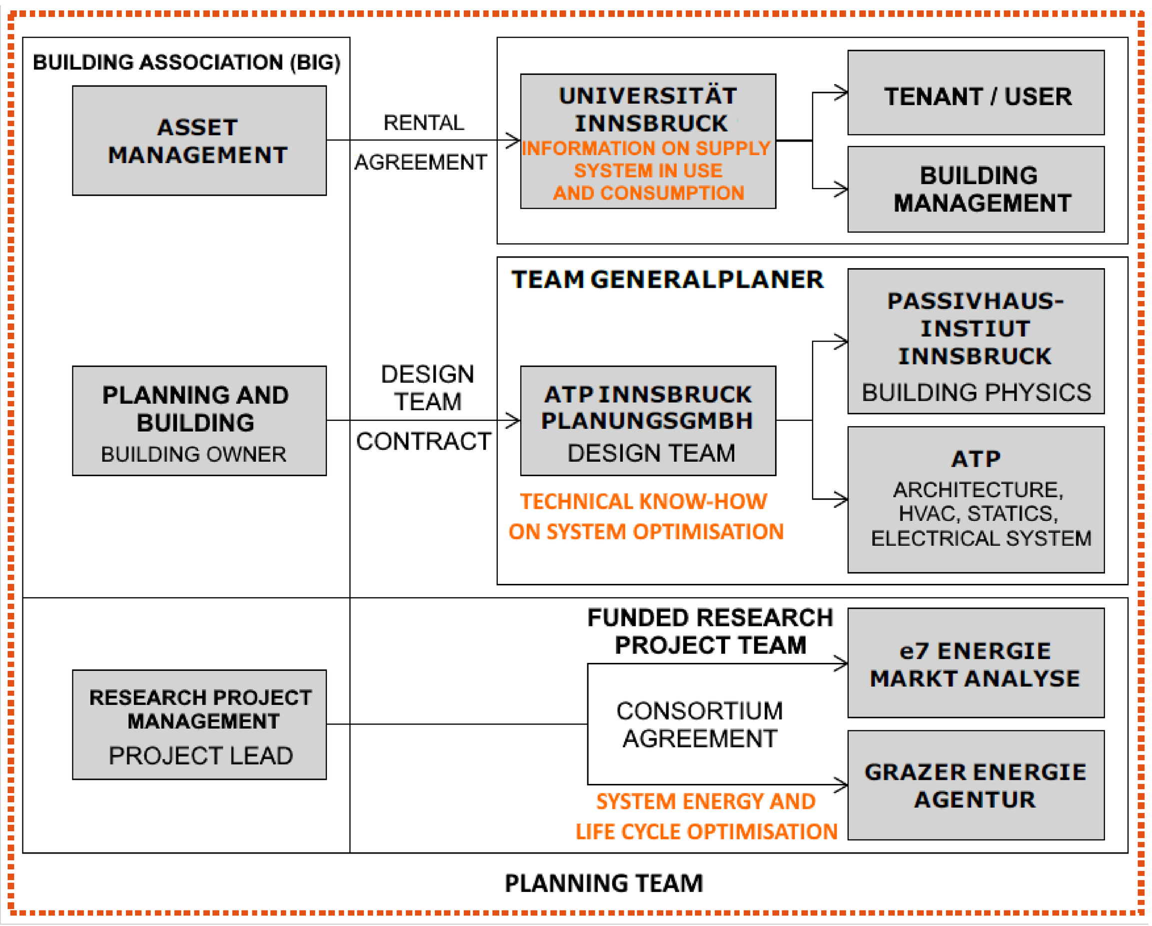

Figure x: Stakeholder structure in Planning Process. Input necessary for whole system resilience analysis is highlighted in orange. Source: BIGMODERN, translated and details added

Aim of the case study:

Analysis of the renovation process of public buildings ensembles, with a special focus on

- **Embedding energy systems**: How were embedding energy systems and neighbouring buildings considered in the renovation process?
- **Resilience** of the energy supply: Is the building ensemble now served by a resilient energy system? How far were sudden events considered?
- **Planning Process**: How was the planning process organized? Which tools were used?

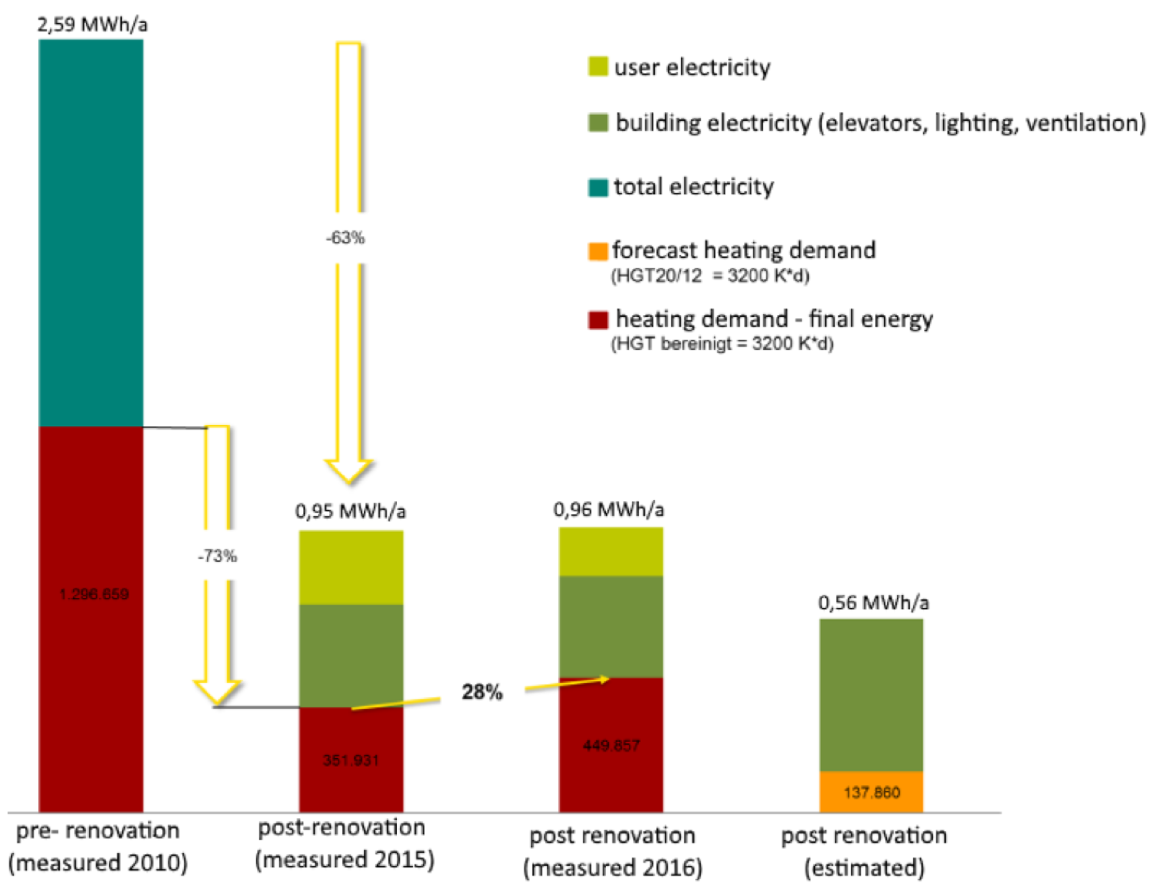

Fig x: Estimated and resultng changes in the energy supply od the focused renovated buildling after the monitoring period of 2 years. Source: BIGMODERN (translated)

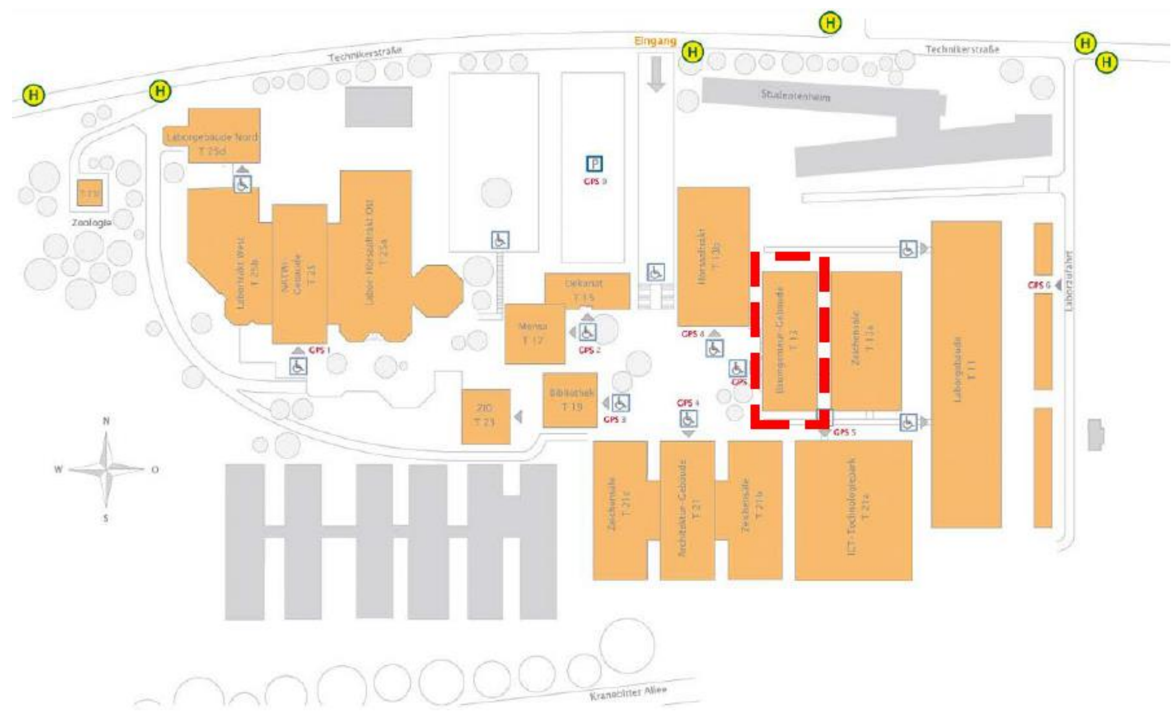

Figure x: Site map of the Technology Campus. Source: University of Innsbruck

Energy supply system

- The campus is connected to the local grid for power supply, and disposes of a emergency power supply.
- There is a local district heating network, fed by a (biomass?) heating station. In the buildings, heat is distributed via radiator system and pre-heated incoming air
- Cooling is provided only in some buildings, and on a single building basis. The renovated buildings are now cooled using a ground water well as well as renewable source.

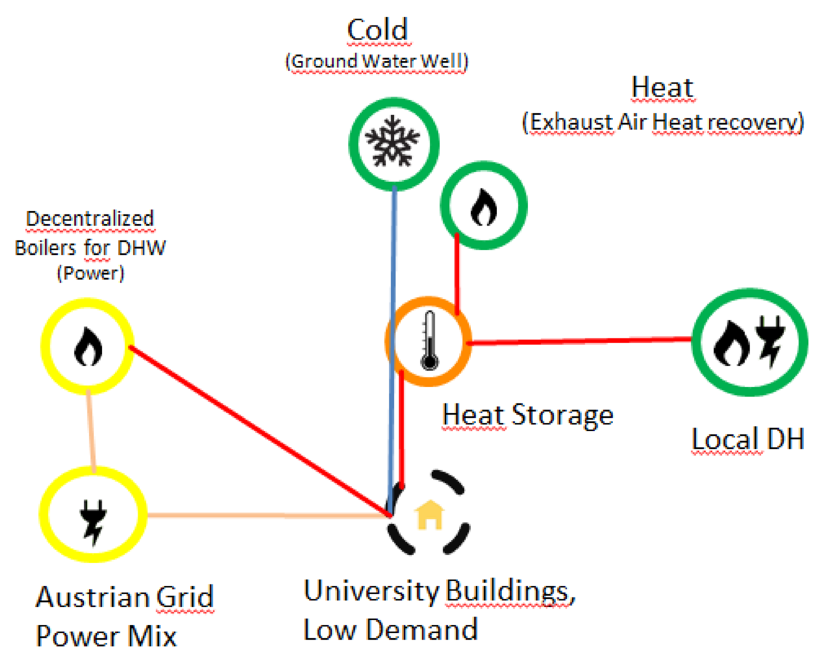

Figure x: Schematic presentation of the university buildings and the energy system they are embedded in.

Further expectations and development

- Redevelopment of the outdoor areas of the technology campus
- Any other plans for renovation (other buildings, part of HVAC, heat generation etc?, reduce temperatures of DH network?)
- An expansion of the technology campus is planned, to create xxx m² of useful are for offices, laboratories and lecture halls.

Conclusions regarding resilient energy systems for public communities:

- Embedding energy systems have not been extensively considered. Reasons are different ownership (heat supply system is owned by tenant) and the time and effort needed to consider also neighbouring buildings and energy supply systems.
- Buildings were not simulated in combination with energy supply. There was no optimization on the energy systems.
- In case owner and user are different it is difficult to reach a full information exchange, leaving the parties uncertain of each others targets and know-how.
- Further effort is needed to reach a co-optimization of buildings and supply system.

Information sources:

- reports and publications of BIG(owner) and Universsity (tenant)
- Interview with project responsible of BIG

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