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

Energy supply system
• The campus is connected to the local grid for power supply, and disposers 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 renewable source.

Further expectations and development
• Redevlopment 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 usable 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 University (tenant)
• Interview with project responsible BIG

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.

General conclusions
• Renovation successful in terms of energy consumption of the buildings and achieved comfort
• LCC are still shown to be lower than in the business as usual case, depending on energy prices 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

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

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

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

Fig. x: Estimated and resulting changes in the energy supply of the focused renovated building after the monitoring period of 2 years. Source: BIGMODERN (transliterated)

Fig. x: Innovative tools used in the renovation project

Fig. x: Building association BIG: as a local contractor, BIG is involved in every project. The aim is to develop innovative solutions and to support the BIGMODERN division in their tasks regarding the energy supply system. 

Fig. x: Innovation elements of BIGMODERN: Embedding energy systems involved in.

Fig. x: University buildings and the energy system they are embedded in. 

Fig. x: Mixture of innovative elements: Description of innovative elements by BIGMODERN

Fig. x: Mixture of solutions: Description of solutions by BIGMODERN

Fig. x: Mixture of energy systems: Description of energy systems by BIGMODERN

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Fig. x: Case study: University of Innsbruck (AUSTRIA), Technology Campus

Fig. x: University buildings and the energy system they are embedded in.