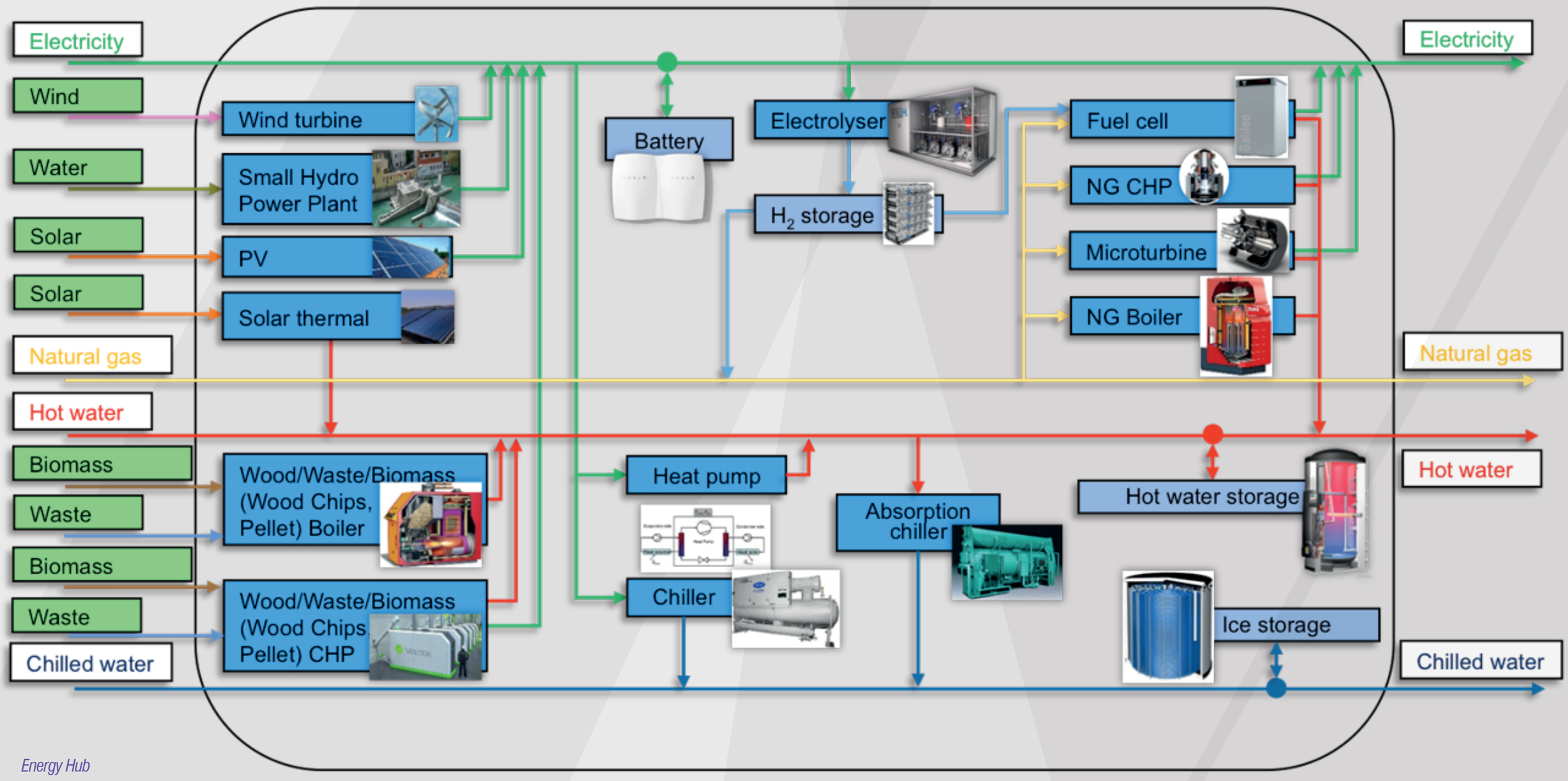
BUILDING AND URBAN ENERGY

INTEGRATION OF SUSTAINABLE MULTI-ENERGY HUB SYSTEMS (IMES):
POWER-TO-GAS FOR DISTRICT ENERGY SYSTEMS

MOTIVATION AND PROJECT GOAL



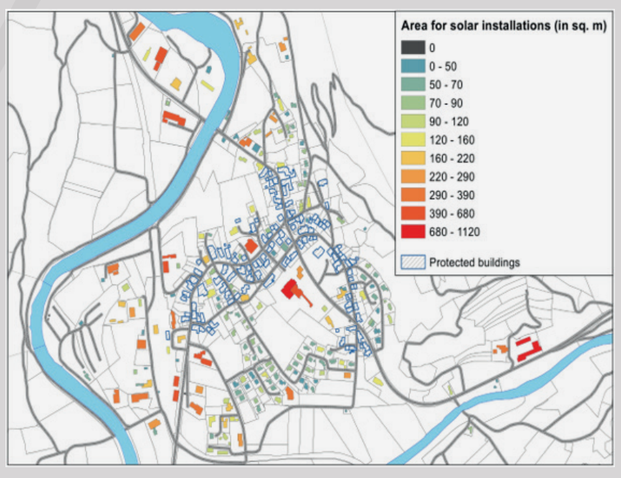
Energy Hub

The increasing penetration of renewable energy sources (e.g. solar, wind) into district energy systems for urban communities necessitates the adoption of storage technologies to temporally shift the renewable energy supply to match the urban energy demand. The goal of the IMES project is to develop a comprehensive simulation and optimisation approach to assess system performance potential, economic feasibility, and system design of a decentralized Power-to-Gas (P2G) network with other storage and conversion technologies.

2015

2050

Energy Demand (2015-2050)



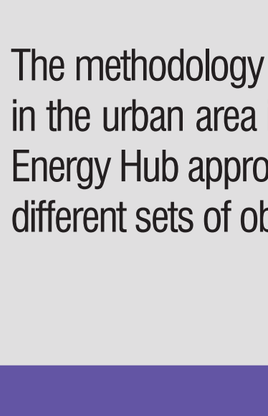
Renewable Potential

APPROACH

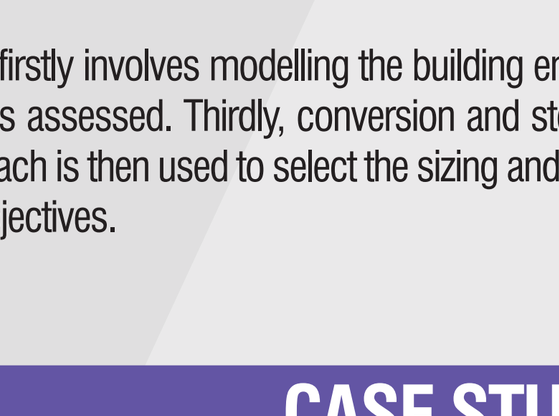
The methodology firstly involves modelling the building energy demand. Secondly, the renewable potential in the urban area is assessed. Thirdly, conversion and storage technologies are chosen and defined. The Energy Hub approach is then used to select the sizing and performance of the district energy system under different sets of objectives.

CASE STUDY

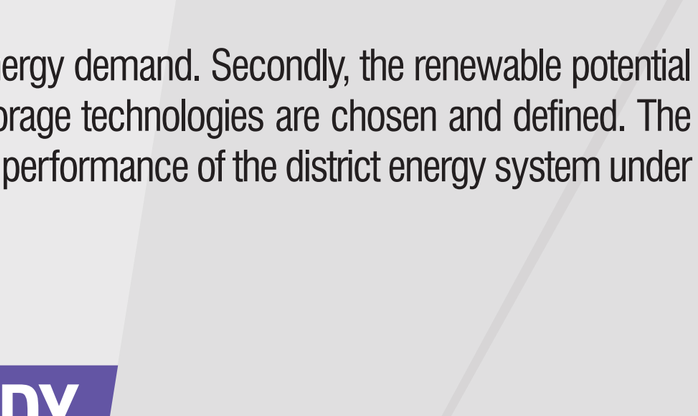
A small village, large city and small city were chosen as three case study sites for the application of the project methodology.



Zernez

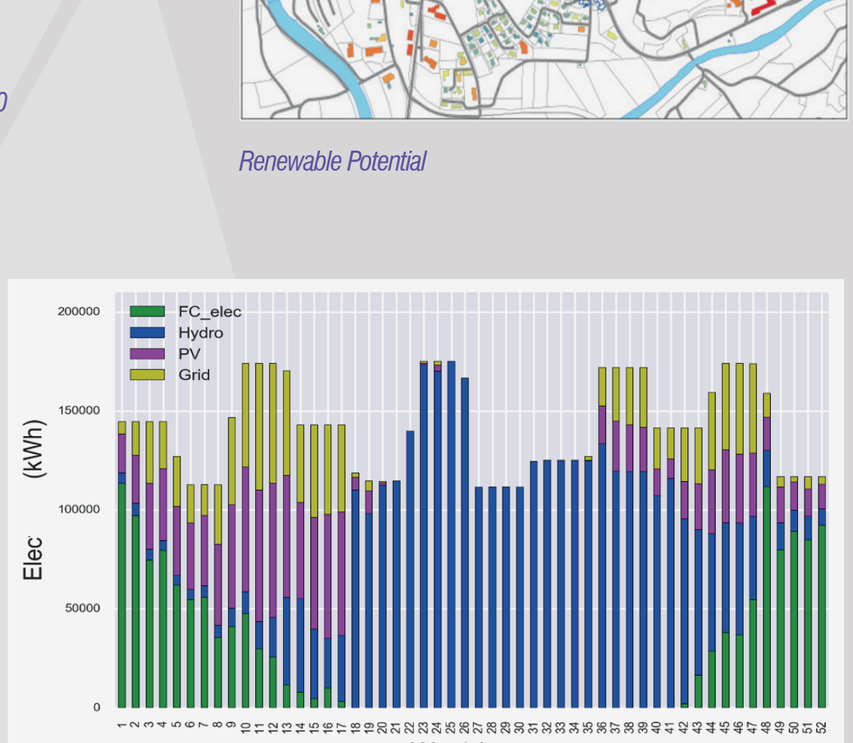


Zürich-Altstetten



Solothurn

Collaborations: ETH: ESC, SPL, LEC, IfA, FEN, SusTec, TfLab



Electricity demand by source

Heat demand by source

Results for Zernez indicate that 89% of both heat and electricity demand in Zernez can be met with renewables

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Funded by

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