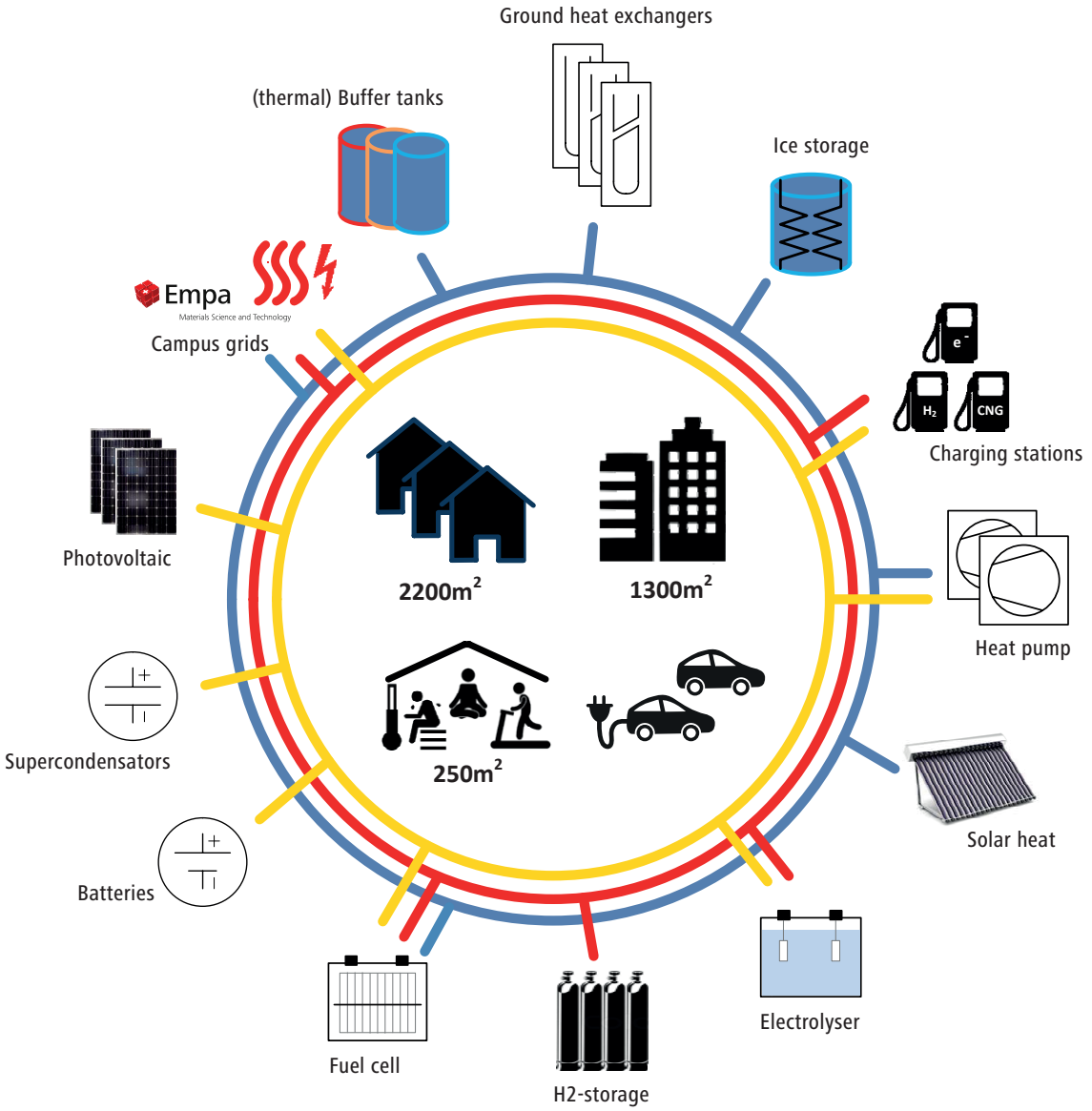
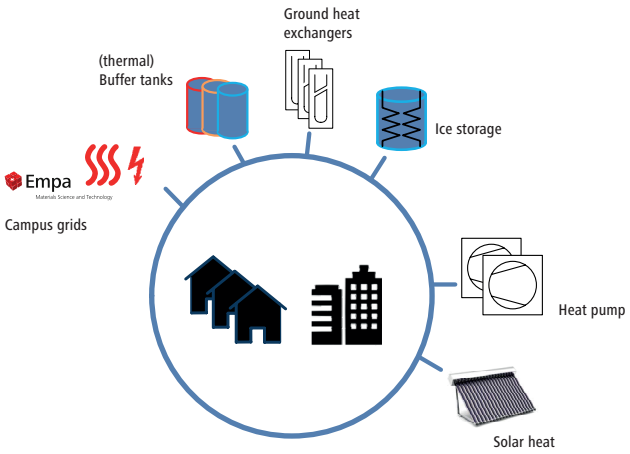
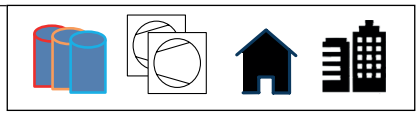
ehub – how it works



Red Ring: Network for Natural Gas and Hydrogen
Blue Ring: Thermal Network (hot water, cold water)
Yellow Ring: Electrical Network

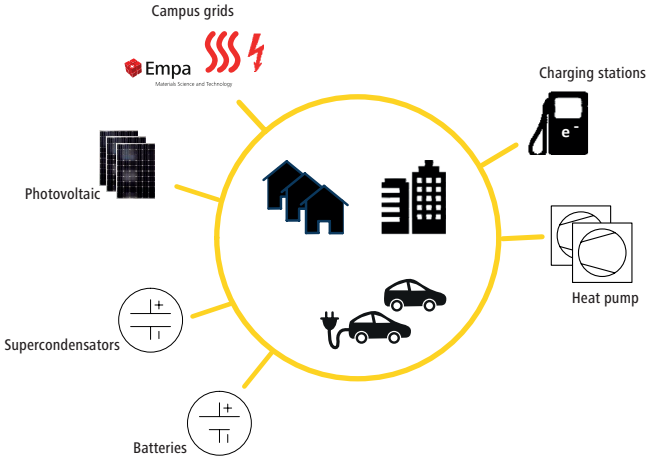
Heatreserves

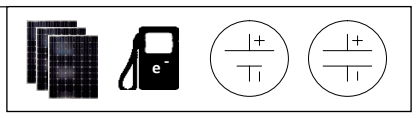




The project aims to make recommendations about the implementation of control, communications, and business schemes for enabling thermal loads to provide ancillary services in the form of control reserves for the Swiss power grid. Ancillary services provide a fast-reacting compensation for a power shortage or surplus in the network.
Thermal loads such as building HVAC systems and household appliances have an inherent thermal storage capacity, which provides flexibility in their power consumption without compromising their original purpose. Hence, one can envision effective demand response schemes exploiting these thermal loads to balance the power grid locally, reducing transmission congestions, improving ancillary service market operations, and reducing power peaks. Most importantly, this facilitates the integration of renewable energy sources, which critically rely on ancillary services today.
Heatreserves will be the first external project using the ehub platform after its launch.

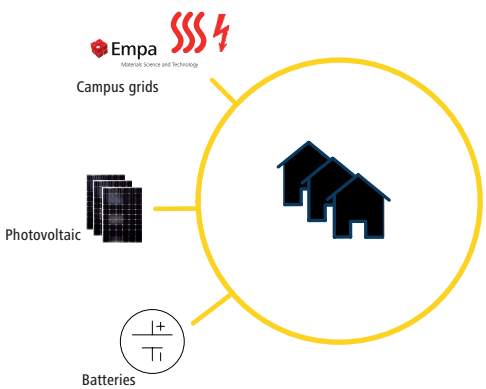
Microgrid





In Switzerland and many other European countries, the future energy system will rely heavily on renewable energy. This will cause an important re-engineering of this part of the electrical infrastructure. Therefore, a massive penetration of distributed power sources and distributed storage devices calls for a new layout and system design of the 'urban' energy system.
The results of our studies will form the basis for the planning such systems and grids. Both the design (planning) of the energy system and the operation will be considered.
The developed microgrid framework consists of independent resource- and grid agents communicating with each other. The goal is that the grid operates in a safe state as it can determine the load on its lines and the resources can operate flexibly and independently. This cooperation based, distributed control scheme has a cycle time of 100ms leading to fast corrections form optimal trajectories. With this scheme one can also operate in islanding mode with the ability to connect and disconnect whole districts to the distribution grid.

BupT pricing



The main goal of this project is to analyze and understand the influence of cost-by-cause pricing schemes of electricity on technical building infrastructure and the operation of this infrastructure. As different operation schemes impact on the energy but also the (peak-)power profile of buildings. Four pricing schemes shall be compared with each other:

- A real time pricing, meaning the end user pays the current spot price. This implies an uncertain price in the future which a building automation system should regard while controlling.
- A power flat rate which neglects the prosumed energy as long it is within a certain power band which has a fix price. This shall limit consumption but also production at a given time.
- A specially developed NEST-pricing scheme distinguishing between summer, winter and transition periods and weekday/weekend prices
- The last scheme is the reference case; the currently used high-tariff, low-tariff scheme. This will show deviations from currently observed energy demands in households.