



# TRI-HP PROJECT

Trigeneration systems based on  
heat pumps with natural refrigerants  
and multiple renewable sources



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## Horizon2020 TRI-HP project for renewable building technology

The renewable supply of buildings is indispensable for a successful energy transition. Hence, modern building technology concepts should be designed to generate most of the energy for heating, cooling and electricity locally from renewable energy sources. The main objective of the TRI-HP project is the development and demonstration of flexible, energy efficient and affordable tri-generation systems (tri stands for heating, cooling and electricity) which can obtain up to 80% of the energy requirement from renewable energy sources on site. According to current simulations, these innovative system solutions will reduce system installation costs by at least 10-15% compared to current heat pump technologies with equivalent energy performance.

### Three system concepts must prove themselves in laboratory tests

The systems will be based on electrically driven natural refrigerant heat pumps coupled with renewable electricity generators (photovoltaics/PV), using cold (ice slurry), heat and electricity storages to provide heating, cooling and electricity to multi-family residential buildings with an on-site renewable share of 80%. The project will develop two system concepts (see figure 1) for two different combinations of heat sources. For the operation of the heat pump, the first concept uses a dual geothermal/air heat source/sink and the second a combination of solar heat and an ice-slurry storage tank. In addition, two heat pump types (with the refrigerant CO<sub>2</sub> or propane) will be developed, so that finally three complete systems (CO<sub>2</sub> solar ice-slurry, propane solar ice-slurry and propane dual source/sink) will be tested in the laboratory.

### Acceptance of the technology will also be investigated

The consortium of the TRI-HP project consists of experts from the fields of heat pumps, heat exchangers, coating development, system tests, control engineering and system simulations. In addition to the purely technical aspects, the social science partners will investigate the acceptance of this new technology and the communication partners will ensure the dissemination and exploitation of the results.

A total of 12 project partners from universities, research institutes, industry and SMEs from Switzerland, Germany, Denmark, Norway, the Belgium and Spain are involved in the project. TRI-HP is coordinated by SPF Institute for Solar Technology at HSR University of Applied Sciences in Rapperswil, Switzerland. The project is funded under grant agreement No. 814888 as part of the European Union's Horizon 2020 research and innovation programme.



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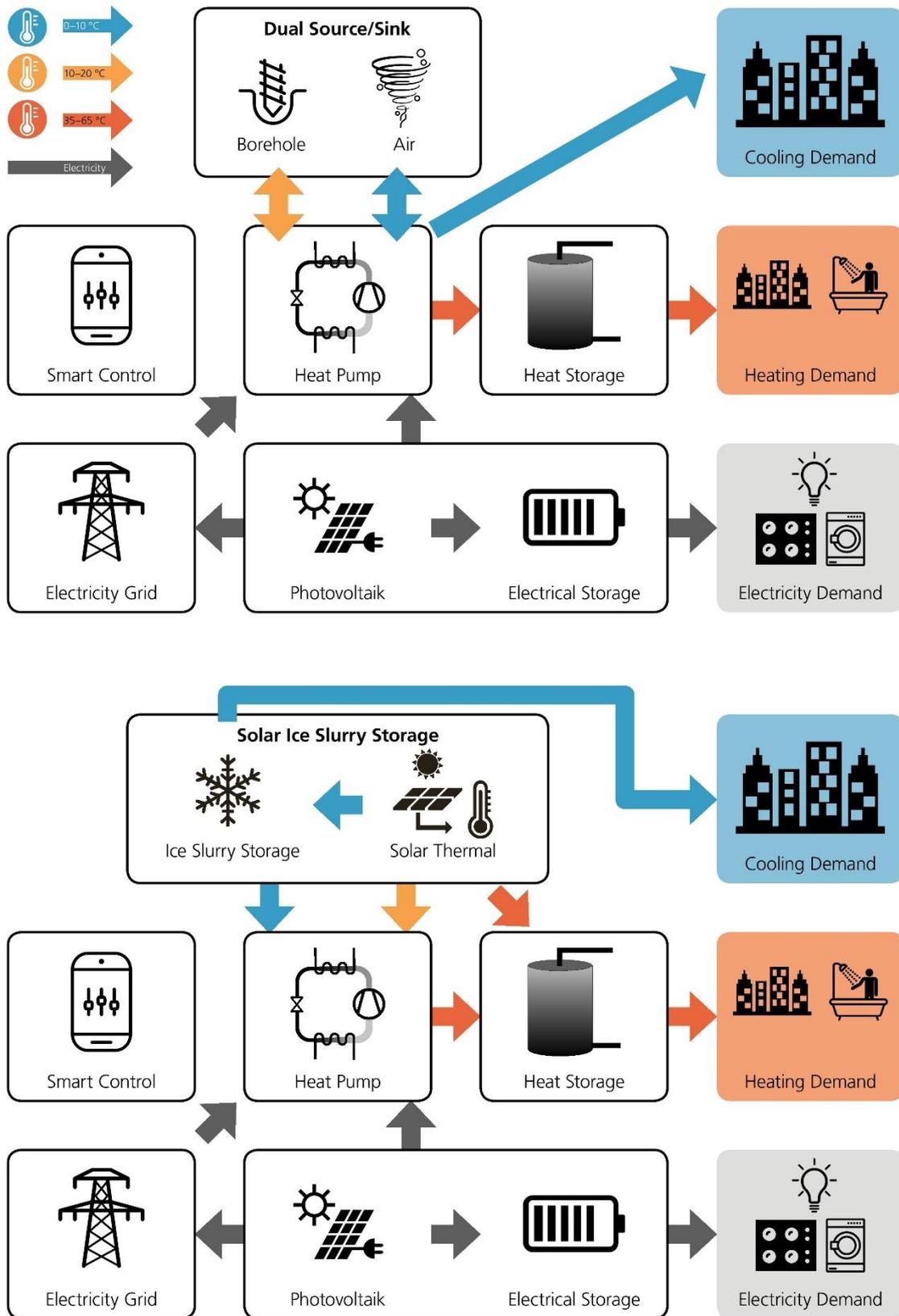


Figure 1: System Concepts