

# Project Fact Sheet

**Project Title** Plus energy buildings – Hybrid-HP+; Technological concepts and software

**Keywords** Heat pump, hybrid operation, air and ground heat source, source-optimized control, hardware-in-the-loop testing, economical year simulation

## Project Details

<b>Project Start</b>	January 2020	<b>Duration</b>	2 years
<b>Funding Authority</b>	BMW i	<b>Project ID</b>	16KN056420
<b>Project Management</b>	VDI/VDE-IT		
<b>Sponsor Program</b>	Zentrales Innovationsprogramm Mittelstand (ZIM)		
<b>Project Budget</b>	190.000 € (Subproject THI)		
<b>Contact Person</b>	Prof. Dr.-Ing. Tobias Schrag (Project Leader) Mathias Ehrenwirth		
<b>Project Partners</b>	ratiotherm GmbH & Co. KG		

## Description

Heat pumps for a potentially regenerative heating supply can be operated using various heat sources. Most common are geothermal heat using sole circuits or ambient air with outside heat exchangers. While so-called soil or ground source heat pumps are more efficient especially at lower ambient temperatures, the investment costs of air source heat pumps are clearly lower. Within the scope of this research project, the advantages of both technologies are combined as far as possible. In case of a low heat demand, the heat pump is using the more efficient heat source – e.g. in winter usually the ground source heat exchanger and during summer times the air source heat exchanger due to the higher ambient temperature – to achieve high efficiencies. At the same time, parallel operation and regeneration of the soil is used to reduce investment costs by reducing the necessary ground source heat exchanger size. In cooperation with the industry partner, a pilot plant is developed including a new hydraulic circuitry and control strategies to enable the different operation modes. The heat pump is designed for operation in domestic environments. Subsequently, the plant is tested under realistic test conditions in the laboratory. Based on the derived test results, a one-year simulation will be performed to assess the economic performance.