



Foto: Eurac Research/Ivo Corrà

LABORATORY

Energy Exchange Lab

Facility for tests on advanced district heating and cooling networks

Energy Exchange Lab

Innovative low-temperature networks that gather heat into the system at variable temperature levels (at a minimum of 30°C) have opened up a new frontier in the field of district heating and cooling (DHC) systems. These next generation plants, along with traditional plants, can be tested under dynamic conditions at our Eurac Research laboratory.

Our laboratory can reproduce on small-scale the operation of an entire DHC network—from thermal energy production and distribution to the end use by homeowners. Its flexible infrastructure that recreates different operational configurations allows researchers to study the optimal management of the network with respect to heat transfer from multiple sources, along with tests of the control system hardware and software.

The laboratory consists of an external setup, which includes the district heating network pipelines and a concentrated solar thermal field, and an internal setup, comprised of the main energy production system and user substations

Energy Production System

The energy production system and solar thermal system are connected and include a gas boiler, an Organic Rankine Cycle (ORC) unit and an absorption chiller. This permits the emulation and testing of a trigeneration system connected to the network. The overall configuration allows for the study and optimisation of a non-programmable source of thermal and electrical energy.

User Substations

Electric heat pumps can emulate users who are taking heat out or feeding it into the low temperature network. Our laboratory lets us study the interfaces through which the user takes energy for the purpose of heating and domestic hot water or feeds it back into the network (when the heat pump is in reverse operation mode).

Testing Controllers and Machinery

We can test the control logics, as well as the operation and communication of the controllers, with respect to both the individual parts of the circuit and the system as a whole. Furthermore, the infrastructure can be used as a test bench for innovative technologies, such as mini-ORC units, absorption machines that are powered by a heat transfer fluid at temperatures up to 250°C, and district heating network substations

Company Service Expertise

Our experts have honed their skills through extensive international research networks. This knowledge-base, combined with the flexibility of the Energy Exchange Lab, can support private companies that focus on heating and cooling systems based on renewable sources, hybrid systems, and strategies for controlling complex systems to develop innovative new products.

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