

# Technology offer

Innovative technology for increased energy efficiency and renewable energy use

## Field of use

Heating systems

Current state of technology  
TRL9

## Patent status

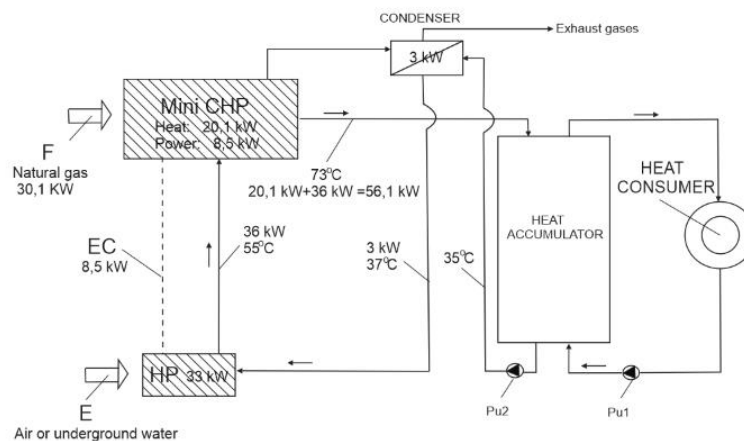
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## Background

High-temperature heating of buildings and industry is identified as one of the most challenges issues at regional and local level due to the high use of non-renewable energy sources and a very low share of renewable energy sources. In order to improve energy efficiency and the use of renewable energy sources for high-temperature heating of buildings, innovative technical solutions were developed.

## Description of the invention

Much effort in recent decades has been made in the EU and elsewhere in the world to ensure cleaner air and reduce greenhouse gas emissions. Many agreements and protocols have been signed on environmental issues. Controlling Europe's energy consumption and increased use of energy from renewable sources, combined with energy savings and increased energy efficiency, are an important part of measures needed to reduce greenhouse gas emissions.

Currently, hot water boilers and cogeneration units (CHP) are being used for high-temperature heating of buildings and in industry. CHP plants have an overall efficiency of about 85% relative to the low heating value of the primary fuel and are economically unprofitable without subsidies. High-temperature heating of buildings and industry is identified as one of the most challenges issues at regional and local level due to the high use of non-renewable energy sources and a very low share of renewable energy sources. In order to improve the fuel energy efficiency and the use of renewable energy sources for high-temperature heating of buildings, innovative technical solutions were developed. The novelty of the demonstration project is unique integration of mini CHP (27% electrical efficiency), a heat pump (HP), a CHP gas engine exhaust gas condenser and heat

accumulators. The heat user takes heat from the heat storage according to their heating needs. From the heat accumulators, the cold return water is fed to the water vapor condenser present in the exhaust gas of the mini CHP gas engine and heated by a few degrees °C, then from the condenser the return water is led to a water / water type heat pump (HP), where by utilizing low-temperature renewable heat sources (groundwater, geosond), the return water of the heating system is heated to 55 °C, and then the return water is led to mini CHP, where it is heated to the final temperature, in our case 73 °C and then leads to heat accumulator. The use of electricity produced by mini CHP is foreseen for the HP compressor operation.

### **Main advantages**

The demonstration project provides to increase the fuel efficiency (natural gas, diesel, LPG, etc.) up to 230% by using renewable energy sources with heat pump for high-temperature heating of buildings. About 80% of the heat is generated from low-temperature renewable heat sources.



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