

# COOLING SECTORS PROFILES

## Geothermal Sector



Geothermal technologies can contribute to the challenge of decarbonising cooling for a variety of demand profiles, in terms of temperature, capacity, and timing. They can be used in buildings for the residential and non-residential sector, as well as in the services and industrial sector.

### SECTOR HIGHLIGHTS



**182.000**

Jobs created worldwide  
(IRENA Report 2017)



**0-250 °C**

Temperature range



**26%**

In the EU28, until 2050, through future district heating and cooling systems geothermal energy could be available for 26% of the European population

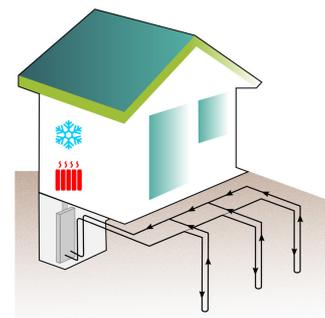


Illustration of a shallow geothermal system (copyright EGEC)

### TYPES OF COOLING USED:

- Reservible geothermal heat pumps
- Direct cooling
- Larger systems (large individual building, district cooling) in geothermal absorption cooling



### BEST PRACTICE EXAMPLE

Office building in Vienna

The STRABAG HOUSE was constructed as a multi-storey multifunctional office property with a floor area of 21.000 square meters. Energy supply needed for heating and cooling is effected through a ground source heat pump system with an installed cooling capacity of 3x693 kW. The three heat pumps are linked to a closed loop heat exchanger furnished partly in the foundation of the building and partly in 250 cast-in-situ driven piles.

## GEOTHERMAL TECHNOLOGIES



In the residential sector, the main geothermal technology to cover the cooling demand is the shallow geothermal heat pump system. This technology is suitable for small, individual houses as well as larger multi-family houses, groups of houses or large buildings. Capacities range from under 10 kWth to over 500 kWth. The depths of borehole heat exchangers range from a few meters to more than 200 m, depending on technology used, geological situation, demand profile, and other design considerations. Geothermal heat pumps can deliver all the thermal energy required for living; not only space cooling but also heating and domestic hot water.



In the services sector, geothermal energy systems (ground source heat pumps or underground thermal energy storage) are the most relevant technologies, ranging in capacity from some 10 kWth for small businesses or offices, to 1 MWth or more for larger projects. The ability to provide both heating and cooling is the major asset of geothermal technologies in this sector. Systems will generally be more complex than those for the residential sector, and can be part of a smart thermal grid.



Because geothermal energy has definite base-load characteristics and is always available when required, it matches perfectly with stable demand patterns of most industrial processes. The annual full-load hours can be rather high, and thus the return on investment for the geothermal installation is favorable. In the medium temperature range (95-250 °C), geothermal energy can provide heat above 95 °C from deep geothermal resources.



### BEST PRACTICE EXAMPLE

A small-scale installation of absorption cooling has been integrated in the geothermal district heating in Zakopane (PL), supplying 45 kW of cold. The absorption chiller used here has been imported from India and was designed for ca. 100°C activation heat, when it would deliver ca. 110 kW of cooling capacity. In the Zakopane system, however, it only can be fed with water of about 80°C, reducing the cooling capacity to some 45 kW. Re-cooling is done by a standard air cooler outside the administration building of the district heating company to which the cooling is connected.

Information kindly provided by EGEC ([www.egec.org](http://www.egec.org))

EGEC, the European Geothermal Energy Council, is a non-profit international organisation founded in 1998 to promote the European geothermal industry and enable its development both in Europe and worldwide, by shaping policy, improving business condition, and driving more research and development.