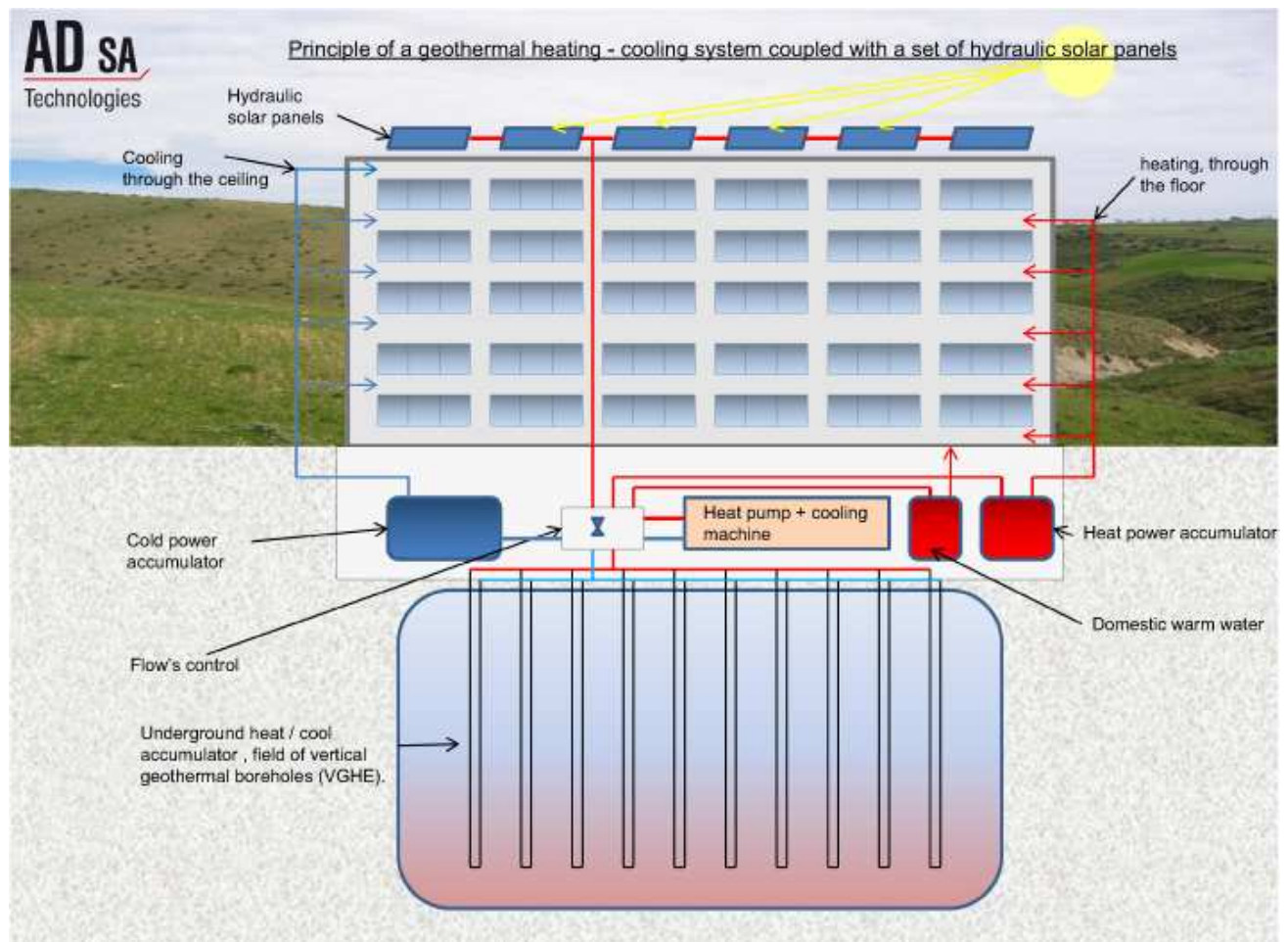


Geothermal Energy Systems



Principle of extraction and storage

The principle of geothermal energy consists in extracting or storing calorific energy underground in order to heat houses or buildings with or without a summer cooling system. As far as we are concerned, we only work on "shallow depth" geothermal energy systems, which are located between 10m and 200m deep.

For the geothermal part of the system a field of vertical ground heat exchangers composed of a series of geothermal boreholes equipped with U-shaped polyethylene pipes (VGHE) functions as heat exchanger with the ground. The number of geothermal boreholes, of U-shaped tubes of each VGHE and their depth depend on the necessary calorific power and on the local geological conditions.

Geothermal Energy Systems

The VGHE's are installed as close as possible or under the buildings. The pipes of each VGHE are all connected together in a water collector which feeds one or several geothermal heat pumps. The heating /cooling is realised through fluid circulation in the paving stones. For the heating, the fluid goes through the floor and, for the cooling, the fluid goes through the ceiling.

Such an installation works on an annual (summer / winter) basis in the following way:

- During winter, and for heating, the system extracts the heat accumulated in the field during summer (cold injection phase).
- During summer, and for cooling, the system gets back the cold stored in the field during winter (heat injection phase).

A building cooling done by freecooling is very advantageous as far as energy savings is concerned. It only works with the VGHE's and the circulation pump, without any cooling machine (heat injection system in the field).

For such type of installation, which is more complex and more expensive than a unique VGHE used for a family house, it is important to precisely calculate and size the future VGHE's field, the solar panels and the installations producing the heat and the cold, according to energetic needs. In fact, it is important to balance as well as possible the heat and cold injection in order to avoid freezing or overheating the ground.

This kind of installation is generally coupled with a set of hydraulic solar panels (solar cells), which has a double function:

- In winter, it produces sanitary hot water and part of the heating.
- In summer, it produces sanitary hot water and then injects and stores the surplus of energy in the ground for the winter through the VGHE's.

As soon as the whole system is working, the software measures and store the performances of the VGHE's field, the solar panels and the building consumption during two seasons (winter /summer cycles) and gives the possibility to optimize the settings thanks to the remote processing.