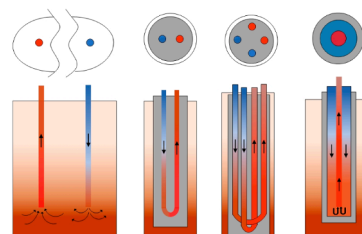
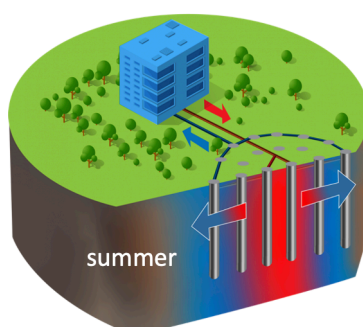
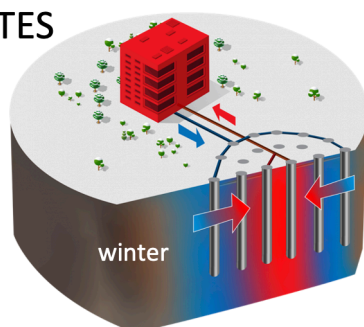


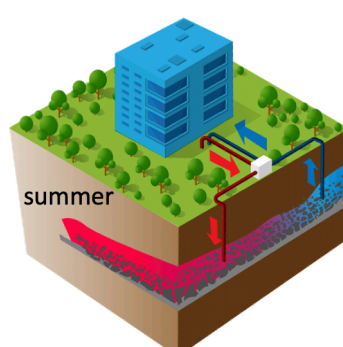
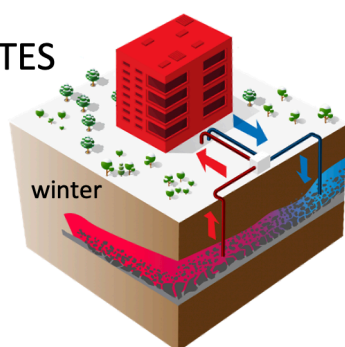
Geothermal potential for livestock farming applications in Europe

The use of renewable energy sources can ensure that the cost of barn climatization can remain low. Geothermal energy can certainly be an alternative here. Moreover, shallow geothermal energy can play an important role in maintaining summer comfort. Borehole thermal energy storage (BTES) uses vertical loops to exchange thermal energy. Aquifer thermal energy storage (ATES) systems use wells with extraction and injection of groundwater. It is prohibitively expensive to deploy classical compression cooling for this purpose. Geothermal energy offers opportunities to use passive cooling to also prevent overheating with minimal energy costs. As an alternative, smart active cooling with geothermal reversible heat pumps offers a solution to increase animal comfort and productivity up to an optimal level.

BTES



ATES



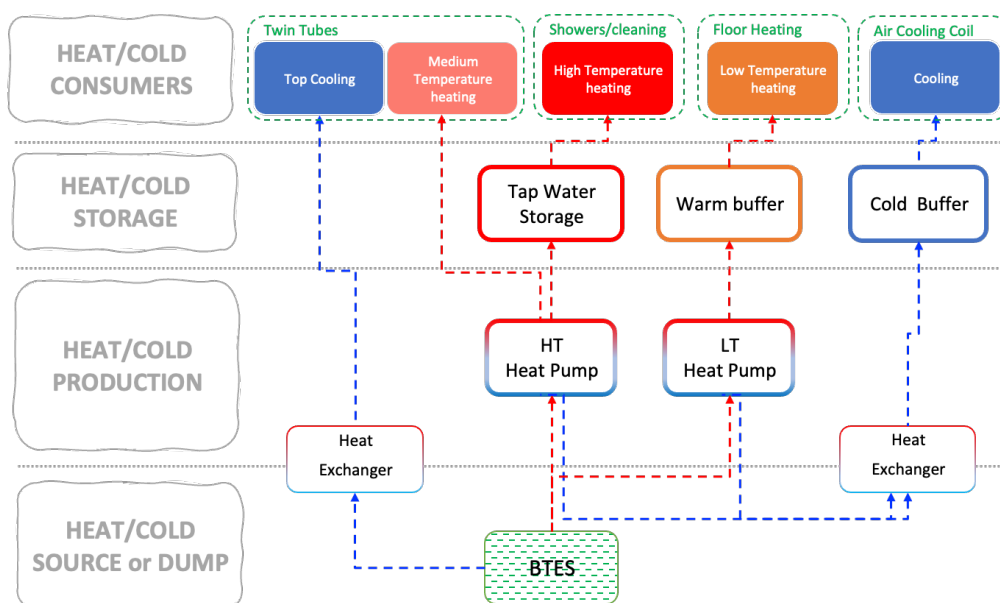
Geothermal energy concept for Pig Farm in Belgium

The research site of ILVO in Belgium (the Pig Farm) suits best for the integration of a central geothermal system with BTES. The barn is relatively young (recently built) and equipped with modern HVAC installations, consisting of radiant panels (twin tubes), floor heating combined with an extensive ventilation system. This installation can be relatively well adapted to integrate barn cooling.

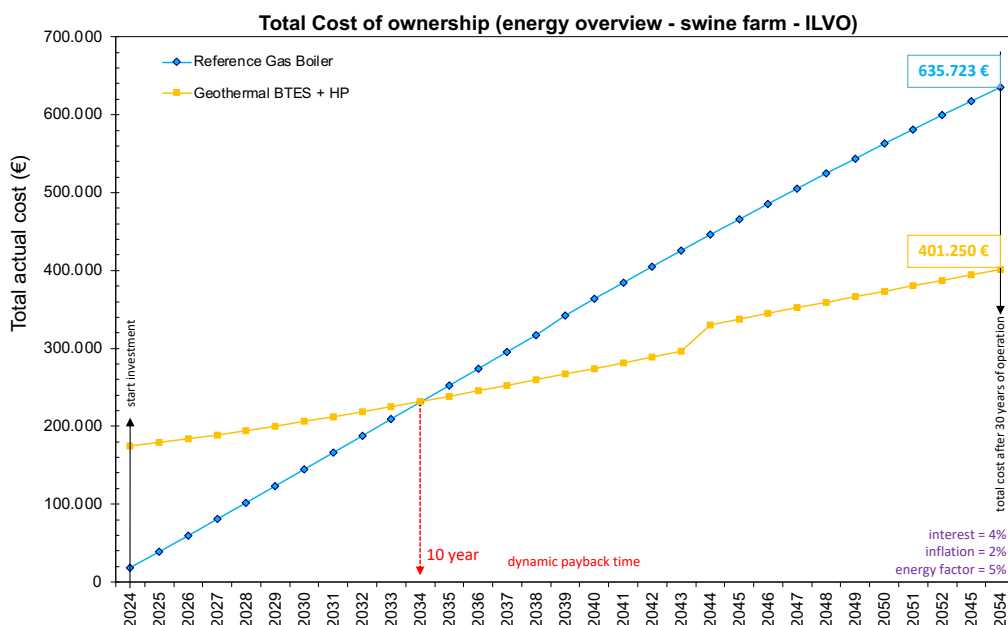




The geothermal system provides the necessary cold after a winter in which heating is mainly required. This cold is produced, without using compression cooling, purely by circulation through the ground and is therefore very efficient. In this project, passive cooling via twin tubes fitted in the air ducts can provide limited cooling capacity. Integrating smart use of the heat pumps, which provide year-round heat for piglet heating and hot tap water, allows active cooling by bringing the residual product of the heating into the stables as cooling during summer.



When calculating total cost of ownership over 30 years, the dynamic payback time will be 10 years. Over the lifespan of the installation, a cost saving of 234,5 k€ can be achieved (-37%).



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