DESIGN OF A GEOTHERMAL WELL FILLED WITH PHASE CHANGE MATERIALS FOR DAILY AND SEASONAL HEAT STORAGE AND SUPPLY

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Geothermal use can be dated back thousands of years. From primitive geothermal direct use to more sophisticated ways of using the resource, now geothermal energy has been utilized in households, farms, buildings and industrial processes. There are typically three geothermal energy systems including direct use and district heating systems, electricity generation power plants and geothermal heat pumps. Besides, geothermal heat pumps have almost no negative effects on the environment, and even have positive effects as they reduce the usage of other environmentally unfriendly energy sources. This project aims at designing a geothermal well for daily and seasonal heat storage and supply for energy efficient buildings as well as other geothermal applications. Coupling with heating, ventilation, and air conditioning (HVAC) systems and building integrated photovoltaic thermal (BIPVT) systems, it can not only significantly boost the efficiency of HVAC and BIPVT systems, but also be used for inter-seasonal heat exchange of heating (winter) and cooling (summer) for energy efficient buildings. The system can be further expanded by integrating with greenhouses on farms.

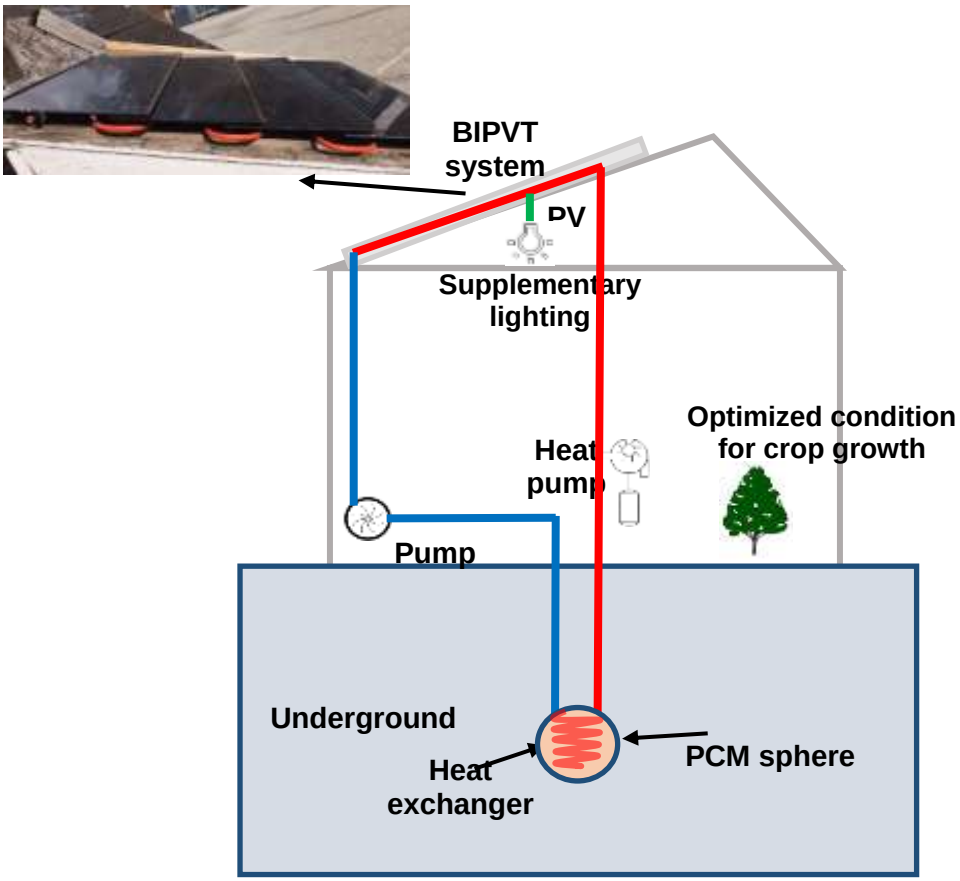

Figure 1 – Demonstration of the closed-loop system