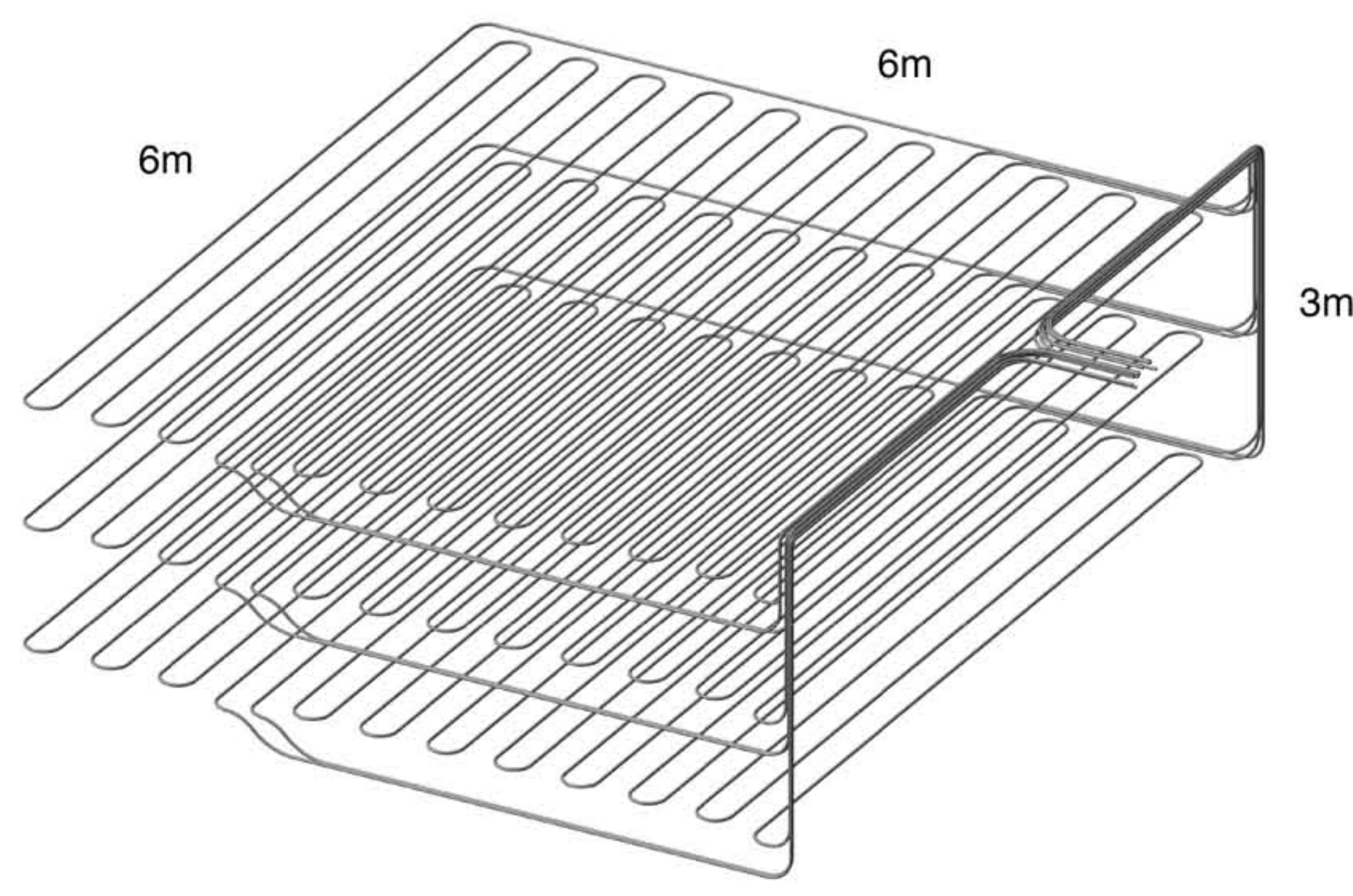




Three types of Thermal Storage



Sand Store System

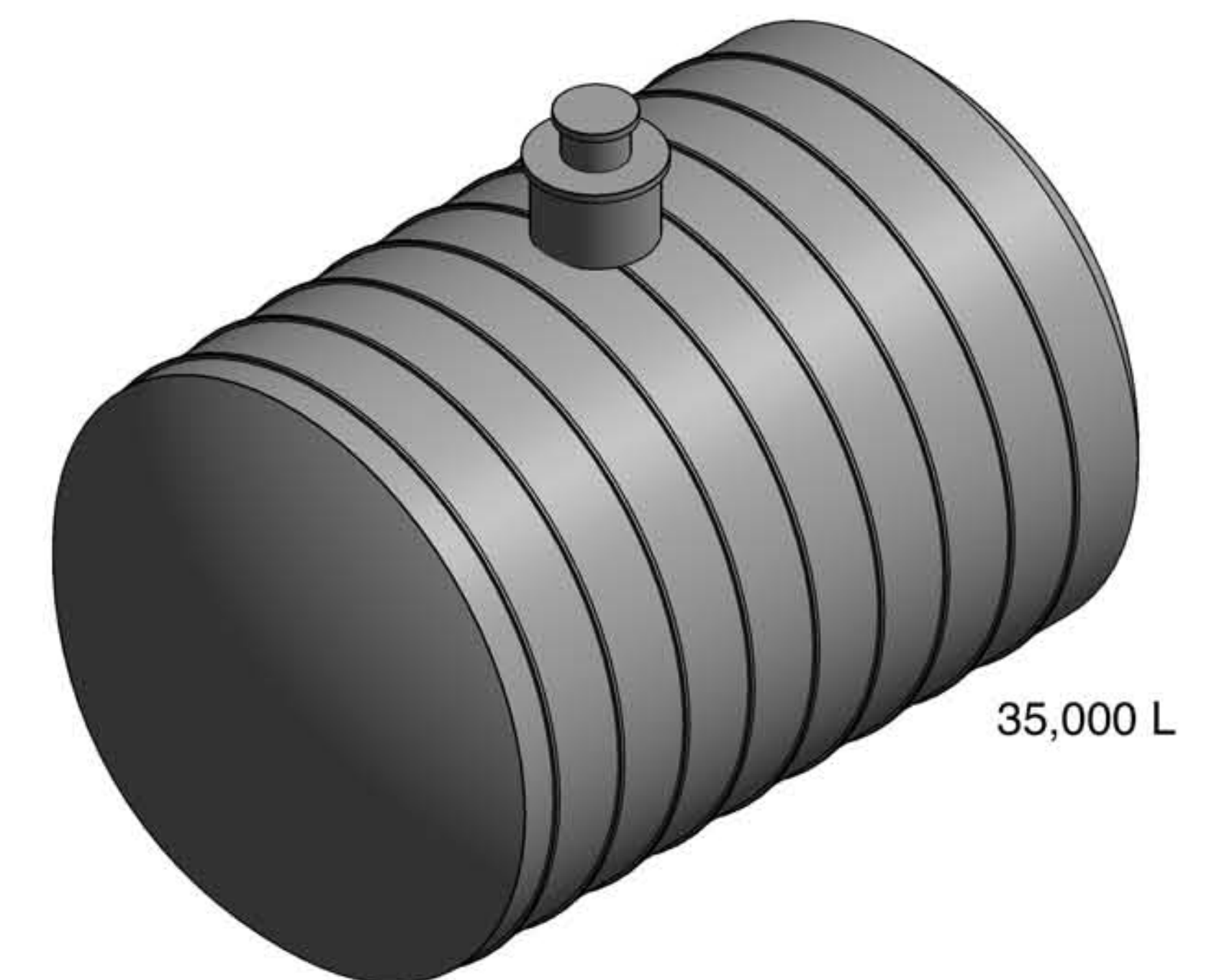
This 6 m x 6 m x 3m deep storage system will provide most of the space heating and hot water heating needs of the house throughout the year. The houses thermal demands are higher in the winter but there is more solar energy in the summer, so we are using the sand to store thermal energy gathered in the summer for use in the winter.

- * water impermeable membrane "the exterior pool liner"
- * poured concrete container
- * 40cm XPS insulation (R 7.5)
- * water impermeable membrane "the interior pool liner"
- * wet sand fill
- * 18 PEX serpentine heat exchangers "the nest of pipes" fully instrumented
- * Top of storage pit approximately 1.5 meters below grade



Water Store System 1 (Diurnal)

These tanks are used for short-term thermal storage. When solar energy is required for use on the same day as it is collected, the heat is sent to these tanks that operate in series. We can send heat to the tanks as needed and fill one, two or three tanks – each with a capacity of 450 litres.



Water Store System 2 (ZCL) 35,000 L

This 35000 litre super-insulated water tank is an alternative system for seasonal storage of thermal energy. Results of this type of storage will be compared to the sand thermal store for solar fraction (the fraction of the space and water heating needs that can be met through solar energy).

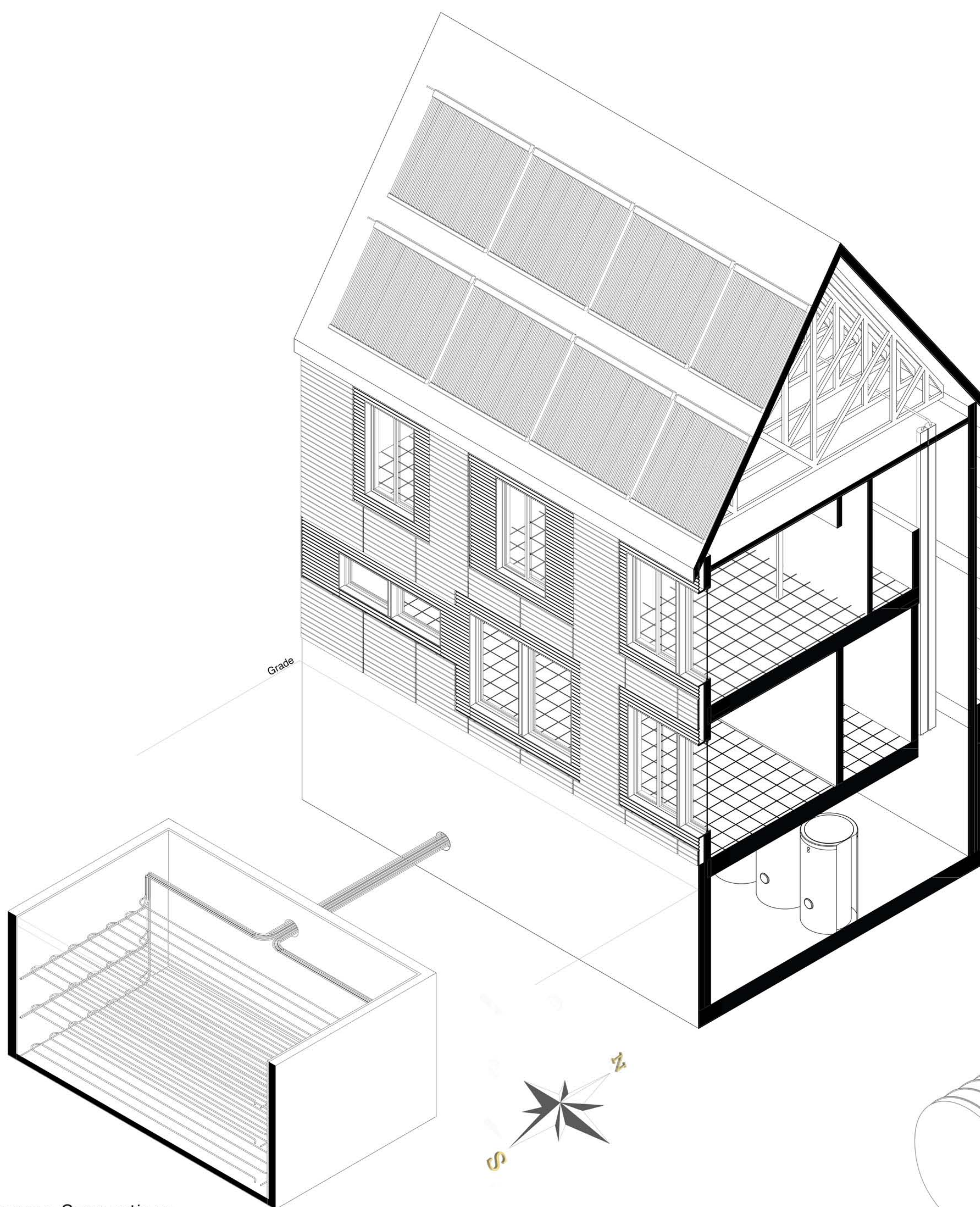
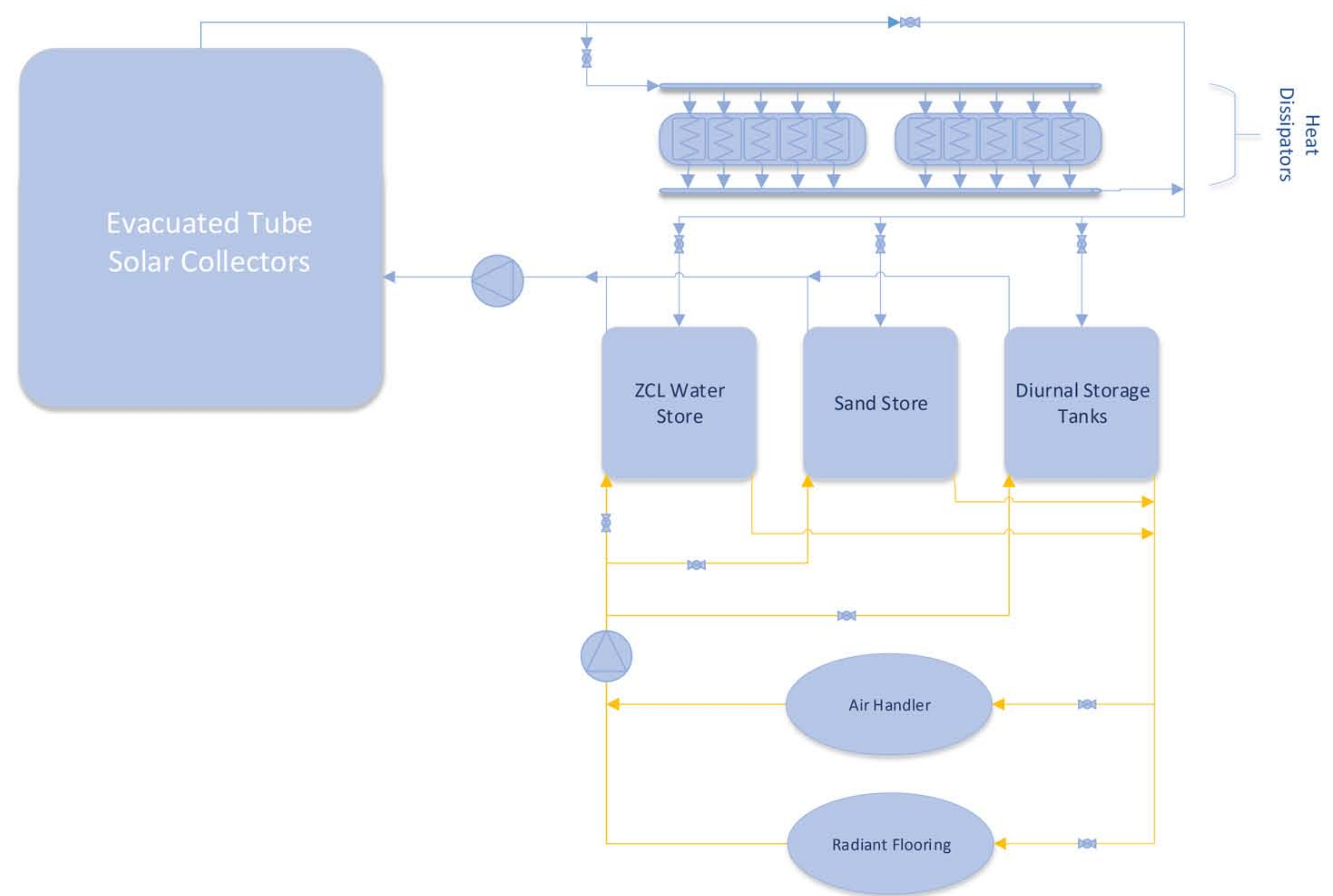
- * tank is temperature tolerant to 93 degrees Celsius
- * includes perforated diffusers inside the tank to enhance stratification of water heat (hot water is kept at the top and cooler water at the bottom)
- * R7.5 sprayed polyurethane insulation (30cm) on outside of tank
- * Top of tank approximately 1 meter below grade to allow pumping to basement

Solar Loop

Connecting Solar Collection to Thermal Storage

We use an antifreeze fluid in the solar collectors to protect from winter freezing, and the heated fluid is pumped down to the basement where the energy gets transferred to the storage systems through heat exchangers. All the pumps and valves to operate the system, including distribution and temperature are controlled by a central data acquisition and control system.

Heat is distributed to the house from the thermal storage systems through the heat exchangers to forced air, radiant floors or domestic hot water.



System Storage Connections