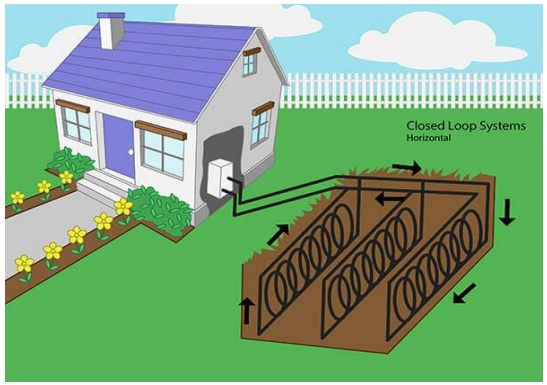
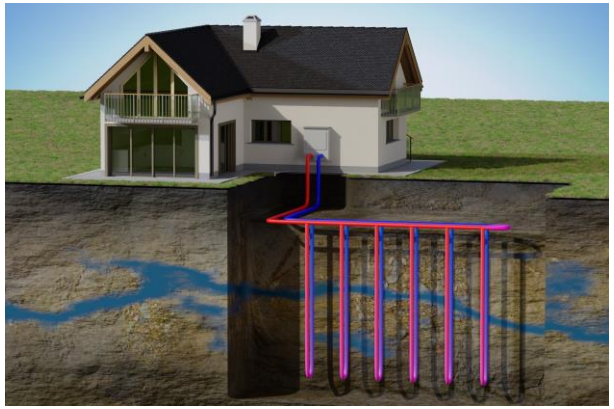
Geo-Thermal Systems

A geothermal thermal system is a renewable energy solution that harnesses the stable temperatures below the earth's surface to provide heating, cooling, and hot water. It works by circulating a fluid through underground pipes (ground loops) that absorb or release heat, which is then transferred indoors via a heat pump and distributed through hydronic systems such as underfloor heating, radiators, or fan coils.





Types of Geothermal Systems

❖ **Vertical Loop System**

- Pipes are installed in deep, vertical boreholes (typically 50–150 meters deep).
- Ideal for areas with limited land space.
- Commonly used in commercial buildings or urban residential settings.
- Higher installation cost, but less surface disruption.

❖ **Horizontal Loop System**

- Pipes are laid out in shallow trenches (typically 1–2 meters deep) across a wide area.
- Suitable for properties with ample land space.
- More cost-effective for residential installations.
- Easier to install but may be less efficient in colder climates due to shallower depth.

➢ Both systems operate on the same principle, transferring heat between the ground and the building but are selected based on site conditions, space availability, and project requirements.

Considerations

- High upfront installation cost (especially for vertical loops).
- Requires space for ground loops or drilling.
- Best used in well-insulated buildings for maximum efficiency.

Applications

- Residential heating and cooling, provides energy efficient comfort for homes year-round.
- Commercial buildings, such as offices, retail, and hospitality spaces benefit from stable, low-cost energy.
- Integrates well renewables, such as solar thermal or photovoltaic systems for greater sustainability.