

# Overview of geothermal energy

Geothermal energy is generated by the natural heat that is produced by the earth's molten core, which is close to the Earth's surface in certain regions.

Geothermal energy can be harnessed through various methods, including geothermal power plants, geothermal heat pumps, and direct-use systems.

## Types of geothermal power plants

- **Dry steam:** These plants use steam directly from underground geothermal reservoirs. The steam is used to drive turbines. It is feasible in areas where the geothermal reservoirs produce steam with high enough pressure and temperature to generate electricity.
- **Flash steam:** These plants use water at high temperatures and pressure to produce steam. When the hot water is released from the well into a lower-pressure environment, it rapidly boils and produces steam, which is then used to drive turbines and generate electricity.
- **Binary cycle:** These plants use a heat exchange to transfer heat from the hot geothermal water or brine to a secondary fluid with a lower boiling point, such as isobutene or pentane.

## Pros of geothermal energy

- **Sustainable:** Geothermal energy is a renewable energy source constantly replenished by the Earth's natural processes. As long as the Earth's core produces heat, geothermal energy will remain a sustainable energy source.

**Low emissions:** Geothermal energy is a low-emission energy source. It is a clean alternative to fossil fuels, which produce high levels of carbon emissions.

## Cons of geothermal energy

- **Limited availability:** Geothermal energy is available in suitable geological conditions, such as active volcanic regions or areas with high temperatures and pressure gradients.
- **High upfront costs:** Building a geothermal power plant or drilling a geothermal well can be expensive, and the initial investment may take several years to recoup. This can be a barrier to developing geothermal energy in some areas.

## Examples of geothermal energy projects

- **The Eden Project in Cornwall** has a new geothermal well, which stretches almost 5 kilometres beneath the Earth's surface, is now pumping heat into the tourist site's famous geodesic "biomes" and a new greenhouse
- **Nesjavellir in Iceland:** The Nesjavellir geothermal power plant in Iceland has a capacity of 120 megawatts and provides heat and electricity to the capital city, Reykjavik. It is one of the largest geothermal power plants in the world and has been in operation since 1990

