

# What is geothermal power? How is it exploited?

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Geothermal Power is a type of renewable energy that works by harnessing the heat in the Earth's molten core.

Specifically, the heat from the Earth's molten core will heat up underground water veins. People will build underground wells to bring hot water to the surface. At that time, the pressure change will cause the water to evaporate, causing the turbine to rotate and run the generator, creating electricity.

Compared with solar and wind energy, the advantage of geothermal is that it can be exploited 24/7, is not affected by weather, climate, day and night, and has a small factory construction area.

The generation of this type of energy releases an average of about 45g of carbon dioxide into the atmosphere, less than 5% of the corresponding emissions in fossil fuel burning plants. Therefore, geothermal energy can be considered clean energy.

However, this type of renewable energy also has high costs and geographical limitations. Geothermal power plants are very picky about where to build, they can only be built in places with underground water hotter than 100 degrees Celsius. The average cost to generate 1GWh of electricity is 75 USD, double the cost of generating electricity from Wind Power and Solar Power.

Due to the above factors, very few countries can currently produce geothermal energy on a large scale. The US is at the top with 61 geothermal plants, total capacity of 3.7 GW. Followed by Indonesia, Philippines, Türkiye.

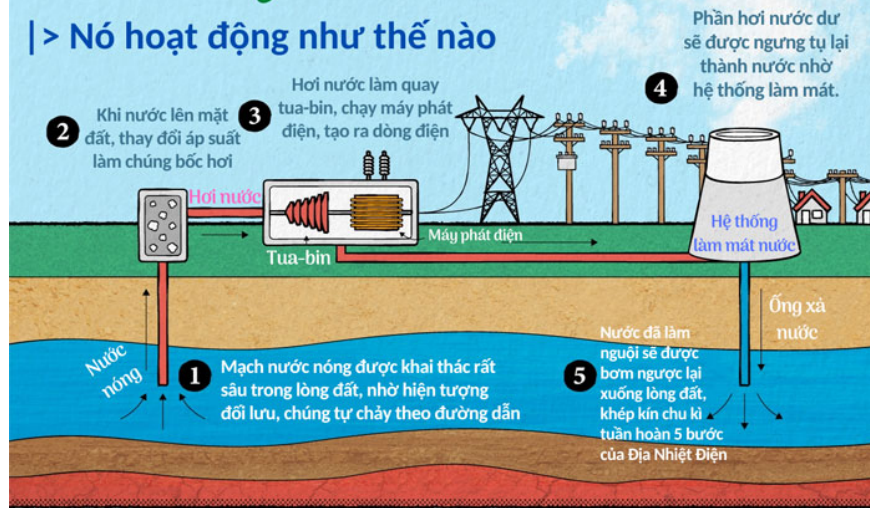
As of 2021, global geothermal power production is 16 gigawatts (GW).

# Địa Nhiệt Điện là gì?

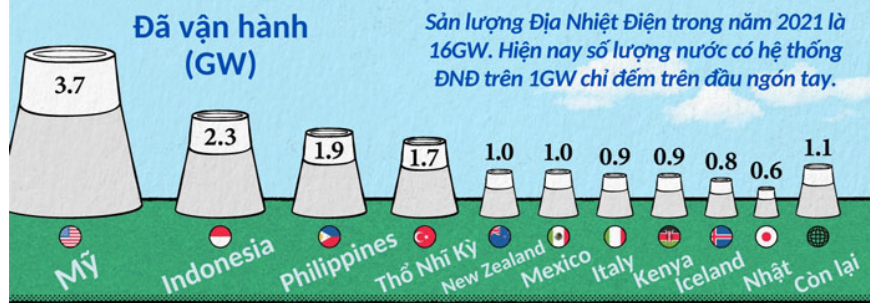
Địa Nhiệt Điện là một loại năng lượng tái tạo ít người biết. Nó hoạt động nhờ khai thác nhiệt lượng trong lõi nóng chảy của Trái đất.

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## > Nó hoạt động như thế nào



## ► Những nước nào đang ứng dụng



## ► So sánh sản lượng với các điện tái tạo khác

Sản lượng Địa Nhiệt Điện hiện nay vẫn còn rất khiêm tốn, chỉ mới góp 0.5% trong tổng số 3.064GW lượng điện của năm 2021

Tổng sản lượng (%)



## ► Ưu, Nhược điểm

**Ưu điểm:** Địa nhiệt điện có thể sản sinh điện 24/7, không bị ảnh hưởng bởi ngày đêm và thời tiết như điện gió, điện NLMT.

**Ưu điểm:** Diện tích xây dựng nhà máy Địa nhiệt điện rất nhỏ, chỉ chiếm 12% diện tích so với Điện NLMT để tạo ra 1GWh điện.

**Nhược điểm:** Còn ít phổ biến nên chi phí xây dựng nhà máy rất cao. Chi phí tạo ra 1GWh điện là \$75, gấp đôi điện gió và điện NLMT.

**Nhược điểm:** Chỉ có thể xây dựng nhà máy ở những nơi có mạch nước ngầm nóng trên 100 độ C, vì vậy không phải ở đâu cũng làm được.

Source: Think GeoEnergy Research, U.S. Department of Energy, National Geographic, International Renewable Energy Agency

## 8 largest geothermal power plants in the world



1. The Geysers Geothermal Complex, California, USA has a combined installed capacity of 1,520 MW.
2. Larderello geothermal complex, Italy total generating capacity 770 MW.
3. Makiling-Banahaw complex, Philippines, total capacity is 460 MW.
4. CalEnergy-Salton Sea, CA, USA, total capacity is 340 MW.
5. Tiwi complex, Philippines, total capacity is about 290 MW.
6. Darajat Station, Indonesia has an installed capacity to generate 260 MW of electricity.
7. Malitbog Station, Philippines has a capacity to produce 230 MW of electricity.
8. Wayang Windu Plant, Indonesia has the capacity to generate 225 MW of electricity.

### What is the current situation of geothermal energy?

Currently, 90 countries in the world are using geothermal energy and in some countries, geothermal energy accounts for more than 20% of the national output. In France, geothermal energy is the third most widely used renewable energy source, after biomass and hydropower.

Geothermal resources are abundant across mainland France and its overseas territories, but remain under-exploited. As a result, only 10% of new homes are equipped with heat pumps (compared to 35% in Switzerland and 90% in Sweden). France's first geothermal power plant is located in Guadeloupe. A second, in Alsace, is currently in the testing phase.

In general, geothermal power sources need to be strongly developed in the context of current climate change. This clean energy source will contribute to making our Earth less hot and more stable.

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