USE OF GEOTHERMAL ENERGY

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Abstract: Renewable energy is undoubtedly the future in the medium to long term, and other forms of energy must be sought to replace the depleting fossil reserves. A combination of different types of interests may be the reason for such a distortion of energy investments today. One of the energies that has attracted the most attention is geothermal energy. However, many people do not know the difference between the use of geothermal energy. Therefore, we dedicate this article to tell you about the main application of geothermal energy, its characteristics and importance.

Keywords: Vertical Geothermal, geothermal energy, heat source, electricity, chemically active substances, Horizontal geothermal, Geothermal under the foundation, hydraulic systems .

Renewable energy is undoubtedly the future in the medium to long term, and other forms of energy must be sought to replace the depleting fossil reserves. A combination of different types of interests may be the reason for such a distortion of energy investments today. One of the energies that has attracted the most attention is geothermal energy [1-5]. However, many people do not know what the difference is **in the use of geothermal energy** .

Geothermal energy can also be considered as **an alternative and renewable energy**

source, if the evaluation is relatively fast. This is because continued extraction from

geothermal resources may lead to a reassessment of thermal boundaries around the extraction site, which may render the energy source no longer renewable. This exception is local and depends on the very variable development time of the resource depending on the site [6-9].

This type of energy is based on the principle of using geothermal energy or the natural heat of the earth (the word geothermal takes its etymology from the Greek "GE" and "thermos", which literally means "heat of the earth".). This heat is

naturally released by the nuclear fission of radioactive elements in the Earth's core, mantle, and crust. Some of these elements are uranium, thorium, and potassium, which are actually found in the deepest parts of our planet.

Inside the Earth, the core is a magmatic substance that releases heat from the inside out, so the temperature **rises from 4 to 100 ºC every 2 meters as we go deeper into the Earth [10-13].**

But the interior of the Earth is made up of different layers, reaching a depth sufficient for water to heat up and change its state, turning into water vapor, which rises to the surface under high pressure or form. jets or hot springs.

Geothermal energy production potential (60 mW/m²) is much lower than that of the sun (about 340 W/m²). However, in some places **this potential heat reaches 200 mW/m² and causes heat accumulation in aquifers that can be used industrially.** The extraction rate is always greater than the heat flux contribution, and care must be taken not to overdensify the extraction site, which would take decades or centuries to recover. Drilling costs increase rapidly with depth.

Low-temperature geothermal energy (from 50 to 100 ° C) is mainly used for heating, through heat networks and less often for heating greenhouses or water management [14-16]. In 1995, **global thermal capacity was 4.1 GW.** This can also apply to the use of geothermal heat pumps, which use shallow groundwater or "geothermal probes" drilled 50 to 100 meters to extract enough calories from the ground to heat a room.

With the onset of the oil crisis, global interest in geothermal energy has increased, and **its use as a source of electricity is growing at around 9% per year.**

Geothermal energy is used in many ways because this renewable source of energy allows the production of heat, electricity or hot water. For this, we must always choose the right place to install , using the best conditions that allow us to meet our needs.

The main uses of geothermal energy include domestic and professional use. They are as follows:

- Heating: Using geothermal energy, heat can be extracted from the earth's interior and converted into a room's air conditioning system through emission systems such as underfloor heating.
- Hot water: can also be used for domestic hot water, use a water storage thermos
- Electricity: Electricity can be generated through geothermal energy, using only deposits with temperatures above 150º

In addition to its main use, geothermal energy is also used for other purposes, such as:

- Drying of products, mainly for agricultural enterprises
- Cleaning and feeding various hydraulic systems
- Sterilization of various materials.
- salt mining
- Evaporation and distillation of liquids.
- Fisheries and fisheries
- Cooling, using a concrete environment
- Use of thermal waters for sanitary and medicinal purposes

As one of the renewable sources, it is important to know the energy obtained from

geothermal energy and understand how we can use it without resorting to other artificial sources. and, of course, respect the natural warmth of the earth.

A very effective and increasingly popular method, especially in new construction, is to build houses with underfloor heating, which allows you to walk around the house barefoot, as it dissipates heat. Of course, these floors are not natural , or they are made of a heat-emitting product, but a heat pump is used to distribute the heat to them [17-18].

A heat pump is a pump that connects our home to geothermal energy. With its help, we achieve air or temperature exchange, so that it absorbs the cold on the one hand, and expels the heat from the interior of the earth, from the underground areas. In this way, with the help of the pump and regulating the underground heat management of the whole house, saving heating, because it is based on natural and ecological heat.

Unlike other heat pumps, they are reversible. You can reposition it or turn it off so it stops drawing heat from the ground, as it does in the summer and in areas where it doesn't need as much heat. And this pump does not use the energy it produces to generate more heat, but the energy it uses to distribute it and drive it to where it is needed.

To accommodate the heat pump, during the construction of the house, the floor must be raised, installed, and then the beam floor must be installed. In the case of new construction, it can be installed in three ways:

- Vertical Geothermal: This is a hydraulic system responsible for heat exchange with the underground layer. It's about trying tens of meters of tubing to get to where the depth and heat is.

• Horizontal geothermal: it requires more space, because it is not connected to the electricity network, it is mainly underground, but it must occupy the entire width of the house, so it is cheaper, despite the fact that the house creates an area, requires more space, not too big.

• Geothermal under the foundation: it would be ideal, but it should be planned even before construction, before laying the foundation, so that when the pipes that come into contact with the underground layers are laid, a hydraulic pump will take care of a more optimal distribution of heat. can be installed.

There is no doubt that having geothermal energy at home not only for heating the

home, but also for powering various facilities, saves us a lot of electricity every month . But the only drawback is that its installation is very expensive, especially before placing the foundation, as in the case of installation under the foundation. The initial investment is huge, especially if you are building a home from scratch. At the lowest prices, there is underfloor heating, which gives us the benefits of geothermal, but promises a little less.

I hope that with this information you can learn more about the different uses and properties of geothermal energy.

As with wind and solar energy, geothermal power has minimal operating costs; capital costs dominate. Drilling accounts for over half the costs, and not all wells produce an exploitable resources. For example, a typical well pair (one for extraction and one for injection) in Nevada can produce 4.5 megawatts (MW) and costs about $10 million to drill, with a 20% failure rate, making the average cost of a successful well $50 million [19-21].

A power plant at The Geysers

Drilling geothermal wells is more expensive than drilling oil and gas wells of comparable depth for several reasons:

• Geothermal reservoirs are usually in igneous or metamorphic rock, which is harder to penetrate than the sedimentary rock of typical hydrocarbon reservoirs.

• The rock is often fractured, which causes vibrations that damage bits and other drilling tools.

• The rock is often abrasive, with high quartz content, and sometimes contains highly corrosive fluids.

• The rock is hot, which limits use of downhole electronics.

- Well casing must be cemented from top to bottom, to resist the casing's tendency to expand and contract with temperature changes. Oil and gas wells are usually cemented only at the bottom.
- Well diameters are considerably larger than typical oil and gas wells.

As of 2007 plant construction and well drilling cost about €2–5 million per MW of electrical capacity, while the break-even price was 0.04–0.10 € per kW·h. Enhanced geothermal systems tend to be on the high side of these ranges, with capital costs above $4 million per MW and break-even above $0.054 per kW·h.

Heating systems are much simpler than electric generators and have lower maintenance costs per kW·h, but they consume electricity to run pumps and compressors

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