



Use of geothermal energy and its benefits in reducing environmental pollution

Sina Ghani¹, Fatemeh Izadian², Fatemeh Mokhtari³

1-MSc, Civil Engineering Department, Geotechnics, Kharazmi University, Tehran, Iran

2-Bachelors, Civil Engineering Department, Arak University, Arak, Iran

3-MSc, Architecture Department, Architecture, Yazd Islamic Azad University, Yazd, Iran

⋮

Ghanisina@yahoo.com

Abstract

Today, with regard to population growth, there is a need for more renewable energy sources that can easily serve different human needs without harming the environment; therefore, designing energy saving buildings as well as protecting natural resources is one of the main responsibilities of the experts. One of the types of renewable energies is geothermal energy, which is one of the least costly, most beneficial of these energies and a good alternative to fossil fuels, and the generation of electricity and the heating and cooling of buildings by the heat pump are a number of its applications. This article attempts to explain the use of this energy in heating and cooling buildings and the need to use this cheap and clean energy instead of using fossil fuels.

Keywords: geothermal energy, renewable energy, energy applications, environment

1. INTRODUCTION

On the one hand, increasing population and increasing economic prosperity on the other requires energy. The increasing need for energy has led people to increasingly use fossil fuels (coal, oil, gas) but the nonrenewable and contaminations that have emerged, such as global warming, ice melting, and the collapse of the natural ecosystem of the planet, have reduced the use of these energy sources. Therefore, the use of energy sources that are unlimited and cause the least pollution has attracted the attention of researchers in recent decades, which they call the sources of new and renewable energy. One of these sources is geothermal energy, which we will continue to explain.

2. GEOTHERMAL ENERGY

The geothermal energy source is the natural heat of the earth that comes from molten or magma. This energy is generated by radioactive decay of the isotope of potassium and other elements that are dispersed in the earth's crust and also due to the high pressure of the mass. Experience shows that as the depth of the earth increases, the temperature rises to about 3 degrees per degree for every 100 meters. In some areas of the earth's crust, which has favorable conditions, high temperatures can be achieved and used. Extracting heat directly from the planet is not possible. To do this, there must be a conveyor fluid that can be steam or hot water, or both, to bring heat from under the surface of Earth to the surface of Earth, but this heat should be close to it. Usually there are areas where there is a volcano or continuous earthquake that has such features.

Exploitation of geothermal energy is simply presented in Fig. 1. The water generated by the earth receives the thermal energy of Earth after penetrating into underground aquifers and flowing into areas with geothermal energy near the surface of Earth. The density of this water decreases after warming and the pressure increases, and in the form of hot water or steam from a pore on the earth's crust, it finds its way to the surface of Earth. These are the hot springs that we see in certain areas of the Earth. In these areas, steam can be extracted industrially from the inside by digging wells with a depth of 80 to 100 kilometers, with a temperature up to 650 to 1200 degrees Celsius and used its thermal energy.