

Magma energy power plant

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As the current renewable energy is unstable¹, Magma energy should be utilized for generating a huge amount of electric power instead of consuming natural gas, coal, petroleum, nuclear, and other fuels². Magma with the lifetime of 0.1 to 1 million years has never been used for generating electric power in the world. If we were to succeed the magma power plant, the existing fuel-consuming power plants can be replaced with it. The conventional geothermal power generators use the steam from the earth for generating electric power. In the magma power system, high temperature heats from magma around 1000 °C can be used to generate strong steam for driving the steam turbine in the power plant.

We have been seeking for natural high-heat sources. We have discovered that Japan has unlimited heat energy sources: magma heat energy. Although geothermal power generation has been studied for many years, in the conventional geothermal power generation, steam or vapor from earth is used to drive the steam turbine for generating electric power. Why not, directly use the magma heat of 1000 °C temperature using the heat pipe in order to transfer the high temperature heat to the steam turbine. It is now possible to design and develop the magma power plant where the high temperature heat pipe up to 2000°C exists in the current market. No one has challenged the high temperature heat pipe to transfer heat energy from magma to the power plant.

Let's take a look at the magma energy. Magma average density is 2.5 g/cm³. Assume that magma's temperature is around 1000°C, then 1kg magma has 1 million Joule. We have a new volcano mountain called "Shinmoedake" located at Kyushu Island. The volcano mountain has a magma chamber or reservoir about 20 million m³. The energy of the magma chamber is given by:

$$(20 \times 10^6) \times (2.5 \times 10^3) \times 10^6 / (3600 \times 1000) = 139 \times 10^8 \text{ kWh}$$

According to Japanese government, 70x10⁸ kWh is generated by a nuclear power plant. The magma chamber of Shinmoedake has twice the amount of energy, which is equivalent to the power generated from two nuclear power plants. Magma can continuously feed heat energy to us for million years. We don't have to buy and use

any fuel to burn for heat while the existing power plants use fuels. In Japan, we don't have to import any fuel for power plants. Depending on the capacity of high temperature heat pipes, generated power can be determined by the transferred heat energy.

Although volcano eruptions are dangerous, it is indispensable for us to build magma power plants. Not like nuclear power plants, any explosion from the magma power plants does not spread any dangerous radiations. Cost of a magma power plant may be equivalent to that of the conventional thermal power plant. Because the conventional steam turbine can be used in the magma power plant.

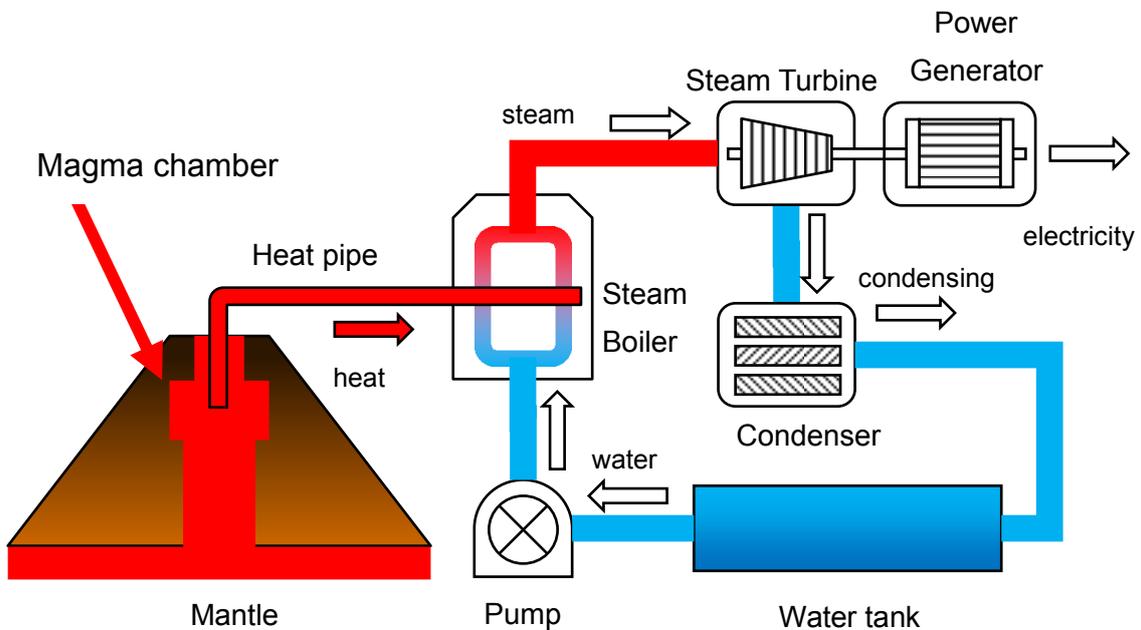


Figure Magma power plant using the conventional steam turbine

References

1. April Reese, Blackouts cast Australia's green energy in dim light, *Science* 10 Mar 2017:Vol. 355, Issue 6329, pp. 1001-1002
2. Yoshiyasu Takefuji, Nature Cafe at UK embassy in Tokyo, May 24, 2012