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Quaise Energy to Tap the Geothermal Energy 6 Miles Beneath Earth's Surface

The engineers at Quaise Energy believe that energy plants that now run on fossil fuels could, in time, be retrofitted to generate electricity using super-heated steam from a geothermal well located directly on the grounds of the powerplant. To accomplish this task they have improved and increased the power of gyrotron millimeter wave beam generator technology; so its beam can cut through rock like a hot knife through butter.

They are now performing final tests and plan on creating a geothermal power plant that is powered by tapping the heat found 6 miles below the surface of the earth. Millimeter waves are located right next to microwaves on the electromagnetic spectrum. In a sense you can think of the Quaise Gyrotron as a similar technology to your microwave oven. The magnetron powers your microwave oven to cook food and the gyrotron creates a superhot beam that can vaporize rock. See photos 1 & 2.

With funding now in place they have started field demonstrations in Marble Falls, Texas. Proof of concept was completed a number of years ago when a gyrotron millimeter wave drilling system was used to cut through very hard sample rocks at MIT's Plasma Science and Fusion Center. Quaise Energy is an MIT company spinoff. My October 2020 column covered that breakthrough and you can find it online at: https://www.technologytoday.us/columnPDF/Millimeter_Waves_ Can_Bore_Geothermal_Wells.pdf

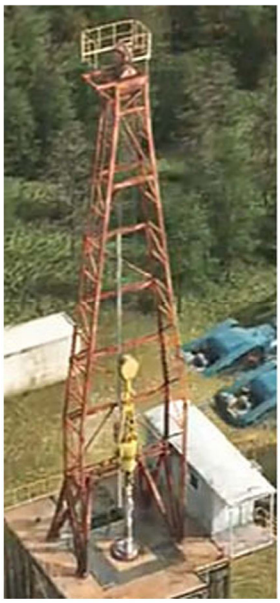

Photo 1 & 2: Credit Quaise Energy

Quaise Energy gyrotron vaporizes rock and will soon be used to create a 6 kilometer deep geothermal well to provide clean renewable energy

The Texas field demonstration's goal is to use the gyrotron millimeter wave generator to vaporize rock to a depth that is 100 times deeper than what was cut in the MIT Plasma Science and Fusion Center. As you drill down through the earth's crust the temperature of the rock, that you are drilling through, continues to rise. The hellish temperatures that are soon reached are so high that mechanical cutters in conventional drilling equipment quickly dull and need continual replacement. That is why attempts to drill geothermal wells have only been successful where the earth's internal heat is closer to the surface; such as volcanic regions and areas with hot springs and geysers.

Once the testing that is now being done in Texas is completed, Quaise Energy will be ready to build a fully functional demonstration geothermal power plant. This demonstration plant will be built at a site in the US where geothermal energy can be harvested about 6 miles below the surface of the earth. They are planning on using a two-step drilling process. The first 3 kilometers (1.86 miles) will be bored using the standard rigs that are currently used by oil and gas companies to drill wells. When the 3 kilometer depth is reached they will switch out the oil drilling equiptment and replace it with their gyrotron drilling system. See photo 1 again. The full-size demonstration plant will tap geothermal energy at a depth of 10 kilometers (6 miles).

To become the dream energy of the future and be able to retrofit current fossil fuel power plants with clean geothermal energy the well depth, that will need to be achieved, will range from 10 to 20 kilometers. At this depth the rock at the bottom of the bore hole will be six hundred degrees (10 kilometers) to one thousand degrees (20 kilometers) Fahrenheit. Water could actually exist as a liquid here because of the very high pressure so far down below the earth's crust. The atmospheric pressure found on the surface of the earth causes water to boil at 212 degrees Fahrenheit. It is the steam generated by the super high temperatures at the bottom of the geothermal well that they will use to spin the power plants generators to create electricity.

Taking it a Step Further

1. Online research – Where and how deep is the world's deepest geothermal well?
2. Why is geothermal considered a green renewable source of energy?

Alan Pierce, EdD, CSIT is a technology education consultant. Visit www.technologytoday.us for past columns and teaching resources