

Google-funded mapping project reveals vast untapped geothermal energy sources

Julia Pyper, Environment & Energy Publishing, 10-27-11

Geothermal energy has made great technological gains in recent years, but for the practice to become a more viable source of clean energy, the field needs more research and more money. That's where Google.org has stepped in.

To shed light on the geothermal potential in the United States, Southern Methodist University (SMU) launched a series of maps this week in a project funded by Google.org. The maps, available online through Google Earth, found that the United States is capable of producing more than 3 million megawatts of clean energy from geothermal -- 10 times more than the currently installed capacity of coal.

"Our study assumes that we tap only a small fraction of the available stored heat in the Earth's crust, and our capabilities to capture that heat are expected to grow substantially as we improve upon the energy conversion and exploitation factors," said David Blackwell, an SMU professor of geophysics, in a statement.

The new research comes as the 2011 GEA Geothermal Energy Expo in San Diego drew to a close yesterday. The conference showcased "exciting" progress in the field, said Karl Gawell, executive director of the Geothermal Energy Association. But it also highlighted areas in need of further technological development.

"That's one of the things the Google program is showing, it's that the resource is [located] in many areas, but you can't necessarily tap into it," said Gawell, who called for sustained investments in reservoir-locating software and effective extraction techniques.

Geothermal energy, also called hydrothermal energy, involves harnessing hot water often found in geothermal reservoirs, and in many cases along fault lines in the western United States. The water, heated up to 700 degrees Fahrenheit, circulates through a system and turns into steam, which powers a turbine. Once the heat is removed, the used water is injected back into the earth, creating a closed-loop system that produces "little or no greenhouse gases," according to the Department of Energy.

Approximately 9,000 MW of traditional geothermal energy exists in the world today, according to Google. The United States is the world's largest producer, with 2,800 MW of installed capacity -- enough to power about 2.8 million homes. Still, geothermal is considered one of the most underused sources of homegrown clean energy.

East Coast potential found

Google's new geothermal maps build upon SMU research from 2004. Google got on board with the mapping project because it's looking to power its servers with renewable energy, said SMU Geothermal Lab Coordinator Maria Richards.

By using data collected from existing or former oil and gas sites, researchers were able to gather information on temperatures at greater depths than before. They also discovered geothermal potential along the East Coast in areas previously considered unsuitable. Hotter sites were found in West Virginia, for instance, where geothermal resources proved equivalent to the state's existing power supply, which is largely fueled by coal.

Using oil and gas wells to explore geothermal potential is advantageous because research on the well and its

fluid properties has already been done, said Richards. Also, unlike water drilled along a fault line, the sedimentary basins where oil and gas is extracted can have fluid reserves at multiple depths, increasing the chances of a successful project.

Knowing precisely where to put a well is significant. "Just because you drill a well doesn't mean you hit high fluid flows," said Richards. "But it's difficult to understand how much water there is underground before you start drilling," she added. Hence, there's a strong need for better visualization technology, but also new drilling and extraction to ensure better returns.

A new approach that Google.org is working on is called Enhanced Geothermal Systems (EGS). EGS replicates the traditional geothermal process, only it injects water underground in order to heat it, rather than tapping into a naturally occurring water supply. These sites are often larger than hydrothermal wells and can support even larger power plants.

Geothermal developments are not funded solely by Google and other private firms. The DOE supplied \$400 million to advance geothermal technology under the American Recovery and Reinvestment Act of 2009. According to Gawell, this investment has had, and is still having, a profound impact on the field.

"[The] investment in research and development in geothermal that the stimulus bill made is the type of sustained commitment you need to make the vision the SMU report become a reality," said Gawell. "The question on everyone's mind is, will it continue?"