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Houston-area drilling tools startup Hephae helps geothermal companies like Fervo scale

A prototype of Hephae Energy Technology's measurement while drilling tools is displayed at the company's Spring office.

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A Houston-area drilling tools startup is working to commercialize technology intended to take geothermal drilling to the next level.

Hephae Energy Technology, which has its assembly space and office at 21617 Rhodes Road in Spring, expects its drilling tools to be used in Houston-based startup Fervo Energy's next well in Utah in the coming weeks.

"We're very close to the first commercial runs with the two developers," Andy Bruce, president of Hephae, told the Houston Business Journal, referring to Fervo and Frisco-based geothermal company Mazama Energy.

"We're still at the prototype stage as of right now. I think we're seeing very fast growth in the next probably six months. Our total fleet will be tripled by the end of the year and then doubled again at least by the end of the following year. So we're going to go from a small research-and-development-type company to a full operating company here in probably about the next nine months."

Hephae specializes in measurement while drilling, which is a technology that provides real-time sensors at the end of a drill while it is drilling to help a company drill into the right areas.

Current technology made for oil and gas drilling is meant to operate at a limit of 175 degrees Celsius. Most tools in oil and gas wells only need to operate at up to150 degrees Celsius.

But for geothermal energy, companies need to drill into areas that are a lot deeper and a lot hotter. Hephae's technology can operate at temperatures of 210 degrees Celsius, and that's with water being used to cool the wells during drilling. The actual temperatures of the reservoirs can be a lot hotter.

"We figured out that this next-generation geothermal needs the same exact tools that we've been developing for the last 40 years

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in oil and gas – it just needs to work a hell of a lot hotter," Hephae CEO Steve Krase told the HBJ.

Fervo, for example, recently drilled a new appraisal well that reached temperatures of 555 degrees Fahrenheit, or about 290 degrees Celsius. The company's flagship Cape Station project in Utah has a resource temperature of 400 degrees Fahrenheit, or about 205 degrees Celsius.

If Hephae's technology can operate at 210 degrees Celsius with cooling, it can operate in reservoir temperatures of about 300 degrees Celsius.

In the long run, Hephae wants its technology to be able to reach 300 degrees Celsius by 2030 and reach reservoir temperatures of over 400 degrees.

Cost savings for geothermal

As power demand skyrockets along with data center demand, geothermal energy is a potentially clean and reliable form of power, but it would need to be on a cost basis close to natural gas in order to scale up that much.

If Fervo could drill at temperatures 50 degrees hotter, its levelized cost of electricity would be cut in half, Krase said.

"You've got to compete with natural gas; you've got to compete with nuclear; you've got to compete with solar and wind," he said. "We're bigger than oil and gas by 2050. There's more rigs drilling geothermal wells than oil and gas wells in the world."

Hephae's next steps

Hephae currently has a prototype fleet of about half a dozen tools that Bruce said is ready to utilize within eight weeks, and the company is preparing to start consistently building more units.

"We're intending to start building two a month from July. Given we've only built six since the start of the company, it will be a quick ramp up," Bruce said.

The technology could be extended to applications beyond geothermal in the future. Some wells in the Haynesville Shale need technology that can reach 185 degrees Celsius, and Krase said Hephae is working on a Space Act Agreement that would allow it to access NASA's data on electronics and cooling technology on a potential Venus rover.

As of February, Hephae has raised $13 million from investors like Nabors Industries and Future Ventures, Krase said, and the company hopes to close a multimillion-dollar Series A funding round in the coming months, Bruce added.

"I'm taking two calls a week from investors that want to get in because the word is getting out," Krase said.

Krase has drilling experience from working at Superior Oil, which was acquired by Mobil in 1984, and Teleco Oilfield Services, which was acquired by Houston-based Baker Hughes in 1992. He was later the CEO of startup Navigate Energy Services, which sold to Nabors, which he left in 2019 as vice president of wellbore placement.

An employee assembles Hephae's measurement while drilling tools at the company's Spring office.

Steve Krase is the CEO of Spring-based Hephae Energy Technology.

Equipment in Hephae's Spring office test the company's measurement while drilling tools.

Bruce, meanwhile, was CFO at Navigate and later was the director of finance at Nabors. He's currently the CFO of geothermal drilling company Scout.

Hephae also has a presence in the United Kingdom, Spain and Canada. It plans to double its U.S. workforce of 12 to 15 people in the next 12 months and plans to have a team of between 30 and 40 people by 2027.

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