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FALL/WINTER 2021



Nagasree Garapati West VIrginia University

Nagasree Garapati, Ph.D., is leading a team of researchers, coordinated by the Energy Institute at West Virginia University, exploring the potential of geothermal energy for West Virginia communities and the region. As a WVU faculty member in the Chemical and Biomedical Engineering Department, her research areas include gas hydrates, geothermal energy and carbon sequestration. Dr. Garapati is proud to be working with a team of experts moving the state forward in renewable energies.

WVU Researchers Dive Deep into Renewables with Exploratory Geothermal Well

Taking a deep dive into any problem means doing an exhaustive study. West Virginia University checks this box and more with a new geothermal energy project.

With funding from the U.S. Department of Energy, WVU will drill a well that will provide critical geologic data on deep geothermal heat as a potential renewable heat source for targeted areas of West Virginia and Mid-Appalachia. Once the research is completed and studied, the DOE and WVU will make the data available as a free public resource. companies seeking renewable energy to reduce their carbon footprint and energy bills, which could mean more jobs for West Virginians." The exploratory well will not produce heat or generate power for electricity. Researchers will use the well to collect core samples and temperature data.

"This Appalachian Basin analysis focuses on the direct use of geothermal heat and not electricity production." said Taylor. "We don't expect to find geothermal temperatures high enough to generate electricity. But we should

"West Virginia's geothermal potential could make the state especially attractive for companies seeking renewable energy to reduce their carbon footprint and energy bills, which could mean more jobs for West Virginians."

"Recent studies show there's potentially good geothermal heat in our region," said James Wood, director of the WVU Energy Institute. "So WVU and the Energy Institute started asking ourselves, what's the public benefit of deep geothermal heat to West Virginia communities? This exploratory well will provide important data to answer that question, and that's the approach we presented to DOE."

"If this project is as successful as we hope," said Sam Taylor, assistant director of strategic partnerships and technology at the Energy Institute, "West Virginia's geothermal potential could make the state especially attractive for be able to confirm if the temperatures are hot enough to be used as a renewable energy source for direct-use HVAC systems for industry and commercial operations."

WVU's exploratory well will be drilled three miles deep near Morgantown, West Virginia, becoming the deepest geothermal well in the region.

The research team, led by Nagasree Garapati, visiting assistant professor of chemical and biomedical engineering, was awarded \$7.25 million from the U.S. DOE. Funding will be used to drill the well, gather critical core samples and data beneficial to the region, and provide a cost estimate for retrofitting HVAC systems

West Virginia University.



Geothermal map of West Virginia.

to geothermal energy on parts of WVU's Morgantown campus to decrease energy costs and reduce its carbon footprint.

This project includes a team of researchers from the WVU Department of Geology and Geography, Statler College of Engineering and Mineral Resources, Facilities Management and the Energy Institute. Collaborators also include Hewitt Energy Strategies, the West Virginia Geological and Economic Survey, National Energy Technology Laboratory and J&L Energy.

"Many don't realize that the United States is the top producer of geothermal power in the world," Garapati said. "Mainly, it's the western states. However, recent studies discovered that north-central West Virginia shows temperatures desirable for district heating. Geothermal heat maps also show higher subsurface temperatures throughout the area." District heating distributes heat generated in a central location through insulated pipes for commercial and larger residential heating. District heating and cooling from geothermal sources could reduce carbon emissions for commercial buildings by 46 to 54 percent, according to experts. This system is commonly used for a wide range of commercial HVAC systems found in office buildings, schools, hospitals and industrial sites.

"The DOE's Office of Energy Efficiency and Renewable Energy funded this project and others, like Cornell University's geothermal borehole, to gather data for targeted areas in the east.



James Wood, Director WVU Energy Institute

The goal is to demonstrate that deep geothermal energy is a national resource not limited to the western states," Garapati said.

"West Virginia is an energy-producing state," said Taylor. "For this experimental well, we have the added benefit of working with a strong drilling industry already operating in the region." Hewitt Energy Strategies is an industry partner on the project and specializes in drilling and exploratory operations. "During this project, we'll be advancing technologies in the drilling and geothermal realms," Jay Hewitt said. "We hope to replicate some of these results on campus and in other public works within West Virginia and Appalachia."

Geothermal energy is an attractive, renewable energy source, precisely because it's available 24 hours a day, 365 days a year, no matter the weather. It's a safe, predictable and reliable source of energy with minimal carbon dioxide emissions.

Another aspect of geothermal is that it can't be produced in one area and then shipped somewhere else. It's used where it's tapped.

"If this exploratory well shows the reservoir is hot enough, geothermal can be a valuable heat source to local communities in the state," Wood said. "We plan to do a good job collecting data and then put it out there for public use. There's a lot of satisfaction in that." V



Sam Taylor, Assistant Director WVU Energy Institute