

The Colorado Geothermal Frontier

By Anna Littlefield and Edikan Udofia

In Chaffee County Colorado, residents and visitors alike have long taken advantage of the natural hot springs generated by thermal anomalies deep underground. Soon, this same heat may be tapped to provide energy for the local community. Here, and across Colorado, geothermal is the focus of renewed attention and funding, with \$7.7 million awarded for geothermal technology from the [Colorado Energy Office](#), and further private investment. This project in Chaffee County was highlighted last week [in an article](#) from the Colorado Sun, noting the investment of Icelandic companies.

A [summit](#) held on June 20th of 2024 between the government of Iceland and the state of Colorado spurred this collaboration, in addition to providing valuable insights into Iceland's experience in harnessing geothermal energy. Attendees of the summit left understanding that, while Colorado is not the literal hot spot that Iceland is, it does hold unique potential for the development of traditional geothermal energy, with high heat flow in the Rico Dome structure in southwest Colorado, Mount Princeton Hot Springs, Waunita Hot Springs, and the San Luis Valley (per [Colorado Geological Survey](#) assessments).

Historically, resources in Colorado have been deemed suitable only for 'direct-use applications' but the Colorado Geological Survey (CGS) [geothermal webpage](#) explains that this assumption is based on a lack of study rather than empirical evidence. In July of 2024, the CGS, in collaboration with the Energy and Carbon Management Commission and Teverra, released an [extensive report](#) highlighting a history of geothermal across Colorado, the resources that exist in different geologic settings, the new technologies that may expand access outside of thermal anomalies, economic implications, as well as impacts and considerations for development.

Recognizing this potential, the ECMC is taking steps towards regulating the development of geothermal energy and has [recently established](#) a set of rules for deep geothermal drilling. On August 12, 2024, the commission unanimously endorsed a 59-page addition to its rulebook, detailing the procedures for permitting and enforcing deep geothermal activities. These regulations, akin to those for oil and gas sectors, empower the ECMC to approve or reject permits based on health and safety criteria, while also providing local governments with a participatory role in the process.

The proactive implementation of these regulations highlights Colorado's dedication to expanding its energy mix and exploring the prospects of geothermal power. Governor Jared Polis, an advocate for geothermal energy through his ["Heat Beneath Our Feet"](#) initiative, mentioned that with these new regulations Colorado is "set to harness this clean, renewable energy source." Nonetheless, geothermal regulators and professionals acknowledge that the industry will not necessarily experience a surge overnight, but will expand as technologies, regulations, and policy incentives improve.

In a recent [interview with KUNC radio](#), Will Toor, director of the Colorado Energy Office, described existing geothermal applications in Colorado and the bigger picture for the industry statewide. For large scale grid power, Toor said: “Geothermal is going to play an important role going forward...As we move towards a grid that is largely going to be renewables, we also need some sources that are available 24/7, to back up the wind and solar. Right now, what we use for that is natural gas generation and we will continue to use natural gas for many years. But geothermal offers a zero-pollution source of that 24/7 electricity.”

While this grid scale generation is part of Colorado’s long term goals, Toor explains that there are examples of successful implementation of localized geothermal resource applications for heating and cooling, “Probably the best known project in Colorado is [at Colorado Mesa University](#) which has an amazing geothermal heating and cooling system right now that provides 70% of their heating and cooling and they’re in the process of expanding it so it will be 100% of their heating and cooling, its such an inexpensive way of conditioning their buildings that their president said it has allowed them to keep tuition 2% lower than it would otherwise be.”

Colorado may be entering a new phase of geothermal exploration and development. With its unique heat sources and the commitment to renewable energy, the state is positioning itself to be a leader in this brand of clean, reliable power. From traditional and enhanced geothermal for grid scale applications to local heating and cooling projects, Colorado is exploring the full range of geothermal possibilities. With rapidly advancing technologies and growing investment, the geothermal frontier may be within sight, with promise for both the environment and the economy. Embracing this clean energy source and proactively ensuring that the regulatory structure exists to safeguard our environment and our people, Colorado can secure a sustainable future for generations to come.

ABOUT THE AUTHORS

Anna Littlefield

Payne Institute CCUS Program Manager and Research Associate

PhD Student, Geology and Geological Engineering, Colorado School of Mines

Anna Littlefield is the Program Manager for Carbon Capture Utilization and Sequestration for the Payne Institute at the Colorado School of Mines. As a current PhD student in the Mines geology department, her research focuses on the geochemical impacts of injecting CO₂ into the subsurface as well as the overlap of geotechnical considerations with policymaking. Anna joins the Payne Institute with 8 years' experience in the oil and gas industry, where she worked development, appraisal, exploration, new ventures, and carbon sequestration projects. Her academic background is in hydrogeology with an M.S. in geology from Texas A&M University, and a B.S. in geology from Appalachian State University. Anna is passionate about addressing both the societal and technical challenges of the energy transition and applying her experience to advance this effort.

Edikan Udofia

PhD Candidate, Operations Research with Engineering, Colorado School of Mines

Edikan Udofia is a Ph.D. candidate in Operations Research with Engineering at the Colorado School of Mines. He also holds a Master's degree in Mineral and Energy Economics from the same institution, which complements his extensive academic and practical experience in the field. Prior to his academic pursuits, Edikan spent over a decade in industries including oil and gas, mining, agribusiness, and logistics. In these roles, he honed his expertise in strategy and implementation, business development, project management, and new venture planning.

With a research focus on industrial-scale data analysis, Edikan combines principles from statistics and operations research. He is particularly interested in applying these concepts to enhance efficiency in complex systems. His unique perspective is grounded in both industry experience and academic rigor, which bolsters his approach to data-driven problem-solving.

Beyond his research, Edikan is dedicated to fostering collaboration. He firmly believes in the importance of academia and industry working in tandem to tackle complex challenges. This belief not only informs his work but also shapes his broader approach to his field of study.

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