

# Heat Mining Company LLC

Carbon Dioxide Plume Geothermal - CPG™

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## **Fast Facts**

Founders:	Kenneth Carpenter, Jimmy Randolph, Martin Saar
Date Founded:	2012
Employees:	10
Headquarters:	Rapid City, SD
Revenue:	N/A
University:	University of Minnesota
Federal Funding Agency:	Department of Energy, National Science Foundation
Initial Research Funding:	\$4.3M

Heat Mining Company's (HMC) proprietary technology, known as carbon dioxide plume geothermal (CPG), stands at the convergence of the practical need to burn fossil fuels to generate the vast majority of the world's energy needs and the growing concern over the emission of carbon dioxide as the primary driver of global warming. Carbon capture and storage (CCS) is currently being employed as a means of reducing CO<sub>2</sub> emissions in an attempt to address global warming. While HMC is not in the CCS business, the CPG technology it licensed from the University of Minnesota is used in conjunction with CCS and provides the potential to mitigate or eliminate the cost of CCS projects and enhanced oil recovery (EOR) projects. The CPG technology also has the potential to provide super-efficient energy storage at wind farms and for these projects to generate revenue by using the captured CO<sub>2</sub> to generate electric power from geothermal energy resources.

## **The Story Behind the Company**

While driving to a field site in 2009, two University of Minnesota researchers, Earth Sciences professor Martin Saar and postdoctoral fellow Jimmy Randolph, imagined a new way to generate electricity through carbon dioxide plume geothermal (CPG). CPG generates power with a "two-for-one" climate benefit: It draws heat from the earth to generate electricity without producing CO<sub>2</sub>, while at the same time geologically sequestering CO<sub>2</sub> that would otherwise be emitted from fossil-fuel-burning power plants and other CO<sub>2</sub> emitters. Unlike traditional geothermal energy production, which uses water as its working fluid for subsurface heat transfer, their technology utilizes the geologically-stored supercritical carbon dioxide as the subsurface heat extraction fluid. Supercritical carbon dioxide is a more efficient working fluid than water, due to its higher mobility compared to water, which results in higher power production efficiencies than those commonly observed in water-based geothermal power plants.

The University of Minnesota's Initiative for Renewable Energy and the Environment provided \$600,000 seed money for this project in 2009. A U.S. Department of Energy grant of \$1.8 million (includes \$300,00 in additional matching funds from the University of Minnesota) followed in 2010 and in 2012, the CPG research team was awarded a highly competitive \$1.9 million grant from the National Science Foundation's new Sustainable Energy Pathways (SEP) program.