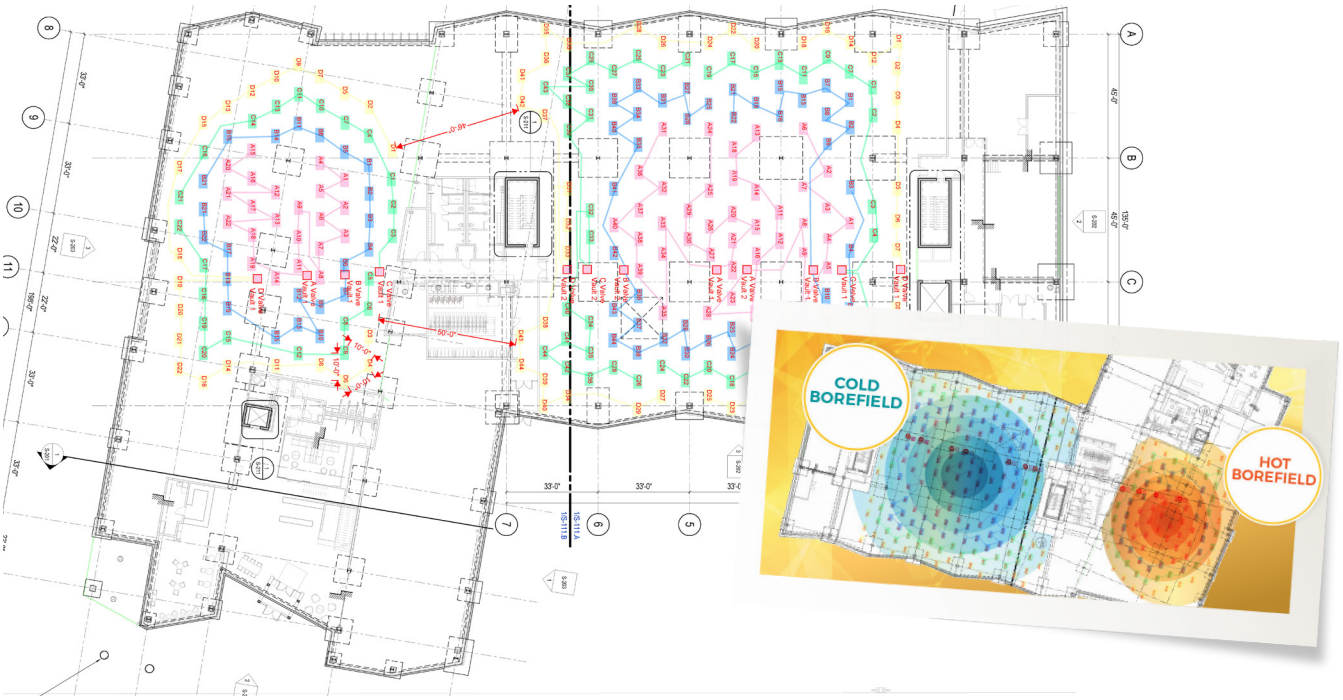
TYPE OF WORK: GEOSTORAGE - FULL DECARBONIZATION **PAST PROJECT**

Private Laboratory

BOULDER COLORADO USA



A high-performance cold Geostorage (BTES) system was implemented at a confidential laboratory campus in Colorado to meet an annual heating demand of ~2,000,000 kWh. The system includes 235 boreholes (36 m deep) designed for seasonal storage, with enhanced roof-mounted photovoltaic-thermal (PVT) collectors covering 821 m². The integration of 528 kW of water-to-water heat pumps and a 240 kW air-source heat pump supports **a peak heating electrical load reduction of 60%**, achieving a seasonal COP of 7.95. The hot and cold borefields were intentionally sized differently. The cold Geostorage field was sized larger lower source-sink temperature differentials on the cooling side.

Year built	**2023**
Client	**{classified} laboratory**
Building size	**30,000 SQ. FT.**
Contract size	**$60,000 USD**
Project size	**$1,800,000 USD**
System size	**8,100 m borehole field; 528 kW water-to-water HP, 240 kW ASHP; 821 m² PVT**

Additional benefits to our Geostorage design over the minimum code requirement included:

Case Study	Input Basis	Code Minimum	Performance	Savings	Notes
Electrical	Electricity Consumption (kWh)	1,187,288	369,520	68.9%	PV&PVT production
	Total Energy Consumption (kWh)	3,182,800	1,271,341	60.1%	HVAC-related
	Peak Demand (kWh)	1,081	**339**	**68.6%**	Eliminate grid service upgrade risk
Carbon	Grid Intensity (tCO2e/MWh)	0.447	0.447	0%	No indirect improvement assumed
	Site Emissions (tCO2e/yr)	531	0	**100%**	**Fully decarbonized**
Cost	Annual Energy Cost	$279,300	**$33,883**	**87.9%**	**Reduced OPEX**
	20 yr OPEX	$9,235,321	$1,120,374	87.9%	First cost advantage