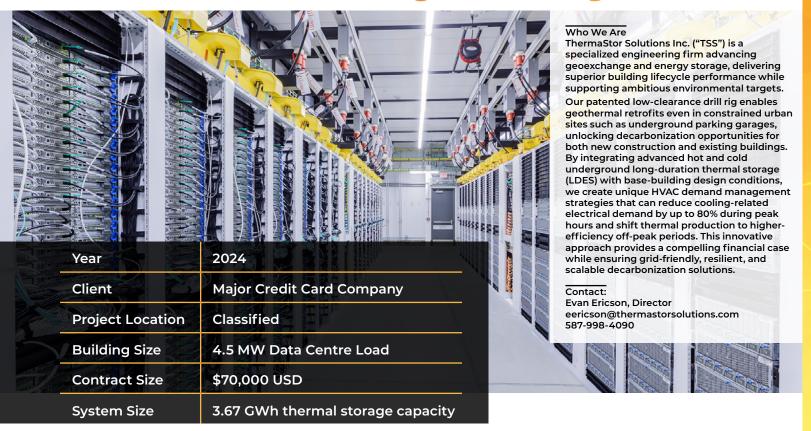


Data Centre Microgrid Design



ThermaStor employees (with previous firm) supported [classified] credit card company in advancing its sustainability objectives at its classified data center and office campus through a comprehensive microgrid feasibility study. The study aimed to significantly reduce reliance on grid electricity – especially during peak hours.

Our engineering team conducted a detailed assessment of the site's energy consuming systems, evaluating building energy conservation measures alongside renewable energy (solar and wind) and storage integration opportunities (long and short duration).

Peak load shifting – the key project mission – was accomplished by thermal energy storage. Aboveground chilled water, phase change material, and ice storage were found to be less effective or costprohibitive compared to Borehole Thermal energy storage (BTES). The cold BTES system emerged as the cornerstone of the energy strategy – designed to reduce the campus's cooling energy demand by 68% and enable seasonal shifting of renewable energy, with a storage capacity of 3.67 GWh. This approach significantly reduces curtailment and operational costs while improving overall energy resilience.

The optimized solution recommended leveraging underutilized parking lot space for solar generation – integrating both standard PV modules and PVT collectors to simultaneously generate electricity and reject heat to a seasonal cold Borehole Thermal Energy Storage (BTES) system. Existing cooling towers were leveraged in heat rejection for the BTES system, and the existing chillers waste heat made a significant contribution to the buildings heating demand.

This holistic, future-ready energy strategy offers a scalable roadmap for deep decarbonization, serving as a potential model for [classified] credit card company's global data center operations.

Lessons Learned:

When designing microgrids for mission-critical infrastructure, stakeholder alignment on operational risk tolerance is as important as technical feasibility. Early-stage engagement with facilities and IT operations teams ensured that system resilience and uptime were not compromised by aggressive decarbonization targets, ultimately shaping a solution that balanced innovation with institutional confidence.