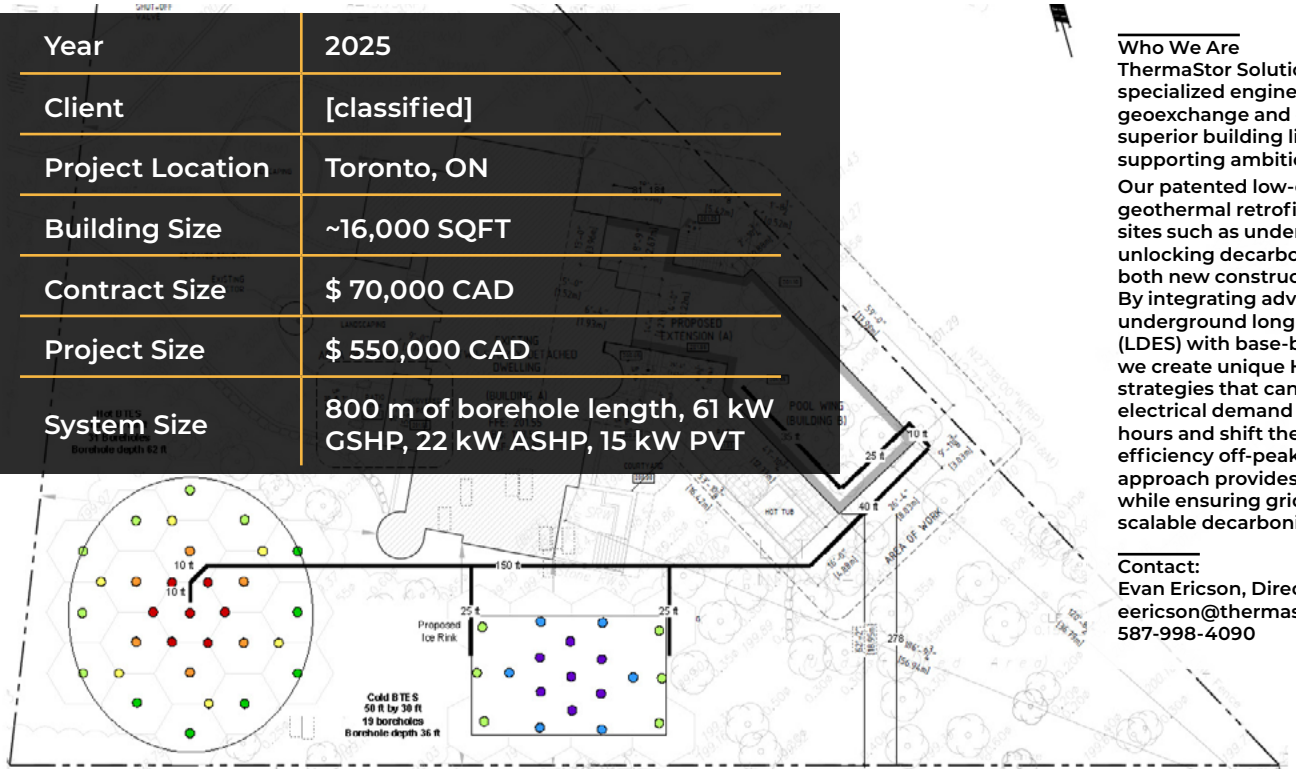
Recreation Centre

Borehole Thermal Energy Storage Integration

Year	2025
Client	[classified]
Project Location	Toronto, ON
Building Size	~16,000 SQFT
Contract Size	$ 70,000 CAD
Project Size	$ 550,000 CAD
System Size	800 m of borehole length, 61 kW GSHP, 22 kW ASHP, 15 kW PVT



Who We Are

ThermaStor Solutions Inc. (“TSS”) is a specialized engineering firm advancing geoexchange and energy storage, delivering superior building lifecycle performance while supporting ambitious environmental targets.

Our patented low-clearance drill rig enables geothermal retrofits even in constrained urban sites such as underground parking garages, unlocking decarbonization opportunities for both new construction and existing buildings. By integrating advanced hot and cold underground long-duration thermal storage (LDES) with base-building design conditions, we create unique HVAC demand management strategies that can reduce cooling-related electrical demand by up to 80% during peak hours and shift thermal production to higher-efficiency off-peak periods. This innovative approach provides a compelling financial case while ensuring grid-friendly, resilient, and scalable decarbonization solutions.

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ThermaStor Solutions served as the lead engineering consultant for the integration of a Borehole Thermal Energy Storage (BTES) system at the Glenbourne Park Recreation Centre, a multi-use facility. The project included an indoor pool, seasonal outdoor ice rink, snow melt system, and year-round outdoor hot tub, creating a highly variable thermal load profile and an ideal application for seasonal energy storage.

The system design featured a hybrid of photovoltaic-thermal (PVT), ground-source, and air-source heat pump technologies, all tied to a centralized BTES field for long-term thermal storage and dispatch. The design team used advanced simulation tools to optimize seasonal heat balancing, load shifting, and component selection, achieving a projected 86% reduction in natural gas and an impressive seasonal coefficient of performance (COP) of 8.5.

By enabling significant thermal flexibility and year-round renewable energy utilization, the system offers both environmental and economic benefits for the facility and its users. The integration of waste heat from the snow melt and refrigeration systems into the BTES field maximizes system efficiency and provides passive redundancy during high-demand periods.

Lessons Learned

Early integration of thermal design with recreational programming allowed the team to balance simultaneous heating and cooling loads more effectively. Careful load profiling and sequencing of heat pump operation were key to achieving a high system COP and reliable year-round performance.