

Our Guide to Net Zero Emissions

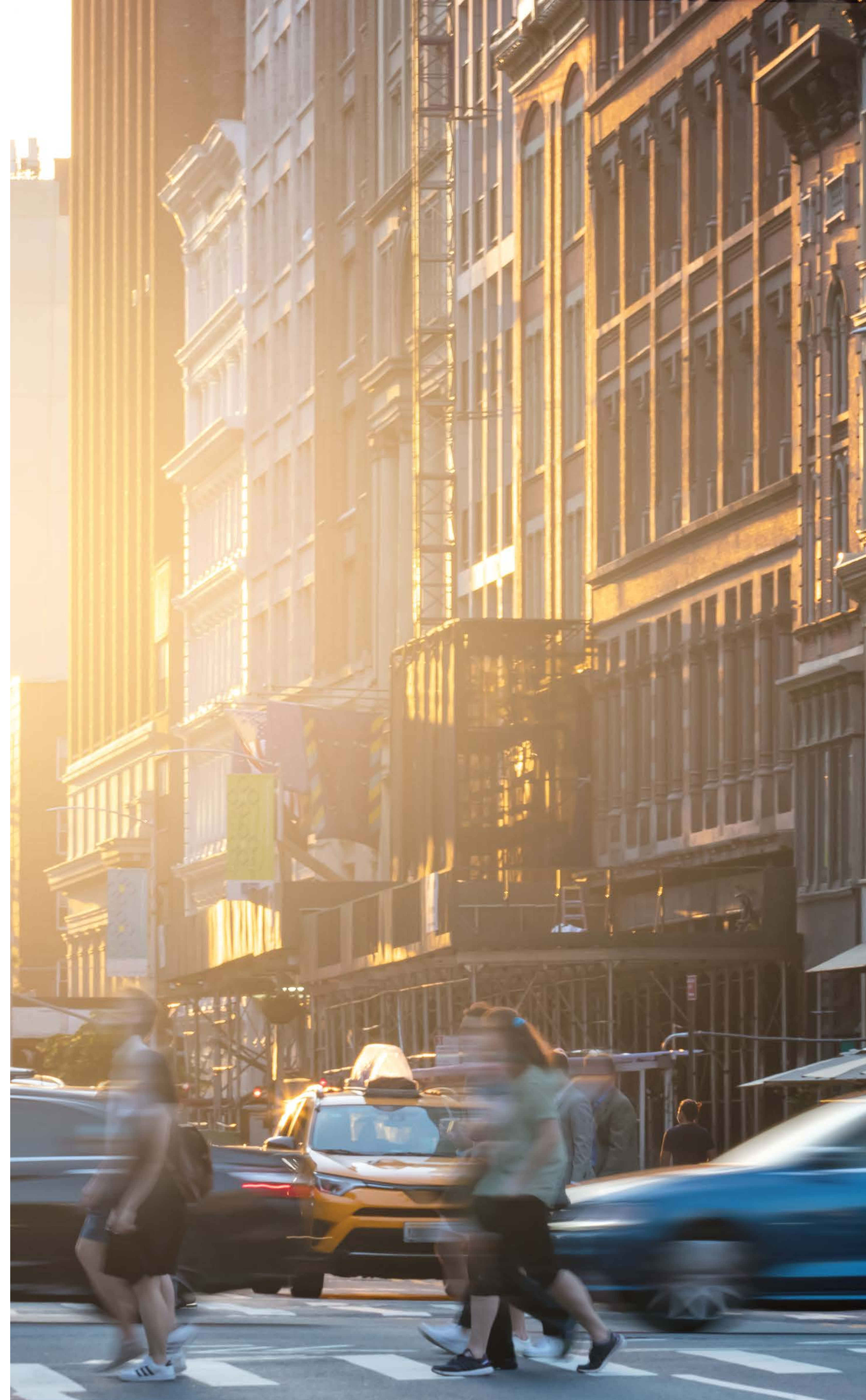
DECARBONIZING THE WORLD



Can we **decarbonize** the world?



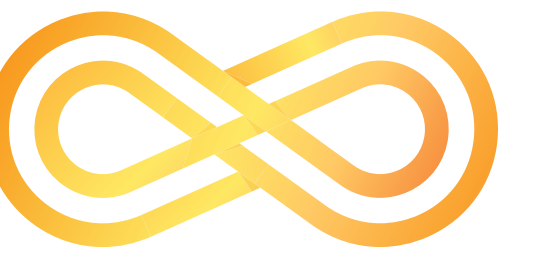
We are focusing our efforts on **decarbonizing** heating systems in the existing urban landscapes.
We can retrofit **any building type** with geothermal to reduce carbon emissions around the world.



We design and install sustainable energy storage systems in pursuit of grid-friendly building electrification and mass decarbonization. Our patent-pending miniature driller allows us to install Geoexchange and Advanced Geostorage in every building in Toronto, across the country, and around the world. Until now, no one could find an affordable way to decarbonize our built world.

Our new innovation harnesses the full potential from both renewables and waste heat, while leveraging the latest in heat pump technology paired with an energy storage system, often eliminating the need for costly grid connection upgrades. We deliver superior building lifecycle performance while supporting ambitious environmental targets.

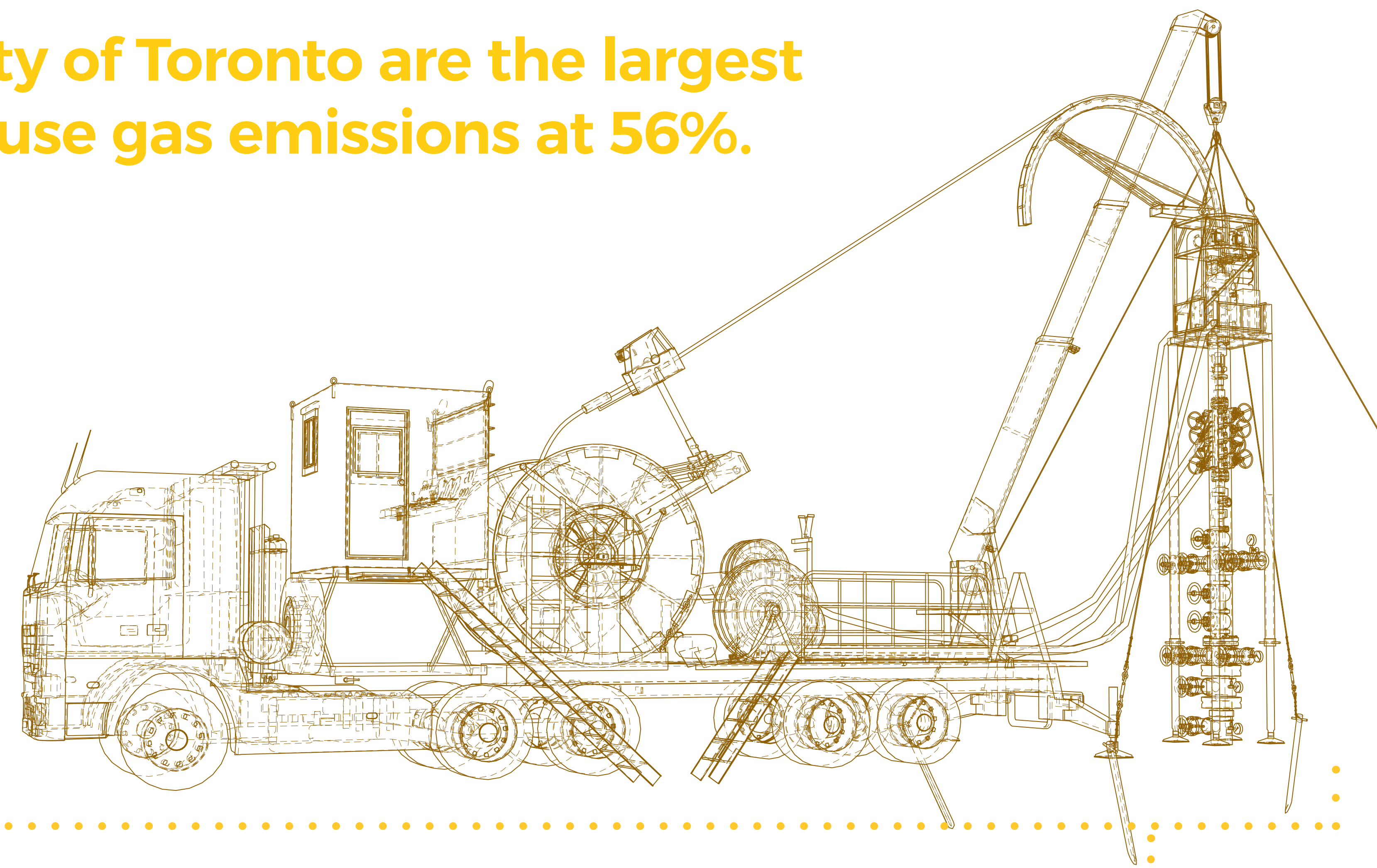
Our people are our greatest strength. Our proven team and decades of experience have gotten us here. Our team brings deep expertise, innovation, and passion to every project. Together, we draw on a wealth of global and local experience to deliver high-performance, low-carbon solutions for the built environment.



Our technology will change the world

It is quite simple; we can reduce greenhouse gas emissions from the largest carbon emitter: urban buildings. **This is the solution to decarbonization.** From historical structures with outdated insulation and inefficient heating systems, to newer buildings burdened with decarbonization mandates, and even the ones that haven't been built yet. This can be accomplished while conserving electricity and reducing grid demands.

Buildings in the city of Toronto are the largest source of greenhouse gas emissions at 56%.



How we got here

Our team saw the need to decrease carbon emissions from buildings and leverage geothermal drilling to heat and cool those buildings.

The idea that changed everything:

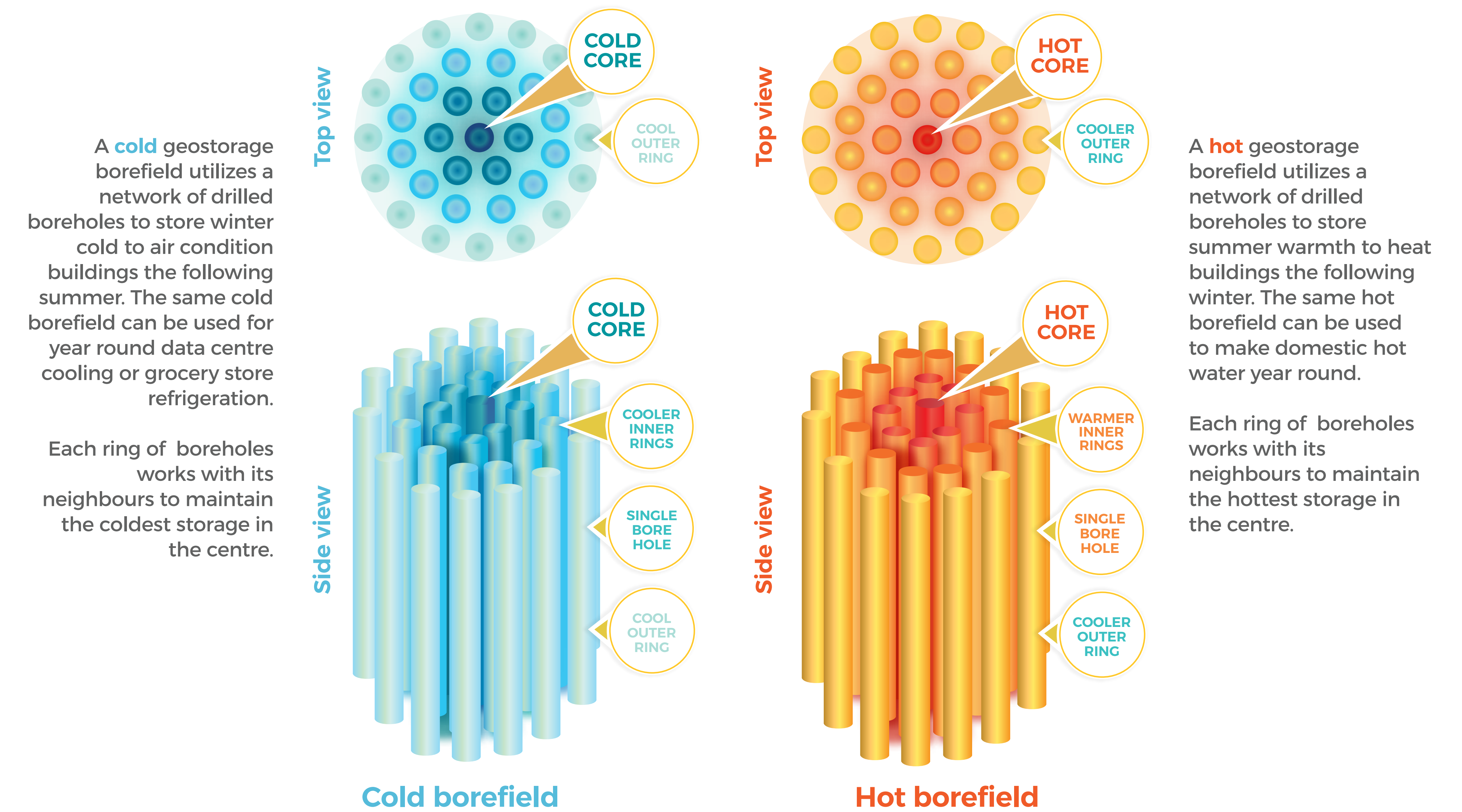
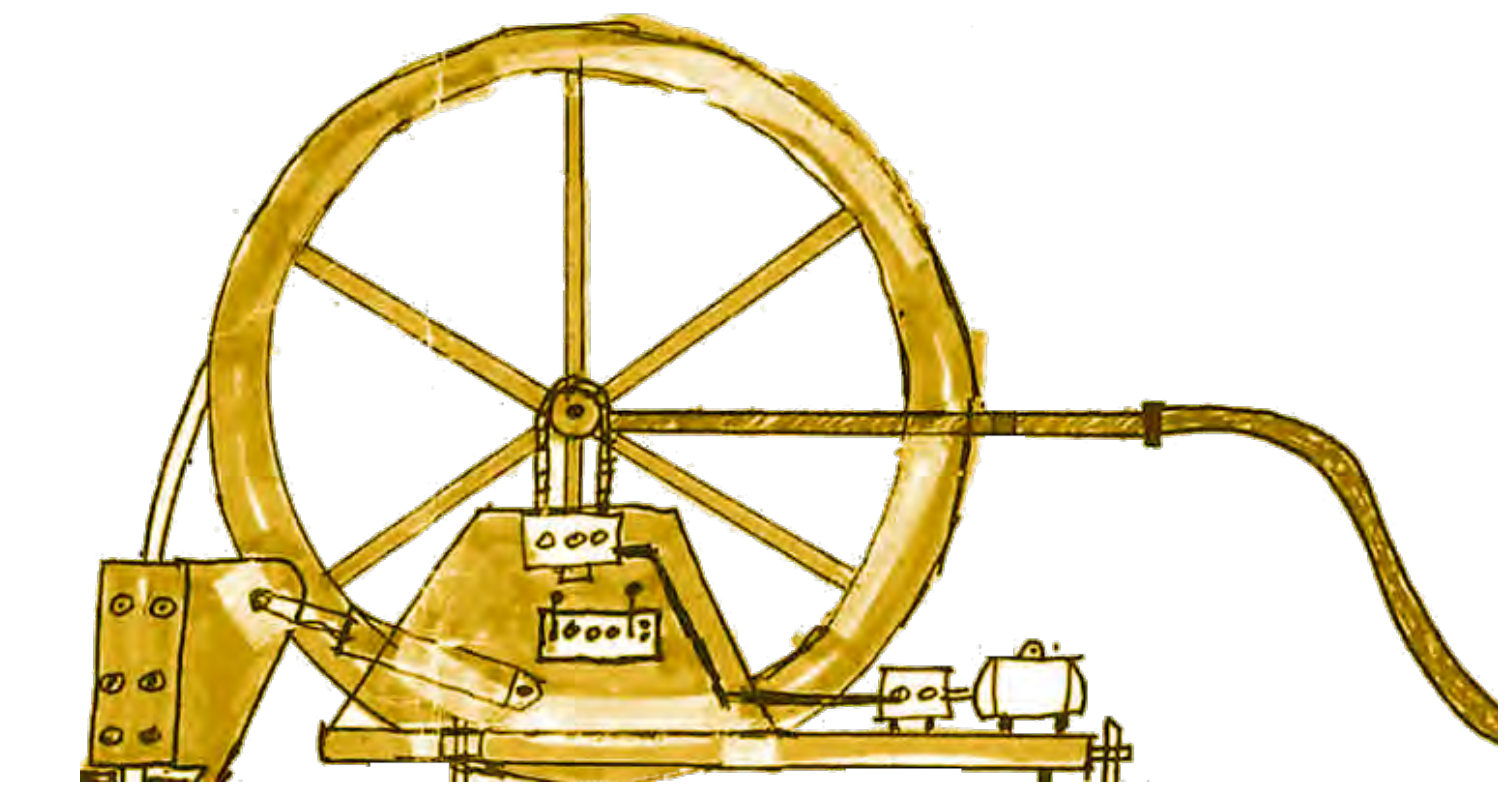
What if there was a drill rig that could fit inside an existing building and drill from the lowest level of a parking garage?

We could convert the heating and cooling of that building from fossil fuels to clean geothermal energy.

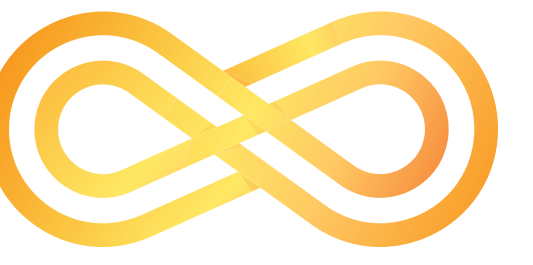
A **typical coil drill rig** stands about 35' high. This large machine, used for oil and gas exploration as well as to drill large outdoor geothermal borefields only works in the construction of new buildings. With thousands of aging buildings of all types across the Greater Toronto Area and across Canada, the solution needed to be something that could fix the problem we have created; the reliance on fossil fuels. The issue was that there wasn't a driller small enough to fit inside a building to retrofit them. Our miniaturized driller solves this seemingly monumental task: Decarbonize our built world.

What sets us apart?

- 1. First-of-its-kind patent-pending miniaturized driller that is just 6'8" in height, allowing us to retrofit existing buildings anywhere in the world. The key to decarbonizing existing buildings.**
- 2. Geostorage - We have developed and improved upon Georexchange to effectively store thermal energy in underground borefields to heat and cool buildings when needed. This process eliminates the largest carbon emission producers; urban buildings like high-density residential towers, commercial structures, industrial warehousing and recently the proliferation of AI - data centres.**

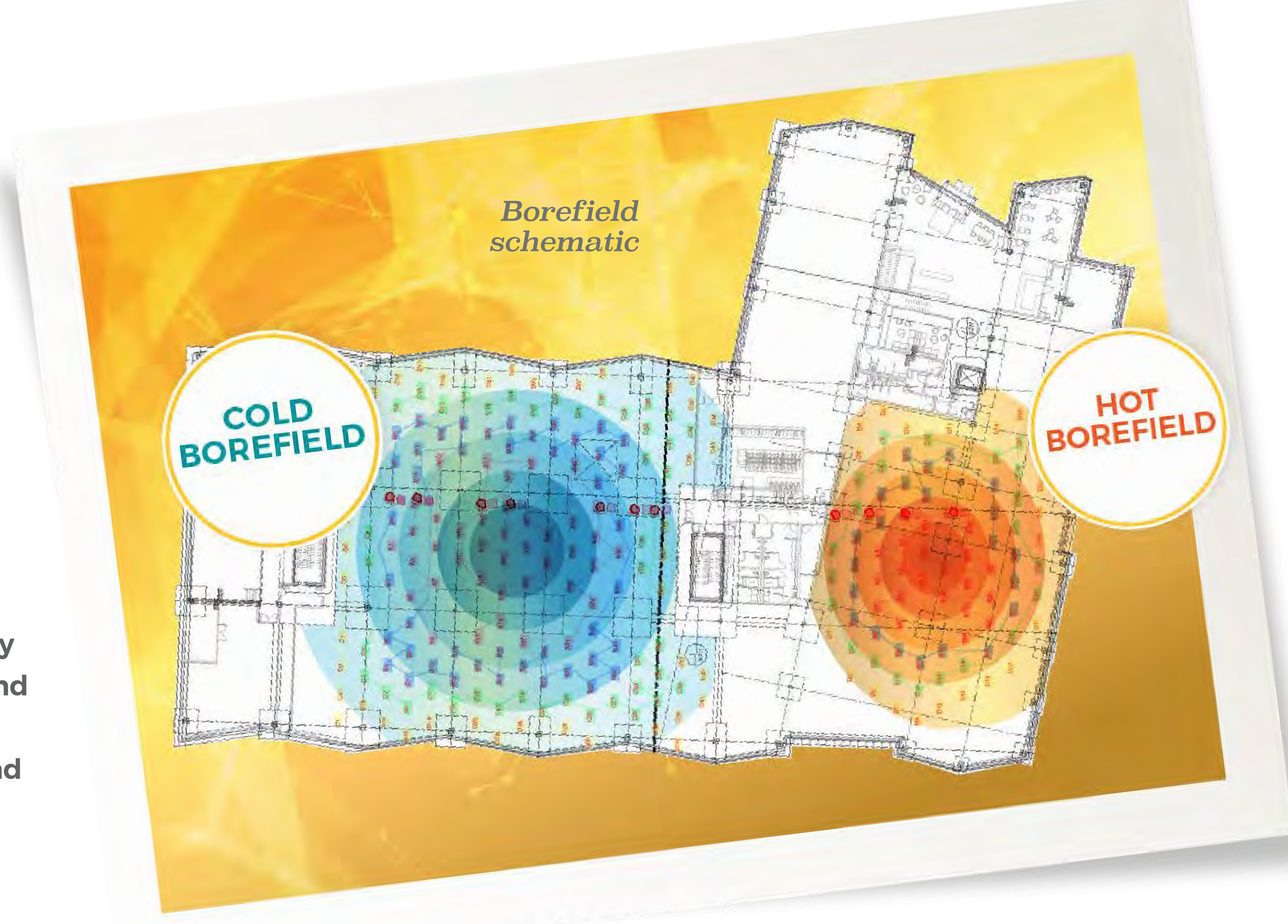


Geostorage can be utilized to retrofit existing buildings, and in new construction applications. It is efficient, scalable and reliable, while also providing grid stability and complementing other clean energy sources. The added benefit of Geostorage is we can capture and store excess wind and solar power, which is often curtailed.



How a borefield works:

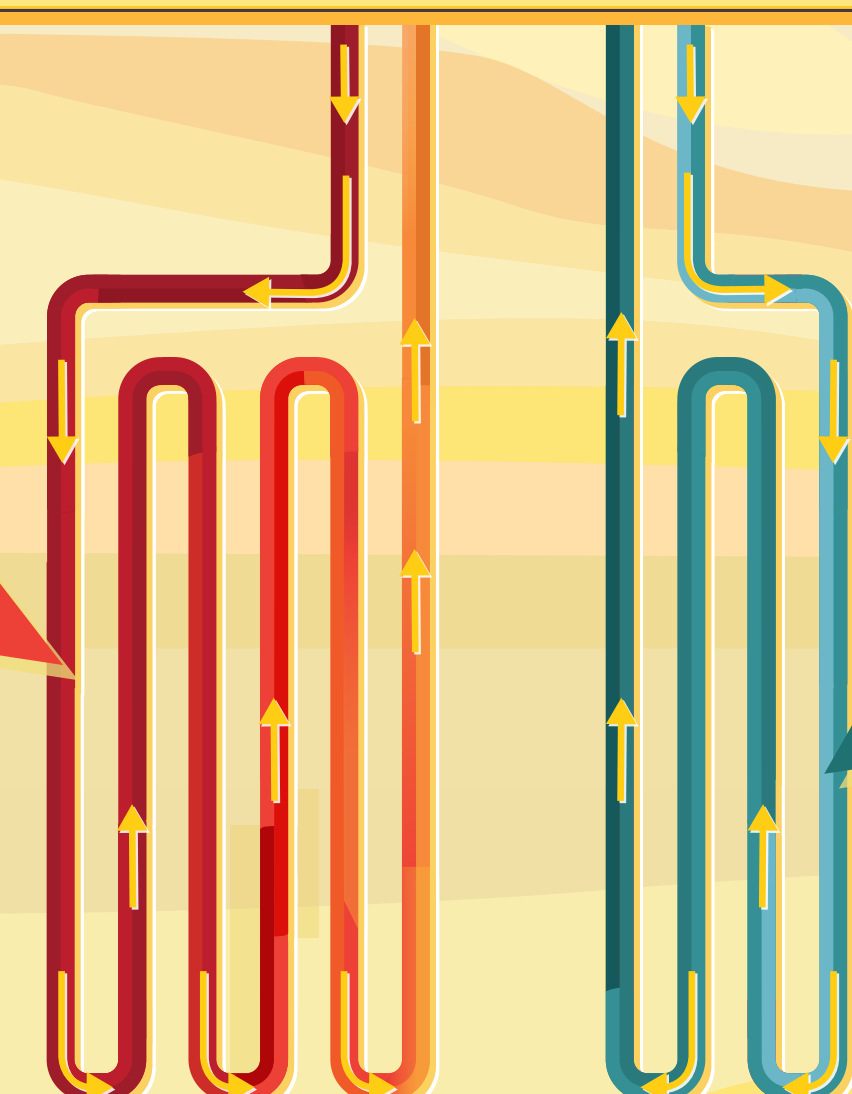
The borefield transfers heating or cooling energy to the surrounding ground material, so the thermal energy may be stored and utilized when needed.



Our Geostorage system allows for independent hot and cold borefields that provides unique advantages over traditional Geoexchange. Separation of hot and cold storage allows the design to intentionally mismatch the size of each thermal battery to better meet the heating and cooling energy needs of the building they are connected to. The two borefields work together to provide all the energy the building needs.

During summer months, cold energy is discharged from the cold borefield to cool the building; simultaneously the hot borefield is charged with warm ambient energy. In winter months, the process is reversed. The hot borefield discharges heating into the building as needed, and cold ambient conditions are leveraged to charge the cold borefield for use the following summer.

SUMMER CHARGING FOR FUTURE WINTER USE



COLD FROM GROUND COOLS BUILDING

Reducing grid demand

Grid demand has increased across the world with the electrification of the automobile industry and the need for data centres to power AI. Not only is Canada short on power to run all these items, but it has become a hot point politically across the globe. As a nation, we can't afford to build enough power plants fast enough to meet our growing electrical requirements.

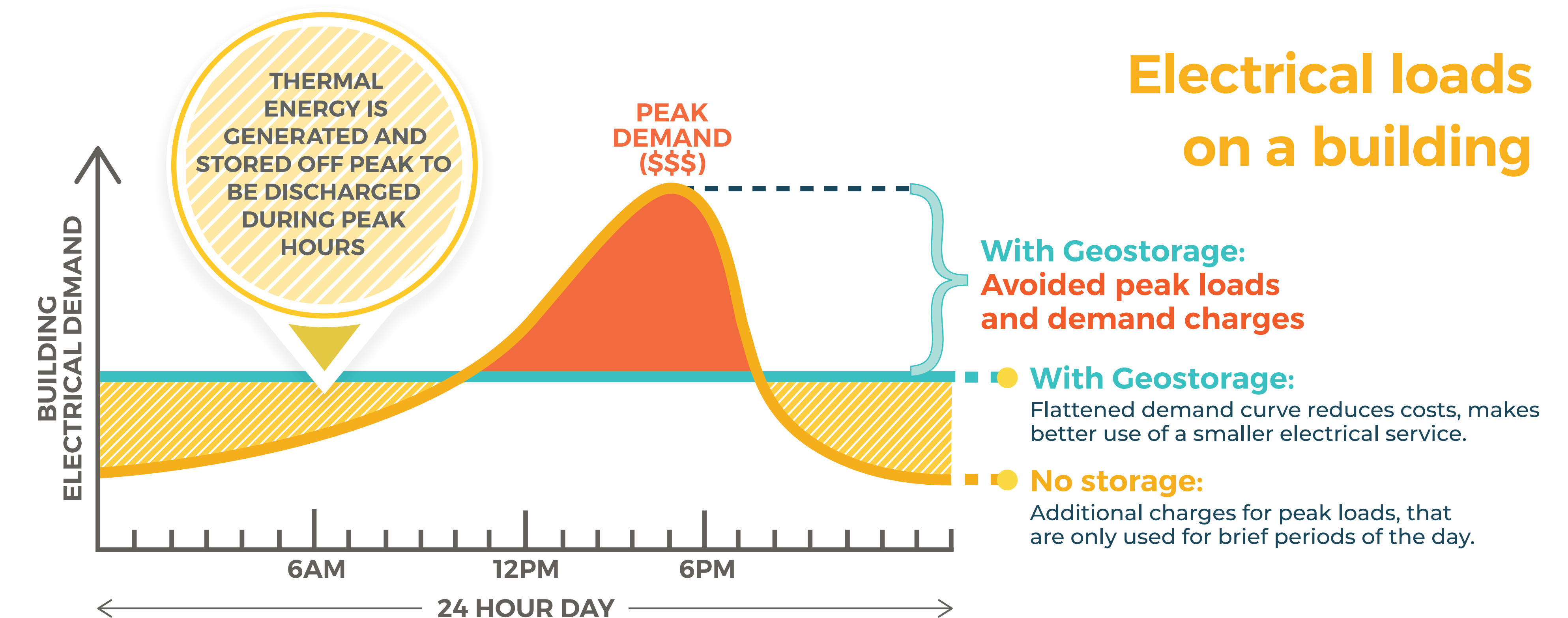
Increased grid demand occurs during extreme weather conditions (a heatwave or extended extreme cold) and requires the greatest electrical needs. Introduce Geostorage into an extreme weather event and no additional power is required. Geostorage decouples the need from the time, leveraging the already charged borefield, further reducing the constraints of the overloaded electrical power grid. This is why Geostorage is the key to lessening the energy crisis and reducing electrical grid peaks in major centres.



This concept is as simple as battery storage in your car. Imagine paying daytime electrical rates for car charging; no one would drive electric cars. It is the off-peak charging that renders the benefits. This is the same basic principle that can apply to every building that is heated and cooled with Geostorage.

Understanding peak demands

Load shifting: Buildings equipped with Geostorage also benefit from load shifting. It decouples the hours of the year when the mechanical equipment runs to produce heating and cooling, from the hours of the year when the building needs that energy. This further enhances grid flexibility and enables additional decarbonization.

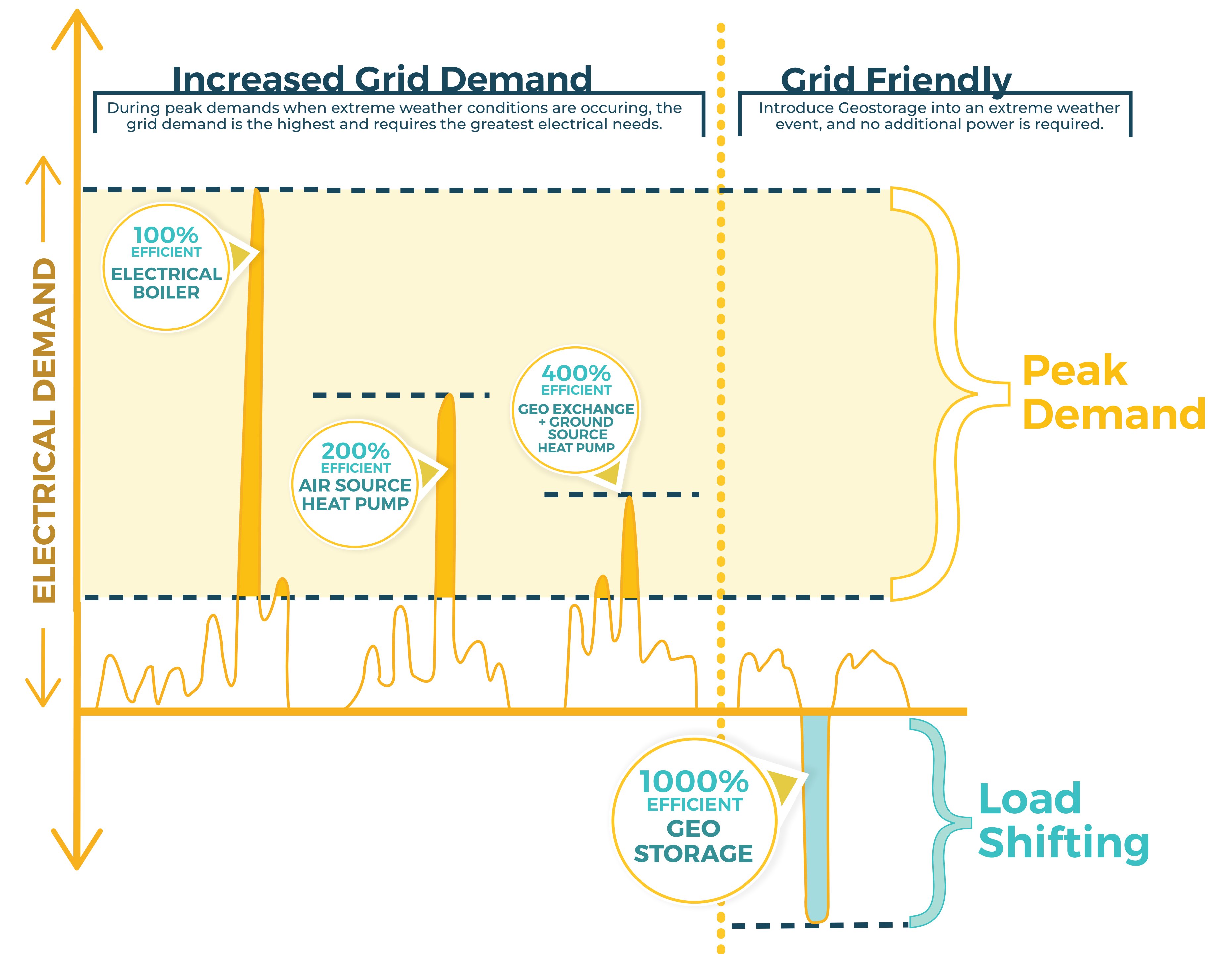
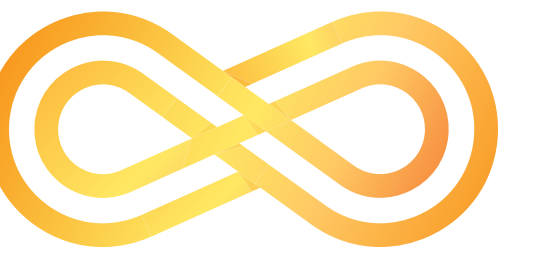


Electrical loads on a building

With Geostorage: Avoided peak loads and demand charges

With Geostorage: Flattened demand curve reduces costs, makes better use of a smaller electrical service.

No storage: Additional charges for peak loads, that are only used for brief periods of the day.



Augmenting how we utilize the power grid:

Geostorage can alleviate peak grid demand

Reducing demand through storage

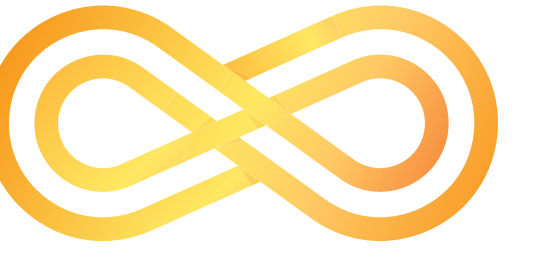
Thermacity Energy can store renewable energy like wind and solar power when they are plentiful to charge the Geostorage system. Thermal energy is utilized from the Geostorage system at grid peaks to reduce the buildings need for expensive peak power. In turn, this reduces the electrical demand on the grid at those peaks.

Electrification takeaway:

Why can't we simply build more power plants?

It's too expensive

The cost is prohibitive of the required nuclear plants that are needed to be built to supply peak demands. Grid friendly applications mean reducing the electrical dependence - while simultaneously electrifying building HVAC systems.



COST CARBON CONSERVATION

We tailor a unique demand management strategy for your building or development 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 a scalable decarbonization solution.

COST:

FOR BUILDING OWNERS + OPERATORS

- Lower upfront cost to install the system. The boreholes are shallower and can be drilled faster
- Lower lifecycle cost of mechanical equipment in the buildings, less real estate needed, and smaller equipment required
- Higher ROI than fossil fuel alternatives

CARBON:

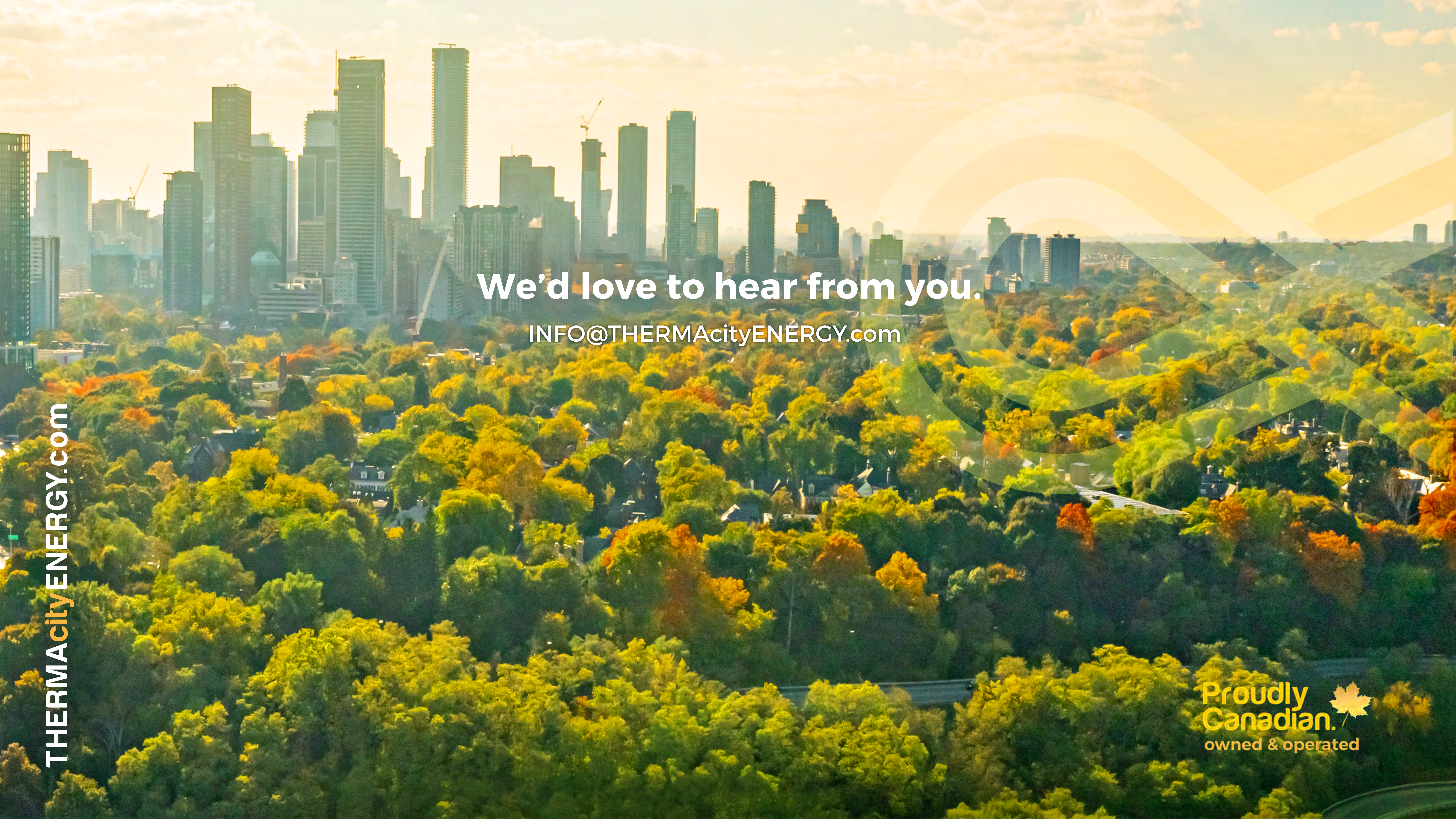
DECARBONIZATION MANDATE

- Improved engineering: Geostorage; is more efficient than typical Geexchange, and offers increased resilience in the new normal of extreme weather patterns and climate change.
- Removes fossil fuel usage
- Reduces demand on the power grid - electrifies the building
- Most cost-competitive solution for decarbonization
- Retrofit solution: Decarbonize entire urban landscapes

CONSERVATION

SAVE THE ENVIRONMENT

- Off-peak operations. **20-40% reduction in grid demand.** Decoupling daily weather patterns from the heating and cooling demand of buildings. Examples like extreme hot and cold weather, where urban areas are taxing the power grid because HVAC systems are calling for more heating or air conditioning.
- Electrical load shifting - decreases the overall electrical demand on the power grid
- Geostorage **can store 100% of renewable electricity like solar and wind** power that is often curtailed from the grid if it is not consumed when sun is shining or wind is blowing.



We'd love to hear from you.

INFO@THERMAcityENERGY.com

THERMAcityENERGY.com

Proudly Canadian. 
owned & operated