

GEOHERMAL

RENEWABLE HEATING & COOLING SOLUTIONS FOR THE CITY OF ANN ARBOR

 **Brightcore**
BUILDING ENERGY PERFORMANCE™

**THE MOST EFFICIENT BUILDING
ELECTRIFICATION SOLUTION IS
RIGHT UNDERNEATH YOUR FEET**



SAFE HEALTHY CLEAN RELIABLE HEATING FOR THE CITY OF ANN ARBOR

Brightcore Energy applauds the City of Ann Arbor for its ambitious commitment to carbon neutrality by 2030. With the expiration of DTE Gas' Heating Franchise, the City has an incredible opportunity to decarbonize its heating and cooling by implementing a community geothermal district system.

The Brightcore team has been actively involved in the design and installation of geothermal systems for the past 30 years, has installed hundreds of geothermal projects, and has consulted for leading utilities, such as Eversource and National Grid, on developing district thermal networks. Brightcore maintains a fleet of state-of-the-art drill rigs and a staff of highly qualified drillers, inclusive of licensed master drillers, with extensive experience on large-scale projects.

In addition, Brightcore has brought innovations from around the world into the US marketplace. Our team has introduced water down-the-hole drilling technology to the US, and can deliver projects with less noise, vibration, and dust – all while delivering more precise drilling capabilities than conventional equipment. This technology can also drill within buildings or other hard to reach places, and at inclined angles, allowing for more installations in urban environments and other compact areas.

There are many challenges to designing and constructing community geothermal systems in urban areas, and Brightcore has the innovative equipment and expertise to overcome them.

We look forward to further discussions and supporting the City of Ann Arbor on the development and implementation of this project.

WE DEPLOY AND FUND A WIDE RANGE OF ELECTRIFICATION SOLUTIONS

INCLUDING:



RENEWABLE HEATING & COOLING



COMMERCIAL & COMMUNITY SOLAR



LED LIGHTING & CONTROLS



BATTERY ENERGY STORAGE



ELECTRIC VEHICLE CHARGING





THE BRIGHTCORE TEAM HAS...

250 MILLION

kWh saved through LED lighting upgrades

\$500 MILLION

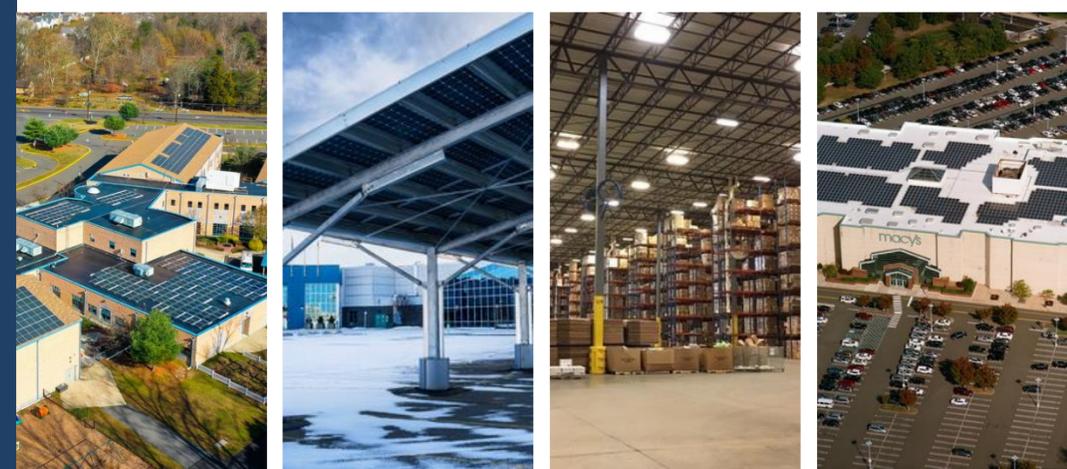
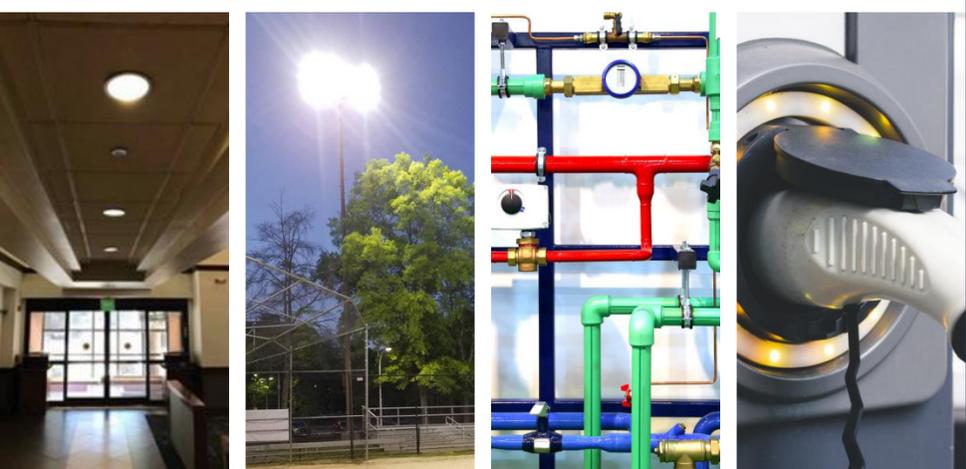
solar PV projects implemented and financed

150

geothermal projects designed and implemented

100+

aggregate years of clean energy experience

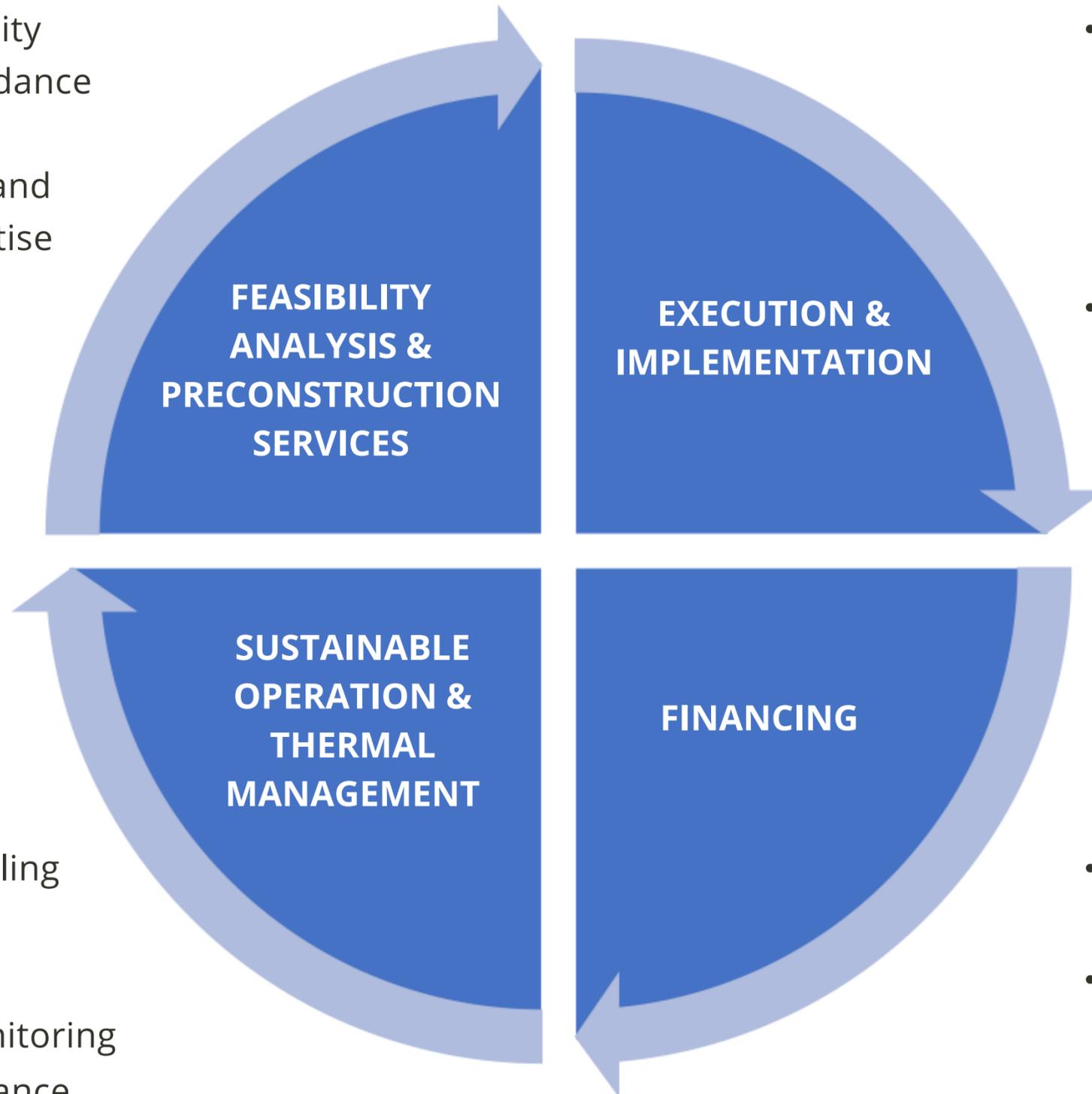


- ✓ **TURNKEY MODEL**
- ✓ **TECHNICAL EXPERTISE**
- ✓ **IN-HOUSE DRILLING**
- ✓ **INNOVATION**
- ✓ **ENERGY AS A SERVICE**
- ✓ **FINANCIAL STRENGTH**
- ✓ **LOCAL PRESENCE**

UNIQUE GEOTHERMAL BUSINESS MODEL

IN-HOUSE ENGINEERING & DESIGN, DRILLING, FINANCE AND ONGOING O&M

- Initial feasibility
- Incentive guidance
- In-house engineering and design expertise



- Brightcore drill rigs: conventional and innovative (incline, water hammer, electric, etc.)
- In-house licensed master drillers

- Energy modeling and asset optimization
- Ongoing monitoring and maintenance

- Geothermal-as-a-service
- In-house capital

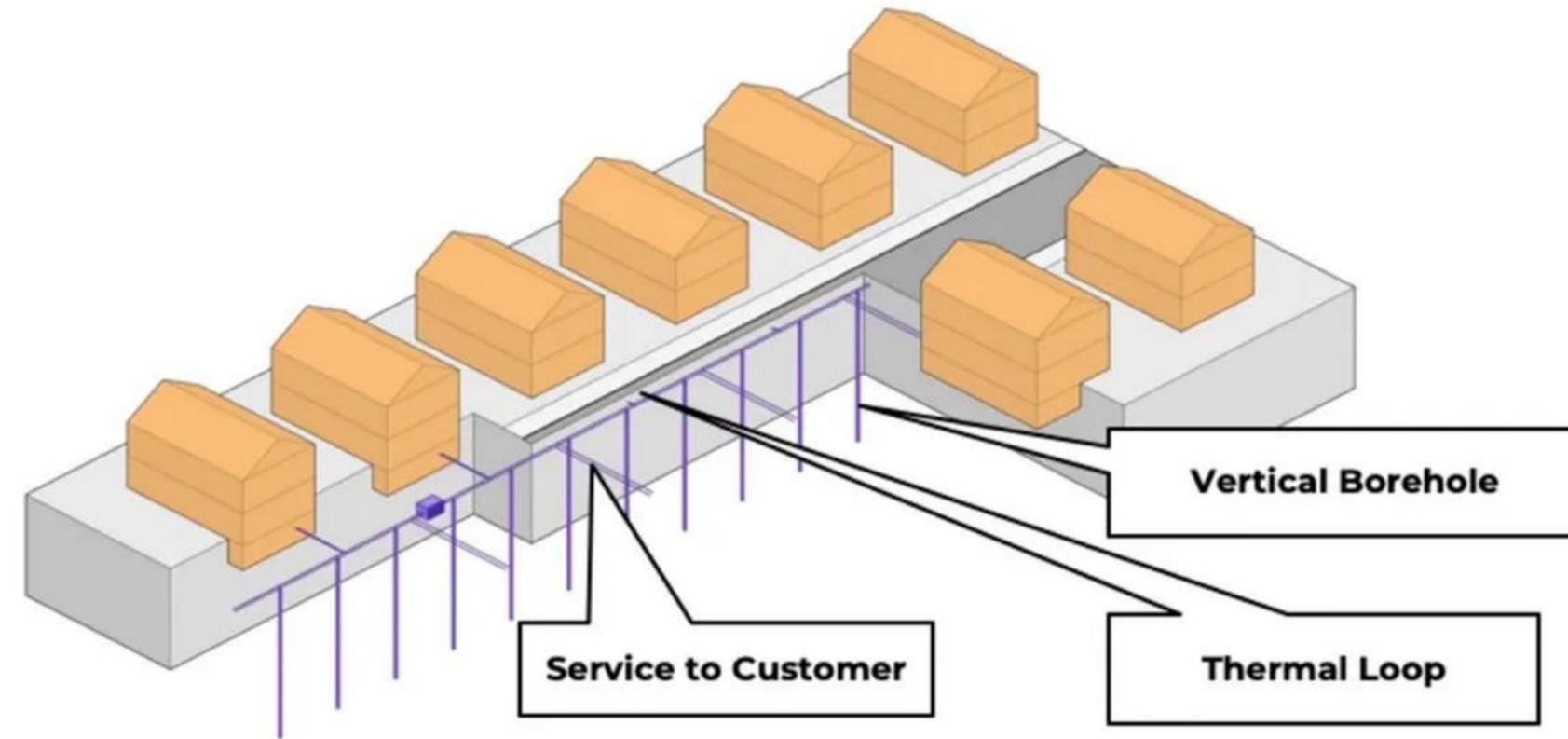


WHY GEOTHERMAL?

- ✓ **Most Efficient HVAC solution:** Geothermal eliminates the use of fossil fuels in the heating and cooling of buildings. In cold climates, it is 3-4x more efficient than gas-fired systems. These two attributes greatly reduce carbon emissions.
- ✓ **Lowers HVAC Operational Expenses:** Due to the efficiency improvements geothermal energy systems provide, HVAC operating costs can be lowered by 30%-40%. Maintenance costs can also be reduced by up to 75%.
- ✓ **Eligible for up to 40% Federal Investment Tax Credit:** The Inflation Reduction Act (IRA) includes up to a 40% Federal Investment Tax Credit (ITC) on both the geothermal ground loop system and the interior mechanical equipment. This credit is not available for air source heat pumps. Not for Profit 501(c) organizations are now eligible to receive cash in lieu of the tax credit under the 'Direct Pay' provision.
- ✓ **Available State and Utility Incentives:** Many states and local utility companies also offer significant incentives for ground source heat pump systems.
- ✓ **Carbon Neutral Ready:** Local and federal mandates are requiring buildings to reduce their carbon emissions. Geothermal is a great solution to help meet sustainability mandates and goals.
- ✓ **Long Operational Life:** The operational life for a geothermal ground loop exceeds 100 years and the heat pump is 25 years. This makes a geothermal system the best option for a long-term solution.

BASICS OF MODERN CLOSED-LOOP WATER SOURCE HEAT PUMPS & AMBIENT TEMPERATURE NETWORKS

- Water-to-water and water-to-air heat pumps leverage the ambient temperature loop to provide the most efficient heating and cooling.
- Buildings with opposing loads can benefit from each other's energy use when connected to an ambient temperature network.
- Ambient temperature loops can also source energy from closed-loop geothermal, waste-water heat recovery, CSO, and surface water.
- Community geothermal networks are the next generation of renewable, carbon neutral heating and cooling.





THE CHALLENGE OF GEOTHERMAL URBAN BUILDING FOOTPRINTS

NEW CONSTRUCTION

Urban building density dramatically limits site access for specialty drilling equipment.

Traditional geo drilling technology requires a large surface area to accommodate the spacing between vertical boreholes.

Conventional borehole drilling cannot be done concurrent with the building construction, delaying the start and completion of the overall project.

RETROFIT OF EXISTING BUILDINGS

Conventional drilling equipment is extremely difficult to fit into existing buildings.

Drilling creates disruption to building occupants and operations due to significant noise, vibration and dust.

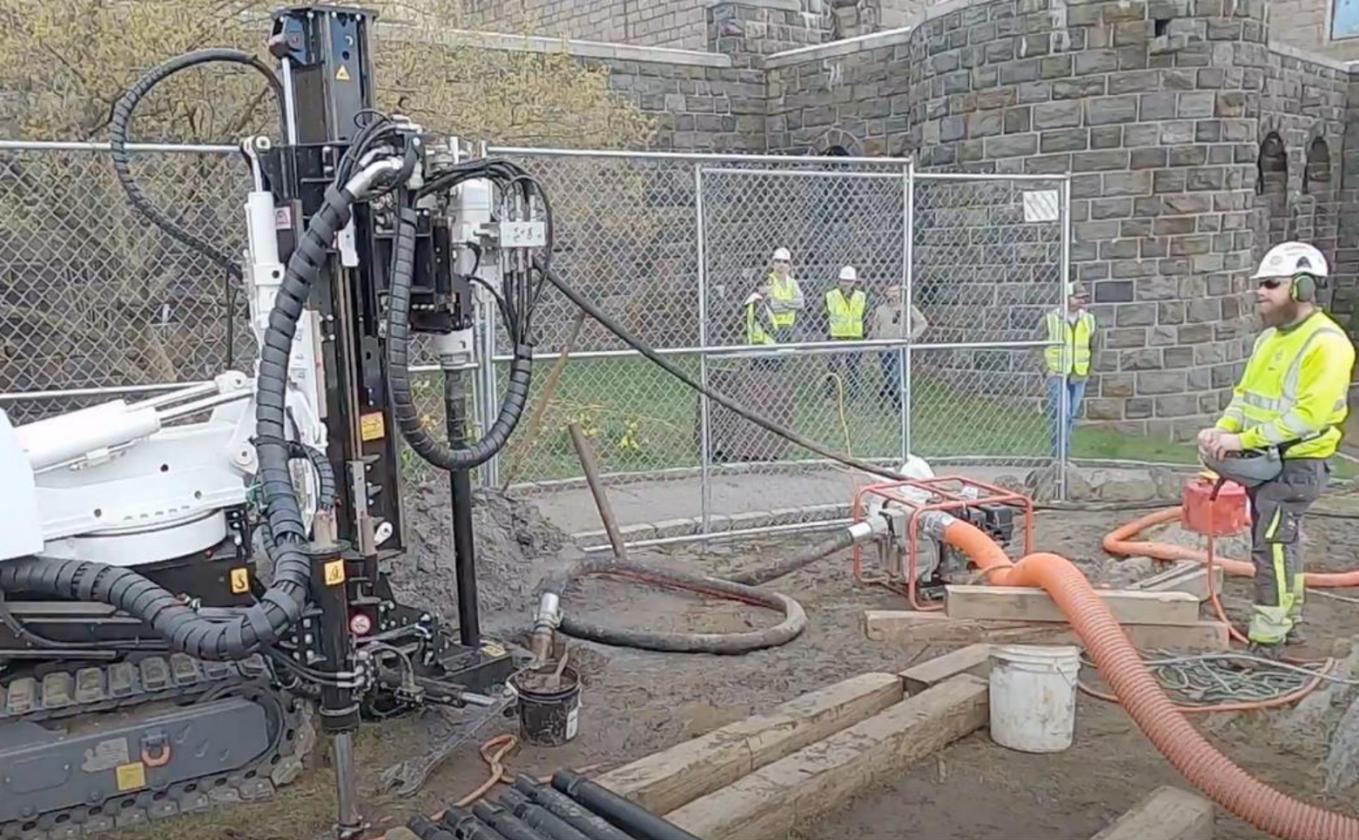
Vertical borefield size cannot be accommodated by existing building footprint



THE SOLUTION FOR URBAN ENVIRONMENTS

UrbanGeo™

- ✓ Delivers all of the benefits of ground source geothermal in an urban environment.
- ✓ Impacts new construction by compressing traditional schedules through concurrent drilling & project execution.
- ✓ Unlocks existing urban buildings by enabling retrofit solutions in tight spaces with minimal business disruption.
- ✓ Innovates drilling with Inclined Borehole Thermal Energy Storage (BTES) optimizing renewable heating & cooling.
- ✓ Is the most efficient building electrification solution that lowers peak demand.



WHY BRIGHTCORE? OUR TECHNOLOGY

Cutting edge equipment: Brightcore's geothermal technology can allow for geothermal installation in places where others can't, including urban areas. We have access to a fleet of drill rigs and can run several rigs simultaneously to reduce project lead time.

Minimal disruption, even in urban areas: Whether your project is a retrofit or new construction, we provide minimal operational disruption, even in urban environments. Our company-owned mini rig fits in small spaces with low overhead clearance. This eliminates dust and drastically reduces noise pollution.

Smaller footprint: Utilizing proprietary drilling technology, boreholes are capable of being drilled at inclined angles, with a much smaller footprint at the top and larger footprint at the bottom. Because it uses water for drilling instead of compressed air, it allows for drilling in bedrock.

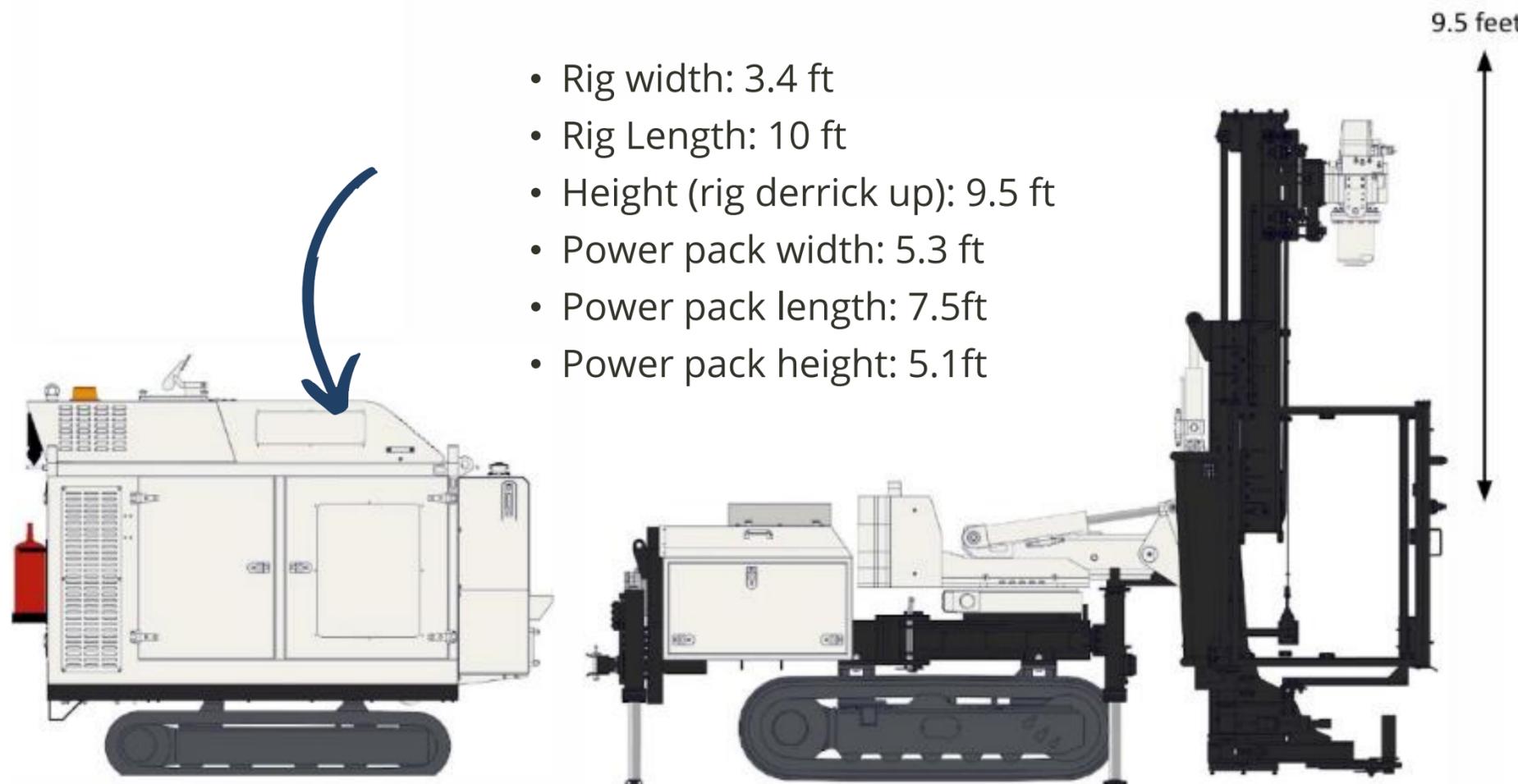
WHY BRIGHTCORE? OUR TECHNOLOGY

WE HAVE ACCESS TO A FLEET OF DRILL RIGS AND CAN RUN SEVERAL RIGS SIMULTANEOUSLY TO REDUCE PROJECT LEAD TIME

OUR CUSTOM MINI RIG

Great for installations in difficult terrain and low-clearance spaces

Not available in the U.S. market - until now!



CONVENTIONAL DRILL EQUIPMENT

Great for installations in large open areas in certain geological settings



SOLUTION: TECHNOLOGICAL INNOVATION CONVENTIONAL V. SPECIALIZED DRILLING RIG SIZE



RETROFITTING THERMAL ENERGY STORAGE GEOTHERMAL SOLUTIONS



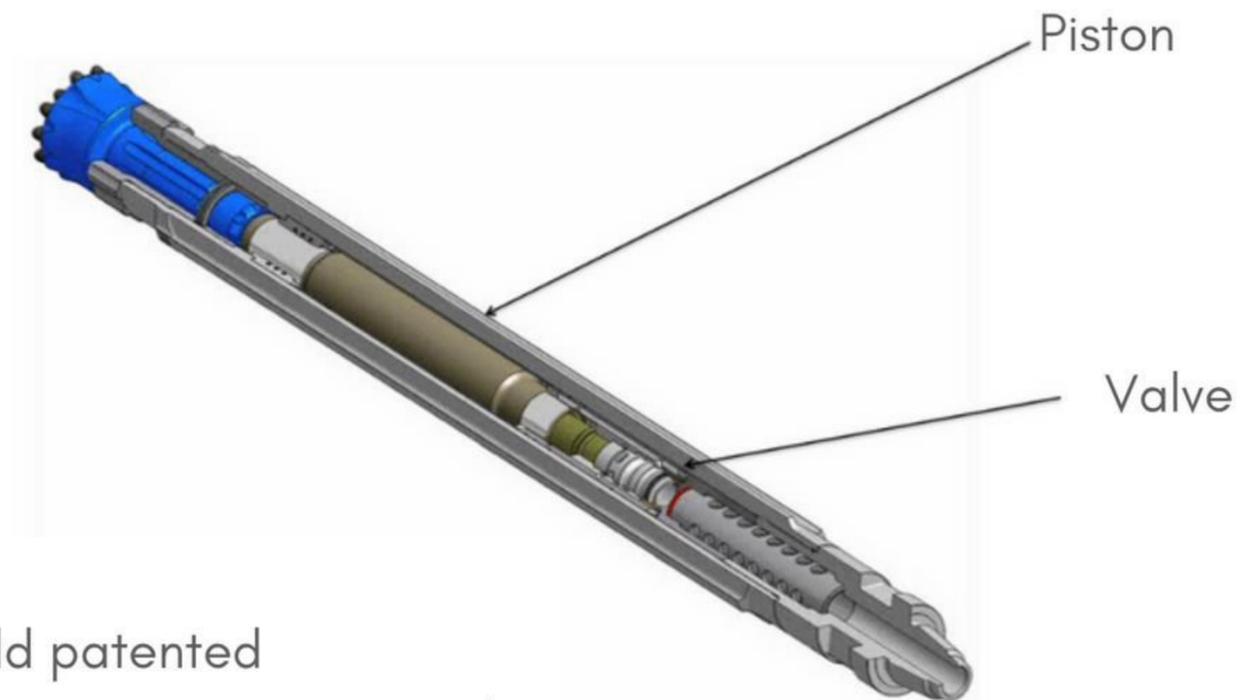
CLEAN BUILDING RETROFITS

Low noise, low vibrations & NO DUST! System retrofits can be completed in small spaces with low overhead clearance.

UrbanGeo™ INNOVATIVE DRILLING TECHNOLOGY

Utilizing the Wassara Water Down-the-Hole (WDTH) drilling technology, boreholes are capable of being drilled at inclined angles from very small footprints.

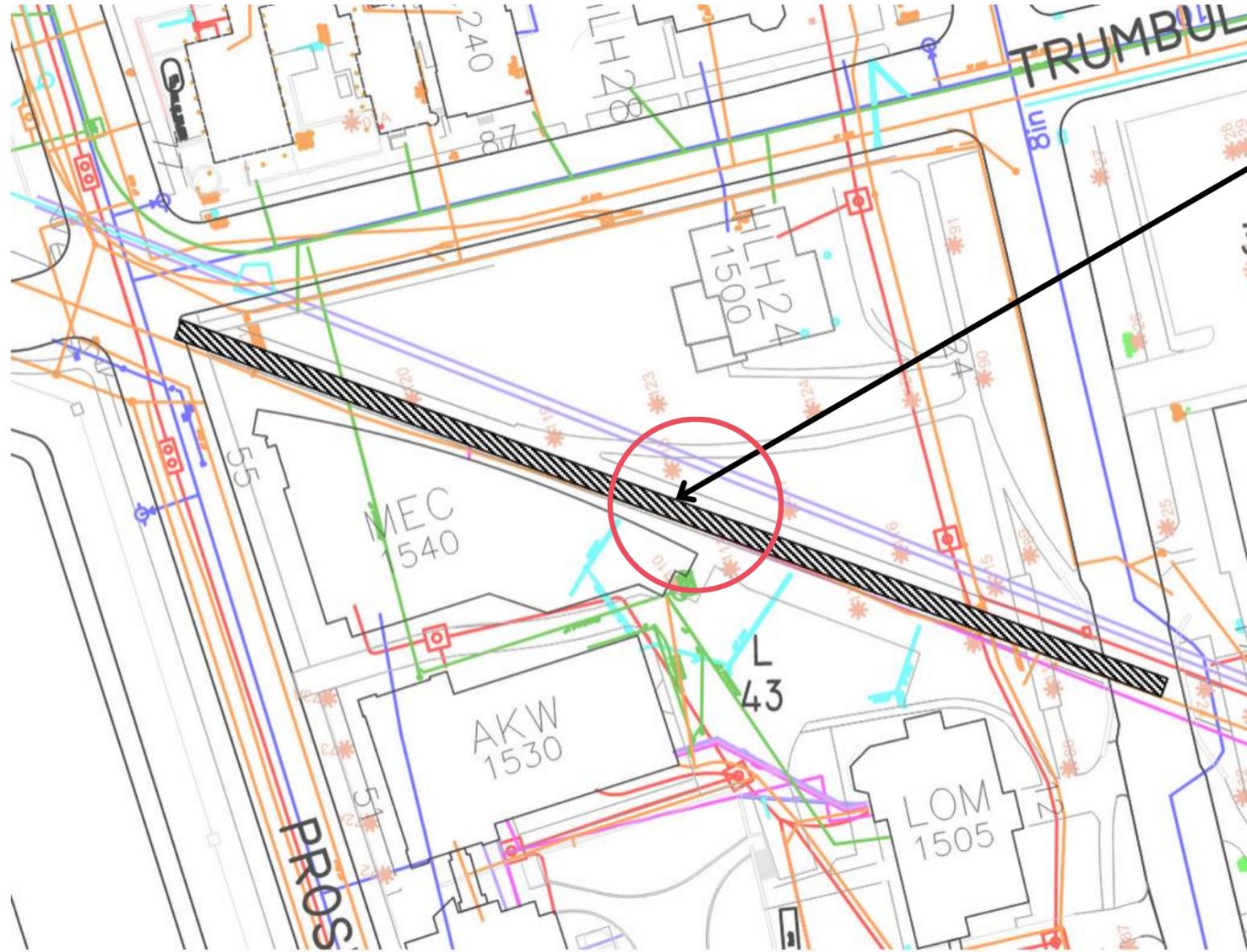
Wassara Water Powered DTH Hammer



- World patented
- > 20 years in various applications
- > 25 million meters drilled in-house by LKAB

DESIGN CHALLENGES

CONSTRAINED DRILLING AREA



TARGETED DRILLING AREA:

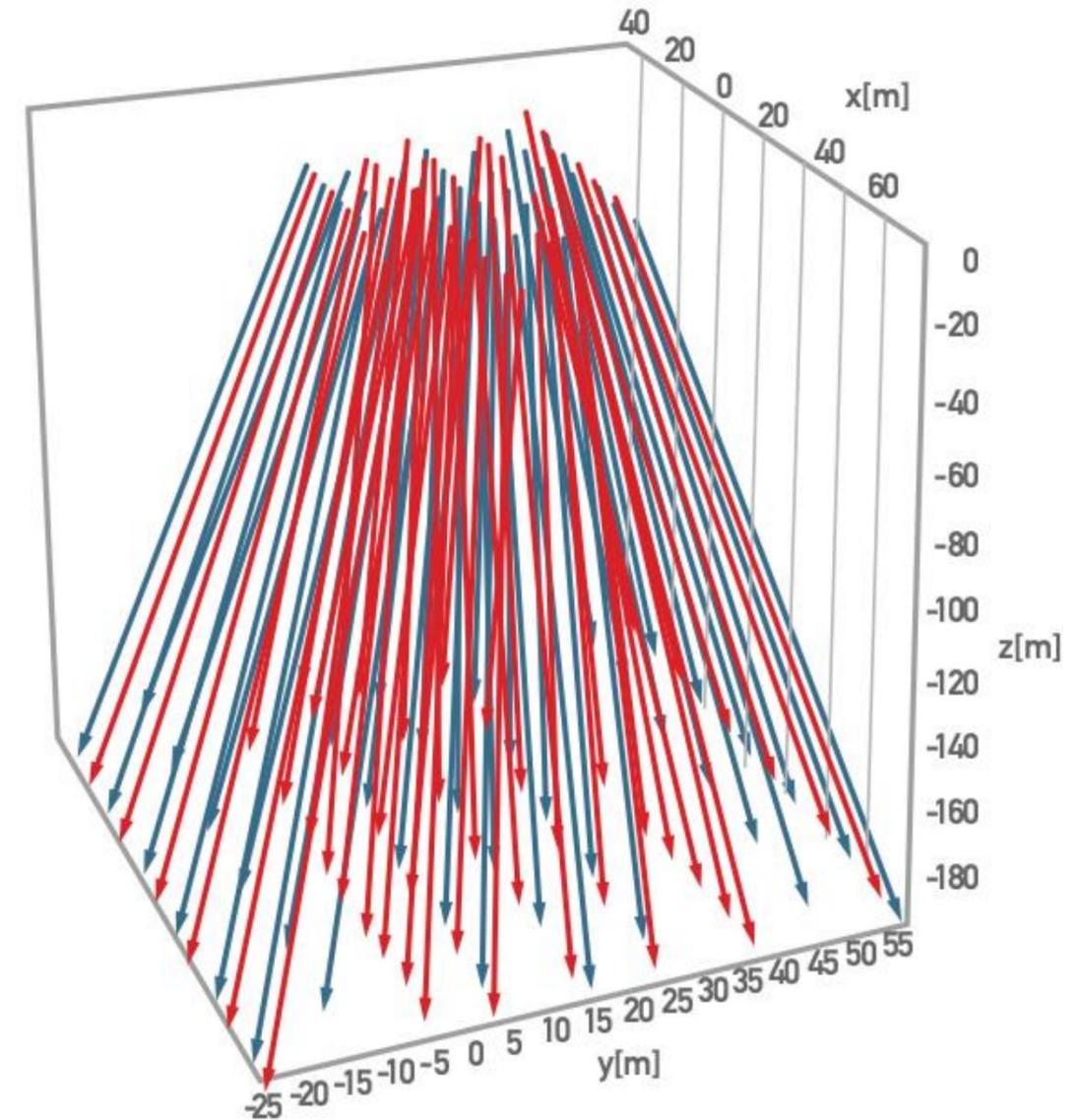
- Narrow Street
- Surrounded by utilities
- Sensitive research buildings nearby

Brightcore's technology expands the options for placing geothermal borefields. Instead of tearing up a park or public open space, we design borefields in low impact areas such as alley ways or access roads, alongside sidewalks, or in the bottom of parking decks or buildings.

SOLUTION: TECHNOLOGICAL INNOVATION

INCLINED BOREHOLES

- The Water Down-the-Hole (WDTH) drill is capable of drilling at very precise, straight inclined angles.
- These inclined boreholes can be drilled in a small surface area and extend to contact an overall greater thermal mass.
- Boreholes can extend from drilling area to the building or property footprint boundaries.





WHY BRIGHTCORE? **OUR TEAM**

WE LEAD WITH OUR INTELLECTUAL CAPITAL AND TECHNICAL EXPERTISE

Intellectual capital: With more than 40 years combined experience, the Brightcore team includes some of the top geothermal experts, professional engineers, developers, and licensed drillers.

Financial expertise: Brightcore provides financial expertise on federal, state, and local rebates and incentives, primarily the Inflation Reduction Act.

Industry leaders: Over the past decade, our team has deployed hundreds of projects representing more than \$500 million of value across solar, LED lighting, and renewable heating and cooling technologies for a wide range of customers. More recently, Brightcore was awarded the largest geothermal project in NYC.



WHY BRIGHTCORE? OUR SERVICE

One Stop Resource: Brightcore can handle your project from start to finish, or we can also add value to existing projects by working with your current design partner.

Turn-key service: We can design, engineer, drill and install the solution - and provide funding if needed. This enables our customers to generate immediate savings with \$0 capital investment.

Tailored, Flexible design: We optimize design to achieve your objectives – financial, environmental, operational, health, comfort, and aesthetics.

Risk Mitigation: Brightcore provides labor and material warranties and has certified Geothermal inspectors for rigorous quality assurance testing.



BRIGHTCORE TEAM
CASE STUDY

District Energy Community Heat Pump

A large affordable housing development in Southeast Washington, DC will create 900 residential apartments, 40,000 square feet of new retail/service uses, open space, and significant new public infrastructure.

Once completed, the new overall redevelopment project will be a vibrant mixed-income community that will include at least 900 new affordable rental and for-sale housing units, of which 380 will be public housing replacement units.

The site is a historically significant project for African Americans in Washington because the neighborhood was originally established in 1867 as the first African-American homeownership community in the District for newly freed slaves.



- Uses less energy to transfer heat with the stable 50-60° F temperatures from the earth rather than air-cooled systems
- Decreases power usage through geothermal condensing units by up to 35% versus air-cooled outdoor units
- Increases heating capacities, lower refrigerant volumes, and the elimination of defrost cycles typically needed in the winter seasons
- Provides simultaneous heating and cooling throughout the buildings
- Reduces penetration in the building envelopes, which is beneficial for projects seeking passive house certification
- Reduces construction costs due to the economy of scale of implementing as a community-level system.

BRIGHTCORE TEAM
CASE STUDY

1 JAVA STREET

Owner: Lendlease

Java Street is a 96,000 sq. ft. lot with 850 rental Units, 30% of which is affordable housing.

This will be the largest geothermal installation for a multi-family building in New York, with more than 300 boreholes drilled to 500 feet.

Brightcore was selected for this project because of their proprietary specialized drilling technology.

This project represents how geothermal can be utilized as the best available technological solution for HVAC efficiency.



Lendlease has strong sustainability goals, and this project is a part of that.

"Our bold sustainability targets are more than just headlines. We have clear decarbonization plans in place and we measure the positive impact we are making in communities around the world," their website reads. "We've made it our mission to achieve Net Zero Carbon by 2025 and Absolute Zero Carbon by 2040, with no offsets and no excuses."

BRIGHTCORE TEAM CASE STUDY

RETROFIT THE BERESFORD

The Beresford is a legendary landmark multi-family building built in 1929. To phase out end-of-useful life equipment, the co-op residents chose a hybrid geothermal and air-source heat pump system to serve the lobbies, offices, and common areas. The geothermal system is being installed in the basement where nine boreholes are drilled to 500 feet deep in the existing boiler room. This installation is projected to reduce peak cooling demand by 18%. In addition, this solution will provide heating while using 60% less energy than an equivalent air source heat pump system. This proposed geothermal system will reduce GHG emissions by more than 40%.

This project was also submitted to NYSERDA Next Gen HVAC PON (Program Opportunity Notice) and received the full submission request of \$500K in funding.



Owner: The Beresford Cooperative at 211 Central Park West, NY

Price: \$2.0M retrofit / replacement of heating and cooling of systems in lobbies, offices, common areas

Capital Structure: Client self-funded

Benefits: Replaced 50-year-old failed equipment with the most efficient electrification option available

Decarbonization: Gas Boiler system= 27.2 tCO₂e vs GSHP/ASHP system= 15.92 tCO₂e, results in a **41% GHG reduction**

Payback: 8 years

Brightcore Team Member: Dave Hermantin

Thank you!

To learn more:

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