CASE STUDY

# Class A Office Space

Lawrence, MA

## THE PROJECT

Achieve's Class A office space project was the first Commercial-scale Ground Source Heat Pump project completed in Massachusetts under the MassCEC commercial-scale grant program. Prior to expanding and refinishing their corporate headquarters, our Client evaluated available heating and cooling options and selected Ground Source Heat Pumps (GSHPs). Selection of GSHPs was made, in part, based upon a nearly $69,000 grant from the Massachusetts Clean Energy Center and eligibility for Alternative Energy Credits (AECs) under the MassDOER Alternative Portfolio Standard. The MassCEC grant, income from the AECs and Federal tax-based incentives made installation of a GSHP System cost-competitive with an alternative fossil-fuel system.

**Achieve Renewable Energy, LLC. designed and installed the geothermal system for the office space renovation.**

- After on-site testing of the bedrock thermal conductivity, Achieve designed the ground heat exchanger, which consists of over 7,000 feet of heat exchange piping.
- Achieve configured the 10 GSHPs to supply over 40 separate temperature zones providing much more individual comfort than was previously available to the employees.
- The geothermal system also allowed removal of seven rooftop HVAC units, which frees space for a future solar photovoltaic array that can provide electricity for the GSHPs and other electrical loads.

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# THE RESULTS

Since completion of the project in 2017, there has been very little maintenance required. This is typical of Achieve's GSHP installations. Each of the GSHPs is individually connected to the Internet and monitored remotely. This allows remote confirmation of operation status and adjustment of equipment settings. Amongst the data collected is electrical use and operational cost. The Table below provides monthly totals electrical use for the 10 GSHPs combined. This 22,000 square foot office space has averaged less than $650 per month while dramatically reducing greenhouse gas emissions.

**Geothermal Operating Cost**
**22,000 Sqare Foot Class A Office Space, Lawrence, MA**

| GSHP ID | Combined Heating and Cooling Cost | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | | | | | | | | 2020 | | | | |
| | May | June | July | August | September | October | November | December | January | February | March | April | 12-Month Total |
| GSHP 1-1 | $ 35 | $ 34 | $ 94 | $ 68 | $ 76 | $ 32 | $ 118 | $ 125 | $ 70 | $ 70 | $ 83 | $ 67 | $ 872 |
| GSHP 1-2 | $ 66 | $ 53 | $ 74 | $ 97 | $ 32 | $ 21 | $ 100 | $ 139 | $ 133 | $ 117 | $ 108 | $ 86 | $ 1,026 |
| GSHP 1-3 | $ 29 | $ 7 | $ 39 | $ 16 | $ 7 | $ 28 | $ 47 | $ 120 | $ 135 | $ 132 | $ 34 | $ 36 | $ 630 |
| GSHP 1-4 | $ 39 | $ 39 | $ 81 | $ 69 | $ 22 | $ 20 | $ 107 | $ 142 | $ 129 | $ 128 | $ 56 | $ 37 | $ 869 |
| GSHP 1-5 | $ 42 | $ 14 | $ 40 | $ 20 | $ 22 | $ 40 | $ 89 | $ 107 | $ 102 | $ 83 | $ 68 | $ 32 | $ 659 |
| GSHP 1-6 | $ 72 | $ 93 | $ 127 | $ 110 | $ 49 | $ 40 | $ 94 | $ 145 | $ 146 | $ 115 | $ 75 | $ 81 | $ 1,147 |
| GSHP 1-7 | $ 92 | $ 62 | $ 124 | $ 135 | $ 56 | $ 27 | $ 6 | $ 98 | $ 79 | $ 78 | $ 43 | $ 33 | $ 833 |
| GSHP 1-8 | $ 34 | $ 27 | $ 38 | $ 16 | $ 15 | $ 2 | $ 2 | $ 24 | $ 13 | $ 23 | $ 24 | $ 28 | $ 246 |
| GSHP 1-9 | $ 32 | $ 41 | $ 91 | $ 59 | $ 30 | $ 23 | $ 33 | $ 50 | $ 39 | $ 43 | $ 23 | $ 31 | $ 495 |
| GSHP 1-10 | $ 25 | $ 49 | $ 146 | $ 104 | $ 42 | $ 10 | $ 76 | $ 142 | $ 160 | $ 149 | $ 24 | $ 7 | $ 934 |
| **Monthly Total:** | $ 466 | $ 419 | $ 854 | $ 694 | $ 351 | $ 243 | $ 672 | $ 1,092 | $ 1,006 | $ 938 | $ 538 | $ 438 | |
| | | | | | | | | | | | | **Montly Average:** | **$ 642.58** |
| | **Annual Total:** | | | | | | | | | | | **Grand Total:** | **$ 7,711** |

Assumes: $0.22 per kWh
Loop circulation not included. Loop circulation typically adds 3-6%.

Ground Heat Exchanger Installation.

GSHP Installed Above Suspended Ceiling. This GSHP supports multiple heating and cooling zones.

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