

# EndoTherm™

CASE STUDY: Castle Howard - GSHP  
York, North Yorkshire



Castle Howard is one of the grandest stately homes in the UK, situated 15 miles north of York. Castle Howard has 145 rooms and attracts over 250,000 visitors a year.

In September 2009 two 110kW Ground Sourced Heat Pumps (GSHP) were installed along the bed of a 3 acre lake adjacent to the main building. The GSHP was installed to replace the traditional oil fired systems. Close monitoring of energy usage within the property handled by The Honourable Simon Howard making Castle Howard an ideal location to trial EndoTherm.

On the 25th July 2014 65 Litres of EndoTherm was installed into the primary circuit of the GSHP, which travels under the lake.

## HOW DOES ENDOTHERM IMPROVE THE EFFICIENCY OF A GSHP?

The ratio of energy input compared with the heat output of a GSHP is called the Coefficient of Performance. The compressor within heat pump systems, which heats water to a usable temperature, is powered by electricity. Traditionally for every kW of electricity consumed by the heat pump, 4kW of energy (heat) is created.

EndoTherm acts as a heat transfer modifier in GSHP systems and reduces the specific heat capacity and surface tension of the water within the system. A lower surface tension correlates to a higher surface area that the liquid of the GSHP can touch within the pipework, which increases the absorption of heat in the ground loop. This results in improving the Coefficient of Performance of the system and increases the efficiency of the GSHP system which is commonly known as the Seasonal Performance Factor (SPF).

16.1  
%

TOTAL SAVINGS

FINANCIAL SAVING

£2069

CO<sub>2</sub> SAVING

12,880 kg

## KEY INFORMATION

Installed: 25/07/2014  
Trial period: 6 Months

**Boiler spec**  
ground sourced heat pump

**Volume EndoTherm installed**  
65 litres

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## RESULTS

The usage of the compressor was calculated for the for the period starting on the 25th July 2014 until 26th January 2015. This usage was compared with the usage from the same period last year (25th July 2013 to the 26th January 2014). Usage was compensated using degree day data obtained from a local weather station in Topcliffe.

Castle Howard	Usage (kWh)	Degree Days	Usage/Degree Days (kWh/DD)
2013/2014	153,818	1,138.1	135.15
2014/2015	127,833	1,126.7	113.45

The two time periods were very similar in temperature with a difference of less than 1% between the degree day figures; this shows that the average temperature difference between the two periods was less than 0.1°C.

## CONCLUSION

This case study revealed a 16.1% reduction in consumption compared with the same period last year.

This saving translates into a financial saving of £2069 in the 6-month term EndoTherm's efficacy was observed. Savings are projected to reach over £4000 in the first year of use, returning investment in the installation within its first year.

NOTE: the actual financial savings would be higher had Castle Howard not been subject to an increase in electricity unit charges from 2014 onwards.