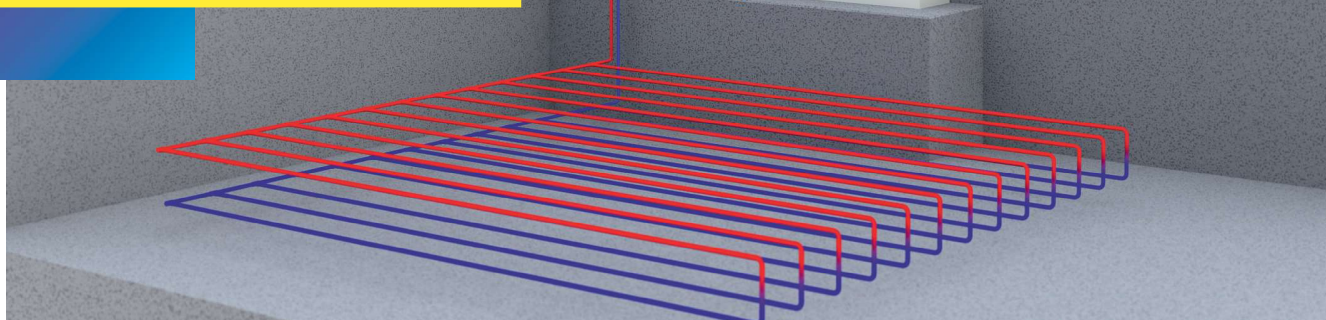


# MAXIMISING EFFICIENCY IN GEOTHERMAL INSTALLATIONS



**Mike Deed** of Geoquip Water Solutions looks at the measures installers can take to ensure geothermal heating installations are as efficient as possible.

**I**ncreasing demand for a move towards renewable energy is seeing a rise in the number of geothermal heating installations across both commercial and domestic markets.

Savings of up to 80% compared to traditional fossil fuels and the ability to significantly reduce CO2 emissions are among the benefits, together with the financial support available from Renewable Heat Incentive (RHI) payments.

However, with costs for installing a typical ground source heat pump system in an average home standing at around £14,000-£19,000, it pays to check that certain steps are in place to help achieve maximum advantage.

The first of these is to ensure the most efficient ground source heat pump is used for the operation, a consideration that also applies to the extraction borehole submersible pump in an open loop system.

This might sound obvious but there's no point having a 'green' geothermal heating system if the source pump is working flat out 24/7 and using far more electricity than necessary to move the water around the loop.

When a geothermal system is being designed, the emphasis must be on saving energy and for an open loop system the borehole pump is a big part of that – if the right pump is not chosen for the job, then it goes without saying it will be less effective and inefficient.

In our opinion, the most energy efficient solution is the High Efficiency Submersible Borehole System (HES), designed and manufactured by Franklin Electric under its E-tech brand.

Available in 4", 6" and 8" sizes – the 4" diameter motor is the only one of its size on the market, making it more affordable for smaller installations – the system includes a submersible pump, permanent magnet motor, and a variable speed drive.

## Synchronous technology

Unlike most systems, which tend to use less energy efficient asynchronous motors, the HES is fitted with a synchronous submersible NEMA standard permanent magnet motor.

The synchronous technology means the windings are permanently magnetised, using less energy when starting and running and,



**MIKE DEED**

Mike is Managing Director of Geoquip Water Solutions and has more than 30 years' experience in the water treatment and solutions sector. He works with strategic partners to ensure customers receive the maximum benefit from their investment, including the supply of heat pumps for geothermal systems. Here, he offers advice on choosing the best system and suggests ways in which monitoring and maintenance can ensure optimum performance.

with less slip, it delivers both a smoother and faster solution.

An associated variable frequency drive and output filter also delivers greater efficiency with higher power density.

Together, these benefits combine to improve motor efficiency with significantly lower motor heat rise and promise a return on investment within two years.

A pre-written software package allows customers to see straight away what their payback period will be – pretty impressive when you consider that the HES delivers guaranteed energy savings of up to 20%-30% above standard borehole motors.







Making it even more environmentally friendly, there is also a solar version.

## Maintenance

Heat pump systems will typically come with a warranty but, although their average life will be around 20 years or more, they do require regular maintenance. It's not enough to 'fit and forget' which can be a tendency when something is buried underground.

We always recommend installing bespoke remote monitoring and telemetry systems which include triggers and alarm points and raise an alert when faults or particular combinations of problems arise. Having full remote access and round-the-clock checks in place means once a problem is identified, the monitoring team can then decide on the best approach.

Typical checks should include the water pump, external pipes and fittings and electronics as, with any similar project, equipment can eventually become contaminated, typically with iron bacteria, manganese oxide, calcium carbonate deposits or other types of bacteria.

	4" MOTORS	6" MOTORS	8" MOTORS
STANDARD ASYNCHRONOUS MOTORS			
	<b>11 Models</b> Power from 0.55kW to 9.3kW	<b>11 Models</b> Power from 4kW to 45kW	<b>9 Models</b> Power from 30kW to 150kW
PERMANENT MAGNET SYNCHRONOUS MOTORS			
	<b>5 Models</b> Power from 0.55kW to 7.5kW	<b>5 Models</b> Power from 4kW to 37kW	<b>3 Models</b> Power from 45kW to 150kW



The table shows reduced inventory when using permanent magnet motors.



Left: Photo shows the test vial (centre) once it has been removed from the outer dispenser. A water sample (right) is ready to be poured into the test vial.

Right: Photo shows typical iron bacteria residues on a pipe prior to treatment.

In time, this can lead to reduced flow and yield, rendering the system less efficient.

A good starting point is to take a water sample for a Biological Activity Reaction Test (BART), which will help determine if bacteria is present and what type it is. A suitable treatment solution, such as the BoreSaver range of borehole cleaning and rehabilitation solutions, can then be applied quickly and effectively to flush out the bacteria and prevent further damage.

If this simple solution doesn't yield any answers, there are two further options.

The first is to remove the pump for a service and to check all the parts are in good working order, and the second is to use that opportunity to undertake a downhole camera survey.

We always recommend the Laval R-CAM 1000 XLT borehole camera as not only is it extremely light and portable, it is easy to use and provides the operator with both a down view and a side view.

This makes it easy to identify problem areas, for example, if a tree root has damaged the underground pipes, and the necessary remedial action can then be taken.

As with all things, being armed with the right information and superior equipment will make a difference. And with the long-term benefits to be achieved through geothermal installations, it pays to invest in the best. **I**



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