



# Why are **Heat Pumps** so Hot Right Now?

An insight with Elliott Sharpe,  
Design Director





INDUSTRY LEADERS & INNOVATORS

# Can Heat Pumps Accelerate our Journey to Net Zero

Vital Energi's Design Director Elliott Sharpe, gives us an insight into heat pumps.

Air, ground, and water source heat pumps are one of the most efficient technologies for reducing carbon, and with a potential 500% efficiency, they are a great solution for projects of all sizes.

With almost 15 years' experience in the industry, Elliott Sharpe, Vital Energi's Design Director in London, leads the design and CAD departments to deliver high quality design solutions that set new standards in best practice. Elliott is helping Vital remain at the forefront of renewable technologies, driving continuous improvement and energy efficiency, with a strong focus on heat pump technology, which is helping the UK's journey to net zero.

Elliott gives us an insight into heat pump technology, covering the benefits, for businesses and the environment alike, the factors that have to be considered when thinking about heat pumps, and he tells us about some of the large scale heat pump projects he's worked on, including the UK's largest water source heat pump.





### **What types of heat pump are there and how do they work?**

Heat pumps can appear quite complicated at first glance, but the technology has been around for quite some time. Think about your fridge at home or an air conditioning system for an office - these are using heat pump technology.

A heat pump takes energy from a source such as water, the ground, or surrounding air, and then using a refrigerant and power from an electrical supply, this heat is transferred into your home, at a higher temperature than the source. I know what you're thinking, how does water from a lake or cold air outside turn into hot heating water coming out of the heat pump. This is the clever part inside, the heat pump is compressing and expanding a refrigerant in a cycle, and it's this process that is able to take water from that cold lake and turn it into heat for your radiators.

### **What are the key benefits of heat pumps?**

Efficiency! In the right conditions, a heat pump can operate at 300, 400, dare I say 500% efficiency. What this means is for 1 unit of consumed electrical energy, the heat pump is producing 5 units of energy.

### **Are there any other renewable technologies that work well alongside heat pumps?**

Yes, heat pumps are a key part of a wider technology mix, that when combined together can provide a low carbon solution. This might be solar thermal panels that are adding heat into the ground to recharge the thermal energy taken out by the heat pump, or a biofuel CHP engine that's used to feed electricity to the heat pump.



### What factors have to be observed if considering a heat pump?

Consider where you're going to source energy for the heat pump, do you have a river nearby or can you drill deep into the ground on your site? Maybe you have lots of outdoor space for an air source solution. Then think about your local electrical infrastructure, depending on how large your heat pump installation is, this could be a significant factor to consider. When it comes to water source heat pumps, there is also the potential to drill down and utilise aquifers, which are bodies of water that lie under the surface.

### Tell us about some of the heat pump projects you've worked on...

We are currently developing and delivering seven heat pump projects, with the most recent completion being the UK's largest district heating connected water source heat pump project at Queens Quay, Clydebank, where we installed two 2.65MW heat pumps to extract energy from the River Clyde, providing heat and hot water to surrounding homes and businesses.

We're also really proud of our recent work with Southwark Council to provide a more efficient low carbon heat supply using water source heat pumps to supply and decarbonise over 2,000 properties, using ground water abstracted from and reinjected into locally drilled boreholes.



< Scan here to learn more about  
The Queens Quay Heat Pump  
scheme





## Can you explain the difference between an open and closed loop system?

Let's take a couple of examples to explain...

An open loop system is where we are directly extracting energy from the source, such as taking water from a river. We pump water from the river, extract energy back at the heat pump and we pump this water back into the river, so because we are interacting directly with the river water, this is an open loop system.

For a closed loop system, let's take pipework installed in boreholes deep into the ground as our example. Within this pipework, we have a fluid that is transferring energy from the ground, which we then pump back to the heat pump, extract this energy and pump it back into the ground around this closed loop.

So unlike in our first open loop example where we directly pumped the river water, here we are transferring energy from the ground via a heat transfer fluid inside a close pipework circuit.

## What size network can a heat pump power?

Heat pumps come in a huge variety of sizes, from one heat pump in your back garden serving that single dwelling, all the way up to large centralised district heating production serving thousands of end users connected to a heat network.

[Learn more about our work with Southwark council >](#)





### **What type of businesses can benefit from heat pump technology?**

Anyone looking to decarbonise energy production can benefit, whether you have an existing installation and are looking to come away from gas, for example. Or you have waste heat or waste electricity which could be used alongside a heat pump installation. Of course, each case has to be looked into to determine the feasibility of applying this technology.

### **How easy is it to retrofit heat pumps into an existing network?**

It comes with its challenges of course. First, we have to determine the appropriate source of energy for the retrofit heat pump, is this water, ground or air source?

Then we have to consider how hard are we asking the heat pump to work, what I mean is, the temperature we are asking the heat pump to produce. Older systems often operate at higher temperatures, which heat pumps can achieve - the trade-off is a reduction in efficiency, so it's about finding a balance between modifications to the existing network to lower temperatures and the heat pump selection. So, it depends on a project by project bases how easy it is, but it's certainly possible.

### **Why are heat pumps becoming more popular?**

Changes in planning policy and the decarbonisation of the electrical grid are major factors. With the electrical grid becoming less carbon intensive, people are turning to electricity as a source of fuel - remember heat pumps require an electrical supply.



*“In the right conditions, for 1 unit of consumed electrical energy, the heat pump is producing 5 units of energy.”*

**Elliott Sharpe**, Design Director  
at Vital Energi

## How are heat pumps renewable if they rely on electricity for power?

Good question! We've talked about how heat pumps can use energy from water, the ground, or air, but quite rightly, they need an electrical supply. In some cases, it could be that this electrical supply is coming directly from a renewable source itself, such as PV panels. However, for the majority of installations this electrical supply will come from the grid, so we have to consider how clean is this electricity supplying the heat pump. Some may argue that the grid isn't quite as low carbon as future planning policy is indicating, but generally speaking, we can see that the grid is on a path of decarbonisation, so the electricity we power the heat pumps with is coming from a greener source each day. Combine this with the efficiency a heat pump can operate at and you start to see why a heat pump is a low carbon technology.

### 5 KEY BENEFITS OF USING HEAT PUMPS

1. Key technology to address the Energy Trilemma
2. BREEAM credits can be gained via the consideration of heat pumps
3. Zero on-site emissions therefore improving air quality
4. 55% reduction in CO<sub>2</sub> emissions
5. Efficiency!

[Scan here to learn more about heat pumps >](#)



If you would like more information on our energy solutions and services then we'd be more than happy to help.

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