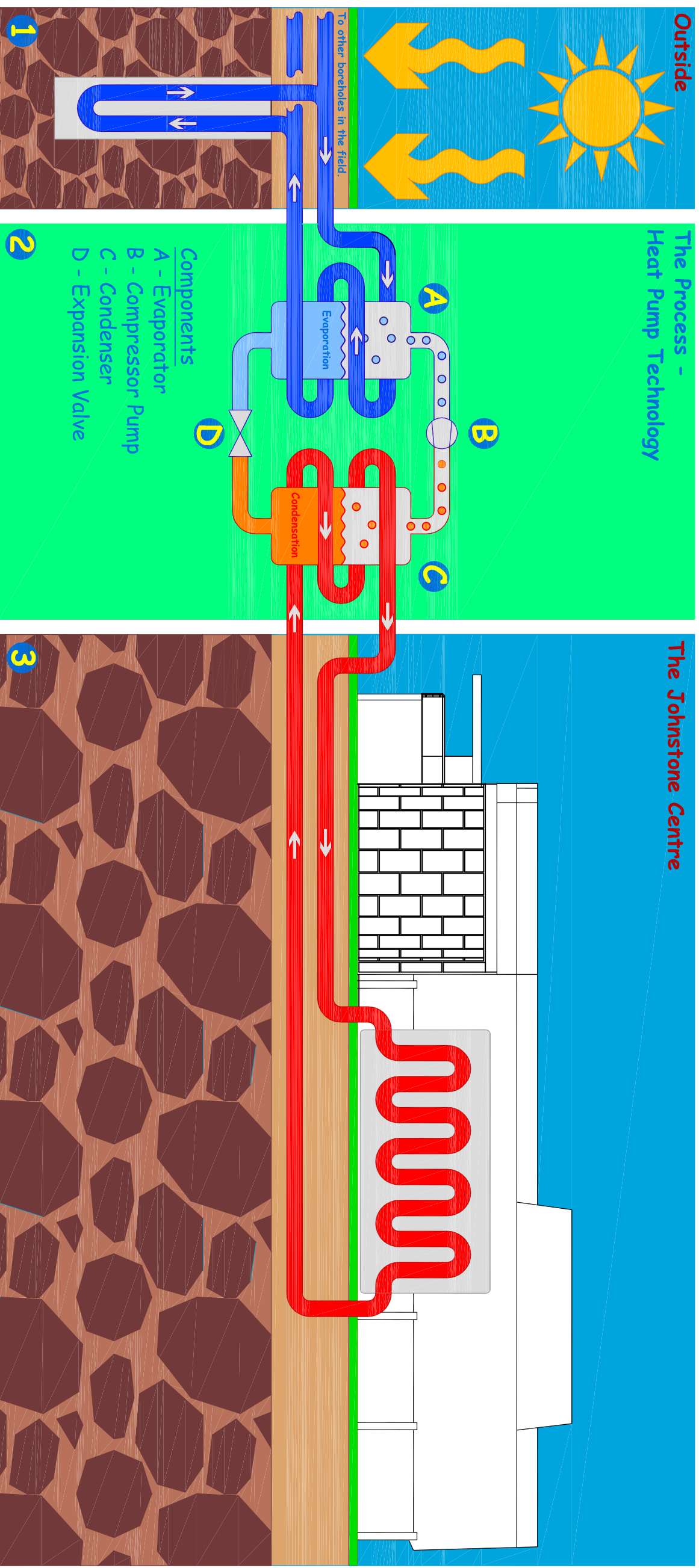


Ground Source Heat Pumps Explained



Section 1 - Outside

The sun's radiation hits the ground causing it to warm up.

The fluid in the borehole loop absorbs this heat and becomes warmer as a result, and then delivers this low grade heat (typically at a temperature of between 35 - 45 degrees celsius) to the heat evaporator side of the heat pump unit.

The depth of the boreholes may range between 50m and 200m deep depending on the ground conditions.

The Johnstone Centre may have around 45 boreholes to 150m deep, to supply the heat required.

Section 2 - The Heat Pump

A - Evaporator - This is where the heat from the ground is transferred to the liquid in the heat pump turning it from a liquid into a gas.

B - Compressor Pump - This causes the newly created gas to become even hotter as the pump squashes the gas, raising its pressure.

C - Condenser - This is where the gas in the heat pump is turned back into a liquid by allowing it to heat up the water to be used for pumping around the building. The temperature of the water will be raised to between 35 and 45 degrees celsius through this process.

D - Expansion Valve - This is where the liquid's pressure is released, to make it ready to be used again the next cycle of the heat pump.

Section 3 - The Johnstone Centre

Because the Johnstone Centre may utilise Ground Source Heat Pump technology to generate some of its heating load, the proposals shall incorporate underfloor heating to make use of the type of heat provided by the heat pumps, as well as maintaining the pool water temperature.

In terms of performance, Ground Source Heat Pumps may provide around 4-4.5kW of Heat for every 1kW of electrical energy required to operate the Compressor Pumps.