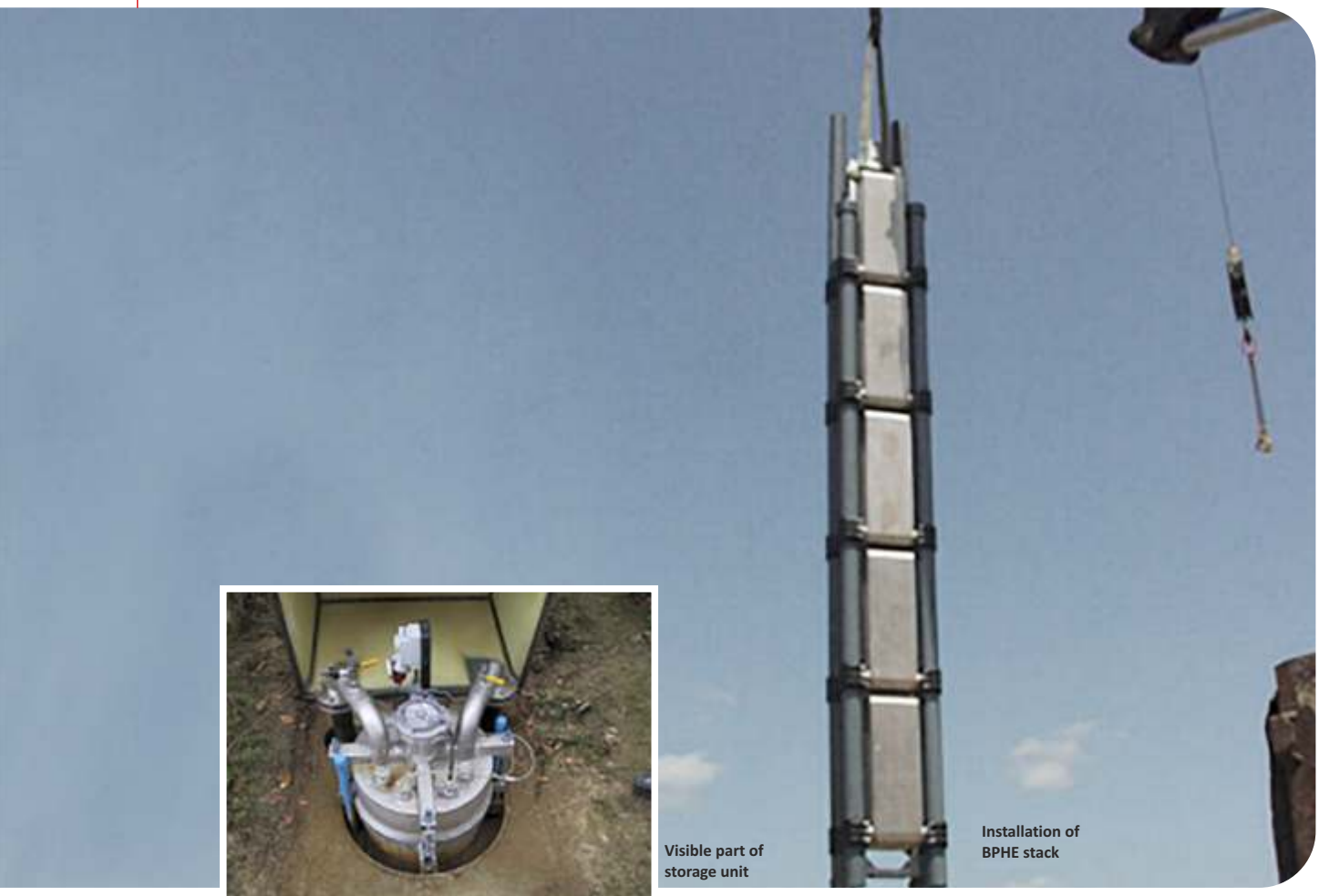
GEOTHERMAL STACK OF BPHEs



Visible part of storage unit

Installation of BPHE stack

Geothermal energy storage is a new energy-saving application with promising future growth potential. Reduced fossil fuel burning and a 95% reduction of CO2 emissions are clear advantages of this system.

Consultants Installect, located amid idyllic Dutch farmland, are the inventors of one of the most interesting brazed plate heat exchanger (BPHE) packages yet seen. Installect's cold storage solution uses stacks of BPHEs, and is used for climate control in stores and offices, and for cooling in industrial plants.

Another company, Westerlo Boringen, is responsible for drilling and system installation. Together, the two companies have developed the patented GeoThermic system discussed in this case story.

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Inspection of a GeoThermic system by Westerlo, in the Netherlands. SWEP B45 BPHEs being lowered into the drilled well.

In a cold storage system, heat in groundwater is used during winter for climate control, i.e. heating. The somewhat cooler groundwater is then returned underground. In summer, the stored cool water can be pumped up again, this time for cooling. The warmed water is returned underground, completing the cycle.

The most common cold storage systems utilize two wells. However, the smart GeoThermic system uses only one well, housing both the warm and cold aquifers.

The heat transfer duty is satisfied by installing several BPHEs in a specially made frame. This solution results in a high degree of optimization between efficiency and flexibility.

SWEP's mass customization philosophy has generated accessories such as stud bolts and special connections that facilitate adaptation of the BPHEs into the unique frame.

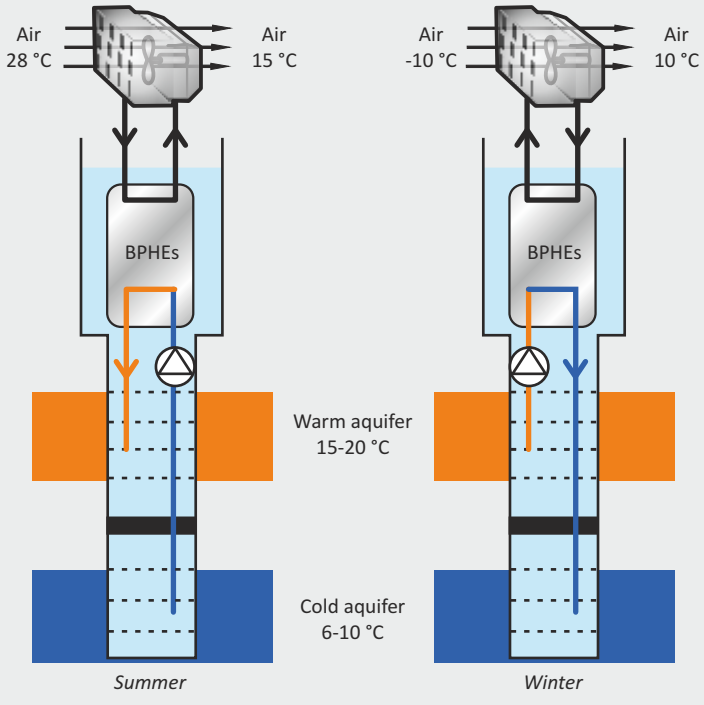
Due to their high internal turbulence, BPHEs can achieve high heat transfer even at low flow rates. This is important, because flow conditions may vary depending on the energy demand. An acceptably low pressure drop in the BPHEs translates into low prime energy consumption.

Summer: Water at 9° C is pumped from the cold aquifer through the BPHEs. The groundwater absorbs heat from the secondary process water flow, and is then returned to the warm aquifer.

Winter: The flow direction is reversed. Water from the warm aquifer can be used to preheat cold ambient winter air in an air coil. Another application is an installed heat pump for heating water to approximately 50 °C.

The only electricity needed for running the GeoThermic system is the electrical input to the pumps. According to the manufacturer, it is possible to achieve a COP of up to 400.

The drawings below show how the GeoThermic system functions in a climate control system.



APPLICATION DATA

BPHE types	B45/2P
Heat transfer per installation	100–350 kW
Electrical input (pump)	max 3 kW
Bore hole dimensions	diameter 0.8 m; depth 50-220 m
Maximum pressure drop	60 kPa

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