

Sustainability Case Studies

ENERGY MANAGEMENT: MATCHING PUMP SPEED TO DEMAND



The Challenge: Heating Pump Constantly Running at Full

A district heating pump was constantly running at 100%, pumping water between the Combined Heat and Power (CHP) engine and the plate heat exchanger (PHE). This pump was controlled via a valve which was constantly set to be fully open; as a result, the pump speed was not matching the circuit's actual demand. With the pump running at maximum all year, electrical energy was being wasted along with associated control issues with flow rates and temperatures.

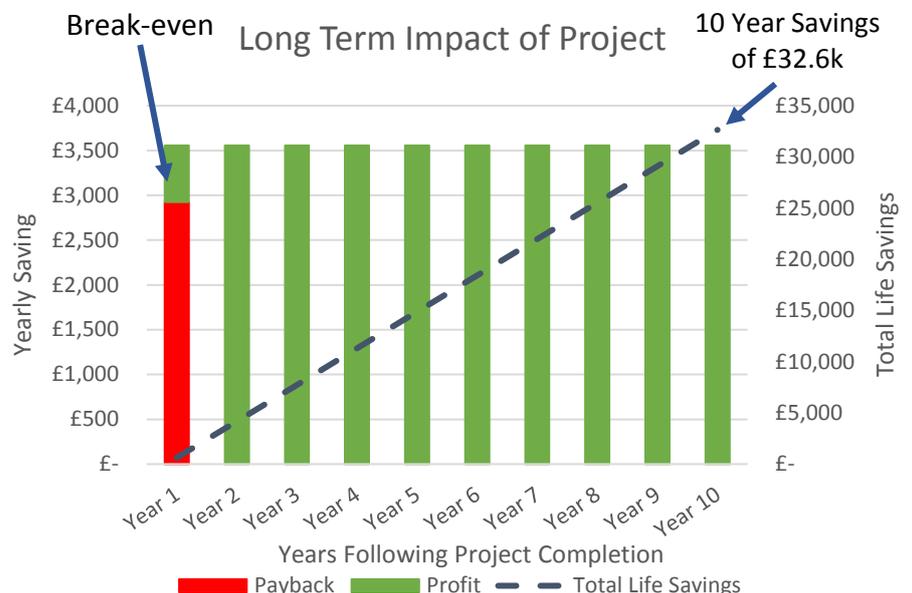
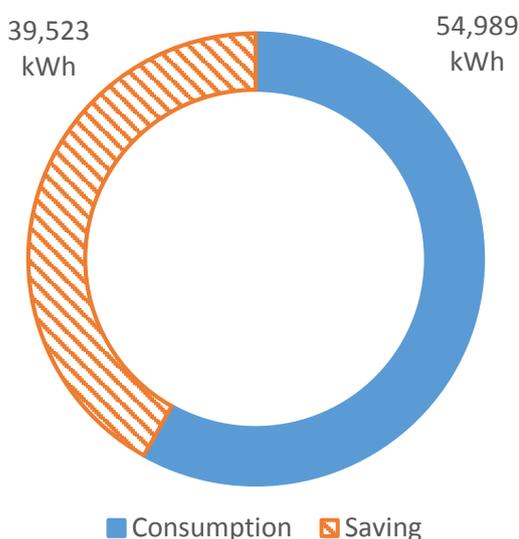
The Solution: Installation of a Variable Speed Drive

It was proposed that by installing a Variable Speed Drive (VSD) to the pump, it would allow the pump to match its speed to the actual demand of the circuit. The existing pump was retrofitted with a VSD rather than upgrading to a pump combined with a VSD to ensure minimum interruption to operations whilst installing the new device.

A VSD is an electronic power controller that is able to adjust the electrical supply to a pump which results in a corresponding change in the pump's speed and torque output. This type of control allows a very close match between the pump speed and the demand of the system.

The Results: Significant Savings

The VSD was installed in October 2017 at a cost of £2,900 and reduced the pump's speed by 16% and power demand by 41.8%. This resulted in actual annual reductions of 39,523kWh of electricity; 14.9 tonnes of CO₂ emissions; and £3,560 of financial savings.



This level of performance significantly exceeded expectations in advance of its installation. The VSD was found to produce savings that were 31% greater than had originally been predicted, with these increased savings also reducing the payback period from just over a year to just under 10 months.

Once the cost of the project has been recovered, £3,560 will be saved each year. After 10 years of the VSD being in use over £30,000 worth of electricity will have been saved!

Lessons Learned

- Calculated savings provide a good estimate of the impact of energy saving projects; however, it is not until the operation of the new equipment in real world applications that we see the whole picture.
- By improving the control of core components in a plant room, long-term savings can be produced.
- It is often cheaper, faster and less disruptive to operations to retrofit components instead of completely changing them when they achieve the same result.



Pump Speed and Consumption before VSD Installation



Pump Speed and Consumption after VSD Installation