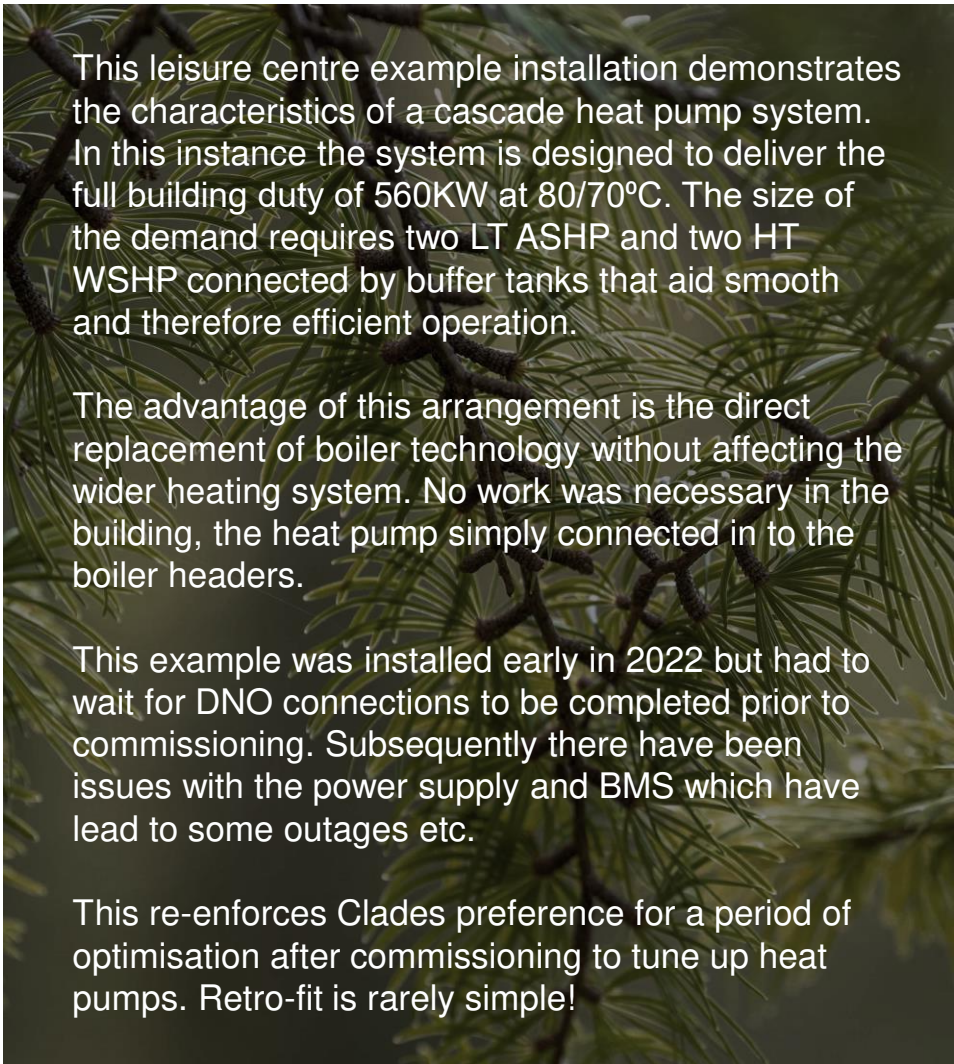




LARCH CASCADE CASE STUDY //



This leisure centre example installation demonstrates the characteristics of a cascade heat pump system. In this instance the system is designed to deliver the full building duty of 560KW at 80/70°C. The size of the demand requires two LT ASHP and two HT WSHP connected by buffer tanks that aid smooth and therefore efficient operation.

The advantage of this arrangement is the direct replacement of boiler technology without affecting the wider heating system. No work was necessary in the building, the heat pump simply connected in to the boiler headers.

This example was installed early in 2022 but had to wait for DNO connections to be completed prior to commissioning. Subsequently there have been issues with the power supply and BMS which have lead to some outages etc.

This re-enforces Clades preference for a period of optimisation after commissioning to tune up heat pumps. Retro-fit is rarely simple!

Expected performance at 82/71°C at -5°C ambient

- 2 x 280kw r600a high temperature WSHP with a COP of 3.89
- 2 x 160kw r290 low temperature ASHP with COP of 2.81

Theoretical system COP of 2.1

Note that a cascade system uses two sets of compressors for one thermal out put unlike a conventional heat pump which is one to one. This means the power consumption is higher and therefore the COP is lower.

The end user and designer must evaluate the relative benefits of modification to the building systems vs. lifetime cost of lower COPs.



Over the recent December cold period this heat pump has actually achieved a COP of 1.9. The ambient dropped below design point and there were various service interruptions caused by external factors which are difficult to evaluate.

Clade will continue to monitor and work with the data to achieve the target outcomes.