chp QA

CHP case study

Stirling Energy Centre

The Site:

The wastewater treatment site and district heating network in Stirling.

Both are served by an energy centre with a natural gas-fired CHP engine that powers an innovative sewage heat recovery system.

The heat is purchased by Stirling Council for the newly developed district heating network which has a variety of end users including both commercial and public buildings.

Energy centre with waste heat recovery system powered by CHP

Location:
Stirling

Date Operational:
October 2019

Investment Cost of Energy System:
£3 million

Annual CO_2 Saving:
255 tonnes*

Project Objective:
To provide low-carbon power to a water treatment site and low-carbon heat to a district heating network.

The Need:

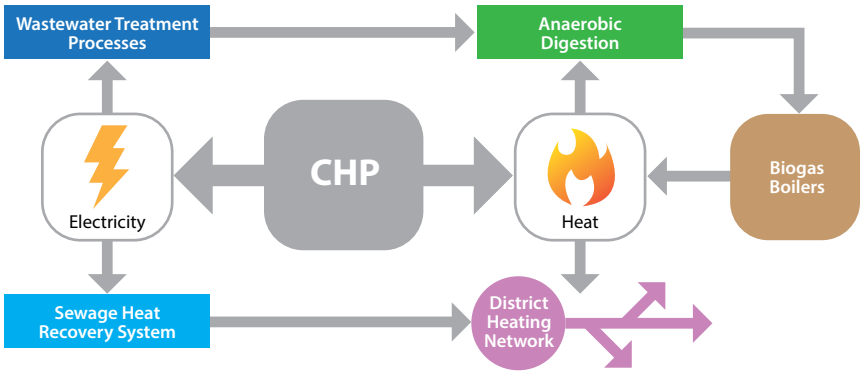
- Installed to reduce energy costs for the wastewater treatment facility (by generating power on site), whilst simultaneously generating revenue through the provision of heat to the Stirling district heating network.
- Power is needed for a set of Water Source Heat Pumps (WSHP) to recover heat from the sewage works for use in the district heating network.

Implemented Solution:

- A single 0.8MWe natural gas-fired reciprocating engine CHP, with top-up heat provided by 5MWth of gas-fired modular boilers.
- Sewage wastewater heat is recovered via 2 x 330kWth (WSHPs).
- The heat network is split in two, with the CHP providing heat to the East wing and the waste sewage heat providing heat to the West wing.
- 2 x 400kWth biogas boilers provide heat to sustain the anaerobic digestion process and also contribute to the heat network.
- Virtual 3D Tours of the heat pump and CHP plant rooms can be found here and here respectively.

The Benefits:

- Due to the displacement of grid electricity and delivery of low-carbon heat from the waste heat recovery and biogas boilers, the system reduces emissions. According to site calculations, using the carbon intensity of the grid in 2019, the system is due to save 255 tonnes of CO2 per year*.
- Cost savings from CCL exemption on the natural gas used by the CHP due to CHPQA accreditation is worth approximately £50k per year.
- The CHP has future potential to be dual fuel with biogas or hydrogen to further reduce carbon emissions.
- The treatment site will no longer need to use propane as a heat source for the anaerobic digester.
- The heat clients benefit from guaranteed heating costs for the next 20 years with scope for further expansion of the network.



'The ground-breaking technology at the energy centre and in the network has made Stirling the home of a new era in heating and will deliver significant environmental and economic benefits.'

Jim Thomson
Stirling Council

*The carbon savings are expected to reduce over time as the national power grid decarbonises.