

SALIX SEELS BID CALCULATION FOR THE OFFSETTING OF GAS USED FOR HEATING AT TY PENALLTA

Data:

- Annual gas consumption is 1,040,000kWh.
- Assumed 85% efficiency the heat produced by gas boiler is 884,000kWh
- Operation of existing heat pump provides 500,000kWh of heat which at a COP of 3 the electricity consumed by the heat pump is 166,667kWh
- 884,000 kWh plus 500,000kwh 1,384,000kWh which is the total heat consumption on the building
- The borehole pumps are running fixed speed at circa 15kW which is an annual electricity use of 120,000kWh (based on 8000 running hours per year)
- Cost of Gas next year is expected to be £0.1303/kWh
- Cost of Elect next year is expected to be £0.4128/kWh

Estimated cost of heating in 2023:

Cost of gas in 2023 is therefore is $1,040,000\text{kWh} * £0.1303 = £135,512$ per year.

Cost of electricity from heat pumps in 2023 is $166,667 * £0.4128 = £68,800$

Cost of electricity from borehole pumps is $120,000 * £0.4128 = £49,536$

Total energy costs for heating are **£253,848**

Upgrade BMS and optimise heating controls and install new heat pump to replace gas boilers:

Heat reduction of 25% (building currently using more energy than it should and can be reduced by this value based on kWh/m² benchmarking) will reduce heat consumption by 346,000kWh

Therefore total heat demand will be 1,038,000kWh

New heat pumps at an increased COP of 4 configured to supply all the heat will require an total input electricity to heat pumps of $1,038,000 / 4 = 259,500\text{kWh}$

Cost of electricity to heat pump will be $259,500 * £0.4128 = £107,121$

The new borehole pumps to operate on a variable rate to match heat demand from heat pumps will reduce electricity use to 40% (based on energy demand of the new heat pumps meeting the 1,038,000 value, taken of a flow rate curve) which will equal 48,000kWh of electricity

Cost of electricity from borehole pumps is $48,000 * £0.4128 = £19,814$

Total energy costs for heating are reduced to **£126,936 per year**

Annual cost savings by proposed scheme:

Total energy costs reduced from £253,848 to £126,936 = saving of £126,912 per year

Therefore we can apply for a Salix Seels loan of : £126,912 * 8 years = **£1,015,296** to save carbon.

Carbon emissions of the proposed project will reduce as the grid electricity decarbonises.

The following graph shows the existing operation in yellow and the proposed operation in green.

