OPTIWOOD

Improving the Performance and Efficiency of Biomass Boilers

A joint UK-France Project 2018-2020

Interreg

EUROPEAN UNION

France (Channel Manche) England

OPTIWOOD

European Regional Development Fund

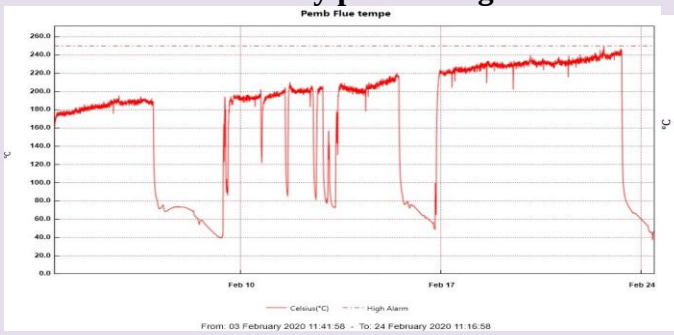
Case Study 3 - NHS Hospital

Introduction: A 990kW Schmid underfed hearth boiler, de-rated from 1200kW to allow it to access the RHI tariff system. Has a 10,000 litre buffer tank and supported by three hook bin fuel silos. Designed to contribute 25% of the hospital's heat load, (remainder supplied by natural gas). The boiler requires frequent manual cleaning due basic design and is shut down every weekend to manually clean the combustion hearth, plus every month the heat exchangers. After a troubled operating history until late 2017 when a new servicing regime was agreed, the boiler efficiency and availability has steadily improved.

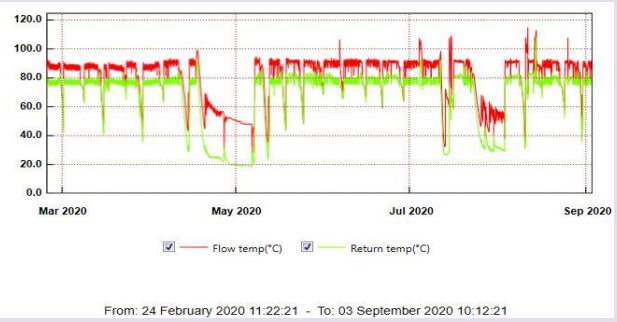
2018-19 Heating Season – Data Results and Recommendations

The results showed a boiler performing reliably with solid flow and return temperatures for the boiler and buffer tank, and O2, under-pressure levels within acceptable parameters. The low-cost design however leads to a rapid ash build-up in both the combustion chamber and heat exchangers requiring manual cleaning of both and resulting in the loss of the boilers for nearly 25% of the average week. Other problems were revealed including air ingress through the ash bins, regular breakdown of wood fuel 'paddles' in the augers, and wear and tear in the hook bin plinth areas.

Data Results – A solidly performing Boiler let down by set of design faults and smaller issues



Steady increase in exhaust flue temps



Very solid flow-return temperatures

2019-20 Changes and Improvements

A number of changes were enacted including more frequent heat exchanger cleaning (every 3 weeks compared to every 4 weeks) and fully sealing the ash bin leaks that were allowing in 'false air' into the combustion areas.

Pilot Project 3 - Hospital (900kW)	Wood Fuel Consumption (tonnes at 32% MC - kWh)	Wood Fuel Coverage (% of total heat demand)	Biomass Boiler Efficiency (%)	Costs of Wood Fuel £	Tonnes CO_2 Emissions saved (cf with equivalent gas)
Heating Season 2018-19	992	31%	72.00%	£157,000	437
Heating Season 2019-20	822	25%	75.00%	£140,000	389
Gain or Loss	-170	-6%	3.00%	-£17000	-48
Estimated Additional Gain/Loss if Recommendations Carried out	-30	0%	3% (78%)	-£5000	-13

Footnote: 1. Boiler in Season 2 offline for longer period due to technical failures

Footnote2; Savings when compared to Season 1

Key Lessons

- **Strong servicing regime and rapid response to breakdowns minimises down time**
- **More frequent heat exchanger cleaning**
- **Dealing with a number of small issues which add up to significant efficiency benefits**

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