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

September 2020

Case Study 5 – Academy School

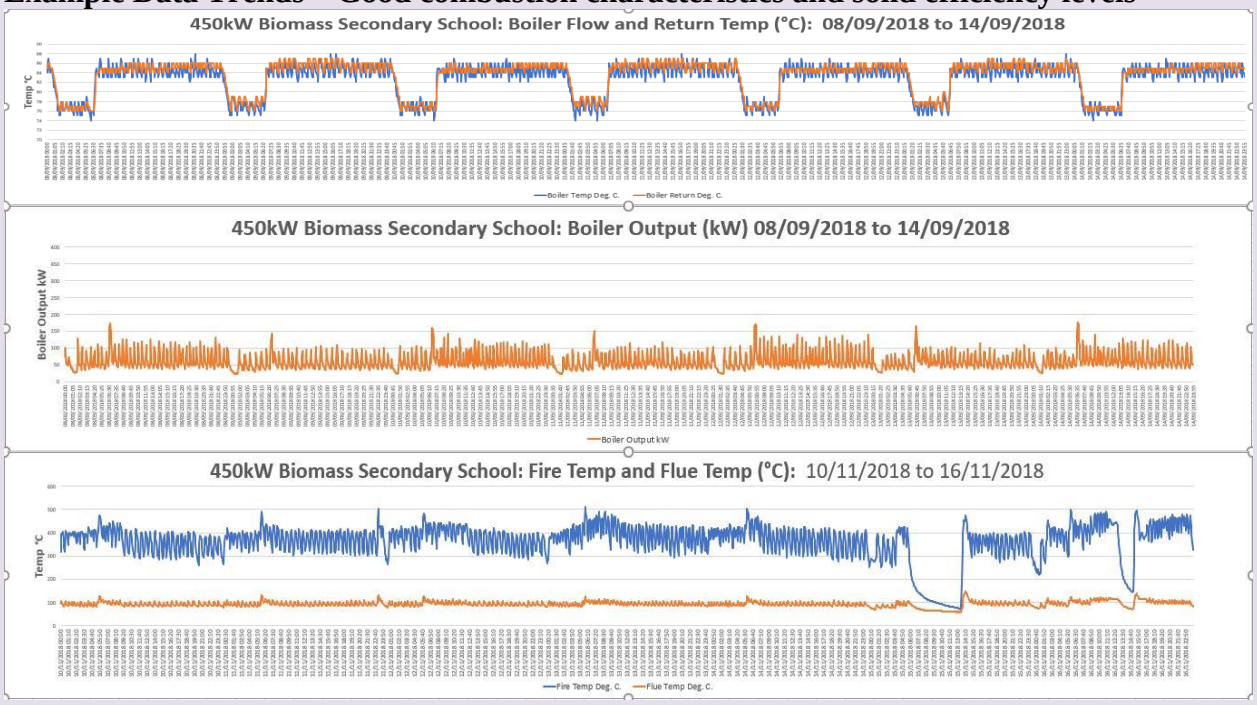
Introduction

This is a 450kW Gilles wood chip boiler system fuelled via twin hook bins. It was installed in 2010 and was accredited under the RHI in 2013. It has no buffer tank but heats a school / community swimming pool plus school buildings. There are also 3 x 140kW gas boilers. After an initial period where the boiler ran poorly and there were a number of breakdowns, a committed new Operator and Manager significantly improved the efficiency levels of the boiler system and increased its availability.

2018-19 Heating Season – Data Results and Recommendations

The boiler was shown to be running consistently and at an efficiency of 77%. Overall it demonstrated good combustion characteristics. Though the biomass system does not have a buffer tank, it supplies heat to the community swimming pool which provides a steady state load. Minor issues were discovered with water ingress to the hook bin silo transfer system which at times causes clinkering and down time for the boiler as this has to be cleared out.

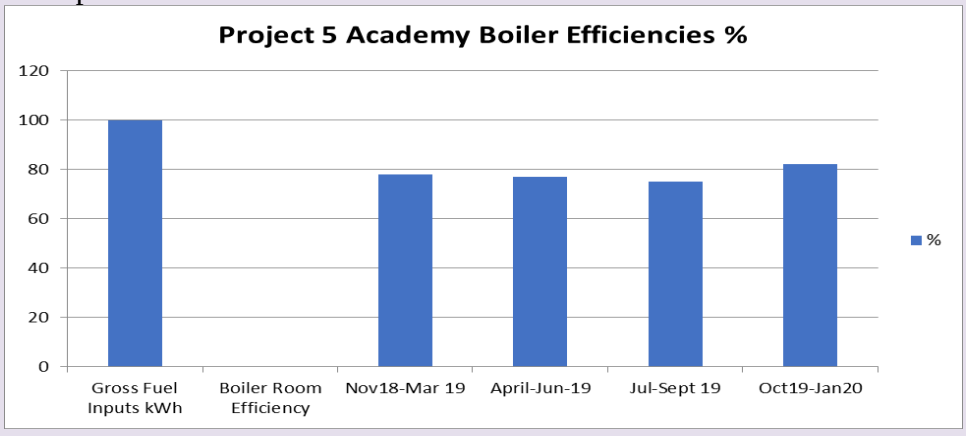
Example Data Trends – Good combustion characteristics and solid efficiency levels



Datasets show good combustion characteristics during varying heat loads.

2019-20 Changes and Improvements

Modifications were made to both hook bin silos to prevent water ingress and subsequent clinkering issues. This will reduce down time periods for the boiler in wet weather. Over the project period there has been a small improvement in efficiencies (see below). Overall a 3-5% improvement has been measured and is expected.



Identification of fuel silo water ingress area

The low-cost 'fix' to prevent water ingress

Pilot Project Summary Results

Pilot Project 5 - Academy School (450kW)	Wood Fuel Consumption (tonnes at 30% 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	115	72%	77%	N/A	54
Heating Season 2019-20	85	64%	80%	N/A	45
Gain or Loss	-30	-8	+3%	N/A	-9
Estimated Additional Gains if Recommendations Carried out			+2% (82%)		0

Footnote1: reduction due to less use of boiler during COVID restrictions - swimming pool closed for 3 months

Footnote2: As per Footnote 1

Footnote3: Improvements to Mobile Fuel Silos and less down time

Footnote4: Reduced use of biomass boiler due to Academy being closed (COVID)

Key Lessons

- **This is a well-run and managed biomass boiler system showing good efficiencies, combustion characteristics and with long run times**
- **The key element is a knowledgeable and motivated Operator who has set up a good servicing regime. He is well supported by a 'Green Issues' Manager**
- **The main technical issue discovered was water ingress into the fuel transfer auger from the wood chip hook bins that has been resolved cost effectively via a nearby engineering workshop**