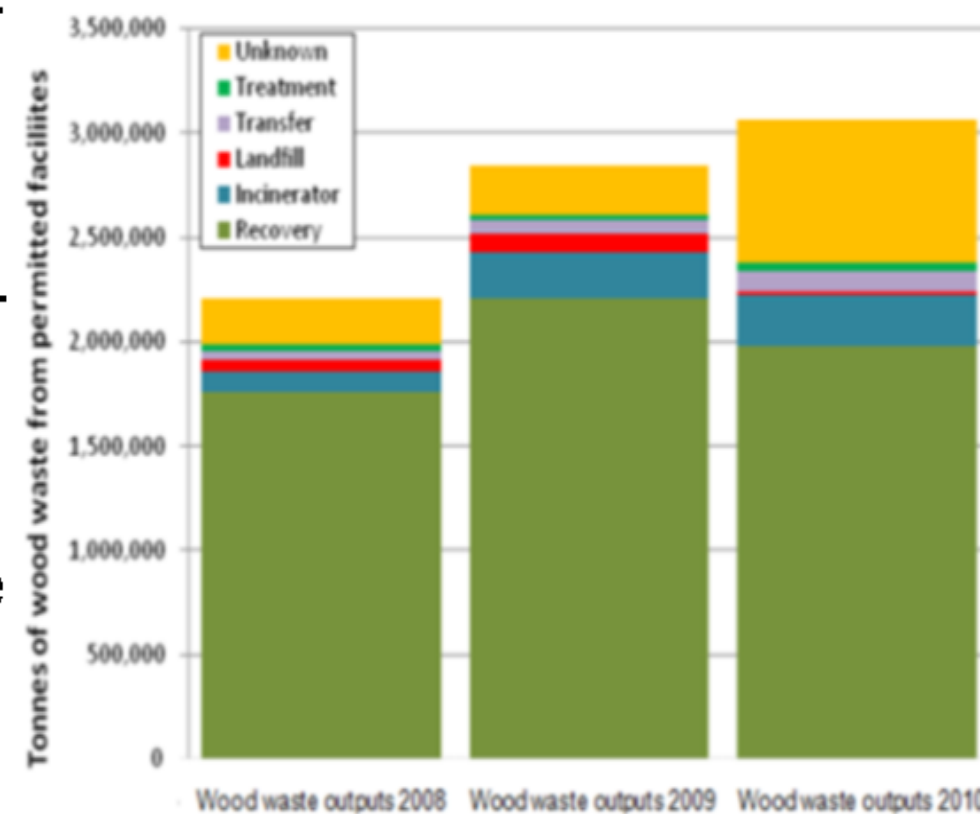


Pre-treatment of Municipal Solid Waste Wood Fuels

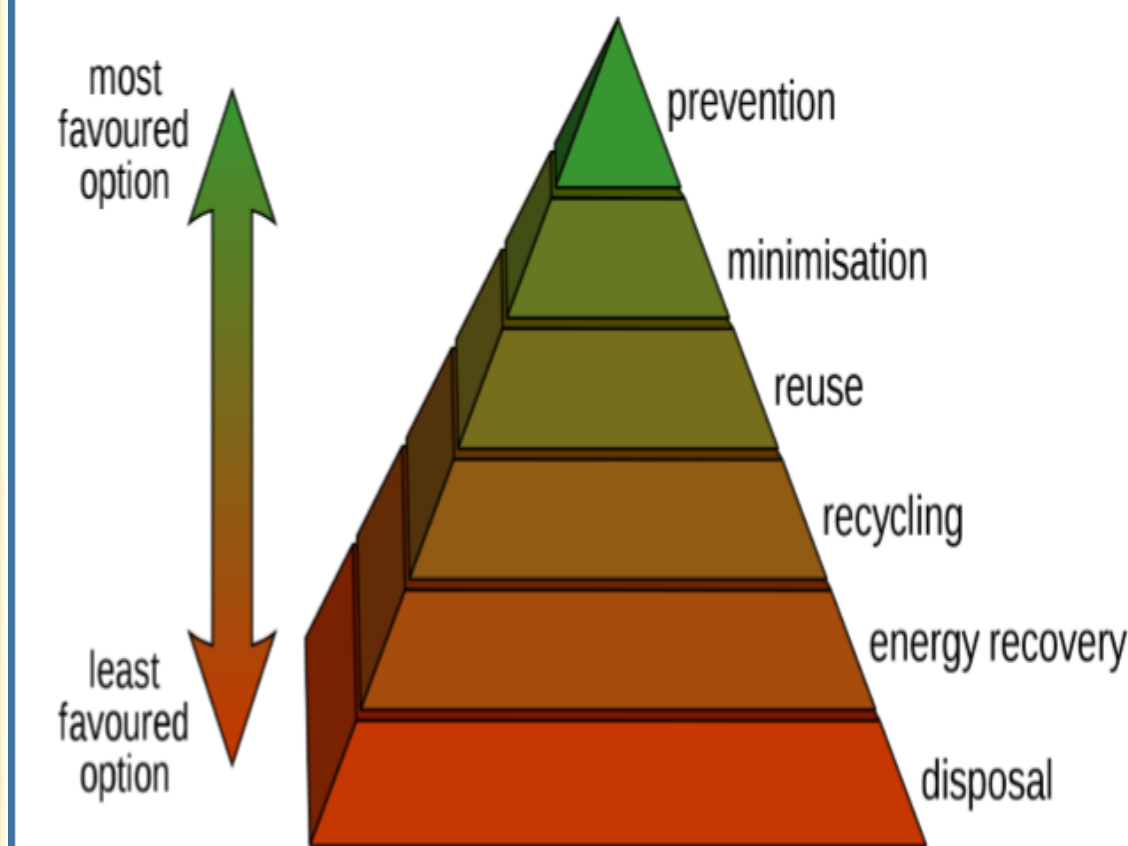
By Gane, J. and Birley, R.I.

Introduction

Large amounts of municipal waste is produced in the UK. Within this there are 4.3Mt of waste wood. An end use of the municipal solid waste wood is the production of energy, however some of the waste wood may produce harmful emissions during combustion. The fuel produces ash which can be harmful and gases that may be toxic. The ash can cause further complications to the operation of the furnace, where it can corrode and form thick ash deposits. The ash may also be of a fine particulate size of less than 2.5 microns, which are particularly harmful in the respiratory system.



Pre-treatments (in the form of) can be used as a method of reducing the ash and changing the emissions from the municipal waste wood.



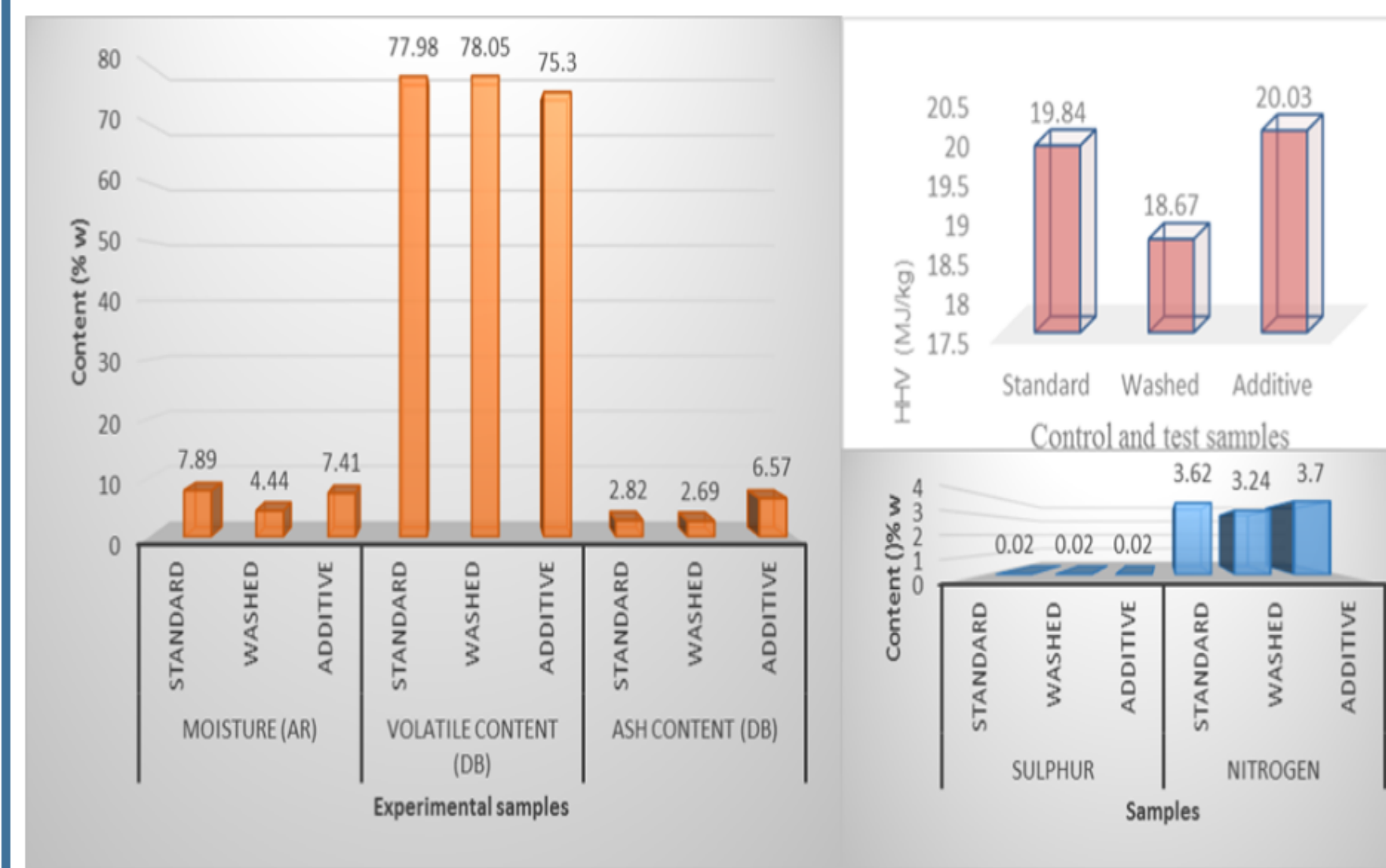
Heirarchy of waste

Aims/Objectives

The overall aim of this work was to use pre-treatment to improve waste wood fuel property.

The specific objectives are:

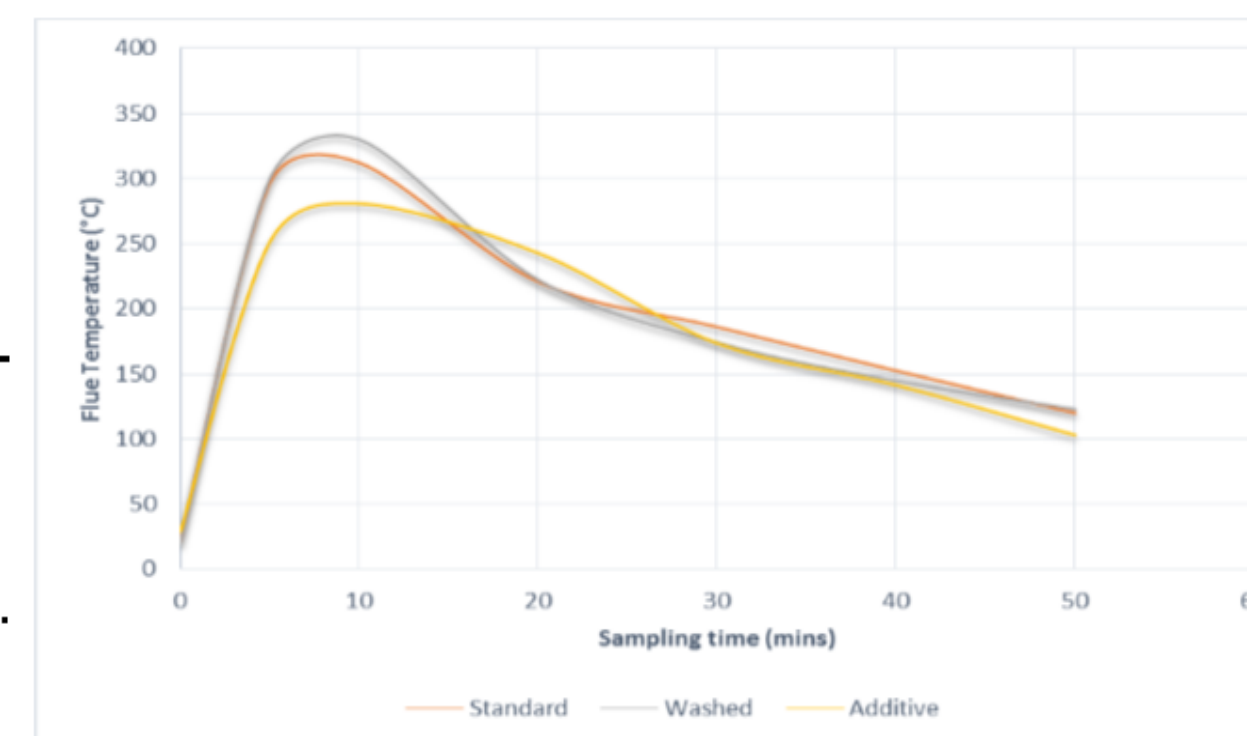
- To study impacts of pre-treatment on waste wood fuel properties
- To study impacts of pre-treatment on emissions from burning waste wood briquette fuels.



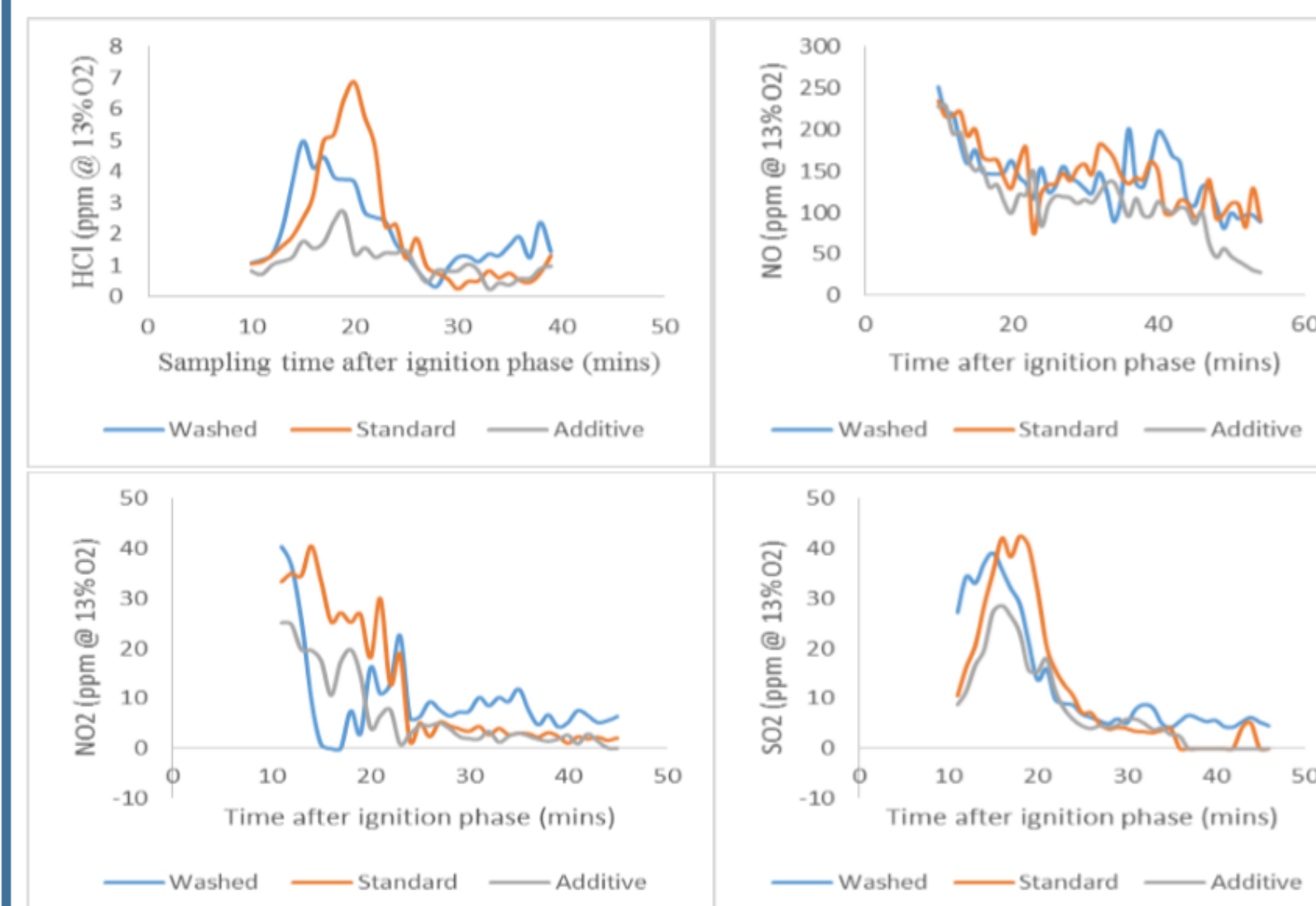
Properties of the control and test

Volatile matter and burning characteristics

The standard fuel showed more volatile content therefore has a better burning characteristics across the flaming phase of the combustion trial. As a result it also shows higher concentrations of the emission factors as NO_x and SO₂



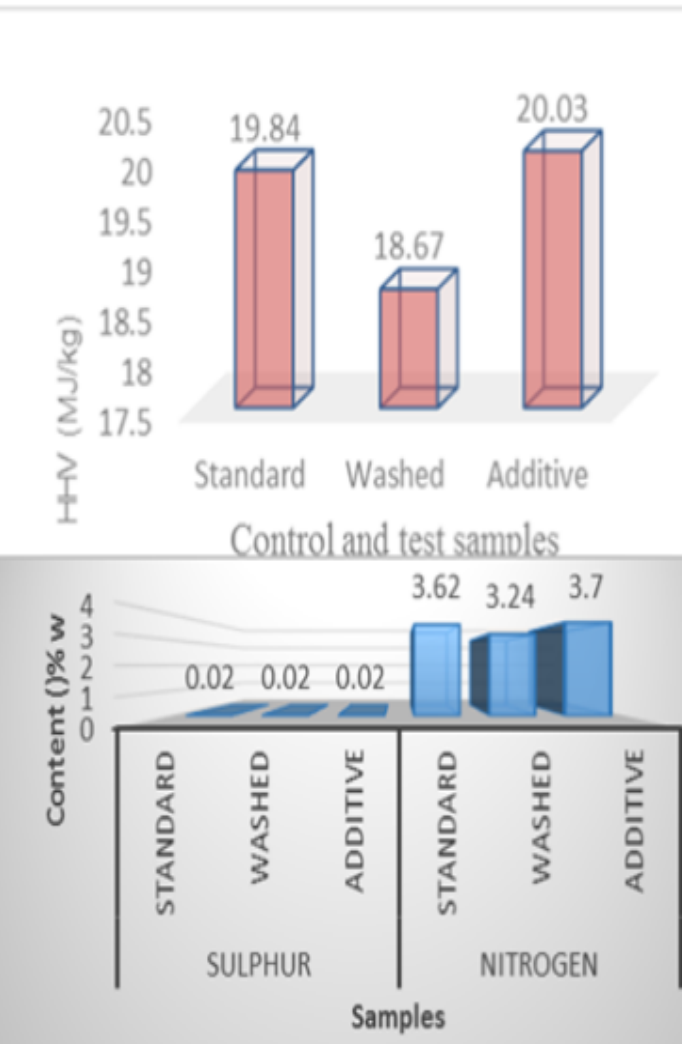
Temp Profile of combustion trials



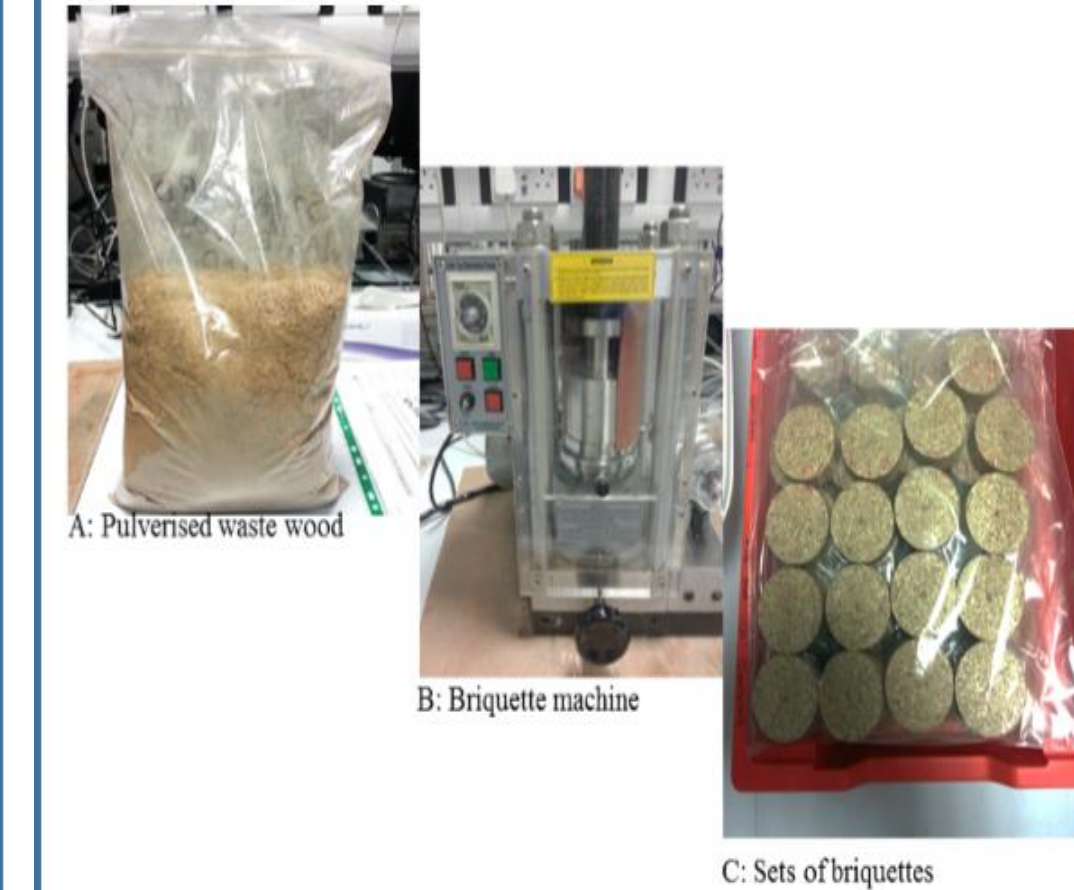
Emission profile of the control and test briquette fuels

Results

Proximates and Ultimates: In the present work pre-washing improved the volatile content of the waste wood fuel, and on dry ash free basis the heating value was increased in the additive pre-treatment compared to the control fuel sample.



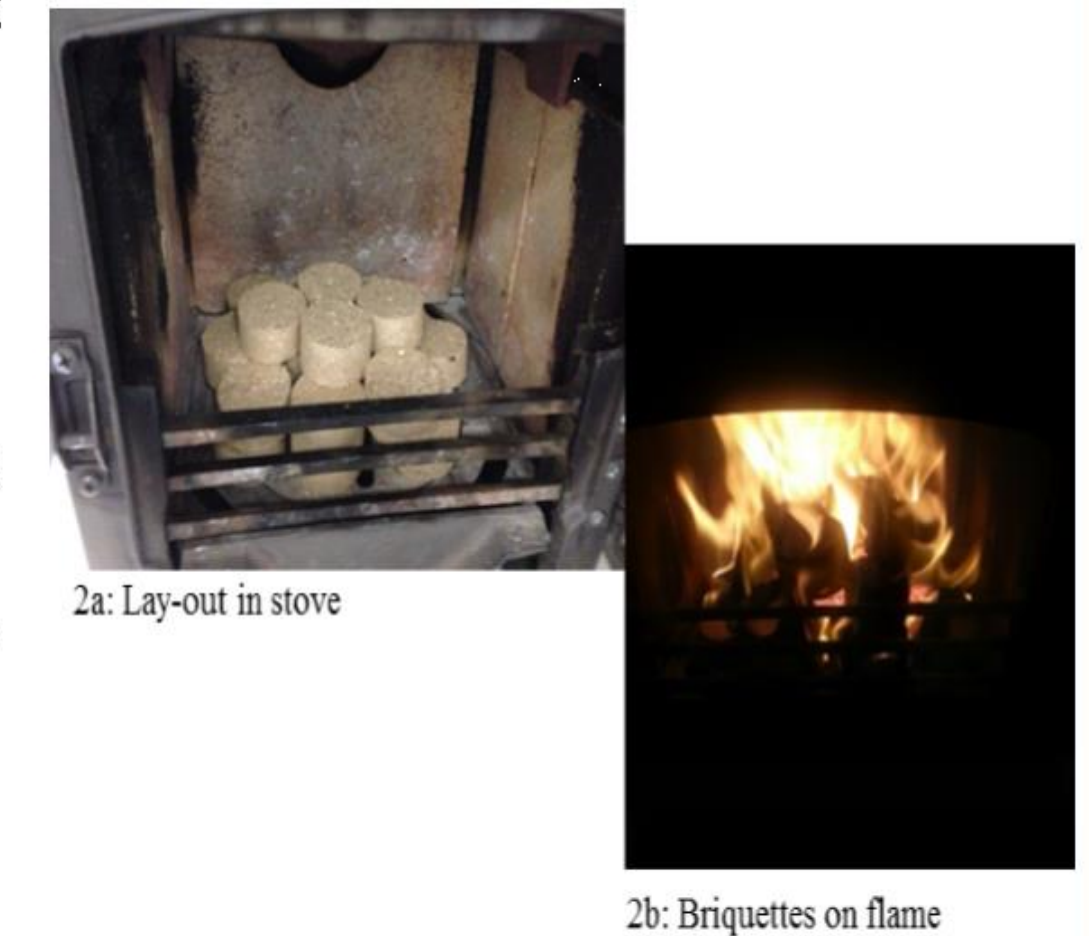
Method



Briquetting: The present work utilised briquettes made from waste wood obtained from municipal solid waste stream. The control sample was not pre-treated and named standard pulverised waste wood. The two pre-treated test samples comprised pre-washed and dried pulverised waste wood as well as additive pulverised waste wood.

Each were made into briquettes using a FYD-40 Desk top electromotion presser (Figure 1a-c).

Fuel characterisation: Proximate and ultimate analysis of control and test samples were carried out using British standard methods. BS EN 14775:2009 and BS EN 15148:2009 for ash and volatile analysis respectively; and BS EN 15104:2011 for CHNS analysis.



Discussion/Further Work

Pre-treatment can improve some solid fuel properties, at the same time reduce emission hazards. For example additive pre-treatment can be used to improve fuel heating value while pre-washing can also improve ash content of fuel. The present work has also shown that both pre-treated fuel conditions produced lesser emission hazard trends compared with the control or standard fuel.