Wood Fuel - User Guide

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Choosing the correct fuel for a Wood Biomass installation is vital for the long term viability of a project. Balancing cost, availability, practicalities and efficiency needs thought and we at P&H Energy are happy to assist with the knowledge we have gathered over the last ten years.

Types of Wood Fuel - how they compare:

Logs	**Wood Chip**
• Cheap • Wide availability • Ease of storage • Few quality standards • Labour intensive • Unpredictable output • High moisture content: 50+% • Output per tonne: highly variable subject to tree species	• Fuel stability • Competitive cost • Lower moisture content – 30-35% • Automated fuel feed • Convenience • Low ash residue - 1% • Less storage space • Output per tonne: 3500KWh
Pellets	**Short Rotation Coppice (SHC)***
• Energy dense fuel – high energy efficiency • Good flow qualities • Stable fuel • Very low moisture content • Convenience • Very low ash content • Less storage space • Automated fuel supply • Output per tonne: 4800KWh • Premium price	• Primary use for power station supply • Limited non contracted availability *(an additional source of wood biomass)

Quality Assurance

It is important for both wood fuel producers and users that a consistent size and quality of wood fuel is achieved - over the page are the main points which should be observed when selecting fuel:

- Quality standards focus on size and moisture content.
- Wood chip is classified via moisture content and particulate size i.e. the size of the individual wood chips.
- Low moisture content is of significant importance when using wood fuel. Wood chip moisture content should not exceed 30-35%.
- Typical conditioned wood chip deliveries should have a moisture content of c.25-30%.
- Unseasoned wood logs have a typical moisture content of 50-60% which impacts on the calorific value of the fuel i.e. the higher the moisture content the less efficient the fuel.
- At 25% moisture content (MC) the calorific value is c. 3800kW/tonne.
- At 50% moisture content (MC) the calorific value is c. 2250kW/tonne (59% index)

Wood fuel moisture classification is as follows:

Wood Chip Designation	Moisture Content %	MC definition
W20	<20	Air dried
W30	20 - 30	Undercover stored
W35	30 - 35	Limited undercover stored

The typical size of wood chip used in biomass boilers is recommended as between 1-3cm in length.
It is important to match the wood fuel with the boiler manufacturer specification to ensure warranty conditions are met. Check the specification and tolerances recommended by your preferred manufacturer.

Energy Values of Wood Fuels: units & conversion factors

A typical comparison is 1000 litres of OIL has the same energy value of 2 tonnes of wood (ODT)

UNIT: Oven Dry Tonnes (ODT).

Example:
ONE oven dry tonne @ 50% moisture content = **2 green tonnes.**
ONE green tonne @ 50% moisture content = **0.5 oven dry tonne**.

ONE tonne (ODT) of wood fuel = **THREE loose cubic metres of woodchip** = 5MWh of energy.

Energy Costs

Common Wood Fuels cost comparison

Fuel	Moisture Content %	Cost/
Soft/Hard "roundwood"	50%	c.£8.60 £/Mwh
Soft/Hard "woodchip"	35%	c.£10.50 £/Mwh
Pellet (Soft)	10%	c.£17.00 £/Mwh

Cost comparison to alternative sources: (average prices as of Oct 2011)

Heating Oil	59 pence / litre
LPG	49 pence / litre
Wood Chip (ODT)	£100-120 / tonne
Wood Chip (25-30% moisture content)	£80 / tonne

Energy Value of Wood – cost comparisons

1 tonne (ODT) represents the equivalent of 500 litres of heating oil

Heating Oil: 500 litres @ 59 pence per litre	=	£295
1 tonne (ODT)	=	**£110**

Fuel Storage Design

Integral to the design of a wood heating installation is matching the fuel store, heat load requirements and storage space to the boiler system. It is essential to match up the fuel store design to the delivery frequency.

An example:
A 150kW boiler using 100 tonnes per annum or c. 500m3 could be supplied from a 100m3 fuel store serviced via 5-6 deliveries per annum.

Wood chip supply delivered via trailer or bulk transportation will require a storage facility that can handle a tipping or moving flat-bed vehicle delivery.

Heat Load Calculations

An accepted "rule of thumb" calculation is as follows:

Volume of the building (m3) multiplied by 0.035 provides an approximate heat load in kW.

Example:
A building with a floor plan of 600sqm with an average ceiling height of 2.2m gives a volume of 1320cubic metres and a heat load calculation of 46.2kW.

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