Energy In Agriculture
21 August 2018

Heating for Drying

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Introduction

- Managing Director Action Renewables
- Offices in Dublin, Belfast, Edinburgh.
- Director of Irish Bioenergy Association
- Director of European Biomass Association
- 500 applications to the Northern Ireland RHI

Principle of Wood Drying

- Wood and forestry by-products are generally harvested at about 55% moisture content.
- For safe long term storage of wood without mould deterioration and associated health risks the biomass material should preferably be below 30% MC.
- The lower the moisture content the higher the heat output when used for fuel.
- There is need for research to examine the factors which affect the drying process and develop systems that require the minimum energy costs
- The outcomes will clarify routes to better enable a viable economic return to be obtained from the energy crop.

Energy Content

Initial moisture content (mc) of chip = 55% to 60%

Energy content at 55% mc = 1950 kWh (7GJ) /tonne

Energy content at 20% mc = 3900 kWh (14GJ)/tonne

Rokwood's calculation

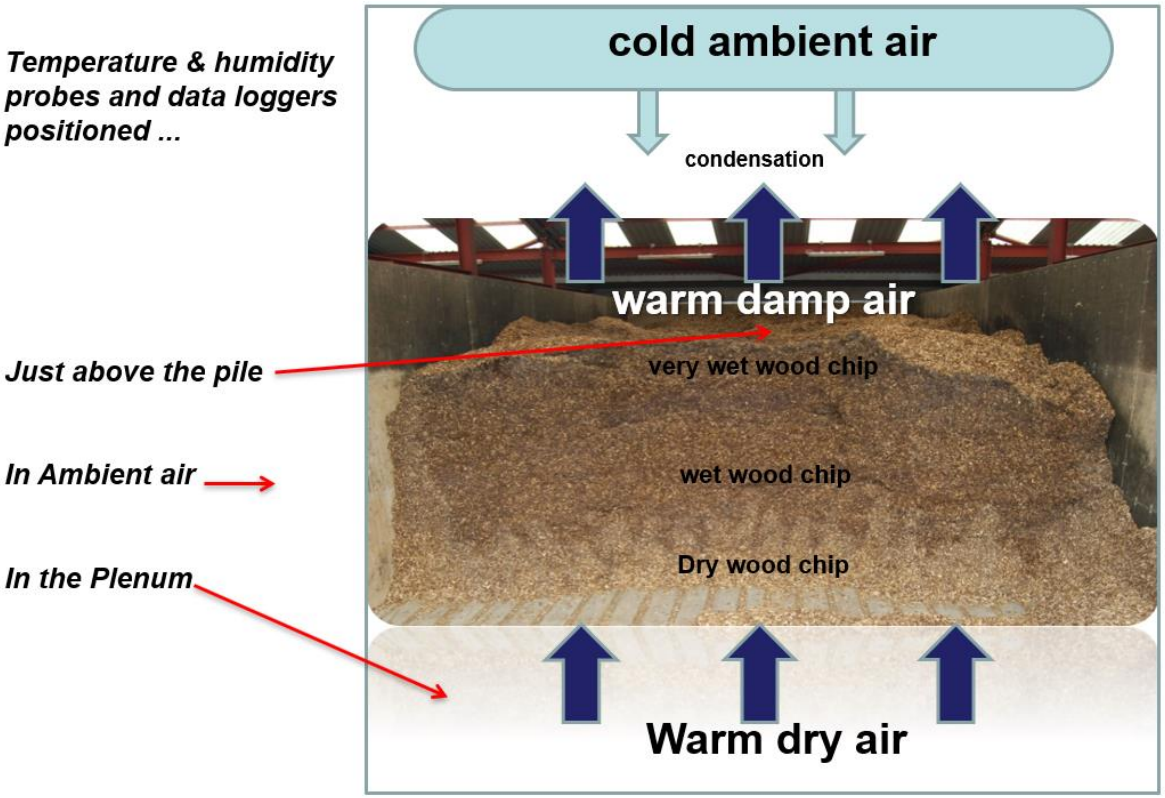
net calorific energy = 18.4 x (%DM/100-(2.45 x (100-%DM)/100

Moisture Content (%)	Gross Calorific Value (MJ/kg)	Net Calorific Value (MJ/kg)	kWh/tonne
10	19.00	16.32	4531.93176
20	19.00	14.23	3952.76671
55	19.00	6.93	1925.68905

Methods of drying wood (1)

Drying Floors

- Wooden, concrete,



Methods of Drying Wood (2)

Belt Dryers (as used for grain drying)

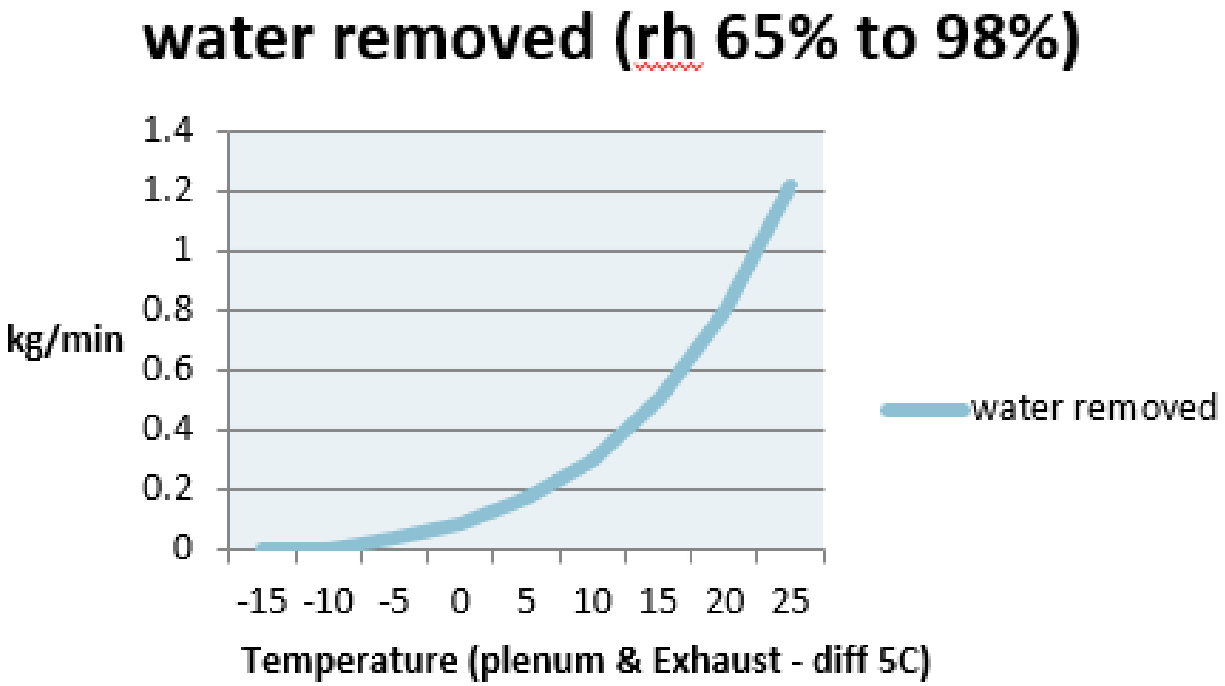
- Most expensive but most effective
- See Alvan Blanch for example
- http://www.alvanblanchgroup.com/driers-other-materials

Drum Dryers

- Not the best option- mesh can get blocked resulting in hot spots and increased risk of fire

Drying process

The physics of drying woodchip relate to the properties of air. The warmer the air and the lower its relatively humidity, the more efficient the drying process will be



Drying calculator

Modelling – drying calculator

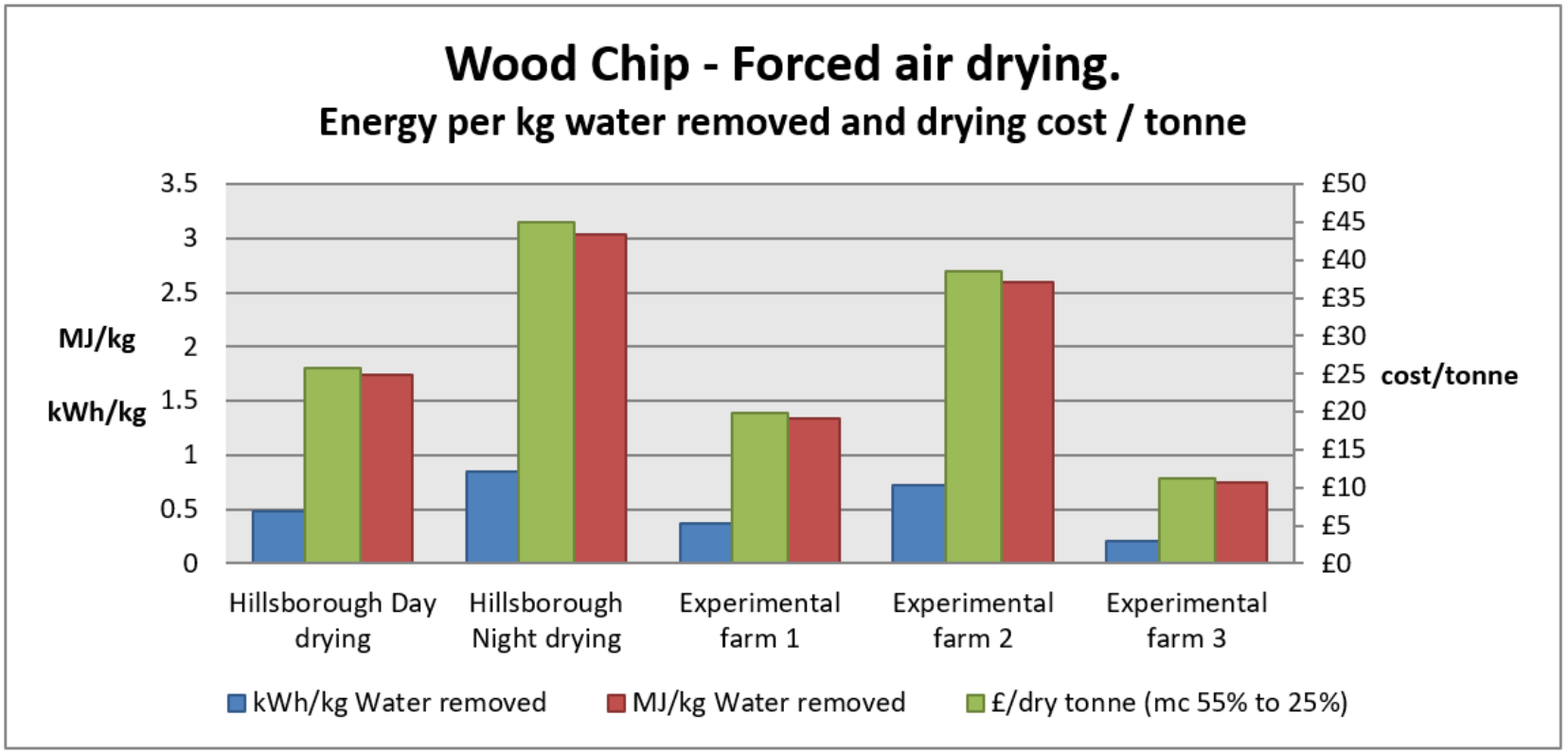
	Actual Costings					
	Pre drying		Post drying		Water Removed	Drying cost
Wood Chip Batch	MC	(Tonnes)	MC	(Tonnes)	(cost / tonne)	(cost / tonne)
Example 1	55%	120	21%	68	£37.23	£28.13
Example 2	55%	120	24%	71	£67.36	£46.40
Example 3	55%	250	35%	173	£29.81	£13.25
Example 4	55%	400	20%	225	£57.79	£44.95
Example 5	55%	800	21%	456	£13.17	£9.95

* - IncludesEstimates due to incomplete data

Forced Drying vs natural Drying

- Potential to earn additional income through adding value to woodfuel.
- Additional potential revenue generation via SSRH!
- Guarantees consistent moisture content for customer.
- Burning wood fuel of a moisture content which matches specification of boiler maximises boiler efficiency
- Reduces requirement for timber storage at fuel depots.
- Reduced transport costs
- Requirement for drying may increase as level of demand for woodfuel increases.
- Key advantages is upfront cost – but loans available
- Other methods of drying are Belt Dryers, Kilns and Drum Dryers

Forced Drying vs natural Drying (2)



Thank you