Wood Chip Production & Supply Chain

McCauley Wood Fuels

Kenny McCauley

Wood Chip Quality Workshop - AFBI

Introduction



Introduction



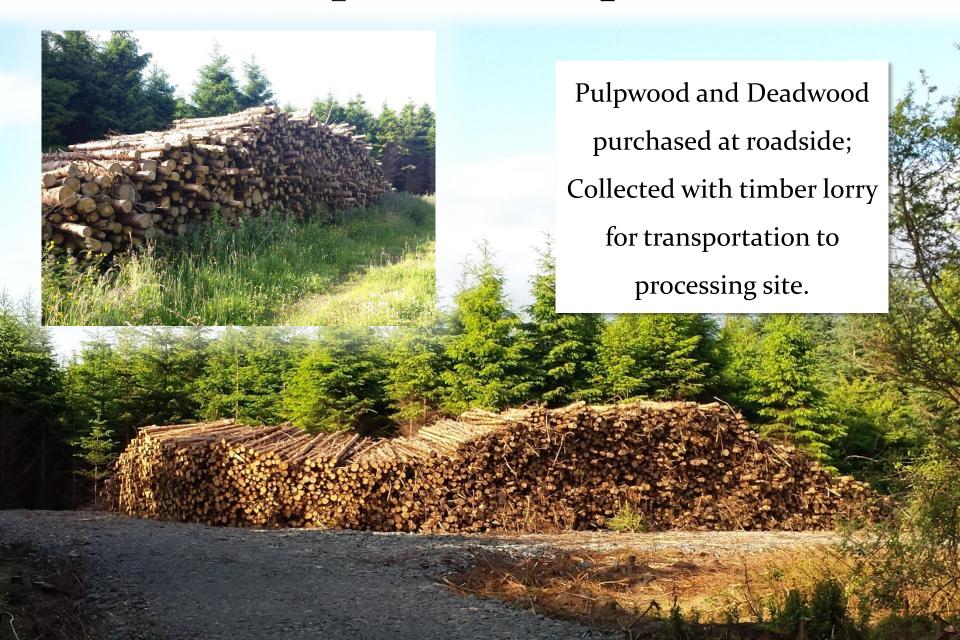
Firewood



Transport of Pulpwood



Transport of Pulpwood

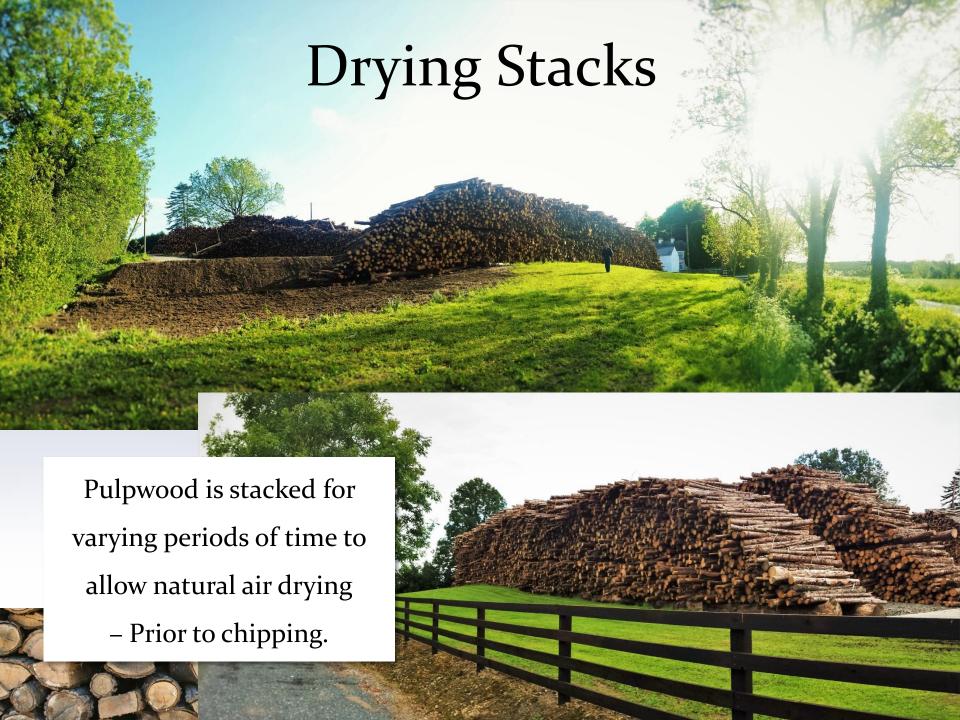


Transport of Pulpwood



Incoming truck stacks pulpwood, for further storage and drying, adjacent to processing yard.





Ventilation of Stacks

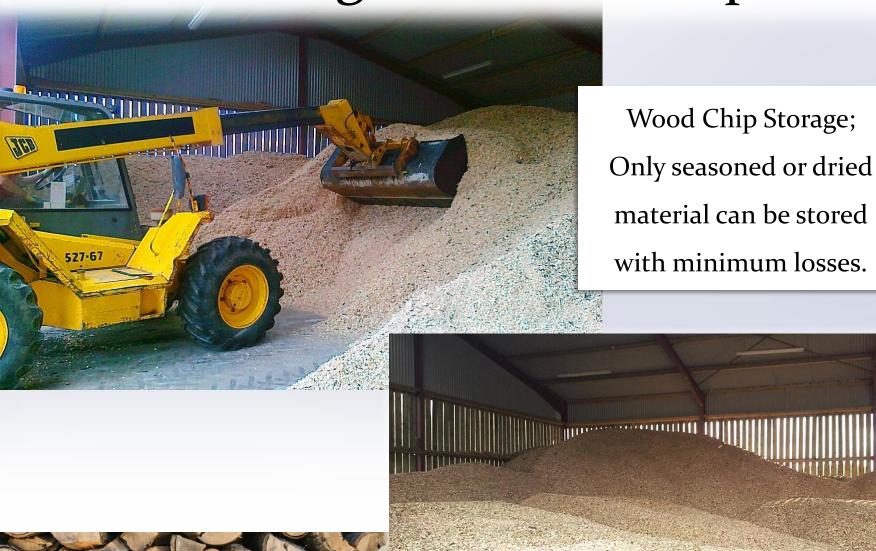








Storage of Wood Chip



Transport of Wood Chip



- Arigna Fuels
- Ecowood
- Edenderry Power
- OCR Recycling

- Fuel merchants
- Mushroom growers
- Chicken farmers
- Pig producers



Delivery of Wood Chip



Wood chip is delivered and conveyed to the users fuel store, by means appropriate to the site and user needs.

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Wood Fuel Quality Assurance



In-House Testing

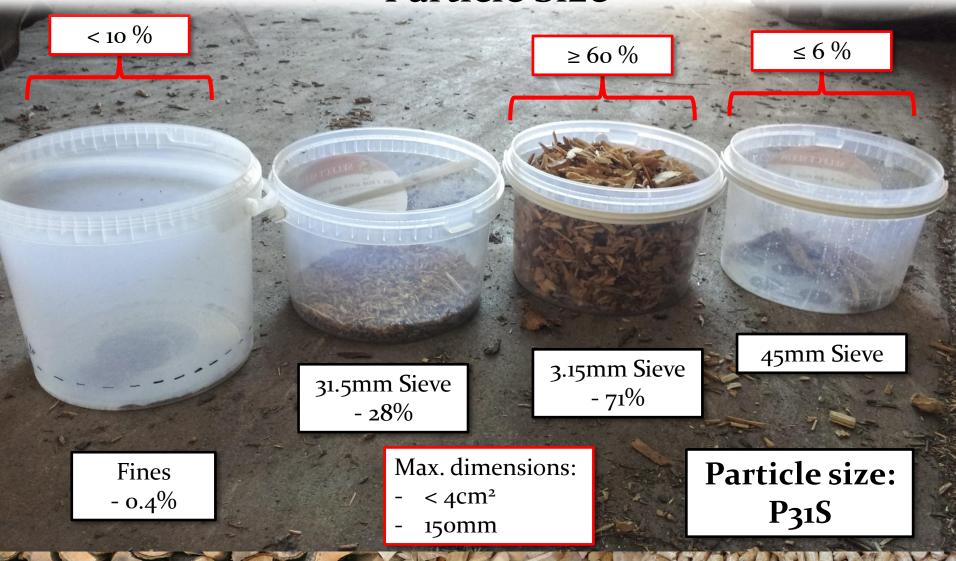
Particle Size



In-house particle size testing is carried out as per the indicative testing procedure outlined by the WFQA scheme.

Independent auditing and testing ensures in-house test results conforms to these guidelines.

In-House Testing – Particle Size



In-House Testing – Moisture Content

Moisture content testing method

- ✓ Sample weighed and recorded;
- ✓ Sample placed in oven at 110°C for 8 hours;
- ✓ Sample then re-weighed;
- Moisture content calculated based on weight loss as per formula:

$$M.C.(wet\ basis) = \frac{Weight\ lost}{Wet\ weight} \times 100$$



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In-House Testing – Testing Records

Wood Chip

McCauley Wood Fuels

Drumard, Mohill, Co. Leitrim



WFQA Registration No.: PC-WF-001

Customer:	Ballyconnell Pig Farms						
Delivery Address:	(collected)						
Country of Origin:	Ireland						
Species:	Softwood (Spruce)						
Drying Method:	Air Dried						
Moisture Content (Average):	M35 ~ 31.1 %						
Particle Size; EN 14961-1:	P45A - Dia. 45mm > (>75% Vol.) > Dia. 8mm & all < 120mm.						
Loose Stacked Density:	$> N/A kg/m^3$						
Delivered Quantity:	30.38 Tonne						
Month:	December '14						
Storage Requirements:	Ensure woodchip is not contaminated by foreign objects (e.g. stones) and is stored in dry conditions						
Boiler Requirements:	Ensure boiler is maintained in accordance with manufacturers recommendations						

Note: All information contained on the delivery docket/packaging is in accordance with Annex C (woodchip) of NWA 4:2009.

					Testing Da		29/08/2013 29/		
		1	Testing Date		Batch Detail 05/05/2014		Murray/Gor Wh 19/05/2014	7	
		I	Batch Details	(Glennons - 1		60		-
Testing Date		18/04/2015	02/05/2015	16/05/20	15 B.K	60 Arigna	60 Arigna	337 278	360 268
Batch Details				Western I		-	-	178	17
m ³ Chip		60	60	13	20 379	342		159	182
Load Date:					322 178	297 178	297 178	100 59	90
Total Weight Wet	~	331	338	310	201	164	157	59.0	102.2
Total Weight Dry	g g	269	277	262	144	119 45	119	37.1	50.5
Tray Weight const.	g	178	178	1	78				
Chip Weight Wet	g	153	160	132	39.6	37.8	31.9		
Chip Weight Dry	g	91	99	84	28.4	27.4	24.2		
Weight Diff.	g	62	61	4	48				
Dry Basis M.C	%	68.1	61.6	57.1					
Wet Basis W.C	%	40.5	38.1	36.4					

Saturday, J	ne 29, 2013	Weight of Sample Length of Maximum			2,546 100	grams mm	10	0.0		Is this < 120	YES
		of Sample	2,4	150	grams	100	.0	%			
		Length of Maximum piece		80	80 mm				Is this < 120		YES
	Chip rer			0	grams	0.0	0.0		Is this < 6%:		YES
	Chip rer	Chip remaining in 8mm Chip remaining in 3mm		950	grams	79.	.6	%	Is th	is > 75% :	YES
	Chip rei			192	grams	20.	.1	%			
Chip tha		nt passes through		8	grams	0	3	%	Is th	is < 8%:	YES
		If the answers to all questions above are 'Yes' then the sample is P45A.								YES	
								Is thi	s san	ple P45A ?	

Wood Fuel Quality Assurance



- Standardised means of displaying quality
- Recognises good practices
- Enhance the reputation of wood fuels
- Evidence that the industry is mature
- Become more important for user and industry
- Improve confidence in supply to existing & potential end users
- Code of conduct

Wood Fuel Quality Assurance

- Member of organisation or greater body
 - Part of public awareness campaign, national media advertising, highly optimised website
- Assistance with improving in-house quality procedures
- Commercial advantage when tendering for public procurements
- Data collection and utilising it to build up greater overall picture of operation
- Our Niche
 - Can we compete with biomass imports?
 - We're small scale
 - Regional supply and users
 - Presentation of quality important to that

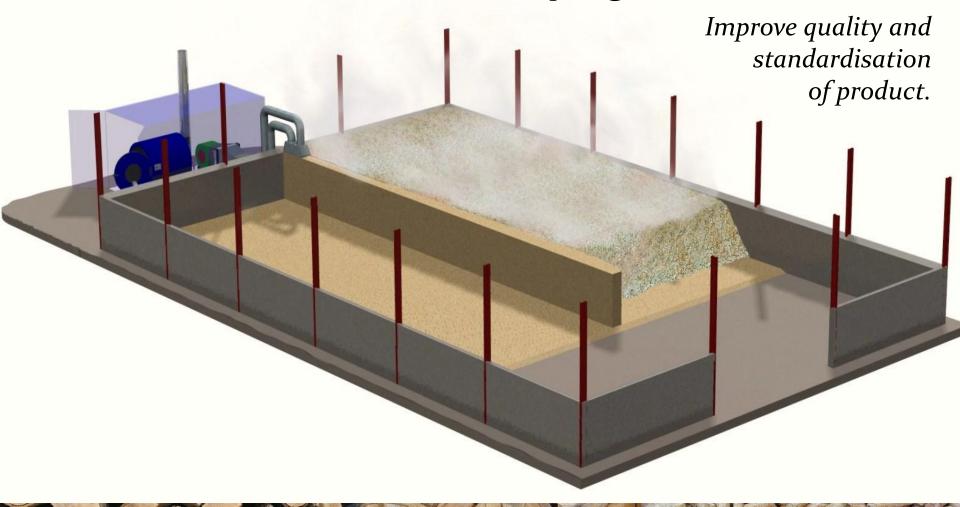
List of Certified Suppliers

- > Forest Fuels Ltd.(Firewood)
- > Worrell Harvesting (Woodchip and Firewood)
- > Aughrim Timber and Stake (Woodchip)
- McCauley Wood Fuels (Woodchip)
- > Woods Firewood Products (Firewood)
- K's Sustainable Energy (KSE) Ltd (Firewood)
- > Balcas brites (Wood Pellets)
- > Woodside Garden Products (Firewood)
- > Cotter Bros Firewood (Firewood)
- > Sherlock Warehousing & Trading Ltd (Sherlogs) (Firewood)
- > Celtic Logs (O'Brien Timber Products Ltd) (Firewood)
- > BR Wood Fuels (Frewood)
- > Wood 2 Go (Firewood)
- > O'Hara Woodfuel Ltd (Firewood & Woodchip)

When you buy Firewood, Woodchip, Wood Pellets or Wood Briquettes, Look for the Quality Label...



Areas of Interest - Forced Drying



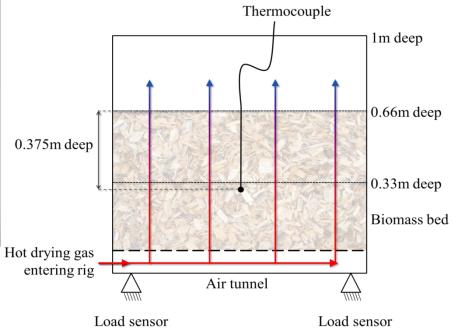
Forced Drying

Investigate effectiveness of forced convective drying as a means of improving solid biomass quality

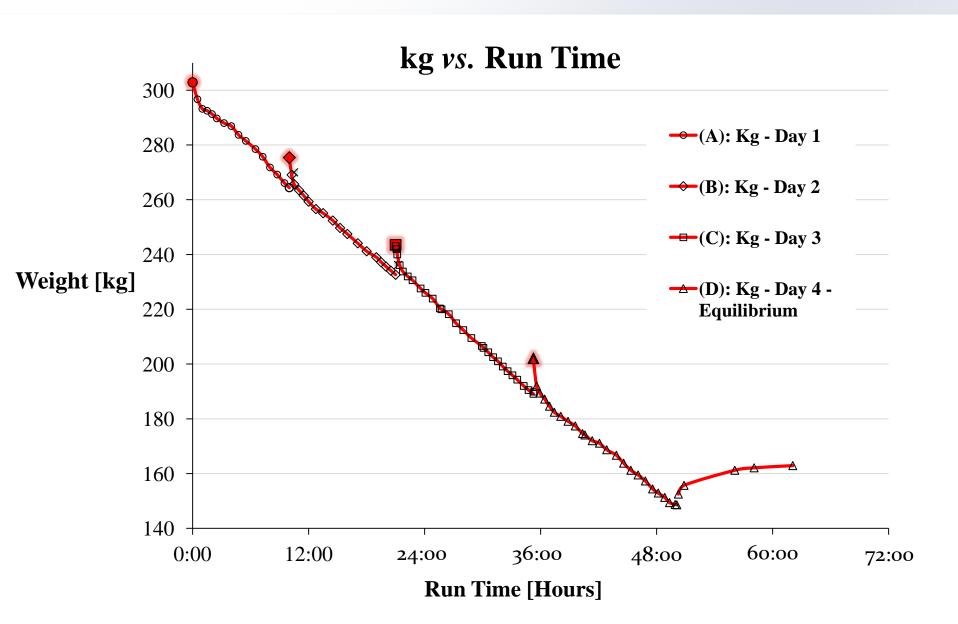
- → Biomass feedstock
- → Drying process
- → Experimental drying trials
- → Simulation

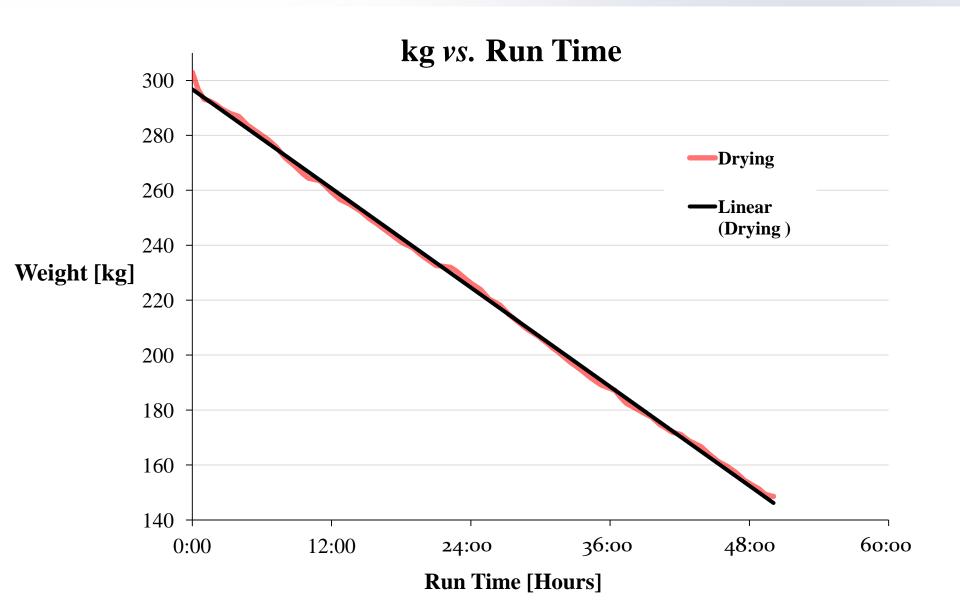
Drying Test Rig



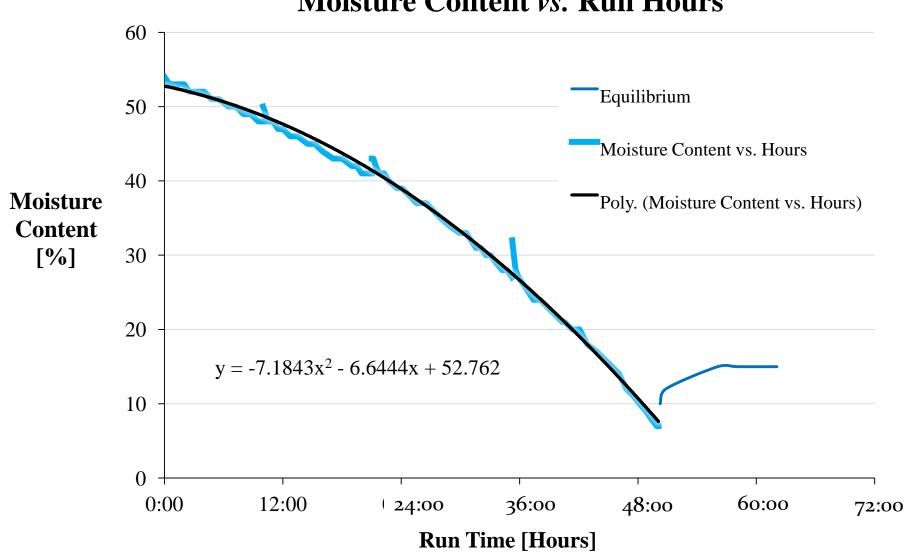








Moisture Content vs. Run Hours



Moisture Content vs. Time Experimental & Numerical

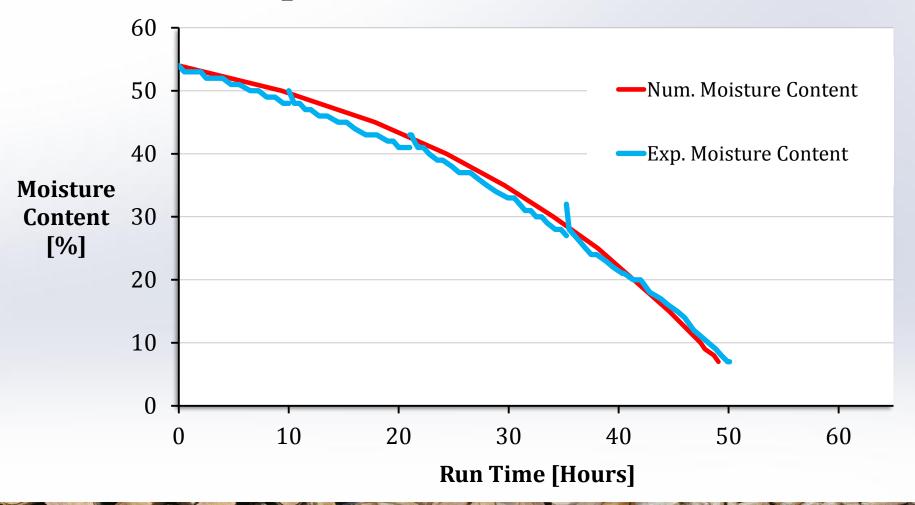
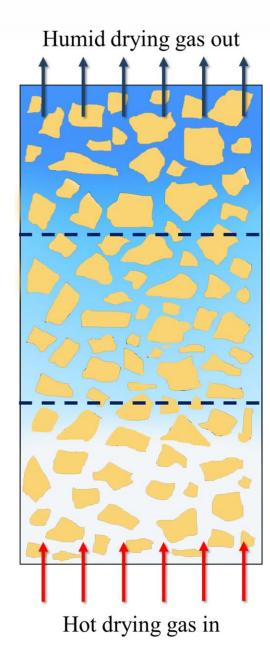


Figure: Drying trial **numerical results versus experimental result** → <u>Good correlation</u>

Drying Process



Zone 3:

Having initial moisture, no drying occurs as air is saturated in this zone

Zone 2:

Unbound moisture removal

Zone 1:

Bound moisture removal

3 apparent zonesexisting in thedrying process



Biomass N.C.V. vs. Moisture Content

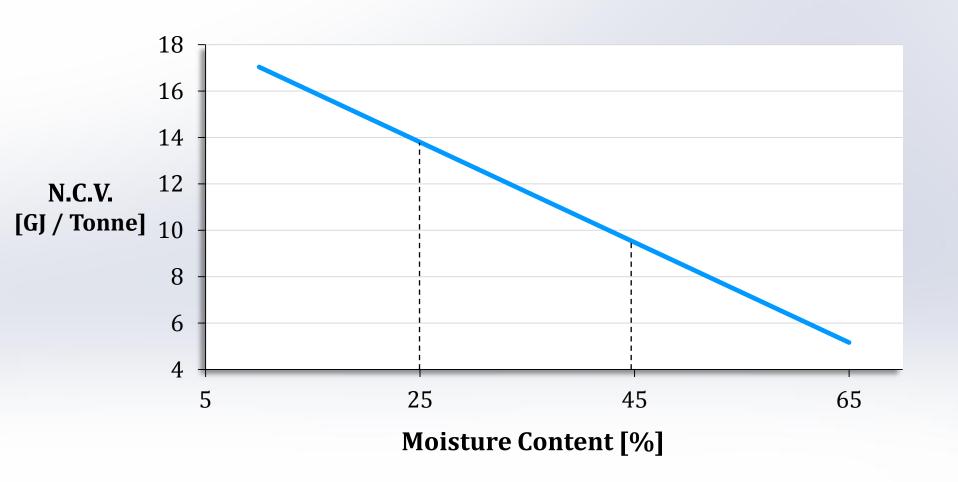
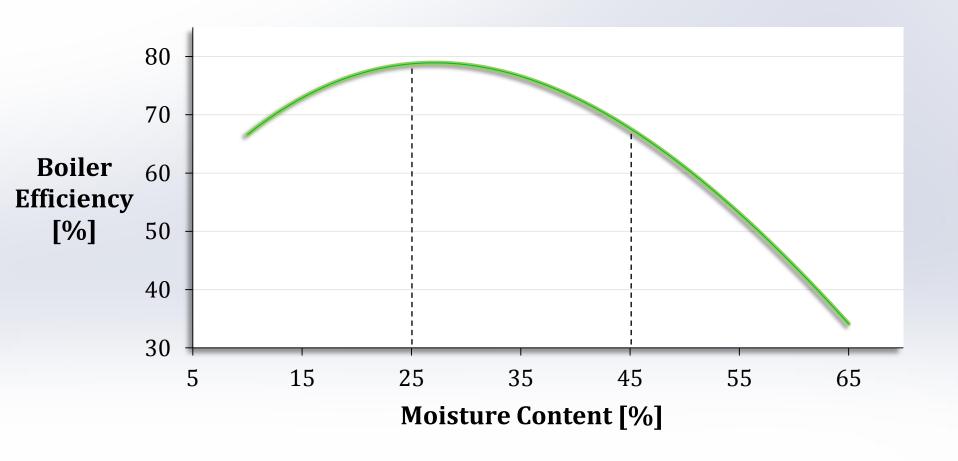


Figure: Graph showing **net calorific value versus moisture content** of solid biomass

Boiler Efficiency vs. Moisture Content of Biomass







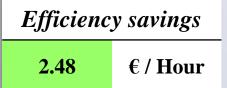


Considered a variety of cases and examples where forced drying may be applicable.



Forced Drying







Summary

Satisfied with wood chip business

- → Constant learning curve, improving with each season
- → Appears a positive outlook
 - → Hopeful for future development

Quality procedures and structure very important

- → Sustained future
- → Service to users
- → Reputation of our business & industry

Forced drying costs more than the gain in energy value

- → Should only be used where necessary
- → Viability hinges on:
 - → Financial incentive (RHI)
 - → If generating/purchasing heat or using waste heat
 - → Utilising lower quality feedstock

McCauley Wood Fuels

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Thank you.