

BIOMASS (Woody)

Woody biomass is biomass from trees, bushes and shrubs. It can also be an industrial waste of wood products in the form of residues such as wood shavings, sawdust, bark, woodchips, wood slabs and other ground woody materials. Wood wastes do not have energy density. They need to become highly compressed into pellets or briquettes for more energy density that will, in turn, provide higher combustion efficiency. All types of woody biomass do not require binding additives. Wood pellets are one of the most common types of biofuel used in many western parts of the world.



Burning of woody biomass

Additional advantages of wood pellets to other non-renewable fuels:

- Save on transportation costs due to its high bulk density
- Clean and renewable energy
- Convenient to use due to its relatively uniform size and weight
- Stable combustion with more than 80% effective burning rate
- Low ash produced
- Very low carbon dioxide emission

Forms of processed biomass



Pellets



Briquettes

Wood residues or wood wastes of various types differ slightly in properties due to lignin and cellulose content.

Wood wastes⁰



Wood Shaves



Sawdust



Wood Barks



Woodchips



Wood Slabs

Wood pellets and briquettes are renewable biofuels. They replace firewood (heating) and charcoal (cooking) in many households. Also, they are massively used in commercial boilers to produce high-pressure steam and in power stations to produce electricity. In addition, they can be used as animal bedding for pets and ungulates.

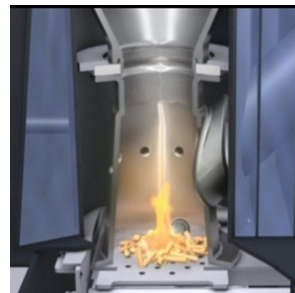
Applications



Heating (in stove)



Cooking



Boiler



Power Station



Animal Bedding

Comparison between wood pellets and other non – renewable fuels¹

Energy Source	Fuel Type	Environmental Property	High Heating Value	Boiler Thermal Efficiency (%)	Consumption Rate	Operation ² Cost (USD/hr.)
Coal	Fossil	Heavy Pollution	5,000 kcal/kg	65	185 kg/hr.	1.45
Heavy Crude Oil	Fossil	Heavy Pollution	8,000 kcal/kg	85	88 kg/hr.	3.26
Diesel	Fossil	Moderate Pollution	102,000 kcal/kg	85	69 kg/hr.	3.88
Natural Gas	Fossil	Pollution Free	8,000 kcal/m ³	86	87 kg/m ³	3.06
Coal Water Mixture (CWM)	Fossil	Low Pollution	4,060 kcal/kg	82	180 kg/hr.	1.69
Wood Pellets	Bio	Pollution Free	4,200 kcal/kg	81	178 kg/hr.	1.53

Table 1.

From *Table 1*, wood pellets are much more efficient concerning operation cost and heating value. Most importantly – it is pollution-free.

Thai standards and classes of woody biomass pellets^{3*}		
Properties	Class I	Class II
Bulk density	$\geq 600 \text{ kg/m}^3$	$\geq 600 \text{ kg/m}^3$
Diameter	6 – 12 mm. $\pm 1 \text{ mm.}$	6 – 12 mm. $\pm 1 \text{ mm.}$
Durability	$\geq 96.5 \text{ \% w/w} - 99.0 \text{ \% w/w}$	$\geq 96.5 \text{ \% w/w} - 99.0 \text{ \% w/w}$
Finds	$\leq 6.0 \text{ \% w/w}$	$\leq 6.0 \text{ \% w/w}$
Average length	3.15 – 40 mm. For Ø6 – 10 mm.	3.15 – 40 mm.
	3.15 – 50 mm. For Ø12 – 25 mm.	
Min. length	$\geq 3.15 \text{ mm.}$	$\geq 3.15 \text{ mm.}$
Max. length Ø6 – 10 mm.	$\leq 45.0 \text{ mm.}$	$\leq 45.0 \text{ mm.}$
Length beyond 40 mm.	$\leq 1 \text{ \% w/w}$	$\leq 1 \text{ \% w/w}$
Moisture	$\leq 10 \text{ \% w/w}$	$\leq 10 \text{ \% w/w}$
High heating value	$\geq 16.5 \text{ MJ/kg}$	$\geq 16.5 \text{ MJ/kg}$
Ash	$\leq 3 \text{ \% w/w}$	$\leq 5 \text{ \% w/w}$
Additives	$\leq 3 \text{ \% w/w}$	Unspecified
Chlorine	$\leq 0.1 \text{ \% w/w}$	$\leq 0.1 \text{ \% w/w}$
Sulphur	$\leq 0.05 \text{ \% w/w}$	$\leq 0.05 \text{ \% w/w}$
Nitrogen	$\leq 0.6 \text{ \% w/w}$	$\leq 0.6 \text{ \% w/w}$
Arsenic	$\leq 2 \text{ mg/kg}$	Unspecified
Cadmium	$\leq 1.0 \text{ mg/kg}$	Unspecified
Chromium	$\leq 15 \text{ mg/kg}$	Unspecified
Copper	$\leq 20 \text{ mg/kg}$	Unspecified
Lead	$\leq 20 \text{ mg/kg}$	Unspecified
Mercury	$\leq 0.1 \text{ mg/kg}$	Unspecified
Zinc	$\leq 200 \text{ mg/kg}$	Unspecified

We sell
<ul style="list-style-type: none"> - Woody biomass pellets - Woody biomass briquettes - Woodchips - Wood shaves

Packaging (kg.)⁴			
Pellets	(15/30 kg. sacks) or (10 kg. cartons) or (900 jumbo packs)		
Briquettes	20 kg.		
Residues	30 kg.		

Transport/Shipment	
Modes of Transport	Containers⁵
Ship	40-foot Standard
Railway/Truck ⁶	40-foot Standard

⁰ Only woodchips are available for export.

¹ Average values from repeated tests.

² Average working cost as of 2017. Value differences change proportionally as time changes.

^{3*} Standards and classes differ from international standards of EN, EN-plus, FPI, DIN plus, CANplus, amongst others.
The analysis report shows specific property values for each type of agricultural waste. Contact us for more details.

⁴ Actual packaging may differ slightly due to products from various sources. '**yoohong**' markings and labels are for product traceability.

⁵ Subject to customs regulations on maximum laden weight/payload.

⁶ An option for customers in Cambodia, China (Yunnan only), Laos, Malaysia Peninsula, Myanmar and Singapore. Subject to service availability.

※ This leaflet may be corrected and updated without prior notice.

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MADE
in
THAILAND