

Torrefied TorrB[®] Briquettes vs Raw Pellets



Torrefaction (roasting at a high temperature in an oxygen free environment) is not new. It has been used to roast coffee beans for over a hundred years. It has taken time, however, to apply this technology to evenly roasting wood chips and ground biomass that is not uniform in size.

Densification of the torrefied biomass product into pellets or briquettes for economic transport has also taken time to perfect.




Advantages of torrefied biofuel as drop-in coal or raw pellet replacement fuel:

- Just like roasted coffee beans, torrefied wood grinds easily, and so can be fed into the same pulverizing equipment that is used to grind coal before it is fed to the coal boiler.
- Like coal, it is water resistant and can be stored without cover.
- Its Btu (energy) content is similar to that of coal and 25-30% higher than that of raw wood pellets.
- Harmful emissions such as mercury and sulfur are virtually non-existent, and nitrous oxides are reduced by 46%.*

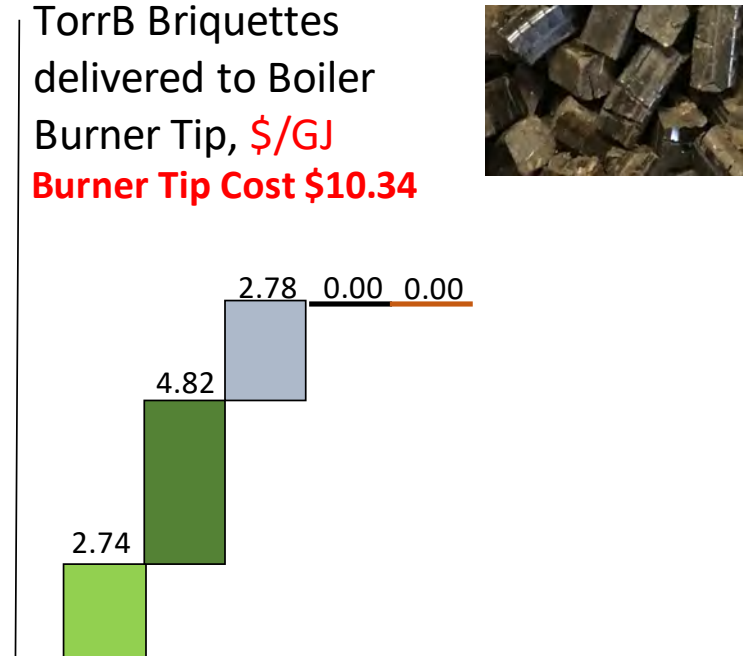
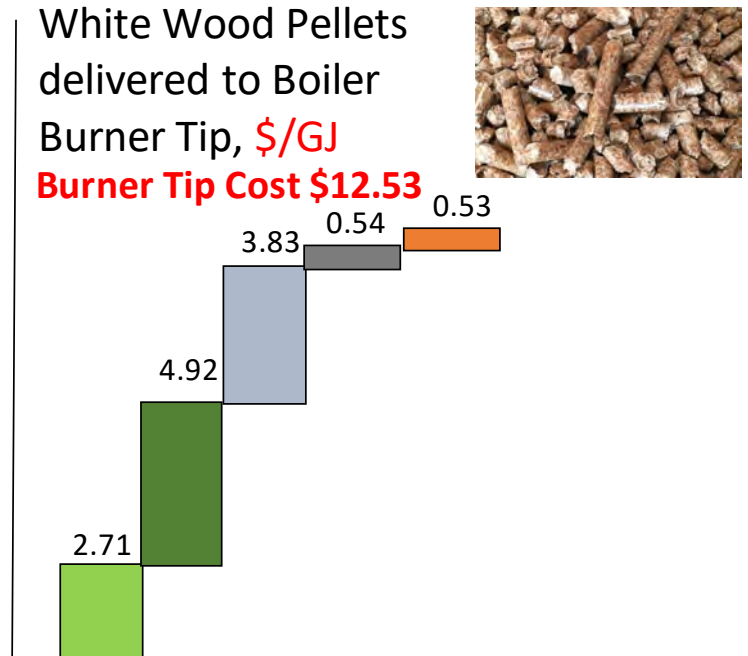

*Data from test burns conducted at coal-fired boiler, Western Research Institute, Laramie WY.



OVERVIEW: Cost of White Wood Pellets vs TorrB[®] Briquettes for Export via Rail and Ship



ENERGY CONTENT
17.5 GJ/MT
 (15.88 GJ/short ton)


ENERGY CONTENT
22.5 GJ/MT
 (20.4 GJ/short ton)

NOTES:

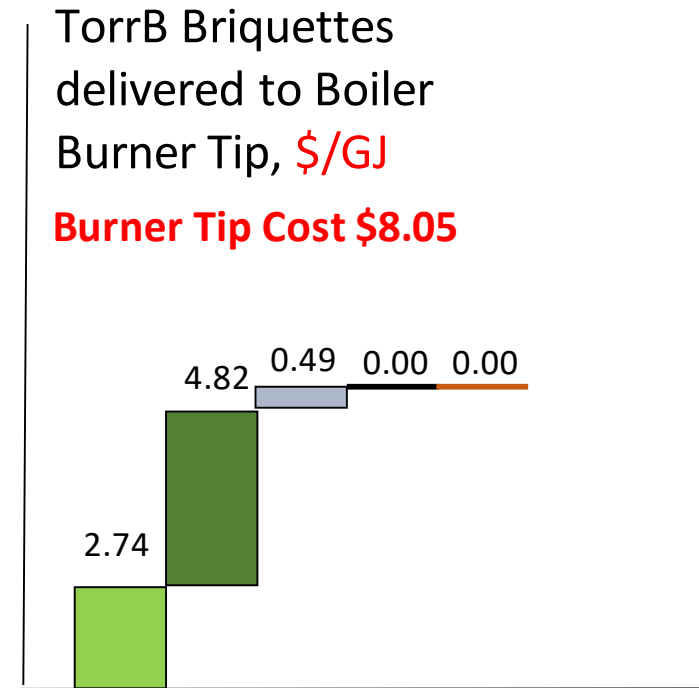
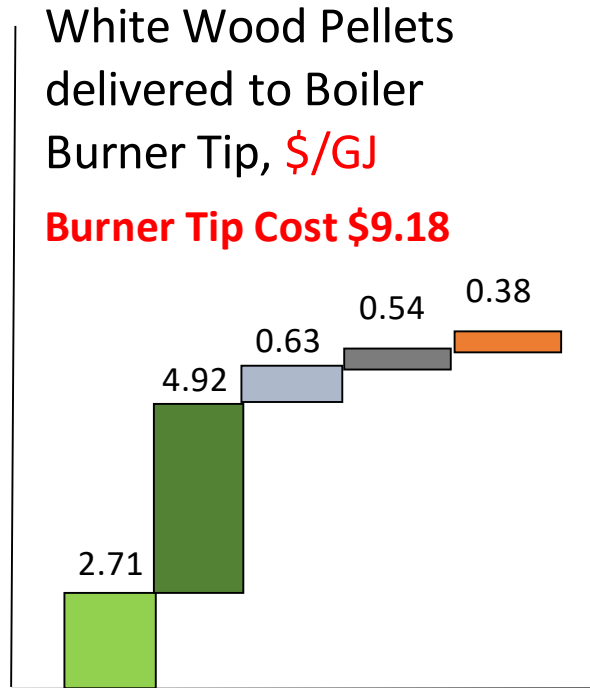



1. Tip cost includes 20% IRR
2. White wood pellet prices from FutureMetrics White Paper, "Forecasting Industrial Wood Pellet Prices," Oct 1, 2018
3. Raw material moisture content, 40% by weight
4. Finished product moisture content: WWP, 6% by weight: TorrB[®] briquettes, 4% by weight
5. Power plant feeding modification cost based upon \$100M for 300 MW capacity plant
6. Boiler inefficiency penalty due to lower steam temperature from white wood pellet firing

OVERVIEW: Cost of White Wood Pellets vs TorrB® Briquettes at a Local Power Plant



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(15.88 GJ/short ton)

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