

Energetic Feasibility of Biomass Densification with Steam Explosion Pretreatment

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Poster

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An energetic study of sawdust pelletization with and without steam explosion pretreatment of sawdust was conducted. The unit operations included transport of biomass from mill to pelleting plant, storage of sawdust, drying, size reduction, steam explosion, solid liquid separation, densification and cooling and screening of pellets. The thermal heat, diesel energy and electric power were estimated and converted all into MJ/Mg of pellets.

The energetic (energy ratio energy spent to make pellets to calorific value of pellets) for three cases of untreated wood pellets and treated wood pellets made from low and high severity steam explosion pre-treatment were 4.68, 3.28 and 3.14, respectively. These ratios indicate that 29% to 32% more energy is spent to produce pellets from steam exploded biomass than energy spent to produce pellets from untreated biomass. Our initial tests on durability of pellets indicate that pellets made from steam exploded biomass had a durability of about 20% higher than the durability of normal pellets. It costs roughly \$80/dry Mg to produce pellets from untreated biomass. Steam treatment adds an average of \$5/dry Mg to produce pellets. Assuming that steam treated pellets lose 5% less dry mass than untreated pellets, and at a selling price of \$170/dry Mg CIF in Europe, there would be a net gain of about \$4.50/dry Mg. Steam treated wood pellets have superior storage stability and longer shelf life than untreated pellets.