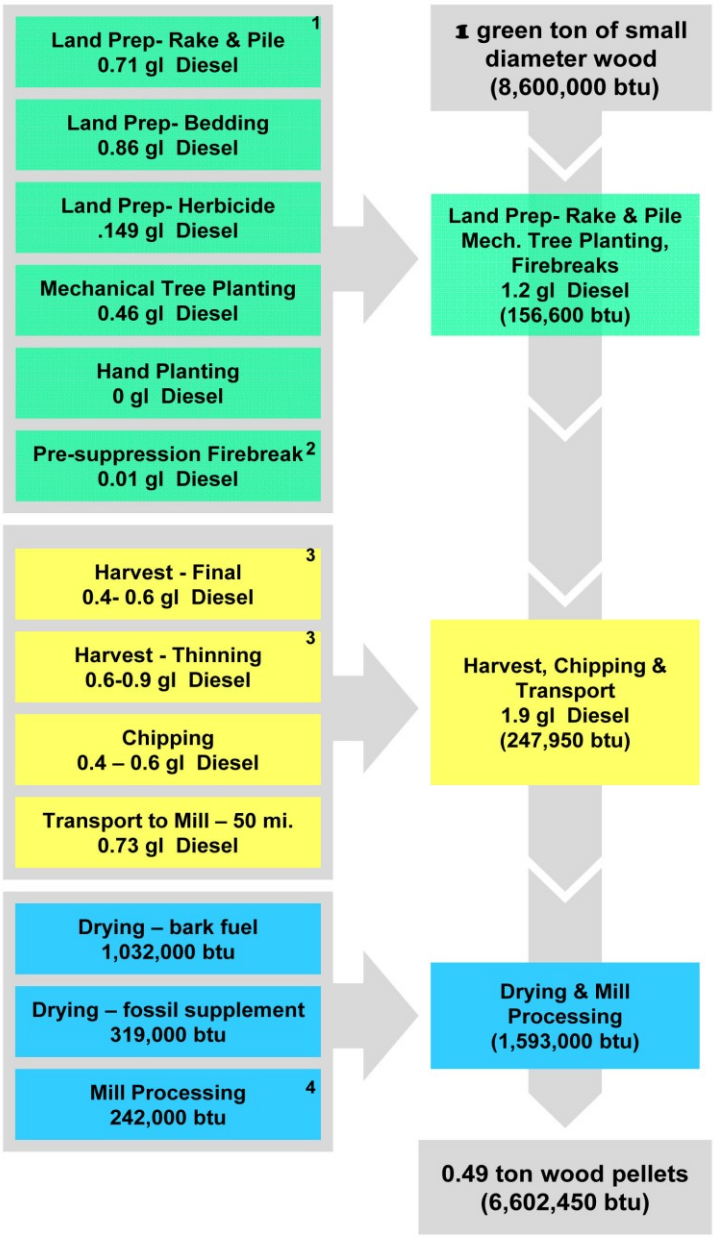
GEORGIA FORESTRY COMMISSION

Energy Balance of Wood Pellets

It is important that renewable energy production has a positive ratio of energy production to energy costs. Wood pellets are produced from two types of feedstock: 1) mill residues, and 2) small diameter harvested trees. While there have been no comprehensive energy balance studies performed on wood pellet production in the South, the results of several related analyses are provided below.

The Pellet Fuels Institute and the University of Wisconsin [4] have examined the life cycle of pellet production and residential heating in the upper Midwest and found that the net energy ratio is 0.79 and 0.66, respectively for high and low efficiency systems. The net energy balance is the proportion of energy output to the total energy input. Energy inputs are both fossil fuel and the energy content of wood. The same analysis shows that the total energy produced by combustion of wood pellets is 9 to 14 times the amount of fossil fuel energy that is needed to produce the pellets.

Figure 1: The Energy Costs of Wood Pellet Production from Small Diameter Pine in the South



Of particular interest, is Figure 1, where a flow of energy requirements are listed for wood pellet production in the South, using small diameter pine. The inherit energy of one green ton of wood is reduced from 8.6 to 6.6 million btu's by growing, harvesting, and processing wood into pellets. While use of the wood pellets is not included, this system results in a net energy balance of 0.77 and produces 9 times the energy of the fossil fuel input.

Greenhouse gas emissions of energy use are also reduced substantially when using wood pellets in place of fossil fuels for electricity production. The Swedish Environmental Institute has issued a report[5] that estimates the GHG emissions at 11-14 CO_2 eq per kwh for wood pellets produced and used in Sweden, while the average GHG emissions for coal-fired plants has been estimated by the National Renewable Energy Lab[6] to be 847 CO_2 eq per kwh.

References are provided on page 2.

Energy Balance of Wood Pellets References

[1] Markewitz, D., Fossil fuel carbon emissions from silviculture: Impacts on net carbon sequestration in forests, Forest Ecol. Manage. (2006), doi:10.1016/j.foreco.2006.08.343

[2] Estimates by N. McClure, Georgia Forestry Commission, based on firebreak plowing and fuel usage by GFC tractors.

[3] Baker, S., et al, Evaluation of Integrated Harvesting Systems in Pine Stands of the Southern United States, University of Georgia, 2008

[4] Katers, J. and Kaurich, J., Heating Fuel Life Cycle Assessment, University of Wisconsin-Green Bay, 2007

[5] Hagberg, L., Sarnholm, E., Gode, J., Edvall, T., and Rydberg, T; LCA Calculations on Swedish Wood Pellet Chains, Swedish Environmental Research Institute, 2009

[6] Mann, M., and Spath, P., Biomass Power and Conventional Fossil Systems with and without CO_2 Sequestration – Comparing the Energy Balance, Greenhouse Gas Emissions and Economics, National Renewable Energy Lab, 2004