

Appendix 1. - Woodchip for heat

The value of wood as a fuel depends primarily on the species of tree, the part of the tree used, the moisture content, the amount of volatile matters, and the ash content
Energy content of forestry residues (figures from COFORD website www.woodenergy.ie)

	Seasoned wood residue chip	Fresh wood residue chips
Moisture content	10-50%	50-60%
Net calorific value in dry matter	18.5-20 MJ/kg	18.5-20MJ/kg
Net calorific value as received	6-15 MJ/kg	6-9 MJ/kg
Bulk density as received	150-300 kg/loose cu m	250-400 kg/loose cu m
Energy density of bulk volume	0.7-0.9 MWh/cu m	0.7-0.9 MWh/cu m
Ash content of wood as received	0.45-0.25%	0.25-0.2%

The effective heating value of Norway Spruce crowns is 19.77MJ/kg and for whole tree thinnings is 19.29MJ/kg

216 fresh tons of residues could be harvested per acre (about 20% of residues created)

Transportation

Transportation costs have a major effect on the viability of a wood energy project. Current costs (2004) for a short haul could be assumed to be 25c/t for 1km if the truck carries 25t each load. Truck capacity is normally restricted by volume not weight. Wood in the form of chips has less volume than whole forest residues by 20-100%. Therefore it is obvious that it is preferable to chip after the residues have seasoned rather than directly they are harvested and to move them as chips rather than as whole residues. Therefore assuming that the average return run for the truck is 6km and that seasoned chips are transported and that a truck can carry 25t each load, then the cost per ton would be €1.50

Other costs would include compilation and off road transportation estimated as €11/cu m¹ (€6.9/MWh) and chipping costs of €7.65/t (€4.3/MWh). Therefore the total cost (in 2004) of delivery of seasoned woodchip to the point of use is estimated to be €21.25/t (€11.94/MWh) if the forest residues are provided at no cost.

Income to forest owner

A delivered fuel cost of €75/dry ton¹ would equate to 1.8c/kwh or €4.95/GJ and this is 25% below the 2004 oil cost. If it is assumed that the wood is 50%DM content this means that the delivered value of the chip was €37.50/ton as received. This means the wood supplier could receive €16.25/t or €3,510 per acre harvested. As the woodchip is being created from material that is usually wasted this is an additional income to the forest owner.