40. THE DRYING OF WOOD CHIPS WITH SURPLUS HEAT IN NORWAY

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This study has investigated the drying of wood chips through use of surplus heat from two hydroelectric plants in the western part of Norway. The wood was chipped and loaded into the dryer; both a tractor-trailer and a container were used. The dryers had perforated floors where warm air from the plants was funneled into the dryer, using an electric fan of 4 kW.

Four separate trials were conducted in September and October 2009. The drying capacity of the trailer and the container was roughly 11.5 and 29 loose m3 respectively. The effective height at which drying took place wa 1.2 m and 1.9 m. The temperature of the air channeled into the dryers was 14–18 °C in the trailer and 25–26 °C in the container.

The fan was operative for 139 hours (2 times) for the trailer and 121.5 and 67.5 hours for the container. The fan used 556 kWh (2 times), 486 kWh and 270 kWh of electricity respectively. The chips located at the bottom dried first, and chips located above dried later. The moisture content in the chip was 66.1 to 52.1% (wet base) before drying and 9.6 to 6.9% (wet base) after drying. Upon completion of the drying procedure, there was no substantial difference in moisture content from top to bottom of the pile of wood chips. The wood chips were weighed before, during and after drying. In the trailer, the wood chips weighed 5300 and 5165 kg before drying and after drying 2185 and 2165 kg. The chips in the container weighed 7845 and 7045 kg before drying and 4010 and 4935 kg after drying. An estimate of applied energy from the power plant was 1432 and 2037 kWh in Kleive and 2115, and 2604 kWh in Viksdalen. The net calorific value as received ranged from 1340 to 2170 kWh per tonne before drying and 4710 to 4860 kWh per tonne after drying. The air current through the dryers was tangible in both locations. The counter pressure from the chips was not sufficient to prevent ample ventilation.

For the container, drying cost roughly one cent USD per kWh; the cost of the trailer was twice as much. This indicates that the drying volume must be as high as feasible. The cheapest option for production of fuel chips is natural drying and chipping at the roadside. In one of the two locations, this costs roughly 2 cents USD per kWh. If the feedstock is detoured through a terminal for conversion to wood chips and on to artificial drying, the cost is about 3 cents USD per kWh.

Artificial drying of wood chips using surplus heat is an alternative when there is a demand for supply of chips with low moisture that produce more heat released during combustion, lower emissions, and better fuel boiler efficiency.

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