Forestry Commission

Wood for energy at Bedgebury Forest

Bedgebury Forest and the National Pinetum in Kent together form one of the premier outdoor sites in the southeast of England, attracting over a quarter of a million visitors per year. The National Pinetum is home to the finest collection of conifers in the world, with nearly 10,000 trees and shrubs. A £2.1 million grant from Sport England and the Forestry Commission funded a new visitor centre, all-ability routes, bike trails and adventure play. The 300 m^2 timber-framed visitor centre, which opened in 2006, houses an educational room, café, visitor information office and toilet and shower facilities. A self-contained bike hire shop has also recently been added. The building has cavity wall insulation to reduce heat loss, and a woodfuel boiler provides space heating and hot water. Wood for the boiler comes from Bedgebury Forest, reducing transportation and ensuring a low-carbon footprint. This is one of a number of woodfuel heating systems used at Forestry Commission sites to help reduce carbon emissions and dependence on fossil fuels.

Bedgebury visitor centre's woodfuel boiler provides a renewable source of energy and demonstrates that locally-produced wood has economic and sustainable value

Woodfuel was the obvious choice for the Bedgebury visitor centre as it has a ready supply of wood on its doorstep. Locally-grown coppiced chestnut is cut and chipped to provide fuel for a 40 kilowatt Austrian-made boiler, which has been installed to provide heating and hot water for the visitor centre and bike hire shop.

The chipper

The woodfuel boiler is designed to run on good-quality chips (G30 size). Funding from the South East England Rural Development Agency allowed the Forestry Commission to purchase a diesel-powered chipper with a conical screw blade, which can efficiently produce splinter-free, even-quality chips. Interchangeable blades can produce variable size chips (up to 170 mm) from all kinds of clean wood such as that from conifers and broadleaves, pruned and unpruned saplings, tree tops, blocks, sawn surfaces and also frozen wood. The rotating screw blade also functions as a feed unit.

The harvesting and chipping process

All the wood for the boiler is locally sourced from 80 hectares of sweet chestnut coppice growing within Bedgebury Forest. The chestnut will be cut on a 15-year cycle, making just over five hectares of sweet chestnut per annum available for fuel. The yield at this age is approximately 140 m^3 per square hectare. One square hectare of sweet chestnut is marked out each year to coppice, working to a long-term forest design plan.

The harvested coppice wood is stored outside but stacked off the ground to allow air to circulate. It is essential that the chips are dry enough and the correct size. The wood takes 12–18 months to season, achieving a moisture content of between 20–23% which enables the system to function at maximum efficiency. Ideally the chips should have no more than 30% moisture content. Two-metre lengths of seasoned wood, 150–200 mm in diameter, are then fed into the chipper. The bark is removed to prevent obstruction. It takes approximately two weeks to chip enough wood for a year. The air-dried material is stored in a covered barn which helps to prevent re-hydration of the chips.

The boiler requires approximately 70 m^3 of wood per year, equating to 175 m^3 of chips. The system can therefore provide sustainable heating and hot water for the visitor centre using sweet chestnut coppice alone, without reliance on any other species. Chips are fed into the boiler from a hopper – a modified shipping container. The system is self-igniting, and thermostatically controlled to heat hot water in a buffer tank.

! Our advice

Sweet chestnut coppice is a dense material which chips well at the correct moisture content. Initially it was found that large or irregular shaped chips and bark blocked the hopper and the system would shut down. Through trial and error a more efficient process was established: lengthening the seasoning cycle, removing bark before chipping and testing chips on a regular basis to ensure that the moisture content stays within the required range.

✓ Achievements

- Savings of approximately £100 are achieved each month.
- A learning programme has been developed around the site's sustainable credentials and an interpretation board displays the lifecycle of trees increasing visitor awareness.

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