Wood-fuelled heating – West Dean Estate

Status of Project:	EXISTING – Commissioned 1981
Location:	West Dean, West Sussex, PO18 0QZ (Grid ref: SU862126)
Owner / Developer:	The Edward James Foundation
Description:	Woodchip fired boiler and district heating system

Photo: Forestry Commission

Background:

West Dean College, a centre for the study of traditional arts, crafts and music, is based in a large country house set in the 6,000 acre West Dean Estate. It lies six miles north of Chichester on the western dip slope of the South Downs. The entirety is owned by the Edward James Foundation, a charitable educational trust. Besides the educational activities of the College, the Estate includes farming, forestry and property management. The house and its five annex buildings are home to 140 students and a place of work for over 70 staff.

The house and its hot water supply were previously heated by converted coke-fired boilers running on oil (at less than 45% efficiency) and electric storage heaters (typically inefficient). Other factors of the time were that the site was off the gas network; coal's associated problems with health and security of supply; prices of heating oil were high and supply unreliable, and straw fuel entailed problems with vast storage in an aesthetically sensitive area.

The study confirmed that the required annual yield of about 1,000 tonnes wood fuel could be sustained: the estate has 1,900 acres of beech woodland mixed with conifers. Conservation and biodiversity were a high priority for the organisation, while demand for timber was fairly variant and unpredictable due to dependence on other sectors.

Other reasons were the renewable and low-carbon nature of bioenergy; the low pollution from a clean and safe fuel; the woodland management benefits - wood fuel supplies at West Dean are generally derived from coppicing and thinning, promoting biodiversity; benefits to the local economy as opposed to remote multinationals.

Technology / Scope of Project:

The Volund boiler was duly installed by Cubbage Machinery UK Ltd., incorporated into a district heating system connecting the various buildings on-site to the central heat supply. The system can burn wood chips of up to 60% moisture content, though typically it is around 30-40%, allowing for a degree of variability between different storage conditions, weather and storage period lengths. The specification of the automated feed augers requires that chips be about one inch in diameter.

Nowadays about 1,200 tonnes of chips are used by the heating system per year. Current practice is to store one year's supply in strategic locations throughout the estate – this is stacked as roundwood, to maximise uniformity of exposure. However, there is also a chipyard which can store two months' supply in chip form if required.

The heat network runs underground and also supplies four houses, the West Dean Gardens visitor centre, the village church and a swimming pool. The network was extended during 2004 to heat an additional 900m^2 of teaching and exhibition space for the College, and there are plans in the near future to extend further to include a large range of glasshouses and five additional Estate houses. The annual total heat load is circa 2.5 million kilowatt hours, saving the organisation c.£80,000 worth of heating oil each year at current prices.

Importance to the South East:

The reasons originally stated by the management for opting for sustainable wood fuel in the days of 1970s oil crises and coal strikes are interesting for modern times, in view of the returning applicability of the drivers, post cheap North Sea oil and gas. This means that for similar rural communities, farms, businesses and other organisations (particularly but not exclusively those off the gas network) facing major choices about their heating system, the medium to long-term security of fuel price and supply is once again appreciated making wood a viable option.

This is in spite of the extra demands of the technology, which are themselves sometimes exaggerated in people's preconceptions. Many target end users such as farmers, foresters and large estate owners already possess hardware and the personnel systems similar or even identical to the preparatory, operational and demands of wood heating. The West Dean example serves to emphasise the local economic benefits that can arise from integrating resource management with consumption of resources.

With regard to the perceptions, in some ways the West Dean system can be set in contrast to the advancement of the technology over the following two or three decades. For instance, electronic output controls are now commonplace, following the lead of later imported products. However, in other ways this is an early example of progressive design, such as in its automatic stoking system.

Photo: Forestry Commission

Furnace of the boiler at West Dean College, showing wood fuel

The importance of ecological reasons and landscape conservation are now all the more evident than 25 years ago, perhaps especially in the South East with the pressures of its successful economy on land and wildlife. The carbon emissions arguments have never been so pressing, given the development in intervening years of scientific evidence and popular acceptance for man-made climate change.

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