

# West Dean Estate, Sussex

A strong track record of woodfuel heating for more than 25 years

First commissioned in 1981, this pioneering district heating scheme remains one of the largest of its kind in the UK.

It meets all of the heating and hot water needs of West Dean College – a centre for the study of traditional arts, crafts and music – as well as parts of the nearby village. Woodfuel is grown on the surrounding 6,400 acre estate. West Dean House, which now contains the college, is a large stately home. Together with its five annex buildings, it accommodates up to 140 residential students, plus more than 70 staff running the diverse activities of the Edward James Foundation, a multi-function educational trust set up in 1964 by the last private owner, a poet and philanthropist.

The heating and hot water requirements have been likened to that of a large country house hotel with a significant office complex, requiring about 2.5M kWh per year.



## objectives

- To replace 50-year-old coke-fired boilers which had been converted to oil in the late 1950s. Efficiency levels were about 40-45%.
- Seeking a more sustainable solution, the trustees commissioned a survey in the 1970s. This settled on woodfuel from the estate's 2,000 acres of woodland as the preferred source of fuel, having ruled out straw bales. Mains gas was unavailable.

## action

- Initially, two woodfuel boilers were installed: one of 770 kW and one of 465 kW. The smaller one was replaced in 2009 with a 1,200kW, 90%+ efficient version to allow for an increasing heat load.
- They burn chipped timber with a typical moisture content of between 25% and 30%, though the system is able to burn chips with a higher moisture content.
- The original system was manufactured by Argusfyr Energiteknik, of Denmark, and installed by Cabbage Machinery UK. The new boiler was manufactured in Austria by Gilles.
- An underground mains feeds the college, five large student residences and 6,000sq ft of new teaching and exhibition space, as well as glasshouses in the walled kitchen garden, nine estate houses, the gardens' visitor centre, an outdoor swimming pool and even the village church.

## achievements

- 20,000 tonnes of CO<sub>2</sub> have been saved since 1981.
- Overall, the performance and technical status of this installation is comparable to and in some instances better than many recent, similar woodfuel system installations.
- More than 25 years of management for fuelwood supplies is evident in some significant beneficial effects in the woodlands, which has a general high level of quality, thanks to early thinning work. High levels of flora and fauna have been assisted through habitat variation, with thinning allowing more light into the woodland.
- Because labour comprises the biggest element of the wood chip cost, this option benefits the local economy.

## fuel

- Mixed species wood is cut and extracted by a “shortwood” system, mostly between 2-2.5m lengths.
- A contract team usually carries out the felling and a small directly-employed estate team carries out extraction and subsequent fuelwood processing operations.
- Produce is stored in the round and air dried, usually at forest roadside in stacks – some covered – for up to two years.
- After transportation, this dried material is then loaded in the boiler house wood yard onto a moving ‘live deck’ in-feed chain conveyor, to filter out any stone or other contamination that would damage the chipper.
- An adjacent splitter is used to reduce any logs too large in diameter for the chipper, a Jenz drum model.
- Chips are fed from here to the store via an elevator; a walking floor system draws chips as required.
- Chip size is typically 25mm, with 1,200 tonnes of chips now processed per year. The chipyard can be used to store nearly two months’ supply of wood, although in practice, a year’s supply is stacked to dry naturally in strategic locations throughout the estate.

## quotes

- *“The estate now supplies woodchips to two other sites, one on the estate where a separate 150kw Binder boiler serves a weddings and conferences facility, the other a private house just off the estate. This, and the continuing demand for woodchips for the college, has given purpose and cash flow to the forestry operation. Forest blocks can be thinned according to silvicultural needs as opposed to market demand, and the Foundation is able to make a significant contribution to reducing global warming.”*  
– Simon Ward, Estate Manager since 1991

## partners & funding

- UK agents for Gilles Boiler are Broag-Remeha
- Mechanical engineering consultant – W G Environmental Services
- Some funding for the 2009 replacement came from the Department for Energy and Climate Change’s Bio-Energy Grant Scheme

## lessons learnt

- One of the greatest attributes has been the ability of the whole management team to successfully work together to develop and maintain the system.
- A competently designed and installed woodfuel heating system and a readily available supply of fuelwood has provided an excellent foundation for success. The selection of the boiler is a minor part of the planning process. Every stage in the process - the conversion of roundwood to chips, the chip delivery, storage and feed methods - needs to be thought through carefully and in detail to ensure reliability, longevity and a fault-free operation.

