

Introduction |

Barnsley Metropolitan Borough (MBC) Council has achieved outstanding carbon emissions reductions within its own building stock. The authority started by dealing with one of its major sources of carbon emissions, coal boilers in council housing. It has achieved dramatic carbon savings by replacing coal boilers with modern wood fuelled heating systems. Barnsley has gone on to develop a wider programme of wood chip boiler installation and a local wood fuel supply chain.

Local Authority role |

Barnsley Council has installed nearly 2 MW of wood-chip boilers in council flats and other buildings. A further 800 kW is currently being commissioned and more are planned. The council has also set up a complementary supply chain to produce wood-chip from council tree-waste.

Context |

In 1986 the Council adopted an 'Energy Efficiency and Conservation Policy' and has been very successful in achieving its target of reducing consumption by 15% in 5 years, having previously achieved a 20% reduction in four years.

Similarly, Barnsley's targets for reduction of CO₂ have been met well ahead of schedule:

- 20% reduction target for 2010 was achieved during 2001
- 40% target for 2020 was achieved during 2005
- now only the 60% target for 2050 remains, estimated to be achieved in 2010

Conversion of coal-fired heating systems to biomass heating has been a key contributor to the Council's CO₂ emissions reduction and will be instrumental in delivering the 60% target. The Council expects to achieve this 40 years ahead of schedule.

Barnsley is situated in an old coal-mining area, many residents used to be employed as miners with many properties heated by coal-fired boilers. The Council recognised that running counter to this, it was itself disposing of many tonnes of wood waste from its parks and gardens each year; a small amount of this was used as a mulch in urban parks, but most was being left to rot or sent to landfill.

Because Barnsley had implemented a successful programme of efficiency measures for its coal boilers back in the 1980s, it had delayed any switch to gas heating, which had happened in many other places. By 2004 some of these coal boilers were due for replacement.

In June 2004, Barnsley MBC adopted a Biomass Implementation Policy, committing it to considering biomass heating systems for all new and refurbished buildings. At this time, Barnsley MBC had 133 coal-fired boilers at 66 premises (mainly primary schools), including 26 district heating schemes, which jointly consumed 6,500 tonnes of coal per year.



Photo 1.

Woodchip boilers like this one at Westgate plaza have helped Barnsley Council slash their CO₂ emissions

Process/partners/funding |

The first biomass boiler was a 470 kW wood-fuelled district heating scheme, installed in 2005 to replace outdated coal boilers in the social housing complex at Sheffield Road, 166 flats in three seven-storey blocks. This was carried out as part of a major £1.7 million refurbishment to the complex. It also included updating the heat mains in the buildings, installing double glazing and providing heat metering to individual flats. Consultation with tenants was fundamental to the success of the Sheffield Road project. The majority of tenants supported the scheme, and have been pleased with the outcome.

Two linked wood-chip boilers rated at 320 kW and 150 kW were installed. The smaller boiler is used alone to meet summer heat demand, thus avoiding the inefficiency of running a single large boiler at a small fraction of its rated output. Boilers made by the Austrian company Fröling were chosen due to their ability to cope with wood with up to 60% moisture content. A gas boiler plant with 100% back-up capacity was installed, to provide continuity during the change-over and to reassure residents about the risk of biomass supply interruption. A thermal storage vessel helps the boiler to manage peak loads.

Grants from EST and other sources covered the £350,000 cost of the biomass boilers, back-up gas boilers and thermal storage vessel.

The second installation was completed in early 2006, a 500 kW Fröling wood-chip boiler at the Smithies Lane council depot. It heats the depot and supplies hot water to 450 council employees, in place of two coal boilers which were in urgent need of replacement. It will use an estimated 150 tonnes of wood-chip each year. An oil-fired back-up boiler was installed to maintain continuity of service during installation. The £150,000 boiler replacement was funded by grants of £60,000 with the remainder from the Council.

The council also provided the £31,000 cost of a wood store, after 50% grant funding, at the depot. One function of the depot in the past had been to handle large volumes of waste from council tree-management. Barnsley MBC decided to convert this waste to wood-chip and a 700-tonne store has been constructed, which allows storage and air-drying of the wood-chip for supply to different biomass heating systems.

Wood-chip boilers are also being installed in new buildings, instead of gas; including the high-profile 'Westgate Plaza One', which will become the Barnsley MBC civic headquarters and house about 700 employees. Under the first phase of this development, a 500kW boiler has been installed, which can use either wood-chip or wood pellets. The boiler will heat the Westgate complex by day and will supply heat to thermal storage vessels in the nearby central library by night. This will maintain an even load and will displace 275 kW of off-peak electrical heating. A further phase is planned, and this will link to a civic centre heating scheme which will supply the Town Hall as well. Barnsley MBC has convinced the private developers of the Westgate Centre to plan for continuing biomass use after the 25-year Council tenancy expires. They have therefore provided only a 50% back-up gas boiler, rather than 100% back-up which they originally planned. The Westgate Centre is a privately-funded development but also benefits from a Bio-Energy Capital Grant.



Photo 2.

Barnsley's wood fuel depot at Smithies Lane.

Associated costs and saving |

The biomass boilers are reducing energy consumption and carbon emissions. This is partly because they replace old, inefficient, coal boilers at Sheffield Road and Smithies Lane. However, the programme has also emphasised the efficient use of energy. This includes the use of heat metering at Sheffield Road, which has motivated tenants to reduce wastage. The estimated primary energy and CO₂ savings are given in the table below. Westgate HQ is a new development, so the CO₂ savings assume that gas would otherwise have been used as the fuel, which is less carbon-intensive than coal.

	Primary Energy Saving	CO ₂ saving (t/yr)
Sheffield Road Flats	72%	1300
Smithies Lane Depot	50%	350
Westgate HQ - phase 1	New build	270
Westgate HQ - phase 2		400

Table 1.

Estimated primary energy and CO₂ savings.

Tenants at the Sheffield Road Flats have reduced heating bills (not yet formally surveyed, but thought to be about 50% reduction) and have more control over their heating. They are also pleased to be rid of the noise and dust of coal delivery.

Barnsley MBC estimates that, even at 2004 fuel prices, the 25-year lifecycle cost of the new Westgate biomass heating scheme is less than that of gas-fired heating. Although the capital cost of £150,000 for the 500 kW biomass heating system is much higher than £18,000 for a gas-fired equivalent, the 25-year running costs will be around £450,000 rather than £1,200,000. These estimates were based on wood-chip being purchased, rather than using the Council's own supply which will soon be available at much lower cost. Also, since the estimates were made, the price of gas has nearly doubled. Barnsley MBC also saves by not having to pay landfill tax to dispose of surplus tree waste.

Spin offs |

A new, local wood-supply business Silva Power Ltd, has been started as a result of this development, and currently supplies 350 tonnes of wood-chip per year in weekly deliveries to a bunker with an automated feed to the boilers. Their wood is all sourced from local sawmill and forestry waste.

Another installation underway is a 320 kW wood-chip boiler to supply heat to 120 high-tech business units in the Digital Media Centre, which is due to be completed by September 2007. Barnsley MBC also plans to convert two more district heating schemes to wood when their boilers are renewed, and to install biomass boilers in nine secondary schools to replace solid fuel boilers under the 'Building Schools for the Future' Scheme.

Change to working patterns/partnerships |

The individual biomass heating schemes which Barnsley MBC has established have been funded and managed in different ways. What links them is the forward-looking Biomass Implementation Policy, which was adopted in June 2004. This commits Barnsley MBC to actively consider biomass heating for new public and commercial buildings or for major refurbishment of existing heating infrastructure, and in particular to purchasing biomass heating systems if the lifetime costs are lower than fossil fuel systems.

At Sheffield Road Flats and Smithies Lane Depot, Econergy manages the supply of wood-chip and charges the Council for heat produced. The contract obliges them to buy wood-chip from the Depot as first choice, when this becomes available. The Council has the option of taking over the management of the heating systems from Econergy, once they have a thorough understanding of the operation and believe they can manage the risks.



Photo 3.

Woodchip Storage on site at
Sheffield Road, Barnsley.

Contact, sources of advice |

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