

Kielder's Wood-Fired District Heating Scheme: a first for the North East

In a remote forestry village in Northumberland, a novel form of central heating is being demonstrated - a shared heat network fuelled by wood. Here, surrounded by Kielder Forest and located at the northern end of Kielder Water, it makes a lot of sense to use local resources to heat buildings - whether individual homes or communal buildings such as the Youth Hostel and the visitor centre at Kielder Castle. Wood fuel is a renewable resource, and does not contribute to greenhouse gas carbon emissions, since the carbon emitted in burning is balanced by forest re-growth. The wood chip fuel supply also helps to secure local forestry jobs and contributes to the Kielder Regeneration Initiative, ensuring the viability of the village in the years to come.



Kielder, a village of about 200 people, with its petrol station, village shop and pub, is already an oasis for cyclists, walkers and other visitors. Now it is attracting increasing numbers of parties interested in renewable energy, who are keen to learn from this exemplary district heating project. District heating networks are commonplace in Scandinavian countries such as Sweden and Finland, where forestry residues are often used as a fuel, but this is one of the first of its kind in Britain.

Locally-grown wood is chipped and stored by Forest Enterprise at a specially designed fuel store in the village, which will be filled up about 3-4 times a year. The wood chip fuel is then delivered to the boiler house and is fed to a 300 kilowatt Austrian KÖB boiler. The hot water is piped to surrounding buildings, where heat exchangers transfer the energy into domestic central heating and hot water systems.

A heat meter measures the amount of energy used by each customer, and the local community company sends them monthly heating bills. Kielder Community Enterprise Ltd. has been established as a community-owned energy service company or “ESCO”, providing a permanent source of local employment.

The Kielder district heating scheme supplies heat and hot water to:

- 1 Kielder Castle Visitor Centre
- 2 Six new 3-bedroom homes
- 3 Rivermead Workshops
- 4 Kielder Community First School
- 5 Kielder Youth Hostel

Kielder District Heating

Facts and Figures:



Wood chip store

Annual wood chip consumption is anticipated to fall in the range 250-450 tonnes. The main fuel store can hold up to 450 cubic metres (between 80 and 120 tonnes) of wood chip from Kielder Forest. The wood chip delivery trailer holds about 16 cubic metres (2-3 tonnes) of fuel, and has a “push off” action to empty the chips into the boiler house fuel store. Inside the boiler house, a “walking floor” moves the wood chips from the storage area to the screw augers, which then convey the wood chips into the boiler where they are burned.

The Köb Pyrot boiler is made in Austria: its output is 300 kW, with an efficiency of 87% (measured as heat output to wood fuel energy input). It has a special rotating firebox, designed to burn all kinds of dry or damp wood fuels (chips, sawdust shavings, pellets, briquettes, forestry wood shavings).

The boiler house also has a back-up system (an oil-fired burner) that can be used if the primary system requires maintenance.

Over 950 metres of super-insulated plastic heat pipe have been used at Kielder to connect the homes and other buildings to the boiler house. Various sizes of pipe are used, depending on the flow rate required - for example, the supply to the school buildings uses 3-inch diameter pipe. The heat pipes are made in Europe by Flexalen, and have been used in District Heating schemes in many European countries.

The hot water leaves the boiler at 85°C and is circulated to all the buildings in the scheme through the buried heat pipes. The water returns from the buildings a little cooler, and is reheated by the boiler before being pumped around the system again.

The boiler produces very little noise, smoke or ash. Visitors sometimes cannot even tell when it is running! Emissions from the chimney are mainly composed of water vapour: total emissions are expected to be less than a single household coal fire. The few wheelbarrow loads of ash produced each year will be used as a fertiliser to mix with compost for the village gardens and allotments.

Compared to alternative fossil fuels (which in this case would be heating oil), the Kielder district heating system saves about 57 tonnes of carbon dioxide emissions per year.

The project has been supported by a variety of sources including the European Regional Development Fund, the Northumberland Strategic Partnership through One NorthEast, Northumberland National Park Authority, Powergen, Forestry Commission, Northumberland County Council and Tynedale Council.



Köb Pyrot boiler



Super-insulated heat pipe



Heat exchanger



Tynedale
COUNCIL