Energy Efficiency Best Practice in Housing

Community heating serves luxury private apartments

Park View, Southampton

- Connection of new build private housing to community heating
- Capital cost savings of £300 per unit
- Flexibility of interior design
- Carbon dioxide emissions reduced by 32 tonnes per year

ENERGY EFFICIENCY
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Energy Saving Trust

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Overview

Barratt Southampton (part of Barratt Homes the national house-builders) has connected Park View, a new development of luxury apartments, to the Southampton District Energy Scheme. This scheme provides community heating to a large number of buildings in the city centre (and cooling to commercial customers). Park View is the first new private housing development of its type in the UK to use community heating.

Using community heating in their new development, rather than a gas mains supply and individual boilers, has a number of advantages for Barratt Homes:

- significant capital cost savings were made;
- gas was not brought into the development therefore removing associated installation issues;
- the absence of a boiler and storage tank created extra space that was used to enhance the design and give additional storage space.

Aspects of the community heating system were particularly attractive to potential buyers of Park View apartments:

- it offers lower running costs than conventional systems and requires less maintenance;
- it provides instantly available hot water and high water pressure for showers.

The Southampton District Energy Scheme is linked to a combined heat and power (CHP) generator which is very efficient at providing heat. As a result of its connection to this, the Park View development received a Bronze Award in the Best Energy Saving Development category of What House? magazine's '2001 What House? Awards'.

Figure 1: The Park View development

This Good Practice Case Study describes Barratt Home's connection of the Park View development to the Southampton District Energy Scheme. It is intended for those involved with building new homes in cities and towns, particularly:

- house builders and developers;
- planners and local authority officials.

The Study draws on the experience of Barratt Homes to describe:

- the decision-making process for choosing community heating;
- the main benefits of community heating for developers, owners and occupants;
- residents' satisfaction with the heating and water system's performance in comparison with conventional systems;
- the practical implications of installation of community heating in new build.

What is community heating?

Community (or district) heating involves the use of a central boiler plant (or other heat sources) to heat a number of buildings or dwellings through a network of well-insulated underground pipes. Community heating schemes come in all shapes and sizes, from single blocks of flats to schemes serving city neighbourhoods.

By using a central boiler plant, community heating systems can benefit from competitive fuel purchasing and can utilise alternative energy sources such as CHP or renewables, including geothermal.

Combined heat and power (CHP)

CHP involves the production of electricity and useful heat from a single plant. In a conventional power station only part of the input energy is converted to electricity (typically 30-50 percent). The rest is wasted as heat that is lost to the surroundings. In CHP systems the waste heat is recovered to supply heat and hot water to nearby buildings. This makes CHP particularly applicable to community heating networks, and overall efficiency is much higher.

'We have continuous hot water and the flat warms up much more quickly. The community heating system is also cheaper to run.'
Park View resident

Connection of Park View to the scheme

Barratt Home's Park View development comprises 108 apartments built on the former site of the Polygon Hotel. The building has six to eight storeys and comprises a mixture of one, two and three-bedroom luxury apartments.

While planning the development, Barratt Homes investigated the cost of conventional gas mains connection and found it to be unexpectedly high. They were therefore receptive to suggestions for an alternative.

The Southampton City Council Planning Department suggested that Barratt Homes consider community heating, specifically the possibility of connection to the Southampton District Energy Scheme. Barratt Homes had not previously considered this because although they were aware of the scheme's existence they did not know that private customers could connect to the scheme.

Following initial discussions, Southampton Geothermal Heating Company (SGHC), the company that operates the scheme and works in partnership with Southampton City Council, carried out a full option appraisal and produced cost estimates for each of the possible heating solutions. They presented the results to Barratt Homes explaining:

- how community heating works;
- who the existing customers of the Southampton scheme are;
- previous applications of community heating to housing;
- how security of supply is achieved;
- the benefit of community heating for developer and future owners;
- comparison of community heating with conventional heating systems and ease of installation;
- comparison of capital and operating costs of community heating versus conventional heating;
- the possible options for metering and charging structures.

Timescale of work

Demolition of the former hotel began in April 1999. The mains were laid down in December and the first apartments were completed by June 2000. By December 2000, 95 percent of the apartments were sold.

Issues to investigate before connecting to the scheme

Barratt Homes had two main concerns that they wanted to investigate before committing to the community heating scheme. These concerns were as follows.

- Possible market resistance to community heating supply. Customers are generally wary of new or unconventional technologies.
- Reliability of the supply. They had not previously used the technology and consequently had some concerns. They were reassured by discussions with the plumbing contractor who was confident that if the community heating connection did not prove to be successful it would be possible to install an alternative heating system using the same on-site pipework.

Who's who in the Southampton scheme

Southampton Geothermal Heating Company (SGHC) – manages and operates the Southampton scheme. SGHC works in partnership with **Southampton City Council** under an agreement signed in 1986 when the scheme began.

Utilicom Group is an energy management company that set up and owns SGHC. **Utilicom** and its parent company, **IDEX**, operate a number of community heating schemes in Europe and the UK.

The Park View development heating system

Hot water enters the building through underground pipes and is then pumped to each flat. The flats have conventional hot water radiators with thermostats and time controls which are fed direct from the system. Domestic hot water is produced using heat exchangers. Each flat has its own heat meter so that occupants pay only for the heat they use.

Figure 2: Underground pipes for community heating mains

Benefits of community heating in new private housing

The use of community heating rather than conventional heating for the Park View development had a number of benefits for both Barratt Homes and for the owners and occupiers of the Park View scheme.

Benefits for Barratt Homes

Using community heating in the Park View development reduced capital costs and allowed better use of space. Specific benefits for Barratt Homes include the following.

- Barratt Homes estimates that using community heating saved them £300 per dwelling. The savings came from avoiding the costs of installing individual boilers, avoiding the costs of gas mains connection and not having to install brickwork to conceal gas risers.
- The absence of a boiler or storage tank freed up space, allowing the installation of additional kitchen units and cupboards.
- There were no flues or pipework to detract from the aesthetic appearance of the development.
- The dwellings are energy efficient leading to higher SAP ratings.
- The improved environmental performance is good for the image of the company amongst customers and the community. The Park View development is used in company publicity.

Benefits for occupants of Park View dwellings

Community heating has provided occupants with a cheaper and more environmentally friendly way to heat their flats. Long-term capital, operating and running costs are also significantly lower than for a conventional system. Specific advantages to occupants of Park View dwellings are as follows.

- There is no boiler – hence no annual boiler maintenance, nor boiler replacement cost. The cost of replacing heat exchangers is comparatively small.
- There is none of the noise associated with the operation of boilers.
- The community heating system is very efficient and therefore cheap to run. Utilicom estimated that the running costs of the scheme were 15 percent lower than for a conventional system and the tariff paid by occupants reflects this benefit.
- There is instant availability of unlimited hot water at high pressure – this is good for shower performance.
- There is more unit and cupboard space.
- Utilicom offers a very prompt emergency call-out service. This works in conjunction with a remote monitoring system which identifies any potential problems.
- Occupants can heat their dwellings in an environmentally considerate way as the high efficiency of community heating results in lower levels of harmful emissions.

Benefits to owners who let flats in Park View

Many of the flats in Park View are owned by private investors for letting. Landlords also benefit from community heating as there are no gas appliances to service or replace and the heating system is more reliable.

Occupant attitudes to the heating and hot water system

According to a postal survey, residents are very pleased with the heating and hot water system. Of those surveyed:

- 90 percent of the occupants said they would choose to live in a property with community heating again.
- 69 percent thought that the community heating system was better than their old system (in most cases this had been gas central heating and hot water); 31 percent had not noticed any difference.
- 88 percent of occupants stated that they would recommend community heating to others.
- 78 percent of occupants stated that they would like to buy electricity from the scheme.
- 78 percent of the occupants were aware that the flat had community heating when they chose to live in it and more than half (60 percent) felt that it influenced their decision to live in Park View in a positive way. 30 percent felt that it hadn't influenced them at all and 10 percent felt that it had been a negative factor.
- 66 percent thought that lack of choice in heat supplier was not a problem.

Residents were also asked to rate a number of aspects of the system's performance on a scale of one to ten. On average each of the aspects was rated seven and above. Their ratings are shown in Figure 4.

Cost savings from connection to the Southampton District Energy Scheme

As part of their option appraisal, Utilicom assessed the cost savings from connecting to the scheme rather than a standard gas mains connection. The following cost benefits were highlighted in the appraisal.

- Connection to the scheme reduced capital costs by 25 percent, saving around £20,000 compared with the estimated cost of alternative supply (£70,000-£90,000).
- Reduction in fuel supply and maintenance costs of 15 percent per annum or £40 per dwelling annually.

'We have constant hot water with good water pressure in the shower. We can also use water in more than one room without loss of pressure!'
'The economy and silent running appealed to us.'
'The flat warms up quickly, it's quick and cheap.'
Feedback from residents

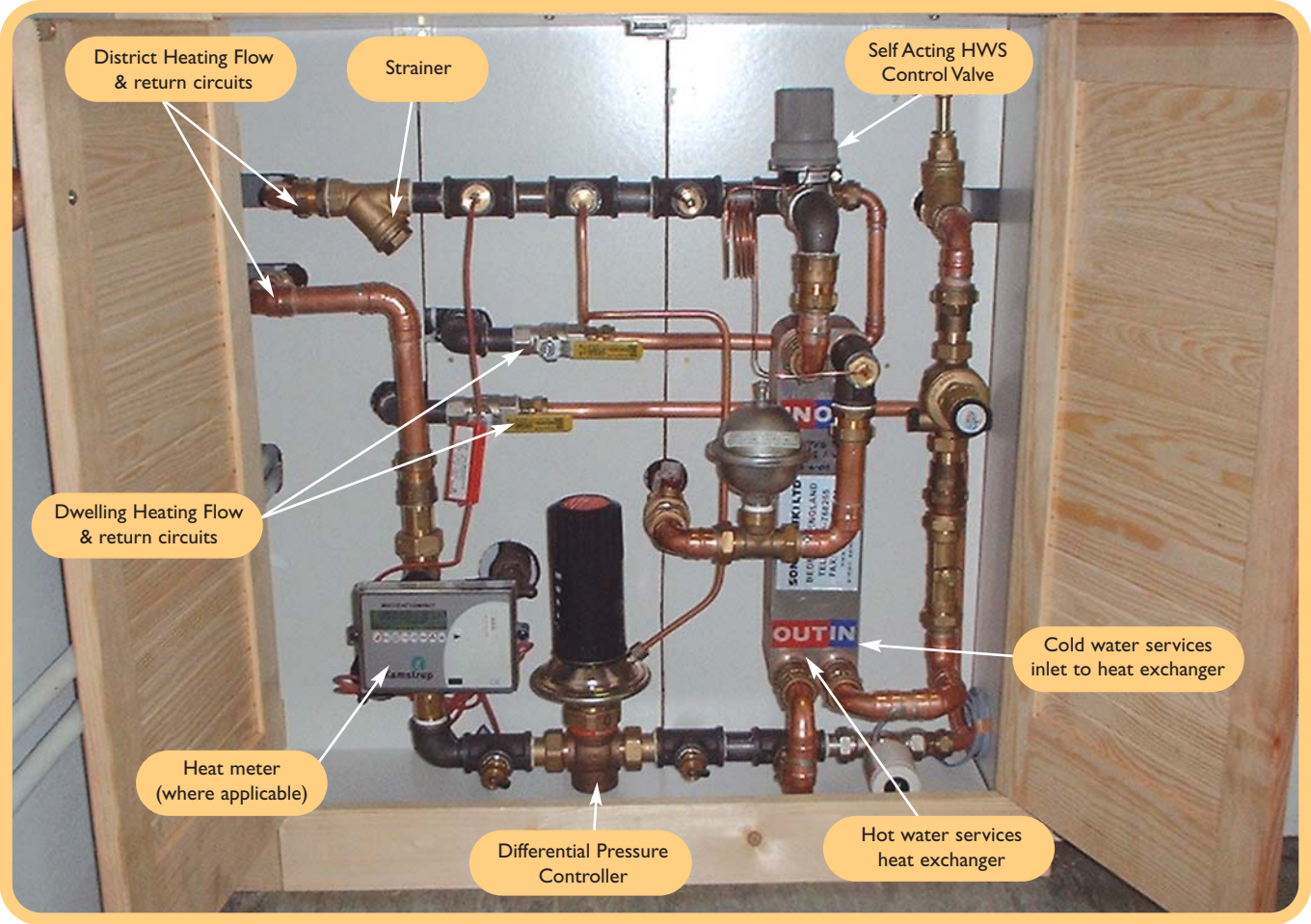

Figure 3: Typical District heating components – replacing boilers and hot water cylinders in dwellings. Maximising safety and space for residents

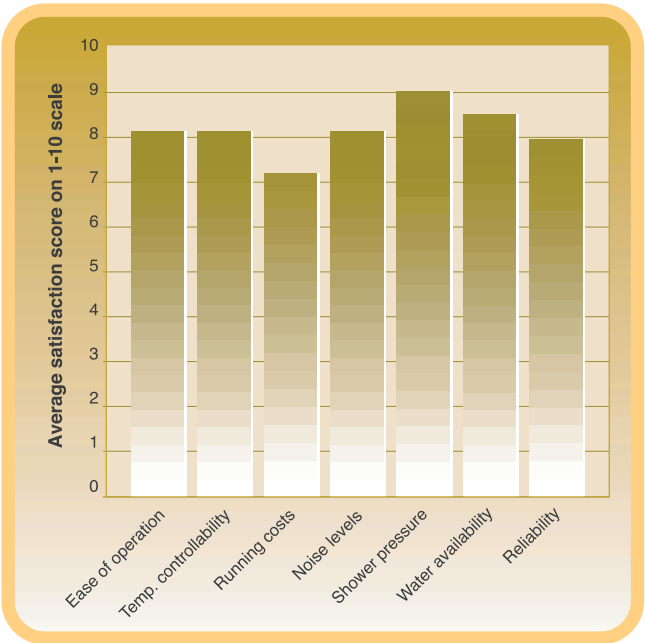

Figure 4: Graph showing residents' satisfaction with aspects of the heating and hot water system

Issues for consideration

Connecting to a community heating scheme was a new experience for Barratt Homes and certain aspects of the process required special consideration. These aspects, and their wider implications, are discussed below.

Cost of extending the community heating mains

This was the most expensive aspect of the connection. Despite this, community heating was still the most cost effective heating option available. Community heating is best suited to high-density housing such as the Park View development. As the density decreases, the cost of mains installation per unit increases.

High-density developments that are close to an existing community heating network will be even more cost effective.

Higher temperature differential

The temperature difference between the flow and return in community heating is higher than for a conventional system. This maximises heat recovery from community heating plant and minimises the diameter of the district heating mains required. This required Barratt Homes to install slightly larger radiators than they usually would for a central heating system.

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Cost of installation
Barratt Homes thought that, as most plumbers would be unfamiliar with a community heating installation, it was essential to appoint a plumbing company that was familiar with the concept and had experience of commercial installation. This cost a little more than installation for a conventional system.

It is the view of Utilicom, however, that installation does not require a specialist plumber. It is a straightforward process involving the connection of supply pipes to a conventional radiator system.

Concerns about the technology and supply
Barratt Homes was concerned that, if for some reason the supply failed, the occupants would be without any back-up heating. They investigated how easy it would be to install conventional boiler plant, in the event that community heating was unsatisfactory. They were confident that it would not present a problem.

As with all utilities, the possibility of problems in the supply exists. Barratt Homes and Utilicom agreed on a number of measures to be put in place to ensure efficient response and communication in the event that an interruption to supply did occur. Barratt Homes also felt that Southampton City Council's involvement in the scheme enhanced its credibility.

Metering
All 108 apartments are individually metered. Utilicom evaluated alternatives to individual metering including the metering of total use by the site with the bill apportioned equally to tenants – this is a less expensive option but was considered to be unfair given that the flats vary in size and occupancy,

Overall it was decided that individual metering was the fairest option. The meters are interlinked and read remotely at Utilicom's central energy generation facility.

'Thanks to a thorough appraisal of our options and by working closely with Utilicom we were able to choose a system that benefits home buyers by giving them a system with better performance. The Park View development has demonstrated to our customers our commitment to environmentally responsible housing development. The 38 percent saving in carbon emissions, that is some 32 tonnes per year, compared to using conventional heating systems, is very significant for a small residential building such as this one.'
Steve Wilks, Managing Director
Barratt Homes
Southampton division

Billing
Barratt Homes and Utilicom agreed that the managing agent for the development should be appointed to carry out billing. Contact with customers is made solely through the managing agent. Utilicom send the managing agent a single bill with a breakdown of units for each flat. The managing agent then apportions the bill according to consumption, collects payments and makes a single payment to Utilicom.

Enforcing payment of bills
It was felt that special consideration needed to be paid to ensure that customers paid their bills. As the flats were sold on a leasehold basis, Barratt Homes were able to include an obligation to pay the bills in the terms and conditions of the lease. It could be more difficult to enforce payment by owners of freehold properties and the cost of cutting off the supply could greatly exceed the cost of unpaid bills.

Marketing of the apartments
Barratt Homes decided not to highlight the apartments' unconventional heating/hot water systems in their marketing. They did not use the environmental or cost benefits of the system to market the apartments. Sales negotiators were instructed to explain the benefits of the system on sale and to explain how it worked. The key benefits promoted were:
- endless and instantly available supply of hot water;
- excellent water pressure for shower heads.

Sales negotiators also distributed a brochure on community heating produced by Utilicom with contact details. Utilicom received a few enquiries from potential buyers.

Working closely with specialists
Barratt Homes stressed the importance of working with specialists such as Utilicom on the design of the building from an early stage.

Further reading

Energy Efficiency Best Practice in Housing

The following publications can be obtained free of charge by calling the Helpline on **0845 120 7799** or by visiting the website at www.est.org.uk/bestpractice.

BedZED, Beddington Zero Energy Development, Sutton (GIR089)
Benefits of Best Practice: community heating (CE13)
Community heating – a guide (CE55)
Pimlico District Heating Undertaking – community heating case study (CE125)
Rural biomass community heating case study (CE91)
Community Heating – Aberdeen City Council Case Study (CE65)

The Carbon Trust

The Carbon Trust offers professional, independent and objective advice on the potential use of CHP. Contact the Carbon Trust Helpline on 0800 58 57 94 or visit the website at www.thecarbontrust.co.uk. Publications include:

CHP opportunities for local authorities (GPG322)
Energy services PPP/PFI projects for community heating (NPP123)
Guide to community heating and CHP – commercial, public and domestic applications (GPG234)
Small-scale combined heat and power for buildings (GPG176)
The manager's guide to packaged combined heat and power systems (GIR082)
The use of combined heat and power in community heating schemes– four case studies (GPCS370)
Using the PFI for the upgrade and extension of community heating (NPR123)
Combined heat and power for buildings – a guide for building services engineers (GPG388)

Contacts and further information

CHP Club

The CHP Club is the Carbon Trust's gateway to the support services that users need when making any CHP investment decision.
Visit www.chpclub.com for more information.

Community Energy programme

The Community Energy programme, managed jointly by the Energy Saving Trust and the Carbon Trust, has provided guidance and funding for the refurbishment of existing, and installation of new, community heating schemes in the public sector across the UK April 2002–March 2005.In addition it offers a range of guidance on:

- financing community heating;
- small schemes;
- renewables-based schemes;
- getting best value for electricity generated by CHP;
- guidance for planners and developers.

For further information, contact the helpline number on 0870 850 608 or visit www.est.org.uk/communityenergy.

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