



Helpu Cymru i leihau
ei Hôl Troed Carbon

Help Wales reduce
its Carbon Footprint



Llywodraeth Cymru
Welsh Government

Case Study 02

Aberdeen City Council Community Heating

www.cymru.gov.uk

Owner:

Aberdeen City Council

Developer:

Aberdeen Heat and
Power Limited

Location:

Aberdeen, Scotland

Building Types:

Residential
Sheltered housing
Public buildings

Project Description

In 1999 Aberdeen City Council (ACC), which has some 26,500 properties, adopted a comprehensive Affordable Warmth Strategy. Since then, ACC have upgraded a large proportion of their housing stock, whilst at the same time meeting the obligations of the Home Energy Conservation Act (1995). The improvements have focussed on heating systems, building fabric and insulation levels. As part of improvements, district heating combined heat and power (CHP) schemes have now been introduced in three council housing developments, with further development proposals to create a city centre network of CHP stations.

Key Drivers

According to the Department of Energy and Climate Change (DECC), domestic energy use accounted for over 15% of UK carbon dioxide (CO₂) emissions in 2009, which contribute to climate change.

A study commissioned by ACC in 1999 identified that very low energy ratings of multi storey council



Multi-storey housing developments linked to the district heating scheme. Reproduced with permission of Aberdeen City Council

blocks and sheltered housing were resulting in inefficient energy demands and expensive energy costs, predominantly met through the use of electrical storage heaters. Consequently, fuel poverty was identified as a key issue for tenants and residents.

Active support of residential community heating development by UK Government has given rise to increased levels of grant funding. Community heating has thus become an economically attractive option for local authorities wishing to reduce CO₂ emissions and tackle fuel poverty.

Renewable and Low Carbon Technologies:

CHP

District Heating

Key Features

- Gas fired CHP units
- District heating systems
- Dual boiler units used in summer months

Procurement

Aberdeen City Council created "Aberdeen Heat & Power Limited", a non profit company in charge of the development and maintenance of CHP schemes across the city.

Procurement of the CHP stations is achieved by Aberdeen Heat & Power Ltd through several distinct packages of work for individual components such as the generators, boilers, distribution pipe network and CHP station infrastructure. The advantages of this are that a more competitive overall price can be achieved and a degree of developer control over the selected components can be maintained. However, a high level of developer knowledge and experience is vital due to the necessity to liaise and enter into contracts with a varied range of suppliers and contractors.

Aberdeen City Council has so far implemented district heating in three developments, serving over 1000 dwellings.

Scheme costs and finance

Capital Costs

Development	Approximate capital cost
Stockethill	£1.6 million
Hazlehead	£1.0 million
Seaton	£2.5 million
Seaton North (due for completion mid 2012)	£4.3 million (projected cost)

Summary table of capital costs for CHP schemes
Data provided by Aberdeen City Council

Aberdeen Heat & Power Ltd has identified the most significant component of the capital cost to be the cost of generators. For instance, the Stockethill generator cost in the region of £650,000; 54% of the total capital cost.

Development of the CHP schemes is partially funded by Aberdeen City Council, who cover approximately 60% of the capital costs. As a non profit organisation, any surplus generated through electricity and heating sales is reused in new CHP developments, minimising the level of external funding required. For the three completed schemes, the remaining capital cost was covered by external grants and funds, such as Energy Efficiency Commitment (EEC) and DEFRA's Community Energy Programme (CEP).

Operational costs and consumer charges

Extensive consultation regarding consumer payment mechanisms was undertaken with local residents of the developments served by the CHP schemes. A majority voted to pay for heating and hot water via a flat rate weekly charge to be paid through "heat-with-rent", thus avoiding unexpected large bills and the risk of being disconnected. Currently, the weekly rate for supplies of heat and hot water to a two bedroom flat is £8.35, approximately equivalent to 3.3 pence/kWh.

While the majority of residents are council tenants, a small number own their properties and consequently are responsible for the installation costs of distribution pipes within their properties. ACC provide the residents with a loan to cover this cost (approximately £2500 + VAT), repayments of which

are lower than the resulting heating cost savings made. Long term maintenance costs are then covered by a flat rate weekly charge of 50 pence.

The Seaton CHP system saves tenants approximately 50% on fuel costs.

Technology selection process

The primary objective for ACC was to achieve affordable heating for tenants and to reduce carbon dioxide emissions. The high development density of multi-storey council owned apartment blocks lends itself to community heating as distribution network costs and losses can be minimised. Additionally, the maintenance and operational requirements of community heating systems are suited to local authority schemes, where a designated company or organisation can be set up to centrally control the system. This is particularly suited to council or housing association owned property.

To date, three CHP projects have been implemented by ACC; these are Stockethill, Hazlehead and Seaton. For each of the developments, plant is housed in a custom built energy centre located in the vicinity of the apartment blocks and public buildings served by the CHP. A further development, due for completion in 2012, is currently underway at Seaton North.



Multi storey apartment blocks in Aberdeen
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Gas fired boilers at the Stockethill development
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Development	Heat demand (MWh/year)	Type of system	CHP capacity	Additional information
Stockethill 4 multi_storey apartment blocks (2 of which are sheltered housing)	3,485	Heat supply to 288 domestic dwellings Export of electricity to grid, income from electricity used to subsidise cost of heat to residents	210 kWe gas fired reciprocating engine CHP unit 2 No. 700 kW gas fired boilers	Annual heating demand approx. 12MWh per dwelling, supplied by CHP during winter and by boilers in summer
Hazlehead 4 multi storey blocks, a sheltered housing scheme, a comprehensive school (Hazlehead Academy), a swimming pool and a sports pavilion	5,600	Heat supply to 234 domestic dwellings and public buildings Supply to heat and electricity to Hazlehead Academy	300 kWe gas fired reciprocating engine CHP unit 1 No. 700 kW gas fired boiler	All heat and hot water supplied by CHP unit
Seaton 6 multi storey blocks, sports changing pavilion, Beachfront complex (including a ballroom, leisure centre and ice rink), new build sports village	–	Heat and hot water to 503 domestic dwellings and beachfront complex	1000 kWe gas fired reciprocating engine CHP unit 1 No. 1 MW gas fired boiler	All heat and hot water supplied by CHP unit
Seaton North (ongoing) 8 multi storey blocks	–	Heat and hot water to 740 domestic dwellings	2000 KWe gas fired reciprocating engine CHP unit 1 No. 1 MW gas fired boiler	Development not yet complete therefore heating load information unavailable

Summary table of key aspects of CHP schemes in Aberdeen
Data provided by Aberdeen City Council





Installation of distribution pipes
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Monitoring and Operation

Public buildings connected to the district heating networks have metered heat supplies and are charged per heat unit consumed. Meter readings are taken by Aberdeen Heat and Power on a monthly basis.

Whilst heat use of individual flats is not metered, ACC have placed great emphasis on providing fully controllable heating systems and individual face-to-face energy efficiency advice, including instructions on how best to use the heating system. ACC hope that this will encourage tenants not to waste energy. A CHP consultant has been commissioned to monitor the actual use of heat and compare it with another similar scheme where heat is individually metered to see if there is a significant difference.

During the summer months, heat and hot water at the Stockethill development are provided by one of the boilers with the second boiler providing redundancy. In the winter months when electricity prices are high, the CHP unit generates electricity and sufficient heat and hot water to supply all residences.

Plans are currently underway to install a 2 MW generator at Seaton North and convert the existing Seaton CHP station to biomass. This will lead to further CO₂ savings as a renewable fuel source will be used in lieu of gas.

The long term vision for ACC is to develop a city centre network to link with other council owned apartment blocks and public buildings. It would be intended to create a 'ring main' of CHP stations around the city operating on a variety of fuels to provide added flexibility, economy and diversity of supply.

Lessons learnt

Technological supply issues:

- Active management of CHP plants and close matching of demand and supply;
- The need to approach the process strategically;
- External specialist assistance is essential;
- Due to the development workload it is advisable to delegate an individual to champion the project and keep it moving; and
- An 'arm's length' company arrangement enables acceleration of refurbishment plans.

Occupant involvement:

- Undertake consultation with occupants regarding payment options.

Financial lessons:

- Whole life costing is the best way to establish the real cost and best value.

Awards & Achievements

- UK Housing Awards 2008 (two awards)
 - Increasing Environmental Sustainability
 - Outstanding achievement in Housing in the UK
- COSLA Excellence 2008 silver award



CHP Energy centre at Seaton
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References and Acknowledgements

Janice Lyon, Energy Manager,
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Further information

Combined Heat and Power
Association (CHPA)
Tel: 020 7828 4077
Web: www.chpa.co.uk
Email: info@chpa.co.uk

The Community Energy Programme
Department for Environment,
Food and Rural Affairs (Defra)
Tel: 08459 335577.

Department of Energy and
Climate Change
www.decc.gov.uk/

These case studies are presented to show examples of how buildings can be designed and built to be low carbon and incorporate renewable and low carbon technologies. This case study is part of a series of case studies supporting a separate practice guidance document on low carbon buildings. **For further information see www.wales.gov.uk/planning**

