



RC UK: Energy and Communities

HEAT AND THE CITY

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1. Aberdeen Heat and Power Ltd – draft Case Study for DH Delivery Structures Guidance, Scottish Futures Trust, 2014.

Project Summary	<p>Aberdeen Heat and Power (AH&P) was set up in 2002 by Aberdeen City Council (ACC) as an independent, not for profit Company limited by guarantee. AH&P employs a general manager and technical officer, and retains the services of a consulting engineer, accountant and accounts/administration assistant. Revenues are from sale of heating, hot water and electricity, with a small additional proportion (3%) from maintenance.</p> <p>AH&P's mission is to deliver clean affordable energy with socio-economic benefits to the citizens of Aberdeen.</p> <p>The key driver for the approach was to reduce fuel poverty and to improve the National Home Energy Rating (NHER) of the City Council multi-storey housing. A further goal was to reduce carbon emissions from energy use. An independent non-profit company, supplying heat, via combined heat and power generation, to clusters of multi-storey blocks was assessed as the most cost effective means to achieve these goals. Households benefit from reduced energy bills and warm homes; the Council has also reduced its energy costs and the business structure has created opportunities for future expansion.</p> <p>By 2014, three district energy centres and heat networks had been developed, supplying over 1700 households and 12 public buildings. Energy bills have been reduced by approx. 45%, with estimated carbon savings of 40%.</p>
Lead entity	Aberdeen City Council
Delivery Structure	Independent not-for-profit company, limited by guarantee
References	<ol style="list-style-type: none">1. Aberdeen City Council – Cogenco case study2. Aberdeen Heat and Power Summary 9th May 20123. http://www.aberdeenheatandpower.co.uk4. www.heatandthecity.org.uk
Key contact	Ian Booth, General Manager, Aberdeen Heat and Power Ltd.

1.1. Project drivers

The UK Home Energy Conservation Act (HECA) (1995) required local authorities to reduce home energy consumption and CO₂ emissions by 30% between 1997 and 2007. Aberdeen City Council decided to appoint a Home Energy Coordinator and administrative assistant to take responsibility for Council strategy to meet these targets. First steps included an energy appraisal of housing stock. This concluded that the multi-storey blocks (of which there are 59, consisting of 4500 flats, across the city) had the poorest energy efficiency ratings

(average 3.3 out of 10 on the National Home Energy Rating (NHER) scale), and were difficult and expensive to heat. A further study revealed that up to 70% of the residents were living in fuel poverty and could not afford to heat their homes properly with resulting damp and, in some cases, poor health conditions. Many multi storey blocks had a high tenancy turnover and were hard to let, resulting in further deterioration in building fabric.

The key driver was therefore the provision of affordable warmth to housing tenants, and the Council's 1999 Affordable Warmth strategy targeted use of the housing capital budget to reduce home energy use by 30% in the least thermally efficient high-rise flats. In 2002, following a Council conference on climate change mitigation, strategy relating to fuel poverty was updated to integrate the environmental aim of reducing CO2 emissions (Aberdeen City Council *Fuel Poverty Strategy* 2002). In addition the Council aimed to improve economic returns from existing housing stock.

1.2. Project objectives

To provide alternative energy efficient heating which delivered:

1. A substantial improvement in the National Home Energy Rating (NHER) of the city's multi-storey flats;
2. Affordable warmth for tenants;
3. Reduction in CO2 emissions;
4. Sustainable and affordable energy for Aberdeen City Council;
5. Improved economic returns to Council from its housing stock¹;
6. Affordability to council in terms of capital outlay.

The initial technical and economic options appraisal included evaluation of the potential to provide a common source of heating to clusters of neighbouring buildings via a shared source of heat, from a combined heat and power (CHP) generator, and a distribution network. In the report, the lowest short-term cost option was replacement of electric storage heating, but this was high cost in use to tenants, and high carbon. The lowest 'cost in use' to tenants was CHP and DH with new external cladding of housing blocks. The high cost of external cladding made this unaffordable to Council, and, since it provided relatively small additional cost in use and carbon savings, the preferred option was CHP and DH without cladding (see Appendix for Table with Aberdeen City Council Energy Audit NHER and cost comparison).

1.3. Description of initial project

The first district heating (DH) scheme, in the city's Stockethill area, has been operational since 2003. Four blocks of flats (288) were connected to a combined heat and power (CHP) gas fired engine with back up gas boilers. The CHP electrical output is 210kW_e, with heat output at approx. 300kW_{th}, supplying 3,485 MWh/Annum heat.

It was recognised at the time that the heat load was highly cyclical (summer v. winter demand and daily peaks in the morning and evening), which does not produce the most efficient operation of the CHP plant. The selection of Stockethill was not however governed by technical efficiency criteria alone, but incorporated costs in the round, including those associated with organisational decision-making, energy project management, political support and social acceptability of community heating. Stockethill housing blocks were

¹ This included improved building fabric condition as well as rental returns

selected on the basis of fabric condition, anticipated ease of system implementation, and the stable population householders who were expected to understand the benefits of the scheme and to be effective ambassadors. The project was also relatively simple to manage in relation to council structures and decision-making, because it required capital contributions from housing services only. In subsequent developments, more typical of the diverse heat load connections needed to optimise CHP and DH efficiencies, funding had to come from multiple budgets held by different council divisions, with the attendant complexities associated with timely decision-making, agreements and legal contracts. The selection of Stockethill was hence part of a long-term strategy for DH development, and provided a means of shared learning about how to standardise Council procedures to reduce future costs and time demands of project coordination, and to ensure best outcomes for householders and City Council.

The Council's formal evaluation of the project found that the system was delivered on budget, and met affordable heating and carbon saving goals.

1.4. Initial delivery structure

An initial CHP and DH feasibility report recommended creation of a 'not-for-profit' company to fulfil the financing requirements for replacement heating, and use of a cost- rather than market-based heat tariff, and was viewed by the Council as enabling affordable warmth targets to be met more rapidly than under internal governance.

In summary the creation of AH&P was considered to be the best means for achieving:

- Delivery of social and environmental objectives for affordable warmth and carbon saving
- Control and governance:
 - Meeting affordable warmth targets more rapidly than under internal governance
 - Retaining local control over system development and asset ownership
 - Fifty year framework agreement and Teckal exemption allowed efficient procurement process (see next section for detail)
 - Construction and operational risks governed by framework contracts between Council and AH&P
- Business management and accountability:
 - Managing cash flow
 - Managing fuel purchases, operation, maintenance and sale arrangements
 - Developing projects to a set budget and timetable
 - Guaranteeing a reliable standard of service and customer protection
- Financial viability
 - A low rate of return on investment was acceptable, given the primary return sought was in well-being and local economic benefit, combined with carbon saving
 - Grant funding could be used within the required short timescales
- Risk management

- The Council would retain much of the risk irrespective of delivery vehicle, as the initial phase connected Council owned housing. The Council is required as a social landlord to ensure security of the tenants' heating supply and to consider what would happen if AH&P were to cease trading. Under Scottish law AH&P assets would revert to the Council, which owns or leases the land where the assets are located. In addition, the Council has underwritten lending to AH&P to finance developments and there would be no other major claim on assets by any outside body.
- Heat costs are charged as a flat rate with rent and collected by the Council, which accepted the risk of tenant non-payment, setting this against expected improvements in revenues from housing stock and reduced costs of heating for Council buildings to be connected to the network in future.

1.5. Governance

Following full agreement of the Council in 2002, Aberdeen Heat and Power Ltd (AH&P) was formed as an independent not-for-profit company, limited by guarantee, to develop and manage DH projects linked to clusters of multi-storey housing. It has a membership structure rather than shareholders and a volunteer board of directors. The Board consists of Council representatives, tenant representative and up to 6 independent members with relevant expertise.

The independent organisation benefits the council by ring-fencing finances and management responsibility, and facilitating capital investment in housing stock refurbishment, while spreading the capital cost over several years (EST, 2003). The Council created a fifty year framework agreement with AH&P for procurement purposes; this is governed by a *Teckal* exemption. The exemption provides that, in certain circumstances, the award of a contract by a public body to another separate legal entity will not fall within the definition of 'public contract', with the result that EU law will not require the contract to be put out to tender. The exemption comprises a 'control test' and a 'function test'. First the local authority must exercise similar control over the contractor to that which it exercises over its own departments, and second the contractor must carry out the essential part of its activities with the controlling local authority or authorities.

AH&P is required by the terms of the *Teckal* exemption to tender its capital works in line with public procurement procedures, and Council also required AH&P to take financial services from them, on a contract basis, during the early years of the project.

For each development the Council enters into a standard Installation Agreement with AH&P which specifies the scope of the project and fixes the capital costs. This reduces the risk to the Council of cost over-runs.

All surpluses made by AH&P are used firstly to keep the heat charge to domestic customers at an affordable warmth rate, and secondly to cover the extra costs of future-proofing the heat network. A high proportion of the capital cost of a district heating system is for the pipe network and the housing for the CHP plant. At the technical feasibility stage of each project, AH&P sizes, and hence costs, these elements appropriately for the needs of the planned project, but not for future growth in heat demand and in network expansion. However, AH&P invests its surplus income to gain the benefit of oversizing main sections of the pipe network and energy centre building in order to cater for future load growth. For example the CHP energy centre at Seaton was built to accommodate 3 generators and associated plant, when initially only 1 generator was to be installed; also the distribution pipe network at Seaton Phase One was oversized to enable later extension into the City Centre.

1.6. Finance

The £1.8 million Stockethill energy centre and heat network were funded by a 40% grant contribution from the UK Community Energy Programme (CEP)², combined with a 7% grant from the energy utility Energy Efficiency Commitment (EEC, now ECO), with 53% from the City Council housing capital budget.

A £1million loan from the Cooperative Bank to AH&P, repayable over 10 years, was raised to finance the construction. A favourable interest rate was secured through provision of a loan guarantee from the Council, hence minimising the total capital costs. Any profit realised by AH&P is used to maintain affordable heat tariffs or reinvested into extension of the network.

1.7. Procurement route

The Council identified a consulting engineer using a list of approved contractors provided by the Energy Saving Trust as part of the UK Community Energy Programme. Integrated Energy Utilities (IEU) tendered for the contract to provide detailed technical and economic appraisal for a pilot CHP and DH scheme for a cluster of multi-storey blocks.

The same engineer was retained by AH&P to carry out detailed design work for Stockethill, and to manage the tendering for the build contract. This was considered the most effective means of minimising materials and construction costs. AH&P own, operate and maintain the systems.

1.8. Subsequent Expansion

The second energy centre and heat network at Hazlehead is located in the original boiler house of Hazlehead Academy, a council secondary school. The district heating network is connected to 4 multi-storey blocks (200 flats) and a sheltered housing scheme. Heat is also supplied to the Hazlehead Park Sport Pavilion and both heat and electricity are supplied to Hazlehead Academy and Swimming Pool complex. The public buildings have a different heat profile from the flats; consequently the CHP generator runs throughout the year, providing improved efficiency and additional revenue from the higher level of electricity generated and sold. The CHP electrical output is 300 kW_e with heat output at approx. 488 kW_{th}, supplying 5,600 MWh/Annum.

The £1.6 million Hazlehead energy centre and heat network were funded by a 40% grant contribution from the UK Community Energy Programme (CEP), combined with a 7% grant from the energy utility EEC, with 53% from the City Council housing capital budget.

The purpose-built Seaton Energy Centre and heat network were developed in two phases, at a total cost of £3.3M. The first phase installed a 1MWe CHP generator and back up boilers. The second phase installed an additional 1MW CHP generator, reducing the dependence on top up heat from the gas boilers, and increasing system efficiency and revenues. Total capacity is 2,100kW_e and 3,000 kW_{th}. Heating and hot water is supplied to 1,050 flats in 14 multi-storey blocks, a sports changing facility adjacent to the Seaton Energy Centre, and to

² The UK Community Energy Programme (CEP) ran from 2002-2007, and consisted of a £50M budget from UK Treasury Capital Modernisation Funds for a Community Energy Programme (CEP) to support DH developments led by public bodies. Applicants for capital grants had to demonstrate *additionality*, and show that community heating was the most viable solution for cost and carbon saving compared to alternative options, and that a range of finance options (such as existing capital funds or bank loans) had been explored.

the Council's leisure complex comprising Beach Ballroom, Beach Leisure Centre and Ice-Rink. AH&P also supplies the Aberdeen Sports Village and the Aquatic Centre, a 50-metre swimming pool. The diverse heat load, provided by the mix of housing, public buildings and community facilities, improves the overall efficiency of the scheme.

Phase one of the Seaton energy centre and heat network were funded by a 40% grant contribution from the UK Community Energy Programme (CEP), combined with 60% from the City Council housing capital budget. Phase two was funded by 40% finance from the energy utility Community Energy Saving Programme (CESP) and 60% housing capital. In both cases, prudential borrowing was used to cover a time gap between construction and receipt of grant and to capitalise future avoided costs.

In 2013 the Seaton network was extended to the City Centre with a further 5 public buildings connected, including the Aberdeen City Council Town House. The pipework extension was funded by a £1M Scottish Government grant.

Current projects in the Cairncry, Tillydrone and Torry areas of the city are connecting a further 11 multi storey blocks to DH, with a target completion date of April 2015.

In late 2013, a Global District Energy Award was presented to AH&P representatives at a ceremony in New York. The award recognised the achievement thus far and the future potential for business growth.

1.9. Future changes

Extension of the heat network to the city centre has opened up potential for connections to commercial buildings. Since the terms of the Teckal exemption restrict the ability of AH&P to act as supplier to non-council buildings, a wholly-owned subsidiary, District Energy Aberdeen Ltd (DEAL) has been established to trade with the private sector. DEAL will operate as a profit-making enterprise, with any profit returned to AH&P for use in maintaining affordable tariffs for social housing and to build reserves for capital replacement and further developments.

In the longer term, AH&P aims to replace fossil fuel energy sources, as sustainable heating supplies become viable. Through liaison with academic and other partners, the aim is to investigate use of biomass, bio-gasification, anaerobic digestion and geo-thermal sources. There are also plans to link the multiple CHP stations around the City into one city-wide heat network.

1.10. Advantages and disadvantages of the chosen structure

The delivery structure has allowed the original project objectives to be achieved:

- Heating costs per household have been reduced by up to 50%, and all households connected to new DH have been taken out of fuel poverty
- Reliable and controllable heating systems have been installed in domestic and public buildings
- Housing standards have been improved and dampness eliminated: average NHER in multi-storey housing increased from 3.3/10 in 1999 to 7.19/10 by 2009. This has led to reduced turnover, informal evidence of improvements in health, much reduced level of tenant complaints and improved council revenues
- The fixed capital costs reduce the risk to the Council
- Use of gas CHP and DH has provided approx. 40% reduction in carbon emissions in comparison with electric heating

- Subsidiary company DEAL is expected to enable further growth of the heat network, while maintaining heat costs at an affordable level for the domestic sector.

The key disadvantage of the structure is that it has placed significant responsibility on Council officers, Councillors and volunteer AH&P Board Members, most of whom had very limited experience or technical expertise in energy systems. Council also retained significant project risks, providing a loan guarantee for the first project, overdraft facilities for AH&P during the early years, and collecting tenants' payments for heat with rent. The business has consequently had to develop considerable knowledge about distributed energy systems, business operation and energy markets, without the contribution of existing utilities. The criteria of affordability of investment to Council also required grant funding to meet a proportion of capital costs.

1.11. Summary

The approach adopted by Aberdeen City Council is likely to be adopted for one or more of the following reasons:

1. Proposed project not financially viable without a component of grant funding or low cost, long term loans;
2. Available resource and willingness within the Council to develop energy projects;
3. Prioritisation of social benefits, and reduction of CO2 emissions, over other objectives such as income generation;
4. A high degree of local control over cost structures and revenues is desired in order to control energy tariffs and future expansion;
5. Council desire for clarity in relation to ring-fencing business finances and project management and ensuring accountability through an independent non-profit company.

It is unlikely to be suitable where:

1. Internal council resource is unavailable;
2. An element of risk transfer is required;
3. There is a lack of capital for development funding.

Key considerations for other Councils considering a similar approach include:

1. Ensuring sufficient resource to undertake initial technical appraisal of options for meeting objectives and to de-risk the project as far as possible;
2. Ensuring sufficient resource for legal advice on independent company structure and contractual and procurement processes between Council and company;
3. Identification and selection, through competitive procurement, of suitable consulting engineer for detailed project design and development, and continuous project cost management;
4. Allocating sufficient funding and resource for development phase to minimise project costs and maximise value from project;
5. Consider the timing of fuel source supply contracts in relation to setting of energy tariffs, and the objective of affordable heat prices, particularly in relation to bulk gas purchase in wholesale markets, and maximising income from the sale of electricity generated.