

Aberdeen Heat & Power



Mission Statement

To deliver clean, affordable energy for the people of Aberdeen

History

In 1999 Aberdeen City Council adopted an Affordable Warmth Strategy to tackle fuel poverty in the city. In part this Strategy determined that investment in its own housing stock should be focussed on its least thermally efficient properties. A stock evaluation using energy rating software found these to be in their 59 high rise blocks of flats. Most of these blocks lacked external cladding and the flats were heated with electrical night storage heaters. Residents were under-heating their homes due the high cost of electricity.

The Council commissioned a technical study to identify the technical solution best able to deliver low cost heating to residents. This identified water-based communal heating systems connected to combined heat and power (CHP). Whilst the Council could afford to install this technology in one cluster of blocks it could only do so at the rate of one project every 12 years due to capital constraints. Commercial energy services companies could access third party investment to accelerate deployment but the returns required would result in high heating charges to the residents – undermining the objective of reducing fuel poverty.

The Council therefore established Aberdeen Heat and Power Ltd, an arms-length not-for-profit Company formed as a company limited by guarantee based on membership. Members were drawn from the local community, including residents, who nominated board directors with two seats reserved on the board for the Council.

For the first project serving 289 flats in four blocks at Stockethill, the Council entered into a contract with the Company to deliver the project based on an annual payment of £219,000 over a ten year term. Based on this contract the Company was able to take out a capital loan of £1 million to deliver the project. At that point a government-funded capital grant programme became available and the Company was able to spread the loan finance over a further two projects at Hazlehead and Seaton blending it with grants funds otherwise intended for refurbishing the heating systems under the Council's capital investment programme for upgrading the stock.

The company has a strategy to develop each project as a heat island and then link them together with the aim of creating a ring main serving a mixed portfolio of energy customers – domestic, institutional and commercial.

Using this blended financing arrangement the Company has now completed a total of five projects, connecting some together with a district heating system, serving approximately 1,766 flats and 9 public buildings. Ten years later it is now financially self-sustaining, the original loan has been re-paid, it continues to expand, providing affordable heating to residents and businesses, and is regarded an exemplar scheme in Scotland and the wider UK.

Greenhouse Gas Emission Reductions

The reduction of carbon emissions are a primary objective for Aberdeen Heat and Power Ltd. Heating systems previously used in the residential blocks were electric heat storage systems. Not only were these expensive to use, resulting in under-consumption by residents, but used high intensity grid-supplied electricity. Switching to high efficiency gas-fired CHP and installing water-based centralised heat distribution networks resulted in 45% carbon emission reductions.

The company seeks to achieve further carbon savings by diversifying in-input fuels to include renewables. Presently one of the three main projects has an element of biomass-generated heat from a biomass heat-only boiler located at the Town House. Further biomass generation will be developed at the Seaton plant room where space has been allocated and planning permission obtained for an extension to accommodate the plant, delivery and storage facilities.

The company has also recently entered a partnership (14th May) with the Council and Logan Energy to explore the opportunity to develop a fuel cell using bio-methane from a landfill site. This will produce electricity, heat and hydrogen. Electricity will be sold via the Grid, the heat will feed into Aberdeen Heat & Power's network and the hydrogen will fuel 10 council-owned buses and fleet of refuse collection trucks.

Lastly, initial considerations have been made to explore the opportunity for heat from geo-thermal sources.

Other greenhouse gases (NO_x, SO₂ and particle emissions) have been reduced by the discontinuation of gas heat-only boilers at the major public buildings. These include the Beach Ballroom, Beach Leisure Centre, Linx Ice Arena, Aulton Sports Pavilion, Hazlehead Academy, Hazlehead Swimming Pool and Hazlehead Joe Paterson Sports Pavilion. The recently built Aberdeen Sports Village did not have a boiler installed at all, relying instead on the district heating for its thermal requirements. It is now developing an Aquatics Centre with international standard swimming and diving facilities.

The hydrogen fuel project will also ensure that methane from the landfill site is safely used and will displace diesel fuel usage by the 10 Council buses and refuse collection trucks.

Innovation and replication

District heating projects in the UK have typically been delivered by municipalities, municipal companies or private commercial companies. Aberdeen Heat & Power Ltd is unique within the UK in adopting a mutual not-for-profit company structure. The blended finance approach using debt finance, council capital investment and grant funding (when available) has accelerated the expansion of the network and the business beyond what the Council could have achieved on its own.

The company continues to innovate with through the partnership to develop a hydrogen fuel cell using bio-methane.

Lastly, the experience of developing the projects and the business was incorporated into a guidance document (*Community Energy; planning development & delivery*) written by one of the company's founding directors and past chairman. This is widely used by other municipalities and consultancies in developing district energy projects in the UK and North America thereby replicating the experiences of Aberdeen Heat & Power Ltd.

Community Impacts

Cost savings The primary objective of Aberdeen Heat & Power Ltd is to deliver affordable energy in order to tackle fuel poverty in the city. On average the company is delivering cost savings to residents ranging from 15% over gas-fired boilers and 40% over electric night storage systems. Revenues from the sale of electricity are used to maintain a downward pressure on residential heat charges.

Employment Installation and construction activities undertaken for Aberdeen Heat & Power Ltd are contracted out. Tenders encourage the use of local labour and the provision of training. This has successfully developed skills in the labour force and local companies, such as First Class Gas, are now undertaking work installing district heating in other UK cities. Additionally, Aberdeen Heat & Power Ltd has a management and administrative staff of four people.

Customer engagement Prior to installation, Aberdeen City Council is obliged to consult with residents to seek their approval for work to proceed. Once secured work

can proceed but tenants and owners are not obliged to connect to the district heating system. However, Aberdeen Heat & Power Ltd has nevertheless achieved high penetration levels with an average of 86% as detailed below (at May 2013).

Site	Total Flats	Council Heated	Owners Heated	Total Heated	% Heated	Council still to heat	Owners still to heat
Hazlehead	186	122	36	158	85%	16	12
Denseat Court	47	47	0	47	100%	0	0
Stockethill	288	268	9	277	96%	11	0
Seaton 1	503	423	10	432	86%	59	12
Seaton 2	742	573	35	608	82%	105	29
Total	1766	1433	90	1522	86%	191	53

Post installation consumer satisfaction surveys are carried out and score equally highly.

Engagement with the commercial sector has been conducted through the local Chamber of Commerce and as representative of the Chamber has been recruited to the board.



Governance Aberdeen Heat & Power Ltd is a company limited by guarantee with a member ownership. Membership is open to anyone in the community and is particularly encouraged from the customers. Board members are unpaid volunteers drawn from the community and relevant bodies such as Scotland's leading fuel poverty organisation, Energy Action Scotland. Two board seats are reserved for local

elected councillors. When vacancies occur new local directors are sought with particular skills in engineering, estate management, business and finance.

Expansion

Aberdeen Heat & Power Ltd has a strategy to develop island or nodal projects that are self sustaining. These will then be gradually linked up to form a ring main around the city. This began with Stockethill shown in red in the centre of the map below followed by Hazlehead in the bottom lefthand corner and then by Seaton on the right.

As part of this strategy the company has recently completed an extension of the Seaton network northwards linking up a number of blocks in Seaton 2 and westwards into the city centre. These extensions are shown in blue in the map below. The city centre extension will connect up a number of public buildings in the centre including the Town House, Victoria House and Aberdeen College. Connections are also being made with Fredrick St Business Centre, a Health Campus and a community centre along the route into the city centre. A separate connection to the Seaton network is being made to Livingstone Court, a private retirement home close to the spur from Seaton that serves the Aberdeen Sports Village.



The company has also undertaken work to install centralised wet heating systems in six stand-alone blocks of flats replacing the electric night storage systems. These are Ashgrove Court, Denburn Court, Mastrick Land and three blocks at Torry. Once installed these systems are managed by the Council. However, as the Company's network expands they will link up to the district heating network.

Lastly, the company has secured agreement and permits to commence two new projects. These are Caincry, which is just to the north of Stockethill in the centre of the map, and Tillydrone which lies to the west of Seaton at the top of the map. These two projects will add a further 820 flats and 2 public buildings to the network.

In March 2013 the UK Government published its policies to support its Heat Strategy published in March 2012. This set an ambition for district heating to serve 30% of the heat market, primarily in urban areas, by 2050. The Scottish Government will be publishing its own proposals in the near future. In the light of this ambition it is necessary to understand how district heating projects can establish themselves and then grow in a phased development. Aberdeen Heat & Power Ltd is providing the a testing ground of how this can be done and as such acts as an exemplar to other town and cities throughout the UK and internationally.

June 2013.

Appendix

Calculations District Heating Ecoheat4Cities default labelling criteria

Total heat consumption buildings	21868	MWh
Auxiliary electricity use	349	MWh
Electricity non-renewable primary energy factor	2.60	

Production type	Fuel type	Fuel non-renewable primary energy factor	Fuel specific CO2 emission	Fuel renewable recycled energy factor	Fuel alternative	Total heat delivered to network	Heat delivered by fuel	Fuel consumption	Environm. heat consumption (Heat pump)	Electricity produced
CHP	Natural gas	1.10	230	0.00	52.5	18177	18177	40856	0.00	14681
Heat boiler	Natural gas	1.10	230	0.00	51.7	6631	6631	7894	0.00	
Heat Boiler	Secondary biofuel, wood	0.10	20	1.00	30.4	1133	1133	1382	0.00	

Distribution network efficiency

84

%

$f_{P,dh,nren}$

0.75

$K_{P,dh,nren}$

227

kg CO₂ / MWh

R_{dh}

4

%

Class $f_{P,dh,nren}$

2

Petals $f_{P,dh,nren}$

6

Class $K_{P,dh,nren}$

2

Petals $K_{P,dh,nren}$

6

Class R_{dh}

6

Petals R_{dh}

2

$f_{P,dh,nren}$

0.83

$K_{P,dh,nren}$

232

kg CO₂ / MWh

R_{dh}

15

%

