



RC UK: Energy and Communities

HEAT AND THE CITY

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1. Wyndford Estate District Heating – draft Case Study for DH Delivery Structures Guidance, Scottish Futures Trust 2014

Project Summary The Wyndford estate comprises over 1,900 flats and maisonettes constructed in the mid 1960s. In 2012 the estate received an energy efficiency retrofit, with external cladding on the tower blocks and district heating initially delivered to over 1,500 tenancies, subsequently extended to owner occupiers. The energy retrofit was driven by the need to reduce energy costs to residents of the estate, both in response to their expressed concerns and to achieve regulatory energy efficiency requirements.

SSE operate the scheme under a thirty-year concession contract with Cube Housing Association. SSE subcontracted the design and construction work to Vital Energi. SSE operates the scheme as a commercial venture, and assumes associated operational business risk. The tariff charged to users on the estate is pegged to the average the Big 6 companies' direct debit gas costs. The concession agreement stipulates that the system will be returned to Cube in good working order at the end of the contract. Capital replacement works are carried out by SSE and paid for by Cube as and when required.

The retrofit has been part funded by a Community Energy Saving Programme (CESP) award from British Gas. This covers the full cost of the external cladding and around a fifth of the capital costs of the heat network. The remainder of the capital costs have been met directly by Cube.

Lead entity	Cube Housing Association
Delivery Structure	Long term (30 year) concession contract (design-build-operate) let to utility company
References	<ol style="list-style-type: none"> 1. Cube Housing Association project profile 2. Vital Energi Case Study 3. www.heatandthecity.org.uk
Key contacts	<p>Willie Croft, Head of Regeneration at Cube Housing Association (to 2013, now River Clyde Homes)</p> <p>Maureen Hannigan, Head of Asset Management, and Scott Devlin , Asset Liaison Coordinator, Cube Housing Association</p> <p>David Forbes, Business Development Manager, Heat Networks, SSE</p>

1.1. Project drivers

The key driver for the Wyndford project was reduction in the costs of heating for households. This driver was manifest in two ways: first the Scottish Housing Quality

Standard (SHQS) set minimum energy efficiency levels to be achieved in social housing by 2015 which feasibility studies found could not be achieved through fabric upgrades alone; second Cube's surveys of residents highlighted the high cost of keeping relatively small homes warm as the second most pressing issue on the estate (after security). Prior to installation of district heating almost all the flats and maisonettes on the estate were uninsulated; with no gas supply to the estate, electric heating predominated. The original storage heaters (two per flat) had not been upgraded since the estate was developed in the 1960s. Many households also used direct electrical-resistance heating which, coupled with time-of-use electricity tariffs, led to high heating costs. Wearing outdoor clothing indoors, going to bed early and staying away from their flats (e.g. at relatives' homes) were common strategies residents used to stay warm.

Cube commissioned the Mackintosh Environmental Architecture Research Unit, Glasgow School of Art, to undertake an options appraisal for improving the energy performance of the estate. The study recommended communal heating for the multi-storey blocks and suggested biomass combined heat and power (CHP), using the electricity to support communal demand (lifts and lights). Initially carbon savings were an ancillary consideration rather than main driver, but assumed greater importance as project funding became linked to emissions abatement (via CESP).

1.2. Project objectives

To provide an alternative, energy efficient heating system which would

1. bring flats up to SHQS energy efficiency standards,
2. deliver affordable warmth for residents,
3. be available to owner occupiers to connect to, but not reliant for financial viability on any users other than Cube Housing Association tenants,
4. have scope for expansion should additional heat load become available in future,
5. be future proofed to allow fuel switching,
6. reduce CO₂ emissions
7. not require the housing association to manage the production or retail of energy, nor expose it to operational risks of the project.

1.3. Description of initial project

Different technical configurations for the project were explored through feasibility studies and the procurement process. While the first feasibility study had explored biomass CHP, Cube chose not to pursue this approach because of the level of fuel transport this would require, the need for fuel storage, and uncertainties in the security of biomass supplies.

Feasibility studies explored additional connections including a nearby regeneration area, a swimming pool which was refurbished around the same time, university buildings and a large supermarket (also under development the same time). However, difficulties coordinating agreement meant the current project delivers heat only to residents on the estate. This first phase of development focused on Cube's tenants in order to meet the deadline for CESP funding (December 2012). In early 2013 the Scottish Government offered grants to over 350 owner-occupiers on the estate to cover the costs of connection and new internal heating systems.

The network is supplied by a 1.2MW gas CHP engine with three 4.5MW backup/peaking gas boilers, and a thermal store (120,000 litres). Electricity from the CHP is not supplied specifically to the estate but is exported via the public network. The energy centre is sited beside a disused football pitch on the estate, and the heat network distributes heat to the

multi-storey blocks and maisonettes on the estate. These comprise four 26-storey blocks, five 14-storey blocks, one 9-storey block, seven 8-storey blocks and a series of maisonettes and flats. The heat network includes 2.7km of underground pipework. There are over 1,900 homes on the estate of which Cube owns over 1,500.

1.4. Initial delivery structure

Cube established two clear aspects of the delivery structure early on: first Cube would contribute some of the capital costs of the project, but seek to leverage other sources of finance; second, Cube would not play a role in the selling of energy, nor be exposed to business risks associated with system operation (such as bad debt risks). Within those parameters, however, various delivery structures were considered, particularly through the procurement process. The approach favoured by Cube, and eventually adopted, was a concession model: a third party would develop and operate the system for a fixed period, after which the assets created (energy centre and heat network) would be handed back to Cube.

Early thinking on delivery structure explored the possibility that a concession holder (i.e. the company developing and operating the system) would also provide some of the project finance (around three quarters of the CAPEX), securing long-term debt against the value of heat and electricity sales. However, the financial crisis and associated changes to credit markets undermined this model as long term finance was unlikely to be available to a concession holder. Under this initial model, Cube would have funded insulation of the homes from its own resources, and was exploring internal wall insulation as a lower cost alternative to external cladding.

In spite of the difficulties caused by the financial crisis, Cube persisted in developing the project, seeking to explore alternative delivery and finance models. The availability of CESP funding, which became apparent relatively late in the development process, enabled a different approach. British Gas fully funded external cladding of the multi-storey blocks, allowing Cube to cover a greater proportion of the CAPEX from its own resources, which were also supplemented by an additional CESP grant from British Gas. The requirement for the concession holder to raise long term finance was accordingly reduced.

SSE were awarded the concession to develop and operate the heat network, and they subcontracted design and construction work to Vital Energi. Vital Energi in turn subcontracted parts of the construction and installation, seeking where possible to make use of local companies. The rapid pace of installation required to meet the CESP deadline put pressure on this process; there were problems with the quality of work carried out by one subcontractor inside flats, resulting in their replacement.

The concession contract is for a 30 year term, after which SSE are required to return the system to Cube in good working order. Under formulae set out in the project agreement, Cube pay SSE an on-going charge to cover maintenance of the energy centre and network (excluding maintenance within tenants homes), and make a budget allowance for capital replacement works carried out by SSE. Owner occupiers, in contrast, have an additional fixed charge on their energy tariff to contribute to capital replacement costs. SSE collects this charge from owner occupiers (as part of their bill) and passes it to Cube to assist with its capital replacement budget. The project agreement makes provision for SSE to connect other users to the system.

The project agreement also governs the heat tariff. This comprises a fixed and a variable element and was agreed through negotiation between Cube and SSE. The variable element is calibrated to be equivalent to the average of the Big 6 energy suppliers' direct debit gas

tariffs (accounting for differing factors between gas and district heating, such as the assumed efficiency of a domestic gas boiler).

1.5. Governance

As concession holder, SSE is responsible for the business operation of the system, within parameters set out in the project agreement. The agreement was established through the procurement process (see below) and covers various aspects including

- How the tariff for heat is set
- Division of responsibility for maintenance (for example, Cube is responsible for maintenance of the heating systems within the flats)
- The capital replacement charge paid by Cube
- Provisions concerning liabilities for energy demand reduction, including if Cube were in future to re-provision some of the estate's housing (for example, by demolishing and rebuilding some of the buildings).
- Benefits and risks of any expansion of the scheme during the period of the concession contract accrue to SSE

1.6. Finance

All finance for external cladding of the housing blocks was from British Gas, under CESP (cost figures not available). The project CAPEX was around £15m which was financed by the combination of a further British Gas CESP award (around 20%), Cube's own resources and a capital contribution from SSE. Cube had explored other financial support mechanisms, but found incentives were generally tied to the use of renewable energy sources which they considered unsuitable at this stage in the system's development.

1.7. Procurement route

Cube appointed Brodies LLP (an Edinburgh-base legal firm) to advise on procurement processes, and under their guidance initiated a Competitive Dialogue. Overall the procurement process took around 12 months (double the initial estimate). This put pressure on the time left within CESP deadlines to complete the project, but Cube officers described the dialogue process as time well spent. The advantage of the Competitive Dialogue route was that Cube could assess different proposals, rather than having to specify the exact system requirements, as required by conventional procurement. Around twenty companies attended the initial open day, seven or eight submitted expressions of interest, and three were shortlisted, each proposing different technical, financial and organisational approaches. Through the procurement process Cube was able to assess the pros and cons of different options, and to negotiate terms of the agreement (such as where responsibility for different aspects of maintenance and replacement would lie, and what the associated costs would be).

The complexity and detail of the procurement process led Cube to retain the services of a high quality engineering consultancy and an experienced legal firm. The cost of this service was borne by Cube, and was considered a risk of the procurement process. Cube officers emphasised that the high quality of the advice they received was crucial to their ability to successfully negotiate with bidders.

1.8. Subsequent Expansion

At the beginning of 2013 Scottish Government offered grant funding to all owner occupiers on the estate to cover their costs of connecting to the system and installing new heating. 266 owner occupiers took up the offer of free connection to the network. Owners pay a slightly different tariff because they are charged for a share of system maintenance and replacement costs; Cube pays this cost for the tenants. The project is designed to have scope for expansion, though to date heat connections beyond the estate have not been made.

1.9. Advantages and disadvantages of the chosen structure

The structure of the project evolved as the availability of finance changed (from long term commercial loans to CESP grants). Through this evolution, however, Cube has achieved a concession structure with the following main advantages:

- Significant improvements in the affordability of heating for most residents on the estate, with the majority of tenants (80%) reporting their homes are now warmer
- The energy efficiency improvements (cladding plus the heat network) are projected to save 7,000 tonnes of CO₂ per year
- Single turnkey contract with SSE who organised (via Vital Energi) design and installation of a complex project involving multiple subcontractors.
- Operation of the system and exposure to business risks (including energy price fluctuation and debt risk) have been passed on to a utility company, shielding the housing association from potential financial risk
- The Wyndford estate has benefitted from one of the largest CESP awards in the UK
- By persisting with the project in spite of changing financial conditions, Cube were able to take advantage of CESP funding when it became available with a project that was already well advanced
- Competitive dialogue enabled Cube to appraise contrasting proposals, and to negotiate details of the arrangements with the bidders
- The project has been extended to owner occupiers, but was not dependent on their connection for viability. Similarly, SSE is able to extend the network to other customers should it choose to do so.
- The system will be returned to Cube in working order at the end of the 30 year period

A number of difficulties or disadvantages faced by the project can also be identified:

- Use of CESP funding put tight time constraints on the project (in spite of plans being well developed when CESP funding was announced) which contributed to difficulties with subcontractors. In addition, the rapid pace of installation reduced the scope to ensure that the placement of flow and return pipes did not undermine visual amenity on the estate (Cube has since installed additional containments to improve the aesthetic qualities of the system).
- The length of time required for project development and procurement meant Cube was unable to give residents accurate information about how the project would operate until close to the time of installation
- Some residents on the estate have found the transition to the new heating system challenging. Some lack an understanding of how to operate their heating controls, contributing to difficulties managing heat use and costs. In addition, moving from one energy supply (electricity) to two (heating and electricity) means residents now pay two standing charges, which some have objected to.
- Cube foregoes potential additional business benefits (e.g. favourable changes in energy prices) and control over the provision of heating over the 30 year term (in exchange for

being shielded from any business downside risk). For example, heat tariffs are governed by formulae agreed by Cube and SSE in the project agreement. The housing association therefore has less flexibility to alter tariffs in future.

1.10. Summary

The approach finally adopted by Cube Housing Association is likely to be adopted for one or more of the following reasons:

1. Registered social landlord seeks to develop a district heating initiative but not take on the role of energy provider (either production, or purchases and sales of energy), and seeks to transfer operational risks to a third party
2. Various technical, organisational and financial configurations may meet the housing association's requirements, and the housing association seeks to explore offerings from the market through procurement
3. Capital funding is available (in this case, via Cube's own resources and CESP awards)

It is unlikely to be suitable where:

1. A housing association seeks long term control over the energy provision business model (for example, changes to tariff formulae if energy market conditions change significantly);
2. There is a lack of capital funding;
3. Project viability depends on energy users beyond the social landlord's tenants

Key considerations for other social landlords 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. Allowing sufficient time, and allocating sufficient resource (such as engineering consultancy services) for the procurement process;
3. Maintaining a long-term view of the project potential, and responding flexibly to changes in the availability of finance.