Community Energy Programme – a Government programme managed by the Energy Saving Trust and the Carbon Trust

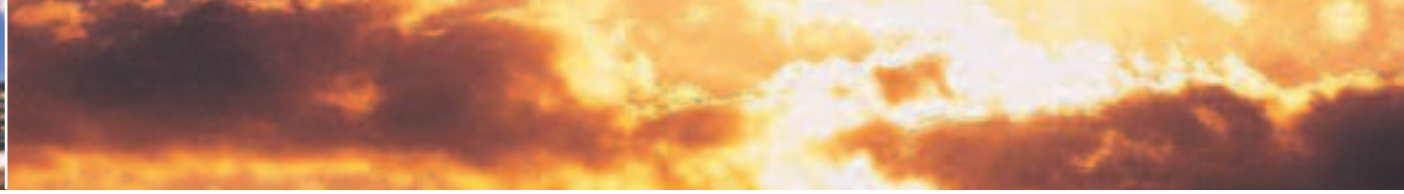
Community heating for planners and developers

A guide to delivering sustainable communities using combined heat and power and renewables

CARBON TRUST

Making business sense of climate change

Energy Saving Trust



Contents

Executive summary

This guide is written for all those involved in the planning and development process including Local Government planners (developing framework plans), urban planners (developing master plans), architects, engineers and construction companies delivering new build or refurbished developments. It applies to all buildings within the built environment including domestic dwellings, commercial and public sector buildings, as well as industrial buildings and the regeneration of estates within towns and cities. There is particular focus on the energy requirements of dense areas of development covered by the Government's sustainable community plans.

Community heating can deliver significant economic, environmental and social benefits and help local authorities with their local agenda 21 and home energy conservation act (HECA) commitments. It can assist area regeneration and help build sustainable communities whilst also making a major contribution to the goals of the Government's energy white paper including the delivery of affordable energy, elimination of fuel poverty, carbon reduction targets and improved security of supply.

The potential for community heating with combined heat and power (CHP) and renewables is significant, both in existing and new buildings. The appropriateness of community heating for any given development needs to be examined within a dedicated site-specific option appraisal. This should ideally be based on Treasury Green Book Guidance, in particular for the evaluation of public sector investment.

Community heating has suffered from a poor image based on the experience of outdated technologies and systems (20-40 years old) that have not been adequately maintained. In appropriate developments (especially dense urban developments), well configured modern systems such as those common in Scandinavia offer one of the most effective ways to reduce buildings-related carbon emissions. Whilst up front costs are higher than other options, it is often the least whole life cost option.

Several examples of newly installed community heating with CHP and renewables exist in new build and refurbished private housing in the UK. Surveys show that residents are more than content with the schemes.

Local authorities and other public authority departments have the opportunity, through the planning system, to request that developers consider community heating as part of the planning and design of their construction projects.

With the planning system is currently undergoing major change, this guide outlines the current instruments providing significant opportunities for the promotion of community heating. These include:

- *Planning guidance documentation issued by the Office of the Deputy Prime Minister (ODPM) in the UK, Planning policy Wales (Welsh Assembly Government), and the Scottish Executive. All outline the importance of encouragement, promotion and consideration of energy efficient buildings, community heating schemes and CHP in developments*
- *The Sustainable Buildings Task Group (SBTG)[1] proposes that best practice guidance will be published as supplementary guidance to PPS1, based around BREEAM and Eco Homes. A good way of achieving these standards may be through the implementation of community heating*
- *Regional spatial planning guidance, such as the London Mayor's Spatial Development and Energy Strategies issued by the Greater London Authority*
- *Local master plans or development frameworks that after consultation can take on the status of Supplementary Planning Guidance (SPG). Case studies within this document are Southampton, Leicester*
- *Section 106 agreements with developers. A case study (which may be subject to change) is West Quay Shopping Centre*
- *The power station consents policy operated by the Secretary of State for Trade and Industry. A case study is Millbrook District Heating Scheme in Southampton*
- *Legacy clauses for the ownership of land. Where a local authority or development corporation owns the land, community heating can be required through a legacy clause in the contract with a developer. Examples include Bed Zed (Beddington Zero Energy Development) in the London Borough of Sutton*
- *Transfer of ownership of social housing through large scale voluntary transfer (LSVT), small scale transfer, or separation through an Arms Length Management Organisation (ALMO) often brings significant refurbishment opportunities. LSVT guidance includes retaining and refurbishing community heating. There is often associated demolition and rebuild associated with transfer. New build can also include community heating*
- *The European Union Energy performance of Buildings Directive will require consideration of community heating, CHP and renewables as an option within all buildings over 1000m², along with building regulations allowing the comparison of these options with other means of provision of electricity and heat.*

In some cases, Government financial support may be available to offset up-front development costs or capital costs. Refer to: ***www.est.co.uk/communityenergy***

It is important to recognise that the potential of community heating is additional to, and does not overlap with emerging technologies such as the potential for Domestic or Micro CHP.

[1] DTI Sustainable buildings task group http://www.dti.gov.uk/construction/sustain/sbtg.htm

1. Aim of the guide

The aim of the guide is to assist regional and local government planners, and those involved in planning or delivering developments. The new planning process will require local planning authorities to produce regional spatial strategies as part of their local plans. These are to promote high density mixed use developments and consideration must be given to the local energy infrastructure.

The information within this guide will be of particular use to:

- Regional Government or Regional Development Agencies (RDAs) and those tasked with formulating local and regional energy strategy
- Local Planning Authorities
- Officers or councillors involved in planning committees
- Building Control Bodies (BCBs) and those responsible for the compliance and granting of planning permission and approval of construction projects within the built environment
- Urban planners, Master planners and architects
- Construction developers, residential developers and housing associations.

The planning framework is under review at present. This guide will be revised in due course, and we would welcome comments on its content as well as new examples of how the planning system can encourage community heating with CHP or heat networks utilising renewable fuels.

If you have any comments on this guide, please contact Community Energy at 0870 850 6085.

"We will continue to emphasise the benefits of CHP and community heating whenever Planning Policy Guidance, Regional Planning Guidance or Sustainable Development Guidance is introduced or reviewed" – *The Energy White paper – Our energy future creating a low carbon economy – DTI 2003*

2. About community heating

2.1 What is community heating?

Community heating is defined as "where a number of buildings or dwellings are heated from a central source"[2]. A community heating scheme provides heat from a central source to more than one building or dwelling via a network of heat mains. Heat can be supplied to the scheme from conventional boilers, renewable-fired boilers, or can utilise the waste heat from power generation (known as CHP). A community heating scheme may also provide the facility of cooling (or chilled water) for air conditioning via an absorption chilling plant.

Often buildings served include mixed use developments such as public, commercial and residential buildings. Residential buildings will include social and affordable housing but can also include private housing. Community heating schemes vary in size and can consist of individual tower blocks, a university campus, hospital site or an area of a town or city undergoing area regeneration. They can also encompass the whole of a city similar to the schemes that serve Southampton, Sheffield, and Nottingham.

Schemes can start installing a heat network with a centralised energy centre and 'energy linking' buildings, initially utilising fossil fuels. Once a viable heat network is established, the energy centre is fuel flexible and can introduce renewable fuels such as biogas, woodchip and other alternative fuels. In dense or tall developments, the costs of making a building explosion-proof and a gas network vandal-proof are significant. In these circumstances, electric heating is often the developer's choice. However, building regulations may require significant changes to building fabric, including for example, reduced external glazing. The effect on a large development with significant new amounts of electric heating can mean large scale investment in upgrade of electrical infrastructure, possibly including new substations. In these circumstances, community heating with CHP or renewables may be more financially attractive whilst also offering a significant environmental benefit. Community heating also often involves the local production and distribution of electricity (often termed 'embedded generation'). This can provide essential security of supply.

[2] A guide to community heating and CHP Commercial, public and domestic applications (GPG234) – (The Carbon Trust) Downloadable from www.carbontrust.co.uk/energy

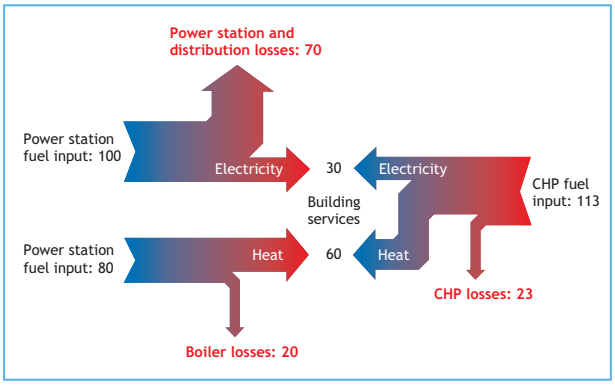


Figure 1: Nominal heat and power production from conventional sources and from CHP

2.2 Elements of a scheme

The physical elements of a community heating scheme consist of an energy centre, with a central heat source, a heat distribution network, and end user space heating and domestic hot water systems within each dwelling/building.

Heat Sources

Community heating can use a wide variety of fuels which may not be easily applicable to individual domestic heating systems. These include:

- Waste heat from power generation. In conventional electricity generation, most of the primary energy input is lost as waste heat. CHP systems, on the other hand, recover this heat which can then be used for community heating. CHP systems therefore are very efficient, with much lower environmental impact and heat production costs
- Energy from waste (EfW) or waste heat from industrial processes
- Geothermal and solar energy.

Even when using conventional boilers there is the potential to achieve better efficiency and security of supply through the use of multiple boilers.

Heat sources can be changed (including at short notice if the system is set up for this) according to availability and/or price.

When considering the implementation of community heating schemes, the 'energy linking of buildings' should be considered. This can further increase environmental, economic and social benefits with more buildings increasing thermal and electrical energy demands at different times of the day. It can be advantageous if community heating systems can be established to supply a range of domestic and non-domestic customers.

Heat distribution

A distribution network of flow and return pipes transfers the heat from the energy centre to the individual buildings or dwellings that are connected to the system. For a system that serves a large complex the heat distribution network may consist of insulated pipework, pumps and valves similar to those within a conventional central heating system. For larger systems serving a number of buildings, increased diameter flow and return heating pipework is used, commonly with variable speed pumping equipment (to reduce electricity consumption) and heat exchangers (to form a primary and secondary circuit).

The larger pipework may be installed above ground (built into the building), or buried within a trench, (commonly pre-insulated to a high standard) similar to other mains water, gas and electrical services. The pre-insulated pipes incorporate automatic leak detection, and their manufacture is in accordance with European standards and guarantees.

Figure 2: Pre-insulated heating flow and return pipe work within a trench

End user installations

Community heating systems generally provide heat to dwellings in the same way as heating systems with their own individual boilers, via pipework and radiators. From the building/dwelling owners' perspective there is no difference in the type of controls available. For example, programmers to set daily and weekly heating and hot water requirements, and radiators having Thermostatic Control Valves (TRVs) installed.

One option that makes a significant difference is the use of a hydraulic interface unit (HIU) within a building or dwelling instead of a boiler. This unit includes a heat exchanger (for provision of space heating and separate domestic hot water) flow and return pipework, control valves and a metering facility.

These units include a plate heat exchanger (similar to what is included within a combination boiler) which can provide instantaneous domestic hot water instantly, and eliminate the need for a hot water storage calorifier. As with individual systems it is important that tenants understand the options available regarding the choice of heating controls, and whether heat is to be metered.

2.3 Generic benefits of community heating

The generic benefits are environmental, economic and social and accrue to all stakeholders in a project. The generic benefits include:

2.3.1 Environmental benefits

(i) Community heating delivers significant carbon reduction benefits compared to conventional solutions for the provision of space heating, domestic hot water and electricity.

(ii) Once established, community heating schemes consisting of heat and electricity networks are fuel flexible (having the option to utilise renewable fuels) and are able to benefit from low or zero carbon emerging technologies such as fuel cells.

2.3.2 Economic benefits

Community heating is most likely to be an economically viable option if there is:

(i) A high heat demand density

(ii) A diversity of building types with different (and therefore complementary) heat demand profiles

(iii) Locally available heat that would otherwise be wasted, so that running costs are low

(iv) The opportunity to integrate other energy services: local electricity (from CHP) supply, cooling (particularly using surplus summer heat).

2.3.3 Social benefits

(i) Social benefits include reduced energy bills for residents that may be on benefits or within fuel poverty. Providing affordable warmth and reducing the potential of cold and condensation related illnesses.

(ii) Additional benefits of community heating include increased floor area of buildings/dwellings with possible elimination of the requirement for individual boilers and domestic hot water storage.

2.4 Regulatory benefits of community heating

There are regulatory benefits of considering and implementing community heating schemes:

2.4.1 For planners:

(i) Assisting local authorities in delivering sustainable development, sustainable communities, and commitments adhering to their Agenda 21 and HECA objectives.

2.4.2 For developers:

(i) By January 2006, the European Union Energy performance of Buildings Directive will be implemented and will require all planning proposals to consider community heating. Some planning authorities already require this. Developers therefore need to understand community heating and be able to evaluate whether it is suitable for their development.

(ii) Building designs with large areas of glazing commonly require energy-intensive cooling and heating services to maintain comfort, and are not therefore recommended. However, modern city centres are often characterised by such developments; community heating can be an effective way to improve their carbon footprint, particularly when the service provision includes cooling.

(iii) Environmental benefits appeal to some informed purchasers.

Figure 3: A typical hydraulic interface unit (HIU)

(iv) Demonstration of corporate environmental responsibility will add to a company profile.

(v) Where a scheme serves the public sector, investment should be appraised using Treasury Green Book Guidance. On this basis, community heating may be the lowest whole life cost.

2.4.3 For the Community:

(i) Promotion of sustainable regeneration within the community.

3. Recognising potential opportunities for community heating

The potential for community heating in the UK is enormous. By definition, the technology cuts across sectors and can provide heat to both public and private sector buildings. The main opportunities are as:

- Part of refurbishment of existing buildings, especially in dense urban areas with high/low rise housing currently using electric heating or with an existing heat network
- A large public sector development new build or refurbishment project such as hospitals, universities, or council offices
- Part of a wider regeneration agenda, at regional/local town level which may include dense new urban developments promoted under the sustainable developments plan
- Part of a small community currently off the gas network that could utilise renewable energy sources.

3.1 Community heating for existing buildings

Community heating in the UK could serve between 194,000 and 5,500,000 homes depending on the cost of finance assumed. These will be the denser dwellings in high rise (defined as more than 6 floors in height). As Table 2 shows, some 942,000 dwellings are in high rise, of which 245,000 have electric heating and 105,000 already have a heat network. They are prime candidates for refurbishment. On top of this, 126,000 high rises have no central heating. At lower discount rates, low rise and maisonettes become cost effective.

The potential for community heating with CHP is predominantly an urban technology, with London accounting for over a quarter of the potential and 12 other major UK cities accounting for approximately 60% of the potential in existing buildings.

It is important to appreciate that the potentials for community heating and for CHP are additional and do not overlap. Community heating is cost effective in dwellings with few external walls, where the heat demand is dense. Micro CHP is less likely to be cost effective in such applications because it would be unlikely to operate for long enough. The full report of the UK potential for community heating and CHP can be downloaded from **www.est.org.uk/communityenergy**

Heat customers	Units above	DR 6% and above	DR 9% and above	DR 12% and above
No. of dwellings connected	No.	5,528,000	404,000	194,000
No. of universities	No.	82	44	41
No. of district hospitals	No.	205	35	21
No. of secondary schools	No.	754	50	25
Government Estate buildings	10^6 m^2	1.63	0.63	0.50
Local Authority offices	10^6 m^2	2.83	0.86	0.73
Private sector offices, warehousing and retail	10^6 m^2	285.89	85.91	35.94

DR – Discount Rate

Table 1: Potential by buildings served

	Total Homes	Flats: Low Rise or Maisonettes	Flats: High Rise
Total Homes	24,040	3,577	942
% of homes	-	15%	4%
Homes without central heating	3,000	549	126
Homes with central heating	21,040	3,028	816
(%)	88	85	87
Central heating with solid fuels	731	41	-
Central heating with mains gas	16,730	2,098	455
Electric central heating	2,333	727	245
Oil	771	6	7
Bottle gas	192	8	4
Existing community heating	283	148	105

Table 2: Type of heating system within each dwelling in the UK (000's)

It is important to recognise that community heating schemes below 300 or 400 dwellings are unlikely to be cost effective to a commercial developer where there is little or no housing association funding. Smaller schemes have to date only proven cost effective where public sector discount rates and project lifetimes of over 20 years are used. An example is where a project has significant registered social landlord (RSL) involvement and the scheme uses Treasury rules for the evaluation of investment.

3.2 Community heating in new buildings[3]

Assuming that most new build will be via private developers (with project lifetime of 20 years and a discount rate of 12%) new developments of 55 dwellings per hectare and above are likely to be cost effective. For smaller developments of 100 homes or less, (typical of infill projects) densities may need to be around 75 dwellings per hectare to be cost effective. Smaller schemes such as these tend to have a higher capital cost per kilowatt. However, if such projects can connect to a larger existing or planned scheme, such limitations do not apply. New developments promoted under the sustainable communities plan are likely to have densities of 35 to 300 dwellings per hectare, and may therefore be cost effective.

3.3 Community heating using renewable energy

There is potential for schemes in both urban and rural areas. Urban schemes can use readily available alternative fuels alongside natural gas. These fuels may include geothermal, biomass (such as tree waste which would otherwise go to landfill) or biogas (produced from anaerobic digestion).

20% of UK households are not on a gas network. In some areas, where a cohesive community exists, the best alternative to electric heating, solid fuels or oil heating would be renewables in an energy centre serving the community through a heat network. Even though such networks are unlikely to be as dense as those in urban areas, the fact that renewables are displacing electric heating, solid fuels or oil heating means this may make them attractive in cost and carbon terms.

A guide to new and renewable energy in community heating can be downloaded from **www.est.co.uk/communityenergy**

4. Assessing whether community heating is appropriate

4.1 Option appraisal using whole life costing

In order to determine whether community heating is appropriate in any given development, an option appraisal will be needed. This allows comparison of a number of different routes for providing a given service on the same economic basis to determine the best option.

An option appraisal for public sector investment should be based on Treasury Green Book Guidance.[4] This recommends whole life costing, taking into account all costs, benefits, income and expenditure, including energy maintenance and replacement costs, over a 25 year period, and discounted back to current values using a discount rate of 3.5%.

Options for provision of electricity and heat may include, for example, community heating with CHP and renewables, electric heating, and gas boilers, with electricity bought from the grid.

An outline option appraisal is included within Appendices A and B, and further guidance is available from the Community Energy Finance guide (see financing community heating) downloadable from **www.est.co.uk/communityenergy**

4.1.1 Scheme costs

Provision of heating services includes covering a number of options whilst adhering to compliance with the Building Regulations, health and safety requirements ensuring buildings are explosion-proof (Part A) and addressing energy efficiency (Part L). In dense developments this means many developers will avoid the additional construction costs of making a building (and gas network) explosion resistant, and opt instead for electric heating.

The costs of electric heating can typically be £1500 per dwelling. Network reinforcement to cope with the increased electrical load is difficult to quantify. It may be that this is met by the DNO (Distribution Network Operator) and costs recovered from Use of System Charges. Power station build to supply is difficult to quantify, but would be around £400 per kW. An average home might have an average electrical demand of 2-3 kW. The costs of new build power stations would not be met by the developer but by electricity customers.

The costs of a central heating system including radiators, internal pipes, controls and boiler can typically be £3000. Installation of a gas main to individual dwellings is additional. Some of the cost may be met by a gas network operator who recovers the installation costs through a charge on gas use.

[3] Feasibility of Community heating and CHP in new build housing (Report for the Carbon Trust BRE 2003)

[4] The Green book, Appraisal and evaluation in Central Government – Treasury (London TSO) http://www.hm-treasury.gov.uk/

The costs of community heating are typically between £3000 and £6000 per dwelling. The internals (such as radiators and controls) are similar in cost to a central heating system, though currently (because of the volume of production) a heat meter is more expensive than a gas meter. A HIU is cheaper than a boiler. A heat network can be more expensive to install than a gas network, because of the additional controls. However, the system adheres to health and safety in comparison to a gas network, and there may be construction costs avoided in making the building explosion proof. The energy centre is an additional cost.

New-build projects typically enable the capital costs of a heat main to be kept to a minimum, as the work can be programmed in to the construction process. Retrofitting heat mains to existing housing stock is typically more problematic than new build, especially if there physical obstacles to laying the heat main, such as roads or walls. Thus additional capital costs of community heating over electric heating may be around £3500 per dwelling, or up to £3000 per dwelling compared to gas.

The following table shows indicative cost effectiveness based on early schemes supported under the Government's Community Energy Programme. There is a very significant variation between schemes depending on circumstances. These figures are indicative only and further information is available from the Community energy indicators document, downloadable from **www.est.co.uk/communityenergy**

4.1.2 Running costs

To justify itself economically, a community heating network must make significant savings over its life, compared to the alternatives.

The key factors in economic savings are:

Within managed housing: Reduced maintenance. Avoiding a gas boiler avoids the need for an annual gas safety inspection, which may typically cost £90-130 per annum.

Longer equipment life: The life expectancy of community heating is around 25 years (although elements of the system may need replacing during that time). The life of individual gas and oil boilers is around 15 years, and electric storage heating is around 10 years.

For all schemes: Energy savings (and therefore carbon savings) are typically 25% compared to gas boilers, and up to 50% compared to electric heating.

Supply of electricity is a potential additional benefit. This can be a supply to the common parts managed by the landlord, in which case the landlord typically avoids around 5 p/kWh (pence per kilowatt hour), or supply to the resident. This can be worth 6p/kWh income to a scheme, and still provide a 10% saving to customers.

4.2 Business planning

Having determined the best option, it is recommended a business plan can be prepared to deliver it in practice. Whilst community heating can be the least Whole Life Costs (WLC), many developers prefer the least cost solution.

The development of community heating requires installation and management of the asset over a period to recover the additional up-front costs. Developers often employ a managing agent or concierge service on developments. An Energy Services Company (ESCO) is exactly the same: it can develop an ongoing relationship with residents, including billing, to cover management and maintenance of an asset. This kind of arrangement requires assessment through business planning or a business case.

Financing community heating schemes can be difficult, due to the high upfront costs compared to the alternatives, even if the scheme is the best Whole Life Costs option. Many schemes in new developments will be best managed through developing a partnership approach with an ESCO, or devolving all ownership, management and maintenance issues to an ESCO.

An outline business plan is included within Appendix C. Further guidance covers arrangements for financing community heating, including partnerships and ESCOs, and sources of funding, including bank finance, leasing, grants and other sources. See financing community heating at **www.est.co.uk/communityenergy**

	Energy Centre	Electrical Connection	Heat Network	Internals	Consumer Connection	TOTAL
Suggested indicative	750-2100	40-160	400-4000	800-3000	100-300	2000-9000
Mid range value	1400	100	2200	1900	200	5800

	Cost per dwelling
Where there is an existing community heating network	3200
Where there is an existing wet system	3900
Where there is no wet system	5800

Table 3: Capital cost indicators (domestic, £/dwelling)

	Energy Centre	Electrical Connection	Heat Network	Internals	Consumer Connection	TOTAL
Suggested indicative	8 to 25	0.5 up to 3	up to 70	5 to 30	0.5 to 5	up to 200
Mid range value	16.5	1.75	50	17.5	2.75	89

Table 4: Capital cost indicators (non domestic, £/m^2)

5. Attitudes to community heating – case studies

'Community heating' covers a wide range of possible systems both in terms of size and connected building types as demonstrated by the case study examples set out in this section.

Two scheme types that are most likely to concern local authority planners are new-build housing developments and town/city centres. In order to decide whether or not community heating is likely to be a good option, a thorough analysis of the heating options will need to be carried out. However, there are a number of key elements that can give an early indication of viability; successful schemes will probably be based on:

- **High heat demand and diversity.**
  Housing development. *The number of dwellings and the density of the development* are important for residential developments where demands tend to be peaky and because increasingly strict building regulations progressively diminish heating demands. Although there are no hard and fast rules, in order to fruitfully integrate CHP the housing density will preferably approach 50 dwellings or more per hectare, with the CHP unit sized to run usefully for at least 5000 hours. Greenwich Millennium Village is a good example of a high density development where the high number of dwellings also provides some load diversity. The number of dwellings is less critical in off-gas grid locations where options are limited, eg the Llandwyddyn Biomass scheme.

  Town/city centre. *The overall heat demand density*, including cooling demand, is likely to be high. Many of the UK's large town/city centres have a density that at least matches that of Southampton which has a highly successful scheme. In city centres there is also likely to be a high load diversity because there are many different types of buildings that require heat at different times.

- **Availability of heat that would otherwise be wasted** will be important for any prospective community heating scheme because, in addition to the environmental benefit, such heat is likely to be available at a low running cost (although establishing the network itself will have a high capital cost). Sources could include industrial or municipal waste heat, use of those renewable resources (probably biomass) unsuitable for individual premises, or waste heat from power generation (large power stations or, more likely, embedded generation CHP).
- **A sound business case:** the community heating option should be compared with other energy efficiency and heating options. Provided this is favourable, the necessary finance needs to be found. It is likely that a combination of sources will need to be secured. These are likely to include a commitment from the local authority itself, and there may be grant funding available (eg currently the Community Energy programme, and the suppliers' Energy Efficiency Commitment). Particularly for city centre schemes, where commercial loads are likely to predominate, the involvement of the private sector is likely to be required, probably in some kind of public private partnership.
- A local **Champion** who is in a position to influence and pull together the various local authority departments which need to be involved. The Champion will also need local political support. Such a Champion will invariably have a good 'high-level' knowledge of community heating and its benefits and the ability to communicate and enthuse this to potential stakeholders. Community heating will be enshrined within environmental strategies (eg Woking Borough Council's Climate Change Strategy) so that any network that is established locally can be replicated or extended.
- **Partnership** – most schemes need to engage with the private sector, the way in which the partnership functions will be important; for example in Southampton there is a formalised Joint Co-operation Agreement between the City Council and Utilicom Ltd, the private sector partner. This sets the foundation for the core scheme to secure new customers so that the connected heating and cooling load continues to grow.

5.1 Modern community heating in Europe the City of Copenhagen

In Denmark 55% of homes, and up to 95% of buildings in urban areas, are served by community heating. The diagram below shows Greater Copenhagen, the whole area being served by community heating with CHP.

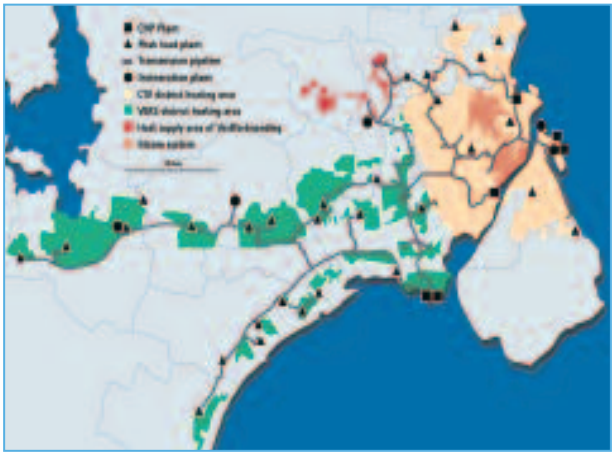


Figure 4: A map of Copenhagen outlining the installation of community heating and CHP (Courtesy of the Danish Board of District Heating)

5.2 Community heating within a new build development in the UK – Greenwich Millennium Village (GMV)

GMV is a community being developed through a joint venture partnership between Taylor Woodrow and Countryside Properties. It is situated close to the Millennium Dome, built on brownfield land surrounding an ecology park. The master plan was drawn up by Swedish architect Ralph Erskine.

The landowner English Partnerships (EP) stipulated stringent environmental design criteria for the millennium community development specifying an 80% reduction in primary energy use (compared to levels of primary energy within new build developments benchmarked in 1998). The target is to be met progressively over the life of the development. To date a 30% reduction has been achieved through measures implemented according to Part L of the building regulations. A 35% reduction has been achieved through the installation of community heating and CHP. The final 80% reduction is to be achieved through a combination of incorporating:

- Photovoltaic cells
- Improved insulation and air tightness

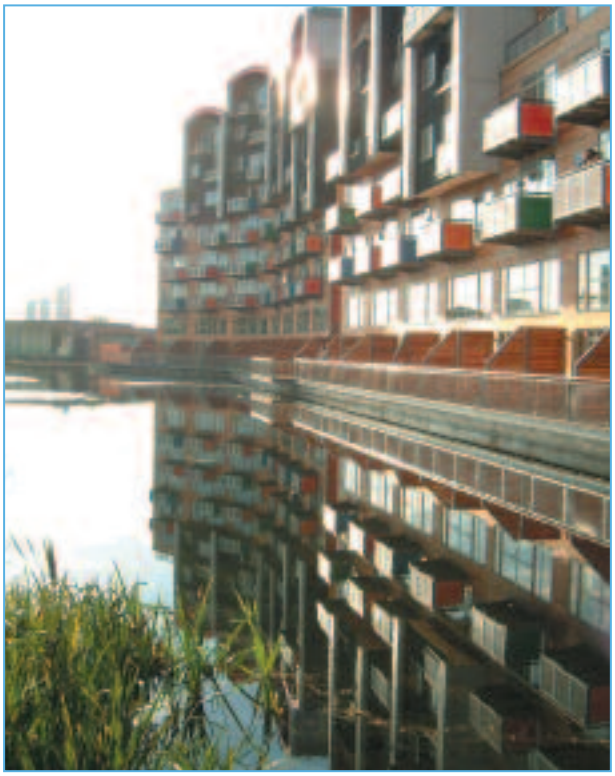


Figure 5: Greenwich Millennium Village Phase 1

- An improvement in the operation of the community heating and CHP
- Education programmes with residents.

The project achieved a BRE ECOHOMES excellent rating through reduced embodied energy, reduced primary energy use and cutting construction waste.

The development comprises some 1,400 homes. Residents are a mix of owner occupiers, buy to let investors, and affordable housing tenants though Moat Housing. All homes are heated by community heating with CHP and heat meter to each dwelling providing space heating and instantaneous unlimited hot water. Heating and hot water controls are by time clock and all radiators have thermostatic radiator valves. Surveys have shown residents were keen to buy into the development because of the development's environmental credentials of which CHP is an important part.

The scheme is managed on behalf of the developer and the residents by an Energy Services Company (ESCO), Utilicom Ltd. The electricity is at present sold for use offsite, but there are moves to explore utilising the electricity generated in the common parts of the development, displacing Landlord's supply. In due course electricity may be sold direct to tenants.

5.3 Community heating within new build development in the UK – The City of Southampton

5.3.1 Why Southampton City Council chose community heating

The city of Southampton has a large city centre community heating scheme serving over 40 major buildings and consumers.

Initially, the catalyst for the scheme was a geothermal energy source that was investigated by the council with government collaboration and EU support. Although the original project was abandoned, the council still wanted to utilise the resource. After discussions with Utilicom Ltd the council became aware of the benefits of expanding the scheme, integrating CHP, and developing both heating and cooling networks.

Consequently, the council committed its own council buildings to the scheme and encouraged local commercial and public sector buildings to connect to the network. For commercial connections this has meant a sound business case based on provision of affordable energy services and avoidance of individual heating and chilling plant.

The scheme has been run as a partnership between Southampton City Council and Utilicom Ltd since 1987, and is now underpinned by a formal Joint Co-operation Agreement. The scheme has cross-party support from councillors and has had multi-departmental involvement within the council from the start.

For more information see the case study at:
www.iea-dhc.org/download/KN1640%20Southampton%20v2.pdf

5.3.2 New-build housing development

Barratt Homes has connected Park View, a new development of luxury apartments, to the Southampton District Energy Scheme. Park View is the first new private housing development of its type in the UK to use community heating.

Barratts initially had reservations about community heating, particularly concerning market resistance to, and reliability of (perceived) new technology. However, having been sufficiently reassured to proceed, their positive experience of community heating at Park View has led them to proceed with connection of a further new-build development on the site of the Dell (the redevelopment on the former site of Southampton FC). Specifically their reasons are:

- Finance: Gas was not required so that installation costs were avoided
- Design: the absence of a boiler and no storage tank was used to enhance the design and give additional storage space
- Marketability: The CH system has proved popular with buyers: instant hot water available 24/7, high water pressure for showers, no gas boiler to maintain, low running costs.

For more information see the good practice case study at:
www.est.org.uk/bestpractice/uploads/publications/pdfs/gpcs400.pdf

Figure 6: Park View – a new residential housing block connected to community heating

6. Planning Instruments

Chapter 4 of the DTI Energy White Paper, 'Our energy future – creating a low carbon economy' states that "the Government will undertake a review of the existing guidance on information required to accompany power station consent applications. The Government will continue to emphasise the benefits of CHP and community heating whenever Planning Policy Guidance, Regional Planning Guidance or Sustainable Development Guidance is introduced or reviewed."

It is important to recognise that the planning system is currently undergoing significant reform. At the strategic level:

- Structure Plans are being abolished and Regional Planning Guidance (RPG) is being replaced with Regional Spatial Strategies (RSS)
- Local Plans are making way for slimmed down criteria-based Local Development Frameworks (LDF)
- 'Action Plans' are to be prepared at the neighbourhood level and adopted as Supplementary Planning Guidance (SPG).

6.1 The planning framework and energy

Planning documentation is of particular relevance and is outlined within this section.

6.1.1 Planning policy guidance (PPG 1 – General policy and principles – ODPM)

Forms the central element of the planning system and emphasises the importance of urban regeneration and the reuse of previously developed land in the promotion of sustainable development. The policy establishes that economic development and mixed use schemes should be compatible with sustainability objectives. There are strong emphases on high quality design: "good design should be the aim of all those involved in the development process…" This is supported by the publication of By Design: Urban design in the planning system by Commission for Architecture in the Built Environment (CABE) which is a companion guide to PPG1. The message is further reinforced within the Urban Design compendium by English Partnerships and the Housing Corporation.

6.1.2 Planning policy statements (PPS 1 – Creating Sustainable Communities – ODPM) (SPP1 – The Planning system –SE) (Planning policy Wales – NAW)

PPS 1 sets out the vision for planning and the key policies and principles which should underpin the planning system. It outlines the importance of using energy resources efficiently and states, "consideration should be given to encouraging energy efficient buildings, community heating schemes and CHP in developments."[6]

The Sustainable Buildings Task Group (SBTG) was set up by three Secretaries of State (the Deputy Prime Minister, the Secretary of State for Trade and Industry, and the Secretary of State for Environment Food and Rural Affairs). It is proposed that best practice guidance will be published as supplementary guidance to PPS1, with recognition that a good way of achieving these standards is through the implementation of community heating.

The equivalent in Scotland, SPP1, encourages "energy efficiency through the layout and design of development."[7] The document Planning Policy for Wales states that development plans should "Contribute to climate protection by encouraging land uses that result in reduced emissions of greenhouse gases, in particular energy-efficient development, and promoting the use of energy from renewable sources."[8]

6.1.3 Planning policy guidance for housing (PPG Note 3 Housing – ODPM) (SPP3- Planning for housing – SE)

This document identifies the need to widen housing opportunity and choice and to maintain the supply of housing. It states that local authorities should "plan to meet the needs of the whole community"[9] in pursuit of objectives to create more sustainable patterns of development. This involves promoting the use of brownfield land, high densities (30-50 dwellings per hectare are suggested), improved accessibility to community services and public transport.

6.1.4 Regional planning guidance

PPG 11 states that "Regional planning guidance (RPG) should also encourage development plans and other regional partners in their investment programmes to promote more local energy-efficient development through such measures as CHP and community heating schemes. These need to be considered at the earliest stage of development because of the infrastructure required. CHP along with a community heating scheme can offer optimum energy efficiency and contribute towards urban regeneration and a sustainable environment. CHP/community heating schemes are particularly relevant to assisting an urban renaissance since they work most efficiently when they are supplying a mix of nearby residential and commercial buildings, particularly in high density city areas, because of the diverse heating and electricity requirements throughout the day."[10]

5 Energy White Paper – Our Energy Future – (DTI 2003)
6 Consultation paper on Planning policy statement 1: Creating sustainable communities (ODPM)
7 SPP1 – The planning system (Scottish Executive)
8 Planning Policy for Wales (National Assembly for Wales)
9 PPG Note 3 – Housing (ODPM)

6.1.5 Planning for sustainable development

"The areas in which planners can be particularly influential are CHP schemes, site layout and, to a limited degree, building design. With CHP, by using waste heat to heat buildings, fuel efficiency can be increased to 70-90% compared to 30-50% with conventional generation. It therefore has the potential to deliver significant reductions in greenhouse gas emissions and in energy costs where suitable heat loads exist.

Planners will need to recognise that maximising energy efficiency will require particular strategies to reflect individual circumstances. So, for example, while a higher density will make CHP more practical, it may militate against passive solar design by increasing overshadowing."[11]

6.2 Regional spatial planning guidance

Regional and spatial planning guidance can also be used to promote community heating.

6.2.1 Mayor of London's Energy Strategy – Green light to green power

The Mayor as leader of the GLA has developed a strategy on energy because of the impact on quality of life. The main route for the implementation of the strategy is through the spatial development strategy.

The London Energy Strategy states, "to help to deliver significant increases in CHP capacity in London, the Mayor requires planning applications referable to him to include CHP and community heating where viable. Boroughs should expect the same. As a key player in urban regeneration, the Mayor expects the London Development Agency to promote CHP and community heating in its work". The strategy requires that all commercial and residential schemes consider CHP and community heating.[12]

The London Plan spatial strategy states "the Mayor will and boroughs should support the Mayor's Energy Strategy and its objectives of reducing carbon dioxide emissions, improving energy efficiency and increasing the proportion of energy used generated from renewable sources by: requiring the inclusion of energy efficient and renewable energy technology and design, including passive solar design, natural ventilation, borehole cooling, CHP, community heating, photovoltaics, solar water heating, wind, fuel cells, biomass fuelled electricity and heat generating plant in new developments wherever feasible.[13]

6.3 Supplementary planning guidance, master plans, local plans and development frameworks

At a more local level, supplementary planning guidance (SPG) can require consideration of community heating with CHP or renewables. In some cases, a master plan or development framework for regeneration of an area can take on the status of SPG if it has been consulted on and approved.

6.3.1 Southampton City Council

The City of Southampton has a large city centre community heating scheme serving over 40 major buildings or consumers. The scheme has a network of over 11 km of heating & cooling pipes around the City Centre. It cost a total of £7,000,000. It supplies over 70,000,000 kWh of energy each year with CO_2 savings of 11,000 tonnes per annum.

The City of Southampton is currently undertaking a local plan review which includes the following[14]:

"CHP or district heating systems involve using excess heat from power generation and/or waste heat from industry by piping it to the local area. District chilling systems provide chilled water for air conditioning plants. Developments that facilitate the introduction of CHP and district heating or chilling schemes are those that are located close to the potential power/heat source. These comprise of a mix of uses to balance the demand for energy and have a grouping or density which reduces installation and transmission costs. Within the City Centre, developers should demonstrate how they have considered the potential to link into the geothermal and district heating/chilling schemes."

10 Planning Policy Guidance 11- Regional Planning guidance (ODPM)
11 Planning for sustainable development – a summary (ODPM)
12 Green light to green power – the mayors energy strategy GLA (2004) (www.london.gov.uk)
13 The London Plan – Spatial development strategy for Greater London (GLA 2004) (www.london.gov.uk)
14 Southampton Local Plan, 2.72, Sustainable Development Principles, Revised Deposit Version February 2003.

Figure 7: The Southampton Energy Centre

6.3.2 Leicester City Council

Leicester is redrafting its local plan (now second deposit draft) and is pushing strongly for the consideration of community heating/CHP by developers. Paragraph BE18a of the proposed local plan reads:

"All major developments and developments within the strategic regeneration area will be expected, where feasible, to source their energy requirements from CHP (either through on-site plant or a community heating network). Planning permission will only be granted for those developments that source their energy requirements from combined heat and power or can demonstrate that this is not a feasible option"[15].

The council also hope to reinforce this clause by issuing supplementary planning guidance on what might constitute suitable proof of non-feasibility, although this has yet to be drafted.

6.4 Planning obligations (Section 106 agreements, Section 75 agreements in Scotland)

Planning obligations, (also known as section 106 agreements), are typically agreements between local authorities and developers negotiated in the context of granting planning consent. Section 106 of the Town and Country Planning Act of 1990 allows the placing of conditions to developments. They provide a means to enable the proposed development to proceed and to meet the needs of the local community associated with the new development by securing developer contributions towards the provision of infrastructure and services. Through planning obligations, developers contribute towards sustainable communities and help ensure the success of new developments. They make cash or in-kind contributions towards a range of infrastructure and services including local roads and public transport schemes, public spaces, community facilities and affordable housing.[16]

Local authorities could spend developer's contributions to the scheme on new community facilities, infrastructure improvements or affordable homes. Under the proposal local authorities must set out details of the charge (e.g. £ per unit of development or housing) in their local development plans. This would ensure all the parties involved know the cost of the charge before an application is submitted, resulting in a more efficient process.

6.4.1 West Quay Shopping centre – The City of Southampton

Southampton City Council requested as part of a Section 106 agreement with the developer that the new West Quay shopping centre development should utilise the existing community heating (and chilled water cooling) system.

Figure 8: West Quay shopping centre

6.5 Power Station consents policy

The Government expects developers to show they have seriously explored opportunities to use CHP technology, including community heating, when presenting power station proposals to the Secretary of State for Trade and Industry for clearance. Such clearance applies to proposals in England and Wales for a power station over 50 MegaWatts (MW) brought forward under Section 36 of the Electricity Act 1989 and to any other oil or natural gas fuelled proposal over 10 MW in Great Britain, where clearance under Section 14 of the Energy Act is required.

[15] Replacement City of Leicester Local Plan, 2nd Deposit Copy – July 2003, Chapter 9 – Built Environment, BE18a.
[16] Contributing to sustainable communities – a new approach to planning obligations – A consultation on proposals to reform planning obligations (ODPM)
[17] CHP opportunities for local authorities GPG322 (The Carbon Trust)

Guidance issued by the Department of Trade and Industry sought to identify sources of information so that developers could pursue the requirement and obtain market information on heat opportunities. A revised draft is currently out to consultation which seeks to strengthen the guidance as a tool. Local planning authorities can assist by:

- Providing developers with energy data for existing buildings in their estate that are located in the environs of an existing or proposed power (or electricity generation) station
- Advising on the region's development background locally, other planning applications/development proposals (e.g. area regeneration plans or specific new buildings such as leisure facilities) and the potential energy requirements.

6.5.1 Millbrook district heating scheme in Southampton

Nursling Generation Limited (NGL), who work in partnership with Utilicom Ltd, applied for consent to construct a 49MW power station near Southampton. After working closely with Southampton City Council, the developers identified an area of the city that could take the heat generated as part of the process of power generation and use it for space heating within dwellings.

The development work on the project, including appropriate agreements between the City Council and NGL, was supported by a development grant of £100,000 from the Community Energy Programme.

6.6 Legacy clauses in development agreements

For land that is to be redeveloped, legacy clauses within agreements for the development of that land can address the use of the land and its environmental impact for the future.

6.6.1 Bed Zed (Beddington Zero Energy Development) London Borough of Sutton

The Bed Zed development in South London aimed to achieve zero net emissions from the development. Alongside a host of measures including massive thermal insulation and Photo-Voltaic cells (PV), the hot water for each flat was provided via a heat network from a central source, using biomass-fired CHP.

The environmental improvements cost the developer more than conventional housing would have done. As a consequence, London Borough of Sutton allowed the developer to increase density on the site (to 120 dwellings per hectare) to pay for the additional cost of the development, so that the additional costs were not borne by residents.

The scheme is written up as a Housing Good Practice case study. Further details are listed in section 7.

Community energy has separate guidance on community heating using new and renewable sources. Please visit **www.est.co.uk/communityenergy** for further information.

6.7 Transfer of housing from local authority control

Housing transfer includes large scale voluntary transfer (LSVT), where an authority transfers all its housing into a single registered social landlord (RSL); small scale transfer, where individual estates each choose a different RSL, and transfer to an arms length management organisation (ALMO), where the housing remains the ownership of the local authority but it is managed separately. All three routes bring with them the opportunity of significant private investment. The first two, since they require transfer of ownership, require a significant business planning, consultation and a vote.

The transfer of ownership of social housing can bring significant refurbishment of large multi-storey blocks of flats and sometimes, demolition and rebuild as part of the process. In all cases, the local authority is in a position to influence whether community heating is retained and refurbished, removed, or installed where it was not there before. Part of this is through the business planning process, the results of which can form part of the agreement at the point of transfer.

ODPM guidance on LSVT states that "the evaluation of community heating networks should be an integral part of the investment strategy accompanying transfer. Where stock has existing but outdated community heating, modernisation to up-to-date standards should be considered, because it can provide heating for tenants at lower cost than individual central heating. Up-to-date community heating will also have lower landlord maintenance costs, for example, one boiler to be checked annually rather than many. Where the modernised community heating can be run in conjunction with CHP, this can also mean cheaper electricity costs. Landlords can sell electricity directly to tenants. New community heating may also be possible. Funding for new and refurbished community heating schemes is available through the £50,000,000 Community Energy Programme". [19]

A number of schemes going through LSVT, small scale transfer, and transfer to an ALMO have explored retaining and refurbishing community heating. Schemes in Plymouth, Walsall, Pimlico and Tower Hamlets are working to refurbish existing schemes.

[18] Guidance on background information to accompany notifications under Section 14 (1) of the Energy Act 1976 and Section 36 of the electricity Act 1989 Downloadable from http://www.dti.gov.uk/energy/

[19] www.housing.odpm.gov.uk/transfers/ guidance2003/24.htm (Paragraph 6)

6.7.1 CityWest homes

Pimlico district heating undertaking serves around 3500 homes, managed by CityWest Homes, an ALMO. The scheme was recently awarded £1,200,000 from Community Energy to refurbish the scheme and install over 3MW of CHP. Further studies are underway to explore the expansion of the scheme to adjacent sites, including offices and schools, as well as other housing estates.

Westminster City Council is supportive of the refurbishment and extension of the scheme. Indeed, the City Council has issued supplementary planning guidance that places the onus on the developer to investigate technologies including CHP. If a decision is made not to adopt such a technology, for technical, economic, or building conservation reasons, then developers need to indicate why.[20]

6.8 The Energy Performance in Buildings Directive

There is a range of planning instruments available today, each appropriate to different circumstances, and most requiring specific action on behalf of planners to make each instrument available (e.g. insertion of clauses in spatial planning guidance).

However, the Energy Performance in Buildings Directive (due for implementation in 2006) will, for the first time, require that regardless of local plans, or SPG, all new developments (or significant refurbishments of existing developments) over1000m^2 will be required to show that they have considered the feasibility of CHP and district or block heating.

The Chartered Institute of Building Services Engineers (CIBSE) holds a database of consultant engineers who can provide specialised services. See section 7 for sources of further information.

6.8.1 Grampian Housing Association

Grampian Housing Association has a new build development of 14 semi-detached 2&3 bedroom houses at Station Street, Newmachar about 10 miles north of Aberdeen. Construction costs have been financed by Communities Scotland, and Grampian Housing Association.

The energy centre is located in a separate boiler house at one end of the row of houses and comprises a 5.5kWe (electrical) 12.5kWth (thermal) gas-fired Baxi DACHS CHP unit and two 38kW condensing gas-fired boilers. The system has been operating successfully for one year, with a high degree of tenant satisfaction. Tenants range from young families to the elderly. The cost of heating is charged at a flat rate as part of the rent, whereas electricity is sold through prepayment cards available at the local supermarket.

Community energy has separate guidance on small scale community heating, available from **www.est.co.uk/communityenergy**

Figure 9: Station Road, Newmachar, Scotland, with energy centre building in foreground and the 5.5Wke CHP unit and two wall-hung gas condensing boilers.

[20] Supplementary Planning Guidance, Westminster, Chapter 4 – Energy, page 21

7. Further information and references

A range of guidance is available from the Community Energy Programme, the Carbon Trust and the Energy Efficiency Best Practice in Housing programme. The guidance is listed under the references below and is either introductory or detailed guidance with other guidance available outlining case studies and the potential of community heating in the UK.

Community Energy Programme

www.est.co.uk/communityenergy

Introductory guidance

A range of publications including the programme prospectus, frequently asked questions document and programme indicators document.

Detailed guidance

- Financing community energy schemes
- Small scale community heating
- Community heating using renewables sources
- Getting the best value for electricity generated in community heating
- Connected CHP in community heating to the electrical network.

Case studies

A range of case studies on development and capital grants awarded under the Community Energy Programme.

Studies of the potential

- The UK potential for community heating and CHP
- A range of heat maps of major cities.

The Carbon Trust

www.thecarbontrust.co.uk/energy

The Carbon Trust provides free, practical advice to business and public sector organisations to help reduce energy use. The Carbon Trust has the UK's biggest online collection of free independent energy efficiency publications which can be ordered online or through the Helpline on 0800 58 57 94. Alternatively, most publications can be downloaded as PDF files. The following is a list of detailed guidance and other case studies that are available on the Carbon Trust website.

Detailed guidance

GPG234 A guide to community heating and CHP (Commercial public and domestic applications)
GPG322 CHP opportunities for local authorities
GPG204 CHP in Universities
NPP123 Energy Services PPP/PFI projects for community heating

Case studies

GPCS370 The use of CHP in community heating schemes – four case studies
GPCS392 CHP at the heart of Government
GPCS434 An Integrated approach to energy services at Woking Borough Council

Housing Energy Efficiency best practice

www.est.org.uk/bestpractice

The programme is a source of tools, training and support for those involved in the housing profession to deliver the best in energy efficiency in housing. It includes case studies of refurbishment of community heating with CHP and with renewables.

- Benefits of best practice: community heating
- Community heating: a guide
- Domestic ground source heat pumps
- Refurbishment of a tower block (Aberdeen heat and power)
- Hard to treat homes off gas network (Llanwyddn).

Other sites include:

ODPM	www.odpm.gov.uk
DEFRA	www.defra.gov.uk
DTI	www.dti.gov.uk
National Assembly for Wales	www.wales.gov.uk
Scottish Executive	www.scotland.gov.uk
Communities Scotland	www.communitiesscotland.gov.uk
The Planning Portal System	www.planningportal.gov.uk
The Housing Corporation	www.housingcorp.gov.uk
CHPA	www.chpa.co.uk
CIBSE	www.cibse.org
Energy Institute	www.energyinst.org.uk
Danish Board of District Heating	www.dbdh.dk

8. Appendices

A Option Appraisal

An option appraisal covers everything up to the point where a decision can be recommended on which type of space heating and hot water system option should be implemented, but would not be expected to specify it or outline how to implement it. Planners may request that any potential development includes an option appraisal as part of its application to the local authority.

B Whole life costing

Whole life or 'life cycle' costing is an important part of an option appraisal. It takes account of the total cost of the equipment or service from day zero of the project to its eventual termination or replacement. All capital costs, running costs, replacement costs and revenue streams are calculated before discounting them back to current values. The planning department can encourage the developers to carry out a whole life costing as part of the scheme proposal, but should take care not to put bidders at a disadvantage where this is not an upfront requirement of the bid. The key stages of whole life costing for community heating and embedded generation are therefore to:

a). Identify the potential heating options for each scheme, domestic or non-domestic building generically. For example these may be:

- community heating
- community heating with embedded generation
- individual boilers
- electric storage heating.

b). Select an appropriate project life time and equipment life expectancy. It is worth noting the following typical life expectancies of the different space heating and domestic hot water options:

- community heating (approx. 25 years, potentially up to 50 years)
- individual gas boilers (approx. 15 years)
- electric storage heating (approx. 10 years).

An example of the outline content of an option appraisal report

1. Executive summary

- This part of the report should summarise the financial and environmental benefits of each of the space heating, domestic hot water and electricity generating systems and make a recommendation based on the results.

2. Introduction

- An indication of the customer, the consultant engineer (who may be the author of the report) and the scope and objectives of the work
- Provision of a map of the site and surrounding areas
- Scope of work description.

3. The site, current heating, hot water and electrical systems, services and estimation of heat demand

- A description of the building and its current services, also outlining the customers likely to be served in early and later phases
- Adjacent sites and customers who may be considered for later phased connection.

4. Heating, hot water and electricity options

- A description of all suitable options considered
- Assessment procedures (including carbon reduction)
- The proposed community heating and embedded generation scheme
- The alternative scheme(s) such as electric storage heating, individual gas boilers, or no change to the existing provision of energy.

5. Whole life costing of the main options

- An analysis showing the net present cost of each alternative using Treasury Green Book Guidance methodology
- An analysis showing the net present value of alternatives at commercial rates of discount and project life to determine the attractiveness to a developer.

6. Conclusions

- State which is lowest whole life cost heating option
- State whether or not it is technically practical and feasible to pursue this option
- In view of the above, state which option it is recommended to pursue.

c). List and identify the capital costs and the operational running costs along with any revenues and ongoing expenditure for each of the options. Then create the resultant cash flow forecasts for each one of the years to 25.

d). Calculate the net present value and use the discount cash flow technique. Yearly future cash flows can then be calculated to obtain their value in today's terms.

e). Total the discounted cash flows to arrive at a 'net present value'. Expect the NPV to be negative. Identify the least negative NPV – this is the best option; the lowest whole life costing.

The Community Energy Programme uses this method of evaluation, so this process will gather much of the data needed for those considering such an application in the future.

Further guidance on whole life costing is available in Financing Community Energy schemes available from the Community Energy website at **www.est.co.uk/communityenergy**

C Business plan

If the option appraisal study concludes that the refurbishment or installation of community heating is the preferred investment, a business plan needs to be developed that outlines the best way of delivering the scheme. The aim of the study is to optimise the whole life costs identified in an option appraisal by exploring a range of issues relevant to delivery.

An example of the outline content of a business plan report

Executive Summary

The aim of the study is to optimise the whole life costs identified in an option appraisal by exploring a range of issues relevant to delivery.

Organisational structure

Examining and concluding (although not establishing) an organisational structure considering an ESCO or partnership and a variety of tendering options.

Finance options

Including evidence of having examined and included or ruled out:

- All funding sources and private investment, and associated costs of capital
- Methods of reducing up-front capital needs such as leasing
- Options for maximising revenue generation (i.e. sales of heat to other public or private sector customers, sales of electricity from CHP either direct or indirect).

Long term plans for future growth (Cash flow forecasts)

This might include setting out a out a timetable for the connection of additional public and non-public sector buildings to the proposed scheme or replication in other areas of the same financial or planning authority.

Approvals

The process to achieve:

- Planning Consent approval (and Section 14 consent from DTI and emissions consents approvals where appropriate)
- Committee approval (applicant's management at committee or board level)
- Appropriate tenant consultation.

A project plan

This would include all proposed activities/tasks, deliverables, the time-scale and an indication of the capital expenditure profile.

Tel 0870 850 6085

www.est.co.uk/communityenergy

Energy Saving Trust

CARBON TRUST

Making business sense of climate change

Community Energy is jointly managed by the Energy Saving Trust and the Carbon Trust with support from the CHPA and others.

The Carbon Trust is funded by the Department for Environment, Food and Rural Affairs, the Scottish Executive, the National Assembly for Wales and Invest Northern Ireland.

The Carbon Trust is a company limited by guarantee.
Registered in England and Wales Number 4190230.
Registered at: 8th Floor, 3 Clements Inn, London, WC2A 2AZ.

Ref: GPG389

December 2004