

Special points of interest:

- * Grant Support for Kensa Heat Pumps
- * Heat Distribution Systems and Domestic Hot Water
- * Part L Compliance Strategies
- * Installation Options
- * Maintenance and Service Options
- * Budget costs

Ground source heat pumps for Social Housing Schemes.

Introduction

Choosing a heating system for social housing projects is becoming more difficult as the range of options continues to grow. Of course, increasing attention is being focussed on renewable technologies and the need to meet Level Three of the Code for Sustainable Homes (CSH) is generating significant interest in ground source heat pumps amongst social housing providers. In fact, heat pumps are so efficient, their specification can normally mean that no other exceptional measures are required to demonstrate compliance. As a result, overall construction costs are reduced. Further, this interest is also being stimulated by the increasingly generous grant support becoming available under the

CERT 2008-2011 programme. Indeed, heat pump lifetime ownership cost models should benefit from a variety of factors including increasingly competitive supply and installation prices and the absence of any costs linked to routine servicing requirements.

Further information on the CERT grant programmes and typical project costs can be found elsewhere in this Fact Sheet. Indeed, the purpose of these notes, prepared by Kensa's Managing Director, Simon Lomax is to provide some practical guidance to help you establish whether heat pumps are an attractive option for your developments or part of any retrofit programme. Of course, for specific information, please



Simon Lomax—Managing Director

feel free to contact Kensa or one of its approved Installation Partners.

For a full explanation on how a heat pump works, please visit the Kensa website at www.kensaengineering.com

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Grant support for Kensa heat pumps

As you know, the Government requires the energy companies to spend considerable sums providing grant support for various measures aimed at reducing carbon emissions. The CERT (Carbon Emission Reduction

Target) 2008-2011 programme commenced in April 2008 and the government proposes the total CERT obligation to be a lifetime saving of 42 million tonnes of carbon (MtC). Since many of the more ob-

vious energy saving measures have been implemented across the social housing stock, energy companies are expanding their schemes and many CERT-supported schemes will offer grants for renewable tech-

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Grant support for Kensa heat pumps (Contd)

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CERT proposals have just been published and the energy companies are now developing schemes for the measures to be favoured. Kensa is in detailed discussions with several energy companies **and specific information on the various grant schemes will be posted within the ‘Social Housing’ section of the website.** This grant funding will be available for heat pumps commissioned after April 1 2008.

The amount of grant funding available will depend on a

number of factors, which includes the type of property, the fuel which is being displaced and the occupants. Priority group occupants, i.e. those claiming benefits will receive a larger grant than non-priority groups.

Social housing developers are faced with an immediate choice – installing a small heat pump appliance in each individual unit or installing a central plant with flow meter technology allowing separate bills for each property. Since the cost per each kilowatt of output decreases as the heat pump increases in size, there are some obvious economies linked to the central plant option. Further, grant funding is available for communal schemes as well as single heat pump schemes and can be significant. (Contact Kensa’s Specialist Communal Heat Pump

Department for further details). In most cases, Kensa would recommend that two or three heat pumps were installed in any central plant configuration to provide some capacity control (ie. all heat pumps would only be working on the coldest days) and to ensure some output in the unlikely event that an individual heat pump fails in service.

For further information, please contact Kensa and request the more detailed ‘Central Boiler Plant’ Fact Sheet.

Heat Distribution Systems and Domestic Hot Water

Heat pumps work most efficiently delivering water at the coolest possible temperature into the heat distribution system. For this reason, underfloor heating – with its larger heat emitting area - has generally been favoured although it should be emphasized that the minimal heat demand typical to many social houses means that radiators can certainly be used. If radiators are favoured, they should generally be designed with a flow temperature of 45°C which means

they will need to be slightly larger than any radiator linked to a conventional boiler and due to the higher temperature will have higher running costs.

Underfloor heating should certainly be considered if the floor construction features a screed layer since the flow temperature could generally be reduced to around 30-35°C. Of course, the likelihood of screed being used is far greater within traditionally built apartment

developments than two storey dwellings which are generally joisted first floor con-



Screeding an underfloor system

struction. Indeed, where

suspended timber floors are present, any underfloor heating pipework, typically installed within the joist void, would need to be embraced by a steel heat transfer plate which not only increases cost but also slows the build programme. Since the flow temperature into these underfloor circuits would need to be increased to around 45°C (to drive the heat through the overlying chipboard and final floor finish), there is no greater operating efficiency than if the heat pump was serving radiators.

Any Kensa heat pump can certainly be linked to a

mains pressure cylinder to provide domestic hot water



Social Housing Scheme

although the required output temperature – 45-50°C – will certainly impact efficiency. One alternative is to provide a mains pressure cylinder complete with immersion heaters and, if possible, link to an Economy

Seven, or preferably, an Economy Ten tariff so the water can be heated during low cost periods. If only Economy Seven is available, a larger cylinder might be desirable to reduce the occasions when higher priced electricity is required to produce hot water. Of course, all cylinder manufacturers provide models which can receive an input from solar panels, if installed, to reduce dependence upon electricity.

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Part L Compliance Strategies

In 2006, Part L of the Building Regulations in England and Wales were altered to require more energy efficient dwellings judged by their CO₂ emissions. Part L now states that the annual CO₂ emission rate or Dwelling Emission Rate (DER) of the completed building must not exceed a Target Emission Rate (TER) set by reference to a notional building of the same size and shape. The DER and TER are calculated according to the Standard Assessment Procedure (SAP) 2005 for domestic buildings and are dependent upon a number of factors including the type of heat source to be used for space heating and domestic hot water production, the effectiveness of the fabric insula-

tion and the standard of the property’s air tightness. As such, the assessor performing the SAP calculations has a number of options to reduce any property’s DER below the TER, all as generally demonstrated on the informative website, www.playtheregs.com.

Of course, merely achieving the DER is insufficient to attract Housing Corporation funding; instead, level three of the Code for Sustainable Homes, representing a 25% improvement on Part L, must be achieved with level four (44% improvement) increasingly becoming the target.

How can heat pumps help achieve compliance?

Firstly, a little background is required. The following table has been produced by the DTI in conjunction with BRE and gives CO₂ emissions per kWh for different fuels.

Fuel	kgCO ₂ /kWh
Electricity	0.43
Natural Gas	0.19
Coal	0.3
Oil	0.25
LPG	0.21

CO₂ emissions for different fuels

Although a ground source heat pump uses electricity, the fuel with the highest emissions, to run the compressor and circulation

Part L Compliance Strategies

pumps, its ability to be 400% efficient (ie. convert one kilowatt of electricity into



Social Housing Scheme

four kilowatts of heat output) means the typical CO₂ emission rate for providing heat to a building equipped with underfloor heating is 0.11kg CO₂/kWh. This

shows a CO₂ reduction of 43% over gas and 57% over oil.

As a result, the current SAP assessment software packages reflect this energy efficiency in their hard-coded settings (320% if the heat pump is linked to underfloor heating, 320% x 0.7 if radiators are used, 320% x 0.7 with a further 0.7 factor applied if the heat pump is also providing the domestic hot water. As a consequence, the DER is significantly reduced. Indeed, such is the reduction, there might be an opportunity, in some cases, to downgrade the insulation

specification and still achieve an acceptable DER. However, this tactic is not recommended simply because any increase in the property's heat load will result in a higher flow temperature, a less efficient heat pump and higher running costs. Later editions of the SAP software are likely to demonstrate even higher efficiencies as BRE, the auditors of the scheme, recognize improved performance data supplied by various manufacturers.

“work can be handled by any plumbing contractor without the need for prior experience, extensive training or specialist tools”

Installation Options

Kensa is a manufacturer with an objective to remove any ‘mystery’ linked to heat pump technology and the installation of the appliances. Without doubt, the most challenging element to any project is the ‘application engineering’ to ensure the correct sizing of the groundworks, heat pump and distribution system. Far more straightforward is the physical on-site work linked to the installation of a heat pump. Indeed, this work can be handled by any plumbing contractor without the need for prior experience, extensive training or specialist tools. As a result, plumbers already working for the contract

builder can provide the service eliminating the need to contract with ‘specialist’ installers who might seek premium rates for their supposed ‘expertise’. It should be emphasized that the installation of a heat pump should take no longer than the fitting of a gas boiler once the groundworks have been completed. Since Kensa fit a multitude of sensors on their units, the heat pump can be commissioned by a Kensa engineer over the telephone to reduce project costs.

Of course, it would be sensible to split the overall installation scope so that a separate contractor is handling

the groundworks. If there is



Communal Heat Pump System

sufficient land for Slinkies, any groundworks contractor would be able to dig the horizontal trenches – following a plan supplied by Kensa - and install the pipework leaving the plumbing contractor to perform a pressure test. If vertical boreholes are required, Kensa

Installation Options

can recommend a number of drilling contractors who, generally, would also install the pipework and grout. Moving on, some social housing providers have expressed an initial desire to have all the work handled by a single contractor, primarily because of some 'nervousness' linked to the performance of the technology. It should be noted that the groundwork contractor is merely providing a connection to the 'heat source' in the same way that the

utility companies are responsible for providing connections to the gas, electricity or water grids. In a typical project featuring a gas boiler, the plumber would only be responsible for installing the boiler and would not handle the provision of the gas supply to the property. Kensa is merely suggesting a mirroring of this approach.

For more specific information about the installation of heat pumps, please contact

Kensa or refer to the website at www.kensaengineering.com



Single Compressor heat pump

Maintenance and Servicing Options



Heat pump internals

There is no requirement for any mandatory annual service which can significantly reduce the total lifetime ownership cost. On occasion, there is a need to replace one of the circulation pumps and these have been

positioned at the front of the unit for ease of replacement. The Kensa heat pump is fitted with the world's most advanced and durable Copeland scroll compressors which have a minimum design life of 20 years.

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Budget Costs

As explained in the section on grant funding, there may be strong reasons for considering central plant rooms for certain new build developments. That said, if the intent is merely to replace an oil or gas boiler with a small heat pump, Kensa has developed a number of affordable units specifically aimed at the social housing sector. These units can either be installed within a kitchen cabinet, positioned under the stairs or within any integral garage or garden shed. For most social housing

units, a 4kW heat pump will suffice. Obviously, prices will vary depending upon the quantities to be purchased – Kensa would be able to provide an indicative budget price upon receiving the development plan. This price would reflect whatever grant support is available.

Kensa would also be able to provide a pricing matrix outlining associated project costs, as outlined in the table below:



Wall mounted heat pump

Client: ABC Housing Trust				Development: River View						
Heat Pump Size	Qty	Estimated Appliance Unit Cost	Grant Amount	Net Appliance Unit Cost	Estimated Bore Hole Price	Estimated Cost of Heat Pump Install	Sub-Total	Estimated Supply/Install Price for Radiators	Total Unit Cost	Over Cost for Under-floor Heating
4kW	35	£2,575	£1,350	£1,225	£1,750	£550	£3,525	£1,500	£5,025	£750

For more information on any of the above or other issues concerning ground source heat pumps please visit our website www.kensaengineering.com or phone on 01872 862140.