

Lewisham Housing select committee 17/12/14

Maxfordham written comments as requested.

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1. Typical heat losses from a district heating system in practice, for Lewisham Housing select committee

'Project B':

London. Around 200 homes completed in 2007. Medium rise.

This is a typical-to-good project in terms of quality of design, massing, workmanship & maintenance. ie there are worse systems.

SAP is the official calculator used to assess the CO2 emissions to demonstrate compliance with Planning, including the London plan, and Part L.

SAP predicted useful heat demand for project B: 725MWh/yr

SAP predicted heat losses from the district heating: 10% of demand

Actual heat demand: data not available

Measured heat loss from the district heating*: 1700MWh/yr

$1700/725=2.3$

Measured heat loss from the district heating as a percentage of SAP predicted heat demand: 230% of demand

Conclusion:

In this instance, the losses are apparently 23x as large as the official calculation predicted.

*calculated using data from a sample week

2. Brief answers to the scope of the enquiry (in red)

SCOPE OF THE LEWISHAM HEATING ENQUIRY

For district/community heating, biomass and CHP installations:

1. What are the calculated performance figures including the operating efficiencies and losses from schemes in the borough. This should include the fuel in, electricity in, heat delivered to the dwelling or user, electricity delivered to the user and/or grid. All figures to be in kWh and CO2 based on current CO2 emission factors from the department of energy and climate change [DECC]. **SAP is the official CO2 emissions calculator used to demonstrate compliance with Planning, including the London plan, and Part L. The SAP default value for district heating (DH) heat losses are typically 5-10% losses. If you actually measure the pipe lengths & calculate the loss (not required for CO2 compliance) the losses are more like 50-100%.**
2. What are the measured operating performance figures from schemes in the borough to back up the calculated figures, and how are they reconciled, if at all? **We have data from one scheme (not in Lewisham) as detailed above. Losses are 230% of SAP calculated useful heat demand.**
3. What is the calculated overheating effect caused by heat loss from system distribution losses and losses from heat interface units? **Significant. We haven't done a detailed analysis of this but our report submitted on the 17th December indicated the heat gain into the common parts from the pipework for various arrangements. To give some idea, one would fit a 1300 w radiator in a 25m2 room with external windows and walls. This would be well oversized for rapid warm up so the output would normally be much lower than this in the winter and nothing in the summer. 1300 w is the constant heat gain from the pipework into the small landing with no heat loss. It is like having a reasonably sized radiator running hot all the time.**
4. What are the measured temperatures in areas that are affected by heat loss from distribution pipes and heat interface units, and how do they reconcile with the calculations?
5. What is the effect of future changes to the CO2 emission factors for grid electricity on the overall carbon intensity of the heat being provided? **This report suggests that district heating systems & CHP installed now will lose any carbon advantage in less than 10 years, depending on how quickly the grid decarbonises. We think it is sooner than that (ie now) because this report does not take into account the system losses which we know quickly negates any marginal benefit using the CHP heat.**
http://www.aecom.com/deployedfiles/Internet/Geographies/Europe/Document%20Library/heated_debate_sustainable_heat_low_carbon_future.pdf
6. What are the costs of installation operation and maintenance for the systems?

Installation:

This report written for the DECC in 2009 suggests it costs at least twice as much to build DH than gas boilers (table 35 of this:
http://www.poyry.co.uk/sites/www.poyry.uk/files/A_report_providing_a_technical_analysis_and_costing_of_DH_networks.pdf

See also figures available from James Gallagher which are less favourable to District heating.

Operation and maintenance:

We presented an analysis to the GLA in 2012 which showed that district heating could cost around twice as much to operate than gas combi boilers, [potentially bringing social tenants 80% of the way to the fuel poverty threshold, for a brand new building in Lewisham.](#)

7. How much are residents being charged for consumed kWh's, Daily Fixed Charge, Operating, Maintenance Costs & Depreciation Charges? [This item needs to be separated into two categories 1]

where there are heat meters installed & 2) where the heat delivered is estimated & charged as a fixed weekly amount. In 2) estimate the heat consumption of the dwelling to establish a specific cost per kWh. [See figures available from James Gallagher](#)

8. How does the advent of new highly insulated and air-tight buildings with very low heat loss affect the findings? [District heating is the cheapest way for a developer to pass the targets, as it is easier to build and less stringently tested than building fabric. Therefore, by encouraging poorly regulated district heating LBL is a penalising energy saving measures such as improved fabric. This is counter to the London plan energy hierarchy, and is a fundamental conflict in that policy.](#)

[The heat losses from district heat are fixed. So, as buildings become more efficient, they become less and less suitable for connection to district heating.](#)

9. As a comparative study, how much is the cost of a combination boiler installation in terms of Installation Costs, Fuel Costs, Operation & Maintenance Costs, and Replacement Cost? [Around half of that of district heating. \(ref table 35 of this: \[http://www.poyry.co.uk/sites/www.poyry.uk/files/A_report_providing_a_technical_analysis_and_costing_of_DH_networks.pdf\]\(http://www.poyry.co.uk/sites/www.poyry.uk/files/A_report_providing_a_technical_analysis_and_costing_of_DH_networks.pdf\)\)](#)

10. What are the other low energy options for providing heat to dwellings in the borough and what are the barriers to beneficial energy options being adopted? [Reducing the demand through insulation and airtightness will yield a reduction in energy use. Modern construction needs very little heat at all. In these conditions it is easy to use more energy moving the heat around and loose energy with poor controls than the actual building heating requirements. Appropriately sized and well controlled conventional systems will provide savings. In time the fuel sources of gas or electricity will decarbonise at a national level. This simple approach is basically shut down in London due to the need to install district heating which needs to sell heat to be economic and stops any innovative ways to provide heat locally. Efficient use of fossil fuels; Gas heating with Passivhaus fabric standards & Passivhaus quality control; Air source heat pumps in some examples.](#)

11. What is the effect of the costs differentials on energy poverty [We presented an analysis to the GLA in 2012 which showed that district heating could cost around twice as much to operate than gas combi boilers, potentially bringing social tenants 80% of the way to the fuel poverty threshold, for a brand new building in Lewisham.](#)

12. What are the options for making sure that residents with higher cost heating systems over other systems are not penalised. What are the options for allocating the costs differentials if the putative benefits are for the greater good of society rather than the individuals. Is this approach a defensible use of public money? [The price that a resident pays for heat from a district heating system could be capped at what they would pay for an equivalent market-linked gas combi boiler. We can not identify a group who could fairly be forced to pay for these ongoing costs. If no one party is responsible, or if no one party can legally be pursued, often the council has to pick up the cost. District heating is creating a legacy which must be dealt with, usually at the tax payer's expense, much like asbestos.](#)

3. Suggestions as to how to improve the situation.

1. **Change the policy:** London Borough of Lewisham (LBL) planning policy makes a presumption that district heat is nearly always right (>10 houses). This could be changed to allow schemes only on the basis that certain procedures are followed, as summarised below.
2. **Price cap on resident's bills:** LBL could require that the price that a resident pays for heat from a district heating system should be capped at what residents would pay for gas burned in a combi boiler that is replaced on a 15 year cycle and maintained on a bulk purchase maintenance agreement available to larger land lords such as RSL's. LBL could ask for a bond on behalf of the residents to ensure that this agreement is honoured in the event of the original contracting party going bankrupt-
3. **Require efficiency data to be shared:** LBL could require that all planning applications are accompanied with realistic carbon emissions based on accurate calculated assessments of the system losses*. These emissions are to be conditioned. Developers are to provide annual running data to allow this to be tested once in operation, and if not compliant, be challenged as a breach of planning conditions with all the sanctions given in planning law. Adding this level of liability and risk to the development will mean that the calculations are done well. This could most easily be enforced in publically funded schemes.
4. **Get training, or use experts:** Structural designs are technical documents which must be reviewed by an expert. Building control officers will send structural designs to external consultants for review. In the same way, district heating designs should be analysed just as rigorously. There are standard methods for assessing the feasibility of CHP & district heat- for example the DCLG Non-domestic compliance guide (part 6) which also refers to CHPQA. For example, maximum pipe heat losses are defined in the same, section 11. LBL to require that the heat loss from all fixings & valves should be included in this max value. These are examples of existing requirements which are routinely ignored/interpreted by developers, clients and building control. Enforcing this requires no change in policy, but it is a change in the culture. If LBL Planning officers, Housing associations, & LBL building control inspectors don't feel qualified to review the information, then it should be sent to external consultants for review, just as for structural designs.
5. **Test the performance:** Currently, all new buildings are physically tested for airtightness as part of the building control application. In the same way, district heating should also be physically demonstrated to be compliant with the stated design heat loss at planning. As an analogy: a new car must have an emissions test, so why not a district heating system?
6. **Link funding to performance:** Public funding for housing to only be released once the performance has been demonstrated. Funding should not be released before the performance/quality has been demonstrated. Would you buy a car without taking it for a drive?
7. Pumping power to be included in the above processes.
8. We anticipate that complying with the cost conditions in item 2 will mean that the developer will want a substantial sum to subsidise the installation and running costs. We anticipate that the realistic calculations set out in item 3 will mean the development will not comply with the building regulations carbon emissions and so other measures such as buying carbon offsets or additional PV's will be required. LBL could publish these costs and request that this funding is provided from the GLA.

*it should be noted that, to our knowledge, there are currently no accurate & robust assessment for predicting carbon emissions of CHP/district heated schemes. Developers are to offer their own assessment of efficiency data upto the apartment, based on their own data. This is reviewed in use.