CASE COLEY HIGH RISE IN ENGLAND

Background

This study is part of an IEE (Intelligent Energy Europe) project called Woodheat Solutions (IEE/07/726/SI2.499568). Woodheat Solutions (WhS) aims to inspire investment in wood-based heat (and CHP) generation particularly from undermanaged forest. The project plans to transfer best practice from experienced EU Member States, namely Finland and Austria, through demonstration of case studies, training, engagement events and one-to-one support. The project will establish a network for long-term co-operation on biomass energy, offering tools and support that can be applied across the EU.

Coley High Rise comprises 3 residential tower blocks situated to the west of Reading center within an area ranked in the lowest 10% as measured by the Indices of Multiple Deprivation in England and as such is eligible for capital funding from the Community Energy Saving Program. This program is a central government initiative and aims to permanently reduce energy bills in areas of low income.

Reading Borough Council requested TV Energy to provide an outline pre-feasibility to investigate the options for replacing the existing individual electric heating systems with central CHP or heating plant.

VTT experts involved in the Woodheat project also visited the area and familiarized themselves with the current situation. Based on the visit and provided pre-feasibility study the following comments were made.

VTT
P.O. Box 1603
FIN - 40101 Jyväskylä
firstname.lastname@vtt.fi
Tel + 358 20 722 111

Comments on feasibility study of TV Energy Ltd

Since a detailed and meticulous feasibility study for this case has already been made, just some minor comments are presented here.

Figure 1: One of the Coley High Rise buildings

The estimated average space heating and hot water demands per 2 and 1 bed flats seem to be very high. Given figures for 2 bed flat are 186 and 89 kWh/sq.m/yr, respectively, resulting in 275 kWh/sq.m/yr in total (see page 7 of the report). For 1 bed flat the given figures are even higher, being 268 and 128 kWh/sq.m/yr, 396 kWh/sq.m/yr in total. In Finland for instance, these figures are typically 120-140 kWh/sq.m/yr for space heating and 30 kWh/sq.m/yr for hot water demand. Taking into account the colder climate in Finland, the given figures seem very high. Particularly, taking into account some building approvements as stated in the study: "*Building improvements have been carried out over previous years including the fitment of external cladding providing increased thermal insulation, and PVC double glazed windows*". Now if the figures really are too high, the boiler plant in both options will become oversized, and consequently, the investment costs become much too high. Perhaps the consumption of space heating and hot water could be double-checked and estimated from measured electricity consumptions. Local power company obviously has the figures for annual power consumption for every single flat and/or for individual blocks. After the consumptions have been re-assessed, VTT could make calculations and comparison of the energy production costs for the two options, and furthermore compare the results with the present energy costs.

In addition, the calculated space heating capacities for 1 and 2 bed flats have been calculated according to 100 W/sq.m (see table on page 7). On the other hand, in the same table, the estimated annual average consumptions for 1 bed flats are clearly higher than for 2 bed flats, as was mentioned in the previous paragraph. Obviously the capacity for 1 bed flat should also be higher than for 2 bed flat.

VTT
P.O. Box 1603
FIN - 40101 Jyväskylä
firstname.lastname@vtt.fi
Tel + 358 20 722 111

Some of CO_2 emissions calculations of the first option (page 9) seem somewhat unclear. Emissions from CHP gas consumption, biomass boiler fuel consumption and gas boilers gas consumption are 673, 65 and 129 tonnes/yr, respectively. These figures are correctly calculated and indicated where they come from. In addition to these, there are three other figures for CO_2 emissions. It is not very clear why these figures are included, and how they have been taken into account in calculation of the total CO_2 emissions saving 2,055 tonnes/yr.

Monthly hot water demands (tables on pages 8 and 11) have been given in kWh/year instead of kWh/month. The figures correspond indeed to monthly demands.

Woodfuel logistics and storage

The pre-feasibility study by TV Energy does not include any assessment of how wood fuel (=wood chips) should be stored or brought to the boiler. No suggestions of a place of the heating plant and the wood chip storage are given. In an urban setting, in particular, these issues should be addressed.

While visiting the high rise buildings, it was suggested that the plant and store could be placed in the parking area (parking lot and/or garages) in front of the buildings. An advantage of this location would be a short distance to the towers. Thus, the main heating pipe could be as short as 50-100 m.

However, there are several reasons why this location is not recommended. First, a central location between the towers and other residential buildings would not be appreciated by the residents. Second, the smokestack of the plant should be built extremely tall because of high towers. Third, chip trucks should use narrow streets and lanes for wood fuel deliveries. Fourth, regular chip truck deliveries through a residential area would not necessarily be appreciated by the residents.

During a short tour around the area an alternative place for the plant was found. There was an unbuilt lot of land nearby where the plant could be built. It is recommended to find out whether it is possible.

In the study there were two options for a biomass boiler, 700 kW or 800 kW. The biomass boiler fuel consumption was estimated 786 or 1,262 tonnes/year respectively. With a truck of 15 t payload this would mean 52 or 84 deliveries a year. Because most wood chips are consumed in winter, in practice there would 2-4 be deliveries a week. At a peak output such a boiler would use about 1 loose –m^3 of wood in every hour. This means that in order to avoid holiday, weekend and daily deliveries the store should be able to hold about 80 m^3 of wood chips. In practice, the storage space should then be over 100 m^3. It is recommended to build a

VTT
P.O. Box 1603
FIN - 40101 Jyväskylä
firstname.lastname@vtt.fi
Tel + 358 20 722 111

store high enough (>6 m) for effective unloading where a truck can drive in and tip the chips into the store. Delivery trucks also need enough room for manoeuvering like turning and reversing.

Jyväskylä 1.11.2010

Jyrki Raitila
Research Scientist, M.Sc. (For.), MA
Technical Research Centre of Finland
Team Leader
Biomass Fuel Production
Tel. +358-40-7195117
Email: jyrki.raitila@vtt.fi

Veli-Pekka Heiskanen
Senior Research Scientist, Lic.Sc. (Tech.)
Technical Research Centre of Finland
Multifuel Operations
Tel. +358-40-547 8960
Email: veli-pekka.heiskanen@vtt.fi