



To: Executive Councillor for Finance and Resources
Report by: Simon Payne, Director of Environment
Relevant Scrutiny Strategy & 14/7/2014
Committee: Resources
Scrutiny
Committee
Wards affected: From Market to Trumpington

Environmental Initiatives with the University of Cambridge Non Key Decision

1. Executive summary

- 1.1 On 8 July 2013 Strategy & Resources Committee supported a Memorandum of Understanding to be signed with the University of Cambridge to investigate a district heating scheme for central Cambridge. A Sponsors Board was then established to lead the work and three city councillors were appointed to the Board. The Board subsequently met and received further advice when it became clear that the business case for the proposed scheme was no longer expected to be financially viable. The Board therefore resolved not to undertake further work on the scheme.
- 1.2 Arup consultants were, however, commissioned to establish if there are other options for collaboration on strategic carbon initiatives between the Council and the University. The conclusions of this work are included in this report and it is recommended that the two organisations keep open the opportunity to explore possible future heat connections between City Council and University Buildings.

2. Recommendations

The Executive Councillor is recommended:

1. To note the decision of the District Heating Scheme Sponsors Board not to pursue the proposed central Cambridge District Heating Scheme; and
2. To support future collaboration between the Council and the University of Cambridge on strategic carbon initiatives where there is a strong environmental and financially viable business case.

3. Background

3.1 Background to the Project

3.1.1 On September 16th 2013 the University and the City Council signed a Memorandum of Understanding to explore a district heating scheme in central Cambridge. This decision followed a meeting of the Council's Strategy and Resources Scrutiny Committee on 8 July 2013. A summary of the scheme is set out in Appendix 1. The objectives of the scheme were to enable the commissioning of a feasible, deliverable, cost effective scheme to provide heating and electricity to the parties and others within the City of Cambridge at a lower rate of carbon emission than the current infrastructure.

3.1.2 On 5th December 2013 the District Heating Sponsors Board met and received a report from Arup consultants. A copy of the report is a background paper to this report. In summary the validation work carried out by the consultants showed that earlier assumptions about capital costs and energy prices needed to be revised and the likely rate of return was in fact significantly lower (at best 1%) than previously identified to a point that the scheme would not be financially viable (at least 7% was required). The relative distances between the users and the energy centre increased costs. In successful schemes in central London, the relative distances are shorter and the heat/power demands greater.

3.1.3 The Board also concluded that Arup consultants should be asked to review the scope for any further collaboration between the City Council and the University on strategic carbon initiatives.

3.2 Arup Findings on Alternatives to a District Heating Network

3.2.2 The Arup work contains high level analysis of potential renewable and low carbon technologies, other than a single district heating network that the University of Cambridge and Cambridge City Council could utilise to lower their carbon dioxide emissions in line with their respective carbon reduction plans.

3.2.3 The conclusions of the consultants are set out in the Executive Summary in Appendix 2. It was found that the Council's energy demand (excluding the council owned housing that is scattered around the city) was approximately 10% of that of the University's, and that 80% of the carbon dioxide emissions of the University came from its electricity usage. It is likely that more than one carbon dioxide

reduction technology will need to be used to reduce the carbon dioxide emissions significantly; however it is clear that the largest opportunity is in electricity producing technologies.

3.2.4 Combined Heat and Power (CHP) technologies may form a part of this carbon reduction plan, however they are only efficient (and therefore carbon dioxide emission reducing) when the heat is used as well as the electricity, hence they are limited in size by the heat demand, not the electricity demand.

3.2.5 Arup have considered several technologies in this study, which are summarised in Table 1 below, along with an approximate capital cost of the technology, a cost of the lifetime reduction in carbon dioxide emissions and lifetime carbon dioxide emissions reduced per m².

Technology	Total cost of electricity [or heat], £/MWh _e [or £/MWh _{th}]	Cost per tonne of carbon dioxide emissions avoided, £/tCO ₂	Simple payback period (years)	Area required per tonne of carbon dioxide emissions avoided m ² , tCO ₂ /m ²
Solar Photovoltaic	£110	£200	13	1.2
Solar Hot Water	£70 [heat]	£300	20+	1.9
Wind	£55	£100	10	500
Biomass (heat only)	£45 [heat]	£200	n/a*	120
Biomass CHP	£250	£400	n/a*	80
Gas Fired CHP	£130	£800	5	75
Anaerobic Digestion	£140	£250	20+	5 - 20
Ground Source Heat Pump	£50 [heat]	£450	n/a**	n/a
Air Source Heat Pump	£50 [heat]	£550	n/a**	n/a

Table 1 – Renewable Technology Summary Table

3.2.6 Using this table, and an analysis of the potential to use the different technologies on the University or Council's premises, it was found that the following technologies could be further investigated in priority order :

- Wind turbines positioned on the University's farm land
- Solar PV positioned on the University's land
- Solar hot water positioned on the roofs of buildings

3.2.6 When all opportunities for the technologies above have been identified, the next technologies to be considered should be:

- Gas fired CHP local heat networks
- Biomass fired CHP heat networks

3.2.7 As the University has both the highest energy demand and the most available land, it is proposed that the University should start identifying the sites that could feasibly incorporate this technology. If CHP plant is being used, heat connections to the Council buildings in the area could be considered on a building by building case.

3.2.8 This report considers the utilisation of wastes produced by the University, or collected by the Council, in an anaerobic digestion scheme. The Council are currently in a long term waste contract with a third party operator, Amey Cespa, who have a waste treatment facility in Waterbeach that includes an anaerobic digester on their site that could potentially compete for feedstock. The figures presented in the work by Arup show that anaerobic digestion could be considered further, but collection of the wastes and indeed ownership of the wastes need to be further considered in the first instance.

3.3 Further collaboration on strategic carbon initiatives

3.3.1 The review of alternatives to the district heating scheme highlights the potential for building by building heat connections. This approach is more likely to provide carbon savings as part of a financially viable business case, especially when the investment is linked to existing capital programmes. For example the University is currently preparing proposals for the New Museum Site, near Corn Exchange Street and there may be scope for including a small combined heat and power plant within the site which could also be linked to the Guildhall or Corn Exchange.

3.3.2 In view of the Arup findings it is recommended that officers continue discussions with the University on an individual scheme basis. Any specific proposals for further collaboration will then be reported back this Scrutiny Committee.

4. Implications

(a) Financial Implications

Earlier investigative work on the District Heating Scheme was funded by the Low Carbon Development Initiative. The City Council did, however make capital programme provision of £50k in 2013/14 and

£50k in 2014/15 (to be match funded by the University of Cambridge). In the event £25k was spent in 2013/14 in reviewing the case for the scheme, the remaining funding was not spent and included in the Budget Setting Report approved by Full Council on 13 February 2014. The most recent work by Arup Consultants has been funded by the University of Cambridge.

(b) **Staffing Implications**

None

(c) **Equality and Poverty Implications**

None

(d) **Environmental Implications**

As set out in the foregoing report.

(e) **Consultation**

This report has been prepared in consultation with the University of Cambridge.

(f) **Community Safety**

There are no direct community safety implications as a result of the Project.

5. Background papers

This background paper was used in the preparation of this report:

- Financial and Technical Review of Feasibility Studies up to October 2013 – Ove Arup & Partners Ltd

6. Appendices

- Appendix 1: Overview of Cambridge City Centre District Heating Scheme
- Appendix 2: Executive Summary of Arup Report May 2014

7. Inspection of papers

To inspect the background paper or if you have a query on the report please contact:

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