Cabinet

Forest Heath District Council

Title of Report:	**Mildenhall Hub – Investing in Renewable Energy Technologies**	
Report No:	**CAB/FH/17/030**	
	Cabinet	20 June 2017
	Council	26 July 2017
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Purpose of report:	To set out principles and a process for developing and adopting the previously agreed addendum to the main business case for the Mildenhall Hub in relation to investing in renewable energy technologies should planning consent be granted.	
Recommendation:	**It is RECOMMENDED that, on the basis set out in this report, a final business case for a renewable energy investment in the Mildenhall Hub Project be presented to Council in July 2017.**	
Consultation:	The development of the Hub project has been based on public, partner and stakeholder consultation. The scheme is currently the subject of public consultation in respect of its planning application. Councillors have been extensively involved in the decision-making process for the Hub (see background papers below). The Overview and Scrutiny Committee received updates on the main business case in February 2017 and on the business case for renewable energy in June 2017.	

Alternative option(s):	(Subject to the Hub proceeding) to install conventional mechanical and engineering solutions to heat and power the new building. The business case will offer this option as the 'base case'. An enhancement to the option may allow heat to be exported to the existing Mildenhall College Academy Sixth Form Building.

Implications of this report:	
*Are there any **financial** implications? If yes, please give details*	Yes ☒ No ☐ Initial financial implications of investing in renewable energy for the hub project are outlined in report. The business case will be set out in more detail for consideration at Council in July 2017.
*Are there any **staffing** implications? If yes, please give details*	Yes ☐ No ☒ Covered in wider project planning.
*Are there any **ICT** implications? If yes, please give details*	Yes ☐ No ☒ Covered in wider project planning.
*Are there any **legal and/or policy** implications? If yes, please give details*	Yes ☒ No ☐ As outlined in report.
*Are there any **equality** implications? If yes, please give details*	Yes ☐ No ☒ Covered in wider project planning.
Risk/opportunity assessment: ***<u>Please note</u>: this is <u>not</u> a risk assessment for the Hub project as a whole, but for the subject matter of this report only i.e. funding of renewable technologies.***	*(potential hazards or opportunities affecting corporate, service or project objectives)*

Risk area	**Inherent level of risk** (before controls)	**Controls**	**Residual risk** (after controls)
Planning consent is not granted for the Hub	Medium	Submit an application which is consistent with the adopted Development Brief and other planning policies, after extensive pre-application consultation with the community and statutory consultees.	Medium
The renewable energy proposals are unaffordable to FHDC and its taxpayers	Medium	Properly evaluate likely costs (including borrowing costs), with contingencies, and sources of funding through this and subsequent reports prior to a final decision to proceed.	Low
There is not a strong business case for FHDC to invest in renewable energy	Low	Examine the strategic and financial case through this report.	Low

There is not a transparent and fair means of dividing costs and benefits for the project	Low	Develop an agreement with partners.	Low
There are not safeguards to protect the interests of FHDC and the taxpayer	Low	Ditto	Low
The project does not achieve the anticipated performance levels	Medium	Properly evaluate the feasibility/viability against a base case. Review of likely success against key milestones and objectives at each stage of project development	Low
Delivery of the Hub project is delayed if planning consent is achieved but there is not clarity on mechanical and engineering solutions	Medium	Develop and consider this addendum to the main business case in summer 2017.	Low
Specific project risks which have been identified but have yet to be assessed at this stage are set out in Appendix 1. These will be fully assessed as part of the next phase of the design (RIBA Stage 4).			
Ward(s) affected:		All Wards	
Background papers: *(all background papers are to be published on the website and a link included)*		• Council Report February 2017 - Mildenhall Hub – Funding • Overview & Scrutiny Report January 2017 - Mildenhall Hub – Funding	
Documents attached:		Appendices: Appendix 1: Risk identification Appendix 2: An explanation of the proposed heating and power technologies	

Important Note:
This report relates specifically to the funding of renewable energy provision in the Mildenhall Hub, as an addendum to the existing business case. The project is subject to planning consent and all planning matters, including those relevant to renewable technologies, will be considered separately by the Local Planning Authority and Development Control Committee.

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1. Purpose of Report

1.1 In July 2015, Forest Heath District Council (FHDC) approved an initial business case to develop a single-site public services hub at Sheldrick Way, Mildenhall. This business case identified that some key central infrastructure to the Hub, including its plant rooms, would be provided by Forest Heath in its enabling role for the scheme.

1.2 In February 2017, an updated business case was approved which indicated the likely capital cost of the FHDC elements of the project would be up to £20m. This excluded funding to invest in renewable energy which would be subject to a separate business case (Report No. OAS/FH/17/001 refers). A planning application for the scheme has now been submitted.

1.3 It is proposed that such a business case will be presented to all councillors at Council in July 2017, following further technical evaluation and clarity on the costs and benefits that can be delivered. Clearly, as with the rest of the project, this technical work is being carried out at risk by the Council, in its developer capacity, since the planning consent is yet to be determined. Nonetheless, to avoid any delay in later delivery, an early decision on the preferred technologies is required at this stage of the project programme so that it can inform later design and procurement decisions.

1.4 This report seeks to clarify the preferred technologies in the light of work carried out to date, and the framework for the final business case. This work has been and will be based on a process of opportunities assessment and options appraisal leading to establishing preferred options for investable technologies which are intended to deliver multiple benefits against a set of key objectives:

- *Financial viability* - financially viable, taking into account both upfront capital costs and whole life costs
- *CO_2 emissions reduction* - capable of delivering CO_2 emissions reductions
- *Affordability* - affordable to the project stakeholders and capable of delivering cheaper fuel prices than the current heat and power systems
- *Security of supply* - able to retain or improve upon the existing security of supply.

2. Outline of technological proposals

2.1 Technical studies carried out by technical specialists, Ramboll and Concertus Design and Property Consultants, in 2016 and 2017 have provided the Hub

partners with energy master planning, an opportunities assessment and options appraisal and these have allowed preferred technologies for heating, cooling and powering the Mildenhall Hub to be identified, should the project proceed. This information has also been used to inform the relevant elements of the planning application.

2.2 The Council's technical consultants, Concertus, have provided preliminary proposals for the optimal mix of renewable technologies to be used in the Hub. These have been compared against a 'base case' of heating provided by conventional gas boilers with power supplied from the grid for cooling and other electrical demand.

2.3 An outline of the proposed technologies are set out below:-

i. Heating and cooling would be provided by a combination of Ground Source Heat Pumps (Heat Pumps), Combined Heat and Power plant (CHP) and gas boilers. The Heat Pumps would provide lower temperature hot water serving underfloor heating systems in the majority of the building. The CHP plant, with gas boilers as top-up, would provide higher temperature hot water serving radiators and some air handling units when heating elsewhere in the building as well as providing heating at times when additional heating is needed.

   Automatic controls would ensure that the building's base heating and cooling come from the Heat Pumps and the CHP plant first with gas boilers and air conditioning only operating if needed to support heating and cooling during peak periods.

ii. Electrical power would be generated on site using the CHP plant and roof-mounted solar panels. The gas CHP plant can generate electricity at times when the heat load is fully satisfied. Generation will either be used in the Hub to offset any power which would have been imported from the grid or could be exported to the grid or other connected consumers.

iii. The provision of batteries would allow storage of the site's CHP and solar-generated power so that it can be used to displace imported power from the grid. The benefits of this approach are twofold; firstly power generated on-site can be stored and used when grid electricity is expensive, typically during the early evening. Secondly, battery storage will provide a buffer in times of supply disruption and resilience of supply to critical infrastructure, for example the computer servers, and give security of supply to any emergency services based at the Hub.

iv. The batteries would be supported by voltage optimisation which helps to save energy costs by controlling the electrical voltage compared to the grid supply so avoiding variability in the quality of grid supply.

A brief explanation of each of the preferred technologies mentioned above is provided in Appendix 2. Depending on the degree to which the Council wishes

to make a direct investment of its own, the total additional cost of these technologies is likely to be in the region of the figures set out in Table 1 below.

Technology	**Capital costs**
Base case – gas boilers and chillers	N/A (approx. £1.1M included in main Hub business case)
Heating and cooling alternative	Approx. £1,010,000
Solar generation	Approx. £150,000
Battery storage	Approx.£1,000,000
Total with 10% contingency applied	**Approx. £2,375,000**

Table 1: Estimated additional capital costs

2.4 Clarity on these costs, and the funding model(s) for the various items, will be provided by Concertus in the next month to inform the final business case that councillors will receive. However, in the following sections, some initial information is provided.

Heating and Cooling

2.5 The 'base case' capital cost for gas boilers and cooling has already been costed into the main Mildenhall Hub business case and the Council's budget of £20M for its own elements. The estimated additional capital cost of the preferred heating and cooling technologies ranges between £0.82M and £1.01M with an allocation put in the main Hub business case of £1.1M.

2.6 The predicted annual revenue savings of the preferred heating and cooling technologies compared to the base case will also need to be clarified for councillors in the final business case. However, Concertus' work to date suggests that, after running costs and costs of borrowing, these savings will be greater than £100,000. As such, they will be capable of meeting the requirements of the Council's Medium-Term Financial Strategy (MTFS) and also be consistent with the earlier assumption in the main Hub business case that renewable technologies will make a positive financial contribution to the overall Hub financial model. Part of the revenue saving could be achieved through eligibility for tariff payments under the Renewable Heat Incentive (RHI) which supports investors in eligible heat technologies.

2.7 A further option is being explored which could see the Mildenhall Hub act as the energy centre supplying heat by underground pipes to the existing Mildenhall College Academy Sixth Form Building (MCA6) which will be retained as part of the project. At this time, no estimate of capital cost is available. However, if viable, this enhancement to the proposal could replace the use of the existing gas boiler heating by MCA6.

Power Generation

2.8 Concertus have proposed the use of solar photovoltaics to generate some of the electricity needed in the Hub. Based on the initial building design, a 150KW scheme is proposed at an estimated capital cost of around £150,000. The electricity that will be generated will reduce the amount of imported electricity from the grid, resulting in annual revenue savings likely to be over

£12,000. Again, therefore, such an investment is likely to be consistent with the MTFS.

2.9 Concertus have also proposed a nominal battery storage capacity of 1.2MW with which to store power generated on site by the CHP and solar panels. Operating cost savings or income could be achieved either by using stored power either by importing grid electricity when tariffs are low for use when tariffs are higher, typically between 4pm and 7pm, or by avoiding importing power when the grid requires consumers to manage their demand at which time advantageous tariffs are paid to avoid consumption.

2.10 The projected capital cost of the battery store ranges between approximately £0.70M and £1.01M depending on the size of storage provided. Again, Concertus estimate a positive annual net cash flow which will be consistent with the MTFS, at over £100,000 p.a.

Contingency

2.11 Further work on renewable technologies is being undertaken at risk as part of the Royal Institute of British Architects (RIBA) Stage 4 design stage for the Hub along with the option to connect to MCA6. Detailed technical and financial modelling will be undertaken at this stage. Given the preliminary stage of the techno-economic assessment of the proposals and ahead of any procurement, however, it is still proposed to include a 10% contingency to the capital cost estimate in the final business case in July.

3. Outline of business case for July 2017

3.1 The key drivers for installing renewable energy technologies in the Mildenhall Hub project are proposed as follows:-

- Strategic fit
- Regulatory compliance
- Economic and financial value
- Carbon savings
- Operational and management value
- Resilience of supply.

3.2 The proposals would need to be consistent with the following strategic and organisational objectives:

a) West Suffolk *Strategic Plan:* Through *Priority 1 – Increased Opportunities for Economic Growth*, the case is made that investing in renewable energy technologies provides both a beneficial economic return and opportunities for stimulating local energy technology supply chain, whether that is for is local provision, installation or ongoing maintenance. Through *Priority 3: Homes and communities*, the outline business case accords with the principle that new developments should be fit for the future, properly supported by infrastructure, and that they build communities.

b) *Medium-Term Financial Strategy*: the business case must respond to the challenges facing local government finance by investing in more efficient

and/or income generating facilities. It must also demonstrate that the Council is prepared to act more commercially and take calculated investment risk where sound, objective evidence shows that it is appropriate to do so.

c) *Asset Management Plan*: the business case will address the condition of existing facilities by replacing them with more efficient facilities.

d) *Suffolk Growth Strategy and the West Suffolk Six Point Plan for Jobs and Growth*: the business case will show that the Council is prepared to demonstrate that it acts in a leadership role, by showing more efficient use of resources, and that the Council is continuing to invest in Mildenhall as a key market town in West Suffolk.

e) *West Suffolk Sustainability Strategy:* The Strategy sets out the range of issues which the Council wishes to influence at a local level through appropriate use of investment and services to deliver a sustainable future for the locality.

3.3 Mildenhall College Academy (ATT) have shown interest in pursuing the additional option to provide heat to their building (MCA6). This is subject to further investigation to prove feasibility and viability. Therefore, no capital allowance has been made at this stage for this option.

3.4 Currently, if the scheme receives planning consent, it is planned that the gas boilers and CHP will be supplied from the mains gas grid connection. It may be feasible to supply gas, as well as power, using other technologies, for example Anaerobic Digestion. Such proposals will not form part of the 2017 business case and would be the subject of separate assessment and business case. This technology could also be retro-fitted.

3.5 After taking account of capital and running costs that would have to be incurred for the base case, the business case will need to show indicative investment returns for each of the preferred technologies. This will be shown as:

- an annual net cost saving;
- an indicative investment return (IRR) as a percentage of the capital cost; and
- a simple payback period in years.

The returns will include income arising from the Renewable Heat Incentive and savings both from reduced importing of grid electricity and the use of stored power at times when it is cheaper than importing from the grid.

3.6 The financial investment and savings compared to the base case will also relate to the Hub scheme as a whole, not just the FHDC facilities. It continues to be envisaged that the Council would fund, procure and operate the heating, cooling and power provisions as a main developer/owner/landlord of the Mildenhall Hub. Although the Council would expect to take a fair rate of return for its investment, to cover its overheads and cost of borrowing on an open-book basis, it is a principle of the development that all of the public services in

the Hub will benefit from cheaper energy; to justify them being part of a hub scheme with shared infrastructure and to assist in sustainable delivery of all public services. The final business case will therefore indicate in outline how the costs and benefits of renewable technology will be shared by the partners.

3.7 The options for financing the provision of renewable technology, which will also be clarified in the final business case, include:

- Funding from capital reserves/any underspend on the main Hub budget estimate
- Prudential borrowing
- Third party commercial finance
- Grant aid.

At this time, no interest free grant aid has been secured to finance the preferred options although other public authorities may be prepared to invest alongside the Council if the Council so chose (see also 3.9 below).

3.8 Any prudential borrowing will need to generate a net return on investment compared with the Council's typical borrowing borrowing costs (interest plus Minimum Revenue Provision) under the terms of the Council's MTFS. Depending on the length of borrowing, these costs (expressed as a rate) could be between 6% and 10%. Furthermore, it is still envisaged that any net surplus generated after the cost of borrowing and running costs by the Council could contribute towards the overall cost of delivering the Hub project (which is an assumption of the main business case).

3.9 Should the investigation of extending heating and cooling to the Mildenhall College Academy Sixth Form Building demonstrate a viable case, then dependent on the investment return that could be achieved the Council could seek central government grant from the Heat Network Investment Programme (HNIP). HNIP was set up at the end of 2016 to create the right conditions for a self-sustaining heat network market to develop. The project is funded by the Department for Business, Energy and Industrial Strategy (BEIS) and aims to provide capital support to help deliver heat networks in the UK and carbon savings. The capital support available to individual schemes is unknown but it is likely to be capped at the minimum amount required to make a project economically viable.

3.10 The proposed options above would deliver wider non-financial benefits. A key benefit is the carbon savings which would be made over the assumed life of each technology. It is predicted that in the region of 400 tonnes of CO_2 could be saved annually compared to the base case.

3.11 A range of options are available for funding, delivering and managing the proposals, the choice of which will be dependent on what control the Council wishes to have over the project development and delivery compared against the financial and wider benefits that could be accrued. A preferred model for funding will be developed and form part of the full business case.

3.12 Alternative funding, delivery and operational management models are

available and already in place within the Abbeycroft Leisure Centres in Bury St Edmunds, Haverhill and Newmarket whereby a commercial operator funds and operates the CHP or other energy-related plant. With respect to the CHP technology, the company buys from Abbeycroft the input gas required to generate heat and power which is then sold on to the Leisure Centre. The CHP operator uses the cost differential between gas purchase and heat sale to commercialise the operation under a contract typically of 15-20 years duration.

3.13 At this stage no detailed assessment of the risks of investing in the proposed technologies has been undertaken. However, the key risks have been identified (see Appendix 1). A detailed risk assessment will be undertaken as part of the full business case at which some of the initial cost and benefits will be further refined.

3.14 Key stakeholders have been identified and their role in the project assessed to ensure that they are both actively engaged and as appropriate involved in any decisions. A stakeholder engagement plan has been drawn up and will continue to be reviewed and updated through each project stage.

Appendix 1 – Risk identification

Risk	Potential impact
Commercial arrangements, delivery vehicle and procurement	Dependent on the procurement, contractual delivery structures that the council chooses will determine the risks that are retained or passed on to others
Policy change	Central government policies are subject to change and this presents an ongoing risk. An example is the impact of Government policy on the Renewable Heat Incentive, taxation and energy pricing.
Planning risks	These would apply to the development of the Mildenhall Hub as whole as the proposals move through the planning process.
Development risks	Programme delay can significantly impact the delivery of the project throughout the development programme.
Operational risks	Issues that could affect the operating cost include under-performance of a specific technology, higher than expected operation and maintenance costs, development passing affecting revenue.
Financial risk	The availability of affordable capital, the energy input costs and heat sale pricing could all have a significant impact on the viability of the options

Appendix 2: An explanation of the proposed heating and power technologies

Combined Heat and Power (CHP)

A Combined Heat and Power unit will be automatically controlled to act as the lead boiler when there is both a heating and electrical demand within the building. The CHP will be sized to meet the base heating load of the building, as this ensures that it will be run almost continuously with little to no heat wastage. Running the CHP system for as long as possible also improves the efficiency of the engine and therefore it's financial payback time. The CHP will be served by a gas engine with gas boilers providing top up only during the coldest days.

Ground Source Heat Pump (Heat Pump)

The majority of the heating energy being supplied to the Hub will look to come from a Ground Source Heat Pump serving underfloor heating. Ground Source Heat Pumps offer coefficients of performances (efficiencies) higher than that of air source heat pumps and gas boilers, they also have the benefit of being able to the reverse cycle. This means that instead of heat being supplied to the Hub, it could also be extracted in the warmer months, helping to cool the building down and decrease the amount of overheating occurring.

Ground Source Heat Pumps can either be open or closed loop and work by extracting heat from the ground, upgrading it using a compressor and then transfers the heat to the buildings heating system. There are two main types of GSHP, vertical bore holes or horizontal trenches. Vertical bore holes may be required to go down to depths of greater than 100m and therefore a ground survey is required to determine their suitability. Whereas horizontal trenches will typically be laid only a few metres under the ground but will require a large horizontal run to ensure sufficient heat is exchanged.

The Ground Source system can also be reversed cycled, extracting heat from the building instead of the ground. This helps to cool the building down during the winter months and reduces the amount of overheating occurring. With a number of ground source heat pump units combined in series the relative heating and cooling energy required by the Hub can be shared between the units. Put simply, if one area of the Hub is too hot then this heat could be extracted and moved to an area that is too cold. This exchange of energy between different parts of the building is extremely efficient and can increase the COP of the GSHP considerably.

Battery storage

The use of battery storage to offset the use of peak cost and carbon electricity using energy stored before the peak is an innovative use of a proven technology. An additional benefit of using a storage technology is that it also provided protection against short-term network outages when IT equipment and other sensitive plant can be protected against unexpected loss of power.

It is likely that lithium ion technology will be used at the Mildenhall Hub.

Solar photovoltaics

Solar power generation is now a mature technology and is becoming commercially viable without the need for financial incentives to invest. The generation of power offsets the importation of electricity from the grid. Power can also be stored where battery technology is combined with solar to allow the power to be used on site beyond the usual profile of solar generation.