

Babraham Smart Energy Grid – Updated Investment Case

To: Environment and Green Investment Committee

Meeting Date: 16/12/2021

From: Executive Director Place and Economy

Electoral division(s): Trumpington, Sawston & Shelford and Queen Ediths

Key decision: Yes

Forward Plan ref: 2021/068

Outcome: 6,900 tonnes of carbon emissions reductions up to 2050 plus the generation of local renewable energy to supply EV charging infrastructure at the park and ride and the excess to local consumers.

Recommendation: Committee is asked to:

- a) note progress with the project;
- b) approve the investment case for the Babraham Road Park and Ride Smart Energy Grid project as set out in section 3.4 of the report;
- c) recommend the additional prudential borrowing of £1.2M to Strategy & Resources Committee;
- d) approve a Letter of Intent to place orders for materials and equipment to secure the costs that have come through from the procurement process;
- e) approve entering into a construction contract with Bouygues Energies and Services for the delivery of the scheme.

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1. Background

- 1.1 The Babraham Smart Energy Grid is to be located at the Babraham Road Park and Ride (BRPR) site (see Appendix A). Phase 1 of the project comprises 4,572 solar modules mounted on solar carports which will generate the equivalent electricity as used by 756 households annually and prevent 6,900 tonnes of CO₂ emissions over the 30-year lifetime of the project. It also includes EV charging infrastructure and a private wire to supply electricity to a local customer. Computer generated images are included in Appendix B.
- 1.2 The Environment and Sustainability Committee approved the investment case for the project on 11th March 2021. It delegated the final decision to enter into a works contract with Bouygues Energies and Services, (once final costs were confirmed), to the Executive Director of Place and Economy and the Chief Finance Officer in consultation with the Chair of Environment and Sustainability Committee and the Green Investment Advisory Group. The finalised costs have now been received and capital costs have substantially increased triggering the need to come back to Committee for a decision on the revised investment case. The update has been shared with Capital Programme Board members by circulation and consideration is anticipated at the next meeting scheduled on 15th December 2021.
- 1.3 On 4th May 2021, a delegated decision to progress with works to lay the private wire was agreed with Members. This part of the project was accelerated to coincide with cycleway improvement works planned by Greater Cambridge Partnership (GCP) and works by Cadent Gas, to avoid digging up the cycle way improvements to lay the private wire 6 months later, and to minimise disruption along the A1307. The Power Purchase Agreement customer, Cambridge University Hospital Trust (CUHT) supported this by signing a Memorandum of Understanding and a Letter of Authority to connect the private wire to the substation located on their site. The route is shown in Appendix C.
- 1.4 Pre-COVID 19, the park and ride site was nearing capacity. As parts of the site will need to be closed off during construction of the smart energy grid for user safety, the project is coordinating with Greater Cambridge Partnership (GCP) on the timing for 160 additional car parking spaces being added to the site. The extension to the car park has included enabling works for the smart energy grid and the construction works for the extension will largely be complete before this project starts on site.
- 1.5 The Babraham Smart Energy Grid project has a number of phases. Phase 1 (current phase) is the completion of the Smart Energy Grid, EV chargers and private wire. Once these elements are complete, the project will move to a commercialisation phase 2, which includes measures such as further battery storage, charging for e-scooters, electrified light freight and public buses etc. This report focusses on phase 1 and its investment case.

- 1.6 The outcome of the report is to progress to the construction of the Smart Energy grid at Babraham Park and Ride which will prevent 6,900 tonnes of carbon emissions through renewable electricity generated from solar panels, up to 140 EV chargers installed at the park and ride site and a private wire installation to sell excess electricity.

2 Main Issues

- 2.1 **Power Purchase Agreement (PPA).** The Heads of Terms for the Power Purchase Agreement have been negotiated and are close to being ready for signature. CUHT will purchase excess power generated by the Smart Energy Grid which is not used by the EV charging on site. The CUHT can accept all excess electricity generated and is willing to agree a long tenancy. The PPA does not obligate the CUHT to accept the energy nor the Council to provide it as this allows flexibility according to the electricity demands of the park and ride site.
- 2.2 In addition to purchasing electricity from the smart energy grid, the PPA also allows the smart energy grid to import electricity from the CUHT at times of insufficient solar generation or when necessary maintenance is needed to keep the site operating. This two-way supply of electricity is necessary as the smart energy grid will not connect to the national grid in the future once the smart energy grid is active.

3 Finance update & sensitivity analyses.

- 3.1 Since approval of the investment case in March 2021 there has been significant volatility in the market and supply chain. This has resulted in increased costs for all construction projects. To manage this risk, the Council and its lead energy services supplier, Bouygues, have been working on cost strategies including advance combined purchase of steel for Babraham and St Ives Smart Energy Grids ahead of further cost rises expected in 2022.
- 3.2 While the increased capital costs worsen the expected financial performance of the project, the economic pressures driving those cost increases have also resulted in very substantial increases in electricity prices - market prices in March were around 55p/kWh and are currently at around 200p/kWh. These prices are short-term, spot transactions and are not directly used in our financial modelling but demonstrate that increased prices are reflected into both sides of a business case. Our finance models are based on electricity pricing from ESPO and Crown Commercial Services, who mitigate the effects of short-term price movements by purchasing in advance. Despite that mitigation, both those organisations predict price increases for 2022 of around 20% and this increases the expected financial performance of the project.

3.3 There will be further substantial increases in electricity prices in future years if market prices remain at the currently high levels. However, the future direction of the market is very uncertain, and our financial models are based on a cautious position and do not take account of those potential increases beyond 2022. Instead, they assume that market prices will fall back to the levels seen in the early months of 2021 before increasing in line with the Retail Price Index for future years.

3.4 The table below summarizes the expected financial benefit of going ahead with the project:

Table 1: Comparison of investment case approved in March 2021 with updated November 2021 position

March 2021 Excl. carbon	Nov. 2021 Excl. carbon	March 2021 Incl. carbon	Nov. 2021 Incl. carbon	
£5,795,386	£6,234,892	£5,795,386	£6,234,892	Capital Cost to complete project
£6,249,790	£7,450,860	£6,249,790	£7,450,860	Total Capital Cost
£14,326,370	£22,889,958	£14,996,779	£24,800,569	Net Operating Revenue over 30 yrs
£6,796,317	£13,436,746	£7,466,726	£15,347,357	Net Cash Flow after loan costs
4.70%	5.98%	5.23%	7.14%	30yr Internal Rate of Return
18.98	17.47	17.88	15.37	Payback Period (years)
£104,286	£2,068,035	£544,082	£3,447,800	Net Present Value @ 30th Year
7,293	6,942	7,293	6,942	Tonnes Avoided Over 30 Yrs
243.10	231.41	243.10	231.41	Average Annual Carbon Saving
~30	~29	~30	~29	Total Household Carbon Footprint
70GWh	71.8GWh	70GWh	71.8GWh	Generated over 30 years
~743	~764	~743	~764	Households' equivalent
~936	~961	~936	~961	Electric Vehicle trips around earth

- 3.5 The financial figures in Table 1 for March 2021 are stated after excluding £0.5m of development costs already incurred. The reason for excluding these ‘sunk costs’ was that stopping the scheme at this point would not allow these costs already incurred to be recovered. The amount of sunk costs now is substantially higher at £1.2m because of the agreement of members to progress with the private wire for the project at risk (see para 1.3 above). Members also subsequently agreed to order steel for the project at a cost of over £0.5m. Given the significant size of these amounts the NPV and IRR of the project at November 2021 is shown on the basis that sunk costs are included, rather than excluded as in March.
- 3.6 The business case figures in the above table are shown both including and excluding the value of carbon, using government recommended figures for carbon savings and carbon prices.
- 3.7 In addition to the overall financial impact shown in Table 1, it is also important to understand the potential impact of the project on Council finances in the short to medium term. Table 2 shows the expected revenue impact over the next seven years. Note that this shows the recurrent impact, i.e. to find the overall impact in any year compared to 2021/22 you need to add in the impacts of all preceding years. The overall financial impact on revenue would thus be broadly neutral in 2024/25.

Table 2: recurrent revenue impact of project

	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Revenue	-48	-281	-35	-19	-17	-26	-32
Costs	13	38	-4	18	20	-35	8
Debt costs	£60	£255	£0	£0	£0	£0	£0
	25	12	-39	-1	3	-61	-24

- 3.8 A sensitivity analysis on the assumptions has been performed on the base business case. The more significant risks and opportunities associated with this are highlighted below in section 4.

4 Major Risks and opportunities to the Business Case

- 4.1 The Committee report in March noted the extent of variation in electricity prices in the last few years – and the experience of the last few months has highlighted that further. The business case uses actual tariffs paid by the CUHT for the price paid to supply the smart energy grid, while electricity purchased by the CUHT will be at a small discount to those actual tariffs. The volume of electricity exported will be much higher than the volume imported, so higher electricity prices will improve the financial performance of the project. Table 3 (overleaf) shows the impact should there be a 10% decrease in the future prices expected.

Table 3 – Sensitivity to 10% lower electricity prices

	Base Case	Sensitivity Case
Payback (years)	15.4	16.6
Net cash flow per year	£511,579	£425,549
IRR	7.14%	6.24%
NPV	£3,447,800	£2,218,998

- 4.2 The project includes not just supplying electricity to the CUHT, but also supplying Electric Vehicle (EV) chargers located on the site. The rate charged for these is expected to be higher than the rate charged to the CUHT and hence the business case improves with higher take-up of EV charging. The assumed tariff for EV charging has been set equal to the proposed tariff for CCC staff. However, we are currently seeking further advice on how VAT should be charged to CCC staff and this could result in a change to the proposed tariff.
- 4.3 There are currently 4 EV chargers on site at present and pre-pandemic data shows they were well-used. To support the decarbonisation of transport and the expected phase-out of diesel and petrol vehicles, this scheme will replace the existing chargers with 20 new ones at the start of the project. Future numbers of chargers will depend on demand, but the current plan is to increase by 30 chargers each 3 years up a maximum of 140 in year 13. Table 4 shows the impact on the business case if future demand for EV were 20% less than expected.

Table 4 – Sensitivity to 20% decrease in take-up of EV chargers

	Base Case	Sensitivity Case
Payback (years)	15.4	15.8
Net cash flow per year	£511,579	£470,810
IRR	7.14%	6.77%
NPV	£3,447,800	£2,908,954

- 4.4 As noted in paragraph 3.5, the base business case includes sunk costs. Table 5 shows the impact on the business case if sunk costs are excluded.

Table 5 – Sensitivity to inclusion of sunk costs

	Base Case	Sensitivity Case
Payback (years)	15.4	13.4
Net cash flow per year	£511,579	£563,004
IRR	7.14%	8.79%
NPV	£3,447,800	£4,876,201

- 4.5 The summary business case table above shows the financial impact both including and excluding carbon savings. The Council has not decided at this stage whether it would wish to keep or sell credits for carbon savings. The carbon value shown in the business case is the social value recommended by government for appraising projects and it is likely that, at least for some years to come, the actual cash value of selling carbon credits would be lower than this. In addition, it should be noted that the price for carbon will be highly dependent on future political actions by the UK and other governments.
- 4.6 The business case agreed by Committee in March assumed funding for the capital costs of the project would be provided by a 15-year. The current business case makes the more typical assumption of a loan length equal to the 30-year life of the project. Spreading the loan cost over a longer period reduces the NPV of the project, but allows the project to provide a positive cash flow to the Authority more quickly. Table 6 shows the impact if the loan length remained at 15 years.

Table 6 – Sensitivity to loan term

	Base Case	Sensitivity Case
Payback (years)	15.4	14.7
Net cash flow per year	£511,579	£550,240
IRR	7.14%	7.62%
NPV	£3,447,800	£4,516,616

- 4.7 The Council could decide to delay investment or not to invest in the project. If a delay is proposed, there is a significant risk that the costs will further increase. It should be noted that the procurements are predicated on the joint purchase of equipment and materials for both the Babraham Road and the St Ives Park & Ride sites to achieve economies of scale. If the decision were not to invest further in the project the sunk costs referred to in para 3.5 would be lost in full and additional losses would be likely in relation to the steel already ordered. As these costs could no longer be capitalised, they would need to be written off to revenue if the project were not to proceed. Should the decision be to proceed, there is the possibility of future revenue streams from adding battery energy storage back into the scheme as a phase 2, as well as electric bus and cycle charging that offer further opportunities for wider commercialisation of the site.
- 4.8 As noted in para 2, CUHT will not be obliged under the PPA to purchase electricity. This means there is a theoretical risk that we will not be able to sell all the electricity produced by the site. However, the hospital's demand for energy is many times greater than the maximum the P&R site could provide and there is no current prospect of CUHT being able to source significant amounts of alternative renewable energy. The structure of the PPA also ensures that electricity from the P&R site will always be cheaper than energy from the grid, in order to minimise the risk that CUHT would not wish to purchase from us in the future.
- 4.9 As set out in the report, the project faces a number of commercial risks in terms of sales prices and volumes as well as construction and operational uncertainties which remain

new or untested to the Council in this setting. This is in the context of a significant increase in costs and the request to commit to increased borrowing and debt costs including in the near future where the Council has significant financial constraints. In considering this report Members should assess whether these risks are commensurate with the potential levels of financial return as well as the Council's carbon reduction objectives.

5 Alignment with corporate priorities

5.1 Communities at the heart of everything we do

Providing the right infrastructure to support communities to live low carbon lifestyles is important as this helps communities to reduce carbon emissions and reduce the impact of climate change.

5.2 A good quality of life for everyone

Any revenues derived from the scheme would be used to support key Council front-line services, supporting a good quality of life for residents.

5.3 Helping our children learn, develop and live life to the full

There are no significant implications for this priority.

5.4 Cambridgeshire: a well-connected, safe, clean, green environment

It is estimated that the project would prevent the emission of more than 6,900 tonnes of CO₂ over the lifetime of the project through offsetting fossil-fuel electricity generation.

5.5 Protecting and caring for those who need us

There are no significant implications for this priority.

6 Significant Implications

6.1 Resource Implications

Future costs for staff to manage the ongoing project are included in the business case along with the budget for the operations and maintenance of the system. The overall resource implications are summarized in Table 1 above.

6.2 Procurement/Contractual/Council Contract Procedure Rules Implications

Bouygues Energies & Services were procured under a mini competition run under the Refit 3 Framework. There are no significant implications arising from this procurement or the proposed contractual arrangements.

6.3 Statutory, Legal and Risk Implications

- 6.3.1 The County Council has a priority outcome to deliver a well-connected, safe, clean, green environment and this project supports the Council to deliver this objective.
- 6.3.2 Planning permission has been obtained from the County Council under Regulation 3 of the Town and Country Planning Act (General Regulations) 1992 as a project it intends to develop itself and legal advice confirms that the Council is able to implement this without the need to set up a company. The planning permission also covers phase 2 of the project, to build a 10MW battery storage facility to be considered when the market conditions change.

6.4 Equality and Diversity Implications

There are no significant implications.

6.5 Engagement and Communications Implications

Several presentations were given to the Local Parish Councils surrounding the site starting in 2018 and into late 2019. In person presentations were replaced with webinars once lockdown restrictions were imposed.

6.6 Localism and Local Member Involvement

The site sits within both Cambridge City and South Cambridgeshire jurisdictions. Both authorities' Local Plans support decarbonising electricity generation.

6.7 Public Health Implications

There are only positive implications. This renewable energy project will generate electricity from the sun, preventing the emission of over 6,900 tonnes of CO₂ over the lifetime of the project.

6.8 Environment and Climate Change Implications on Priority Areas:

- 6.8.1 Implication 1: Energy efficient, low carbon buildings.
Positive/neutral/negative Status: Positive
Explanation: The project will increase the volume of renewable energy used on site and supplied to the CUHT; offsetting grid supplied electricity.
- 6.8.2 Implication 2: Low carbon transport.
Positive/neutral/negative Status: Positive
Explanation: Installation of EV chargers will expand the public's access to electric vehicle charging.
- 6.8.3 Implication 3: Green spaces, peatland, afforestation, habitats and land management.
Positive/neutral/negative Status: Neutral
Explanation: The scheme is being installed on an existing car park and highway.
- 6.8.4 Implication 4: Waste Management and Tackling Plastic Pollution.
Positive/neutral/negative Status: Neutral

Explanation: As part of the construction project there will be waste generated, however this will be minimised and dealt with following an agreed waste management plan for the project.

6.8.5 Implication 5: Water use, availability and management:

Positive/neutral/negative Status: Neutral

Explanation: Drainage strategy considered within the design of the scheme.

6.8.6 Implication 6: Air Pollution.

Positive/neutral/negative Status: Positive

Explanation: Reduction in carbon emissions from reduced reliance on grid electricity supplies.

6.8.7 Implication 7: Resilience of our services and infrastructure and supporting vulnerable people to cope with climate change.

Positive/neutral/negative Status: Positive

Explanation: Clean energy supply supporting existing infrastructure.

Have the resource implications been cleared by Finance? Yes

Name of Financial Officer: Sarah Heywood

Have the procurement/contractual/ Council Contract Procedure Rules implications been cleared by the LGSS Head of Procurement? Yes

Name of Officer: Henry Swan

Has the impact on statutory, legal and risk implications been cleared by the Council's Monitoring Officer or LGSS Law? Yes

Name of Legal Officer: Fiona McMillan

Have the equality and diversity implications been cleared by your Service Contact? Yes

Name of Officer: Elsa Evans

Have any engagement and communication implications been cleared by Communications? Yes

Name of Officer: Bethan Griffiths

Have any localism and Local Member involvement issues been cleared by your Service Contact? Yes

Name of Officer: Sheryl French

Have any Public Health implications been cleared by Public Health? Yes

Name of Officer: Iain Green

If a Key decision, have any Environment and Climate Change implications been cleared by the Climate Change Officer? Yes

Name of Officer: Emily Bolton

7 Source documents guidance

7.1 Source documents

- Trumpington and Babraham Outline Business Cases – May 2018 C&I Committee
- Babraham Smart Energy Grid – Investment Grade Proposal Stage 1 Update, 21 June 2019 Commercial and Investment Committee meeting
- Approval for Grid Connection down payments for energy Investment Projects, 18 October 2019 Commercial and Investment Committee meeting
- Babraham Smart Energy Grid – Options Appraisal, 22 November 2019, Commercial and Investment Committee meeting
- Babraham Road Park and Ride Smart Energy Grid Investment Decision, 11 March 2021, Environment and Sustainability Committee meeting

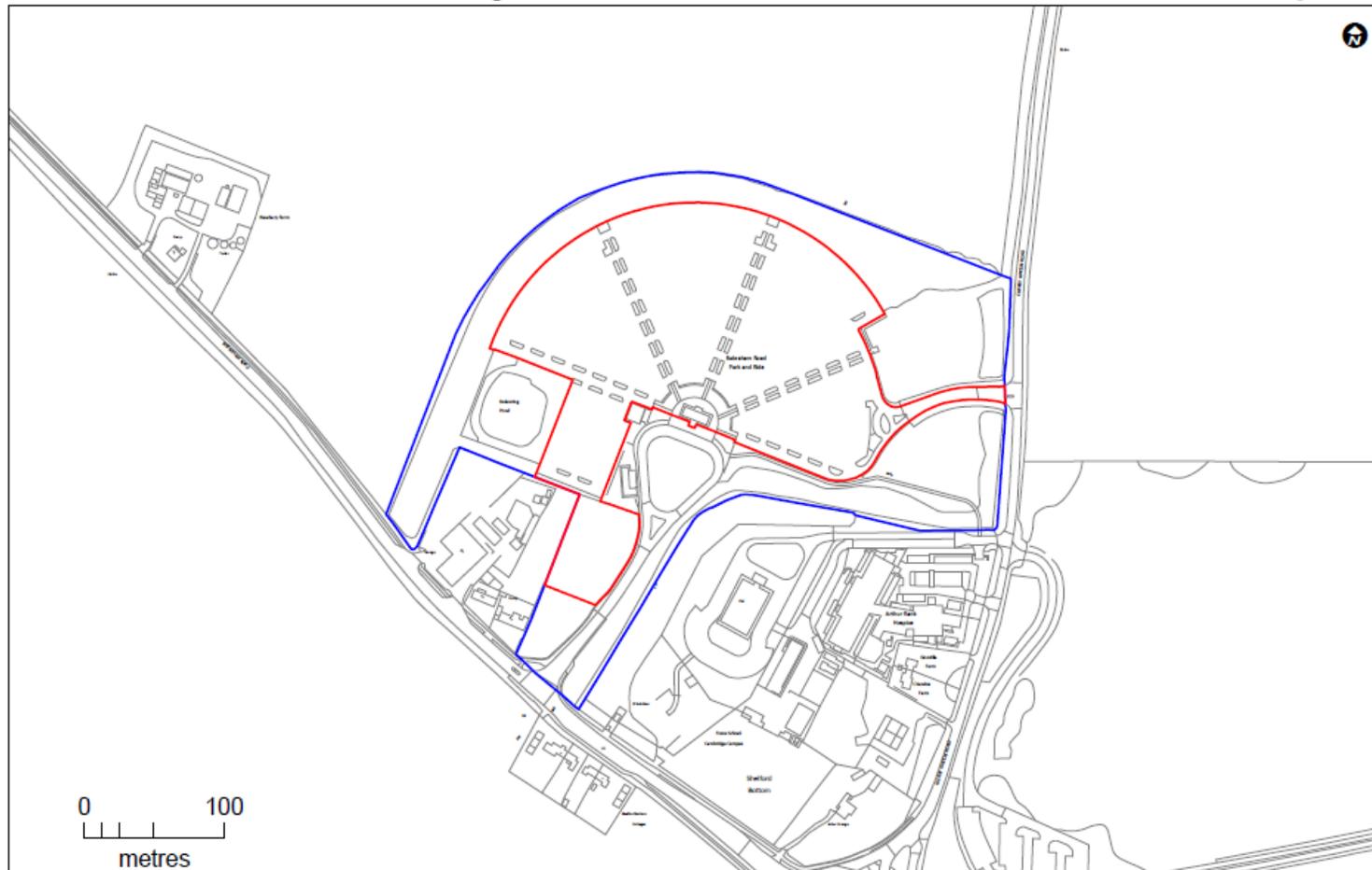
7.2 Location

1. [Outline Business Case report to May 2018 Committee](#)
2. [Investment Grade Proposal report to June 2019 Committee](#)
3. [Approval for Grid connection report to October 2019 Committee](#)
4. [Options Appraisal report to November 2019 Committee](#)
5. [Investment case decision report to the March 2021 Committee](#)

Appendix A – Site location

A map showing the proposed area for the development of a smart energy grid on the Council-owned and operated Babraham Road park and ride site.

Site Location Plan
Park & Ride Site, Babraham Road, Cambridge



Scale 1:2,500 @ A3 Site Boundary ———

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Appendix B – Computer Generated Images of the finished project



Appendix C: Path of the private wire

