

Major Energy Projects – Progress Update

To:	Assets and Procurement Committee
Meeting Date:	28 November 2023
From:	Executive Director; Place and Sustainability
Electoral division(s):	All
Key decision:	No
Forward Plan ref:	N/A
Outcome:	The purpose of this report to provide an update to members of the Committee on the delivery of large energy projects.
Recommendation:	<p>The Committee is recommended to:</p> <p>a) Note the current position regarding the delivery of the Council's large energy project and planned actions to enable their successful completion.</p>

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1. Background

- 1.1 Within the strategic framework of the Council ambitions have been set to achieve net zero carbon emissions by the Council by 2030 and for the County area by 2045. Linked to these ambitions the Council has invested in a range of major energy projects to:
- Showcase new business models to overcome grid connection challenges, for example the St Ives Smart Energy Grid project.
 - Build investor confidence in projects that bring together different low carbon technologies e.g. Babraham Road Smart Energy Grid and its collaboration with Cambridge University Hospital Trust (CUHT),
 - Provide demonstrator projects for rural areas in low carbon technologies that engage communities and businesses e.g. Swaffham Prior Community Heat Project
 - Generate local renewable electricity to reduce carbon emissions from fossil fuels e.g. Triangle Solar Farm
 - Invest in green projects and generate income for the Council e.g. North Angle Solar Farm
- 1.1 A total capital investment £67.4m is included in the capital programme for the delivery of these projects. In addition to these projects a further £17m has been invested in the schools retrofit and low carbon heating programme and £6.6m in the low carbon heating projects on Council buildings. Together, these projects have helped to build the capacity and skills in the Council to support energy transition and deliver the Council's commitment to achieving net zero in Cambridgeshire by 2045.
- 1.2 A key principle with the current programme is that each project is supported by a business case which demonstrates that the costs during development, construction, operations and life cycle replacements stages, can be fully met from future revenue.
- 1.3 However, some of the projects have been designed to provide a net financial benefit in terms of revenues generated from energy sales. Other projects have a focus on directly reducing fuel poverty and/or tackling strategic barriers to the delivery of net zero. Some have required grants from national government to overcome market barriers.
- 1.4 Across all the large energy projects, the total gross income projection over their lives is an estimate c£273m. This is primarily supported by the North Angle Solar Farm which is our largest individual asset. The income projections are underpinned by the tariffs that can be achieved in the export market and are at this stage indicative. The forecasts are prudent but reasonable rates that we believe can be achieved. The generation data from Triangle Solar Farm, has informed these figures as annual measurement and verification of performance is undertaken. The generation evidence from Triangle Solar Farm feeds into our revenue assumptions providing confidence to our electricity generation assumptions for our largest asset. Overall, the net financial benefit across all the large energy projects is £42,363k in terms of Net Present Value, demonstrating that the revenue to be achieved supports the business cases.
- 1.5 However, assumptions had been made around the deliverability of these projects and the timing for when the income would be achieved within the budget for the Council for 23/24.

The budget for 23/24 assumes a revenue forecast of £5,667k for all large energy projects. However, this is now forecast to be £174k. The key reason for this has been construction delays on some key projects.

- 1.6 The revenues forecasts for both 23/24 and 25/26 have now been reprofiled and are reflected in the financial monitoring reports and business planning assumptions.
- 1.7 The estimated annual and lifetime carbon emission savings for the large energy projects are set out in the table 1 below:

Project Name	Estimated average annual CO₂ saving (tCO₂)	Estimated lifetime CO₂ saving (tCO₂)
Triangle Solar Farm	5,047	*126,179
North Angle Solar Farm	2,559	76,781
St Ives Smart Energy Grid	501	15,025
Babraham Road Smart Energy Grid	220	6,615
Swaffham Prior Heat Network	965	57,901
Total	9,292	282,501

*Carbon emissions reductions are higher for Triangle Solar Farm as the grid is decarbonising over time

- 1.8 This report provides an overview of each of the large energy projects. It outlines the current position, the headline business case, the governance arrangements and key learnings from this programme.

2. Main Issues

- 2.1 The major energy projects can be divided into the following categories:

- a. Built and operating, e.g. Triangle Solar Farm and Swaffham Prior Community Heat Network
- b. In construction e.g. North Angle Solar Farm, St Ives and Babraham Smart Energy Grids
- c. In development e.g. Stanground Solar and Battery Project

2.2 Built and Operating

- 2.2.1 *Triangle Solar Farm* is located near Soham, on Council owned land and became operational in 2017. It is starting its seventh year of operation. It is a 12MW solar farm where all the electricity is exported to the grid. The project is a £9million investment, has a guaranteed electricity price over 15 years and has generated £5,986,965m income for the council since 2017. A new Power Purchase Agreement has just been completed for 12 months and this is forecast to generate approximately £1.59m revenue over that period.

The project has saved 15,192 tonnes of carbon dioxide equivalent since it started operating and can be used to net off a portion of the Council's carbon emission from electricity use. The aim of this project was to build knowledge and capacity in the Council to develop energy projects, reduce the Council's own carbon footprint and to generate revenue.

2.2.2 *Swaffham Prior Heat Network* is a community led project and is the first of its kind in creating an off-gas rural village in the UK. It encompasses a renewable energy centre hosting ground source and air source heat pumps and a 7km district heat network across the village. It is based in East Cambridgeshire and was mainly completed during 2022/23 and connections from this network to homes now underway. To date the heat network is supplying heat to 60 homes. Planning for the next phase of home connections is underway. The project will reduce the village's dependence on oil and tackle fuel poverty. It is an exemplar project on potential ways to tackle heat decarbonisation in rural areas, which is a significant issue for Cambridgeshire, with over 25,000 households with oil-based heating and off the gas grid. The scheme will receive solar electricity directly from North Angle Solar Farm in due course, fully decarbonising the heating and hot water for the village and saving on average 965 tCO₂ per annum. This project has received grant from government both for its development and capital grant to build the heat network. It has a small net positive business case, as shown in table 2 below and is a proof of concept on tackling financial barriers to rural decarbonisation. The programme for connecting homes is a five-year programme and the first year is just completing. The break even for the business case is half the village homes connected to the heat network, but the aim is to achieve 280 homes connected in five years.

2.2.3 The upfront funding of home connections at Swaffham Prior has been included in the business case below as a key principle of the project was to reduce upfront financial barriers to switching to more environmentally beneficial heating. It is to be noted that these costs are paid back over time through the revenue generated from future heat sales as outlined in the table below. This shows a small positive benefit to the project remains even after all the home connection costs. The table below shows how the forecast additional costs for end customer connections impacts the business case: The Net Present Value has reduced by c£3.7m as a result of an additional uplift in capital of c£3.2m and as a result increased interest costs for the project life of c£500k. However, the total return over asset life remains positive and the business case needs to be considered in the context of the wider energy market. The original business case assumed an income from the sale of carbon credits of £12.6m. This is removed from the approved October 2023 business case as the voluntary carbon markets are still emerging and it is unclear yet on how much could be realised in the short term.

Table 2. Swaffham Prior Heat Network Financial Metrics

Metric	Original business case approval	Approved Oct 2023
Capital budget	£11,852k	£14,140k
NPV	£2,490k	-£2,755k
ROI	108.04%	50.86%
Total return over asset life	£31,524k	£7,206k
Payback period	30 years (out of total 60 year project life)	48 years (out of total 60 year project life)

2.3 In construction

- 2.3.1 *North Angle Solar Farm* is located adjacent to Triangle Solar Farm on Council owned land. It's construction mainly took place in 2022/23 and is now awaiting connection to the grid. It is a £30million investment into a 39MW solar farm, where an estimated 95% of the electricity generated will be exported to the grid and the remaining 5% will be supplied to Swaffham Prior Heat Network. The cable to connect the solar farm to the grid and the heat network is due to start imminently and is subject to commercially confidential discussions.

Table 3. North Angle Solar Farm Financial Metrics

Metrics	Original business case approval	Most recent business case approval
Capital budget	£24,443k	£30,849k
NPV	3,538	38,443
ROI	5.02%	11.9%
Total return over asset life	£57,333k	£122,775k
Payback period	20.79 years	13.26 years

The aim of the project is the same as for Triangle Solar Farm, but opportunities to connect the heat network arose during the development phase. The North Angle Solar Farm forecast generation is from summer 2024.

- 2.3.2 *St Ives Park and Ride Smart Energy Grid* is now 95% complete. It is a 1MW solar canopy over the existing park and ride site, with a small battery and electric vehicle charging points which can be increased over time according to demand for EV charging. A local business will be connected to the smart energy grid and supplied with solar electricity, when available. The original concept of the smart energy grid was to overcome the barrier of grid upgrade costs by managing demand behind the meter. A key change to this project was a shift from a shared connection to the grid via a local business to a secure grid connection with UK Power Networks. The project will also supply clean electricity to one business, onsite EV chargers, onsite energy demand and sell any excess electricity to the grid. It is a demonstrator project on how to provide security of supply for local businesses and other large users of electricity where grid constraints exist and to provide evidence to investors on the risks and returns linking a number of low carbon technologies together to accelerate decarbonisation. It received £2million of grant funding under the European Regional Development Fund (ERDF) and the total project cost is approximately £5,686,000. The return on investment is shown below and income is expected from January 2024.

Table 4. St Ives Smart Energy Grid Financial Metrics

Metrics	Original business case approval	Latest business case approval
Capital budget	£4,283k	£5,686k
NPV	311	145
ROI	0%	0%
Total return over asset life	£4,503k	£13,559k
Payback period	20 years	24 years

2.3.3 *Babraham Road Park and Ride* is a further Smart Energy Grid in Cambridge replicating many of the features of St. Ives. However, it is larger, at 2.5MW installed capacity and is under construction currently. The latest business case for the project is:

Table 5. Babraham Road Smart Energy Grid Financial Metrics

Metrics	Original business case approval	Latest business case approval
Capital budget	£6,250k	£8,840k
NPV	308	6,530
ROI	4.81%	8.47%
Total return over asset life	£15,048k	£42,842k
Payback period	21.46 years	19.19 years

The project is scheduled to complete in Spring 2024. It has completed its first construction phase, the largest and most complex and is now delivering phase 2. It has been delayed for a number of reasons including switching from a two-phase construction programme to three phase programme to allow availability of more car parking spaces for biomedical campus staff to park especially those working at Cambridge University Hospital. This delayed the project by nearly a year. An underperforming electrical subcontractor has also created delays and there have been onsite challenges to manage with existing lampposts. A private wire is already delivered and when complete will supply electricity to Cambridge University Hospital and supply onsite EV charging infrastructure for cars and possibly buses and taxis in the future. This project can be further commercialised through the addition of battery storage as and when needed. Current forecast completion is Spring 2024.

2.4 In development

Stanground is a project that would combine a solar farm (3MW) and battery storage (10MW) into one project, which would be grid connected. Planning permission has been secured for this. It is located on the former Stanground Waste facility in Peterborough, which is a capped former landfill site. In May 2020, the Council accepted a grid connection offer from UK Power Networks (UKPN). However, in September 2023, the Council received notification that reinforcement of the transmission network will be necessary before Stanground can be connected, which is scheduled for 2030 currently. UKPN are reviewing a number of options to help speed up this process to allow projects that have connection agreements to connect sooner. However, if there is no resolution of this, then this project will stay on hold. If a sooner more reasonable date can be agreed with UKPN, the investment grade proposal will be finalised and presented to the Environment and Green Investment committee for consideration. Currently there is no budget built into the capital programme for the project, this will only come forward when a final business case is approved. Minor works have started on site to retain the planning permission as a result of this delay.

Programme Governance

2.5 Political governance

2.5.1 The investment decisions on the above projects were originally made by Commercial and Investment Committee and Environment and Sustainability Committee prior to May 2021.

Subsequent decisions have been taken by the Environment and Green Investment Committee and where these have increased costs, reported to or approved by Strategy and Resources Committee. Due to the complexity and risks associated with the large energy projects and their delivery, a Green Investment and Utility Advisory Group (GIUAG) was set up, comprising cross party representation from both the Environment and Green Investment Committee and Strategy and Resources Committee. With the recent constitutional changes, the membership of GIUAG will change to reflect the new parent committees, EGI and Assets and Procurement (A&P) Committees.

- 2.5.2 This advisory group meets monthly and is provided with briefing notes and detailed risk and mitigation reports. A key objective of the advisory group is to build Members' knowledge and capacity to understand energy projects to support decision making when presented with committee reports. More widely, it is preparing and building knowledge around the energy transition and our role facilitating some of this change.

2.6 Programme governance

The Climate Change and Environment Strategy includes the development and delivery of energy projects using the council's assets to cut carbon emissions and to benefit from the energy system transformation. A Climate Change and Environment Programme was established during 2022 with a workstream on Project Delivery that includes the large energy projects along with schools retrofit, Council buildings decarbonisation and other projects. Progress and risks are reported on a monthly basis to the Programme Board along with the detailed mitigation and management approach. The Programme Board is chaired by the Executive Director of Place and Sustainability and quarterly reports are provided to Corporate Leadership team.

2.7 Project governance

- 2.7.1 The implementation of Committee decisions on large energy projects, where these have been delegated to the Executive Director of Place and Sustainability are taken in consultation with the Executive Director of Finance and Resources and Chair and Vice Chair of Environment and Green Investment Committee. Monthly Strategic Board meetings have been set up with the Executive Directors to execute these delegations where appropriate.
- 2.7.2 Managing the day-to-day business of the projects is delivered via the Project Boards. These are established for each of the large energy projects at project inception. These boards oversee the development of the project and continue into the construction phase to ensure continuity of knowledge. The Project Boards are made of a range of skills including senior project managers, finance, technical and legal (as required). Project Board meetings are held weekly and when in the construction phase include the main contractor and contract administrators. The Senior Responsible Officer for each project is the Head of Energy Services, appointed in February 2023.

Procurement and contract arrangements

- 2.8. A number of options appraisals have been undertaken to identify the appropriate procurement route for projects. Options assessed include other existing frameworks, a Local Energy Partnership procurement and the Peterborough City Council Energy

Performance Contract

2.8.1 Table 6 below shows the procurement process and contract arrangements for each of the large energy projects.

Project	Contract	Procurement Process
Triangle Solar Farm	Design and build contract with Energy Performance Guarantee	The Greater London Authority set up the Refit 2 Framework and appointed 18 pre-qualified suppliers. The Council ran a mini competition under the Re:Fit 2 Framework, evaluated seven tenders and appointed Bouygues Energies and Services. This is an open book procurement.
St Ives Smart Energy Grid	Design and build contract with Energy Performance Guarantee	As above. It is worth noting, that the Project Development phase was extended for this project as it was seeking European Regional Development Funding (ERDF) grant funding which is why it's been delivered under Refit 2.
North Angle Solar Farm	Design and build contract with Energy Performance Guarantee	The Greater Local Authority (GLA) and Local Partnerships (LP) developed and own the Refit 3 Framework. 16 pre-qualified suppliers were appointed to the framework. The Council ran a mini-competition to secure a supplier. And Bouygues Energies and Services were appointed. A support agreement was also set up with Local Partnerships to review IGPs and works contracts for all the large energy projects to benchmark costs and check compliance with the framework.
Babraham Road Smart Energy Grid	Design and build contract with Energy Performance Guarantee	Re:Fit 3 Framework- as above
Swaffham Prior Heat Network (SPHN)	Design, build and operational contract with Energy Performance Guarantee	Re:Fit 3 Framework- as above

2.8.2 The GLA and LP Refit Frameworks have enabled projects to be set up under energy performance guarantee arrangements. This holds the contractors to account on their designs by guaranteeing the performance of the system when constructed. For projects agreed before the Covid pandemic fixed price contracts were also agreed and together with the guarantee reduced the risk to the Council.

2.8.3 However, due to covid, no fixed price contracts could be agreed during 2021 due to the volatility of the supply chain. It was therefore necessary to move to a cost-plus model.

Under this arrangement those costs that could be fixed in the contract were, but where prices or supplies remained volatile these costs could not be fixed and new ways of working on projects had to be facilitated. Examples of this include how the Council secured solar panels when demand increased during the covid pandemic. The Council partnered with Bouygues purchasing experts and used the global reach and buying power of Bouygues to fix costs and secure a place in a queue. The 'cost plus' model is a legacy that exists on three of our large energy projects. However, global events have also led to significant market disruption, for example high value electronic components can take of up to 9 months lead time.

Key Learning

- 2.9 The key lessons learnt from these projects are that the multi-year development and construction phases of these large infrastructure projects take time to deliver and therefore the timeframes for the delivery and associated income streams need to be realistic for future projects of this nature. However, it is to be noted that the projects still have financially robust long term business cases. For the Smart Energy Grids, these delays and risks are currently relatively low as forecast income was low. Triangle has exceeded income forecasts so far, which should be replicated by North Angle Solar Farm, once generating.
- 2.10 Furthermore, challenges around grid capacity have had an impact on the delivery of these projects. This reinforces the need for the Council to develop Local Area Energy Planning to reduce this risk for all parties seeking to connect to UK Power Networks, the district network operator in Cambridgeshire, in the future.
- 2.11 Proceeding during Covid, at the encouragement of national government to avoid recession was understood to be a risk and has continued to be so. Once complete, these projects are still expected to make a valuable contribution to reduction in Council carbon emissions, provide an opportunity to potentially reduce its energy costs, as well as support wider decarbonisation in Cambridgeshire through supplying renewable energy to local homes and businesses. In addition to this, the projects will provide additional EV charging infrastructure where it is needed and generate significant revenue for the Council for other activities.
- 2.12 Client side risks, particularly in relation to securing subterranean works for pipes and wires are now better understood and this learning will be built into projects in the future.

3. Alignment with ambitions

- 3.1 Net zero carbon emissions for Cambridgeshire by 2045, and our communities and natural environment are supported to adapt and thrive as the climate changes

The report above sets out the carbon emissions reductions from the large energy projects in paragraph 1.8

- 3.2 Travel across the county is safer and more environmentally sustainable

Two of the park and ride sites will host EV charging infrastructure powered by solar electricity. It is intended that this can extend to support buses and taxis.

3.3 Health inequalities are reduced

The Swaffham Prior Heat Network has removed finance as a barrier to connecting to the heating scheme and securing a warm home for lower costs over the lifecycle of the project. Warm homes contribute to reducing health inequalities. In addition, air quality improvement from removing the burning of fossil fuels.

3.4 People enjoy healthy, safe, and independent lives through timely support that is most suited to their needs

There are no significant implications for this ambition.

3.5 Helping people out of poverty and income inequality

The Swaffham Prior Heat Network aims to help tackle fuel poverty in the village, which will contribute to reducing poverty and income inequality, as heating can be a significant part of a householder's budget, particularly with recent sustained increases in energy prices. The recent Quality of Life Survey highlighted how households were cutting heating of homes to save money.

3.6 Places and communities prosper because they have a resilient and inclusive economy, access to good quality public services and social justice is prioritised

The Swaffham Prior Heat Network is aimed at contributing to a local resilient and inclusive Economy, with a publicly provided heating service available to households and other buildings in the village. This also aims to promote social justice through the affordable provision of long term, low carbon heating to all, ensuring that those on lower incomes are not left with more expensive and carbon intensive forms of heating due to issues of affordability.

3.7 Children and young people have opportunities to thrive

There are no significant implications for this ambition.

4. Source documents

4.1 Source documents

North Angle Solar Farm

- North Angle Solar Farm Investment Decision – Report taken to the Commercial and Investment Committee on 18th December 2020
- Approval for Grid Connection Down Payments for Energy Investment Projects – Report taken to the Commercial and Investment Committee on 18th October 2019

Swaffham Prior Community Heat Network

- Integrated Finance Monitoring Report for the period ending 31st August 2023 – Report taken to the Strategy, Resource and Performance Committee on 31st October 2023

- Finance Monitoring Report – August 2023 (Including Swaffham Prior Heat Network) – Report taken to the Environment and Green Investment Committee on 12th October 2023.
- Swaffham Prior Community Heat Project – Investment Case – Report taken to the Environment and Sustainability Committee on 14th January 2021.

Stanground Closed Landfill – Solar Project

- Stanground Solar PV and Battery Storage Project – IGP Stage 1 Update - Report taken to the Commercial and Investment Committee on 21st June 2019
- Outline Business Cases for Clean Energy Projects at Woodston and Stanground closed landfill sites – Report taken to the Commercial and Investment Committee on 14th September 2018.

Babraham Road Park and Ride Smart Energy Grid

- Babraham Smart Energy Grid – Updated Investment Case – Report taken to the Environment and Green Investment Committee on 16th December 2021.
- Babraham Road Park and Ride Smart Energy Grid Investment Decision – Report taken to the Environment and Sustainability Committee on 11th March 2021

St Ives Park and Ride Smart Energy Grid

- Investment Decision, St Ives Park and Ride Smart Energy Grid – Report taken to the Environment and Sustainability Committee on 1st July 2021.
- Minor Works for St Ives Smart Energy Grid – Report taken to the Commercial and Investment Committee on 22nd May 2020.

Optimisation

- Operation & Maintenance contracts for large energy infrastructure projects – Report taken to the Environment and Green Investment Committee on 16th March 2023.
- Renewable energy export arrangements for the Council's large renewable energy projects – Report taken to the Environment and Green Investment Committee on 16th March 2023

4.2 Location

[North Angle Solar Farm Investment Decision – Report taken to the Commercial and Investment Committee on 18th December 2020](#)

[Approval for Grid Connection Down Payments For Energy Investment Projects – Report taken to the Commercial and Investment Committee on 18th October 2019](#)

[Integrated Finance Monitoring Report for the period ending 31st August 2023 – Report taken to the Strategy, Resource and Performance Committee on 31st October 2023](#)

[Finance Monitoring Report – August 2023 \(Including Swaffham Prior Heat Network\) – Report taken to the Environment and Green Investment Committee on 12th October 2023.](#)

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[Stanground Solar PV and Battery Storage Project – IGP Stage 1 Update - Report taken to the Commercial and Investment Committee on 21st June 2019](#)

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[Minor Works for St Ives Smart Energy Grid – Report taken to the Commercial and Investment Committee on 22nd May 2020.](#)

[Operation & Maintenance contracts for large energy infrastructure projects – Report taken to the Environment and Green Investment Committee on 16th March 2023.](#)

[Renewable energy export arrangements for the Council's large renewable energy projects – Report taken to the Environment and Green Investment Committee on 16th March 2023](#)