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Burnham Parish Council
Solar power feasibility study
Final report and Design Documents



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Executive Summary

Stage 3 findings

Following the Stage 2 feasibility study and recommendations to Burnham Parish Council for optimal solar PV systems at the two sites, we are pleased to present our final report, and the Design Documents to enable the Council to proceed to procure and commission the desired systems.

Carbon Smart assessed and presented a range of options for the Council in Stage 2. Having presented the businesses case for each, and following discussion with the Clerk, the preferred systems are:

Burnham Park Hall – 30kWp roof mounted system.

George Pitcher Memorial Recreation Ground buildings – 19.6kWp mounted on the Pavilion roof, meeting daytime demand.

Issues and constraints

Both of these systems comply with Permitted Development limitations – planning permission is therefore not required.

Burnham Parish Council have a choice with regard to warrantees – we have assessed the financial impact of extended warrantees for inverters, compared to replacing them out of warranty. There is slight improvement in Net Present Value under the scenario that inverters are replaced outright, compared to the upfront cost of extended warrantees. Inverter manufacturers offer different warrantees – this should be assessed when selecting suppliers; we have stated the manufacturers' warrantees for the suppliers we engaged on page 6

An EPC is required for Burnham Park Hall. The suppliers' quotations include provision of an EPC for the Hall.

Grid connection

The Distribution Network Operator (SSE) has advised that a generation connection at Burnham Park Hall is available, with no reinforcement costs.

At George Pitcher Memorial Recreation Ground a generation connection of 19.6kWp will require either:

1. reinforcement costs of £185,
2. an export limiter, or
3. downsizing to 11kWp across the workshops and cottage.

Due to the cost of installing the export limiter (option 2), and the additional costs of installing three smaller systems (option 3), we recommend installing the 19.6kWp system at the Pavilion and paying the connection fee (option 1). The following documentation is for that size system in that location, and accounts for the cost of the DNO connection. Since the fee is modest, there is no significant impact on the payback, with the 19.6kWp system paying for itself in less than 8 years.

Next steps

Included in this pack of documents are the full specification and documentation required to take forward the recommended schemes at the two sites. Burnham Parish Council can now approach suitable suppliers (for example from the supplier list enclosed) to secure the installation contract, and start realising the benefits of reduced utility bills and revenue streams from FiT and export tariff payments.

Detailed design considerations

Technical specification and performance

Full technical specification for equipment suitable for the recommended systems is included in the Appendices. Prospective suppliers should indicate how their solution will meet the needs of the brief.

In particular Burnham Parish Council should ensure suitable warranties are offered on panels, mounting system and inverters.

Output	Burnham Park Hall (30kWp)	George Pitcher Memorial Recreation Ground (19.6kWp)
Annual yield (kWh)	25,444 kWh in Year 1	16,734 in Year 1
Projected shading impacts	None – panels arranged to minimise shading impact	Some potentially from young trees outside Pavilion. Preferred supplier should confirm impact on installation.
Allowable losses	These are accounted for in the inverter performance specification.	
Lifetime performance degradation (based on panel specification)	80.7% efficient at 25 years Equivalent to 0.7% degradation per year.	

Structural considerations

No structural changes are required to support the proposed systems.

Installation requirements for access to site and the roof

Both sites will require scaffolding for the duration of the installation.

While the scaffolding will have little impact or disruption at George Pitcher Memorial Recreation Ground, there will be some restriction to parking at Burnham Park Hall for the duration of the installation. This should be communicated to Hall staff and users.

Indicative installation date

Subject to Burnham Parish Council commissioning the systems, installation can commence within six weeks from confirmed order. Our calculations to date have assumed these systems would access the Jan-Mar 2018 feed-in tariff regime of 4.05p/kWh for both systems, if the work is booked before end January 2018, and commissioned by the installer before end March 2018.

Installation will take up to 10 days at each site.

There is spare capacity in Ofgem's FIT cap for the current quarter (Oct – Dec 2017); any unused capacity is rolled forward into the next quarter, so there is no need for Burnham Parish Council or their installer partner to pre-accredit for the feed-in tariff¹.

Waste management approach

We recommend specifying that the contractor provides a lockable skip for removal of all waste. Relevant carriers' licenses must be in place and provided as evidence.

A debris chute should also be used at all sites to minimise risk of loose materials, or injury to personnel working at ground level. See Appendix H for further details on waste management approach.

¹ Ofgem weekly deployment update 21st Nov 2017
https://www.ofgem.gov.uk/system/files/docs/2017/11/deployment_update_21_11_17.pdf

Supplier engagement

As stated in the scope of works, we have requested price verification from a range of suppliers for the two systems. These are presented below with a comparison of the proposals.

Supplier	Eco Environments	Caplor Energy	ACES	Solar UK
Price for Burnham Park Hall (30kWp)	£36,000 excl. VAT	£29,443 excl. VAT	£28,000 excl. VAT	£30,000 excl. VAT Scaffolding costs not included
Price for George Pitcher Memorial Recreation Ground (19.6kWp)	£22,675 excl. VAT	£23,192 excl. VAT	£18,500 excl. VAT	£18,205 excl. VAT Scaffolding costs not included
Requirements:				
EPC for Burnham Park Hall	Included in price	Included in price	£250	Included in price
Structural survey	Included in price	Included in price	Included	TBC
MCS accreditation	Yes	Yes	Yes	Yes
Meets technical criteria:				
Panels	Yes – performance guaranteed with efficiency ~80.7% by year 25	Yes – performance guaranteed with efficiency not less than 80% by year 25	Yes	Yes
Inverters	Yes	Yes	Yes	Yes
Warrantees offered:				
Panels	BYD – 10 years	10 years	10 years	20 years
Inverters	Solis – 5 years Extended warrantee available	Huawei – 5 years Extended warrantee available	7 years Extended warrantee available	5 years Extended warrantee available
Mounting system	Limpet with S-Flex – 10 years	10 years	Not stated	Not stated
Workmanship	5 years	8 years	2 years	Not stated
Installation timescales:				
	3-6 weeks from order	Up to 6 weeks from order	5 weeks from order	Not stated

These suppliers were sourced through Carbon Smart's previous project work for clients.

Inverter replacement costs

The inverters are usually the element of the system that have the shortest lifespan. Typically manufacturers offer warranties of 5-10 years. We have run the financial calculations under a low-risk scenario, where extended warranties on inverters are secured; and for a high-risk scenario, where standard warranties are held, and the inverters are replaced outside of warranty once in the 20-year study period.

Replacing inverters costs c. £2,000 per inverter. Extended (20 year) warranties are available for c. £1,850 per inverter.

		Burnham Park Hall	George Pitcher Memorial Recreation Ground Pavilion
Low-risk – extended warranties	Simple payback	9.4	8.2
	Average Return on Investment over 20 years	5.6%	7.3%
	Internal Rate of Return over 20 years	12%	14%
	Net Present Value over 20 years	£5,900	£8,400
High-risk – standard warranties, with cost of replacing all inverters once	Simple payback	8.6	7.6
	Average Return on Investment over 20 years	6.7%	8.2%
	Internal Rate of Return over 20 years	12%	15%
	Net Present Value over 20 years	£7,400	£9,100

We note that if inverters must be replaced twice in the 20 year study period, then the extended warranty scenarios perform better.

Planning permission

Burnham Park Hall is located in the Burnham conservation area, and a solar array must therefore comply with certain conditions to be considered a Permitted Development.

All the following conditions must be observed: ²	Condition met by this design?
<ul style="list-style-type: none"> Equipment should be sited, so far as is practicable, to minimise the effect on the external appearance of the building and the amenity of the area. 	Yes.
<ul style="list-style-type: none"> When no longer needed the equipment should be removed as soon as reasonably practicable. 	For future Hall owners, as appropriate.
All the following limits must be met:	
<ul style="list-style-type: none"> Solar panels installed on a wall or a pitched roof should project no more than 200mm from the wall surface or roof slope. 	Yes.
<ul style="list-style-type: none"> Where panels are installed on a flat roof the highest part of the equipment should not be more than one metre above the highest part of the roof (excluding the chimney). 	N/a – all panels on pitched roof.
<ul style="list-style-type: none"> Equipment mounted on a roof must not be within one metre of the external edge of that roof. 	Yes.
<ul style="list-style-type: none"> Equipment mounted on a wall must not be within one metre of a junction of that wall with another wall or with the roof of the building. 	N/a – no wall-mounted panels.
<ul style="list-style-type: none"> The panels must not be installed on a listed building or on a building that is within the grounds of a listed building, or on a site designated as a scheduled monument. 	N/a.
<ul style="list-style-type: none"> If the building is on Article 2(3) designated land (including conservation areas) the equipment must not be installed on a wall or a roof slope which fronts a highway. 	Yes – panels to be installed within Park boundary and away from highways.
<ul style="list-style-type: none"> If the equipment is on the roof of the building the capacity for generation of electricity across the whole of the site cannot exceed 1 megawatt. 	Yes – 30kWp capacity specified.
<ul style="list-style-type: none"> Other than microgeneration solar thermal equipment or microgeneration solar PV equipment, if there is to be any other solar PV equipment installed on the roof of a building then the Prior Approval (56 days) of the Local Planning Authority is required. This will assess the design and external appearance of the development, particularly in respect of the impact of glare on occupiers of neighbouring land. 	N/a – 30kWp system is “microgeneration solar PV”, so Prior Approval not required.

Since the George Pitcher Memorial Recreation Ground buildings are not subject to additional criteria, the proposed building mounted system will be considered a Permitted Development.

² https://www.planningportal.co.uk/info/200130/common_projects/52/solar_panels_-_non_domestic/2

Design Documents

Appendices A-H include the following documentation for the systems.

- Appendix A – optimum panel layout for Burnham Park Hall
- Appendix B – optimum panel layout for George Pitcher Memorial Recreation Ground
- Appendix C – electrical diagrams for connection to current electrical circuitry including inverter location for Burnham Park Hall
- Appendix D – electrical diagrams for connection to current electrical circuitry including inverter location for George Pitcher Memorial Recreation Ground
- Appendix E – loading reports and mounting system technical specification
- Appendix F – technical specification for solar array, including panel specification, strings and modules, inverter specification; meter specification
- Appendix G – G59/83 application and approval process management
- Appendix H – Health & Safety documentation

Risk log and mitigation approach

An updated risk log is also included as Appendix I.



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