Oxford Consulting Engineers Ltd
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Merchant Taylors' School and Merchant Taylors Preparatory School – Solar panel Roof load check

MARCH 2024

Report Reference: 2024393-MTS & MTP-Rpt1- Solar panel load check			
Date	**Revision**	**Author**	**Checked/Approved**
20h March 2024	A (first issue)	M Dickson	MKS

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1 Introduction

1.1. Oxford Consulting Engineers Limited (OCE) was appointed by Merchant Taylors' School (MTS) and Merchant Taylors' Preparatory School (MTPS), to undertake a structural loading assessment to determine the ability of the three structures to support the weight of proposed photovoltaic panel systems (Solar Panels). The three buildings are the sports hall and grounds maintenance buildings at MTS and the sports hall at MTPS.

1.2. The School have approached Powercor to provide proposals for the PV systems for each of the buildings. These proposals are included in appendix A of this report for convenience. The panels and their fixing bracketry have a total mass of 12.5kg per square metre. Furthermore, the units are 30mm deep. The 30mm dimension will present an obstacle to the flow of wind across the roof. However, in comparison to the wind loads on the walls and the roofs themselves, the additional wind load attracted by the PV panels is considered negligible and will not be considered further.

1.3. OCE visited the school on the 1st March 2024 to undertake a visual walkover survey of the structural form as no structural drawings were available to study. The purpose of the walkover inspection was to gain an understanding of the structural form of the buildings. Many of the structural elements were inaccessible and consequentially their sizes were unable to be measured. The three buildings were in very good conditions with no visual signs of structural defects.

1.4. The Sports Hall at the main school will be referenced building 1, the grounds maintenance building as building 2 and the sports hall at the prep school will be building 3.

2 The Existing buildings

2.1. **Building 1 (MTS Sports Hall)**

2.1.1. Building 1 was built circa in 1985. It is likely that it was designed in early 1984.

2.1.2. The main hall consists of a single [tall] storey hip-ended steel portal frame of rectilinear plan form. The 6° pitched roof consists of corrugated steel inner liner and outer sheets. It is likely that it forms a built-up system with a layer of insulation between the two sheets. No purlins were visible, so it is likely that the deep profile inner liner sheet supports itself, the insulation and outer water-proof sheet. The inner liner sheets were noted as spanning between the main steel rafters/hip members as can be seen in photograph 2 below.

2.1.3. The walls consist of blockwork and brickwork cavity wall construction. Vertical bracing could not be seen, and it is likely that it is encapsulated within the cavity wall construction.

Photograph 1 – External view MTS Sports Hall.

Photograph 2 – internal view MTS Sports Hall (main hall area).

Photograph 3 – Internal view MTS Sports Hall (roof over lean-to part).

2.1.4. To one side of the main hall is a two-storey 'lean-to' structure that accommodates offices for the Sport staff, and gym areas. The first floor contains cricket-nets. The principal roof members consist of trussed steel frames. Like the main hall, a built-up roof cladding system has been used.

2.2. **Building 2(MTS Grounds maintenance Buildings)**

2.2.1. Building 2 was built circa in 2008. It is likely that it was designed in 2007.

2.2.2. The structure consists of single storey steel portal frames forming a U-shape in plan. In plain stability is provided by portalisation action of the portal frames. A system of roof-plan and vertical bracing stabilises the building in the across-frame direction.

Photograph 4 – external view of MTS Grounds Maintenance building.

2.2.3. The 8° pitched roof consists of light-gauge galvanised steel purlins that support a trapezoidal profile inner liner sheet. That in turn supports insulation and the outer waterproofing sheets.

2.2.4. The walls are timber clad.

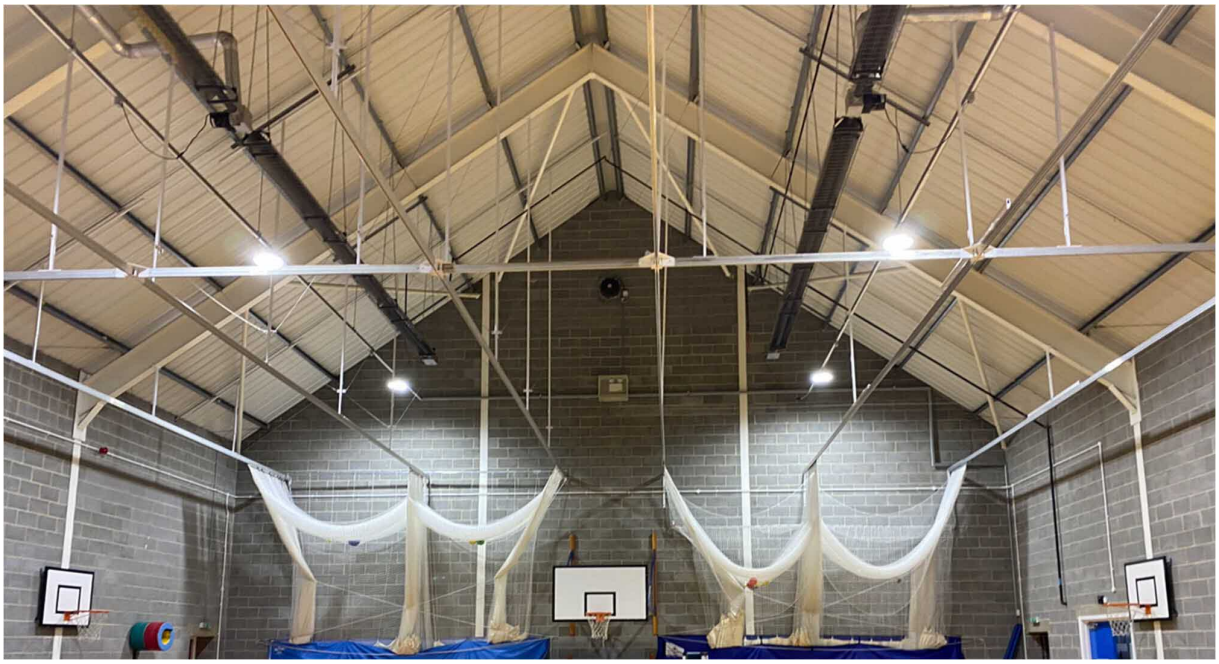
Photograph 5 – internal view showing the arrangement of roof members of the MTS Grounds Maintenance building.

2.3. **Building 3 (MTPS Sports Hall)**

2.3.1. Building 2 was opened in Dec 1996. It is likely that it was designed in 1995.

2.3.2. The main hall consists of a single [tall] storey gable-ended steel portal frame of rectilinear plan form. The 30° pitched roof consists of light-gauge galvanised steel purlins that support a trapezoidal profile inner liner sheet. That in turn supports insulation and a slate-tiled outer layer. It could not be determined to what the tiles have been fixed down to. A conventional build-up of timber rafters and battens may have been installed over the top of the internal liner sheets. Alternatively, timber battens may have been fixed to an outer liner sheet. Knowledge of this build-up is not relevant to this study. However, the fixing of the Solar panels to the roof will be influenced by the roof build-up and the installer will have to determine the best way of fixing down the panels to the roof structure.

Photograph 6 – external view of MTPS Sports hall.



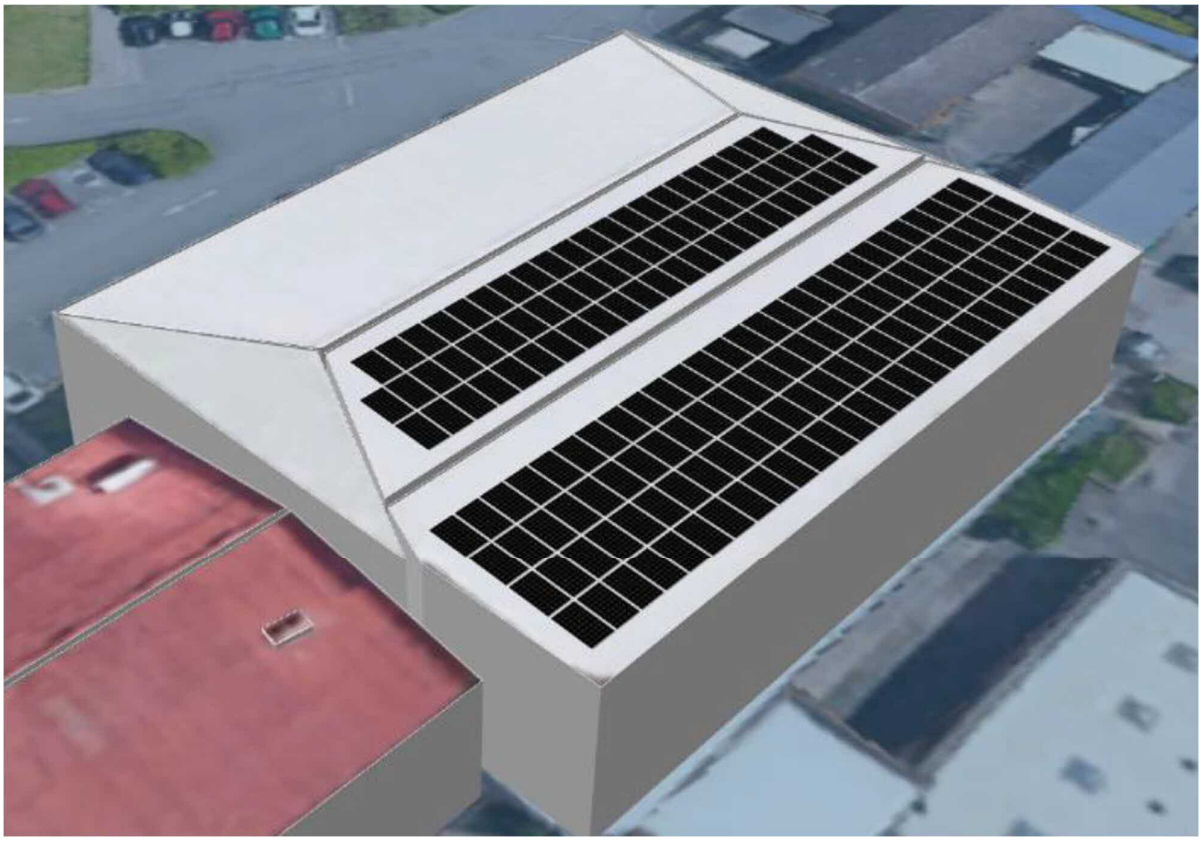
Photograph 7 – internal view of MTPS Sports hall's roof.

2.3.3. The walls consist of blockwork and brickwork cavity wall construction. Vertical bracing could not be seen, and it is likely that it is encapsulated within the cavity wall construction.

3 Proposed Solar panel installations

3.1. Powercor have prepared proposals for the installation of PV panels on each roof of the three buildings. These can be found in appendix A. Extracts from their proposals are replicated in figures 1 to 3 below.

Figure 1 – 3D view of PV layout on MTS Sports Hall roof (courtesy of Powercor)



3.2. The PV panels will be installed on the southern roof pitch of the main hall and the lean-to roof of the Sports Hall at MTS. It is assumed that no panels will ever be installed on the northern pitch.

3.3. The PV panels will be installed on the southern roof pitches of the two wings of the ground maintenance building's roof at MTS. It is assumed that no panels will ever be installed on the northern pitches or the linking part between the two wings.

3.4. The PV panels will be installed on the south-eastern roof pitch of the Sports hall's roof at MTPS. It is assumed that no panels will ever be installed on the northeastern pitch.

3.5. Powercor have confirmed that the mass of their system directly applied to the roofs is 12.5kg/m^2. This includes the panels, the fixings, the rails, and the cabling.

Figure 2 – 3D view of PV layout on MTS Grounds maintenance building's roof (courtesy of Powercor)

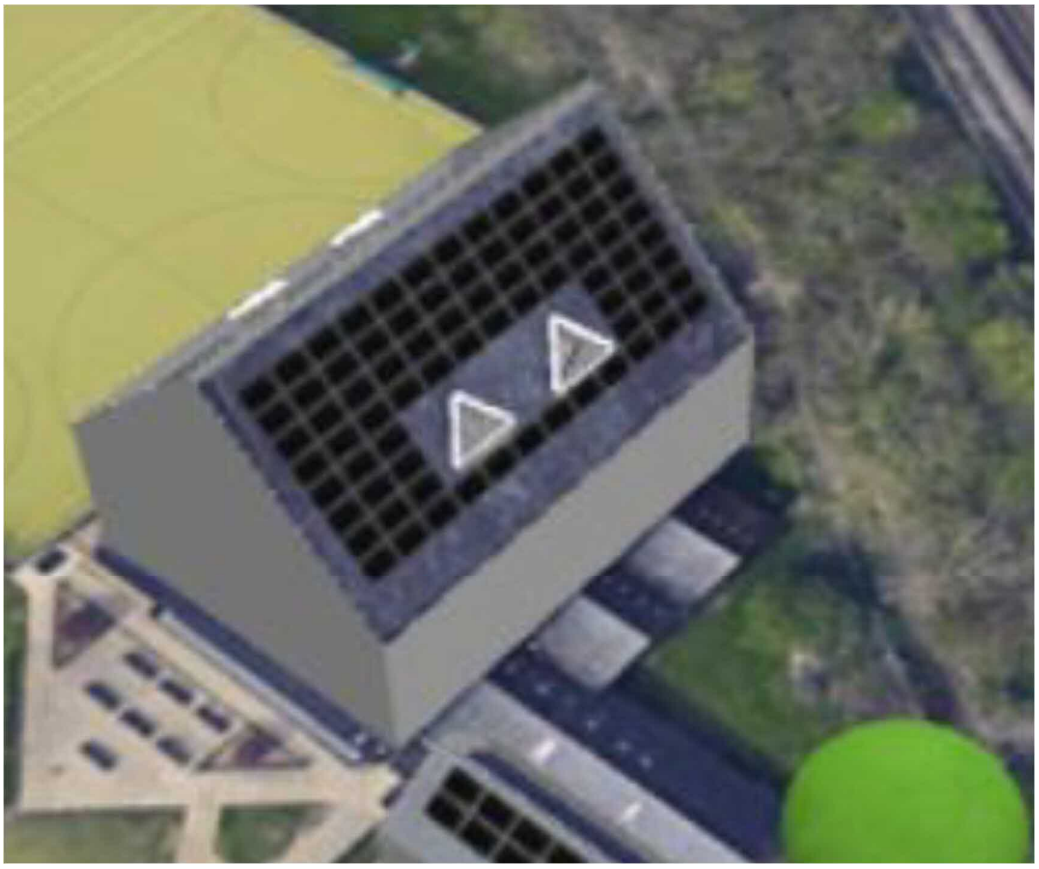


Figure 3 – 3D view of PV layout on MTPS Sports hall building's roof (courtesy of Powercor)

4 Codes of practice

4.1. The relevant British standards codes of practice went through a process of change during the 1980's. The original Engineer and Architect have ceased trading and no records of their calculations or drawings are available. Without such information it cannot be determined, with absolute certainty, what versions of the CoPs were used within the original design. However, it is reasonable to make the following assumptions:-

4.1.1. Code of practice CP3, chapter V was first published in 1952, and had a major revision in 1967. This CoP gave recommendations on, amongst other things, the imposed loads to which roofs should be designed to support. In February of 1984 this CoP was withdrawn and replaced by BS6399. Initially BS6399 gave recommendations for all types of loads (dead, imposed and wind) to which a building should have been designed to withstand. However, in 1988 BS6399 part 3 was first published, and it specifically covered recommendations for imposed roof loads. BS6399, part 3 was revised in September of 1996.

To summarise the following codes of practice for determining the design-imposed loads that should have been used at the various points in time:-

- CP3, chapter V (1967) for buildings designed between 1967 and Feb 1984.
- BS6399 (1984) for buildings designed after Feb 1984 until May 1988.
- BS6399 (1988), part 3 for buildings designed after May 1988.

4.1.2. Building 1 was thought to have been designed in early 1984. Therefore, it is a reasonable assumption to make that CP3, Chapter V (1967) would have been used to determine the design-imposed roof loads.

4.1.3. Building 2 was thought to have been designed in 2008. Therefore, it is a reasonable assumption to make that BS6399 (1988), part 3 would have been used to determine the design-imposed roof loads.

4.1.4. Building 3 was thought to have been designed in 1995. Therefore, it is a reasonable assumption to make that BS6399 (1988), part 3 would have been used to determine the design-imposed roof loads.

5 Load assessment approach

5.1. The first stage in the assessment is to make a simple comparison between the imposed roof loading allowances that the original building designers would have likely used and the loads that will likely be imposed on the roofs by the PV panel proposals will be made. If the load comparison is below unity (100%) then no further checks are necessary. However, if the comparison is greater than 100% then a *back-analysis* of the frame would be necessary.

5.2. Although the solar panels will attract some additional wind loads, the overall increase in wind loads on the buildings is considered very small, and negligible. Therefore, a wind analysis and comparison has not been undertaken. Only imposed loads need be considered further. Refer to the calculations in appendix B.

5.3. Snow tends to drift and accumulate in valleys of roofs or up against obstructions (for example chimneys). However, for all three roofs the solar panels will be installed on parts of the roofs with no such obstructions. Therefore, the effect of drifting snow in this assessment has not been considered.

6 Load assessment comparisons

6.1. The original design-imposed roof load is calculated for each building in the calculations in appendix B. The figures represent the **allowable** imposed loads. An assessment of the proposed imposed roof load is then made. That load is a summation of the weight of the PV solar panels, bracketry, cabling, snow load and maintenance access loads. It should be noted that although these loads have been considered as additive, it is unlikely that the roof will be accessed for maintenance whilst there is snow on the roof. Therefore, this proposed load may be considered as a conservatively high figure.

6.2.

	Original design-imposed roof load (kN/m^2) = load allowance (A)	**Imposed roof load from proposals (kN/m^2) (B)**	**Ratio of B to A as a %**	**Pass/Fail**
Building 1 – MTS Sports Hall	0.75	0.50	67%	Pass
Building 2 – MTS Ground Maintenance Building	0.60	0.50	83%	Pass
Building 3 – MTPS Sports Hall	0.60	0.50	83%	Pass

Table 1 – Comparison between allowable imposed roof loads and the imposed roof loads from the Solar panel proposals.

6.3. Table 1 above compares the design-imposed roof loads that the roof would likely have been designed to support with the loads from the proposed Solar panels. For all three buildings considered it is concluded that the Solar Panels, because the b to A ratio is less than unity, that the Solar panels will not overload the roofs.

7 Final Conclusion and Recommendations

7.1. The installation of the proposed Solar panel systems will not overload the roofs or their supporting structures [including foundations]. That is, the system proposed by Powercor may be installed on the roofs.

7.2. If another manufacturer or product is selected, then this load-assessment must be repeated.

7.3. If the layout of the Solar panels were to vary in the future then this load assessment must be repeated.

7.4. Beyond the addition of the Solar panels, no further loads are to be added to the roof structures without seeking the advice of a Structural Engineer.

7.5. The load carrying capacity of roof lights often does not reach the same level as that of the cladding, purlins, and primary structural elements. That is, they are often more fragile. It is therefor recommended that the solar panels are not installed over, or within 250mm of, a roof light.

7.6. Although Snow and roof access loads were considered additive in this assessment, it is recommended that access to the roofs is not permitted when snow is laying on the roofs.

APPENDIX A: Powercor proposals

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PROPOSAL PACK

Covering letter

Dear John

13.02.2024

Merchant Taylors School Sports Hall V2

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Thank you for asking Powercor to provide you with a proposal for a microgeneration system. We have pleasure in enclosing our proposal for the work:

our quote
a diagram showing the location of the main components /a design of the system
an estimate of the performance you can expect to get including the sunpath diagram to estimate the shading on your system
our terms of business, and
a cancellation form in case you change your mind.

We have also set out some key points you need to be aware of should you decide to go ahead.

Please note the quote is not based on a site survey.

Powercor is a member of the Renewable Energy Consumer Code (RECC), member no. 00044977. A leaflet describing the Code is included with this proposal.

This letter and the items above make up our proposal. Once you've had a chance to look through them, if you wish to proceed please complete the **Order Form** and return it to Powercor. When we have received your order we will contact you to arrange delivery and installation dates.

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Before you go ahead:

1. Planning Permission and Building Control

If your property is a listed building or you are in a conservation area you may need planning permission. You are responsible for contacting your local planning authority to obtain confirmation that planning permission is not required. [1]

2. Roof Structure

We believe your roof is suitable for the proposed installation.
You may want to obtain an independent opinion on the condition of your roof for the proposed installation and it is recommended that you pay for a Structural Engineers Report.

3. Insurance

It is recommended that you inform your property insurers about the proposed installation to check if it will increase your buildings insurance premium.

Powercor has appropriate insurance to cover possible third-party damage, which may be caused by any of our activities in supplying a small-scale energy generator to you. We are insured by Allianz Insurance Plc.

When you confirm the order and we receive your deposit, we will register your name and address and total value of the contract with the Insurance Scheme Administrator, IWA. You will be sent

[1] Powercor cannot be held responsible for any installations carried out where planning permission was required but not obtained and we cannot offer refunds in such cases.

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insurance policy documents directly. A leaflet explaining the scheme is enclosed. If you are not content for us to register your details in this way, please let us know.

4. Data protection

Please be assured Powercor will keep information about you in accordance with data protection legislation and will not pass information to any third party without your permission.

As members of RECC, we may be required to provide the RECC Administrator with information relating to our contacts with you as part of RECC's monitoring procedures; this information may include your personal data. Please see the RECC Use of Personal Data Notice for information on how RECC would use and store this data.

Your installation

1. Timetable for Works

We will agree installation dates with you in writing after the order has been confirmed and we have received your deposit, if we have asked you for one. It usually takes 5 days to install a system, including the erection and removal of scaffolding. Your installation will usually take place within 2 weeks of receiving your order, subject to work load and availability of materials.

Please note: We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. For more information about your right to cancel the contract see the '*Cancellation Period and your right to cancel*' in your quote document.

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2. Commissioning the system

We will commission your system in line with MCS installation standards to ensure that the system is safe, has been installed in accordance with documented procedures and manufacturer's requirements and is operating correctly in accordance with the system design.

Following the testing and commissioning of the system, a detailed operating manual will be provided to you within 10 days including an MCS certificate if the system is smaller than 50Kw gross.

3. After Sales Support and Maintenance

Although Solar PV is reasonably 'fit and forget' technology, certain parts such as the inverter may need servicing or have to be replaced in the lifetime of the panels.

Powercor will provide a basic maintenance program for the client to follow to ensure the system is working as best as it can.

Powercor provides optional servicing and/or maintenance contracts at additional cost.

4. Guarantees

Your equipment is guaranteed by its manufacturer. The guarantees are:

20 years for solar panels

5-10 years for the inverter

This depends if an additional warranty has been taken out by client.

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Any products damaged during installation shall be replaced free of charge.

We guarantee our workmanship for 2 years from date of install. This workmanship warranty will be transferable to the new legal owner of the property if it is sold during the warranty period.

5. Workmanship warranty insurance

As members of the Renewable Energy Consumer Code, we are required to have arrangements in place so that your workmanship warranty from us will still be honoured if we should go out of business during the warranty period.

You will receive a policy from IWA which gives details of the workmanship warranty insurance.

6. The Smart Export Guarantee (SEG)

We will register your installation on the MCS Installation database and send you the MCS Certificate as soon as possible and certainly no later than 10 days after the installation is commissioned.

If you are looking to register for a Smart Export tariff, you will need to send your MCS certificate and any other information that may be required to the licensed electricity supplier with whom you have contracted for their Smart Export tariff. You can read more information about the SEG from Ofgem, the energy regulator, here:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg
Ofgem's guidance for generators like you, is available at:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/generators

The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

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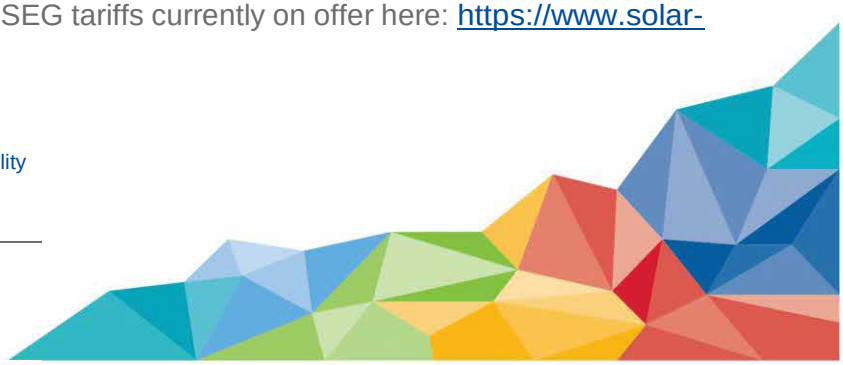

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MODEL PV PERFORMANCE ESTIMATE

Predicted System Performance for Solar PV Installations

The UK Microgeneration Certification Scheme (MCS) requires all certified companies to give an assessment of solar PV system performance based on the standard MCS procedure in Microgeneration Installation Standard MIS3002, Issue 3.5 and Issue 4.0 from 16 March 2021[2].

Important Note: The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure and is given as guidance only. It should not be considered as a guarantee of performance.

The Solar PV self-consumption has been calculated in accordance with the most relevant methodology for your system. There are a number of external factors that can have a significant effect on the amount of energy that is self-consumed so this figure should not be considered as a guarantee of the amount of energy that will be self-consumed.

In optimal circumstances (a property in the south of the UK with an unshaded south-facing roof sloping at an angle of 35°) an 3.0 kWp PV system typically generates 2800 kWh.

2

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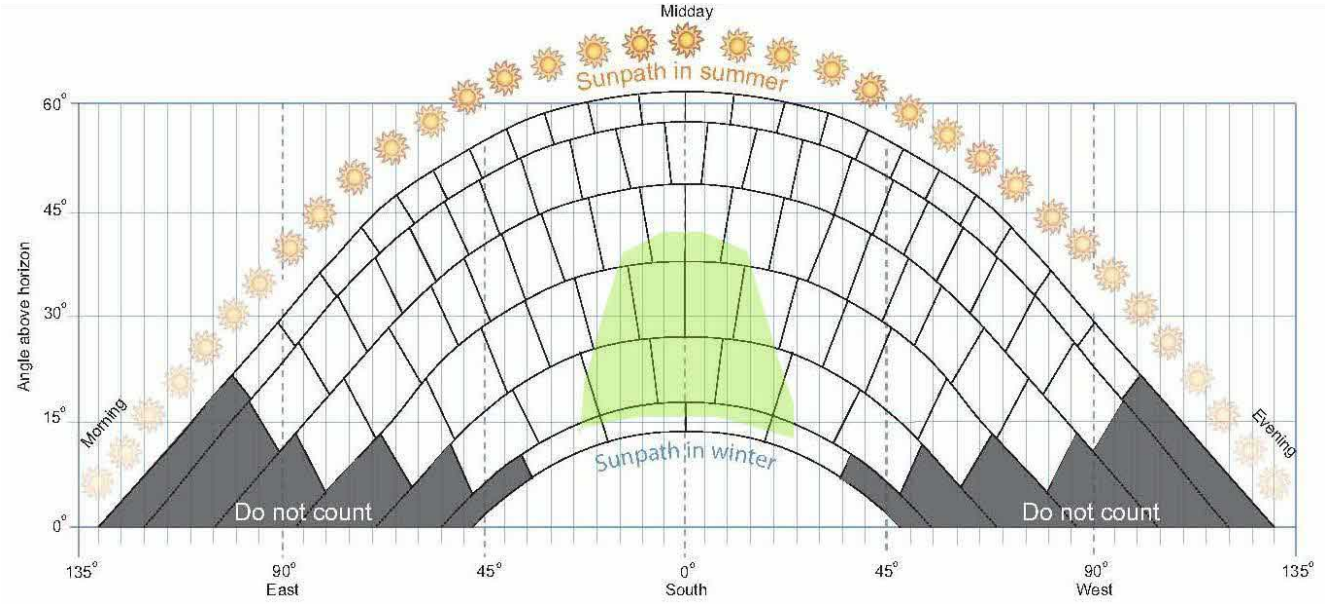
Your system is predicted to produce 68136.35 kwh

To calculate this, we take:

the size of your system (in kWp)
how much solar radiation the system is estimated to get (the 'solar radiation input factor' or Kk for short). We use official tables to estimate this which take into account your postcode region, the inclination (or tilt) of your roof and its orientation (which direction it faces)
how much shading there is on the system (the 'shade factor' or SF), such as from surrounding trees, chimneys, shadow from nearby buildings). If there is no shading, the SF equals 1.
We have estimated this using the sunpath diagram below.



In addition, we estimate the proportion of this output that you can be expected to consume on-site ('self-consumption') in the first year in kWh. In accordance with MCS guidance, this estimate is based on your estimated annual use of electricity and also on your household's pattern of being at home or not during the day in comparison with certain 'archetypes'. You have told us that your household's 'occupancy' is closest to the following 'archetype': [delete as applicable]
Home all day (at least one person is in between 9 am and 5pm on weekdays)
Home half day (the home is typically empty either all morning or all afternoon on weekdays)
Out all day (the home is typically empty on weekdays)

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The calculation we do is:

kWp (size of system) x Kk (solar radiation input factor) x SF (shade factor)

A. Installation data	
Installed capacity of PV system	76.13kWp
Orientation of the PV system –degrees from south	10°
Inclination of system –degrees from horizontal	10°
Postcode region	Zone 1
B. Performance calculations	
kWh/kWp (Kk) from table	895Kwh
Shade factor (SF)	1
Estimated annual output (kWP x Kk x SF)	68136.35kwh

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DISCLAIMERS

1. Shading will be present on your system that will reduce its output to the factor stated. This factor was NOT calculated using the MCS shading methodology but we can confirm that the system as quoted, taking into account the shading present, will deliver at least 90% of the energy (in kWh) as set out in this performance estimate.

2. This system performance calculation has been undertaken using estimated values for array orientation, inclination or shading. Actual performance may be significantly lower or higher if the characteristics of the installed system vary from the estimated values.

3. If we have had to estimate or take remotely any of the factors that affect this estimate, we will carry out a full site survey before installation commences. If this survey results in a lower performance estimate than in this quote, then we will issue you with a new quotation and you will have a new Cancellation Period in line with your Cancellation Rights set out in the contract in which to consider it.

ADDITIONAL ESTIMATE USING X, Y, Z

An additional estimate using alternative calculation methods is also provided:

Estimated system performance using Solar Edge	
Energy Supplied annually by solar system –Solar Input	72750kWh

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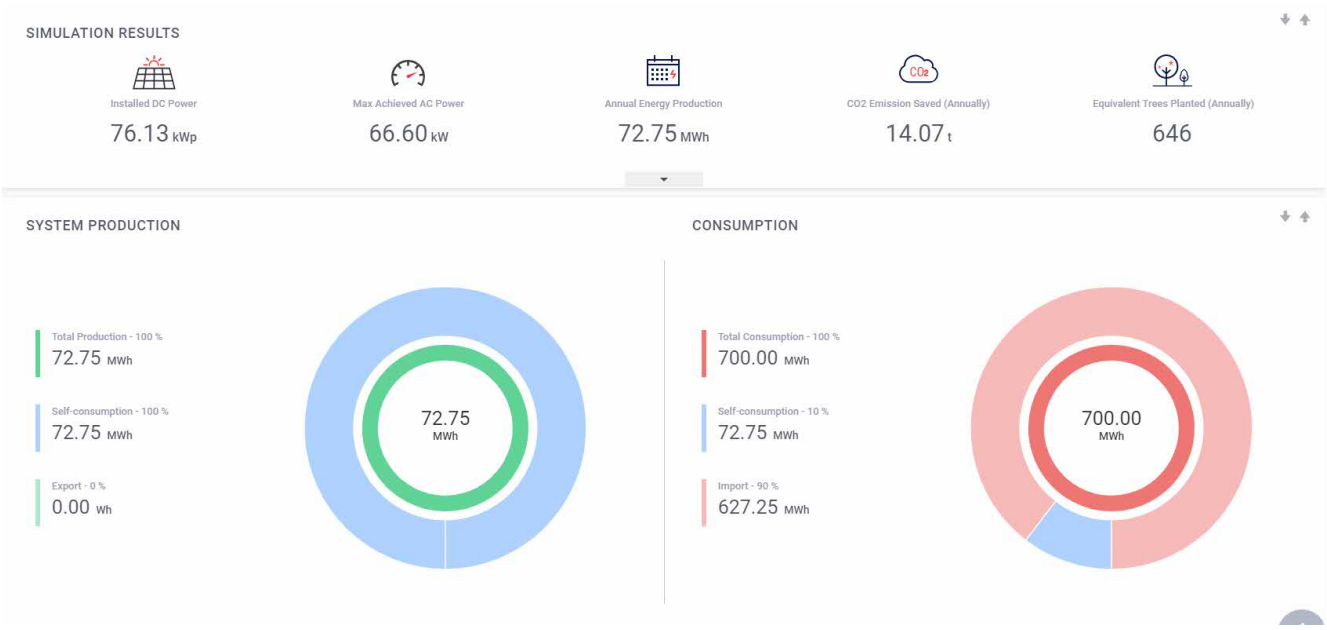

This estimate has been produced using a methodology /assumptions that differ from the standard MCS procedure for estimating performance. You should consider both estimates together.

Getting the most out of your solar PV system

Based on your current bills, your electricity requirement is 700000 kWh per year. (Compare this to the average medium-use UK household which uses 2,900 kWh of electricity each year, according to latest figures available from energy regulator Ofgem.) You will be able to meet some of this requirement in daylight hours with the electricity generated by your solar PV system. The more you can use electricity in the daytime, when the system is generating, the more you can save on the electricity you need to buy (or 'import') from your electricity company.

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Even if you are not at home during most of the day, you could put your appliances (such as washing machines and dishwashers) on timers to run during daylight hours. The average washing machine runs through hundreds of cycles a year and a typical 7kg machine will cost typically between £25 –£35 a year to run (source: Energy Saving Trust). So you could save that just by doing your washing in daylight hours. Running other appliances when the solar PV is generating will also save you money.

You can get the best out of your system by keeping panels clean. Trimming foliage to reduce shading. Changing usage habits.

Smart Export Guarantee

If you **use** some of the electricity that your panels generate in daylight hours, you will **save** on your electricity bill because you will be able to use less electricity from your electricity supplier (see 'Getting the most out of your PV system', above)

You may also be able to get paid for any electricity that your system generates that you do **not** use in your home but instead feed in or 'export' to the electricity grid. Under the Smart Export Guarantee (SEG) scheme, certain energy suppliers must offer to pay you for this exported electricity. The SEG is a payment from your chosen provider for the kilowatt hours (kWh) of electricity that your Solar PV system generates but which you don't use or store in your home and which is instead fed back (or 'exported') into the electricity grid. Your export meter will measure how many kWh you export and the electricity supplier you sign up with will pay you for this export at the rate per kWh you and the supplier agree. They may ask you to provide an MCS certificate to prove your installation meets the required standard for you to receive the SEG.

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For more information about the SEG from Ofgem, the energy regulator, see: https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg

For Ofgem's guidance for generators like you, see: https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/generators

The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

BENEFITS

Installed system size	76.13 KWp
Estimated annual system output using standard MCS procedure	68136.35 KWh

Electricity savings: i.e. what you will save by using the electricity generated by your PV system rather than paying to import those kWh from the electricity grid at your current electricity tariff. We estimate this to be:

Solar Consumption –(Solaredge) 72750 KWh x 0.34p = £24,735.00

Export 00.00Kwh

Estimated annual savings - **£24,735.00**

Your savings from using some of the electricity generated will increase if electricity prices rise.

Smart Export Guarantee: to estimate your potential income from the SEG, compare:

A. our estimate of how much your system will produce and
B. how much of that estimated output will be self-consumption ie how many kWh it is estimated you will consume in your home.

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C. Subtract B from A to give the kWh available for export
D. Multiply C (the kWh available for export) x the SEG tariff offered by your chosen supplier per kWh.

For example, if your system is estimated to produce 3000kWh (A) and your self-consumption is estimated to be half of this or 1500kWh (B), then there will be 1500kWh (A –B) for export.

More information

The Energy Saving Trust's website has lots of useful information. Check out

https://energysavingtrust.org.uk/energy-at-home/generating-renewable-energy/

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MODEL SOLAR PV QUOTE AND ORDER FORM

Powercor LTD
23 Trade City
Avro Way
Weybridge
KT13 0YF

Dear Merchant Taylor School Sports Hall

HA62HT

[redacted]

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2. If you request changes that involve us in additional time or cost, or if unforeseen additional works are required, we will provide you with a revised quote. Any additional charges will be based on the installers hourly rate of £50.
3. You may have additional costs to pay for planning permission, building control fee and /or a Structural Engineers Survey.
4. This quote excludes structural reports.
5. We enclose a copy of Powercor terms of business/ contract with this quote. Please read this carefully.
6. The battery element and any additional items (iboost/pigeon protection etc) are not covered by the MCS, these are only on the quotation to streamline the costs and make it clear for what you are paying for.

Performance estimate

We have estimated that this system will produce 72250kwh a year. Please see the attached '**Predicted System Performance for Solar PV installations.**

Sub-contracting installation Works

Powercor will subcontract Scaffolding BTW Scaffolding. In accordance with the Renewable Energy Consumer Code Consumer Code, Powercor is responsible for ensuring that all sub-contracted works are carried out to standards required by MCS and RECC.

[redacted]th

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If we cannot resolve your complaint, you may be able to complain to RECC. You can read about this here: www.recc.org.uk/consumers/how-to-complain

Powercor LTD
23 Trade City
Avro Way
Weybridge
KT13 0YF

Order Form

Consumer name:	
Site address:	
Reference Number:	**MTSH V2**
Date of Quote:	

To accept the quotation please sign and return this page to Powercor – support@powercor.co.uk. Or the person that provided you with the quotation.
We / I agree to the quotation and confirm the order for the products and installation services specified.
We / I agree to the total cost and payment terms set out above.
We / I have read and agree to abide by Powercor Terms and Conditions provided with the quotation

Name:	
Signature:	
Date:	

[redacted]

Cancellation period and your right to cancel

You have the right to cancel this contract during the 'cancellation period' without giving any reason.

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Your cancellation period – the time you have to change your mind and cancel the contract without any penalty - starts when you sign the contract and ends 14 days after all of the goods relating to the contract have been delivered to you.

To exercise the right to cancel, you must inform us of your decision to cancel this contract by a clear statement (e.g. a letter sent by post, fax or e-mail). You may use the attached model cancellation form, but it is not obligatory.

[redacted]

If you cancel within the cancellation period, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

Effects of cancellation within the cancellation period

If you cancel this contract within the cancellation period we will reimburse to you all payments received from you. If you cancel this contract within the cancellation period but after delivery of some or all of the goods, then we will reimburse to you all payments for delivery charges unless you specifically requested an enhanced delivery costing more than our normal service. In which case we will only reimburse the price of our normal delivery charges.

If you cancel this contract within the cancellation period but after delivery of some or all of the goods then:

We will collect the goods from you.

We will make the reimbursement without undue delay, and not later than:

- 14 days after the day we receive back from you any goods supplied; or
- if there were no goods supplied, 14 days after the day on which we are informed about your decision to cancel this contract.

We will make the reimbursement using the same means of payment as you used for the initial transaction, unless you have expressly agreed otherwise; in any event, you will not incur any fees as a result of the reimbursement.

We may withhold reimbursement until we have received the goods back or you have supplied evidence of having sent back the goods, whichever is the earliest.

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We may make a deduction from the reimbursement for loss in value of any goods supplied, if the loss is the result of unnecessary handling by you.

Starting the installation before the end of the cancellation period

We do not normally start any work until the end of your cancellation period, that is 14 days after the last part of the goods relating to the contract is delivered to you. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing and you should describe why you need the work to start within the cancellation period.

Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

Cancellation period and your right to cancel

You have the right to cancel this contract during the cancellation period without giving any reason.

After signing this contract you have a Cancellation Period of 14 days during which you may cancel the contract without penalty. If you cancel within this time, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

You must cancel in writing, by post or email, to us at the above address. We have provided a cancellation form with this quotation.

We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

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PROPOSAL PACK

Covering letter

Dear John

13.02.2024

RE: Merchant Taylor Maintenance Shed V2

Electrical & Mechanical | Energy Saving & Sustainability
Facilities Management | Security & Life Safety

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Thank you for asking Powercor to provide you with a proposal for a microgeneration system. We have pleasure in enclosing our proposal for the work:

our quote
a diagram showing the location of the main components /a design of the system
an estimate of the performance you can expect to get including the sunpath diagram to estimate the shading on your system
our terms of business, and
a cancellation form in case you change your mind.

We have also set out some key points you need to be aware of should you decide to go ahead.

Please note the quote is not based on a site survey.

Powercor is a member of the Renewable Energy Consumer Code (RECC), member no. 00044977. A leaflet describing the Code is included with this proposal.

This letter and the items above make up our proposal. Once you've had a chance to look through them, if you wish to proceed please complete the **Order Form** and return it to Powercor. When we have received your order we will contact you to arrange delivery and installation dates.

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Before you go ahead:

1. Planning Permission and Building Control

If your property is a listed building or you are in a conservation area you may need planning permission. You are responsible for contacting your local planning authority to obtain confirmation that planning permission is not required. [1]

2. Roof Structure

We believe your roof is suitable for the proposed installation.
You may want to obtain an independent opinion on the condition of your roof for the proposed installation and it is recommended that you pay for a Structural Engineers Report.

3. Insurance

It is recommended that you inform your property insurers about the proposed installation to check if it will increase your buildings insurance premium.

Powercor has appropriate insurance to cover possible third-party damage, which may be caused by any of our activities in supplying a small-scale energy generator to you. We are insured by Allianz Insurance Plc.

[1] Powercor cannot be held responsible for any installations carried out where planning permission was required but not obtained and we cannot offer refunds in such cases.

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When you confirm the order and we receive your deposit, we will register your name and address and total value of the contract with the Insurance Scheme Administrator, IWA. You will be sent insurance policy documents directly. A leaflet explaining the scheme is enclosed. If you are not content for us to register your details in this way, please let us know.

4. Data protection

Please be assured Powercor will keep information about you in accordance with data protection legislation and will not pass information to any third party without your permission.

As members of RECC, we may be required to provide the RECC Administrator with information relating to our contacts with you as part of RECC's monitoring procedures; this information may include your personal data. Please see the RECC Use of Personal Data Notice for information on how RECC would use and store this data.

Your installation

1. Timetable for Works

We will agree installation dates with you in writing after the order has been confirmed and we have received your deposit, if we have asked you for one. It usually takes 5 days to install a system, including the erection and removal of scaffolding. Your installation will usually take place within 2 weeks of receiving your order, subject to work load and availability of materials.

Please note: We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. For more information about your right to cancel the contract see the '*Cancellation Period and your right to cancel*' in your quote document.

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2. Commissioning the system

We will commission your system in line with MCS installation standards to ensure that the system is safe, has been installed in accordance with documented procedures and manufacturer's requirements and is operating correctly in accordance with the system design.

Following the testing and commissioning of the system, a detailed operating manual will be provided to you within 10 days including an MCS certificate if the system is smaller than 50Kw gross.

3. After Sales Support and Maintenance

Although Solar PV is reasonably 'fit and forget' technology, certain parts such as the inverter may need servicing or have to be replaced in the lifetime of the panels.

Powercor will provide a basic maintenance program for the client to follow to ensure the system is working as best as it can.

Powercor provides optional servicing and/or maintenance contracts at additional cost.

4. Guarantees

Your equipment is guaranteed by its manufacturer. The guarantees are:

20 years for solar panels

12 years for the inverter

This depends if an additional warranty has been taken out by client.

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Any products damaged during installation shall be replaced free of charge.

We guarantee our workmanship for 2 years from date of install. This workmanship warranty will be transferable to the new legal owner of the property if it is sold during the warranty period.

5. Workmanship warranty insurance

As members of the Renewable Energy Consumer Code, we are required to have arrangements in place so that your workmanship warranty from us will still be honoured if we should go out of business during the warranty period.

You will receive a policy from IWA which gives details of the workmanship warranty insurance.

(Domestic only)

6. The Smart Export Guarantee (SEG)

We will register your installation on the MCS Installation database and send you the MCS Certificate as soon as possible and certainly no later than 10 days after the installation is commissioned.

If you are looking to register for a Smart Export tariff, you will need to send your MCS certificate and any other information that may be required to the licensed electricity supplier with whom you have contracted for their Smart Export tariff. You can read more information about the SEG from Ofgem, the energy regulator, here:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg
Ofgem's guidance for generators like you, is available at:
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The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

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MODEL PV PERFORMANCE ESTIMATE

Predicted System Performance for Solar PV Installations

The UK Microgeneration Certification Scheme (MCS) requires all certified companies to give an assessment of solar PV system performance based on the standard MCS procedure in Microgeneration Installation Standard MIS3002, Issue 3.5 and Issue 4.0 from 16 March 2021[2].

Important Note: The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure and is given as guidance only. It should not be considered as a guarantee of performance.

The Solar PV self-consumption has been calculated in accordance with the most relevant methodology for your system. There are a number of external factors that can have a significant effect on the amount of energy that is self-consumed so this figure should not be considered as a guarantee of the amount of energy that will be self-consumed.

In optimal circumstances (a property in the south of the UK with an unshaded south-facing roof sloping at an angle of 35°) an 3.0 kWp PV system typically generates 2800 kWh.

2

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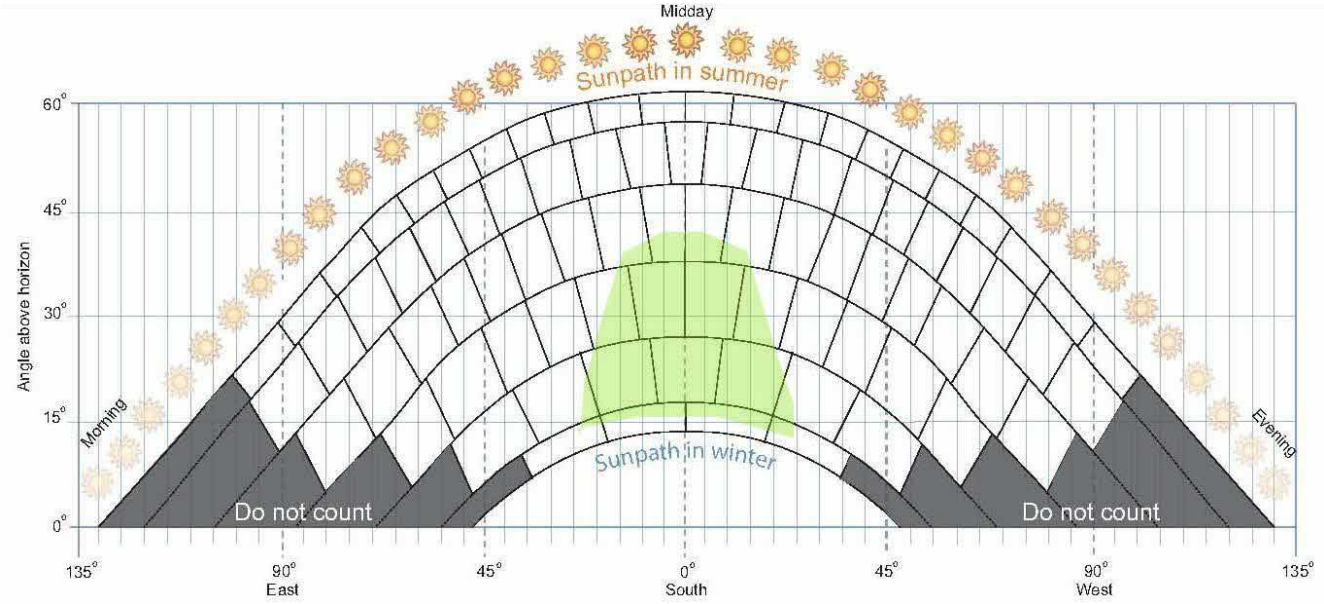
Your system is predicted to produce 32541.02Kwh

To calculate this, we take:

the size of your system (in kWp)
how much solar radiation the system is estimated to get (the 'solar radiation input factor' or Kk for short). We use official tables to estimate this which take into account your postcode region, the inclination (or tilt) of your roof and its orientation (which direction it faces)
how much shading there is on the system (the 'shade factor' or SF), such as from surrounding trees, chimneys, shadow from nearby buildings). If there is no shading, the SF equals 1.
We have estimated this using the sunpath diagram below.



In addition, we estimate the proportion of this output that you can be expected to consume on-site ('self-consumption') in the first year in kWh. In accordance with MCS guidance, this estimate is based on your estimated annual use of electricity and also on your household's pattern of being at home or not during the day in comparison with certain 'archetypes'. You have told us that your household's 'occupancy' is closest to the following 'archetype': [delete as applicable]
Home all day (at least one person is in between 9 am and 5pm on weekdays)
Home half day (the home is typically empty either all morning or all afternoon on weekdays)
Out all day (the home is typically empty on weekdays)

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The calculation we do is:

kWp (size of system) x Kk (solar radiation input factor) x SF (shade factor)

A. Installation data	
Installed capacity of PV system	34.37 KWp
Orientation of the PV system –degrees from south	15
Inclination of system –degrees from horizontal	21°
Postcode region	Zone 1
B. Performance calculations	
kWh/kWp (Kk) from table	946kwh
Shade factor (SF)	1
Estimated annual output (kWP x Kk x SF)	**32541.02Kwh**

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DISCLAIMERS

1. Shading will be present on your system that will reduce its output to the factor stated. This factor was NOT calculated using the MCS shading methodology but we can confirm that the system as quoted, taking into account the shading present, will deliver at least 90% of the energy (in kWh) as set out in this performance estimate.

2. This system performance calculation has been undertaken using estimated values for array orientation, inclination or shading. Actual performance may be significantly lower or higher if the characteristics of the installed system vary from the estimated values.

3. If we have had to estimate or take remotely any of the factors that affect this estimate, we will carry out a full site survey before installation commences. If this survey results in a lower performance estimate than in this quote, then we will issue you with a new quotation and you will have a new Cancellation Period in line with your Cancellation Rights set out in the contract in which to consider it.

ADDITIONAL ESTIMATE USING X, Y, Z

An additional estimate using alternative calculation methods is also provided:

Estimated system performance using Solar Edge	
Energy Supplied annually by solar system –Solar Input	33180KWh

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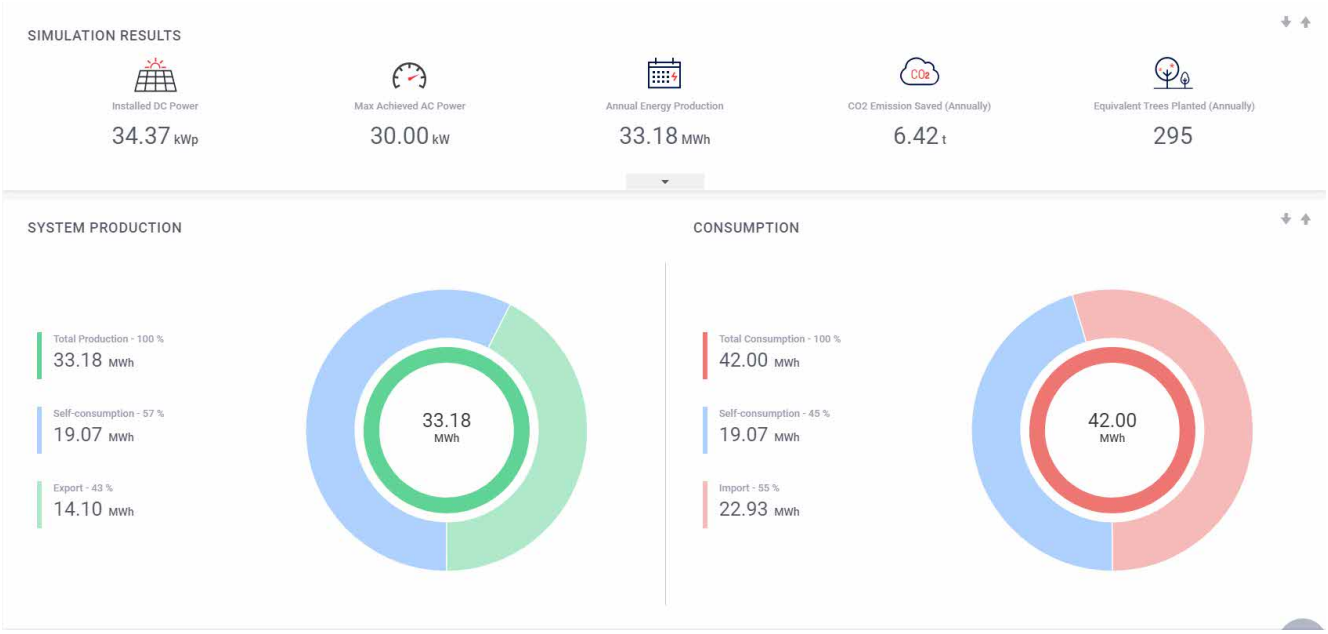

This estimate has been produced using a methodology /assumptions that differ from the standard MCS procedure for estimating performance. You should consider both estimates together.

Getting the most out of your solar PV system

Based on your current bills, your electricity requirement is kWh per year. (Compare this to the average medium-use UK household which uses 2,900 kWh of electricity each year, according to latest figures available from energy regulator Ofgem.) You will be able to meet some of this requirement in daylight hours with the electricity generated by your solar PV system. The more you can use electricity in the daytime, when the system is generating, the more you can save on the electricity you need to buy (or 'import') from your electricity company.

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Even if you are not at home during most of the day, you could put your appliances (such as washing machines and dishwashers) on timers to run during daylight hours. The average washing machine runs through hundreds of cycles a year and a typical 7kg machine will cost typically between £25 –£35 a year to run (source: Energy Saving Trust). So you could save that just by doing your washing in daylight hours. Running other appliances when the solar PV is generating will also save you money.

You can get the best out of your system by keeping panels clean. Trimming foliage to reduce shading. Changing usage habits.

Smart Export Guarantee

If you **use** some of the electricity that your panels generate in daylight hours, you will **save** on your electricity bill because you will be able to use less electricity from your electricity supplier (see 'Getting the most out of your PV system', above)

You may also be able to get paid for any electricity that your system generates that you do **not** use in your home but instead feed in or 'export' to the electricity grid. Under the Smart Export Guarantee (SEG) scheme, certain energy suppliers must offer to pay you for this exported electricity. The SEG is a payment from your chosen provider for the kilowatt hours (kWh) of electricity that your Solar PV system generates but which you don't use or store in your home and which is instead fed back (or 'exported') into the electricity grid. Your export meter will measure how many kWh you export and the electricity supplier you sign up with will pay you for this export at the rate per kWh you and the supplier agree. They may ask you to provide an MCS certificate to prove your installation meets the required standard for you to receive the SEG.

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For more information about the SEG from Ofgem, the energy regulator, see: https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg

For Ofgem's guidance for generators like you, see: https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/generators

The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

BENEFITS

Installed system size	34.37 KWp
Estimated annual system output using standard MCS procedure	32541.02 Kwh

Smart Export Guarantee: to estimate your potential income from the SEG, compare:

A. our estimate of how much your system will produce and
B. how much of that estimated output will be self-consumption ie how many kWh it is estimated you will consume in your home.
C. Subtract B from A to give the kWh available for export
D. Multiply C (the kWh available for export) x the SEG tariff offered by your chosen supplier per kWh.

For example, if your system is estimated to produce 3000kWh (A) and your self-consumption is estimated to be half of this or 1500kWh (B), then there will be 1500kWh (A –B) for export.

More information

The Energy Saving Trust's website has lots of useful information. Check out

https://energysavingtrust.org.uk/energy-at-home/generating-renewable-energy/

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MODEL SOLAR PV QUOTE AND ORDER FORM

Powercor LTD
23 Trade City
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Weybridge
KT13 0YF

Dear Merchant Taylor School Maintenance Shed Prep

WD31LW

[redacted]

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Please note:

1. This quote has not been prepared following a site visit.
2. If you request changes that involve us in additional time or cost, or if unforeseen additional works are required, we will provide you with a revised quote. Any additional charges will be based on the installers hourly or daily rate of £50.
3. You may have additional costs to pay for planning permission, building control fee and Structural Engineers Survey.
4. This quote excludes structural reports.
5. We enclose a copy of Powercor terms of business/ contract with this quote. Please read this carefully.
6. The battery element and any additional items (iboost/pigeon protection etc) are not covered by the MCS, these are only on the quotation to streamline the costs and make it clear for what you are paying for.

Performance estimate

We have estimated that this system will produce 33180kwh a year. Please see the attached '**Predicted System Performance for Solar PV installations.**

ACCEPTING THIS QUOTATION

To accept this quotation please sign and return the Order Form overleaf to Powercor together with your deposit payment. Thank you for your order.

When we have received your deposit we will contact you to arrange delivery and installation dates.

COMPLAINTS

We hope you won't have any reason to complain about any aspect of our service. But if you do, please contact us. support@powercor.co.uk, Powercor, 23 Trade City, Avro Way, Weybridge, KT13 0YF.

T: +44 (0) 1932 839 890

support@powercor.co.uk
www.powercor.co.uk

Unit 23, Trade City, Avro Way
Brooklands Business Park
Weybridge, Surrey, KT13 0YF

If we cannot resolve your complaint, you may be able to complain to RECC. You can read about this here: www.recc.org.uk/consumers/how-to-complain

Powercor LTD
23 Trade City
Avro Way
Weybridge
KT13 0YF

Order Form

Consumer name:	
Site address:	
Reference Number:	
Date of Quote:	

To accept the quotation please sign and return this page to Powercor – support@powercor.co.uk. Or the person that provided you with the quotation.
We / I agree to the quotation and confirm the order for the products and installation services specified.
We / I agree to the total cost and payment terms set out above.
We / I have read and agree to abide by Powercor Terms and Conditions provided with the quotation

Name:	
Signature:	
Date:	

[redacted]

Cancellation period and your right to cancel

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support@powercor.co.uk
www.powercor.co.uk

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Brooklands Business Park
Weybridge, Surrey, KT13 0YF

You have the right to cancel this contract during the 'cancellation period' without giving any reason.

Your cancellation period –the time you have to change your mind and cancel the contract without any penalty - starts when you sign the contract and ends 14 days after all of the goods relating to the contract have been delivered to you.

To exercise the right to cancel, you must inform us of your decision to cancel this contract by a clear statement (e.g. a letter sent by post, fax or e-mail). You may use the attached model cancellation form, but it is not obligatory.

Powercor LTD, 23 Trade City, Avro Way, Weybridge, KT13 0YF.
01932 839 890
support@powercor.co.uk

If you cancel within the cancellation period, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

Effects of cancellation within the cancellation period

If you cancel this contract within the cancellation period we will reimburse to you all payments received from you. If you cancel this contract within the cancellation period but after delivery of some or all of the goods, then we will reimburse to you all payments for delivery charges unless you specifically requested an enhanced delivery costing more than our normal service. In which case we will only reimburse the price of our normal delivery charges.

If you cancel this contract within the cancellation period but after delivery of some or all of the goods then:

We will collect the goods from you.

We will make the reimbursement without undue delay, and not later than:

> 14 days after the day we receive back from you any goods supplied; or
> if there were no goods supplied, 14 days after the day on which we are informed about your decision to cancel this contract.

We will make the reimbursement using the same means of payment as you used for the initial transaction, unless you have expressly agreed otherwise; in any event, you will not incur any fees as a result of the reimbursement.

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We may withhold reimbursement until we have received the goods back or you have supplied evidence of having sent back the goods, whichever is the earliest.

We may make a deduction from the reimbursement for loss in value of any goods supplied, if the loss is the result of unnecessary handling by you.

Starting the installation before the end of the cancellation period

We do not normally start any work until the end of your cancellation period, that is 14 days after the last part of the goods relating to the contract is delivered to you. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing and you should describe why you need the work to start within the cancellation period.

Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

Cancellation period and your right to cancel

You have the right to cancel this contract during the cancellation period without giving any reason.

After signing this contract you have a Cancellation Period of 14 days during which you may cancel the contract without penalty. If you cancel within this time, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

You must cancel in writing, by post or email, to us at the above address. We have provided a cancellation form with this quotation.

We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

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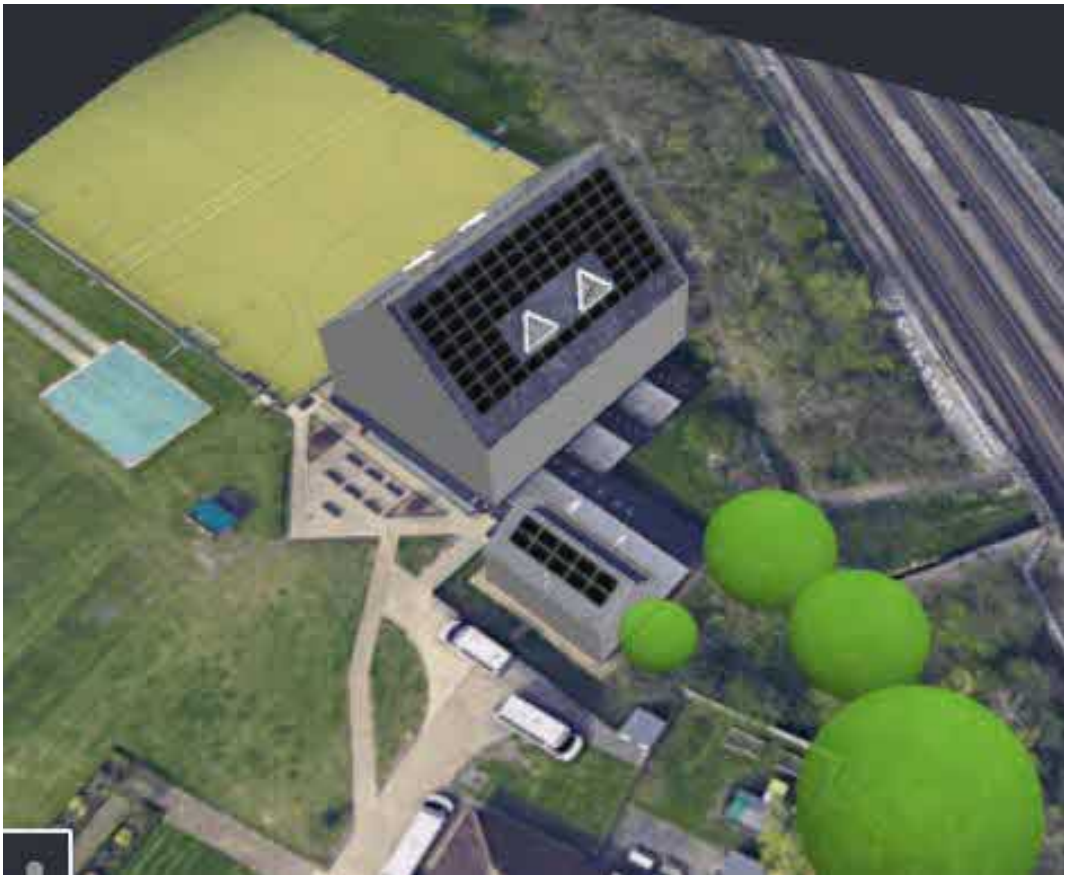
PROPOSAL PACK



Covering letter

Dear John

13.02.2024

Merchant Taylors Prep School Sports Hall V2

Electrical & Mechanical | Energy Saving & Sustainability
Facilities Management | Security & Life Safety

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Weybridge, Surrey, KT13 0YF

Thank you for asking Powercor to provide you with a proposal for a microgeneration system. We have pleasure in enclosing our proposal for the work:

our quote
a diagram showing the location of the main components /a design of the system
an estimate of the performance you can expect to get including the sunpath diagram to estimate the shading on your system
our terms of business, and
a cancellation form in case you change your mind.

We have also set out some key points you need to be aware of should you decide to go ahead.

Please note the quote is not based on a site survey.

Powercor is a member of the Renewable Energy Consumer Code (RECC), member no. 00044977. A leaflet describing the Code is included with this proposal.

This letter and the items above make up our proposal. Once you've had a chance to look through them, if you wish to proceed please complete the **Order Form** and return it to Powercor. When we have received your order we will contact you to arrange delivery and installation dates.

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Before you go ahead:

1. Planning Permission and Building Control

If your property is a listed building or you are in a conservation area you may need planning permission. You are responsible for contacting your local planning authority to obtain confirmation that planning permission is not required. [1]

2. Roof Structure

We believe your roof is suitable for the proposed installation.
You may want to obtain an independent opinion on the condition of your roof for the proposed installation and it is recommended that you pay for a Structural Engineers Report.

3. Insurance

It is recommended that you inform your property insurers about the proposed installation to check if it will increase your buildings insurance premium.

Powercor has appropriate insurance to cover possible third-party damage, which may be caused by any of our activities in supplying a small-scale energy generator to you. We are insured by Allianz Insurance Plc.

When you confirm the order and we receive your deposit, we will register your name and address and total value of the contract with the Insurance Scheme Administrator, IWA. You will be sent

[1] Powercor cannot be held responsible for any installations carried out where planning permission was required but not obtained and we cannot offer refunds in such cases.

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insurance policy documents directly. A leaflet explaining the scheme is enclosed. If you are not content for us to register your details in this way, please let us know.

4. Data protection

Please be assured Powercor will keep information about you in accordance with data protection legislation and will not pass information to any third party without your permission.

As members of RECC, we may be required to provide the RECC Administrator with information relating to our contacts with you as part of RECC's monitoring procedures; this information may include your personal data. Please see the RECC Use of Personal Data Notice for information on how RECC would use and store this data.

Your installation

1. Timetable for Works

We will agree installation dates with you in writing after the order has been confirmed and we have received your deposit, if we have asked you for one. It usually takes 5 days to install a system, including the erection and removal of scaffolding. Your installation will usually take place within 2 weeks of receiving your order, subject to work load and availability of materials.

Please note: We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. For more information about your right to cancel the contract see the '*Cancellation Period and your right to cancel*' in your quote document.

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2. Commissioning the system

We will commission your system in line with MCS installation standards to ensure that the system is safe, has been installed in accordance with documented procedures and manufacturer's requirements and is operating correctly in accordance with the system design.

Following the testing and commissioning of the system, a detailed operating manual will be provided to you within 10 days including an MCS certificate if the system is smaller than 50Kw gross.

3. After Sales Support and Maintenance

Although Solar PV is reasonably 'fit and forget' technology, certain parts such as the inverter may need servicing or have to be replaced in the lifetime of the panels.

Powercor will provide a basic maintenance program for the client to follow to ensure the system is working as best as it can.

Powercor provides optional servicing and/or maintenance contracts at additional cost.

4. Guarantees

Your equipment is guaranteed by its manufacturer. The guarantees are:

20 years for solar panels

5-10 years for the inverter

This depends if an additional warranty has been taken out by client.

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Any products damaged during installation shall be replaced free of charge.

We guarantee our workmanship for 2 years from date of install. This workmanship warranty will be transferable to the new legal owner of the property if it is sold during the warranty period.

5. Workmanship warranty insurance

As members of the Renewable Energy Consumer Code, we are required to have arrangements in place so that your workmanship warranty from us will still be honoured if we should go out of business during the warranty period.

You will receive a policy from IWA which gives details of the workmanship warranty insurance.

6. The Smart Export Guarantee (SEG)

We will register your installation on the MCS Installation database and send you the MCS Certificate as soon as possible and certainly no later than 10 days after the installation is commissioned.

If you are looking to register for a Smart Export tariff, you will need to send your MCS certificate and any other information that may be required to the licensed electricity supplier with whom you have contracted for their Smart Export tariff. You can read more information about the SEG from Ofgem, the energy regulator, here:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg
Ofgem's guidance for generators like you, is available at:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/generators

The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

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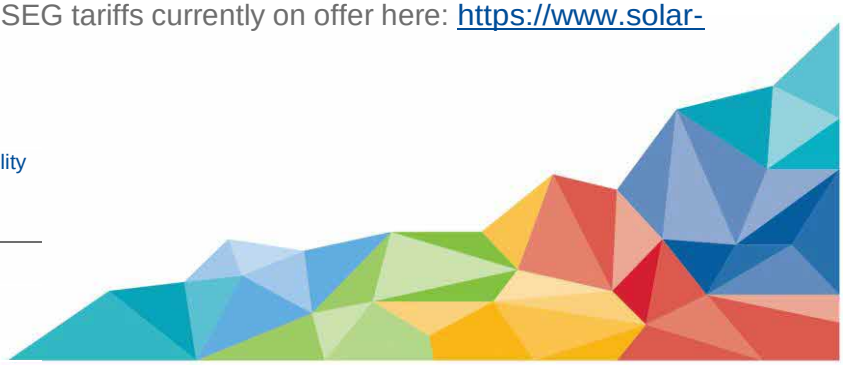

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MODEL PV PERFORMANCE ESTIMATE

Predicted System Performance for Solar PV Installations

The UK Microgeneration Certification Scheme (MCS) requires all certified companies to give an assessment of solar PV system performance based on the standard MCS procedure in Microgeneration Installation Standard MIS3002, Issue 3.5 and Issue 4.0 from 16 March 2021[2].

Important Note: The performance of solar PV systems is impossible to predict with certainty due to the variability in the amount of solar radiation (sunlight) from location to location and from year to year. This estimate is based upon the standard MCS procedure and is given as guidance only. It should not be considered as a guarantee of performance.

The Solar PV self-consumption has been calculated in accordance with the most relevant methodology for your system. There are a number of external factors that can have a significant effect on the amount of energy that is self-consumed so this figure should not be considered as a guarantee of the amount of energy that will be self-consumed.

In optimal circumstances (a property in the south of the UK with an unshaded south-facing roof sloping at an angle of 35°) an 3.0 kWp PV system typically generates 2800 kWh.

2

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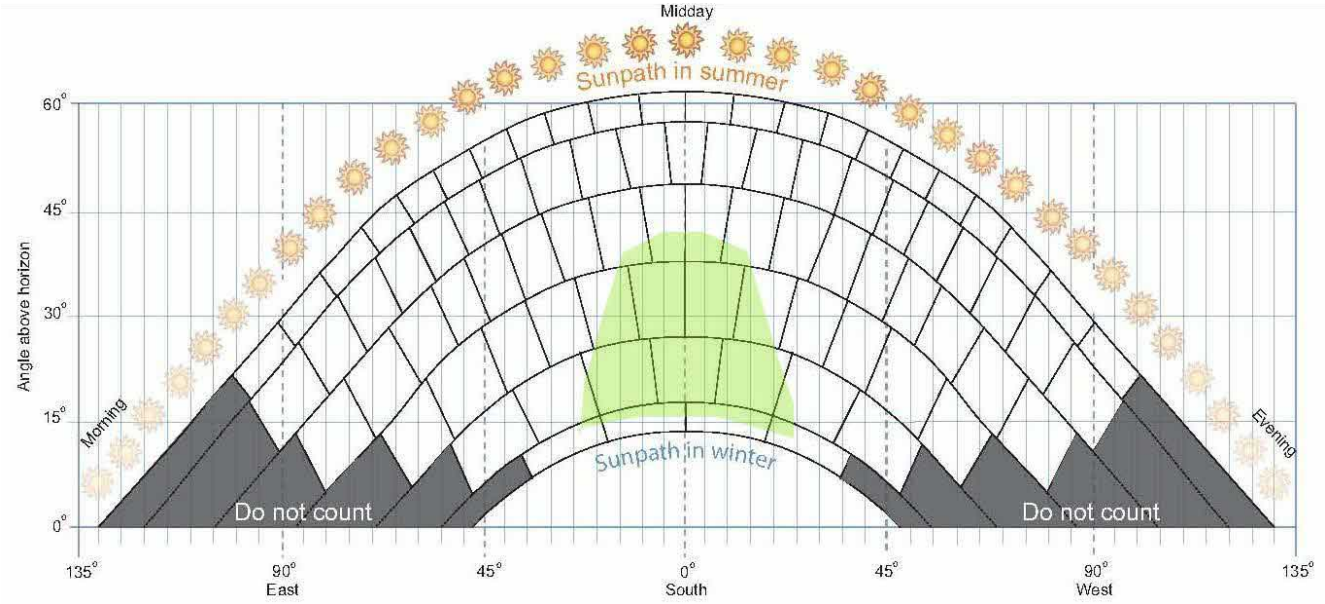
Your system is predicted to produce 31708.89 kwh

To calculate this, we take:

the size of your system (in kWp)
how much solar radiation the system is estimated to get (the 'solar radiation input factor' or Kk for short). We use official tables to estimate this which take into account your postcode region, the inclination (or tilt) of your roof and its orientation (which direction it faces)
how much shading there is on the system (the 'shade factor' or SF), such as from surrounding trees, chimneys, shadow from nearby buildings). If there is no shading, the SF equals 1.
We have estimated this using the sunpath diagram below.



In addition, we estimate the proportion of this output that you can be expected to consume on-site ('self-consumption') in the first year in kWh. In accordance with MCS guidance, this estimate is based on your estimated annual use of electricity and also on your household's pattern of being at home or not during the day in comparison with certain 'archetypes'. You have told us that your household's 'occupancy' is closest to the following 'archetype': [delete as applicable]
Home all day (at least one person is in between 9 am and 5pm on weekdays)
Home half day (the home is typically empty either all morning or all afternoon on weekdays)
Out all day (the home is typically empty on weekdays)

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The calculation we do is:

kWp (size of system) x Kk (solar radiation input factor) x SF (shade factor)

A. Installation data	
Installed capacity of PV system	38.28kWp = 33.93 / 4.35w
Orientation of the PV system –degrees from south	80°/ 15°
Inclination of system –degrees from horizontal	45/ 45°
Postcode region	Zone 1
B. Performance calculations	
kWh/kWp (Kk) from table	808 Kwh / 978Kwh
Shade factor (SF)	1
Estimated annual output (kWP x Kk x SF)	27415.44 kwh + 4293.45Kwh = **31708.89 kwh**

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DISCLAIMERS

1. Shading will be present on your system that will reduce its output to the factor stated. This factor was NOT calculated using the MCS shading methodology but we can confirm that the system as quoted, taking into account the shading present, will deliver at least 90% of the energy (in kWh) as set out in this performance estimate.

2. This system performance calculation has been undertaken using estimated values for array orientation, inclination or shading. Actual performance may be significantly lower or higher if the characteristics of the installed system vary from the estimated values.

3. If we have had to estimate or take remotely any of the factors that affect this estimate, we will carry out a full site survey before installation commences. If this survey results in a lower performance estimate than in this quote, then we will issue you with a new quotation and you will have a new Cancellation Period in line with your Cancellation Rights set out in the contract in which to consider it.

ADDITIONAL ESTIMATE USING X, Y, Z

An additional estimate using alternative calculation methods is also provided:

Estimated system performance using Solar Edge	
Energy Supplied annually by solar system –Solar Input	33030kWh

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This estimate has been produced using a methodology /assumptions that differ from the standard MCS procedure for estimating performance. You should consider both estimates together.

Getting the most out of your solar PV system

Based on your current bills, your electricity requirement is kWh per year. (Compare this to the average medium-use UK household which uses 2,900 kWh of electricity each year, according to latest figures available from energy regulator Ofgem.) You will be able to meet some of this requirement in daylight hours with the electricity generated by your solar PV system. The more you can use electricity in the daytime, when the system is generating, the more you can save on the electricity you need to buy (or 'import') from your electricity company.

Even if you are not at home during most of the day, you could put your appliances (such as washing machines and dishwashers) on timers to run during daylight hours. The average washing machine runs through hundreds of cycles a year and a typical 7kg machine will cost typically between £25 –£35 a year to

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run (source: Energy Saving Trust). So you could save that just by doing your washing in daylight hours. Running other appliances when the solar PV is generating will also save you money.

You can get the best out of your system by keeping panels clean. Trimming foliage to reduce shading. Changing usage habits.

Smart Export Guarantee

If you use some of the electricity that your panels generate in daylight hours, you will save on your electricity bill because you will be able to use less electricity from your electricity supplier (see 'Getting the most out of your PV system', above)

You may also be able to get paid for any electricity that your system generates that you do not use in your home but instead feed in or 'export' to the electricity grid. Under the Smart Export Guarantee (SEG) scheme, certain energy suppliers must offer to pay you for this exported electricity. The SEG is a payment from your chosen provider for the kilowatt hours (kWh) of electricity that your Solar PV system generates but which you don't use or store in your home and which is instead fed back (or 'exported') into the electricity grid. Your export meter will measure how many kWh you export and the electricity supplier you sign up with will pay you for this export at the rate per kWh you and the supplier agree. They may ask you to provide an MCS certificate to prove your installation meets the required standard for you to receive the SEG.

For more information about the SEG from Ofgem, the energy regulator, see:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/about-smart-export-guarantee-seg

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For Ofgem's guidance for generators like you, see:
https://www.ofgem.gov.uk/environmental-programmes/smart-export-guarantee-seg/generators
The Solar Trade Association has a list of SEG tariffs currently on offer here: https://www.solar-trade.org.uk/seg/

BENEFITS

Installed system size	34.37 KWp
Estimated annual system output using standard MCS procedure	31708.89 kwh

Electricity savings: i.e. what you will save by using the electricity generated by your PV system rather than paying to import those kWh from the electricity grid at your current electricity tariff. We estimate this to be:

Your savings from using some of the electricity generated will increase if electricity prices rise.

Smart Export Guarantee: to estimate your potential income from the SEG, compare:

A. our estimate of how much your system will produce and
B. how much of that estimated output will be self-consumption ie how many kWh it is estimated you will consume in your home.
C. Subtract B from A to give the kWh available for export
D. Multiply C (the kWh available for export) x the SEG tariff offered by your chosen supplier per kWh.

For example, if your system is estimated to produce 3000kWh (A) and your self-consumption is estimated to be half of this or 1500kWh (B), then there will be 1500kWh (A –B) for export.

More information

The Energy Saving Trust's website has lots of useful information. Check out
https://energysavingtrust.org.uk/energy-at-home/generating-renewable-energy/

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MODEL SOLAR PV QUOTE AND ORDER FORM

Powercor LTD
23 Trade City
Avro Way
Weybridge
KT13 0YF

Merchant Taylor School Sports Hall Prep

WD31LW

[redacted]

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Please note:

1. This quote has not been prepared following a site visit.
2. If you request changes that involve us in additional time or cost, or if unforeseen additional works are required, we will provide you with a revised quote. Any additional charges will be based on the installers hourly or daily rate of £50.
3. You may have additional costs to pay for planning permission, building control fee and Structural Engineers Survey.
4. This quote excludes structural reports.
5. We enclose a copy of Powercor terms of business/ contract with this quote. Please read this carefully.
6. The battery element and any additional items (iboost/pigeon protection etc) are not covered by the MCS, these are only on the quotation to streamline the costs and make it clear for what you are paying for.

Performance estimate

We have estimated that this system will produce 31708.89 kwh a year. Please see the attached '**Predicted System Performance for Solar PV installations.**

ACCEPTING THIS QUOTATION

To accept this quotation please sign and return the Order Form overleaf to Powercor together with your deposit payment. Thank you for your order.
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Avro Way
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Order Form

Consumer name:	
Site address:	
Reference Number:	
Date of Quote:	

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We / I agree to the quotation and confirm the order for the products and installation services specified.
We / I agree to the total cost and payment terms set out above.
We / I have read and agree to abide by Powercor Terms and Conditions provided with the quotation

Name:	
Signature:	
Date:	

[redacted]T13 8DF

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If you cancel within the cancellation period, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

Effects of cancellation within the cancellation period

If you cancel this contract within the cancellation period we will reimburse to you all payments received from you. If you cancel this contract within the cancellation period but after delivery of some or all of the goods, then we will reimburse to you all payments for delivery charges unless you specifically requested an enhanced delivery costing more than our normal service. In which case we will only reimburse the price of our normal delivery charges.

If you cancel this contract within the cancellation period but after delivery of some or all of the goods then:

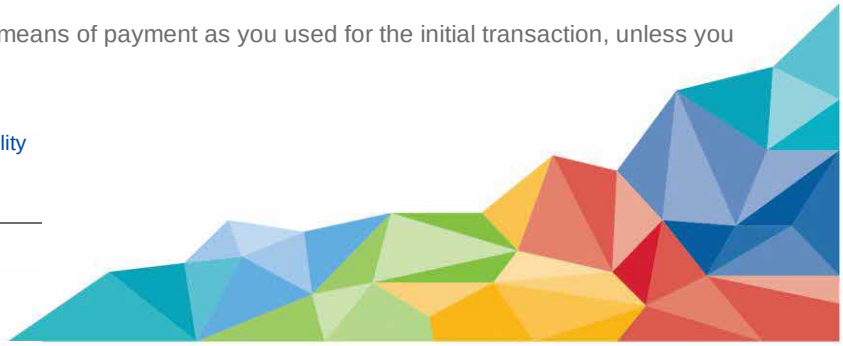
We will collect the goods from you.

We will make the reimbursement without undue delay, and not later than:

> 14 days after the day we receive back from you any goods supplied; or
> if there were no goods supplied, 14 days after the day on which we are informed about your decision to cancel this contract.

We will make the reimbursement using the same means of payment as you used for the initial transaction, unless you

Registered in England and Wales no: 04473558
Registered address: Powercor Ltd, 23 Trade City, Avro Way
Brooklands Business Park, Weybridge, Surrey, KT13 0YF



T: +44 (0) 1932 839 890

support@powercor.co.uk
www.powercor.co.uk

Unit 23, Trade City, Avro Way
Brooklands Business Park
Weybridge, Surrey, KT13 0YF

have expressly agreed otherwise; in any event, you will not incur any fees as a result of the reimbursement.

We may withhold reimbursement until we have received the goods back or you have supplied evidence of having sent back the goods, whichever is the earliest.

We may make a deduction from the reimbursement for loss in value of any goods supplied, if the loss is the result of unnecessary handling by you.

Starting the installation before the end of the cancellation period

We do not normally start any work until the end of your cancellation period, that is 14 days after the last part of the goods relating to the contract is delivered to you. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing and you should describe why you need the work to start within the cancellation period.

Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

Cancellation period and your right to cancel

You have the right to cancel this contract during the cancellation period without giving any reason.

After signing this contract you have a Cancellation Period of 14 days during which you may cancel the contract without penalty. If you cancel within this time, we will return any deposit you may have paid in full. If you cancel after this time, we may have to charge you, based on the actual costs we have incurred by the time you cancel.

You must cancel in writing, by post or email, to us at the above address. We have provided a cancellation form with this quotation.

We do not normally start any work until the end of your 14 day cancellation period. If you want us to start work sooner for any reason, please be aware that you must ask for this in writing. Should you later decide to cancel the contract within your 14 day cancellation period, then you will have to pay reasonable charges for goods and services supplied up to the date that you cancel and for making good your property.

Registered in England and Wales no: 04473558
Registered address: Powercor Ltd, 23 Trade City, Avro Way
Brooklands Business Park, Weybridge, Surrey, KT13 0YF

APPENDIX B: OCE calculations

	Project			Job no.	
oxford consulting engineers	MTS - Sports hall roof load check (PV panels)			2024393	
	Calcs for			Start page no./Revision	
	Snow load (furture)			MTS.SH. 1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	MD	14/03/2024	MKS	19/03/2024	MD	19/03/2024

SNOW LOADING TO BS6399:PART 3:1988

TEDDS calculation version 1.0.03

Site location

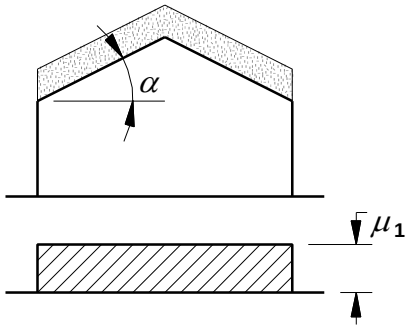
Location of site	**London**
Site altitude	A = **56** m

Calculate site snow load

From BS6399:Part 3: 1988 - Figure 1. Basic snow load on the ground

Basic snow load	s_b = **0.40** kN/m^2
	$s_{alt} = 0.1 \times s_b + (0.09\ kN/m^2)$ = **0.13** kN/m^2
Site snow load	$s_0 = \max(s_b, s_b + s_{alt} \times (A - (100\ m)) / 100\ m)$ = **0.40** kN/m^2

BS6399:Part3:1988 Cl.6.2



Uniform loading

Roof geometry

Roof type	**Pitched**
Distance on plan from gutter to ridge	b = **9.000** m
Angle of pitch of roof	α = **6.2** deg

Calculate uniform snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient	**μ_1 = 0.80**
Uniform roof snow load	$s_{d1} = \mu_1 \times s_0$ = **0.32** kN/m^2

BS6399:Part3:1988 Cl.5

Roof pitch α is not greater than 15 degrees so there is no asymmetric loadcase

Snow sliding down roof

Maximum uniform snow load on roof	s_{d_max} = **0.32** kN/m^2
Force from sliding snow load	$F_s = s_{d\_max} \times b \times \sin(\alpha)$ = **0.31** kN/m

BS6399:Part3:1988 Cl.8

Project:-

Merchant Taylors School - Sports Hall

Details:-

Solar panel load check on roof - IMPOSED ROOF LOADS

Status:-

job no. 2024393

date Mar 24

page no. MTS.SH.2

ASSESSMENT OF ORIGINAL DESIGN IMPOSED LOAD.

USING CP3, CHAPTER V (1967):-

ROOF SLOPE ≈ 6.2°. (MAINTENANCE ONLY ACCESS)

CLAUSE 6.2 IMPOSED ROOF LOAD = 0.75 kN/m² INCLUDING SNOW.

∴ DESIGN IMPOSED LOAD ALLOWANCE = **0.75 kN/m²** ON PLAN.

IMPOSED ROOF LOAD FROM PV SOLAR PANEL PROPOSED.

PV PANELS AND BRACKETRY = 12½ kg/m² = 0.123 kN/m²

SNOW LOAD = 0.320 kN/m²

2 PEOPLE MAINTENANCE ACCESS SPREAD OVER 45m² SAY = 2×0.9/45 (1 BAY = 5m c/c × 9m = 45m²) ×½ ROOF SPAN = 0.04 kN/m² / 0.48/cos 6.2°

TOTAL PROPOSED ROOF LOAD = **0.50 kN/m²**

< 0.75 kN/m² (67%) √PASS

by: M Dickson M:07876820244

	Project				Job no.	
	MTS - Grds maint' building roof load check (PV panels)				2024393	
	Calcs for				Start page no./Revision	
	Snow load (furture)				MTS.GMB. 1	
	Calcs by	Calcs date	Checked by	Checked date	Approved by	Approved date
	MD	14/03/2024	MKS	19/03/2024	MD	19/03/2024

SNOW LOADING TO BS6399:PART 3:1988

TEDDS calculation version 1.0.03

Site location

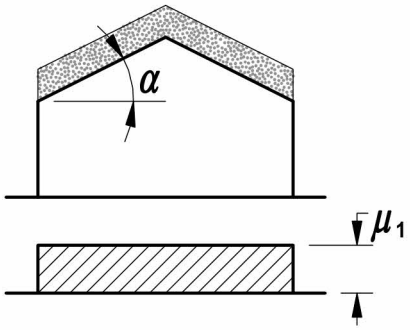
Location of site	**London**
Site altitude	A = **55** m

Calculate site snow load

From BS6399:Part 3: 1988 - Figure 1. Basic snow load on the ground

Basic snow load	s_b = **0.40** kN/m^2
	$s_{alt} = 0.1 \times s_b + (0.09\ kN/m^2)$ = **0.13** kN/m^2
Site snow load	$s_0 = \max(s_b, s_b + s_{alt} \times (A - (100\ m)) / 100\ m)$ = **0.40** kN/m^2

BS6399:Part3:1988 Cl.6.2



Uniform loading

Roof geometry

Roof type	**Pitched**
Distance on plan from gutter to ridge	b = **5.000** m
Angle of pitch of roof	α = **8.0** deg

Calculate uniform snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient	**μ_1 = 0.80**
Uniform roof snow load	$s_{d1} = \mu_1 \times s_0$ = **0.32** kN/m^2

BS6399:Part3:1988 Cl.5

Roof pitch α is not greater than 15 degrees so there is no asymmetric loadcase

Snow sliding down roof

Maximum uniform snow load on roof	s_{d_max} = **0.32** kN/m^2
Force from sliding snow load	$F_s = s_{d\_max} \times b \times \sin(\alpha)$ = **0.22** kN/m

BS6399:Part3:1988 Cl.8

Project:-

Merchant Taylors School - Grounds maintenance building

Details:-

Solar panel load check on roof - IMPOSED ROOF LOADS

Status:-

job no. 2024393

date Mar 24

page no. MTS.GMB.2

ASSESSMENT OF ORIGINAL DESIGN IMPOSED LOAD.

USING BS 6399, PART 3 (1988):-

ROOF SLOPE ≤ 8°. (MAINTENANCE ONLY ACCESS)

CLAUSE 4.3.1.c

IMPOSED ROOF LOAD = 0.60 kN/m² EXCLUDING SNOW.*

∴ DESIGN IMPOSED LOAD ALLOWANCE = **0.6 kN/m²** ON PLAN.

IMPOSED ROOF LOAD FROM PV SOLAR PANEL PROPOSED.

PV PANELS AND BRACKETRY = 12½ kN/m² = 0.123 kN/m²

SNOW LOAD = 0.320 kN/m²

2 PEOPLE MAINTENANCE ACCESS SPREAD OVER 45m² SAY = 2×0.9/45 = 0.04 kN/m²
(1 BAY = 5m c/c × 9m = 45m²)
× ½ ROOF SPAN

0.48/cos 8°

TOTAL PROPOSED ROOF LOAD = **0.50 kN/m²**

< 0.60 kN/m² (83%) √PASS

* THE DESIGN VALUE IS EITHER 0.6 kN/m² OR SNOW LOAD, WHICHEVER IS GREATEST.

by: M Dickson M:07876820244

SNOW LOADING TO BS6399:PART 3:1988

TEDDS calculation version 1.0.03

Site location

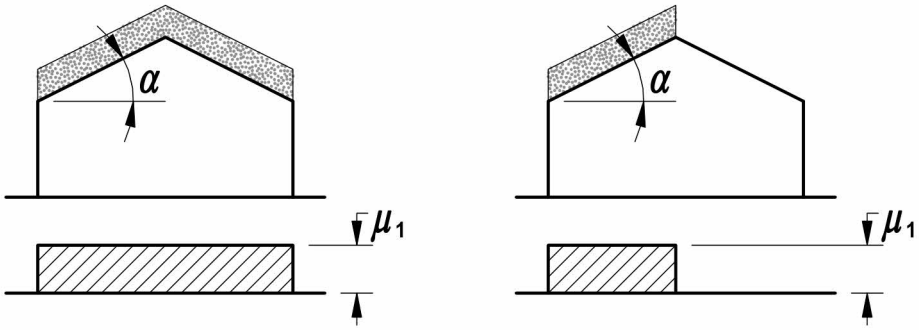
Location of site	**London**
Site altitude	A = **51** m

Calculate site snow load

From BS6399:Part 3: 1988 - Figure 1. Basic snow load on the ground

Basic snow load	s_b = **0.40** kN/m^2
	$s_{alt} = 0.1 \times s_b + (0.09\ kN/m^2)$ = **0.13** kN/m^2
Site snow load	$s_0 = \max(s_b, s_b + s_{alt} \times (A - (100\ m)) / 100\ m)$ = **0.40** kN/m^2

BS6399:Part3:1988 Cl.6.2



Uniform loading **Asymmetric loading**

Roof geometry

Roof type	**Pitched**
Distance on plan from gutter to ridge	b = **8.250** m
Angle of pitch of roof	α = **30.0** deg

Calculate uniform snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient	**μ_1 = 0.80**
Uniform roof snow load	$s_{d1} = \mu_1 \times s_0$ = **0.32** kN/m^2

BS6399:Part3:1988 Cl.5

Calculate asymmetric snow load

From BS6399:Part 3: 1988 - Figure 3. Snow load shape coefficients for pitched roofs

Snow load shape coefficient	**$\mu_1 = 0.8 + 0.4 \times [(\alpha - 15\ deg) / 15\ deg] = 1.20$**
Asymmetric roof snow load	$s_{d1} = \mu_1 \times s_0$ = **0.48** kN/m^2

BS6399:Part3:1988 Cl.5

Snow sliding down roof

Maximum uniform snow load on roof	s_{d_max} = **0.48** kN/m^2
Force from sliding snow load	$F_s = s_{d\_max} \times b \times \sin(\alpha)$ = **1.98** kN/m

BS6399:Part3:1988 Cl.8

Project:-

Merchant Taylors Prep School - Sports Hall

Details:-

Solar panel load check on roof - IMPOSED ROOF LOADS

Status:-

job no. 2024393

date Mar 24

page no. MTPS.SH. 2

ASSESSMENT OF ORIGINAL DESIGN IMPOSED LOAD.

USING BS 6399, PART 3 (1988):-

ROOF SLOPE ≤ 30°. (MAINTENANCE ONLY ACCESS)

CLAUSE 4.3.1.c

IMPOSED ROOF LOAD = 0.60 kN/m² EXCLUDING SNOW.*

∴ DESIGN IMPOSED LOAD ALLOWANCE = **0.6 kN/m²** ON PLAN.

IMPOSED ROOF LOAD FROM PV SOLAR PANEL PROPOSED.

PV PANELS AND BRACKETRY = 12½ kg/m² = 0.123 kN/m²/COS30°

SNOW LOAD = 0.32 kN/m² ON PLAN

2 PEOPLE MAINTENANCE ACCESS SPREAD OVER 45m² SAY = 2×0.9/45 = 0.04 kN/m² ON PLAN
(1 BAY = 5m c/c × 9m = 45m²)
× ½ ROOF SPAN

TOTAL PROPOSED ROOF LOAD = **0.50 kN/m²**

< 0.60 kN/m² (83%) √PASS

* THE DESIGN VALUE IS EITHER 0.6 kN/m² OR SNOW LOAD, WHICHEVER IS GREATEST.

by: M Dickson M:07876820244