Supply and Installation on roof, grid connection, maintenance and warranty, for 75.0 kWp of Solar PV (Photovoltaic) panels at Brent Civic Centre

Specification Brief

for

LONDON BOROUGH OF BRENT
Brent Civic Centre
Engineers Way
Wembley
HA9 0FJ

January 2020

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A Half Hourly Data Analysis – Brent Civic Centre

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1.0 Introduction

1.1 London Borough of Brent (LBB) commissioned a Solar PV Feasibility Appraisal in late 2018 for seven buildings in the LBB estate.

1.2 LBB now want to proceed with installation of the Solar PV panels on the Brent Civic Centre only, with a system capacity of 75.0 kWp.

1.3 After installationand connection to the electrical infrastructure,LBB furthermore require a full warranty and all Operation & Maintenance services to be included.

2.0 Background

2.1 The roof at the Civic Centre is orientated due south and there should be no issues in installing a PV array on mounting rails on the over-cladding system. The site has a high demand and there is enough space for a system of up to 125kW to be installed.

2.2 In the Solar PV Feasibility Appraisal, several scenarios were modelled for the Civic Centre site. The results of these scenarios are provided in the table below:

Site	System	System Capacity (kWp)	Annual Generation (kWh)	Simple Payback (years)	IRR (%)
Civic Centre	System 1	125.2	109,882	13.4	7.8%
	System 2	75.0	70,125	12.4	8.7%
	System 3	**49.9**	**47,008**	**10.1**	**11.2%**

2.3 At the time of the Appraisal, System 3 was expected to be used as it would enable a higher Feed-in-Tariff (FIT) rate to be claimed. However the FIT payments have now ceased, and LBB want to proceed with the larger System 2 option instead (75.0 kWp).

2.4 The energy data collected for the Civic Centre for the Appraisal is as below:

Site	Floor Area (m^2)	Annual Electricity consumption (kWh)	Unit price paid (£/kWh)	Half Hourly Data Available (Y/N)
Brent Civic Centre	40,000	5,425,182	£0.113	Y

2.5 Appendix 1 shows the Half-hourly data analysis for the Civic Centre.

2.6 The Brent Civic Centre was constructed in 2013 next to Wembley Stadium and Wembley Arena. The site caters for many of the borough's central civic administration services as well as the Council Chambers, library, community hall, wedding venue, restaurant and retail area. The site has a Combined Cooling, Heat and Power (CCHP) liquid biofuel engine which runs predominantly off fish oil residue.

3.0 Service Summary

No	Service Summary
4.0	Provide a full structural survey of the roof
5.0	Install 75 kWp of PV panels on the roof of the Civic Centre
6.0	Connection to building electrical infrastructure and the grid
7.0	Maintenance
8.0	Warranty

4.0 Provide a full structural survey of the roof

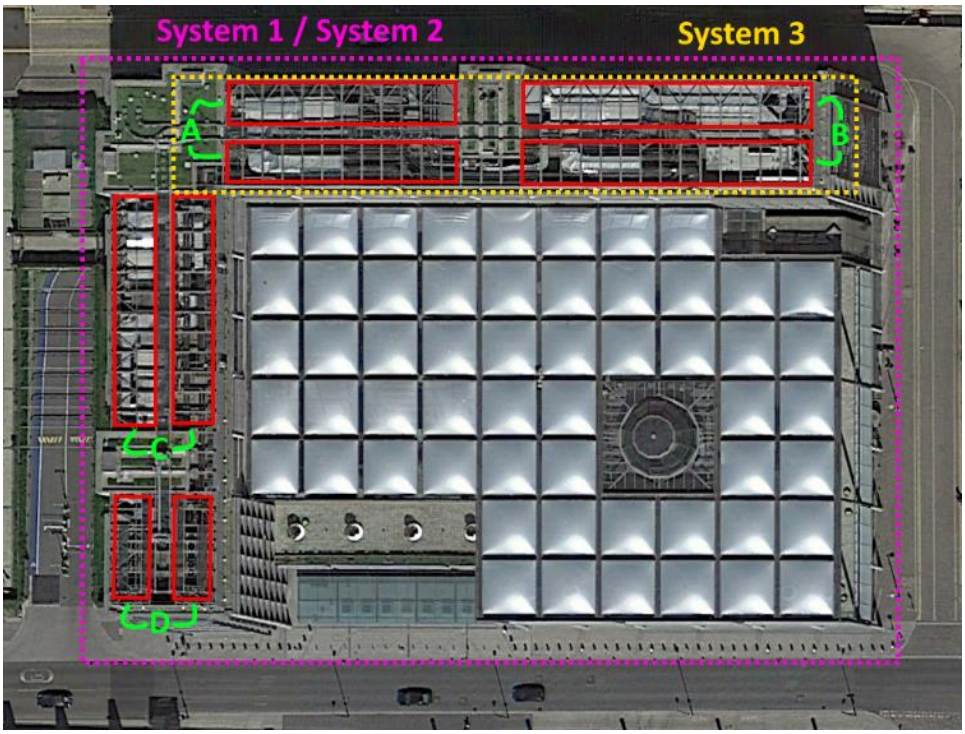
4.1 Full structural survey

A suitable method for supporting the solar panels needs to be agreed, taking fully into account the site constraints given in section 4.2 below. One proposed solution in section 4.2 is to install a rail system connected between the external beams of the over cladding; another proposed solution is to install a rail system between the lateral beams. Therefore, a full structural survey needs to be made by a qualified surveyor, which confirms the suitability the beams if using such solutions, or any other solutions deemed appropriate, to provide the necessary support for the panels to be installed.

Full roof loading analysis has not yet been conducted, and though 'rail mounting' the panels on the over-cladding is assumed to be suitable, this still needs to be confirmed by the structural survey.

5.0 Install 75 kWp of PV panels on the roof of the Civic Centre

5.1 Suitable Roof Space



The areas highlighted in red are suitable for PV arrays (A-D). The red areas are flat roof sections with an over-cladding system that PV modules should be able to be connected to. Note there is a similar roof structure at Willesden Green library which has a PV array installed.

There is sufficient space on the roof for a system sized at approximately 125 kW (system 1). System 2 is approximately 75 kWp and uses the same areas, but has greater spacing to reduce shading produced by the panels.

As the site has a high electrical consumption and baseload, a large system can be installed without the risk of exporting the electricity generated. The site is orientated due south which will maximise the PV generation at the site.

3 simulations were developed for the site.

- System 1 – All roof sections A, B, C + D 125.2 kW
- **System 2 – All roof sections A, B, C + D 75.0 kW**
- System 3 – Roof sections A and B only 49.9 kW

As stated, it is System 2 that is required in this tender specification.

5.2 Site Constraints

The main constraints to solar PV at this site are the spacing between the structure beams. The horizontal beams are too far apart to be used as the supporting structures for the PV modules. Therefore one proposed solution is to install a rail system connected between the external beams of the over cladding.

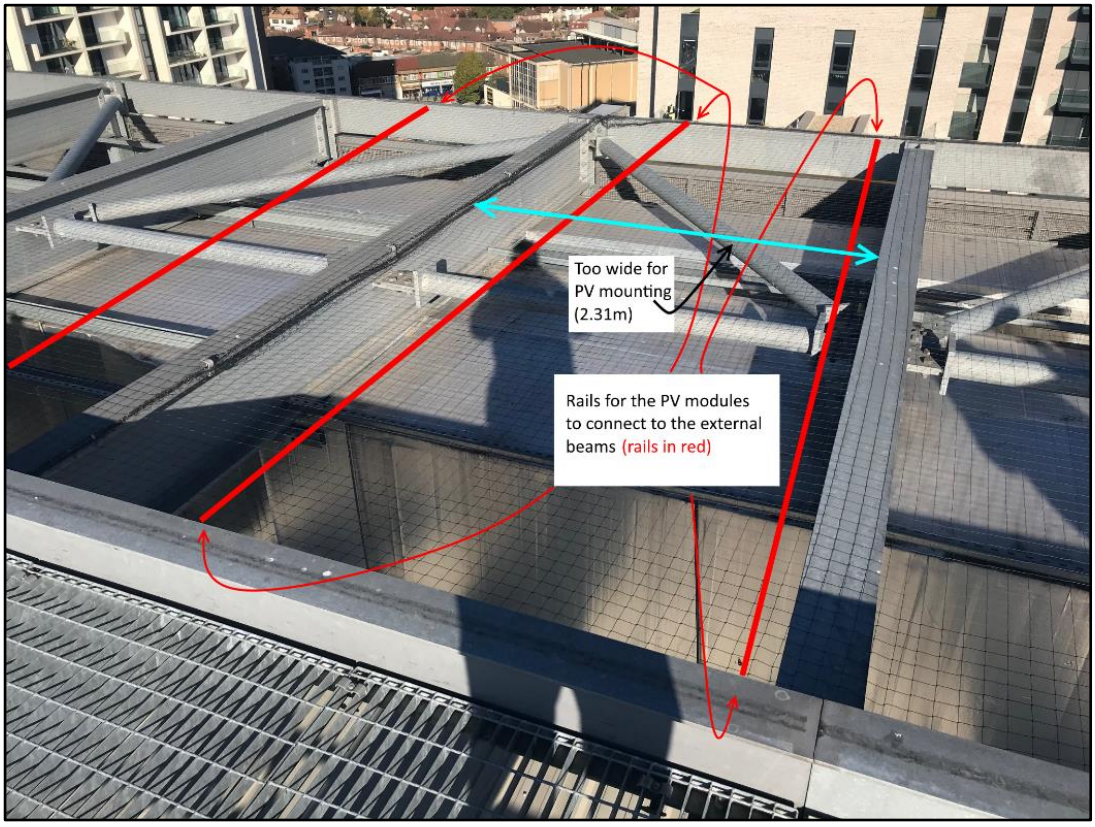


Photo 1: Proposed method for mounting external rails (to support PV panels on top)

Another option would be to install a rail system between the lateral beams (those beams leading out from the centre to the edges of the building roof).

If you prefer to offer an alternative way of installing the panels given the spacing of the existing beams, please specify in answer to the quality questions below.

The panels should be inclined at a shallow angle to minimise wind loading.

There are unlikely to be any issues with connecting the PV into the building electrical infrastructure due to the building age. Inverters should be located in the rooftop plant room contains other electrical equipment.

The successful bidder will need to explain in the tender questions below how they intend to get the PV panels (and 'rail system' supporting rails, if using) up to the **top level roof**. There is both a lift and stairs that are expected to be sufficiently wide to transport the panels and rails up to the lower (plant) level of the roof (where the plant is located), but as the panels need to be installed at the top level of the roof, they need to be lifted another floor. There are different options to do this:

i) There is a rooftop ‘hatch’ (see photo 2 below) (dimensions 56 cm x 56 cm, diagonal length 79 cm), which may or may not be wide enough to carry the panels and rails up.

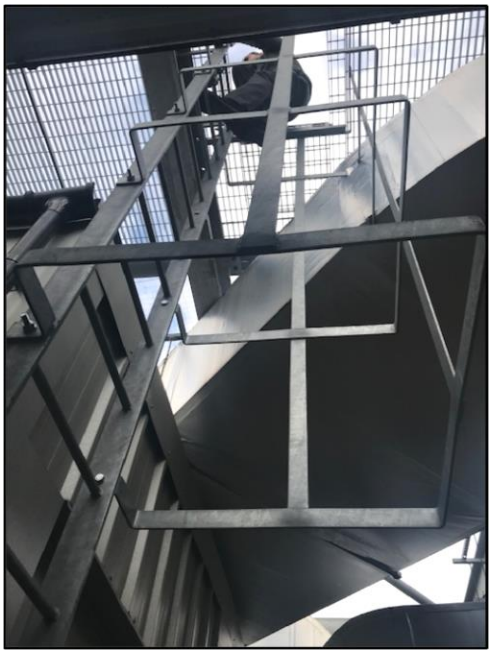


Photo 2: Rooftop ‘hatch’, which could be used to lift up to roof top level the PV panels, and rails (if using)

ii) There is a widow cleaner basket (see photos 3a and 3b below) (dimensions 184 cm x 54 cm) which is capable of holding 240 kg of weight.

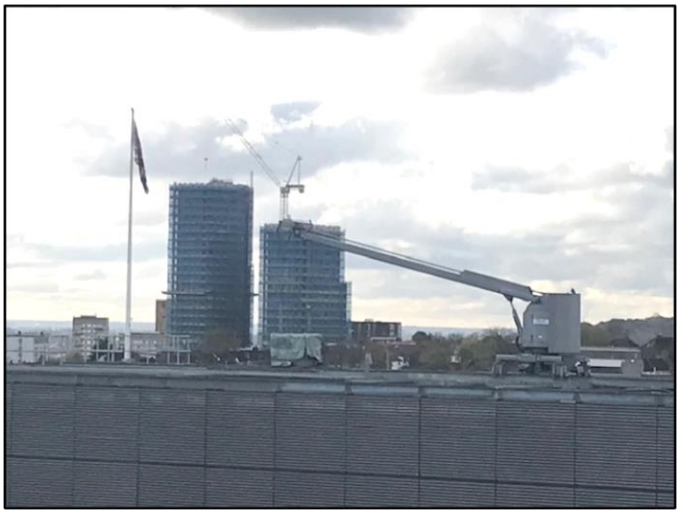


Photo 3a and 3b: Window cleaner basket, which could be used to lift up to roof top level the PV panels (and rails, if using)

iii) There is grating (see photo 4 below) which can easily be temporarily removed (dimensions 165 cm x 99 cm for one plate, but two adjacent can be removed to give

a larger opening). In one place this has some stairs beneath, which could be used to carry the PV panels (and rails, if using) part way up to the roof top level. The successful bidder would need to provide their own solution to lift the equipment up the rest of the way, such as a portable winch, or use of manual ropes, cables etc (or it may be close enough to lift from one person to another, see photo 5).

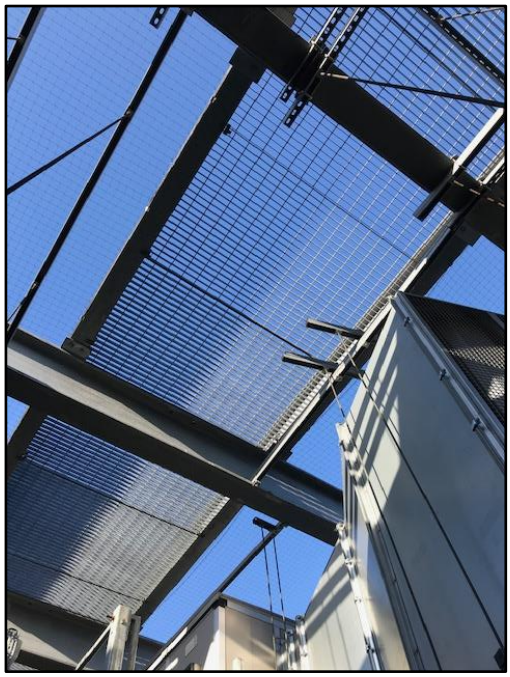


Photo 4: Looking up, from roof lower (plant) level, at grating in roof top level where PV is to be installed

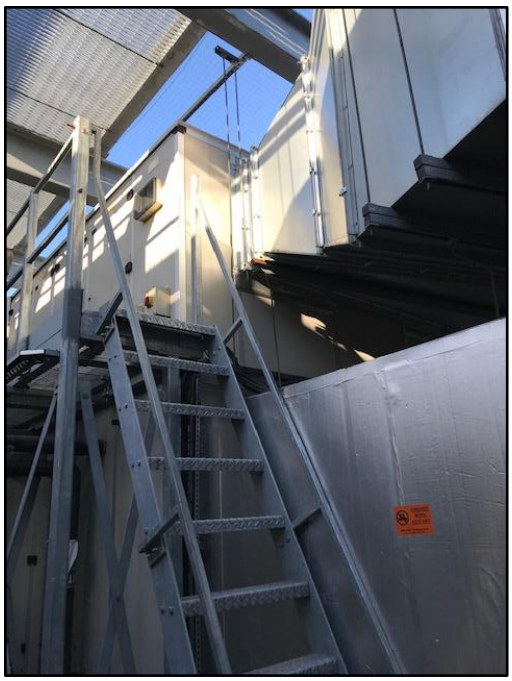


Photo 5: Stairs leading part way up from roof lower (plant) level to roof top level, which can be used to carry PV panels (and rails, if using) part way up to roof top level

iv) It will be possible to temporarily remove a section of the netting - shown in photo 1. Again for this option, the successful bidder would need to provide their own solution, such as a portable winch, or use of manual ropes, cables etc.

If connecting a rail system to beams:

If you are proposing installing a system of rails, the following dimesions will be useful. The inner beams are those adjacent to the inner walkway down the middle of the roof. The lateral beams are those that lead from the inner beams to the outer beams at the edge of the roof.

- Height of inner beams = 23 cm, **but usable** height of beams for a rail system = 10 cm (because the window cleaner basket runs on the central beams and overhangs the top half of the beams – see photo 6 below)
- Width of inner beams = 15 cm (and indent of beams = 7cm on side facing outwards)
- Distance between centre of two adjacent lateral beams = 248 cm
- Width of lateral beams = 19 cm (and indent of beams = 9cm on each side)

Photo 6: Inner beam, showing overhang of the window cleaner basket, and 10 cm clearance underneath

6.0 Connection to building electrical infrastructure and the grid

6.1 The solar panels need to be connected to the building electrical infrastructure and to the grid as part of this work.

6.2 Inverters can be installed into roof-top plant room and into building distribution system via distribution boards located there. Inverters should be located in the rooftop plant room since it contains other electrical equipment. There are unlikely to be any issues with connecting the PV into the building electrical infrastructure due to the building age.

7.0 Maintenance

7.1 The Service Provider must include maintenance of the solar panels within the quote to ensure that they continue to operate optimally for the lifetime of the warranty.

8.0 Warranty

8.1 These PV panels must come with a 20 year warranty which guarantees that the panels will produce at least 80% of the rated power at the point of 20 years of use. This should be an insurance backed warranty to mitigate any risk should the installer go out of business.

9.0 Limitations & Confidentiality

9.1 Information set out in this Brief and further information, together with documents provided to the Tenderer in connection with matters described in this Brief are, and shall be provided to the Tenderer on a strictly confidential basis and on the understanding that the Tenderer shall not (and the Tenderer will ensure the Tenderer's employees do not) disclose any such information or documents to any third party without the prior consent of the Client and that otherwise all such information and documents shall be kept by the Tenderer with inviolable secrecy and shall be used only for the preparation of the offer described in this document and for the performance of the Tenderer's duties. An equivalent duty of confidentiality shall apply to all documents prepared by the Tenderer in the performance of the Tenderer's duties concerning this assignment.

9.2 All Intellectual Property Rights in any Goods which are original works created by the Tenderer for the Council pursuant to the Order will be vested in the Tenderer. The Tenderer undertakes to allow the Council access to all such Goods and original works as required at all times so as make full use of the data and results of the project.

9.3 If at any time during the term of this contract legislation or guidance changes, as part of a government review into incentive payments to replace the Feed-in-Tariff or equivalent scheme, the Council have the right to alter the scope of this project and revise requirements to comply with the changes, subject to consultation with the service provider. The change will be deemed to be a variation for which the Service Provider will be entitled to be paid for any additional services outside the scope of the original project.

10.0 Insurances

10.1 In relation to insurance liabilities, the successful bidder shall hold the following amounts as a minimum:

- ✓ Public Liability: £5 million liability
- ✓ Employers Liability: £5 million liability
- ✓ Professional Indemnity: £2 million liability

11.0 Form of Agreement

11.1 The award of the contract will be made to the successful bidder under the terms of the Council's Terms & Conditions for Services.

12.0 Pricing & Payment Process

12.1 A fixed price sum shall be provided for the completion of the tasks described within this Brief and as set out with the pricing matrix schedule. The pricing matrix shall include for all costs involved providing the services described in this Brief, including all necessary staff travelling, accommodation and other expenses/disbursements.

12.2 The Service Provider should allow for the following meetings at the Client's offices, as a minimum:

- Mobilisation meeting to discuss all project requirements within 1-week of contract award notification.
- Pilot survey review and feedback session.

12.3 The payment profile will be: split between each of the four areas that the PV panels are installed on, so up to four separate bills; or a single invoice, based upon completion of the works, whichever the contractor prefers. Payments shall be made to the appointed service provider within 30-days of receipt of invoice. Payment will normally be made direct to the Appointed Service Provider's bank account.

13.0 Quotation Submission

13.1 Quotations must be submitted to the Council by email no later than **12 Noon on 28 February 2020** to: London Tenders Portal: https://www.londontenders.org/

14.0 Note to Bidders

14.1 The Council will not reimburse bidders for any costs incurred in connection with the preparation and the submission of their bid. This Invitation to Tender (ITT) is not an offer, nor is it intended to create a binding contract.

14.2 The fee price submitted by bidders and accepted by the Council will be deemed to be fully inclusive of ALL disbursements e.g. travelling, accommodation and other sundry expenses incurred by the bidder for the successful delivery of the project brief. The Council will not entertain any additional claims in this respect.

15.0 Quality Questions

15.1 Please answer the following questions as part of your tender submission:

1. How will your full roof structural survey determine the method you use to support the solar panels?
2. How will you get the solar panels (and 'rail system' mounting rails if using) up to the top level roof?
3. Is the use of 'rail system' mounting rails the approach you would intend to take, or would you prefer to propose an alternative method?
4. What maintenance would be covered?
5. How long is the warranty you offer (e.g. 20 years, 25 years), and can you confirm it is an insurance-backed warranty?
6. What previous experience on similar projects can you provide evidence for? In particular please provide details of experience of working at height.
7. What resources will you have to install the solar panels and specified supporting mechanism within the timescales set out in the ITT document?
8. What social value will you add through the works?

15.2 The fee price submitted by bidders and accepted by the Council will be deemed to be fully inclusive of ALL disbursements e.g. travelling, accommodation and other sundry expenses incurred by the bidder for the successful delivery of the project brief. The Council will not entertain any additional claims in this respect.

16.0 Cost Schedule

16.1 Please provide pricing for each of the following schedule items as part of your tender submission:

1. Provide a full structural survey of the roof
2. 75 kWp solar panels
3. 'Rail system' mounting rails (or price of alternative method if specified)
4. Connection to building electrical infrastructure and the grid
5. Maintenance charge (annual, up front, etc)
6. Warranty

Appendix A

4.1 Half Hourly Data Analysis

4.1.1 Brent Civic Centre

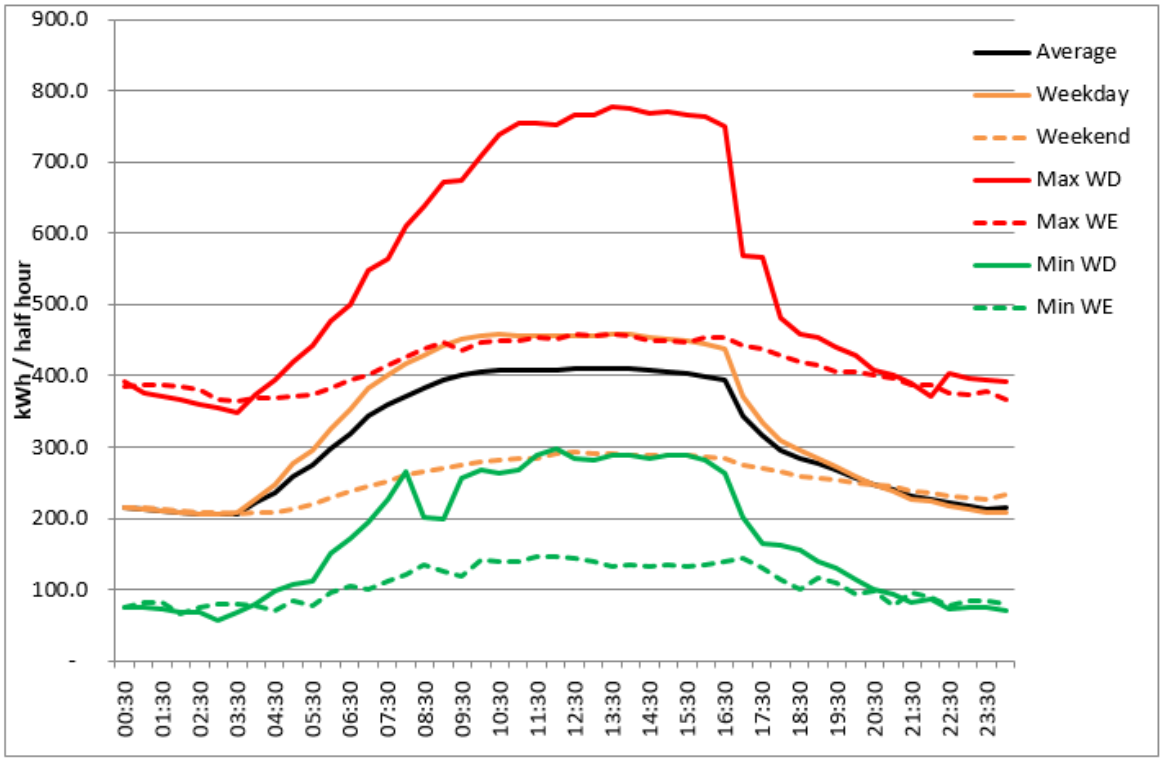


Figure 1 - HHD analysis Brent Civic Centre

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Demand (kW)	1,069	1,556	1,423	1,208	1,162	1,140	1,176	1,239	1,154	984	1,204	1,225
Minimum Demand (kW)	369	160	384	140	116	141	188	180	149	376	132	381

Brent Civic Centre has a high electricity consumption. The electricity used in this analysis is from the fiscal HH meter and includes the electricity generated by the on-site CCHP. The baseload is approximately 150-200 kW (weekend/weekday) and a maximum demand of around 1.2MW. The high baseload means that a large PV system can be installed without any electricity being exported.

Figure 2 shows how the consumption at site (kW/half hour) varies throughout the year. Electrical consumption increases over summer months due to an increased cooling load.

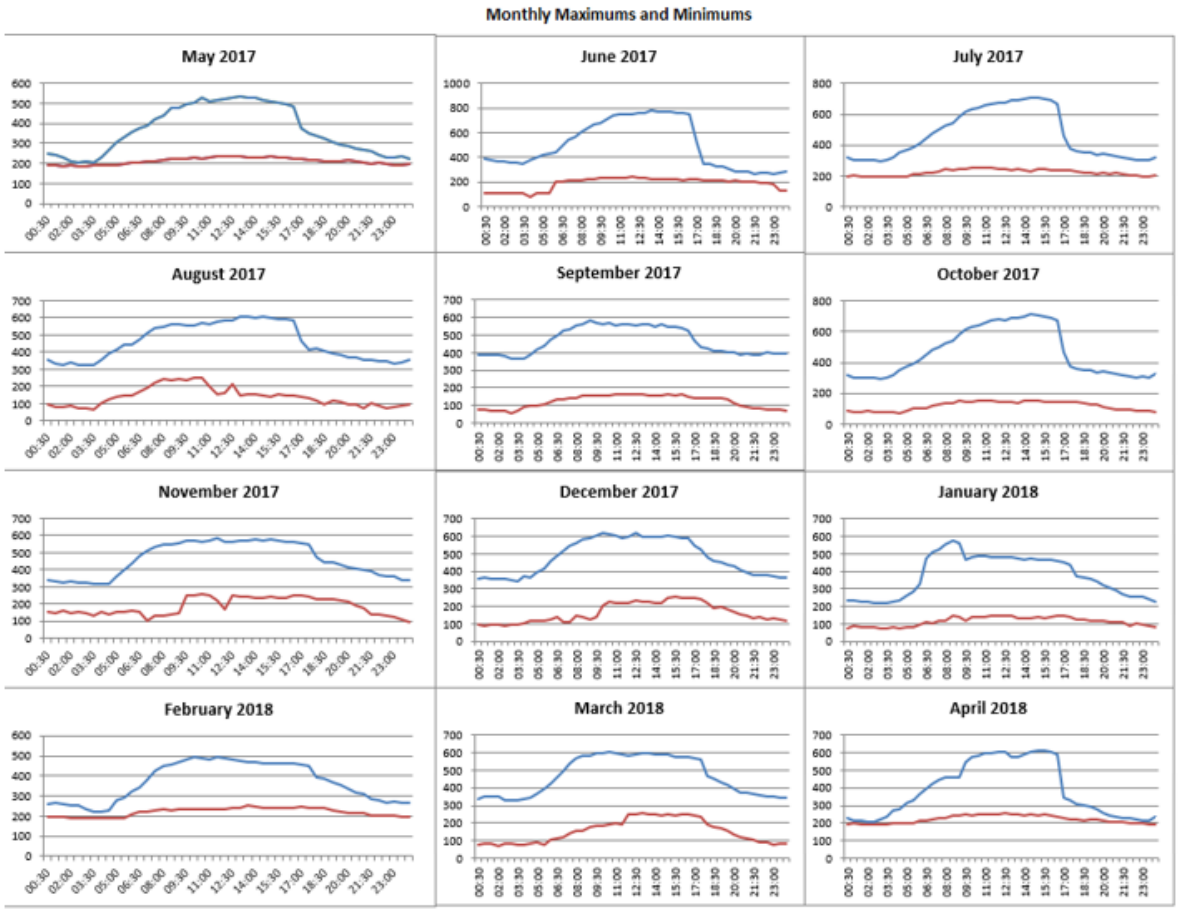


Figure 2 - Maximum and minimum demand – Brent Civic Centre

Appendix B

8 Simulations + Results

This section outlines the simulations completed for each site including the inputs to the models and the outputs.

8.1 Simulation inputs and outputs

8.1.1 Brent Civic Centre

Aspect	System 1	System 2	System 3
Roof Areas	All roof areas	**All roof areas**	Roof sections A+B
System size (kWp)	125.2	**75.0**	49.9
Orientation*	180°	**180°**	180°
Inclination	15°	**15°**	15°
Performance Ratio (%)	82.4%	**87.8%**	88.5%
Yield reduction due to shading (%)	7.2%	**1.1%**	2.2%
Annual Generation (kWh)	109,882	**70,125**	47,008
Specific Annual Yield (kWh/kWp)	877.4	**934.8**	941.9

*Orientation measured clockwise from north. Note Orientation is usually measured from due south (0°); East is negative, west is positive (figure in the brackets).