Greater South East Net Zero Hub

ROOFTOP SOLAR PV INSTALLATIONS
PROCUREMENT SPECIFICATIONS & FINANCIAL BUSINESS CASE MODELLING

www.gsenetzerohub.org.uk

Published October 2026

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Introduction

1. This document provides guidance for public sector bodies (henceforward referred to as "the Authority") on criteria to include in specifications for procuring rooftop solar photovoltaic (PV) installations. It assumes that installations will be generating principally for on-site use with any excess sold to the grid under Smart Export Guarantees (SEG). Separate specifications will be required if the system is required to export to a third-party customer via a private wire.
2. The guidance is primarily aimed at:
   - Microgeneration i.e. up to 50 kilowatts peak (kWp) rooftop solar PV systems; and
   - Larger, but straightforward rooftop solar PV systems utilizing permitted development rights[1] (rather than going through a full planning application)

   where project development involves either procurement of a contractor for all elements of the work or procurement of surveys and outline design followed by procurement of an installer.
3. For very large or complex rooftop solar PV installations e.g. installations on unusual roof structures, including battery storage, Electric Vehicle charge points, private wire export or full planning applications, a more involved project development process is likely to be required. This process is outlined in the Appendix to this guidance.
4. The guidance also covers factors for the Authority to consider in their internal business cases (or in reviewing external financial modelling) for rooftop solar PV.
5. Guidance on the process for developing rooftop solar PV projects is available to Local Authorities on Net Zero Go at Standard process for delivering rooftop and car park solar PV – Net Zero Go (you will need to have a Net Zero Go account and be logged in to access the link).

Solar PV Business Case Considerations

6. Although Contractors may provide financial modelling with their proposals it is recommended that the Authority conduct its own modelling for decision making purposes or critically review the Contractor's modelling, in particular assumptions on energy pricing and electricity exports.
7. Maximising electricity generation used on-site improves the business case for solar PV, as the value of avoided grid electricity imports is significantly higher than the income

[1] As set out in Schedule 2 Part 14 Class J of the Town and Country Planning (General Permitted Development) (England) Order

from exports under SEGs. Typically, on-site consumption should be at least 50% of generation, and ideally 80% or more, to achieve a good payback/return on investment. Ideally, half hourly electricity consumption data will be available for the site and will have been used by the Contractor to model electricity generated and used on-site versus electricity exported.

8. It is not always possible to access SEG revenue. To be able to access this you will need an electrical connection with export capacity and the metering arrangements will need to meet the SEG provider's requirements. In areas where the grid is constrained Distribution Network Operators (DNOs) may not offer any export capacity, although (depending on the DNO's approach to export limitation) you may be able to access flexible connection arrangements which allow you to export under certain circumstances. Half hourly export metering will certainly need to be in place in order to claim SEGs, but some SEG providers may be more specific about which specification of half hourly export meters they will work with e.g. they may be focused on domestic metering standards and less familiar with mandatory half hourly settled meter standards.

9. Consider roof lifetime/replacement cycles. It is best to avoid installation prior to a scheduled re-roofing. If required, panels and mountings can be lifted for re-roofing and reinstated, but there is a cost to this which should be included in your financial business case modelling if you expect to need to do this after the solar PV is installed.

10. Energy savings and revenues should be modelled over the installation's lifetime. This is typically assumed to be 25 years.

11. Make sure your financial business case accounts for all of the following capital costs:
    - Surveying and design costs (if procured separately from installation);
    - Installation Contractor cost;
    - Asbestos costs (if a licensed asbestos contractor is required and procured by the Authority rather than the Contractor);
    - Contingency (at least 10%).

12. Make sure your financial business case accounts for the following Operation & Maintenance (O&M) costs:
    - Periodic maintenance. As a minimum, for microgeneration installations, you should allow for cleaning panels every 3-5 years (more often in dirtier environments) and electrical checks as part of 5 yearly fixed wiring tests. For larger installations, and installations in sensitive environments such as hospitals, routine annual maintenance may be more appropriate. You should check any requirements stipulated by your insurer on maintenance frequency and scope. NB accessibility and the absence of edge protection can significantly impact maintenance costs so should be considered at installation design;

- Any data communication costs e.g. mobile costs for generation meters using SIM cards for communication;
- The cost of replacing failed inverters at least once during the installation's lifetime.

13. Make sure your financial business case accounts for the following in savings and revenue modelling:
    - Electricity generated and used on-site should be valued at the site's daytime electricity tariff to calculate the bill savings. Deciding how this electricity tariff might change over time (and hence the value of future savings) is challenging.
        - Contractors' bill saving estimates often assume that current electricity prices increases year-on-year faster than general inflation.
        - In contrast Government modelling predicts that tariffs will come down to around 14 p/kWh (in 2026 money) and stay at around that level in real terms (see Data tables 4 and 19 (for inflation) of the Green Book GHG Analysis Toolkit).
        - In practice, it's impossible to accurately predict future energy prices. Authorities are advised to model a range of savings scenarios using different future electricity price assumptions to understand how sensitive the business case is to electricity prices;
    - Electricity projected to be exported should be valued at the SEG tariff to calculate export revenues. Like electricity tariffs future SEG tariffs are uncertain as electricity tariffs. There's a table of current SEG offerings here Smart Export Guarantee (SEG) | A Complete 2026 Guide, but SEG providers can increase or decrease their rates at any time. Broadly speaking, changes in SEG tariffs should be consistent with changes in electricity tariffs, so you may wish to link SEG tariff assumptions to electricity price assumptions e.g. if your SEG provider's current offering is say 50% of your current daytime electricity tariff, model future SEG tariffs as 50% of the prevailing electricity tariff in each electricity price scenario;
    - Some element of annual deterioration should be included in your modelling. A 0.5% per annum reduction in generation is a fairly typical assumption.

Desktop & Feasibility Assessments

14. Before commencing procurement activity it is sensible to confirm that the roof is not expected to require maintenance in the near future and to conduct a desktop assessment to assess solar PV potential for the site. Desktop assessment results can help inform procurement specifications e.g. specifying the targeted installation capacity in kWp in order to ensure comparable tenders and can provide a first iteration of technoeconomic modelling, identifying potential generation, export versus on-site use and financial metrics (payback, NPV, IRR). GSENZH can produce a desktop

assessment for public sector bodies. Input data required to produce a desktop assessment includes:

- The site address and use (office, school, leisure centres etc);
- A site plan indicating available and unavailable roof spaces;
- Electricity consumption data for at least 12 months in as granular a form as possible (ideally half hourly, although assessments can be produced using monthly or annual data if half hourly data is unavailable);
- A sample electricity bill.

15. Where desktop assessment identifies potential for a rooftop solar PV system which is larger than a microgeneration (up to 50 kWp) system it would be sensible to conduct rooftop structural surveys and DNO engagement to confirm feasibility of installing on the intended roofs and that the DNO is likely to accept the installation and any proposed export to the grid. GSENZH can support public sector bodies with DNO engagement. Whilst roof structural suitability and DNO acceptance are also relevant for microgeneration systems, these elements can be built into the installation contractor's responsibilities to simplify procurement.

Asbestos, IT datapoints, Main Electricity Meter & FiT issues

16. Procurement specifications will need to be clear about whether the Contractor or the Authority will be responsible for:

i) any asbestos-related works e.g. drilling of cable penetrations, fixings etc. The Authority may want to appoint their own licensed asbestos contractor or require the solar PV Contractor to appoint a licensed asbestos contractor;

ii) installation of IT datapoints next to inverters and generation meters and connection to the building's Local Area Network. This may be required to enable communication with the internet for remote access to meter readings and remote diagnosis. Again, the Authority may have their own IT contract that they would wish to use;

iii) any main meter upgrades required to meet SEG provider requirements. The Authority may wish to arrange these via their energy supplier(s) and/or have an existing meter operating services contract in place that they wish to use.

17. Draft specifications should be shared with the Authority's Compliance (e.g. Fire Safety, asbestos compliance) team, Property/Assets, Education Capital (for school projects) and Energy teams for comment prior to finalising them.

18. Caution is required if any sites have existing Feed in Tariff (FiT) accredited solar PV (pre 31/03/2019 install). In general, any new solar PV, installed on the same site as a FiT accredited installation, will need to be connected to a separate export meter and MPAN (see paragraph 6.4 of Ofgem's Guidance for Generators) if it is to claim SEGs

without surrendering the existing installation's FiT accreditation. Authorities should check with their FiT Licensee (the organisation making the FiT payments). FiT payments are more generous than SEGs and you would not want to lose FiT revenue for an existing installation.

Solar PV Procurement Specification Requirements

19. Public sector procurement needs to comply with statutory requirements aimed at ensuring free and open competition and value for money. You should engage with your Procurement team to ensure that your proposed procurement approach is compliant with these requirements. GSENZH can support with identifying potential public sector procurement frameworks that you could use.

20. Specifications should include the following requirements. Text in italics is addressed to the Authority and is either a note on site-specific information to include or a background note explaining the reason for certain requirements. This text should not be included in the Authority's Specification.

21. Contractor Certification Requirements

    21.1 In the case of "microgeneration" installations i.e. those below 50 kWp capacity (typically around 115 panels) contractors should be accredited to either MCS or Flexi-Orb. Accreditation provides a degree of confidence that the contractor will work to industry quality standards and also provides a third-party complaints procedure in the event of issue. Note: MCS is longer established than Flexi-Orb so there will be more MCS accredited installers and some SEG providers will only accept installations installed by MCS accredited contractors.

22. Solar PV Survey and Design Requirement

    22.1 [*Delete if already conducted as part of a feasibility study*] The Contractor shall conduct structural surveys of roofs to confirm suitability for the weight of the solar PV. Where structural surveys identify that rooftop solar PV is not possible, the Contractor shall be entitled to claim costs incurred for surveying, inclusive of their overhead and profit markups, and the contract shall be terminated without further cost to the Authority.

    22.2 Solar PV installations should be designed to meet the IET Code of Practice for Grid-Connected Solar PV Systems, 2nd Edition.

    22.3 Microgeneration installation designs should meet MCS's Solar PV Installation Standard (MIS 3002:2025 1.0) or equivalent standards.

    22.4 The installation design must either comply with the requirements of The Town and Country Planning (General Permitted Development) (England) Order 2015, as amended, Schedule 2 Part 14 Class J, or the Contractor must obtain planning consent.

22.5 The solar PV installation shall be designed and installed to meet the requirements of the Fire Protection Association's RC62 guidance www.thefpa.co.uk/resource-download/363. [*The Authority should check with their Building Insurers whether they have any additional fire safety requirements for rooftop solar PV that need to be reflected in the specification.*] Where appropriate, contractors should consider incorporating passive fire detection measures, such as linear heat detection (LHD), especially in rooftop installations with long DC cable runs or in sensitive environments such as hospitals or schools. This can support compliance with broader fire safety obligations and help ensure early warning capability in the event of rooftop incidents.

22.6 The solar PV installation design shall consider rooftop accessibility and safety for system maintenance in operation e.g. do edge protection or Mansafe systems need to be installed to facilitate safe maintenance.

22.7 The design shall include the facility to safely isolate DC cabling.

22.8 Design should address integration of the solar PV with the existing fire alarm system and lightning protection systems. Tenderers should highlight any additional fire safety features of their design in their proposals e.g. use of arc fault protection, automatic reduction of DC cabling voltages to safe levels in the event of fire etc.

22.9 The solar PV installation shall be designed to prioritise use of generation on-site, with any excess exported to the grid under a SEG.

22.10 Design shall include measures to prevent nesting of birds or vermin underneath solar panels.

22.11 Solar panel and inverter selection shall consider length of manufacturer warranty offered and tenderers shall explicitly state warranty lengths in their proposals.

22.12 Design shall specify generation metering and communications to enable remote reading of meters e.g. LAN/internet or SIM connection to a web portal/app. The Contractor shall identify any upgrade required to the site's main electricity meter to enable a SEG application (*check the meter specification requirements of your chosen SEG provider, a smart meter or mandatory half hourly meter, including export metering will be required*).

23 Solar PV Installation Approvals

23.1 If the installation results in more than 50 kWp solar PV capacity on-site, the Contractor must submit the design to the Local Planning Authority for a determination on whether it requires prior approval.

23.2 If the installation design does not comply with the requirements of The Town and Country Planning (General Permitted Development) (England) Order 2015, as amended, Schedule 2 Part 14 Class J, the Contractor must obtain planning consent.

23.3 The Contractor will be responsible for obtaining G99 approval from the DNO for connection of the solar PV to the grid.

23.4 Where the Contractor is unable to secure the approvals set out in 22.1-22.3 the Contractor shall be entitled to claim costs incurred for surveying, design and planning, inclusive of their overhead and profit markups, and the contract shall be terminated without further cost to the Authority.

24 System Installation Requirements

24.1 The Contractor will be responsible for:

- [Delete if you are appointing a separate Principal Designer] Discharging the Construction Design & Management Regulation 2015 Principal Designer role & responsibilities.
- Discharging the Construction Design & Management Regulation 2015 Principal Contractor role & responsibilities.
- HSE F10 notification (for projects lasting longer than 30 working days, with more than 20 workers on-site or exceeding 500 person days construction work).

24.2 Solar PV equipment shall be ethically sourced, in particular solar panels shall be from a traceable source free from forced labour.

24.3 The Contractor shall install generation metering and communications to enable remote reading of meters e.g. LAN/internet or SIM connection to a web portal/app.

24.4 [*If applicable*] In the case of installations on roofs with outstanding warranty on the roof covering, the solar PV Contractor must comply with any requirements specified by the roofing contractor e.g. on installation mounting types, use of sacrificial felt beneath mounting feet etc.

24.5 A durable hardcopy of emergency shutdown procedures shall be displayed at the solar PV system's electrical isolation points.

24.6 "Solar PV on Roof" labelling and a site plan indicating isolation points shall be displayed next to fire alarm panels.

25 System Handover Requirements & Warranty

25.1 The Contractor must provide all evidence required for a SEG application e.g.

- G99 certificate
- MCS or Flexi-Orb certificate for <50kWp installations
- invoice for installation addressed to the electricity account holder.

25.2 The Contractor shall provide an on-site demonstration of the emergency shut-down procedure and a teach-in on maintenance requirements and their importance.

25.3 Login details shall be provided for remote access to generation and export meter readings via a web platform/app. The Contractor shall provide the Authority training on how to monitor system output, what to expect and look out for.

25.4 The Contractor shall provide Operation & Maintenance manuals including:

- Images of the installation process e.g. panel mounting, cabling, isolation, inverter installation;
- Warranty information (warranty duration, contacts for warranty claims etc);
- Emergency shutdown and re-energisation procedures;
- Maintenance requirements and frequency;
- MCS or Flexi-Orb certificate;
- G99 certificate or other evidence of DNO acceptance of connection of the installation to the grid;
- Any IT firewall setting adjustments required e.g. external IP addresses that the solar PV system's inverters might need to communicate with to enable remote access to meter readings and/or for remote diagnosis of faults. NB it's quite common for communications to become blocked post-installation due to site IT changes in firewall settings. Some generation meters have a dedicated SIM and mobile connection as an alternative to using the site's Local Area Network and internet connection. SIM and mobile connection isn't susceptible to on-site IT changes, but may incur an annual comms charge;
- As-Built drawings (these should also be provided as separate files in both .dwg and .pdf format). These shall include drawings of string layout to support future fault finding;
- Building Regulations certification for the installation;
- (If applicable) A copy of the planning consent for the installation including approved plans.

25.5 The Contractor shall provide a minimum of 12 months warranty, covering parts and labour on the installation. Ideally a 24-month warranty should be provided. [*NB manufacturer component warranties will be significantly longer e.g. 5-10 year inverter warranties, up to 25 year performance warranties on panels etc. Authorities may wish to consider competing warranty offers (paragraph 22.11 asks tenderers to state warranty lengths) as part of tender evaluation.*]

Monitoring

26 It's recommended that someone within the Authority take on responsibility for monitoring of generation from the solar PV, at least on a monthly basis and at a higher frequency following installation and during periods of expected higher generation (Spring-Autumn), otherwise it's very easy for a failure to go un-noticed. Some remote monitoring platforms allow automatic email alerts to be set-up when generation drops below pre-set standards.

27 It's also recommended to check generation immediately after maintenance contractor site visits in case the system was isolated during maintenance/inspection and not switched back on afterwards. The same staff member should also lead on initiating any warranty claims with the Contractor/equipment suppliers. If monitoring responsibility is not allocated to a suitably skilled staff member the Authority should consider contracting monitoring services as part of an Operation & Maintenance contract.

Maintenance

28 Depending on the size of installation or portfolio of installations you may wish to procure a contract for ongoing maintenance. In the case of a single microgeneration installation it may be more appropriate to procure one off maintenance visits. MCS MIS 3002 Issue 4.0 Appendix F Maintenance Schedule includes recommendations for frequency of intermediate and full maintenance visits in different building types.

29 Specifications should include the following requirements. Text in italics is addressed to the Authority. This text should not be included in the Authority's Specification.

30 Context

30.1 [*Provide background information on the portfolio size, number of locations, building use, age of installation etc that will be covered by the maintenance contract. Specify whether equipment is within or out of warranty. Specify the range of makes of inverter present in the installations and any online or other monitoring platforms that being used to monitor system performance.]*

30.2 [*Add any restrictions on access hours and prior notice periods required for site visits*.]

30.3 [*You should provide electrical schematics for the installations, where available, as part of the invitation to tender pack*.]

31 Contractor Certification Requirements

31.1 The contractor must be MCS or Flexi-Orb accredited and NICEIC (or equivalent) accredited. All works must be carried out by a "Competent Person", as defined by the IEE Wiring Regulations (18th Edition) and to the Electricity at Work Regulations 1989 incorporating all Amendments and other Acts, regulations or

orders pertaining to the health and safety of employees and all others who may be affected by their acts or omissions.

31.2 The contractor's technical staff and operatives must have received asbestos awareness training as required under Regulation 10 of "The Control of Asbestos Regulations 2012".

31.3 [*Do Contractor staff require Enhanced Disclosure Barring Service clearance e.g. for working on schools or other sensitive sites?*].

32 [*Delete this section if conducting monitoring internally*] Monitoring Requirements

32.1 The Contractor shall, as a minimum, monitor the following aspects of the performance of the installation:

- Any metering faults, drop out of data streaming or other communications faults;
- Generation levels versus expectation;
- Inverter status;
- Fault alerts.

32.2 The Contractor shall alert the Authority to any faults detected or loss of generation not obviously attributable to weather e.g. snow coverage of panels, within 2 working days of the fault occurring. The notification shall include an indication of the severity of the fault, potential causes and recommended action.

33 Maintenance Requirements

33.1 The Contractor must comply with the requirements of the Health & Safety at Work etc Act 1974, BS7671:2018 18th Edition of the IEE Wiring Regulations incorporating all Amendments and any other Acts, regulations or orders pertaining to the health and safety of employees and all others who may be affected by their acts or omissions.

33.2 [*For installation up to 50 kWp*] As a minimum, maintenance visits shall involve the Intermediate inspection activities listed in MCS MIS 3002 Issue 4.0 Appendix F. Full inspection activities should be conducted [*Specify required frequency*]. [*For public buildings the MCS standard recommends an Intermediate inspection every year and a Full inspection every 5 years. These are recommendations only and the standard notes that a reduced frequency may be appropriate for smaller installations and an increased frequency for larger installations. This is to ensure that maintenance costs remain proportionate to the scale of bill savings that the installation is achieving. You will need to consider this and the duration of your contract in specifying whether and how frequently you want Intermediate versus Full inspections.*]

33.3 [*For installations larger than 50 kWp*] The Contractor must adhere to British Standard BS EN IEC 62446-2:2020 and to the recommendations of Solar Energy UK's Rooftop O&M Guidelines 3.0.

33.4 In addition to the above inspection activities the contractor should:

- confirm that generation meter and/or inverter communication with any online monitoring apps is working;
- inspect any solar PV specific fire protection systems;
- check for the presence and integrity of pigeon netting;
- update inverter firmware as and when required;
- report on any increase in shading e.g. due to tree growth, that could not be safely addressed by the contractor.

33.5 Service items and any defective items or low value (e.g. connectors, isolators) should be replaced as part of service to avoid the need for/cost of repeat visits [*You may wish to specify a maximum repair value that does not require prior approval*]. Any higher cost rectification requirements should be reported to the Authority with a description of the faults, their impact on the operation of the system and a quote for cost of replacement/rectification with supporting product data sheets, product warranty information and evidencing that replacement solar panels are from a traceable source free from forced labour.

33.6 The Contractor's staff will be required to provide all necessary access equipment. Scaffolding will only be used by prior mutual agreement. All work at height must be assessed prior to maintenance visits, and the contractor must provide a suitable solution for the specific site, to allow safe working at height.

33.7 For any inspections involving drones, drone operators must hold relevant qualifications and able to provide evidence of this, including their CAA license. No drones are to be used on establishments with children present without consent of the Authority and site manager.

33.8 All materials and components supplied by the Contractor must be suitable for their purpose and all workmanship must be to a competent standard. The Authority reserves the right to inspect works and repairs at any time to ensure that the materials used and work performed are to a satisfactory standard.

33.9 The Contractor must leave the solar PV on each site safe and fully operational at the end of each maintenance/rectification visit except in the case where safety concerns necessitate immediate isolation of all or part of the solar array. Where the Contractor has isolated installations for safety reasons they must notify the Authority within one working day.

34 Reporting & Documentation

34.1 Following each maintenance inspection the Contractor must issue an inspection report. This should clearly detail the activities undertaken as part of the inspection, measurement results, give commentary on the condition of the installation, and document any repair work required.

34.2 Where a maintenance inspection identified, but did not complete, required rectification work, the contractor must provide their proposal for rectification works, as described in paragraph 33.5, within 7 days of attending site. Following completion of rectification work a report shall be submitted to the Authority documenting the work carried out. In the event that rectification work results in a change to the As-Built electrical schematic, the Contractor shall provide an updated schematic within one month of competing rectification works.

Queries & Feedback

35 If you have any questions on the content of this guide or feedback on how it could be improved please contact info@gsenetzerohub.org.uk.

Appendix – Development of High Value or Complex Rooftop Solar PV Projects

1. Installation of larger, higher capital value rooftop solar PV or systems which are more complex due to unusual roof structures, a requirement to secure planning consent, interactions with other systems such as battery energy storage, electric vehicle charge points, private wire connections etc are likely to require a multi-stage project development and implementation process in order to manage technical and financial risk.
2. The following development stages are likely to be applicable to such projects:
    i) Desktop Assessment: to identify rooftop solar PV potential capacity, generation, export and first iteration financial modelling. GSENZH can conduct desktop assessment modelling for public sector bodies, as set out in paragraph 14 of the main body of this guidance.
    ii) Design & Feasibility: procurement of a consultant to deliver on-site surveys e.g. structural surveys and installation design. Where planning consent is required, consultants would also develop and submit a planning application including all required supporting evidence. Outputs from the Design & Feasibility stage would inform updates to the Authority's financial business case modelling for the project and be used as the basis for installation procurement specifications.
    iii) Procurement: procurement of an installer and of an independent Project Manager to manage the installer, ensure the installed system complies with the Design, with the planning consent and with regulatory requirements (e.g. Construction Design & Management Regulations, Health & Safety, Building Regulations etc). The Authority may wish to utilise the Design consultant to provide Project Management services.
    iv) Installation & Project Management: on-site preliminary and installation works.
    v) Handover: formal completion, on-site training, handover of Operation & Maintenance manual and Health & Safety file for the project and signature of completion certificate.
    vi) Operation & Maintenance: procurement of maintenance contractors and implementation of a monitoring regime to track system performance and initiate rectification works when required.