

## ITT SCHEDULE 2 - SPECIFICATION

### NCC258 Design and Build of County Hall Solar Carport, Battery Storage and Electric Vehicle Charging Points

#### Introduction

The Contracting Authority (Authority) has a requirement for a Contractor to undertake the design and build (RIBA stages 3-6) of an 800KW solar photovoltaic car port, 400KW battery storage, 10 rapid electric vehicle charging points and 50 fast electric vehicle charging points installed in the rear car park of its County Hall office building. The Authority requires the system to integrate an energy management system that maximises the use of the solar within the building and the electric vehicle charge points. The system must have a lifespan of no less than 25 years and should be designed and installed accordingly.

This project has been awarded funding from the England European Regional Development Fund as part of the European Structural and Investment Funds Growth Programme 2014-2020.

It is imperative that the successful tenderer is compliant with the ERDF guidance in regards to funding regulation and requirements. These can be found [here](#).

The works are to be inclusive of a full re-surfacing of the existing car park and any drainage improvement and amendments that are required as part of the works.

Warranties are required from the Main Contractor, Contractor's Consultants and Sub-contractors where applicable.

Minimum requirements are that all installers are Microgeneration Certification Scheme (MCS) certified and ensure compliance with all standards for systems up to 50KWp and meet the requirements specified within Institute of Engineering and Technology (IET) Code of Practice for Grid Connected Solar Photovoltaic Systems for any system over 50KWp. The development is to be fully compliant with all local and statutory requirements and regulations.

The Contractor is to make all design and technical information available as required by the Employers insurers. The Contractor shall also allow the Employers Insurers access to site to inspect and monitor the works during the construction.

The Contractor will be fully responsible for the design, management, construction and commissioning of the works. The works shall be constructed in a good, sound, substantial and professional manner and in accordance with good engineering and building practice and standards appropriate for a project of the scope, nature, size, and value of the works and using good quality and appropriate materials. The works are to be constructed using well-tried and tested methods of design and construction, suitable for long term investment by institutional investors. The Contractor is required to ensure that the development complies with all agreements, conditions and restrictions etc., which have been imposed by local authorities; statutory/ utility services etc. and is included in the planning application for the development that the Contractor is required to submit.

## 1 Solar Installation

1.1 The installation of solar photovoltaics (solar PV) must be installed to the standards set out by MCS and compliant with all applicable building regulations and standards.

1.2 Solar panels must be of a robust design and meet the following:

1.2.1 A minimum product guarantee of 15 years

1.2.2 Be a registered tier 1 product as dictated by Bloomberg New Energy Finance PV Module Maker Tiering System

1.2.3 A linear performance guarantee of 25 years with no less than 80% of the original outputs being achieved in year 25.

1.3 Inverters for the system must come with a minimum product guarantee of 10 years.

1.4 An AC, double pole, rotary isolator must be installed adjacent to the distribution board and the inverter. A DC isolator must be installed for each string to allow ease of maintenance.

1.5 The Contractor must provide all necessary commissioning certificates including certificates from National Inspection Council for Electrical Installation Contracting (NICEIC), MCS and the final PV SOL (equal and approved) drawing upon final handover.

1.6 The Contractor must provide a full handover pack post install containing but not limited to the following;

1.6.1 Job sheet, specifying all component makes and models detailing all serial numbers

- 1.6.2 Panel test of each PV panel
- 1.6.3 NICEIC certification
- 1.6.4 Part P Electrical sign off certificate
- 1.6.5 Systems schematic
- 1.6.6 G99 Application
- 1.6.7 Wind and Snow load calculations

1.7 The following will also be required for the installation:

- 1.7.1 MCS contractor accreditation number
- 1.7.2 MCS certification for each installation
- 1.7.3 Smart Meter Manufacturer manual (instruction and guidance)
- 1.7.4 Electrical Installation Certificate
- 1.7.5 DC test certificate
- 1.7.6 PV power estimate information (PV Calculations)
- 1.7.7 Structural calculations
- 1.7.8 Proof ownership (invoice of payment for each installation)

Due to the funding regulations the Authority requires the power from the solar car port to be export limited. No export can be made to the grid. It is therefore required that the Energy Management System as specified is capable of maximising the use of the solar energy to minimise any grounded power.

## 2 Solar Car Port

2.1 The Authority requires the Car Port mounting system to be affixed to Tee-Shape stands. This is to minimise impact on car parking spaces and limit the possibility of having the legs hit by cars.

2.2 The steel structure must comply with BE EN 1090: Execution of Steel Structures, BS EN 1991-1-1: Actions on structures, BS EN 1993-1: Design of Steel Structures and BS EN 1991-7: Accidental Actions.

2.3 As detailed within the outline design in Appendix 3 completed by the Authority a two pitch canopy has been utilised, unless valid rationale is provided as to why a different canopy type is preferred this must be incorporated into the Contractor's design.

2.4 All solutions must take account of applicable snow load and wind load calculations; BS EN 1991-1-3: Snow Loads & BS EN 1991-1-4: Wind Loads.

2.5 Solutions must be dynamic and have the ability to allow electric vehicle charging points integrated both at time of install as well as additional points retrofitted at a later date.

2.6 Due to the need to keep the car park operational during the build it is essential that the Contractor phase the installation process so that the total number of usable bays is not overly impacted. The Authority has provided an example phased install diagram within appendix 5.

2.7 LED (Light Emitting Diode) lighting is to be installed underneath the car port structures to provide light to the car park.

### 3 Battery Storage

3.1 Depending on the type of battery utilised different regulations are required. The Authority is not specifying the specific battery type, lead acid, lithium-ion, flow or sodium nickel chloride for example. The relative merits and drawbacks of each must be considered and the most appropriate specified by the Contractor.

3.2 The Authority requires a 400KW installed battery which can hold when fully charged a minimum of 2000kWh/s at maximum storage capacity.

3.3 The Authority requires a containerised battery unit which will be stored securely on site, the Contractor's design must detail where this is to be housed and agreed with the Authority.

3.4 The Authority requires the housing for the battery to be waterproof rated to IP67 standard.

3.5 To maximise storage and minimise losses the battery must be capable of being charged using DC direct from the solar PV.

3.6 In order to take advantage of time of use tariffs applied from the grid to County Hall, the battery must be capable of charging using AC power from the grid.

3.7 The battery must be warrantied for 5,500 charge cycles and operate at no less than 80% of the initial rated capacity at the end of those charge cycles.

3.8 The solar car port structure and panels are expected to be a 25 year asset and hence the battery must be capable of having key components replaced at the end of the 5,500 charge cycles in order that it can be utilised for the 25 year duration. It is therefore the requirement of the Authority that the Contractor ensures that as many elements as reasonably possible have a 25 year life at the design stage of the project.

#### 4 Electric Vehicle Charge Points

4.1 The Contractor must provide 10 rapid chargers, which are required to be a minimum of 50KW each.

4.2 The Contractor must provide 50 fast electric vehicle chargers at least 22KW each.

4.3 The charging equipment must be fitted with a Measuring Instruments Directive (MID) (SI 2006/1679) approved electricity meter

4.4 As a minimum the following information must be recorded for each charging session:

- 4.4.1 Charging session ID
- 4.4.2 Charge point ID
- 4.4.3 User ID
- 4.4.4 Plug in date and time
- 4.4.5 Unplug date and time
- 4.4.6 Charge start date and time
- 4.4.7 Charge end date and time
- 4.4.8 Total energy drawn (kWh)

4.5 All charge points must be capable of remotely informing the Authority of required maintenance or if the unit is offline.

4.6 A load management system must be installed to optimise the system and avoid the capacity ever exceeding the building's maximum KVA.

4.7 Load management must be managed as detailed within the Energy Saving's Trust Guide to Charge point infrastructure for business users on pages 11 & 12 of Appendix 1.

4.8 The Contractor must ensure the final installation is in accordance with the Institute of Electrical Technicians (IET) Wiring Regulations (BS 7671); the recommendations of the IET Code of Practice for Electric Vehicle Charging Equipment Installations (as amended); Electricity Safety, Quality and Continuity Regulations and all other applicable standards.

4.9 Charging Equipment must be installed in accordance with BS EN 61851.

4.10 Charging equipment must be CE marked in accordance with EC Directive 768/2008/EC.

4.11 Charging equipment must be compliant with:

4.11.1 BS EN 61851 Part 1

4.11.2 Electromagnetic Compatibility Regulations 2006

4.11.3 Electrical Equipment Safety Regulations 1994

4.12 As the expectation is that the majority of the power for the electric vehicle charge points will come from the solar the charge points must comply with;

4.12.1 DC charging equipment must be compliant with BS EN 61851 Part 23

4.12.2 DC charging equipment must use BS EN 62196 Mode 4 charging.

4.13 Where the solar is insufficient to supply the requirements to the vehicles seeking to charge the supply will be directly from the building and thus an AC supply;

4.13.1 AC charging equipment output power must be measured or calculated at a nominal supply voltage of 230Vac single-phase or 400Vac three-phase.

4.14 AC charging equipment must be compliant with BS EN 61851 Part 22.

4.15 AC charging equipment must use BS EN 62196 Mode 3 charging.

4.16 All charge points must come with a minimum 5 year manufacturer guarantee.

## 5 Energy Systems Controls

5.1 The Contractor must provide a system that can optimise the energy produced, the energy stored and the energy demanded by the electric vehicle charge points to provide the maximum economic benefit.

5.2 The energy systems controls must be able to limit the amount of power being demanded by the electric vehicle charge points.

5.3 County Hall has an agreed demand kilovolt-ampere (KVA) of 800. As such the Contractor must ensure that the load management software installed on the electric vehicle charge points limits the power demand to ensure that the agreed KVA is never exceeded.

5.4 The energy control system must be programmable with County Hall's energy charging rates on a half hourly basis and the system must make the most efficient use of stored power within the battery to maximise the cost benefit of the stored energy i.e. maximise the use during peak charging or daytime hours and minimise evening and weekend usage.

5.5 The Contractor must provide an energy system capable of being utilised for peak shaving, i.e. when economical to do so the battery should charge from the grid when the cost of electricity is cheaper such as overnight and discharge when energy costs are most expensive, this is generally between 16:00 and 19:30 Monday to Friday.

5.6 The Contractor must provide an energy system capable of being programmed to mitigate triad charging.

5.7 Where the Authority's fleet vehicles are charging over a weekend the energy management system must be capable of maximising the use of solar in charging these vehicles. For example not charge the vehicles when connected on Friday evening, but utilise the energy generated by the solar over and above the buildings base demand on a Saturday and Sunday to charge the vehicles.

5.8 The control system must be able to make use of historic building usage data to predict future usage trends as well as take account of public holidays and expected office closures.

5.9 The control system must make use of available weather data to make predictions of the future amount of solar generated. Using this data the battery must be optimised to discharge at the most economical times, but not hold energy in storage if the solar will generate more than predicted building demand and hence have nowhere to be stored.

5.10 The energy systems control must be capable of being connected to the Contracting Authority's IT network and being live monitored.

5.11 Monitoring of the equipment should detail any down time or errors in any of the following elements;

5.11.1 Solar Inverters

5.11.2 Battery Storage capacity

5.11.3 Electric vehicle charge points

5.11.4 Lower than expected solar generation

5.11.5 Lower than expected battery storage capacity

5.11.6 Higher than expected losses from energy stored

5.12 The Contractor must provide a user-friendly interface to be provided as part of the energy systems controls.

5.13 The energy systems controls must be able to produce accurate and detailed reporting on all aspects of the system including but not limited to;

5.13.1 Solar produced within a given period

5.13.2 Energy stored within battery within a given period

5.13.3 Power demanded by electric vehicle charge points

5.13.4 Percentage of power demanded by electric vehicle charge points provided by solar

5.13.5 Percentage of power demanded by County Hall supplied by energy generated from solar (including energy stored)

5.13.6 Solar and battery cost savings based on current grid supplied electricity tariffs

5.13.7 Tonnes of carbon saved based on current carbon factors within a given period

## 6 Car Park Resurfacing

6.1 All works on the car park must be in accordance with the Manual of Contract Documents for Highway Works - Specification for Highway Works.



6.2 The Authority requires the area detailed within Appendix 6 to be resurfaced to the below specification.

6.3 The Contractor must ensure that the current surface is removed to at least 40mm depth, notwithstanding any further removal required to satisfy the drainage requirements and foundations for the car port stands.

6.4 In reinstating the car park surface the Contractor must provide the following;

6.4.1 Surfacing - 40mm depth close graded asphalt surface course (AC 10 Close Surf 100/150) to BS EN 13108

6.4.2 Bond Coat - Hot applied bond coat C50BP3 to BS EN 13808

6.4.3 Road Markings - (relevant line type, colour, length, width etc.) in thermoplastic screed with applied solid glass beads to Traffic Signs Regulations & General Directions 2016 & BS 3262

6.5 The car park layout is to be delivered as per Appendix 2 following the completion of the project.

## 7 Drainage

7.1 The Contractor must undertake drainage surveys which include the following;

7.1.1 Cover levels and invert levels of gullies, manholes and other access chambers;

7.1.2 Invert levels of all incoming and outgoing pipes from manholes and gullies;

7.1.3 Invert levels of all manholes and access chambers;

7.1.4 Pipe diameters, materials, flow direction, type of system (foul, surface water, combined);

7.1.5 Manhole and access point sizes and materials;

7.1.6 Coordinates of all drainage features; and

7.1.7 A CCTV survey to record the condition of the drainage within the car park, with all defects clearly recorded.

7.2 The Contractor will utilise the information collected to:

7.2.1 Identify any drainage that requires diverting, abandoning, remediating or protecting;

7.2.2 Determine the requirements for new drainage as part of the overall scheme design;

7.2.3 Identify existing catchments and work out the existing discharge rate, including confirmation of where the car park currently discharges to;

7.2.4 Aid in clash detection with other proposed services and utilities; and

7.2.5 Determine suitable connection points between proposed and existing networks.

7.3 The Contractor must ensure the peak surface water discharge rate from the redeveloped car park to the proposed outfall is restricted to a maximum rate of 50% of the existing discharge rate from the existing car park. This applies for the 1 in 1 year rainfall event and the 1 in 100 year rainfall event.

7.4 The Contractor must ensure that runoff from the car park is treated before discharge by an oil separator or appropriate Sustainable Drainage Systems (SuDS) that provides cleansing.

7.5 An appropriate oil separator would be a CNSB25s/21 oil separator (equal and approved).

## 8 Statutory Services

8.1 The Contractor is to satisfy themselves that the existing network has relevant capacity to accept the proposed works.

8.2 The contractor is to satisfy themselves and price accordingly any statutory service diversions that are required in order to facilitate the development.

## 9 System Design

9.1 Appendix 3 details an outline design on PV Sol undertaken by the Authority. The Contractor must undertake a full design of the system seeking the most efficient layout from a cost, generation and integrated technology point of view

9.2 The Contractor should note that model types specified within Appendix 3 are for illustrative and modelling purposes only the Contractor must specify its own equipment which meets the specification detailed within this tender.

9.3 Within the Contractor's design the Authority requires as a minimum;

9.3.1 Carport structure and panel lay out schematic as a CAD and PDF file, developed utilising appropriate software.

9.3.2 Mounting system layout provided as a CAD and PDF file, this must detail the fixings for all brackets. This must be completed in conjunction with the wind and snow load testing.

9.3.3 Locations of electric vehicle charging points including all wiring arrangements within the car port structure.

9.3.4 Computer Generated Imagery visually depicting the finished car port construction.

- 9.3.5 Details of wind and snow load test results.
- 9.3.6 Inverter system design, showing system configuration and schematic.
- 9.3.7 Full electric design and drawings showing, cable runs, isolator locations, Inverter, generation and export metering (if required) and connections to distribution board detailing all cable sizes.
- 9.3.8 Centralised Battery location and schematic as a CAD and PDF file developed utilising appropriate software.

9.4 The Contractor must detail the specifications of all equipment being used including relevant manufacturer datasheets. The Contracting Authority requires the following as a minimum however, all components must have relevant datasheets;

- 9.4.1 Solar panels
- 9.4.2 Solar inverter(s)
- 9.4.3 Mounting systems
- 9.4.4 Battery unit(s)
- 9.4.5 Electric vehicle charge points
- 9.4.6 Energy control systems

9.5 The design must be cognisant and developed in line with the requirements of;

- 9.5.1 Distribution Network Operator (DNO) application, in Northumberland this is Northern Power Grid
- 9.5.2 Planning requirements of Northumberland County Council
- 9.5.3 Drainage and surface-water management plans, within the technical design for the car park all drainage implications must be included
- 9.5.4 Structural and foundation conditions

9.6 The Contractor's design documents must be provided to the Authority once design is complete and must be agreed subsequently by the Authority.

## Appendices

- Appendix 1 - EST Charge points Guide\_v10b
- Appendix 2 - Car Park Layout N-S with Pedestrian Route
- Appendix 3 - County Hall Carport PV SOL Design

Appendix 4 - Site layout with Compound  
Appendix 5 - Solar Layout with Example Phasing  
Appendix 6 - Area for Resurfacing  
Appendix 7 - Pre-Construction Information  
Appendix 8 - Site Surveys and Existing Site Information