



66kV 275kV 33kV 11kV 132kV 400kV

CASE STUDY
15960

Lower Dunton

Flexible Generation Substation & BoP

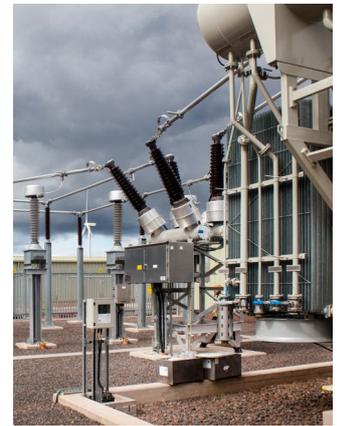


Lower Dunton Flexible Generation Substation & BoP

Powersystems high voltage (HV) electrical engineering was responsible for the design, installation, testing and commissioning of the electrical infrastructure associated with the construction of the 7.5MW Flexible Generation Connection at Lower Dunton Flexible Generation site on Lower Dunton Road in Basildon Essex.

The plant was designed to provide flexible generation to the grid when the more conventional but unpredictable renewable energy source are unavailable. The principle of the development and its impact on environmental, social and economic factors was carefully assessed and given the go-ahead.

Lower Dunton Flexible Generation site is a 7.5MW generation platform that will be available to export energy to the grid early April 2021. The site consists of three 2.5MW generators powered by an MTU GS Engine supplied by VPower Ltd, which is capable of supplying electricity to the grid when called upon. As a trusted NERS accredited company with over 40 years' experience, Powersystems were appointed to assume the responsibility for the installation of electrical infrastructure.



Project facts and figures

- ▶ Number of generators: 3
- ▶ Generator capacity: 2.5MW
- ▶ Total Installed capacity: 7.5 MW
- ▶ Connection Voltage: 11 kV
- ▶ Altitudes of site: 105ft
- ▶ Length of onsite 11 kV cabling: 0.15 km
- ▶ Length of onsite 400V cabling: 0.2 km
- ▶ Length of onsite control & signal cabling: 1.0 km
- ▶ Powersystems are a Lloyds registered (NERS) approved independent connection provider (ICP)

11
kV

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Powersystems partnerships

The site is located on Lower Dunton Road, Lower Dunton in Basildon and was constructed in partnership with ANTS Civil Engineering Ltd on behalf of the client, Conrad Energy Ltd.

The site connects onto the UK Power Networks (UKPN) 11kV network. Powersystems have connected countless Flexible Generation and STOR projects to the grid over the years, this project being one of three projects undertaken this financial year for our client Conrad Energy, which is a young but exiting relationship being built. Our engineers have the much-needed experience of working with every Distribution Network Operator (DNO) across the UK on this type of project, helping customers connect this type of project up and down the country.



Flexible Generation development

As the UK energy production is changing by becoming greener and relying more on renewable energy to become net zero by 2050, flexible generation sites will help fill the gap when the more unpredictable wind and solar energy sources are unavailable.

The Flexible Generation technology works by utilising a fuel source to generate electricity, this project utilised a typically used fuel source in natural gas. The electricity produced by the Generators will be utilised by the grid in times of demand when renewable energy is unavailable.



Scope of works and major design considerations

The major items of electrical Infrastructure that Powersystems designed, supplied, installed, and commissioned were for the design, supply, installation, testing and commissioning of the 11kV grid connection consisting of:

- ▶ Design and construction of the 11 kV GRP substation
- ▶ Installation of the five panel 11 kV Schneider Genie Evo Switch Board
- ▶ Installation of the 500 kVA Auxiliary transformer
- ▶ Installation of the 300mm² 11 kV incomer circuit and 185mm² 11 kV Triplex generator and Auxiliary Transformer circuits
- ▶ Earthing installation works
- ▶ Installation of low voltage, control, signal and communications cabling works
- ▶ Design installation of the LV infrastructure
- ▶ Design and installation of the compound lighting and control panels
- ▶ Carry out Fault level and protection co-ordination studies

Project timings

Construction of the Lower Dunton site initially began in December 2020. Unfortunately, this was during a critical stage of the UK lock down due to the Coronavirus Pandemic, but despite the necessary restrictions and with the right health and safety approach and procedures implemented, the project continued at a steady and efficient pace. Powersystems mobilised on site in December 2020 which involved preparing the ground for construction activity. Plant and material deliveries, with key dates such as Energisation and G99 Testing on 18 March 2021 and 7 April respectively.

What the client wanted

Climate change is the biggest challenge of our time, so the energy landscape is rapidly evolving. The UK's power network requires smart solutions to keep the lights on.

Conrad Energy's growing generation portfolio provides power to over a million homes within the UK when the more unpredictable wind and solar assets are unavailable, hence the need for the flexible generation sites

Conrad Energy are driven by positively impacting the climate change, they offer services to support the delivery of power solutions to commercial and industrial business including the national grid to help achieve the UK's energy transition to net zero by 2050. Powersystems being an Independent Connection Provider (ICP) would be charged with becoming a conduit for the grid connection to allow these types of schemes become reality.

How Powersystems have helped

Powersystems were appointed as the Balance of Plant HV contractor for the project, involved with the design, installation and commissioning of the electrical infrastructure for the generation project. Powersystems aim was to provide a high-quality service throughout this project, Powersystems achieved this by setting out objectives such as ensuring technical correctness, ensuring the client was getting exactly what they asked for whilst adding cost-effectiveness and finally by adhering to the number one Powersystems moto of "Safety First".

During the project there were a number of challenges that presented themselves and Powersystems engineers were at hand to provide full support to the client to help overcome any challenges through our excellent engineering knowledge and experience, which enabled the client to smoothly and successfully complete the project.

Powersystems worked closely with the project partners in order for the client to meet their deadlines that included arranged G99 testing. To achieve this, Powersystems engineers worked with the customer to prioritise the work tasks which resulted in the customer being able to generate power at the set target date to avoid costly penalties.

The list of responsibilities tasked to Powersystems can be summarised by the below;

- ▶ Electrical design and studies
- ▶ Interface with UKPN to co-ordinate any DNO requirements
- ▶ Control Panel installation and commissioning
- ▶ HV and LV infrastructure installation and commissioning
- ▶ Cables & containment design, supply & installation
- ▶ HV/LV testing
- ▶ Senior Authorised Person (SAP) provision

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Design works

Design work is a vitally important part of any Powersystems project, at this stage we ensure the project will meet the clients regulatory, economic and most importantly safety requirements. The design works included in this project are listed below;

- ▶ Design of the GRP Substation
- ▶ Battery Charger Unit design
- ▶ Civil designs for the GRP Substation and Auxiliary transformer
- ▶ Design of the clients HV network
- ▶ Design of the LV network
- ▶ HV/LV cable calculations and cable sizing appropriate to the project loads
- ▶ Fault level Study and full report
- ▶ Protection co-ordination and full report
- ▶ Control & signal cable - this included the design of all small power and equipment control wiring

Installation works

Following the design stage, the installation work listed below was undertaken and completed;

- ▶ Installation of earthing systems
- ▶ Installation of the GRP Substation
- ▶ Installation of HV cables
- ▶ Installation of LV and control cables.
- ▶ Installation of the 500 kVA Auxiliary transformer.
- ▶ Installation of the five panel 11 kV Schneider Genie Evo SWB
- ▶ Installation of the 110V DC Battery charger unit.
- ▶ Installation of the compound lighting including bespoke lighting contactor panel
- ▶ Installation of the oil tank control panels

Commissioning works

- ▶ Hot and Cold commissioning of the 11 kV SWB.
- ▶ Hot and Cold commissioning of the 500 kVA TX.
- ▶ AC Pressure testing of newly installed HV cables.
- ▶ Electrical Installation certificate completed on newly installed LV circuits.
- ▶ Insulation Resistance testing of all control and signal cables.
- ▶ Functional testing of all newly installed equipment

Energisation works

- ▶ Provision of an 11 kV SAP to take control of the client's 11 kV Network
- ▶ Provision of an 11 kV SAP to attend site to provide supervision and to undertake pre-energisation checks and issue safety documents to Powersystems operatives



The results:

The Lower Dunton BoP contract work was completed in line with the client programme against constricted timescales and within budget. This project is the first to be completed by Powersystems for our new client but hopefully not the last as we hope to build a strong and supporting partnership between Powersystems UK and Conrad Energy as we work towards our common goal of making the UK greener.

