



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

CASE STUDY
15895

Plastic Omnium

Warrington CHP 11 kV Substation



**Base
Power**

Plastic Omnium Omega South Warrington CHP

Powersystems high voltage (HV) power engineering were responsible for the design, installation, testing and commissioning of the electrical infrastructure associated with the construction of the 1.0MW Combined Heat and Power (CHP) Generator Connection at Plastic Omnium Omega South Warrington.

The plant was designed to provide the factory with a more economical alternative supply of electricity, hot water and steam to supplement the systems already in place. The principle of the development and its impact on environmental, social and economic factors was carefully assessed and given the go-ahead.

Plastic Omnium Warrington CHP plant is a 1.0MW generation platform that began to supply power to the factory in September 2020. The site consists of one 1.0MW generator powered by an MTU 8V4000 GS Engine supplied by 2G Ltd, which is capable of supplying electricity continuously to the factory in parallel to the grid. As a trusted NERS accredited company with over 40 years' experience, Powersystems were appointed to assume the responsibility for the installation of electrical infrastructure.

Powersystems partnerships



The site is located in Great Sankey, Warrington and was constructed in partnership with Nijhuis Construction and 2G Ltd on behalf of the client, BasePower.

The site connects onto Plastic Omnium Warrington's 11kV network which is a part of Scottish Power Energy's (SPEN) larger electricity network. Powersystems have connected countless CHP generator projects to the grid over the years, this project being number two of four this year for our client BasePower, which exemplifies our strong and trusting relationship. 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.

Project Facts and Figures:

- ▶ **Number of generators: 1**
- ▶ **Generator capacity: 1.0 MW**
- ▶ **Total Installed capacity: 1.0 MW**
- ▶ **Number of transformers: 1**
- ▶ **Transformer rating: 1250 kVA**
- ▶ **Connection Voltage: 0.415 kV**
- ▶ **Altitudes of site: 49 ft**
- ▶ **Length of onsite 11 kV cabling: 0.10 km**
- ▶ **Length of onsite 400 V cabling: 0.20 km**
- ▶ **Length of onsite control & signal cabling: 0.40 km**
- ▶ **Powersystems are a Lloyds registered (NERS) approved independent connection provider (ICP)**



**11
kV**

Powering the Transition to a Sustainable Future



CHP development

As UK energy production is changing fast and becoming more expensive, manufacturers who consume large amounts of energy need to find new ways to reduce cost and remain competitive.

Plastic Omnium Warrington CHP will allow our client Basepower to provide the factory with on-site energy generation at a reduced cost when compared to more conventional sources. This not only helps the manufacturer reduce cost, it also addresses the Governments strategy for a low carbon economy.

CHP 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 CHP will be utilised by the factory to match the current load consumption at a reduced rate.

The CHP engine will also harness the waste heat produced by the process of generating electricity, this heat will distribute hot water and steam through heating pipework to provide heating and hot water to the factory buildings.

By being able to generate electricity and heat through one fuel source simultaneously, the CHP becomes much more efficient than traditional power generation due to the reduction in wasted energy and has been known to improve energy efficiency by up to 45%.

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 11 kV grid connection consisting of:

- ▶ 1 x GBE 1250kVA, 11/0.415kV ONAN Dyn-11 transformer and associated bund
- ▶ Installation of a Schneider RN2d-T2 Non-Extensible Ring Main Unit (RMU) close coupled with an MU2 Metering Unit.
- ▶ 11 kV Cabling between the CHP Substation RMU and the existing network, including HV Terminations onto the client's network
- ▶ 0.415 kV connection from the RMU to 2G's G99 circuit breaker (Schneider Masterpact CB)
- ▶ Installation of a Powersystems custom made Power Measurement Panel for site import/export signals to the BMS to enable control of the generator output
- ▶ 0.415 kV auxiliary supply connections to the Pump Kiosk LV distribution board
- ▶ Programming of protection for the associated circuit breakers
- ▶ Earthing Study
- ▶ Transformer earthing system installation and testing
- ▶ Within the CHP site, the installation of low voltage, control, signal and communications cabling works
- ▶ Carry out full protection study for all new equipment



Plastic Omnium Warrington Project timings

Construction of The Plastic Omnium Warrington CHP generator initially began in June 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 was allowed to continue. Powersystems mobilised on site in June 2020 which involved preparing the ground for construction activity. Plant deliveries such as Transformer, RMU and Generator commenced July 2020, with key dates such as Energisation and G99 Testing on 27th August and 9th September respectively.



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What the client wanted

As UK energy production is changing fast and becoming more expensive, manufacturers who consume large amounts of energy need to find new ways to reduce cost and remain competitive.

BasePower offer a solution to manufacturers via their award-winning business model, that would see manufacturers develop and operate on-site energy generation schemes. This not only helps the manufacturer reduce cost, it also addresses the Governments strategy for a low carbon economy. 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 CHP project HV contractor, involved with the design, installation and commissioning of the electrical infrastructure for the CHP 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".

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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 date of 9th September 2020. 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
- ▶ Interface with SPEN to co-ordinate any DNO requirements
- ▶ Switchgear installation and commissioning
- ▶ Transformer installation and commissioning
- ▶ Cables & containment design, supply & installation
- ▶ HV testing
- ▶ Senior Authorised Person (SAP) provision



Environmental benefits

- ▶ Due to the fact that less fuel is burned to produce a given energy output and the bakery is avoiding the use of power from the grid which mitigates transmission and distribution losses therefore, the CHP reduces emissions of greenhouse gases and other air pollutants such as carbon dioxide, nitrogen oxide and sulphur dioxide.

Economic benefits

- ▶ The CHP will save the factory considerable amounts of money on their energy bills due to its high efficiency.
- ▶ Protection of revenue through onsite generation and improved reliability, the CHP can allow the factory to continue to operate in the event of an interruption of the grid supplied electricity providing the connection agreement allows for this.
- ▶ Less exposure to electricity rate increases, due to the fact less electricity is being purchased from the grid, the bakery will have less exposure to any rate increases.

The results:

The Plastic Omnium Warrington CHP connection work was completed in line with the client programme against constricted timescales and within budget. The first generation to the factory was achieved on 10th September 2020. This project the second of four of BasePower CHP projects this year and exemplifies a long-term working partnership with Powersystems UK.

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