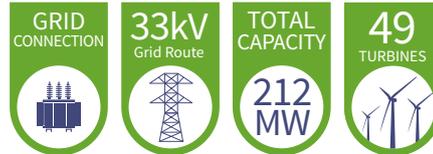




CASE STUDY
16139

North Kyle Wind Farm

49 Wind Turbines with a connection capacity of 212 MW capable of powering 183,000 Homes



Introduction

Powersystems' high-voltage (HV) engineering team was responsible for the design, installation, testing and commissioning of the electrical infrastructure for the 212 MW North Kyle Wind Farm. As a long-established NERS-accredited Independent Connection Provider (ICP), we delivered the full Electrical Balance of Plant, providing a safe, reliable and future-ready system for this major renewable energy development.

The site exports power to Scottish Power Transmission (SPT) via two 33 kV grid connections, each capable of transmitting 106 MW. The project underwent rigorous environmental, social and economic assessments as part of its planning process, ensuring responsible long-term land use and community benefit.



Project Facts and Figures

- ▶ Number of turbines: 49
- ▶ Turbine type: Vestas V150-4.5 MW
- ▶ Individual turbine rating: 4.5 MW
- ▶ Installed capacity: 212 MW
- ▶ Connection voltage: 33 kV
- ▶ Site altitude: Approx. 1000 ft
- ▶ Onsite 33 kV cabling: ~ 353 km
- ▶ Onsite control and signal cabling: 87 km
- ▶ Pre-ducted fibre optic cable used to reduce installation time and minimise ground disturbance: ~ 85km
- ▶ Design, Supply and Installation of 33 kV ICP underground cable of 200 kVA connections works, which was adopted by SPEN
- ▶ NERS-accredited ICP, registered with Lloyd's

Powersystems Partnerships

The project was delivered in close collaboration with Jones Bros Civil Engineering and Natural Power, on behalf of Brockwell Energy. North Kyle connects to the SPEN 33 kV network, contributing to the UK's expanding fleet of clean energy generation assets.

With over 4.77 GW of UK wind projects connected by Powersystems, our engineers brought proven experience of working with every Distribution Network Operator across the country. Our role included significant coordination to maintain safety, quality and consistency across the 30 km site footprint and its multiple temporary work hubs.



North Kyle - Wind Farm delivering a connected capacity of 212 MW

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Project Development

Wind generation continues to play a central role in the UK's transition toward a more sustainable energy system, providing almost a third of the nation's electricity. North Kyle contributes 212 MW of that capacity - enough to power around 183,000 homes.



Restoring a Former Coal Landscape

One of the most notable aspects of North Kyle is the transformation of a former coal mining site into a productive renewable energy landscape. This restoration-led approach has formed a cornerstone of the project's sustainability strategy:

- ▶ Removal of old haul roads, bunds and backfill
- ▶ Reinstatement with topsoil to enable replanting and natural regeneration
- ▶ £600,000 dedicated to planting native broad-leaf trees
- ▶ Long-term biodiversity enhancements embedded in the maintenance plan
- ▶ £2.6 million invested in immediate restoration, with a further £2.6 million allocated for future ecological recovery

The project also prompted the formation of the 9 Communities Community Group (9CCG), representing nearby villages and helping ensure long-term local benefit from the wind farm's operation.

Health, Safety and Sustainability

Safety formed the foundation of every phase of the project.

- ▶ Clear site-wide communication systems were essential, with three temporary office locations across the 30 km site
- ▶ Daily safety briefings and environmental toolbox talks ensured consistent awareness
- ▶ Traffic management and cable installation works were carefully planned to reduce vehicle movements and minimise carbon and noise impacts
- ▶ Pre-ducted fibre routes reduced ground excavation and improved safety by limiting heavy plant working hours

Sustainability was embedded throughout the electrical and civil engineering decisions, with materials sourced locally where possible to reduce fuel consumption and support local economies.



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

North Kyle - Wind Farm delivering a connected capacity of 212 MW

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Top Five Environmental Risks and Mitigation Measures

- 1. Construction Waste Management**
Strict waste segregation and multiple disposal points maintained a clean, safe site.
- 2. Turbine Lifespan**
Turbines at North Kyle are expected to operate for up to 40 years, maximising long-term value.
- 3. Fuel Consumption**
Bulk and local procurement strategies minimised transport emissions.
- 4. Protection of Flora and Fauna**
Biodiversity plans and native species planting support long-term ecosystem recovery.
- 5. Restoration of Disturbed Land**
Degraded industrial land was reinstated for natural regrowth with topsoil placement and rewilding measures.

Scope of Works and Key Design Considerations

Powersystems delivered the full EBoP package including:

- ▶ Indoor 33 kV switchgear, bus coupler and spare panel
- ▶ Complete protection relay systems
- ▶ DC battery charging systems
- ▶ HV and LV cabling
- ▶ LV distribution for all substation equipment
- ▶ Fibre optic and communication networks
- ▶ Customer substation electrical fit-out
- ▶ DSM and ASM monitoring systems for both circuits
- ▶ Power quality meters and National Grid testing panels
- ▶ Full earthing system design and installation
- ▶ Small power and lighting, CCTV and fire alarm
- ▶ ICP works including pole-mounted transformer equipment 33 kV 200 kVA connection adopted by SPEN
- ▶ 50 kVA Auxiliary Transformer for the customer building
- ▶ Integration of customer equipment to Vestas SCADA
- ▶ In house testing and commissioning and SAP support

Project Engineering and Re Engineering

North Kyle presented significant engineering challenges due to the terrain. Powersystems developed and optimised cable routing across multiple elevation changes to avoid unnecessary excavation and reduce overall cabling costs-critical when installing ~ 353 km of HV cable.

Re engineering solutions were also developed during construction to ensure:

- ▶ Efficient cable pulling on steep gradients
- ▶ Reduced energy losses through optimised routing
- ▶ Improved reliability of protection and SCADA systems
- ▶ Reduced environmental impact through revised trenching and reinstatement methods

Project Timings

Works began in December 2023 with installation of HV and fibre optic cables. The site was successfully energised and handed over in October 2025, meeting the client's time and cost expectations. The first array was energised in April 2025, we were ready for energisation much earlier but the delay was mainly from SPEN.

Client Objectives

The client required:

- ▶ A cost-effective, fully operational wind farm
- ▶ A robust, resilient electrical system
- ▶ Benefits for local communities
- ▶ A sustainable approach that respected the landscape's industrial past

How Powersystems Helped

- ▶ With extensive HV engineering expertise, Powersystems:
- ▶ Delivered a practical and economical cable route design across challenging topography
- ▶ Completed the full electrical fit-out of the customer substation interfacing with SPEN
- ▶ Provided consistent onsite leadership, communication and safety management
- ▶ Ensured high-quality installation standards and coordinated delivery with project partners



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Design Works

Our comprehensive design package included:

- ▶ Short circuit and fault studies
- ▶ P28 & P29 voltage fluctuation and disturbance studies
- ▶ G5.5 Stage 3 harmonic assessment
- ▶ Grid Code compliance studies (load flow, voltage control and reactive capability)
- ▶ DRC Schedule 5 cable and transformer parameters
- ▶ EMF exposure assessment
- ▶ Arc flash study
- ▶ Earthing design
- ▶ Hot zone contour mapping
- ▶ Electrical losses analysis
- ▶ Protection settings and coordination
- ▶ Cable sizing and full construction drawings

The Results

North Kyle was energised in October 2025, contributing clean, reliable energy to the grid and forming a key part of Scotland's and the UK's sustainable energy landscape.

Environmental Benefits

- ▶ 212 MW of clean energy powering approx. 183,000 homes
- ▶ Re-use of degraded coal-mining land for renewable generation
- ▶ £600,000 dedicated to tree planting and biodiversity
- ▶ Long-term restoration funding totalling £5.2 million

Economic and Social Value

- ▶ Locally sourced materials reduced cost and supported regional businesses
- ▶ Expected £65 million in indexed community funding
- ▶ Local employment during construction and ongoing operational roles
- ▶ Community representation through the 9CCG organisation



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