

Case Study Howden Water Treatment Works



Summary

- Location: Howden Water Treatment Works, Selkirk, Scotland
- **Capacity:** 1.2MW (Solar) & 1.8MWh DCcoupled (BESS)
- **Type:** Ground-mounted Solar PV with Battery Storage
- **Developer:** Emtec Energy (EPC)
- **Owner:** Scottish Water
- Panel type: DMEGC 550W Modules
- Completion date: 2024



For over 13 years, Emtec Energy has delivered high-quality solar PV and battery storage solutions across the UK, enabling businesses to lower energy costs and achieve Net Zero. Specialising in design, engineering, and installation, Emtec has deployed 52MW of solar PV projects. Their turnkey services prioritise precision, safety, and sustainability, helping industries reduce operational costs and future-proof energy use.

Overview

Emtec Energy was selected by Scottish Water Horizons to deliver a landmark renewable energy project at the Howden Water Treatment Works in Selkirk. This installation represents Scottish Water's first integration of solar power with battery storage at a water treatment facility, setting a new sustainability benchmark within the sector.

The project features a 1.2MW ground-mounted solar PV system paired with a 1.8MWh DC-coupled battery energy storage system (BESS), including 2,112 solar panels and four Solinteg inverters. Designed to optimise energy generation and storage efficiency, the system helps Scottish Water reduce operational costs while significantly lowering its carbon footprint.

One of the project's key innovations was overcoming grid limitations. Initially, the site was restricted to 200kW of inverter power. To address this, Emtec Energy implemented a DC-coupled battery storage solution with a 200kW inverter, allowing the system to scale up to 1.2MW while ensuring full compliance with Distribution Network Operator (DNO) regulations. This strategic approach avoided approximately £2.3 million in grid connection costs for Scottish Water.



Another challenge involved the site's environmental constraints. Located within a well field and borehole area, traditional piling methods for securing the structure were not feasible due to contamination risks. Emtec Energy adapted by using concrete ballast blocks for a non-intrusive, secure installation. Additionally, floodplain considerations led to an elevated system design with surface-run AC and DC cables to ensure durability and mitigate risks.

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The system is expected to generate approximately 932,630kWh of renewable energy annually, offsetting 169 tonnes of carbon emissions. By integrating battery storage, the facility maximises its self-generated renewable energy, further reducing dependence on grid electricity, lowering operational costs, and providing greater energy resilience.

Project Summary

- 1.2MW ground-mounted solar PV system
- 1.8MWh DC-coupled battery energy storage system
- Avoided £2.3 million in grid connection costs
- 932,630kWh of renewable energy generated annually
- 169 tonnes of carbon offset annually
- Provides 35% of the facility's annual energy needs

Drivers of the Project

- Scottish Water's commitment to achieving Net Zero emissions by 2040
- The need to lower operational costs by reducing electricity consumption from the grid
- The opportunity to enhance site energy resilience through battery storage
- Growing industry pressure to transition to renewable energy solutions Demonstrating innovative approaches to energy generation and storage in critical infrastructure projects

Challenges

- Grid constraints limiting inverter capacity to 200kW
- Site located within an environmentally sensitive area (well field and borehole protection zone)
- Flood risk requiring an elevated design and surface-run cables
- Ensuring compliance with DNO specifications while maximising energy output Balancing system efficiency and cost-effectiveness while minimising environmental impact

Outcomes

Emtec Energy's innovative approach enabled Scottish Water Horizons to achieve a ground-breaking renewable energy solution at Howden Water Treatment Works. By integrating solar PV with battery storage, the project delivers substantial energy savings, improved efficiency, and long-term sustainability.

One of the project's main technical challenges was the 200kW inverter capacity limit imposed by the grid.

Rather than accepting a smaller system, Emtec Energy designed a DC-coupled battery storage solution that enabled the installation of a 1.2MW PV system without exceeding grid constraints. This avoided costly grid upgrades and significantly enhanced site energy capabilities. Additionally, the battery system allows stored solar energy to be used during peak demand periods, reducing reliance on grid electricity and optimising financial returns.

The environmental constraints of the site posed another hurdle. As the location is within a well field and borehole area, Emtec Energy could not use traditional piling methods to secure the solar structures. Instead, they employed concrete ballast blocks, ensuring stability while avoiding ground penetration. This innovative design protected the site's delicate environmental ecosystem while maintaining structural integrity. Furthermore, all construction machinery was powered by food-grade HVO biodiesel, and low-impact hydraulic machines were selected to minimise environmental impact and align with sustainability best practices.



Flood risk mitigation was another key consideration. The system was designed with elevated ground clearance to prevent potential water damage, and all AC and DC cables were surface-run on containment structures rather than buried underground. This design choice not only mitigated the impact of potential flooding but also simplified future maintenance and ensured compliance with industry safety standards.

By adopting a DC-coupled battery storage method, Emtec eliminated energy losses common in AC-DC-AC conversions, further improving system efficiency. This approach allows for more effective utilisation of stored energy, ensuring that excess generation is not wasted but instead strategically deployed when most beneficial. Additionally, remote monitoring capabilities enable continuous performance tracking and proactive fault detection, ensuring long-term system reliability and performance optimisation.

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Scottish Water Horizons has greatly benefited from this state-of-the-art renewable energy installation, which is now supplying approximately 35% of the facility's total electricity demand. The project not only supports Scottish Water's commitment to achieving Net Zero by 2040 but also provides a replicable model for other water treatment facilities looking to integrate solar and battery storage solutions into their operations.

Local Benefit & Community Impact

This project plays a significant role in supporting Scottish Water's commitment to sustainability and its goal of achieving Net Zero by 2040. By integrating solar energy and battery storage solutions, the system reduces carbon emissions by 169 tonnes annually, contributing to the company's efforts to lower its environmental impact.

In addition to its sustainability benefits, the project enhances energy security for the Selkirk region's water supply, ensuring a reliable and stable energy source for the treatment facility. The innovative approach showcases how renewable energy can be effectively utilized in the public utility sector, providing a model for other water treatment facilities looking to integrate solar and battery storage technologies into their operations.

This initiative also highlights the power of collaboration between public utilities and renewable energy specialists, demonstrating how partnerships can drive decarbonisation efforts and support a sustainable future. The success of this project provides a replicable blueprint for other public utilities, offering a proven solution to reducing reliance on conventional energy sources while also lowering operational costs and carbon footprints. By fostering innovation and collaboration, this project sets an example for the future of energy use in public utilities across the country.



Learn more about what's happening at Emtec Energy at <u>www.emtecenergy.co.uk</u>



Published in the United Kingdom by Solar Solar Energy UK 6 Langley St, London WC2H 9JA, The Conduit © Solar Trade Association 2025

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