A BALANCED GRID FOR THE SCOTTISH SHETLAND ISLANDS

Smart storage with service solutions to secure power supply

A reliable electricity supply is essential to the local community living on the Shetland islands, a subarctic archipelago in the Northern Isles of Scotland. The Lerwick Power Station is the main generator for the grid, with an obligation to deliver uninterrupted power to the island community. The introduction of energy storage will enhance the islands' security of supply and reduce operating hours on the diesel generators. Wärtsilä's storage system and GEMS Digital Energy Platform are enabling an increased integration of existing renewable power into the power system, which will help lower CO_2 emissions. A combination of flexibility solutions is setting the Scottish archipelago on a path towards a cleaner energy system.

Storage solution enabling more flexible operations

The Wärtsilä energy storage system will provide grid balancing services and reserve power control via the **GEMS Digital Energy Platform** to the Lerwick Power Station, operated by Scottish and Southern Electricity Networks (SSEN) Distribution. The full system is being delivered on an engineering, procurement and construction (EPC) contract and will deliver 8 MW / 6 MWh of power. A ten-year lifecycle service agreement will support the installation, as well as maintenance for the software and hardware system components. Wärtsilä will also assist the customer's operations with 24/7 remote support and management.

Facilitating the islands' energy transition

To address the unique set of challenges that an islanded grid presents, particularly the need for reliable energy to provide critical power needs, the energy storage solution comprises the Wärtsilä **GridSolv Max** technology and GEMS Digital Energy Platform. GEMS enables the delivery of efficient, sustainable, and reliable power to the Shetland Islands, via future-proofed monitoring, control and optimisation of assets on a site level at the lowest cost.

The GEMS Digital Energy Platform integrates multiple generation sources seamlessly.

As the electricity distribution network operator responsible for ensuring homes and businesses in Shetland receive a safe, secure and reliable supply of electricity, we're investing in Lerwick Power Station to support full duty operations of the station before it transitions to standby operation when Shetland is connected to the Great Britain electricity system via a high-voltage direct current link. The Wärtsilä energy storage system will enhance the islands' security of supply, while at the same time lowering our carbon footprint.

Darren Hitchin, Embedded Generation Manager at Lerwick Power Station

THE CHALLENGE	WÄRTSILÄ'S SOLUTION	BENEFIT
• Ensure a balanced grid for the secure supply of (reserve) power. • Upgrade existing infrastructure and integrate renewables to support a reliable islanded grid.	• Reduce the operating hours on current diesel generators and displace spinning power generation. • Modernise the grid by providing extra energy supply via the storage solution that can instantly deliver power if there are power supply interruptions. • Integrate and optimise penetration of wind turbine-generated electricity into the grid with the GEMS Digital Energy Platform.	• Enhanced security of power supply. • Improved utilisation of existing wind power into the system, resulting in further energy infrastructure stability, and reduced CO_2 emissions and fuel costs.

The storage solution will facilitate the optimal integration of the existing 12 MW of wind and tidal-generated electricity into the grid, estimated at more than 4300 MWh/annum while providing further stability to the entire energy system.

GridSolv Max is a standardised energy storage solution that provides modular backup and storage for the core hardware assets of the system. Energy storage will support a more stable grid and improve the reliability of the islands' power system, plus reduce carbon emissions and the need to import fuel.

Renewables integration for a modern energy grid

Wärtsilä's energy storage system will enable local grid modernisation. The solution can instantly deliver power in cases where energy supply is interrupted, or support intemittent sources, like wind.

The station is currently using diesel generators at partial load in order to have enough capacity in reserve. The storage solution will displace spinning reserve, minimising the operation of diesel generators and storing energy for dispatch as needed.

Displacing spinning reserve is estimated to provide more than 1000 tonnes of fuel savings and 3400 tonnes of CO_2 reductions for the customer annually.

The modernisation of the grid is also supported by a Wärtsilä 32 engine operating on light fuel oil (LFO), that was delivered to the power station in 2020. In order to minimise emissions, the engine is installed with an exhaust gas cleaning system to reduce nitrogen oxides (NO_X) emissions.

The Wärtsilä energy storage system ensures more reliable energy supply while also accelerating the decarbonisation of the power network.

SITE SIZE: 8 MW / 6 MWh

SITE LOCATION: Shetland Islands, UK

APPLICATIONS: Island Grid+, Grid reliability, Renewables integration

SCOPE OF SERVICES: Engineering, procurement and construction (EPC)

DELIVERY: 2021

RELATED RESOURCES

Wärtsilä's Energy Storage System with service agreement will help secure Shetland's power supply

Wärtsilä's energy storage technology

GEMS Digital Energy Platform

Island Grid+ solution

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