Specification Sheet

GEMS Island+ Solution

Islanded grids present a unique set of challenges, particularly the need for reliable energy to fulfil critical power needs. Wärtsilä Energy Storage and Optimisation's **GEMS Island+ solution** offers a comprehensive suite that empowers the modernisation of islanded grids using a variety of generation assets, especially renewables. The result is both economical and environmentally beneficial for the grid-scale capabilities of localised energy.

Features

Tertiary Control dispatches engines, batteries, and renewable generation assets at any given time to achieve the best possible economic optimisation and meet grid safety reserve requirements, while observing the operational constraints of all assets.

Secondary Control maintains high grid quality by distributing real and reactive power across all running engines and energy storage system (ESS) units.

Primary Response is provided by engine governors and the Wärtsilä ESS, with the droop set points dictated by the GEMS Power Plant Controller. The ESS's fast power electronic control allows batteries to effectively regulate frequency and voltage when facing large load steps or renewable power ramps.

Renewable Energy (RE) Forecast uses weather forecasts to compute the expected AC power generation from solar and wind assets using statistical models, including physics-based models, non-parametric machine learning, and advanced parametric regression techniques.

Load Forecast is conducted based on load types (residential vs. industrial). Machine learning is used to predict the load, which enables predictions to get progressively more accurate over time.

Emergency Handling reacts to plant failures, unexpected renewable generation interruptions, or load changes to ensure grid reliability. Emergency Handling reacts to plant failures, unexpected renewable generation interruptions, or load changes to ensure grid reliability.

Key Advantages

Minimised levelised cost of energy (LCOE) by reducing fuel consumption and maximising renewable generation.

Improved grid quality by adding fast responding battery assets to the islanded grid.

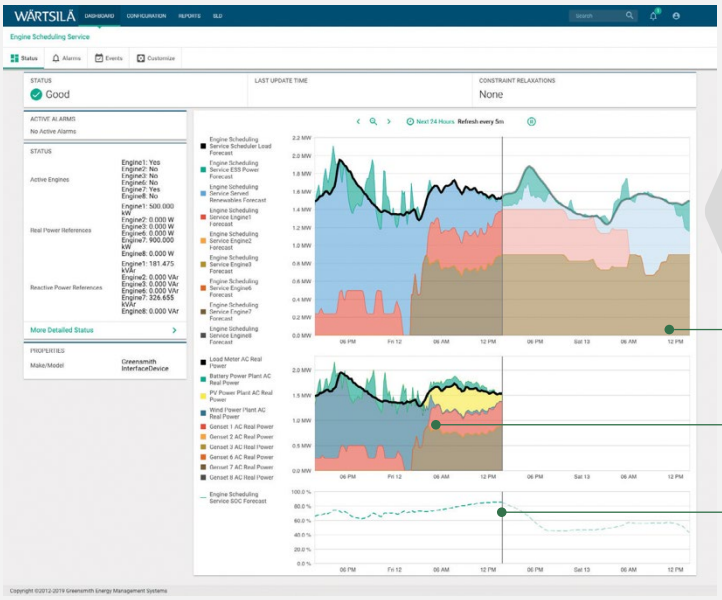
Improved grid safety by optimising asset dispatching and maintaining reserve levels.

Predictable energy generation using both load and renewable energy (RE) generation forecasting.

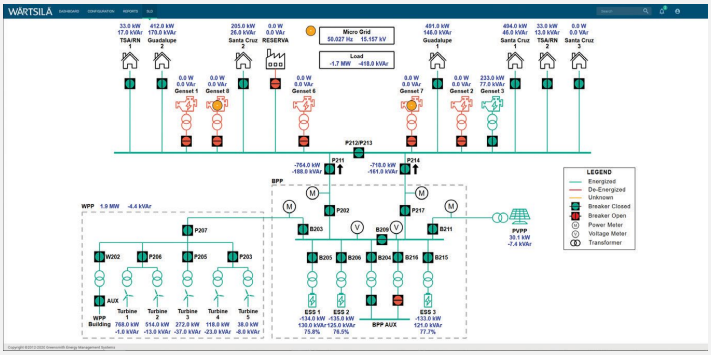
Transparent insights through use and versatility of GEMS Island+ user interface, API, and SCADA capabilities to smartly manage and optimise various assets under a single portfolio.

Industry-leading expertise in Wärtsilä's experience in renewable power generation, energy storage, energy asset control, and computing technologies.

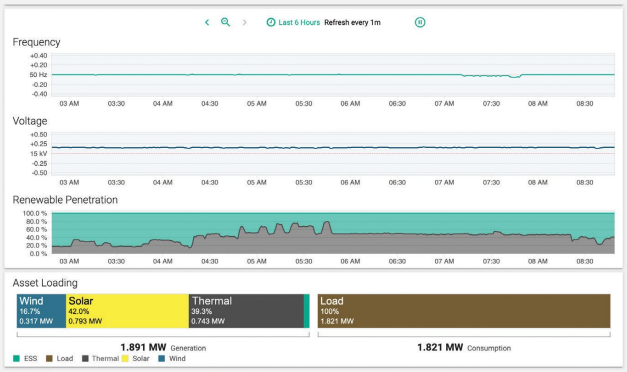
GEMS User Interface Examples



The GEMS dashboard illustrates monitoring and reporting capabilities: generation stack, Engine Dispatch Schedule, load and renewable forecasts. The GEMS user interface shown here gives insight into historic and forecasted asset loading via a stacked power plot.



GEMS platform capabilities include 24/7 grid monitoring, including detailed single-line diagrams (SLDs).



GEMS can monitor all assets within a system, such as Energy Contribution Monitoring. The GEMS dashboard shows data such as grid quality, renewable penetration, and asset loading.

Optional Wärtsilä Services

- System design
- Energy study and asset sizing to optimise CapEx and OpEx
- Circuit study
- Solution function tailoring to meet site specific needs
- SCADA and user interface customisation to meet customer requirements
- Site commissioning
- Site network cyber security assessment
- Virtual simulation and cloud-based training targeting operators, administrators, and analysts
- Remote monitoring, operation, and maintenance services

Related GEMS Products

- Wärtsilä GEMS Power Plant Controller for generation asset control, local operation, monitoring, protection and data collection on site installed in the GEMS Rack.
- Wärtsilä GEMS Grid Controller for microgrid control installed in the GEMS Rack.
- Wärtsilä GEMS Fleet Director for multi-plant fleet management, remote control, and data analytics.
- Wärtsilä GEMS Forecasting Services for renewable energy and load forecasting to maximise the site's potential.
- Wärtsilä's Quantum, a comprehensive battery energy storage system.

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