

GEMS Renewables+ Solution

SPECIFICATION SHEET



The Wärtsilä Renewables+ solution is designed to maximise the value of renewable energy sources through the integration with energy storage systems, and a rich library of included operation logics, forecasting features, connected hardware such as safety equipment and renewable energy generation assets, and advanced asset monitoring capabilities.

SOLUTION ADVANTAGES

- **Maximise revenue** by utilising the flexibility of the GEMS platform to stack and combine available operations.
- **Storage integration** by allowing GEMS to orchestrate and optimise the relationship between your renewable generation assets and energy storage. Asset hybridisation allows co-located assets to be bid as one, unlocking potential greater than the sum of its parts.
- **Optimise performance** by making use of the DC-DC solar and storage configuration.
- **Predictable energy generation** using both load and renewable energy generation forecasting where applicable.
- **Transparent insights** through the use and versatility of the GEMS HMI, 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 and engines, plus control and computing technologies.

SOLUTION APPLICATIONS

- **Capacity firming** and **renewable energy power smoothing** through **ramp rate control** and stored power compensation.
- **Energy shifting** to cover **peak shaving** or **transmission deferral**.
- **Frequency response** by following a frequency droop curve.
- **Frequency regulation** by following an **AGC signal** over SCADA or the internet.
- **Voltage response** by following a voltage droop curve.
- **Voltage regulation** by following a reactive power or power factor signal over SCADA or the internet.
- **Microgrid** capability to ensure the continued supply of local loads with renewable energy even during grid outages. *See GEMS Island Grid+ documentation for details.*
- **Custom operations** can be designed to fit site specific needs.
- **Emergency handling** reacts to plant failures, unexpected renewable generation interruptions or load changes to ensure grid reliability.

SOLUTION INTELLIGENCE

- **Intelligent automation** through the use of the GEMS Rule Engine, which allows your system to change operations based on market, environmental, and other conditions.
- **Renewable energy forecasting** uses weather forecasts to compute the expected AC power generation from solar, wind, and hydro assets using statistical models, including physics-based models, non-parametric machine learning, and advanced parametric regression techniques.
- **Auto-bidding** to optimise revenue in local energy and ancillary service markets through intelligent asset bidding powered by machine learning algorithms.

KEY SOLUTION COMPONENTS

- **Wärtsilä GEMS Power Plant Controller (PPC)** software for generation asset control, local operation, monitoring, protection and data collection on site installed in the **GEMS Rack**.
- **Wärtsilä GEMS Grid Controller (FC)** software for microgrid control installed in the **GEMS Rack**.
- **Wärtsilä GEMS Fleet Director (FD)** software for multi-plant fleet management, remote control, data analytics, forecasting installed in the cloud.
- **Wärtsilä Energy Storage System (ESS) with GridSolv** as a comprehensive battery energy storage system.
- **Wärtsilä Island Grid+ Solution** for sites that operate both in grid-tied and off-grid configurations.

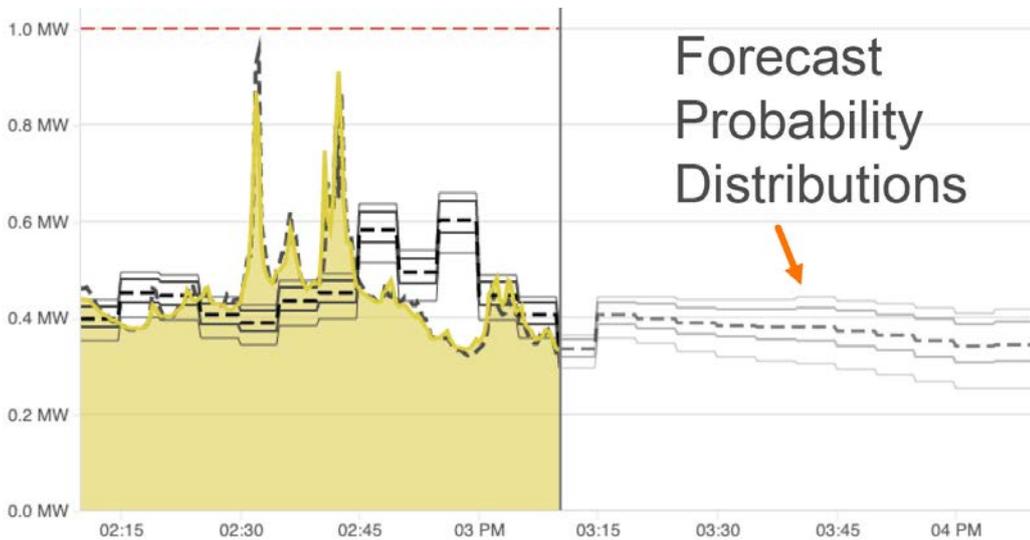
WÄRTSILÄ SERVICES AVAILABLE

- System design
- Full EPC
- Energy study and asset sizing to optimise CAPEX and OPEX
- Circuit study
- Solution function tailoring to meet site specific needs
- SCADA and UI customisation to meet customer requirements
- Site commissioning
- Site network cybersecurity assessment
- Virtual simulation and cloud-based training targeting operators, administrators and analysts
- Remote monitoring, operation and maintenance services

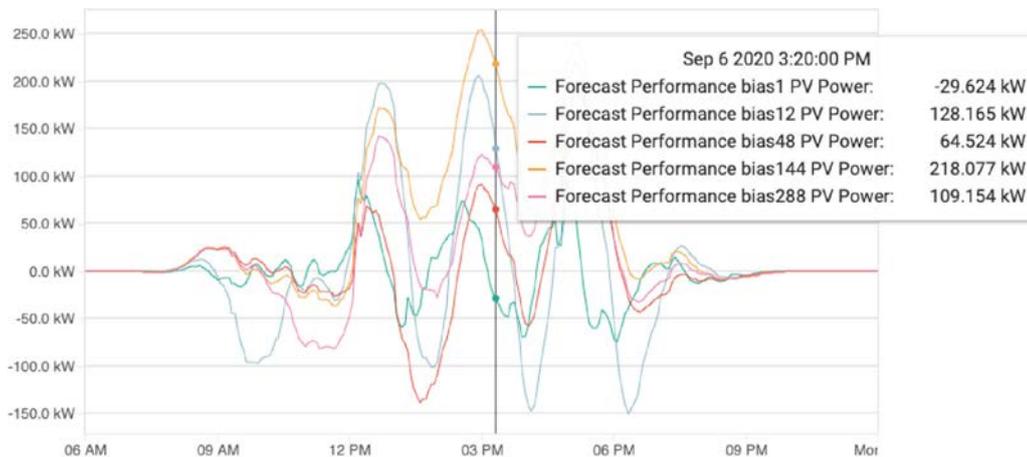


The Byllesby hydro plant and dam, where Wärtsilä's GEMS combines the hydro and energy storage under one control system, is located on the New River in southwest Virginia, USA.

Two 10 MW/5 MWh grid-scale energy storage systems deployed near Roscoe, Texas, fully leverage and sync with existing wind farm energy generation.



GEMS Solar Forecasting. GEMS renewable forecasting is available for both solar and wind generation, an example GEMS web UI chart shown here.



Transparency and reporting via key performance indicators, forecast error tracking, and controls that leverage AI and machine learning.