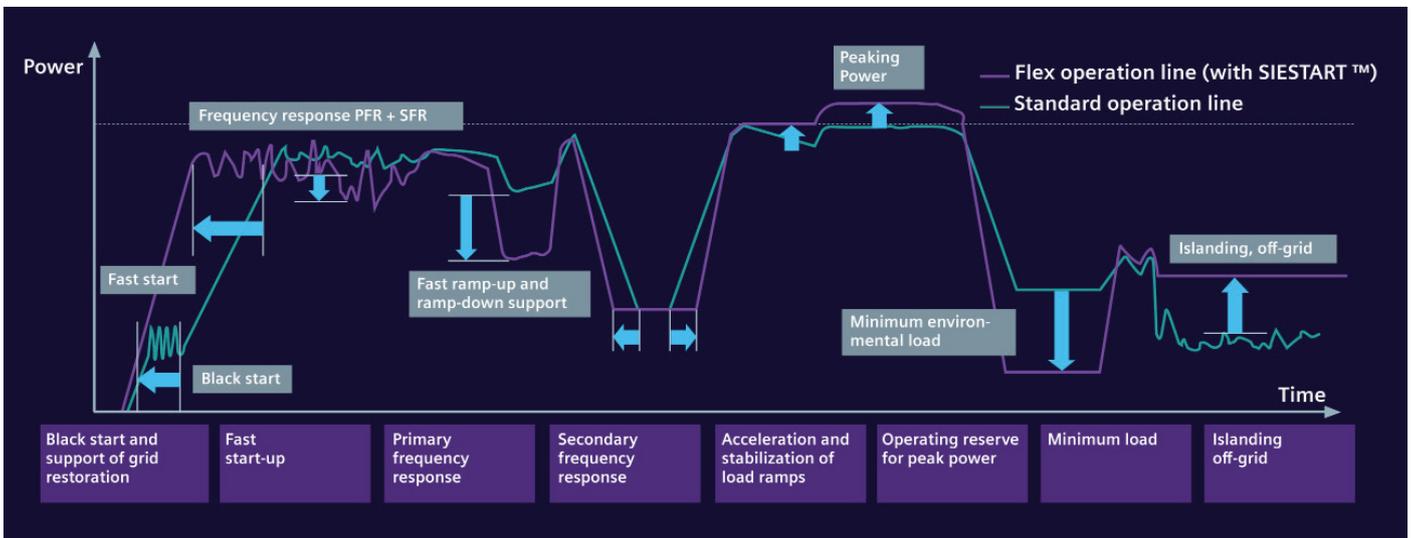


Enhancing conventional power generation with battery storage

Higher operational flexibility
with SIESTART™



SIESTART™: optimized performance and new opportunities – for grid services and gas turbine operation

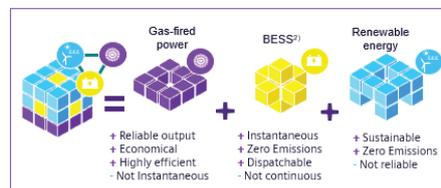
Today's challenges in the grid

Based on society's goal to combat climate change, a shift from conventional energy producing methods towards renewable energy sources such as sun and wind is taking place. This transition increases pressure on electrical grids, as renewable sources don't provide sufficient inertia to help stabilize the grid frequency. To ensure grid stabilization, conventional power plants that were originally designed for baseload operation now need to ramp much faster and more frequently while providing highly flexible peaking power. Usually, maintaining frequency and voltage stability relies on gas turbine power generation. However, if there's a serious imbalance between demand and power generation, partial or even total power outages can occur. To address these challenges power producers need to broaden their capabilities. They must:

- Accelerate load ramping for fast compensation of imbalances in the grid
- Provide peaking power as an additional power reserve to stabilize the grid
- Provide islanding and off-grid services (especially for industrial power plants)
- Provide black start capability in the event of a grid failure

The solution: SIESTART™

Siemens Energy's SIESTART™ solution combines the performance of a gas turbine with a battery energy storage system (BESS). The system comprises very fast and reliably responding Lithium-ion battery technology combined with cutting-edge power electronics and control for the fast and accurate response required by ancillary services. Designed with both active and reactive power components, it can offer reliable black start functionality in the event of a grid collapse. Moreover it can be combined with conventional generation and batteries for ramping up and down faster, thereby enabling flexible operation for providing and selling ancillary services. Another advantage of this system is its reliability and high round-trip efficiency. SIESTART™ not only ensures a more reliable grid, but also a higher share of renewables in the grid. Therefore, it supports your operations on the path to decarbonization.



Essentially, our SIESTART™ system offers the following features:

- Containerized solutions, proven technology, various references
- Scalable from 2 to 500+ MW, grid building inverter technology on demand
- Can be integrated at any voltage level to power generation units or substations
- Extreme fast reaction times in grid-following and grid forming nodes
- Emission-free BESS, resistant even against highest load steps, bi-directional
- Operating reliability monitored and secured by state-of-the-art control systems, remote surveillance
- Various applications, e.g. enhanced conventional and renewable power generation, energy cost control, frequency regulation, ancillary services

Use Cases:

- Black start
- Grid restoration
- Frequency control
- Stabilization of voltage – critical power
- Stabilization of electrical island mode
- Ramping control and acceleration
- Decrease GT minimum load by time shifting
- Peaking power

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For more information, please visit our website:
[siemens-energy.com/SIESTART](https://www.siemens-energy.com/SIESTART)

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