

Spectrum Power™ MGMS

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The Siemens Spectrum Power™ MGMS is advanced control and optimization software - used to maximize the value of your onsite generation and energy storage in coordination with local utility rates. Spectrum Power[™] has the ability to forecast site electrical and thermal loads – and while taking into account the current electric and fuel/gas utility tariffs, will execute a comprehensive plant operation routine in order to find the economic optimal unit schedules for the next 24 hours or 7 days. These schedules are then dispatched in real time, turning units on and off, and sending the economic optimal operating set points and charge/ discharge rates. This results in significantly decreased operating expenses from electricity and, in the case of CHP projects, fuel/gas purchases. Spectrum Power[™] MGMS is an advanced software solution for the optimal management of small-scale, local power networks or microgrids. MGMS is based on our world-renowned utility grid control center platform, Spectrum Power[™] 7, optimizing the ability to handle any local power application. The overall function of MGMS is the optimal coordination of dispatchable generation (gas, diesel generators, CHP, etc.), renewable generation (PV, wind, etc.), energy storage (batteries), and load (via Building Management System or remotely-operated switches). This optimal coordination allows two major functions:

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Ingenuity for life

- The reduction of energy costs and emissions production associated with onsite and imported energy, relevant to all local power projects
- 2. Operational sequences involving the entire electric network, including: islanding, black start, grid resynchronization, and more



Figure 1: MGMS Operational Flow

usa.siemens.com/microgrid



Figure 2: System Architecture

Is MGMS for you? Do you require any of the following:

- Integration of onsite firm and renewable generation
- Energy storage integration and optimal charge/discharge scheduling
- Increased reliability and availability of local power network
- Energy and demand charge reduction
- Revenue opportunity through market participation (including demand response)

Advantages

- Available ROI analysis of control system to support your specific project
- Fully-integrated system that includes robust SCADA, forecasting, and optimal scheduling
- Advanced cyber security design
- Flexibility to deploy on site or remotely

- Backed by Siemens service, providing expertise in control center, onsite power generation, substation automation, and building automation solutions
- Onsite energy planning services provided by Siemens

Functional Highlights

SCADA

MGMS provides complete SCADA functionality for secure, reliable and efficient operation. Industry-standard protocols are supported to make integrating to energy storage and generation controllers simple (Modbus, DNP3, IEC 101, IEC 104, etc.). The user interface provides a clear and easy-tooperate user environment including:

- A common look and feel for control centers, offices, remote and mobile workplaces using web-based technology
- Live view of power network energization state and topology
- Easy data export to spreadsheets for reporting and further evaluation

Generation and Load Management (GLM)

The GLM module regulates the real and reactive power output of the generating and storage units within the network to maintain the desired frequency and voltage when in island mode and to maintain net interchange with the external grid when in grid-connected mode. GLM has a reserve monitoring and enforcement feature that ensures sufficient real and reactive power is online to support volatility of the load.

Generation Forecast

The Generation Forecast function uses onsite values and historical data in coordination with imported weather forecast data to determine renewable generation output for the coming day(s)/ week. This function supports solar PV, wind turbines, and small hydro units.

Load Forecast

MGMS utilizes historical load data as well as seasonal weather conditions to forecast load profiles for the site over hourly and weekly intervals. MGMS collects load data from a variety of sources including building automation systems, sub-meters and more to obtain a detailed view of the entire power system. When load varies, MGMS makes automatic corrections to ensure system stability.

Features & Benefits

Generation Optimization

The MGMS optimization module allows each microgrid owner to determine at an aggregate level whether to optimize generation scheduling and dispatch based on economics or emissions or a combination of the two. Based on demand forecasts, renewable generation output, unit economic efficiencies, and the energy import tariff, MGMS will optimize the mix of energy produced between all forms of generation/storage both electrical and thermal. MGMS is able to provide such optimization up to a week in advance.

Load Shed

MGMS performs the shedding or disconnecting of loads when requested by an operator or automatically during disturbance conditions (such as islanding or insufficient generation) to maintain system stability. The function has a modular design that can be adapted to meet specific requirements. The loads are ordered according to predetermined priority schemes. Thus transitioning operations can be executed with the most important loads remaining connected.

Sequence of Operations

The Sequence of Operations (SOO) function within MGMS allows preprogrammed operational actions to be executed autonomously or manually. These operational actions could be the individual steps to island the network, or conduct a black start restoration in the event of an unplanned grid outage. The SOO eliminates the need for PLC programming logic by making this possible in an easy-to-use MGMS web-display.

Archiving and Reporting

The Spectrum Power™ Historical Information System (HIS) provides a solid and reliable archive to store power system, economic, and emissions historical data. Features include periodic and spontaneous data collection, integrated data reduction and compression, a calculation engine, manual update capability, disturbance data collection, replay, easy integration with external tools, and an energy accounting module. Reporting on year-to-date economic and emission targets is a valuable feature for any onsite energy project.

Reliable

- Proven islanding and resynchronization capabilities
- Frequency and voltage regulation

Sustainable

- Minimize CO2, SO2, NOx emissions
- Integrate renewable generation and storage solutions, making a "zero carbon" network possible

Standard and Optional Features

The MGMS platform includes a rich complement of standard features that are vital to operation of any distributed generation systems.

Standard Features

- Generation and load control
- Renewable generation forecasting
- Frequency and voltage control
- Emissions vs. energy cost optimization
- Renewable generation integration and control
- Energy storage systems integration and controls
- Designed for NERC-CIP cyber security compatibility
- Consolidated easy-use interface
- Sequence of Operations (islanding, grid-resynch, black start, etc.)

Optional Features

- Market participation
- Server redundancy
- Advanced cyber security

Efficient

- Economic or environmentally optimal unit scheduling
- All-in-one single server
 deployment
 Spectrum

Power™ MGMS

- Based on a proven utility SCADA software platform with proven security compliance
- Available server redundancy

Why MGMS by Siemens?

- Centralized control system with advanced functionality (forecasting, generation optimization)
- Industry-proven market participation
- Control software applicable to both grid-connected and islanded networks
- Strong security, platform based on utility-grade system (NERC-CIP design)
- Scalable: monitor, control, and optimize as many DERs as necessary
- Easy-to-use UI that consolidates all necessary information
- Optional software package tailored to customer needs
- Integrated system that supports standard industry protocols (DNP3, IEC 101, IEC 104, Modbus, etc.)
- Seamless integration with utility control center through IEC 60870-6 (ICCP) protocol
- Flexible deployment schemes
- Siemens expertise in areas from planning all the way to building automation and end-to-end integration

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