



Network Manager GMS  
enables advanced operation,  
optimal scheduling, and  
detailed analysis of your  
generating resources.

**HITACHI**  
Inspire the Next



Network Manager

# Generation Management System

 **Hitachi Energy**

How do you tackle today's challenges and deliver consistently superior services to your customers?

Network Manager  
GMS can help.



# Network Manager

## Generation Management System

Renewables are rapidly changing the global generation mix, offering new opportunities for operators and asset owners to more effectively manage their portfolios to ensure reliability and maximize revenues.

### Industry challenges

The power industry is facing regulatory and market pressures to move to low-carbon generation. Utilities have to manage the volatile power output of renewable generation through the regulation and reserve markets. Power generation companies need to optimize a more sophisticated array of generating assets to meet regulatory standards and contractual requirements. At the same time, they need to minimize operation and production costs while maximizing revenue opportunities.



### Solution

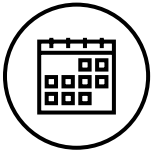
Network Manager GMS enables advanced operation, optimal scheduling, and detailed analysis of your generating resources. The solution is built on a high-performance, cybersecure SCADA platform designed to meet the requirements of mission-critical control systems. It supports a wide variety of markets and operating constraints.

### Benefits

- Real-time control and dispatch of conventional and renewable generation assets
- Optimal scheduling of generation resources for intra-day, day-ahead and long-term planning
- Closed-loop monitoring and control to meet regulation, economic and environmental constraints on a company, plant and unit basis
- Reduce total production costs by minimizing operating expenses and increasing operations and maintenance efficiency



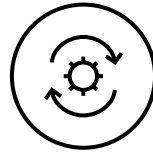
# Advanced generation applications



## Production scheduling

Network Manager production scheduling applications allow optimal scheduling of all types of generation resources and interchange transactions to minimize total operating costs. It seamlessly interfaces Hitachi Energy's nMarket and Portfolio Optimization, and with external bidding and settlement systems such as ISOs and RTOs in deregulated markets.

- Interchange scheduling
- Short-term load forecasting
- Thermal unit commitment and economic dispatch
- Portfolio trading decision support



## Generation control

Network Manager GMS provides a complete set of applications for real-time generation control in multiple markets and control areas, across multiple time zones, in hierarchical configurations.

- Reserve and power monitoring
- Economic dispatch
- Imbalance calculations
- Advanced hydro scheduling



# Additional tools



## Short-term forecasting

Nostradamus is Hitachi Energy's neural network system designed for short-term demand, renewable generation, and price forecasting.

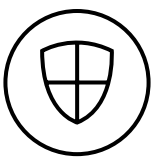
- Designed specifically for electric & gas utilities, system operators & power pools, cooperatives, energy marketers and gas pipelines
- Flexible neural network, weather-adaptive program
- Three-layer feed-forward neural network delivers highly-accurate forecasts
- Automated data import and forecasting with the included Automation Scheduler
- Easy to use for novices and experts alike



## Optimal unit commitment and dispatch

The Hitachi Energy Portfolio Optimization tool improves your portfolio's operation by modeling detailed unit operating constraints and market conditions.

- Fully global optimization of generation schedules for energy and ancillary services and fuel nominations
- Fuel management and consumption forecasting
- Decision support for physical trading
- ISO/TSO bidding support
- Simulation scenarios for "what if" analysis to support sound business decisions
- Post analysis for improved operations



## Cybersecurity

- Network Manager conforms to security standards CIP 002-011, ISO 27001/2, and the NIST Cybersecurity Framework
- Internal and external penetration testing performed by the Idaho National Lab
- Advanced security and compliance services available through Hitachi Energy Cybersecurity Care offerings

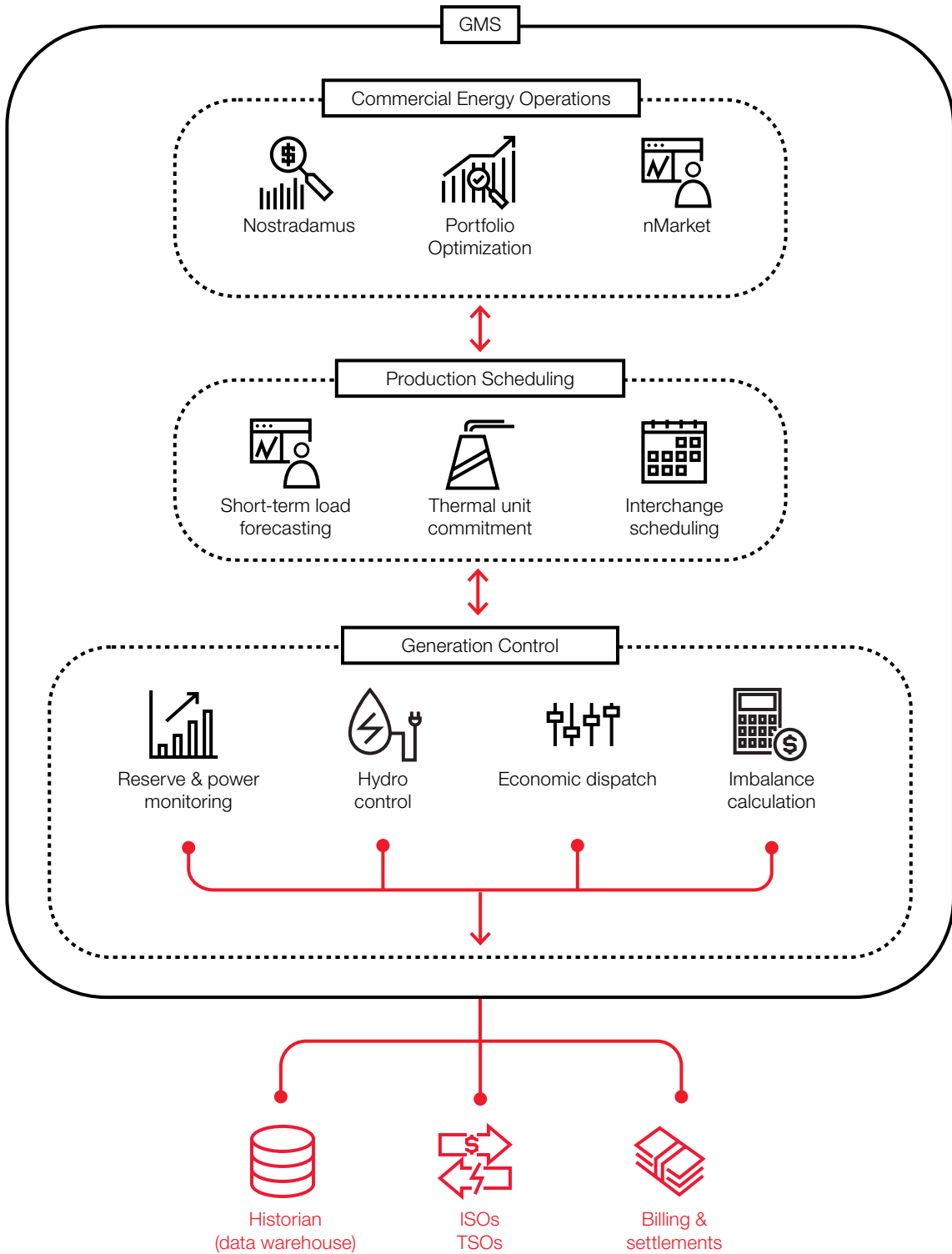


## Bid-to-bill analysis

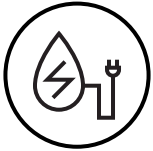
Hitachi Energy nMarket is a seamlessly-integrated bid-to-bill transaction management platform for bidding, position management, nomination/scheduling, dispatch, settlement and reporting.

- Flexible, evolving multi-market coverage
- Bid-to-bill process management
- Multiple technical configurations
- Front-, mid- and back-office productivity enhancements
- Analyze and compare different bid strategies
- Adjust bids to fit objectives and expected market conditions
- Bid evaluation studies using the Hitachi Energy Portfolio Optimization engine

# Network Manager GMS

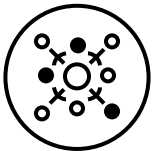


# Performance highlights



Network Manager controls two of the world's largest hydroelectric plants:

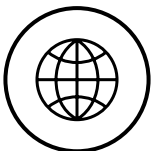
- **Three Gorges Dam**, 22.5 GW (China)
- **Itaipu Dam**, 14 GW (Brazil/Paraguay)



Successfully provided centralized monitoring and control of **17 hydropower plants** with a **combined capacity of 3,670 MW**



Enabled market participant to dispatch **26 coal and gas** fired generation units in the ERCOT market



**Over 400 Hitachi Energy control centers** successfully delivered globally

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