

## Georgia System Operations Corporation, Inc. *Energy Management Infrastructure Project*

### Scope of Work

The Georgia System Operations Corporation (GSOC) Energy Management Infrastructure Initiative (GEMINI) Project involved upgrades to the company’s transmission operations, communications and control systems, and new analysis tools for grid operators.

### Objectives

The objective of the GEMINI project was to install or upgrade the infrastructure necessary to support smart grid applications deployed by GSOC’s 38 rural electric distribution cooperatives to increase the reliability, security, interoperability, and efficiency of their distribution systems. The project implemented advanced analysis software for improved monitoring, planning, and electricity cost analysis. The improvements to wide-area monitoring, visualization, and control system capabilities enable GSOC to rapidly analyze operations across its entire transmission system and automatically communicate information about disruptions or changes in power flow on the grid to its member electric cooperatives.

### Deployed Smart Grid Technologies

- **Communications infrastructure:** GSOC upgraded its energy control system (ECS) to enhance its ability to detect, prevent, respond to and recover from security threats. GSOC upgraded both the hardware and ECS software so that it is now capable of implementing the latest security technologies, has an open communications platform that allows for implementation of future industry standard protocols, and interfaces with new Smart Grid devices.  
  
GSOC also improved its communications infrastructure by adding a dual-path fiber network between the primary and backup control centers, updating its telecom internet routing equipment, and upgrading its Gateway routers to accommodate the new ECS’s increased data capacity requirements.
- **Advanced transmission applications:** GSOC deployed a post-mortem analysis tool to give power system engineers and grid operators the ability to more robustly analyze disturbances and large-scale system events, resulting in a better understanding of root causes and improved planning capability for the future. A new thermal overload monitoring application provides grid operators with the ability to proactively identify potentially unstable conditions, and improved state estimation tools target parts of the transmission grid that lack physical monitoring. Both improved state estimation and steady-state model benchmarking increase the accuracy of power systems models for planning and operations.

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### At-A-Glance

**Recipient:** Georgia System Operations Corporation, Inc.

**State:** Georgia

**NERC Region:** SERC Reliability Corporation

**Total Project Cost:** \$14,344,974

**Total Federal Share:** \$6,456,500

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**Project Type:** Electric Transmission Systems

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#### Equipment

- Transmission Systems Communications Equipment
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#### Advanced Transmission Applications

- Post-Mortem Analysis
  - Thermal Overload Monitoring
  - Improved State Estimation
  - Steady-State Model Benchmarking
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#### Key Benefits

- Improved System Reliability
  - Improved Operational Awareness and Efficiency
  - Enhanced Protection from Cyber Attacks
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**Georgia System Operations Corporation, Inc. (continued)****Benefits Realized**

- **Improved system reliability:** The GEMINI project has enhanced GSOC's capability to detect, prevent, communicate, respond to and recover from system disruptions.
- **Improved operational awareness and efficiency:** The GEMINI project integrated historical data trending and load forecasting to provide the operations group with improved decision-making tools. Furthermore, the project increased overall efficiency of power delivery system operations by giving GSOC the ability to use digital controls to manage and modify electricity demand.
- **Enhanced protection from cyber attacks:** The project has added additional protective measures to minimize the likelihood of unauthorized access to any of GSOC's computer systems.

**Lessons Learned**

- **Regression testing:** When implementing large-scale system implementation projects such as the ECS upgrade, coordinate end-to-end regression testing to minimize the probability of encountering integration and data transfer issues between new and existing systems.
- **System performance testing:** Make sure that all computing systems are adequately sized to handle changes to the electric system modeled—specifically, the number of parameters—without creating unanticipated delays.
- **Vendor support for application development:** Utilize relationships with application vendors to gain necessary attention to issues as they arise and to ensure opportunities for future enhancements are recognized.

**Future Plans**

GSOC plans to add additional functionality to its transmission system model by expanding it to additional circuits and incorporating power flow analysis capabilities within the next three years. The increased functionality will allow GSOC to develop improved interfaces with its balancing authority.

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