Missouri Smart Grid Status Update: Substation Automation

Siemens Energy, Inc

Jeff Walz
ADMS Product Line Manager
Energy and Automation Division
Minneapolis, Minnesota, USA

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Siemens Global Sectors and Divisions

**Industry**
- Drive Technologies
- Industry Automation
- Building Technologies
- Mobility
- Lighting (OSRAM)
- Industry Solutions

**Energy**
- Fossil Power Generation
- Renewable Energy
- Oil & Gas
- Energy Service
- Power Transmission
- Power Distribution

**Healthcare**
- Imaging & IT
- Workflow & Solutions
- Diagnostics

Business volume: 36 billion €
Employees: More than 73,000
Competencies bundled in new “Infrastructure & Cities” Sector

Mobility
- High-speed trains and light rail
- Traffic management and networking
- Postal and airport logistics

Smart Grid and Smart Consumption
- Modern energy management systems
- Automated power distribution systems
- Virtual power plants and micro-grids

Building Technologies
- Energy-efficient building automation
- Fire protection and security systems
Clear Movement to Coordinated Decentralized Distribution Automation Decision/Control Hierarchy

**Control Center**
- Distribution Grid Supervision
- Delivery Optimization

**Super Substation**
- Interconnected Substations
- Interconnected Feeder Circuits

**Substation**
- Interconnected Feeder Circuits

**Super Device**
- Feeder Circuit

**Device**
- Feeder Circuit Section

Decision Complexity

Decision Time
Substation Modernization

Control & Automation Zone
- Control and Data Acquisition
- Volt/VAr Control
- Power Flow
- Fault Location
- Fault Isolation & Service Restoration

Monitoring Zone
- Transformer
- Circuit Breaker
- Battery
- Cable
- Arrester
- Access and Activity

Enterprise Engineering
Operations
Benefits to Consumers

Direct

• Increased reliability
• Decreased outage durations
• Improved power quality

Indirect

• Verify technologies essential to support deployment of renewable energy sources
• Facilitate expanding penetration of distributed energy resources
• Reduce dependence on fossil-fuel based generation