Integrated Distribution Management System in Alabama

Research & Technology Management

Joe Schatz
Integrated Distribution Management System

• Develop and demonstrate the principle concepts required for operating the next generation distribution system through implementation of IDMS

• IDMS will provide a seamless integration of distribution mission critical applications to increase the efficiency and operational intelligence of the system operator

• A single user interface for SCADA, Outage Management, Distribution System State & Switching Info and Advanced Applications
IDMS facilitates Smart Grid

The IDMS Will Provide a Seamless Integration of Distribution Mission Critical Applications Required in the Operations Arena to Increase the Efficiency and Operational Intelligence of the System Operator.
Project Management

United States
Department of Energy

Southern Company Services
(Prime Contractor)

Alabama Power Company
- Proof of concept
- Pilot Host
- Providing the infrastructure
- Technical and Business expertise

Mark Varenhorst, LLC
- Software development and improvement
- Integration, definition and development

AREVA T&D
- Overall application development
- Site and Field Acceptance Testing
- Outage Management System
- Training
Project Management Structure

- Executive Sponsor
- Executive Advisory Committee
- System Steering Committee
- Overall Project Sponsor and PI
- Project Manager
- System Team Leads
- Subject Matter Experts
Project Management Role

• **Project Planning**
  - Lead the project teams to develop project planning documents
  - Lead the project teams to develop clear, complete project scope statements in project charters/definition documents
  - Lead the project teams to build project schedules that identify the critical path
  - Adjust scope, time and cost dimensions to meet project constraints
  - Document and distribute the project plan, including schedule.

• **Project Control/Analysis**
  - Maintain project plan, including schedule
  - Collect and analyze project information to determine where the project stands and takes corrective action to eliminate negative deviations from the plan
  - Maintain the inter-dependencies of project milestones across projects
  - Ensure that project standards are followed at all times
  - Provide schedule reports to program manager as define in the communication plan
  - Provide status updates of project to appropriate management as outlined in the communication plan
  - Documentation planning, collection, distribution, reporting and storage of project information
  - Maintenance of project web site
Project Management Role

• **Budget**
  – Manage costs (in particular monitor for variances and appropriate charges)
  – Provide monthly budget updates sponsor

• **Risk/Issue Management**
  – Lead project teams to identify, analyze, respond to and mitigate risks over the course of the project.
  – Ensure overall project issues and risks are managed.
Project Progression

• **Initial IDMS Project Phase 1**
  – Develop proof of concept to demonstrate the common look and feel of the End User Environment and emulate production-like system functionality and capabilities
  – Completed and Final Report Submitted

• **Fully Developed & Deployed IDMS in Alabama**
  – Build on Phase 1 Prototypes to document comprehensive application requirements for final IDMS product.
  – Prioritize Development plan and complete interface design.
  – Delivered “Production Candidate Release” at various intervals for detailed analysis and evaluations.
  – Internal interface development of BizTalk with ARMS, IVR, CSS.
  – Factory and Site Acceptance Testing
  – Deployment of IDMS to all Distribution Operation Centers and End Users
IDMS facilitates Smart Grid

The IDMS will provide a seamless integration of distribution mission critical applications required in the operations arena to increase the efficiency and operational intelligence of the system operator.
Advanced IDMS Applications

- Fault Isolation and System Restoration
- Oscillography Based Fault Location
- Power Flow / Short Circuit / Coordination Analysis
- Contingency Analysis
- Distribution Operator Training Simulator
- Distribution Energy Efficiency Program
Distribution Energy Efficiency Program

Substation

Distance

Volts

Without DEP

With DEP

Normal Voltage Profile

Proposed DROP Profile

Upper Voltage Limit

Lower CVR Limit

Lower Voltage Limit
Technology Transfer

EPRI Smart Grid Demonstration Project Host Site
Technology Transfer –
Renewable Energy Demonstration

- Install 50 single-module, utility-connected photovoltaic (PV) sites in Alabama
- Monitor each ac module’s output and sunlight input at 1- to 5-sec intervals for 18 months
- Generate datasets to feed into detailed distribution system circuit models
- Study the impacts of bringing high penetration of PV onto the distribution system

PV panels installed on Alabama Power rooftop

- 4 different arrays (1.1 kW each)
- Side-by-side performance comparison
- 120V AC modules using micro-inverters on each panel
- Increased understanding of PV operations in southeast climate

Data acquisition monitors ac & dc electricity, sunlight, temperature for each array

<table>
<thead>
<tr>
<th>Panel Type</th>
<th>Panel Cost June '09 ($/W)</th>
<th>Panel Cost May '10 ($/W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polycrystalline</td>
<td>$3.54</td>
<td>$2.42</td>
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<tr>
<td>Monocrystalline</td>
<td>$3.50</td>
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<td>Thin film (flexible)</td>
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<tr>
<td>Heterojunction with intrinsic thin layer</td>
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<td>$4.46</td>
</tr>
</tbody>
</table>

At this site micro-inverters on each PV panel will track individual max power point output

99 total data points recorded every minute

✔ First hand knowledge of installation issues and system impacts of Distributed Solar PV
Technology Transfer –

Energy Storage Demonstration

- Installing 10 GreenSmith Li-Ion battery storage systems rated 6kW and 24kWh each

✓ Energy Storage will add a completely new dimension to power delivery operations
Questions?