How Graphic Representations of Outages at Alabama Power Are Made Simple
This presentation will discuss the steps we took at Alabama Power using GIS to create a couple of different maps of outages reported in our Outage Management System.

Reasons Outage Maps Developed
- Executive Dashboard
- Update Media
Presentation Agenda

- Alabama Power—Who are we?
- How Our Outage Management System (OMS) Functions
- Maps
  - Real Time Outage Map
  - Historic Outage Map
- The Future
  - AMI (Advanced Metering Infrastructure)
  - IDMS (Integrated Distribution Management System)
### Alabama Power Company

- Affiliate of The Southern Company
- Headquartered in Birmingham, Alabama

#### Customers

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>1,431,334</td>
</tr>
<tr>
<td>Residential</td>
<td>1,207,883</td>
</tr>
<tr>
<td>Commercial</td>
<td>216,830</td>
</tr>
<tr>
<td>Others*</td>
<td>6,621</td>
</tr>
</tbody>
</table>

#### Employees

- Employees: 6,980

#### Miles of Line

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>89,648</td>
</tr>
<tr>
<td>Transmission</td>
<td>10,218</td>
</tr>
<tr>
<td>Distribution</td>
<td>79,430</td>
</tr>
</tbody>
</table>

#### Service Territory

- Square Miles: 44,500
- Divisions: 6
- Operation Centers: 82

#### Transmission and Distribution

<table>
<thead>
<tr>
<th>Category</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total poles and towers</td>
<td>1,516,602</td>
</tr>
<tr>
<td>Distribution poles</td>
<td>1,396,297</td>
</tr>
</tbody>
</table>
Hurricane

Hurricane Katrina
Date: August 2005
Type of storm: Hurricane
Peak customers out: 636,891
Days to restore service: 9
Ice Storms

Ice Storm of 1982
Date: January 12, 1982
Type of storm: Ice
Peak customers out: 250,000
Days to restore service: 9
The Blizzard of 1993

Date: March 13, 1993
Type of storm: Snow
Peak customers out: 404,206
Days to restore service: 8
Straight Line Winds
Afternoon Thunderstorms
Outage Management System

Used to identify the source of outages in the electrical distribution system based on customer calls via an interface to the Customer Accounting System.
Data OMS

DATA RECEIVED FROM OUTAGE MANAGEMENT SYSTEM TABLE

- OPERATION CENTER
- DEVICE
- # OF CUSTOMERS
- COMMENTS
- TIME (OUTAGE AND RESTORATION)

<table>
<thead>
<tr>
<th>OP CENTER</th>
<th>SWITCH</th>
<th># OF CUST</th>
<th>COMMENTS</th>
<th>OUTAGE REPORT</th>
<th>SERVICE RESTORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUS</td>
<td>T101</td>
<td>30</td>
<td>BROKEN POLE</td>
<td>08/12 6:30</td>
<td>08/12 12:00</td>
</tr>
<tr>
<td>TUS</td>
<td>T103</td>
<td>45</td>
<td></td>
<td>08/12 6:45</td>
<td>08/12 15:00</td>
</tr>
<tr>
<td>TUS</td>
<td>T105</td>
<td>200</td>
<td>TREE DOWN BROKEN POLE</td>
<td>08/12 7:00</td>
<td>08/12 19:00</td>
</tr>
<tr>
<td>BHAM</td>
<td>B201</td>
<td>10</td>
<td></td>
<td>08/13 9:00</td>
<td>08/13 13:00</td>
</tr>
<tr>
<td>BHAM</td>
<td>B203</td>
<td>60</td>
<td></td>
<td>08/13 7:15</td>
<td>08/13 12:30</td>
</tr>
<tr>
<td>BHAM</td>
<td>B206</td>
<td>300</td>
<td>WIRE DOWN</td>
<td>08/13 10:00</td>
<td>08/13 17:30</td>
</tr>
</tbody>
</table>
Data Structure

OMS ➔ GIS

REAL TIME OUTAGE GRAPHIC

HISTORIC OUTAGE ANALYSIS
**Data Structure**

- **OPERATION CENTER TABLE**
  Contains Operation Center and Number of Customers Out by Operation Center Directly from OMS
Data Structure

- **PRIMARY TABLE**
  Created by Joining Primary Table with OMS Table Based on Sectionalizing Device

![Diagram showing data structure with GIS, OMS, and OUTAGE PRIMARY TABLE]
Data Structure

ArcMap

GIS

ArcReader (.pmf)

OUTAGE PRIMARY TABLE

GIS OH/UG PRIMARY TABLE

GIS OPERATION CENTER TABLE

OUTAGE OPERATION CENTER TABLE

PRIMARY SYMBOLOGY
- Energized
- De-Energized

OP CENTER SYMBOLOGY

1 - 5,000
5,001 - 10,000
10,001 - 20,000
20,001 - 40,000
40,001 - 80,000
80,001 +
Real Time Outage Map
Outage Map at State Level

- APCO
- Birmingham
  - Substations
  - BIRMINGHAM DIVISION
    - ALL BIRMINGHAM
    - MetroCentral
      - EastJefferson
      - WestJefferson
      - Leeds
      - Columbiana
      - MetroSouth
      - Gardendale
      - ESRI_Shapefile
      - ESRI_StreetMap_World_2D
      - ESRI_Imagery_World_2D
- Southeast
- Mobile
- Eastern
- Western
- Southern
- Map Legend
Outage Map at Operation Center Level

METRO CENTRAL: 45% OUT

- Energized
- De-Energized
Outage Map at Primary Level

With Satellite Image and Street View
Outage Map in ArcReader

Tools:
- Zoom in/out
- Pan
- Go to previous/next extent
- View spatial bookmarks
- Searching by address or feature
- Identify features
- Hyperlink tool
- Measure features
- Mark-up capabilities

Outage Graphic
Historic Outage Map

- Post Storm Restoration
- Shows Storm Impact and Restoration Efforts
- Helps Analyze Past Storm Operation in Preparation for Future Events
- Tracking Analyst Tool (ESRI)
Historic Outage Maps

- **Data Sources**
  - OMS
  - Wind Band Shapefile
  - APCO GIS Database
  - ESRI Resource Center
    (Imagery, Weather Radar, and Street Maps)
Tracking Analyst (ESRI Extension)

How to Add Temporal Data

How to Customize Layer

How to Play Back Data
Future Outage Management

- Advanced Metering Infrastructure (AMI)
- Integrated Distribution Management System (IDMS)
Future Outage Management

- Advanced Metering Infrastructure
  - Read Any Meter Anytime
  - Voltage Information
  - Active Power Outage, Power Restoration, and Tamper Detection
Future Outage Management

Integrated Distribution Management System

IDMS Infrastructure

- DGIS
- SUB INFO
- MODEL VALIDATE BUILD
- Electronic User Environment
- AMI
- CSS
- Meters
- SCADA
- OMS
- ADVANCED APPLICATIONS
- IVR
- OUTAGE HISTORY ANALYSIS
- Field RTU Devices
- SWITCHING MANAGEMENT
- Business Rules Switching History

Users
THANKS FOR YOUR TIME!

QUESTIONS?

Contact Us:

Sultan Alhabsi
205-257-1026
SAlhabsi@southernco.com

Brandon Clark
205-257-1186
BClark@southernco.com