Southern California Edison Strategy

Build the next generation energy company that delivers superior value to customers and enables a clean energy future, focusing on four areas:

- Cleaning the power system
- Strengthening and modernizing the grid
- Helping customers make cleaner energy choices
- Achieving operational and service excellence
Digitally Connected Utility

• Coverage
  ➢ Over 50,000 square miles
  ➢ Over 5,000 miles of fiber
  ➢ Over 5 million smart meters
• More data
  ➢ A mix of hourly and 15 min interval data (both usage and voltage) from smart meters,
  ➢ Over 2.5 petabytes of structured data
• Increased automation on the grid, now and in the foreseeable future
  • Installing thousands of automated switches over time
  • Substations becoming more connected
• Continued focused on analytics

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Outage Management Analytical Tools

- Advanced Analytics
  - Outage Prediction Models
  - Estimated Restoration Time Models and Apps

- Visualization and Analytical Tools
  - Outage Explorer
  - Outage Mobile App
  - AMI Meter Data
  - Outage Management Dashboard
Outage Management Dashboard

System Wide Summary
Thursday
September 14, 2017 4:30 PM

Calls 178
Incidents 76
Customers Out 111

Customers Affected 1,991
Priority Customers 134

ALL REGIONS

Calls 178
Incidents 76
Customers Out 111

Customers Affected 1,991

NO LIGHTS

0-8 Hrs 19
8-16 Hrs 0
16-24 Hrs 0
>24 Hrs 7

OUTAGE MANAGEMENT DASHBOARD

Main Dashboard

ALL AREAS

CATALINA
DEVERS
LUGO
VISTA
MESA
MIRA LOMA
EL NIDO
LIGHTHARPE

Sector Calls Incidents Customers Affected Customers Out Priority Customers

CATALINA 4 4 4 0 0
DEVERS 5 5 4 0 2
LUGO 28 1 61 61 4
VISTA 12 11 23 9 6
MESA 7 7 6 1 0
MIRA LOMA 12 7 18 13 3
EL NIDO 11 9 8 3 0
LIGHTHARPE 8 7 7 1 0

Sector 8-16 Hrs 16-24 Hrs >24 Hrs

LUGO 8 8 7 0
VISTA 6 6 3 0
MESA 3 3 4 0
MIRA LOMA 3 3 4 0
EL NIDO 2 2 4 0

Sector 0-8 Hrs 8-16 Hrs 16-24 Hrs >24 Hrs

LUGO 8 8 7 0
VISTA 6 6 3 0
MESA 3 3 4 0
MIRA LOMA 3 3 4 0
EL NIDO 2 2 4 0

Sector 0-500 501-1000 1001-1500 1501-2000 2001-2500 2501-3000 3001-4000 4001-5000 5001+

LUGO 8 8 7 0
VISTA 6 6 3 0
MESA 3 3 4 0
MIRA LOMA 3 3 4 0
EL NIDO 2 2 4 0
Smart Meters and Voltage Signatures

- Digital utility
- Culture change to data driven decision making
- Enablement through technology foundation
- Business insights through advanced analytics

Enterprise Analytics Platform (EAP)

HANA
Hadoop

Smart Meter Data (Teradata)
Customer Service Data (DB2)
Power Procurement Data (Oracle)
Enterprise Back Office Data (SAP BW)

Migrate Data & Capabilities
Consolidate onto EAP & Decommission
Situational Awareness Center

- Digital utility
- Culture change to data driven decision making
- Enablement through technology foundation
- Business insights through advanced analytics

What are the business problems we are trying to solve?

How do we go about solving the problem?

How can technology / analytics or other support?

Are we structured for success?

Where is this leading?

Weather Stations
- Collects hi-resolution local weather data
- Enables more accurate forecasting

Situational Awareness Center
- 24/7 weather and situational awareness monitoring
- Co-located with SCE's Emergency Operations Center and Watch Office
- SCE meteorologists on-site

High Resolution Weather Data Visualization
- Visualization of weather conditions at circuit level
- Alerts when conditions reach thresholds

Fire Monitoring Cameras
- High Definition
- Remote-controlled pan-tilt zoom
Evolution Capabilities

Using Analytics for Grid Resilience and Public Safety

- Instrumenting our grid and monitoring our environment
  - Weather stations and cameras in high fire danger areas
  - Modern grid sensors (e.g. smart meters, remote fault indicators, remote automatic reclosers, etc.)
- Energized down conductor detection using advanced analytics on streaming data
- Asset reliability analytics including ignition, fuel and environmental risk scoring
- Wildfire simulations using high performance computing platforms
- Storm impact forecasting to pre-stage crews and equipment prior to event
- Future planned capabilities including FAN, remote intelligence switches, and edge analytics coming together to enable things like de-energizing falling conductors