

TEP and UNSE Ten-Year Transmission Plans

Arizona Corporation Commission 2014 Biennial Transmission Assessment

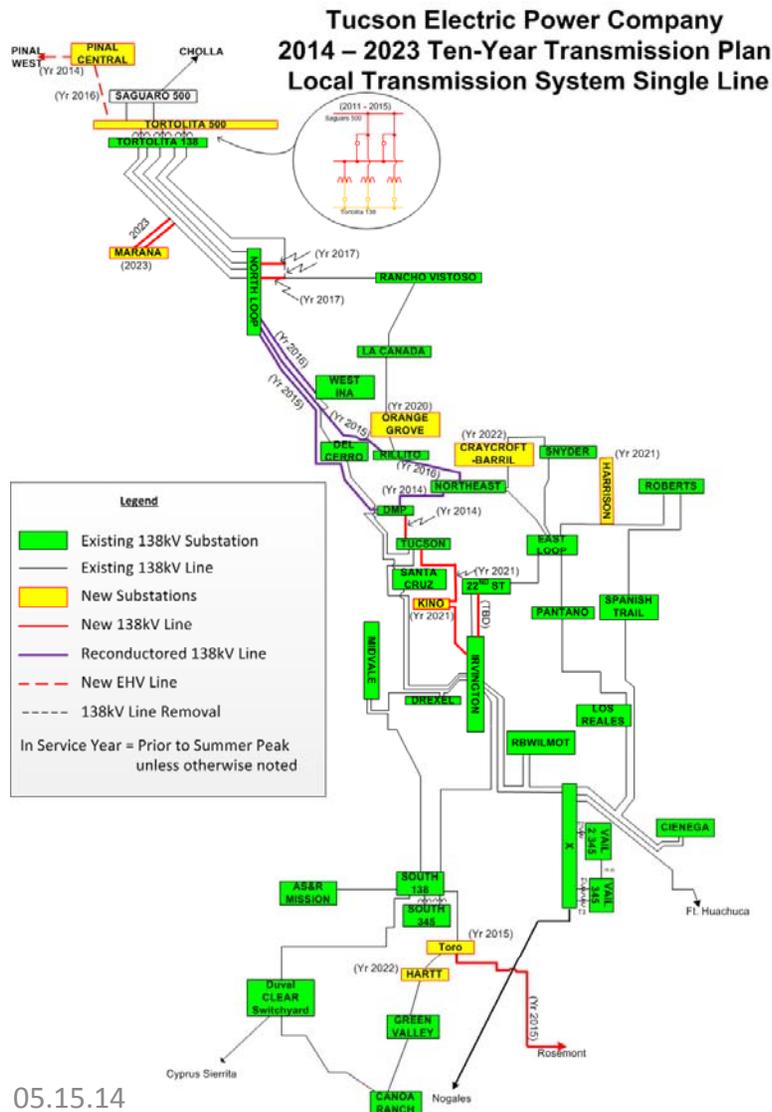
Gary Trent
Tucson Electric Power
8th BTA Workshop No. 1
May 15, 2014



Topics

- **Ten-Year Plans**
 - Changes relative to the 7th BTA
- **Technical studies and Reports**
 - Projects without power flow and stability studies
- **Stakeholder input**
- **Subregional transmission planning forums**
 - Projects not addressed in subregional planning forums
- **Impacts of energy efficiency and distributed generation programs**
- **Steps being taken to evaluate effects of potential coal plant closures due to EPA regulations**
- **Effects of September 8, 2011 outage on system adequacy planning**
- **Steps to evaluate impacts on transmission system adequacy due to increased penetration of variable energy resources**

TEP 138kV Transmission Projects



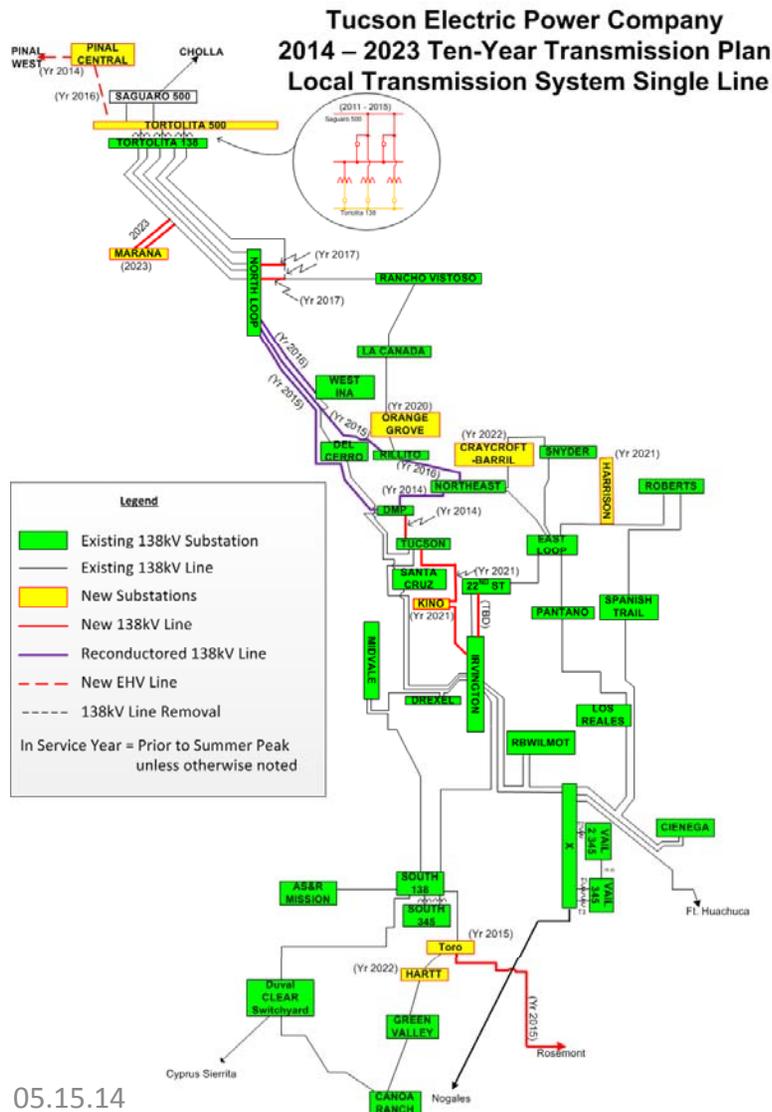
Completed Projects

- Canoa Ranch to Duval CLEAR 138kV Line (2013)

New Projects

- DMP – North Loop 138kV Line Reconductor (2015)
- North Loop – West Ina 138kV Line Reconductor (2016)
- Upgrade of Rillito 138kV Capacitor Bank #1 (2014)
- Upgrade of Irvington 138kV Capacitor Banks #1 & #2 (2014)
- Upgrade of South Loop 138kV Capacitor Bank #1 (2015)
- Upgrade of DMP 138kV Capacitor Bank #1 (2017)
- Upgrade of North Loop 138kV Capacitor Banks #1 & #2 (2016)
- Addition and upgrade of Irvington 138kV Capacitor Bank #3 (2015/2017)
- Addition and upgrade of DMP 138kV Capacitor Bank #2 (2015/2017)

TEP 138kV Transmission Projects



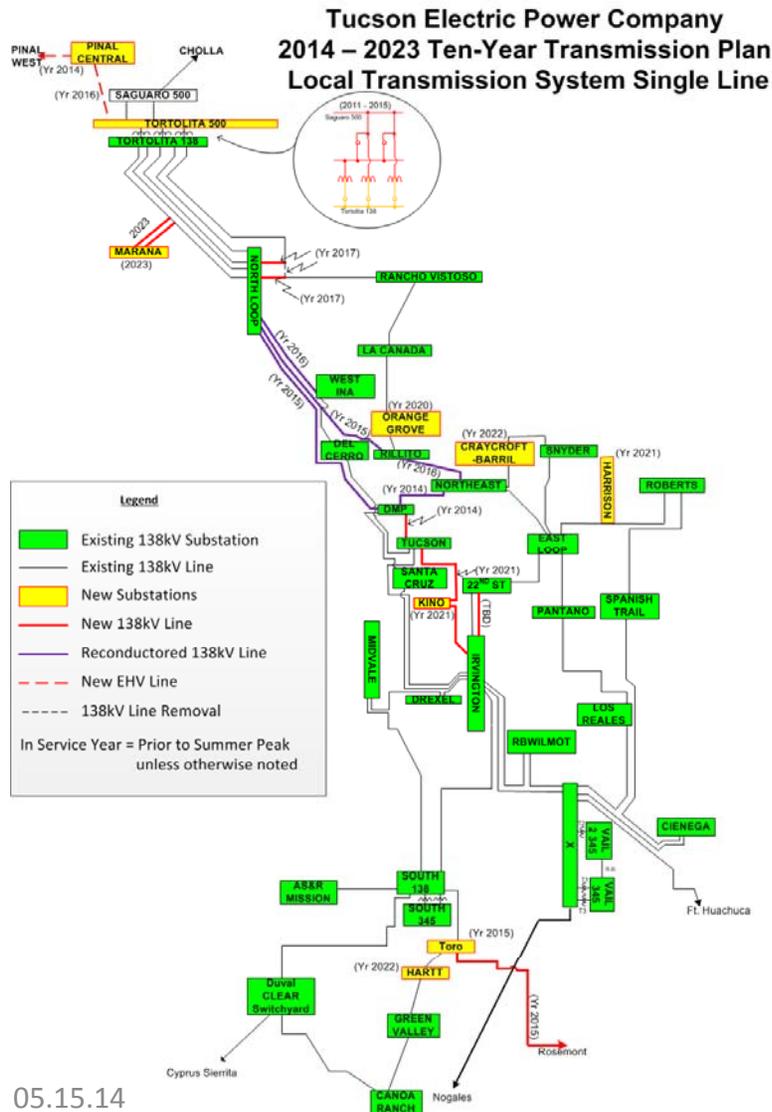
Advanced Projects

- DMP – Northeast 138kV Line Reconductor (TBD → 2014)
- North Loop – Rillito 138kV Line Reconductor (TBD → 2015)
- Northeast – Rillito 138kV Line Reconductor (TBD → 2016)

Unchanged Projects

- New DMP – Tucson 138kV Line (2014)
- Irvington – 22nd Street 138kV #2 Line (TBD)
- Vail – East Loop 138kV #3 Line (TBD)

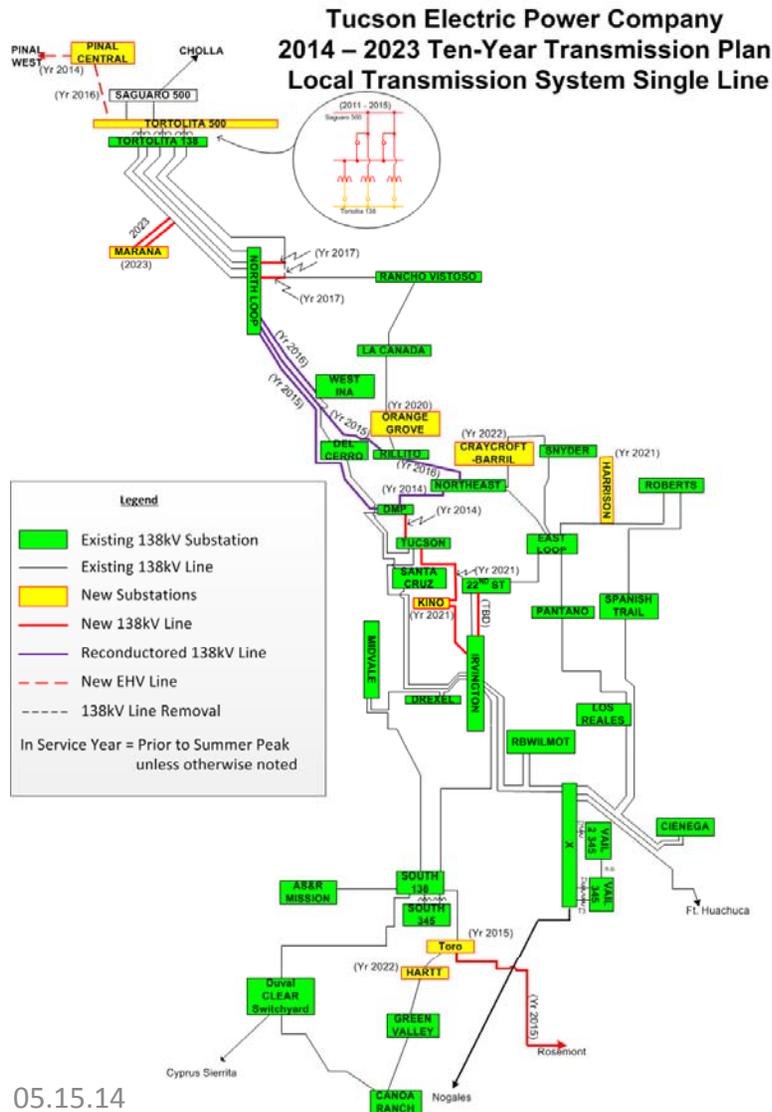
TEP 138kV Transmission Projects



Deferred Projects

- Toro – Rosemont 138kV Line (2013 → 2015)
- Toro Loop-in of South – Green Valley 138kV Line (2013 → 2015)
- Reconfiguration of Tortolita – Rancho Vistoso 138kV to North Loop – Rancho Vistoso 138kV (2015 → 2017)
- Orange Grove Loop-in of La Canada – Rillito 138kV Line (2016 → 2020)
- Harrison Loop-in of Roberts – East Loop 138kV Line (2016 → 2021)
- Irvington – Tucson 138kV #2 Line with Loop-in of Kino (2017 → 2021)
- Craycroft-Baril Loop-in of Northeast – Snyder 138kV Line (2015 → 2022)
- Hartt Loop-in of Toro – Green Valley (South – Green Valley) 138kV Line (2017 → 2022)
- Marana Loop-in of one Tortolita – North Loop 138kV Circuit (2018 → 2023)

TEP 138kV Transmission Projects

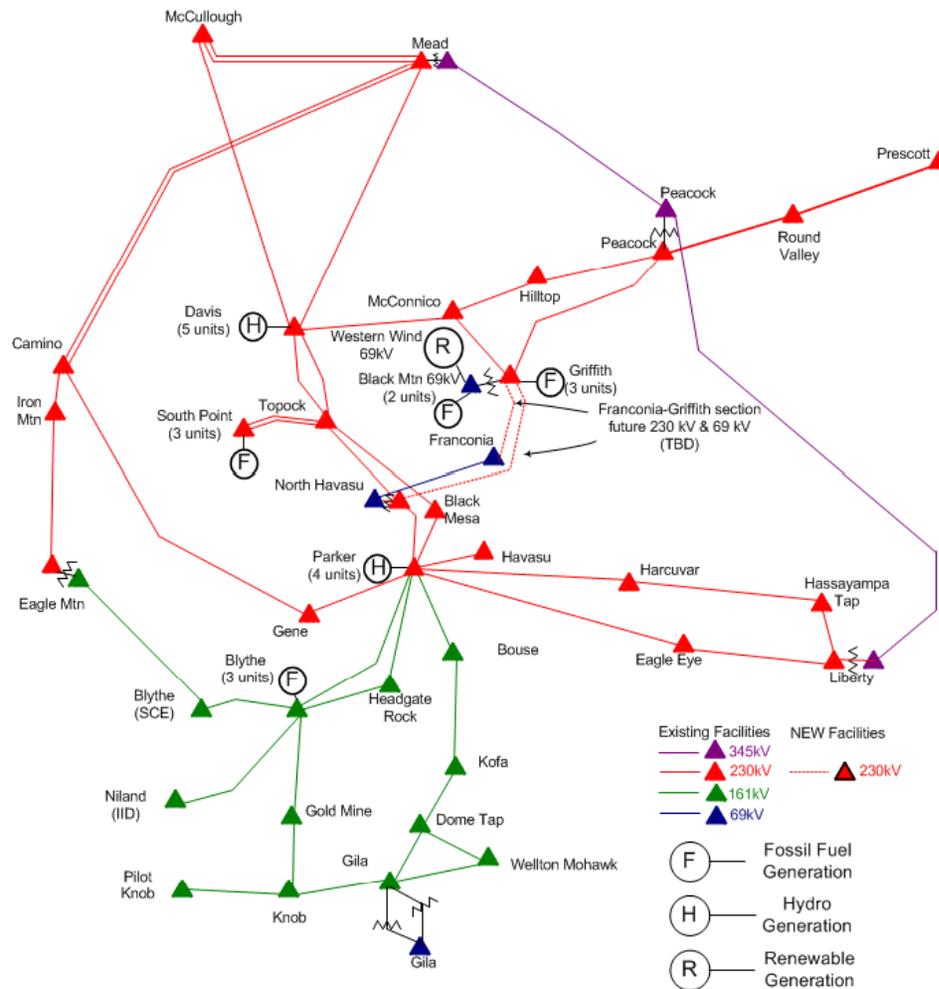


Removed Projects

- Toro STATCOM
- Naranja Loop-in of North Loop – Rancho Vistoso (Tortolita – Rancho Vistoso) 138kV Line
- UA TechPark Loop-in of Irvington – Vail 138kV #2 Line
- Medina Loop-in of Midvale – South 138kV Line
- UA Med Loop-in of Irvington – Tucson 138kV #2 Line
- Spencer Loop-in of Midvale – Medina (Midvale – South) 138kV Line
- Anklam Loop-in of Santa Cruz – DMP 138kV Line
- Raytheon Loop-in of South – Medina (Midvale – South)
- Orange Grove – East Ina 138kV Line
- Irvington – Robert Bills-Wilmot 138kV Line Reconductor
- Los Reales – Pantano 138kV Line Reconductor
- Los Reales – Vail 138kV Line Reconductor
- Rancho Vistoso – La Canada 138kV Line Reconductor

UNSE Mohave County Transmission Projects

8th BTA Workshop #1



- **Completed Projects**

- None

- **New Projects**

- None

- **Advanced Projects**

- None

- **Deferred Projects**

- Griffith – North Havasu 230kV Line (2017 → TBD)

- **Removed Projects**

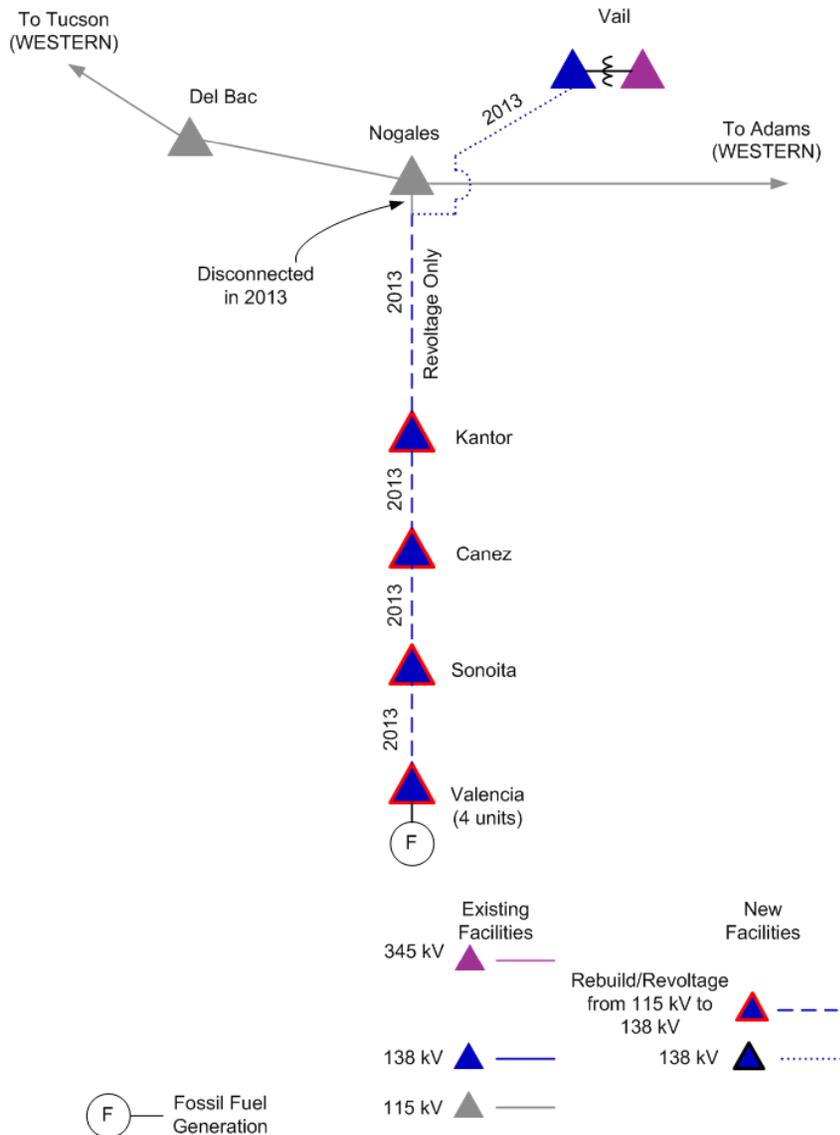
- Black Mesa Loop-in of the Parker – Davis 230kV #1 line

- **Unchanged Projects**

- None

UNSE Santa Cruz County Transmission Projects*

8th BTA Workshop #1



- **Completed Projects**

- Upgrade existing transmission line to Nogales to 138kV (2013)

- **New Projects**

- None

- **Advanced Projects**

- None

- **Deferred Projects**

- None

- **Removed Projects**

- None

- **Unchanged Projects**

- None

Technical Studies

- **2013 Capital Budget Studies**
 - Includes study years 2014-2019
 - Power flow only
- **2013 Ten-Year Plan Studies**
 - Includes study years 2020-2023
 - Power flow only
- **2013 TPL Compliance Studies**
 - Based on Ten-Year Plan filed in January 2013
 - Power flow and Transient Stability
 - Included years 2015, 2016, 2018, and 2022

Reports Supporting Ten-Year Plans

- **Reports Included in Ten-Year Plan Filings**
 - TEP Ten-Year Plan For Years 2014-2023
 - UNSE Ten-Year Plan For Years 2014-2023

- **Reports Not Included in Ten-Year Plan Filings**
 - Transmission Planning Memos
 - 2013 Annual Transmission Reliability Assessment
 - WestConnect 2014 Ten-Year Transmission Plan Report

Projects Without Technical Reports

- **Hassayampa – Pinal West 500kV line loop-in to Jojoba Switchyard**
 - Associated with the Gila River generator acquisition
 - Interconnection study in progress
 - Will be included in future technical reports

- **Conceptual projects associated with potential generation additions at Irvington**
 - Vail – Irvington 345kV Line
 - Irvington – South 345kV Line

Stakeholder Input

- TEP, UNSE Stakeholder meetings held in 2nd and 4th quarters each year
- WestConnect meetings held in 1st and 3rd quarters each year
- Network customer loads and resource forecasts provided
- Base case develop
 - WECC Annual Study Plan
 - Coordination with other AZ entities

Subregional Transmission Planning

- **Western Electricity Coordinating Council**

- Transmission Expansion Planning Policy Committee (TEPPC)
 - All TEP planned projects except the the Jojoba loop-in of the Hassayampa – Pinal West line were included in the Common Case Transmission Assumptions
 - TEP conceptual projects were not included in the Common Case Transmission Assumptions

- **WestConnect**

- Southwest Area Transmission (SWAT)
- All TEP projects except the Jojoba loop-in of the Hassayampa – Pinal West line were included as planned or conceptual projects

Effects of DG and EE Programs

- Load reductions attributed to DG and EE programs have allowed TEP to delay re-conductor projects, capacitor bank improvements and line uprates.
- Similar analysis suggests no UNSE projects have been delayed by DG or EE programs
- Analysis does not address additional generation and distribution projects that may be needed due to DG

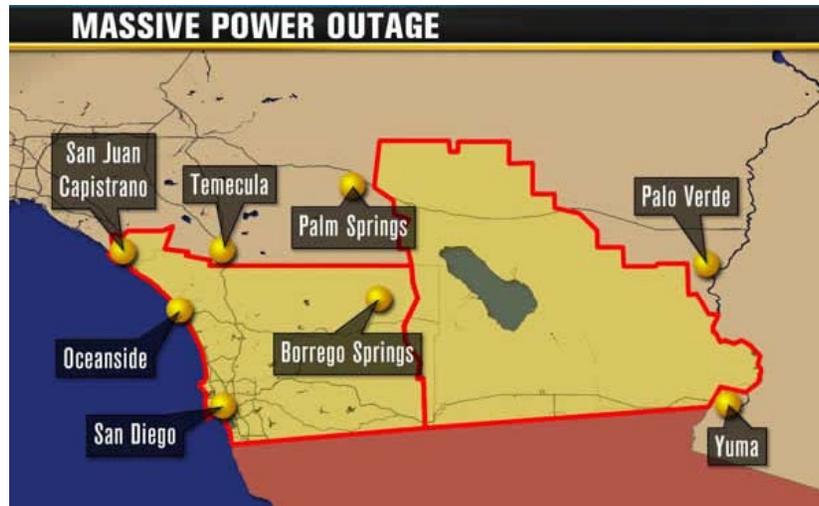


Impacts of Potential Coal Plant Closures

- **TEP Initiated SWAT Coal Reduction Assessment Study**
- **SWAT Task Force presentation addresses the issue**



Impact of September 8, 2011 Outage



- Increased Planning Requirements for the Operations Horizon
- WECC System Operating Limits Methodology
- New Processes (Next Day Studies, Bi-weekly outage coordination calls, & coordinated seasonal studies)
- Staff increased due to these operational requirements

Impact of Variable Energy Resources

- **Southwest Variable Energy Resource Initiative (SVERI)**
 - Evaluate likely penetration, locations, and operating characteristics of VER
 - Exploring tools that may facilitate VER integration and provide benefits to customers
 - TEP is a founding member (Fall 2012)
 - Objectives
 - Quantify current/planned installations of VER
 - Define current operational impacts at the BA level
 - Determine if/when VER integration challenges may arise
 - Partnered with U of A to collect, display, and analyze generator output and load data
 - Display provides real-time data for all renewable resources and net effect on load and other resources

Impact of Variable Energy Resources

- **TEP forecasting of variable energy resources**
 - Contracted with U of A to provide forecast of renewable resources
 - Forecast between the next hour and 3 day window
 - Use of cloud measurement sensors, radar, and mathematical models
- **TEP study to evaluate variable energy resources**
 - In the early stages
 - Identify and model utility scale projects
 - Identify feeders with residential/commercial rooftop solar installations
 - Analysis will include power flow and transient stability