

## Power Task Force Agenda Number 2.

# Arizona Transmission Challenges

Central Arizona Water Conservation District  
Power Committee Presentation  
May 18, 2017

## Transmission Planning Efforts

- NATIONAL
  - [Section 368 Energy Corridors \(Energy Policy Act of 2005\)](#)
  - [Quadrennial Energy Review](#)
  - [NERC 2016 Long-Term Reliability Assessment \(December 2016\)](#)
- WECC
  - [Draft 2017 TEPPC Study Program](#)
- Interregional
  - [Western Planning Interregional Coordination Meeting](#) (February 23, 2017)
  - [CREPC/WIRAB Joint Spring Meeting](#) (April 12-14<sup>th</sup>, 2017)
- WestConnect
  - [2015 Abbreviated Cycle Regional Transmission Plan](#) (Approved December 16, 2015)
  - [2016-2017 Study Plan](#) (Approved March 16, 2016)
  - [Regional Transmission Planning Stakeholder Meeting](#) (February 15, 2017)
- CAISO
  - [2016 – 2017 Transmission Plan](#) (Approved March 17, 2017)
  - [2017 – 2018 Final Study Plan](#) (Approved March 31, 2017)
- Arizona
  - [9<sup>th</sup> Arizona Biennial Transmission Plan](#) (Approved October 27, 2017)
  - [2017 Ten Year Plan Filings](#)
  - Order 890 Stakeholder Meetings (2<sup>nd</sup> Quarter Updates in June)
  - [Summer Preparedness Workshop](#)
  - [Integrated Resource Planning](#)

## ACC 9<sup>th</sup> Arizona Biennial Transmission Assessment (BTA)

- AZ statutes require 10-year plans for new transmission (100kv+) and new generation (100MW+).
  - AZ Corporation Commission required to review plans and issue report every 2 years.
  - 9<sup>th</sup> BTA approved by ACC in October 2016.
- 19 Entities filed plans containing 36 projects/707 miles of new transmission projects for the 2016-2025 period. Additional 82 miles of transmission will be reconducted.
- Strong coordination and cooperation amongst interregional and regional study groups is occurring.
- Statewide demand forecast continues to be lowered since the Fifth BTA.
- Overall, Arizona Transmission system is robust and supports the statewide load forecast through 2025

## Completed Transmission Projects

- 500 kV
  - Delaney – Palo Verde (APS, CAWCD)
  - Delaney – Sun Valley (APS, CAWCD)
  - Hassayampa – North Gila #2 (APS)
  - Pinal Central – Browning (SRP)
  - Palo Verde – Pinal West – Duke – Pinal Central (SRP and Districts)
  - Pinal Central – Tortolita (TEP)
- 230 kV
  - Palm Valley – Trilby Wash (APS)
  - Sun Valley – Trilby Wash (APS)
  - Browning – Rogers (SRP)
  - Desert Basin – Pinal Central (SRP)
  - Test Track - ED5 (WAPA)
- Upcoming Completions
  - Morgan – Sun Valley 500 kV (APS, CAWCD 2018)
  - Hassayampa – Pinal West – Jojoba Loop 500 kV (TEP, 2018)

## Arizona Public Service Company Historical Transmission Costs

Historical Year	Adjusted Transmission Rate Base	Net Adjusted Revenue Requirement (Annual)	Average Summer Peak Demand (kW)	Average Point To Point Cost (\$/kW-year)
2016	\$ 1,524,702,841	\$ 325,345,684	7,451,357	\$ 43.66
2015	\$ 1,437,358,351	\$ 290,209,546	7,334,068	\$ 39.57
2014	\$ 1,305,354,528	\$ 265,298,272	7,342,044	\$ 36.13
2013	\$ 1,254,357,321	\$ 282,925,962	7,941,093	\$ 35.63
2012	\$ 1,228,339,449	\$ 277,012,307	7,855,545	\$ 35.26
2011	\$ 1,233,614,610	\$ 250,816,656	7,932,675	\$ 31.62
2010	\$ 1,168,987,680	\$ 234,509,481	7,955,691	\$ 29.48
2009	\$ 1,137,593,951	\$ 190,119,342	8,130,498	\$ 23.38
2008	\$ 1,057,765,588	\$ 202,458,059	8,100,857	\$ 24.99
2007	\$ 965,602,362	\$ 179,696,947	8,641,858	\$ 20.79

*On May 15, 2017, APS posted its annual update of its Formula Transmission Rates based upon 2016 historical data, which rate will be effective on June 1, 2017.*

## Merchant Transmission Projects

- Southline Transmission Project
  - 345KV line between NM and AZ, 1000 MW of bidirectional transfer capability
  - BLM/WAPA released ROD in April 2016
  - Southline Transmission Project Receives New Mexico State Right-of-Way (August 2016)
  - ACC approves CEC in February 2017
  - Construction Start 2018
- DCR Ten West Link (Delaney-Colorado)
  - CA completes Valley-Devers-Colorado 500kv circuit (2<sup>nd</sup> 500kv line along I-10).
  - Remaining section of Palo Verde-Devers 2 is 115 mile / 500 kV section between Delaney and Colorado River, Approved by CAISO in 2014
  - DCR Transmission, LLC filed an Application for a Certificate of Public Convenience & Necessity for Ten West Link with the California Public Utilities Commission.
  - BLM lead agency on NEPA EIS. Draft Report as early as Oct 2017, AZ CEC application to follow
- SunZia Southwest Transmission Project
  - 515 mile, two single-circuit 500 kV line between NM and Pinal Central (AZ).
  - EIS Record of Decision by BLM in January 2015
  - ACC approves CEC in February 2016
  - WECC granted SunZia an Accepted Rating of 3,000 MW for two 500kV AC lines in March 2011; rating was re-confirmed in January 2015
  - Plan of Development in being prepared; NTP from BLM expected December 2017
  - Construction Start 2018

# Transmission Topics Today

## Changing Resource Mix

- Coal Retirements
  - [Primary Frequency Response: Maintaining System Reliability](#) (GE, April 2016)
  - [PFR: Reliability, Regulatory, And Jurisdictional Challenges Posed By Our changing Resource Mix](#) (Spiegel & McDiarmid, September 2016)
  - [Primary Frequency Response NOPR](#) (FERC, November 2016)
- Impacts of regional resource changes impacts across all connected systems and areas
- VAR's / "Duck Curve" / CA 50% RPS concentrations on the same time zone

## Congestion

- Contract Path vs. Flow base models
- Operating the system with new sources, fuel supply changes, congestion, brown outs, and load response programs
- CA 800 MW load response for 2 hours –Enernoc; CA new solar resource peaks with increased solar peak of 9,868 MW
  - midday oversupplies forcing more frequent negative prices and a jump in curtailment of excess wind and solar resources. (All at 27% Portfolio)
- At 50% how much will California have to curtail its resources or how much congestion will it cause on the grid.
- Duck Curve – should other States duck this consequence of the new energy horizon, or savor it gently over time

# Transmission Topics Tomorrow

## Changing Transmission Technologies and Grid Responsibilities

- Grid Storage and Pumped Storage to use energy within day and respond to Duck Curve reliability impacts
- Inverter backed wind and solar generators (Plug and Play)
- Micro Grids, Distributed Resources, Electric Cars, Battery Storage, and controlled loads (Load Shedding)
- Internet of Things, Data Storage and exceedingly high reliance upon internet reliability and power

## Grid Security – Critical Infrastructure Protection CIP V5

- Presidential Executive Order on Strengthening the Cyber security of Federal Networks and Critical Infrastructure May 11, 2017!
- Fixing America's Surface Transportation Act ("FAST Act"), [DOE NOPR](#) (Dec 2016)
- [Federal Efforts to Enhance Grid Resilience](#) (GAO, January 2017)
- Senate Cyber security Hearings [3/28/17](#) & [4/4/17](#)
- [NIST Situational Awareness for Electric Utilities](#) (February 2017)
- Electromagnetic Pulse Disturbances

## Transmission System Responses - Today

- FERC improvements emanating from southwest system outage event
  - WECC breaks out Peak Reliability – Situational Awareness to monitor and manage grid more efficiently and anticipate ramping congestion issues affecting hour-ahead reliability sufficiently in advance to make corrections!
- EIM – Market Reactions to interstate flow imbalances across the grid
  - California is approximately 50% of WECC therefore the resource changes and over generation impacts from California affect WECC interstate flows
  - EIM imbalance impacts 2-3% of Annual Power Related Costs today
  - Participants
    - CAISO/ PacifiCorp (2014), NV Energy (2015), [Arizona Public Service](#)/ Puget Sound Energy (2016), Portland General Electric (2017), Sacramento Municipal Utility District/ Seattle City Light (2019), [Salt River Project \(2020\)](#), TEP, UNS, COOPS Evaluating Benefits
- Mountain West Transmission Group
  - De-pancaking of wheeling charges
  - Single determination of ATC
  - Single Network Tariff
  - Single Transmission Plan