

Transmission Planning and Development

Examples and Lessons

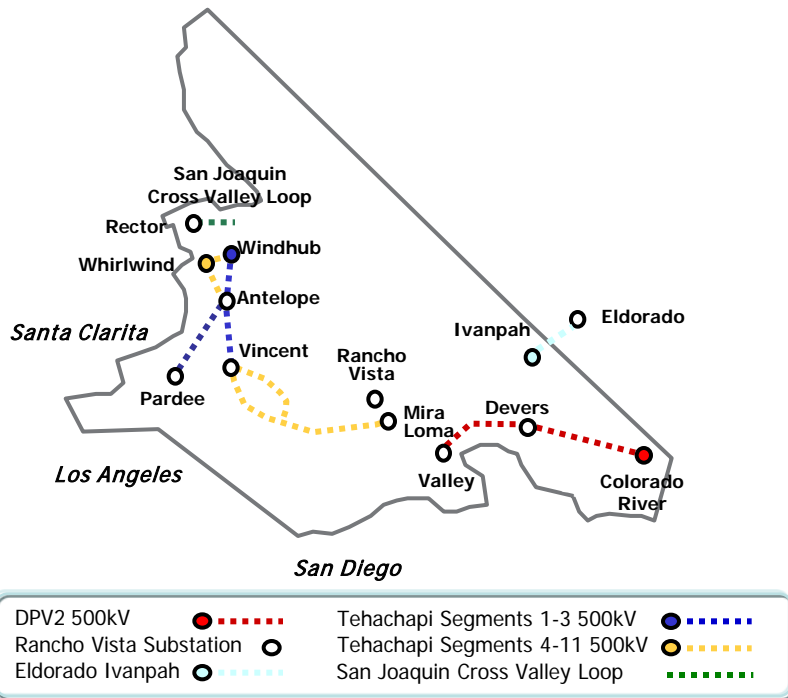
Pedro J. Pizarro
EVP, Power Operations
Southern California Edison

Harvard Electricity Policy Group
February 25, 2010

Renewables Driving Significant CA Transmission Needs

- California Renewable Portfolio Standard (RPS) mandates for renewable energy delivered to customers
 - 20% by 2010
 - 33% by 2020
- A CPUC-commissioned study estimated meeting RPS will require 7–11 major new transmission lines in California, costing approximately \$12 billion
- SCE targeting \$5 B transmission investment over next 5 years
 - Renewables interconnection
 - Reliability

SCE Transmission Investment Program



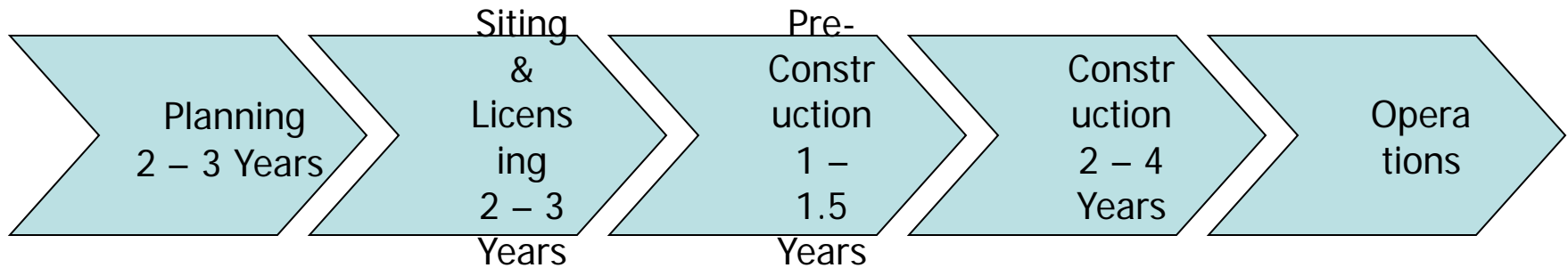
* New substations are filled

Project Name	Phase	In-Service	2009 - 2013 (\$ Millions) ¹
<u>Renewables</u>			
Tehachapi Segments 1 - 3	Construction	Various	598
Tehachapi Segments 4 - 11	Licensing	Various	1,369
Devers-Colorado River Project ³	Licensing	2013	637
Eldorado-Ivanpah	Licensing	Various	464
Other Projects ²	Licensing	Various	242
Total Renewables			3,310
<u>Reliability</u>			
San Joaquin Cross Valley Loop	Licensing ⁴	2012	134
Rancho Vista Substation	Complete	2009	37
Other Projects ²	Various	Various	1,460
Total Reliability			1,631
Grand Total			4,941

Transmission investment needed to strengthen system reliability and increase access to renewable energy

1 Subject to timely receipt of permitting, licensing, and regulatory approvals. Forecast as of October 2009 and is based on the Base Case (see SCE Capital Investment Forecast).
 2 "Other Projects" include new transmission projects to connect renewable generation and projects related to reliability, load growth, infrastructure replacement, and grid monitoring and control.
 3 The Devers-Colorado River (DCR) project was formerly described as the California portion of the DPV2 project.
 4 CPCN Filing submitted in May 2008 with a decision expected in 2010.

Major Transmission Project Process



*Typical CA Major Transmission Project
Requires 7-11 Years to Complete*

Transmission Line Categories Under CAISO Tariff

(examples later)

- CAISO's Transmission Planning Process considers additions or upgrades that:
 - Maintain ***system reliability***
 - – Promote ***economic efficiency***
 - – Satisfy requirements of a ***Location Constrained Resource Interconnection Facility (LCRIF)***
 - Maintain the simultaneous ***feasibility of allocated Long-Term Congestion Revenue Rights***
- CAISO's Large Generator Interconnection Process considers additions or upgrades needed to connect both conventional and renewable generation to the grid
- CAISO considering new Renewable Energy Transmission Planning Process

Reliability Driven Projects

- Additions or upgrades required to ensure system reliability is consistent with reliability criteria and planning standards
- Considers lower cost alternatives such as DSM, remedial action schemes, generation, interruptible loads or reactive support
- Participating Transmission Owner obligated to construct, own and finance, and maintain reliability projects

Economically Driven Projects

- Request window submittals – approval dependent on the degree to which benefits outweigh costs
 - Benefits may include reduction in production costs, congestion costs, transmission losses, capacity or other electric supply costs resulting from access to cost-efficient resources, and environmental costs
 - If proposed and approved by CAISO, the PTO will act as project sponsor (own, construct, and finance the addition or upgrade)

- Merchant transmission facilities – project sponsor pays the full cost of construction and operation
 - Costs recovered through CRRs rather than through the TAC

Location Constrained Resource Interconnection Facility Projects

- Connects two or more location constrained generators in an Energy Resource Area (geographic region certified by the CPUC and CEC)
- At the time of its in-service date, the facility will not be a network facility (e.g., radial)
- PTOs finance the costs initially through their FERC-approved revenue requirement
- Generators become responsible for their pro rata share of these monthly payments as they come on-line and use the facilities

Maintaining Feasibility of Allocated Long Term CRRs

- CAISO is obligated to ensure the continuing feasibility of Long Term CRRs that are allocated by the CAISO over the length of their terms
- CAISO shall identify the need for any transmission additions or upgrades required to ensure their continuing feasibility
- PTOs are obligated to construct, own and finance, and maintain needed additions or upgrades

Generation Interconnection Driven Projects

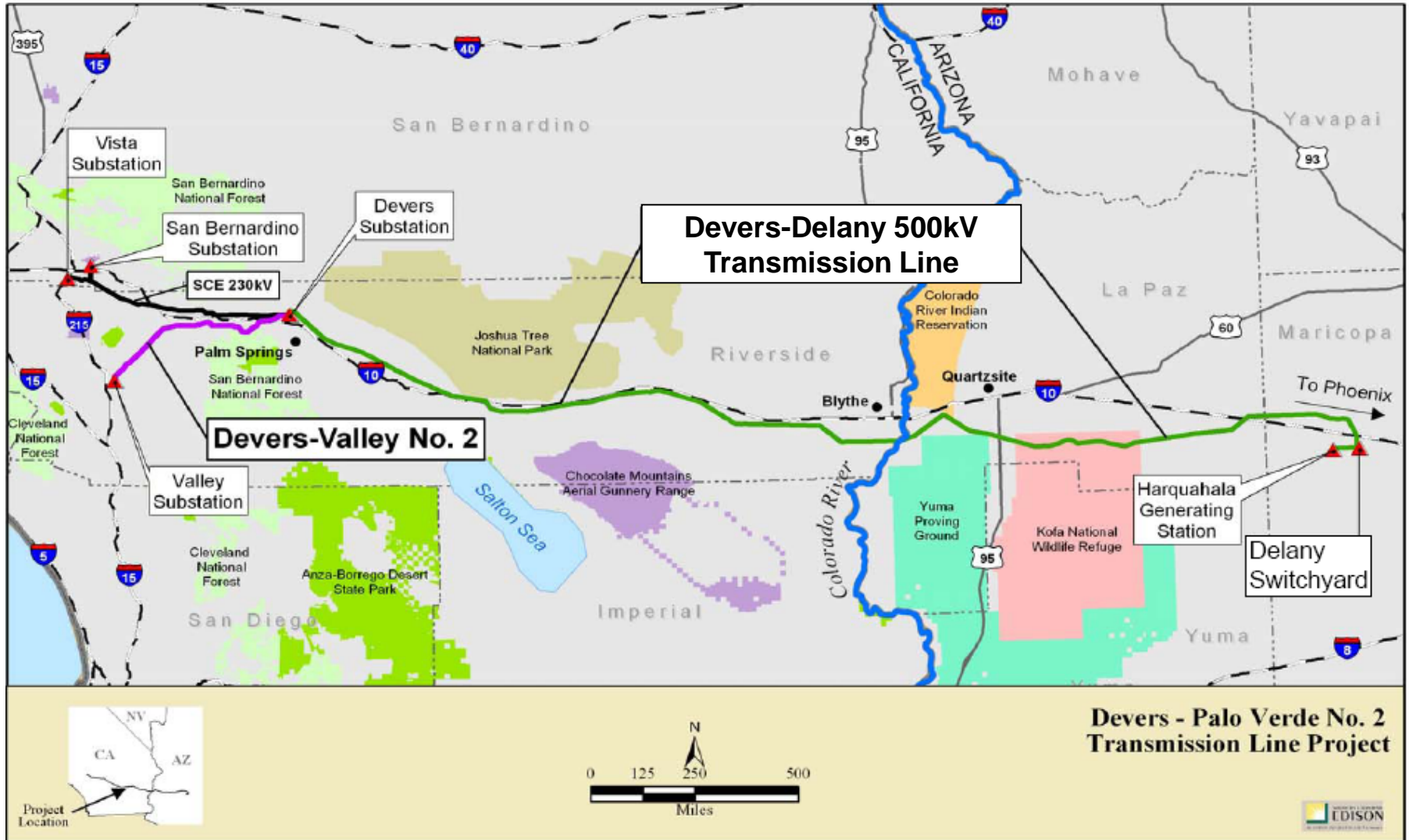
- Accepted applications for interconnection are placed in the interconnection queue
- Does not differentiate between conventional and renewable generation
- Technical studies are run to identify any necessary transmission additions or upgrades
- Execution of Interconnection Agreement constitutes CAISO project approval

Economic Project Example:

DPV2 – Original Project Overview

- Two major transmission line segments totaling approximately 267 miles (about 102 miles in AZ)
 - 225-mile 500 kV line connecting Devers Substation to the Delany Switchyard
 - Would parallel SCE's existing DPV1 500 kV line
 - Would cross 25 miles of the Kofa National Wildlife Refuge in AZ.
 - 42-mile 500 kV line connecting the Devers Substation to SCE's Valley Substation in Romoland, CA (Devers-Valley No. 2)
 - Would parallel SCE's existing Devers-Valley No. 1 500 kV line
 - Would pass through the San Bernardino National Forest.
- Would increase transfer capability by 1,200 MW; originally projected to be in service in 2009
- Filed with CPUC in April 2005 as an “economic project” with about \$460 million net benefit

DPV2 Original Project Route



DPV2 Regulatory History – Part 1

- February 2005 – California Independent System Operator project approval
- April 2005 – Filed for approval as an economic project with the California Public Utilities Commission
- May 2006 – Filed for approval with the Arizona Corporation Commission
- January 2007 – California Public Utilities Commission approved entire DPV2 project (California and Arizona segments)
- March 2007 – Arizona Line Siting Committee recommended approval of Arizona segment
- June 2007 – Arizona Corporation Commission denied approval
- June 2007 to May 2009 – SCE and Arizona stakeholders worked on project reconfigurations that might produce additional benefits to Arizona
- February 2008 – Initiated Federal Energy Regulatory Commission backstop siting pre-filing process
- May 2008 – Petition submitted to the California Public Utilities Commission for authority to construct the California segment of DPV2
- February 2009 – Meet and Confer report filed with the Arizona Corporation Commission

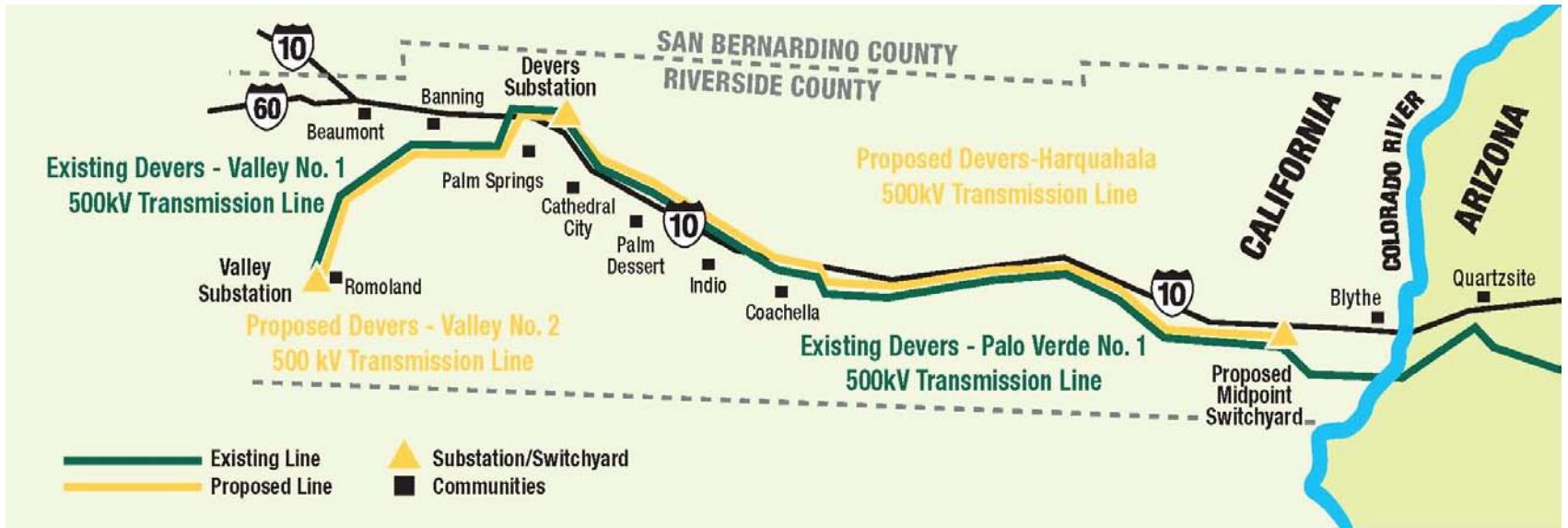
DPV2 Regulatory History – Part 2

- May 2009 – SCE announced that updated economic analysis of DPV2 indicated substantially reduced economic benefits to California customers, as well as less congestion mitigation, associated with the Arizona portion of DPV2
 - Updated economic analysis no longer supported a refiling of the Arizona DPV2 segment
 - **More renewable generation** in the Western Electricity Coordinating Council, including higher RPS targets in California
 - **Reduced load growth** in California and Western Electricity Coordinating Council, as well as increased energy efficiency and distributed generation
 - **Generator interconnection requests** at Colorado River switchyard (near Blythe), lessening the need for imports from the Southwest
 - **Lower projected differential in fuel prices** between California and Arizona
 - Revised congestion analysis did not support a backstop authority request made with the Federal Energy Regulatory Commission
 - If future generation studies establish the need for new transmission in western Arizona to interconnect generation resources to the California Independent System Operator system, SCE will evaluate seeking ACC transmission approval at that time

Revised Project: Devers to Colorado River Substation

- Proposed 153-mile 500 kV transmission line connects greater Los Angeles with sources of renewable energy in the eastern Mojave Desert and western Arizona
- 500 kV transmission line would connect Southern California Edison's existing Valley Substation near Romoland, California, to the proposed Colorado River switchyard located approximately 10 miles southwest of Blythe, California
- Increases transfer capability by 1,200 MW
- Omits original DPV2 extension into Arizona to the Palo Verde area west of Phoenix

DCRS Project Map (DPV2 California Segment)



DPV2 Regulatory History – Part 3

- November 2009 – California Public Utilities Commission approved construction of the California portion of DPV2, primarily for connection of renewable resources, subject to California Independent System Operator approval
 - CAISO approval pending completion of sufficient generation interconnection agreements

- Current Activity – Southern California Edison working to achieve numerous final regulatory approvals and preparing for construction phase

LCRIF Project Example:

Tehachapi Renewable Transmission Project (TRTP) Overview

- One of largest transmission projects of its kind in the US, with capability to deliver 4,500 MW of wind resources in Tehachapi Region (Kern County) to Southern California load center
- \$2.1 billion in capital investment, SCE committed to upfront financing for all network upgrades
- Segments 1, 2, and 3A
 - Filed CPCN in 2004
 - CPCN received in 2007
 - Completed construction in December 2009
- Segments 4-11
 - Filed CPCN in 2007
 - CPCN received in December 2009
 - Awaiting permits from US Forest Service and other agencies to start construction
 - Construction expected to complete in phases over four years following receipt of all permits

TRTP Segments

- Segments 1, 2, and 3 (shown as green lines) were completed in 2009
- Segments 4-11 (shown as blue lines) have received a license from the CPUC and will be completed in 2011 – 2015
- Significant portions of the project are in the Angeles National Forest
- Two large portions of the project are located in heavily populated urban areas – e.g., Chino Hills



Financing for Non-Network Components

- Two radial facilities (yellow lines on map):
 - Segment 3B
 - Drycreekwind to Whirlwind
- SCE initially petitioned FERC in 2004 to classify Segment 3 (A + B) as a multi-generator trunkline with cost recovery as a network facility
- FERC rejected SCE's petition, stating Segment 3 is radial
- With addition of Segment 10, Segment 3A became a network facility, but 3B remained radial
- CAISO developed new tariff for multi-generator trunkline facilities (Location Constrained Resource Interconnection Facilities, or LCRIF) in 2007
- Under LCRIF, SCE upfront finances the trunkline, and generators pay pro-rata share of going forward costs to use the trunkline
- SCE applied for LCRIF approval at CAISO in December 2008 for Segment 3B, received conditional approval in May 2009
- Requires executed Interconnection Agreements to receive final approval from CAISO
- Drycreekwind – Whirlwind does not currently qualify under LCRIF

Northern Portion of TRTP



Permitting and Licensing Lessons Learned

- Align interests with regulators and the public
- Partner with regulators
- Partner with agencies
- Engage public early and often
- Interstate lines need on-ramps and off-ramps
- Need to Establish “unassailable” need for projects
- Regularly assess how things could go wrong...and work to keep it from happening

Public Opposition Acronyms Glossary

- NIMBY – Not In My Back Yard
- NOPE – Not On Planet Earth
- BANANA – Build Absolutely Nothing Anywhere Near Anyone
- NIMET – Not In My Elected Term
- CAVE – Citizens Against Virtually Everything
- NIABY – Not In Anyone's Back Yard
- LULU – Locally Unwanted Land Use
- NEIUROW – Not Even In Utility Right-Of-Way
- BNMHYMWBS – Build Near My House Your Mama Will Be Sorry