ORIGINAL

TEP
Tucson Electric Power
88 East Broadway Blvd., P.O. Box 711
Tucson, AZ 85702

RECEIVED
AZ CORP COMMISSION
DOCKET CONTROL
2016 FEB 1 PM 1 35

February 1, 2016

Docket Control
Arizona Corporation Commission
1200 West Washington Street
Phoenix, AZ 85007

Re: Notice of Filing -Tucson Electric Power Company's Ten-Year Plan Transmission Projects 2016-2025
Docket No. E-00000D-15-0001

Pursuant to A.R.S § 40-360.02, attached is an original and thirteen copies of Tucson Electric Power Company's ("TEP") Ten-Year Plan Transmission Projects for years 2016-2025. As required by Decision No. 74785 (October 24, 2014), this plan includes a study report on the effects of distributed generation and energy efficiency on TEP's future transmission needs.

If you have any questions, please contact me at (520) 884-3680.

Sincerely,

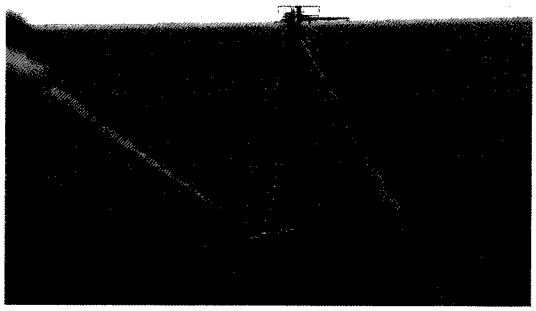
Melissa Morales
Regulatory Services Coordinator

cc: Compliance Section, ACC

Arizona Corporation Commission
DOCKETED
FEB 01 2016
DOCKETED BY

Tucson Electric Power

TEN-YEAR PLAN TRANSMISSION PROJECTS FOR YEARS 2016-2025



SUBMITTED TO THE
ARIZONA CORPORATION
COMMISSION
JANUARY 31, 2016
DOCKET NO: E-00000D-15-0001

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS
2016-2025

Table of Contents

Introduction 3

General Overview 3

Load Forecasting 3

Project Status Definitions 4

Table 1, Completed Projects 4

Biennial Transmission Assessment Orders 5

Transmission Planning Process 6

EHV Projects 6

Table 2, EHV Project Categories 7

HV Projects 7

Table 3, HV Project Categories 8

Transmission System Maps 9

Figure 1, Existing and Planned / Conceptual EHV Transmission Facilities Map 10

Figure 2, Local Existing and Conceptual EHV Transmission Facilities Map 11

Figure 3, Existing and Planned EHV Transmission Facilities Single-Line Diagram 12

Figure 4, TEP Local Area 138kV Ten Year Transmission Plan 13

Planned EHV Transmission Projects 14

Hassayampa – Pinal West 500kV Line Loop-in to Jojoba Switchyard 15

Pinal Central Substation to Tortolita Substation 16

Planned EHV Reactive Projects 17

Series Capacitor Replacement at Vail 345kV Substation (Springerville – Vail 345kV Line) 18

Series Capacitor Replacement at Vail 345kV Substation (Winchester – Vail 345kV Line) 19

Series Capacitor Replacement at Greenlee 345kV Substation (Springerville – Greenlee 345kV Line) 20

Conceptual EHV Transmission Projects 21

Vail Substation to Irvington Substation 22

Irvington Substation to South Substation 23

Saguaro Substation to Winchester Substation 24

Vail Substation to South Substation – 2nd circuit 25

Springerville Substation to Greenlee Substation - 2nd circuit 26

Tortolita Substation to South Substation 27

Westwing Substation to South Substation – 2nd circuit 28

Planned HV Transmission Projects 29
DeMoss Petrie – Northeast 138kV Line Re-Conductor 30
North Loop – Rillito 138kV Line Re-Conductor 31
DeMoss Petrie – North Loop 138kV Line Re-Conductor 32
North Loop Substation – West Ina Substation 138kV Line Re-Conductor 33
West Ina Substation – Del Cerro 138kV Line Re-Conductor 34
North Loop – Rancho Vistoso 138kV Line Re-Conductor 35
Irvington – 22nd Street 138kV Line Re-Conductor 36
Del Cerro– Tucson 138kV Line Re-Conductor 37
Reconfigure Tortolita - Rancho Vistoso to North Loop Rancho Vistoso 38
Future Toro Switchyard to Rosemont Substation Radial 138 kV Distribution line 39
Loop-in of existing La Canada – Rillito 138kV Transmission Line into future Orange Grove 138kV Substation 40
Irvington Substation –Tucson Station #2 138 kV 41
Loop in of Roberts-East Loop line to the future Harrison Substation 42
Loop-in of future Toro – Green Valley 138kV transmission line into future Hartt 138kV substation 44
Loop-in of existing Northeast – Snyder 138kV Transmission Line into future Craycroft-Barril 138kV Substation 45
Interconnection of Tortolita – North Loop 138 kV line 125 with future TEP Marana 138 kV Substation 46
Interconnection of North Loop – Rancho Vistoso 138 kV line with future Naranja 138 kV Substation 47
Interconnection of existing Irvington – South Loop 138kV Transmission Line into future Corona 138kV Substation 48
Planned HV Reactive Projects 49
Roberts Substation 138kV Capacitor Bank #1 Addition 50
Midvale Substation 138kV Capacitor Bank #1 Addition 51
Canoa Ranch 138kV Capacitor Bank #1 Addition 52
North Loop Substation 138kV Capacitor Banks #1 and #2 Upgrade 53
Conceptual HV Transmission Projects 54
Irvington - Vail 138kV Line Re-Conductor 55
Irvington – RobertBills - Vail 138kV Line Re-Conductor 56
Irvington – South 138kV Line Re-Conductor 57
Irvington – Drexel – Midvale - South 138kV Line Re-Conductor 58
Irvington Substation to East Loop Substation (through 22nd Street Substation) 59
Attachment A - DG and EE Study Report 60

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS
2016-2025

Introduction

General Overview

Pursuant to A.R.S. § 40-360.02, Tucson Electric Power Company ("TEP") hereby submits its 2016-2025 Ten-Year Transmission Projects Plan ("Ten-Year Plan") to the Arizona Corporation Commission ("Commission"). This Ten-Year Plan describes the transmission facility projects of 115 kilovolt ("kV") or higher that TEP may construct between 2016-2025.

This Ten-Year Plan has been prepared consistent with in-service dates for new distribution substations as determined by TEP distribution planning. The study was conducted in 2015 and the results of the study are represented in the 2016-2025 Ten-Year Plan. Estimated in-service dates may vary depending upon changes in regulatory requirements, underlying assumptions, other utilities' plans and economic conditions.

Load Forecasting

TEP's 2016 – 2025 Ten-Year Plan was developed based on TEP's approved Corporate Forecast. The ten-year demand forecast that was specifically developed for transmission planning was approved by TEP management in December of 2014. This forecast takes into account renewable distributed generation ("DG") and energy efficiency ("EE") programs, as well as TEP's retail customer load.

Project Status Definitions

Planned Projects: Included within this Ten-Year Plan are "planned" projects for TEP's 500 kilovolt ("kV") and 345kV extra high voltage ("EHV") transmission system, as well as planned projects for TEP's 138kV high voltage ("HV") transmission System. Previously reported planned projects that have been canceled are not included.

Conceptual Projects: For informational purposes, TEP has also included "conceptual" projects for both the EHV and HV transmission systems. Because these conceptual projects are not expected to be built within the ten-year planning horizon, their in-service date is shown as "to be determined" ("TBD"). These conceptual projects may become planned projects as they move into the ten-year planning horizon in subsequent studies.

Completed Projects: Projects submitted in previous Ten-Year Plans that have been completed are designated as completed in this Ten-Year Plan for tracking purposes. See Table 1 for a summary of completed projects. These projects will be removed from future Ten-Year Plans.

Table 1, Completed Projects

Project	In-Service Date
Series Capacitor Replacement at Vail 345kV Substation (Springerville – Vail 345kV Line)	May 2015
Series Capacitor Replacement at Vail 345kV Substation (Winchester– Vail 345kV Line)	May 2015
DeMoss Petrie – Northeast 138kV Line Re-Conductor	May 2015
DeMoss Petrie – North Loop 138kV Line Re-Conductor	May 2015
West Ina Substation – Del Cerro 138kV Line Re-Conductor	May 2015
Series Capacitor Replacement at Greenlee 345kV Substation (Springerville – Greenlee 345kV Line)	November 2015
Pinal Central Substation to Tortolita Substation	December 2015
North Loop – Rillito 138kV Line Re-Conductor	December 2015
North Loop Substation – West Ina Substation 138kV Line Re-Conductor	December 2015

Biennial Transmission Assessment Orders ("BTA")

Consistent with the Commission's Sixth BTA (Decision No. 72031, December 10, 2010) this Ten-Year Plan includes information regarding planned transmission re-conductor projects, substation transformer replacements, and reactive compensation programs. This Ten-Year Plan also considers how DG and EE programs will affect TEP's retail customer load and future transmission needs, as set forth in the Sixth BTA.

In the Seventh BTA Decision (Decision No. 73625, December 12, 2012), the Commission ordered suspension of the requirement for Reliability Must Run ("RMR") studies and implemented criteria for re-starting RMR studies based on a biennial review of the factors set forth in Seventh BTA Decision. Upon review of the factors, TEP is not required to conduct RMR studies in the Tucson RMR load pocket.

In the Eighth BTA decision (Decision No. 74785, Oct 24. 2014), the Commission ordered utilities with retail load to file a study with the Commission as part of the Ninth BTA docket identifying the effects of DG and EE installation and/or programs. This Study Report ("Study Report") is included as Attachment A. As set forth in the Study Report, there were no additional transmission system needs identified and therefore no additional projects were required due to the effects of DG and EE. All EHV and HV projects included in the Ten-Year Plan would be required with or without the effects of DG and EE programs. The impact of DG and EE programs did not result in a delay or cancellation of any projects identified for the 2020 study year when DG and EE were included, nor were any additional projects required if the effects of DG and EE are not considered. Impacts to the TEP distribution system were not a part of the scope of this study. Cost

and construction requirements throughout the system would result if the distribution system were included in any study.

The Commission also ordered that for each load growth or reliability driven project, utilities shall report a load level range at which each transmission project is anticipated to be needed. Projects triggered by load growth are indicated on the individual project descriptions.

Transmission Planning Process

Power flow analysis was conducted to identify thermal overloads under normal and contingency conditions in compliance with the NERC Reliability Standards and Western Electricity Coordinating Council ("WECC") System Performance Criteria. Proposed projects were determined such that the performance measures of the NERC Reliability Standards and WECC System Performance Criteria are met for Category P0 and P1-P7 conditions as defined in NERC Standard TPL-001-4.

EHV Projects

TEP is a member of the WestConnect Planning Area and the Southwest Transmission Planning Group ("SWAT") (see http://www.westconnect.com/planning.php). TEP actively participates in various WestConnect committees and SWAT workgroups to ensure that its EHV system is properly studied and that EHV and HV systems are accurately modeled in Regional or Sub-Regional evaluations. Questions and issues, if any are addressed in these forums as they arise.

TEP has both 345 kV and 345 kV facilities on its EHV system. The EHV project summaries have been divided into categories that define the placement of each of the projects. See Table 2 for

a description of categories. See ***Figures 1, 2*** and ***3*** for maps depicting approximate routing and project locations for the EHV projects.

Table 2, EHV Project Categories

Projects	Description
Planned EHV Transmission	Those planned EHV projects with projected in-service dates between 2016-2025 as needed to support the EHV transmission system
Planned Reactive EHV	Those planned EHV projects with projected in-service dates between 2016-2025 that will provide voltage support for the EHV transmission system
Conceptual EHV Transmission	Those planned EHV projects that either may have a Certificate of Environmental Compatibility ("CEC") in place or have been included within previous ten-year plans but are not scheduled in-service between 2016-2025

HV Projects

TEP conducts an annual review of its HV transmission system performance over a ten-year planning horizon. This results in the identification of needs and new facilities and upgrades to existing facilities to meet those needs, with associated in-service dates as required to ensure adequate transmission capacity within TEP's service territory. Capital improvements are proposed for the TEP 138kV system to accommodate the addition of new 138/13.8 kV substations to address increased transmission facility loading and mitigate localized stability issues.

The HV project summaries have been divided into categories that define the placement of the project. See Table 3 for summary of project categories. See ***Figure 4*** for a map depicting approximate routing and locations for the HV projects.

Table 3, HV Project Categories

Projects	Description
Planned HV Transmission	Those planned HV projects with projected in-service dates between 2016-2025 as needed to support the local TEP 138 kV transmission system
Planned Reactive HV	Those planned HV projects with projected in-service dates between 2016-2025 that will provide voltage support for the local TEP 138 kV transmission system
Conceptual HV Transmission	Those planned HV projects that that may have a CEC in place or have been included within previous ten-year plans but are not scheduled in-service between 2016-2025

Transmission System Maps

This Ten-Year Plan includes system maps depicting the existing transmission networks along with the addition of planned or conceptual projects, followed by individual project descriptions for both the EHV and HV transmission systems. The maps and descriptions are intended to be general planning-level documents to describe projects conceptually. Therefore the maps and descriptions do not represent specific routes or geographically correct project locations.

Transmission System Maps

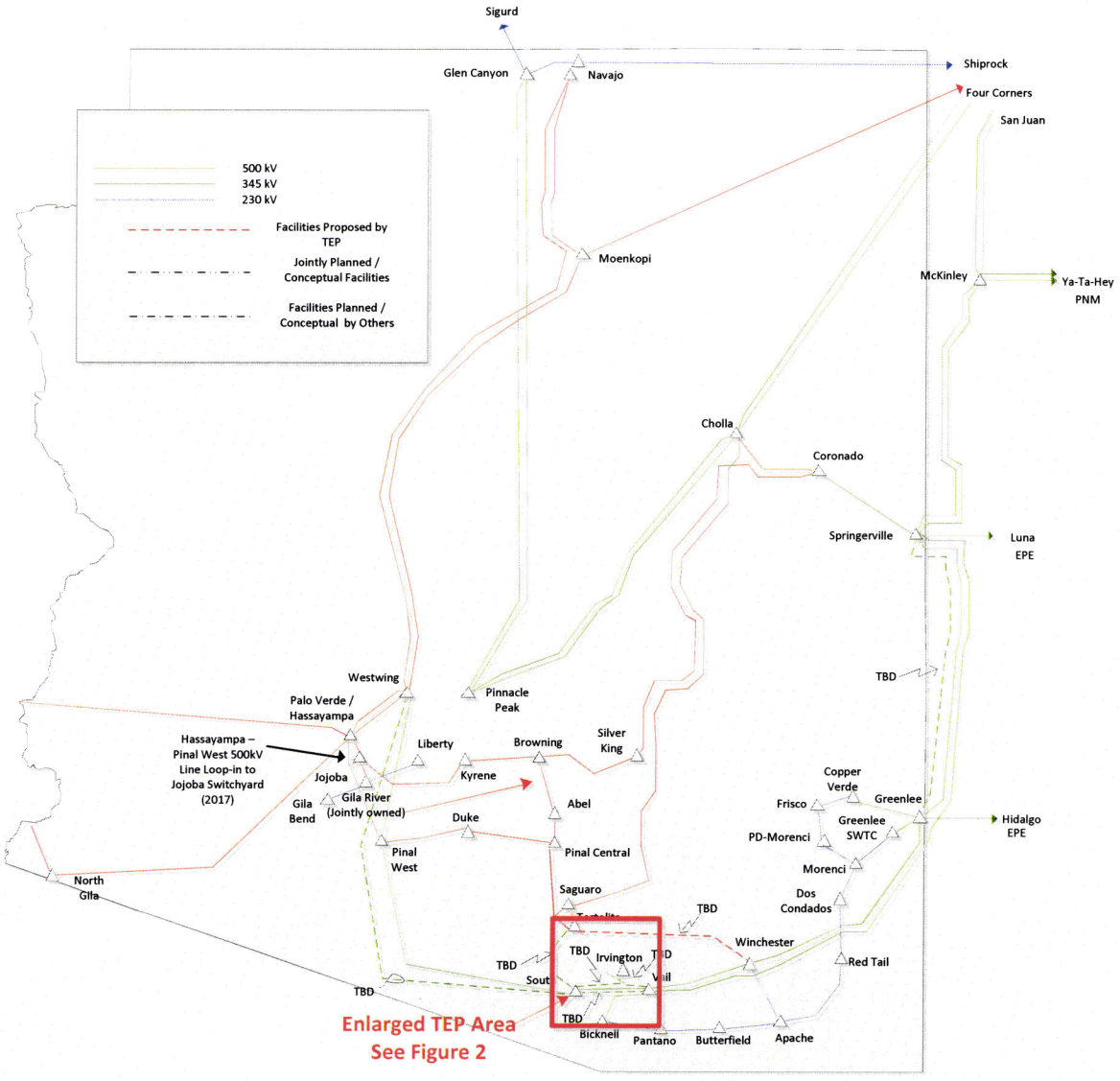


Figure 1. Existing and Planned / Conceptual EHV Transmission Facilities Map

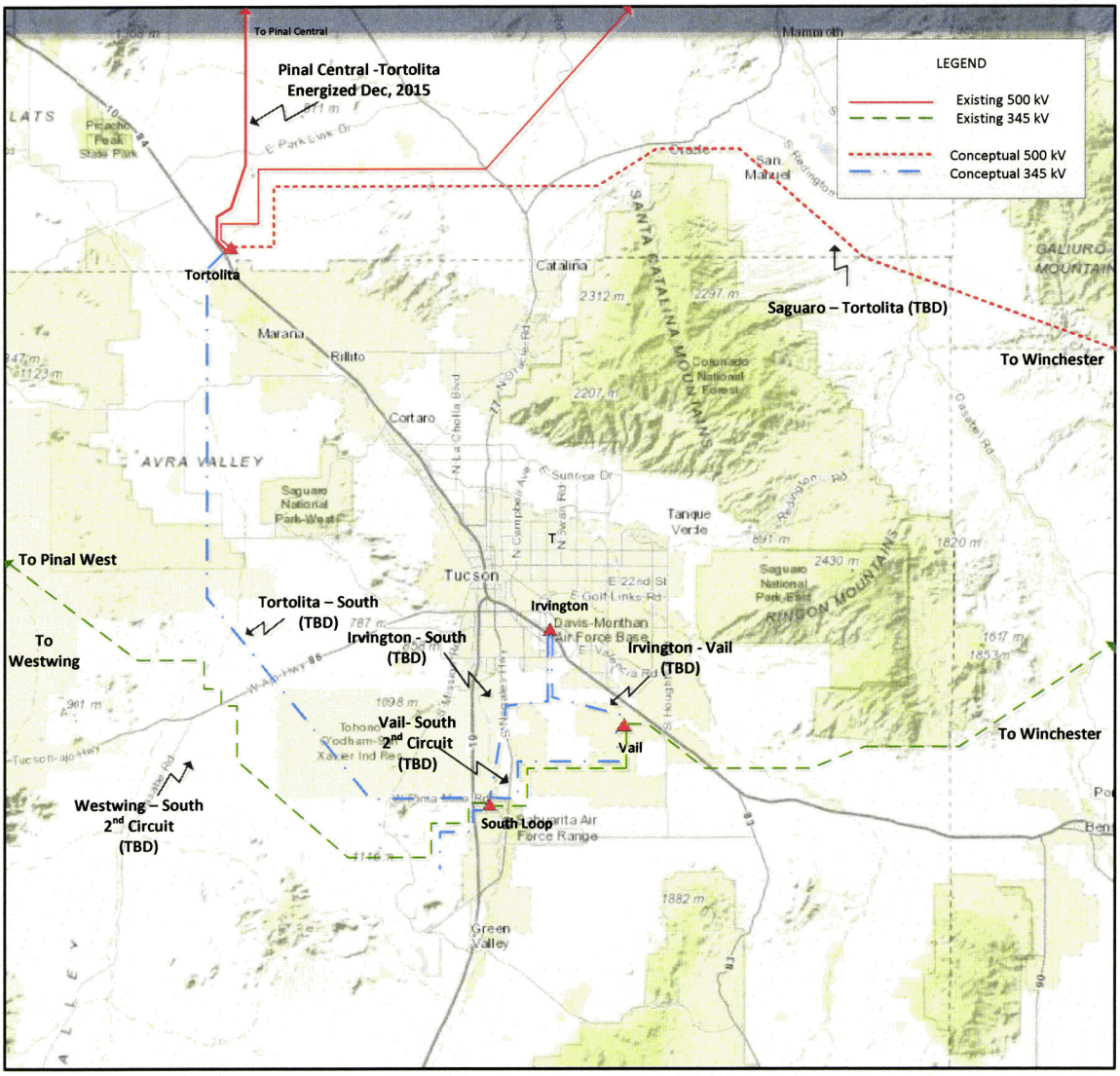


Figure 2. Local Existing and Conceptual EHV Transmission Facilities Map

Figure 3. Existing and Planned EHV Transmission Facilities Single-Line Diagram

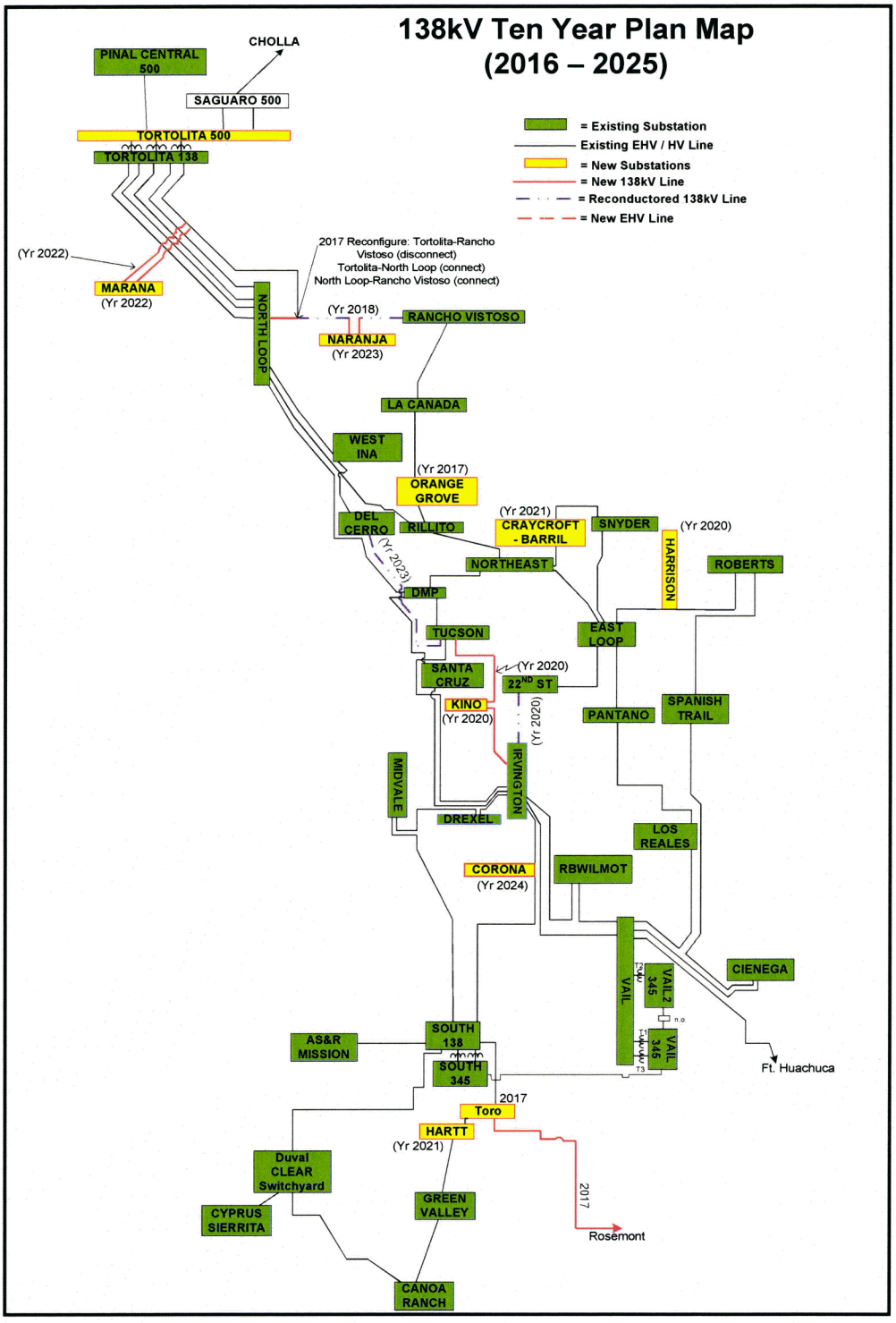


Figure 4. TEP Local Area 138 kV Ten Year Transmission Plan

Planned EHV Transmission Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Hassayampa – Pinal West 500 kV Line Loop-in to Jojoba Switchyard
Parameters	
a) Voltage	500 kV
b) Capacity	System dependent
c) Point of Origin	Jojoba substation
d) Point of Termination	Interconnection with existing Hassayampa – Pinal West line
e) Length	Less than 3 spans
Routing	Drop existing line into existing switchyard
Purpose	To provide connectivity between existing 500 kV transmission lines.
Date	
a) Construction Start	2017
b) In-Service Date	2017
Is Certificate Necessary	Certificate is part of Case # 124
Technical Studies	Initial interconnection request submitted to SRP in 2014. In April 2015, SRP began the Interconnection Facilities Study ("IFAS"). SRP issued to TEP a draft IFAS report in December 2015. SRP will continue to work to complete the IFAS and draft report at the earliest possible time.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Pinal Central Substation to Tortolita Substation
Parameters	
a) Voltage	500 kV
b) Capacity	System dependent
c) Point of Origin	Pinal Central substation (Sec. 30 T6S R8E)
d) Point of Termination	Tortolita Substation (Sec. 14 T10S R10E)
e) Length	Approximately 40 miles
Routing	In accordance with the CEC approved in Decision No. 73282 (July 30, 2012).
Purpose	To reinforce TEP's EHV system and to provide additional capacity for the flow of power from the Palo Verde area into TEP's northern service territory.
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service December 2015***[1]
Is Certificate Necessary	Certificate was part of Case # 165
Technical Studies	Completed

[1] This project will be removed from future Ten-Year Plans

Planned
EHV Reactive Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Series Capacitor Replacement at Vail 345 kV Substation (Springerville – Vail 345 kV Line)
Parameters	
a) Voltage	345 kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Vail Substation
d) Point of Termination	Vail Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service May 2015***[2]
Is Certificate Necessary	No
Technical Studies	Completed

[2] This project will be removed from future Ten-Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Series Capacitor Replacement at Vail 345 kV Substation (Winchester – Vail 345 kV Line)
Parameters	
a) Voltage	345 kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Vail Substation
d) Point of Termination	Vail Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service May 2015***[3]
Is Certificate Necessary	No
Technical Studies	Completed

[3] This project will be removed from future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Series Capacitor Replacement at Greenlee 345 kV Substation (Springerville – Greenlee 345 kV Line)
Parameters	
a) Voltage	345-kV
b) Capacity	1195 MW Continuous/1494 MW Emergency
c) Point of Origin	Greenlee Substation
d) Point of Termination	Greenlee Substation
e) Length	NA
Routing	NA
Purpose	To upgrade existing equipment.
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service November 2015***[4]
Is Certificate Necessary	No
Technical Studies	Completed

[4] This project will be removed from future Ten-Year Plans filings

Conceptual EHV Transmission Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Vail Substation to Irvington Substation
Parameters	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	Irvington Substation (Sec. 03 T15S R14E)
e) Length	Approximately 11 miles
Routing	Unknown
Purpose	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Yes
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington Substation to South Substation
Parameters	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Irvington Substation (Sec. 03 T15S R14E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	Approximately 16 miles
Routing	Unknown
Purpose	To reinforce TEP's EHV system and to provide a new tie between TEP's HV and EHV systems.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Yes
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Saguaro Substation to Winchester Substation
Parameters	
a) Voltage	500-kV
b) Capacity	System dependent
c) Point of Origin	Saguaro Substation
d) Point of Termination	Winchester Substation
e) Length	Approximately 80 miles
Routing	In accordance with the CEC approved in Decision 46801 (January 23, 1976).
Purpose	To reinforce TEP's EHV system and to provide additional capacity for the flow of power from the Palo Verde area into TEP's eastern transmission system.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Certificate is part of case # 23
Technical Studies	Studies in progress via SWAT and internal TEP study efforts.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Vail Substation to South Substation – 2nd circuit
Parameters	
a) Voltage	345-kV or 500-kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	14 miles
Routing	Parallel and adjacent to existing Vail – South Line
Purpose	To reinforce TEP's EHV system and to provide additional transmission capacity between Vail and South Substations
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Certificate is part of case # 15
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Springerville Substation to Greenlee Substation - 2nd circuit
Parameters	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Springerville Substation (Sec. 34 T11N R30E)
d) Point of Termination	Greenlee Substation (Sec. 29 T5S R31E)
e) Length	110 Miles total; 27 Miles in Arizona.
Routing	Parallel and adjacent to existing Springerville to Greenlee line.
Purpose	To deliver power and energy from major TEP interconnections in the Four Corners and Eastern Arizona regions.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Certificate is part of case #'s 12, 30, 63 and 73
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Tortolita Substation to South Substation
Parameters	
a) Voltage	345-kV
b) Capacity	System dependent
c) Point of Origin	Tortolita Substation (Sec. 23 T10S R10E)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	68 Miles
Routing	From Tortolita Substation south through Avra Valley to existing Westwing-South 345-kV transmission line right-of-way, then parallel and adjacent to existing Westwing – South line to South Substation.
Purpose	To reinforce TEP's EHV system and to provide additional capacity for the flow of power in Southern Arizona.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Certificate is part of case # 50
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 70's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Westwing Substation to South Substation – 2nd circuit
Parameters	
a) Voltage	345-kV or 500-kV
b) Capacity	System dependent
c) Point of Origin	Westwing Substation (Sec. 12 T4N R1W)
d) Point of Termination	South Substation (Sec. 36 T16S R13E)
e) Length	178 Miles
Routing	Parallel and adjacent to existing Westwing to South line and will include loop-in to Pinal West.
Purpose	To deliver power and energy from major TEP interconnections in the Northwest Phoenix region.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	Certificate is part of case # 15
Technical Studies	Studies conducted in coordination with neighboring utilities formed the basis for the design of TEP's original EHV system in the 1970's. This project is based on that original work. Detailed studies will be performed in the future upon a determination of need for this project by TEP.

Planned HV Transmission Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	DeMoss Petrie – Northeast 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	Northeast Substation
e) Length	Approximately 6 Miles
Routing	Existing
Purpose	Required to support TEP construction of new EHV Pinal Central to Tortolita 500 kV line
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service May, 2015***[5]
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

[5] This project will be removed in future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	North Loop – Rillito 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	North Loop Substation
d) Point of Termination	Rillito Substation
e) Length	Approximately 11 Miles
Routing	Existing
Purpose	Required to support TEP construction of new EHV Pinal Central to Tortolita 500 kV line
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service December, 2015***[6]
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

[6] This project will be removed from future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	DeMoss Petrie – North Loop 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	DeMoss Petrie Substation
d) Point of Termination	North Loop Substation
e) Length	Approximately 14 Miles
Routing	Existing
Purpose	Required to support TEP construction of new EHV Pinal Central to Tortolita 500 kV line
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service May, 2015***[7]
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

[7] This project will be removed from future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	North Loop Substation – West Ina Substation 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	North Loop Substation
d) Point of Termination	West Ina Substation
e) Length	Approximately 6 Miles
Routing	Existing
Purpose	Required to support TEP construction of new EHV Pinal Central to Tortolita 500 kV line
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service December, 2015***[8]
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

[8] This project will be removed from future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	West Ina Substation – Del Cerro 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	W. Ina Substation
d) Point of Termination	Del Cerro Substation
e) Length	Approximately 2.8 Miles
Routing	Existing
Purpose	To increase TEP load serving capability.
Date	
a) Construction Start	***Completed***
b) In-Service Date	***Completed, in-service May, 2015***[9]
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

[9] This project will be removed from future Ten Year Plan filings

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	North Loop – Rancho Vistoso 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	North Loop Substation
d) Point of Termination	Rancho Vistoso Substation
e) Length	Approximately 10.5 Miles
Routing	Existing
Purpose	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1574A. Final rating to be 2264A continuous.
Date	
a) Construction Start	2018
b) In-Service Date	2018
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington – 22nd Street 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Point of Termination	22nd Street Substation
e) Length	Approximately 4 Miles
Routing	Existing
Purpose	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1957A. Final rating to be 2264A continuous.
Date	
a) Construction Start	2020
b) In-Service Date	2020
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Del Cerro– Tucson 138 kV Line Re-Conductor
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Del Cerro Substation
d) Point of Termination	Tucson Substation
e) Length	Approximately 6.75 Miles
Routing	Existing
Purpose	Required to comply with reliability standards. Required for flows on line exceeding existing rating of 1301A. Final rating to be 2264A continuous.
Date	
a) Construction Start	2023
b) In-Service Date	2023
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Tortolita Substation – Rancho Vistoso Substation Reconfiguration to Tortolita Substation – North Loop Substation #5 and North Loop Substation – Rancho Vistoso Substation
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Tortolita Substation
d) Intermediate Point	North Loop Substation
e) Point of Termination	Rancho Vistoso Substation
f) Length	Approximately 22 Miles
Routing	Existing
Purpose	To provide a more reliable connection to the existing Rancho Vistoso substation.
Date	
a) Construction Start	2017
b) In-Service Date	2017
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Future Toro Switchyard to Rosemont Substation Radial 138 kV Distribution line
Parameters	
a) Voltage	138-kV
b) Capacity	TBD
c) Point of Origin	Future Toro Switchyard that will be a loop-in of the TEP South – Green Valley 138 kV Line (Sec. 29 T17S R14E)
d) Point of Termination	Future Rosemont Switchyard (Sec. 30 T18S R16E)
e) Length	Approximately 13.2 Miles
Routing	Approximately 1 mile east from Toro, then southeast to the intersection of Santa Rita Road and Helvetia Road, then northeast to Rosemont.
Purpose	To provide electrical service to large retail customer (mine load) located east of Green Valley, AZ
Date	
a) Construction Start	September 2016
b) In-Service Date	2017 (Dependent upon approval of Mine Record of Decision from United States Forest Service)
Is Certificate Necessary	Certificate is part of case # 164
Technical Studies	Annual 138 kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Loop-in of existing La Canada – Rillito 138 kV Transmission Line into future Orange Grove 138 kV Substation
Parameters	
a) Voltage	138-kV
b) Capacity	System dependent
c) Point of Origin	La Canada 138 kV Substation
d) Interim Point	Future Orange Grove 138 kV Substation
d) Point of Termination	Rillito 138 kV Substation
e) Length	Loop-in off of existing line
Routing	Loop-in of the existing La Canada - Rillito 138 kV circuit and drop into future station adjacent to the right-of-way
Purpose	Required to connect the future Orange Grove 138/13.8 kV Substation to the local 138 kV system.
Date	
a) Construction Start	2016
b) In-Service Date	2017
Is Certificate Necessary	No
Technical Studies	Annual 138 kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington Substation –Tucson Station #2 138 kV
Parameters	
a) Voltage	138-kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Interim Point	Future Kino Substation
e) Point of Termination	Tucson Station
f) Length	Irvington – Kino – approximately 6 miles Kino – Tucson – approximately 5 miles
Routing	To be determined
Purpose	To connect the future Kino 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2019
b) In-Service Date	2020
Is Certificate Necessary	Yes
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Vail Substation to East Loop Substation through Spanish Trail and Roberts Substations, looping-in the Roberts-East Loop line to the future Harrison Substation.
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Vail Substation (Sec. 4 T16S R15E)
d) Point of Termination	East Loop Substation (Sec. 8 T14S R15E)
e) Length	Phase 1: Vail Substation to East Loop Substation - 22 Miles Phase 2: East Loop – Roberts – 7 miles Spanish Trail to Roberts – 5.75 miles Phase 3: Vail Substation to East Loop Substation - 22 Miles Phase 4: East Loop – future Harrison – approximately 3 miles Roberts – future Harrison – approximately 4 miles
Routing	East and north from Vail Substation along existing transmission line to Irvington and Houghton Roads, then north along Houghton Road to Speedway Boulevard, then east and north to Roberts Substation and west along Speedway to East Loop Substation.
Purpose	To provide additional electric service to the eastern portion of TEP's service area and to reinforce the local transmission system.

Date			
	a) Construction Start	1976	
	b) In-Service Date	Phase 1 - 1977 (Completed)	Spanish Trail Substation to East Loop and Vail Substation
		Phase 2 - 1983 (Completed)	Roberts Substation and associated 138 kV lines
		Phase 3 – TBD	Third 138 kV line from Vail to East Loop Substation
		Phase 4 - 2020	Loop-in of the existing Roberts – East Loop 138kV circuit and drop into future Harrison station adjacent to the right-of-way
Is Certificate Necessary		Certificate is part of case # 8.	
Technical Studies		Annual 138kV planning studies	

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Loop-in of future Toro – Green Valley 138kV transmission line into future Hartt 138kV substation
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Future Toro 138 kV Substation
d) Interim Point	Future Hartt 138 kV Substation
d) Point of Termination	Green Valley 138kV Substation
e) Length	Loop-in off of existing line
Routing	Looping the existing South – Future Toro – Green Valley 138kV circuit and drop into future station adjacent to the right-of-way
Purpose	Required to connect the future Hartt 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2020
b) In-Service Date	2021
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Loop-in of existing Northeast – Snyder 138kV Transmission Line into future Craycroft-Barril 138kV Substation
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Northeast 138 kV Substation
d) Interim Point	Future Craycroft-Barril 138 kV Substation
d) Point of Termination	Snyder 138kV Substation
e) Length	Loop-in of existing line
Routing	Existing Northeast-Snyder Corridor. Requires 1 span of wire to drop into station.
Purpose	Required to connect the future Craycroft-Barril 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2020
b) In-Service Date	2021
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Interconnection of Tortolita – North Loop 138 kV line 125 with future TEP Marana 138 kV Substation
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Tortolita 138 kV Substation
d) Interim Point	Future Marana 138kV Substation
e) Point of Termination	North Loop 138 kV Substation
f) Length	Approximately 4 miles from existing circuit
Routing	Loop-in a circuit from the Tortolita- North Loop corridor (line 125) at the Trico-Marana Rd. alignment and extend approximately 4 miles of double-circuit pole-line west across I-10 to proposed Marana substation site near Sanders Rd.
Purpose	Required to connect the future Marana 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2021
b) In-Service Date	2022
Is Certificate Necessary	Yes
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Interconnection of North Loop – Rancho Vistoso 138 kV line with future Naranja 138 kV Substation
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	North Loop 138 kV Substation
d) Interim Point	Future Naranja 138kV Substation
e) Point of Termination	Rancho Vistoso 138 kV Substation
f) Length	Approximately 1mile from existing circuit
Routing	Loop-in a circuit from the North Loop – Rancho Vistoso corridor alignment and extend approximately 1 mile of double-circuit pole-line south to future Naranja substation site.
Purpose	Required to connect the future Naranja 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2022
b) In-Service Date	2023
Is Certificate Necessary	Yes
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Interconnection of existing Irvington – South Loop 138kV Transmission Line into future Corona 138kV Substation
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Irvington 138 kV Substation
d) Interim Point	Future Corona 138kV Substation
e) Point of Termination	South Loop 138 kV Substation
f) Length	Approximately 1 mile from existing circuit
Routing	Existing Irvington – South Loop Corridor. Requires 1 span of wire to drop into station.
Purpose	Required to connect the future Corona 138/13.8 kV Substation to the local 138kV system.
Date	
a) Construction Start	2023
b) In-Service Date	2024
Is Certificate Necessary	Yes
Technical Studies	Annual 138kV planning studies

Planned
HV Reactive Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Roberts Substation 138kV Capacitor Bank #1 Addition
Parameters	
a) Voltage	138 kV
b) Capacity	24.4 MVAR at 138kV,
c) Point of Origin	Roberts Substation
d) Point of Termination	Roberts Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2017
b) In-Service Date	2017
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Midvale Substation 138kV Capacitor Bank #1 Addition
Parameters	
a) Voltage	138 kV
b) Capacity	24.4 MVAR at 138kV,
c) Point of Origin	Midvale Substation
d) Point of Termination	Midvale Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2017
b) In-Service Date	2017
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Canoa Ranch 138kV Capacitor Bank #1 Addition
Parameters	
a) Voltage	138 kV
b) Capacity	24.4 MVAR at 138kV
c) Point of Origin	Canoa Ranch Substation
d) Point of Termination	Canoa Ranch Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2016
b) In-Service Date	2016
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	North Loop Substation 138kV Capacitor Banks #1 and #2 Upgrade
Parameters	
a) Voltage	138 kV
b) Capacity	Exist: 36.7 MVAR, each Proposed Total: 48.9 MVAR each at 138kV
c) Point of Origin	North Loop Substation
d) Point of Termination	North Loop Substation
e) Length	NA
Routing	NA
Purpose	Voltage support of the TEP 138kV system.
Date	
a) Construction Start	2016
b) In-Service Date	2016
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

Conceptual
HV Transmission Projects

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington - Vail 138kV Line Re-Conductor
Parameters	
a) Voltage	138 kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Point of Termination	Vail Substation
e) Length	Approximately 11 Miles
Routing	Existing
Purpose	To facilitate short notice interconnection of large industrial loads in the Port of Tucson area.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington – RobertBills - Vail 138kV Line Re-Conductor
Parameters	
a) Voltage	138 kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Mid-Point	RobertBills
e) Point of Termination	Vail Substation
f) Length	Approximately 14 Miles
Routing	Existing
Purpose	This line is parallel to the Irvington – Vail 138kV line and would need to be re-conductored for n-1 outages of the Irvington - Vail 138kV line.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington – South 138kV Line Re-Conductor
Parameters	
a) Voltage	138 kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Point of Termination	South Substation
e) Length	Approximately 18 Miles
Routing	Existing
Purpose	To facilitate short notice interconnection of large industrial loads in the TAA area.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington – Drexel – Midvale - South 138kV Line Re-Conductor
Parameters	
a) Voltage	138 kV
b) Capacity	System Dependent
c) Point of Origin	Irvington Substation
d) Mid-Point	Drexel
e) Mid-Point	Midvale
f) Point of Termination	South Substation
g) Length	Approximately 18 Miles
Routing	Existing
Purpose	This line is parallel to the Irvington – South 138kV line and would need to be re-conductored for n-1 outages of the Irvington – South 138kV line.
Date	
a) Construction Start	TBD
b) In-Service Date	TBD
Is Certificate Necessary	No
Technical Studies	Annual 138kV planning studies

TUCSON ELECTRIC POWER COMPANY
TEN-YEAR PLAN
TRANSMISSION PROJECTS

Project Designation	Irvington Substation to East Loop Substation (through 22nd Street Substation)
Parameters	
a) Voltage	138 kV
b) Capacity	System dependent
c) Point of Origin	Irvington Substation (Sec. 03 T15S R14E)
d) Point of Termination	East Loop Substation (Sec. 08 T14S R15E)
e) Length	Irvington – East Loop – 9 Miles Phase 1: Irvington Substation to 22nd Street Substation – 4 miles Phase 2: 22nd Street to East Loop Substation – 5 miles
Routing	North and East of Irvington Substation, through 22nd Street Substation, then East and North to East Loop Substation.
Purpose	To provide additional electric service to the central area of TEP's service area and to reinforce the local transmission system.
Date	
a) Construction Start	1985
b) In-Service Date	Phase 1 – 1994 (Completed) — Irvington Station to 22nd St. Substation Phase 2 – 2000 (Completed) — 22nd Street to East Loop Substation Phase 3 – TBD — 2nd Circuit of Phase I
Is Certificate Necessary	Certificate is part of case # 66.

Attachment A
DG and EE Study Report

Tucson Electric Power

Ninth Biennial Transmission Assessment Study of the Effects of Distributed Renewable Generation and Energy Efficiency Programs

SUBMITTED TO THE
ARIZONA CORPORATION COMMISSION
JANUARY 31, 2016

DOCKET NO: E-00000D-15-0001

Introduction

In the 8th BTA (Decision 74785, October 24, 2014), the Arizona Corporation Commission ("Commission") ordered jurisdictional utilities to address the effects of distributed renewable generation and energy efficiency programs on future transmission needs in their ten-year plan filings. Evaluation of distributed renewable generation ("DG") and energy efficiency ("EE") effects were to be done for the fifth year of the study only. This analysis was conducted to determine how the fifth year of the study would be affected by the absence of load reductions realized through DG and EE programs.

Case Development

The study was conducted using the case developed for the 2020 used in the development of Tucson Electric Power's ("TEP") Ten Year Plan ("Ten-Year Plan"). The case was developed from an approved Western Electric Coordinating Council ("WECC") base case. The study was performed for the 2020 study year.

Loads

Loads used were specifically developed for transmission planning for use in TEP's Ten-Year Plan and were approved by TEP management in December of 2014. This forecast takes into account DG and EE programs, as well as TEP's retail customer load. Forecasted DG and EE loads were provided from TEP's Energy Management department. These loads were provided as of February 2014. Loads used for the 2020 study year were as provided in Table 1 below.

Table 1, Load Summary

Area	Tucson	Rosemont	Santa Cruz	Thornydale	DG	EE	Net	Without DG & EE
Load	2434.00	86.00	76.00	37.73	16	78	2633.73	2539.73
w/5% Stability Margin	2555.70	90.30	79.80	39.62	16	78	2765.42	2671.42

Study Methodology

Power flow analysis was conducted to identify thermal overloads under normal and contingency conditions in compliance with the NERC Reliability Standards and Western Electricity Coordinating Council ("WECC") System Performance Criteria. Proposed projects were determined such that the performance measures of the NERC Reliability Standards and WECC System Performance Criteria are met for Category P0 and P1-P7 conditions as defined in NERC Standard TPL-001-4.

To determine projects that may result due to the loss of DG &EE, the DG & EE loads were added back into the case developed for the Ten-Year Plan. The newly developed DG & EE case ("case") was then studied using the same criteria as that used in the development of the Ten-Year Plan. Results of the output was compared with the results from the 2020 study year developed for the Ten-Year Plan.

Results

There were no additional projects required when comparing the results of the DG & EE study to the Ten-Year Plan study results for the study year of 2020.

Summary

There were no additional transmission system needs identified and therefore no additional projects were required due to the effects of DG & EE. All projects included in the plan would be required with or without the effects of DG and EE programs. The impact of DG and EE programs did not result in a delay or cancellation of any projects required for the 2020 study year, nor were any additional projects required if the effects of DG and EE are not considered.

End of document