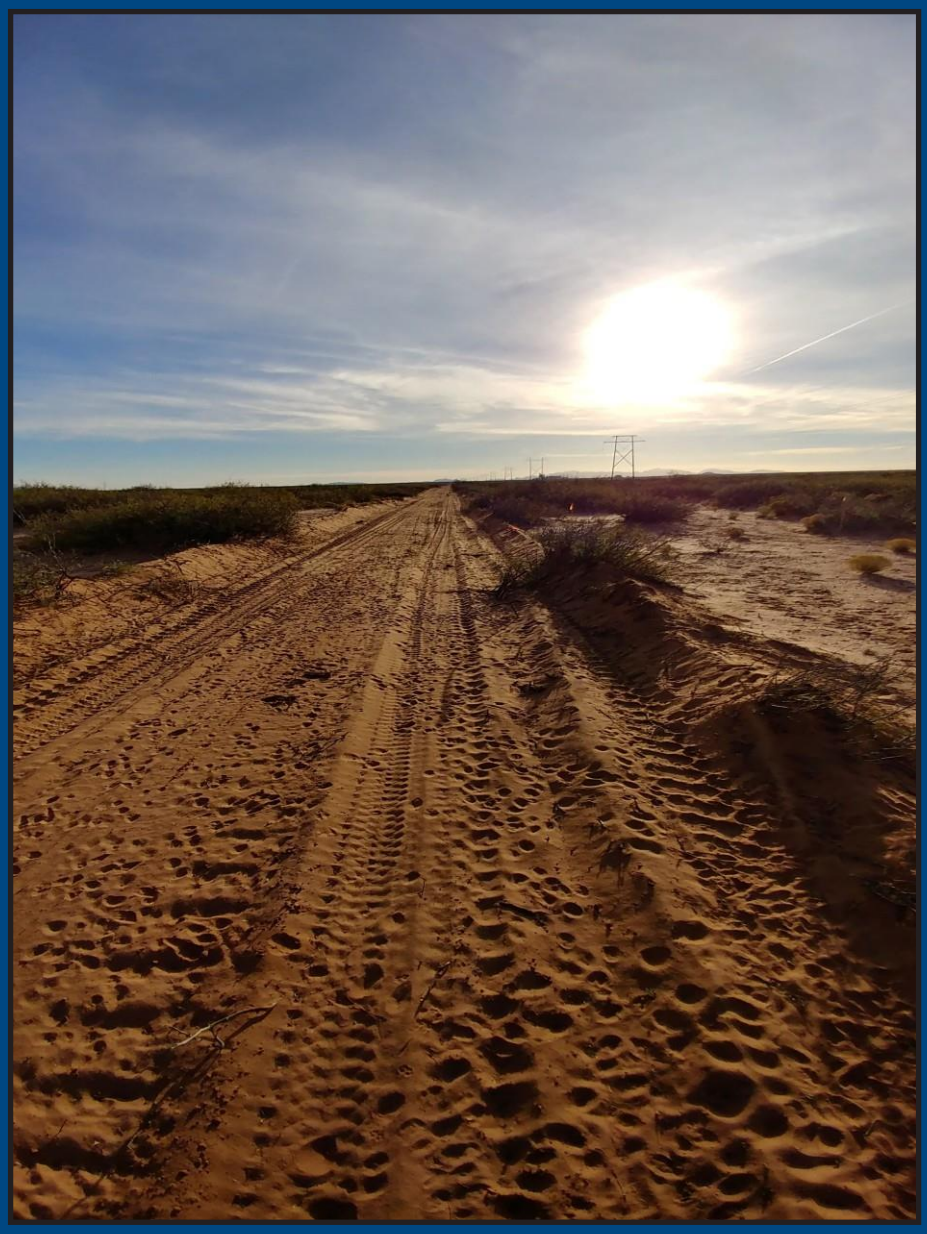
2020



EL PASO ELECTRIC COMPANY
SYSTEM EXPANSION PLAN
2021-2030

Prepared by
Transmission
System Planning

Table of Contents

EXECUTIVE SUMMARY

El Paso Electric Company's ("EPE") System Planning Department performs System Expansion Plan ("Plan") studies annually as described in EPE's Open Access Transmission Tariff ("OATT") Attachment K ("Attachment K"). This process is a technical evaluation of EPE's Bulk Electric System performed for a ten-year planning horizon (currently from 2021 through 2030). The Plan determines system facility additions and upgrades necessary to comply with Western Electricity Coordinating Council ("WECC") and the North American Electric Reliability Corporation ("NERC") reliability requirements under these conditions:

- Equipment will not be loaded more than its normal facility limits for All Facilities in Service ("AFIS").
- Equipment will not be loaded more than its emergency facility limits for any single-element ("N-1") contingency.
- Real-time violations that have been identified because of actual system conditions or real-time contingency analysis will be addressed.
- Conformance with NERC Standard TPL-001-4 criteria will be applied to certain planning events.
- Equipment voltage limits (high or low) will not be exceeded.

This Plan's content has been organized as follows:

- A description of major EPE planned projects for each year is provided under the Transmission Project Summary. Information includes the Project Name, Operating Voltage, Project Number, Planned In Service Date, Project Description, and Project Justification.
- A General Assumptions Section addresses Load Projections, Demand Side Management, Generation Resources, Reliability Criteria, System Operating Limit ("SOL") Methodology for the Operating Horizon, Open Planning Meetings, and Base Case System Assumptions.

  The basis for Native system peak demand projections was EPE's 2019 Long-Term Forecast Report. In summary, the 2019 Forecast projects a ten-year Compounded Annual Growth Rate ("CAGR") of 1.2% for native system peak demand. Incorporated within the 2019 Load Forecast and the 2019 Loads and Resources ("L&R") are EPE Public Policy requirements. It is in this manner that Public Policy requirements are considered in the Plan.
- The Tables Section consists of the Yearly Peak Energy Efficiency Adjustment, EPE Local Generation, System Expansion Projects Scheduled for Completion before Peak of 2021, and Project Schedule for 2021-2030 System Expansion Plan Projects.

  Future local generation resources serving native load have been identified in the 2019 L&R as detailed in the Generation Resources are summarized in Table 2.

  Table 3 identifies expansion projects identified to be completed prior to the peak of 2021. New or modified projects in this Plan are summarized in Tables 4A and 4B and

explained in each year's project descriptions.

Tables 4A and 4B detail line item project descriptions per year on a project by project basis in the years 2021-2030.

The system performance analyses presented in this Plan include an assessment of multiple outage impacts, generator interconnection impacts, and economic planning evaluations. The major projects identified within this report are summarized below by geographical area:

WEST EL PASO SERVICE TERRITORY

- Afton North Substation (2023)
- Afton 345 kV to Afton North 345 kV Transmission Line (2023)
- Vado 115 kV Substation (2024)
- Double Bundled Afton North-Vado 115 kV Transmission Line (2024)
- Two new 345/115 kV Autotransformers at Afton North (2024)
- Vado to Salopek 115 kV Line Reconductor Double Bundled (2026)
- Vado to Anthony 115 kV Line Reconductor Double Bundled (2027)
- Afton North - Airport Transmission Line Addition (2028)
- In-and-Out into Vado 345 kV Substation from Afton North - Newman 345 kV Transmission Line (2030)
- New Vado 345/115 kV Autotransformer (2030)

DOWNTOWN NETWORK AND CENTRAL EL PASO SERVICE TERRITORY

- Marlow-Trowbridge Transmission Line Reconductor (2021)
- Rio Grande – Sunset (5500/5600) 69 kV Lines Upgrades (2025)

NORTHEAST EL PASO SERVICE TERRITORY

- Roberts Substation (2022)

EAST EL PASO SERVICE TERRITORY

- In-and-Out into Picante 345 kV Substation from Caliente-Amrad 345 kV Transmission Line (2021)

FAR EAST EL PASO SERVICE TERRITORY

- Eastside Loop Expansion Project (2023-2025)

LAS CRUCES AND HATCH SERVICE TERRITORY

- Las Cruces Loop (2021-2023)

The projects presented within El Paso Electric Company System Expansion Plan 2021-2030 are a result of technical analyses performed by System Planning. This new Plan updates and replaces EPE's previous 2020-2029 System Expansion Plan.

TRANSMISSION PROJECT SUMMARY

Transmission Projects will be identified with the following template;

PLANNED PROJECTS
YEAR XXXX
DEFINITIONS

Project Name: Commonly used name by El Paso Electric Company for a transmission or substation system expansion capital project. Projects of a normal maintenance nature and those located external to the EPE's transmission network are normally not included here.

Operating Voltage: The operational voltage level(s) of the system element(s).

Project Number: Project number as per the Projected Capital Expenditure Report.

Planned In Service Date: This is System Planning's recommended project completion date. In general, System Planning recommends that projects be completed by May of the installation year, so that anticipated system peak load demand is met.

Project Description: A general description of the project.

Project Justification: Project need is identified.

Transmission Projects in 2021

PLANNED PROJECTS
YEAR 2021

Project Name: Marlow-Trowbridge 115 kV Line (Reconductor)

Operating Voltage: 115 kV

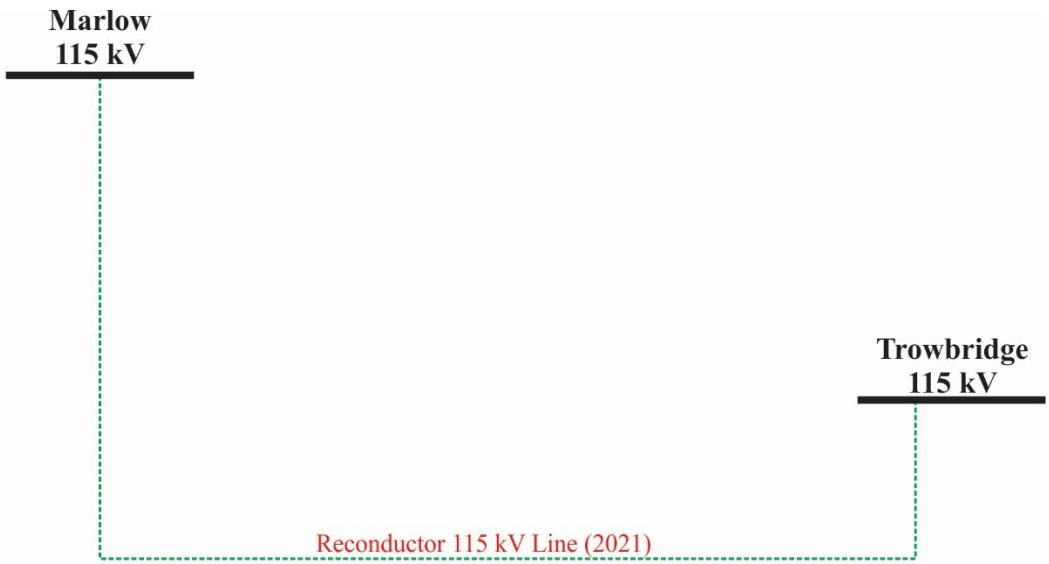
Project Number:

In Service Date: December 2021

Project Description: The project consists of reconductoring the Marlow to Trowbridge 115 kV transmission line with conductor that provides a normal capacity rating of 185 MVA and an emergency capacity rating of 246 MVA.

Project Justification: Real-time assessment analyses identified overloads during N-1 contingencies for certain EPE local generation dispatch scenarios. This reconductoring project will not only relieve the overload condition and reduce losses but will also improve voltage support and power flow within the area.

MARLOW-TROWBRIDGE 115 kV LINE RECONDUCTOR
YEAR 2021



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PLANNED PROJECTS
YEAR 2021

Project Name: Moongate-Jornada 115 kV Line (New)

Operating Voltage: 115 kV

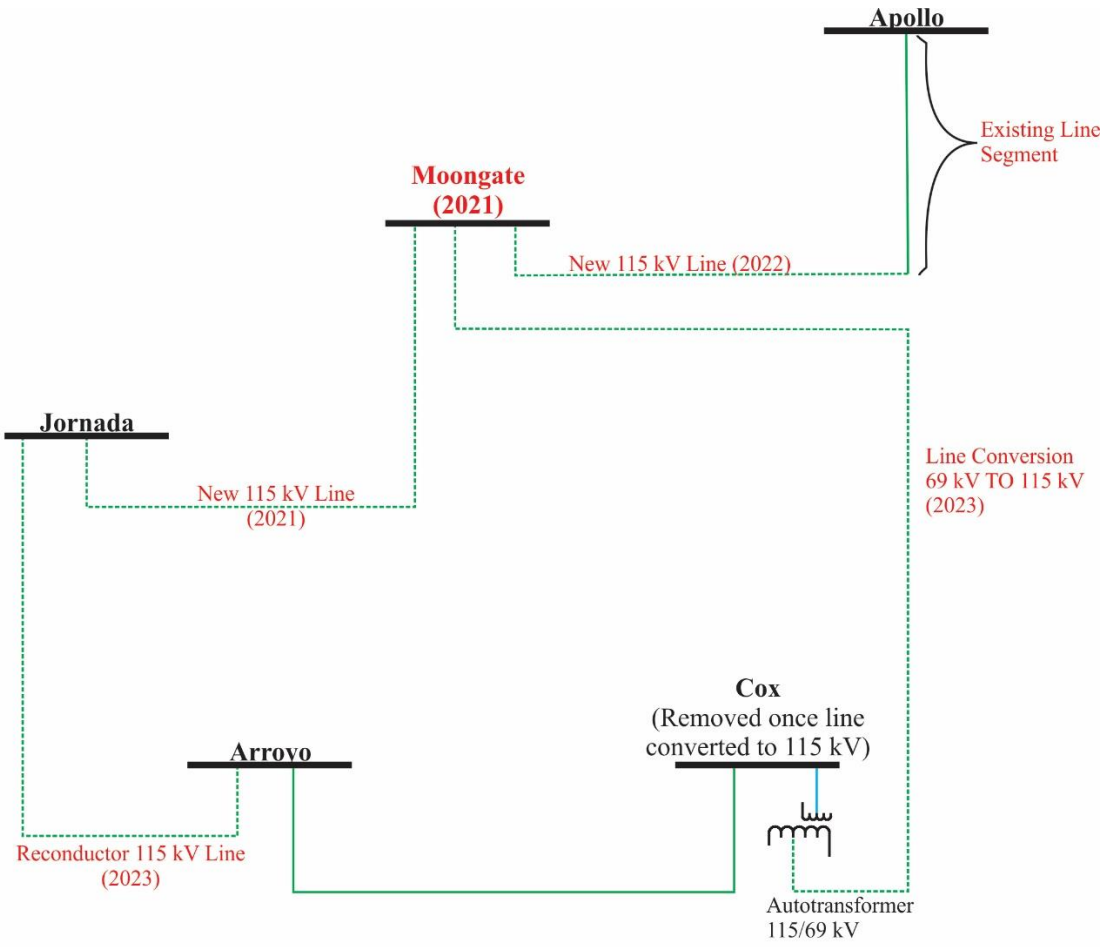
Project Number:

In Service Date: December 2021

Project Description: This project consists of constructing a new Moongate 115 kV Substation in the Las Cruces New Mexico area, with two transmission lines connecting the Moongate Substation to the Jornada and Apollo 115 kV substations. The lines will use a conductor that provides at least a normal capacity rating of 185 MVA and an emergency capacity rating of 246 MVA.

Project Justification: Moongate Substation will be constructed to meet load growth and will be part of the planned Las Cruces Loop Project.

LAS CRUCES LOOP
YEAR 2021



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PLANNED PROJECTS
YEAR 2021

Project Name: Construction of an In-and-Out transmission configuration into Picante 345 kV Substation for the Caliente-Amrad 345 kV line.

Operating Voltage: 345 kV

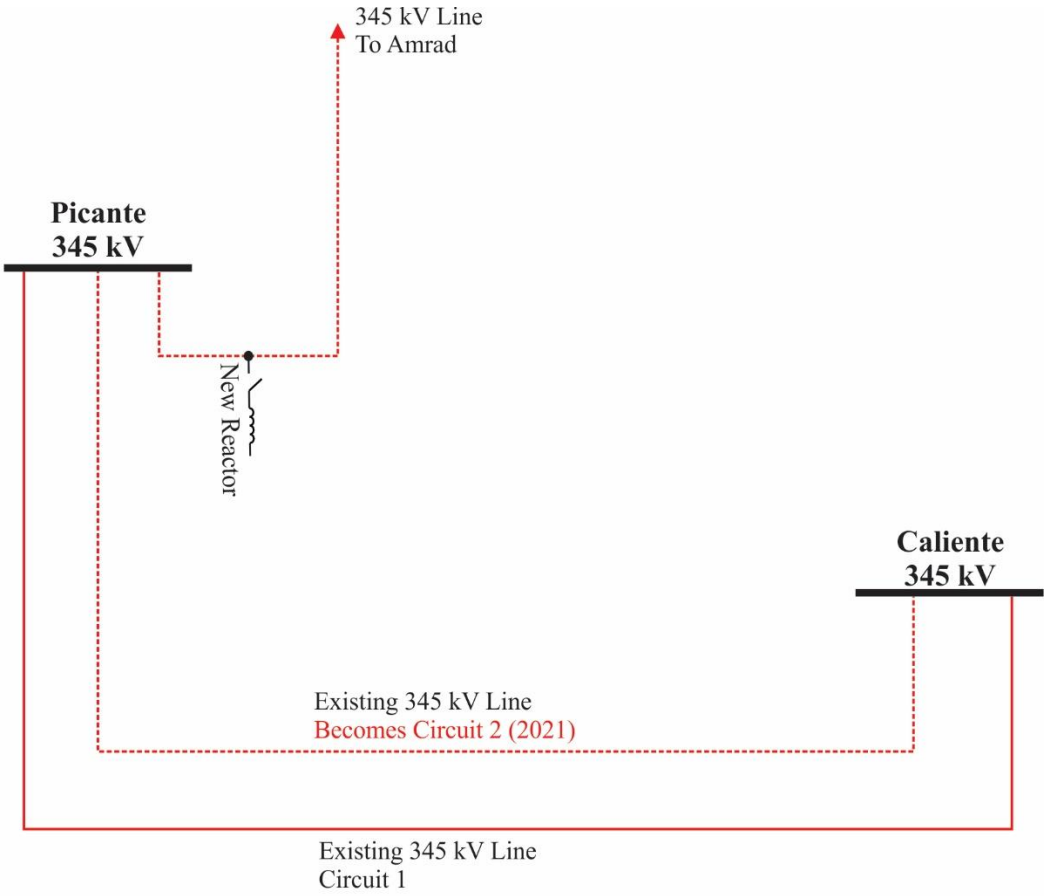
Project Number:

In Service Date: October 2021

Project Description: EPE's Caliente to Amrad 345 kV transmission line runs adjacent to Picante Substation and will be reconfigured to connect to this substation's ring bus. This requires the addition of three 345 kV Gas Circuit Breakers as well as disconnect switches with motor operated devices. A new in-line 345 kV reactor will be installed at Picante Substation of what will become the Amrad-Picante 345 kV line.

Project Justification: EPE's existing Caliente-Amrad 345 kV will be reconfigured to be the Amrad-Picante 345 kV and the Picante-Caliente 345 kV lines. As a result of this re-configuration, two parallel transmission lines from Picante Substation to Caliente Substation will now exist. The project will provide increased reliability within the area.

PICANTE 345 kV SUBSTATION IN-AND-OUT
NEW 345 kV TRANSMISSION LINE IN-AND-OUT:
PICANTE 345 kV BUS FROM AMRAD TO CALIENTE 345 kV LINE
YEAR 2021



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Transmission Projects in 2022

PLANNED PROJECTS
YEAR 2022

Project Name: Roberts Substation (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: December 2022

Project Description: This project involves connecting the Newman-Picante and the Newman-Pipeline 115 kV transmission lines as well as the future Newman 6 generator into the Roberts Substation.

Project Justification: This Substation is needed for the interconnection of the Newman 6 Generator to EPE's 115 kV system.

PLANNED PROJECTS
YEAR 2022

Project Name: Moongate-Apollo 115 kV Line

Operating Voltage: 115 kV

Project Number:

In Service Date: April 2022

Project Description: This project consists of constructing a new Moongate 115 kV Substation in the Las Cruces New Mexico area, with two transmission lines connecting the Moongate Substation to the Jornada and Apollo 115 kV substations. The lines will use a conductor that provides at least a normal capacity rating of 185 MVA and an emergency capacity rating of 246 MVA.

Project Justification: Moongate Substation will be constructed to meet load growth and will be part of the planned Las Cruces Loop Project.

Transmission Projects in 2023

PLANNED PROJECTS
YEAR 2023

Project Name: Afton North Substation

Operating Voltage: 345/115 kV

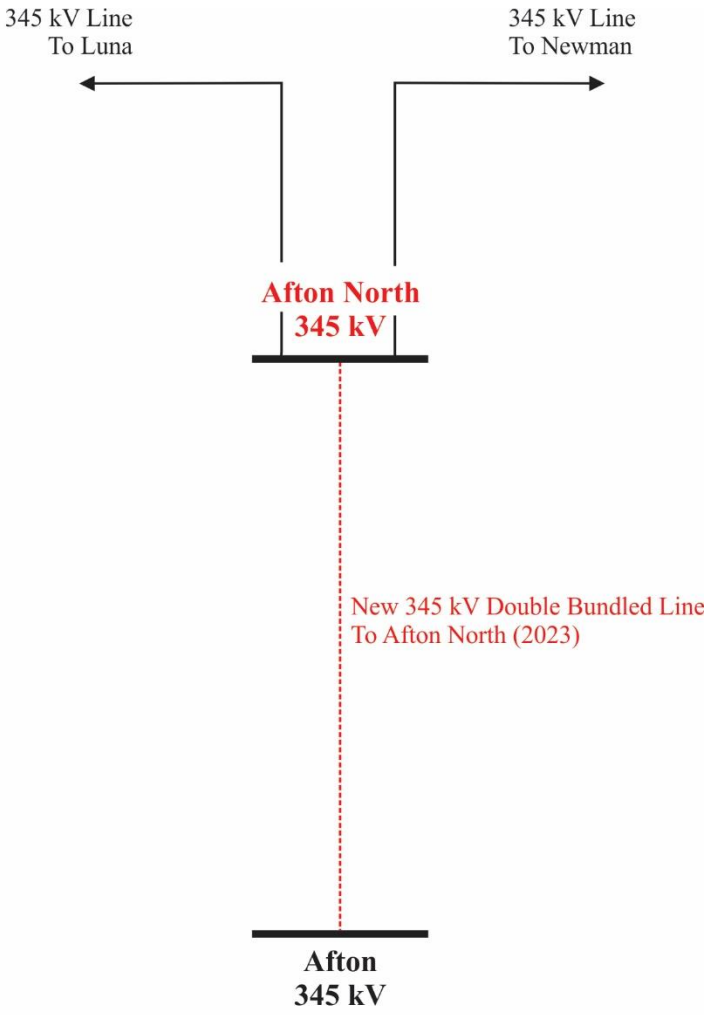
Project Number:

In Service Date: May 2023

Project Description: A planned 345/115 kV substation in southern New Mexico will enhance system reliability. The new substation will have two new future (2024) 345/115 kV autotransformers (part of TH171) that will connect a new 115 kV radial line from Afton North Substation to Airport Substation. The Afton North 115 kV bus will be used to connect a 115 kV line from Afton North Substation to the proposed Vado Substation in 2024.

Project Justification: This project is part of the Afton-Afton North-Vado project which is scheduled for completion by 2026, and that will increase El Paso Import Capability (EPIC). It will serve Las Cruces Airport Substation and improve reliability in the area. The future two autotransformers, planned for 2024, are part of a plan to bring a 115-kV feed from the Afton North 115 kV bus to the Airport Substation, and to a new Vado Substation.

NEW AFTON NORTH 345 kV SUBSTATION
&
345 kV TRANSMISSION LINE AFTON TO AFTON NORTH
YEAR 2023



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PLANNED PROJECTS
YEAR 2023

Project Name: Afton-Afton North 345 kV Transmission Line (New)

Operating Voltage: 345 kV

Project Number:

In Service Date: May 2023

Project Description: A new one-mile, 345 kV double bundled transmission line with at least a normal capacity rating of 370 MVA and emergency capacity rating of 492 MVA is planned to connect the Afton Substation to the new Afton North Substation in southern New Mexico. This project will enhance system reliability and will help EPE meet load growth needs.

Project Justification: This project is part of the Afton-Afton North-Vado projects, scheduled for completion by 2026, that will increase El Paso Import Capability (EPIC) and improve reliability within the area.

PLANNED PROJECTS
YEAR 2023

Project Name: Apollo-Cox Conversion/Reconductor 69 kV to 115 kV

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2023

Project Description: This project consists of converting from a nominal operating voltage of 69 kV to a nominal operating voltage of 115 kV. It also calls for the reconductor of the Apollo-Cox transmission line with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: The existing Apollo to Cox 69 kV line will be converted to 115 kV and upgraded to mitigate N-1 contingency conditions. As part of this conversion, the removal of the Cox 69 kV substation is planned, and the portion of the line that formerly terminated at the Cox 69 kV bus will now be terminated at the Arroyo 115 kV bus.

PLANNED PROJECTS
YEAR 2023

Project Name: San Felipe Substation 115/69 kV (New)

Operating Voltage: 115 kV and 69 kV

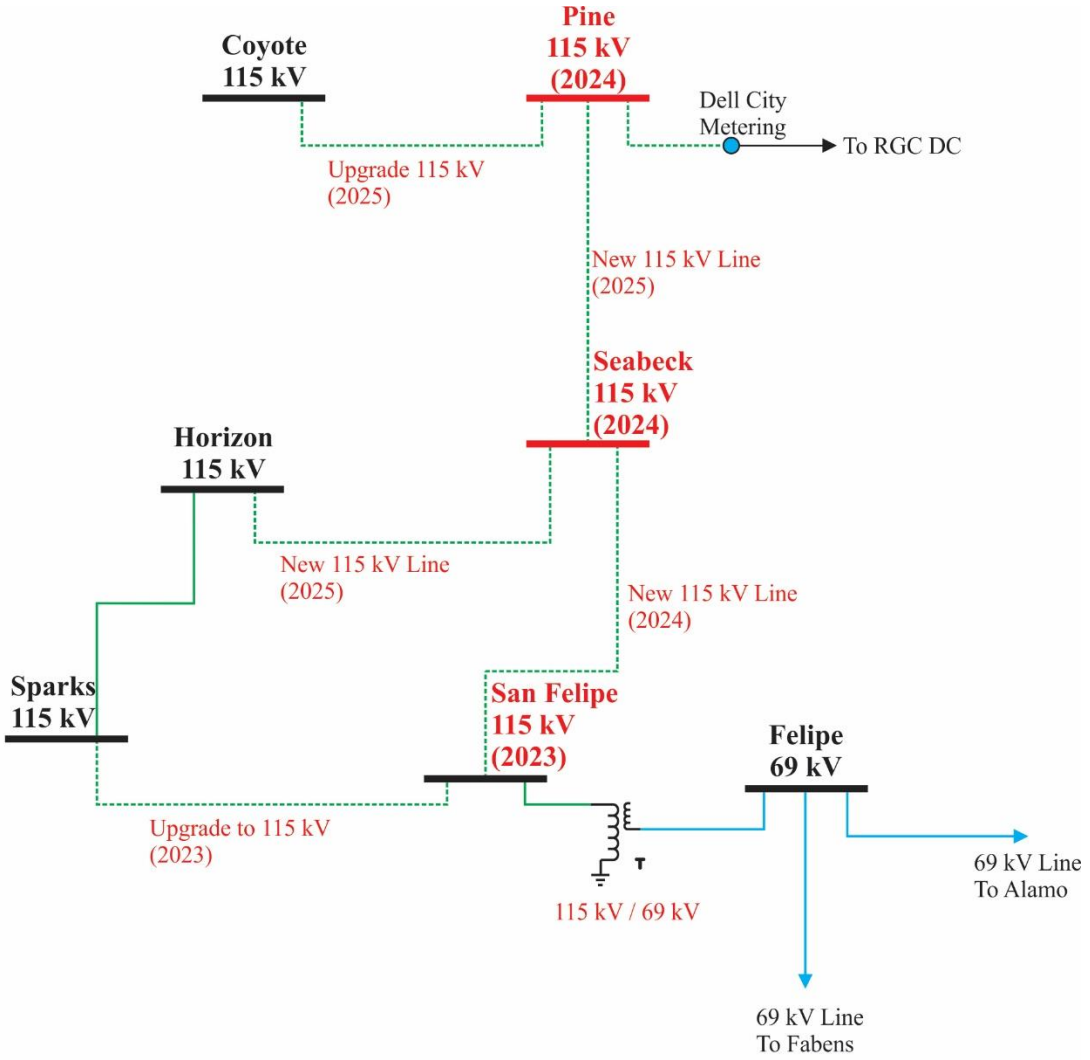
Project Number:

In Service Date: May 2023

Project Description: The project consists of constructing a new San Felipe Substation 115/69 kV that will be part of the East Side Loop Expansion Project.

Project Justification: This project is part of the East Side Loop Expansion Project and is needed to address projected overload conditions on the EPE system under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in eastern El Paso County.

EASTSIDE LOOP
YEAR 2023



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PLANNED PROJECTS
YEAR 2023

Project Name: Jornada-Arroyo Line Rebuild Double Bundled (Reconductor)

Operating Voltage: 115 kV

Project Number:

In Service Date: December 2023

Project Description: This project consists of reconductoring the Arroyo to Jornada 115 kV line to increase the capacity of the line with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: The line experiences an increase in loading under heavy summer conditions. The increase in line rating with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA will relieve identified overloads.

PLANNED PROJECTS
YEAR 2023

Project Name: Sparks-San Felipe Line Conversion 69 kV to 115 kV and Reconductor

Operating Voltage: 115 kV

Project Number:

In Service Date: May 2023

Project Description: This project will involve the conversion and reconductoring the Sparks-San Felipe transmission line from 69 kV to 115 kV with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: This project is part of the East Side Loop Expansion Project and is needed to address potential overload conditions on the EPE system under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in east El Paso County.

Transmission Projects in 2024

PLANNED PROJECTS
YEAR 2024

Project Name: Afton North-Vado 115 kV Line Double Bundled (New)

Operating Voltage: 115 kV

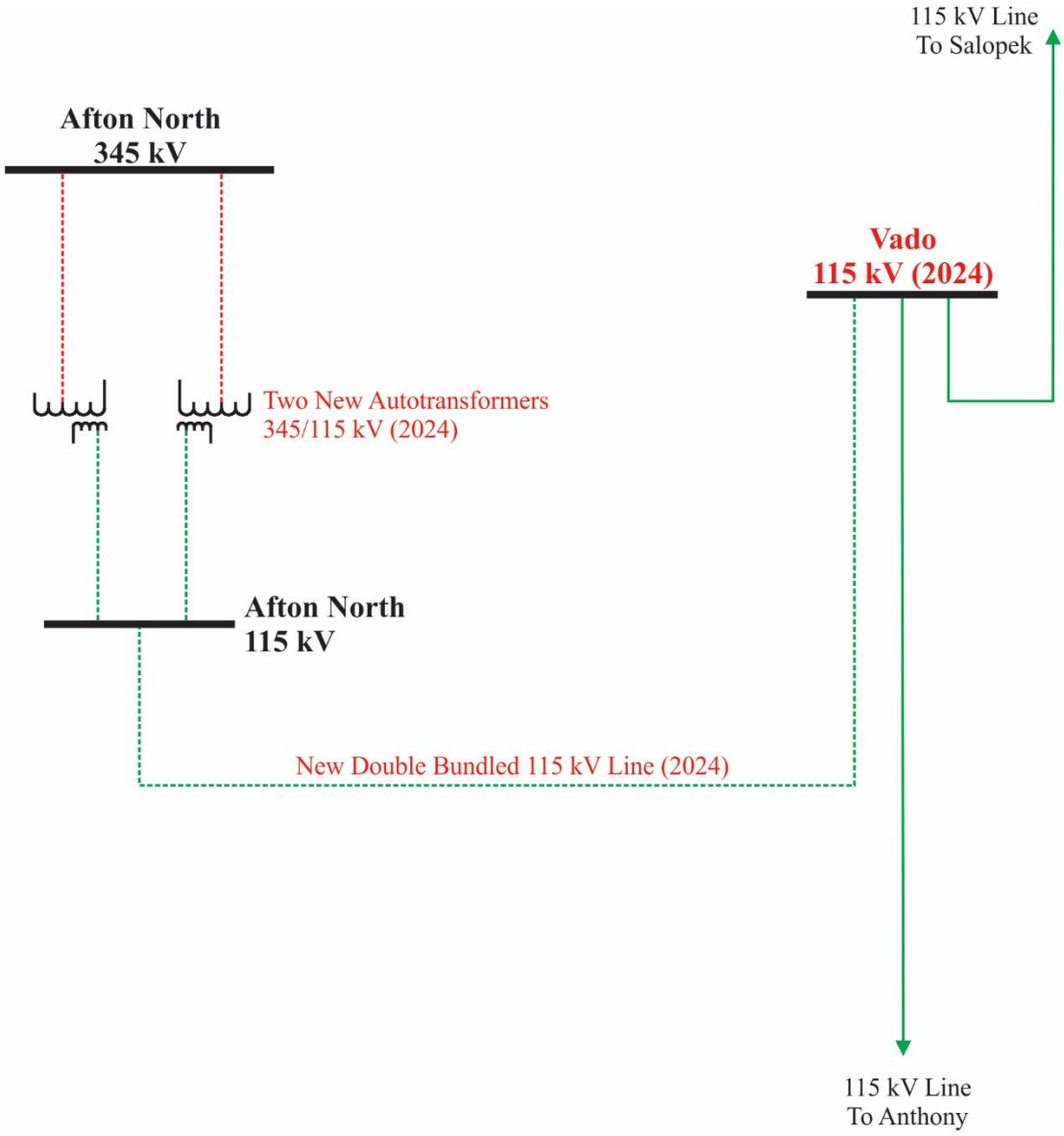
Project Number:

In Service Date: March 2024

Project Description: A new 115 kV transmission line will be built from Afton North Substation to Vado Substation (12 miles). It will have a normal capacity rating of at least 370 MVA and emergency capacity rating of 492 MVA.

Project Justification: The purpose of this transmission line is to improve reliability to Las Cruces and West El Paso area by connecting Vado Substation to Afton North Substation via a 115 kV line. This connection will also reduce losses in the system as generation from the 345 kV system will have a shorter path to Las Cruces and west El Paso loads. The project is part of the Afton-Afton North-Vado projects, scheduled for completion by 2026, which will increase El Paso Import Capability (EPIC).

NEW VADO 115 kV SUBSTATION
NEW DOUBLE BUNDLED 115 KV LINE:
VADO 115 kV TO AFTON NORTH 115 kV
TWO AFTON NORTH 345/115 kV AUTOTRANSFORMERS
YEAR 2024



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PLANNED PROJECTS
YEAR 2024

Project Name: Two Afton North 345/115 kV Autotransformers (New)

Operating Voltage: 345/115 kV

Project Number:

In Service Date: March 2024

Project Description: Two new 345/115 kV autotransformers will be installed at Afton North Substation.

Project Justification: The two new autotransformers will connect the 115 kV bus at Afton North Substation in preparation for 115 kV transmission line additions i.e. Vado Substation to Afton North Substation via a 115 kV line in 2024. This will improve reliability in the Las Cruces and West El Paso areas. The project is part of the Afton-Afton North-Vado projects, scheduled for completion by 2026, that will increase El Paso Import Capability (EPIC).

PLANNED PROJECTS
YEAR 2024

Project Name: Vado Substation 115 kV (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2024

Project Description: This project involves the construction of a new substation in the Vado/Anthony area in order to allow for the addition of a new 115 kV line that will connect to Afton North Substation. The project includes splitting EPE's existing Anthony-Salopek 115 kV transmission line with terminations into Vado 115 kV. The Anthony-Salopek 115 kV Line will then become the Anthony-Vado 115kV line and the Vado-Salopek 115 kV line.

Project Justification: This project is part of the Afton-Afton North-Vado projects scheduled for completion by 2026, that will increase El Paso Import Capability (EPIC). The substation will also increase reliability in the Vado/Anthony area.

PLANNED PROJECTS
YEAR 2024

Project Name: Pine Switching Station 115 kV (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2024

Project Description: This project involves the construction of a new Pine 115 kV Switching Station that will be part of the East Side Loop Expansion Project

Project Justification: This project is a segment of the East Side Loop Expansion Project and is needed to address potential overload conditions under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in east El Paso County.

PLANNED PROJECTS
YEAR 2024

Project Name: Seabeck Switching Station 115 kV (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: May 2024

Project Description: This project consists of constructing a new 115 kV switching station that is part of the East Side Loop Expansion Project.

Project Justification: The project is part of the East Side Loop Expansion Project and is needed for mitigation of potential overload conditions under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will allow EPE to address expected development and load growth in east El Paso County.

PLANNED PROJECTS
YEAR 2024

Project Name: Seabeck-San Felipe 115 kV Line (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: May 2024

Project Description: This project consists of constructing a new 115 kV transmission line from Seabeck Substation to San Felipe 115 kV Substation. The conductor will have at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: The project is part of the East Side Loop Expansion Project and will address projected overload conditions on the EPE system under certain N-1 and N-2/N-1-1 contingencies. The project will also enable EPE to address anticipated development and load growth in east El Paso County.

Transmission Projects in 2025

PLANNED PROJECTS
YEAR 2025

Project Name: Coyote-Pine 115 kV Line (Reconductor)

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2025

Project Description: This project consists of reconductoring the Coyote to Pine 115 kV transmission line with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: This project is part of the East Side Loop Expansion Project and is needed to address potential overload conditions under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in east El Paso County.

PLANNED PROJECTS
YEAR 2025

Project Name: Seabeck-Horizon 115 kV Line (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2025

Project Description: This project will involve the construction of a new 115 kV transmission line from Seabeck to Horizon with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: This project is part of the East Side Loop Expansion Project and is needed to address potential overload conditions under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in east El Paso County.

PLANNED PROJECTS
YEAR 2025

Project Name: Pine-Seabeck 115 kV Line (New)

Operating Voltage: 115 kV

Project Number:

In Service Date: March 2025

Project Description: This project consists of constructing a new 115 kV transmission line from Pine to Seabeck with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA.

Project Justification: This project is part of the East Side Loop Expansion Project and is needed to address potential overload conditions under certain N-1 and N-2/N-1-1 contingencies. Additionally, the project will enable EPE to address expected development and load growth in east El Paso County.

PLANNED PROJECTS
YEAR 2025

Project Name: Upgrades of the Rio Grande – Sunset (5500/5600) 69 kV Lines

Operating Voltage: 69 kV

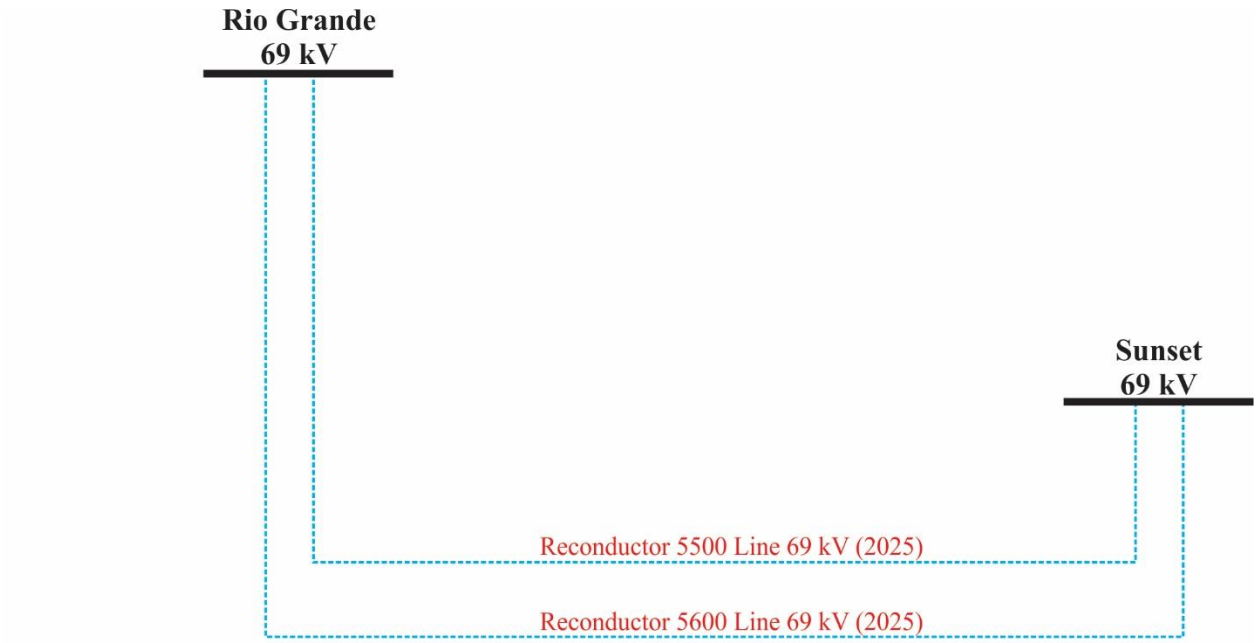
Project Number:

In Service Date: March 2025

Project Description: This project involves the reconductoring of two 69 kV lines that for a portion of each of these lines, traverse mountainous terrain and extend through the UTEP campus area. The lines connect Rio Grande Substation and Sunset Substation. The reconductoring capacity of the lines require an upgrade with at least a normal capacity rating of 111 MVA and emergency capacity rating of 147 MVA.

Project Justification: These lines experience increased loading during the summer peak months, a condition that is difficult to mitigate. The increase in line capacity will relieve operational mitigation measures.

RIO GRANDE-SUNSET 69 kV LINES
RECONDUCTOR
YEAR 2025



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Transmission Projects in 2026

PLANNED PROJECTS
YEAR 2026

Project Name: Vado-Salopek 115 kV Line Double Bundled (Reconductor)

Operating Voltage: 115 kV

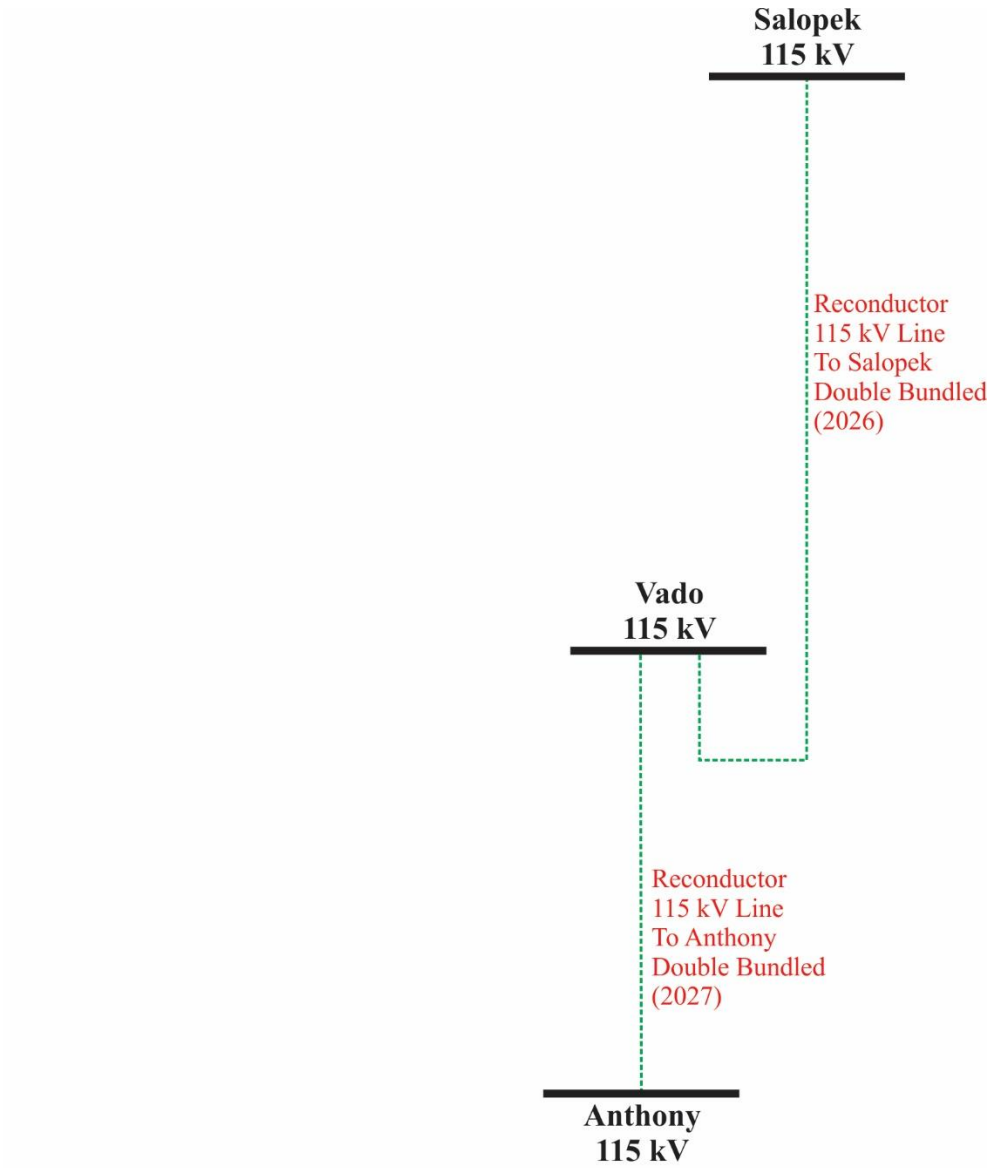
Project Number:

In Service Date: May 2026

Project Description: The addition of the Vado Substation in 2024 resulted in the reconfiguration of the Anthony-Salopek 115 kV transmission line into the Anthony-Vado 115kV and Vado-Salopek 115 kV transmission lines. By 2026, additional capacity will be needed on the 115 kV lines out of Vado Substation. The new capacity of the line must have a minimum of 370 MVA under normal conditions and emergency rating of 492 MVA from Anthony to Vado and, separately, from Vado to Salopek.

Project Justification: The increased capacity of this line will allow EPE to serve the Las Cruces load from the Afton and Vado area which will increase reliability and system flexibility under contingency situations.

LINE FROM VADO 115 KV TO SALOPEK 115 kV (YEAR 2026)
LINE FROM VADO 115 TO ANTHONY 115 kV (YEAR 2027)



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Transmission Projects in 2027

PLANNED PROJECTS
YEAR 2027

Project Name: Vado-Anthony 115 kV Line Double Bundled (Reconductor)

Operating Voltage: 115 kV

Project Number:

In Service Date: May 2027

Project Description: With the addition of Vado Substation in 2024, the Anthony-Salopek 115 kV Line became the Anthony-Vado 115 kV and Vado-Salopek 115 kV Lines. By 2026, additional capacity will be needed on the 115 kV lines out of Vado Substation. The new capacity of the line must have a minimum of 370 MVA under normal conditions and emergency rating of 492 MVA from Anthony to Vado and, separately, from Vado to Salopek.

Project Justification: The increased capacity of this line will allow EPE to serve west El Paso load from the Afton and Vado area increasing reliability and adding system flexibility under contingency and maintenance situations.

Transmission Projects in 2028

PLANNED PROJECTS
YEAR 2028

Project Name: Afton North - Airport 115 kV Line (New)

Operating Voltage: 115 kV

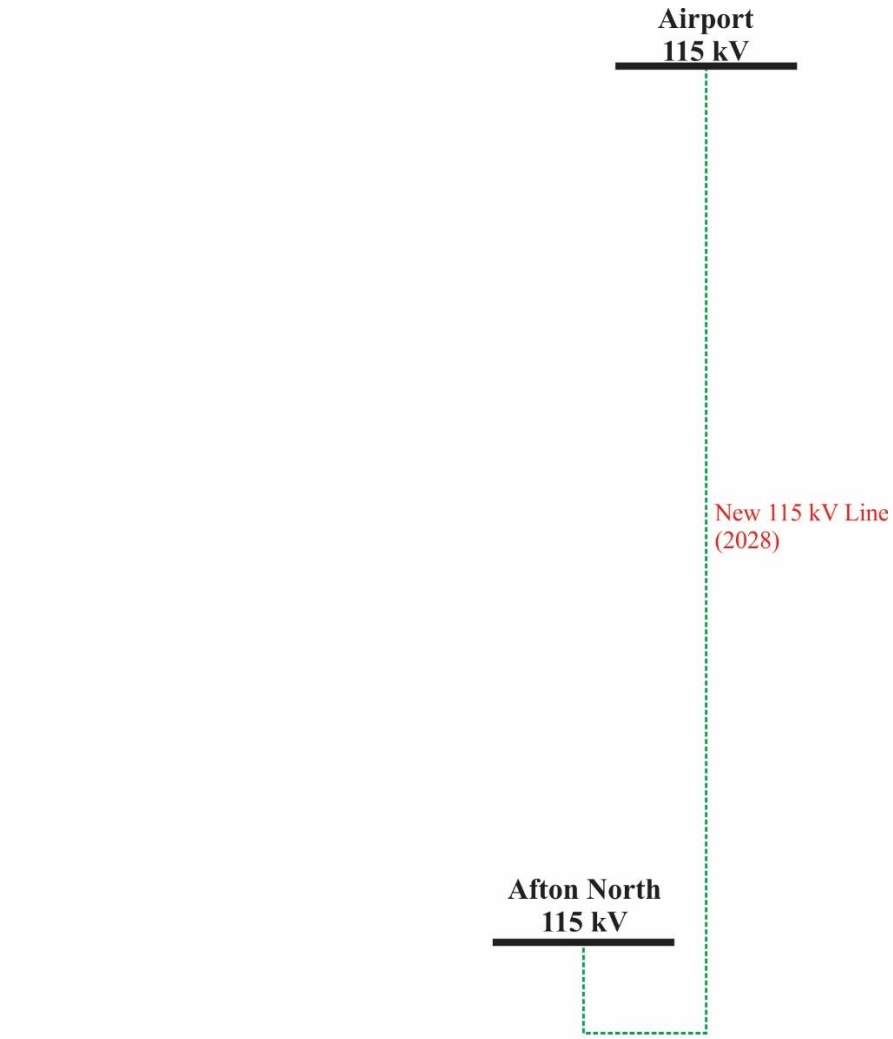
Project Number:

In Service Date: May 2028

Project Description: A new 115 kV transmission line is planned to be built from Afton North Substation to Airport Substation with at least a normal capacity rating of 185 MVA and emergency capacity rating of 246 MVA. This transmission line will serve Airport Substation in Las Cruces, New Mexico.

Project Justification: The purpose of this transmission line is to improve reliability to Airport Substation. The Afton North to Airport connection will become the source serving Airport. Presently, Airport Substation is being served via PNM's Mimbres-Picacho 115 kV transmission line through a radial connection from Airport Tap.

AFTON NORTH-AIRPORT 115 kV TRANSMISSION LINE ADDITION
YEAR 2028



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Transmission Projects in 2029

No specific new transmission facilities are called for in this Plan year.

Transmission Projects in 2030

PLANNED PROJECTS
YEAR 2030

Project Name: In-and-Out configuration into Vado 345 kV Substation from Afton North - Newman 345 kV Transmission Line

Operating Voltage: 345 kV

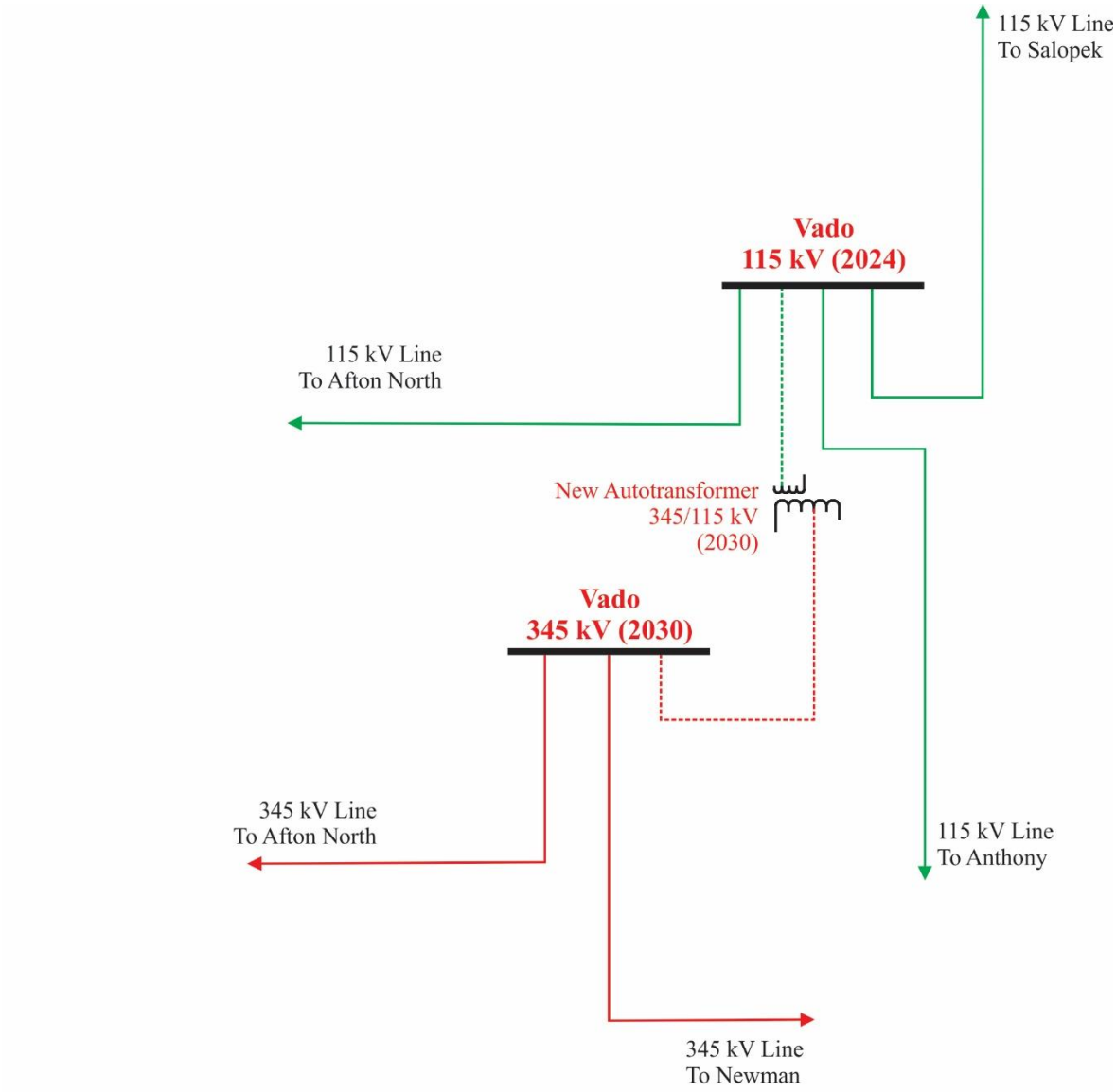
Project Number:

In Service Date: May 2030

Project Description: EPE has an existing 345 kV transmission line between Afton and Newman Substations which runs adjacent to the proposed Vado Substation. With the addition of the Afton North 345 kV Substation in 2023, the Afton-Newman 345 kV Line will become the Afton North-Newman 345 kV transmission line.

Project Justification: The purpose of this transmission line in-and-out is to improve reliability to Las Cruces and West El Paso area by connecting the Vado 345 kV bus to EPE's 345 kV grid at Afton North and Newman Substations. This connection will reduce losses in the system as generation from the 345 kV system will have a shorter path to Las Cruces and west El Paso loads.

VADO 345 kV SUBSTATION IN-AND-OUT
NEW VADO 345/115 kV AUTOTRANSFORMER
YEAR 2030



NOTE: FOR ILLUSTRATION PURPOSES ONLY.
FINAL DESIGN WILL BE COMPLETED
BY TRANSMISSION LINE DESIGN
AND SR ENGINEERING

PLANNED PROJECTS
YEAR 2030

Project Name: Vado 345/115 kV Autotransformer (New)

Operating Voltage: 345 kV and 115 kV

Project Number:

Planned In Service Date: May 2030

Project Description: EPE has an existing 345 kV transmission line between Afton and Newman Substations and this line runs adjacent to the proposed Vado Substation; with the addition of the Afton North 345 kV Substation in 2023, the Afton-Newman 345 kV Line will become the Afton North-Newman 345 kV Line prior to this project. The plan is to cut the Afton North-Newman 345 kV Line and connect it in-and-out to the Vado Substation 345 kV bus. It will be necessary to add a Vado 345 kV ring bus and a new Vado 345/115 kV 224 MVA Autotransformer to connect to the Vado 115 kV system. The Afton North-Newman 345 kV Line will become the Afton North-Vado and Afton North-Newman 345 kV Lines after the completion to this project.

Project Justification: The purpose of this transmission line in-and-out is to improve reliability to Las Cruces and West El Paso area by connecting the Vado 345 kV bus to EPE's 345 kV grid at Afton North and Newman Substations. This connection will also reduce losses in the system as generation from the 345 kV system will have a shorter path to Las Cruces and west El Paso loads.

GENERAL ASSUMPTIONS

Load Projections

The forecasted native system peak demand values were obtained from EPE's 2019 Long-term Forecast report ("Forecast"), published by the Economic Research department on April 9, 2019. The 2019 Forecast predicts 10-year CAGR of 1.2% for native system peak demand. The Forecast includes demand side management and energy efficiency programs as detailed in the next section. Native load, system losses and station service modeled for future years were determined using the forecasted Expected Native System Demand value plus station service plus ¼ of the difference between the Upper Bound Native System Demand value and the Expected Native System Demand value from the Forecast. Note that station service is modeled explicitly as load and generation is also modeled in the powerflow cases used for the 2020 Plan powerflow studies.

Each substation load was projected for the planning years based on available historical 2019 coincident peak loads; Distribution System's monthly (non-coincident) load reports; load projections in the May 2019 Distribution Expansion Plan (updated November 2019); and input from EPE's Load Forecasting and Commercial Services departments.

The 2019 Forecast predicts a Native System Energy increase for 2020 of 1.04% compared to year 2019. The Forecast also predicts Native System Peak Demand in 2020 will increase 0.86% compared to last year's peak.

Demand Side Management

In Attachment K (posted on EPE's website -- www.epelectric.com), EPE includes demand side resources through energy efficiency programs to mitigate the need for new transmission. Mandated energy efficiency goals accounted for in the Forecast are shown in Table 1. EPE expects an increase to its total cumulative energy efficiency load adjustments compared to the previous forecast. The 2019 Forecast shows a continuous increase in the energy efficiency demand adjustment with a projected peak of 58.9 MW in 2028.

Demand savings achieved through the EPE Energy Efficiency Programs are across all customer classes and across the whole transmission system. No single project or customer provides a significant amount of demand savings to dramatically impact the transmission system.

Generation Resources

EPE's Resource Planning Department ("RP") identified future generation resources and purchased power to serve native load in its Loads & Resources 2020-2029 document ("L&R") dated May 13, 2019. It compares owned resources and power purchases against forecasted load to determine new resources that may be needed. However, this Plan year additional resources were modeled to consider the EPE Request for Proposal ("RFP") resources announced in 2019 and 2020.

System Planning modeled generation based on this L&R and other documents/press releases while developing the Plan. Table 2 shows EPE's local generation resources (including additions

and retirements) used in the Plan.

The following new generation was assumed in the System Expansion Plan modeling and is reflected on Table 2.

As shown on Table 2, the 2019 L&R renewable portfolio identifies the following:

- 100 MW solar facility in 2022
- solar/battery combination storage facility of 100/50 MW in 2022
- 50 MW stand-alone battery facility in 2023
- 125 MW solar facility in 2028

In addition, other RFP renewable resources modeled in the 2020 Plan and listed on Table 2 include:

- 50 MW solar facility in 2022
- 20 MW solar facility in 2022

As for non-renewable generation additions, the 2019 L&R identifies the following generation:

- 226 MW (summer rating)/255 MW (winter rating) Newman 6 GT5 resource/unit is planned to be energized in 2023
- a resource addition consisting of a 1x1 combined-cycle (CC) generating unit of 320 MW was identified in 2027
- 50 MW reciprocating engine is planned for 2028

Reliability Criteria

The Plan follows Good Utility Practice and planning as described in EPE's Attachment K. It uses a deterministic approach for transmission system planning. Each annual review verifies that modeling, assumptions, and planned facilities meet WECC and NERC compliance requirements under normal (N-0), and single contingency (N-1) conditions for EPE's transmission area. Under these two conditions, the network must be operated within WECC, NERC and EPE criteria to supply projected customer loads and firm transmission services over the ten-year planning horizon. The Plan uses steady-state powerflow analyses to identify transmission projects (facility upgrades and/or additions) required to mitigate any criteria violations with the goal of providing sufficient lead time to incorporate them. The Plan summarizes each individual expansion project's scope, in-service date, justification and purpose. Additionally, EPE reviews operational planning cases and determine transmission line loading conditions, mitigation practices and the need to upgrade transmission lines to facilitate operational needs and practices.

The Plan focuses on facilities under heavy summer coincidental peak demand conditions -- usually considered worst case scenarios for EPE's system. Light Winter cases are examined as well.

EPE strives to complete all system improvements in a prudent, safe, and timely fashion. Nevertheless, scheduling factors may delay projects forcing EPE to apply temporary alternatives or measures to mitigate potential overloads.

Southwest Power Pool Reliability Coordinator Area System Operating Limit Methodology Western Interconnection Revision 1.1

On August 30, 2019, Revision 1.1 of the Southwest Power Pool Reliability Coordinator Area System Operating Limit Methodology Western Interconnection went into effect. It requires that EPE operate its system in the pre-contingency state (All-Facilities-in-Service, AFIS) so that all facilities shall be within their normal (continuous) facility (thermal) ratings and; that for the post-contingency state for single (element) contingencies, all facilities shall be within their emergency facility (thermal) ratings.

Open Planning Meetings

The transmission planning process, per Attachment K, includes Open Planning meetings while developing this Plan. Two meetings were held -- one in September 2019 and the second in March 2020 -- to allow third party participants to review or submit data and request studies of potential Stakeholder needs. Stakeholders are allowed to submit data up to posted due dates to be incorporated into EPE's Plan case models. Data submitted after the due dates will not be incorporated into the current Plan, although they will be considered in the next year's planning cycle, if applicable. To date, no applicable Stakeholder data has been submitted to EPE that was incorporated into the Plan. The purpose of the Plan is to identify and evaluate, on a regular basis, future electric transmission system modifications and additions or alternatives that may be required to serve the anticipated area load growth, existing third-party customers' transmission needs, Public Policy requirements and NERC/WECC reliability requirements in the EPE service territory for a ten-year planning horizon.

Plan Case System Assumptions

System expansion analyses utilize powerflow studies and stability studies for each Plan year from 2021 through 2030. These analyses incorporated in-progress system expansion projects assumed to be completed before the peak of 2021. System modeling also includes the following assumptions:

- The forecasted substation load for each Plan year was adjusted to projected coincidental peak loads using the Forecast (dated April 9, 2019) and historical load data.

- Generation, system configuration, imports, and interchange schedules -- including contractual agreements with third-party entities -- were set according to load demand in each Plan case.

- El Paso Electric load power factor was set to 0.98 per unit (lagging) in each Plan case.

- Plan cases were modeled with an Arroyo Phase Shifting Transformer ("PST") in service with a 400 MVA normal and a 500 MVA emergency rating.

- Plan cases modeled Afton G1 and Afton S1 as "Off" when the Arroyo PST power flow was set to 151 MW north to south.

- Sensitivity analyses were performed on Plan cases with PST power flow set to 10 MW north to south and with Afton G1 at 141 MW output, per the EPE/PNM Settlement Agreement, and Afton S1 (combined cycle HRSG) set at 94 MW with its flow directed to Springerville via the Luna-Macho Springs-Springerville 345 kV transmission path.

- Montana Power Station (MPS) generation sensitivity analyses were performed in this Plan by increasing MPS generation to 88 MW for each MPS generating unit (in every year where units are available) and reducing Newman plant output by an equivalent amount.

- Eddy County flow from the DC tie was modeled at zero (0) MW open ended at the Artesia bus in each of the Plan cases.

- EPE's share of Southern New Mexico Imports ("SNMI") was set at a schedule of 645 MW (per contractual rights) and EPE imports ("EPI") at 747 MW in all Plan cases.

- No on-line generation was modeled at Lordsburg. Luna Energy Facility ("LEF") was set to 570 MW output with 100 MW scheduled to EPE under the Phelps Dodge (Freeport McMoran) Exchange Agreement and additional power from LEF to EPE, if needed, to meet EPI of 747 MW.

- The 59 MVAR line reactor at the Hidalgo 345 kV Substation bus end of the Hidalgo-Greenlee 345 kV line and the 49 MVAR line reactor at the Macho Springs 345 kV Substation bus end of the Macho-Springerville 345 kV line are "must-on" line reactors for every Plan case. However, the Luna 345 kV line reactors were modeled on or off as needed. These reactors can be switched off during an outage of a Path 47 345 kV line.

- A 150 MW solar photovoltaic facility was modeled beginning in 2022 and onwards at a substation bus assumed to be in Santa Teresa, New Mexico.

- A 120 MW solar/battery facility was modeled beginning in 2022 and onwards at a substation bus assumed to be in Otero County, New Mexico.

- A 50 MW battery storage facility was modeled beginning in 2023 and onwards at a substation bus assumed to be in Canutillo, Texas.

- A 125 MW solar photovoltaic facility was modeled beginning in 2028 and onwards

at a substation bus assumed to be in northeast El Paso, Texas.

- Newman 6 GT5 is a gas combustion turbine generating unit addition capable of 226 MW in the summer and 255 MW in the winter, and it is modeled at the planned Roberts substation located approximately 1 mile east of the existing Newman power plant in El Paso, Texas (2023 onwards).

- Newman 7 is a 320 MW 1x1 combined cycle and is modeled at the Newman power plant in El Paso, Texas (2027 onwards).

- Newman 8 is a 50 MW reciprocating engine and is modeled at the Newman power plant in El Paso, Texas (2028 onwards).

- Plan cases include lowered capacity ratings on several transmission lines based on updated field conditions.

- "To be determined" shall be abbreviated as TBD throughout the document.

Please note that the final generation sites have not yet been determined for the resource additions called for in the L&R to be phased in from 2022 to 2028. Therefore, the transmission configuration used in the Plan studies may change requiring different upgrades by future interconnection and facility studies, per FERC's Large Generator Interconnection Procedures ("LGIP").

Case Development

WECC-Approved Cases

Plan cases were developed with the General Electric Positive Sequence Load Flow ("GE-PSLF") program which was used for the numerous powerflow and contingency studies performed for the Plan. Each case is a "database" of the WECC transmission system -- originating from the latest "WECC cases" for the appropriate year. These WECC-approved Heavy Summer and Light Winter base cases contain system configurations and conditions from other nearby Transmission Planners. System Planning then incorporates EPE's latest forecasted loads, expected generation resources, both of which incorporate EPE's Public Policy requirements, and any topology changes not already included in the WECC-supplied cases. Many projects listed in the previous plan are removed (or reverted to the existing topology) to re-verify their need and schedule in the current Plan.

Topology Changes

In addition to the most current load and generation updates, System Planning incorporates topology changes not already included in the WECC-supplied cases such as planned substation-level and transmission changes. Substation changes, such as those detailed in EPE's latest Distribution Expansion Plan, include capacity upgrades, additions, deletions, location changes, and/or postponements. Planned transmission changes typically include capacity upgrades, additions, deletions, location changes, and postponements that are usually driven by the

substation-level changes, generation changes, other studies (e.g. those in the LGIP), or routing changes due to regulatory orders or right-of-way issues.

If a newly planned substation is postponed, any transmission changes associated with that substation may also be postponed. This may affect study results since many future projects depend on previously identified improvements. Factors affecting completion dates include, for example, those identified above. Where completion targets are not achieved, or in instances in which EPE experiences more rapid load growth than forecasted, EPE evaluates and identifies short-term corrective measures to mitigate impacts, as necessary.

Table 3 shows expansion projects that were called for and budgeted in the last Plan (2020-2029) but are now re-scheduled to be completed before the peak of 2021. These projects have been modeled in the 2021 Plan cases and beyond to help mitigate potential contingency overloads. New or modified Plan projects are summarized in Tables 4A & 4B and detailed in each year's project descriptions.

System Improvement Methodology

After Plan cases were modified as outlined above, contingency analyses are performed for each Plan year to identify reliability criteria violations on EPE facilities within EPE's service area. If violations were identified, mitigating improvements (e.g. Plan projects) were added to EPE's transmission system. Each year's Plan cases carried over the previous year's system improvements. These upgrades will be reflected in the following year's assessment.

Some Plan projects are a result of studies performed outside of System Planning, such as those from the LGIP, third-party generators or Transmission Service Requests while others are incorporated from the latest EPE capital budget. Projects listed in the Plan are specific to the expansion of the EPE internal electrical transmission system. Any projects outside the local electrical system planning area may be evaluated in separate studies.

Additionally, the Plan does not normally include maintenance projects nor external system expansion projects other than those in the WECC-approved base cases. Furthermore, projects associated with non-EPE large generator interconnections are not included unless a Large Generator Interconnection Agreement (LGIA) has been executed.

Additional analyses were performed on each of the Plan years to verify that the EPE transmission system meets the required WECC volt-ampere-reactive ("VAR") margin under normal and single-element contingency conditions. In cases where the VAR margin or other voltage criterion was not met, additions to the system in the form of static reactive compensation ("capacitors") were included as Plan projects to correct them.

Project's Summary Explained

Tables 4A and 4B identify each year's system improvements. It also includes generic projects as "Additional Future Capital Improvements" added in each year to serve as placeholders in areas of the system where it is difficult, at present, to identify whether and how much specific

transmission infrastructure may be necessary. In most cases, System Planning recommends a completion date by May of the given year (unless otherwise noted), to support peak summer load.

The Plan also contains a brief description and justification for each planned system improvement along with basic one-line diagrams illustrating new additions broken down by year (included in Tabs 2021 through 2030). The planned in-service date of the recommended system improvement projects reflects the date the project was modeled to meet planning requirements and it does not represent the construction completion date of the project. Furthermore, deferred projects identified in prior expansion plans are also not included in Tabs 2021-2030. Deferred projects from prior expansion plans are listed on Table 3.

Acknowledgements

This document was prepared by EPE System Planning in collaboration with contributions from the following EPE departments: Distribution Systems, TSR Engineering, Asset Management Services, Economic Research, and Resource Planning.

Supporting documentation for the numerous studies is not included in this document due to space constraints but is available from System Planning. The photograph shown in the front of this report was courtesy of Armando Reyes.

TABLES

Table 1. Yearly Peak Energy Efficiency Adjustment

Calendar Year	Total Energy Efficiency Demand Adjustment (MW)	Calendar Year	Total Energy Efficiency Demand Adjustment (MW)
2021	18.0	2026	47.2
2022	23.9	2027	53.1
2023	29.7	2028	58.9
2024	35.5	2029	64.8
2025	41.4	2030	70.6

Table 2. Projected EPE Local Generation

Generator	Type	Capacity (MW) (1)	Planned Dates		Notes
			In Service	Retirement (4)	
Airport PV	Photovoltaic	12	Pre-2015		(2)
Chaparral PV	Photovoltaic	10	Pre-2015		(2)
Copper	Gas Combustion Turbine	63	Pre-2015	Dec. 2030	
Hatch PV	Photovoltaic	5	Pre-2015		(2)
Macho Springs 2	Photovoltaic	50	Pre-2015		
MPS 1	Gas Combustion Turbine	88	Jan. 2015		
MPS 2	Gas Combustion Turbine	88	Jan. 2015		
MPS 3	Gas Combustion Turbine	88	Jan. 2016		
MPS 4	Gas Combustion Turbine	88	Jan. 2017		
Newman 4 G1	Gas Combustion Turbine	72	Pre-2015	Dec. 2026	
Newman 4 G2	Gas Combustion Turbine	72	Pre-2015	Dec. 2026	
Newman 4 S1	Combined Cycle HRSG	83	Pre-2015	Dec. 2026	
Newman 5 G1	Gas Combustion Turbine	70	Pre-2015		
Newman 5 G2	Gas Combustion Turbine	70	Pre-2015		
Newman 5 S1	Combined Cycle HRSG	148	Pre-2015		
Newman 6 GT5	Gas Combustion Turbine	226	Jan. 2023		(3)
Newman 7	1 x 1 Combined Cycle (CC)	320	Jan. 2027		(5)
Newman 8	Reciprocating Engine	50	Jan 2028		(5)
Newman G1	Gas-fired Steam Turbine	74	Pre-2015	Dec. 2022	
Newman G2	Gas-fired Steam Turbine	76	Pre-2015	Dec. 2022	
Newman G3	Gas-fired Steam Turbine	97	Pre-2015	Dec. 2026	
Patriot PV	Photovoltaic	10	Jan. 2015		(2)
Rio Grande 7	Gas-fired Steam Turbine	46	Pre-2015	Dec. 2022	
Rio Grande 8	Gas-fired Steam Turbine	144	Pre-2015	Dec. 2033	
Rio Grande 9	Gas Combustion Turbine	88	Pre-2015		
Hecate	Photovoltaic	150 (100,50)	May 2022		
Buena Vista	Photovoltaic/Battery Storage	120 (100 + 20 Solar/50 Battery)	May 2022		
CANUT1_BAT	Battery Storage	50	May 2023		
PV125_1	Photovoltaic	125	May 2028		(5)

Notes:

1) Available capacity used in Plan cases may differ from those published in other documents.
2) This Photovoltaic generation connects into EPE's distribution system.
3) Plan identifies new generation as Newman 6 – approximately 1 mile east of the existing Newman Generation Station.
4) No listing if planned retirement date is after the peak of 2033. Retirements taken from L&R (dated May 13, 2019).
5) Planned facilities pending studies to determine location.

Table 3. System Expansion Projects Scheduled for Completion Before Peak of 2021

(All projects below are modeled in the 2021 Plan Case)

SYSTEM UPGRADE NEEDED	LOCATION OF UPGRADE	IMPROVEMENT IDENTIFICATION
Reconductor line to 954 ACSR	Wrangler-Sparks 115 kV Line	Improves Reliability under N-1
Reconductor line to 954 ACSR	Felipe-Fabens 69 kV Line	Improves Reliability under N-1

Table 4A. Project Schedule (2021 - 2024)
EPE 2021-2030 System Expansion Plan (1)

Year	Project No.	Project Description	Recommended Completion Date Month- Year (2)
2021		Marlow-Trowbridge 115 kV Line Reconductor (1 mile)	Dec-21
		Moongate-Jornada 115 kV Line (new)	Dec-21
		Caliente-Picante-Amrad 345 kV In-and-Out	Oct-21
2022		Roberts Substation	Dec-22
		Moongate-Apollo 115 kV Line	Apr-22
2023		Afton North Substation 345 kV (new)	May-23
		Afton-Afton North 345 kV Line double bundled (new)	May-23
		Apollo-Cox Conversion/Reconductor 69 kV to 115 kV	Mar-23
		San Felipe Substation 115/69 kV (new)	May-23
		Jornada-Arroyo 115 kV Reconductor/Rebuild double bundled	Dec-23
		Sparks-San Felipe Line Conversion 69 kV to 115 kV	May-23
2024		Afton North-Vado 115 kV (12 miles) double bundled (new)	Mar-24
		Two Afton North 345/115 kV Autotransformers (new)	Mar-24
		Vado Substation 115 kV (new)	Mar-24
		Pine Switching Station 115 kV (new)	Mar-24
		Seabeck Switching Station 115 kV (new)	May-24
		Seabeck-San Felipe 115 kV Line (new)	May-24

NOTES:
1) Table does not include maintenance projects with the exception of transmission line rebuilds and/or conductor upgrades.
2) System Planning recommends a completion date of May for the given year prior to the summer peak period.

Table 4B. Project Schedule (2025 - 2030)
EPE 2021-2030 System Expansion Plan (1)

Year	Project No.	Project Description	Recommended Completion Date Month- Year (2)
2025		Coyote-Pine 115 kV Line Reconductor	Mar-25
		Seabeck-Horizon 115 kV Line (new)	Mar-25
		Pine-Seabeck 115 kV Line (new)	Mar-25
		Rio Grande-Sunset 69 kV Lines Reconductor	Mar-25
2026		Vado-Salopek 115 kV Line Reconductor	May-26
2027		Vado-Anthony 115 kV Line Reconductor	May-27
2028		Afton North-Airport 115 kV Line (new)	May-28
2029	(3)	No specific facilities or improvements were identified by System Planning in year 2029	None
2030		Afton North-Vado-Newman 345 kV In-and-Out	May-30
		Vado 345/115 kV Autotransformer (new)	May-30

NOTES:
1) Table does not include maintenance projects with the exception of transmission line rebuilds and/or conductor upgrades.
2) System Planning recommends a completion date of May for the given year prior to the summer peak period.
3) No reliability-based projects are needed in this year; however, future projects may be affected by load growth and load growth patterns.

Table 5. 115 kV and 69 kV Bus Shunt Capacitor Additions

SYSTEM UPGRADE NEEDED	LOCATION OF UPGRADE	IMPROVEMENT IDENTIFICATION
Capacitors (2 x 15 MVAR)	Ascarate 69 kV	Improves low voltage conditions in the downtown area under N-1
Capacitors (2 x 15 MVAR)	Moongate	Improves reactive capability in the Las Cruces area
Capacitors (2 x 15 MVAR)	San Felipe	Improves low voltage conditions in far east El Paso under N-1
Capacitors (2 x 15 MVAR)	Leasburg	Improves low voltage conditions in the Las Cruces area under N-1