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Arizona Corporation Commission

DOCKETED

JUN 12 2019

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June 12, 2019

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

RE: Supplemental Filing to Arizona Public Service Company 2019-2028 Ten-Year Transmission System Plan
Docket No. E-00000D-19-0007

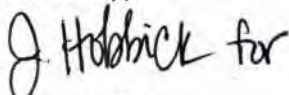
On January 31, 2019, Arizona Public Service Company (APS) filed its 2019-2028 Ten-Year Transmission System Plan (Ten-Year Plan) in compliance with A.R.S. § 40-360.02. APS is filing this supplement to its Ten-Year Plan to provide explicit modifications to reflect load growth in the West Valley; however, all other aspects of the January 31, 2019 Ten-Year Plan remain unchanged.

The Supplemental filing includes the following updates to the Ten-Year Plan: five (5) new Project Descriptions, updated Planned Transmission Maps, and updated Tables 1 and 2. APS is including a clean copy of the entirety of its Ten-Year Plan, which is attached as Exhibit A. Updates have been made only to Attachment A. Also attached, as Exhibit B, is a redlined copy that shows the changes to the Ten-Year Plan.

The technical study report and the internal planning criteria and system ratings are deemed confidential Critical Energy/Electric Infrastructure Information (CEII). These confidential reports can be made available upon request under a separate cover pursuant to a protective agreement.

If you have any questions, please contact me at (602)250-3341.

Sincerely,



Kerri A. Carnes
KC/eml

c: Thomas Chenal
Elijah Abinah
Robert Geake
Toby Little

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Exhibit A

2019-2028 Ten-Year Transmission System Plan

Supplemental Filing

Attachment A

2019-2028 Ten-Year Transmission System Plan

Supplemental Filing



**ARIZONA PUBLIC SERVICE COMPANY
2019-2028
TEN-YEAR TRANSMISSION SYSTEM PLAN
SUPPLEMENTAL FILING**

Prepared for the
Arizona Corporation Commission



June 2019

**ARIZONA PUBLIC SERVICE COMPANY
2019 - 2028
TEN-YEAR TRANSMISSION SYSTEM PLAN**

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**ARIZONA PUBLIC SERVICE COMPANY
2019-2028
TEN-YEAR TRANSMISSION SYSTEM PLAN**

GENERAL INFORMATION

Pursuant to A.R.S. § 40-360.02, Arizona Public Service Company (“APS”) submits its 2019-2028 Ten-Year Transmission System Plan (“Ten-Year Plan”), attached as Attachment A. Also included in this filing are the Renewable Transmission Action Plan (Attachment B) as required by Arizona Corporation Commission (“ACC” or “Commission”) Decision No. 70635 (December 11, 2008), and the Technical Study on the Effects of DG/EE (Attachment C) as required by ACC Decision No. 74785 (October 24, 2014). This filing provides explicit modifications to reflect load growth in the West Valley with all other aspects remaining unchanged from the January 31, 2019 filing. The technical study report and the internal planning criteria and system ratings are deemed confidential Critical Energy/Electric Infrastructure Information (“CEII”). This confidential information can be made available upon request under separate cover pursuant to a protective agreement.

This Ten-Year Plan describes planned transmission lines of 115kV or higher voltage that APS may construct or participate in over the next ten-year period. Pursuant to A.R.S. § 40-360(10), underground facilities are not included. There are approximately 25 miles of 230kV transmission lines, 1 mile of 115kV transmission lines, 30 transformers, and 5 banks of 500kV bus reactors contained in the projects in this Ten-Year Plan. The total investment for the APS projects and the anticipated APS portion of the participation projects as they are modeled in this

filing is estimated to be approximately \$390 million.¹ Table 1 provides an overview of the projects included in this Ten-Year Plan.

Table 1: Ten Year Plan Project Breakdown

<u>Description</u>	<u>Projects in Ten-Year Plan</u>
230kV transmission lines	25 miles
115kV transmission lines	1 mile
Transformers	30
500kV Bus Reactors	5
Total Investment	\$390 million ²

Consistent with the Commission's Sixth BTA³ this Ten-Year Plan includes information regarding planned transmission reconductor projects, substation transformer replacements, and reactive compensation projects. At this time, APS does not have any plans for reconductoring any existing transmission lines. These types of plans often change as they typically are in direct response to load growth or generator interconnections. Therefore, in-service dates for transformer replacement/additions and transmission reconductor projects may change to reflect the load changes in the local system. Also, there may be projects added throughout the course of the planning year to accommodate changes in system topology, retirement of generation, or new generator interconnections. Examples of this will be the identification of new projects or the advancement of already planned projects to accommodate customers, either single large customers such as new data centers or large master planned communities such as those being contemplated west of the White Tank Mountains. Table 2 shows a list of the planned substation transformer additions/replacements and reactive compensation projects.

¹ This value is not comparable to the Capital Expenditures table presented in the "Liquidity and Capital Resources" section of APS's 10-K filing, which also includes other transmission costs for new subtransmission projects (69kV) and transmission upgrades and replacements.

² See footnote 1.

³ Decision No. 72031, December 10, 2010.

Table 2: Equipment Additions/Replacements

<u>Description</u>	<u>Year</u>
Mural 115/69kV Transformer Replacement (1 unit)	2019
White Tanks 230/69kV Transformer Addition (1 unit)	2019
Ocotillo 230/69kV Transformer Replacement (1 unit)	2019
El Sol 230/69kV Transformer Replacements (2 units)	2019
Milligan 230/69kV Transformer Addition (1 unit)	2019
Cholla 500kV Bus 170 MVAR Shunt Reactor Addition (1 unit)	2019
Navajo 500kV Bus 170 MVAR Shunt Reactor Additions (3 units)	2019
Moenkopi 500kV Bus 170 MVAR Shunt Reactor Addition (1 unit)	2019
Cactus 230/69kV Transformer Replacements (2 units)	2020
Scatter Wash 230/69kV Transformer Addition (1 unit)	2020
Freedom 230/69kV Transformer Addition (1 unit)	2020
TS19 230/69kV Transformer Additions (3 units)	2020
North Gila 500/230kV Transformer Addition (1 unit)	2021
Orchard 230/69kV Transformer Additions (2 units)	2021
TS15 230/69kV Transformer Additions (3 units)	2021
TS18 230/69kV Transformer Additions (3 units)	2021
TS16 230/69kV Transformer Additions (3 units)	2022
TS20 230/69kV Transformer Additions (3 units)	2022
TS17 230/69kV Transformer Additions (2 units)	2025

Some of the facilities reported in prior Ten-Year plan filings have been completed. Others have been canceled or deferred beyond the upcoming ten-year period and are therefore not

included here. The projects that have “To Be Determined” (“TBD”) in-service dates are projects that have been identified, but are either still outside of the ten-year planning window or have in-service dates that have not yet been established. They have been included in this filing for informational purposes. A summary of changes from last year’s Ten-Year plan is also provided.

For ease of reference, APS has included planned transmission maps showing the electrical connections and in-service dates for all overhead transmission projects planned by APS for Arizona (p.1), the Phoenix Metropolitan Area (p.11), and the Yuma area (p.12). Written descriptions of each proposed transmission project are provided on subsequent pages in the currently expected chronological order of each project. The line routings shown on the system maps and the descriptions of each transmission line are intended to be general, showing electrical connections and not specific routings, and are subject to revision. Specific routings are recommended by the Arizona Power Plant and Transmission Line Siting Committee and approved by the Commission when issuing a Certificate of Environmental Compatibility (“CEC”) and through subsequent right-of-way acquisition.

APS participates in numerous regional planning organizations, which provides an opportunity for other entities to participate in future planned projects. Through membership and participation in these organizations, the needs of multiple entities, and the region as a whole, can be identified and studied, which maximizes the effectiveness and use of new projects. Regional organizations in which APS is a member include the Western Electricity Coordinating Council (“WECC”), the Southwest Area Transmission Planning (“SWAT”), and WestConnect. The plans included in this filing are the result of these coordinated planning efforts.

The Commission’s Sixth BTA ordered that utilities include the effects of distributed generation (“DG”) and energy efficiency (“EE”) programs on future transmission needs. APS’s

modeled load, as described in the Technical Study Report, addresses the requirements of the Commission's Sixth BTA. Also, in the Eighth BTA Decision⁴ the Commission directed utilities to conduct or procure a study to more directly identify the effects of DG and EE installations and/or programs on their future transmission needs. This study is marked as Attachment C to this filing.

The Commission's decision in the Seventh BTA⁵ to suspend the requirement for performing Reliability Must Run (RMR) studies in every BTA unless certain criteria is met to restart such studies is still in effect. Since APS's last RMR, there have been no triggering events that would require restarting a RMR study for Phoenix and Yuma load pockets, which are the two major areas in APS's service territory where load cannot be served totally by imports over transmission lines. The Commission's Ninth BTA Decision ordered utilities to describe, in general terms, the driving factors(s) for each transmission project in the Ten-Year Plan. Also consistent with the Commission's Decision in the Seventh BTA APS continues to monitor the reliability in Cochise County. To improve reliability in Cochise County, APS is working with Arizona Electric Cooperative ("AEPCO") and Sulphur Springs Valley Electric Cooperative ("SSVEC") to coordinate and jointly participate in a number of projects and upgrades within the Cochise County area. APS is finalizing additional plans for system additions in that area that will likely include new and upgraded transmission lines and new transformers.

Power flow analysis was conducted to identify thermal overloads under normal and contingency conditions in compliance with NERC Reliability Standards and WECC System Performance Criteria. The projects identified in this Ten-Year Plan, with their anticipated in-service dates, will ensure that APS's transmission system meets all applicable reliability criteria

⁴ Decision No. 74785, October 24, 2014.

⁵ Decision No. 73625, December 12, 2012.

for Category P0 and P1-P7 conditions as defined in NERC Reliability Standard TPL-001-4.

Changes in regulatory requirements, regulatory approvals, or underlying assumptions such as load forecasts, generation or transmission expansions, economic issues, retirement of generation, changes in the system topology, and other utilities' plans may substantially impact this Ten-Year Plan and could result in changes to anticipated in-service dates or project scopes. Additionally, future federal and regional mandates may impact this Ten-Year Plan specifically and the transmission planning process in general. This Ten-Year Plan contains tentative information only and is subject to change without notice at the discretion of APS (A.R.S. § 40-360.02(F)).

CHANGES FROM 2018-2027 TEN-YEAR PLAN

The following is a list of projects that were removed or changed from APS's January 2018 Ten-Year Plan filing, along with a brief description of the change that was made:

- The Mazatzal 345/69kV Substation Project went in-service in May of 2018.
- The Interconnection Facilities portion of the Ocotillo Modernization Project went in-service in March of 2018. The generators included as part of the project are scheduled to be completed and in-service in 2019.
- The Sun Valley – Morgan 500kV went in-service in April of 2018.
- The Bagdad 115/69kV Back-up Project in-service date has moved from TBD to 2019.
- The TS2 230kV Project in service date has moved from TBD to 2022.

The TS4 230/69kV Substation has been named the Freedom 230/69kV Substation.

NEW PROJECTS IN THE 2019-2028 TEN-YEAR PLAN

There are transmission projects included in the 2019-2028 Ten-Year Plan that were not in the 2018-2027 Ten-Year Plan.

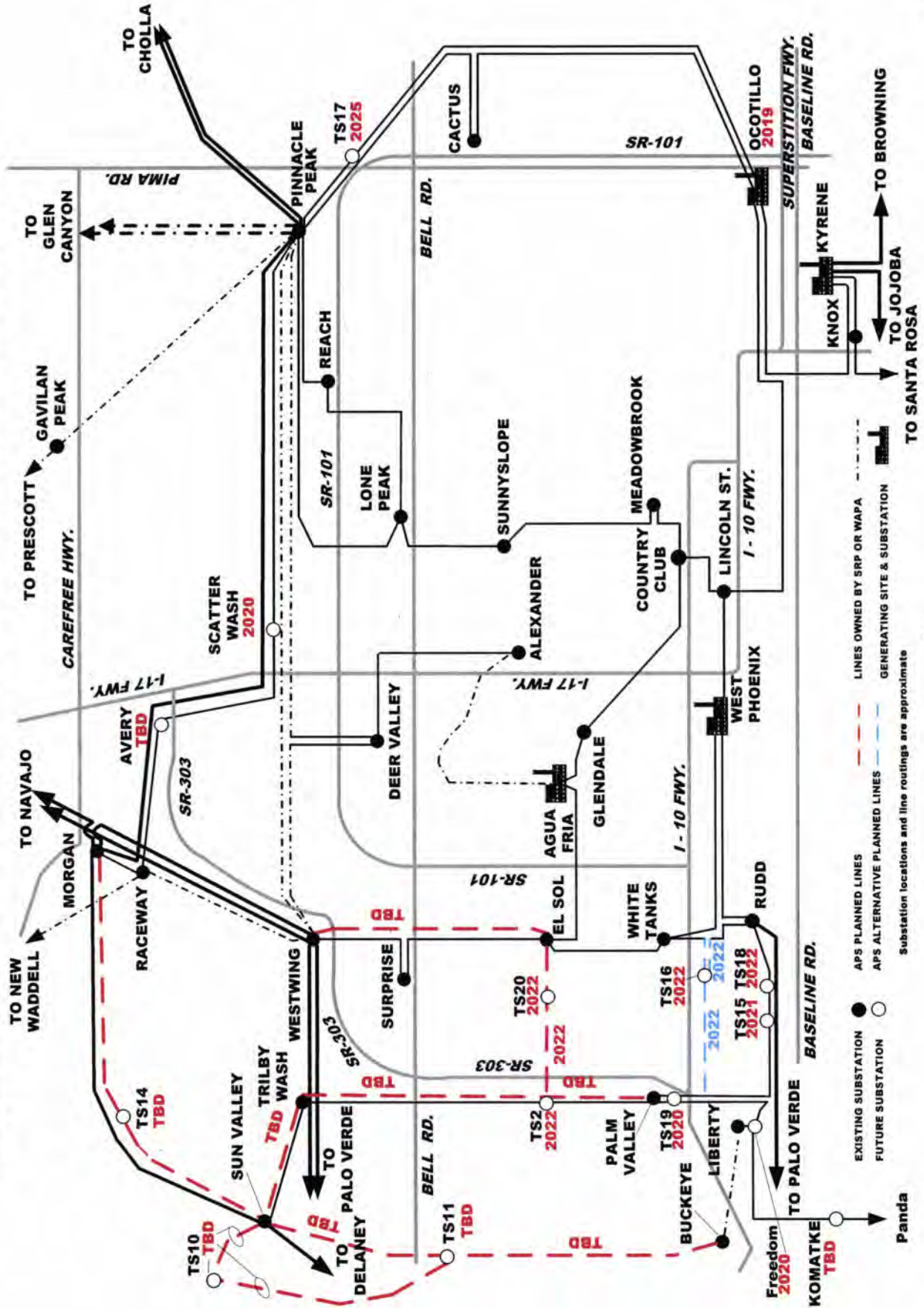
- The TS19 230kV Project includes new 230kV lines cutting into an existing 230kV lines and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2020.
- The TS15 230kV Project includes new 230kV lines cutting into an existing 230kV line and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2021.
- The TS18 230kV Project includes new 230kV lines cutting into an existing 230kV line and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2021.
- The TS16 230kV Project includes new 230kV lines cutting into an existing 230kV line and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2022.
- The TS20 230kV Project includes new 230kV lines from existing and planned substations and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2022.

- The TS17 230kV Project includes new 230kV lines cutting into an existing 230kV line and terminating at a new 230/69kV substation. The project is currently scheduled to be in-service in 2025.

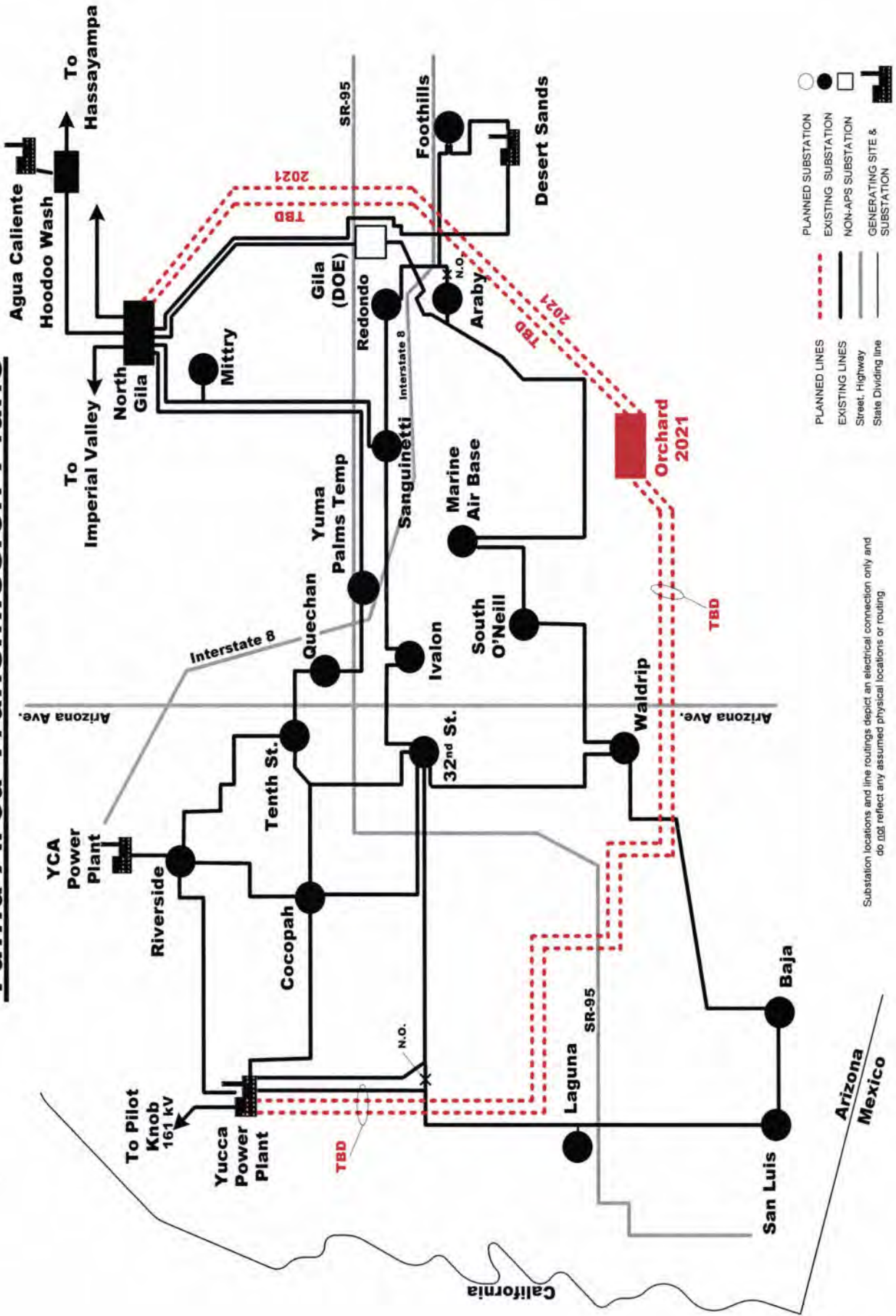
PLANNED TRANSMISSION MAPS

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PHOENIX METROPOLITAN AREA TRANSMISSION PLANS



Yuma Area Transmission Plans



PROJECT DESCRIPTIONS

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2019

<u>Project Name</u>	Ocotillo Modernization Project
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	TBD
(c) Point of Origin	Ocotillo GT2-6 Collection Yard
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	Ocotillo 230kV Substation
(f) Length	Less than 1 mile
<u>Routing</u>	This project includes two onsite 230kV generation interconnection circuits for interconnection to the existing onsite Ocotillo 230kV Substation. One circuit is routed along a portion of the northern boundary of the site. The second circuit is routed along portions of the western and northern boundaries of the site.
<u>Purpose</u>	Driving Factor(s): To interconnect new generators being constructed as part of the Ocotillo Modernization Project. These circuits connect the new units to the existing Ocotillo 230kV Substation and were placed in service March of 2018. The new generators have started to come online and are scheduled to be completed in the second quarter of 2019.
<u>Date</u>	
(a) Construction Start	2016
(b) Estimated In-Service	2019
<u>Permitting / Siting Status</u>	CEC issued on 11/13/2014. (Case No. 169, Decision No. 74812, Ocotillo Modernization Project). Note – Ocotillo 230kV Generation Interconnections is now referred to as Ocotillo Modernization Project.

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2019

<u>Project Name</u>	Bagdad 115/69kV Back-up
<u>Project Sponsor</u>	Arizona Electric Power Cooperative
<u>Other Participants</u>	Arizona Public Service Company
<u>Size</u>	
(a) Voltage Class	115kV AC
(b) Facility Rating	TBD
(c) Point of Origin	Bagdad-Prescott 115kV line
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	AEPCO's Bagdad 69kV Substation
(f) Length	Approximately 1 mile
<u>Routing</u>	A 115/69kV transformer will be installed adjacent to the AEPCO Bagdad 69kV substation. A new 115kV line will be routed, generally east, to connect to the APS Bagdad-Prescott 115kV line.
<u>Purpose</u>	Driving Factor(s): This will be a normally open back-up tie between APS and AEPCO. The project will provide back-up service for AEPCO member loads in case of the loss of the Parker source. The project will provide back-up service for APS to serve the Town of Bagdad loads in case of a loss of the 115kV line from Prescott.
<u>Date</u>	
(a) Construction Start	2019
(b) Estimated In-Service	2019
<u>Permitting / Siting Status</u>	CEC issued on 12/12/18 (Case No. 179, Decision No. 76976, APS Bagdad Interconnect 115kV Transmission Line).

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2020

<u>Project Name</u>	Scatter Wash 230/69kV Substation
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	188 MVA
(c) Point of Origin	Pinnacle Peak-Raceway 230kV line
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	Scatter Wash Substation
(f) Length	Less than 1 mile
<u>Routing</u>	The Scatter Wash Substation will be located adjacent to the Pinnacle Peak-Raceway 230kV line.
<u>Purpose</u>	Driving Factor(s): To provide electric energy in the northern portions of the Phoenix Metropolitan area as well as increase the reliability for these areas. The load demands in north Phoenix are increasing and this substation will provide a new transmission source to maintain reliability of the local 69kV system serving the area.
<u>Date</u>	
(a) Construction Start	2013
(b) Estimated In-Service	2020
<u>Permitting / Siting Status</u>	<i>CEC issued on 6/18/03 (Case No. 120, Decision No. 65997, North Valley Project. The Scatter Wash Substation was referred to as TS6 in Case 120). On April 10, 2013, in Decision No. 73824, the Commission approved APS's application to extend the term by 10 years to June 18, 2023 and to relocate the Scatter Wash Substation to the north side of the approved corridor.</i>

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2020

<u>Project Name</u>	Freedom 230/69kV Substation
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	188 MVA
(c) Point of Origin	Panda-Liberty-Palm Valley 230kV line Tap point
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	Freedom Substation
(f) Length	Less than 1 mile
<u>Routing</u>	The Freedom Substation will be located immediately south of WAPA's Liberty substation near the point where the three 230kV line segments converge.
<u>Purpose</u>	Driving Factor(s): To provide electric energy in the southwestern portions of the Phoenix Metropolitan area and into the Buckeye area. The load demands in Goodyear and Buckeye areas are increasing and this substation will provide a new transmission source to maintain reliability of the local 69kV system serving the area.
<u>Date</u>	
(a) Construction Start	2019
(b) Estimated In-Service	2020
<u>Permitting / Siting Status</u>	<i>CEC issued on 12/22/03 (Case No. 122, Decision No. 66646, West Valley South Project. The Freedom Substation was referred to as TS4 in Case 122). On 6/27/2013 in Decision No. 73937, the Commission approved APS's application to extend the CEC term to 12/23/2018 for the first circuit of the Project and to 12/23/2028 for the second circuit and other facilities.</i>

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2020

Project Name TS19 230kV Lines

Project Sponsor Arizona Public Service Company

Other Participants None

Size

- | | |
|--|--|
| (a) Voltage Class | 230kV AC |
| (b) Facility Rating | TBD |
| (c) Point of Origin | Freedom-Palm Valley and Palm Valley-Rudd 230kV lines |
| (d) Intermediate Points of Interconnection | None |
| (e) Point of Termination | TS19 Substation |
| (f) Length | Less than 1 mile |

Routing The TS19 substation will be located directly across the street of the Freedom-Palm Valley and Palm Valley-Rudd 230kV lines, on the southeast corner of Indian School Road and Citrus Road. The cut-in and extension of the existing lines will head directly south and connect to the new TS19 substation. The new lines will then be routed from the new substation generally directly north back to the existing lines. This will cut the new substation in and out of the existing lines. Four separate circuits will be brought in on two separate structures.

Purpose Driving Factor(s): To provide electric energy to a new high load customer in the area. In service date is predicated on ramp rate of customer load.

Date

- | | |
|--------------------------|------|
| (a) Construction Start | 2019 |
| (b) Estimated In-Service | 2020 |

Permitting / Siting Status *The new transmission lines tie into an existing 230kV transmission line, which was authorized in CEC 122 (Case No. 122, Decision No. 66646, West Valley South Project). On 6/27/2013 in Decision No. 73937, the Commission approved APS's application to extend the CEC term to 12/23/2018 for the first circuit of the Project and to 12/23/2028 for the second circuit and other facilities. APS expects to file an application to amend CEC 122 in latter 2019.*

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2021

<u>Project Name</u>	North Gila – Orchard 230kV Line Circuit #1
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	3000 A
(c) Point of Origin	North Gila Substation
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	Orchard 230kV Substation
(f) Length	Approximately 13 miles
<u>Routing</u>	Generally the line will proceed south from the North Gila Substation until the route proceeds west near the County 13 ½ Street alignment and then it will turn south to the Orchard Substation.
<u>Purpose</u>	Driving Factor(s): To increase ability to import resources into the Yuma load pocket. The project will also be used to improve reliability, serve the need for electric energy, and provide continuity of service for the greater Yuma area by adding a transmission source in a new area of the Yuma system. This project will have double-circuit capability with one circuit in-service in 2021 and the second circuit in-service TBD.
<u>Date</u>	
(a) Construction Start	2019
(b) Estimated In-Service	2021
<u>Permitting / Siting Status</u>	CEC issued 2/2/12 (Case No. 163, Decision No. 72801). Note – North Gila to TS8 230kV Transmission Line is now referred to as North Gila – Orchard 230kV Line.

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2021

Project Name TS15 230kV Lines

Project Sponsor Arizona Public Service Company

Other Participants None

Size

- | | |
|---|------------------------------|
| (a) Voltage Class | 230kV AC |
| (b) Facility Rating | TBD |
| (c) Point of Origin | Palm Valley-Rudd 230kV line |
| (d) Intermediate Points
of Interconnection | None |
| (e) Point of Termination | TS15 Substation |
| (f) Length | Less than 1 mile per circuit |

Routing The TS15 Substation will be located less than one mile to the north of the Palm Valley-Rudd 230kV line, on the north side of Broadway Rd. The cut-in and extension of the existing line will generally head directly north and connect to the new TS15 substation. Then a new line will be routed from the new substation generally directly south back to the existing line. This will cut the new substation in and out of the existing line. Each new circuit will be on separate structures.

Purpose Driving Factor(s): To provide electric energy to a new high load customer in the area. In service date is predicated on ramp rate of customer load.

Date

- | | |
|--------------------------|------|
| (a) Construction Start | 2019 |
| (b) Estimated In-Service | 2021 |

Permitting / Siting Status *An application for a CEC has not yet been filed. APS expects to start permitting activities and file a CEC application in 2019.*

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2021

Project Name TS18 230kV Lines

Project Sponsor Arizona Public Service Company

Other Participants None

Size

- (a) Voltage Class 230kV AC
- (b) Facility Rating TBD
- (c) Point of Origin Palm Valley-Rudd 230kV line
- (d) Intermediate Points of Interconnection None
- (e) Point of Termination TS18 Substation
- (f) Length Less than 1 mile per circuit

Routing The TS18 Substation will be located less than one mile to the north of the Palm Valley-Rudd 230kV line, on the north side of Broadway Rd. The cut-in and extension of the existing line will generally head directly north and connect to the new TS18 substation. Then a new line will be routed from the new substation generally directly south back to the existing line. This will cut the new substation in and out of the existing line. Each new circuit will be on separate structures.

Purpose Driving Factor(s): To provide electric energy to a new high load customer in the area. In service date is predicated on ramp rate of customer load.

Date

- (a) Construction Start 2020
- (b) Estimated In-Service 2021

Permitting / Siting Status *An application for a CEC has not yet been filed. APS expects to start permitting activities and file a CEC application in 2019.*

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2022

<u>Project Name</u>	TS2 230kV Lines
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	TBD
(c) Point of Origin	Palm Valley-Trilby Wash 230kV line
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	TS2 Substation
(f) Length	Less than 1 mile
<u>Routing</u>	The TS2 Substation will be located less than one mile east of the Palm Valley – Trilby Wash 230kV line. The substation will be located north of Olive Avenue between the Loop 303 and Cotton Lane.
<u>Purpose</u>	Driving Factor(s): To provide electric energy to a new high load customers in the area. In service date is predicated on ramp rate of customer loads.
<u>Date</u>	
(a) Construction Start	2021
(b) Estimated In-Service	2022
<u>Permitting / Siting Status</u>	CEC issued on 12/22/03 (Case No. 122, Decision No. 66646, amended on 6/27/13 by Decision No. 73937, West Valley South 230kV Transmission Line Project)

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2022

<u>Project Name</u>	TS16 230kV Lines
<u>Project Sponsor</u>	Arizona Public Service Company
<u>Other Participants</u>	None
<u>Size</u>	
(a) Voltage Class	230kV AC
(b) Facility Rating	TBD
(c) Point of Origin	Rudd-White Tanks 230kV line
(d) Intermediate Points of Interconnection	None
(e) Point of Termination	TS16 Substation
(f) Length	Approximately 4 miles
<u>Routing</u>	The TS16 Substation will be located approximately three and a half miles to the west of the Rudd-White Tanks 230kV line, on the southwest corner of Van Buren Street and Bullard Avenue. The cut-in and extension of the existing line will generally head west to connect to the new TS16 substation. Pending the results of the line siting study, an alternative route would originate at the Palm Valley – Freedom 230kV line and head generally east to terminate in the new TS16 substation. Pending results of the line siting study, portions of the new lines may be double circuit.
<u>Purpose</u>	Driving Factor(s): To provide electric energy to a new high load customer in the area. In service date is predicated on ramp rate of customer load.
<u>Date</u>	
(a) Construction Start	2020
(b) Estimated In-Service	2022
<u>Permitting / Siting Status</u>	<i>An application for a CEC has not yet been filed. APS expects to start permitting activities and file a CEC application in 2019.</i>

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2022

Project Name TS20 230kV Lines

Project Sponsor Arizona Public Service Company

Other Participants None

Size

- | | |
|--|-----------------------|
| (a) Voltage Class | 230kV AC |
| (b) Facility Rating | TBD |
| (c) Point of Origin | El Sol Substation |
| (d) Intermediate Points of Interconnection | TS20 Substation |
| (e) Point of Termination | TS2 Substation |
| (f) Length | Approximately 7 miles |

Routing The TS20 substation will be located on the southeast corner Olive Avenue and Dysart Road. The line will originate in the El Sol substation and will head generally west and interconnect at the TS20 substation. The line will then continue from TS20 substation and head generally west and terminate at the TS2 substation. Pending results of the line siting study portions of the new lines may be double circuit.

Purpose Driving Factor(s): To provide electric energy to a new high load customer in the area. In service date is predicated on ramp rate of customer load.

Date

- | | |
|--------------------------|------|
| (a) Construction Start | 2020 |
| (b) Estimated In-Service | 2022 |

Permitting / Siting Status *An application for a CEC has not yet been filed. APS expects to start permitting activities and file a CEC application in 2020.*

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

2025

Project Name TS17 230kV Lines

Project Sponsor Arizona Public Service Company

Other Participants None

Size

- | | |
|---|-------------------------------------|
| (a) Voltage Class | 230kV AC |
| (b) Facility Rating | 367MVA |
| (c) Point of Origin | Ocotillo – Pinnacle Peak 230kV line |
| (d) Intermediate Points
of Interconnection | None |
| (e) Point of Termination | TS17 Substation |
| (f) Length | Less than 1 mile |

Routing The TS17 Substation will be located adjacent to the existing Ocotillo – Pinnacle Peak 230kV line generally between Bell Road and Thompson Peak Parkway near the existing Downing 69/12kV substation.

Purpose Driving Factor(s): To provide electric energy in the northeastern portions of the Phoenix Metropolitan area. The load demands in northeastern portions of the Phoenix Metropolitan area are increasing and this substation will provide a new transmission source to maintain reliability of the local 69kV system serving the area. Additionally, this substation offloads multiple heavily loaded 230kV lines in the Phoenix Metropolitan area.

Date

- | | |
|--------------------------|------|
| (a) Construction Start | 2023 |
| (b) Estimated In-Service | 2025 |

Permitting / Siting Status *An application for a CEC has not yet been filed. APS expects to start permitting activities and file a CEC application in 2019/2020.*

**Arizona Public Service Company
2019 – 2028
Ten-Year Plan
Planned Transmission Description**

To Be Determined Projects

<u>Project Name</u>	<u>Permitting/Siting Status</u>
El Sol – Westwing 230kV Line	CEC issued (Case No. 9, Docket No. U-1345)
Palo Verde – Saguaro 500kV Line	CEC issued (Case No. 24, Decision No. 46802)
Komatke 230/69kV Substation	CEC issued (Case No. 102, Decision No. 62960)
Avery 230/69kV Substation	CEC issued (Case No. 120, Decision No. 65997, amended by Decision No. 73824, North Valley Project)
Palm Valley – TS2 – Trilby Wash 230kV Line Circuit #2	The Palm Valley-TS2 segment CEC issued (Case No. 122, Decision No. 66646, amended by Decision No. 73937, West Valley South 230kV Transmission Line Project) The Trilby Wash-TS2 segment CEC issued (Case No. 127, Decision No. 67828, amended by Decision No. 75045, West Valley North 230kV Transmission Line project)
Sun Valley – Trilby Wash 230kV Line Circuit #2	CEC issued (Case No. 127, Decision No. 67828, amended by Decision No. 75045, West Valley North 230kV Transmission Line project)
Pinal Central – Sundance 230kV Line	CEC issued (Case No. 136, Decision No. 70325, Sundance to Pinal South 230kV Transmission Line project)
Morgan – Sun Valley 230kV Line	CEC issued (Case No. 138, Decision No. 70850, amended by Decision No. 75092, TS5-TS9 500/230kV Project)
Orchard – Yucca 230kV Line	CEC issued (Case No. 163, Decision No. 72801, North Gila to TS8 to Yucca 230kV Transmission Line Project)
Sun Valley – TS10 – TS11 230kV Line	An application for a CEC has not yet been filed
Buckeye – TS11 – Sun Valley 230kV Line	An application for a CEC has not yet been filed
TS14 230kV Lines	An application for a CEC has not yet been filed

Attachment B

Renewable Transmission Action Plan

**Arizona Public Service Company
Renewable Transmission Action Plan
January 2019**

In the Fifth Biennial Transmission Assessment ("BTA") Decision (Decision No. 70635, December 11, 2008) the Arizona Corporation Commission ("Commission") ordered Arizona Public Service Company ("APS" or "Company") to file a document identifying the Company's top potential Renewable Transmission Projects ("RTPs") that would support the growth of renewable resources in Arizona. On January 29, 2010, APS filed with the Commission its top potential RTPs, which were identified in collaboration with the Southwest Area Transmission planning group ("SWAT") and its subgroups, other utilities and stakeholders. In its filing, APS included a Renewable Transmission Action Plan ("RTAP"), which included the method used to identify RTPs, project approval and financing of the RTPs. On January 6, 2011, the Commission approved APS's RTAP (Decision No. 72057¹), which allows APS to pursue the development steps indicated in the APS RTAP. The Decision, in part, ordered:

[T]hat the timing of the next Renewable Transmission Action Plan filing shall be in parallel with the 2012 Biennial Transmission Assessment process.

[T]hat Arizona Public Service Company shall, in any future Renewable Transmission Action Plans filed with the Commission, identify Renewable Transmission Projects, which include the acquisition of transmission capacity, such as, but not limited to, (i) new transmission line(s), (ii) upgrade(s) of existing line(s), or (iii) the development of transmission project(s) previously identified by the utility (whether conceptual, planned, committed and/or existing), all of which provide either:

- 1. Additional direct transmission infrastructure providing access to areas within the state of Arizona that have renewable energy resources, as defined by the Commission's Renewable Energy Standard Rules (A.A.C. R14-2-1801, et seq.), or are likely to have renewable energy resources; or*
- 2. Additional transmission facilities that enable renewable resources to be delivered to load centers.*

Two of the three RTPs that APS filed in its original RTAP have been completed. The Hassayampa-North Gila 500kV line #2 was placed into service in May, 2015 and the Palo Verde-Delaney 500kV line was placed into service in May, 2016. The remaining RTP that APS filed in its original RTAP (described below) continues to be viable and will be developed as reliability and resource needs arise.

Proposed development plan for a Palo Verde to Liberty and Gila Bend to Liberty projects

Description: The Palo Verde to Liberty and Gila Bend to Liberty are conceptual 500kV transmission line projects from the Palo Verde hub and from the Gila Bend/Gila River area to a new substation near the existing Liberty substation located in the west valley.

Current Status: The APS 2019 Ten-Year Plan Study does not currently show a need for these projects and, as a result, no further progress on the

¹ Commission Decision No. 72057 found that APS's 2010 RTAP process and Plan is appropriate and consistent with the Commissions' Fifth Biennial Transmission Assessment final order.

**Arizona Public Service Company
Renewable Transmission Action Plan
January 2019**

development plan has been made. APS will revisit these projects when appropriate.

Renewable expansion (solar) in the APS service territory originally saw a number of large scale projects being proposed. That trend dissipated after a few years and moved towards the development of smaller scale renewable projects, which interconnect directly into the local distribution system (69kV or below) rather than APS's high voltage transmission system. APS's current Generator Interconnection queue consists of a mix of smaller scale projects and larger projects. The number of large scale interconnection requests has continued to be much lower the last couple of years as compared to the large volume of activity seen at the start of the decade. The current activity also seems to be cyclical and coincide with the release of RFPs from APS or California utilities. As a result, in this RTAP, APS does not propose new RTPs. APS will explore new renewable transmission opportunities when appropriate.

Attachment C

Technical Study on the Effects of Distributed
Generation/Energy Efficiency on Fifth Year Transmission Plan



Technical Study

Effects of Distributed Generation and
Energy Efficiency on
Future Transmission Needs

ARIZONA PUBLIC SERVICE COMPANY

January, 2019

Executive Summary

In Decision No. 74785 (October 24, 2014), the Eighth Biennial Transmission Assessment (Eighth BTA), the Commission ordered Arizona utilities with retail load to study the effects of Distributed Generation (DG) and Energy Efficiency (EE) on their future planned transmission systems in their fifth planning year (the Study).

Arizona Public Service Company (APS) utilized the APS 2023 Ten-Year Plan base case, which was coordinated through the Southwest Area Transmission (SWAT) sub-regional planning group.

- The first case is the base case or typical system peak planning load, which includes the effects of DG and EE in the load.
- The second case is the base case with the projected increases in DG and EE over the next five (5) years backed out of the load forecast. The projected increases of DG and EE for 2019 to 2023 that are backed out of the forecast for this case are 395 MW; 58 MW for DG and 337 MW for EE.

The Study indicates that delayed or non-implemented DG and EE have no effect on APS's Bulk Electric System (BES) as currently planned in 2023. The increase of 395 MW of additional load did not show a need for any additional projects beyond what APS has already planned.

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1. Introduction

In Decision No. 74785 (October 24, 2014), the Eighth Biennial Transmission Assessment (Eighth BTA), the Commission ordered Arizona utilities with retail load to study the effects of Distributed Generation (DG) and Energy Efficiency (EE) installations and/or programs on their future planned transmission systems. The Decision states:

The technical study should be performed on the fifth year transmission plan by disaggregating the utilities' load forecasts from effects of DG and EE and performing contingency analysis with and without the disaggregate DG and EE. The technical study should at a minimum discuss DG and EE forecasting methodologies and transmission loading impacts. The study should monitor transmission down to and including the 115kV level. ...Alternative methodologies or study approaches will be acceptable on condition that the study results satisfy the minimum requirements [above].¹

2. Study Requirements and Assumptions

2.1. Study Requirements

To fulfill this requirement in the Eighth BTA, the Study looks at two load scenarios, outlined in Table 1 below. The first case uses the forecasted load including the effects of DG and EE, per the typical planning process. The second case uses the forecasted load excluding the effects of projected increases in DG and EE between 2019 and 2023. This scenario is equivalent to “disaggregating the utilities load forecasts from effects of DG and EE.”²

Table 1 - Summary of Cases

Case	Scenario	Load	EE	DG	Utility Solar
1	Base	Peak	On	On	On
2	EE/DG	Peak	Pre 2019 only	Pre 2019 only	On

The Study monitored the loading impacts to the transmission system and performed reliability analysis similar to how APS analyzes it in the ten year planning process. For the two cases, BES facilities (>100kV) are examined to ensure there are no thermal or voltage criteria violations. These facilities are examined with all lines in-service and for all single contingencies.

¹ Decision No. 74785 at 9:22-27 and 10:1-2.

² *Id.* at 9:22-24.

2.2.Base Case Assumptions

This Study utilized the 2023 power flow case used in APS's 2019-2028 Ten-Year Plan. The 2023 heavy summer case was a "seed case" coordinated through the Southwest Area Transmission – Arizona (SWAT-AZ) subcommittee. The case was reviewed and updated by all the Arizona utilities and the Imperial Irrigation District (IID). For the EE/DG scenario case the APS load in the 2023 planning case was increased to reflect the values of DG and EE, as described below.

- For APS, 77% of the MW contributions of DG were estimated to be from metro Phoenix load areas, while 23% of the MW contributions of DG were estimated to be from areas outside the metro area. Similarly, 76% of the MW contributions of EE were estimated to be from metro Phoenix load areas, while 24% of the MW contributions of EE were estimated to be from areas outside the metro area. Identified large industrial loads were not scaled during the process of creating the scenario cases.
- Available generation within Arizona, along with market purchases, was increased to account for the increased load.

3. Distributed Generation and Energy Efficiency Forecasting Methodology Description

While DG and EE have impacts on APS's system load, EE was the primary contributor in this Study. Estimates were developed to determine what each program's role was at the time of the system peak in 2023. The combined total DG and EE impacts in 2023 are estimated to be 395 MW. This total is comprised of 85% EE and 15% DG. The details of the EE and DG estimates are described below.

3.1.Energy Efficiency Impact

To forecast the EE program impact (net of demand response curtailment) on system peak in 2023, several steps were taken. First, efficiency measures in 2019 – 2023 were forecasted by assuming levels associated with APS's 2017 IRP. Then, when the EE amounts were determined, as defined above, they were assessed to establish the EE programs overall impact coincident to APS's system peak:

- (a) Existing EE impact at peak hour (defined as EE on or before 2018): **~935MW**
- (b) Projected increases in EE at peak hour 2019 – 2023.

Table 2: Energy Efficiency Forecast 2019-2023³

	2019	2020	2021	2022	2023
EE 2019+ impact to peak	100 MW	199 MW	250 MW	294 MW	337 MW

3.2.Distributed Generation Impact

The impact to load from DG systems in 2019 – 2023 was based on APS projections of new DG system starting in 2019. That number of installs was then applied to each month of the forecast period until 2023 to forecast the total amount of DG on the network. From this, the impacts to the 2023 system coincident peaks from DG were determined.

To determine the base system peak loading in the fifth year, 2023, the following load values have been calculated:

- (a) Existing DG impact at peak hour (defined as DG on or before 2018): ~**245MW**
- (b) Forecasted incremental DG at peak hour 2019 – 2023.

Table 3: Distributed Generation Forecast 2019-2023³

	2019	2020	2021	2022	2023
DG 2019+ impact to peak	11 MW	22 MW	32 MW	45 MW	58 MW

³ Estimates shown in Tables 2 and 3 are incremental increases to existing systems with cumulative values shown in years 2020+.

4. Conclusion

The Study indicates that delayed or non-implemented DG and EE have no effect on the reliability of APS's BES as currently planned in 2023. Studies performed, with the load increased by 395 MW, indicated there were no new reliability planning criteria violations observed. Therefore, no project advancements or new projects would be required to reliably meet the increased load. This Study only addresses APS's BES and there may be some impacts at the subtransmission level due to variations in timing and quantity of implemented DG and EE.