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November 1, 2011

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RE: Renewable Export Study Sixth Biennial Transmission Assessment
Docket No. E-00000D-09-0020

The Arizona Corporation Commission's ("Commission") Sixth Biennial Transmission Assessment ("BTA") Decision 72031 highlighted Arizona's abundant supply of renewable resources and the potential for the development of these energy resources to be utilized by surrounding states to meet their renewable portfolio obligations.

To help advance this potential, the Commission ordered certain Commission-regulated electric utilities to conduct or procure a study and to conduct a stakeholder workshop process to identify the barriers to and solutions for enhancing Arizona's ability to export renewable energy. Commission Decision No. 72031, dated December 10, 2010 states:

> IT IS FURTHER ORDERED that the jurisdictional utilities shall jointly conduct or procure a study, as well as conduct a stakeholder workshop process in conjunction with the study, which identifies the barriers to and solutions for enhancing Arizona's ability to export renewable energy, including identifying specific transmission corridors that should be built out in order to accomplish this objective. The study and results of the workshop shall be filed at the Commission no later than November 1, 2011, and shall be included as part of the 2012 BTA.

In compliance with that decision, Arizona Public Service Company; Salt River Project Agricultural Improvement and Power District; Southwest Transmission Cooperative, Inc.; Tucson Electric Power Company; and UniSource Electric, Inc. (collectively referred to as the "Arizona Utilities") commissioned PDS Consulting, PLC to conduct the study referenced above. This report is being provided by PDS to the Commission on behalf of the Arizona Utilities and incorporates both PDS's technical analysis and stakeholder input.

Should you have any questions please contact me at 480-838-1427.

Sincerely,

Mark Etherton

Mark Etherton

cc: Parties of Record

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Enhancing Arizona's Ability to Export Renewable Energy

A Report to Address the Arizona Corporation Commission
Sixth Biennial Transmission Assessment
Commission Decision No. 72031

Prepared by PDS Consulting, PLC

October 2011

EXECUTIVE SUMMARY

The Arizona Corporation Commission's ("ACC" or "Commission") Sixth Biennial Transmission Assessment ("BTA") Decision highlighted Arizona's abundant supply of renewable resources and the potential for the development of these energy resources to be utilized by surrounding states to meet their renewable portfolio obligations.[1] To help advance this potential, the ACC ordered certain Commission-regulated electric utilities to jointly conduct or procure a study and to conduct a stakeholder workshop process to identify the barriers to and solutions for enhancing Arizona's ability to export renewable energy. Arizona Public Service Company ("APS"); Salt River Project Agricultural Improvement and Power District ("SRP")[2]; Southwest Transmission Cooperative, Inc. ("SWTC"); Tucson Electric Power Company ("TEP"); and UniSource Electric, Inc. ("UNS Electric") procured the services of PDS Consulting, PLC to conduct the study.

This report: (1) summarizes the ACC order for which this report was prepared and briefly introduces the Arizona Utilities (*see* Section I of this report); (2) provides an overview of Renewable Energy Standards ("RES") and regional renewable energy assessments, followed by a summary of prior evaluations regarding Arizona's renewable energy resources and related transmission projects (*see* Section II of this report); (3) presents the results of a high level technical evaluation that assessed the deliverability of the existing transmission system, assessed the incremental deliverability with the addition of the renewable transmission projects ("RTPs"), and identified transmission corridors to enhance export capability (*see* Section III of this report); (4) summarizes stakeholder input, including the identification of barriers to and solutions for enhancing Arizona's ability to export renewable energy (*see* Section IV of this report); and (5) provides the current status of the export market environment (*see* Section V of this report).

Background of Regional Opportunities for Development of Renewable Energy

Renewable Energy Standards ("RES") have emerged as a result of state regulatory rules, federal tax policy, technological advances, and changes in public acceptance. Arizona is surrounded by other states in the Southwest (e.g., California, Colorado, Nevada, New Mexico) that also have RES requirements or goals (e.g., Utah). The combined effect of these standards is an increased demand for renewable energy within the region.

Studies that have evaluated Arizona's renewable resources include:

- Western Renewable Energy Zones ("WREZ") Initiative (Phase 1 report dated June 2009,[3] initiative includes on-going studies)
- A Final Report on the Activities of the Finance Subcommittee (report dated October 5, 2009)
- Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee (report dated September 2009)
- SWAT Renewable Transmission Task Force Report (report dated May 15, 2008)
- Arizona Renewable Energy Assessment (report dated September 2007)

[1] Commission Decision No. 72031, dated December 10, 2010.

[2] While SRP is not a Commission-regulated utility, SRP has voluntarily participated in this effort.

[3] www.westgov.org/wga/publicat/WREZ09.pdf (Last accessed October 27, 2011)

The results of these studies indicate that Arizona has significant renewable resource potential and has far more supply of renewable resources than demand. The WREZ initiative also indicates that Nevada and New Mexico have supplies that exceed the in-state demand for renewable resources; whereas, California has a greater demand for renewable resources than in-state supply. The Western Electricity Coordinating Council ("WECC") ten-year plan, approved in September 2011, identified California as representing two-thirds of the total renewable energy needed to address RES and Renewable Portfolio Standards ("RPS") in the western United States. Based on this information, California is the most likely market for Arizona renewable energy exports.

In Arizona, as part of the Commission's Fifth BTA,[4] the Commission-regulated utilities were required to identify future renewable transmission projects ("RTPs"), plans and proposed funding mechanisms to construct the top three RTPs in their respective service territories. As such, APS, SRP, SWTC, TEP, and UNS Electric each filed a report with the Commission in 2009. The utilities also identified additional transmission projects of significant interest to the utilities.

Technical Assessment, including Corridor Identification

This report resulted from Commission Decision No. 72031 (the Sixth BTA) that mandated a study to assess Arizona's ability to export renewable energy. A technical evaluation, discussed in Section III of this report, assessed the deliverability of the existing transmission system and the incremental deliverability with the addition of the RTP system to export renewable resources from the Arizona Renewable Energy Zones ("REZ") to Southern California. The assessment used an injection analysis approach to bench mark the existing transmission system and to assess the incremental deliverability of the RTPs to deliver energy to Southern California. This assessment limited its analysis of exporting Arizona's renewable energy supply to Southern California due to the market potential identified by the WREZ and WECC.

The technical assessment concluded that the RTPs as a whole would bring potential incremental export capability between Arizona and Southern California. This incremental export would be greater if existing limitations in the Southern California system on the existing North Gila – Imperial Valley 500kV line were resolved. This line limits the amount of energy that can be scheduled from Arizona to Southern California. With an additional 500kV line from Delaney to the Colorado River the incremental export would increase but would remain limited due to the existing North Gila – Imperial Valley 500kV line. With the addition of the second North Gila to Imperial Valley 500kV transmission line, the incremental export to Southern California could be increased by approximately 2000 MW. Approximately 3000 MW of additional transmission capacity between Arizona and Southern California could potentially be achieved if the proposed RTPs and the addition of Delaney to the Colorado River and the North Gila to Imperial Valley 500kV transmission lines were combined. It should be noted that the incremental export values achieved in this assessment could differ when analyzed in a WECC Path Rating Study, which would analyze the East of River ("EOR") Path at a stressed level and would also consider the simultaneous impacts on other WECC Paths (i.e., West of River Path).

Commission Decision No. 72031 also required the utilities to identify specific corridors to be built to enhance Arizona's ability to export renewable energy to outside markets. The assessment considered the

[4] Commission Decision No. 70635 (December 11, 2008).

need for additional corridors to the Southern California markets because the assessment identified deliveries to Southern California due to the market potential identified by WREZ and WECC. The assessment concluded that additional corridors were not needed and additional transmission capacity within the existing corridors made more sense. Therefore, two existing corridors in Arizona were evaluated for additional transmission: (1) the Palo Verde – Devers corridor; and (2) the Palo Verde – North Gila corridor. Increased transmission capacity on the North Gila – Imperial Valley corridor could significantly increase Arizona's ability to export to California when added in conjunction with the Arizona RTPs; however, this corridor is located primarily outside of Arizona and would require approval by the California Public Utilities Commission.

Stakeholder Involvement

Stakeholders representing renewable energy developers, transmission developers, state agencies, and industry consultants were invited to participate in the process of the identification of barriers to and solutions for enhancing Arizona's ability to export renewable energy. The barriers and solutions identified by the stakeholders have been categorized as they pertain to economic concerns, physical limitations, permitting corridors or right-of-way, and regulatory structure (*see* Section IV of this report). Neither the Arizona Utilities nor PDS Consulting, PLC has conducted an analysis of the barriers or solutions. Further, the barriers and solutions do not represent a consensus of the Arizona Utilities and stakeholders nor does it reflect a prioritization of issues from the stakeholders.

Current Export Market Environment

This assessment limited its analysis of exporting Arizona's renewable energy supply to Southern California due to the market potential identified by multiple sources; however, California has indicated a focus on meeting the state's RPS with in-state resources. Although there are several indications that California will require additional out-of-state resources, mixed messages exist regarding California's desire to meet significant portions of their RPS requirements with out-of-state renewable resources. California's Renewable Energy Transmission Initiative ("RETI"), California State Law that requires utilities to obtain portions of renewable energy requirement from in-state generation, letters in 2009 and 2011 from Southern California Edison to the ACC, and a letter in 2011 from the Office of the California Governor to WECC indicates that California is focusing on meeting their RPS with in-state resources. These factors have provided significant uncertainty related to California's plans and are discussed in more detail in Section V of this report. Additional clarity of California's policy regarding their need and desire for Arizona renewable resources is needed before Arizona invests substantial resources to move toward additional transmission to support the export of Arizona's renewable energy.

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Attachment C: August 3, 2011 Letter from the Office of the California Governor to the Western Electricity Coordinating Council

Attachment D: Stakeholder List

ACRONYMS AND ABBREVIATIONS

ACC	Arizona Corporation Commission
APS	Arizona Public Service Company
Arizona Utilities	APS, SRP, SWTC, TEP, and UNS Electric
ARRTIS	Arizona Renewable Resource and Transmission Identification Subcommittee
A.R.S.	Arizona Revised Statutes
BTA	Biennial Transmission Assessment
CEC	Certificate of Environmental Compatibility
Commission	Arizona Corporation Commission or Commission
CPUC	California Public Utilities Commission
CTPG	California Transmission Planning Group
DG	distributed generation
EHV	Extra High Voltage
EOR	East of the Colorado River
FERC	Federal Energy Regulatory Commission
GWh	gigawatt hours
kV	kilovolt
LGIP	Large Generator Interconnection Procedure
MW	megawatt
NEPA	National Environmental Policy Act
OASIS	Open Access Same-time Information System
OATT	Open Access Transmission Tariff
RES	Renewable Energy Standards
RETI	Renewable Energy Transmission Initiative
REZ	Renewable Energy Zones
RPS	Renewable Portfolio Standards
RTAP	Renewable Transmission Action Plans
RTP	Renewable Transmission Project
RTTF	Renewable Transmission Task Force
RUS	Rural Utilities Service
SB 2X	Senate Bill 2 of the 1st Extraordinary Session (California)
SPS	Special Protection Schemes
SRP	Salt River Project Agricultural Improvement and Power District
SWAT	Southwest Area Transmission

SWTC	Southwest Transmission Cooperative, Inc.
TEP	Tucson Electric Power Company
TTC	Total Transfer Capability
UNS Electric	UniSource Electric, Inc.
WECC	Western Electricity Coordinating Council
WREZ	Western Renewable Energy Zones

I. INTRODUCTION

The Arizona Corporation Commission's ("ACC" or "Commission") Sixth Biennial Transmission Assessment ("BTA") Decision highlighted Arizona's abundant supply of renewable resources and the potential for the development of these energy resources to be utilized by surrounding states to meet their renewable portfolio obligations. To help advance this potential, the ACC ordered certain Commission-regulated electric utilities to conduct or procure a study and to conduct a stakeholder workshop process to identify the barriers to and solutions for enhancing Arizona's ability to export renewable energy. Commission Decision No. 72031, dated December 10, 2010 states:

> IT IS FURTHER ORDERED that the jurisdictional utilities shall jointly conduct or procure a study, as well as conduct a stakeholder workshop process in conjunction with the study, which identifies the barriers to and solutions for enhancing Arizona's ability to export renewable energy, including identifying specific transmission corridors that should be built out in order to accomplish this objective. The study and results of the workshop shall be filed at the Commission no later than November 1, 2011, and shall be included as part of the 2012 BTA.

This report was prepared by PDS Consulting, PLC on behalf of Arizona Public Service Company ("APS"), Salt River Project Agricultural Improvement and Power District ("SRP"); Southwest Transmission Cooperative, Inc. ("SWTC"); Tucson Electric Power Company ("TEP"); and UniSource Electric, Inc. ("UNS Electric") in response to Commission Decision No. 72031. APS, SRP, SWTC, TEP, and UNS Electric are collectively referred to herein as the "Arizona Utilities."

Section I, of this report, summarizes the ACC order for which this report was prepared and briefly introduces the Arizona Utilities; Section II provides an overview of Renewable Energy Standards ("RES") and regional renewable energy assessments, followed by a summary of prior evaluations regarding Arizona's renewable energy resources and related transmission projects; Section III presents the results of a high level technical evaluation that assessed the deliverability of the existing transmission system, assessed the incremental deliverability with the addition of the renewable transmission projects ("RTPs"), and identified transmission corridors to enhance export capability; Section IV describes stakeholder input, including the identification of barriers to and solutions for enhancing Arizona's ability to export renewable energy; and Section V provides the current status of the export market environment.

A. Arizona Public Service Company

APS is Arizona's largest and longest-serving electricity utility which provides electric service to more than 1.1 million Arizona customers in 11 of the state's 15 counties. APS service territory includes most of the state, with the major exceptions being about half of the Phoenix metropolitan area, the Tucson metropolitan area and Mohave County in northwestern Arizona. In addition, APS operates the second-largest generation fleet in the western United States.

As a Commission-regulated electric utility, APS files a ten-year plan each year with the ACC in accordance with the Arizona Revised Statutes ("A.R.S.") §40-360.02.A. Ten-year plans are reviewed biennially by the ACC; APS has been involved with activities related to the BTA since its inception. APS

has a ten-year transmission plan to make significant investments in the construction of approximately 250 miles of new high-voltage transmission lines in Arizona. In addition to ensuring the overall reliability of the power supply for APS customers, these lines will open up areas of the state for new renewable energy projects.

B. Southwest Transmission Cooperative

SWTC is a nonprofit electric transmission cooperative corporation organized under the generation and transmission electric cooperative laws of the State of Arizona. It does not own any generation or distribution facilities but is engaged wholly in the transmission of electrical energy primarily from Arizona Electric Cooperative, Inc. generating resources to six distribution cooperative Class A Members: Anza Electric Cooperative, Inc., located in Riverside County, California; Duncan Valley Electric Cooperative, Inc., located in Duncan, Arizona; Graham County Electric Cooperative, Inc. , located in Pima, Arizona; Mohave Electric Cooperative, Inc., located in Bullhead City, Arizona; Sulphur Springs Valley Electric Cooperative, Inc., located in Willcox, Arizona; and Trico Electric Cooperative, Inc., located in Marana, Arizona.

SWTC has also entered into point-to-point transmission and network transmission service with other entities for deliveries of power and energy through its interconnections with APS, SRP, TEP and the Western Area Power Administration.

As a Rural Utilities Service ("RUS") borrower, SWTC is required to follow RUS regulations for all workplan and funding submittals. RUS is the preferred funding mechanism that SWTC utilizes for funding for new transmission projects to meet the needs of its six Class A Members.

As a Commission-regulated electric utility, SWTC files a ten-year plan each year with the ACC in accordance with the A.R.S. §40-360.02.A. SWTC has been involved with activities related to the BTA since its inception.

C. Tucson Electric Power and UniSource Electric

TEP generates, transmits, and distributes electricity to approximately 400,000 retail electric customers in a 1,004 square mile area in Southern Arizona. UNS Electric provides electric service to the majority of Mohave County and Santa Cruz County, including the cities of Kingman, Lake Havasu City, and Nogales. UNS Electric serves over 71,000 customers in Mohave County and over 18,000 customers in Santa Cruz County.

As Commission-regulated electric utilities, TEP and UNS Electric file a ten-year plan each year with the ACC in accordance with the A.R.S. §40-360.02.A. The TEP and UNS Electric support transmission facilities that serve multiple purposes. Transmission facilities that are designated as renewable transmission projects are more cost effective when they can serve additional functions beyond RES requirements, including enhancing the reliability of the electric grid and the possibility to export to other markets.

D. Salt River Project Agricultural Improvement and Power District

SRP owns and operates an electric system which generates, purchases, transmits and distributes electric power and energy, and provides electric service to approximately 950,000 customers in a 2,900 square mile service territory spanning portions of Maricopa, Gila and Pinal counties, plus mining loads in an adjacent 2,400 square mile area in Gila and Pinal counties.

SRP is required to submit its Ten Year Transmission Plan to the ACC on an annual basis, pursuant to A.R.S. §40-360.02.A. While SRP is not a Commission-regulated utility, SRP has voluntarily participated in the Commission's BTA process since the statute was modified in 1999 to require such a review. SRP supports the state-wide assessment and has participated in a number of jointly-owned transmission projects with other Arizona utilities.

Similarly, SRP has participated in the effort to identify renewable transmission projects, recognizing the need and importance of renewable resources to all Arizona residents as well as to facilitate coordination with other utilities and to keep the ACC apprised of such projects. SRP believes that, through proper planning, multi-purpose transmission can be identified that allows for joint development and ownership of transmission that serves both SRP needs and needs of others.

II. BACKGROUND

This section provides an overview of RES requirements and regional renewable energy assessments, followed by a summary of prior evaluations regarding Arizona's renewable energy resources and related transmission projects.

A. Renewable Energy Standards

More sustainable alternatives for production of electricity, including renewable resources, have emerged as a result of state regulatory rules, federal tax policy, technological advances, and changes in public acceptance. Arizona is surrounded by other states in the Southwest (e.g., California, Colorado, Nevada, and New Mexico) that also have RES requirements or goals (e.g., Utah). The combined effect of these standards is to substantially increase the demand for renewable energy in the region. The following paragraphs summarize RES and Renewable Portfolio Standards ("RPS") in Arizona and neighboring states.

1. Arizona

In November 2006, the Commission adopted final rules to substantially increase Arizona's RES requirements that require Commission-regulated utilities to obtain 15% of their energy from renewable resources by 2025. As part of the rule, for 2012, Commission-regulated utilities must achieve 30% of their renewable portfolio through distributed generation ("DG"), translating to 4.5% of total energy in 2025. SRP's Board has established a goal that SRP will meet a target of 20% of its expected retail energy requirements with sustainable resources by 2020.

2. California

Established in 2002 under Senate Bill 1078, accelerated in 2006 under Senate Bill 107 and expanded in 2011 under Senate Bill X1-2, California's RPS is currently one of the most aggressive renewable energy standards in the country. On April 12, 2011, Governor Brown signed legislation, the proposed Senate Bill 2 of the 1st Extraordinary Session (known as "SB 2X") which will become effective on December 10, 2011. SB 2X requires all California retail electric providers to procure 33% of their retail energy sales from eligible renewable sources by 2020. SB 2X establishes a structure under which a certain percentage of renewable energy should be procured from three different "buckets" of RPS eligible resources, including: (1) in-state or in-state equivalent products (e.g., delivery directly to a California Balancing Authority); (2) firmed and shaped products that provide incremental power; and (3) unbundled renewable energy credits and other RPS products. SB 2X also requires the CPUC to establish a procurement expenditure limitation for each utility for compliance with the RPS, and requires the CPUC to determine whether each utility can achieve the 33% RPS under those cost limitations. In addition, utilities are required to obtain at least 50% of its renewable energy requirement from in-state generation or connecting directly into balancing authorities by December 31, 2013. This requirement escalates to 75% of the RPS beginning on January 1, 2017.

The California Public Utilities Commission ("CPUC") has opened up a new proceeding (Rulemaking 11-05-005) to review the implementation and administration of SB 2X. The California Transmission

Planning Group ("CTPG") estimates that the order of magnitude of new renewables required to meet this objective is approximately 50,000 gigawatt hours ("GWh").

3. Colorado

In November of 2004, Colorado voters approved its RPS. Subsequent house bills in 2007 and 2010 further expanded the RPS to require investor owned utilities to achieve 30% of retail sales from renewable resources by 2020. Three percent of the 30% requirement is to be met by DG and half of the DG requirement is to be met by retail DG serving on-site load. In-state eligible electricity receives a 1.25 times multiplier and community-based projects (residential or government entity owned) receive a 1.5 times multiplier.

4. Nevada

In June 2005, the Nevada legislature passed a bill during a special legislative session that modified the Nevada RPS (Assembly Bill 03). The bill extends the deadline and raised the requirements of the RPS to 20% of sales by 2015 and 25% by 2025. In addition, 5% of the requirement must be met with solar by 2015 and 6% for the years 2016 through 2025. The bill also allows utilities to receive credits toward meeting the state's RPS by investing in certain energy efficiency measures. The contribution from energy efficiency measures is capped at one-quarter of the total RPS in any particular year. In addition, solar photovoltaic technology receives a 2.4 times multiplier and solar photovoltaic DG earns a 2.45 times multiplier.

5. New Mexico

Senate Bill 418 was signed into law in March 2007 and added new requirements to the state's RPS, which formerly required utilities to get 10% of their electricity needs from renewable resources by 2011. Under the new law, regulated electric utilities must have renewables meet 15% of their electricity needs by 2015 and 20% by 2020. Rural electric cooperatives must utilize renewable energy for 5% of their electricity needs by 2015, increasing to 10% by 2020. Of the 20% requirement in 2020, 4% must come from solar; 4% from wind; 2% must come from geothermal, biomass, or small hydro; and 0.6% must come from DG. Any hydro plant in service after July of 2007 qualifies towards meeting the requirements.

6. Utah

Utah passed Senate Bill 202 in March of 2008, enacting its Renewable Portfolio Goal of 20% by 2025. This requirement can be considered a goal instead of a standard as utilities are only required to pursue renewable energy when it is cost effective to do so. Utah's 20% goal is based on adjusted sales less new nuclear generation, demand side management measures, and fossil fuel plants that sequester carbon emissions. In contrast to a majority of other states, Utah has no interim targets, although utilities must still file progress reports in 2010, 2015, 2020 and 2024. Solar energy receives a 2.4 times multiplier. Also of note, Utah allows Municipal Solid Waste plants to count towards the goal.

B. Western Renewable Energy Zones – Phase 1 Report

In an effort to facilitate the construction of new, utility scale renewable energy facilities and any needed transmission to deliver that energy across the Western Interconnection,[5] the Western governors collaborated with the U.S. Departments of Energy, Interior and Agriculture, the Federal Energy Regulatory Commission ("FERC"), Canadian provincial premiers, and a diverse group of stakeholders to provide the analysis and tools to make this a reality.

The Phase 1 Report, completed in June 2009, of the four-phase Western Renewable Energy Zones ("WREZ") initiative achieved several important outcomes.[6] First, it identified the WREZ, those areas throughout the Western Interconnection that feature the potential for large scale development of renewable resources in areas with low environmental impacts, subject to resource-specific permitting processes, and screening out areas where development is prohibited or severely constrained by geography, regulation, or statutes. The stakeholders continue to work toward refining WREZ by implementing additional screening criteria that balance the benefits of renewable energy development with the need to protect wildlife and crucial habitat.

Second, the Phase 1 Report marks the completion of important work to assist evaluating various transmission strategies. The intention of the WREZ initiative is not simply to identify renewable energy zones in the Western Interconnection, but to facilitate the development of high voltage transmission to those areas with the potential for abundant renewable resources and low or easily mitigated environmental impacts. To this end, the WREZ initiative created a modeling tool to evaluate the relative economic costs of renewable resources on a delivered basis, including transmission costs, from specific renewable resource areas to specific population (load) centers. The model also calculates how much theoretical energy could be supplied from the WREZ, once identified, to the load centers across the region.

Finally, the Phase 1 Report identified the breadth of renewable energy potential across the Western Interconnection, beyond the potential identified in the WREZ. The initiative recognized that its work on regional development can and should be done in concert with more localized efforts to utilize the most cost effective renewable energy resources in the Western Interconnection.

More recently, the WREZ process compared the potential demand of renewable energy to the available renewable energy within the Western States. As part of the WREZ Initiative Webinar (held on September 27, 2011) several slides were presented that illustrate this comparison. The comparisons for Arizona, Nevada and New Mexico indicate that there is more available supply than demand; whereas, the comparison for California indicates that there is more demand than there is supply. Figure 1 through Figure 4 depict the comparison of the renewable energy demand (orange) versus supply (green) for each of these states.

[5] The Western Interconnection is the name of the electricity grid that includes the states of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; the part of Texas near El Paso; the Canadian provinces of Alberta and British Columbia; and a small portion of northern Mexico in Baja California. It is overseen by the WECC.

[6] www.westgov.org/wga/publicat/WREZ09.pdf (Last accessed October 27, 2011)

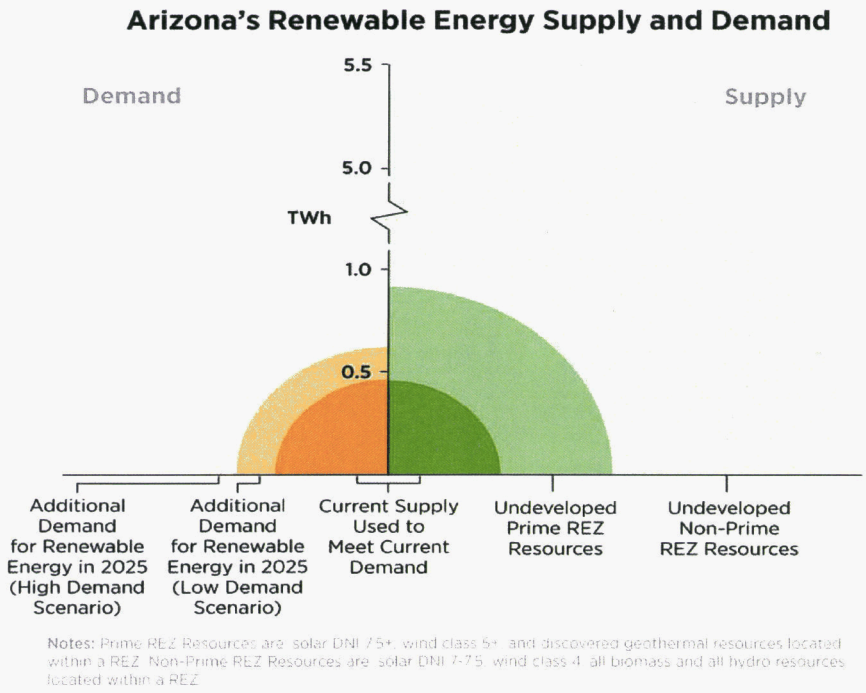

Figure 1: Arizona's Renewable Energy Supply and Demand

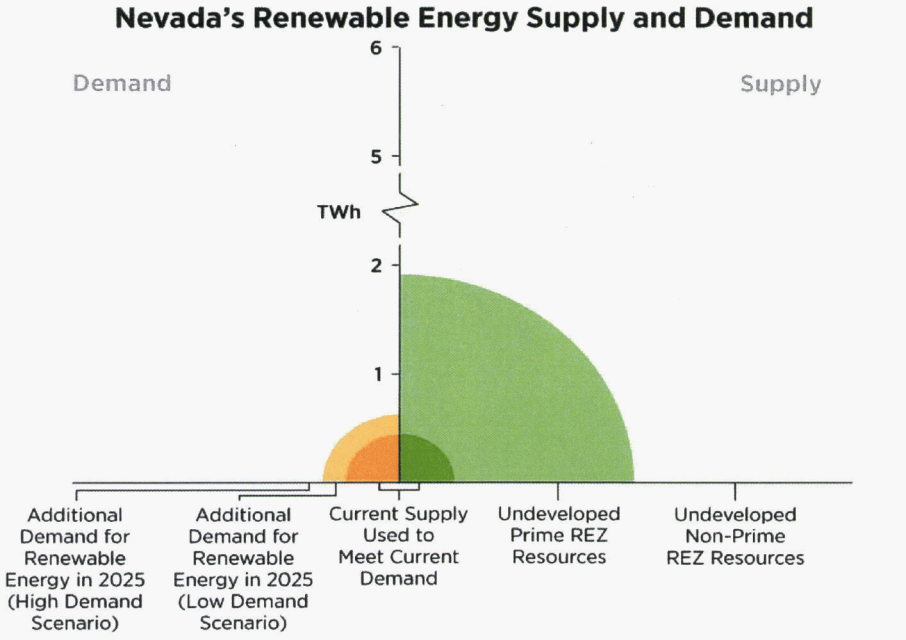

Figure 2: Nevada's Renewable Energy Supply and Demand

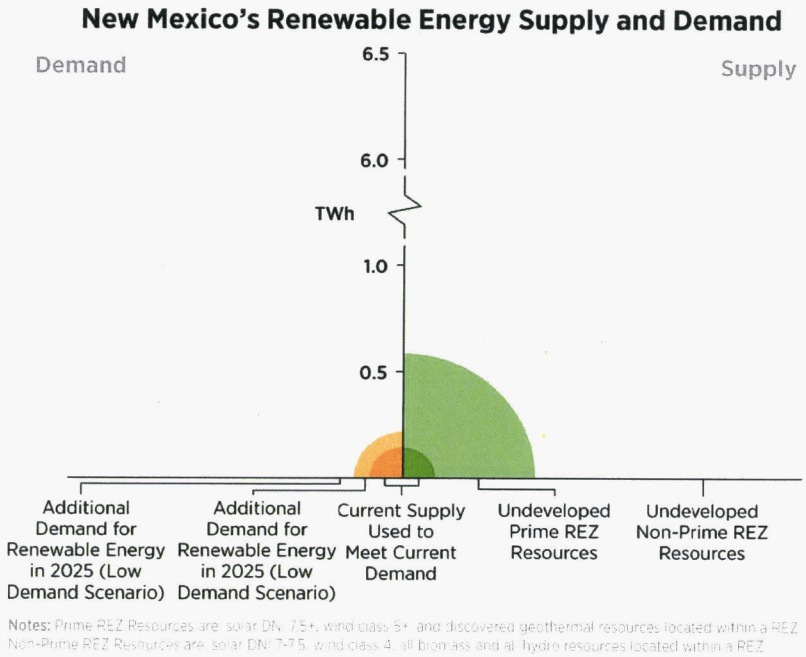

Figure 3: New Mexico's Renewable Energy Supply and Demand

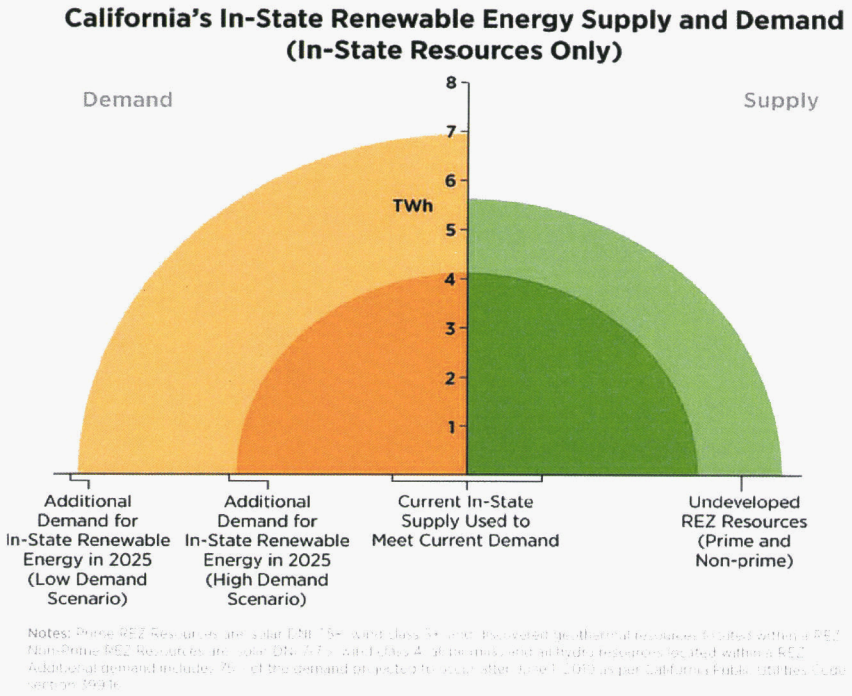

Figure 4: California's In-State Renewable Energy Supply and Demand

C. Arizona Renewable Energy Assessment

In 2007, Black & Veatch Corporation finalized a renewable energy assessment for APS, SRP, and TEP to assess the prospects for significant renewable energy development in Arizona while accounting for the economics of developing those resources. It is important to note the renewable landscape has changed significantly since the report was finalized in 2007. The scope of the study was limited to Arizona projects that would export power to the grid (that is, not distributed energy projects). The study included a review of the status of renewable energy in Arizona, a characterization of renewable power generation technologies, an assessment of Arizona's renewable resources, and an assessment of key risk factors.

The study concluded that Arizona is well known for its solar resources and that solar was the most expensive renewable energy resource at the time of assessment. The cost to install solar photovoltaic has declined over time which has narrowed the price difference when compared to conventional generation. By comparison, the study stated that Arizona is thought by many to have relatively limited opportunities for what where then believed to be comparatively lower cost renewables, such as wind, biomass, geothermal and hydroelectric. The study evaluated the relative potential of all resources and forecasts which are most likely to be developed over the 20 years.

The study also concluded that, in the mid to near-term, developable potential for new biomass, geothermal, and hydroelectric projects combined could contribute about 1,080 GWh per year, or 1% of the electricity that was generated in Arizona in 2005 while wind could contribute about 2.5%. Despite the relatively limited potential of wind, biomass, geothermal and hydroelectric resources, they serve an important role in forestalling the need to install the more expensive solar. Solar photovoltaic is now considered one of the least expensive renewable resources. This study demonstrates how quickly the landscape for renewable resources can change.

D. Summary of BTA Orders, Renewable Transmission Task Force, and Arizona Renewable Resource and Transmission Identification Subcommittee

1. BTA Orders

The ACC biennially reviews ten-year plans filed by Commission-regulated utilities and other entities, who want to construct transmission within the State of Arizona. After analyzing the ten-year plans and conducting workshops for stakeholder input, ACC Staff drafts the BTA, evaluating the adequacy of existing and planned transmission facilities to reliably meet the present and future needs of the State. Every two years, the Commission approves the BTA.

The Commission's Fourth BTA Decision[7] ordered that, for the Fifth BTA, Commission-regulated electric utilities should prepare a plan to identify the renewable resource areas in the state, the amount of transmission capacity available to deliver the identified renewable resources to load, and the transmission needed to deliver the identified renewable resources in Arizona to load. To aid in compliance with the Fourth BTA Decision, the utilities developed the Renewable Transmission Task Force ("RTTF"), a task force of the Southwest Area Transmission ("SWAT") sub-regional planning group, to identify renewable

[7] Commission Decision No. 69389 (March 22, 2007).

energy resource areas and the transmission necessary to bring those resources to load centers. Following coordinated efforts between the utilities and stakeholders, SWAT issued the 2007 SWAT Renewable Transmission Task Force Report[8] identifying the location and a theorized amount of renewable energy development opportunities for several different locations in Arizona, and the conceptual transmission lines that would be necessary to bring those resources to load centers.

The Commission's Fifth BTA Decision,[9] directed the Commission-regulated utilities to develop plans to identify future renewable transmission projects and to develop plans and proposed funding mechanisms to construct the top three RTPs in their respective service territories. In addition, the Commission-regulated utilities were directed to conduct a joint workshop or series of planning meetings to develop ways in which new transmission projects can be identified, approved for construction, and financed in a manner that will support the growth of renewable energy in Arizona.

2. Arizona Renewable Resource and Transmission Identification Subcommittee

To aid in response to the decision in the Fifth BTA, the RTTF established the Arizona Renewable Resource and Transmission Identification Subcommittee ("ARRTIS") to identify, more specifically, those areas in Arizona with the best potential for renewable generation project development based on resource availability and environmental sensitivities. The ARRTIS convened a process to gather, review, and map renewable resource and environmental sensitivity data for the State of Arizona and to provide input and support to the renewable transmission planning efforts of the RTTF. The process identified areas within the state where utility-scale solar and wind resources were available and had the potential to be developed.

The ARRTIS developed resource maps identifying environmental exclusion and sensitivity areas, with an overlay of existing and potential future transmission corridors. The RTTF used the information provided by the ARRTIS to identify transmission options that would link the resource areas to the existing transmission system to load pockets within the state or for export from Arizona.

3. Renewable Transmission Task Force Finance Subcommittee

The RTTF also established a Finance Subcommittee to investigate and recommend methods for financing RTPs in Arizona. Areas of investigation included: developing a working definition for a renewable transmission project; reviewing various project subscription methodologies; developing provisions for recovery of reasonable and prudent costs, including various methods for allocation of both a base and incentive return on equity for development of RTPs; and assessing relevant legislative and regulatory developments. The Finance Subcommittee held several meetings to discuss a range of issues related directly to financing methodologies. The Subcommittee coordinated its efforts with the ARRTIS to provide recommendations to electric utilities to assist in the identification of each utility's top three renewable transmission projects.

The Finance Subcommittee formed a smaller legal working group to formulate recommendations for the subcommittee's consideration. The Finance Subcommittee adopted the recommendations and included

[8] 2007 SWAT Renewable Energy Transmission Task Force Report (Filed in Docket No. E-00000D-07-0376, May 15, 2008).

[9] Commission Decision No. 70635 (December 11, 2008).

them in the final report.[10] The final report of the Finance Subcommittee included recommendations for the electric utilities to file future Renewable Transmission Action Plans ("RTAP") and the process to identify future renewable transmission projects. The proposed RTAP Process, to be concurrent with the ten year plan filings and conducted in corresponding BTA years, outlined how future renewable transmission projects should be described, including how it advances renewable penetration in Arizona, among a number of other requirements.

Both of these efforts culminated in reports filed with ACC Docket Control and posted on the WestConnect Website.[11] The ARRTIS report is titled, "Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee" (September 2009). The final report for the Finance Subcommittee is titled, "A Final Report on the Activities of the Finance Subcommittee" (October 5, 2009).

To satisfy the remaining directive of the Commission's Decision in the Fifth BTA, the utilities each filed a report, with the Commission, identifying future renewable transmission projects, plans and proposed funding mechanisms to construct the top three RTPs in their respective service territories.[12] The following list outlines the priority RTPs and identifies the pursuing utility. Some of the projects are anticipated to be joint participation projects.

E. Arizona Utilities' Top Three Renewable Transmission Projects

As ordered by the Commission's Decision, in 2009 each Commission-regulated utility and SRP identified its priority future RTPs and developed plans and proposed funding mechanisms to construct the top three projects. The priority projects are listed below, along with the participating utilities.

1. Delaney to Palo Verde 500 kilovolt ("kV") Line (APS, SRP)
2. Palo Verde to North Gila #2 (APS)
3. Palo Verde to Liberty (area) and Gila Bend to Liberty (area) (APS)
4. Palo Verde to Pinal West to Pinal Central (SRP, TEP)
5. Pinal Central to Tortolita (SRP, TEP)
6. Western Apache to Tortolita/Saguaro 115kV Line Upgrade (TEP, SWTC)
7. San Manuel Interconnect Project (SWTC)
8. Apache to Bicknell 230kV Line Upgrades (SWTC)

In addition, to the priority projects identified above, the following projects were identified as additional transmission projects of significant interest to the utilities but did not have as high of a priority as the top three:

[10] Finance Subcommittee Final Report dated October 5, 2009 (Filed in Docket No. E-0000A-09-0066).

[11] http://www.westconnect.com/filestorage/ARRTIS%20Final%20Report.pdf (Last accessed October 18, 2011)

[12] APS's RTAP was filed in Docket No. E-01345A-10-0033 (Decision No 72057). SRP filed a report in Docket No. E-00000D-07-0376. TEP and UNS Electric filed a report in Docket No. E-00000D-07-0376. SWTC filed a report in Docket No. E-00000A-09-0066.

1. Coronado to Phoenix Valley 500kV Line (SRP)
2. Palo Verde (Delaney) to Blythe (Colorado River) 500kV Line (APS, SRP)
3. SunZia Southwest Transmission Project (SRP, SWTC, TEP)
4. Palo Verde to North Gila #2 (SRP)
5. Pinal Central to Tortolita (SWTC)

Figure 5 illustrates the RTPs and additional projects of significant interest.

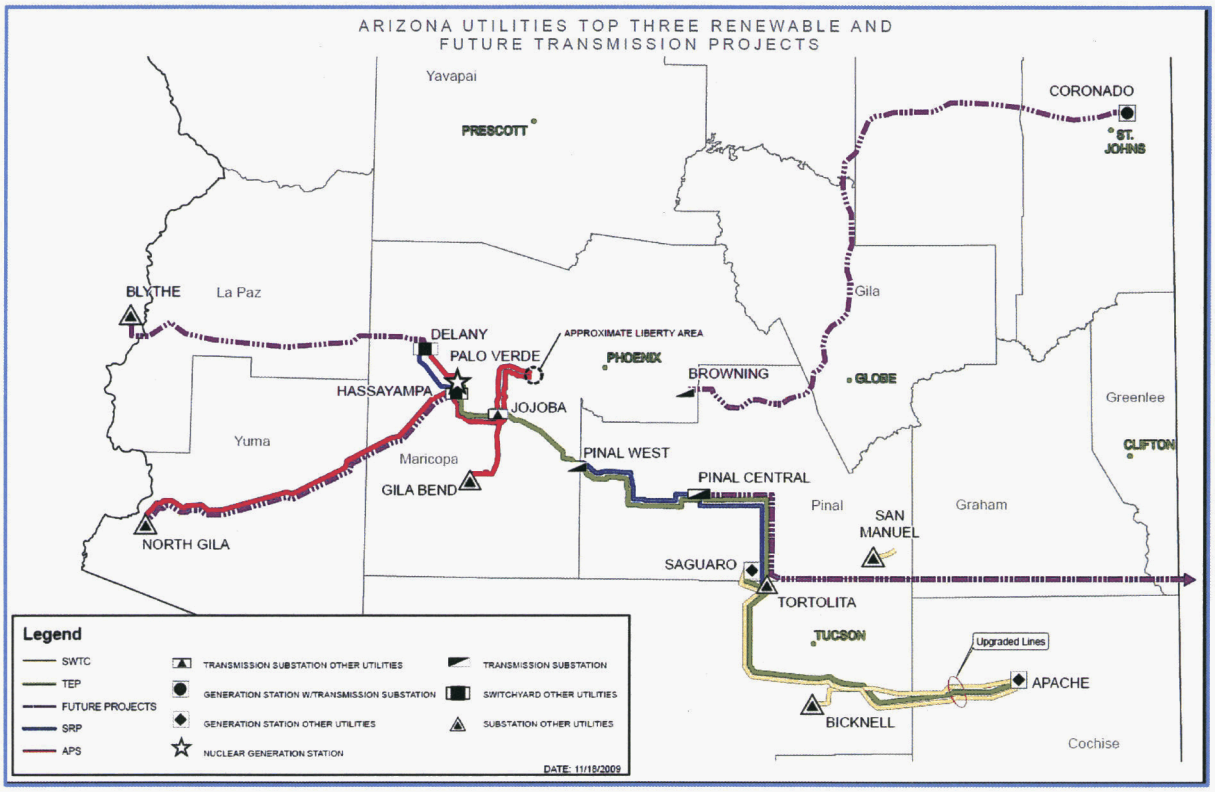

Figure 5: Arizona RTP Projects (Including Additional Projects of Significant Interest)

F. Arizona Transmission Paths

Arizona has several transmission paths that are used for importing and exporting regional resources as part of the interconnected transmission system. Many of the paths are part of the Western Electricity Coordinating Council ("WECC") Path Rating Process that have been technically evaluated via a rigorous peer review process to determine their respective scheduling limit, or rating. Within Arizona, utilities are responsible for the scheduling on the transmission facilities. The Total Transfer Capability ("TTC") of these paths are posted on their respective Open Access Same-time Information System ("OASIS").

Figure 6 illustrates the WECC regional transmission paths specific for the desert southwest area.

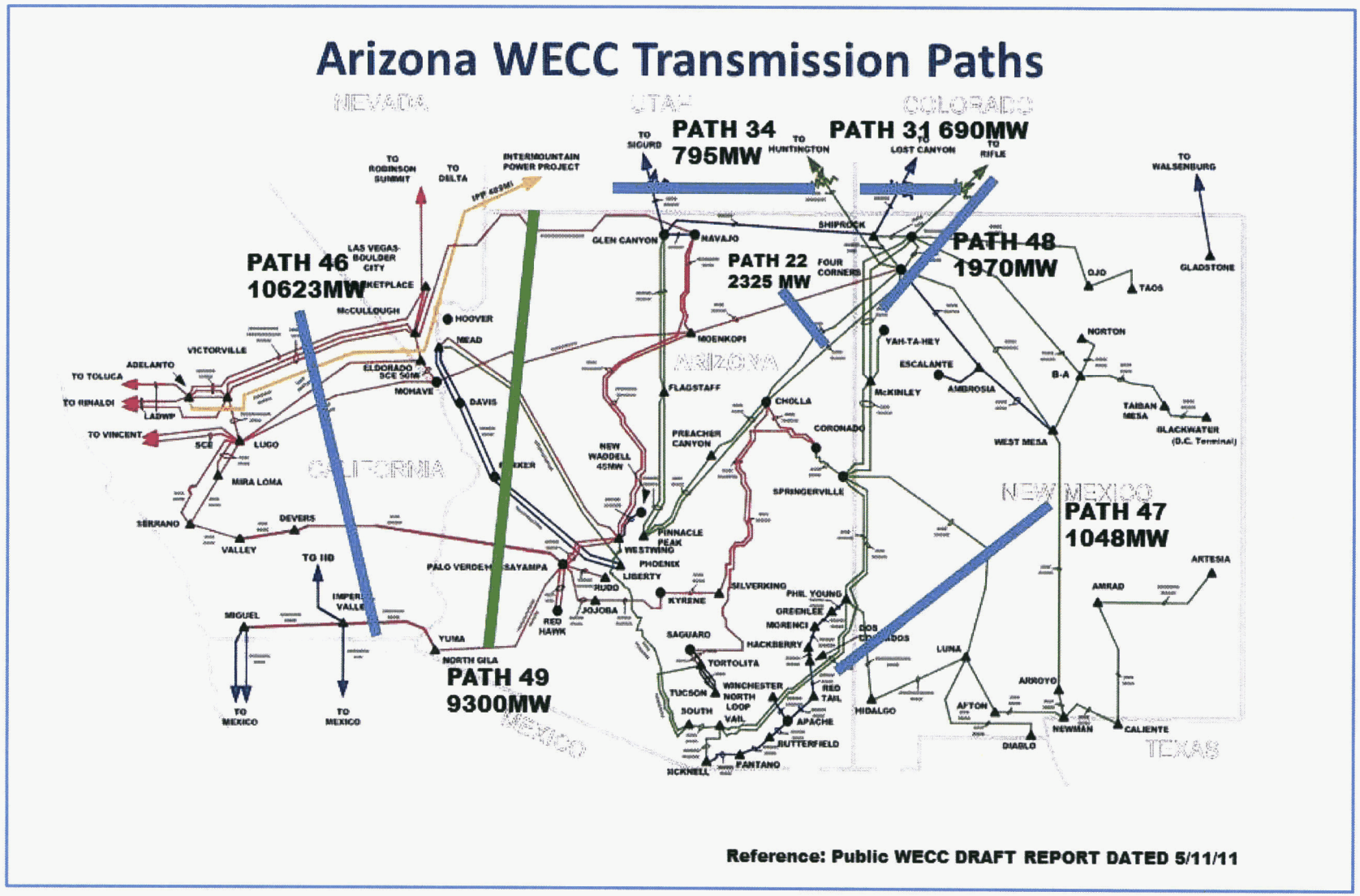

Figure 6: Desert Southwest WECC Regional Transmission Paths

III. TECHNICAL ASSESSMENT

A. Introduction

This assessment resulted from Commission Decision No. 72031 (the Sixth BTA) that mandated a study to assess Arizona's ability to export renewable energy. This technical evaluation assessed the deliverability of the existing transmission system and the incremental deliverability with the addition of the RTP system to export renewable resources from the Arizona REZ to Southern California. The assessment used an injection analysis approach to bench mark the existing system and to assess the incremental deliverability of the RTPs to deliver energy to Southern California.[13] Energy was injected into each bus that represented the Arizona REZ, until an Extra High Voltage ("EHV") (345kV or above) element reached its thermal limit. This analysis was performed pre- and post-RTP, first on the base system without the RTPs and then on the base system with the RTPs. The incremental deliverability was measured by the amount of change in the flows on the lines that interconnect the Arizona system to the Southern California system.

The interface between Arizona and Southern California is identified as the East of the Colorado River ("EOR") Path (WECC Path 49). The EOR path consists of six EHV transmission lines that interconnect the Arizona system to the Southern California system:

1. Navajo-Crystal 500kV
2. Eldorado-Moenkopi 500kV
3. Liberty-Peacock-Mead 345kV
4. Perkins-Mead 500kV
5. Palo Verde-Devers 500kV
6. Hassayampa-North Gila 500kV

The incremental deliverability from the Arizona REZ injections was measured based on the incremental change in the flows on the EOR path.

This technical assessment is not intended to identify specific increases in transfer capacity for the identified transmission paths. This technical assessment was used to identify potential export capacity if certain paths were to be developed. The WECC three-phase rating process would be required to establish the transfer capacity of future transmission paths.

B. Methodology

1. Base Case Selection

The base case selected for this study was the SWAT 2014 Heavy Summer Base Case. This base case is an Arizona regional base case developed from the WECC 2014 HS3-SA approved base case. The base case is a coordinated base case which includes all the Arizona utilities and it represents a 2014 planned system and a 2014 load and resource forecast. The base case was developed and approved by the SWAT/Central Arizona Transmission System sub-regional planning group in April 2011. The base case does not

[13] The study assumed that area resources and area interchange were adjusted to simulate energy schedules of 20% to Arizona loads and 80% to Southern California.

represent a stressed EOR flow, it represents a typical heavy summer system representation with a typical heavy summer system dispatch.

2. Base Case Scenarios

The two study cases were developed from the original SWAT 2014 heavy summer base case as follows:

1. Base Case without the RTPs
2. Base Case with the RTPs

Table 1 summarizes the EOR path flow and the flow on each EOR element for the two study base cases, with and without the RTP projects (EOR unstressed).

Table 1: Summary of EOR Flows, With and Without RTPs

SWAT HEAVY BASE CASE			
EAST OF COLORADO RIVER PATH FLOW			
WITH OUT RTPs		WITH RTPs	
EOR Element	Flow (MW)	EOR Element	Flow (MW)
Navajo Crystal 500kV	1059.41	Navajo Crystal 500kV	1058.00
Eldorado-Moenkopi 500kV	975.95	Eldorado-Moenkopi 500kV	973.78
Liberty-Peacock-Mead 345kV	-97.02	Liberty-Peacock-Mead 345kV	-103.91
Perkins-Mead 500kV	205.26	Perkins-Mead 500kV	174.00
Palo Verde Devers 500kV	1499.76	Palo Verde Devers 500kV	1404.00
Hassayampa-North Gila #1 500kV	1255.71	Hassayampa-North Gila #1 500kV	930.70
		Hassayampa-North Gila #2 500kV	722.90
TOTAL EOR FLOW:	**4899.07**	TOTAL EOR FLOW:	**5199.47**

Note: Negative numbers represent flow in the opposite direction.

3. Identify Renewable Energy Zones

As previously described, ARRTIS was created as a subcommittee of the RTTF to identify, more specifically, those areas in Arizona with the best potential for renewable generation project development. The following injection buses were selected to represent the ARRTIS identified REZs and are illustrated in Figure 7:

1. Palo Verde 500kV
2. Pinal Central 500kV
3. Moenkopi 500kV
4. Cholla 500KV
5. Coronado 500kV
6. Winchester 345kV
7. Apache 230kV

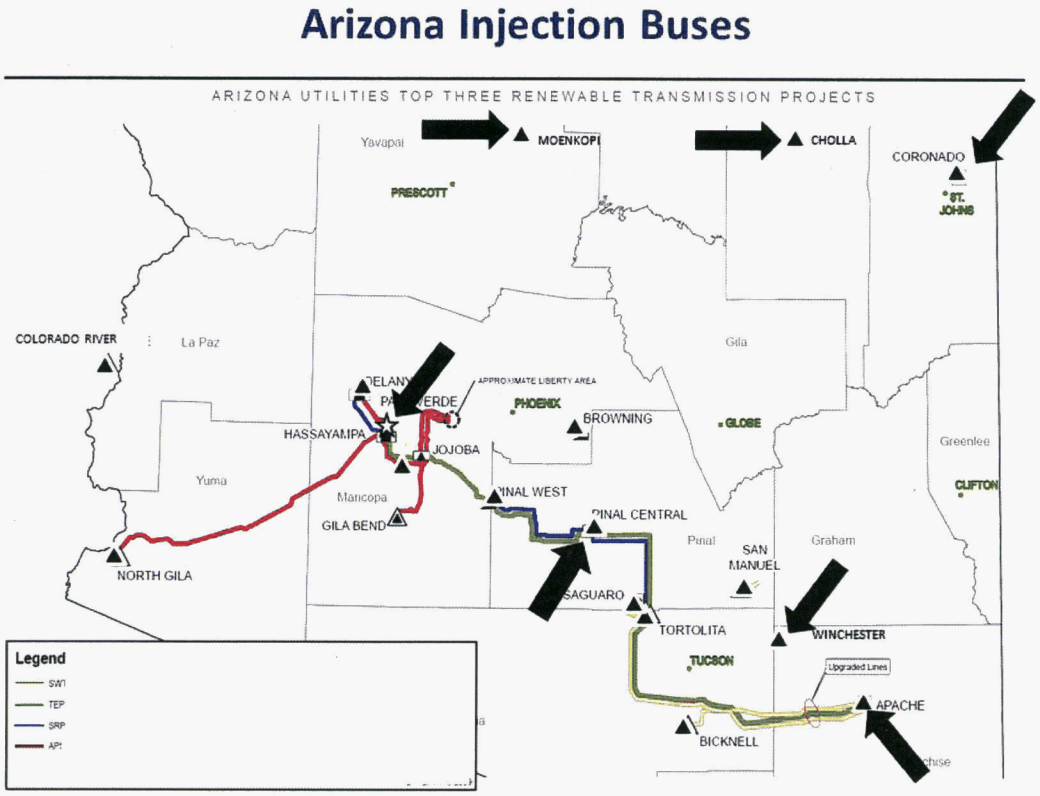

Figure 7: Arizona Renewable Energy Zones for Injections Available for Export

4. Delivery Scenarios

Based on Arizona Utilities' RES requirements of 15 to 20%, this technical analysis assumed that 20% of the renewable resources being evaluated would be delivered to Arizona loads.

The following is the delivery Scenario evaluated in this assessment specifically for scheduling to Arizona and Southern California loads (offset by respective local generation resources):

1. Arizona area load (20%)
2. Southern California area loads (80%), allocated as follows[14]:
    a. Los Angeles Department of Water & Power (30%)
    b. San Diego Gas & Electric (15%)
    c. Southern California Edison (55%)

5. Assess the 2014 Arizona System without the RTP system

The selected base case was adjusted to represent the Arizona system without the RTP system. Injection buses were defined based on the Arizona REZs. Each defined injection bus was analyzed individually. Energy was injected into each injection bus, one at a time, until an EHV system element reached its thermal-rated limit based on N-0 (the system operating with all expected transmission and generation

[14] Typical resource allocation when scheduling resources to Southern California.

facilities in service) or N-1(the loss of any single power system element such as a transmission line or transformer) power flow analysis. Area resources and area interchange were adjusted to simulate energy schedules of 20% to Arizona loads and 80% to Southern California for each injection. Injection levels and EOR path flow levels were monitored for each injection bus.

6. Assess the 2014 Arizona System with the RTP system

The selected base case was adjusted to represent the Arizona system with the RTP system. Each defined injection bus was studied using a power flow analysis by injecting energy into each injection bus until an EHV system element reached its thermal-rated limit. The power flow analysis looked at two different system conditions: (1) normal condition (N-0); and (2) a single contingency condition (N-1). Area resources and area interchange were adjusted to simulate energy schedules of 20% to Arizona loads and 80% to Southern California for each injection. Injection levels and EOR path flow levels were monitored for each injection bus. The following RTP Projects were modeled for the post-RTP case:

1. Delaney to Palo Verde 500kV Line
2. Palo Verde to North Gila #2
3. Palo Verde to Pinal West to Pinal Central
4. Pinal Central to Tortolita
5. Western Apache to Tortolita/Saguaro 115kV Line Upgrade
6. San Manuel Interconnect Project
7. Apache to Bicknell 230kV Line Upgrades

7. Identify Specific Transmission Corridors

Commission Decision No. 72031 required the jurisdictional utilities to identify specific corridors that should be built to enhance Arizona's ability to export renewable energy to outside markets. This assessment only looked at exporting to Southern California due to the market potential identified by WECC at the start of this study process. For additional capacity to the Southern California Markets, the need for new transmission corridors was not found. Expansion of the existing transmission within existing corridors was identified as the best solution. The expanded transmission included in this evaluation as Sensitivity #1 and Sensitivity #2 is defined below.

1. Sensitivity #1: For the Palo Verde injection analysis, include the addition of the Delaney to Colorado River 500kV line (existing PV-DEV Corridor) and
2. Sensitivity #2: For the Palo Verde injection analysis, include the addition of both the Delaney to Colorado River 500kV line and the North Gila to Imperial Valley #2 500kV Line (existing PV-NG-IV Corridor).

8. Key Assumptions

- Base Case SWAT 2014 Heavy Summer base case (not a stressed case)
- The Assessment only looked at (N-0) and (N-1) power flow analysis
- The Assessment did not address any contractual arrangements
- The Assessment did not indicate the type of renewable resource
- The RTPs were assessed together as a whole (not individually)
- Injections were analyzed at individual buses only (not simultaneously)

C. Technical Assessment Results

This technical assessment demonstrates that the RTPs contribute to increased transmission system transfer capability, including export capability, which may be accessed by renewable projects or generally utilized for multiple purposes. No attempt has been made to distinguish among uses other than to perform injection studies at locations that are candidates for renewable energy project development.

1. Palo Verde 500kV Injection

The initial injection amount at the Palo Verde 500kV bus without the RTPs was 2500 megawatts ("MW"). The limiting element was the (N-0) overload of the Hoodoo Wash to North Gila 500kV line. At this injection level the EOR path flow was at 6911 MW. With the RTPs the injection level was increased by 750 MW to 3250 MW. The limiting element was the (N-0) overload of the North Gila to Imperial Valley 500kV line. At this injection level the EOR path flow was increased by 526 MW to 7437 MW. Figure 8 represents the Palo Verde injection with RTPs included.

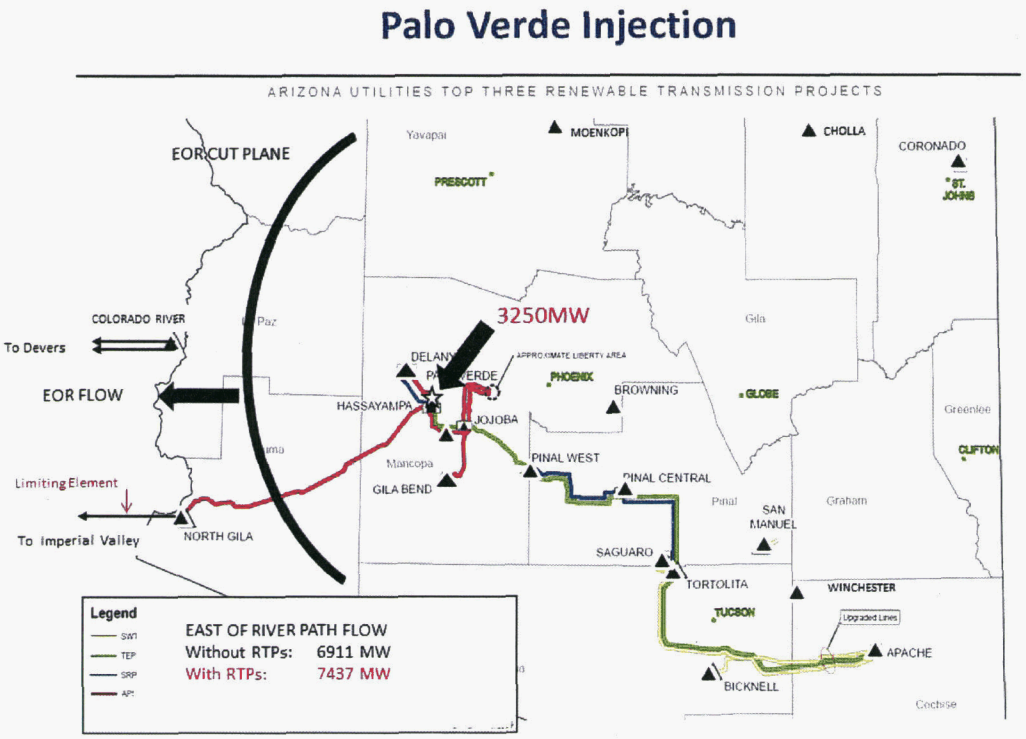

Figure 8: Palo Verde Injection with RTPs

2. Palo Verde Sensitivity #1 (RTPs with the addition of the Delaney to Colorado River 500kV Line)

Sensitivity #1 was analyzed to assess what additional incremental export could be achieved by adding an additional transmission line between Arizona and Southern California. The Delaney to Colorado River 500kV line was selected based on its direct connection to Southern California and as being identified as a project of significant interest to the utilities.

With the addition of the Delaney to Colorado River 500kV line, the Palo Verde 500kV bus injection was increased by 550 MW to 3800 MW. The limiting element was the (N-0) overload of the North Gila to Imperial Valley 500kV line, which is located primarily in California. At this injection level the EOR path flow was increased by 436 MW to 7873 MW. The cumulative impact, due to the RTPs and addition of the Delaney to Colorado River 500 kV Line is an increase in Palo Verde injection of 1300 MW and EOR flow of 962 MW, respectively. Figure 9 represents the Palo Verde injection with RTPs and the Delaney to Colorado River 500 kV line included.

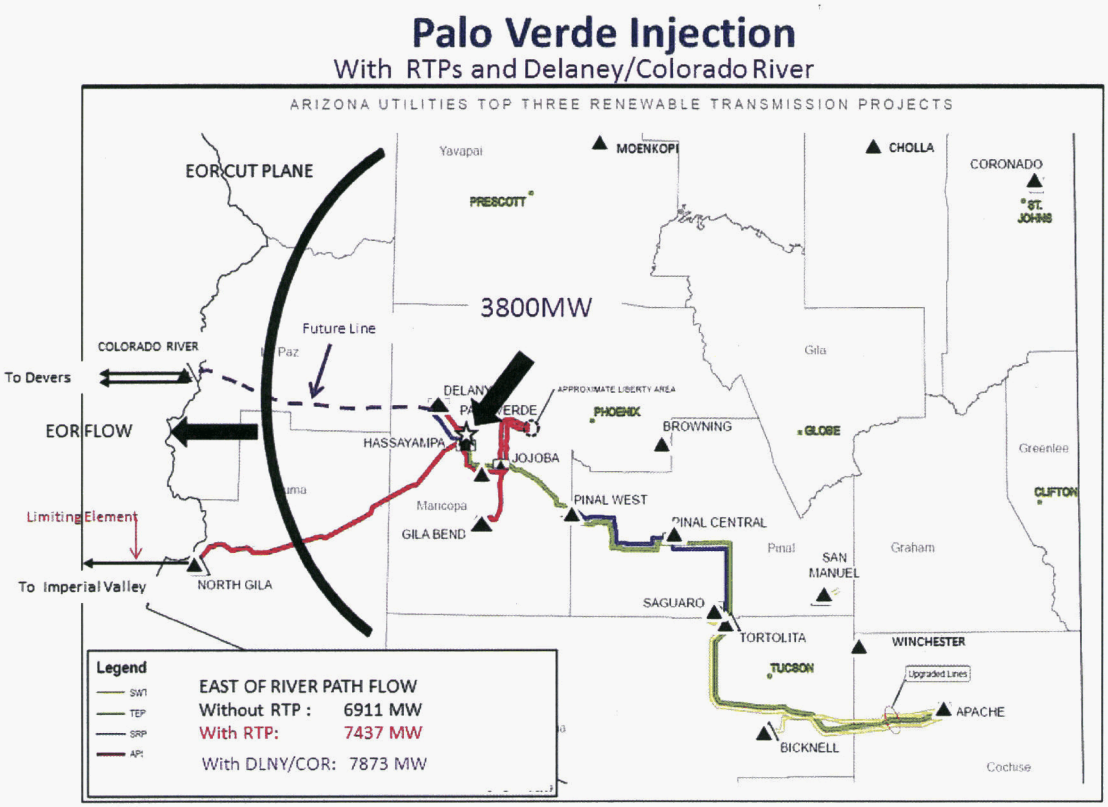

Figure 9: Palo Verde Injection with RTPs and Delaney to Colorado River 500kV Line

3. Palo Verde Sensitivity #2 (RTPs with the addition of the Delaney to Colorado River and the North Gila to Imperial Valley 500kV #2 Lines)

Sensitivity #2 was analyzed to assess what additional incremental export could be achieved by mitigating the limiting element (North Gila – Imperial Valley 500kV line). For this analysis the addition of the North Gila – Imperial Valley 500kV #2 line was the selected mitigation.

With the addition of the Delaney to Colorado River 500kV line and the North Gila – Imperial Valley 500kV #2 line, the Palo Verde 500kV bus injection was increased by 2900 MW to 6700 MW. The limiting element was the (N-1) overload of the Hassayampa to North Gila #2 500kV line for an outage of the Hoodoo Wash to North Gila 500kV line. At this injection level the EOR path flow was increased by 2701 MW to 9944 MW. The cumulative impact, due to the RTPs and addition of the Delaney to Colorado River and the North Gila to Imperial Valley #2 500 kV Lines is an increase in Palo Verde injection of 4200 MW and EOR flow of 3033 MW, respectively. Figure 10 represents the Palo Verde injection with RTPs, the Delaney to Colorado River 500 kV line, and North Gila to Imperial Valley 500kV #2 included.

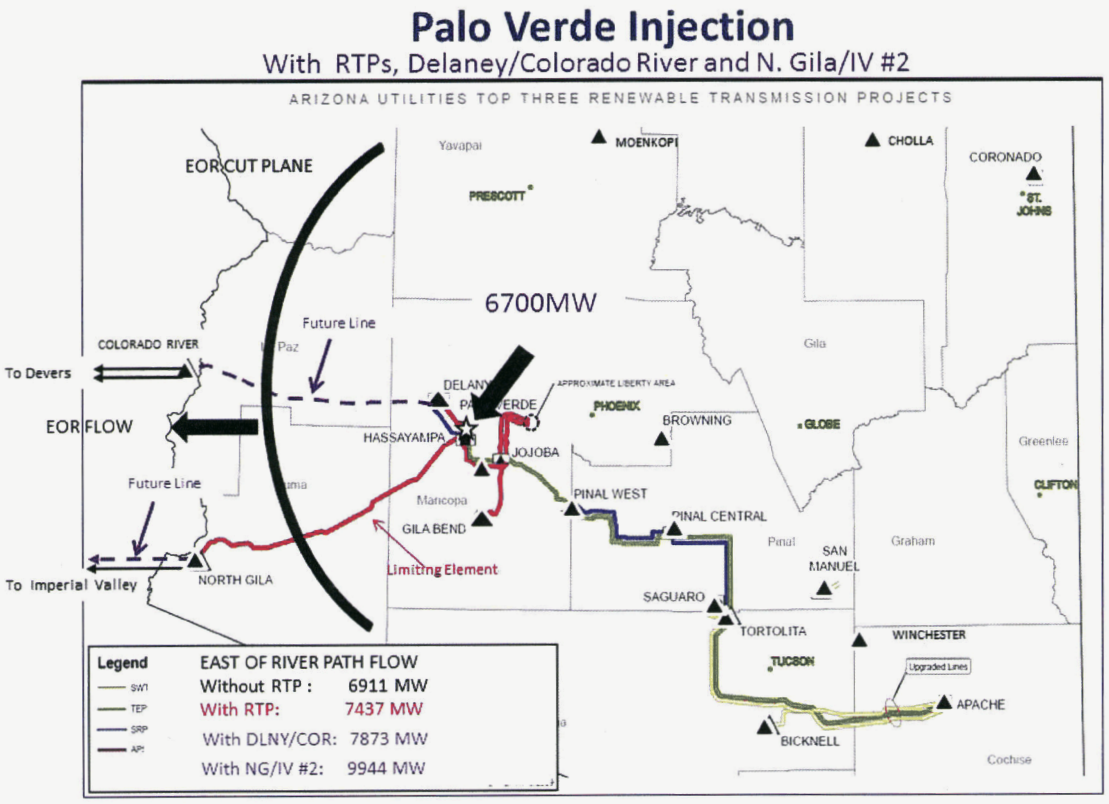

Figure 10: Palo Verde Injection with RTPs, Delaney to Colorado River 500 kV Line, and North Gila to Imperial Valley 500kV #2 Line

4. Pinal Central 500kV Injection

The initial injection amount at the Pinal Central 500kV bus without the RTPs was 1200 MW. The limiting element was the (N-1) overload of the Pinal Central 500/230kV transformers 1 & 2 for the outage of the Browning to Abel 500kV line. At this injection level the EOR path flow was at 5940 MW. With the RTPs the injection level was increased by 2200 MW to 3400 MW. The limiting element was the (N-0) overload of the North Gila to Imperial Valley 500kV line. At this injection level the EOR path flow was increased by 1533 MW to 7473 MW.

This injection bus shows a large delta increase as compared to the other injection buses. This is due to the fact that for the Pre RTP base case the Pinal Central bus does not include two 500kV lines which have been identified as Renewable Transmission Projects. Without these lines, the Pinal Central bus is only connected to the system via two 500/230kV transformers. This configuration greatly limits the initial injection into the bus which yields a large delta after adding the two 500kV lines as part of the RTPs. Figure 11 represents the Pinal Central injection with RTPs included.

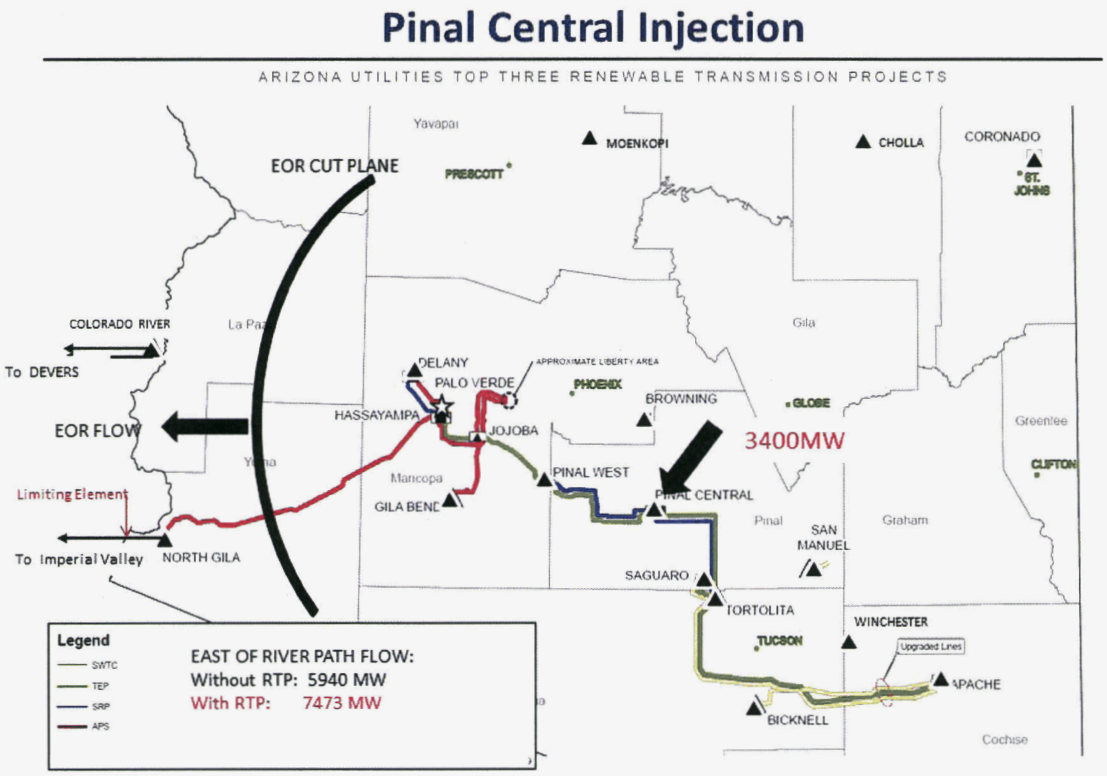

Figure 11: Pinal Central Injection with RTPs

5. Moenkopi 500kV Injection

The initial injection amount at the Moenkopi 500kV bus without the RTPs was 2250 MW. The limiting element was the (N-1) overload of the Moenkopi to Eldorado 500kV line for the outage of Navajo to Crystal 500kV line. At this injection level the EOR path flow was at 6747 MW. With the RTPs the injection level was increased by 250 MW to 2500 MW. The limiting element was the (N-1) overload of the Moenkopi to Eldorado 500kV line for the outage of the Navajo to Crystal 500kV line. At this injection level the EOR path flow was increased by 179 MW to 6926 MW. Figure 12 represents the Moenkopi injection with RTPs included.

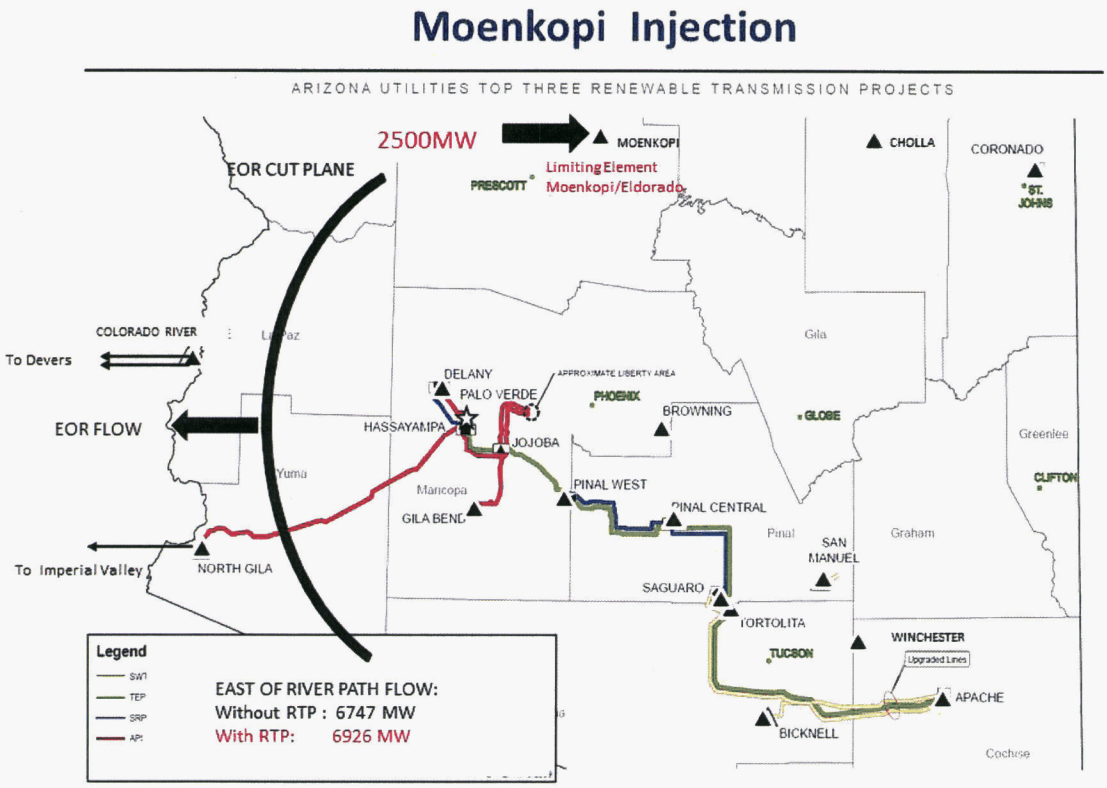

Figure 12: Moenkopi Injection with RTPs

6. Cholla 500kV Injection

The initial injection amount at the Cholla 500kV bus without the RTPs was 620 MW. The limiting element was the (N-0) overload of the Cholla to Saguaro 500kV line. At this injection level the EOR path flow was at 5569 MW. With the RTPs the injection level did not change from the 620 MW. The limiting element remained the same and there was no change in the EOR path flow. Figure 13 represents the Cholla injection with RTPs included.

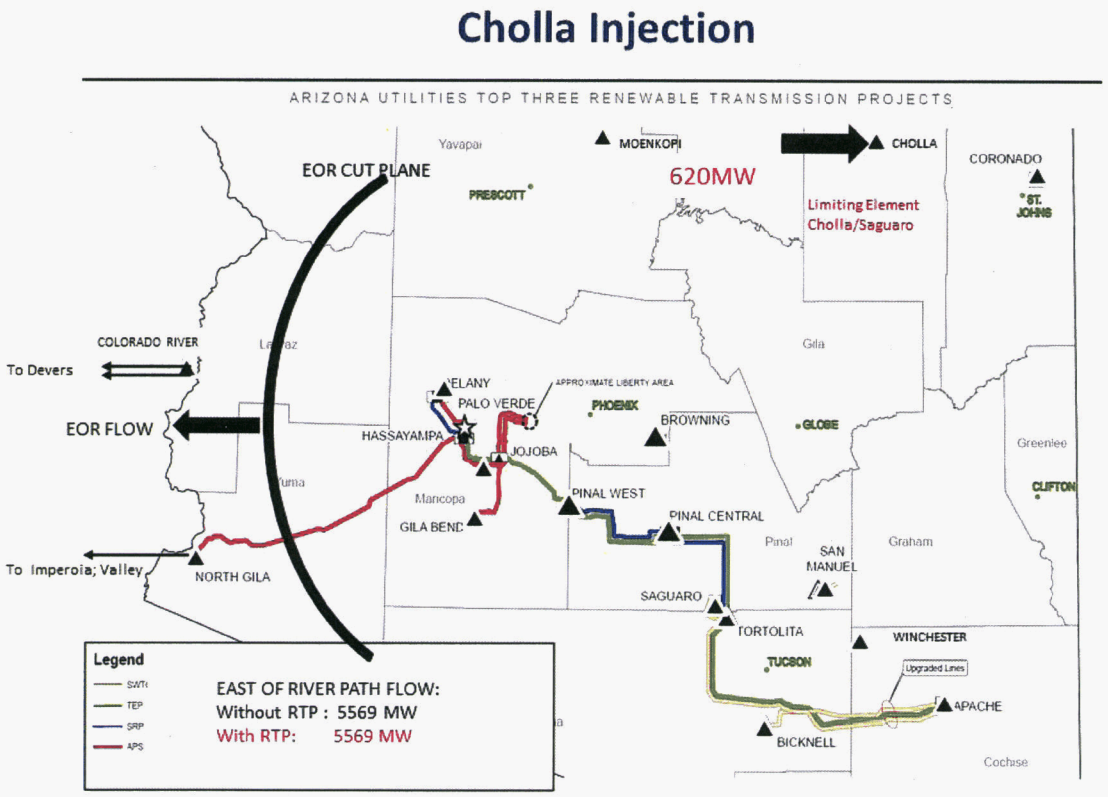

Figure 13: Cholla Injection with RTPs

7. Coronado 500kV Injection

The initial injection amount at the Coronado 500kV bus without the RTPs was 1250 MW. The limiting element was the (N-0) overload of the Cholla to Saguaro 500kV line. At this injection level the EOR path flow was at 5982 MW. With the RTPs the injection level did not change from the 1250 MW. The limiting element remained the same and there was no change in the EOR path flow. Figure 14 represents the Coronado injection with RTPs included.

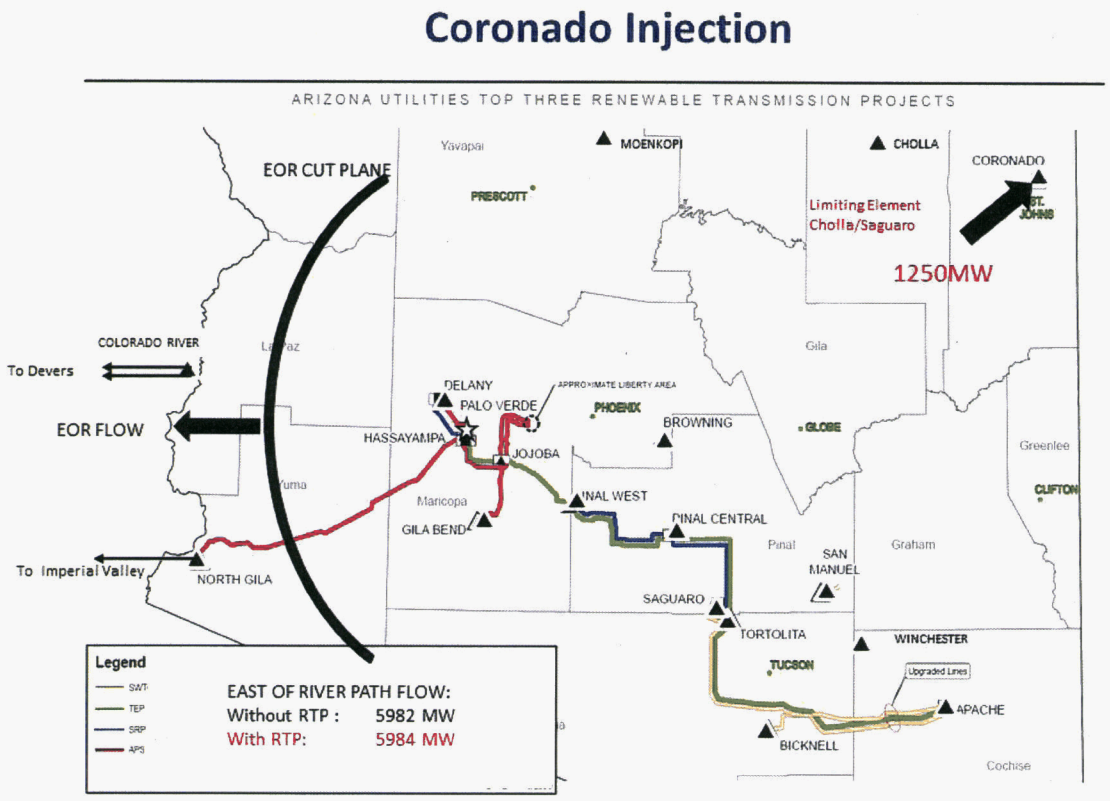

Figure 14: Coronado Injection with RTPs

8. Winchester 345kV Injection

The initial injection amount at the Winchester 345kV bus without the RTPs was 240 MW. The limiting element was the (N-1) overload of the Apache to Butterfield 230kV line for the outage of Winchester to Vail 345kV line. At this injection level the EOR path flow was at 5324 MW. With the RTPs the injection level was increased by 400 MW to 640 MW. The limiting element was the (N-1) overload of the Apache to Butterfield 230kV line for the outage of the Winchester to Vail 345kV line. At this injection level the EOR path flow increased by 265 MW to 5589 MW. Figure 15 represents the Winchester injection with RTPs included.

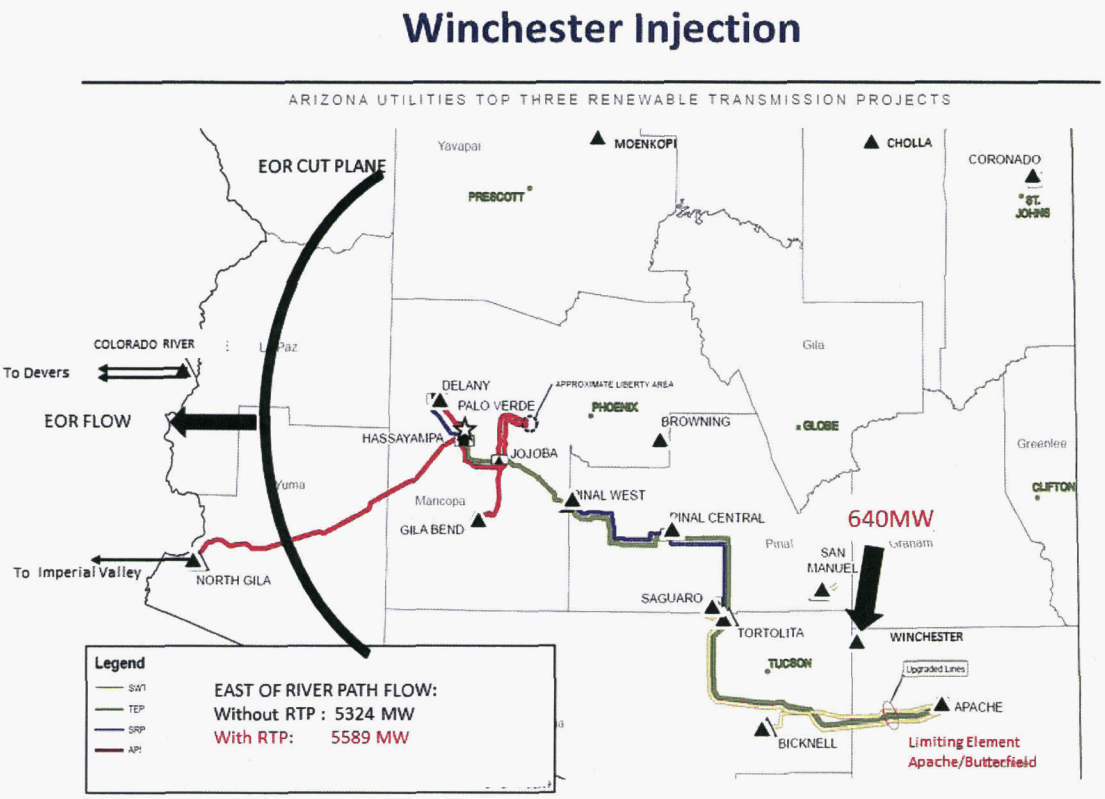

Figure 15: Winchester Injection with RTPs

9. Apache 230kV Injection

The initial injection amount at the Apache 230kV bus without the RTPs was 165 MW. The limiting element was the (N-1) overload of the Apache to Butterfield 230kV line for the outage of the Winchester to Vail 345kV line. At this injection level the EOR path flow was at 5275 MW. With the RTPs the injection level was increased by 260 MW to 425 MW. The limiting element was the (N-1) overload of the Apache to Winchester 230kV line for the outage of the Apache to Butterfield 230kV line. At this injection level the EOR path flow was increased by 172 MW to 5447 MW. Figure 16 represents the Apache injection with RTPs included.

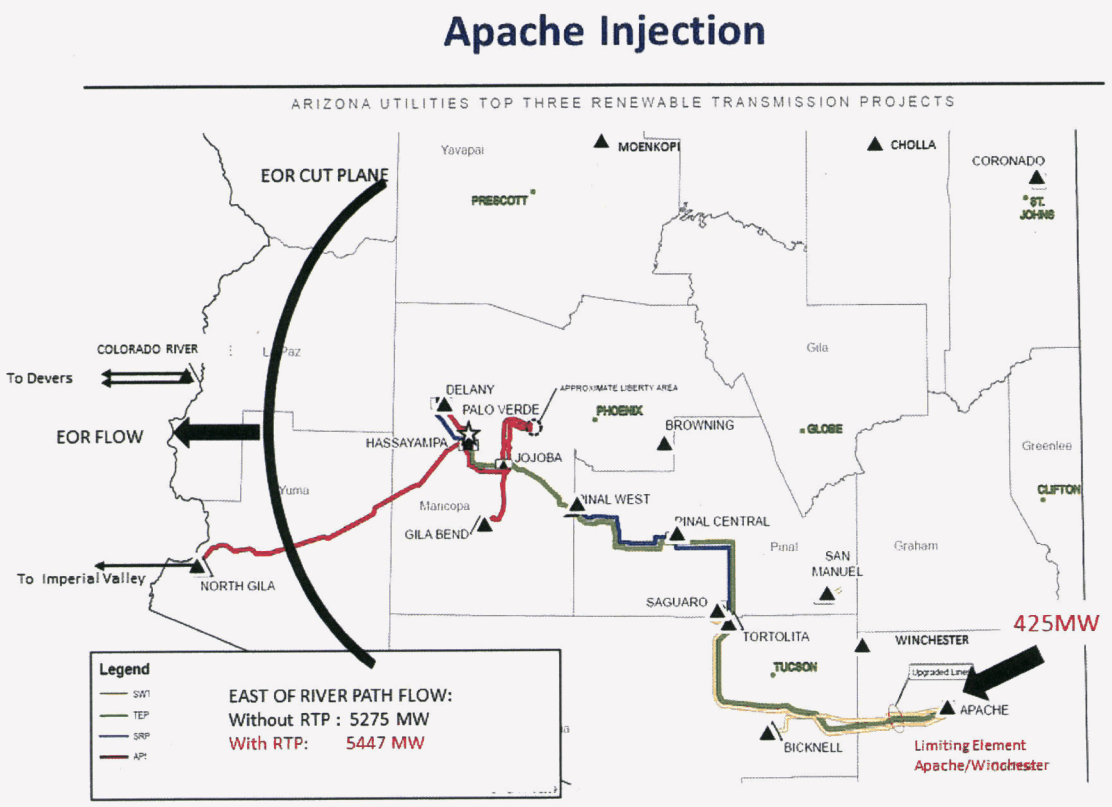

Figure 16: Apache Injection with RTPs

D. Discussion of Results

The following tables summarize the results for both Pre and Post RTPs scenarios (Table 2) and for the Sensitivity #1 and #2 scenarios (Table 3). Listed in Table 2 for each injection bus are the total injection and the scheduled distribution to Southern California and Arizona for both Pre and Post RTPs. Table 2 also lists the resultant change in the EOR flow for both Pre and Post RTPs.

Listed in Table 3 are the results for the Palo Verde Injection Sensitivity #1 and #2. Shown in Table 3 are the resultant EOR flows for the Pre and Post RTPs and for the Sensitivity #1 and #2.

Table 2: Results Pre and Post RTPs

SWAT BASE CASE 2014 HS					
INJECTION BUS	**INJECTION WITHOUT RTPs**	**INJECTION WITH RTPs**	**EOR-FLOW WITHOUT RTP**	**EOR-FLOW WITH RTP**	**DELTA CHANGE IN EOR-FLOW**
	Total/SoCal/AZ	**Total/SoCal/AZ**			
	(MW)	**(MW)**	**(MW)**	**(MW)**	**(MW)**
PALO VERDE 500kV	2500/2000/500	3250/2600/650	6911	7437	526
PINAL CENTRAL 500kV	1200/960/240	3400/2720/680	5940	7473	1533*
MOENKOPI 500kV	2250/1800/450	2500//2000/500	6747	6926	179
CHOLLA 500kV	620/496/124	620/496/124	5569	5569	0
CORONADO 500kV	1250/1000/250	1250/1000/250	5982	5984	2
WINCHESTER 345kV	240/192/48	640/512/128	5324	5589	265
APACHE 230kV	165/132/33	425/340/85	5275	5447	172

*This large change in EOR flow is due to the fact that the pre RTPs base case for the Pinal Central bus does not include two 500kV lines. Without these 500kV lines, Pinal Central only has limited ties to the system which limits the initial injection into the Pinal Central bus.

Table 3: Results Sensitivity #1 and #2

Palo Verde Sensitivity #1: (RTPs with the addition of the Delaney to Colorado River 500kV Line)				
Palo Verde Sensitivity #2: (RTPs with the addition of the Delaney to Colorado River and the North Gila to Imperial Valley #2 500kV Lines)				
INJECTION BUS	**EOR-FLOW WITHOUT RTPs**	**EOR-FLOW WITH RTPs**	**EOR-FLOW WITH SENSITIVITY #1**	**EOR-FLOW WITH SENSITIVITY #2**
	(MW)	**(MW)**	**(MW)**	**(MW)**
PALO VERDE 500kV	6911	7437	7873	9944

E. Technical Assessment Conclusions

In conclusion, the assessment showed that the RTPs as a whole would bring potential incremental export capability between Arizona and Southern California. This incremental export might be greater if existing limitations in the Southern California system on the existing North Gila – Imperial Valley 500kV line were resolved. This line limits the amount of energy that can be scheduled from Arizona to Southern California markets. With an additional 500kV line from Delaney to the Colorado River, the incremental export would increase but would remain limited due to the existing North Gila – Imperial Valley 500kV line. With the addition of the second North Gila to Imperial Valley 500kV transmission line, the incremental export to Southern California could be increased by approximately 2000 MW. Approximately 3000 MW of additional transmission capacity between Arizona and Southern California could potentially be achieved if the proposed RTPs and the addition of Delaney to the Colorado River and the second North Gila to Imperial Valley 500kV transmission lines were combined. It should be noted that: (1) the initial injections were required to bring the system to a stress level and they should not be viewed as injection capability; and (2) the incremental export values achieved in this assessment could differ when analyzed in a WECC Path Rating Study, which would analyze the EOR Path at a stressed level and would also consider the simultaneous impacts on other WECC Paths (i.e., West of River Path).

1. Corridors

As stated before, Commission Decision No. 72031 also required the Arizona Utilities to identify specific corridors to be built to enhance Arizona's ability to export renewable energy to outside markets. Since this assessment limited its analysis of exporting Arizona's renewable energy supply to Southern California due to the market potential identified by the WREZ and WECC, the need for additional corridors to the Southern California markets were also considered. This review indicated that additional corridors were not needed; rather, additional transmission capacity within the existing corridors made the most sense. Therefore, two existing corridors in Arizona were evaluated for additional transmission capacity: (1) the Palo Verde – Devers corridor; and (2) the Palo Verde – North Gila corridor. Increased transmission capacity on the North Gila – Imperial Valley corridor could significantly increase the export to California; however, this corridor is located primarily in California and would require approval by the CPUC.

IV. STAKEHOLDER INVOLVEMENT

In May 2011, the Arizona Utilities began the stakeholder involvement process with a small group of stakeholders ("Focus Group"), representing renewable energy and transmission developers, to get their views on a preliminary list of barriers to and potential solutions for enhancing Arizona's ability to export renewable energy. That preliminary list laid the foundation for discussion and further evaluation by a larger stakeholder group in a workshop process. The utilities then formed a technical group to direct the consultant, PDS Consulting, PLC, in preparing preliminary technical analysis that was used as the foundation of this report.

On October 5, 2011, the utilities hosted a Stakeholder Workshop, which was attended by individuals representing organizations, including renewable energy developers, transmission developers, state agencies including the Commission, and industry consultants. The attendee list is attached to this report as Attachment D. The primary objective of this workshop was to solicit input from a broad stakeholder group regarding barriers and solutions for enhancing Arizona's ability to export renewable energy, including the potential development of transmission corridors. The workshop included a sampling of the background on Arizona renewable energy studies performed to date, a presentation of RTP export capability based on a typical SWAT 2014 heavy summer time frame, and a review of proposed content of the report. Below is a summary of the comments received from stakeholders. Neither the Arizona Utilities nor PDS Consulting, PLC has conducted an analysis of these comments. Further, the barriers and solutions do not represent a consensus of the Arizona Utilities and stakeholders nor does it reflect a prioritization of issues from the stakeholders.

A. Barriers to Exporting Renewable Energy

The barriers identified through the stakeholder involvement have been categorized as economic concerns, physical limitations, permitting corridors or right-of-way, and regulatory structure.

1. Economic Concerns

- **Insufficient Demand for Arizona Renewables**
  - Regional markets point to California as the most readily available market for Arizona renewables. Most of Arizona's neighbors (Colorado, Nevada, New Mexico, and Utah) are also looking to export energy to southern California. The California "CA SB 2X" will limit how much can be imported from Arizona based on the ability to transact with a California balancing authority (or dynamically transferred to a California balancing authority). In addition, California studies (including the Renewable Energy Transmission Initiative ["RETI"]) have shown that most of the renewable resources for California can be obtained from within California.
  - Transactions to the east or south may also involve multiple transmission contracts from multiple transmission owners to deliver to those markets, resulting in "pancaking" of wheeling fees. These costs have the potential to make total delivered costs uneconomical for renewable projects.

- Due to local economic interests for jobs, taxes, etc., the perception is to keep all renewable projects local versus importing from other regions.

- **Cost Recovery**
  - Arizona Utilities' current rate mechanisms are based on the resource need for Arizona ratepayers, and are not intended to allow for transmission specifically for exporting since transmission for export is not specifically needed for Arizona load serving requirements.
  - Other cost recovery methodology may include recovery of long-term bi-lateral transmission service agreements for firm transmission capacity. Using this methodology, there may not be sufficient interest to justify new transmission construction or to optimize line size for long term use and create extra available transmission capacity.

- **Cost Allocation**
  - Methodology for allocating costs of new facilities to customers that specifically benefit from those new facilities may require multiple jurisdictions for approval (e.g., California vs. Arizona, and/or FERC vs. State).
  - FERC Order 1000 implications on cost allocation.
  - CAISO methodology allows for a larger "bucket" to spread costs among more customers.

- **Permitting Risk**
  - Permitting of transmission requires a substantial amount of time and monetary investment that must be borne by the developer throughout the process. Unexpected outcomes can significantly add to the risk. Recovery of permitting costs (and other development costs) could be allowed in the event the project does not move forward.

- **Customer Interconnection and Delivery Costs**
  - Durations for completing the Large Generator Interconnection Procedure ("LGIP") that are attached to the respective Open Access Transmission Tariffs ("OATT") are significantly longer than anticipated due to the large volume of interconnection requests. The longer time requirement contributes to increased uncertainty and lessens the ability of developers to submit proposals to potential customers that are interested in renewable energy.
  - Transmission Service Agreements require firm capacity (24x7) for renewable energy projects. However, resources such as solar and wind have a range of only 20 to 35% capacity factors, which makes economic justification of a new transmission line for renewable projects difficult.
  - Network Upgrades are typically assigned to the interconnection customer (at least initially) which requires the customer to increase their financial obligations over and above the renewable energy project itself. In some instances, Network Upgrades may be more expensive than the renewable energy project itself.
  - The intermittency of renewables requires that utilities consider the cost of additional reserves and/or other ancillary services. Utilities consider this cost when evaluating the

relative economics of renewable resources against conventional resources as well as other types of renewable resources.

2. Physical Limitations

Physical limitations include barriers that affect the transmission system's ability to accommodate or deliver renewable energy resources with the primary emphasis to deliver to California markets, although limited opportunities may exist for Arizona to export to other regions, such as Mexico.

- **Technical Limitations**
  - There is a limited amount of available transfer capacity on the existing transmission system. This limitation, combined with the limited number of physical interconnections between Arizona and its primary export market, the California Independent System Operator ("CAISO") system, constrains the ability to schedule transactions into or out of the CAISO.
  - Minimal transmission and sub-transmission assets exist in the renewable energy zones for some renewable resources to economically interconnect and deliver to potential markets.
  - The fact that Network Upgrades may be required resulting from individual or clustered projects that are not known until late in the interconnection process pose a technical (as well as economic) barrier for certain renewable energy zones in Arizona.
  - The paths into California consisting of the EOR and the associated West of Colorado River (southern) systems and the associated scheduling limitations limit the actual available transmission capacity to export from Arizona.
  - There are facilities associated with each individual injection, as presented in the technical assessment that limit the amount of transfer capability that can be achieved.
  - Path rating calculations are based on the ability to schedule for a single hour of the year (simultaneous or non-simultaneous rating). However, real time operational constraints may exist that are more limiting and could potentially be well under the respective path ratings for several hours of the year.
- **Contractual Obligations and Agreements**
  - Transmission lines have various and complex contractual obligations that may limit firm long-term transmission commitments for renewable energy delivery for exports. Long-term transmission commitments are needed for financing utility scale renewable energy projects.
  - Short term transmission availability or the use of Energy Imbalance Markets do not support financing of renewable energy projects.
- **System Reliability Concerns**
  - Integration of renewable resources poses a challenge for real time operations as well as transmission planning functions as key conventional generation facilities are displaced by renewable resources (with limited or no mechanical inertia) needed to provide system stability under normal and emergency conditions.

- Due to the intermittency of some renewable energy sources, as increased levels of intermittent renewables are put on the system, the ability to maintain a constant frequency and ability to respond to system disturbances will become increasingly more difficult, and will result in the need for additional capacity reserves or other ancillary services. Utilities consider reserve needs whether evaluating relative economics of renewable or conventional resource options.
- Requirements for technical data for Low Voltage Ride Through or Power Factor continue to evolve for projects that have been in the permitting and interconnection process for several years. These data requirements will change as renewable technologies mature over time.
- Many of the projects are interconnecting and allowing for Special Protection Schemes ("SPS") to resolve emergency overload issues. Reliance on these SPSs will require significant coordination and redundancy to ensure system reliability standards are met throughout the system.

▸ **Coordination of Transmission Planning with other Subregional Planning Groups**

- WestConnect plans and CTPG plans have not historically been in alignment, and not adequately coordinated in near term or long term plans.

3. Permitting Corridors or Rights-of-Way

▸ **Duplication of Permit Process**

- The mix of private, state, federal, and tribal lands throughout Arizona often results in the need for several levels of regulatory approval. Some of the approvals require similar but distinct application procedures (e.g., National Environmental Policy Act ["NEPA"] process and Arizona Certificate of Environmental Compatibility ["CEC"] process). This is essentially a duplication of effort.
- Network Upgrades may also trigger additional permitting efforts that may not have been identified within the initial scope.
- Concerns of "Connected Actions" for permitting additional or oversized facilities add to the complexity and cost of what is needed for a single interconnection customer.

▸ **Creating New Corridors**

- Permitting additional corridors ahead of "need" to prepare for renewable exports from renewable energy zones or additional interconnections to market facilities (i.e., additional CAISO interconnection points) is difficult.
- Concerns of too many transmission facilities in a single corridor and risks for a single event taking out multiple circuits.

▸ **Permitting Risks**

- Permitting new facilities does require some element of risk with the various types of environmental processes that are needed to complete the process. Extended time periods for permitting is not just an additional economic burden, but lengthy delays in

transmission permitting can hinder renewable projects delivery requirements. Permitting risk is a major concern to project development.

- **Public Perception**
  - Negative public perception of transmission facilities continues to add risk and uncertainty of permitting transmission lines.

4. Regulatory Structure

- **California Intent for In-State Renewables**
  - At this time, California has expressed their intent to meet renewable energy goals through in-state projects, rather than be importing energy from nearby states (see Attachment C).
- **Cohesive State Vision**
  - A consistent and cohesive state-wide policy vision is needed to guide renewable energy development for Arizona and the region. More consistent direction is needed from the state to county level or "top/down" to the local jurisdictions. For example, the first project through a process on the local level takes significant effort. Similar efforts that are required for each subsequent jurisdiction are complicated by differing processes that are difficult for developers to navigate.
- **Interstate Coordination ("Seams" Issue)**
  - There are significant issues related to coordination of policies between states, specifically between Arizona and California. Interstate Commerce rules may apply.
  - Coordination between transmission planning groups (WestConnect/SWAT and CTPG) is minimal regarding regional resources and transmission.
  - Compliance with FERC Order 1000 will require that "regions" be sufficiently defined, and that "inter-regional" processes are developed to enable coordination such that "seams" issues established by the proposed regions (i.e., WestConnect and CAISO) are thoroughly addressed.
- **Changing Regulatory Landscape**
  - State Renewable Energy Standards are not always static, and requirements to meet specific targets (i.e., reference "CA SB2X"), including DG create additional complexities.
  - Federal Production and Investment Tax Credits levels (i.e., incentives) are uncertain in both length and amount of credits.
  - Shifts in regulatory policy direction.
  - A disconnect exists between FERC LGIP requirements and procurement of renewables. The time required for procurement approvals is much shorter than that required to complete the LGIP process, which increases uncertainty due to the unknowns for Network Upgrade costs, permitting risks of facilities, etc.

- **Applicability of A.R.S. 40-360 (Arizona CEC Process)**
  - Flexibility is needed for In-Service Dates, considering the uncertainty of permitting renewable transmission. CEC's should have applicable durations that are long enough to allow for sufficient customer demand to materialize to minimize the permitting risk.
  - Flexibility is needed for establishing "need" to consider longer-term requirements for additional transmission capacity for delivering renewables, in addition to the current application to additional export locations. This increases the potential to "right size" given longer-term renewable and conventional energy capacity requirements.
  - Given the uncertainty of acquiring the rights-of-way with appropriate eminent domain rights with immediate possession, can changes be made to not delay the process more for renewable transmission projects?
- **Lack of Other Organized Markets**
  - The proposed Energy Imbalance Market may help for existing renewable resources to overbuild in some instances, but may not be sufficient to get additional large scale generation to be built in Arizona to export.
  - With the delivery to the CAISO either via a direct connection or a dynamic transfer of the energy, no additional transmission costs or ancillary services are needed (or what we have is a market [CAISO] to no-market [others] configuration today).

B. Solutions to Exporting Renewable Energy

- **Arizona State Vision**
  - Develop a common vision for renewable energy and transmission requirements in Arizona among utilities, local jurisdictions, regional planning organizations, etc. that balances economic benefits with the cost to customers. Recommendation for policy could be developed and communicated by utilities, transmission providers, and stakeholders, to assist with guiding energy development.
  - Coordination with Arizona Commerce Authority for transmission planning issues to develop a strategy that makes sense for the economy, as well as Arizona ratepayers.
- **Maintain a Competitive Edge**
  - Time to market for renewable resources is an economic advantage for development. Arizona has proven that they can permit facilities more quickly, which may create a competitive edge over California's development of in-state renewable resources.
- **Streamline Permitting**
  - Projects that have demonstrated need, within an established and defined corridor, delivery from a renewable energy zone, or other defined parameters (as discussed in more detail in the Renewable Transmission Task Force/Finance subcommittee report).
  - Possibility that the Arizona Corporation Commission could participate as a Cooperating Agency in a NEPA process, this could at least shorten the timeframe during a CEC

process if it can't be eliminated altogether to avoid total duplication of Federal and State permitting.

- **Improve Existing System Efficiency**
  - Apply technology where possible to increase existing transmission utilization and capacity, including dynamic line monitors, composite conductors, etc.
  - Review Contractual Agreements for opportunities to offer additional transmission services, including Energy Imbalance Market type services.
- **Improve Interstate Coordination ("Seams" Issue)**
  - State to State level (not necessarily Western Governors' Association as too broad) discussions to discuss regional resources for renewable energy, jobs, and transmission. All customers in the region will benefit, not necessarily along state lines.
  - WestConnect and CTPG cohesive near and long term plans (similar to what Southwest Transmission Expansion Plan accomplished in 2005).
- **Revise A.R.S. 40-360**
  - Flexibility in CEC durations and what constitutes "need" for a renewable transmission project would provide additional certainty for potential customers.
- **Create Incentives**
  - Continue or create additional incentives for longer term development of transmission facilities to facilitate development of renewable energy projects, while balancing the need for new resources with utility rate obligations.
  - Review protocols from the Arizona Independent Scheduling Administration to facilitate potential market opportunities.
- **Develop More Physical Connections with CAISO (Increase Export Capability)**
  - ***Potential Corridors:***
    - I-10 Corridor along existing Palo Verde to Devers 500kV line, potentially from the proposed Delaney substation to the proposed Colorado River substation (SCE has received approval from the CPUC to construct the Blythe to Devers section only).
    - I-8 Corridor along existing Palo Verde to North Gila 500kV line (Hassayampa to North Gila #2 permitted).
  - ***Work with CAISO for Additional Solutions:***
    - Third Party "bank and shape" similar to diversity exchange or other.
    - Valley Electric Association model for certain facilities.
    - Imperial Irrigation District model for "policy" level upgrades for improving delivery of renewable energy from Imperial County to CAISO.

- Additional transmission upgrades are needed on the California side of the border to enable the addition of transfer capability to be maximized.

V. CURRENT EXPORT MARKET ENVIRONMENT

California has typically been viewed as a potential import market for renewable energy from surrounding states. As discussed in previous sections, studies have suggested that the supply in Arizona, Nevada, and New Mexico have exceeded in-state demand while in California demand for renewable energy exceeds in-state supply, suggesting California could potentially benefit from import. Demand for renewables in California is in part due to California's RPS requirement. According to the WECC, California has been identified as representing two-thirds of the total renewable energy needed to address RES and RPS in the western United States as the figure below illustrates.[15]

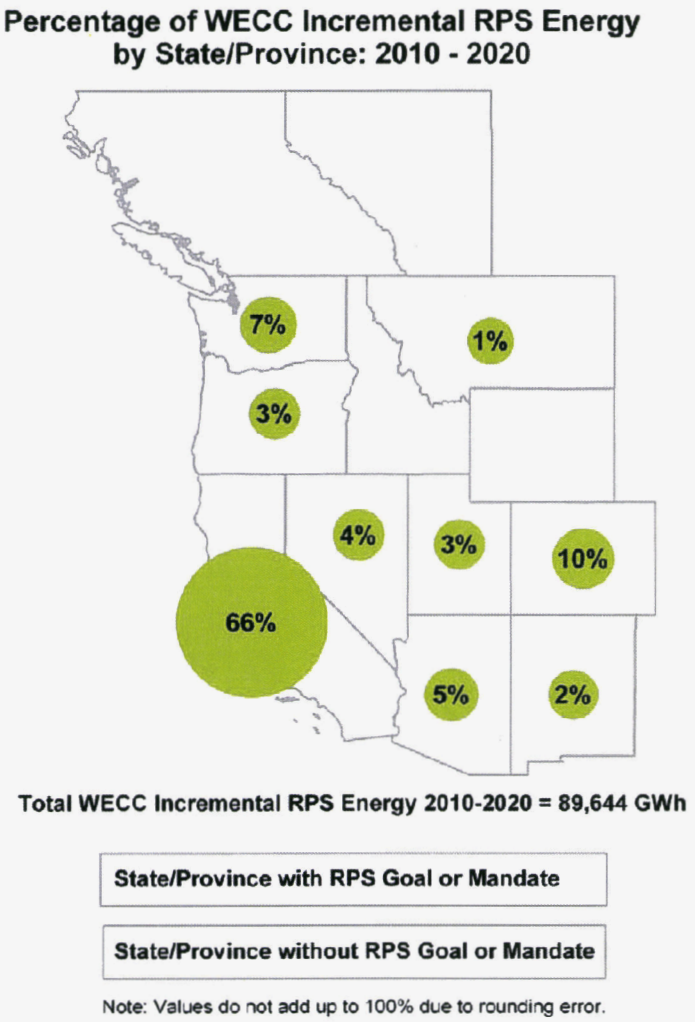

Figure 17: Percentage of WECC Incremental RPS Energy by State, 2010 through 2020

[15] WECC 10-Year Regional Transmission Plan, located at: http://www.wecc.biz/library/StudyReport/Wiki%20Pages/Home.aspx (Last accessed October 24, 2011)

Although initial indications show California can be an import state, the RETI[16] Phase 1B report included a review of out-of-state renewable resources. The RETI Phase 2B[17] model included updated data from the WREZ initiative to expand and improve the consideration of out-of-state resources. The RETI Phase 2B report provided the weighted average ranking costs of California REZ and the out-of-state resource areas. The ranking costs show several California REZ areas ranking higher than the out-of-state resource areas and that Arizona's renewable resources would not be needed until well into the future.

Despite strong indications that California will require additional out-of-state resources, correspondence from Southern California Edison to the ACC in letters dated 2009[18] (attached as Attachment A) and 2011[19] (attached as Attachment B), and a letter in 2011[20] from the Office of the California Governor to WECC (attached as Attachment C) indicate that California is focusing on meeting their RPS with in-state resources.

Additionally, California Law SB 2X requires utilities to obtain portions of renewable energy requirement from in-state generation, thereby restricting the amount of renewable resources that can be obtained from outside of California.

It is for these reasons that additional clarity of California's policy regarding their need and desire for Arizona renewable resources is needed before Arizona invests substantial resources to move toward additional transmission to support the export of Arizona's renewable energy.

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[16] RETI is a California statewide planning process to identify the transmission projects needed to accommodate California's renewable energy goals.

[17] RETI Report Phase 2B: http://www.energy.ca.gov/2010publications/RETI-1000-2010-002/RETI-1000-2010-002-F.PDF (Last accessed October 24, 2011)

[18] Letter addressed to Kristin K. Mayes, Chairman of the ACC, from Pedro J. Pizarro, Executive Vice President of Southern California Edison (SCE). SCE indicated that after the completion of updated economic analysis, the analysis results did not support the refiling of the Arizona portion of the Devers – Palo Verde No. 2 transmission line with the ACC. The letter points to what SCE considered as two very important changes: 1) increased generation resources in California, including a significant amount of renewable generation projects due to increased renewable goals; and 2) reduced load forecasts, due to changed economic conditions and the success of energy efficiency programs. (May 15, 2009)

[19] A follow-up letter addressed to Gary Pierce, Chairman of the ACC, from David L. Mead, Vice President of SCE. SCE states that since May 2009 it has continued to assess whether any request for interconnection in the CAISO control area would establish the need for the Arizona portion of the Devers – Palo Verde No. 2 project. The letter indicates that there are no completed studies associated with generator interconnections requests that trigger the need for the line. Therefore SCE has no basis to pursue the Arizona portion of the Devers – Palo Verde No. 2 line. (July 7, 2011)

[20] A letter addressed to Brad Nickell, the Director of Transmission Expansion Planning for WECC, from Michael Picker, Senior Advisor to the Governor (of California) for Renewable Energy Facilities. The letter informed WECC that recent trends in California "significantly affect the outlook for California as an import market for power in the western United States". Those trends include policies that support primarily in-state renewables, including distributed local generation. The letter stressed the fact that the State of California is taking aggressive steps to develop transmission facilities within the state to deliver energy from in-state renewable resources, and that WECC should take into account several factors in evaluating transmission expansion, including factors that influence procurement decisions for renewable resources. (August 3, 2011)

Attachment A

May 15, 2009 Letter from Southern California Edison
to the Arizona Corporation Commission

SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONAL Company

Pedro J. Pizarro
Executive Vice President

May 15, 2009

VIA Hand-Delivery

Chairman Kristin K. Mayes
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

Re: May 19, 2009 Special Open Meeting, Docket No. E-00000P-08-0570 Matters Pertaining to the Devers-Palo Verde No. 2 Electric Transmission Line

Dear Chairman Mayes:

I am writing to provide you with an update on Southern California Edison Company's ("SCE's") activities related to the Arizona portion of the Devers-Palo Verde No. 2 transmission line project (the "Project").

As we have discussed on several occasions, SCE's belief that the Arizona portion of the Project would provide important benefits to both California and Arizona was based in part on an economic analysis and underlying assumptions originally filed with the ACC on May 1, 2006. In SCE's February 9, 2009 Meet and Confer Report (the "Report"), SCE explained that we were in the process of updating our previous economic analysis, including the economic impacts of the Arizona portion of the Project, to incorporate updated conditions and assumptions. Two very important changes noted in the Report were increased generation resources in California, including a significant amount of renewable generation projects due to increased renewable goals; and reduced load forecasts, due to changed economic conditions and the success of energy efficiency programs. Accordingly, I had indicated to you that we did anticipate that the benefits of the Arizona portion of the Project to California consumers could be reduced from the level of benefits forecast at the time of SCE's initial filing for the Project.

We now have completed updating the economic analysis and it reveals that the benefits are indeed significantly lower as a result of recent developments. In fact, the analysis does not support refiling with the ACC, at this time, for authorization of the Arizona portion of the Project. As discussed below, however, SCE does intend to continue to review the anticipated renewable and non-renewable benefits that building DPV2 would provide to both Arizona and California. If the required interconnection studies establish the need for new transmission in western Arizona to interconnect generation resources into the California Independent System Operator ("CAISO") system, we will again seek ACC approval of necessary transmission. In

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Rosemead, CA 91770
626-302-1497
Fax 626-569-2563
pedro.pizarro@sce.com

the meantime, SCE will continue to pursue the California portion of the Project, which is needed to interconnect generation resources in the Blythe area. SCE will cease the current pre-filing activities at the Federal Energy Regulatory Commission. While SCE is not able to proceed immediately with permitting the Arizona portion of the Project, we are committed to find a way to do so if further analysis supports the approach.

The following four factors explain the significant reduction in economic benefits to California customers of constructing the Arizona portion of the Project:

- Anticipated Renewable Generation Developments: The development of renewables in California, caused in part by California policymakers' focus on increasing RPS to 33% by 2020, will decrease the need for imports and thus, the economic benefits to California of the Arizona portion of the line.

- Generator Interconnection Requests in California, including at Midpoint Switchyard: The development of both conventional and renewable generation, which will connect to the California portion of the Project at the proposed Midpoint Switchyard, lessens the need for imports from the Southwest.

- Projected Changes in Future Fuel Prices: As a result of changed fuel price forecasts, the expected differential in power prices between California and the Palo Verde Hub has decreased, lowering the value of imports.

- Changed Economic Conditions: Reduced load growth in California has reduced the need for and benefits of imports. Higher levels of energy efficiency and distributed generation in California are expected to also reduce future load growth.

This analysis reveals that the Arizona portion of the Project today cannot be justified as an economic investment funded by California consumers. However, currently four renewable generators in western Arizona, totaling 2,950 MW, have requested interconnection to the CAISO grid. As noted above, SCE will continue to study current and future requests for interconnection in the CAISO control area. SCE anticipates that the next round of studies will be completed in April 2010. If these studies, or subsequent ones, establish the need for new transmission in western Arizona to interconnect generation resources into the CAISO system, SCE will seek authorization from your Commission and other applicable agencies to construct the necessary transmission.

Thank you for providing ongoing support and the opportunity for parties to evaluate the Arizona portion of the Project. SCE also appreciates the time and effort of the Arizona participants in the Meet and Confer process and the ACC's support of that process. SCE hopes that the results of that process will be useful as the ACC considers the possibility of pursuing transmission needs in the western United States.

SCE will be prepared to discuss this matter further with the ACC at the May 19 Special Open Meeting.

Very truly yours,

Pedro J. Pizarro

cc: Commissioner Gary Pierce
Commissioner Paul Newman
Commissioner Sandra D. Kennedy
Commissioner Bob Stump
Janice Alward
Ernest Johnson
Lyn Farmer
Rebecca Wilder
ACC Docket Control

Attachment B

July 7, 2011 Letter from Southern California Edison
to the Arizona Corporation Commission

SOUTHERN CALIFORNIA
EDISON®
An EDISON INTERNATIONAL® Company

David L. Mead
Vice President

July 7, 2011

Chairman Gary Pierce
Arizona Corporation Commission
1200 West Washington
Phoenix, AZ 85007-2996

Re: Docket No. E-00000P-08-0570
Matters Pertaining to the Devers-Palo Verde No. 2 (DPV2)
Electric Transmission Line

Dear Chairman Pierce,

I am writing to update you on Southern California Edison Company's (SCE) activities and status related to the Arizona portion of the Devers-Palo Verde No. 2 (DPV2) transmission line project ("Project").

In May 2009, SCE sent a letter to the Arizona Corporation Commission (ACC) informing the ACC that SCE would not submit an application to the ACC to license the Arizona portion of DPV2 at that time because updated analysis revealed the Project could no longer be justified as an economic investment funded by Califrornia consumers.

Since May 2009, SCE has continued to assess whether any requests for interconnection in the CAISO control area would establish the need for the Arizona portion of the Project. To date, there are no completed studies associated with generator interconnection requests that trigger the need. Therefore SCE has no basis to pursue the Arizona portion of the DPV2 Project. As a result, SCE intends to submit a Section 205 filing at the Federal Energy Regulatory Commission ("FERC") by October 31, 2011, to recover costs incurred for the Arizona portion of DPV2 consistent with the terms of a FERC-approved all-party settlement concerning these costs.

While SCE is no longer planning to pursue the DPV2 Project in Arizona, the CAISO will continue to study current and future requests for interconnection to the CAISO control area, which could establish the need for new transmission infrastructure in western Arizona to interconnect generation resources into the CAISO system. If the CAISO were to determine that new transmission infrastructure is needed, SCE may seek authorization from the ACC and other applicable agencies to construct new transmission lines in Arizona.

One Innovation Way
Pomona, CA 91768
909-274-1120
Fax 909-274-1114

I truly appreciate the interest you and your fellow Commissioners have shown in evaluating the need for transmission between Arizona and California. Additionally, I would like to thank you for your help in rebuilding the relationship between SCE and the ACC since the project was denied in 2007.

Very truly yours,

David Mead
Senior Vice President
Transmission & Distribution

cc: Commissioner Paul Newman
Commissioner Brenda Burns
Commissioner Bob Stump
Commissioner Sandra D. Kennedy
Ernest Johnson
Janice Alward
Lyn Farmer
Rebecca Wilder
ACC Docket Control

Attachment C

August 3, 2011 Letter from the Office of the California Governor
to the Western Electricity Coordinating Council

OFFICE OF THE GOVERNOR

August 3, 2011

Mr. Brad Nickell
Director, Transmission Expansion Planning
Western Electricity Coordinating Council
155 North 400 West, Suite 200
Salt Lake City, Utah 84103

Re: Reflecting current California trends and policies in regional transmission planning

Dear Mr. Nickell:

In the time since the Western Electricity Coordinating Council (WECC) embarked on its process of preparing the western interconnection Regional Transmission Plan, much has occurred in California. Significant reductions in the technology cost of solar generation and the availability of investment tax credits have resulted in large scale resource development within the borders of our state. We also have a new Administration that has put into place strong policies supporting additional in-state and distributed local generation. Taken together these recent trends significantly affect the outlook for California as an import market for power in the western United States.

In 2010 alone, the State of California approved eleven large solar and wind projects together totaling over 5,000 megawatts (MW) of renewable generation capacity.[1] In 2011, the state has already permitted an additional 1,000 MW of solar PV projects; we anticipate that by the end of the year we will have permitted another 5,000 MW of solar and wind, bringing the total amount of large-scale renewable energy projects permitted in the state in only two years to approximately 10,000 MW. This surge in permitting moves California closer to bringing online the additional 15,000 to 20,000 MW of renewable generation capacity needed to meet our goal of generating one-third of our power from renewable energy resources by 2020.

The pipeline of projects seeking future approval is robust. The California Energy Commission has recently found 513 projects seeking permits to construct and operate in the State of California representing over 49,775 MW of nameplate renewable generation capacity. This is in addition to the 5,300 MW of large-scale (200 MW plus) projects

[1] Of these 5,000 MW, approximately 3,500 of them were a direct result of the historic collaboration between California and the U.S. Department of the Interior.

permitted in California last year, the 1,000 MW permitted to-date this year and several other smaller projects that have already begun construction in California.

This success in attracting and permitting projects complements progress in other elements of project development, including interconnection, contracting and transmission development. The California Independent System Operator (CAISO) indicates that renewable projects totaling 70,000 MW of installed capacity are seeking to connect to the CAISO-managed grid.

Additionally, investor owned utilities in California have executed power purchase agreements in excess of 33 percent of their expected 2020 retail sales.[2] The CAISO, in concert with the California Transmission Planning Group's 2010 planning, has recently adopted a statewide transmission plan that identifies the transmission needed to deliver sufficient resources to meet 33 percent. Several of the significant elements of the plan are already under construction or in the permitting process.

While these are by no means perfect metrics or forecasts of the future, they all point to the same consideration - that California is taking necessary steps to meet its 33 percent renewable portfolio standard (RPS). Should we be able to develop higher levels than 33 percent (hopefully a 40 percent goal), we will be positioning ourselves for relationships with other load areas outside California and can hopefully provide mutual benefit in cost-efficient renewable market transfers.[3]

Looking back, until the first solar project was approved last year, California had not permitted a large-solar project since 1989. Thus, we fully understand that to-date there would be no reason to assume that California would be able to pursue its renewable energy needs in-state. However, things are progressing here in California at an unprecedented pace.

What does all of this mean for the regional planning process?

California's large market for electrical power and the state's renewable portfolio procurement policy will be central in delineating need for new renewables and transmission outside of the state. We are concerned that several of the scenarios considered in the Transmission Expansion Planning Policy Committee (TEPPC) studies for 2019 and 2020 time horizons were defined before very recent siting successes, ARRA incentives, transmission development, procurement activity and the new Brown Administration's policies for distributed generation. We are also particularly concerned when we see proposals for large renewable energy resource development outside of California interconnecting across long distances directly into California balancing authorities. This may be problematic for three primary reasons:

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[2] While not all of these PPAs and interconnection requests are for California-based resources, to date, approximately 75% of them have been within California's borders.

[3] The potential of exports is strengthened by Governor Brown's goal of installing 12,000 MW of distributed renewables across the state - investments that will help CA meet its peak needs.

1. **Cost:** The west-wide benefits that WECC's studies attribute to several of these projects are driven by assumptions about generation and transmission costs, capacity factors, and other key considerations. As you know, the developer of at least one significant line, TransWest Express, expects the project to cost about 70 percent more than WECC's original assumptions for transmission capital costs would indicate. We thus appreciate the ongoing efforts of WECC staff to review these and other assumptions and to revise capital cost assumptions upward.[4] We look forward to working with you in the next study cycle to ensure that all such assumptions reflect the best-available information gleaned from developers, utilities, regulatory filings, independent estimates and other sources.

2. **Risk:** When procuring energy for their RPS goals, California utilities consider several factors in addition to cost, including the risk associated with particular generation and related transmission services. Transmission lines proposed to stretch hundreds of miles over private and public lands face significant permitting and development risk – perhaps most so in the case of DC lines, which offer few electrical benefits to the states they cross. The WECC final plan should report not only the potential costs and benefits associated with transmission and generation options, but also the risks associated with those options, and how those risks, and potential delays in siting and permitted the lines, affect procurement priorities and decisions.

3. **Importance of a Dynamic Western Grid:** With high penetrations of renewable energy, customers across the West will benefit most from a grid that is truly dynamic and allows for the flexible importing and exporting of power and ancillary services in real time among balancing authorities.[5] We encourage the efforts WECC has underway on initiatives supporting such a future. These include movement toward sub-hourly scheduling, which would assist with integrating intermittent renewable generation across the West, with significant benefits for California. We are also supportive of WECC's efforts to study energy imbalance markets. By enabling additional renewable generation output while helping to minimize reserve requirements and load following requirements, such initiatives balance responsible and prudent system operation with the increasing need for flexibility.

We recognize the importance of regional planning for the interconnected western system. We are all part of one grid and moving toward more efficient regional markets should enhance our ability to integrate more renewables at lower cost. As you progress forward in finalizing the first Regional Transmission Plan, we would note that 10 years is not too distant, and most procurement to meet statutory RPS mandates is already well underway by load serving entities and states. The relevance and usefulness of the first plan will

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[4] We note, however, that the revised WECC value of approximately $2.4 million per mile is still well below that of the developer (at $3.3 million per mile), and a depicted sensitivity range suggests a potential cost as low as $1.5 million per mile. Thus, we remain concerned that WECC's current modeling may not reflect realistic infrastructure options.

[5] We would point out that DC lines into California may be less expensive than AC lines over long distances, but they allow a much narrower range of opportunities for trading of power, and thus offer less versatility of west-wide energy system benefits across a range of uncertain future conditions.

largely depend on how closely it reflects trends and results on the ground in the western states and utilities.

The State of California is committed to working closely with WECC to plan for and build out the energy infrastructure needed to move the West and the nation towards a cleaner energy future. We understand that as a region you must plan within the federal framework of Federal Energy Regulatory Commission Order 890. At the same time we urge you to undertake planning in a manner that is cognizant of the rapidly changing dynamics in California. It is especially important that alternative generation and transmission futures are evaluated in a way that captures the many factors that influence actual procurement decisions.

Should you have any questions or wish to discuss this further please do not hesitate to contact me at (916) 445-7665.

Sincerely,

Michael Picker,
Senior Advisor to the Governor for Renewable Energy Facilities

Cc:

Steven Chu, United States Secretary of Energy
Ken Salazar, United States Secretary of the Interior
Nancy Sutley, Chair, White House Council on Environmental Quality
Thomas Vilsack, United States Secretary of Agriculture
John Wellinghoff, Chair, Federal Energy Regulatory Commission

Attachment D

Stakeholder List

Parties Expressing Interest
Sixth Biennial Transmission Assessment Study
Enhancing Arizona's Ability to Export Renewable Energy

Name		Company	Workshop Attendee	Focus Group Participant
Aguayo	Stacy	Arizona Public Service	X	
Aldridge	Madeleine	First Solar	X	
Andreasen	Erinn	Arizona Public Service	X	
Annan	Bud	Annan Group		
Arnold	Linda	Arizona Public Service	X	
Bahl	Prem	Arizona Corporation Commission	X	
Beck	Ed	Tucson Electric Power	X	
Belval	Ron	Tucson Electric Power	X	X
Bevan	Bob	Western Wind Energy	X	
Black	Patrick	Fennemore Craig, P.C.	X	
Brandt	Jana	Salt River Project	X	
Bronner	Eric	Entegra Power Group	X	
Burks	Jeff	Energy Strategies LLC	X	
Burson	Jim	Southwest Transmission Cooperative	X	
Calkins	Ian	Copper State Consulting Group	X	
Charters	Jim	Western States Energy Solutions, LLC	X	
Churchill	Susannah	The Vote Solar Initiative	X	
Cobb	Steven	Salt River Project		
Cole	Brian	Arizona Public Service	X	
Comnes	Alan	SunPower	X	
Cook	Jacquie	Southwest Transmission Cooperative	X	X
De Blassi	Michelle	Quarles & Brady LLP		
Deise	Cary	USE Consulting		
Didsayabutra	Paul	BrightSource Energy		
Edelman	Mark	AZ State Land Department		
Englander	John J.	ADEQ- Air Quality Division	X	
Etherton	Mark	PDS Consulting	X	X
Fecke-Stoudt	Christopher M.	K. R. Saline & Associates, PLC	X	
Freeman	Cindy	Southwestern Power Group		X
Frist	Bernie	ARCADIS U.S., Inc.	X	
Haskovec	Jarrett J.	Lubin & Enoch, PC	X	
Hodges-Copple	Daniel	Clean Line Energy Partners, LLC	X	
Jamieson	Bill	SWCA Environmental Consultants	X	
Johnson	Lee Allen	W Holdings		
Jenkins	Robert	First Solar	X	
Keel	Brian	Salt River Project	X	X
Kisch	Krista	BrightSource Energy		
Knight	John	Element Power		
Krzykos	Peter	Arizona Public Service	X	X
Lacey	Michael J.	Arizona Department of Water Resources		
Lane	Coleen	AZ Department of Water Resources		
Le Sueur	John	Arizona Corporation Commission	X	
McElhany	Mike	Western Area Power Administration		
McGuirk	Joe	Sun Miner		
McMahon	Rachel	First Solar		

Parties Expressing Interest
Sixth Biennial Transmission Assessment Study
Enhancing Arizona's Ability to Export Renewable Energy

Name		Company	Workshop Attendee	Focus Group Participant
Mendoza	Steve	Western Wind Energy	X	
Monat	Ron	CB Richard Ellis	X	
Olson	Mike	Western Area Power Administration	X	X
Ormond	Amanda	Ormond Group LLC		X
Patterson	Doug	Black Forest Partners	X	X
Pratt	Jim	Salt River Project		X
Roberts	Cary	URS Corporation	X	
Romero	Gary	PDS Consulting	X	X
Ruiz	Reuben	Central Arizona Project	X	
Rutland	Jeff	Southwestern Power Group		
Sanders	Shane	Southwest Transmission Cooperative	X	
Sandler	Vicki	Wearthy Ideas	X	
Sours	Sam	Community Energy Solar	X	
Spitzkoff	Jason	Arizona Public Service	X	
Stoudt	Christopher	KR Saline		
Szot	Lisa	Enel Green Power North America	X	
Tang	James		X	
Taylor	Robert	Salt River Project		
Theisen	Nicholas	SOLON Corporation	X	
Thor	Vincent	Arizona Public Service	X	X
Torkelson	LeeAnn	Salt River Project	X	X
Wallace	John	Grand Canyon State Electric Cooperative		
Wang	Andrew	SOLARRESERVE	X	
Wilton	Jessica	Tierra Environmental Consutants	X	X
Witt	Jerry	W Holdings	X	
Woodall	Laurie	KR Saline		
Wray	Tom	Sun Zia		X