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BEFORE THE ARIZONA CORPORATION COMMISSION

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IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR APPROVAL OF PLANS RELATED TO RENEWABLE TRANSMISSION PROJECTS	DOCKET NO. E-01345A-10-_____ E-01345A-10-0033 **APPLICATION**

Arizona Public Service Company ("APS" or "Company") previously made a filing ("October 30 APS Filing") in compliance with the Arizona Corporation Commission's ("Commission") Decision resulting from the Fifth Biennial Transmission Assessment ("BTA") process.[1] In the October 30 APS Filing, the Company identified its "top" potential Renewable Transmission Projects ("RTPs") in APS's service territory that would support the growth of renewable resources in Arizona, as directed by Decision No. 70635. The projects in the October 30 APS Filing included a possible development approach and schedule. A copy of that plan is provided herein as Exhibit A.

In developing plans for these transmission projects, APS sought an appropriate balance between advancing renewable resource development within Arizona and managing the potential rate impact on retail customers. One way APS sought to achieve this balance was by carefully considering project timing, since completion of an RTP prior to an identified need could prematurely raise retail customer bills in advance of the corresponding benefit.

Further, in the October 30 APS Filing, APS proposed a Renewable Transmission Action Plan ("RTAP"), a process developed in conjunction with other utilities and interested

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[1] <u>See</u> Commission Decision No. 70635 (December 11, 2008); APS compliance filing, Docket No. E-00000A-09-0066, October 30, 2009.

parties aimed at creating efficient mechanisms for RTP identification, approval, and funding.[2] The proposed RTAP makes clear that cost recovery for the projects proposed is essential for their viability.[3] The Company's RTAP (attached as Exhibit A) provides a detailed discussion and analysis of each RTP.

I. BACKGROUND

The Commission's 2008 BTA Decision directed Commission-regulated utilities to develop plans to identify future RTPs and to propose funding mechanisms to construct the top three RTPs in their respective service territories.[4] In addition, the Commission directed the utilities to conduct a joint workshop or series of planning meetings to develop ways in which new RTPs could be identified, approved for construction, and financed in a manner that supports renewable energy growth.[5]

In response to a prior Commission directive in the 2006 BTA,[6] the Southwest Area Transmission ("SWAT") Sub-Regional Planning Group (an organization comprised of utility representatives, developers, and other interested stakeholders) formed a Renewable Transmission Task Force ("RTTF") to consider transmission needs for developing renewable resources.[7] In response to the Commission's 2008 BTA Decision, the RTTF established the Arizona Renewable Resource and Transmission Identification Subcommittee ("ARRTIS") to more specifically identify those areas in Arizona with the best potential for renewable generation project development, and thus aid the utilities in their response to the BTA Decision.[8] The ARRTIS identified areas within the state where solar and wind resources were potentially available for utility-scale generation development.[9] The ARRTIS also developed resource maps (Attachment B to Exhibit A herein) identifying environmental

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[2] See APS's RTAP, attached here as Exhibit A.
[3] Customer bill impacts of each project are specified in the RTAP.
[4] See Commission Decision No. 70635, at 8-9.
[5] Id.
[6] See Commission Decision No. 69389 (March 22, 2007).
[7] See WestConnect <*http://www.westconnect.com/planning_swat_rttf.php*>.
[8] See WestConnect <*http://www.westconnect.com/planning_swat_rttf_arrtis.php*>.
[9] See *Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee* (September 2009).

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 and/or to load pockets within the state or to export markets.[10]

The RTTF also established a Finance Subcommittee to develop a methodology for identifying, planning, and facilitating RTP development in Arizona, including methods for providing utilities with a means to effectively finance and construct RTPs.[11] The Finance Subcommittee developed the RTAP methodology for identifying RTPs, which is the same method APS is using here.

In compliance with Decision No. 70635, APS worked with other utilities and interested stakeholders to develop plans to identify future RTPs as well as to construct RTPs in its service territory. Additionally, APS participated in the RTTF and its subcommittees to identify areas in Arizona with the best potential for renewable generation and the transmission options necessary to link those areas to the existing transmission system.[12] This participation included attending several meetings and two workshops held at the Commission on April 20 and June 5, 2009.[13] In addition, APS met with Salt River Project ("SRP"), Tucson Electric Power Company ("TEP"), and Southwest Transmission Cooperative ("SWTC") to identify common interests in potential RTPs and to coordinate efforts where appropriate.

II. APS'S CHOICE OF RENEWABLE TRANSMISSION PROJECTS

In determining the Company's top RTPs and associated development plans, APS took into consideration the input from the two workshops, the ARRTIS's work, the Finance Subcommittee's work, and the RTTF's work. The Company did a comparative analysis that assessed the economic value of viable renewable resource and transmission line combinations. Based upon its analysis, APS identified the RTPs that were best suited to

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[10] See id.

[11] See WestConnect <*http://www.westconnect.com/planning_swat_rttf_finance.php*>.

[12] See WestConnect <*http://www.westconnect.com/planning_swat_rttf_arrtis.php*>.

[13] See Attachment A to APS's RTAP (Exhibit A).

support the growth of renewable resources in Arizona while considering the costs and benefits to APS customers. The most effective way for APS to move forward with these projects is for APS to develop and construct them, in some cases jointly with other parties, and to recover the development costs through its Federal Energy Regulatory Commission ("FERC") approved transmission rates and its retail Transmission Cost Adjustor ("TCA"). This approach will allow APS to secure the necessary capital, which is above existing capital needs, to develop these projects. Accordingly, Commission approval is key to achieving these ends, as described in Section III(B) below.

In its 2009 rate settlement, APS agreed to "commence permitting, design, engineering, right of way acquisition, regulatory authorization . . . and line siting for one or more new transmission lines or upgrades designed to facilitate delivery of solar and other renewable resources to the APS system" and "to construct such line(s) or upgrade(s)" once it obtains all required permitting and authorizations.[14] To begin complying with this commitment, APS intends to pursue the Delany to Palo Verde 500kV line, described in greater detail below.

APS's Ten-Year Plans also include transmission projects that will support the development of renewable resources due to their ability to connect renewable resource areas to the Phoenix Metropolitan Valley ("Valley") load center. These include, for example, the Delany to Sun Valley 500kV project, the Sun Valley to Trilby Wash 230kV project, the Sun Valley to Morgan 500kV project, and the Morgan to Pinnacle Peak 500kV project. With the transmission lines identified in APS's 2009 Ten-Year Plan,[15] APS is currently well-positioned to meet renewable energy requirements for APS's customers at levels that exceed the Renewable Energy Standard ("RES") requirements without adding major transmission lines[16] until approximately 2018. The transmission lines identified in APS's 2009 Ten-Year Plan would provide adequate transmission to meet a 25% RES through approximately 2016.

[14] See Decision No. 71448 at Exhibit A, § 15.4.
[15] Filed January 29, 2009 in Docket No. E-00000D-09-0020.
[16] Without adding major new transmission lines on top of the lines indicated in the 2009 Ten-Year Plan.

The transmission development plans proposed in APS's RTAP serve a different purpose. The RTAP proposes additional renewable transmission (either by advanced timing or with additional projects) that can generally advance the development of renewable resources in Arizona. Thus, with APS's planned transmission as a baseline, along with its analysis conducted under Decision No. 70635, APS seeks approval to pursue the following RTPs.

A. Delany to Palo Verde 500kV

The first RTP is the Delany to Palo Verde 500kV line. The Delany to Palo Verde transmission project is a 500kV transmission line from the Palo Verde hub to a new switchyard ("Delany Switchyard"), located approximately eighteen miles west of the Palo Verde hub. The Delany Switchyard would be a station along a 500kV "loop" that will eventually run from Palo Verde around the west and then north side of the Valley to the Pinnacle Peak Substation. The Delany area exhibits excellent solar conditions, which should result in competitive pricing of solar resources compared to other available solar resource pricing. Currently, there are interconnection requests for a significant amount of renewable generation in the Delany area,[17] which is a clear indicator that there is a robust interest in renewable resource development.[18] The project also provides access to the Palo Verde hub to provide for delivery to either Arizona loads or for export to other markets in the Southwestern United States. Using only the expected additional renewable resource needs for APS[19] as well as the natural gas resource displacement[20] that could occur at the Palo Verde hub, APS

[17] As of August 2009, there were 3,310MW of interconnections in the APS queue at Delany.
[18] The October 30 APS Filing (Exhibit A) identifies the reasons, in addition to those identified here, that this project is an excellent RTP and one capable of advancing the growth of renewable resources in Arizona.
[19] APS's renewable resource needs are defined here by the resource plan filed in January of 2009 that contains renewable resource levels that exceed the RES requirements.
[20] With California's RES requirement, it is anticipated that California utilities will be replacing energy currently generated by natural gas resources, some of which are located at the Palo Verde hub, with renewable resources. Thus, if renewable resources are available in Arizona, California utilities could import renewable energy over existing Palo Verde-West transmission facilities as natural gas generation is displaced.

believes that the potential exists for over 1,200 MW of renewable resources to be developed by 2015 in the Delany area alone.[21]

Consistent with APS's commitment in its 2009 rate settlement, APS will expeditiously pursue permitting and authorizations and thereafter construct this project with the aim of meeting a December 2012 in-service date. The Company anticipates outside participation from SRP and the Central Arizona Project ("CAP"), each at 10%. However, APS will proceed independently with development if necessary. Although project development will be accelerated to allow for a 2012 in-service date, close coordination with resource developers is necessary so that the project is synchronized with renewable generation construction. This project is also an important component to the potential Devers II transmission project because it creates the Delany Switchyard. The Delany Switchyard would be the starting point for the Devers II transmission project, which is a connection to the Southern California markets and has the potential to allow additional renewable energy to be exported from Arizona to California.

The anticipated APS cost for this project is $55 million.[22] Cost recovery for this project is anticipated to occur through the annual formula rate reset at FERC, as discussed in APS's RTAP, and an associated request for a TCA change filed with the Commission.[23] Commission approval of this project as an RTP by mid-2010 would support a 2012 in-service date.

B. Palo Verde to North Gila 500kV #2

The Palo Verde to North Gila transmission project is a potential 500kV transmission line from the Palo Verde hub area to the North Gila Substation, which is located outside of Yuma. It is approximately 114 miles in length and would parallel an existing jointly-owned 500kV line. The area has excellent solar conditions, which should result in comparably good pricing of solar resources. Currently, there are interconnection requests to the area adjacent to

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[21] This amount may be more than the line from Delany to Palo Verde is capable of; studies will determine the transfer capability.

[22] This is the project cost for APS's 80% share of the project and is based on current estimated costs.

[23] See Exhibit A. Transmission costs are passed through to APS's retail customers through the TCA.

this line, which indicates there is a robust interest in this renewable resource area. In addition, this line would provide additional transmission to the Yuma load pocket, increase load-serving capability in Yuma in the future, and provide additional resource flexibility to serve both the Valley and Yuma load pockets.

APS has already acquired a Certificate of Environmental Compatibility ("CEC") for this project[24] and anticipates a 2014 in-service date. If the only consideration was the reliability or load serving needs of the Yuma area, APS would extend the in-service date until 2017 or later. However, given the potential for development of renewable resources in this area, as well as other identified benefits that APS customers, other participants, and the regional grid will derive from this transmission line, APS seeks approval to work towards the earlier 2014 in-service date.

Due to the magnitude of project costs, this project has been pursued as a participant transmission project. SRP, the Imperial Irrigation District ("IID"), and the Wellton-Mohawk Irrigation and Drainage District ("Wellton-Mohawk") are the other current participants, each holding a 20% share of the project. In addition, the Western Administration Power Administration ("WAPA") has expressed an interest in participating in the project. WAPA involvement would provide the potential for federal government funding for WAPA transmission expansions that foster renewable energy.[25] Because of the large capital investment required to build this line, participant involvement is critical to manage rate impacts to APS customers.

The anticipated cost for APS's 40% share of this project is $97 million.[26] Cost recovery for this project will occur through APS's FERC-approved rates, as discussed in APS's RTAP, and the TCA.[27] APS may also file for certain authorizations from FERC, as discussed in APS's RTAP.[28]

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[24] Commission Decision No. 70127 (January 23, 2008).

[25] Through the American Recovery and Reinvestment Act of 2009 ("ARRA"). Pub.L. 111-5.

[26] Based on current estimated costs.

[27] *See* Exhibit A, pages 21-23.

[28] Including Construction Work In Progress ("CWIP") and/or Abandonment cost recovery.

C. Palo Verde to Liberty and Gila Bend to Liberty

The area around the Palo Verde hub and the Gila Bend area have excellent solar conditions, which could result in the development of significant solar generation facilities. To address the solar potential of these areas, APS seeks approval to begin developing two conceptual transmission projects: first, a 500kV transmission line from the Palo Verde hub to a new substation near the existing Liberty substation location in the West Valley; and second, a 500kV transmission line from the Gila Bend/Gila River area to a new substation near the existing Liberty substation. Upon RTAP and RTP approval, APS will identify the best alternative for each of these projects to enable additional renewable resources in the Palo Verde and Gila Bend areas to be delivered to the Valley load pocket.

Once APS identifies definitive projects, APS will conduct an open season[29] for each of the identified projects, begin the permitting process, and pursue the acquisition of a CEC. APS believes that these development steps can be completed by the end of 2011. Subsequent to this permitting activity, a schedule will be developed to place these projects in service to support further renewable resource development. These projects, as proposed in APS's RTAP, could be instrumental in addressing the issues caused by the inconsistent periods required to construct transmission lines as compared to renewable resource facilities – often referred to as the "chicken-and-egg" problem where transmission infrastructure takes longer to build than renewable resource facilities.

D. Delany to Blythe (Arizona Portion of Devers II)

The last RTP is the Arizona portion of the Devers II project, originally proposed by Southern California Edison.[30] APS continues to encourage and support WAPA and/or other developers to move this project forward, which could include the use of federal funds. APS supports development of this transmission line because it could influence additional solar resource development in Arizona given the potential for additional export capability to California.

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[29] An "open season" is a process by which participation is solicited for proposed transmission projects.
[30] Docket No. E-00000P-08-0570.

III. PROPOSED RTAP PROCESS

To assist the utilities in their responses to Commission Decision No. 70635, the RTTF Finance Subcommittee developed proposed methodologies for identifying, planning and facilitating RTP development in Arizona, including methods for utilities to effectively finance and construct RTPs. The Finance Subcommittee viewed the proposed RTAP process as a procedure by which the Commission can review and approve a utility's identified RTPs within or in parallel with the BTA process. APS supports these proposals, as described below, and urges the Commission to adopt the cost recovery regulatory framework recommended by the RTTF Finance Subcommittee. A copy of the Final Report on the Activities of the Finance Subcommittee is included as Attachment D to Exhibit A.

In considering the proposed RTPs, APS asks the Commission to balance the potential customer costs and benefits with the regulatory treatment necessary for the development of renewable transmission projects. Because these factors will be unique for each project, this requires individual analysis of each RTP. The Finance Subcommittee concluded that balancing customer costs with the regulatory treatment necessary to get the transmission lines developed is an important consideration, and that this balancing must be done on a case-by-case basis. In fact, the Finance Subcommittee states that "this determination cannot be made by the Commission by formula or fiat: a proposition on which the Subcommittee reached consensus. Rather, this must be settled on a case-by-case basis."[31] The October 30 APS Filing shows why, based on APS's analysis, the development steps that APS is submitting for Commission approval are the appropriate steps to take to balance the customer cost and potential benefits. The fundamental goal of the proposed process should be to achieve an appropriate balance between the policy goal of advancing renewable resource development within Arizona and, at the same time, manage the potential rate impact on retail customers. The process must also recognize that cost recovery for prudently incurred costs is essential for the viability of RTPs. This recovery will provide regulatory certainty, which is necessary for

[31] Summary and Recommendations of the Final Report on the Activities of the Finance Subcommittee (Attachment D of Exhibit A), page 15 of 21.

utilities to commit capital to these projects. Components of the proposed process are described below.

A. Utility Filing

Each Commission-regulated electric utility would be required to file a RTAP every two years in parallel with the BTA and concurrent with the filing of its Ten-Year Plan in 2012.[32] The RTAP would generally be comprised of six parts: (1) identification of RTPs for Commission approval; (2) a description of how each RTP will advance renewable resource deployment; (3) a development approach and schedule for each RTP; (4) expected costs for each RTP; (5) a proposed cost recovery methodology; and (6) a status report on previously identified RTPs.

An RTP should be the acquisition of transmission capacity by upgrade or new construction that either provides access to renewable resource areas or enables renewable resources to be delivered to load centers. This will help utilities focus on increasing transmission infrastructure in areas that are most likely to see the realization of renewable resource potential.

B. Commission Approval

Transmission is important and closely linked with resource planning because most new resources will require new transmission to reliably deliver the resource to load. Construction of new transmission infrastructure typically requires a long lead-time due to the CEC process, local, state, and federal permitting requirements, and rights-of-way acquisition. The financial commitments necessary for an RTP are significant. RTPs may not be necessary for local load serving or reliability, but would support the development of renewable resources in Arizona.[33] Thus, it is essential that the Commission concur with and approve a utility's proposed plan

[32] In this filing, APS has committed only to file RTAPs for the 2010 and 2012 BTA processes. Per the Finance Subcommittee's work and Report, contemporaneous with the 2012 BTA process, the Commission may assess the need and frequency for subsequent RTAP filings.

[33] The transmission development plans proposed in APS's RTAP establish additional renewable transmission beyond those identified in APS's Ten-Year Plan (either by advanced timing or with additional projects) with the intent of advancing the development of renewable resources in Arizona.

before the utility undertakes significant infrastructure additions over and above those needed for its own reliability requirements.

C. Line Siting Committee and Commission Processes

One of the focuses of both the Finance Subcommittee meetings and the BTA Order workshops[34] was the need for flexibility in the CEC process. This flexibility would allow for filing a CEC application with an unknown in-service date for the RTP. Specifically, there needs to be flexibility with the timing and duration of the CECs acquired for RTPs. Participants agreed that it was important to be able to proceed with the CEC application, and its approval, prior to a known in-service date; thus, CECs need a longer duration than the time period currently provided in most cases. The Power Plant and Transmission Line Siting Committee, as well as the Commission, would need to allow for longer duration CECs to allow for the uncertainties of project build-out due to resource development uncertainty.

The Commission generally wants to understand the "need" for each proposed transmission project. With renewable transmission, this is a complicated issue because reliability does not drive the need for RTPs. The motivation for RTP development lies in large part with the ability to support the development of renewable resources. In addition, the timing of the need is uncertain. Therefore, Commission consideration of flexibility of CEC durations (*e.g.*, longer durations) and what constitutes sufficient need for an RTP would provide a solution to the timing inconsistencies. These considerations would foster the development of transmission projects aimed specifically at advancing the development of renewable resources in Arizona.

D. Funding Mechanisms

Construction of an RTP is generally a capital-intensive endeavor that will require the utility to obtain financing for the RTP. Thus, cost recovery mechanisms for an RTP must be addressed during the planning stages, and should include cost recovery of prudently incurred

[34] The workshops occurred at the Commission on April 20 and June 5, 2009.

costs for an RTP even if it is subsequently discontinued because it is no longer reasonable or necessary.

FERC's Open Access Transmission Tariffs ("OATTs") apply to transmission facilities that provide "network service" on the interconnected grid. Generally, the utility would apply to FERC for cost recovery of transmission projects.[35] Commission approval of an RTAP or RTP would enhance the utility's ability to obtain cost recovery of and obtain any other FERC approvals, if applicable, for Commission-approved RTPs.[36] APS believes that its current TCA mechanism will facilitate timely cost recovery for RTAP implementation.

CONCLUSION

For the reasons discussed above, APS requests that the Commission determine that:

1. The proposed process to identify RTPs is appropriate.
2. The proposed RTAP process is appropriate.
3. The proposed timing of the next RTAP filing should be in parallel with the 2012 BTA process.
4. The proposed flexibility with the timing and duration of the CECs acquired for RTPs is appropriate.
5. The proposed Delany to Palo Verde 500kV line is in the public interest and this RTP and APS's RTAP development plan for the project are therefore approved.
6. The proposed Palo Verde to North Gila 500kV line is in the public interest and this RTP and APS's RTAP development plan for the project are therefore approved.

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[35] Cost recovery for prudently incurred developmental costs would include: permitting; preliminary engineering and environmental investigation costs; technical study costs; survey and mapping costs; preliminary right-of-way acquisition costs; and other project formation costs, as well as prudent costs of construction of the RTP.

[36] Special regulatory treatment includes, but is not limited to, an enhanced return-on-equity, CWIP in rates, and project abandonment costs.

7. The proposed Palo Verde to Liberty and Gila Bend to Liberty projects are in the public interest and this RTP and APS's RTAP development plan for the projects are therefore approved.

RESPECTFULLY SUBMITTED this 29 day of January 2010.

By: Meghan H. Grabel

Meghan H. Grabel
Attorney for Arizona Public Service Company

ORIGINAL and thirteen (13) copies of the foregoing filed this 29th day of January, 2010, with:

Docket Control
ARIZONA CORPORATION COMMISSION
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Phoenix, Arizona 85007

Stephanie Little

EXHIBIT A

APS's Renewable Transmission Action Plan

Filed in Compliance with BTA Decision No. 70635

Arizona Public Service Company October 30, 2009

1. Executive Summary

Following the Fifth BTA, the Arizona Corporation Commission ("ACC" or "Commission") issued Decision No. 70635 directing the Commission-regulated utilities to develop plans to identify future renewable transmission projects ("RTPs") and to develop plans and proposed funding mechanisms to construct the "top three"[1] RTPs in their respective service territories. APS conducted an analysis of the potential resource and transmission pair options to identify its "top three" RTPs.[2]

APS's "top three" RTPs will support the growth of renewable energy resources in Arizona. In addition, each project identified by APS includes a planned development approach and schedule that is supported by the analysis. In the development of our plans for these transmission projects, APS has tried to achieve an appropriate balance between the goal of advancing renewable resource development within Arizona and minimizing the potential rate impact on our retail customers. Achieving this balance is the heart of this matter.

Arizona is blessed with very attractive renewable energy resources and development of these resources represents a compelling economic opportunity for the state. However, it is highly unlikely that the needed transmission projects will be built by non-utility market participants on a speculative basis and, in addition, the "chicken-and-egg" timing mismatch between the time needed to construct renewable resources and the time needed to construct transmission would

[1] The term "top three" will continue to be used throughout this report, as Decision No. 70635 refers to the "top three" projects, even though APS discusses more than three projects.

[2] A resource/transmission pair is a renewable resource area coupled with the transmission segments necessary to deliver the resource to a load area.

still be present.[3] Therefore, APS's transmission customers (of which APS's retail customers are the largest portion) must play a critical role in providing the cost recovery support that is needed to ensure these transmission projects move forward and that the "chicken-and-egg" timing issue is improved or eliminated.

In addition to the RTPs identified here, there are other transmission projects identified in APS's previous Ten-Year Plans that support the development of renewable resources. Several of these previously-identified projects (such as Delaney to Sun Valley 500 kV, Sun Valley to Trilby Wash 230 kV, Sun Valley to Morgan 500 kV, and Morgan to Pinnacle Peak 500 kV) could have a significant impact on renewable resource development within Arizona due to their ability to connect renewable resource areas to the metro Valley ("Valley") load center. In fact, APS expects to be able to meet the renewable energy component of its Resource Plan,[4] without additional major transmission lines (beyond those identified in APS's 2009 Ten-Year Plan), until approximately 2018 based on baseline assumptions, current market conditions, and load forecasts.

The transmission development plans proposed in this RTAP establish additional renewable transmission (either by advanced timing or with additional projects) that can be used to advance the development of renewable resources in Arizona. With APS's planned transmission, along with its analysis conducted here, APS has identified the following "top three" RTPs.

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[3] In addition to the timing mismatch, utilities are hesitant to build transmission to areas without existing resources and resource developers are hesitant to build resources where there is no existing transmission.

[4] Docket No. E-01345A-09-0037 (Dated January 29, 2009). The renewable energy plan put forth in the Resource Plan filing exceeds the Commission's current Renewable Energy Standard requirements.

The first RTP is the Delaney to Palo Verde 500-kV line. For this project, and in support of APS's pending rate case settlement agreement, APS will perform the necessary engineering, acquire land and Right-of-Ways ("ROW"), and construct this project to support a December 2012 in-service date. Although the project development will be advanced to enable a 2012 in-service date, close coordination with developers is necessary to ensure the project is not built prior to being needed. This project is also an important component to the potential future Palo Verde to Devers II transmission project since the Palo Verde to Delaney project creates the Delaney switchyard. The Delaney switchyard has been identified as the starting point for the Devers II transmission project, which could be a connection to the Southern California markets and has the potential to enable additional renewable energy to be exported from Arizona to California. The need for the RTP could come in the form of an APS power purchase agreement ("PPA") with a resource developer at Delaney or a committed Transmission Service Agreement ("TSA") with a resource developer selling to another utility (including California). Absent a need, the construction schedule would be synchronized with the Delaney to Sun Valley 500kV transmission project – currently scheduled for 2014.

The second RTP is the Palo Verde to North Gila 500-kV line. Because of the magnitude of investment to develop this line, APS is pursuing this project as a joint-participation project with three other utilities. Decisions regarding the development steps for this project must ultimately be made by all participants. However, APS supports a development schedule with planned in-service date of 2014. Because this RTP has the potential to allow for an increase in renewable energy exports to California, close coordination with California will be necessary to ensure the transmission "west of the river" will be adequate to support this "east of the river" transmission upgrade. Additionally, APS has proposed this project to the Western Area Power Administration ("WAPA") for potential funding under the provisions of the American Recovery and Reinvestment Act ("ARRA"). The purpose of proposing this to WAPA was to seek a way to either advance the timing of this project in a manner that would lessen the rate impact to APS's retail customers or mitigate some of the uncertainty inherent in a major joint-participation project. WAPA is currently evaluating this, as well as other proposals.

The next two RTPs are the Palo Verde hub to a new substation near the Liberty substation (in the Valley load pocket) project and the Gila Bend/Gila River area to a new substation near the existing Liberty substation (in the Valley load pocket) project. For these projects, APS will conduct detailed studies to determine the optimal transmission project to support renewable resources in the Palo Verde and Gila Bend areas. APS will then conduct an open season on the identified project(s) to solicit potential participants. Once this is complete, APS will pursue the acquisition of Certificates of Environmental Compatibility ("CECs"). Subsequent to this permitting activity, APS (in conjunction with other potential project participants) will develop the appropriate schedule for placing this project in-service to support further renewable resource development in Arizona.

Additionally, APS has included development of the Arizona portion of the Palo Verde to Devers II project, identified as the Delaney to Blythe project, in its list of projects to support the development of renewable resources in Arizona. Although APS has at present not shown that an ownership participation in this project would be beneficial for its customers, APS believes that this project could influence additional solar resource development given its potential export capability to California, in addition to its potential to deliver solar resources to Arizona utilities at the Delaney switchyard. The financing mechanism that APS believes is appropriate for this project is either development by the Western Area Power Administration using funding from Section 402 of the American Recovery and Reinvestment Act of 2009 ("ARRA"), development of the project as a merchant transmission line by a project developer, or a combination of the two.

2. Procedural History and Introduction

The Commission biennially reviews 10-year plans filed by Commission-regulated utilities and other entities wishing to construct transmission within the State of Arizona.[5] After analyzing the 10-year plans and conducting workshops for stakeholder input, ACC Staff prepares a Biennial Transmission Assessment ("BTA") that evaluates the adequacy of existing and planned transmission facilities to reliably meet the present and future needs of the state.[6] Every two years, the BTA is finalized when approved by the Commission.[7]

In 2006, the Commission's Fourth BTA Decision ordered the Commission-regulated electric utilities to prepare a plan to identify: the renewable resource areas in Arizona; the amount of transmission capacity available to deliver the identified renewable resources to load; and the additional transmission needed to deliver the identified renewable resources to load.[8] To aid in compliance with the Commission's Order, the Southwest Area Transmission ("SWAT")[9] sub-regional planning group formed the Renewable Transmission Task Force ("RTTF") to identify renewable 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 Energy Transmission Task Force Report* identifying an estimated amount of

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[5] ARS § 360.02.
[6] ARS § 360.02(G).
[7] Id.
[8] ACC Decision No. 69389 (March 22, 2007), at 8.
[9] SWAT is part of a group that handles sub-regional transmission planning in the Southwest. See WestConnect <http://www.westconnect.com/planning.php>. It is comprised of transmission regulators/governmental entities, transmission users, transmission owners, transmission operators and environmental entities. See WestConnect <http://www.westconnect.com/planning_swat.php>.

renewable energy development opportunities for several different locations in Arizona, and the potential transmission lines that could bring those resources to load centers.[10]

The Commission's Fifth BTA Decision, in 2008, directed the Commission-regulated utilities to develop plans to identify future RTPs and to develop plans and proposed funding mechanisms to construct the "top three" RTPs in their respective service territories.[11] 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.[12]

The RTTF established the Arizona Renewable Resource and Transmission Identification Subcommittee ("ARRTIS") to more specifically identify those areas in Arizona with the best potential for renewable generation project development and aid the utilities in their response to the BTA Decision.[13] The ARRTIS conducted 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 RTTF renewable transmission planning efforts. The process identified areas within the state where solar and wind resources were available for utility-scale generation development. The ARRTIS developed resource maps identifying environmental exclusion and

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[10] See 2007 SWAT Renewable Energy Transmission Task Force Report (filed in Docket No. E-00000D-07-0376, May 15, 2008). The opportunities included wind, solar, biomass, hydro and/or geothermal renewable energy types.
[11] See ACC Decision No. 70635 (December 11, 2008), at 8-9.
[12] Id.
[13] See WestConnect <http://www.westconnect.com/planning_swat_rttf_arrtis.php>.

sensitivity areas.[14] The RTTF used the information provided by the ARRTIS to identify transmission options, to inform the utilities for use in their evaluations of RTPs, that would link the renewable resource areas to the existing transmission system, to load pockets within the state, or to export markets.[15]

The RTTF also established a Finance Subcommittee to investigate and recommend methods for financing RTPs in Arizona.[16] Areas of investigation included: developing a working definition for an RTP; 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.[17] It coordinated its efforts with the ARRTIS to provide recommendations to the Commission-regulated electric utilities.[18]

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[14] See *Final Report of the Arizona Renewable Resource and Transmission Identification Subcommittee* (September 2009); see also ARRTIS maps in Attachment B.

[15] See WestConnect <http://www.westconnect.com/planning_swat_rttf.php>; see also maps in Attachment C.

[16] See WestConnect <http://www.westconnect.com/planning_swat_rttf_finance.php>.

[17] Id.

[18] See Attachment D, Final Report on the Activities of the Finance Subcommittee (without attachments).

3. Utility Analysis

Decision No. 70635 required the Commission-regulated utilities to accomplish two things. By April 30, 2009, the utilities were to conduct a joint workshop or series of planning meetings to develop ways in which new transmission projects could be identified, approved for construction, and financed in a manner that would support the growth of renewable energy resources in Arizona. APS, Salt River Project ("SRP"), Tucson Electric Power ("TEP"), and Southwest Transmission Cooperative ("SWTC") participated in two workshops, which were held at the Arizona Corporation Commission, to address these issues.[19] More importantly, by October 31, 2009, the utilities were required to develop plans to identify future RTPs and proposed funding mechanisms to construct the "top three" RTPs in their respective service territories.

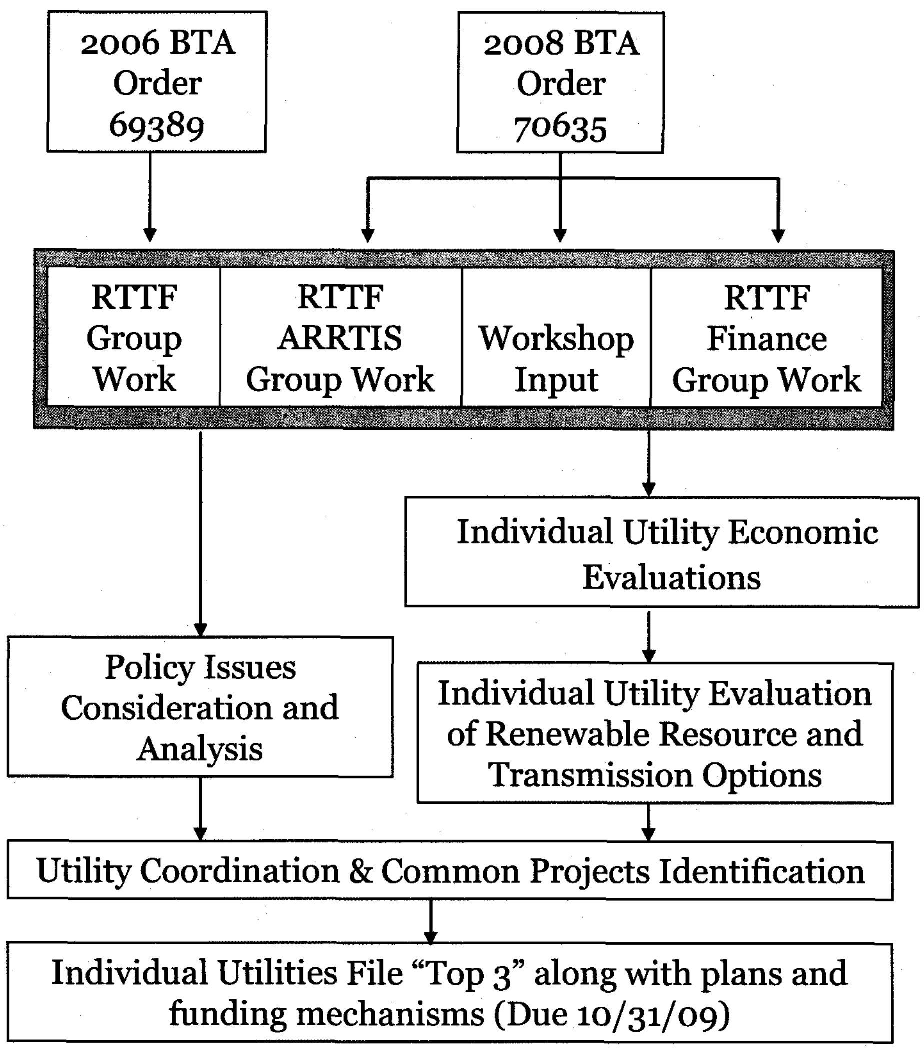
APS worked with the other utilities and interested stakeholders to develop plans to identify future RTPs. The Finance Subcommittee developed the Renewable Transmission Action Plan ("RTAP") methodology for identifying RTPs, which APS has adopted in this report. APS's RTAP identifies the RTPs best suited to support the growth of renewable resources in Arizona, while considering the costs and benefits to APS customers. APS has identified the preferred renewable transmission options and, for each RTP, established a plan to develop the project, proposed funding mechanisms, provided the background that explains the value of the project in supporting renewable energy development in Arizona, and described potential rate impacts to APS's customers for the projects selected. This report serves as APS's first RTAP.

To identify APS's "top three" RTPs, APS conducted an analysis of the potential transmission options. The APS analysis was made up of several components including input from the two,

[19] These workshops were held on April 20, 2009 and June 5, 2009 and were held in the Commission hearing room.

utility-hosted workshops held at the Commission, the ARRTIS's work, the Finance Subcommittee's work, the RTTF's work, APS economic analysis of resource/transmission pair options, and an APS qualitative analysis of the resource/transmission pair options. In addition, APS met with representatives of SRP, TEP, and SWTC to identify common interests in potential RTPs and to coordinate efforts, where applicable. The following diagram depicts the process that was undertaken by the utilities to respond to Decision No. 70635.

Utility Evaluation Process



APS conducted a comparative analysis to assess the economic value of viable renewable resource and transmission line combinations in Arizona to help identify the "top three" RTPs for APS and its customers as well as the delivery of renewable resources to export markets. Using information from the ARRTIS process[20] for renewable resource areas and sensitivities related to potential resource development, APS identified the resource areas to be analyzed in the economic analysis. In determining resource areas and transmission pairs to evaluate, APS analyzed resource areas that would ensure that an adequate representation of different resources and different resource areas were analyzed. APS identified four wind sites and 12 solar sites for further economic analysis. Additionally, APS used the work of the RTTF to identify the potential transmission components (Attachment C) that would enable delivery of the identified resource areas to APS loads, as well as options to deliver renewable resources to "export" points. The combination of the resource areas and the transmission components defined the resource/transmission pairs that APS analyzed. APS conducted detailed analysis of the solar and wind resources, as well as their expected output profiles within each identified resource area (Attachment E – "Biennial Transmission Assessment (BTA) Economic Assessment of Potential Wind and Solar Generation in Arizona").

The National Renewable Energy Laboratory's Western Wind Resource Dataset was used to estimate annual capacity factors of the four potential wind sites. Likewise, the Department of Energy's Solar Advisory Model was used to model concentrating solar power and solar photovoltaic plants at the twelve potential solar sites. Transmission costs were estimated using the capital costs for 500-kV transmission lines used in the Western Governors Association Western Renewable Energy Zone process, model, and report.[21]

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[20] See WestConnect <http://www.westconnect.com/planning_swat_rttf_arrtis.php>.

[21] See Western Governors Association <http://www.westgov.org/wga/publicat/WREZ09.pdf> and Western Renewable Energy Zones <http://www.westgov.org/wga/initiatives/wrez/gtm/index.htm>.

APS used an adjusted delivered-cost analysis to compare the candidate resource/transmission pairs. The adjusted delivered cost calculates the average cost of a renewable resource, including the cost to deliver the energy from the production location to the Phoenix load center, or in the case of export options, to the California border. The adjusted delivered-cost analysis also includes factors to differentiate the "value" of the energy produced by a specific renewable energy resource. For instance, a solar plant may provide a larger energy credit than a wind plant because a higher percentage of its energy production occurs during higher value times of the year – such as afternoon hours in the summer months. The equation for calculating the adjusted delivered cost is:

Generation Busbar Cost

\+ Transmission Cost

<u>+ Substation Cost</u>

= Delivered Cost

\+ Integration Cost

\- Capacity Credit

<u>- Energy Credit</u>

= Adjusted Delivered Cost

As shown in the following summary table and Attachment E,[22] the comparative analysis shows that, from an economic standpoint, the best renewable resource areas to build transmission to are: the Palo Verde hub, Delaney (Harquahala Valley), Gila Bend, and Hyder.[23]

[22] See Attachment E, page 24.

APS Comparative Economic Analysis Results

Resource Area	Transmission Segments	Adjusted Delivered Costs $/MWh
Palo Verde (solar resources area)	Palo Verde to Liberty (Valley load center)	$90.44
Delaney (solar resources area)	Delaney to Palo Verde to Liberty	$91.56
Gila Bend (solar resources area)	Gila Bend to Jojoba to Liberty	$92.23
Hyder (solar resources area)	Hyder to Palo Verde to Liberty	$93.10[24]
Dinosaur (solar resources area)	Dinosaur to Browning to Pinnacle Peak	$94.71
Wickenburg (solar resources area)	60 miles of Palo Verde to Mead	$94.79
Little Harquahala (solar resources area)	Little Harquahala to Delaney to Palo Verde to Liberty	$95.89
Casa Grande (solar resources area)	Desert Basin to Santa Rosa to Pinal West to Jojoba to Liberty	$98.58
Harcuvar (solar resources area)	Harcuvar to Little Harquahala to Delaney to Palo Verde to Liberty	$99.75
Bouse (solar resources area)	Bouse Hills to Little Harquahala to Delaney to Palo Verde to Liberty	$102.89
Meteor Crater (wind resource area)	50% of Flagstaff to Cholla to Pinnacle Peak	$104.90
Moenkopi/Gray Mountain (wind resource area)	Moenkopi to Flagstaff, 50% of Flagstaff to Cholla and Cholla to Pinnacle Peak	$107.77
Hilltop (wind resource area)	Peakock to Hilltop to and all but 40 miles of Mead to Westwing	$111.29
Springerville (wind resource area)	Coronado to Cholla, 50% of Flagstaff to Cholla and Cholla to Pinnacle Peak	$115.68
Bowie (solar resources area)	Bowie to Coolidge to Sundance to Dinosaur to Browning to Pinnacle Peak	$120.37
Aubrey Cliffs (wind resource area)	Mead to Westwing	$122.55

[23] In order to compare the resource and transmission pairs, the most "positive" case for each pair was assumed, i.e., there was full utilization of the transmission projects - even though full utilization may not occur until several years after a major RTP is placed in service.

[24] The Hyder resource and transmission pair option represents the same economic outcome as an APS 40% ownership share of the entire Palo Verde to North Gila line.

In addition to the economic analysis, APS conducted a qualitative analysis (Attachment F) to identify and assess several qualitative factors that APS believes are important considerations to determine the best renewable transmission alternatives. The factors considered were:

- Expectation for candidate RTP to help lower future renewable resource costs;
- Potential to support multiple potential renewable energy markets;
- Potential to bring benefits beyond renewable resource access for APS customers;
- Likelihood of attracting participants to the project;
- Expected permitting sensitivity (resource and transmission);
- Interconnection queue robustness for resource area (how many megawatts ("MW") of interconnection requests are there now);
- Expected immediate utilization level;
- Ability to support phased implementation to spread out customer rate impacts;
- Current requests for long-term transmission service that might help support cost recovery;
- Potential ability to secure land for resource development in resource area (Bureau of Land Management ("BLM") vs. private, etc.); and
- Market test verification/availability of existing transmission/other.

APS also used information gathered as part of the Finance Subcommittee's work[25], as well as information gathered during workshops conducted in April and June, 2009, as required by the BTA Decision.[26] The combination of this information and analyses enabled APS to reach its conclusions.

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[25] See WestConnect <http://www.westconnect.com/planning_swat_rttf_finance.php>.

[26] See WestConnect <http://www.westconnect.com/documents_results.php?categoryid=104>.

4. Recommended Projects

Based on APS's overall analysis, described in Section 3 of this Report, the following is a description of the conclusions reached in response to Decision No. 70635. It identifies APS's "top three" potential RTPs, along with plans and proposed funding mechanisms to develop the projects. APS believes that these RTPs, along with the proposed development approach, will support the growth of renewable energy resources in Arizona.

1. Delaney to Palo Verde 500-kV

Project Description:

This transmission project is a 500-kV transmission line from the Palo Verde hub to a new switchyard that has not yet been constructed ("Delaney"), approximately 18 miles west of the Palo Verde hub. The Delaney switchyard will be a station along a 500-kV "loop" that will eventually run from Palo Verde around the west and the north side of the Phoenix Metropolitan Valley to the Pinnacle Peak substation (See Map in Attachment G). This project is also an important component to the potential future Devers II transmission project since the project creates the Delaney switchyard. The Delaney switchyard has been identified as the starting point for the Devers II transmission project, which is a connection to the Southern California markets and has the potential to enable additional renewable energy to be exported from Arizona to California.

Summary of Development Approach and Rationale:

APS will pursue the land/ROW acquisition, engineering, and construction necessary to enable the capability of meeting a December 2012 in-service date. Outside participation of

20% is anticipated to support this project; however, APS will proceed independently with development if necessary. Project development activities will be advanced to provide for an in-service date as early as December 2012. Close coordination with resource developers is necessary to ensure the project development corresponds to the development schedule of resources in the Delaney area. The actual in-service date of this project will be aligned with the first definitive use of the line. This first use of the RTP could come in the form of an APS PPA with a developer at Delaney or a committed TSA with a developer selling to another utility. Absent an earlier need, the construction schedule would be synchronized with the Delaney to Sun Valley 500kV transmission project – currently scheduled to be in-service in 2014.

<u>Development Steps</u>

- Acquire CEC – *This step is already completed.*[27]
- File CEC compliance stating intent to utilize Delaney to Palo Verde portion of the CEC.
- Finalize participant agreements for project.
- Acquire ROW
- Engineering Design
- Construction-ready and capable to meet an in-service date of December 2012 contingent on a need – an APS PPA or a TSA – otherwise in-service to be synchronized with the Delaney to Sun Valley transmission project.

[27] ACC Decision No. 68063 (August 17, 2005).

Cost Recovery:

- Cost recovery through annual formula rate filing at FERC.
- The Transmission Cost Adjustor ("TCA") provides for cost recovery from retail customers upon ACC approval.[28]
- Special cost recovery requests:
  - No special treatment is anticipated at this time.

Description of why this RTP is expected to advance renewable resource deployment within the State of Arizona:

- Project provides opportunity for comparably low-cost renewable resources for APS customers.
- At the time of this analysis, there were 3,300MW+ interconnection requests to Delaney, which indicates a robust market interest in this renewable resource area.
- Project provides access to PV hub for delivery to Arizona loads or for export to California markets via existing transmission lines from the PV hub to California, which aids developers in market assessment of projects in the Delaney area.
- Area contains excellent solar output, which leads to comparably good pricing of solar resources.
- SRP and Central Arizona Project ("CAP") are currently participants (for 20% of line).

[28] FERC approves cost-recovery, and the rates are passed on to retail customers through a TCA mechanism.

- There is BLM land in the area of Delaney that could potentially be used for solar development.
- Project could potentially support up to 1,500MW of solar development.
- Project is relatively low cost in relation to its benefits.
- Project fits in the long-term APS and regional transmission plans.

Expected Cost and Potential Rate Impacts of Project:

- Estimated APS cost of project is \$55M.[29]
- Potential approximate rate increase impact to customers: 0.36%

[29] This is the estimated project cost for APS's 80% share of the project and is based on current estimated costs.

2. **Palo Verde to North Gila 500-kV #2**

Project Description:

This transmission project is a 500-kV transmission line from the Palo Verde hub to the North Gila substation outside of Yuma. It is approximately a 114 mile line and would parallel an existing, jointly-owned 500-kV transmission line from the Palo Verde hub area to the North Gila substation (See Map in Attachment G). This project is a participant transmission project with the current participation being:

APS - 40%,

SRP- 20%,

Imperial Irrigation District ("IID") - 20%, and

Wellton Mohawk Irrigation and Drainage District ("WMIDD") - 20%.

Additionally, APS has proposed this project to the WAPA for potential funding under the provisions of the ARRA.

Summary of Development Approach and Rationale:

APS will, given the current level of participation by others, continue to work toward an in-service date of 2014 for this project. APS originally initiated the development of this line to increase the load serving capability for, and to deliver resources to, the Yuma load center. Based on current Yuma load forecasts, the timing for the APS need for a portion of this line is closer to the 2017 timeframe or beyond. APS would not pursue this project if there was not participant involvement due to the large investment, relative to the size of the Yuma load. This project is not needed to meet APS's renewable energy requirements in the 2014 timeframe because APS can access high quality renewable resources in the Palo Verde hub, Delaney, and Gila Bend areas, as well as the potential to access some renewable resources on the existing Palo Verde to North Gila line. Due to the large amount of capital needed for this project, it is important to recognize the need for multiple participants, especially because no single participant has a compelling reason to build the line independently. For these reasons, APS is working to maintain the participant involvement, as well as seeking WAPA involvement for a share of the project. Although this project may be very beneficial from an export standpoint, close coordination with California will be necessary to ensure the transmission "west of the river" will be adequate to support this "east of the river" upgrade.

Development Steps

- Acquire CEC – *This step is already completed.*[30]
- Develop participant agreements (in process).
- Acquire land/ROW (on timeline to support current in-service date and subject to second bullet).
- Engineering design (on timeline to support current in-service date and subject to second bullet).
- Construction for in-service date of 2014 (subject to completion of work described above).

[30] ACC Decision No. 70127 (January 23, 2008).

Cost Recovery:

- Cost recovery through annual formula rate filing at FERC.
- The TCA provides for cost recovery from retail customers upon ACC approval.
- Special cost recovery requests:
    - Will file with FERC early to request special treatment, including:
        - Construction Work In Progress.
        - Recovery of costs already incurred if it becomes prudent to abandon project at any point during the development process (due to participant uncertainty).

Description of why this RTP is expected to advance renewable resource deployment within the State of Arizona:

- Project provides opportunity for comparably low-cost renewable resources for APS customers.
- There are 2,000 MW+ interconnection requests to the area adjacent to this line, which indicates a robust market interest in this RTP.
- APS customers have an additional use for this line beyond renewable resources. This line will enhance the reliability of the Yuma load pocket, increase the load serving capability in Yuma, and provide additional resource flexibility to serve the both the Valley and the Yuma load pocket.
- Project provides access to both PV hub and North Gila for project delivery to Arizona loads or for export to California markets.

- Having both Palo Verde and North Gila delivery would enable additional flexibility for renewable projects desiring to export to California markets.
- Area contains excellent solar output, which leads to comparably good pricing of solar resources.
- SRP, IID, and WMIDD are current participants (for 60% of line).
- Additionally, WAPA has expressed an interest in participation as part of the potential government funding of WAPA transmission expansions for renewable energy. WAPA is currently in the process of evaluating this project for potential participation.
- There is BLM land in the area adjacent to this line, which could potentially be used for solar development.
- Project could potentially support up to 1,500 MW of solar development.
- At APS's current participation level, project has a reasonable cost in relation to its benefits.
- Project fits in the greater APS and regional transmission plans.
- Potential transmission wheeling on the line could lower exposure to increased APS customer costs further. However, wheeling revenue may be limited on the new line due to the existence of an existing line and the dependence on additional transmission development within California to allow for the full export benefits of this line.
- This line could also enable APS to bring additional geothermal resources to APS customers from the Imperial Valley in California.

Expected Cost and Potential Rate Impacts of Project:

- Expected APS cost of project is $97M.
    - Potential approximate rate increase impact to customers: 0.63%

3a. Palo Verde to Liberty

Project Description:

This transmission project is a conceptual 500-kV transmission line from the Palo Verde hub to a new substation near the existing Liberty substation located in the west Valley (See Map in Attachment G). The specific details of the project are not yet known since transmission planning study work will have to be conducted to identify the optimum project.

Summary of Development Approach and Rationale:

APS, in conjunction with the overall regional planning process, will conduct studies to identify the best alternative to enable additional resources in the Palo Verde area to be delivered to the Valley load pocket. The studies will also consider, concurrent with the evaluation of the Gila Bend to Liberty project, the enabling of the resources in the Gila Bend area to reach the Valley load pocket. Once a definitive project has been identified, APS will conduct an open season for participation. Once the open season is complete, APS will prepare and file for a CEC. The in-service date of the project may not be known when the CEC application is filed; this highlights the need for flexibility in the line siting process to help resolve the "chicken-and-egg" problem, which is the greater period of time required to develop and construct transmission lines as compared to renewable resource facilities. APS will proceed with engineering design and ROW acquisition as and when needed to support a to-be-determined in-service date. This development plan, along with support from other projects, can help resolve the "chicken-and-egg" problem as it relates to acquiring additional resources from the Palo Verde hub, the Hyder area, and/or the Harquahala Valley.

Development Steps

- Perform technical studies to determine the optimal electrical connection and best project approach.
- Conduct open season.
- Prepare CEC application and file application for CEC approval.
- Acquire land/ROW (proceed once needed based on in-service date).
- Engineering design (proceed once needed based on in-service date).
- Construct line – Proceed once a need exists – either a load serving need, PPA, or a TSA.

Cost Recovery:

- Cost recovery through annual formula rate filing at FERC.
- The TCA provides for cost recovery from retail customers upon ACC approval.
- Special cost recovery requests:
    - APS does not anticipate requesting special cost recovery treatment at this time although this may be re-evaluated at a later stage of project development.

Description of why this RTP is expected to advance renewable resource deployment within the State of Arizona:

- Project provides opportunity for comparably low-cost renewable resources for APS customers.
- There are extensive interconnection requests at the Palo Verde hub and additional locations to the west of Palo Verde, indicating an eventual need for this type of project to allow access to the Valley load center.
- APS has additional potential uses for this line that make it robust for APS customers:
    - Provides increased load serving capability;
    - Provides increased import capability; and
    - Provides access to existing gas resources.
- Adding additional PV-east capacity allows others to utilize transmission to export power.
- Area contains excellent solar output, which leads to comparably good pricing of solar resources.
- Potential for other participants in this line.
- Project could potentially support up to 1,500 MW of solar development.

Expected Cost and Potential Rate Impacts of Project:

- Expected cost of project is unknown at this time due to the early development of the project.

- Potential range of rate impacts to customers is unknown at this time due to the uncertainty of the future project cost.

3b. Gila Bend to Liberty

Project Description:

This transmission project is a conceptual 500-kV transmission line from the Gila Bend/Gila River area to a new substation near the existing Liberty substation located in the west valley (See Map in Attachment G). The specific details of the project are not yet known since transmission planning study work will have to be conducted to identify the optimum project.

Summary of Development Approach and Rationale:

APS, in conjunction with the overall regional planning process, will conduct studies in order to identify the best alternative to enable additional resources in the Gila Bend/Gila River area to be delivered to the Valley load pocket. The studies will also consider, concurrent with the evaluation of the Palo Verde to Liberty project, the enabling of the resources in the Palo Verde area to reach the Valley load pocket. Once a definitive project has been identified, APS will conduct an open season for participation. Once the open season is complete, APS will prepare and file for a CEC. The in-service date of the project may not be known when the CEC application is filed; this highlights the need for flexibility in the line siting process to help resolve the "chicken-and-egg" problem, which is the greater period of time required to develop and construct transmission lines as compared to renewable resource facilities. APS will proceed with engineering design and ROW acquisition as and when needed to support a to-be-determined in-service date. This development plan, along with support from other projects, can help resolve the "chicken-and-egg" problem as it relates to acquiring additional resources from the Gila Bend area.

Development Steps

- Perform technical studies to determine the optimal electrical connection and best project approach.
- Conduct open season.
- Prepare CEC application and file application for CEC approval.
- Acquire land/ROW (proceed once needed based on in-service date).
- Engineering design (proceed once needed based on in-service date).
- Construct line – Proceed once a need exists – either a load serving need/PPA or a TSA.

Cost Recovery:

- Cost recovery through annual formula rate filing at FERC.
- The TCA provides for cost recovery from retail customers upon ACC approval.
- Special cost recovery requests:
    - APS does not anticipate requesting special cost recovery treatment at this time although this may be re-evaluated at a later stage of project development.

Description of why this RTP is expected to advance renewable resource deployment within the State of Arizona:

- Project provides opportunity for comparably low-cost renewable resources for APS customers.
- There are almost 1,200 MW of interconnection requests to the area in and around Gila Bend, which indicates a robust market in this renewable resource area.
- APS has an additional potential uses for this line that make it robust for the APS customers:
    - Provides increased load serving capability;
    - Provides increased import capability; and
    - Provides access to existing gas resources.
- Provides opportunity for future expansion of transmission system by completing a transmission loop. This would be done by using the Palo Verde North Gila II line (from the Palo Verde hub to the Hyder area) and then connecting the Gila Bend/Gila River to Valley project with an additional future segment from Gila Bend to Hyder (shown as segment 54 in Attachment C). This would provide future additional renewable transmission capability and flexibility.
- Provides additional opportunity for export of power.
    - Wheeling from Gila Bend to Jojoba to Palo Verde would allow export sales to the California market.

- Area contains excellent solar output, which leads to comparably good pricing of solar resources – as demonstrated by the Solana Concentrated Solar Plant PPA.
- Potential for other participants in this line.
- Project could potentially support up to 1,500 MW of solar development.

Expected Cost and Potential Rate Impacts of Project:

- Expected cost of project is unknown at this time due to the early development of the project.
- Potential likely range of rate impacts to customers is unknown at this time due to the uncertainty of the future project cost.

4. Delaney to Blythe (Arizona Portion of Devers II)

Project Description:

This transmission project is part of a previously planned 500-kV transmission line by Southern California Edison that would connect the Delaney switchyard to a substation near the town of Blythe.

Summary of Development Approach and Rationale:

The last RTP is the Arizona portion of the Devers to Palo Verde II project, originally proposed by Southern California Edison. Assuming the likely need for additional access to renewable resources in Arizona by California and other Western States, and the proximity of the Delaney to Blythe project to renewable resources, development of this transmission line should enhance renewable project development in Arizona. On April 3, 2009, APS proposed to WAPA that it consider development of the Palo Verde to Devers II project using the borrowing authority under Section 402 of the ARRA. It is APS's understanding that WAPA has included the Delaney to Blythe segment along with several other potential transmission projects in a conceptual transmission plan for further analysis.

Although APS has currently has not concluded that an ownership participation in this project is appropriate for its customers, APS believes that this project could influence additional solar resource development given its potential export capability to California in addition to its potential to allow for solar resources to be delivered to

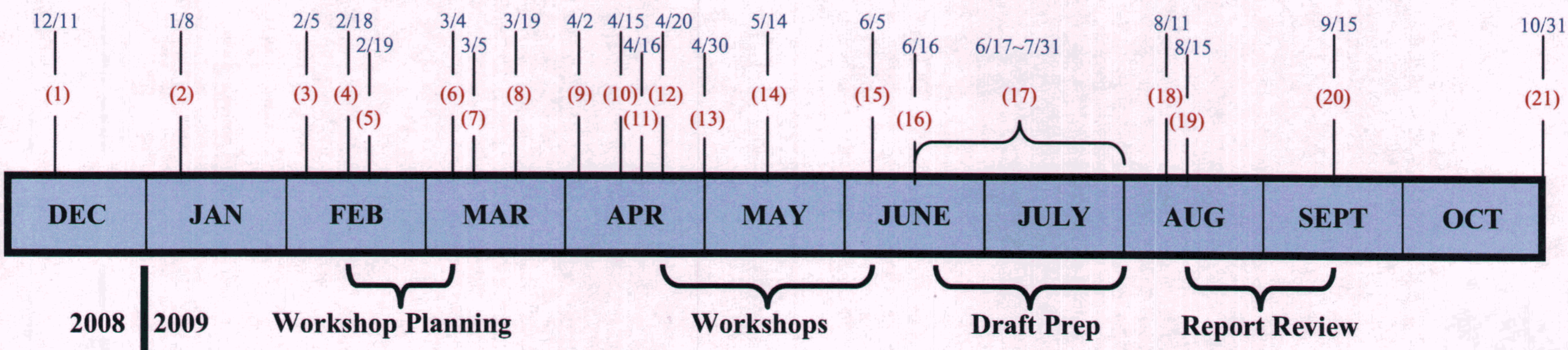
Arizona utilities at the Delaney switchyard. APS will continue to encourage and support WAPA, other developers, or a combination of the two to move this project forward, including the potential use WAPA's ARRA borrowing authority, and will work with WAPA in its further analysis of this segment. Also, additional transmission development within California may be necessary to allow for the full export benefits of this line.

Attachment A

10/30/09

ATTACHMENT A
RTTF TIMELINE

(1)	12/11/08	ACC issues Decision No. 70635
(2)	01/08/09	RTTF creates subcommittees: AARTIS and Finance
(3)	02/05/09	ARRTIS Meeting No. 1
(4)	02/18/09	Finance Subcommittee Meeting No. 1
(5)	02/19/09	ARRTIS Meeting No. 2
(6)	03/04/09	Finance Subcommittee Meeting No. 2
(7)	03/05/09	ARRTIS Meeting No. 3
(8)	03/19/09	ARRTIS Meeting No. 4
(9)	04/02/09	ARRTIS Meeting No. 5
(10)	04/15/09	Submit Interim Report to RTTF
(11)	04/16/09	ARRTIS Meeting No. 6
(12)	04/20/09	ACC Workshop No. 1
(13)	04/30/09	ARRTIS Meeting No. 7
(14)	05/14/09	ARRTIS Meeting No. 8
(15)	06/05/09	ACC Workshop No. 2
(16)	06/16/09	Finance Subcommittee Meeting No. 3
(17)	06-07/09	Work Group Develops and Subcommittee Reviews Draft Form of Order
(18)	08/11/09	Finance Subcommittee Meeting No. 4
(19)	08/15/09	Issue Draft Report to Subcommittee and initiate review
(20)	09/15/09	Issue Final Report to RTTF with Draft Form of Order
(21)	10/31/09	Utilities respond to order No. 70635: " ... plans and funding mechanisms shall be filed with the Commission no later than October 31, 2009 …."

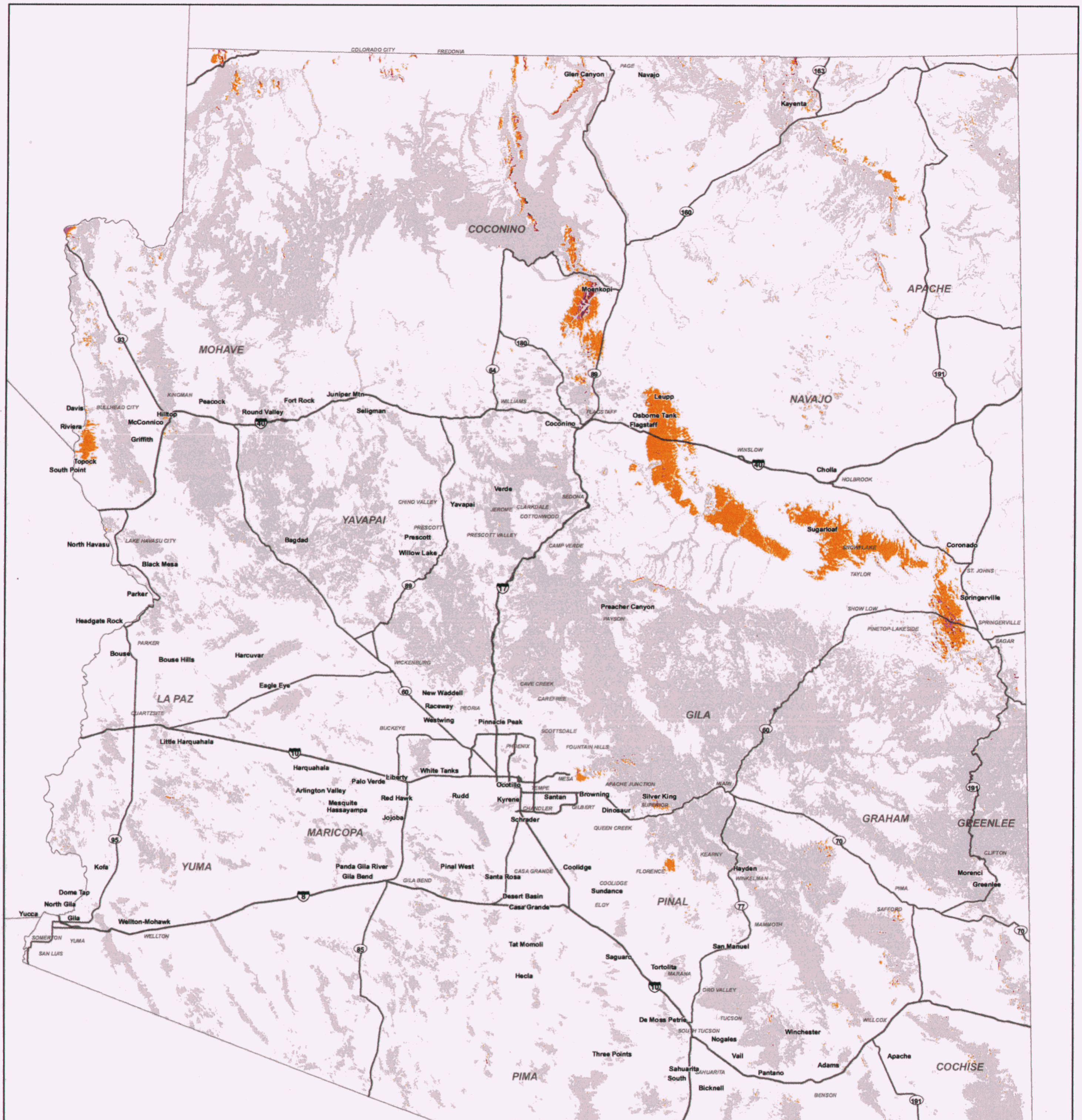


10/30/09

Attachment B

ARRTIS Maps

10/30/09



The information on this map has not been peer- or field-reviewed, and are valid only during the course of ARRTIS activities from February- May 2009. The data contained on this map should not be used to designate any resource development boundaries, determine the viability of renewable generation projects, or for any other planning-related decisions other than the expressed purpose of the ARRTIS to provide information to the RTTF transmission planning efforts. Any use of the maps developed by ARRTIS without this disclaimer information and for purposes not outlined in the Summary Report are prohibited.

WIND RESOURCE POTENTIAL (NREL CATEGORIES)

- Exclusion - Includes areas greater than 15% Slope
- Class 3 - Fair
- Class 4 - Good
- Class 5 - Excellent
- Class 6 - Outstanding
- Class 7 - Superb

GENERAL REFERENCE

- Interstate/Highway
- Major Road
- City Boundary
- County Boundary
- State Boundary

SOURCES

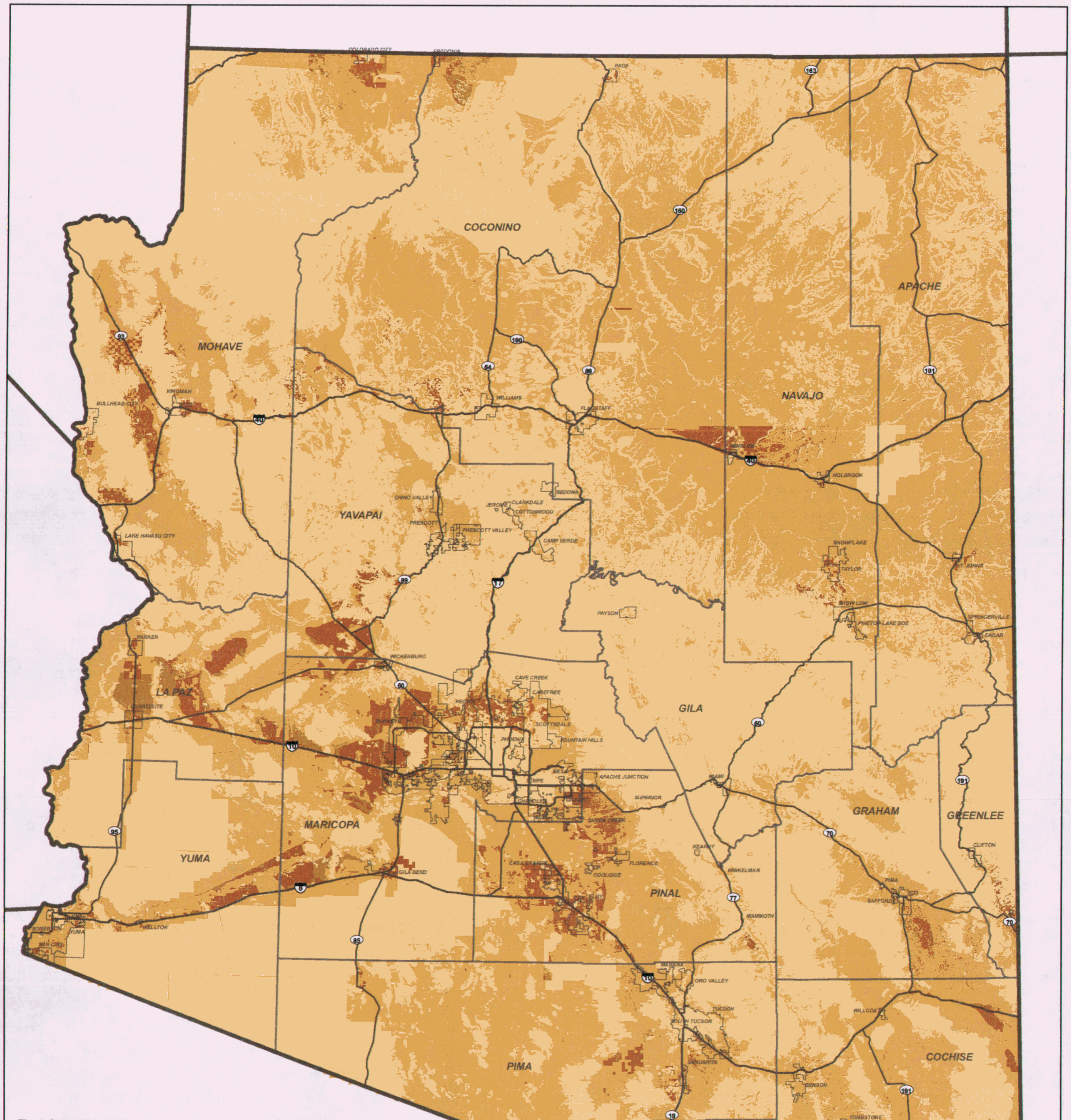
NREL, USGS, 2009

WIND RESOURCES

ARRTIS - ARIZONA RENEWABLE RESOURCE AND TRANSMISSION IDENTIFICATION SUBCOMMITTEE

September 2009

0 10 20 40 60 Miles



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ENVIRONMENTAL EXCLUSION AND SENSITIVITY AREAS

- Exclusion - Includes areas greater than 5% Slope
- High Sensitivity
- Moderate Sensitivity
- Low Sensitivity

GENERAL REFERENCE

- Interstate/Highway
- Major Road
- City Boundary
- County Boundary
- State Boundary

SOURCES

ASLD, AGFD, BLM, NREL, USFS, USFWS, USGS, WREZ, 2009

ENVIRONMENTAL RESOURCE EXCLUSION AND SENSITIVITY AREAS (SOLAR)

ARRTIS - ARIZONA RENEWABLE RESOURCE AND TRANSMISSION IDENTIFICATION SUBCOMMITTEE

September 2009

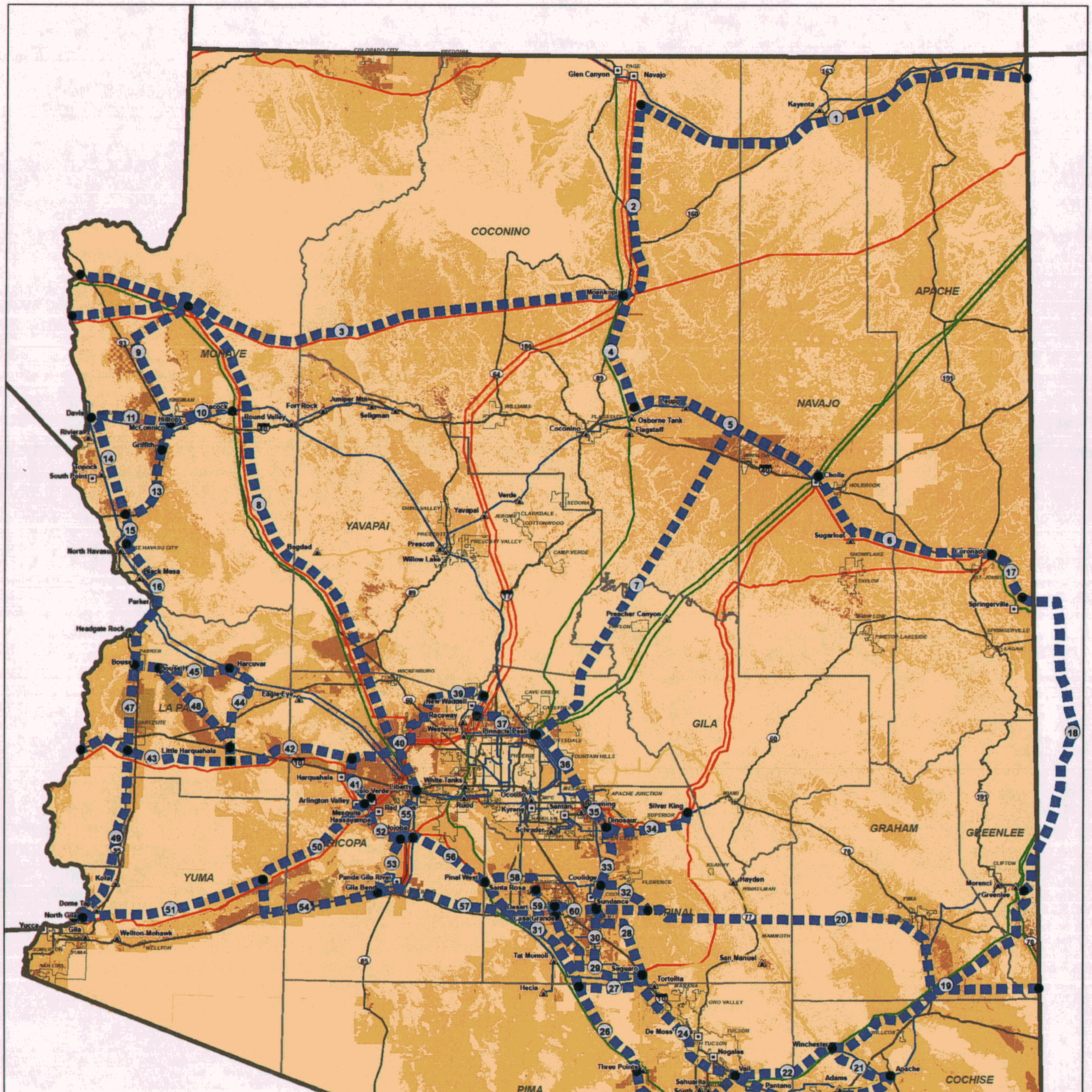
0 10 20 40 60 Miles

N

Attachment C

RTTF Map

10/30/09



ENVIRONMENTAL EXCLUSION AND SENSITIVITY AREAS

- Exclusion - Includes areas greater than 5% Slope
- High Sensitivity
- Moderate Sensitivity
- Low Sensitivity

GENERAL REFERENCE

- Interstate/Highway
- Major Road
- City Boundary
- County Boundary
- State Boundary

UTILITY FACILITIES

- RTTF Proposed New Transmission/Upgrades
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- 161kV Transmission Line
- 138kV Transmission Line
- 115kV Transmission Line
- Power Plant
- Pumping Plant
- Substation

SOURCES

ASLD, AGFD, BLM, NREL, USFS, USFWS, USGS, WREZ, 2009

ENVIRONMENTAL RESOURCE EXCLUSION AND SENSITIVITY AREAS (SOLAR)

ARRTIS - ARIZONA RENEWABLE RESOURCE AND TRANSMISSION IDENTIFICATION SUBCOMMITTEE

DRAFT: June 18, 2009

0 10 20 40 60 Miles

Attachment D

Final Report on the Activities of the Finance Subcommittee

10/30/09

ACC Docket No. E-0000A-09-0066

A

FINAL REPORT

On the Activities of the

Finance Subcommittee

Renewable Energy Transmission Task Force

Southwest Area Transmission Planning Group

October 5, 2009

CONTENTS

ACKNOWLEDGEMENTS

The work products, findings, conclusions and recommendations of the Finance Subcommittee are due to the efforts of the following companies and organizations:

Arizona Corporation Commission Staff; Arizona Public Service Company; Az ISA; Bright Source Energy; Element Power; Federal Energy Regulatory Commission; Genesee Consulting Group, LLC; Horizon Wind Energy; Interwest Energy Alliance; POWER Engineers; RES Americas, Inc.; Richard W. Tobin II, LLC; Salt River Project; SouthWestern Power; Southwest Transmission Cooperative, Inc.; Tessera Solar; Tucson Electric Power Company; Western Grid Group; and Western States Energy Solutions

Further recognition is extended for the participation by and thoughtful insights from the following individuals:

Albert, Brad - APS
Bagley, Ken - Genesee
Bahl, Prem[1] – ACC
Belval, Ron - TEP
Bernosky, Gregory - APS
Brandt, Jana - SRP
Charters, Jim – Western States Energy Solutions
Cole, Brian - APS
Groves, Jack - POWER Engineers
Kondziolka, Robert – SRP
Ormond, Amanda – Interwest Energy Alliance and Western Grid Group
Scott, Deb - APS
Tobin, Richard - RWT II, LLC
Woodall, Laurie

Finally, the Subcommittee's efforts were aided substantially by the diligent assistance of Cindy Bailey. Cindy arranged all the meetings; helped in the production of presentation materials; made filings in the ACC docket; and, drafted Subcommittee reports (including this one).

Tom Wray
Chairman

[1] Commission Staff attended most of the meetings of the Finance Subcommittee, and provided comments in the process of the drafting of this report. However, the conclusions of this report do not necessarily, in whole or in part, represent Staff's recommendations and/or conclusions.

INTRODUCTION

The Final Report of the Finance Subcommittee of the Renewable Energy Transmission Task Force ("RTTF") provides information on the activities of the Subcommittee during the period of January-September 2009. It consists of an Executive Summary, Background, Process, Findings and Conclusions, Summary and Recommendations, and supporting Appendices.

EXECUTIVE SUMMARY

The RTTF, itself a formal task force of the Southwest Area Transmission planning group ("SWAT"), established the Finance Subcommittee on January 8, 2009. This action was taken to provide supplemental advisory information to the Arizona Corporation Commission's ("ACC" or "Commission") jurisdictional utilities. This information was intended for the utilities' consideration as part of their response to ACC Decision No. 70635 (the "Decision"), issued on December 11, 2008, which requires the utilities to identify and develop plans for the top three renewable transmission projects, submit a report by October 31, 2009, and have this report discussed in the Commission's next BTA. This Decision was the result of the 2008 Biennial Transmission Assessment ("BTA") process, which is undertaken every two years pursuant to A.R.S. § 40-360.02.

The RTTF assigned the Finance Subcommittee the tasks of investigating and recommending financing methodologies for Renewable Transmission Projects ("RTPs") in Arizona. The findings and recommendations of the Subcommittee were to be submitted to the RTTF and the jurisdictional utilities subject to the Decision. In coordination with its companion RTTF subcommittee, the Arizona Renewable Resource and Transmission Identification Subcommittee ("ARRTIS"), the Finance Subcommittee was also directed to provide support to the utilities responsible for the Workshops as directed by the ACC in the Decision.

The Finance Subcommittee has conducted four meetings to discuss factual matters relating to possible financing methods for RTPs in Arizona. Areas of investigation included: developing a working definition for an RTP; review of various project subscription methodologies; provisions for recovery of reasonable and prudent costs; and, various methods for providing utilities with an enhanced means to effectively finance and construct RTPs.

The Finance Subcommittee participated in two utility-sponsored workshops that were arranged as a means to facilitate stakeholder input on the issues raised in the Decision.

Following considerable investigation and deliberation, the Finance Subcommittee recommends that the Commission adopt a Renewable Transmission Action Plan as a methodology for identifying, planning, and facilitating RTP development in Arizona.

Further, the Subcommittee recommends that the Commission closely coordinate RTP cost recovery determinations for utilities, with similar determinations made by the Federal Energy Regulatory Commission, as such jurisdiction inevitably overlaps.

Finally, the Subcommittee recommends specific cost components associated with RTP development that should be eligible for rate recovery by utilities.

Additional discussion on these recommendations can be found beginning on page 15 of this Final Report.

BACKGROUND

On December 11, 2008, the Commission issued its Decision No. 70635 in Docket No. E-00000D-07-0376:

> *"IN THE MATTER OF THE COMMISSION'S FIFTH BIENNIAL TRANSMISSION ASSESSMENT ("BTA"), PURSUANT TO THE ADEQUACY OF EXISTING AND PLANNED TRANSMISSION FACILITIES TO MEET ARIZONA'S ENERGY NEEDS IN A RELIABLE MANNER"*

[ACC Decision No. 70635 can be found in Appendix A of this report.]

In response to the Decision, the RTTF created the ARRTIS and the Finance Subcommittees on January 8, 2009. The RTTF directed the two subcommittees to generate supplemental information and recommendations for the jurisdictional utilities to consider as part of their response to the Decision.

The Decision directed the utilities to:

> *"...identify future renewable transmission projects and develop plans and propose funding mechanisms to construct the top three renewable transmission projects. These plans and mechanisms shall be filed with the Commission no later than October 31, 2009, and shall be discussed in the sixth Biennial Transmission Assessment..."* (Page 9; Lines 2-6).

The subcommittees were directed to complete their work, such that utilities subject to the Decision had sufficient time to prepare their filings by October 31, 2009.

The Finance Subcommittee was created to investigate and recommend financing methodologies the ACC can consider and implement on RTPs, such as those identified by ARRTIS. The two subcommittees were expected to coordinate activities and work products to provide the utilities with comprehensive information and recommendations that address the issues raised in the Decision.

In addition to the development of financing methodologies for RTPs, the Finance Subcommittee provided support to the two utility-sponsored workshops that were conducted on April 20, 2009 and June 5, 2009, respectively.

On June 16, 2009, the Finance Subcommittee established a Work Group to document the Finance Subcommittee's findings, conclusions, and recommendations for possible funding mechanisms for RTPs. The Work Group prepared a memorandum of *"Proposed Findings of Fact"* to assist the Commission in establishing a process for the evaluation and approval of RTPs.

The Final Report is provided to the Commission, utilities subject to the Decision, and interested stakeholders.

PROCESS

This section describes the process by which the Subcommittee sought to achieve the objectives set forth by the RTTF and to meet the expectations contemplated by the Commission in the Decision. The primary objective of the Finance Subcommittee was to investigate and recommend possible funding mechanisms that could apply to the utilities' three proposed RTPs that would promote the development of Arizona's renewable energy resources.

During an RTTF meeting on January 8, 2009, the Finance Subcommittee was established. Tom Wray was designated the chairman and deemed responsible for coordinating the Subcommittee's activities and development of various work products.

On February 6, 2009, the Finance Subcommittee chairman issued an e-mail correspondence to all participants-of-record in RTTF and SWAT to solicit involvement and input from interested stakeholders desiring to address the issues raised in the Decision. This solicitation of interest was supplemented with a description of the Finance Subcommittee's proposed schedule and scope of investigation. The Finance Subcommittee's scope of investigation, as proposed at that time, included:

1. Establish a working definition for a "renewable transmission project";

2. Review methods of securing project participation in RTPs, including open seasons, request for proposal, bilateral contracts, auctions, transmission capacity options, etc.;

3. Develop a standard procedure for utilities to accumulate costs attributable to engineering, technical studies, survey work and investigation, permitting and rights-of-way acquisition in support of RTPs, which may become eligible for rate-based cost recovery by order of the Commission;

4. Review procedures whereby incentives are available to utilities participating in RTPs, including the ability to earn a higher rate of return on equity invested by the company's shareholders; and,

5. Investigate the applicability of alternative capital structures for both construction and operating period financing.

[Appendix B to this report includes the February 6, 2009 solicitation of interest e-mail and the Finance Subcommittee's **Scope and Schedule** document.]

Meeting No. 1 of the Subcommittee was conducted on February 18, 2009. The primary task of the first meeting was to refine the Subcommittee's scope of investigation and schedule. Matters discussed at the meeting included: ACC Decision No. 70635; the relationship between the Subcommittee's work efforts and the planned workshops; potential definitions for an RTP in Arizona; and, the possible work products developed from the Subcommittee's efforts.

[Appendix C includes the items used during Meeting No. 1 including, agenda, roster, presentation materials, subcommittee timeline, and revised minutes.]

Meeting No. 2 of the Finance Subcommittee was conducted on March 4, 2009. Subcommittee participants provided input on topics relevant to the Subcommittee's scope of investigation including: a working definition for RTPs; cost recovery methodologies for capital investments in RTPs located in Arizona; allocation of both a base and incentive rate of return for development efforts on RTPs; transmission capacity subscription methods and practices; developing policies and recent orders of the Federal Energy Regulatory Commission ("FERC"); and, relevant legislative developments.

[Appendix D includes the items used during Meeting No. 2 including, agenda, roster, presentation materials, and revised minutes.]

The Finance Subcommittee filed an **Interim Report** on April 16, 2009 in Docket No. E-00000A-09-0066 that was opened by the Commission:

> *"IN THE MATTER OF THE COMMISSION'S GENERIC DOCKET FOR INFORMATION GATHERING CONCERNING RENEWABLE TRANSMISSION ISSUES IDENTIFIED IN THE FIFTH BIENNIAL TRANSMISSION ASSESSMENT FINAL ORDER AS REQUIRED IN DECISION NO. 70635"*

The Interim Report provided information on the activities of the Subcommittee during the period of January through March of 2009. It consisted of an executive summary, areas of inquiry, and supporting appendices.

The RTTF directed the Subcommittee to provide support to two workshops that were conducted on April 20, 2009 and June 5, 2009, respectively, as set forth in the Decision:

> *"The Commission will require utilities and other stakeholders to hold a workshop 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 renewables in Arizona. The workshop shall be held no later than April 30, 2009."* (Page 7; Lines 17-20).

On behalf of the Subcommittee, the Finance Subcommittee chairman provided a presentation to the participants of Workshop No. 1 on April 20, 2009. The presentation provided an update on the Subcommittee's scope of investigation and progress toward developing RTP funding mechanisms and recommendations for the utilities responsible for responding to the Decision.

[Presentation provided during Workshop No. 1 was filed in Docket No. E-0000A-09-0066, on April 16, 2009, and is provided in Appendix E.]

On June 5, 2009, the utilities sponsored Workshop No. 2 at the Commission to continue the discussion on RTP issues. Participants provided input during the workshop that focused on "Ways to Finance" RTPs. The Subcommittee incorporated the ideas and suggestions gained from the workshop into its work.

[The agendas for the two utility-sponsored Workshops are found in Appendix F.]

Meeting No. 3 of the Finance Subcommittee was held on June 16, 2009. On June 4, 2009, the Finance Subcommittee chairman issued an e-mail correspondence requesting proposals from interested stakeholders on possible funding mechanisms that could be implemented for RTPs in Arizona. These proposals were presented during Meeting No. 3.

APS provided a presentation on cost recovery mechanisms and potential definitions for RTPs. APS additionally introduced a proposal for a Renewable Transmission Action Plan ("RTAP") that could be used as part of the BTA process. The RTAP was conceived as a procedure for the Commission to review and approve a utility's identified RTAP within or in parallel with the BTA process.

TEP provided a handout on a possible cost recovery process for RTPs. This document prompted a discussion on the issues associated with the Commission ordering RTP designation and the potential conflict brought about by the utilities' required compliance with FERC Order 888.

The Finance Subcommittee chairman reviewed past Subcommittee work to promote considerable discussion regarding a draft "form of order" that responds to the financing RTP issue identified in the Decision. The Finance Subcommittee generally agreed such a document should be submitted to the RTTF and utilities subject to the Decision as the Subcommittee's final work product.

Meeting No. 3 concluded with the formation of a Work Group charged with the responsibility of drafting the "form of order". The Subcommittee discussed addressing the following items in the draft order:

1. Provide a working definition of a "renewable transmission project";
2. Detail the method of the Commission's designation of RTP status;

3. Describe terms of the duration of such RTP designation and the form of application for RTP status;
4. Provide the basis and procedure for revocation of RTP status by the Commission and an appeal process before the Commission when considering such revocation;
5. Identify and establish the retail rate treatment of recoverable costs of RTP development, construction and operation, otherwise not subject to cost recovery via the utility's Open Access Transmission Tariff filed with FERC; and,
6. Establish protocols for the Commission to award an incentive return on equity for investments in eligible RTPs and, with such ROE recovery being provided through retail rates duly ordered by the Commission.

[Appendix G includes the items used during Meeting No. 3 including agenda, roster, and presentation materials.]

At the request of the chairman, Ric Tobin agreed to serve as chairman of the Work Group and to lead the effort in developing a draft "form of order". The Subcommittee designated one individual from each utility and other stakeholder representatives wishing to participate in this effort. The Work Group was composed of volunteer representatives from each utility company and other attorneys and professionals familiar with ACC practices. The members of the Work Group were:

APS:	Joseph D'Aguanno; Brian Cole; Deb Scott
SRP:	Jana Brandt; Rob Taylor
TEP:	Ron Belval; Michelle Livengood; Brenda Pries; Amy Welander
SWTC:	Bruce Evans; Jim Rein
	Laurie A. Woodall

The Work Group conducted two meetings: the first on July 9, 2009 and the second on July 24, 2009. Three drafts of the memorandum regarding proposed findings for future ACC Orders regarding renewable transmission projects were circulated via e-mail among the Work Group.

[The Work Group's memorandum is found in Appendix H.]

Meeting No. 4 of the Finance Subcommittee was held on August 11, 2009. The primary focus of this meeting was to review the findings of the Work Group and seek consensus on findings, conclusions, and recommendations of the Subcommittee's collective efforts over the past 8 months.

[Appendix I includes the materials used during Meeting No. 4 including, agenda, roster, and presentation materials.]

FINDINGS AND CONCLUSIONS

The Finance Subcommittee charged the Work Group with the responsibility of drafting a "form of order" that would be responsive to the renewable transmission financing issues raised in the Decision. The Work Group's final product was to reflect the Subcommittee's nine-month investigation of possible funding mechanisms for RTPs in Arizona.

In the process of the Work Group's deliberations and thorough review of three drafts on the Subcommittee's findings, a decision was made among the Work Group participants that a draft "form of order", as tasked by the Subcommittee, would not be pursued. Instead, an alternate approach was deemed to be more useful and more likely to attract consensus.

The Work Group prepared a memorandum of proposed findings related to renewable transmission projects. The purpose of the memorandum was to develop language (along the lines of a "form of order") for inclusion in the Final Report. The Work Group's intent was that the utilities consider using the memorandum as part of their response to the Decision. The Commission may then choose to include the proposed findings from the memorandum in future orders resulting from the utilities' responses that are due by October 31, 2009, which would serve as each utility's first RTAP.

At the conclusion of the final Finance Subcommittee meeting on August 11, 2009, the participants *generally* agreed to accept the Work Group's memorandum and RTAP as the Subcommittee's recommended method for financing RTPs in Arizona.

The Work Group's memorandum that was accepted at the final Finance Subcommittee meeting, on August 11, 2009, included the following:

- Each jurisdictional utility will file[2] an RTAP, concurrent with the filing of its Ten Year Plan. The RTAP will describe with specificity the RTPs that the utility is proposing. Contemporaneous with the 2012 BTA process, the ACC may assess the need and frequency for subsequent RTAP filings.

- Jurisdictional utilities' RTAPs may include RTPs with ownership participation involving non-jurisdictional parties (i.e., merchants, independents, etc.).

- The RTAP will include the following information:

---

[2] The Subcommittee did not make any specific recommendations regarding the procedural mechanisms for filing the RTPs and RTAPs.

1. Identification of RTPs, which includes the acquisition of transmission capacity, such as, but not limited to, (i) new transmission line(s), (ii) upgrade(s) of existing line(s), or (iii) the development of transmission project(s) previously identified by the utility (whether conceptual, planned, committed and/or existing), all of which provide **either**:

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

    Or

    - Additional transmission facilities that enable renewable resources to be delivered to load centers.

2. Description of how each RTP is expected to advance renewable resource deployment within the State of Arizona.

3. Development approach and schedule for the proposed RTPs, including plans for solicitation of other participants and/or commercial interests, and pre-conditions for moving beyond initial development activities to actual construction.

4. Expected costs of the RTPs, including an assessment of the range of bill impacts for retail customers for each project, and a range of the project costs for each phase of the development approach set forth by the utility in the RTAP.

5. Cost recovery, including any special regulatory treatment that will be sought from the Federal Energy Regulatory Commission ("FERC") or other regulatory agencies.

6. Status report on RTPs identified in the previous RTAP.

- The ACC would review and approve RTPs within a utility's RTAP. An RTP that provides potential benefits to Arizona electric consumers that outweigh the potential costs could be deemed to be in the public interest and would be considered for approval.

- Once a project has been designated an RTP by the ACC, then it shall maintain that status unless it is shown by clear and convincing evidence, presented during a hearing, that the RTP does not and will not provide the capability to advance renewable resource development in the State of Arizona as described in the filing utility's RTAP.

- The ACC may consider pre-approval of cost recovery for a utility to enter into a long-term transmission service agreements in order to facilitate the construction of transmission facilities where the transmission line is not owned by the utility (to allow for the purchase of transmission capacity).

- Because network transmission facilities are under the jurisdiction of FERC, the utility will initially seek any necessary cost recovery and special regulatory treatment, if applicable, of ACC-approved RTAP projects, from FERC. Special regulatory treatment available from FERC may include, but is not limited to, enhanced return-on-equity, Construction Work in Progress ("CWIP") in rates, and assurances of cost-recovery should the project be prudently discontinued.

- To improve a utility's ability to obtain financing for the RTPs, timely recovery of transmission costs in retail rates should be provided by a transmission cost adjustor mechanism, transmission cost rider or some other ACC-approved mechanism that provides for recovery of FERC-accepted rates. A cost recovery mechanism would be adopted in a utility's rate case proceeding.

- Should FERC fail to fully approve cost recovery or provide special regulatory treatment for ACC-approved RTPs, or if the utility proposes an RTP that does not fall within FERC jurisdiction (such as a radial line that is not a network facility), a utility may seek cost-recovery and/or special regulatory treatment from the ACC, such as:

    - Timely cost recovery for prudently incurred developmental costs, including permitting; engineering and environmental investigation costs; technical study costs; survey and mapping costs; preliminary right-of-way acquisition costs; and other project formation costs, as well as for prudent costs of construction of RTP.

    - A utility may be entitled to receive an enhanced return on equity incentive for RTPs from the ACC.

    - A utility may be entitled to CWIP in rates.

    - In the event that a specific RTP project is no longer reasonable due to a change in circumstances, the utility's prudently incurred costs may be considered for recovery by the Commission.

SUMMARY AND RECOMMENDATIONS

Obtaining consensus was difficult on all matters associated with defining methods of financing RTPs in Arizona. The subject is complex as jurisdiction over transmission development, financing, construction and operation, is a shared responsibility between the ACC and FERC. Facts of individual cases generally determine the proper forum of jurisdiction, but areas of grey persist.

FERC Order 888 requires non-discriminatory access to transmission service by any shipper meeting certain requirements. FERC requirements do not allow discrimination in access to transmission based upon fuel type utilized by the generator-shipper. Thus, in accordance with current federal law, cost recovery through pro-forma tariff rents is insensitive to developing renewable transmission policy, and is determined irrespective of a generator's fuel type. This practice is currently undergoing substantial review which may lead to changes. In the meantime, some renewable energy projects identified in Arizona are in need of transmission lines as one precondition to serious investment of capital and ultimate development of such projects. The other precondition for the investment of capital and development of renewable resources is the signing of power purchase agreements with load-serving entities.

FERC's Open Access Transmission Tariffs ("OATTs") generally apply to transmission facilities placed in "network" service on the interconnected grid. These OATTs generally do not apply to radial transmission facilities or so-called "generator tie-lines", which are transmission lines built from a generation facility to another transmission line.

As the Commission considers the coming identification of recommended RTPs by the utilities, attention should be directed to balancing potential customer costs and benefits with the regulatory treatment necessary to get the transmission lines developed. These considerations include whether renewable transmission projects have the capability to encourage development of renewable generation and the potential benefits that customers may derive from this increased renewable energy. This determination cannot be made by the Commission by formula or fiat: a proposition on which the Subcommittee reached consensus. Rather, this must be settled on a case-by-case basis. What is offered below are "considerations for comparisons" that will materially aid the Commission in achieving fair and equitable treatment of each RTP application:

I. RTPs, RTAPs, the BTA and Determining Project Eligibility

   A. Under normal circumstances, all RTPs shall be characterized and identified in the utility's RTAP.

B. Each utility's RTAP, beyond their required submittal in response to BTA Order 70635, shall be filed prior to the 2012 BTA.

C. Subsequent incorporation of a review of RTAPs in future BTAs will be determined by the Commission.

D. To be eligible for RTP treatments, the candidate RTP must be included in the utility's RTAP and duly filed with the Commission.

E. RTP treatment and any special cost recovery considerations shall be requested by the utility as part of the utility's RTAP filing with the Commission.

F. RTAPs may include RTPs having participation of non-jurisdictional parties.

II. *Coordination of Jurisdictions and RTP Cost Recovery in Retail Rates*

A. If an otherwise eligible RTP is capable of cost recovery through the utility's OATT, the Commission need only approve the utility's RTAP and associated RTPs.

B. The Commission may issue a finding that such an RTP has achieved eligibility as a renewable transmission project within Arizona's jurisdiction.

C. The filing utility may utilize such formal Commission finding at FERC to further justify full recovery of costs and other special cost recovery considerations as presented in the utility's RTAP.

D. In circumstances where the cost of transmission projects necessary to the development of the state's renewable resources is <u>not</u> recoverable in federal jurisdiction, the utility may seek such recovery from the Commission.

E. Cost recovery will include full recapture of prudently-incurred costs of development, financing, construction and operation of the RTP.

F. Cost recovery may also include an <u>incentive</u> rate of return on equity, if requested by the utility, and as determined by the Commission.

G. Utilities may request advance approval from the Commission of a cost recovery protocol on an RTP prior to commencing investment in the project.

H. Utilities receiving cost recovery on an RTP approved by the Commission shall not have such recovery interrupted by an act of revocation of RTP status by the Commission without due process in a scheduled hearing.

I. Revocation of RTP status by the Commission cannot be based on actions taken by the utility necessary to comply with federal law, rule or practice.

J. Notwithstanding other parts of this section, the jurisdiction of the Commission over RTPs involving the participation of non-jurisdictional parties shall not relieve the Commission from determining cost recovery remedies for the jurisdictional utilities involved in such projects.

III. Components of Cost Recovery

A. Cost recovery shall be timely

B. Costs shall be prudently-incurred as determined by the Commission

C. Costs eligible for recovery include, but are not limited to, the following:

i. Permitting and licensing activities;

ii. Land and rights-of-way acquisition;

iii. Engineering;

iv. Environmental and cultural mitigation;

v. Environmental fatal flaw screening studies;

vi. Technical studies;

vii. Mapping and surveying;

viii. Legal costs including project formation fees and expenses;

ix. Incentive rate of return on equity;

x. Construction work-in-progress;

xi. Costs of project removal prior to commercial operation; and

xii. Abandonment and salvage costs.

Contents of the Finance Subcommittee Submissions to ACC Docket No. E-00000A-09-0066:

April 16, 2009	Cover Letter; Interim Report; Supporting Appendices; Meeting Materials for the Subcommittee's first two meetings; and, Presentation for the ACC Workshop No. 1
June 18, 2009	Cover Letter; Meeting Materials for the Subcommittee's third meeting

APPENDICES

A ACC Decision No. 70635
December 11, 2008

B Solicitation of Interest E-Mail & Finance Subcommittee Scope and Schedule
February 6, 2009

C Meeting No. 1
February 18, 2009
i. Agenda
ii. Roster
iii. Presentation Materials
iv. Subcommittee Timeline
v. Minutes

D Meeting No. 2
March 4, 2009
i. Agenda
ii. Roster
iii. Presentation Materials
iv. Minutes

E Finance Subcommittee Presentation provided at ACC Workshop No. 1
April 20, 2009

F Agendas for ACC Workshops
April 20, 2009
June 5, 2009

G Meeting No. 3 Documents:
i. Agenda
ii. Roster
iii. Subcommittee Presentation
iv. APS Presentation
v. RTP Cost Recovery Handout from TEP

H Finance Subcommittee Work Group's *Memorandum of Proposed Findings for Future ACC Orders re Renewable Transmission*

I Meeting No. 4

August 11, 2009

i. Agenda

ii. Roster

iii. Presentation

List of Acronyms

ACC	**Arizona Corporation Commission**
BTA	**Biennial Transmission Assessment**
APS	**Arizona Public Service Company**
FERC	**Federal Energy Regulatory Commission**
OATT	**Open Access Transmission Tariff**
RTAP	**Renewable Transmission Action Plan**
RTTF	**Renewable Energy Transmission Task Force**
RTP	**Renewable Transmission Project**
SRP	**Salt River Project Agricultural Improvement and Power District**
SWAT	**Southwest Area Transmission Planning Group**
SWTC	**Southwest Transmission Cooperative, Inc.**
TEP	**Tucson Electric Power Company**

Attachment E

Biennial Transmission Assessment (BTA) Economic Assessment of Potential Wind and Solar Generation in Arizona

10/30/09

Biennial Transmission Assessment (BTA) Economic Assessment of Potential Wind & Solar Generation in Arizona

Arizona Public Service Company

October 27, 2009

Purpose

The purpose of this study was to assess the economic values of viable renewable resource and transmission line combinations in Arizona in order to identify the top three Renewable Transmission Projects that are economically beneficial to APS and its customers.

Selection of Wind Generation Sites

Four potential wind generation sites were selected based on the Wind Resource map (ARRTIS, 6/8/2009)

1. Aubrey Cliffs
2. Moenkopi/Gray Mountains
3. Meteor Crater/Snowflake
4. Springerville

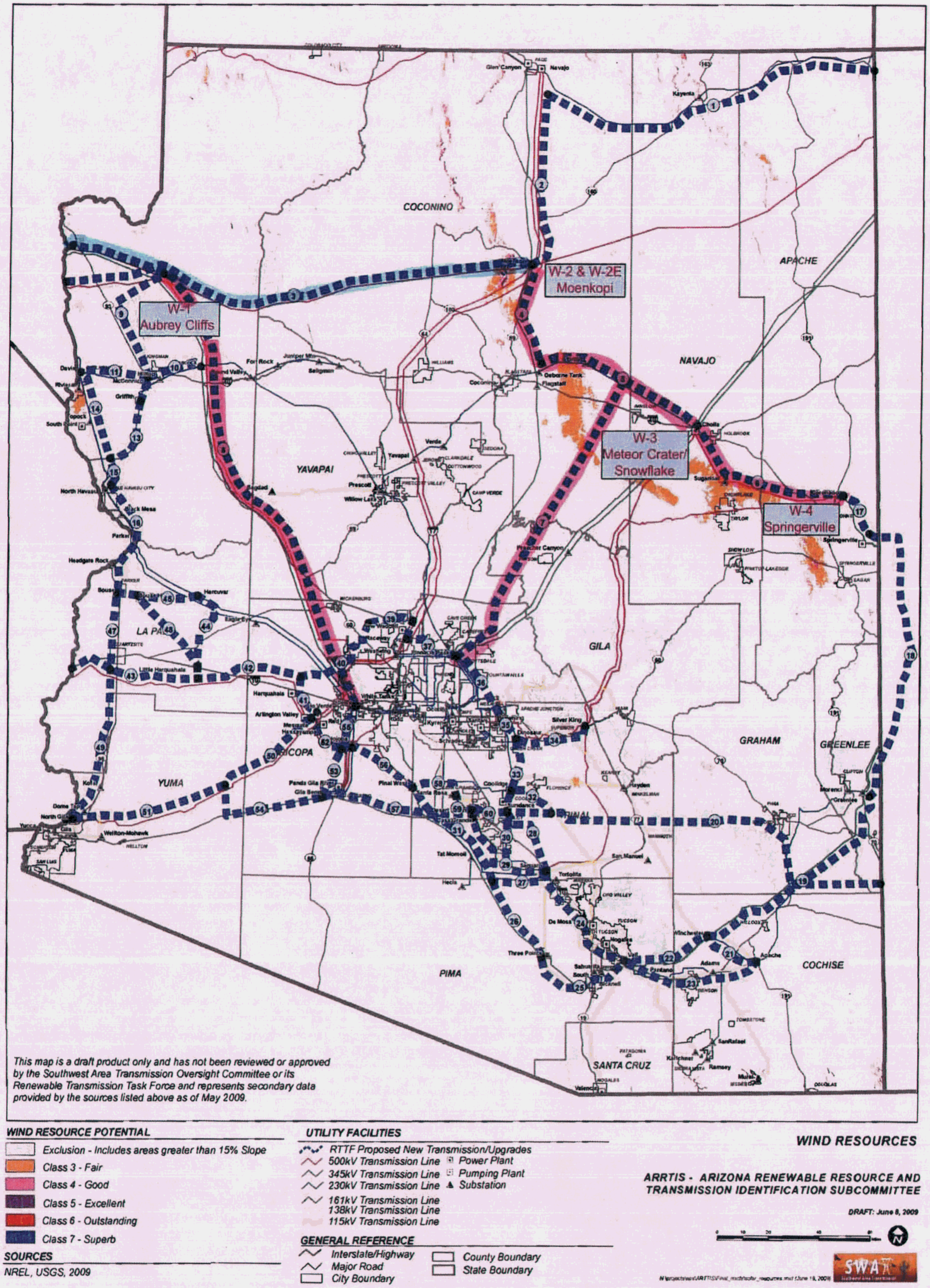
APS

Wind Generation Site Criteria

- Each site must be within close proximity (20-30 miles) to the proposed 1,200MW renewable resource transmission lines.
- A hypothetical wind plant of 1,200 MW power generation is assumed at each site to fully utilize the proposed transmission.
- Based on a 25% developability factor*, a total of 4,800MW wind potential is required for each site.

* Consistent with the methodology used by the WGA.

Wind Resource Map



Selection of Solar Generation Sites

Twelve potential solar generation sites were selected based on the Environmental Resource Exclusion and Sensitivity Areas (Solar) map (ARRTIS, 6/18/2009)

1. Hilltop
2. Harcuvar
3. Hyder
4. Gila Bend
5. Delaney
6. Little Harquahala
7. Wickenburg
8. Casa Grande
9. Dinosaur
10. Bowie
11. Bouse
12. Palo Verde

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Solar Generation Site Criteria

- Each site must be within close proximity (20-30 miles) to the proposed 1,200MW renewable resource transmission lines.
- A hypothetical solar plant of 1,200 MW power generation is assumed at each site to fully utilize the proposed transmission.
- Two solar generation plant technologies are considered at each site: concentrating solar power (CSP) plant and fixed, thin film solar photovoltaic (SPV) plant.

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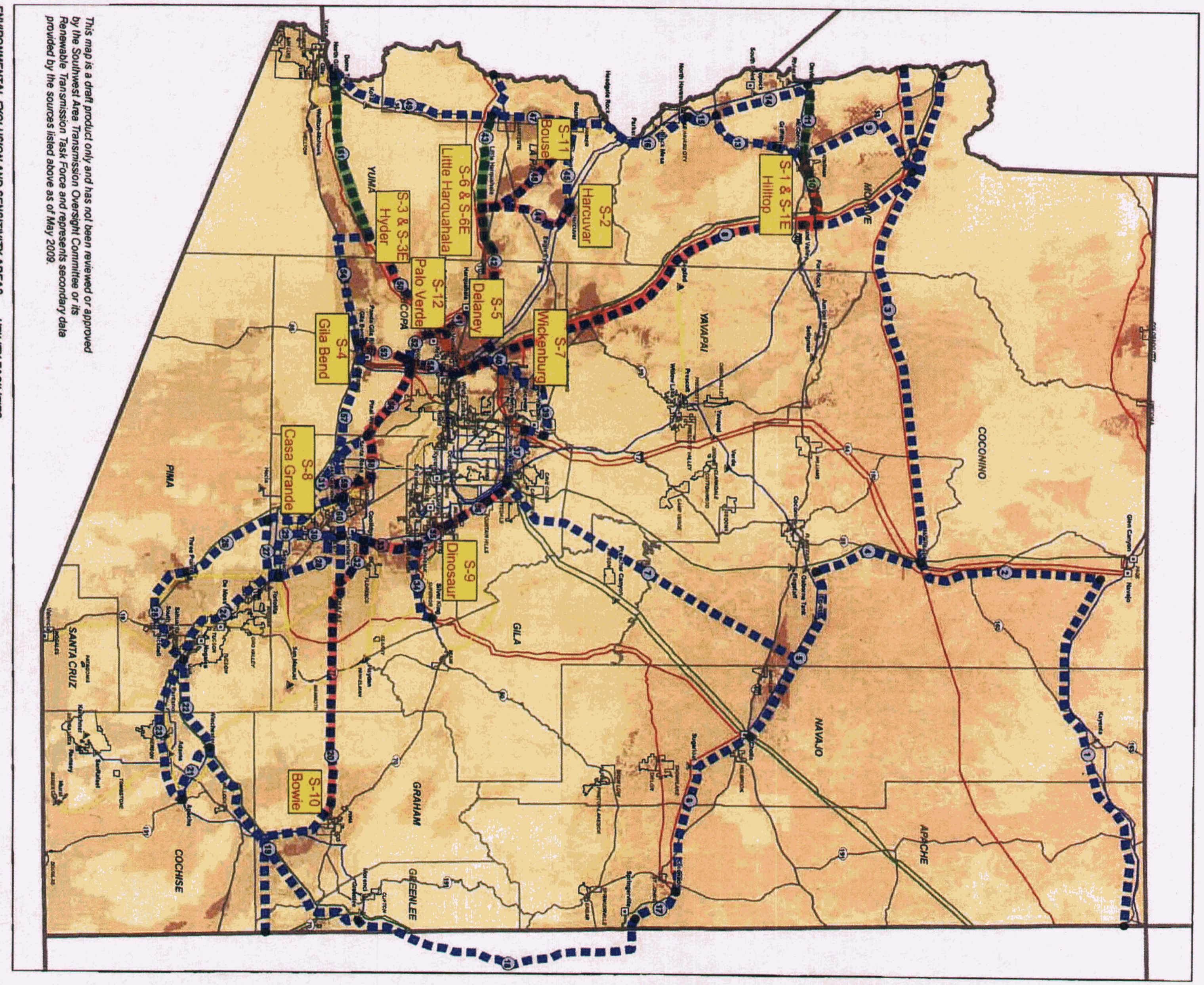
Environmental Resource Exclusion and Sensitivity Areas (Solar) Map



Wind & Solar Generation Data

For purposes of economic analyses, the following data for wind & solar generation plants are required.

- Capital costs
- Fixed & variable O&M costs
- Annual power output: Energy generation, or capacity factor
- Useful economic life

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Capital Cost Estimation

- Capital costs for wind & solar generation plants were derived from market data collected by APS from supplier responses to its RFP for renewable resources.
- Given the terms of an offer (energy price, contract length, annual energy, maximum capacity and/or capacity factor), the capital cost of the generation plant dedicated to the proposed contract can be estimated by assuming certain O&M and financing costs.
- For example, based on a proposal to supply energy from a to-be-built CSP plant for 30 years at $145/MWh and 41% capacity factor, the capital cost of the new plant was estimated at approximately $5,788/kW with additional assumptions of $17.5/MWh variable O&M and APS financing costs (45.5% debt, 54.5% equity, 7.25% interest and 10.75% ROE).

Estimated Capital Costs of Wind & Solar Generation Plants

Using APS financing costs (45.5% debt, 54.5% equity, 7.25% interest and 10.75% ROE), the capital costs for wind, concentrating solar power (CSP) and solar photovoltaic (SPV) plants were estimated. The $21/MWh PTC and 30% ITC were assumed for wind and solar plants, respectively.

	Price $/MWh)	Capacity Factor %	Contract Length Years	Fixed O&M $/kW-Year	Variable O&M $/MWh	Capital Cost $/kW
Wind Plant	110	29.8	20	29.7	8.5	2,237
Concentrating Solar Power (CSP) Plant	145	41.0	30	0.0	17.5	5,788
Solar Photovoltaic (SPV) Plant	130	26.0	25	31.8	0.0	3,019

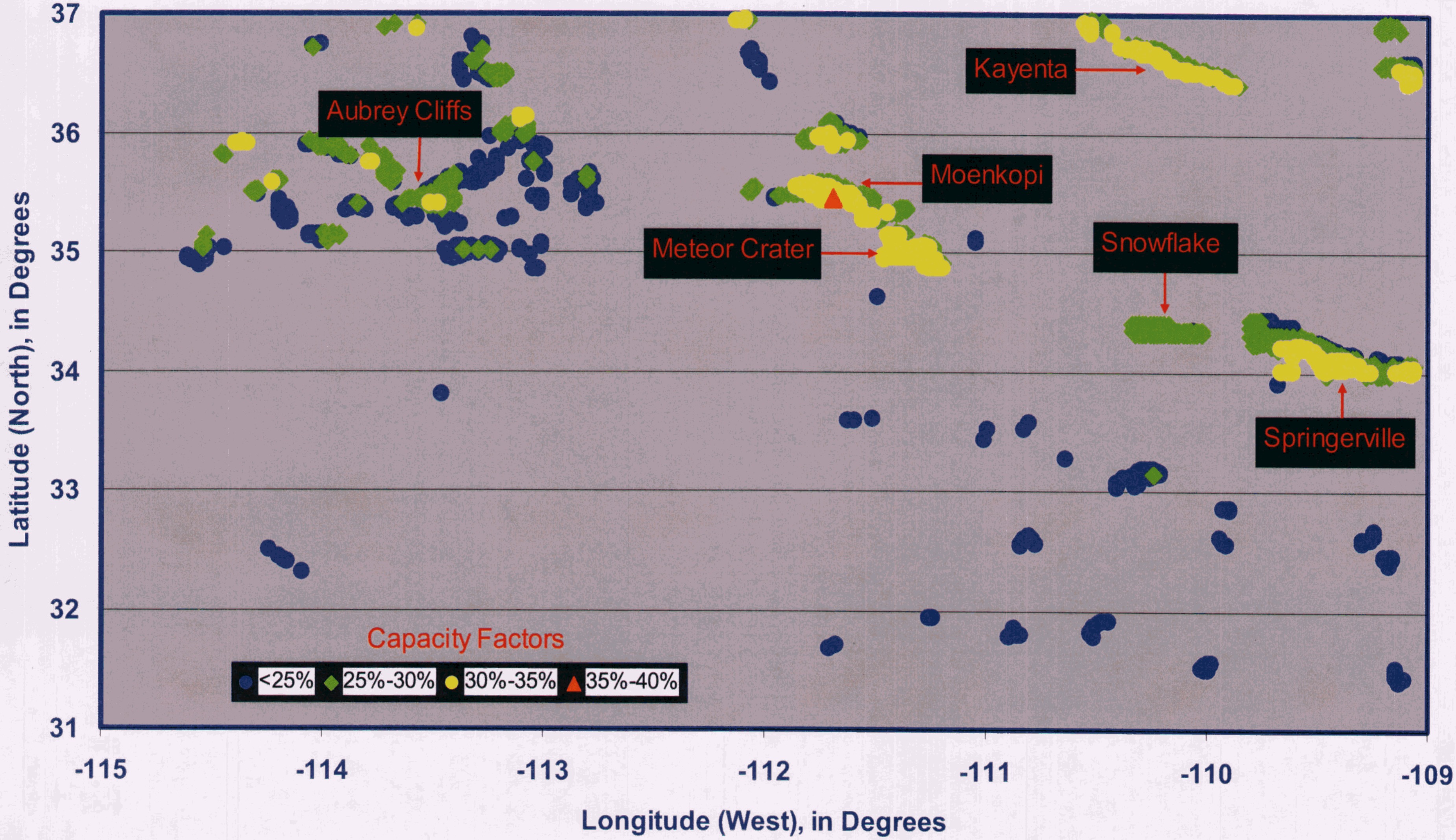
APS

Wind Capacity Factor Estimation

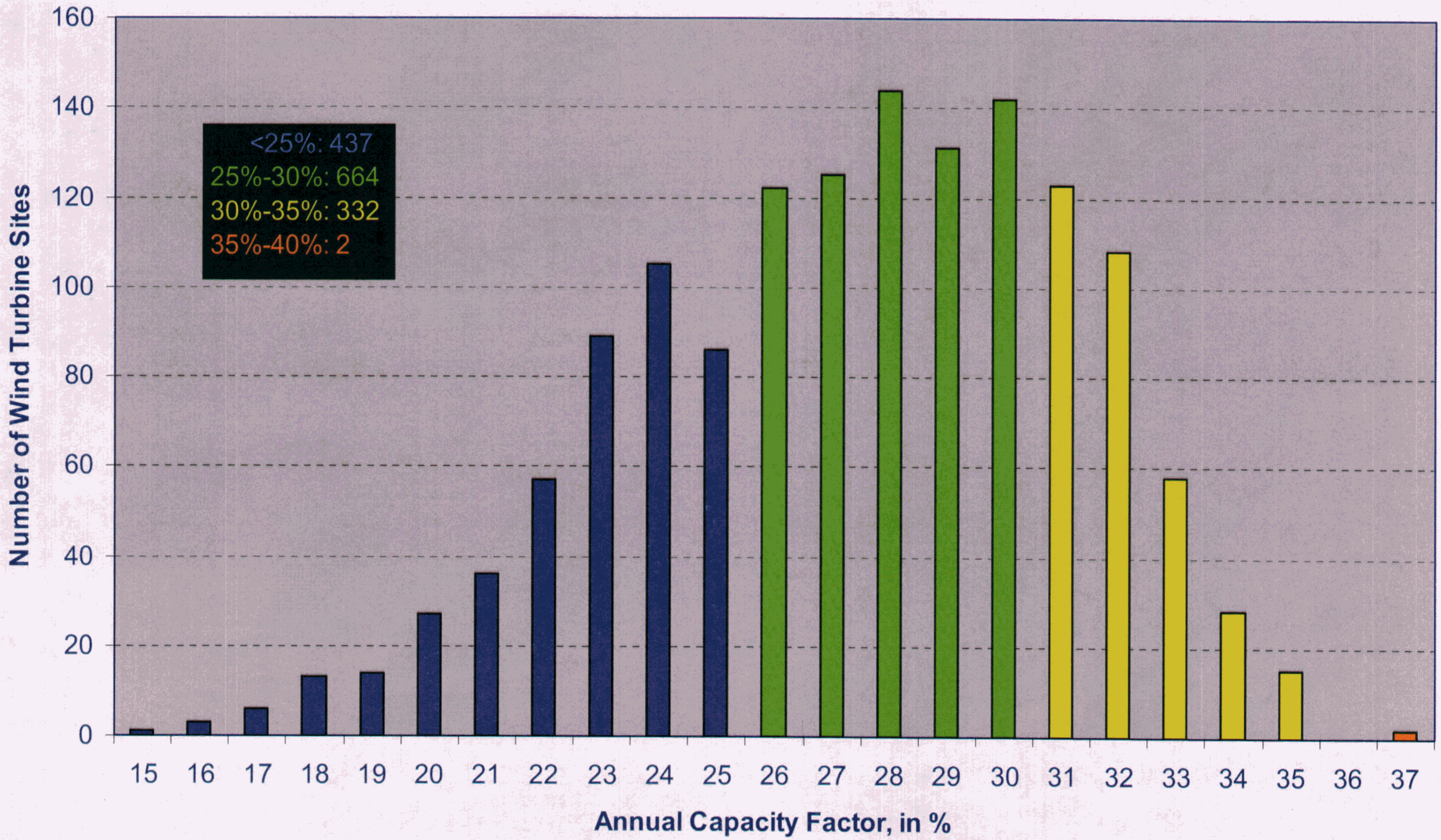
- NREL's Western Wind Resource Dataset (WWRD) was used to estimate annual capacity factors of the 4 Arizona potential wind sites.
- The WWRD provides 10-minute time series of simulated wind generation data (based on 2004, 2005 & 2006 weather data) for more than 30,000 developable wind turbine locations across the Western US, including 1,435 in Arizona.
- Each WWRD location represents a hypothetical 30MW wind plant with 10 turbines (3MW rated output each at 100-m height).
- 160 WWRD locations (4,800MW) were mapped to each Arizona site in estimating its average annual capacity factor.

APS

Arizona's 1,435 Developable Wind Turbine Locations (NREL-WWRD)



Arizona's 1,435 Developable Wind Turbine Locations (NREL-WWRD)
Distribution of 3-Year Average Annual Capacity Factors



Estimated Wind Capacity Factors

Arizona Wind Sites	Number of WWRD Locations	MW per Location	Total MW per Site	Capacity Factor		
				Maximum	Minimum	Average
Aubrey Cliffs	160	30	4,800	30.6%	23.1%	26.0%
Moenkopi/Gray Mountains	160	30	4,800	36.6%	28.8%	30.9%
Meteor Crater/Snowflake	151	30	4,530	33.9%	24.9%	29.9%
Springerville	160	30	4,800	34.4%	27.6%	30.2%
Total	631		18,930			29.2%

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Solar Power Output Estimation

- DOE's Solar Advisor Model (SAM) was used to model CSP and SPV plants at 12 potential Arizona sites.
- SAM simulation was performed to estimate power output for each solar plant type at each Arizona site, using 2005 historical weather data from local weather stations
- SAM's hourly power output was used to estimate annual capacity factors and capacity values.

Estimated Transmission Capital Costs

- Capital costs for transmission lines were estimated at $1.80 million/mile for construction and $0.23 million/mile for right of way, or total of $2.03 million/mile*, for a 1,200 MW capacity.
- The capital cost of a transmission line in $/kW is dictated by its overall mileage. For example, the $/kW for Line #8 is $377 due to its 233-mile length, but for Line #38, only $12 due to its 7-mile length.
- In order to compare the resource and transmission pairs, the most "positive" case for each pair was assumed, i.e., there was full utilization of the transmission projects.
- Longer transmission lines have longer lead time, thus their financing costs are also higher as compared to those having shorter mileage.
- Substation costs on the resource end are assumed to be paid for by the resource, and consequently are included in its costs.
- Switchyard/substation costs of $10 million are included for each intermediate interconnection, and $ 20 million for each ultimate load destination interconnection.

*Capital costs are consistent with those used in the WGA report.

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Estimated Transmission O&M Costs

- APS own historical O&M expenses for transmission lines were used to estimate O&M costs for the proposed transmission lines.
- The O&M cost was estimated at $5,546 per mile per year.

Estimated Line Losses & Lead Time

- Line losses and lead time of a transmission line are functions of its mileage
- Line losses were assumed at 1% per each hundred miles
- Generally, lead time for a transmission line was assumed as follows:
  - 5 years for lines 25 miles long or shorter
  - 6 years for lines in the 25-mile to 75-mile range
  - 7 years for lines longer than 75 miles
- Lead time is required for the planning, permitting, right-of-way acquisition, engineering and construction of the line.
- Lead time is 2 years shorter for lines with existing CEC's.
- It was assumed that a proposed transmission line and its associated renewable generation plant have the same commercial operation date (COD).

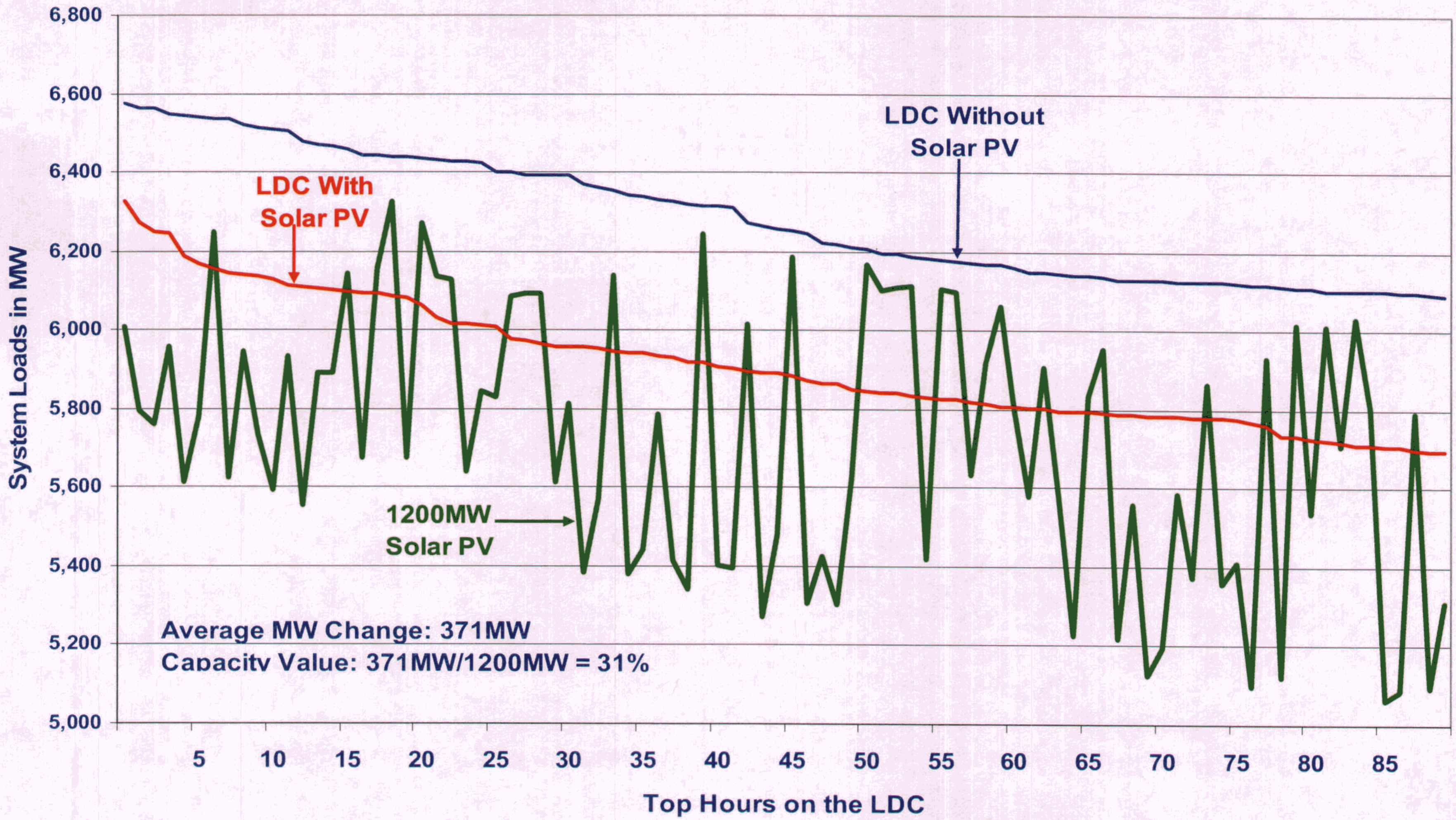
Estimated Integration Costs

- Integration costs are costs associated with the integration of a renewable generation resource into an electric supply system. They represent additional costs for regulation, load following and unit commitments required to compensate for the intermittent and unpredictable nature of the renewable resource.
- Integration costs for a CSP plant with storage capability were assumed to be negligible because of its nearly full dispatchability.
- Integration costs for wind were assumed to be at $3.95/MWh based on the APS Wind Integration Cost Impact Study conducted by NAU, September 2007.
- Integration costs for a SPV plant were assumed at $2.50/MWh based on the Solar Integration Study for Public Service Company of Colorado, prepared by Xcel Energy, February 9, 2009.

Capacity Value Estimation

- In order to properly capture the capacity credit attributed to an intermittent renewable generation resource, it was necessary to estimate its capacity value (or dependable capacity) which represents its effective contribution to the APS system peak load hours.
- The CSP plants considered in this study have a 6-hour storage capability and are fully dispatchable; therefore, they all have a capacity value of 100%. The wind and SPV plants considered in this study are intermittent and non-dispatchable; therefore, their capacity values are lower than 100%.
- For purpose of this study, the load duration curve (LDC) technique was used to estimate the capacity value of each wind plant and SPV plant at their respective sites.
- The LDC technique essentially compares the system LDC's with and without a renewable generation resource, and calculates the average of the hourly changes during the top 90 hours of the system LDC. The capacity value is the ratio of the top 90-hour average impact divided by the maximum power output of the renewable resource under consideration.
- For example, power generation from a 1,200MW SPV at Gila Bend would result in an average impact of 371MW over the top 90 hours when the two system LDC's are compared. The capacity value of this plant is estimated at approximately 31% (371MW/1200MW).

Example: Estimated Capacity Value of a 1,200MW SPV Plant at Gila Bend



Delivered Cost Estimation

Generation Busbar Cost

\+ Transmission Cost

\+ Substation Cost

\+ Line Losses

= Delivered Costs

\+ Integration Cost

\- Capacity Credit

\- Energy Credit

= Adjusted Delivered Costs

APS

Arizona Potential Wind & Solar Generation Power Plants

2009 COD - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2009 Dollars)

Rank	Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Wind Sites**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	96.01	14.94	1.32	1.80	114.07	3.95	(13.13)	0.00	104.90
2	W-2	W-2 Moenkopi / Gray Mountain Wind	93.07	18.06	1.70	2.28	115.11	3.95	(11.29)	0.00	107.77
3	W-4	W-4 Springerville Wind	95.10	21.21	1.74	2.74	120.80	3.95	(9.07)	0.00	115.68
4	W-1	W-1 Aubrey Cliffs Wind	108.69	24.23	1.01	3.05	136.98	3.95	(18.38)	0.00	122.55
	Ref-WIND	Reference Wind Plant @Market Price	96.20*								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hour Storage)**										
1	CSP-12	CSP-12 Palo Verde Solar CSP	145.86	1.13	0.60	0.26	147.85	0.00	(52.57)	(4.84)	90.44
2	CSP-5	CSP-5 Delaney Solar CSP	145.06	2.16	0.90	0.50	148.62	0.00	(52.23)	(4.84)	91.56
3	CSP-4	CSP-4 Gila Bend Solar CSP	145.58	2.47	0.90	0.57	149.52	0.00	(52.45)	(4.84)	92.23
4	CSP-3	CSP-3 Hyder Solar CSP	144.09	3.86	0.89	0.90	149.74	0.00	(51.81)	(4.84)	93.10
5	CSP-5a	CSP-5a Delaney Solar CSP	145.06	3.71	0.90	0.86	150.54	0.00	(52.23)	(4.84)	93.47
6	CSP-9	CSP-9 Dinosaur Solar CSP	149.34	2.72	0.93	0.62	153.62	0.00	(54.07)	(4.84)	94.71
7	CSP-7	CSP-7 Wickenburg Solar CSP	147.31	3.99	0.61	0.92	152.82	0.00	(53.19)	(4.84)	94.79
8	CSP-6	CSP-6 Little Harquahala Solar CSP	146.15	4.91	1.21	1.15	153.43	0.00	(52.69)	(4.84)	95.89
9	CSP-8	CSP-8 Casa Grande Solar CSP	149.64	5.20	1.56	1.22	157.62	0.00	(54.20)	(4.84)	98.58
10	CSP-2	CSP-2 Harvcuvar Solar CSP	146.68	7.75	1.22	1.86	157.51	0.00	(52.92)	(4.84)	99.75
11	CSP-11	CSP-11 Bouse Solar CSP	151.64	7.97	1.26	1.90	162.78	0.00	(55.06)	(4.84)	102.89
12	CSP-1	CSP-1 Hilltop Solar CSP	153.15	14.21	0.96	3.51	171.84	0.00	(55.71)	(4.84)	111.29
13	CSP-10	CSP-10 Bowie Solar CSP	162.08	16.51	2.05	4.11	184.75	0.00	(59.55)	(4.84)	120.37
	Ref-CSP	Reference CSP Plant @Market Price	145.00								
Rank	**Solar Sites (SPV Thin Film, Fixed)**										
1	SPV-12	SPV-12 Palo Verde Solar PV	131.13	1.91	1.03	0.23	134.31	2.50	(27.95)	(4.74)	104.11
2	SPV-5	SPV-5 Delaney Solar PV	130.48	3.66	1.53	0.46	136.13	2.50	(27.86)	(4.74)	106.02
3	SPV-4	SPV-4 Gila Bend Solar PV	130.81	4.14	1.52	0.52	136.99	2.50	(25.93)	(4.74)	108.82
4	SPV-5a	SPV-5a Delaney Solar PV	130.48	6.29	1.53	0.80	139.09	2.50	(27.86)	(4.74)	108.99
5	SPV-3	SPV-3 Hyder Solar PV	130.52	6.55	1.52	0.84	139.43	2.50	(28.16)	(4.74)	109.03
6	SPV-7	SPV-7 Wickenburg Solar PV	131.52	6.78	1.04	0.84	140.18	2.50	(28.29)	(4.74)	109.65
7	SPV-9	SPV-9 Dinosaur Solar PV	132.11	4.48	1.54	0.56	138.69	2.50	(26.19)	(4.74)	110.26
8	SPV-6	SPV-6 Little Harquahala Solar PV	130.70	8.30	2.05	1.07	142.12	2.50	(28.95)	(4.74)	110.93
9	SPV-8	SPV-8 Casa Grande Solar PV	131.87	8.54	2.57	1.12	144.10	2.50	(25.18)	(4.74)	116.67
10	SPV-11	SPV-11 Bouse Solar PV	132.54	12.99	2.07	1.75	149.35	2.50	(30.20)	(4.74)	116.91
11	SPV-2	SPV-2 Harvcuvar Solar PV	130.61	13.16	2.07	1.74	147.59	2.50	(28.03)	(4.74)	117.31
12	SPV-1	SPV-1 Hilltop Solar PV	133.38	23.72	1.61	3.31	162.02	2.50	(28.46)	(4.74)	131.31
13	SPV-10	SPV-10 Bowie Solar PV	134.84	26.26	3.28	3.74	168.12	2.50	(23.48)	(4.74)	142.40
	Ref-SPV	Reference SPV Plant @Market Price	130.00								

Note: * This reference price is based the 30% ITC option as opposed to the $110/MWh price (shown on page 11) which is based on the $21/MWh PTC option.

Arizona Potential Wind & Solar Generation Power Plants

2009 COD - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2009 Dollars)

	Site ID	Plant Name	Busbar Costs	Transmission Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Wind Site**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	93.07	17.28	0.85	2.14	113.34	3.95	(11.29)	0.00	106.01
	Ref-WIND	Reference Wind Plant @Market Price	96.20								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hr Storage)**										
1	CSP-3E	CSP-3E Hyder Solar CSP	144.09	4.16	0.59	0.97	149.81	0.00	(51.81)	(4.84)	93.17
2	CSP-6E	CSP-6E Little Harquahala Solar CSP	146.15	3.43	0.60	0.79	150.98	0.00	(52.69)	(4.84)	93.45
3	CSP-1E	CSP-1E Hilltop Solar CSP	153.15	1.84	0.64	0.42	156.05	0.00	(55.71)	(4.84)	95.51
4	CSP-5E	CSP-5E Delaney Solar CSP	145.06	6.11	0.90	1.45	153.51	0.00	(52.23)	(4.84)	96.45
	Ref-CSP	Reference CSP Plant @Market Price	145.00								
Rank	**Solar Sites (SPV Thin Film, Fixed)**										
1	SPV-6E	SPV-6E Little Harquahala Solar PV	130.70	5.80	1.03	0.73	138.25	2.50	(28.95)	(4.74)	107.06
2	SPV-1E	SPV-1E Hilltop Solar PV	133.38	3.08	1.07	0.37	137.89	2.50	(28.46)	(4.74)	107.19
3	SPV-3E	SPV-3E Hyder Solar PV	130.52	7.05	1.01	0.90	139.49	2.50	(28.16)	(4.74)	109.09
4	SPV-5E	SPV-5E Delaney Solar PV	130.48	10.33	1.53	1.36	143.70	2.50	(27.86)	(4.74)	113.60
	Ref-SPV	Reference SPV Plant @Market Price	130.00								

Note: * Designation E is for Export

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2009 COD - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2009 Dollars)

	Wind Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, ITC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	96.01	14.94	1.32	1.80	114.07	3.95	(13.13)	0.00	104.90
2	W-2	W-2 Moenkopi / Gray Mountain Wind	93.07	18.06	1.70	2.28	115.11	3.95	(11.29)	0.00	107.77
3	W-4	W-4 Springerville Wind	95.10	21.21	1.74	2.74	120.80	3.95	(9.07)	0.00	115.68
4	W-1	W-1 Aubrey Cliffs Wind	108.69	24.23	1.01	3.05	136.98	3.95	(18.38)	0.00	122.55
	Ref-WIND	Reference Wind Plant @Market Price	96.20								
Rank	**Sensitivity 1 (20-Year Life, PTC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	109.75	14.94	1.32	2.02	128.03	3.95	(13.13)	0.00	118.86
2	W-2	W-2 Moenkopi / Gray Mountain Wind	105.78	18.06	1.70	2.54	128.08	3.95	(11.29)	0.00	120.74
3	W-4	W-4 Springerville Wind	108.53	21.21	1.74	3.06	134.54	3.95	(9.07)	0.00	129.42
4	W-1	W-1 Aubrey Cliffs Wind	126.86	24.23	1.01	3.46	155.56	3.95	(18.38)	0.00	141.13
	Ref-WIND	Reference Wind Plant @Market Price	110.00								
Rank	**Sensitivity 2 (30-Year Life, ITC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	89.12	14.11	1.23	1.68	106.14	3.95	(12.69)	0.00	97.40
2	W-2	W-2 Moenkopi / Gray Mountain Wind	86.44	17.06	1.59	2.12	107.22	3.95	(10.91)	0.00	100.26
3	W-4	W-4 Springerville Wind	88.30	20.04	1.63	2.56	112.52	3.95	(8.77)	0.00	107.70
4	W-1	W-1 Aubrey Cliffs Wind	100.65	22.89	0.94	2.83	127.31	3.95	(17.77)	0.00	113.50
	Ref-WIND	Reference Wind Plant @Market Price	89.29								
Rank	**Sensitivity 3 (30-Year Life, PTC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	101.07	14.11	1.23	1.87	118.28	3.95	(12.69)	0.00	109.55
2	W-2	W-2 Moenkopi / Gray Mountain Wind	97.50	17.06	1.59	2.35	118.49	3.95	(10.91)	0.00	111.53
3	W-4	W-4 Springerville Wind	99.97	20.04	1.63	2.83	124.46	3.95	(8.77)	0.00	119.64
4	W-1	W-1 Aubrey Cliffs Wind	116.45	22.89	0.94	3.19	143.47	3.95	(17.77)	0.00	129.65
	Ref-WIND	Reference Wind Plant @Market Price	101.29								

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2009 COD - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2009 Dollars)

Rank	Wind Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, ITC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	93.07	17.28	0.85	2.14	113.34	3.95	(11.29)	0.00	106.01
	Ref-WIND	Reference Wind Plant @Market Price	96.20								
Rank	**Base Case (20-Year Life, PTC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	105.78	17.28	0.85	2.39	126.30	3.95	(11.29)	0.00	118.96
	Ref-WIND	Reference Wind Plant @Market Price	110.00								
Rank	**Sensitivity 2 (30-Year Life, ITC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	86.44	16.33	0.79	1.99	105.56	3.95	(10.91)	0.00	98.60
	Ref-WIND	Reference Wind Plant @Market Price	89.29								
Rank	**Sensitivity 3 (30-Year Life, PTC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	97.50	16.33	0.79	2.21	116.83	3.95	(10.91)	0.00	109.87
	Ref-WIND	Reference Wind Plant @Market Price	101.29								

Note: * Designation E is for Export

APS

Sensitivity: 2017 COD

Arizona Potential Wind & Solar Generation Power Plants

2017 COD - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

Rank	Site ID	Plant Name	Busbar Costs	Transmission Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	Wind Sites										
1	W-3	W-3 Meteor Crater / Snowflake Wind	121.80	18.97	1.69	2.29	144.74	3.95	(16.72)	0.00	131.97
2	W-2	W-2 Moenkopi / Gray Mountain Wind	118.06	22.94	2.17	2.89	146.06	3.95	(14.38)	0.00	135.63
3	W-4	W-4 Springerville Wind	120.65	26.94	2.22	3.48	153.29	3.95	(11.56)	0.00	145.68
4	W-1	W-1 Aubrey Cliffs Wind	137.88	30.77	1.29	3.87	173.82	3.95	(23.42)	0.00	154.34
	Ref-WIND	Reference Wind Plant @Market Price	122.03								
Rank	Solar Sites (CSP Wet-Cooled, 6-Hour Storage)										
1	CSP-12	CSP-12 Palo Verde Solar CSP	185.14	1.43	0.77	0.32	187.67	0.00	(66.96)	(5.41)	115.30
2	CSP-5	CSP-5 Delaney Solar CSP	184.12	2.75	1.15	0.63	188.65	0.00	(66.52)	(5.41)	116.72
3	CSP-4	CSP-4 Gila Bend Solar CSP	184.79	3.13	1.15	0.72	189.79	0.00	(66.80)	(5.41)	117.57
4	CSP-3	CSP-3 Hyder Solar CSP	182.89	4.90	1.14	1.14	190.08	0.00	(65.99)	(5.41)	118.68
5	CSP-5a	CSP-5a Delaney Solar CSP	184.12	4.72	1.15	1.10	191.08	0.00	(66.52)	(5.41)	119.15
6	CSP-9	CSP-9 Dinosaur Solar CSP	189.56	3.46	1.19	0.79	194.99	0.00	(68.86)	(5.41)	120.72
7	CSP-7	CSP-7 Wickenburg Solar CSP	186.98	5.06	0.78	1.16	193.98	0.00	(67.75)	(5.41)	120.82
8	CSP-6	CSP-6 Little Harquahala Solar CSP	185.51	6.24	1.54	1.47	194.75	0.00	(67.12)	(5.41)	122.23
9	CSP-8	CSP-8 Casa Grande Solar CSP	189.95	6.60	1.99	1.55	200.08	0.00	(69.03)	(5.41)	125.64
10	CSP-2	CSP-2 Harvcuvar Solar CSP	186.18	9.84	1.55	2.36	199.94	0.00	(67.41)	(5.41)	127.12
11	CSP-11	CSP-11 Bouse Solar CSP	192.48	10.12	1.61	2.41	206.63	0.00	(70.13)	(5.41)	131.10
12	CSP-1	CSP-1 Hilltop Solar CSP	194.40	18.05	1.22	4.46	218.13	0.00	(70.95)	(5.41)	141.77
13	CSP-10	CSP-10 Bowie Solar CSP	205.73	20.96	2.62	5.22	234.54	0.00	(75.84)	(5.41)	153.28
	Ref-CSP	Reference CSP Plant @Market Price	184.05								
Rank	Solar Sites (SPV Thin Film, Fixed)										
1	SPV-12	SPV-12 Palo Verde Solar PV	166.42	2.43	1.32	0.29	170.46	2.50	(35.61)	(5.29)	132.06
2	SPV-5	SPV-5 Delaney Solar PV	165.59	4.65	1.95	0.58	172.78	2.50	(35.49)	(5.29)	134.50
3	SPV-4	SPV-4 Gila Bend Solar PV	166.01	5.26	1.95	0.66	173.88	2.50	(33.03)	(5.29)	138.06
4	SPV-5a	SPV-5a Delaney Solar PV	165.59	7.98	1.95	1.01	176.54	2.50	(35.49)	(5.29)	138.26
5	SPV-3	SPV-3 Hyder Solar PV	165.65	8.32	1.94	1.06	176.97	2.50	(35.87)	(5.29)	138.32
6	SPV-7	SPV-7 Wickenburg Solar PV	166.91	8.61	1.33	1.07	177.92	2.50	(36.04)	(5.29)	139.10
7	SPV-9	SPV-9 Dinosaur Solar PV	167.66	5.69	1.97	0.72	176.04	2.50	(33.36)	(5.29)	139.88
8	SPV-6	SPV-6 Little Harquahala Solar PV	165.88	10.53	2.62	1.36	180.39	2.50	(36.87)	(5.29)	140.73
9	SPV-8	SPV-8 Casa Grande Solar PV	167.36	10.85	3.28	1.42	182.90	2.50	(32.08)	(5.29)	148.03
10	SPV-11	SPV-11 Bouse Solar PV	168.22	16.50	2.64	2.22	189.57	2.50	(38.47)	(5.29)	148.32
11	SPV-2	SPV-2 Harvcuvar Solar PV	165.76	16.71	2.65	2.21	187.33	2.50	(35.71)	(5.29)	148.83
12	SPV-1	SPV-1 Hilltop Solar PV	169.27	30.12	2.05	4.20	205.65	2.50	(36.26)	(5.29)	166.61
13	SPV-10	SPV-10 Bowie Solar PV	171.12	33.35	4.19	4.75	213.41	2.50	(29.91)	(5.29)	180.72
	Ref-SPV	Reference SPV Plant @Market Price	164.99								

Arizona Potential Wind & Solar Generation Power Plants

2017 COD - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Site ID	Plant Name	Busbar Costs	Transmission Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Wind Site**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	118.06	21.95	1.09	2.72	143.81	3.95	(14.38)	0.00	133.39
	Ref-WIND	Reference Wind Plant @Market Price	122.03								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hour Storage)**										
1	CSP-3E	CSP-3E Hyder Solar CSP	182.89	5.28	0.76	1.23	190.16	0.00	(65.99)	(5.41)	118.76
2	CSP-6E	CSP-6E Little Harquahala Solar CSP	185.51	4.36	0.77	1.01	191.65	0.00	(67.12)	(5.41)	119.12
3	CSP-1E	CSP-1E Hilltop Solar CSP	194.40	2.34	0.82	0.53	198.08	0.00	(70.95)	(5.41)	121.72
4	CSP-5E	CSP-5E Delaney Solar CSP	184.12	7.75	1.15	1.84	194.86	0.00	(66.52)	(5.41)	122.93
	Ref-CSP	Reference CSP Plant @Market Price	184.05								
Rank	**Solar Sites (SPV Thin Film, Fixed)**										
1	SPV-6E	SPV-6E Little Harquahala Solar PV	165.88	7.36	1.31	0.92	175.47	2.50	(36.87)	(5.29)	135.81
2	SPV-1E	SPV-1E Hilltop Solar PV	169.27	3.91	1.37	0.47	175.01	2.50	(36.26)	(5.29)	135.97
3	SPV-3E	SPV-3E Hyder Solar PV	165.65	8.96	1.29	1.15	177.05	2.50	(35.87)	(5.29)	138.39
4	SPV-5E	SPV-5E Delaney Solar PV	165.59	13.12	1.95	1.72	182.39	2.50	(35.49)	(5.29)	144.11
	Ref-SPV	Reference SPV Plant @Market Price	164.99								

Note: * Designation E is for Export

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2017 COD - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Wind Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, ITC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	121.80	18.97	1.69	2.29	144.74	3.95	(16.72)	0.00	131.97
2	W-2	W-2 Moenkopi / Gray Mountain Wind	118.06	22.94	2.17	2.89	146.06	3.95	(14.38)	0.00	135.63
3	W-4	W-4 Springerville Wind	120.65	26.94	2.22	3.48	153.29	3.95	(11.56)	0.00	145.68
4	W-1	W-1 Aubrey Cliffs Wind	137.88	30.77	1.29	3.87	173.82	3.95	(23.42)	0.00	154.34
	Ref-WIND	Reference Wind Plant @Market Price	122.03								
Rank	**Sensitivity 1 (20-Year Life, PTC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	139.21	18.97	1.69	2.56	162.43	3.95	(16.72)	0.00	149.65
2	W-2	W-2 Moenkopi / Gray Mountain Wind	134.16	22.94	2.17	3.22	162.49	3.95	(14.38)	0.00	152.06
3	W-4	W-4 Springerville Wind	137.65	26.94	2.22	3.88	170.69	3.95	(11.56)	0.00	163.08
4	W-1	W-1 Aubrey Cliffs Wind	160.90	30.77	1.29	4.39	197.35	3.95	(23.42)	0.00	177.88
	Ref-WIND	Reference Wind Plant @Market Price	139.52								
Rank	**Sensitivity 2 (30-Year Life, ITC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	113.09	17.91	1.58	2.13	134.70	3.95	(16.16)	0.00	122.49
2	W-2	W-2 Moenkopi / Gray Mountain Wind	109.68	21.66	2.03	2.69	136.07	3.95	(13.89)	0.00	126.12
3	W-4	W-4 Springerville Wind	112.04	25.44	2.08	3.24	142.80	3.95	(11.17)	0.00	135.58
4	W-1	W-1 Aubrey Cliffs Wind	127.71	29.06	1.21	3.60	161.57	3.95	(22.63)	0.00	142.89
	REF	Reference Wind Plant @Market Price	113.30								
Rank	**Sensitivity 3 (30-Year Life, PTC)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	128.22	17.91	1.58	2.37	150.08	3.95	(16.16)	0.00	137.87
2	W-2	W-2 Moenkopi / Gray Mountain Wind	123.69	21.66	2.03	2.98	150.35	3.95	(13.89)	0.00	140.41
3	W-4	W-4 Springerville Wind	126.82	25.44	2.08	3.59	157.93	3.95	(11.17)	0.00	150.71
4	W-1	W-1 Aubrey Cliffs Wind	147.73	29.06	1.21	4.05	182.04	3.95	(22.63)	0.00	163.36
	Ref-WIND	Reference Wind Plant @Market Price	128.50								

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2017 COD - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Wind Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, ITC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	118.06	21.95	1.09	2.72	143.81	3.95	(14.38)	0.00	133.39
	Ref-WIND	Reference Wind Plant @Market Price	122.03								
Rank	**Base Case (20-Year Life, PTC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	134.16	21.95	1.09	3.03	160.23	3.95	(14.38)	0.00	149.80
	Ref-WIND	Reference Wind Plant @Market Price	139.52								
Rank	**Sensitivity 2 (30-Year Life, ITC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	109.68	20.73	1.01	2.53	133.96	3.95	(13.89)	0.00	124.02
	Ref-WIND	Reference Wind Plant @Market Price	113.30								
Rank	**Sensitivity 3 (30-Year Life, PTC)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	123.69	20.73	1.01	2.80	148.23	3.95	(13.89)	0.00	138.29
	Ref-WIND	Reference Wind Plant @Market Price	128.50								

Note: * Designation E is for Export

Sensitivity: 2017 COD With No Tax Credits

Arizona Potential Wind & Solar Generation Power Plants

2017 COD & No Tax Credits - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Wind Sites - No Tax Credits**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	159.58	18.97	1.69	2.89	183.13	3.95	(16.72)	0.00	170.36
2	W-2	W-2 Moenkopi / Gray Mountain Wind	154.54	22.94	2.17	3.63	183.28	3.95	(14.38)	0.00	172.85
3	W-4	W-4 Springerville Wind	158.03	26.94	2.22	4.35	191.54	3.95	(11.56)	0.00	183.93
4	W-1	W-1 Aubrey Cliffs Wind	181.28	30.77	1.29	4.86	218.20	3.95	(23.42)	0.00	198.73
	Ref-WIND	Reference Wind Plant @Market Price	159.90								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hour Storage) - Reverting to 10% Permanent ITC**										
1	CSP-12	CSP-12 Palo Verde Solar CSP	228.10	1.43	0.77	0.40	230.70	0.00	(66.96)	(5.41)	158.33
2	CSP-5	CSP-5 Delaney Solar CSP	226.80	2.75	1.15	0.77	231.47	0.00	(66.52)	(5.41)	159.54
3	CSP-4	CSP-4 Gila Bend Solar CSP	227.64	3.13	1.15	0.88	232.81	0.00	(66.80)	(5.41)	160.60
4	CSP-3	CSP-3 Hyder Solar CSP	225.23	4.90	1.14	1.40	232.67	0.00	(65.99)	(5.41)	161.27
5	CSP-5a	CSP-5a Delaney Solar CSP	226.80	4.72	1.15	1.34	234.00	0.00	(66.52)	(5.41)	162.07
6	CSP-7	CSP-7 Wickenburg Solar CSP	230.44	5.06	0.78	1.43	237.71	0.00	(67.75)	(5.41)	164.55
7	CSP-9	CSP-9 Dinosaur Solar CSP	233.74	3.46	1.19	0.97	239.35	0.00	(68.86)	(5.41)	165.08
8	CSP-6	CSP-6 Little Harquahala Solar CSP	228.57	6.24	1.54	1.79	238.14	0.00	(67.12)	(5.41)	165.61
9	CSP-8	CSP-8 Casa Grande Solar CSP	234.23	6.60	1.99	1.90	244.71	0.00	(69.03)	(5.41)	170.27
10	CSP-2	CSP-2 Harvcuvar Solar CSP	229.43	9.84	1.55	2.88	243.70	0.00	(67.41)	(5.41)	170.88
11	CSP-11	CSP-11 Bouse Solar CSP	237.47	10.12	1.61	2.95	252.15	0.00	(70.13)	(5.41)	176.62
12	CSP-1	CSP-1 Hilltop Solar CSP	239.92	18.05	1.22	5.41	264.60	0.00	(70.95)	(5.41)	188.24
13	CSP-10	CSP-10 Bowie Solar CSP	254.39	20.96	2.62	6.33	284.30	0.00	(75.84)	(5.41)	203.05
	Ref-CSP	Reference CSP Plant @Market Price	226.70								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hour Storage) - Reverting to 10% Permanent ITC**										
1	SPV-12	SPV-12 Palo Verde Solar PV	205.84	2.43	1.32	0.36	209.95	2.50	(35.61)	(5.29)	171.55
2	SPV-5	SPV-5 Delaney Solar PV	204.86	4.65	1.95	0.71	212.17	2.50	(35.49)	(5.29)	173.89
3	SPV-4	SPV-4 Gila Bend Solar PV	205.42	5.26	1.95	0.81	213.43	2.50	(33.03)	(5.29)	177.62
4	SPV-5a	SPV-5a Delaney Solar PV	204.86	7.98	1.95	1.24	216.03	2.50	(35.49)	(5.29)	177.76
5	SPV-3	SPV-3 Hyder Solar PV	204.97	8.32	1.94	1.30	216.53	2.50	(35.87)	(5.29)	177.87
6	SPV-7	SPV-7 Wickenburg Solar PV	206.39	8.61	1.33	1.31	217.64	2.50	(36.04)	(5.29)	178.81
7	SPV-9	SPV-9 Dinosaur Solar PV	207.46	5.69	1.97	0.88	215.99	2.50	(33.36)	(5.29)	179.84
8	SPV-6	SPV-6 Little Harquahala Solar PV	205.17	10.53	2.62	1.66	219.98	2.50	(36.87)	(5.29)	180.32
9	SPV-8	SPV-8 Casa Grande Solar PV	207.07	10.85	3.28	1.73	222.92	2.50	(32.08)	(5.29)	188.05
10	SPV-2	SPV-2 Harvcuvar Solar PV	204.97	16.71	2.65	2.68	227.00	2.50	(35.71)	(5.29)	188.51
11	SPV-11	SPV-11 Bouse Solar PV	208.11	16.50	2.64	2.69	229.93	2.50	(38.47)	(5.29)	188.68
12	SPV-1	SPV-1 Hilltop Solar PV	209.21	30.12	2.05	5.04	246.42	2.50	(36.26)	(5.29)	207.38
13	SPV-10	SPV-10 Bowie Solar PV	211.44	33.35	4.19	5.67	254.65	2.50	(29.91)	(5.29)	221.96
	Ref-SPV	Reference SPV Plant @Market Price	204.15								

2017 COD & No Tax Credits - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Wind Sites - No Tax Credits**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	154.54	21.95	1.09	3.42	181.00	3.95	(14.38)	0.00	170.57
	Ref-WIND	Reference Wind Plant @Market Price	159.90								
Rank	**Solar Sites (CSP Wet-Cooled, 6-Hour Storage) - Reverting to 10% Permanent ITC**										
1	CSP-3E	CSP-3E Hyder Solar CSP	225.23	5.28	0.76	1.51	232.77	0.00	(65.99)	(5.41)	161.37
2	CSP-6E	CSP-6E Little Harquahala Solar CSP	228.57	4.36	0.77	1.24	234.93	0.00	(67.12)	(5.41)	162.40
3	CSP-5E	CSP-5E Delaney Solar CSP	226.80	7.75	1.15	2.25	237.94	0.00	(66.52)	(5.41)	166.01
4	CSP-1E	CSP-1E Hilltop Solar CSP	239.92	2.34	0.82	0.65	243.73	0.00	(70.95)	(5.41)	167.36
	Ref-CSP	Reference CSP Plant @Market Price	226.70								
Rank	**Solar Sites (SPV Thin Film, Fixed) - Reverting to 10% Permanent ITC**										
1	SPV-6E	SPV-6E Little Harquahala Solar PV	205.17	7.36	1.31	1.13	214.98	2.50	(36.87)	(5.29)	175.31
2	SPV-1E	SPV-1E Hilltop Solar PV	209.21	3.91	1.37	0.57	215.06	2.50	(36.26)	(5.29)	176.01
3	SPV-3E	SPV-3E Hyder Solar PV	204.97	8.96	1.29	1.40	216.62	2.50	(35.87)	(5.29)	177.97
4	SPV-5E	SPV-5E Delaney Solar PV	204.86	13.12	1.95	2.10	222.03	2.50	(35.49)	(5.29)	183.75
	Ref-SPV	Reference SPV Plant @Market Price	204.15								

Note: * Designation E is for Export

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2017 COD & No Tax Credits - Estimated Delivered Costs for Imports into the Phoenix Load Area

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

Rank	Wind Site ID	Plant Name	Busbar Costs	Transmission Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, No Tax Credits)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	159.58	18.97	1.69	2.89	183.13	3.95	(16.72)	0.00	170.36
2	W-2	W-2 Moenkopi / Gray Mountain Wind	154.54	22.94	2.17	3.63	183.28	3.95	(14.38)	0.00	172.85
3	W-4	W-4 Springerville Wind	158.03	26.94	2.22	4.35	191.54	3.95	(11.56)	0.00	183.93
4	W-1	W-1 Aubrey Cliffs Wind	181.28	30.77	1.29	4.86	218.20	3.95	(23.42)	0.00	198.73
	Ref-WIND	Reference Wind Plant @Market Price	159.90								
Rank	**Sensitivity 1 (30-Year Life, No Tax Credits)**										
1	W-3	W-3 Meteor Crater / Snowflake Wind	145.95	17.91	1.58	2.65	168.09	3.95	(16.16)	0.00	155.88
2	W-2	W-2 Moenkopi / Gray Mountain Wind	141.41	21.66	2.03	3.34	168.43	3.95	(13.89)	0.00	158.49
3	W-4	W-4 Springerville Wind	144.55	25.44	2.08	4.00	176.06	3.95	(11.17)	0.00	168.84
4	W-1	W-1 Aubrey Cliffs Wind	165.45	29.06	1.21	4.46	200.17	3.95	(22.63)	0.00	181.49
	Ref-WIND	Reference Wind Plant @Market Price	146.23								

Arizona Potential Wind Generation Power Plants - Sensitivity Analysis

2017 COD & No Tax Credits - Estimated Delivered Costs for Exports

Life-Cycle Levelized Costs in $/MWh (2017 Dollars)

	Wind Site ID	Plant Name	Busbar Costs	Transmiss-ion Costs	Substation Costs	Line Losses	Delivered Costs	Integration Costs	Capacity Adjustment	Energy Adjustment	Adjusted Delivered Costs
Rank	**Base Case (20-Year Life, No Tax Credits)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	154.54	21.95	1.09	3.42	181.00	3.95	(14.38)	0.00	170.57
	Ref-WIND	Reference Wind Plant @Market Price	159.90								
Rank	**Sensitivity 1 (30-Year Life, No Tax Credits)**										
1	W-2E	W-2E Moenkopi / Gray Mountain Wind	141.41	20.73	1.01	3.14	166.30	3.95	(13.89)	0.00	156.35
	Ref-WIND	Reference Wind Plant @Market Price	146.23								

Note: * Designation E is for Export

APS

Backup Data, Assumptions and Calculations

APS

Arizona Potential Wind & Solar Generation Power Plants
Life-Cycle Levelized Value Adjustments in $/MWh (2009 COD)

Site ID	Plant Name	Capacity Factor	Capacity Value	Useful Life (Years)	Levelized CT Cost $/kW-Yr	Levelized Gas Price $/MMBtu	Spark Spread MBtu /MWh	Integration Costs $/MWh	Capacity Adjustment $/MWh	Energy Adjustment $/MWh	Total Adjustment $/MWh
Wind Sites											
W-1	W-1 Aubrey Cliffs Wind	26.00%	21.59%	20	194.0	9.29	0	3.95	(18.38)	0.00	(14.43)
W-2	W-2 Moenkopi / Gray Mountain Wind	30.93%	15.77%	20	194.0	9.29	0	3.95	(11.29)	0.00	(7.34)
W-2E	W-2E Moenkopi / Gray Mountain Wind	30.93%	15.77%	20	194.0	9.29	0	3.95	(11.29)	0.00	(7.34)
W-3	W-3 Meteor Crater / Snowflake Wind	29.86%	17.70%	20	194.0	9.29	0	3.95	(13.13)	0.00	(9.18)
W-4	W-4 Springerville Wind	30.18%	12.36%	20	194.0	9.29	0	3.95	(9.07)	0.00	(5.12)
Solar Sites (CSP Wet-Cooled, 6-Hr Storage)											
CSP-1	CSP-1 Hilltop Solar CSP	38.42%	100.00%	30	187.5	9.67	500	0.00	(55.71)	(4.84)	(60.54)
CSP-1E	CSP-1E Hilltop Solar CSP	38.42%	100.00%	30	187.5	9.67	500	0.00	(55.71)	(4.84)	(60.54)
CSP-2	CSP-2 Harvcuvar Solar CSP	40.44%	100.00%	30	187.5	9.67	500	0.00	(52.92)	(4.84)	(57.76)
CSP-3	CSP-3 Hyder Solar CSP	41.31%	100.00%	30	187.5	9.67	500	0.00	(51.81)	(4.84)	(56.65)
CSP-3E	CSP-3E Hyder Solar CSP	41.31%	100.00%	30	187.5	9.67	500	0.00	(51.81)	(4.84)	(56.65)
CSP-4	CSP-4 Gila Bend Solar CSP	40.80%	100.00%	30	187.5	9.67	500	0.00	(52.45)	(4.84)	(57.29)
CSP-5	CSP-5 Delaney Solar CSP	40.98%	100.00%	30	187.5	9.67	500	0.00	(52.23)	(4.84)	(57.06)
CSP-5a	CSP-5a Delaney Solar CSP	40.98%	100.00%	30	187.5	9.67	500	0.00	(52.23)	(4.84)	(57.06)
CSP-5E	CSP-5E Delaney Solar CSP	40.98%	100.00%	30	187.5	9.67	500	0.00	(52.23)	(4.84)	(57.06)
CSP-6	CSP-6 Little Harquahala Solar CSP	40.62%	100.00%	30	187.5	9.67	500	0.00	(52.69)	(4.84)	(57.53)
CSP-6E	CSP-6E Little Harquahala Solar CSP	40.62%	100.00%	30	187.5	9.67	500	0.00	(52.69)	(4.84)	(57.53)
CSP-7	CSP-7 Wickenburg Solar CSP	40.23%	100.00%	30	187.5	9.67	500	0.00	(53.19)	(4.84)	(58.03)
CSP-8	CSP-8 Casa Grande Solar CSP	39.49%	100.00%	30	187.5	9.67	500	0.00	(54.20)	(4.84)	(59.04)
CSP-9	CSP-9 Dinosaur Solar CSP	39.58%	100.00%	30	187.5	9.67	500	0.00	(54.07)	(4.84)	(58.90)
CSP-10	CSP-10 Bowie Solar CSP	35.94%	100.00%	30	187.5	9.67	500	0.00	(59.55)	(4.84)	(64.38)
CSP-11	CSP-11 Bouse Solar CSP	38.87%	100.00%	30	187.5	9.67	500	0.00	(55.06)	(4.84)	(59.89)
CSP-12	CSP-12 Palo Verde Solar CSP	40.71%	100.00%	30	187.5	9.67	500	0.00	(52.57)	(4.84)	(57.41)
Solar Sites (SPV Thin Film, Fixed)											
SPV-1	SPV-1 Hilltop Solar PV	24.48%	32.11%	25	190.1	9.49	500	2.50	(28.46)	(4.74)	(30.71)
SPV-1E	SPV-1E Hilltop Solar PV	24.48%	32.11%	25	190.1	9.49	500	2.50	(28.46)	(4.74)	(30.71)
SPV-2	SPV-2 Harvcuvar Solar PV	25.34%	32.74%	25	190.1	9.49	500	2.50	(28.03)	(4.74)	(30.28)
SPV-3	SPV-3 Hyder Solar PV	25.90%	33.61%	25	190.1	9.49	500	2.50	(28.16)	(4.74)	(30.40)
SPV-3E	SPV-3E Hyder Solar PV	25.90%	33.61%	25	190.1	9.49	500	2.50	(28.16)	(4.74)	(30.40)
SPV-4	SPV-4 Gila Bend Solar PV	25.84%	30.88%	25	190.1	9.49	500	2.50	(25.93)	(4.74)	(28.17)
SPV-5	SPV-5 Delaney Solar PV	25.75%	33.06%	25	190.1	9.49	500	2.50	(27.86)	(4.74)	(30.10)
SPV-5a	SPV-5a Delaney Solar PV	25.75%	33.06%	25	190.1	9.49	500	2.50	(27.86)	(4.74)	(30.10)
SPV-5E	SPV-5E Delaney Solar PV	25.75%	33.06%	25	190.1	9.49	500	2.50	(27.86)	(4.74)	(30.10)
SPV-6	SPV-6 Little Harquahala Solar PV	25.57%	34.12%	25	190.1	9.49	500	2.50	(28.95)	(4.74)	(31.19)
SPV-6E	SPV-6E Little Harquahala Solar PV	25.57%	34.12%	25	190.1	9.49	500	2.50	(28.95)	(4.74)	(31.19)
SPV-7	SPV-7 Wickenburg Solar PV	25.16%	32.80%	25	190.1	9.49	500	2.50	(28.29)	(4.74)	(30.54)
SPV-8	SPV-8 Casa Grande Solar PV	25.56%	29.67%	25	190.1	9.49	500	2.50	(25.18)	(4.74)	(27.43)
SPV-9	SPV-9 Dinosaur Solar PV	25.56%	30.86%	25	190.1	9.49	500	2.50	(26.19)	(4.74)	(28.44)
SPV-10	SPV-10 Bowie Solar PV	24.03%	26.00%	25	190.1	9.49	500	2.50	(23.48)	(4.74)	(25.72)
SPV-11	SPV-11 Bouse Solar PV	25.36%	35.30%	25	190.1	9.49	500	2.50	(30.20)	(4.74)	(32.44)
SPV-12	SPV-12 Palo Verde Solar PV	25.46%	32.80%	25	190.1	9.49	500	2.50	(27.95)	(4.74)	(30.20)

* Designation E for export.

Sensitivity of Plant Size to its Capacity Value

		Capacity Values*		
		300MW Size	600MW Size	1200MW Size
	Wind Plants			
1	Aubrey Cliffs	30.02%	27.62%	21.59%
2	Moenkopi / Gray Mountain	20.99%	19.43%	15.77%
3	Meteor Crater / Snowflake	22.93%	21.34%	17.70%
4	Springerville	17.20%	15.84%	12.36%
	Solar PV Plants			
1	Hilltop	44.28%	40.11%	32.11%
2	Harcuvar	44.76%	40.62%	32.74%
3	Hyder	46.33%	41.98%	33.61%
4	Gila Bend	42.28%	38.56%	30.88%
5	Delaney	45.57%	41.37%	33.06%
6	Little Harquahala	46.95%	42.63%	34.12%
7	Wickenburg	44.87%	40.77%	32.80%
8	Casa Grande	40.77%	37.08%	29.67%
9	Dinosaur	42.82%	38.75%	30.86%
10	Bowie	34.48%	31.43%	26.00%
11	Bouse	47.70%	43.49%	35.30%
12	Palo Verde	44.87%	40.77%	32.80%

* Based on 2005 historical weather & APS system load data.

APS

Arizona Potential Wind & Solar Generation Sites - Renewable Power Plant Data

Site ID	Plant Name	Capacity (MW)	Capital Cost ($/kW)	Capital Cost ($Million)	Fixed O&M ($/kW-Yr)	Variable O&M ($/MWh)	Installed Cost ($Million)	Capacity Factor %	Useful Life (Years)	Lead Time (Years)	Capacity Vaue
Wind Sites											
W-1	W-1 Aubrey Cliffs Wind	1,200	2,237	2,685	29.71	8.49	2,765	26.00%	20	2	21.59%
W-2	W-2 Moenkopi / Gray Mountain Wind	1,200	2,237	2,685	29.71	8.49	2,765	30.93%	20	2	15.77%
W-2E	W-2E Moenkopi / Gray Mountain Wind	1,200	2,237	2,685	29.71	8.49	2,765	30.93%	20	2	15.77%
W-3	W-3 Meteor Crater / Snowflake Wind	1,200	2,237	2,685	29.71	8.49	2,765	29.86%	20	2	17.70%
W-4	W-4 Springerville Wind	1,200	2,237	2,685	29.71	8.49	2,765	30.18%	20	2	12.36%
Ref-WIND	Reference Wind Plant (@Market Price)	1,200	**2,237**	2,685	29.71	8.49	2,765	29.80%	20	2	
Solar Sites - CSP (Wet-Cooled, 6-Hour Storage)											
CSP-1	CSP-1 Hilltop Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	38.42%	30	3	100.00%
CSP-1E	CSP-1E Hilltop Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	38.42%	30	3	100.00%
CSP-2	CSP-2 Harvcuvar Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.44%	30	3	100.00%
CSP-3	CSP-3 Hyder Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	41.31%	30	3	100.00%
CSP-3E	CSP-3E Hyder Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	41.31%	30	3	100.00%
CSP-4	CSP-4 Gila Bend Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.80%	30	3	100.00%
CSP-5	CSP-5 Delaney Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.98%	30	3	100.00%
CSP-5a	CSP-5a Delaney Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.98%	30	3	100.00%
CSP-5E	CSP-5E Delaney Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.98%	30	3	100.00%
CSP-6	CSP-6 Little Harquahala Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.62%	30	3	100.00%
CSP-6E	CSP-6E Little Harquahala Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.62%	30	3	100.00%
CSP-7	CSP-7 Wickenburg Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.23%	30	3	100.00%
CSP-8	CSP-8 Casa Grande Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	39.49%	30	3	100.00%
CSP-9	CSP-9 Dinosaur Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	39.58%	30	3	100.00%
CSP-10	CSP-10 Bowie Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	35.94%	30	3	100.00%
CSP-11	CSP-11 Bouse Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	38.87%	30	3	100.00%
CSP-12	CSP-12 Palo Verde Solar CSP	1,200	5,788	6,945	0.00	17.51	7,391	40.71%	30	3	100.00%
Ref-CSP	Reference CSP Plant (@Market Price)	1,200	**5,788**	6,945	0.00	17.51	7,391	41.00%	30	3	100.00%
Solar Sites - Solar PV (Thin Film, Fixed)											
SPV-1	SPV-1 Hilltop Solar PV	1,200	2,898	3,478	31.83	0.00	3,769	24.48%	25	3	32.11%
SPV-1E	SPV-1E Hilltop Solar PV	1,200	2,898	3,478	31.83	0.00	3,769	24.48%	25	3	32.11%
SPV-2	SPV-2 Harvcuvar Solar PV	1,200	2,945	3,534	31.83	0.00	3,830	25.34%	25	3	32.74%
SPV-3	SPV-3 Hyder Solar PV	1,200	3,019	3,623	31.83	0.00	3,925	25.90%	25	3	33.61%
SPV-3E	SPV-3E Hyder Solar PV	1,200	3,019	3,623	31.83	0.00	3,925	25.90%	25	3	33.61%
SPV-4	SPV-4 Gila Bend Solar PV	1,200	3,019	3,623	31.83	0.00	3,926	25.84%	25	3	30.88%
SPV-5	SPV-5 Delaney Solar PV	1,200	2,998	3,597	31.83	0.00	3,898	25.75%	25	3	33.06%
SPV-5a	SPV-5a Delaney Solar PV	1,200	2,998	3,597	31.83	0.00	3,898	25.75%	25	3	33.06%
SPV-5E	SPV-5E Delaney Solar PV	1,200	2,998	3,597	31.83	0.00	3,898	25.75%	25	3	33.06%
SPV-6	SPV-6 Little Harquahala Solar PV	1,200	2,979	3,575	31.83	0.00	3,874	25.57%	25	3	34.12%
SPV-6E	SPV-6E Little Harquahala Solar PV	1,200	2,979	3,575	31.83	0.00	3,874	25.57%	25	3	34.12%
SPV-7	SPV-7 Wickenburg Solar PV	1,200	2,944	3,533	31.83	0.00	3,828	25.16%	25	3	32.80%
SPV-8	SPV-8 Casa Grande Solar PV	1,200	3,009	3,611	31.83	0.00	3,913	25.56%	25	3	29.67%
SPV-9	SPV-9 Dinosaur Solar PV	1,200	3,016	3,619	31.83	0.00	3,922	25.56%	25	3	30.86%
SPV-10	SPV-10 Bowie Solar PV	1,200	2,872	3,446	31.83	0.00	3,734	24.03%	25	3	26.00%
SPV-11	SPV-11 Bouse Solar PV	1,200	3,000	3,600	31.83	0.00	3,901	25.36%	25	3	35.30%
SPV-12	SPV-12 Palo Verde Solar PV	1,200	2,976	3,571	31.83	0.00	3,869	25.46%	25	3	32.80%
Ref-SPV	Reference SPV Plant (@Market Price)	1,200	**3,019**	3,623	31.83	0.00	3,925	26.00%	25	3	

* Designation E is for Export.

Arizona Potential Wind & Solar Generation Sites - Transmission Data

Site ID	Plant Name	Capacity (MW)	Transmission Lines ID***	Mileage	Transmission Capital Cost ($M)	Substation Capital Cost ($M)	TotalCapital Cost ($M)	Average Capital Cost ($/kW)	O&M Cost ($M/Yr)	Losses
Wind Sites										
W-1	W-1 Aubrey Cliffs Wind	1,200	8	223	452	20	472	393	1.2	2.23%
W-2	W-2 Moenkopi / Gray Mountain Wind	1,200	4 + 50% of 5 + 7	198	402	40	442	368	1.1	1.98%
W-2E*	W-2E Moenkopi / Gray Mountain Wind	1,200	3	189	384	20	404	336	1.0	1.89%
W-3	W-3 Meteor Crater / Snowflake Wind	1,200	50% of 5 + 7	158	321	30	351	292	0.9	1.58%
W-4	W-4 Springerville Wind	1,200	6 + 50% of 5 + 7	227	461	40	501	417	1.3	2.27%
Solar Sites - CSP (Wet-Cooled, 6-Hour Storage)										
CSP-1	CSP-1 Hilltop Solar CSP	1,200	10 + 8 (less 40 miles)	204	415	30	445	371	1.1	2.04%
CSP-1E*	CSP-1E Hilltop Solar CSP	1,200	11	27	54	20	74	62	0.1	0.27%
CSP-2	CSP-2 Harvcuvar Solar CSP	1,200	44 + 42 + 40	118	240	40	280	233	0.7	1.18%
CSP-3	CSP-3 Hyder Solar CSP	1,200	50 + 61**	60	122	30	152	127	0.3	0.60%
CSP-3E*	CSP-3E Hyder Solar CSP	1,200	51	65	132	20	152	126	0.4	0.65%
CSP-4	CSP-4 Gila Bend Solar CSP	1,200	53 + 55	38	77	30	107	89	0.2	0.38%
CSP-5	CSP-5 Delaney Solar CSP	1,200	41 + 61**	33	68	30	98	82	0.2	0.33%
CSP-5a	CSP-5a Delaney Solar CSP	1,200	40+39	57	117	30	147	122	0.3	0.57%
CSP-5E*	CSP-5E Delaney Solar CSP	1,200	42 + 43	94	192	30	222	185	0.5	0.94%
CSP-6	CSP-6 Little Harquahala Solar CSP	1,200	42 + 41 + 61**	75	153	40	193	161	0.4	0.75%
CSP-6E*	CSP-6E Little Harquahala Solar CSP	1,200	43	53	107	20	127	106	0.3	0.53%
CSP-7	CSP-7 Wickenburg Solar CSP	1,200	60 miles of 8	60	122	20	142	118	0.3	0.60%
CSP-8	CSP-8 Casa Grande Solar CSP	1,200	59 + 58 + 56 + 55	77	157	50	207	173	0.4	0.77%
CSP-9	CSP-9 Dinosaur Solar CSP	1,200	35 + 36	41	82	30	112	94	0.2	0.41%
CSP-10	CSP-10 Bowie Solar CSP	1,200	20 (less 30 miles) + 32 + 33 + 35 + 36	223	452	60	512	427	1.2	2.23%
CSP-11	CSP-11 Bouse Solar CSP	1,200	48 + 42+ 40	117	237	40	277	231	0.6	1.17%
CSP-12	CSP-12 Palo Verde Solar CSP	1,200	61**	17	35	20	55	46	0.1	0.17%
Solar Sites - Solar PV (Thin Film, Fixed)										
SPV-1	SPV-1 Hilltop Solar PV	1,200	10 + 8 (less 40 miles)	204	415	30	445	371	1.1	2.04%
SPV-1E*	SPV-1E Hilltop Solar PV	1,200	11	27	54	20	74	62	0.1	0.27%
SPV-2	SPV-2 Harvcuvar Solar PV	1,200	44 + 42 + 40	118	240	40	280	233	0.7	1.18%
SPV-3	SPV-3 Hyder Solar PV	1,200	50 + 61**	60	122	30	152	127	0.3	0.60%
SPV-3E*	SPV-3E Hyder Solar PV	1,200	51	65	132	20	152	126	0.4	0.65%
SPV-4	SPV-4 Gila Bend Solar PV	1,200	53 + 55	38	77	30	107	89	0.2	0.38%
SPV-5	SPV-5 Delaney Solar PV	1,200	41 + 61**	33	68	30	98	82	0.2	0.33%
SPV-5a	SPV-5a Delaney Solar PV	1,200	40+39	57	117	30	147	122	0.3	0.57%
SPV-5E*	SPV-5E Delaney Solar PV	1,200	42 + 43	94	192	30	222	185	0.5	0.94%
SPV-6	SPV-6 Little Harquahala Solar PV	1,200	42 + 41 + 61**	75	153	40	193	161	0.4	0.75%
SPV-6E*	SPV-6E Little Harquahala Solar PV	1,200	43	53	107	20	127	106	0.3	0.53%
SPV-7	SPV-7 Wickenburg Solar PV	1,200	60 miles of 8	60	122	20	142	118	0.3	0.60%
SPV-8	SPV-8 Casa Grande Solar PV	1,200	59 + 58 + 56 + 55	77	157	50	207	173	0.4	0.77%
SPV-9	SPV-9 Dinosaur Solar PV	1,200	35 + 36	41	82	30	112	94	0.2	0.41%
SPV-10	SPV-10 Bowie Solar PV	1,200	20 (less 30 miles) + 32 + 33 + 35 + 36	223	452	60	512	427	1.2	2.23%
SPV-11	SPV-11 Bouse Solar PV	1,200	48 + 42+ 40	117	237	40	277	231	0.6	1.17%
SPV-12	SPV-12 Palo Verde Solar PV	1,200	61**	17	35	20	55	46	0.1	0.17%

* Designation E is for Export.

** Line segment 61 is assumed to be the same as line segment 55, but not shown on the map.

*** Transmission lines are for import capability from all sites, except sites having designation E for export. Full-length transmission lines are required unless otherwise noted.

APS

Financial & Economic Assumptions

Financial Structure	Ratio	Cost
Debt	45.5%	7.25%
Equity	54.5%	10.75%

After-tax WACC **7.86%** (NPV discount rate)

Income Tax Rate **39.36%**

Annual Escalation Rates		Sources
Capital	**3.0%**	Recent Handy-Whitman index analysis
Variable O&M	**3.0%**	Corporate data
Fixed O&M	**3.0%**	Corporate data
Property Tax	**1.0%**	Property tax accounting

Annual AFUDC Rate **8.326%** Financial planning

	Book Life	**Tax Life**	**Tax Credits**
Wind Plant	20 Years	5 Years	30% ITC*
CSP Plant	30 Years	5 Years	30% ITC**
SPV Plant	25 Years	5 Years	30% ITC**
Swityard/Substation	40 Years	20 Years	N/A
Transmission	50 Years	20 Years	N/A

Notes: * Wind plant may choose the $21/MWh PTC for 10 years. Both expire in 2012.
** The 30% ITC for solar expires in 2016, and reverts to 10%.

APS

Potential Transmission Lines for Renewable Resources in Arizona (1 of 2)

Segment ID	Description	Mileage (Miles)	Construction Costs (Million $)	ROW Costs (Million $)	Total Capital Costs (Million $)	Capacity (MW)	Pro-rated Capital Costs ($/kW)	Annual O&M Costs (Million $)	Losses (%)	Lead Time (Years)
1	NTP - Segment 1 (Four Corners to Red Mesa)*	138	248	32	280	1,200	233	0.76	1.38%	5
2	NTP - Segment 2 (Red Mesa to Moenkopi)*	68	123	16	139	1,200	116	0.38	0.68%	4
3	NTP - Segment 3 (Moenkopi to Marketplace)*	189	340	43	384	1,200	320	1.05	1.89%	5
4	Moenkpi to Flagstaff	40	72	9	81	1,200	68	0.22	0.40%	6
5	Flagstaff to Cholla	68	123	16	138	1,200	115	0.38	0.68%	6
6	Cholla to Coronado	69	125	16	140	1,200	117	0.38	0.69%	6
7	Pinnacle Peak to Cholla	124	223	28	251	1,200	210	0.69	1.24%	7
8	Palo Verde to Mead	223	401	51	452	1,200	377	1.23	2.23%	7
9	Hilltop North - Dolan Springs - Red Lake Area	52	94	12	106	1,200	89	0.29	0.52%	6
10	Peacock to Hilltop	22	39	5	44	1,200	37	0.12	0.22%	5
11	Hilltop to Davis	27	48	6	54	1,200	45	0.15	0.27%	6
12	Hilltop to Griffith	9	17	2	19	1,200	16	0.05	0.09%	5
13	Griffith South to Davis/Parker Line	28	51	6	57	1,200	48	0.16	0.28%	6
14	Parker to Davis Segment 1	35	63	8	71	1,200	59	0.19	0.35%	6
15	Parker to Davis Segment 2	11	20	2	22	1,200	18	0.06	0.11%	5
16	North Havasu to Bouse	46	83	11	94	1,200	78	0.26	0.46%	6
17	Coronado to Springerville	19	34	4	38	1,200	32	0.10	0.19%	5
18	Springerville to Greenlee	113	204	26	230	1,200	191	0.63	1.13%	7
19	Greenlee to Winchester	91	164	21	184	1,200	154	0.50	0.91%	7
20	Sunzia (AZ Border to Pinal Central)	165	297	38	334	1,200	279	0.91	1.65%	7
21	Winchester to Apache	23	41	5	46	1,200	38	0.13	0.23%	5
22	Winchester to Vail	35	62	8	70	1,200	59	0.19	0.35%	6
23	Apache to Vail	56	101	13	114	1,200	95	0.31	0.56%	6
24	Vail to Saguaro	49	89	11	100	1,200	83	0.27	0.49%	6
25	Vail to Three Points	43	78	10	88	1,200	74	0.24	0.43%	6
26	Three Routes to West of Saguaro	35	63	8	71	1,200	59	0.19	0.35%	6
27	Saguaro to West of Saguaro	23	42	5	47	1,200	40	0.13	0.23%	5
28	Pinal Central to Saguaro	30	54	7	61	1,200	51	0.17	0.30%	6
29	Desert Basin to Saguaro	45	81	10	91	1,200	76	0.25	0.45%	6
30	Sundance - South to Desert Basin to Saguaro Alts	20	36	5	41	1,200	34	0.11	0.20%	5

*Project already has CEC, lead time is 2 years shorter than normal.

Potential Transmission Lines for Renewable Resources in Arizona (2 of 2)

Segment ID	Description	Mileage (Miles)	Construction Costs (Million $)	ROW Costs (Million $)	Total Capital Costs (Million $)	Capacity (MW)	Pro-rated Capital Costs ($/kW)	Annual O&M Costs (Million$)	Losses (%)	Lead Time (Years)
31	West of Saguaro to Santa Rosa	48	86	11	97	1,200	81	0.27	0.48%	6
32	East of Sundance to Coolidge	20	35	4	40	1,200	33	0.11	0.20%	5
33	Dinosaur to Sundance*	28	50	6	56	1,200	47	0.15	0.28%	4
34	Dinosaur to Silver King	31	55	7	62	1,200	52	0.17	0.31%	6
35	Browning to Dinosaur*	10	18	2	20	1,200	17	0.06	0.10%	3
36	Pinnacle Peak to Browning	31	55	7	62	1,200	52	0.17	0.31%	6
37	TS9 to Pinnacle Peak*	22	40	5	46	1,200	38	0.12	0.22%	3
38	Does not exist	7	13	2	14	1,200	12	0.04	0.07%	5
39	TS8 to TS9*	18	32	4	36	1,200	30	0.10	0.18%	3
40	Delaney to TS5*	39	71	9	80	1,200	67	0.22	0.39%	4
41	Delaney to PV*	16	29	4	33	1,200	27	0.09	0.16%	3
42	Delaney to Little Harquahala	42	75	10	85	1,200	71	0.23	0.42%	6
43	Little Harquahala to Blythe	53	95	12	107	1,200	89	0.29	0.53%	6
44	Harcuvar to Little Harquahala	37	67	9	75	1,200	63	0.21	0.37%	6
45	Bouse Hills to Harcuvar	24	43	5	48	1,200	40	0.13	0.24%	5
46	Bouse Hills to Bouse	8	15	2	16	1,200	14	0.04	0.08%	5
47	Bouse south to PV Devers Alternative	29	52	7	58	1,200	49	0.16	0.29%	6
48	Bouse Hills to Little Harquahala	36	64	8	72	1,200	60	0.20	0.36%	6
49	Devers I-10 to North Gila Along State Highway 95	59	107	14	121	1,200	101	0.33	0.59%	6
50	Palo Verde to North Gila Segment 1*	43	77	10	87	1,200	73	0.24	0.43%	4
51	Palo Verde to North Gila Segment 2*	65	117	15	132	1,200	110	0.36	0.65%	4
52	Palo Verde to Jojoba	22	40	5	45	1,200	38	0.12	0.22%	5
53	Jojoba to Gila River	21	37	5	42	1,200	35	0.11	0.21%	5
54	Gila River West to Palo Verde North Gila Line	50	89	11	101	1,200	84	0.28	0.50%	6
55	Jojoba to Liberty	17	31	4	35	1,200	29	0.10	0.17%	5
56	Jojoba to Pinal West*	28	51	7	58	1,200	48	0.16	0.28%	4
57	No Name _ ID57	60	108	14	122	1,200	102	0.33	0.60%	6
58	Pinal West to Santa Rosa*	20	37	5	41	1,200	35	0.11	0.20%	3
59	Santa Rosa to Desert Basin	11	20	3	23	1,200	19	0.06	0.11%	5
60	Desert Basin to Sundance	14	26	3	29	1,200	24	0.08	0.14%	5
61	Palo Verde to Liberty (same as 55, not shown on map)	17	31	4	35	1,200	29	0.10	0.17%	5

*Project already has CEC, lead time is 2 years shorter than normal.

SAM Simulation of CSP Plants

CSP Plant Assumptions

CSP Type	Parabolic Trough
Solar Multiple	2.44
Solar Field Area	1,097,040 m^2
Storage	6 hours
System Type	Steam Reheat, Wet Cooling

Summary of SAM Ouputs

Locations	Gross Output	Net Output		
	Max MW	Max MW	Annual MWh	Cap. Fac.
Hilltop	126.5	117.9	396,638	38.4%
Harcuvar	126.5	117.8	417,265	40.4%
Hyder	126.5	117.9	426,568	41.3%
Gila Bend	126.5	117.8	421,240	40.8%
Delaney	126.5	117.8	422,874	41.0%
Little Harquahala	126.5	117.8	419,270	40.6%
Wickenburg	126.5	117.9	415,403	40.2%
Casa Grande	126.5	117.9	407,700	39.5%
Dinosaur	126.5	117.7	408,292	39.6%
Bowie	126.5	117.7	370,627	35.9%
Bouse	126.5	117.7	400,961	38.9%
Palo Verde	126.5	117.9	420,349	40.7%

SAM Simulation of SPV Plants

SPV Plant Assumptions

PV Panel Type	Thin film
Orientation	South-facing
Tilt	30^0
Tracking	Fixed (no tracking)
Rated Capacity	496.8 KW DC per array

Summary of SAM Ouputs

Locations	**DC Output**	**Net AC Output**		
	Max kW	Max kW	Annual kWh	Cap. Fac.
Hilltop	515.8	416.2	892,385	24.5%
Harcuvar	507.4	409.6	909,075	25.3%
Hyder	494.6	399.6	906,417	25.9%
Gila Bend	494.6	399.5	904,407	25.8%
Delaney	498.2	402.4	907,655	25.7%
Little Harquahala	501.5	404.9	906,924	25.6%
Wickenburg	507.5	409.7	902,855	25.2%
Casa Grande	496.2	400.9	897,559	25.6%
Dinosaur	495.1	399.9	895,650	25.6%
Bowie	525.5	420.0	883,943	24.0%
Bouse	497.9	402.1	893,409	25.4%
Palo Verde	501.9	405.4	904,119	25.5%

APS

Weather Stations for SAM Simulations

	Solar Plant Site	Weather Station
1	Hilltop	Kingman
2	Harcuvar	Harcuvar
3	Hyder	Hyder
4	Gila Bend	Gila Bend
5	Delaney	Tonopah
6	Little Harquahala	Brenda
7	Wickenburg	Wickenburg
8	Casa Grande	Casa Grande
9	Dinosaur	Queen Creek
10	Bowie	Artesia
11	Bouse	Parker
12	Palo Verde	Wintersburg

Attachment F

BTA Order Evaluation Qualitative Analysis Matrix

10/30/09

APS BTA Order Evaluation
Qualitative Analysis Matrix

Issue Area → / Resource/Transmission Pair ↓	Expectation for project to help lower future resource costs	Ability to support multiple potential renewable energy markets	Ability to secure additional uses for APS customers (multi-use opportunity)	Likelyhood of attracting participant partners in the project(s)	Expected permitting sensitivity (Resource and Transmission)	Interconnection queue robustness for resource area
Aubrey Cliffs Wind	Wind technology is progressing without any help from Arizona and it is not likely that Arizona's relatively low capacity factor wind will provide additional help in lowering costs for wind	The development of this transmission would not directly allow sales to other markets although along with allowing direct sales to the Phoenix energy market, the California energy market could be accesses by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	Other than potential market purchases made from the CAISO (which is generally higher cost energy), there are no clear additional uses for this transmission	Currently no known/likely participants	Avoid isoloated tribal parcels and difficult terrian along Seg 8; NPS jurisdiction near Davis Dam; existing WAPA lines may be an opportunity	There are 500 MW of interconnection requests in this area to WAPA
Moenkopi/Grey Mountain Wind	Wind technology is progressing without any help from Arizona and it is not likely that Arizona's relatively low capacity factor wind will provide additional help in lowering costs for wind	The development of this transmission would not directly allow sales to other markets although along with allowing direct sales to the Phoenix energy market, the California energy market could be accesses by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	APS already has some capacity from Moenkopi to the valley - there just hasn't been any good resources to utilize it	Currently no known/likely participants	Tribal land may be unavoidable. Corridor on USFS may need to be separate from existing corridor = challenging permit process; constraints entering Phoenix metro area to PP	There are 1500 MW of interconnection requests in this area to APS
Moenkopi/Grey Mountain Wind - Export	Wind technology is progressing without any help from Arizona and it is not likely that Arizona's relatively low capacity factor wind will provide additional help in lowering costs for wind	The development of this transmission would allow direct sales to either the California energy market or the Nevada energy market	None - transmission goes to CA	Possible participants include DINE power authority	Crosses tribal land at Hualapai; 3rd segment of NTP in federal process but may have to avoid Hualapai; other USFS and BLM issues	There are 1500 MW of interconnection requests in this area to APS
Meteor Crater/ Snowflake Wind	Wind technology is progressing without any help from Arizona and it is not likely that Arizona's relatively low capacity factor wind will provide additional help in lowering costs for wind	The development of this transmission would not directly allow sales to other markets although along with allowing direct sales to the Phoenix energy market, the California energy market could be accesses by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	There are no clear additional uses for this transmission	Currently no known/likely participants	State Land may be designated for transfer to Hopi; USFS and PP issues similar to W-2. Similar tribal, USFS, and PP constraint issues as W-2; potential BLM land along Segment 6 but more flexibility between Coronado and Cholla	There are 1775 MW of interconnection requests in this area to APS and SRP
Springerville Wind	Wind technology is progressing without any help from Arizona and it is not likely that Arizona's relatively low capacity factor wind will provide additional help in lowering costs for wind	The development of this transmission would not directly allow sales to other markets although along with allowing direct sales to the Phoenix energy market, the California energy market could be accesses by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	There are no clear additional uses for this transmission	Currently no known/likely participants	Same as W-4	There are 2950 MW of interconnection requests in this area to TEP
Hilltop Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a market hub as well as a CAISO delivery point	There are no clear additional uses for this transmission	Currently no known/likely participants	Similar to W-1; mix of BLM and state land; development encroachment issues closer to Phoenix metro area	There are 990 MW of interconnection requests in this area to TEP, SRP and WAPA
Hilltop Solar - Export	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission may allow parties to wheel on WAPA's system from Davis to Mead which is a market hub	There are no clear additional uses for this transmission	Currently no known/likely participants	Similar to portions of W-1; Davis Dam encrochment sensitivities/opportunity to parallel Western facilities	There are 990 MW of interconnection requests in this area to TEP, SRP and WAPA
Harcuvar Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	By delivering energy to the Palo Verde hub, a market hub is accessible which includes access to the CAISO market	There is a potential, depending on where a future nuclear plant is sited, that the transmission could be used to deliver nuclear power to the market hub and valley load	Currently no known/likely participants	Segs 41, 42, and 61 are part of PV-Devers alignment; Seg 44 primarily BLM; new NEPA/CEC would be required but manageable	There are 350 MW of interconnection requests in this area to WAPA
Hyder Solar	This resource area contains a large amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	The Hyder resource area is located such that through utilization of the Palo Verde to North Gila transmission line(s), both the Arizona market as well as the CAISO market could be reached	The transmission associated with this resource/transmission pair is part of a line from Palo Verde to North Gila (Yuma). The full line would provide additional benefits to the APS customers in Yuma by increasing the load serving capability in Yuma. Additionally, resources such as Salton Sea area geothermal could be brought from Yuma back to the Palo Verde hub.	Current participant group for the Palo Verde to North Gila II 500kV project are: SRP, IID, and Wellton Mohawk	Eastern portion of PV-NG#2 already has federal and state permitting complete	There are 1958 MW of interconnection requests in this area to APS
Hyder Solar - Export	This resource area contains a large amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	The Hyder resource area is located such that through utilization of the Palo Verde to North Gila transmission line(s), both the Arizona market as well as the CAISO market could be reached (either at Palo Verde or at North Gila)	The transmission associated with this resource/transmission pair is part of a line from Palo Verde to North Gila (Yuma). The full line would provide additional benefits to the APS customers in Yuma by increasing the load serving capability in Yuma. Additionally, resources such as Salton Sea area geothermal could be brought from Yuma back to the Palo Verde hub.	Current participant group for the Palo Verde to North Gila II 500kV project are: SRP, IID, and Wellton Mohawk	Western portion of PV-NG#2 already has federal and state permitting complete	There are 1958 MW of interconnection requests in this area to APS

APS BTA Order Evaluation
Qualitative Analysis Matrix

Issue Area → / Resource/Transmission Pair ↓	Expectation for project to help lower future resource costs	Ability to support multiple potential renewable energy markets	Ability to secure additional uses for APS customers (multi-use opportunity)	Likelyhood of attracting participant partners in the project(s)	Expected permitting sensitivity (Resource and Transmission)	Interconnection queue robustness for resource area
Gila Bend Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a market hub as well as a CAISO delivery point	There are existing gas resources located in the resource area that could be purchased for native load cutomers to utilize transmission capacity	Currently no known/likely participants	Seg 53 adjacent to existing 500kV lines would border Sonoran NM, other areas would be near wilderness or Gila River; Seg 55 difficult north of Jojoba into Buckeye depending on terminus	There are 1182 MW of interconnection requests in this area to APS
Delaney Solar	This resource area contains a large amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	This resource/transmission pair would support sales to both the Phoenix market as well as the CAISO market at Palo Verde	APS already holds a CEC for segment 41 and the segment would support the long-term strengthening of the transmission system	Current participant group for the Palo Verde to Delaney 500kV project are: SRP and CAP	Seg 41 has federal and state permitting complete if using PV Hub to Delany alignment	There are 3310 MW of interconnection requests in this area to APS
Little Harquahala Solar	This resource area contains a good amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	This resource/transmission pair would support sales to both the Phoenix market as well as the CAISO market at Palo Verde	There are no clear additional uses for this transmission	Currently no known/likely participants	All segments have been previously studied, would require new permitting to assemble alignments into new project	There are 125 MW of interconnection requests in this area to WAPA
Little Harquahala Solar - Export	This resource area contains a good amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	This resource/transmission pair would support sales to mainly the CAISO market	There are no clear additional uses for this transmission	Potential participant would be SCE	Crossing of Kofa NWR will be a challenge but has been approved as part of previous projects; all other areas BLM land with some wilderness	There are 125 MW of interconnection requests in this area to WAPA
Wickenburg Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	There are no clear additional uses for this transmission	Currently no known/likely participants	Mix of federal and state land; challenges closer into metro area, Wickenburg, etc.	APS is not aware of any renewable resource interconnection requests in this area
Casa Grande Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	An additional transmission path in this area could be used to bring additional gas resources from the Saguaro/Sundance area to the Phoenix load center	Currently no known/likely participants	Seg 55 difficult north of Jojoba; Seg 56 is primarily BLM, may have existing CEC for portions of the area; Seg 58 enters developed areas near Casa Grande but could use SRP alignment for SEV	There are 80 MW of interconnection requests in this area to APS
Dinosaur Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	There are no clear additional uses for this transmission	Potential participant would be SRP	Highly developed urban area; may be some opportunties gained from converting and/or existing 230kV to 500kV and reducing amount of right-of way in some areas	There are 125 MW of interconnection requests in this area to SRP
Bowie Solar	This resource/transmission pair may provide some minimal help in bringing down future solar costs	The development of this transmission would allow direct sales to the Phoenix energy market and would allow sales to the California energy market by wheeling from Phoenix to the Palo Verde hub which is a CAISO delivery point	An additional transmission path in this area could be used to bring additional gas resources from the Bowie area to the Phoenix load center. Bringing gas resources from this distance to the Phoenix load center is not as economical as other alternatives	Potential participants would be SRP, TEP, and SWTC	Seg 20 may impact USFS and Arravaipa Canyon, other BLM areas as well; same issues as S-9 for segments in Phoenix metro area	APS is not aware of any renewable resource interconnection requests in this area
Bouse Solar	This resource area contains a good amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	This resource/transmission pair would support sales to both the Phoenix market as well as the CAISO market at Palo Verde	There are no clear additional uses for this transmission unless additional non-renewable resources are built in the Bouse area	Currently no known/likely participants	Segs 41, 42, and 61 are similar to S-2 part of PV-Devers alignment; Seg 48 is a mix of BLM, state, and private	There are 260 MW of interconnection requests in this area to WAPA
Palo Verde Solar	This resource area contains a good amount of potential solar resources. Building an additional line would spur development in the area and, therefore, could provide some help in bringing down future solar costs	This resource/transmission pair would support sales to both the Phoenix market as well as the CAISO market at Palo Verde	This transmission could potentially be used to bring gas resources in the Palo Verde area to the phoenix load center	Potential participant would be SRP	Constraints with amount of area available for new transmission in PV Hub area	There are 1720 MW of interconnection requests in this area to SRP

Legend:
- Highly Positive
- Positive
- Nuetral
- Negative

APS BTA Order Evaluation
Qualitative Analysis Matrix

Issue Area → / Resource/Transmission Pair ↓	Expected immediate utilization level	Ability to support phased implementation to spread out customer rate impacts	Current requests for long-term transmission service along same path as resource/transmission pair that might help support development	Ability to acquire land for resource development in resource area (BLM vs Private, etc.)	Market Test Verification/ Availability of Existing Transmission/ Other (APS Perspective)
Aubrey Cliffs Wind	There is no immediate use of this transmission at this time	It may be possible to build transmission from Bullhead City to the 500kV and 345kV WAPA lines and to either use APS capacity or wheel on WAPA's system until additional capacity is neeeded	None	Mix of state and private, possible BLM; Fort Mojave Reservation towards southern portion of resource area	There have been projects bid in the general area but they have not, to date, been cost effective even without the cost of additional transmission
Moenkopi/Grey Mountain Wind	There is no immediate use of this transmission at this time	Once transmission is needed, there is no phasing of the transmission path back to the valley	None	Tribal or USFS land, very challenging to get utility scale generation without tribal participation	We have not seen any proposals in this area although we know there are developers in the area - they may be targeting the CA market
Moenkopi/Grey Mountain Wind - Export	There is no immediate use of this transmission at this time	Once transmission is needed, there is no phasing of the transmission path back to the valley	None	Same as W-2	We have not seen any proposals in this area although we know there are developers in the area - they may be targeting the CA market
Meteor Crater/ Snowflake Wind	There is no immediate use of this transmission at this time	Once transmission is needed, there is no phasing of the transmission path back to the valley	None	Avoid tribal land for site if no tribal particpation, otherwise state and private checkboard area	There have been projects bid in the general area but they have not, to date, been cost effective even without the cost of additional transmission
Springerville Wind	There is no immediate use of this transmission at this time	Once transmission is needed, there is no phasing of the transmission path back to the valley	None	Large areas of contiguous state land; some BLM land north of SR 60	We have not seen a great deal of proposals in this area.
Hilltop Solar	There is no immediate use of this transmission at this time	It may be possible to build transmission from Hilltop to the 500kV and 345kV WAPA lines and to either use APS capacity or wheel on WAPA's system until additional capacity is neeeded	None	Primarily private land in Sacramento Valley west of McConnico	We have not seen a great deal of proposals in this area. If the energy could be moved to the Mead Phoenix 500kV line and other DC conversion issues resolved, APS has some limited ability to bring resources to the Phoenix load center.
Hilltop Solar - Export	There is no immediate use of this transmission at this time	No - Hilltop to Davis is a single segment	None	Rough terrain; areas of NPS and BLM jurisdiction	We have not seen a great deal of proposals in this area. If the energy could be moved to the Mead Phoenix 500kV line and other DC conversion issues resolved, APS has some limited ability to bring resources to the Phoenix load center.
Harcuvar Solar	CAP has expresed an interest in participating in these line segments	A phased approach is unlikely unless the CAISO system can be used in the short term	None	BLM and State but manageable	We have not seen a great deal of proposals in this area.
Hyder Solar	There is no immediate use of this transmission at this time	A phased approach could be used by building a segment from Hyder to Palo Verde and later developing the Hyder to North Gila segment	None	Primarily private and BLM land	We have seen proposals in this area and believe it to be a viable solar development area
Hyder Solar - Export	There is no immediate use of this transmission at this time	A phased approach could be used by building a segment from Hyder to Palo Verde and later developing the Hyder to North Gila segment	None	Mostly positive with some terrain issues to the west	We have seen proposals in this area and believe it to be a viable solar development area

APS BTA Order Evaluation
Qualitative Analysis Matrix

Issue Area → / Resource/Transmission Pair ↓	Expected immediate utilization level	Ability to support phased implementation to spread out customer rate impacts	Current requests for long-term transmission service along same path as resource/transmission pair that might help support development	Ability to acquire land for resource development in resource area (BLM vs Private, etc.)	Market Test Verification/ Availability of Existing Transmission/ Other (APS Perspective)
Gila Bend Solar	This transmission would be along the same path as an existing PPA contract that APS has with Solana	This project could be used as part of a bigger phased project that linked Phoenix load with Gila Bend, over to the Palo Verde to North Gila corridor near Hyder and back to the Palo Verde hub. It would be part of a large solar loop after full build out	None	State and private land; active solar development ongoing	APS has an existing PPA in the Gila Bend area (Solana) so APS believes it to be a viable solar development area
Delaney Solar	APS has a PPA contract with Starwood near Delaney that would utilize this transmission path	A phased approach could be used by building a segment to Palo Verde first and then building from Palo Verde in to the valley when it is needed. This would support export sales as well as import	None	Active solar development ongoing; does include additional areas of BLM land	APS has an existing PPA in the delaney area (Starwood) so APS believes it to be a viable solar development area
Little Harquahala Solar	There is no immediate use of this transmission at this time although there are potential particiapants in this transmission (CAP)	Depending on the timing (if timed to be in service after the Delaney to Morgan line), the segment to delaney could be built first followed by the remaining segments to Palo Verde and then to Phoenix	None	Primarily state and private with some BLM land	We have not seen a great deal of proposals in this area.
Little Harquahala Solar - Export	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	Kofa NWR and wilderness area issues; better options north of I-10	We have not seen a great deal of proposals in this area but there are evidently developers looking in the area.
Wickenburg Solar	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	Mostly state land east and west of SR 93	We have not seen a great deal of proposals in this area.
Casa Grande Solar	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	State and private land, large areas of agricultural land that may be opportunties	We have not seen a great deal of proposals in this area.
Dinosaur Solar	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	Developing area of state and private land; sites could be close to load area, may lend itself to smaller footprint facilities	We have not seen any proposals in this area because it is in SRP's service territory
Bowie Solar	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	Mostly BLM and state land	We have not seen a great deal of proposals in this area.
Bouse Solar	There is no immediate use of this transmission at this time	No phasing possibility is forseen	None	Somewhat equal mix of BLM, state and private land	We have not seen a great deal of proposals in this area.
Palo Verde Solar	With all of the resources that APS owns/purchases at the Palo Verde hub, the line would be expected to immediately contribute to the operation and delivery of resources in the APS system	No phasing possibility is forseen	None	Mix of state and private land with BLM associated with Saddle Mountain, Palo Verde Hills and other adjacent areas	We have seen several proposals in this area and believe it to be a viable solar development area

Legend:

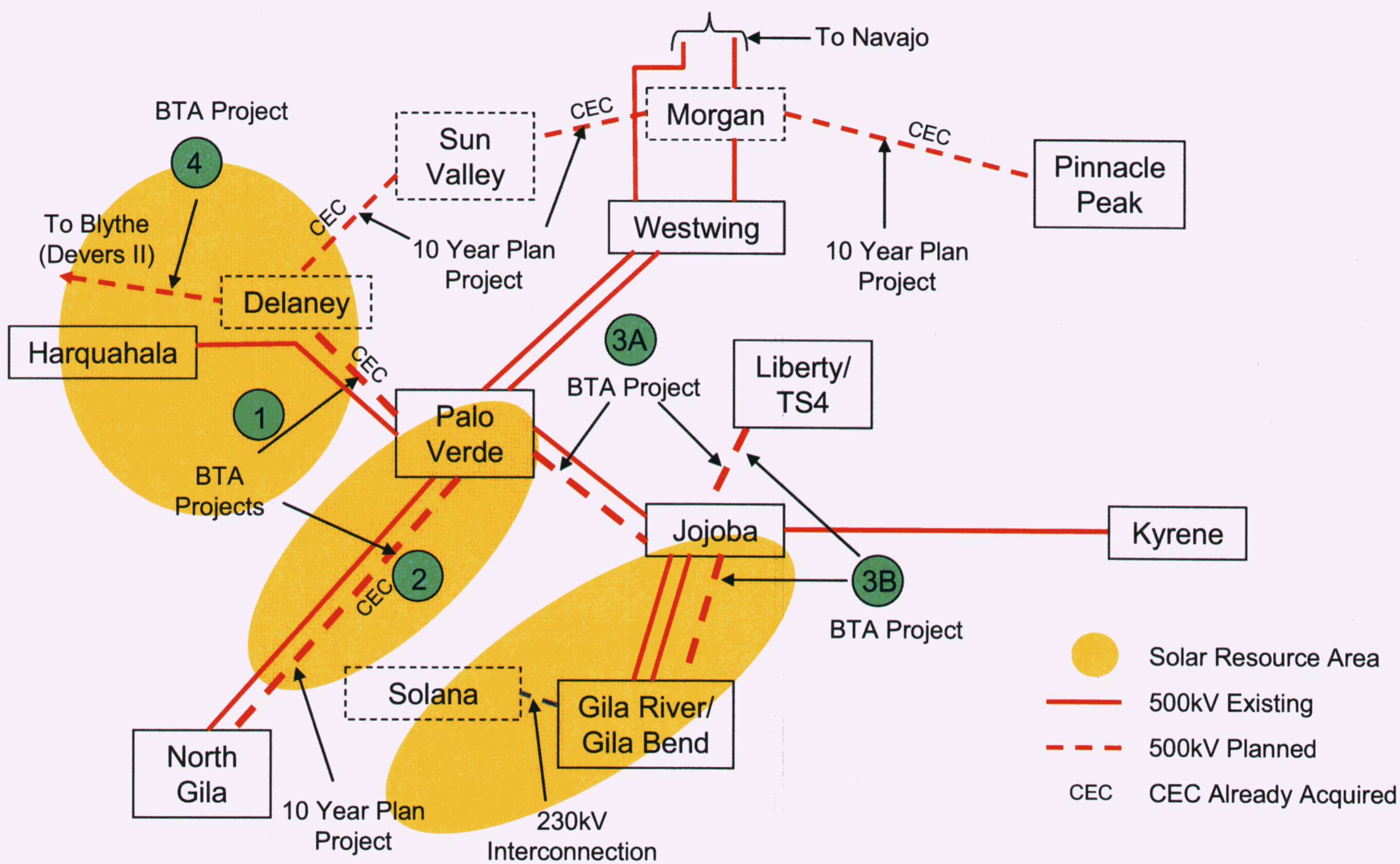
- Highly Positive
- Positive
- Nuetral
- Negative

Attachment G

Map of APS BTA Order Projects

10/30/09

Map of APS BTA Order Projects



10/30/09