

**Documentation of the History and Proposed Uses of the SunZia Transmission Project
By Norm “Mick” Meader, Cascabel Working Group, July 12, 2011**

1. Initial Characterization of the SunZia Project

The first outline of the SunZia Project was provided in the minutes of the October 18, 2006, meeting of the Southwest Area Transmission Regional Planning Group (SWAT)¹ and an accompanying presentation by Mark Etherton², consultant to the Southwestern Power Group (SWPG). The meeting minutes characterize the SunZia Project as the following:

- *Two 500 kV lines out of Bowie [SWPG’s permitted Bowie power plant], one going east, one going west.*
- *Will create transmission path from southern New Mexico to southern Arizona.*
- *Southwest Power Group interested in 50% ownership.*

Etherton’s associated presentation characterized the SunZia Project in the following way:

- *Bowie (SWPG II) interested in assisting with development of new 500kV line in/out Bowie*
- *Southern New Mexico to Southern Arizona with segments in-service as early as 2011*
- *Participation Project with other interconnections as requested by Participants (e.g. Luna, Winchester, etc.)*

2. Presentation to the Western Electricity Coordinating Council

The SunZia Project is more fully characterized in a SunZia presentation to the Western Electricity Coordinating Council (WECC) on May 15, 2007³. The project description is as follows:

Currently, SWPG (and interests received to date) anticipates that SunZia will consist of the following major facilities:

- *Construction of approximately 150 miles of 500kV line from the proposed 600MW IGCC Bowie Power Station near Bowie, Arizona, to the proposed Pinal South substation, located near Coolidge, Arizona. A probable intermediate interconnection point (and transformation) between these two terminations is the existing Winchester substation, located near Benson, Arizona, approximately 50 miles west from the proposed Bowie Power Station. Winchester and Pinal South are part of the original Central Arizona Transmission System (“CATS”) EHV long range plan and has been developed for a future 500 kV interconnection.*
- *Construction of approximately 185 miles of 500kV line from the proposed Bowie Power Station to the existing Newman substation [connection for the five-unit, 700- to 800-MW natural gas Newman Power Station] near El Paso, Texas. A probable intermediate interconnection point (and transformation) between these two terminations is the existing Luna substation [connection for the 570-MW Luna Energy Facility], located near Deming, New Mexico, approximately 100 miles east from the proposed Bowie Power Station.*

Additional comments in this presentation include the following:

- *SunZia is initially envisioned to provide an additional interconnection opportunity for the proposed Bowie Power Station (proposed as a 600MW IGCC). SunZia can provide a delivery path to multiple markets versus a single interconnection location; both in southern New Mexico (and El Paso, Texas) and to southern Arizona.*
- *Thus far, the interest in SunZia has been from 1,500-3,000MW for delivery of the renewable and thermal [coal and natural gas] resources throughout the SunZia proposed study area, as well as some potential local load serving opportunities.*

Note that at this time SunZia terminated ~150 miles south of the principal wind-generating area of central New Mexico, the closest high-quality wind resources now being considered for development. With this project scenario, use of SunZia by developers of New Mexico wind would require that they construct ~150 miles of their own transmission line to interconnect with SunZia. Development of the renewable resources – solar and geothermal – along the actual route is much more hypothetical because these would require federal subsidies.

3. Presentation to the Southwestern Renewable Energy Conference

On August 1, 2007 Mark Etherton, consultant to SunZia, gave a presentation to the Southwest Renewable Energy Conference on the SunZia Project⁴ in which he noted *Capacity Interest*, that is, who would be interested in purchasing transmission capacity and how much, an essential consideration in justifying the economic viability of a project. The Southwestern Power Group's Bowie power plant was listed first with an interest of 600 MW, the full rating of the plant using coal gasification technology.

The other potential interests listed included 6-10 non-specific entities interested in a total of 1500-3000 MW of capacity. Because at this stage the SunZia Project terminated ~150 miles from the principal wind-generating area slated for development, these entities presumably included at least some of the natural gas plants in southwestern New Mexico that would be adjacent to the line. These plants include the 80-MW Lordsburg generating station, the 160-MW Pyramid generating station (near Lordsburg), the 570-MW Luna Energy Facility at Deming, and the 235-MW generating station at Afton. The following proposed SunZia substations would provide interconnections for these plants: (1) *Midpoint substation* – Afton generating station and Luna Energy Facility, (2) *Lordsburg substation* – Lordsburg and Pyramid generating stations, and (3) *Willow substation* – Bowie power plant.

4. Relationship to the High Plains Express Project

In the summer of 2008 the SunZia Project was restructured and extended to the wind-generating area of central New Mexico, taking over the full southern leg of the High Plains Express Project (HPX), which had proposed to build two separate 500-kV lines to Phoenix from the area. In its *Stage 1 Feasibility Study*⁵ HPX makes this statement (page 17): “*For this study, the SunZia project was considered to be an integral segment of the HPX Project. Therefore, a separate SunZia project was not modeled.*” In that study HPX examined both daily and seasonal

variations in wind energy output and the physical and economic problems related to this variability.

HPX determined that a system carrying entirely renewable energy was not economically or physically feasible, making this statement (page 6): “A ‘*balanced*’ scenario consisting of near equal amounts of fossil and renewable energy [generating capacity?] performed the best under a range of circumstances.” Because of the much lower dependability factor for wind, the majority of the energy in the system would likely be generated by fossil fuels. A system dedicated to renewable energy would use on average only about one-third of the system’s transmission capacity, which is not economic. A 75% average usage is optimal. HPX is assuming that most of the new fossil-fuel generating capacity connected to the system to achieve this will be natural gas.

At the end of its report, HPX listed questions and answers regarding the project. The following question specifically addresses this mix of energy sources in the system:

Q1. What is the planned generation resource mix for HPX?

- *HPX is planned to enable renewable and other economic resource [that is, coal and natural gas] development.*
- *Dispatchable resources [conventional fossil fuel; hydro is possible but highly unlikely] are needed to maximize transmission utilization to firm renewables [compensate for their great short-term variability in output].*
- *Studies indicate that economics (B/C ratios [benefit/cost ratios]) are most favorable with renewable/fossil resource mix [50/50 mix].*
- *Fossil-only and Renewable-only scenarios were the least favorable. (page 39)*

In addition, an associated HPX PowerPoint presentation⁶ makes the following statements:

- *Renewable resources will have to be blended and supported with “dispatchable” [nonrenewable] resources.*
- *HPX is a “fuel neutral” initiative, as its customers will dictate the fuel mix.*
- *Renewables are expected to be a significant part of the HPX resource mix, particularly wind and solar.*

Note in the last item that renewables are expected to be a *significant* part of the mix, not the *primary* part of the mix.

¹ SWAT Meeting Minutes, 10.18.06, Las Vegas, page 3. Available from http://www.westconnect.com/filestorage/swat_mtg_min_101806.pdf. Accessed June 24, 2011.

² Mark Etherton, “SunZia Southwest Transmission Project,” SWAT Steering Committee, October 18, 2006, slide 8. Available from http://www.westconnect.com/filestorage/swat_sun_zia_status_101806.pdf. Accessed June 24, 2011.

³ SunZia, “WECC Regional Planning Project Report on the Proposed SunZia Southwest Transmission Project,” May 15, 2007. Available from http://www.wecc.biz/committees/StandingCommittees/PCC/TSS/Shared%20Documents/Projects%20Undergoing%20Regional%20Planning%20Rating%20Review/SunZia%20Southwest%20Transmission%20Project/SunZiaRPPR_Final_051507.pdf. Accessed June 24, 2011.

⁴ Mark Etherton, “Presentation to the Southwest Renewable Energy Conference on the Proposed SunZia Southwest Transmission Project,” August 1, 2007, slide 19. Available from <http://www.swrec.org/2009/conf2007/docs/presentations/PP%20Etherton%20Mark.pdf>. Accessed June 24, 2011.

⁵ “High Plains Express Transmission Project Feasibility Study Report,” June 2, 2008. Available from http://www.highplainsexpress.com/site/static/feasibilityStudyPDFs/HPX_First_Stage_Feasibility_Report.pdf. Accessed June 24, 2011.

⁶ “High Plains Express, A roadmap for transmission development to benefit consumers in Wyoming, Colorado, New Mexico and Arizona,” slide 5, June 2, 2008. Available from http://www.rmao.com/wtp/HPX/HighPlainsExpress%20First%20Stage%20Feasibility%20Powerpoint%2006_08.pdf. Accessed June 24, 2011.



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Docket

Arizona Corporation Commission

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BEFORE THE ARIZONA POWER PLANT AND LINE SITING COMMITTEE

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IN THE MATTER OF THE APPLICATION OF BOWIE POWER STATION, L.L.C., IN CONFORMANCE WITH REQUIREMENTS OF ARIZONA REVISED STATUTES 40-360.03 AND 40-360.06 FOR TWO CERTIFICATES OF ENVIRONMENTAL COMPATIBILITY AUTHORIZING CONSTRUCTION OF A 1,000 MEGAWATT NATURAL GAS-FIRED, COMBINED-CYCLE POWER PLANT, 345 kV AND 345 kV/230kV SWITCHYARDS, 345 kV 230 kV INTERCONNECTION AND RELATED FACILITIES IN COCHISE AND GRAHAM COUNTIES, ARIZONA. THE PROPOSED POWER STATION SITE IS LOCATED IN SECTIONS 28 AND 29, TOWNSHIP 12 SOUTH, RANGE 28 EAST, TOWNSHIP 11 SOUTH, RANGE 28 EAST, TOWNSHIP 11 SOUTH, RANGE 27 EAST, AND TOWNSHIP 11 SOUTH, RANGE 26 EAST, GILA AND SALT RIVER BASE AND MERIDIAN

CASE NO. 118

Docket No. L-00000BB-01-0118

(POWER PLANT)

DECISION NO. 64625

The Arizona Corporation Commission ("Commission") has conducted its review, as prescribed by A.R.S. § 40-360.07. Pursuant to A.R.S. § 40-360.07, the Commission, in compliance with A.R.S. § 40-360.06 and in balancing the broad public interest, the need for an adequate, economical and reliable supply of electric power with the desire to minimize the effect thereof on the environment and ecology of this state:

The Commission finds and concludes that the Certificate of Environmental Compatibility ("CEC") issued by the Arizona Power Plant and Transmission Line Siting Committee for Applicant's Power Plant is granted as modified and amended by this Order.

The Commission modifies Condition Number 2 with an additional provision as follows:

2(F). Make arrangements with local and county law enforcement to support their efforts to serve and protect the public and the Project and its employees.

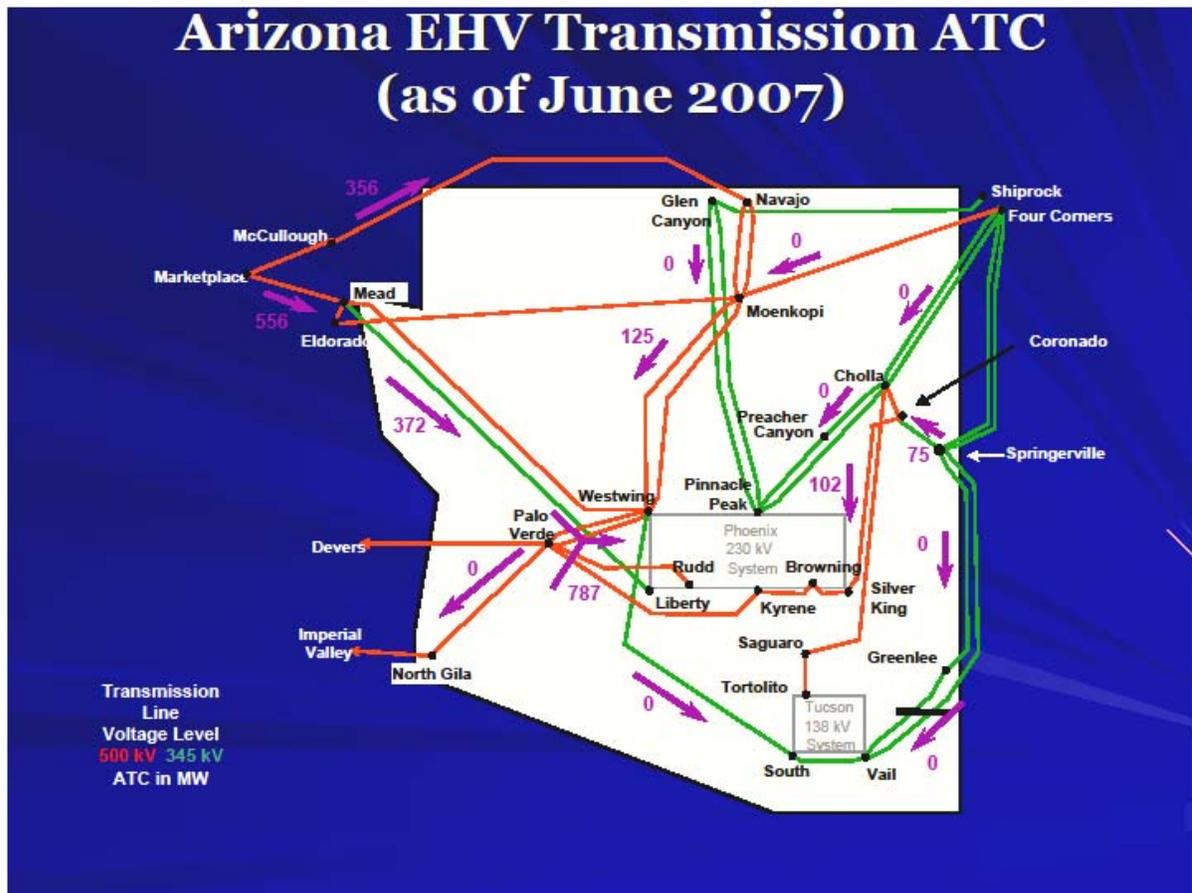
1 utility planning criteria without reliance on remedial action such as reducing generator
2 output, generator unit tripping or load shedding.

- 3 7. Prior to construction of any facilities, Applicant must provide the Commission with
4 technical study evidence that sufficient transmission capacity exists to accommodate the
5 full output of the plant and that the full output of the plant shall not compromise the
6 reliable operation of the interconnected transmission system. The technical studies shall
7 include a power flow and stability analysis report showing the effect of the plant on the
8 existing Arizona electric transmission system. The technical study report(s) shall
9 document both physical flow capability as well as contractual schedule capability to
10 deliver full plant output to its intended market. In addition, Applicant must provide the
11 Commission with updates to the information required in this condition not more than
12 one year and not less than three months prior to commercial operation of the plant.
13 Prior to commencing operation of a given power block, transmission facilities
14 improvements necessary to deliver the full output of that power block to intended
15 markets, as identified in the aforesaid technical studies, shall have been completed.
- 16 8. Applicant shall become and remain a member of the WSCC, or its successor, and file
17 an executed copy of its WSCC Reliability Management System ("RMS") Generator
18 Agreement with the Commission. Membership by an affiliate of Applicant satisfies this
19 condition only if Applicant is bound by the affiliate's WSCC membership.
- 20 9. Applicant shall apply to become, and if accepted, thereafter remain a member of the
21 Southwest Reserve Sharing Group or its successor, thereby making its units available
22 for reserve sharing purposes, subject to competitive pricing.
- 23 10. Applicant shall continue to participate in good faith in state and regional transmission
24 study forums to identify and encourage expedient implementation of transmission
25 enhancements, including transmission cost participation as appropriate, to reliably
26 deliver power from the Project throughout the WSCC grid in a reliable manner.
- 27 11. Applicant shall first offer wholesale power purchase opportunities to credit-worthy
28 Arizona load-serving entities and to credit-worthy marketers providing service to those
Arizona load-serving entities.

Transmission Needs for the Bowie, Arizona, Power Plant
Norm “Mick” Meader, Cascabel Working Group, August 24, 2010

Tom Wray and SunZia have stated in the past that the SunZia Project is not needed for transmission of power from the Southwestern Power Group’s proposed Bowie, Arizona, natural gas generating station to potential markets. The Bowie power plant was, indeed, permitted in 2002 with an interconnection to TEP’s two 345-kV lines that run from its Springerville generating stations to Tucson. These two lines provide power to the southern part of Tucson and to points south along the Santa Cruz River. At that time, the Arizona Corporation Commission was sufficiently assured that this transmission scheme was possible. Both Tucson Electric Power Company (TEP) and the Southwest Transmission Cooperative (SWTC) agreed to the project, thus providing initial transmission capability for it.

What is perplexing about this is that both of these 345-kV lines are currently at capacity. As of June 2007 they had no available transfer capacity (ATC) (see figure below¹). From the definition of ATC at the end of this document, this means that no additional transmission capacity can be sold for these lines. Although ATC varies with time, this still provides a fundamental basis for assessing what is available to the Bowie plant. While the use of these lines by the Bowie power plant was approved with TEP’s consent, the sale to the Southwestern Power Group of transmission



capacity means that TEP would at times have to limit the power it uses from its own Springerville generating stations.

At the most, TEP's two lines are each capable of carrying 750 MW of power, or a total of 1500 MW. Their actual capacity is presumably less. This compares with a maximum generating capacity at the Bowie power plant of 1000 MW. While the full power-carrying capacity of these lines is approached only during peak demand, it is apparent that when this capacity is reached that they cannot carry any power from the Bowie plant. In addition, a measure of unused capacity must be reserved in case one of the TEP lines fails, further limiting the Bowie power plant's access to transmission. Peak generating capacity at the Bowie plant would in itself not be reached until peak demand required it, and at that point, the plant could not deliver any power to the grid without TEP significantly limiting its own power transmission. The Southwest Transmission Cooperative's 230-kV line, which intersects TEP's 345-kV lines at Willow, could carry some power, but the line's transmission capacity is much smaller and could not accommodate significant Bowie power, especially with the line's current transmission commitments.

While the Bowie power plant would provide additional stability to TEP's and SWTC's power grids, the full capacity of this plant cannot be used without building additional transmission capacity. The most economical solution to do this would be to build single 500-kV lines away from the power plant. This size of line could carry the maximum power that the Bowie plant could generate. For the owners of the plant to have full market availability, i.e., to sell power to California as Tom Wray of SunZia has indicated², this 500-kV line would need to reach the southeast Phoenix area to connect with that part of the electrical grid that services California.

While Tom Wray of SunZia denies that building the Bowie power plant depends upon the SunZia Southwest Transmission Project, the full capacity of the plant cannot be utilized without either using SunZia's lines or building new lines to carry the power. The plant's power generation is greatly limited by having to compete with TEP's own transmission needs and cannot be fully utilized without additional transmission capacity. Delivery of power from the Bowie plant depends largely upon TEP's good graces, although the Federal Energy Regulatory Commission could require TEP to provide enhancements to its transmission system to help facilitate it. It is unclear why the Arizona Corporation Commission did not fully take this into consideration in its decision to approve the plant.

Although transmission capacity built by other operators (TEP, SWTC) will undoubtedly grow in southern Arizona independently of the Bowie power plant's needs, the full use of the plant's eventual capacity still appears to require at least one extra-high-voltage transmission line dedicated to delivering power from the plant.

A. Definition of Available Transfer Capacity (ATC)

For market participants, *ATC is essentially a measure of unused transmission that a transmission provider can offer for sale pursuant to Order Nos. 888 and 889.*

Transmission providers sell transmission service to customers in the form of transfer capability. Transfer capability is the measure of the ability of the interconnected electrical system to move electric energy reliably from one point to another and is limited by,

among other things, the capacity either of equipment (such as transformers or transmission circuits) or interfaces (one or more circuits). *ATC is the amount of transfer capability still available for sale after all existing uses are accounted for.* Transmission providers calculate ATC by subtracting existing transmission commitments, transmission reserve margin, and capacity benefit margin from total transfer capability.

(This definition taken from the Federal Energy Regulatory Commission’s “Information Requirements for Available Transfer Capacity,” dated May 27, 2005, Docket No. RM05-17-000.)

¹ *Arizona Renewable Transmission Task Force BTA Response*, by Peter Krzykos, Chairman of SWAT RTTF, BTA Workshop, May 22-23 2008, available from http://www.congestion09.anl.gov/documents/doc/AZCC_BTA_Response_on_Renewables_FINAL1_4.pdf.

² Tom Wray in “SWAT Meeting Minutes 10.18.06 Las Vegas,” Accessed from http://www.westconnect.com/filestorage/swat_mtg_min_101806.pdf, September 16, 2010.