SunZia: An Unnecessary High-Risk Project?

A response to the report

"Evaluating the SunZia Transmission Line Proposal

A Guide for Stakeholders and Decision Makers"*

by Norm "Mick" Meader
Cascabel Working Group
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*Authors John Shepard of the Sonoran Institute and Julia Haggerty of Headwaters Economics, released November 19, 2012

Acknowledgments

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In addition, I want to thank John Shepard of the Sonoran Institute for meeting with me to get his further perspective on SunZia and clarifications of key points in the Sonoran Institute/Headwaters Economics report. I shared preliminary versions of the CWG report with him and Julia Haggerty of Headwaters Economics; this report, however, does not reflect any review and comments provided by them. I nevertheless appreciate their openness to reviewing it and for the suggestions they did provide. Alex Daue of the Wilderness Society and Helen O'Shea and Carl Zichella of the National Resources Defense Council have also had the opportunity to review the report, although they as well did not provide specific comments.

I especially want to thank Russell Lowes, Energy Chair of the Grand Canyon Chapter of the Sierra Club, for his critical reading of the report's Introduction and Conclusions and his in-depth recommendations to improve them and the report in general. Sandy Bahr of the Grand Chapter of the Sierra Club also provided helpful recommendations, as did Chris McVie of the Tucson Audubon Society, who critiqued the entire report. Many other colleagues had the opportunity to review the report, and I appreciate their looking at it.

The author assumes full responsibility for the content of the report and any errors or misinterpretations it may contain. Any comments or corrections are welcome.

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Executive Summary

In November 2012, the Sonoran Institute and Headwaters Economics released their report, ***Evaluating the SunZia Transmission Line Proposal, A Guide for Stakeholders and Decision Makers***, with the stated aim of clarifying several issues surrounding the project. The report's most important conclusions were based upon incomplete information, however, and this analysis corrects misconceptions resulting from this. The following are the key conclusions of this analysis:

- ***A fundamental motivation of the SouthWestern Power Group (SWPG) in proposing SunZia was to expand the markets for its Bowie, Arizona natural gas power plant. SWPG intends to use SunZia with the plant to distribute its power***. SWPG cannot know exactly how much transmission capacity it may need until power purchase agreements are in place.

- ***While we agree that New Mexico wind energy is one of the primary rationales for proposing SunZia and that SunZia's success would depend, in part, upon this generation, wind energy by itself could not support a project of this scale, and natural gas generation would be as important or more so to it***. Even by combining both, it is questionable whether they can financially support a project of this magnitude.

- ***Any realistic assessment of the SunZia proposal would include the project's potential to facilitate large-scale natural gas generation***. Within the past 10 years, 1,045 megawatts (MW) of new natural gas generation has been built along the SunZia route in southwestern New Mexico, and an additional 1,000 MW has been permitted adjacent to it in Arizona (SWPG's Bowie plant). In addition, natural gas generation is planned to constitute more than two-thirds of new generation built over the next 30 years in the Southwest.

- ***SunZia is not needed to meet the renewable portfolio standards of adjacent states, most importantly those of California.*** All states targeted for New Mexico's renewable energy are now projected to meet and exceed their own Renewable Portfolio Standard (RPS) requirements with their own resources.

- ***The completion of the Luna Energy Facility in Deming, New Mexico in 2006 eliminated any physical congestion on transmission lines in southwestern New Mexico (Path 47). These lines are now some of the least congested and most reliable in the West, and SunZia capacity is not needed to alleviate congestion on them***. Any remaining "congestion" on these lines is caused by utilities scheduling much of the path's transmission capacity but then not fully using this scheduled capacity to deliver power. Other utilities subsequently cannot purchase transmission capacity even when no physical shortage exists. This form of "congestion" is best addressed with regulatory measures, not new transmission capacity.

- ***While New Mexico has abundant, high-quality renewable resources, so do all surrounding states, and building a transmission system cannot be justified merely to deliver New Mexico's energy elsewhere.*** All other western states, including Arizona, California, and Nevada, that might use New Mexico's energy have abundant high-quality renewable energy of their own. Each state now hopes to export that energy to boost its own economy, even though other states do not necessarily need it.

Introduction

From SunZia's inception, both the project proponent and the Bureau of Land Management have promoted SunZia's renewable energy potential. This promotion has been to the exclusion of other energy sources such as natural gas, and the Sonoran Institute/Headwaters Economics report follows suit. Their report reinforces and accentuates this past bias rather than critically examines it. The current analysis addresses this bias and provides a counterbalancing perspective.

SunZia comprises two 500-kilovolt (kV) alternating current (AC) transmission lines that would run from a potential wind-generation area in central New Mexico to central Arizona, ending southeast of Phoenix. One of the two lines could alternatively be a direct current (DC) line, which would increase transmission capacity from 3,000 megawatts to 4,500 megawatts (MW). Three new substations would be constructed in New Mexico and a fourth would be sited with the Willow substation in Arizona. The Willow substation has long been a component of the SouthWestern Power Group's yet-to-be-built 1,000-MW natural gas-fired power plant near Bowie, Arizona.

The Sonoran Institute and Headwaters Economics state that the purpose of their report is to "contribute transparent, unbiased analysis to better inform the perspectives of stakeholders and decision makers." Yet, the report is strongly colored by the Sonoran Institute's own objectives for the project. The lead author (Shepard) felt that neither the project proponent nor the Bureau of Land Management (BLM) adequately presented the project's purpose and need, and the authors set out to formulate their own vision of these. A second purpose of the report was to counter the perception that SunZia was more about nonrenewable than renewable energy, a belief attributed in large part to the past work of the Cascabel Working Group.[1] For these reasons and more, the Cascabel Working Group felt a need to address the report.

While the report's stated purpose is to clarify certain issues surrounding SunZia, it also obscures certain issues by overlooking essential information, which leads the reader to misleading conclusions. First, it portrays SunZia as being unrelated to the SouthWestern Power Group's Bowie power plant, implying that the plant will not use SunZia, when the Bowie plant was a fundamental motivation for proposing the project. Second, it leads readers to believe that mostly New Mexico wind generation will use SunZia, arguing that natural gas generation will not, when natural gas generation could easily provide the majority of power carried by the project.

In addition, both the project proponent and the BLM have said that SunZia is needed to meet renewable portfolio standards in adjacent states and to reduce transmission congestion in southwestern New Mexico. Neither of these statements is true. A *Greenwire* article coordinated with the report's public release accentuates these misleading statements and the purported need to export New Mexico's energy, which this analysis also addresses.

Uncertainty and the Need for Multiple Scenarios

The great problem with assessing SunZia use is the enormous uncertainty in how future energy use will evolve and the inability to predict it. ***No one can dictate what energy sources will ultimately use SunZia, as market conditions and regional energy needs will determine this, and federal regulations do not***

[1] Personal communication from John Shepard, January 3, 2013.

allow the lines to be set aside for a specific generation source. SunZia itself cannot say with any certainty how the project will be used. The company can lobby energy producers and encourage certain uses, but it cannot determine use because current law and federal rules prohibit this. Policy makers and the environmental community cannot ask that the project be used in a specific way.

Any realistic assessment of SunZia must involve a mix of scenarios for the system's energy use. One of the most disturbing aspects of this project is the lack of a publicly available feasibility study that presents and evaluates these. To date, this project has been very long on salesmanship and very short on methodical, comprehensive analysis. Any development scenario will also be sensitive to general economic conditions, and each scenario must incorporate a variety of economic forecasts to be valid. If this has ever been done, it has never been publicly presented. Project proponents and policy makers need this diversity of viewpoints to help decide how or whether to proceed with this project.

The very simple scenario for SunZia's use that the project proponents, the BLM, and now the Sonoran Institute/Headwaters Economics present is unrealistic given projected regional power needs. Valid economic and environmental assessments require evaluating a much broader range of scenarios. If renewable energy facilities used 81 percent of the system's transmission capacity as SunZia and the BLM state, the amount of power in the system would be low because the average output (or capacity factor) of renewable energy facilities is so low. This could result in an average system utilization of 30 percent or less at full subscription, significantly limiting the project's efficiency and income. Efficiency and income are determined by the amount of power delivered, which will be markedly less per unit of installed renewable capacity.

In addition, the volatility of natural gas prices makes the future energy use of SunZia unpredictable. The recent vast increase in U.S. natural gas production and subsequent drop in price has caused utilities to favor natural gas for the bulk of their future generation, partially displacing renewable energy development, wind energy in particular. In 2010 T. Boone Pickens abandoned his plans for a 4,000-MW Texas Panhandle wind farm because he saw natural gas generation as being more economic and the main driver of future electrical generation[2]. This adds further uncertainty to the economic viability of New Mexico wind generation and how much financial support it can provide for SunZia.

SunZia faces great uncertainty and high risk, and neither the Cascabel Working Group nor the Sonoran Institute/Headwaters Economics can say definitively how the project will actually be used. Some of the arguments herein are in themselves based upon assumptions that may prove faulty, leading to erroneous conclusions. ***What is certain is that the simple primarily-renewable-energy scenario for this project is unrealistic.*** The Sonoran Institute/Headwaters Economics report reinforces this simplistic scenario. For this reason, the Cascabel Working Group felt the need to provide a broader perspective on the project.

[2] Keith Johnson, "Pickens shelves plans for Texas wind farm," *The Wall Street Journal*, January 14, 2010. Article vailable at http://online.wsj.com/article/SB10001424052748704675104575001290675508802.html.

The Relationship of the Bowie Power Plant to SunZia

> "The Bowie Power Plant, a fully permitted 1,000 Megawatt (MW) facility proposed for southeastern Arizona, is not dependent on the SunZia line in order to be built. The Bowie facility has access to other transmission lines which have the capacity to transmit power from Bowie to markets." – *From the press release for the report*

First, the Sonoran Institute/Headwaters Economics report addresses the relationship of the Bowie power plant to SunZia, concluding that SunZia is unnecessary for the plant, yet this avoids the reason why the SouthWestern Power Group (SWPG) proposed SunZia, which was to open up the markets for the plant's power to make the plant more economic. This is amply reflected in all of SunZia's early presentations, which are summarized following this introduction. One can, indeed, safely input at least the first 500 MW of Bowie power into Tucson Electric Power Company's existing 345-kV lines, as has been successfully modeled twice[3,4], and one can reach certain customers this way.

The real problem with having only these lines for distribution is that this restricts the markets that SWPG can reach. SWPG can acquire transmission capacity to the northeast from the plant toward power plants in the Four Corners region, but not westward. This stems from the fact that available transfer capability (ATC) is directional on the same line, as indirectly revealed in this report. This directionality can make acquiring firm transmission capacity to particular customers difficult. While ATC is available going away from load centers, it is very limited or absent going toward them, making many load centers difficult to access. This is amply illustrated by the map in Figure 1, which shows ATC in southwestern states[5].

In most cases, this map does not show ATC in both directions, which causes some confusion. What is important in the diagram are the number of paths showing 0 ATC, meaning that firm transmission capacity cannot be acquired in that direction to deliver power. The Bowie power plant is shown on the map by the red dot and is located on the double black lines (345-kV lines) leading from Springerville, Arizona, to Tucson, which belong to Tucson Electric Power Company. All available transfer capability on these lines is toward generating stations to the northeast and is not labeled on the map. These lines have long been at capacity in the opposite direction toward Tucson, however, and show 0 ATC in that direction.

As examples of this problem, Path 48 serves the Albuquerque load center, and Path 47 serves the El Paso load center. The ATC from Arizona to Albuquerque is 0, as is the ATC from Arizona to El Paso, although that is not shown on this map. This prevents SWPG from acquiring transmission capacity to serve these load centers with the Bowie power plant. This map also shows the difficulty in obtaining firm ATC from eastern, northeastern and northern Arizona to the Phoenix area and subsequently to California. Building SunZia would provide the transmission capacity needed to access these markets.

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[3] Bowie Power Partnership, Bowie Power Project, *Interconnection Study*, *System Impact Study*, prepared by Jorge Chacon for Tucson Electric Power Company, October 10, 2002, available from http://app.oasis.oati.com/TEPC/TEPCdocs/Bowie-TEP_merged_12032002.pdf.

[4] Bowie Power Station Project, *Generator Interconnection Study*, *Final Report*, May 13, 2008, prepared for Southwestern Power Group, LLC, by PDS Consulting PLC, on behalf of Tucson Electric Power, available from http://www.oatioasis.com/TEPC/TEPCdocs/Bowie_PS_Project_500_MW_GIS--FINAL_REPORT.pdf.

[5] Ron Belval, Tucson Electric Power Company, *Transmission Planning*, Bright Solutions Workshop 2, October 22, 2009. Available from https://www.tep.com/doc/planning/workshop-two-belval-transmission-planning.pdf.

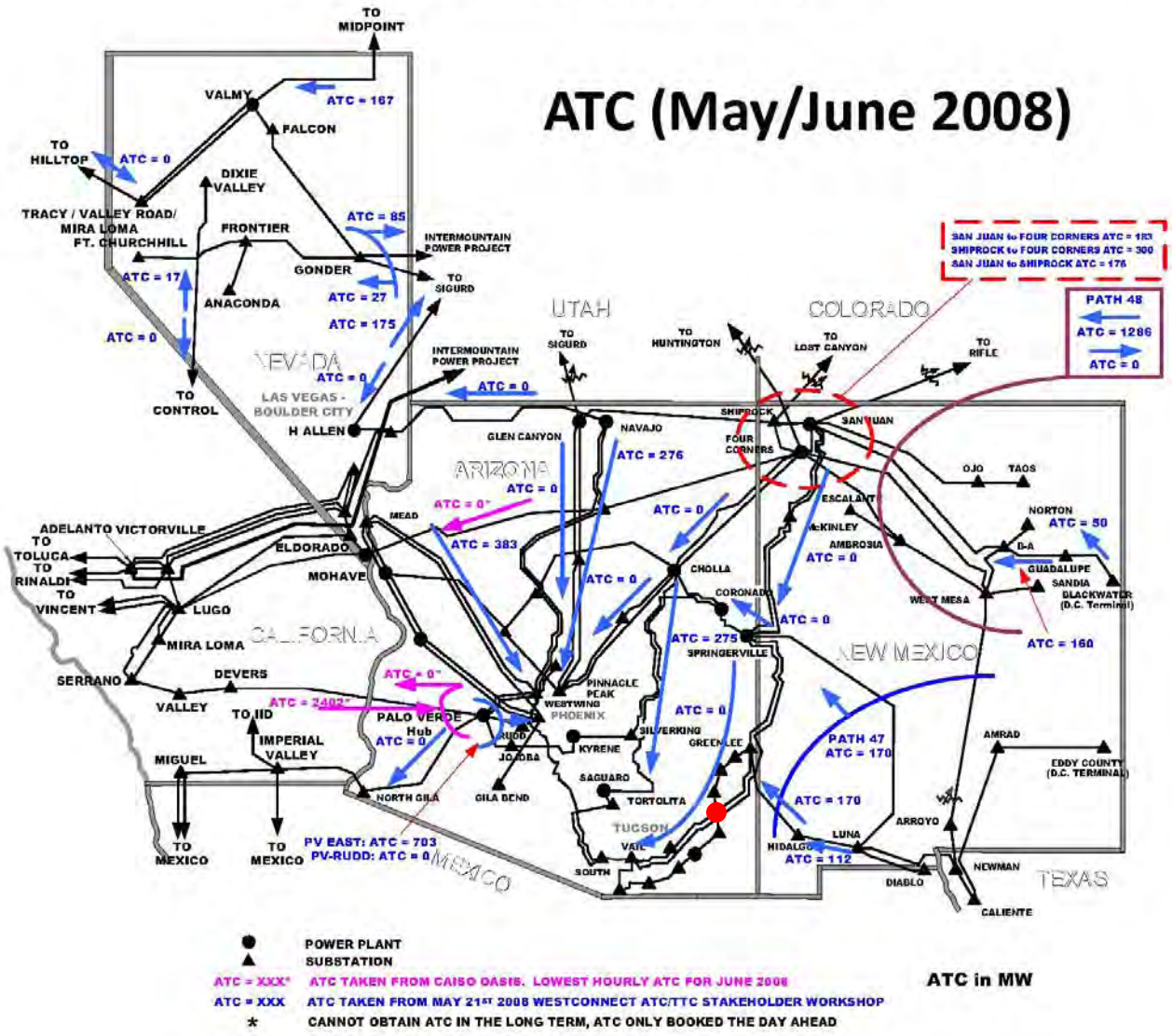

Figure 1. Available transfer capability (ATC) map for Arizona and surrounding states, with specific reference to Tucson and Phoenix load centers. The Bowie power plant is shown by the red dot and is located on the double black lines (345-kV lines) leading from Springerville to Tucson. Transmission paths with 0 ATC indicate that no transmission capacity is available for purchase in that direction. (See footnote 5 for source.)

If SWPG sells Bowie power to Tucson Electric Power Company or the Arizona Electric Power Cooperative, the transmission capacity of these companies will be used. SunZia's capacity will not be. However, if SWPG sells power to Public Service Company of New Mexico, El Paso Electric, the Salt River Project, or California utilities, SunZia transmission capacity will most likely be used. First, this capacity is what will be readily available, and second, SunZia needs to sell all the capacity it can to any potential user for the project to be economically viable. It is misleading to imply that SWPG will not use SunZia capacity and does not intend to, especially when SunZia's only connection to the grid in Arizona occurs at the Bowie power plant and the SouthWestern Power Group will be an owner of both facilities.

SWPG cannot determine exactly how much SunZia capacity it will need for the Bowie plant until power purchase agreements are completed. Nevertheless, if SWPG has a comprehensive business model for the plant, SWPG will have thoroughly analyzed how regional loads are likely to grow and what individual utilities will require for power, and they will have determined who the most likely customers for the plant's power will be. SWPG has not revealed this marketing information and its intentions to the public, and the public cannot know how much SunZia transmission capacity SWPG may need to use.

If the full potential of the Bowie power plant is ever realized, SunZia transmission capacity will undoubtedly play an instrumental role in achieving that. What is important here is how SWPG intends to use SunZia, not that SWPG was able to legally permit the plant with the transmission capacity existing at the time.

One cannot justify building a project on the scale of SunZia merely for the Bowie power plant, and other generation is essential to SunZia's success. This additional generation will be the majority of what would use the system. Nevertheless, the potential use of SunZia for the Bowie plant was a fundamental motivation for proposing the project, and attempting to hide this has badly damaged the project's credibility. It would have been far better for the SouthWestern Power Group to have specified a range of capacity needed to deliver power to the plant's most likely customers. If the full potential of the Bowie power plant is ever realized, SunZia transmission capacity will undoubtedly play an instrumental role in achieving that. What is important here is how SWPG intends to use SunZia, not that SWPG was able to legally permit the plant with the transmission capacity existing at the time.

The following sections summarize those presentations and documents that demonstrate that the SouthWestern Power Group proposed SunZia to use with the Bowie power plant hoping to make the plant more economic.

Documentation of the Bowie Power Plant–SunZia Relationship

While the SunZia Southwest Transmission Project has been lengthened approximately 150 miles since its inception and a second 500-kV line added, the initial project description and justification give the SouthWestern Power Group's fundamental motivation for proposing the project. This motivation is intrinsically tied to SWPG's Bowie power plant and the desire to expand markets for it. This is amply documented in SunZia's early presentations on the project, which are summarized in the sections below While SWPG has consistently associated the project with at least some renewable energy development since its inception, for the first 18 months of the project SWPG also openly and publically associated it with the Bowie power plant.

The Origin of the Project

In 2004 New Mexico Governor Bill Richardson asked the Southwest Area Transmission subregional planning group (SWAT) to develop a plan to export New Mexico power in order to help develop the state's wind industry. In response, SWAT created a map (Figure 2) with hypothetical routes for

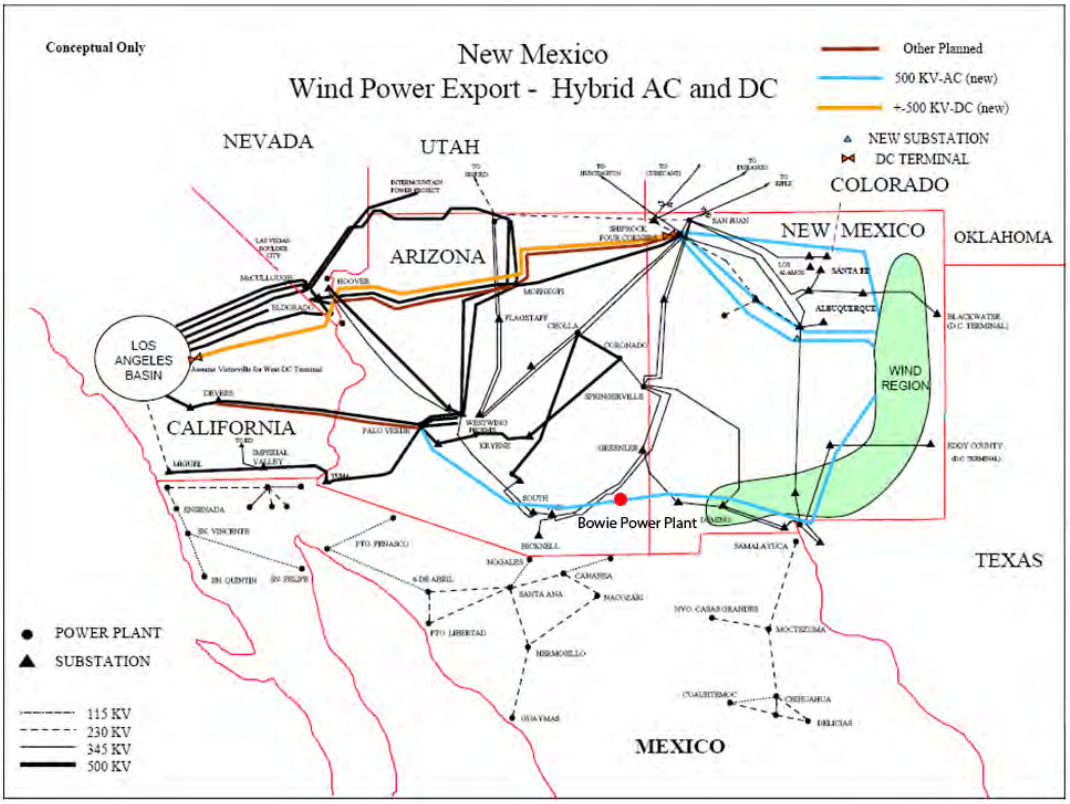

Figure 2. New transmission lines proposed by the Southwest Area Transmission subregional planning group to export wind-generated electricity from New Mexico. The blue lines in New Mexico are proposed 500-kV AC lines. The southerly line passed through the SouthWestern Power Group's Bowie power plant, and SWPG subsequently proposed SunZia in part to benefit the plant.

these lines, one of which passed through the SouthWestern Power Group's permitted Bowie, Arizona, power plant. SWPG saw the proposed line as an opportunity to provide transmission capacity to expand the plant's markets. In the fall of 2006 SWPG officially proposed SunZia to provide this transmission capacity while accommodating potential renewable energy development in keeping with SWAT's

original purpose. SWPG would not have proposed SunZia had SWAT not proposed this route through the Bowie plant.

Source: "Report of Southwest Area Transmission 2004 Study Activities," prepared for the SWAT Oversight Committee, November 23, 2005. Available from http://www.westconnect.com/filestorage/swat_activity_rpt_112305.doc.

Initial Presentation of the Project

The project was first mentioned at an October 18, 2006 meeting of the Southwest Area Transmission subregional planning group. In a presentation on both the Bowie power plant and SunZia, the SouthWestern Power Group noted its interest in the project as follows:

> **SunZia Southwest Project**
>
> Bowie (SWPG II) interested in assisting with development of new 500kV line in/out Bowie

Source: PDS Consulting and SouthWestern Power Group II, LLC, "SunZia Southwest Transmission Project," SWAT Steering Committee presentation, October 18, 2006. Available from http://www.westconnect.com/filestorage/swat_sun_zia_status_101806.pdf, accessed December 26, 2012.

This initial presentation of the SunZia Project is then summarized in the minutes of the October 16, 2006 SWAT meeting as follows.

> Two 500 kV lines out of Bowie, one going east, one going west. Will create transmission path from southern New Mexico to southern Arizona.

In this conceptualization of SunZia, the Bowie power plant is proposed as the hub of the project with single 500-kV lines extending eastward and westward from the plant.

Source: "SWAT Meeting Minutes 10.18.06 Las Vegas." Available from http://www.westconnect.com/filestorage/swat_mtg_min_101806.pdf.

(Additional documentation and maps follow.)

Presentation to the Western Electricity Coordinating Council

In May of 2007 SunZia was more completely and formally introduced to the Western Electricity Coordinating Council, where the project was characterized in the following way, again with the Bowie power plant at the center of the project and benefiting from it:

II. Project Description

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

1) ***Construction of approximately 150 miles of 500kV line from the proposed 600MW IGCC Bowie Power Station*** [briefly downsized from a 1,000 natural gas plant and then later resized to same] near Bowie, Arizona, to the proposed Pinal South substation, located near Coolidge, Arizona.

2) ***Construction of approximately 185 miles of 500kV line from the proposed Bowie Power Station*** to the existing Newman substation near El Paso, Texas.

III. Compliance with Regional Planning Guidelines

[Points 1 and 3 are omitted because they discuss other issues.]

2. *Cooperate with others to look beyond specific end points of the sponsors' project to identify broader regional and subregional needs or opportunities.*

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.

4. *Identify and show how the project improves efficient use of, or impacts existing and planned resources of the region (e.g., benefits and impacts, transmission constraint mitigation).*

SunZia will provide additional delivery options for the proposed Bowie Power Station (proposed as a 600MW IGCC) as well as significant renewable energy resource potential across the southern New Mexico and southern Arizona area.

Source: SunZia Southwest Transmission Project, "WECC Regional Planning Project Report on the Proposed SunZia Southwest Transmission Project," May 15, 2007. This presentation is available at http://www.wecc.biz/committees/StandingCommittees/PCC/TSS/Shared%20Documents/Projects%20Undergoing%20Regional%20Planning%20Rating%20Review/SunZia%20Southwest%20Transmission%20Project/SunZiaRPPR_Final_051507.pdf

Initial Map of the SunZia Project

The initial, formal map of the project ultimately took the form shown in Figure 3, with the Bowie power plant clearly shown as the center of the project. In mid-2008 the project was extended to central New Mexico in response to the development of the High Plains Express Project, whose southerly most line connected central New Mexico with the eastern terminus of SWPG's initial proposed route.

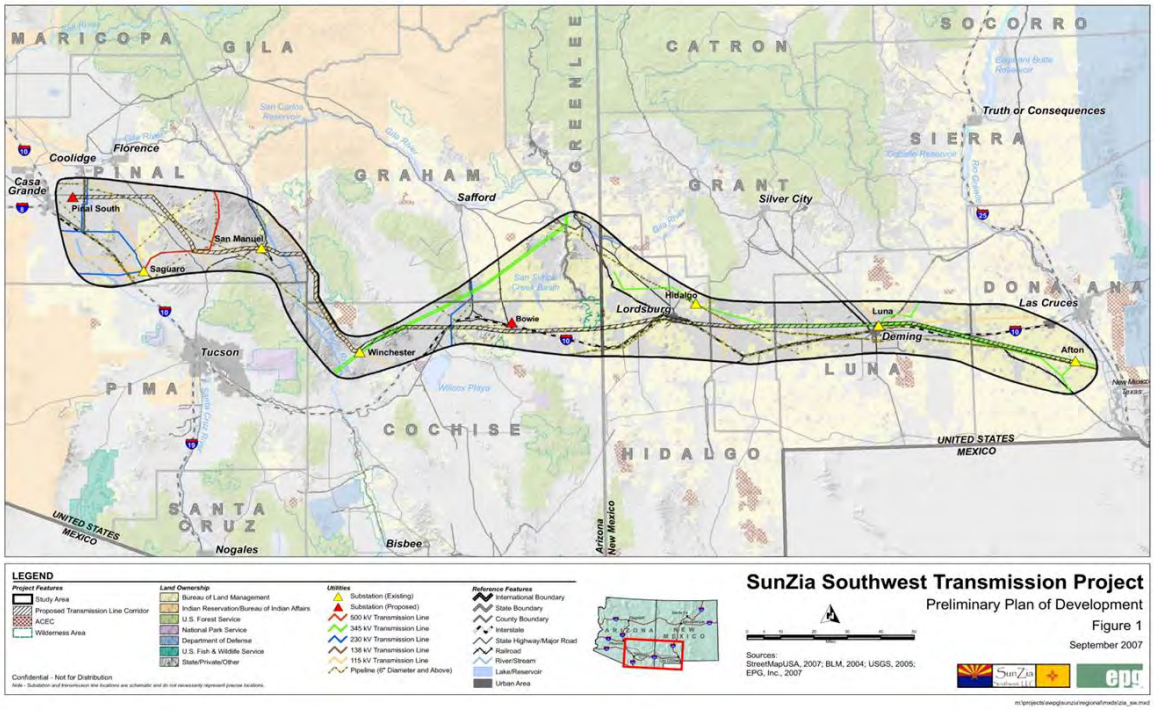

Figure 3. Initial SunZia route proposed by the SouthWestern Power Group, with the Bowie power plant at the center of the project.

Source: SunZia Southwest Transmission Project, Arizona Corporation Commission Biennial Transmission Assessment Workshop, Phoenix, AZ May 22 & 23, 2008. Available from http://www.azcc.gov/Divisions/Utilities/Electric/Biennial/2008%20BTA/SunZia%20BTA%202008.ppt.

Presentation to the Southwest Renewable Energy Conference, Statement of Capacity Interest

Later in August of 2007, Mark Etherton, a consultant for the SouthWestern Power Group, presented the project to the Southwest Renewable Energy Conference, where he listed those generation facilities that had a potential interest in using SunZia transmission capacity (Figure 4). This interest was given as a partial justification for building the project. The full output of the Bowie power plant was listed as a potential user of SunZia. At the time, the Bowie power plant had been downsized to a 600-MW integrated gasification combined cycle (coal-fired) power plant, but it was soon resized to its original specifications as a 1,000-MW natural gas-fired power plant. Again, use of SunZia by the Bowie power plant is explicitly listed as one of the justifications for building the project.

Company Name	Capacity Interest	Approximate Need Date	Probable Interconnect Point(s)	Probable Interconnect Termination
SunZia Southwest	600 MW	2012/2013	Bowie P.S.	El Paso Winchester Pinal South
Others (6 – 10)	1500MW to 3000MW	2011/2015	Eastern NM SW NM	Various

Figure 4. Table of capacity interest in the SunZia Southwest Transmission Project presented to the Southwest Renewable Conference in August of 2007. The Bowie power station was listed as the principal user of SunZia.

Source: Mark Etherton, "Presentation to Southwest Renewable Energy Conference for the Proposed SunZia Southwest Transmission Project," August 1, 2007. Available at http://www.swrec.org/2009/conf2007/docs/presentations/PP%20Etherton%20Mark.pdf.

Bowie Power Station–Willow Substation

The Willow substation is the only grid interconnection for SunZia in Arizona other than the terminus at the Pinal Central substation. SunZia plans no other interconnections in Arizona. The proposed SunZia Willow substation will be built with the Bowie power plant's 345-kV Willow substation, designed to connect the plant to the existing regional power grid. SunZia would add 500-kV transformers here to connect with the existing regional power grid and the 345-kV lines tied to the plant, allowing the plant to use SunZia transmission capacity. The map of the connection between the Bowie power plant and the Willow substation is given in Figure 5.

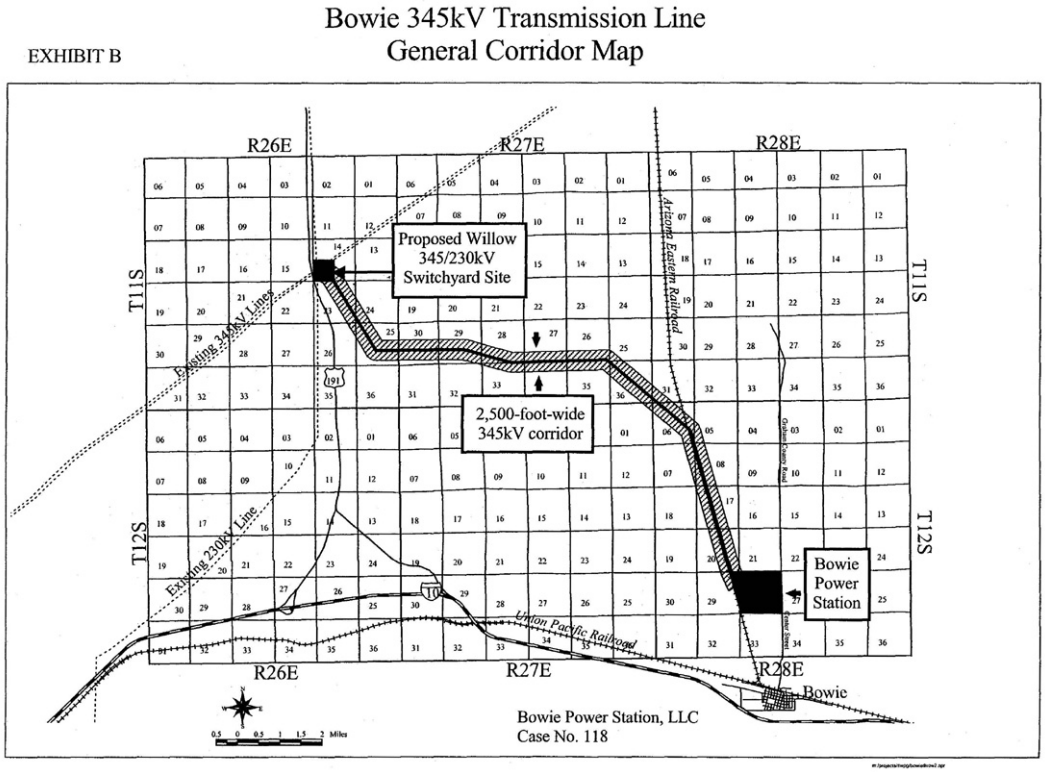

Figure 5. Map showing the transmission path from the Bowie power plant to the Willow substation used to transfer power to Tucson Electric Power Company's 345-kV lines. The SunZia Willow substation would add 500-kV transformers here to allow full interchange of power with the Bowie power plant and TEP's lines.

Source: Application for a revision to the Bowie Power Station–Willow Substation transmission corridor, "Exhibit B" (document page 11), submitted by Larry Robertson, October 8, 2008. Arizona Corporation Commission Docket No. L-00000BB-01-0118. Application available at http://images.edocket.azcc.gov/docketpdf/0000089340.pdf.

Energy Prospects West Article on SunZia

In May 2007 *Energy Prospects West* ran an article on SunZia, pointing out that the project would open up California power markets for the Bowie power plant. In this article, SunZia is clearly envisioned as serving this role.

> ***SWPG is still lining up power purchase contracts for Bowie***. And while the facility only needs a short line to tie into existing transmission owned by Tucson Electric Power, ***the markets for its clean coal could blossom if the proposed SunZia Southwest transmission project is built***.
>
> Connecting to the Pinal West-Southeast Valley line would mean that ***Bowie's clean coal*** and wind energy from New Mexico ***could travel on up to Palo Verde and from there to California***.

As noted earlier, the Bowie power plant was originally proposed as a 1,000-MW natural gas-fired power plant but briefly changed to being a 600-MW coal-fired power plant (IGCC) because of soaring natural gas prices. Because of environmental objections, the plant has reverted to being a 1,000-MW natural gas-fired plant.

Source: "Arizona IGCC Plant Would Test Terrestrial Sequestration," *Energy Prospects West*, May 1, 2007. Available from http://www.energyprospects.com/static/113-01.html.

California Energy Markets Article on SunZia

After the project was lengthened and reconfigured with a second 500-kV line, an article in *California Energy Markets* contained the following statements about SunZia

> ***The project also may offer power delivery options for the Bowie Power Station***, a 1,000 MW, gas-fired plant that SPWG is building near Bowie, Ariz. Calkins noted the transmission line cannot discriminate against power generated with convention fuels at other plants, as per federal policy.

Source: John Edward, "Group Plans 500-Mile Line for Southwest Green Power," *California Energy Markets*, June 6, 2008. (No longer available online.)

Petition to the Federal Energy Regulatory Commission for a Declaratory Order for SunZia

When SunZia submitted its request for a Declaratory Order to the Federal Energy Regulatory Commission in January 10, the Southwestern Power Group attempted to reserve 40% or 1,200 MW of SunZia transmission capacity for its own generation facilities without offering this capacity to other companies under existing open-access laws. The only generation facility that SWPG has or intends to build is the Bowie power plant. SWPG has no interest in renewable generation facilities and does not intend to build any to connect to SunZia. Statements from the FERC petition regarding this are given below:

> Petitioner requests that the Commission allow the non-Franchised IOU LLC Members (***SWPG***, ECP SunZia, and SWE) ***to use up to 100% of their pro rata share of the Project to transmit the power of affiliated generators***.

> [footnote] It is possible that other ***LLC Members will also use some or all of their portion of the Project for affiliated generation*** (***SWPG's Bowie power plant***, ECP SunZia-affiliated generation projects in early-stage development located in the vicinity of the Project). ***Such generation*** may also be renewable or ***may be combined-cycle gas-fired generation***.

With this application, SWPG sought to reserve sufficient SunZia transmission capacity for the full output of the Bowie plant. The FERC denied the application on all counts because it violated all prior precedent for issuing a Declaratory Order. FERC's ruling is as follows:

> Concerns about open transmission access and fair rates for transmission customers led the Commission to turn down the SunZia petition as proposed. FERC determined that the project must allow for open access to transmission service without withholding transmission capacity from the market in a manner that is unduly discriminatory or preferential and at rates that are just and reasonable.

Source: SunZia Transmission, LLC, "Petition for Declaratory Order and Request for Expedited Action," FERC Docket No. EL10-39-000, submitted January 29, 2010. Available at http://elibrary.ferc.gov/idmws/common/OpenNat.asp?fileID=12258815.

Conclusions

All of these articles and presentations demonstrate that the SouthWestern Power Group initially proposed SunZia to serve its Bowie, Arizona, power plant and that SWPG intends to use SunZia for this purpose. While it is true that at least the first 500 MW of Bowie power can be safely input into Tucson Electric Power Company's 345-kV lines that cross southeastern Arizona, this still limits the markets for Bowie power, and SunZia would open up these markets, making Bowie more financially viable. Whether SunZia capacity is used to deliver power to a customer would depend on the customer and location. How much SunZia transmission capacity the SouthWestern Power Group would need for the Bowie plant cannot be fully known until SWPG has firmly identified customers and power purchase agreements are in place.

The first 500-MW unit of the Bowie plant was scheduled to be completed in 2005-06, but it has never been built because SWPG has never been able to sell the power, in part because sufficient transmission capacity is not available to all markets. Building SunZia would eliminate this restriction and fully open power markets in the Southwest to the plant, and this was a fundamental reason for proposing the project. SWPG could not build a regional-scale transmission project merely to serve the Bowie power plant. The directive from Governor Richardson and the Southwest Area Transmission Regional Planning Group (SWAT) to provide transmission capacity to export renewable energy from New Mexico provided the justification for doing so.

The Use of SunZia by Wind Power and Natural Gas Generation

> "SunZia's success will depend on its ability to secure agreements with customers on the line which are likely to be wind generators and other smaller renewable energy facilities located in New Mexico." – *John Shepard, Sonoran Institute*

This analysis concurs that the full, current scope of SunZia would not have been proposed without New Mexico wind energy being a major objective of the project and that the success of SunZia for at least the eastern portion of the project does depend upon potential wind energy production, as the Sonoran Institute/Headwaters Economics (SI/HE) report says. However, the project cannot survive financially if this is the only generation source that will use the project, and that is what is so misleading about this report. Adding solar energy potential to this cannot overcome this shortcoming, as there is no market for this energy in solar-rich Arizona and California. ***Ultimately, natural gas generation is as important to the success of this project as wind generation is, and the project will succeed or fail financially based upon the combined usage of SunZia by both***. The project is just as likely to fail if project proponents target only wind generation for support as it is if they were to target only natural gas generation.

All generation sources are essential to the project's financial success, including the Bowie power plant, and no single type of generation can ensure this success. Even taken together, these generation sources are unlikely to be built rapidly enough to sustain a merchant project of this scale. Rapidly growing competition from predominantly solar resources in the targeted markets of California, Arizona and Nevada has sharply reduced potential demand for New Mexico's wind resources. It is also important to recognize that what is economically required to build the project and how its use will actually evolve if built are two very separate issues. One cannot predetermine the overall mix of generation that will use the system because uncertainties are far too great.

If the the SouthWestern Power Group (SWPG), which proposed SunZia, has fully and carefully analyzed the financial prospects for SunZia, then project proponents will understand this and will have planned for it. If SWPG has genuinely developed the most viable business model possible for this project, that model will include projected natural gas generation as a critical element. SI/HE's statement that SunZia's success depends upon New Mexico wind energy can be made almost as easily about natural gas generation. The conclusion that natural gas generation is needed to support the project is based partly upon the two feasibility studies done for the High Plains Express Project (HPX)[6,7], of which SunZia was an integral part. ***The low capacity factor of New Mexico wind energy relative to nonrenewable energy makes it difficult if not impossible for wind energy alone to financially and physically support a project of this scope.***

While a fundamental purpose of the HPX system is to bring renewable energy to areas of demand, HPX was not conceived as a renewable-energy system *per se*. This system is designed to interconnect with both types of generation. The optimum economical use of this system requires approximately a 50/50 mix of renewable and conventional energy[1], which in itself is difficult to achieve because renewable generation has a much lower capacity factor. This mix is needed because (1) renewable energy cannot fully meet growing demand, (2) significant interconnection with conventional energy sources is required to compensate for fluctuating renewable energy output, maintain power reliability, and achieve optimal

[6] *High Plains Express Transmission Project Feasibility Report*, June 2008, 42 pages. Available from http://www.highplainsexpress.com/site/static/feasibilityStudyPDFs/HPX_First_Stage_Feasibility_Report.pdf.

[7] *High Plains Express Initiative Stage 2 Feasibility Report*, April 28, 2011, 62 pages. Available from http://www.highplainsexpress.com/site/stakeholderMeetingDocuments/HPX_Stage-2_Feasibility-report.pdf.

use, and (3) a wind-first scenario is not economically viable without a high rate of carbon taxation, which does not yet exist and remains uncertain. This is just as true for the SunZia Project as it is for HPX.

It is unrealistic for SI/HE to conclude that new natural gas generation in the Southwest will make very little use of SunZia and that mostly renewable generation will. Figure 6 shows the relationship of SunZia to the El Paso Natural Gas pipeline that parallels the project. In the past ten years four natural gas generation plants totaling 1,045 MW of capacity have been built in southwestern New Mexico along this pipeline adjacent to the SunZia route (Table 1 and Figure 7). In addition, the 1,000-MW Bowie power plant has been proposed and permitted along that route, totaling ~2,000 MW of new capacity that will

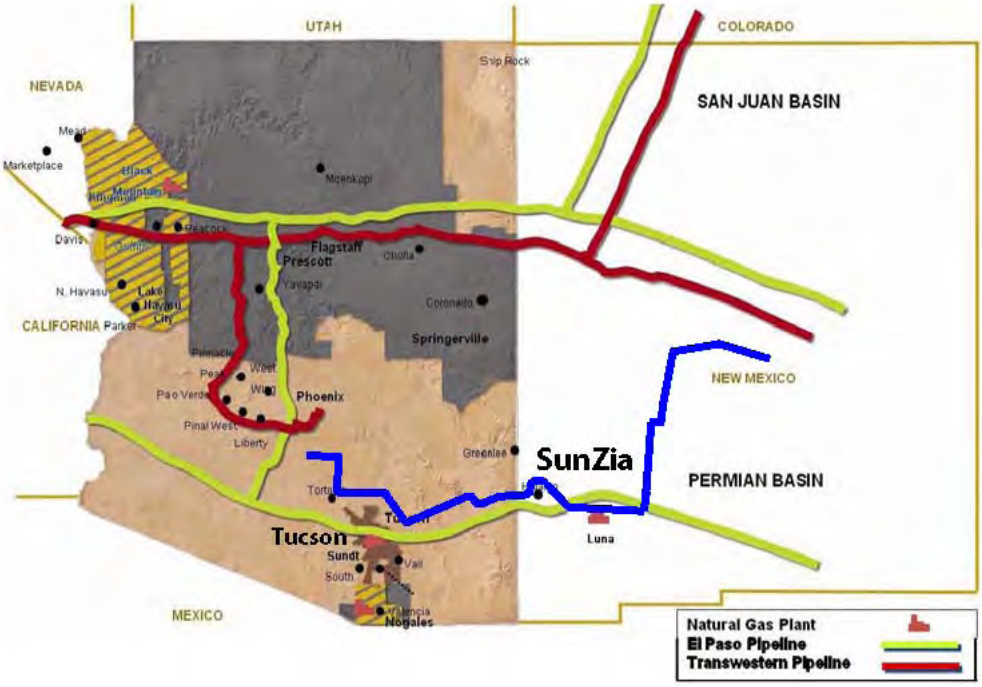

Figure 6. Relationship of the El Paso Natural Gas pipeline system to the approximate SunZia route. SunZia parallels the pipeline for nearly 200 miles. (Background figure from Tucson Electric Power Company. See footnote 14 for source.)

Table 1. New gas-fired generation plants in southern New Mexico and Arizona along the SunZia route, from east to west

Power Plant	Location	Owner*	MW	Date Completed
Afton	Las Cruces, NM	PNM	235	Initial 210 MW completed in 2002; 25 MW added in 2006
Luna	Deming, NM	PNM, TEP, EPE	570	2006
Lordsburg	Lordsburg, NM	PNM	80	2002
Pyramid	Lordsburg, NM	TSGT	160	2003
Bowie	Bowie, AZ	SWPG	1000	First unit originally planned for 2005-06; now 2015

*PNM = Public Service Company of New Mexico, TEP = Tucson Electric Power Company, EPE = El Paso Electric, TSGT = Tri-State Generation and Transmission Association, SWPG = SouthWestern Power Group.

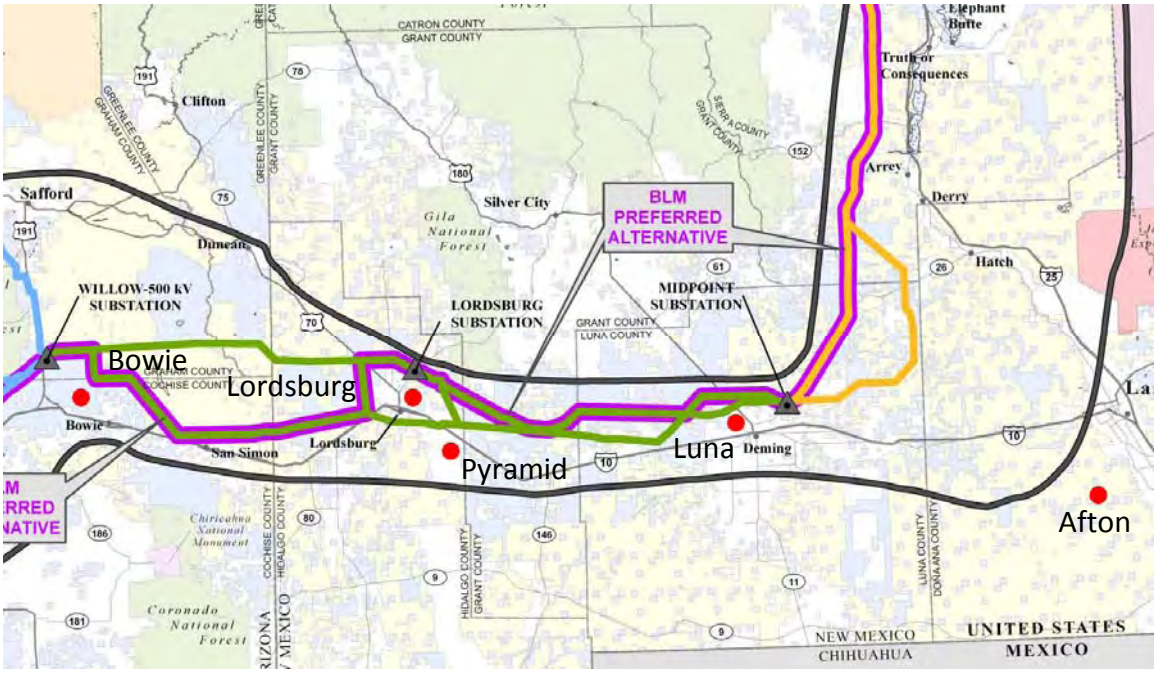

Figure 7. Natural gas plants built or permitted along the El Paso Natural Gas pipeline since 2002. This included 1,045 MW of new generation in southwestern New Mexico and the 1,000-MW Bowie, Arizona, power plant.

all be linked directly to SunZia. The SI/HE report implies that very little if any additional natural gas generation will be proposed and built here. This is highly unlikely.

In addition, utilities in the region are planning to build or purchase 2–4 times as much natural gas generation as renewable generation over the next 15 years (Table 2). Black and Veatch[8,9] estimate that over the next 25 years, 3 times as much natural gas generation will be built as renewable generation in the U.S., in part to replace existing coal-fired power plants, which Arizona and California utilities rely heavily upon. Almost all of that generation will be replaced by natural gas generation.

Black and Veatch report summary, *Energy Prospects West*, August 7, 2012[4]

- "…the continent could see more than three times as much new capacity from natural gas-fueled generation as renewable generation by 2037…"
- "Renewables will help close the gap, although Black & Veatch expects most new generation in coming years to be gas-fired."
- "61,500 megawatts of coal-fired generation will be retired by 2020…the majority of this generation will likely be replaced with natural gas-fueled capacity."

In light of this, it is unjustified to conclude that utilities are going to heavily subscribe to renewable energy sources hundreds of miles from load and transmit the power over long-distance transmission

[8] Rob Patrylak and Greg Hopper, *Energy Market Perspective Mid-Year Report, A New Era of "Smart Planning,"* Black and Veatch, July 26, 2012. Available from http://bv.com/docs/reports-studies/energy-market-perspective-2012-midyear-final.pdf.

[9] Mavis Scanlon, "Natural gas to provide bulk of new capacity in future," *Energy Prospects West*, August 7, 2012. Available from http://www.energyprospects.com/archives/247-print.html.

Table 2. Planned natural gas and renewable generation by Arizona and New Mexico utilities

Utility	New Natural Gas Generation (MW)	Peak Demand Utility-Scale Renewables (MW)	Nameplate* Utility-Scale Renewables (MW)	Target Year
Arizona Public Service Co.[§10]	3,712 1,764	685		2027
El Paso Electric[†11]	2,472	–		2031
Public Service Co. New Mexico[12]	611		390	2026
Salt River Project[**13]	500 820/1,360		 450	2011 2018
Tucson Electric Power[14]/Unisource[§§15]	380	167	527	2027

*Nameplate capacity is the rated output of a renewable energy facility at maximum output. Peak demand capacity is the amount of output that can be expected during times of peak demand. Typically, peak demand capacity is one-third to one-quarter of nameplate capacity. For natural gas generation, nameplate and peak demand capacity are the same. This is related to the different capacity factors for these types of generation.

§The amount of natural gas generation built by APS will depend on the amount of retirement of coal plants, if any. It would require 1,764 MW of additional natural gas generation to replace the coal-fired generation that it has.

†El Paso Electric has no projections for building renewable capacity through 2031, although it plans to purchase such capacity. It does not specify how much renewable capacity it would purchase.

**The Salt River Project planned to purchase 500 MW of natural gas power in 2011 and plans to build either 820 MW or 1360 MW of capacity by 2018 depending upon economic conditions. SRP should need more than 3,000 MW of new capacity by 2027.

§§Tucson Electric Power Company has the most conservative integrated resource plan of any utility and is strongly committed to renewable generation in its new resource mix.

[10] Arizona Public Service Company, *2012 Integrated Resource Plan*, March 2012. Available from http://www.aps.com/_files/various/ResourceAlt/2012ResourcePlan.pdf.

[11] *Integrated Resource Plan of El Paso Electric Company for the Period 2012-2013*, June 16, 2012. Available through Google search. (Unable to obtain exact URL.)

[12] Public Service Company of New Mexico, *Electric Integrated Resource Plan, 2011-2030*, July 2011. Available from http://www.pnm.com/regulatory/pdf_electricity/irp_2011-2030.pdf.

[13] Salt River Project, *Fiscal Year 2011 Integrated Resource Plan*, August 2010. Available from http://www.srpnet.com/about/pdfx/ResourcePlanFY2011.pdf.

[14] Tucson Electric Power Company, *2012 Integrated Resource Plan*, April 2, 2012. Available from http://ir.uns.com/common/download/download.cfm?companyid=UNIS&fileid=557199&filekey=806B57DB-06CF-4E46-BB16-124E53DCAC74&filename=2012_TEP_IRP_1.pdf.

[15] UniSource Energy Corporation, *2012 Integrated Resource Plan*, April 2, 2012. Available from http://ir.uns.com/common/download/download.cfm?companyid=UNIS&fileid=581799&filekey=A94A5E83-D73F-42F9-BDAA-F8685EF134F1&filename=UNSE_2012_IRP_Final_Verson_04-02-2012_.pdf.

lines when they have abundant local renewable resources, while at the same they are going to build all of the new natural gas generation they require close to load rather than along the SunZia alignment where it may be more physically convenient, especially when three times as much capacity is needed. This is an unbalanced perspective on how the use of the project is likely to evolve in the long term and seems meant to convince doubting parties that SunZia will genuinely be a nearly pure renewable energy project.

These long-distance transmission systems are going to evolve around the growth in regional power loads and the type of power that is needed to meet them, not around policy ideals. If SunZia is built, it will likely be more than 30 years before most of the generation that will use it is in place, and this generation will be a mixture of types, with non-renewable generation potentially equaling or exceeding any renewable generation. This reflects the power needs of the region. The potential area of natural gas generation is also much closer to primary load centers in Arizona and California, allowing SunZia to build a shorter length of project to bring this power to market. This may be financially advantageous in the initial stages of the project, in particular for power generated by the Bowie power plant.

Because of the greatly accelerated construction of more local renewable generation in distant California and Arizona markets and the ease of meeting energy needs with it, more remote New Mexico facilities built specifically for those markets are unlikely to be constructed with nearly the speed that policy advocates anticipate or desire. Also, solar technologies should advance sufficiently over the next two to three decades to enhance energy production in solar-rich California and Arizona so that a transmission system of this scale may never be fully utilized or needed for renewable resources. This makes it less likely that renewable energy will be the predominant type of power carried by a system of this scale and reach however much policy advocates push for it.

Additional Statements Supporting Usage of SunZia by Natural Gas Generation

The following comments offer additional support for the conclusion that SunZia will facilitate significant natural gas generation. In August 2012 New Mexico's three congressmen wrote a letter to Secretary of Interior Salazar at SunZia's behest urging him to expedite the SunZia Environmental Impact Statement[16]. They did this in response to SunZia's fear of requests for an extension to the comment period. The following talking points were included in this letter:

> "***SunZia is the key to unlocking New Mexico's very high-capacity*** wind, solar, geothermal and ***natural-gas resources to generate electricity***."
>
> "***New development of*** renewable and ***natural-gas plants enabled by SunZia*** will contribute millions of new property tax dollars to depleted county treasuries."
>
> "***The SunZia project*** is a market-driven project that ***would*** create needed jobs and revenues, ***create new demand for natural-gas*** to firm the wind's intermittency…"

[16] Letter available from http://www.sunzia.net/documents_pdfs/08_14_12_sz_nm_congress.pdf.

The SouthWestern Power Group clearly sees natural gas generation as integral to SunZia's purpose and success at this point, and this use must be a fundamental part of SunZia's business model and strategy. If SunZia's success were to depend solely upon developing New Mexico's wind energy and smaller renewable sources, as the SI/HE report indicates, and if natural gas generation will not be built to use the lines, then the project appears destined to financial failure. It may be so doomed even by aggressively pursuing both types of generation to use the project, which must be done to secure any chance of financial success.

The SI/HE report says, "Simply stated, there are cheaper ways to bring additional natural gas resources to markets, particularly in Arizona, than through SunZia," yet little genuine evidence is presented to support this. One could also say that there are cheaper ways to bring renewable energy to market than by building a mega-scale transmission system across hundreds of miles of landscape when local resources are sufficiently abundant to meet any needs. While one might argue that the uncertainty and variability of renewable energy sources can be partly offset by combining energy from areas hundreds of miles apart, it is difficult to justify the cost and complications of building a huge regional transmission system merely to achieve this.

SunZia will provide easy access to abundant natural gas where land is readily available and will provide large-scale transmission capacity for any generation built, of whatever scale. Building all natural gas generation – three times as much as renewable generation – close to major population centers while building renewable generation hundreds of miles away when renewable resources are abundant near them makes little economic or physical sense. The SI/HE report also states that excess natural gas generating capacity will be used to meet new demand for natural gas generation, eliminating any need to use SunZia for it, yet the projected need for such generation would exhaust that capacity within the next 10 years. It is thus hard to argue that natural gas generation will not use SunZia merely because of current excess capacity.

If the conclusions of SI/HE report were true, that no long-distance interstate transmission lines will be needed to meet the growth in non-renewable generation over the

Rated Output *vs.* Actual Output*: How Much Renewable Energy Can SunZia Carry?*

An important, perhaps confusing aspect of assessing the power a system carries is the difference between the rated output of a generation facility (its nameplate capacity) and the actual power it produces. A power production facility's ***capacity factor*** determines the average power generated. The capacity factor of a natural gas plant can be 80% or greater, whereas for New Mexico wind energy it is ~35%. That is, if 1,000 MW of natural gas capacity were to use SunZia – the rated output of the Bowie power plant – and 2,000 MW of wind turbine capacity were to use SunZia, 800 MW of power would come from the Bowie plant and 700 MW from New Mexico wind. Natural gas generation would be the majority user of the system even though wind generation has reserved twice the transmission capacity.

This relationships is further complicated by the ***peak capacity factor*** – a facility's expected output when the greatest power is needed, which in the Southwest occurs in the summer in mid-afternoon. The peak capacity factor for natural gas generation is 100%, whereas for New Mexico wind generation it is 13%. That is, during the summer, 1,000 MW of installed natural gas capacity would deliver a planned 1,000 MW of power when needed, whereas 2,000 MW of installed wind-generation capacity would deliver only 260 MW of planned power. This makes wind energy inconsequential in meeting summer demand. Any utility that purchases wind-generated electricity must also build or purchase the natural gas generation required to compensate for this summer shortfall. This can be a deterrent to contracting for wind-generated electricity.

next 25 years – ~8,000 MW in Arizona and up to 380,000 MW nationwide – then this would signify the end of the long-distance transmission era. Building mega-scale long-distance interstate transmission lines merely to deliver a specific type of renewable energy – wind power – to areas that already have an excess of renewable energy is poorly thought-out policy both economically and physically no matter the abundance of that resource. A major, long-term price advantage would have to exist to justify it, and it is highly questionable that such a thing exists, especially given projected advances in solar technology. In addition, building such a project merely trying to smooth variable renewable power output by combining energy from different areas is a tenuous justification for the associated expenditures and impacts when more local energy management strategies would suffice and be more economic.

Conclusions

In conclusion, while we concur that New Mexico's wind energy is a major focus of this project and that the full scope of the project depends financially upon its development, we also conclude that natural gas generation is likely to be just as necessary and that the project's financial success will depend as much upon it. As energy use develops in the Southwest over the next 30 years, natural gas generation could easily come to dominate the project's use because this type of generation is projected to meet the majority of new demand in the region. If SunZia has a comprehensive plan for long-term success, natural gas development will be as central to it as renewable energy development.

This conclusion stems from two principal facts: (1) renewable energy is an enormously abundant resource in those areas targeted to receive New Mexico's renewable energy, resulting in intense local market competition, and (2) natural gas generation will be needed and developed at ~3 times the rate of renewable generation over the next 25 years. Even by combining these two forms of energy generation, they may not be developed rapidly enough in the region to support a merchant project of this scale in the timeframe required.

The problem is not that the rate of growth of these markets is abnormally slow but that they must grow far faster than normal to sustain the project. The transmission capacity of this project for the timeframe considered far exceeds the rate of growth of load in the region, especially when the preferred forms of future energy lend themselves to more local generation. Markets and demand will determine how the use of SunZia develops, and these will favor natural gas generation as strongly as renewable generation, or more so, over the next several decades. If SunZia is not built, this will not necessarily result in a lack of needed renewable or natural gas energy to support requirements and loads. Rather, more local resources will be more fully developed to meet them.

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The SI/HE report suggests that SunZia may not be needed for natural gas generation, but if SunZia is built, it will certainly be used for natural gas generation and result in its expansion where it might not otherwise occur. While this may stimulate New Mexico's economy, it is not necessarily needed to meet more distant needs. In this case, SunZia would be built not because the power it carries is essential to areas where it is delivered but merely because New Mexico wants to sell power it cannot use. Whether New Mexico can actually sell that power remains the question. ***The real driver in this project is thus not a need for electricity generated in New Mexico but a desire by energy speculators to access distant markets hoping to sell energy they otherwise cannot sell.***

Natural gas generation has become much more critical to SunZia's success as a consequence of rapidly changing energy markets. At this point, the natural gas resource of southwest New Mexico is far more important to SunZia than the area's solar potential and rivals or exceeds central New Mexico's wind energy potential. Indeed, this natural gas resource now appears just as essential to SunZia's success, and SunZia may not survive financially without its expanded development, if the project is to survive at all. Even by appealing to natural gas generation to sustain the project, such generation may in itself not grow rapidly enough to support the project, especially if utilities opt to add natural gas capacity incrementally and more locally, as the SI/HE report suggests. This is the same problem that SunZia faces with New Mexico's wind energy development: those states targeted for New Mexico's energy are developing their own renewable resources at a rate that can readily meet in-state RPS mandates. Nevertheless, if SunZia is built, it could eventually become the principal corridor for natural gas generation in the Southwest, something that SunZia is undoubtedly keenly aware of.

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Renewable Portfolio Standards and SunZia

Arizona Solar: Victim of Success? – "We are victims of our own success and are on the path to achieve ***overcompliance***…" (*Energy Prospects West*, December 2011)[17]

California on Track to Exceed 2020 RE goals, but Issues Still Exist – "…California is well on the way to ***overachieving*** its 2020 aim to generate 33 percent of its electricity from renewables, in fact by almost double." (*PV Magazine*, March 2012)[18]

Nevada Utilities Flush With Renewable Energy Credits – "Nevada Power's ***oversupply*** of RECs would cause the utility to exceed RPS requirements through 2029." (*Energy Prospects West*, January 2012)[19]

A fundamental justification given for SunZia is the purported need to meet the renewable energy portfolio standards of the states of Arizona, California, and Nevada.[20,21,22] California is by far the largest consumer of power in the region and has been the principal marketing target. These portfolio standards are, respectively, 15% by 2025 for Arizona, 33% by 2020 for California, and 25% by 2025 for Nevada.

New Mexico is portrayed as having an excess of renewable energy that it can sell to these states, which are conversely portrayed as being unable to meet their needs with their own resources. Since SunZia was conceived, however, all of these states have made great strides in meeting these standards with their own resources, as noted in the articles cited above and below, with all states now projected to easily achieve them. This has undermined if not eliminated a key part of SunZia's stated purpose and need and what seemed like a sure economic bet for the project.

California's Needs

California's greatly reduced need for imported power is amply reflected in statements from Michael Picker, Senior Adviser to Governor Brown of California for Renewable Energy Facilities, who informed the Western Electricity Coordinating Council in August 2011 that California utilities do not need this power and may not purchase it. Excerpts from his letter to the Council follow.[23] These conclusions are

[17] Susan Whittington, "Arizona Solar: Victim of Success," *Energy Prospects West*, December 6, 2011. Available from http://www.energyprospects.com/archives/230-print.html.

[18] Cherly Kaften, "California on track to exceed 2020 RE goals, but issues still exist," *PV Magazine – Photovoltaic Markets and Technology*, March 9, 2012. Available from http://www.pv-magazine.com/news/details/beitrag/california-on-track-to-exceed-2020-re-goals--but-issues-still-exist-_100006045/#ixzz1ySkTA1cC.

[19] John Edwards, "Nevada utilities flush with renewable energy credits, *Energy Prospects West*, June 26, 2012. Available from http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=3844.

[20] See various SunZia presentations at http://www.sunzia.net/resources_presentations.php. Tom Wray's October 23, 2012 presentation to the 4th Annual Transmission Summit West is an example.

[21] Bureau of Land Management, *SunZia Southwest Transmission Project Newsletter 1*, May 2009. Available at http://www.blm.gov/nm/st/en/prog/more/lands_realty/sunzia_southwest_transmission.html.

[22] Bureau of Land Management, *Draft Environmental Impact Statement and Resource Management Plan Amendments for the SunZia Southwest Transmission Project*, Chapter 1, Introduction, page 1-6, May 2012. Available at http://www.nm.blm.gov/sunZia/DEIS/Setup/SunZia_DEIS_Vol_I.html.

[23] Letter available from http://www.wecc.biz/committees/bod/teppc/20110809/lists/minutes/1/letter%20to%20teppc%20from%20california.pdf.

reinforced by additional recent articles in *Renewablesbiz*[24] and *Energy Prospects West*[25]. In this letter Picker warned against building long-distance extra-high-voltage interstate transmission lines to California because of California's emerging ability to meet its own renewable energy requirements with its own resources.

> …California is taking necessary steps to meet its 33 percent renewable portfolio standard (RPS). Should we be able to develop higher levels than 33 percent (hopefully a 40 percent goal), ***we will be positioning ourselves for relationships with other load areas outside California and can hopefully provide mutual benefit in cost-efficient renewable market transfers***[3].
>
> Footnote 3 of the letter reads: ***The potential of exports is strengthened*** by Governor Brown's goal of installing 12,000 MW of distributed renewable across the state – investments that will help CA meet its peak needs.
>
> We are also particularly concerned when we see proposals for large renewable energy resource development outside of California interconnecting across long distances directly into California balancing authorities.
>
> As you progress forward in finalizing the first Regional Transmission Plan, we would note that 10 years is not too distant, and most procurement to meet statutory RPS mandates is already well underway by load serving entities and states.

Mr. Picker also states the following In a personal email message to the author dated June 14, 2012:

> I was surprised to get your letter regarding SunZia, and the suggestion that the purpose of the power line might be to sell power into California. That seems like a risky business bet.
>
> ***Most California utilities report that they are already oversubscribed for renewable power generation***… In fact, the California Public Utilities Commission reports that the state's investor-owned utilities have enough contracts from renewable power projects to supply 40% of the state's electricity needs.

Exporting Renewable Energy to California

In response to California's large energy requirements and the state's equally large renewable energy portfolio standard, ***almost every western state has proposed selling excess renewable energy to California***. Not only does New Mexico see California as an export target, so now do Arizona and Nevada, which SunZia has been targeting for New Mexico's renewable energy. Arizona is aggressively seeking to expand transmission capacity to reach California markets, just as New Mexico is with its Renewable Energy Transmission Authority, and Nevada now has its own transmission initiative for this purpose, discussed below. Colorado, Montana, Wyoming, and Oregon are also focused on exporting renewable energy to California.

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[24] Bill Opalka, "PG&E says it will meet California's renewable energy goals," *Renewablesbiz*, May 31, 2012. Available from http://www.renewablesbiz.com/article/12/05/pge-says-it-will-meet-california-s-renewable-energy-goals.

[25] Mavis Scanlon, "California utilities on their way to meeting 33-Percent RPS," *Energy Prospects West*, August 7, 2012. Available from http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=3874.

The economic peril in this thinking should be apparent. With California declaring that it can meet its own renewable energy needs and that it hopes to export renewable energy itself, energy policy makers in adjacent states need to reassess their ambitious plans. It is now clear that local resources are sufficiently abundant to meet in-state needs and are winning the day, meaning that most of the potential excess renewable energy that these states have is likely to remain where it is, developed in response to more local demand and not economic wishful thinking.

Arizona's Renewable Energy Export Intentions

Arizona itself now has strong intentions to export renewable energy because, as with California, Arizona's utilities have procured more than enough renewable energy to meet their RPS requirements. The governor's Solar Energy Advisory Task Force makes this amply clear in its December 2012 report to the governor.[26] Relevant excerpts from this report are given below.

Efforts to Evaluate Regional Markets and Deliverability

The ACC [Arizona Corporation Commission] required regulated utilities to study solutions for ***enhancing Arizona's ability to export renewable energy*** to supply these markets [adjacent states having renewable portfolio standards]…In 2010 the ACC ordered regulated utilities "to jointly conduct or procure a study…to identify the barriers to and solutions for ***enhancing Arizona's ability to export renewable energy***…" (page 12)

As noted previously, California's current high RPS, which could be increased to even higher levels, has also attracted merchant generation and transmission developers *who intend to export renewable energy from generation facilities in Arizona…to utilities in California*…***This interstate market is critical for the development of renewable energy resources in Arizona, because the Arizona in-state regulated utilities have procured sufficient renewable energy to meet the mandated REST standards well in to the future*** *and certain non-regulated utilities are well under way in meeting their sustainability goals*. (pages 13-14)

That Arizona can easily meet its renewable energy portfolio standard is further reinforced by former Arizona Corporation Commission Chairperson Kris Mayes, now director of Arizona State University's Program on Law and Sustainability, quoted in the following January 2013 *Energy Prospects West* story[27], as follows:

Mayes pointed out in a post-election television interview [November 13, 2012][28] that ***Arizona utilities have already indicated they can achieve the state's standard in two years, "which is 10 years early."*** She favors raising the RES.

[26] Governor's Office of Energy Policy, *Arizona Governor's Solar Energy Advisory Task Force 2012 Recommendations*, December 21, 2012. Available at http://www.azenergy.gov/doclib/2012_GSETF_Recommendations.pdf.

[27] Susan Whittington, "Arizona 2013: Birthplace of the utility of the future?," *Energy Prospects West*, January 8, 2013. Available from http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=3985.

[28] Carrie Morales, Mayes interviewed on Arizona Horizon, November 20, 2012. Story and interview available at https://asunews.asu.edu/20121120_inthenews_law_mayes.

Mayes is heading up ASU's new Utility of the Future Center, whose focus is helping utilizes adapt to a more decentralized energy world. This article notes that the Arizona Energy Consortium envisions the state as "the energy hub of the Southwest," supplying energy to surrounding states.

Both the Arizona legislature and Arizona Corporation Commission oppose raising Arizona's renewable portfolio standard (RPS) even though it is the lowest of any adopted by the more than 30 states that now have one. Policy makers believe that renewable energy mandates will increase energy costs, which they want to avoid to strengthen Arizona's economy and attract outside business. The Task Force report notes that utilities are unlikely to procure or build more renewable energy capacity beyond the RPS requirement because of the need to keep electricity costs as low as possible. Arizona is thus focused on exporting renewable energy to boost its economy rather than on increasing its in-state use.

What is remarkable about the Solar Energy Advisory Task Force report is that it references SunZia as a potential transmission project to export renewable energy from Arizona, not import it. The Task Force envisions using SunZia to export energy to California, not to New Mexico or more eastern states, by delivering solar energy from southeastern Arizona to central Arizona. That energy would then be transferred to California on other in-state transmission lines. The report fails to acknowledge that New Mexico wind energy would compete for and perhaps eliminate the central and northern Arizona transmission capacity needed for these exports.

Nevada's Renewable Energy Export Intentions

A similar situation exists in Nevada, which is aggressively seeking to build both new transmission capacity and generation facilities to export its renewable energy. This effort is reflected in two articles that appeared in the *Las Vegas Review Journal*. Excerpts from these articles are given below. The dilemma for would-be exporters is exemplified by the title of the first article, *Nevada imagines exporting excess renewable power, but California has the same plan*.[29]

> ***Renewable energy will save Nevada.***
>
> At least, that's the idea. Build solar, geothermal and wind plants, and not only will the Silver State meet its legal quota for clean energy, but ***it'll have leftovers to export to huge markets such as California*** -- thereby diversifying the economy. It's a classic case of doing well by doing good.
>
> There's just one problem.
>
> ***California's thinking the same thing*.**
>
> "…We're going to generate a lot of energy, and ***hopefully, we're going to be able to export***. I think integration (with other states) is good, but we're going to try to build as much indigenously as we can."– **Governor Jerry Brown, California**

[29] Jennifer Robison, "Nevada imagines exporting excess renewable power, but California has the same plan," *Las Vegas Review Journal*, September 9, 2011. Available at http://www.lvrj.com/business/nevada-imagines-exporting-excess-renewable-power-but-california-has-the-same-plan-129286013.html.

This effort to export Nevada's renewable energy is further emphasized in another *Las Vegas Review Journal* article, *Nevada groups compete to export renewable energy*.[30]

> ***The race to export renewable energy from Southern Nevada to California is on***, with a rural electric co-op and a former Nevada governor vying for the lead.
>
> The stakes are huge: California has an almost insatiable need for green power, with laws requiring utilities to get a third of their electricity from renewables by 2020. Energy companies are jostling with each other to meet the demand, proposing transmission lines ***that could ship as many as 2,000 megawatts of renewables from Southern Nevada to the Golden State***.

In addition, NV Energy, Nevada's principal utility, has embarked upon a Renewable Transmission Initiative to both build renewable energy facilities and needed transmission capacity to deliver the power to California. A summary of the company's initiative follows:[31]

> **NV Energy's Renewable Transmission Initiative ("RTI")**
>
> Through the Renewable Transmission Initiative ("RTI"), NV Energy is undertaking efforts to engage renewable developers, load serving entities, and others ***to assess their interest in obtaining transmission service from renewable energy zones in Nevada to electric loads in other markets, particularly California and the Desert Southwest***.
>
> The SOI [Solicitation of Interest] will enable the Company [NV Energy] to determine which of the renewable zones previously identified by the State of Nevada generate sufficient interest on the part of market participants to ***support the development of any potential transmission infrastructure required to export energy from those zones***.
>
> NV Energy is ***requesting that market participants express their interest in exporting renewable energy*** from any of four specified Points of Receipt ("PORs") on the NV Energy system [within Nevada] to any of three Points of Delivery ("POD") [to California]…

Colorado's Renewable Energy Export Intentions

Colorado has also expressed interest in exporting its renewable energy to Arizona, Nevada, and California, as indicated in the statement below from the Colorado Energy Office's website.[32] Colorado has not developed nearly the plans or strategies to do this, however, and references the High Plains Express Project as the principal way to export the power. The state is much more reserved and hesitant about exporting its renewable energy and sees exportation as a potential long-term strategy, not something to be undertaken in the near term. Nevertheless, Colorado recognizes that it has more renewable energy potential than it can ever use and thinks that exportation may someday be an option.

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[30] Jennifer Robison, Nevada groups compete to export renewable energy, *Las Vegas Review Journal*, August 18, 2011. Available from http://www.lvrj.com/business/nevada-groups-compete-to-export-renewable-energy-128045563.html.

[31] https://www.nvenergy.com/company/doingbusiness/RTI/RTI.cfm.

[32] Colorado Energy Office, http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/12516147252228.

Exporting Colorado's renewable energy is further explored in the report, *Strategic Transmission and Renewables, A Vision of Colorado's Electric Power Sector to 2050*.[33]

Colorado is rich in utility-scale renewable resources, more than enough to meet the state renewable energy standard (RES). Potentially, large population centers outside of Colorado (***like Arizona, Nevada, and southern California***) could import excess renewable energy from within Colorado.

For the long term at least, Colorado is thinking precisely the same thing that New Mexico is and is looking at the very same markets, when two of those markets, Arizona and Nevada, are thinking precisely the same thing that Colorado and New Mexico are, looking to California as their market as well. Each state believes it can reap large economic benefits if someone merely builds a transmission system to reach these envisioned out-of-state markets.

Conclusions

While New Mexico has substantial renewable energy resources, ***the renewable energy resources of Arizona, California, and Nevada are in themselves vast and make these states self-sufficient in renewable energy for the foreseeable future***. A rapid increase in Arizona and California renewable energy capacity has sharply decreased the demand for out-of-state power and makes the use of such power by these states highly questionable. Utilities prefer to develop renewable generation close to load rather than import renewable energy from great distances.

The market potential for New Mexico power in western states is now clearly much less than anticipated when SunZia was proposed, meaning that the out-of-state market for New Mexico power will develop far more slowly than expected, if at all. At the very least, that market will be greatly diminished. Consequently, this significantly reduces the amount of transmission capacity that can be financially supported. ***Power must be sold to utilities through this project in order to pay for the project***. Development of more local resources closer to load sharply reduces the need for the amount of long-distance transmission capacity that SunZia would provide, greatly increasing the project's financial vulnerability. SunZia is thus a very high risk project that demands close financial scrutiny, not only by the federal government but by potential investors as well.

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As an added complication, delivering power to California from New Mexico could greatly reduce central and western Arizona's transmission capacity for in-state use and energy export. This situation needs to be resolved before allowing construction to proceed. At a minimum, SunZia should extend one 500-kV line from the Pinal Central substation to the Palo Verde hub west of Phoenix to maintain Arizona transmission capacity for in-state use and solar development. Without this, SunZia will ***reduce*** not ***increase*** transmission capacity in Arizona for solar development because most such development is anticipated to occur in the central and western parts of the state.

[33] Colorado Governor's Energy Office, December 2010. See *STAR Report* at http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/1251597774824.

While huge renewable energy reserves may occur in more remote areas, this does not necessarily mean that a need exists to develop and deliver them hundreds or a thousand miles away. Many of these reserves will remain unused, held in reserve just as the nation's huge coal reserves are. As renewable energy demands grow and technology advances, utilities should be able to progressively develop more local reserves to fully meet their needs, meaning that a project such as SunZia may never be needed. This is because the local renewable energy potential in the Southwest is so huge.

SunZia and Transmission Congestion on Path 47

One of the issues that the Sonoran Institute/Headwaters Economics (SI/HE) report addresses is congestion on Path 47 in southwestern New Mexico, emphasizing how SunZia could relieve this. Path 47 is shown schematically in Figure 8 and comprises a network of 115-kV and 345-kV lines that deliver power to principally El Paso from northerly and westerly power sources[34]. Any congestion on this path is thus associated with delivering power to that service area.

Congestion is defined as the inability of the transmission system to deliver sufficient power when it is needed. This concern about congestion in part stems from statements included in the Department of Energy's 2009 *National Electric Transmission Congestion Study*[35], which the SI/HE report references with the following statement. This study is also the basis for congestion analysis in the SunZia Draft Environmental Impact Statement.

> Yet, a 2009 update of the DOE congestion study also referred to a number of transmission corridors that had been identified in 2006 as congested and remained so in 2009. These included Path 47, which refers to the power flows over a cluster of 115 to 345 kV lines in southern New Mexico and Arizona. Engineering studies have established that the addition of SunZia would substantially increase power transfer capability over Path 47, offering potential solutions to seasonal congestion.

The conclusion that Path 47 is congested, however, is based upon older data and does not reflect the changes in power flow on the path following the integration of the 570-MW Luna Energy Facility into the regional grid in 2006. A 2011 report done for the Western Electricity Coordinating Council[36] shows that the location of this power plant eliminated congestion on Path 47 for the foreseeable future and that ***Path 47 is now one of the least congested and most reliable paths in the western United States***. Any remaining congestion is related solely to scheduling, with the utilities and power generators that use Path 47 scheduling much of the path's transmission capacity but then not using it.

In addition, calculations by Public Service Company of New Mexico show that path 47 has sufficient transmission capacity to export approximately ~1,000 MW of power[37]. Currently, development of solar resources in southwestern New Mexico is not limited by insufficient transmission capacity. Rather, these resources are not being developed because potential power generators cannot obtain power purchase agreements from utilities. That is, utility companies are unwilling to buy the power. This heightens the financial risks for a project like SunZia if it intends to support itself by selling transmission capacity to deliver this kind of power.

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[34] Diagram from Public Service Company of New Mexico, *Electric Integrated Resource Plan, 2011-2030*, July 2011. Available from http://www.pnm.com/regulatory/pdf_electricity/irp_2011-2030.pdf.

[35] U.S. Department of Energy, *National Electric Transmission Congestion Study*, December 2009 (hereinafter DOE 2009). Available from http://energy.gov/sites/prod/files/Congestion_Study_2009.pdf. Accessed September 4, 2012.

[36] Western Electricity Coordinating Council, *Discussion of WECC Paths*, *Southern New Mexico (NM1) Path 47* (draft), WECC Path Report, 2011. Available from http://www.wecc.biz/committees/BOD/TEPPC/External/2011_WECC_PathReport_Path47.pdf. Accessed September 4, 2012.

[37] Public Service Company of New Mexico, Electric Services, Transmission Development and Contracts, *Path 47 Export Rating*, May 5, 2004. Available from http://www.mrlc.gov/nlcd2006_downloads.php. Accessed September 4, 2012.

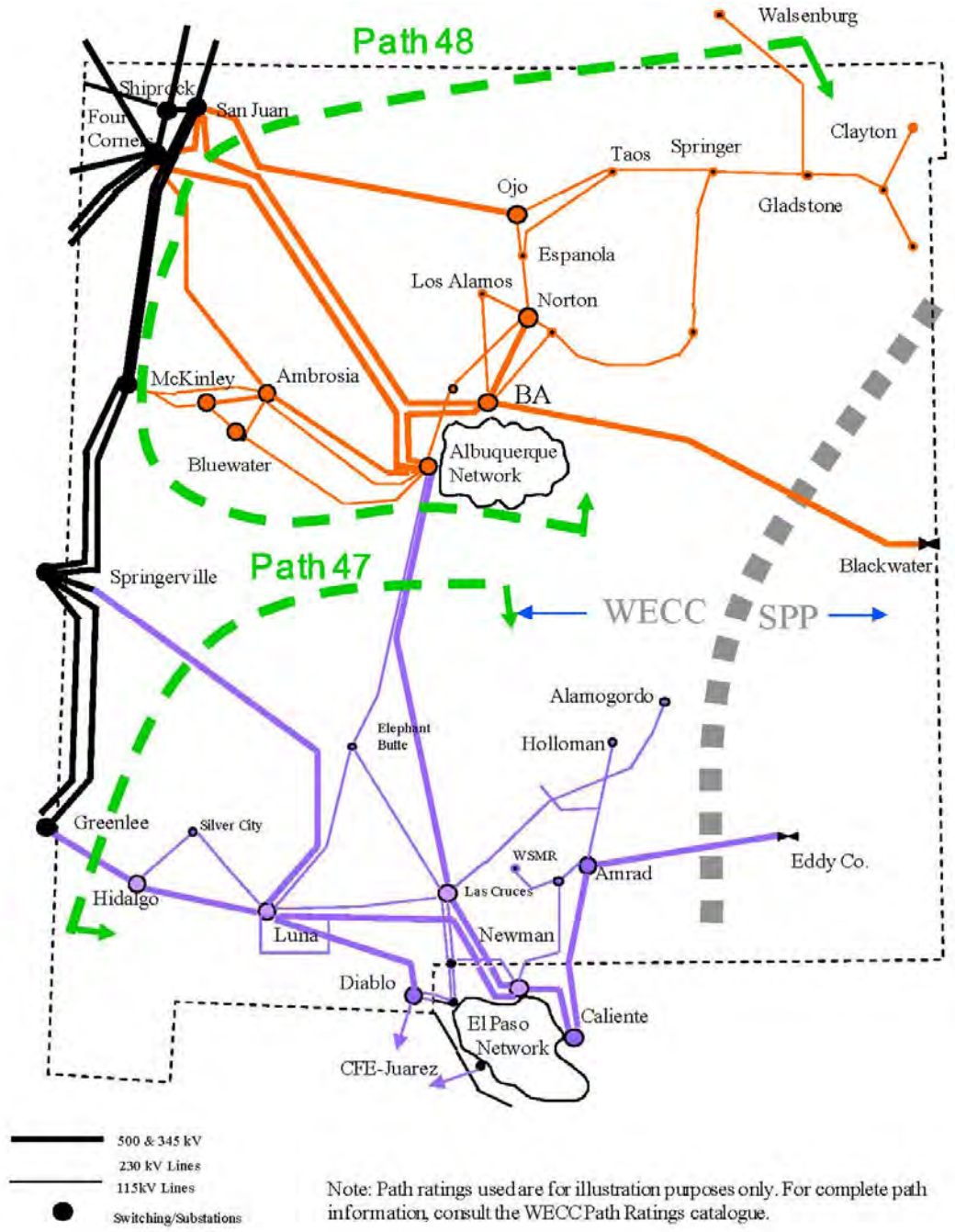

Figure 8. A schematic diagram for Path 47 in southwestern New Mexico (see footnote 34 for source). Most power flow on Path 47 is toward El Paso. El Paso receives distant power from Four Corners-area power plants and the Palo Verde generating station. This power is delivered via the 345-kV lines coming from Albuquerque, Springerville, and Greenlee.

The following sections review studies of congestion on path 47 and newer data that show that congestion is not a current problem for power delivery in the region. The power flow on path 47 has traditionally been from west to east to supply El Paso with power. This directional power flow was reduced to a major degree by the integration of the Luna Energy Facility at Deming, New Mexico, into the path in 2006.

A Review of Path 47 Congestion in Southern New Mexico

The most critical document to review in researching the issue of transmission congestion in southern New Mexico is Part 3 of the Western Electricity Coordinating Council's 2008 Annual Report, *Western Interconnection Transmission Path Utilization Study*: *An Analysis of Path Flows and Schedules on the WECC Transmission System During 2007*[38]. This report is the basis for statements regarding path 47 in DOE's 2009 transmission congestion report.

In the WECC report, four methods are used to assess congestion, and it is critical to understand each and which is most important. Two are related to actual power flow and two to scheduling. Actual power flows determine how much reserve transmission capacity exists and whether additional physical capacity is needed. In terms of actual power flow, current transmission capacity in southern New Mexico is lightly utilized and uncongested. These four methods are discussed below (adapted from this report). For these methods, U75 refers to a 75% utilization level for a path, and U90 refers to a 90% utilization level.

- **Actual flow grouping.** For each path, *sum* the magnitude of all individual U75 and U90 actual flow metrics for all seasons and heavy- and light-load hours. This summed number represents the path-usage ranking number for the path.
- **Actual flow grouping.** For each path, identify the *highest* U75 actual flow metric calculated for each season and heavy- and light-load hours. This maximum number represents the path-usage ranking number for the path.
- **Net Schedule grouping.** For each path, *sum* the magnitude of all individual U75 and U90 net schedule metrics for all seasons and for heavy- and light-load hours. (It was felt this schedule ranking method might produce ranking results similar to the actual flow ranking Method #1.) This summed number represents the path-usage ranking number for the path.
- **Maximum directional schedule grouping.** For each path, identify the *highest* U75, U90 and U99 directional schedule metrics calculated for all seasons and for heavy- and light-load hours. This maximum number represents the path-usage ranking number for the path.

Twenty-three western U.S. paths were considered here, and the *path-usage ranking numbers* for Path 47 are, respectively: *Method 1*: 19, *Method 2*: 19, *Method 3*: 21, and *Method 4*: 1. These rankings are shown in Figures 9, 10, 11, and 12. For method 4, Path 47 ranks 1 at the U75 and U90 levels. Only by this method is this path considered congested, and this ranking is suspect because path rankings radically reverse between methods for this path unlike any other path. What appears to be occurring is that power operators using path 47 are reserving much of its transmission capacity for their own use without fully utilizing it. While these data are now somewhat dated, they still demonstrate the sharp reduction in congestion on Path 47. These data postdate the data used for the DOE 2009 report.

[38] Western Electricity Coordinating Council, Transmission Expansion Planning Policy Committee, Historical Analysis Work Group, *2008 Annual Report*, *Part 3*, *Western Interconnection Transmission Path Utilization Study*, *An Analysis of Path Flows and Schedules on the WECC Transmission System During 2007*, April 2009 (hereinafter WECC 2009). Available from http://www.wecc.biz/library/StudyReport/Documents/2008%20Western%20Interconnection%20Transmission%20Path%20Utilization%20Study.pdf. Accessed September 4, 2012.

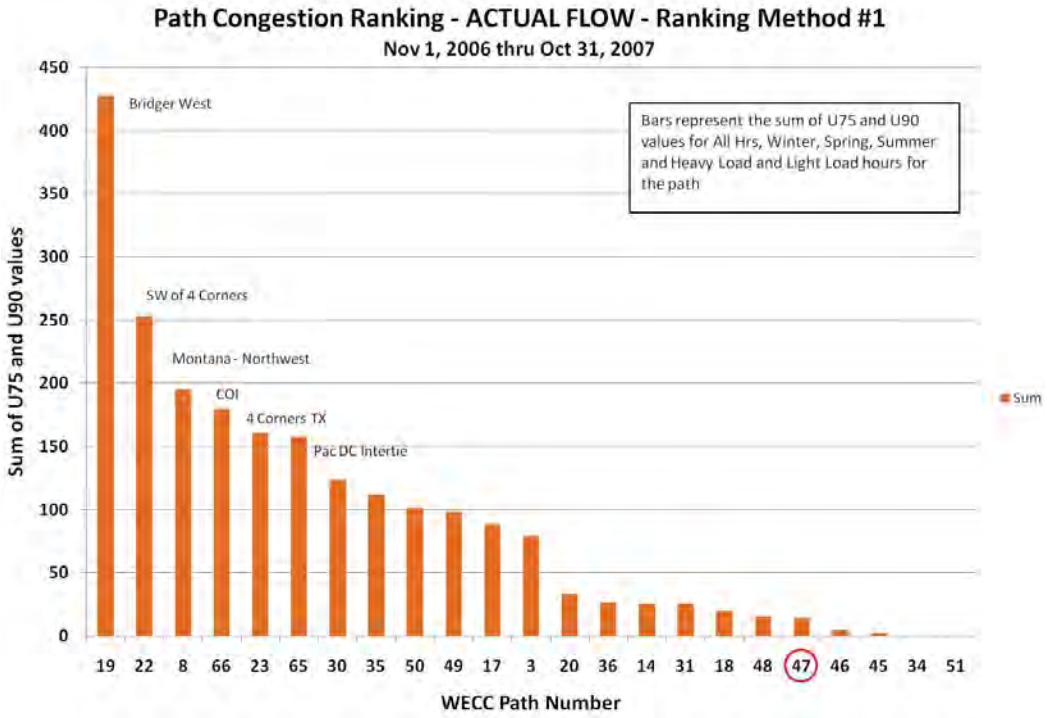

Figure 9. Path congestion rankings by Method 1 for western U.S. paths in 2007. Path 47 is ranked 19 out of 23. See text for discussion of ranking method. (Figure IV-1 of WECC 2009 report.)

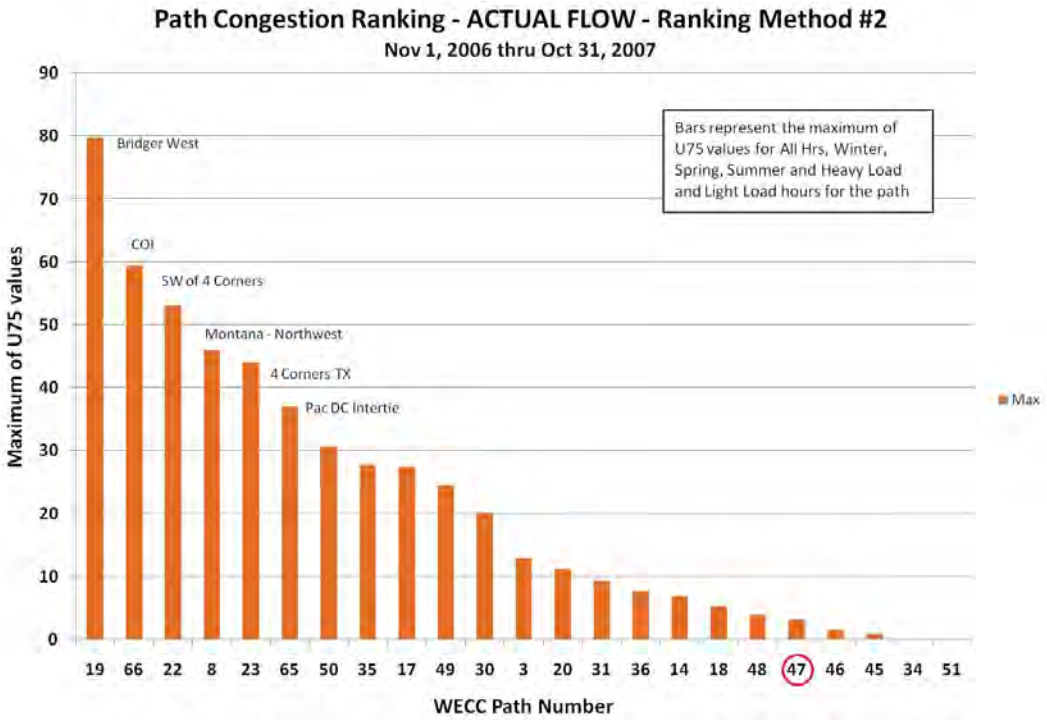

Figure 10. Path congestion rankings by Method 2 for western U.S. paths in 2007. Path 47 is again ranked 19 out of 23. See text for discussion of ranking method. (Figure IV-2 of WECC 2009 report.)

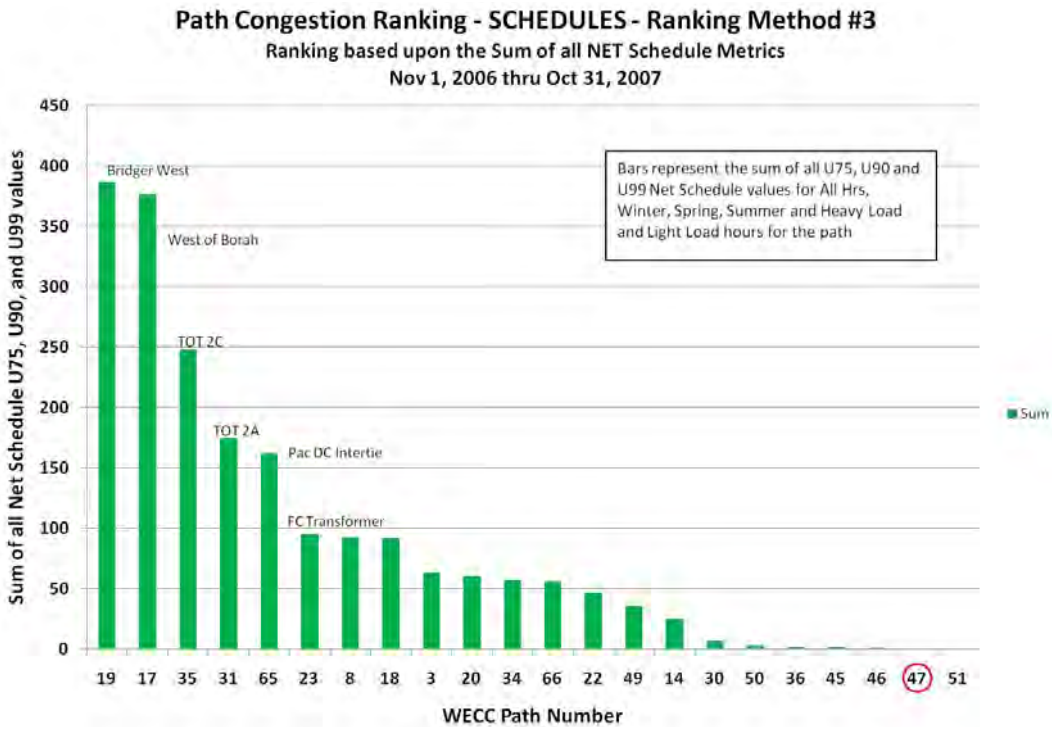

Figure 11. Path congestion rankings by Method 3 for western U.S. paths in 2007. Path 47 is ranked 21 out of 22. See text for discussion of ranking method. (Figure IV-3 of WECC 2009 report.)

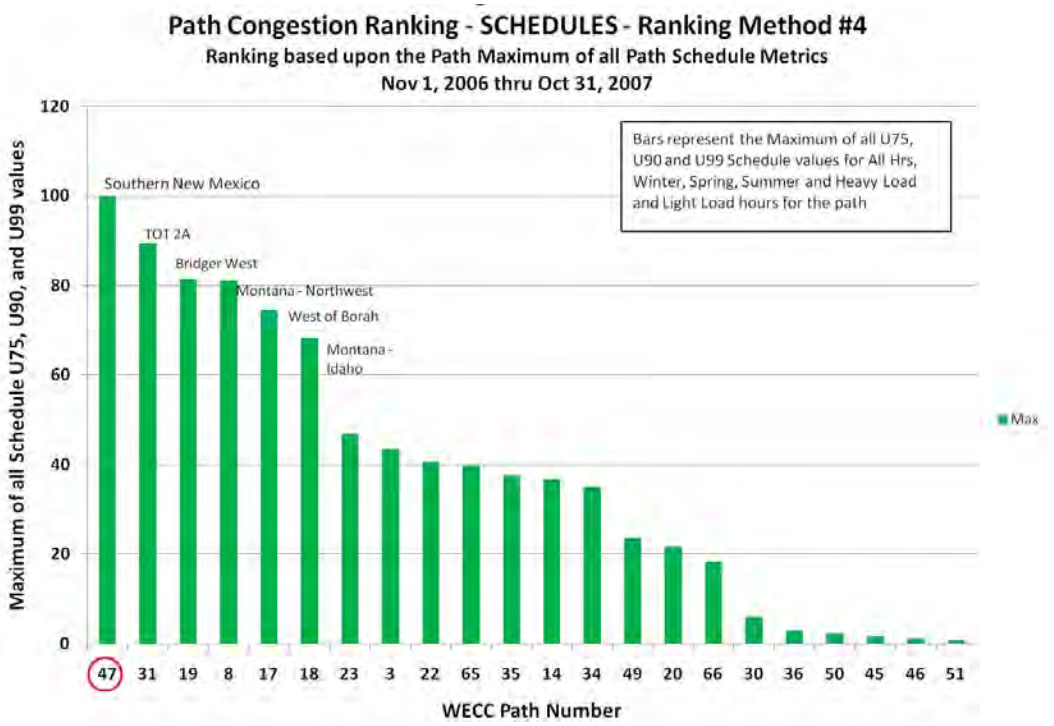

Figure 12. Path congestion rankings by Method 4 for western U.S. paths in 2007. Path 47 is ranked 1 out of 22. Note the radical reversal in congestion ranking by this method. This demonstrates that congestion is occurring only in scheduling of transmission capacity, not in the usage of that capacity. See text for discussion of ranking method. (Figure IV-4 of WECC 2009 report.)

In terms of actual power flow, in 2007 the 75% utilization level was exceeded on Path 47 only 2.4% of the time, and the 90% utilization level was exceeded only 0.1% of the time[39]. Full usage (U99) is essentially never achieved. For more than 95% of the time, the utilization of this path is less than 75% of its operational transfer capacity (how much power it can carry), and this constitutes a light level of utilization. Net directional scheduling also indicates that this path is lightly used.

In addition, the WECC 2008 report shows that power flow on Path 47 dropped approximately 30% between 2005 and 2007 (Figure 13), largely because of the integration of the Luna Energy Facility into the path. Path flow data for 2010 for Path 47 indicate an average power flow in the path of 533 MW with a path rating of 1048 MW (calculated from path data available from the WECC). Again, these figures greatly reduce the concern about congestion on this path.

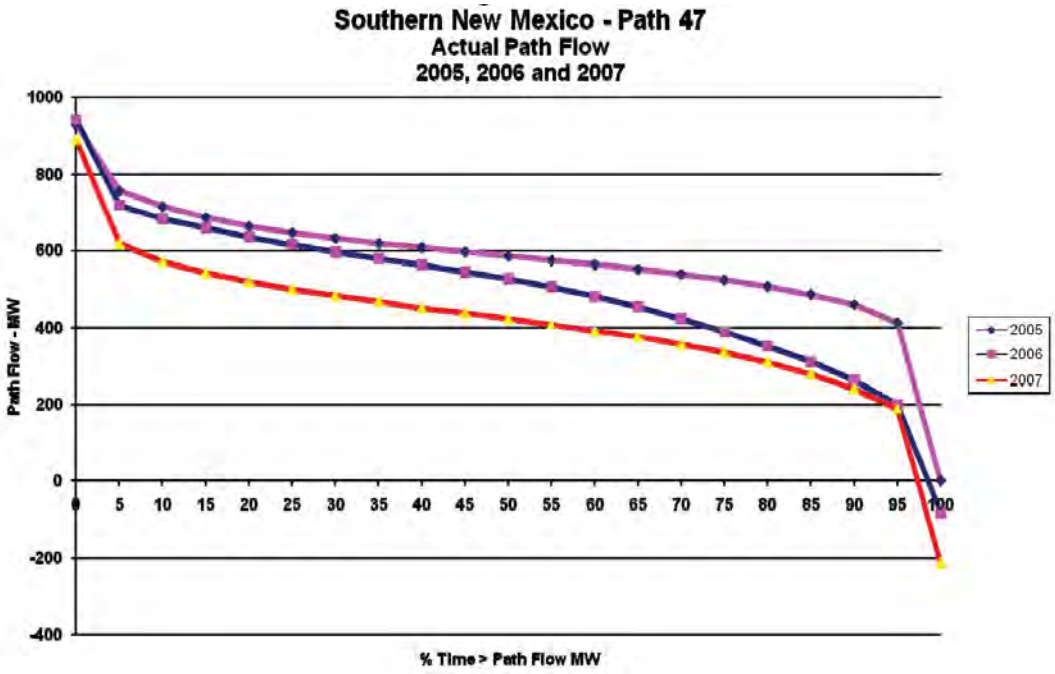

Figure 13. Actual path-flow data for Path 47 for the years 2005, 2006, and 2007. Note the drop in power flow in 2006 and the even sharper drop in 2007. This reflects bringing the Luna Energy Facility at Deming, New Mexico on line and the subsequent reversal of power flows on the path. (Figure II-42 of WECC 2009 report.)

The high utilization for maximum direction scheduling indicates that power operators, most likely El Paso Electric, are reserving most of the transmission capacity for their use and are then not utilizing it. This is revealed in the maximum direction scheduling utilization for heavy-load and light-load periods in Figure 14. Even during light-load periods, the maximum directional scheduling remains just as high as for heavy-load periods, indicating that the transmission capacity is merely being reserved rather than used. Thus transmission capacity is only contractually limited. It is not physically limited.

Through this scheduling mechanism, power operators can monopolize transmission capacity and maintain control over it for their own use. This can force other utilities to purchase more expensive power through other paths. This would seem to be an issue to address through regulatory measures,

[39] From Table 2, DOE 2009.

not by adding additional transmission capacity to carry more power. The latter would further increase the underutilization of transmission capacity.

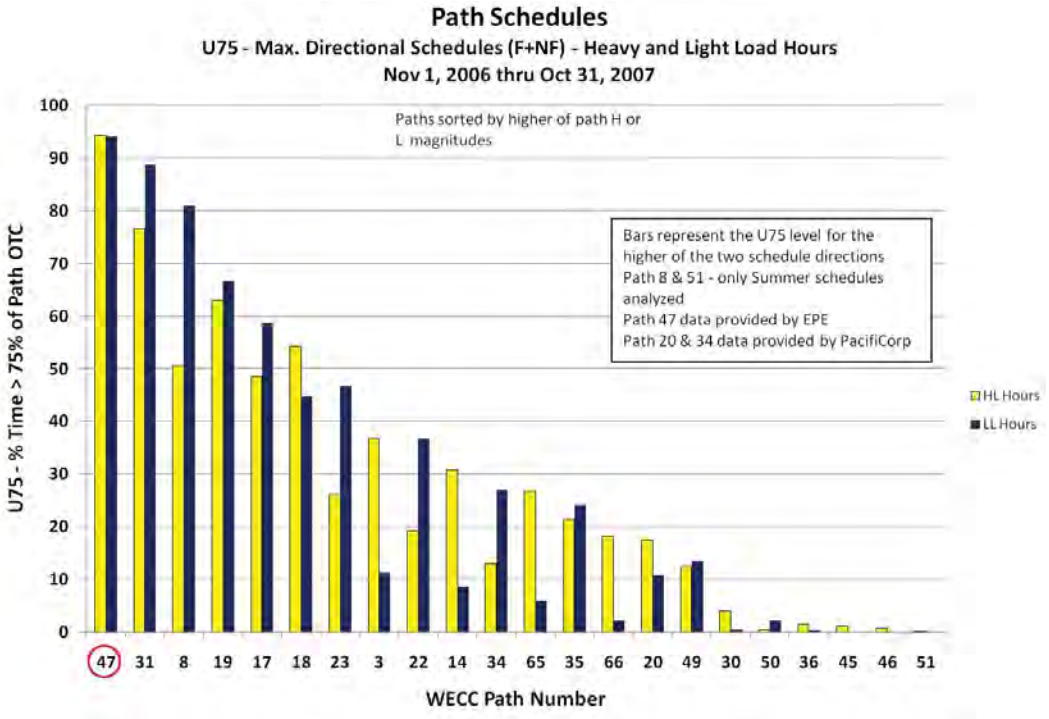

Figure 14. Path schedules showing that path scheduling is nearly identical for both heavy-load and light-load hours for path 47. This would indicate that the path is being scheduled to hold the capacity, not necessarily to deliver power. (Figure III-12 of WECC 2009 report.)

WECC 2011 Report on Path 47 Transmission Capacity

In 2011, the Western Electricity Coordinating Council (WECC) again studied congestion on Path 47)[40]. This study is the most up-to-date publically available and the most relevant to use in assessing congestion with respect to SunZia, in particular because it analyzes the impact of SunZia transmission capacity on Path 47. Although this study notes that Path 47 was historically congested in the WECC's 2007 study[41], subsequent studies show that this congestion has entirely dissipated. A 2009 study showed that the path is no longer congested, and for the expected future the path is projected to be uncongested. Much of the reason for this stems from incorporating the 570-MW Luna Energy Facility at Deming, New Mexico, into Path 47 in 2006. Excerpted statements from the report are included in the following.

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[40] Western Electricity Coordinating Council, *Discussion of WECC Paths*, *Southern New Mexico (NM1) Path 47* (draft), WECC Path Report, 2011. Available from http://www.wecc.biz/committees/BOD/TEPPC/External/2011_WECC_PathReport_Path47.pdf. Accessed September 4, 2012.

[41] Western Electricity Coordinating Council, Transmission Expansion Planning Policy Committee (TEPPC), Historical Analysis Working Group, *Western Interconnection Transmission Path Flow Study*, *1998 thru 2005*, September 2007. Available from http://www.wecc.biz/library/StudyReport/Documents/2007%20Western%20Interconnection%20Trasnsmission%20Path%20Utilization%20Study.pdf. Accessed September 4, 2012.

Summary of Comments from WECC 2011 Study of Path 47

Observations and Historical Congestion

It is likely that Path 47 will have reduced flow in future historical analysis because of new generation located in southern New Mexico.

Path 47 was not congested in the 2020 expected future study case, or any other cases in the 2010 Study Program.

The 2009 Study did not identify Path 47 as one of the more congested paths.

Future Congestion Analysis

Expected Future

Path 47 was not heavily utilized or congested in the expected future case. The path exceeded U90 and U75 for 6.44 percent and 25.85 percent of the year, respectively. Neither of these values surpasses the utilization screening requirement. The duration plot in Figure 3 shows this light utilization.

Conditional Congestion

Congestion on Path 47 is not contingent on any future evaluated in the 2010 Study Program.

Project Development Impact

Path 47 is not heavily utilized in the base case or the resource relocation case. Change in flows caused by the implementation of the incremental transmission [SunZia, Southline] was not significant.

Other Observations

Congestion on Path 47 has been reduced due to the addition of the Luna Energy Facility (LEF) generating station owned by Phelps Dodge Energy, PNM, and TEP. The LEF generation output flows in an east to west direction which counter flows the natural flow of Path 47.

With regard to project development impact, the report shows that that for 2019, Path 47 would exceed the 75% utilization level just 2.43% of the time for the base case, and just 6.19% of the time for the resource allocation case. Thus congestion is not currently an issue on Path 47.

Existing Transmission Capacity for Exporting Southern New Mexico Power

In 2004 Public Service Company of New Mexico conducted a study[42] to determine how much power could be exported from southern New Mexico using Path 47. With the Luna Energy Facility in operation (originally called the DENA facility, put on-line in 2006), Path 47 was given a thermally limited export rating of 880 MW with the Arroyo phase shift transformer (PST) in service and 1,132 MW with the PST bypassed. The export rating is defined as "the maximum real power than can flow out of southern New Mexico over Path 47 while maintaining an acceptable level of reliability."

Although somewhat dated, ***this study indicates that a lack of transmission capacity is not currently limiting renewable energy development in southwestern New Mexico***. While insufficient transmission capacity could limit future development if significant development of solar and natural gas generation

[42] PNM 2004.

does takes place in the region, ***what currently limits solar development is the lack of power purchase agreements***, that is, utilities will not buy the power. An August 25, 2009 article in *The El Paso Times*[43] quotes the developer of a SolarReserves solar project near Lordsburg, New Mexico, as saying that the project cannot be built because the company cannot get a power purchase contract with a utility. The inability to complete power purchase agreements has inhibited the construction of not just this project but also solar projects by EnXco Development (Afton), Iberdrola Renewables (Lordsburg), and New Solar Ventures (Deming), all given as supporting reasons for building SunZia.

This means that renewable energy development in southern New Mexico is likely to occur much more slowly than anticipated or desired and that it will be difficult to support a project as large as SunZia with it within the time frame required. That is, slowed resource development will sharply limit the revenue available to SunZia from this source. In addition, the rapid development of renewable energy resources closer to load in Arizona and California further reduces the rate at which New Mexico's renewable resources are likely to be developed and purchased by outside entities. It is thus possible that the full transmission capacity of SunZia will not be utilized, making a project on this scale much harder to justify.

Conclusions

The conclusions regarding congestion of Path 47 drawn from the Department of Energy's 2009 *National Electric Transmission Congestion Study* are misleading because they do not distinguish actual physical congestion from scheduling congestion. ***In terms of actual power flow, Path 47 is now one of the least congested and most reliable paths in the western United States.*** Use of Path 47 was sharply reduced in 2006 with the incorporation of the Luna Energy Facility in Deming, New Mexico, into the path, eliminating physical congestion on it. At this time, congestion on Path 47 occurs only with regard to scheduling, not actual power flow. In addition, a 2011 study by the Western Electricity Coordinating Council shows that the path is now lightly utilized and will remain so until at least 2019. Thus construction of SunZia is not specifically needed to address this problem.

This demonstrates that congestion can be addressed through means other than building more transmission capacity. Also, the Southline Project would relieve any congestion on the path in the same way as SunZia, and one cannot justify building both projects across this region simultaneously specifically for this purpose. Doing so is not physically needed or financially reasonable. The one significant difference between the two projects is that SunZia could provide a direct link to the wind generation area in central New Mexico.

In addition, a rating study by Public Service Company of New Mexico shows that ***approximately 1,000 MW of transmission capacity is available in southwestern New Mexico without SunZia to export power using Path 47.*** Solar development in that part of the state is currently not limited or inhibited by a lack of transmission capacity. Rather, it is inhibited by the inability to negotiate power purchase agreements. This inability to obtain power purchase agreements, even with sufficient transmission capacity, is likely to affect wind-energy producers in central New Mexico as well and further affects the financial viability of SunZia.

[43] Vic Kolenc, "Solar power boom: Applications for projects filed, as BLM designates areas for study," *The El Paso Times*, August 25, 2009. Available from http://shapleigh.org/news/3567-solar-power-boom-applications-for-projects-filed-as-blm-designates-areas-for-study. Accessed September 4, 2012.

A Review of the *Greenwire* Article on the Sonoran Institute/Headwaters Economics Report

The Sonoran Institute and Headwaters Economics coordinated the release of their report with a major article written by Scott Streater in the November 19, 2012 edition of the on-line journal *Greenwire*, which featured the report's conclusions[44]. This article contains several statements that can be misleading, and these merit clarification. The following discusses those statements that raise the greatest concern.

Author Misconceptions

First, two misconceptions on the part of the author need clarifying regarding New Mexico's wind energy and how SunZia relates to meeting New Mexico's and Arizona's renewable portfolio standards. The *Greenwire* article says the following about this:

> …the power line is needed to develop huge wind resources in central New Mexico…

While this wind resource is high quality, it is also very modest, not huge. The area being accessed is a rather small part of the vast mid-continent wind province, as shown in Figure 15. For comparison, Iowa is far ahead of New Mexico in developing its wind resource, yet the population of the two states is similar, with Iowa having a population of ~3 million and New Mexico a population of ~2 million. Iowa has >4,500 MW of installed wind generation capacity[45] compared with 778 MW for New Mexico[46]. Iowa now obtains 20% of its power from within the state. New Mexico still has far to go in efficiently using this resource for its own needs.

Another misconception created by the *Greenwire* article is the following:

> The SunZia line…is viewed as critical to meeting renewable portfolio standards (RPS) in both New Mexico, where 20 percent of generation must come from renewables by 2020, and Arizona, which must meet a 15 percent RPS by 2025.

In reality, neither state needs or intends to use SunZia to meet its RPS requirements. New Mexico has its own rather aggressive in-state program to add transmission capacity to exploit the state's wind capacity for this purpose, and SunZia will deliver little if any renewable energy in the state. This is essentially true for Arizona also, which is easily meeting its RPS mandate with its own solar resources and is consequently aggressively pursuing a renewable energy export program of its own[47,48]. ***SunZia is***

[44] Scott Streater, "Hotly contested SunZia power line would help promote renewables – study," *E&E Greenwire*, November 19, 2012. Available by subscription only through the *Greenwire* archives at http://www.eenews.net/gw/2012/11/19.

[45] Iowa Wind Energy Association, "Wind Power Facts." Available at http://www.iowawindenergy.org/whywind.php.

[46] American Wind Energy Association, "Wind Energy Facts: New Mexico," 3rd Quarter 2012. Available at http://www.awea.org/learnabout/publications/factsheets/upload/3Q-12-New-Mexico.pdf.

[47] Governor's Office of Energy Policy, *Arizona Governor's Solar Energy Advisory Task Force 2012 Recommendations*, December 21, 2012. Available at http://www.azenergy.gov/doclib/2012_GSETF_Recommendations.pdf.

essentially unneeded to meet the RPS requirements of either state, and neither will significantly use the project for this purpose. The question remains as to whether California may still want to access New Mexico wind energy to meet its future RPS requirements, although California is also projected to meet these requirements with its own resources.

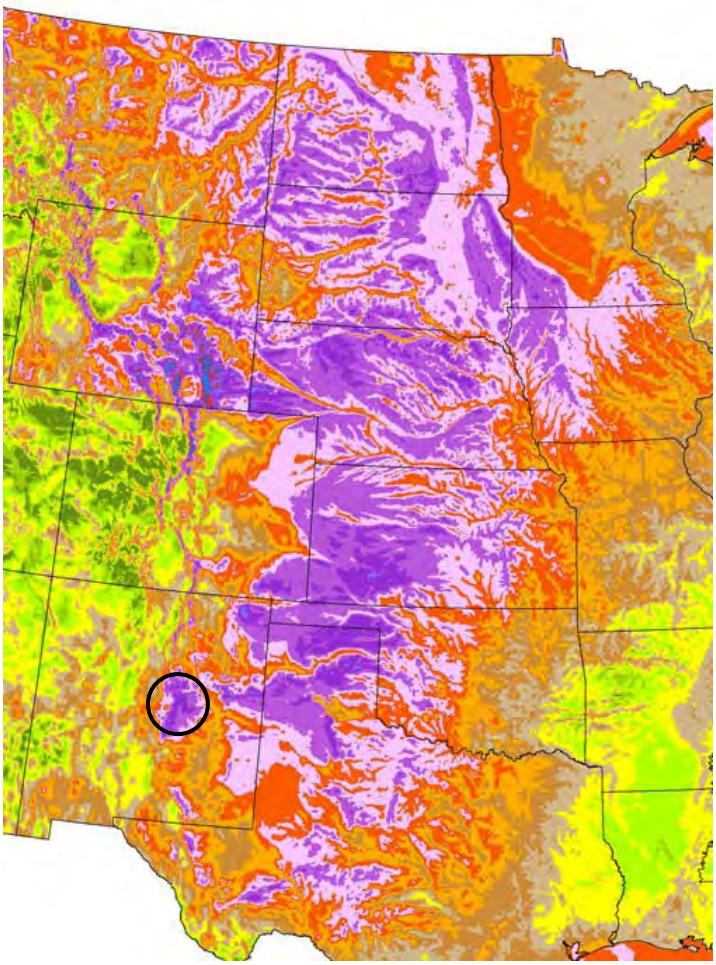

Figure 15. U.S. average annual wind speed at 80 meters[49]. The highest resource areas (greatest average wind speed) are those denoted by the darkest purple color. The black circle outlines the wind-generation area being targeted in New Mexico by SunZia. While central New Mexico is a high-quality wind resource area, it is also a small part of the vast mid-continent wind province and constitutes a modest rather than a huge resource.

Wind Energy and Natural Gas Generation

The principal conclusion of the report was stated as follows:

> "[The report] concluded that the SunZia project…will live or die based on the successful development of wind and solar power in central New Mexico and southern Arizona."

[48] Susan Whittington, "Arizona 2013: Birthplace of the utility of the future?," *Energy Prospects West*, January 8, 2013. Available from http://www.energyprospects.com/cgi-bin/package_display.pl?packageID=3985.

[49] Taken from the National Renewable Energy Laboratory 80-meter wind resource map for the United States, available at http://www.nrel.gov/gis/wind.html.

Yet one can say almost as readily that the project will live or die based upon development of natural gas generation in southwestern New Mexico and southeastern Arizona. Both sources of generation are required to give the project a chance to succeed financially. Wind energy alone cannot accomplish this. Neither source by itself can ensure the success of the full scope of the project, and even by using both, it is quite possible that sufficient generation will not be built and subscribed to quickly enough to sustain it financially. The great difficulty with the project, as noted previously in the critique, is that generation of either variety is unlikely to be needed rapidly enough to recover costs for the entire project and make it profitable, especially with the current rapid rate of development of renewable sources in targeted markets.

Conflicting Comments

A major point of contention brought out in the article centered around comments made by Sandy Bahr of the Grand Canyon Chapter of the Sierra Club, who said there is "little evidence to support claims that the line will carry much, if any, renewable-generated electricity." She later expressed fear that the real motive for the project is to support the 2,300-MW natural gas-fired Gila Bend power plant and the permitted 1,000-MW Bowie power plant, which are associated with SunZia's principal proponent, the SouthWestern Power Group.

John Shepard of the Sonoran Institute replied to this by saying, "Nothing we found supports those claims." While the Cascabel Working Group also does not find evidence that the Gila Bend plant would use SunZia, ***ample evidence exists*** – featured earlier in this critique – ***that the SouthWestern Power Groups does intend to use SunZia to transmit natural gas-generated power from the Bowie plant, which is a basis for reasonable concern***. A more accurate perspective would seem to lie somewhere between Bahr's and Shepard's positions.

The *Greenwire* article then states the following:

> The study concludes that projected and existing natural gas resources could not support the cost to build the SunZia line.

A similar statement could be made nearly as easily about New Mexico's existing renewable resources. What is critical here is the *rate of development* of these resources. It is very likely that *the rate of development* of New Mexico's renewable energy cannot support the cost to build the full scope of this project any more than the rate of development of natural gas generation by itself can. Both resources are substantial in New Mexico and will be the focus of future development, and SunZia will unquestionably target both to sustain itself. Not stating this leads to the misleading conclusion that wind energy alone is all that is needed for this project to succeed and that the project's proponents are focused solely on it. If this project is actually built, its eventual use will differ greatly from the primarily-renewable-energy scenario originally given by the project proponent and strongly reinforced by the SI/HE report.

Evidence Supporting Natural Gas Use of SunZia

In regard to natural gas generation that might use SunZia, in the past 10 years ~2,000 MW of generation has been built or permitted along the SunZia route in southwestern New Mexico and southeastern Arizona, as noted earlier. The long-term expansion of this capacity may ultimately prove crucial to SunZia's success. New Mexico is rich in natural gas, and SunZia follows El Paso Natural Gas's primary

trunk line through southern New Mexico and Arizona for nearly 200 miles. This makes eastern and southwestern New Mexico prime territory to develop natural gas generation. The development of this resource for electrical generation is potentially as important or more so to New Mexico as wind or solar energy development, especially when 3 times as much natural gas generation is projected to be needed in the U.S. during the next 25 years[50,51].

As New Mexico's congressmen state in their letter to Secretary Salazar noted, "***SunZia is the key to unlocking New Mexico's very high-capacity...natural-gas resources to generate electricity***."[52] In this letter, New Mexico's policy makers see natural gas generation as a means of boosting the state's economy and SunZia as a way of helping achieve that. It is just as reasonable to assume that this resource will be developed in response to growing regional demand over the next 30 years as utilities switch to it, and SunZia would be well located for this. Thus the dismissal of the importance of natural gas to this project is unmerited. ***The larger question is whether any of these resources – renewable or nonrenewable or a combination thereof – will be developed in a timeframe that can support a project of SunZia's scope, and it is highly questionable whether they will be.*** It is also questionable whether building either kind of generation at such great distances from load will ever be necessary or advantageous and whether the full scope of SunZia would ever be used.

The Renewable Energy Potential of New Mexico and the Southwest

Shepard is also quoted in the *Greenwire* article as follows:

> "… the amount of potential wind energy resources in the area is far more than what New Mexico could consume."…"The resource there is so good it's going to need to be developed, and it needs to be shipped elsewhere."

Yet these statements are equally true about the renewable energy potential of Arizona, or Nevada, or California, most importantly regarding their solar energy. Each of these states possesses renewable resources that are greater than what each can individually consume, even California. In addition, while New Mexico does have good wind energy potential, this potential is by no means exceptional, and the *Greenwire* article overemphasizes it.

What this means is that all of these southwestern states possess more renewable energy than they or adjacent states can ever fully utilize and that most of this energy is likely to be used more locally. Much of this potential will be left undeveloped for use as needed. Little need exists to devise strategies to transmit it long distances because it is somehow lacking elsewhere and cannot be economically developed there. The real issue, perhaps, is whether such long-distance transmission results in any cost advantage for the power. All of this raises the question of whether creating a network of several-hundred-mile-long extra-high-voltage transmission systems throughout the West meets a real need or whether this is merely the vision of those who have not thought more realistically and creatively about how to use the abundant high-quality, developable renewable energy that permeates the entire region.

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[50] Rob Patrylak and Greg Hopper, *Energy Market Perspective Mid-Year Report*, *A New Era of "Smart Planning*," Black and Veatch, July 26, 2012. Available from http://bv.com/docs/reports-studies/energy-market-perspective-2012-midyear-final.pdf.

[51] Mavis Scanlon, "Natural gas to provide bulk of new capacity in future," *Energy Prospects West*, August 7, 2012. Available from http://www.energyprospects.com/archives/247-print.html.

[52] Letter available from http://www.sunzia.net/documents_pdfs/08_14_12_sz_nm_congress.pdf.

Conclusions

The Sonoran Institute/Headwaters Economics (SI/HE) report on SunZia was written in large part because the principal author felt that project opponents and others were overemphasizing the project's natural gas use and dismissing its renewable energy potential[53]. In responding to this, however, the authors overcompensated, portraying the project with an opposing bias. This analysis provides a broader discussion of these issues.

The SI/HE report leads one to believe that the SouthWestern Power Group has no intentions of using SunZia with its natural gas-fired Bowie power plant and never did, and that essentially all generation that will use SunZia will be wind related, with very little if any use by natural gas generation. ***The SouthWestern Power Group has always intended to use SunZia to transmit Bowie power, and natural gas generation would very likely to be a major, if not majority, long-term user of the project.*** If SunZia has developed a comprehensive business model for this project, that model will include this usage.

What complicates any assessment of SunZia is the great uncertainty regarding how its use will evolve, something no one can accurately predict. Policy makers and project proponents must thus consider a range of scenarios when evaluating the project and its economic viability. ***A primarily-renewable-energy scenario for SunZia is unrealistic given the projected growth in energy types in the region over the next 30 years.*** Currently, natural gas generation is expected to dominate new generation in the Southwest even with the enormous emphasis being given to renewable generation. This fact cannot help but influence the evolution of this project and has been largely ignored.

Summary Points

- While the current transmission system in Arizona can physically accept at least the first 500 MW of power from the SouthWestern Power Group's Bowie power plant, this does not ensure that SWPG can acquire transmission capacity to reach all potential customers. ***To further the salability of Bowie power, the SouthWestern Power Group proposed SunZia specifically to more fully access markets and would use SunZia transmission capacity to deliver it.*** SWPG cannot state how much SunZia transmission capacity it will need or likely use because it does not yet have firm power purchase agreements for the plant. However, as the sole owner of the Bowie plant and principal partner in SunZia, SWPG would have a high priority for using SunZia.
- While New Mexico wind generation might be an important component of SunZia's financial success and while some New Mexico wind energy providers are likely to use the project, ***natural gas generation would be as important or more so and could easily become the dominant form of power the project carries once generation along the route is fully developed***. This development may take 30 years or more to reach maturity given the amount of transmission capacity being proposed and the history of other transmission systems.
- Much of the justification for SunZia in publicity materials and the draft environmental impact statement has been to meet renewable portfolio standards in southwestern states, California most importantly, yet ***both the abundance of renewable energy and the rate of its development in these states show that SunZia is not needed to meet them***. Most states in the West are now looking at California to export renewable energy to in order to boost their own economies, while California

[53] John Shepard, Sonoran Institute, personal communication, January 3, 2013.

itself hopes to develop enough of its own renewable energy to export it. This greatly reduces the need and justification for a project like SunZia.

- ***The completion of the 570-MW natural gas-powered Luna Energy Facility at Deming, New Mexico, eliminated any physical congestion on Path 47 in southwestern New Mexico, and additional transmission capacity is not needed to alleviate it***. El Paso Electric (EPE) has overscheduled use of the path, however, reserving most of its capacity and then not fully using it, which results in "congestion scheduling." This prevents others from accessing it. The solution to this is regulatory intervention, not the construction of additional transmission capacity.
- The *Greenwire* article on the SI report implies that SunZia must be built because New Mexico's renewable energy resource is so great– the state cannot use it all, and that energy must and will be used somewhere else. ***Yet a similar statement could be made just as easily about the renewable energy potential of any of the states that New Mexico might want to export its renewable energy to***. This significantly diminishes the potential export market for New Mexico's energy and increases SunZia's financial vulnerability.

Uncertainty and Risk

The uncertainty in the construction and use of SunZia is great, and no one can predict whether the project will actually be built or how it will be utilized in detail. What is certain, however, is that if SunZia is successful, it will carry far more natural gas generation than anyone in SWPG or the BLM currently admits. The great financial uncertainty and high risk that SunZia faces will also make the project very difficult to finance, and any business model must be very flexible and adaptable if any version of the project is to succeed.

To have any chance of success, SunZia must aggressively pursue and encourage the development of every type of energy generation possible along its route, whatever and wherever it might be. ***This project cannot focus solely on renewable energy***. Even by pursuing this comprehensive strategy, SunZia is likely to have difficulty obtaining the number of subscribers needed to recover costs on an acceptable schedule and be profitable. The ease with which both renewable energy generation and natural gas generation can be built closer to load in Arizona and California brings into question whether a project of this scale and length will ever be efficiently and fully used.

The ease with which both renewable energy generation and natural gas generation can be built closer to load in Arizona and California raises the question of whether a project of this scale and length will ever be efficiently and fully used.

Whether natural gas or renewable energy generation uses SunZia depends upon distant markets for New Mexico's power, and the immediate market for both is weak, certainly weaker than initially assumed for wind energy. ***Wind energy would seem to have some immediate potential to use SunZia transmission capacity, but the Bowie power plant represents an immediate, major potential as well and appears as important in the scheme.*** While SunZia may facilitate building the Bowie plant, building the Bowie plant would also significantly benefit SunZia because power purchasers must obtain the transmission capacity needed to deliver the power.

Another significant factor affecting the project's potential success is the very strong and united environmental opposition that has arisen because the project will adversely impact high-quality environmental resources in Arizona if it is completed. The project must either follow the sensitive San Pedro River Valley for 45 miles – the second-most highly valued and protected river valley in the Desert

Southwest after the Colorado River/Grand Canyon – or it must cross the Galiuro Mountains by threading its way between the Santa Teresa, Aravaipa Canyon, and Galiuro Wildernesses, crossing the second-largest unfragmented landscape in Arizona and New Mexico, exceeded in size again by only the Grand Canyon area. The crossing of the Galiuro Mountains is thus one of the most sensitive environmental areas in southern Arizona and of universal concern.

The Final Word – SunZia's Purpose

- ***At this point this project is not being built to meet a fundamental need.*** Rather, it is being built almost exclusively to give energy producers in New Mexico a chance to sell their power in far-distant markets because they cannot sell it in more local markets. No guarantee exists that these producers can sell their power in this way. This is quite unlike the rationale and justification for building such projects in the past, which utilities undertook based upon carefully assessed need. This was necessary because ultimately these projects could be paid for only by forcibly extracting money from ratepayers. It would seem that this must ultimately be the case with SunZia also, through some mechanism.

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- ***The real question is whether building SunZia can give New Mexico power producers a sufficient cost advantage to allow them to undercut or compete effectively with the same basic type of power in out-of-state markets.*** These producers do not have a monopoly on the power they want to sell but must compete strongly with more-local energy producers in these distant markets. Merely having the transmission capacity to reach those markets can by no means assure their success.

- ***The underlying purpose for SunZia is thus not about meeting need but about trying to access markets. This constitutes a major transition in the utility industry away from building infrastructure to meet a projected need toward merely attempting to sell someone else's energy***. While not building this project may hurt prospective energy producers in areas such as New Mexico, this does not mean that Arizona, California, and Nevada will go wanting for renewable energy and that needs will go unmet. Rather, this will influence where energy facilities are located, with associated economic activity focused more strongly in a different area. That activity will not necessarily be lost or foregone. The BLM's recent Solar Energy Development Programmatic Environmental Impact Statement (PEIS) is further step in facilitating this.

- ***Policy makers must decide which is more practical and secure***: (1) building 500- or 1000-mile-long extra-high-voltages transmission lines to deliver distant-generated power, inevitably across sensitive lands in some areas, or (2) building needed generation closer to load, much of it on a smaller, more distributed scale, and using shorter, more local transmission lines to deliver power. This choice depends strongly on economic and security considerations, not upon the need for power generated at great distances. Upgrading existing lines to deliver more locally generated power could efficiently meet these needs, and more conservative subregional transmission projects such as the Southline would have far fewer environmental impacts.

- ***Does a mega-scale transmission system genuinely have an advantage for the nation over a more diffuse, local and distributed energy system?*** Such a "local" system can include utility-scale projects just as readily as community-scale or distributed projects, and with less transmission loss. One can no doubt demonstrate some advantages in such a large-scale system, but do those advantages convincingly and sufficiently outweigh the disadvantages to confidently build it, and are the economic and environmental costs worth it? Are we perhaps enamored with a mega-scale system because our principal generation sources of the past – coal, nuclear energy, and large-scale hydroelectric power – have demanded it?

About the Cascabel Working Group

The Cascabel Working Group (CWG) serves as a voluntary community organization to educate governmental organizations and individuals within the government; non-governmental organizations and individuals within those organizations; and the public about environmental, archaeological, cultural, recreational, agricultural, economic and other features of the San Pedro River Valley and its tributaries with a focus on the Middle San Pedro River Watershed.

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Mick was raised in central Iowa and graduated from the University of Arizona in 1977 with an M.S. in Geosciences. Following graduation, he worked for Cities Service Oil Company and Marathon Oil Company before returning to Tucson in 1986. He subsequently worked for the Department of Geosciences as an administrative assistant for the Geophysics Group for 23 years, fully retiring in 2010. Since retiring, he has been very active in working to protect the San Pedro Valley and currently serves as Co-Chair of the Cascabel Working Group.

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