



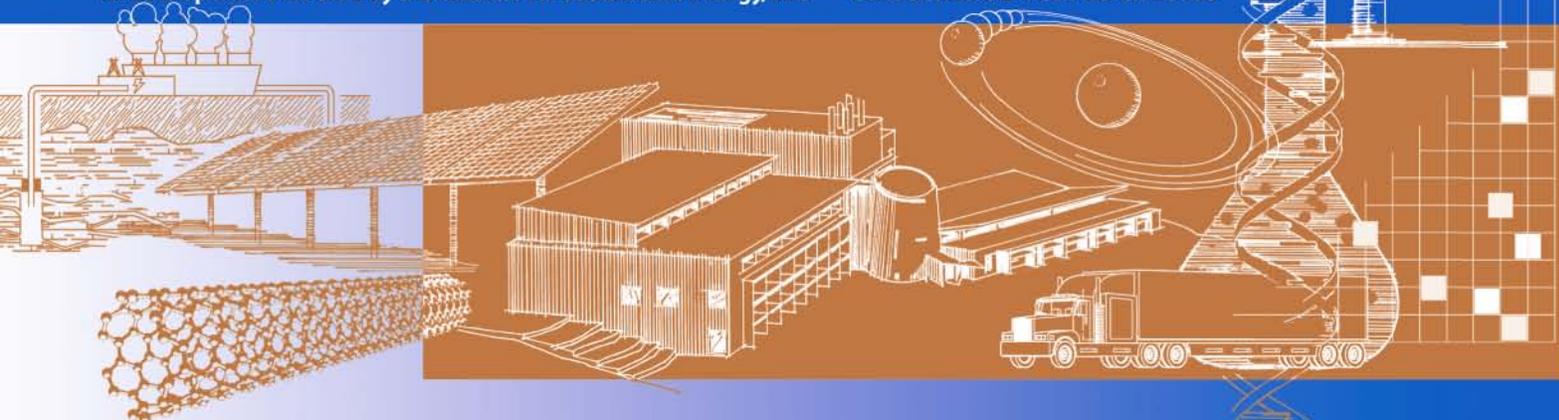
Moving Beyond Paralysis: How States and Regions Are Creating Innovative Transmission Projects

May 2009 — May 2010

A. Schumacher
Schumacher & Associates
Arlington, Virginia

S. Fink and K. Porter
Exeter Associates, Inc.
Columbia, Maryland

Subcontract Report
NREL/SR-550-46691
October 2009



Moving Beyond Paralysis: How States and Regions Are Creating Innovative Transmission Projects

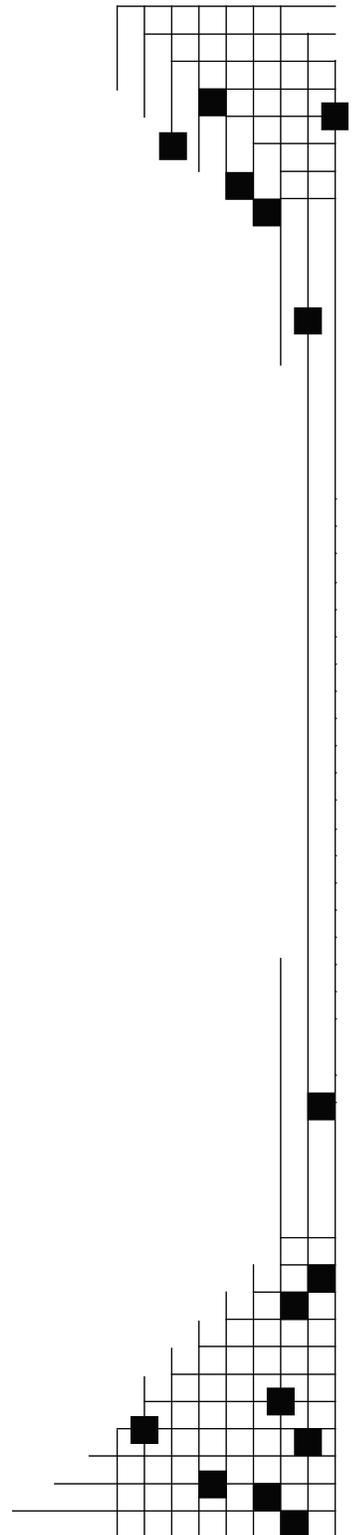
May 2009 — May 2010

A. Schumacher
Schumacher & Associates
Arlington, Virginia

S. Fink and K. Porter
Exeter Associates, Inc.
Columbia, Maryland

NREL Technical Monitor: Lynn Coles
Prepared under Subcontract No. LAM-9-99431-01

Subcontract Report
NREL/SR-550-46691
October 2009



National Renewable Energy Laboratory
1617 Cole Boulevard, Golden, Colorado 80401-3393
303-275-3000 • www.nrel.gov

NREL is a national laboratory of the U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC

Contract No. DE-AC36-08-GO28308

NOTICE

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

Available electronically at <http://www.osti.gov/bridge>

Available for a processing fee to U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: <mailto:reports@adonis.osti.gov>

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering: <http://www.ntis.gov/ordering.htm>

This publication received minimal editorial review at NREL



Acknowledgments

The National Renewable Energy Laboratory's Electricity, Resources and Building Systems Integration office funded the research that went into this report. The authors thank Lynn Coles of the National Renewable Energy Laboratory for supporting this work.

We also thank Mr. Coles and David Hurlbut of the National Renewable Energy Laboratory for reviewing an early draft of this report. The authors also thank David Olsen of Western Grid Group; Ryan Pletka of Black & Veatch Global Renewable Energy Group; Cynthia Hinman of the California Independent System Operator; Jay Caspary of the Southwest Power Pool; Dottie Roark of the Electric Reliability Council of Texas; Morey Wolfson of the Colorado Governor's Energy Office; and Sean Egusa of the Bonneville Power Administration for reviewing sections of this report. Finally, the authors thank Bruce Green of the National Renewable Energy Laboratory for his editorial assistance.

TABLE OF CONTENTS

	Page
I. Introduction.....	1
II. Texas Competitive Renewable Energy Zones	3
III. Colorado Renewable Energy Resource Zones.....	6
IV. California Initiatives	7
A. California Independent System Operator Location-Constrained Resource Interconnection	8
B. California Renewable Energy Transmission Initiative	9
C. California Public Utility Commission Transmission “Backstop”	11
V. Bonneville Power Administration Network Open Season	11
VI. Southwest Power Pool’s Balanced Portfolio Approach.....	13
VII. Conclusion	15

TABLE OF FIGURES

	Page
Figure 1. Proposed CREZ Transmission Projects in Texas.....	5
Figure 2. Xcel Colorado SB 07-100 Plan	7
Figure 3. Conceptual RETI Transmission Segments.....	10
Figure 4. SPP’s Balanced Portfolio Projects.....	14

I. Introduction

It is widely believed throughout the electric power industry that more transmission is needed in the United States to maintain grid reliability and to meet growing demand. The level of investment in transmission infrastructure in the United States declined through the 1990s to less than \$3 billion per year (adjusted for inflation) in 1999, down from an average of \$5.5 billion per year in the mid-1970s.¹ Since that time, investment in transmission has once again started to rise, reaching an estimated \$9.5 billion in 2008, and is projected to rise to \$10.3 billion in 2009 and about \$11 billion in 2010.² Despite this increase in transmission investment, the North American Electric Reliability Corporation (NERC) cautions that even more transmission is needed. NERC's latest reliability assessment projects that transmission miles will increase approximately 9.5%, but generation will increase by about 21% over the next decade and hence, some regions may start falling below a reliable transmission capacity margin as early as 2010.³

Furthermore, the connection between state Renewable Portfolio Standard (RPS) policies and transmission may not have been evident to policy makers when RPS policies were first enacted, but it is becoming increasingly obvious now. Through 2008, 28 states and the District of Columbia had implemented state RPS policies that require load serving entities (LSEs) to have a specified percentage of their electricity sales come from eligible renewable energy resources. In addition, many existing state RPS requirements have increased since their inception – since 2003, 17 states have revised their RPS policies, some more than once, mainly to increase the amount of renewable energy required.

Finally, higher quality renewable energy resources tend to be located in remote areas, away from loads, and available transmission infrastructure in these areas tends to be undersized as compared to the available renewable energy resources. Expanding transmission in these regions is seen as necessary for LSEs to be able to meet state RPS requirements. In addition, seeing the business opportunity spurred at least in part by state RPS requirements, renewable energy generation developers have flooded the generator interconnection queues of transmission providers in several regions across the country.⁴

¹ “20 Percent Wind Energy by 2030: Increasing Wind Energy’s Contribution to U.S. Electricity Supply,” U. S. Department of Energy, July 2008, http://20percentwind.org/20percent_wind_energy_report_revOct08.pdf.

² Testimony of Pedro J. Pizarro before the Federal Energy Regulatory Commission’s Technical Conference on Integrating Renewable Resources into the Wholesale Electric Grid (Docket No. AD09-4).

³ North American Electric Reliability Corporation, *2008 Long-Term Reliability Assessment 2008-2017*, October 2008, <http://www.nerc.com/files/LTRA2008.pdf>.

⁴ Kevin Porter, Sari Fink, Christina Mudd and Jennifer DeCesaro, *Generation Interconnection Policies and Wind Power: A Discussion of Issues, Problems, and Potential Solution*, National Renewable Energy Laboratory, NREL/SR-550-44506, January 2009, <http://www.nrel.gov/docs/fy09osti/44508.pdf>.

This report will profile certain state and regional transmission policy initiatives aimed at promoting transmission development, mainly to access renewable resources – including renewable energy zones, location-constrained tariffs, open seasons, and balanced portfolio plans. In particular, this article will focus on transmission initiatives intended to plan and build transmission in advance of new generation, instead of waiting for enough planned new generation to justify the development of a new transmission line of sufficient capability. These initiatives, at various stages of development, are located in the states of Texas, Colorado, and California, and the regions covered by the Bonneville Power Administration (BPA) and the Southwest Power Pool (SPP). These activities could likely result in the building of much-needed transmission lines. While the success of these new proactive programs has yet to be fully demonstrated, these state and regional plans could serve as models to be considered and adopted by other states and regions that are encountering difficulty developing new transmission lines.

This report is limited to proactive transmission policies or cost recovery. This report will not cover examples of what we call regional proactive transmission planning for renewable energy. Examples include the Western Renewable Energy Zone (WREZ) initiative, which will measure and define renewable energy zones in the West. The Western Governors' Association administers the WREZ initiative and includes 11 states, two Canadian provinces, and part of Mexico. Another example is the Midwest ISO's Regional Generation Outlet Study that is assessing the transmission that may be necessary to transmit the roughly 15 GW of renewable energy needed to meet RPS requirements in Minnesota, Wisconsin, Illinois, and Iowa. While both of these efforts may result in new transmission, they will have to overcome hurdles such as transmission cost allocation that the proactive transmission policies were designed to overcome.⁵ Other states have established transmission infrastructure authorities, which we have addressed previously and will not discuss further.⁶

This report was compiled by reviewing available documents and is current as of August 2009; federal proposals from Congress and the Obama Administration, therefore, are beyond the scope of this article. The report builds upon a comparison of proactive state and regional transmission proposals and policies prepared by Exeter Associates in January 2008.⁷

⁵ For more examples, see Andrew Mills, Ryan Wiser, and Kevin Porter, *The Cost of Transmission for Wind Energy: A Review of Transmission Planning Studies*. Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-1471E, February 2009, <http://eetd.lbl.gov/EA/EMP/reports/lbnl-1471e.pdf>.

⁶ Kevin Porter and Sari Fink, "State Transmission Infrastructure Authorities: The Story So Far," *The Electricity Journal*, April 2009. See also the NREL publication available at www.nrel.gov/docs/fy08osti/43146.pdf.

⁷ Kevin Porter and Sari Fink, *A Table on Pro-active Transmission Proposals and Policies to Develop Transmission Accessing Renewable Energy*, January 2008, http://www.awea.org/policy/regulatory_policy/transmission_documents/Expansion/Summary_ProactiveTransmissionPolicies_Jan2008.pdf.

II. Texas Competitive Renewable Energy Zones

Measured by the amount of new renewable energy capacity installed, Texas has the most successful state RPS policy in the country. In 2002, Texas supplanted California as the state with the most installed wind capacity and has far surpassed its initial RPS targets. Nearly all of the renewable energy capacity used to meet the RPS in Texas is wind, and most of it is located in West Texas. The region features significant transmission congestion when delivering wind energy from West Texas to load centers in East Texas, and adding new wind capacity will become more difficult without new transmission.

In 2005, the Texas Legislature passed Senate Bill 20, which expanded the Texas RPS and authorized the creation of Competitive Renewable Energy Zones (CREZ), defined as areas with high renewable energy resource potential.⁸ The Public Utility Commission of Texas (PUCT) was tasked with defining the zones by considering a number of factors, such as the level of financial commitment already exhibited by wind energy developers. The statute also dispensed with demonstration of need requirements for transmission built to serve these zones, and guarantees cost recovery. The Texas legislature directed the PUCT to select the CREZs and to devise a transmission plan to move power generated from these zones to various population centers. The PUCT subsequently directed the Electric Reliability Council of Texas (ERCOT) to examine regions of Texas for consideration as potential CREZs.

ERCOT submitted a report in late 2007, from which the PUCT designated five CREZs in West Texas and the Texas Panhandle, and four different scenarios for wind energy and transmission development from those CREZs. The four scenarios ranged from 12,053 MW to 24,859 MW of wind power transfer capability from the five CREZs in the west to the load centers in the east. The PUCT then tasked ERCOT with developing cost estimates for constructing transmission for the four scenarios. In April 2008, ERCOT released a study identifying transmission plans for the four scenarios with projected costs ranging from \$2.95 billion to \$6.38 billion.⁹

In July 2008, the PUCT granted preliminary approval for developing Scenario 2 at an estimated cost of \$4.93 billion. Scenario 2 could result in 18,456 MW of wind power moving from the Texas Panhandle to Dallas and Fort Worth; from Central-west Texas and Abilene to Dallas, Austin, and San Antonio; and from McCamey to Austin and San Antonio. The plan includes 2,334 miles of new 345-kV right of way and 42 miles of new 138-kV right of way transmission

⁸ Texas Legislature, Senate Bill 20, <http://www.capitol.state.tx.us/BillLookup/Text.aspx?LegSess=791&Bill=SB20#>.

⁹ ERCOT, "CREZ Transmission Optimization Study Summary," presentation by Dan Woodfin to the ERCOT Board of Directors, April 15, 2008, www.ercot.com/.../Item_6_-_CREZ_Transmission_Report_to_PUC_-_Woodfin_Bojorquez.pdf. Scenarios 1a & 1b would have supported up to 12,053 MW of wind capacity, Scenario 3 would have supported up to 24,859 MW, and Scenario 4 would have supported up to 24,419 MW.

lines. Additionally, the collector system for wind power projects will cost between \$580 and \$820 million.¹⁰ Other than the costs of the direct generator interconnection facilities, transmission costs will be spread across all load-serving entities in ERCOT. In early 2008, the PUCT began a Competitive CREZ Transmission Service Provider Selection Process. The PUCT wanted to provide an opportunity for new transmission companies to participate in CREZ transmission development along with the established transmission service providers (TSP). The PUCT issued an invitation for all interested entities to submit construction proposals prior to a hearing in mid-December 2008. In March 2009, following the December hearing and open meetings held January through March 2009, the PUCT issued a final order awarding the development of CREZ transmission plan segments to the following entities: AEP Texas Central Company (AEP TCC), AEP Texas North Company (AEP TNC), Bandera Electric Cooperative, Brazos Power Electric Cooperative, CenterPoint Energy Houston Electric, Texas Municipal Power Agency (TMPA), Lower Colorado River Authority (LCRA), Oncor Electric Delivery Company, Cross Texas Transmission, Electric Transmission Texas (ETT), Lone Star Transmission, Sharyland Utilities, South Texas Electric Cooperative (STEC), and Wind Energy Transmission Texas (WETT).¹¹ Figure 1 outlines the CREZ projects.

The PUCT intends to stagger the transmission filings over time, with the intent of having the first of these transmission projects in operation by 2011 or 2012. The PUCT opened two dockets for the purposes of facilitating and sequencing the Certificate of Convenience and Necessity (CCN) application process. The set of projects in the first docket have been identified as priority projects and the PUCT expects the entities responsible to submit their filings by October 7, 2009. The second CCN sequencing docket will address the remaining projects.¹²

The CREZ TSP designations have been challenged by the Texas Industrial Energy Consumers and the City of Garland, whose municipal electric utility operates as Garland Power & Light. Both of these entities object to the way the TSPs were chosen, especially with respect to the selection of three new entrants, Cross Texas Transmission, Lone Star Transmission, and Wind Energy Transmission Texas, arguing this will not lead to a least cost solution. The City of Garland especially objects to the PUCT leaving out municipally-owned utilities from the CREZ plan because they are not required to obtain a CCN to construct transmission. The PUCT had imposed a requirement that only TSPs that are required to obtain a CCN may be selected to construct CREZ transmission. Following PUCT denial of two motions for rehearing, the City of Garland has launched a lawsuit challenging the rulings.¹³

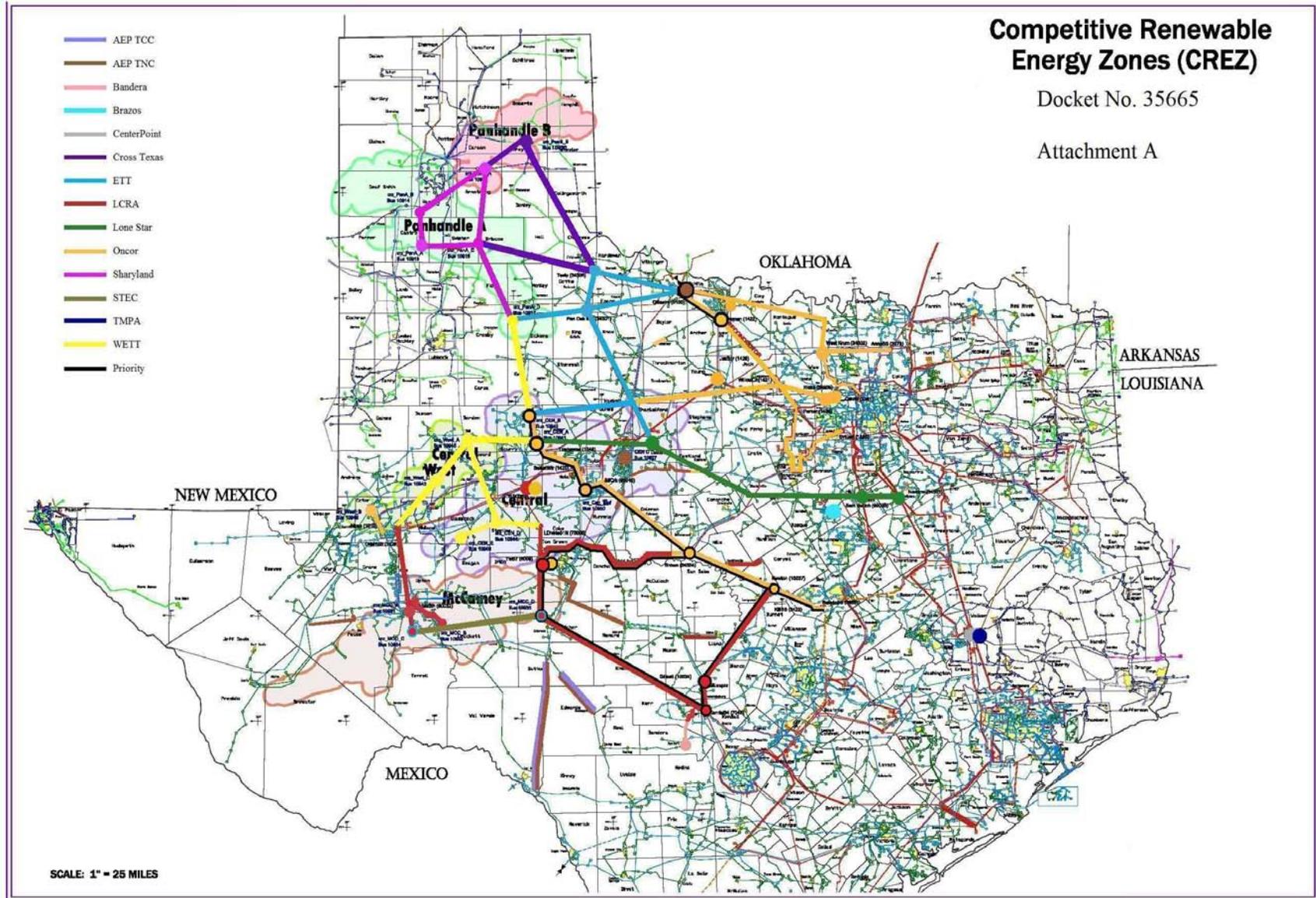
¹⁰ *Ibid.*

¹¹ Public Utility Commission of Texas, "Order, Commission Staff's Petition for Selection of Entities Responsible for Transmission Improvements Necessary to Deliver Renewable Energy from Competitive Renewable Energy Zones," Docket No. 35665, March 30, 2009.

¹² Public Utility Commission of Texas, Docket Nos. 36801 and 36802.

¹³ Public Utility Commission of Texas, Docket No. 36556, accessed September 9, 2009.

Figure 1. Proposed CREZ Transmission Projects in Texas.



Source: Public Utility Commission of Texas, CREZ Final Map Attachment A, Docket No. 35665.

III. Colorado Renewable Energy Resource Zones

In 2007, the Colorado Legislature enacted SB 07-091, which established a task force to identify high-potential renewable resource generation-development areas within the state.¹⁴ The Task Force on Renewable Resource Generation Development Areas issued its final report on December 21, 2007. The report contained maps of ‘Renewable Resource Generation Development Areas’ (GDA), defined as specific geographic regions that could provide a minimum of 1,000 MW of developable generating capacity. The task force identified eight GDAs for wind power with a total potential capacity of 96 gigawatts (GW), and two GDAs for solar power with an estimated achievable capacity of 5.5 GW.¹⁵

Another bill the Colorado Legislature passed in 2007, SB 07-100, directs Colorado’s two investor-owned utilities, Xcel Energy (Public Service Company of Colorado) and Black Hills Energy (Colorado Electric Utility Company, formerly owned by Aquila Networks), to identify energy resource zones (ERZs) in Colorado, develop transmission plans to access the zones, and submit certificate of public convenience and necessity (CPCN) applications for the new or expanded transmission.¹⁶ Starting in October 2007, and every odd-numbered year thereafter, Xcel Energy and Black Hills¹⁷ are required to submit reports recommending ERZs to the Colorado Public Utilities Commission (CPUC), which is required to act upon the plans within 180 days. In addition, the utilities may recover transmission development expenses during construction at the weighted average cost of capital, including a return on equity. SB 07-100 also requires the utilities to consider how transmission development could encourage local rural ownership of renewable energy facilities, such as through creation of renewable energy cooperatives.

Xcel Energy submitted its first SB 07-100 plan in 2007 with a preliminary set of four ERZs and a CPCN for one new transmission line in northeastern Colorado that the CPUC approved. This plan was subsequently updated and resubmitted (as a preliminary plan) on November 24, 2008, taking into account the GDA information developed by the SB 07-091 task force that was not available when the first plan was created.¹⁸ Xcel Energy identified five ERZs encompassing the wind and solar GDAs from the task force report. The updated ERZ filing also contained a long-term transmission expansion proposal to access and/or relieve congestion to the zones. In May 2009, Xcel Energy and Tri-State Generation and Transmission Association filed applications

¹⁴ Colorado Senate Bill 07-091 at http://www.colorado.gov/energy/in/uploaded_pdf/091_enr.pdf.

¹⁵ Colorado Senate Bill 07-091 Renewable Resource Generation Development Areas Task Force, “Connecting Colorado’s Renewable Resources to the Markets,” December 21, 2007, <http://www.colorado.gov/energy/utilities/SB91-taskforce.asp>.

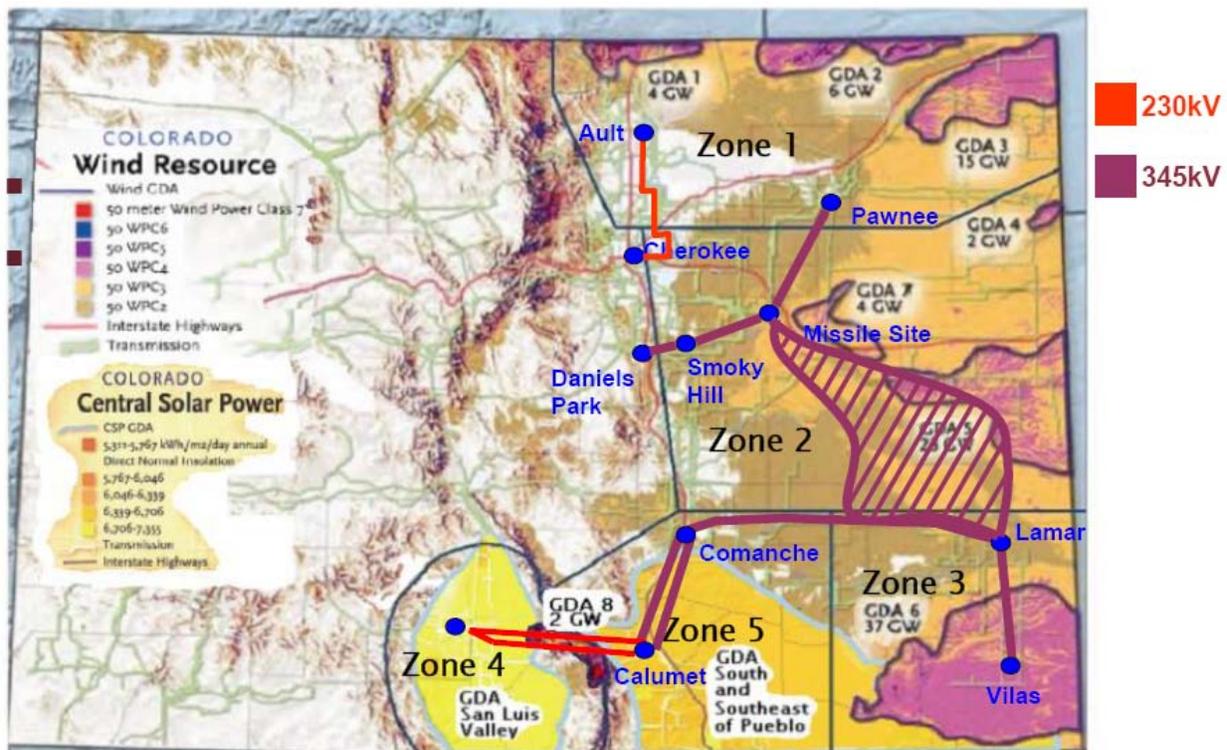
¹⁶ Colorado Senate Bill 07-100 at http://www.colorado.gov/energy/in/uploaded_pdf/100_enr.pdf.

¹⁷ Black Hills Energy will be submitting its first SB 07-100 plan in 2009.

¹⁸ Public Service Company of Colorado, “Senate Bill 07-100 Designation of Energy Resource Zones and Transmission Planning Information Report,” Xcel Energy Public Service Company, November 24, 2008.

with the Colorado Public Utilities Commission for a series of 230-kV and 345-kV lines in southern Colorado to improve reliability and to access renewable energy resources.¹⁹

Figure 2. Xcel Colorado SB 07-100 Plan.



Source: Xcel Energy, *Senate Bill 100 Information Filing Presentation Clean Energy Development Authority*, January 22, 2009.

IV. California Initiatives

California has an RPS requirement of 20% renewable energy by 2010 and a policy goal of 33% renewable energy by 2020.²⁰ State agencies and numerous market participants have identified transmission as a primary barrier, and various initiatives are underway.

¹⁹ Xcel Energy, “Tri-State and Xcel Energy move forward with significant southern Colorado transmission project proposal,” May 14, 2009, <http://xcelenergy.com/Company/Newsroom/Pages/NewsRelease2009-05-14-TRI-STATEANDXCELENERGYMOVEFORWARDWITHSIGNIFICANTSOUTHERNCOLORADOTRANSMISSIONPROJECTPROPOSAL.aspx>.

²⁰ California is currently considering legislation to increase the RPS requirement to match this goal.

A. California Independent System Operator (CAISO) Location-Constrained Resource Interconnection

A central issue with transmission expansion is the “chicken and egg” dilemma, whereby generation developers cannot construct generating projects because of a lack of transmission, yet transmission is not developed because of a lack of generation to help pay for it. The chicken and egg problem is particularly pronounced for renewable-rich areas, as the cost to fully develop the transmission necessary to access these areas is often considered too much for one developer to bear.

The CAISO’s location-constrained resource interconnection (LCRI) tariff, approved by the Federal Energy Regulatory Commission (FERC) on December 31, 2007, was designed to overcome the chicken and egg obstacle.²¹ For an identified resource area (which is not limited to renewable energy, but the first areas are likely to be renewables-oriented), the CAISO will recover new transmission costs through its transmission access charge that is assessed to all loads in the CAISO grid. Transmission facilities must be included in the CAISO’s transmission planning process and turned over to the CAISO’s operational control once in operation. In addition, there must be a demonstrated interest of 60% or more in the transmission capacity, of which at least 25% is from interconnection agreements. The other 35% could be from power contracts of five years or longer, additional interconnection agreements, being in the CAISO interconnection queue and paying a cash deposit to the CAISO equal to the cost of all interconnection costs, or a cash deposit of five percent of a generator’s pro rata share of the capital costs of a proposed transmission facility in a location-constrained resource area.

Once the transmission is built and generators begin coming online, they will pay a pro rata share of costs going forward.²² Total investment in LCRI facilities is limited to 15% of the value of the high-voltage transmission assets in the CAISO.²³ On May 18, 2009, the CAISO announced their Board of Governors have approved the first LCRI project, the Highwind Project transmission upgrade, which consists of 10 miles of new transmission lines and a new substation to access the Tehachapi renewable energy development area, at an estimated cost of \$46.1 million.²⁴

²¹ FERC, “Order Conditionally Accepting Tariff Revisions,” LCRI, California Independent System Operator Corp. Docket No. ER08-140-000, December 21, 2007, <http://www.caiso.com/1b63/1b63b6fa48bb0.html>.

²² CAISO, “Attachment B – Blacklines, Location Constrained Resource Interconnection Amendment Filing,” October 31, 2007, <http://www.caiso.com/1816/1816d22953ec0.html>.

²³ The most recent TAC filing identified the value of HV TAC at approximately \$931 million, therefore 15% would be about \$139 million (communications with Cynthia Hinman, California ISO, April 28, 2009).

²⁴ CAISO press release, “California ISO okays first location-constrained transmission project,” May 18, 2009, <http://www.caiso.com/23b2/23b2cb348860.pdf>.

B. California Renewable Energy Transmission Initiative

In September 2007, the California Public Utility Commission (CPUC), the California Energy Commission (CEC), the CAISO, and California's Publicly-Owned Utilities (POU) launched the California Renewable Energy Transmission Initiative (RETI), which aims to identify Competitive Renewable Energy Zones (CREZ) in and out of California, and the transmission needed to access those zones. RETI is intended to feed into the CAISO's LCRI process. RETI is organized as a stakeholder collaborative with the goal of building a broad base of support for the transmission projects necessary to meet state RPS and greenhouse gas reduction goals. RETI work is being conducted in three phases. In Phase I, RETI identified and ranked CREZs in California and neighboring areas that can provide significant electricity to California consumers by 2020.²⁵

The RETI participants developed a ranking system for assessing CREZs that accounts for the economic cost effectiveness of developing the resources in each zone, the environmental impacts of doing so, the degree of development and scheduling certainty associated with each zone, and other factors that can result in providing renewable supplies to California in the required time-frame. RETI's Phase IA report, released May 21, 2008, described the methodology, assumptions, and resource information sources used to create the economic and environmental ranking systems.²⁶ The Phase IB report, released January 2, 2009, identifies the CREZs and their relative rankings. The highest-ranked options include six in-state CREZs with a combined potential energy output of 74,300 GWh/yr. The report notes that some of these zones, including Tehachapi and the Imperial Valley, are already associated with three major transmission projects – Tehachapi Renewable Transmission Project, Sunrise PowerLink, and the Green Path North. The report also identified approximately 15,000 GWh/yr of out-of-state CREZs that are competitive with California zones – wind and geothermal in British Columbia, geothermal in Oregon and Nevada, and wind in Baja California Norte.²⁷

Phase II consists of further refining the CREZ analysis and developing conceptual transmission plans for accessing the resources. The Phase 2A Final Report outlined a conceptual transmission plan designed to facilitate meeting the 33% by 2020 renewables goal.²⁸ The RETI plan includes 82,739 GWh from 11 CREZs and a series of new transmission lines in three categories – *Foundation*, *Delivery*, and *Collector*. Foundation transmission lines increase the overall capacity of the California transmission network, Delivery transmission lines move energy from the

²⁵ RETI Mission Statement (revised April 2008) at http://www.energy.ca.gov/reti/Mission_Statement.pdf.

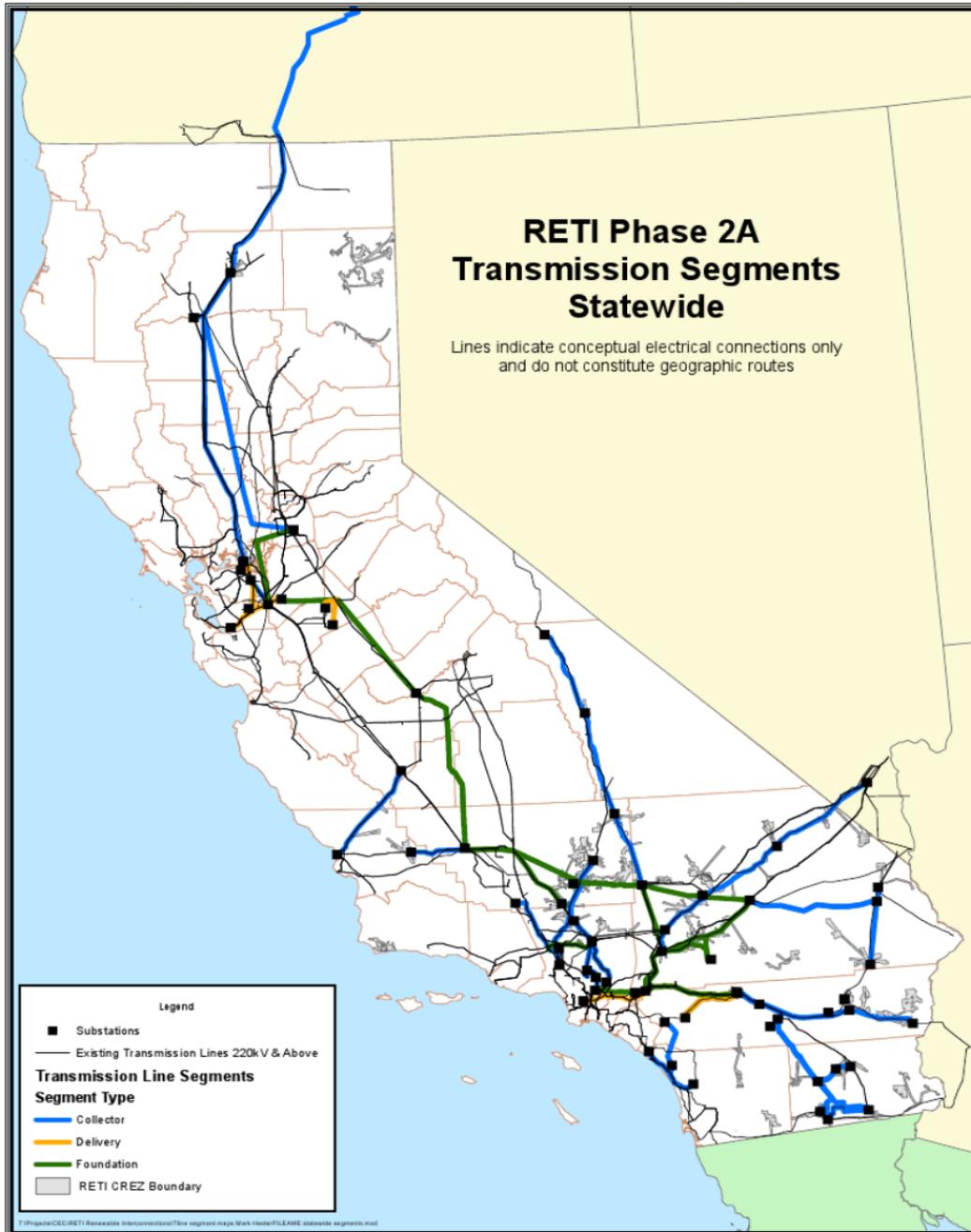
²⁶ Black & Veatch. *Renewable Energy Transmission Initiative, Phase 1A, Final Report*, April 2008, prepared for RETI Coordinating Committee and RETI Stakeholder Steering Committee, <http://www.energy.ca.gov/2008publications/RETI-1000-2008-002/RETI-1000-2008-002-F.PDF>.

²⁷ RETI Stakeholder Steering Committee, "Renewable Energy Transmission Initiative, Phase 1B, Final Report," January 2009, <http://www.energy.ca.gov/2008publications/RETI-1000-2008-003/RETI-1000-2008-003-F.PDF>.

²⁸ RETI Coordinating Committee, "Renewable Energy Transmission Initiative, Phase 2A, Final Report," August 2009, <http://www.energy.ca.gov/2009publications/RETI-1000-2009-001/RETI-1000-2009-001-F-REV.PDF>.

Foundation lines to major load centers and Collector lines connect the CREZs to the Foundation and Delivery lines. Figure 3 shows a map of the RETI transmission projects. The total cost of the plan is estimated at \$5.144 billion for Foundation lines, \$788 million for Delivery lines, and \$656 million for the Collector system, totaling \$6.558 billion.

Figure 3. Conceptual RETI Transmission Segments.



Source: RETI Coordinating Committee, "Renewable Energy Transmission Initiative, Phase 2A, Final Report," August 2009, <http://www.energy.ca.gov/2009publications/RETI-1000-2009-001/RET-1000-2009-001-F-REV.PDF>.

Phase III will involve identifying and composing specific transmission project proposals and working with the CAISO and POU transmission planning processes to implement the projects.²⁹

C. California Public Utility Commission Transmission “Backstop”

Pursuant to the California Public Utilities Code § 399.25 that came into being when California adopted an RPS, the CPUC guarantees that a utility can recover the costs of transmission projects built for meeting the California RPS through retail rates in the event that FERC disallows an application for cost recovery of wholesale costs. The backstop operates on a project-by-project basis applying only to generators that have first attempted cost recovery through FERC. The backstop applies to in-state network or generation tie facilities that serve multiple RPS-eligible generators. Generator-tie facilities must have at least one CPUC-approved RPS contract. Finally, it must be demonstrated that the facilities are necessary to meet the California RPS and normal cost recovery methods are unavailable.

V. Bonneville Power Administration Network Open Season

The Bonneville Power Administration (BPA) launched its first network open season in April 2008, moving away from a prior business model that required generators to provide up-front financing for market-based transmission. BPA’s network open season program offers transmission service to all entities that request service on BPA’s network (excluding interties), with parties required to commit in advance to purchase a set amount of transmission capacity via a precedent transmission service agreement. The precedent transmission service agreement requires applicants to provide at least one year of transmission charges in advance.³⁰ Under these agreements, BPA has committed to provide the new transmission service if it can be offered and paid for at BPA’s embedded cost rate and if BPA can meet the requirements of the National Environmental Policy Act (NEPA). In addition, BPA will pay for preliminary engineering and design studies. If a transmission service request would require an incremental rate (i.e., customers would have to pay an additional amount above the listed transmission rate), then the precedent transmission service agreement is terminated, and transmission customers are responsible for funding engineering and NEPA studies.

The window to submit an eligible transmission request for BPA’s first network open season closed on June 27, 2008, and resulted in 153 transmission service requests representing 6,410 MW, submitted by 28 participating BPA customers.³¹ Of the 6,410 MW, wind projects

²⁹ RETI Mission Statement Addendum B, p. 13, http://www.energy.ca.gov/reti/Mission_Statement.pdf.

³⁰ For BPA network open season contracts of less than ten years, customers will additionally provide one-half year’s transmission charges in advance for each year below the 10-year threshold. Existing transmission service requests may be extended to 10 years and beyond.

³¹ Bonneville Power Administration. “Network Open Season Nets Robust Response,” factsheet, August 2008, http://www.bpa.gov/corporate/pubs/fact_sheets/08fs/fs_Network_Open_Season.pdf.

accounted for 4,716 MW, or approximately 74% of the 2008 network open season. BPA's initial cluster study identified eight new areas of reinforcement that were needed for BPA to be able to accommodate all of the Precedent Transmission Service Agreements (PTSAs).³² The subsequent financial analysis determined that five of the projects could be constructed at BPA's embedded rates. That, in turn, will help enable 3,360 MW of generation, 2,575 MW of which is from wind power. The final projects are:

- McNary-John Day 500-kV line, now under construction
- Big Eddy-Station Knight 500-kV line and substation
- Little Goose 500-kV line
- I-5 Corridor 500-kV line and substation
- West of Garrison Remedial Action Scheme

BPA will finance and construct network open-season transmission expansion projects either through U.S. Treasury Department borrowing or third party financing, supported by the rates of the future transmission users. Total direct transmission costs are expected to reach \$800 million. Construction began in spring 2009 on the McNary-John Day 500-kV transmission line in Oregon, thanks in part to additional borrowing authority BPA received from the American Recovery and Reinvestment Act that was enacted by Congress in February 2009. Once on-line in late 2012, another 700 MW of wind power could be transmitted.³³ In addition, enough transmission capacity was freed up from requests dropping out of the transmission queue that BPA could offer 2,059 MW of new transmission service without any grid upgrades. Of this, 1,089 MW was for wind projects.

BPA's network open season program employs several features to manage its transmission queue, such as eliminating speculative development proposals through precedent transmission service agreements, aggregating demand of those generators ready to take service, utilizing cluster studies by grouping requests to get a clearer picture of aggregate net impacts of all service requests and the network interactions among the requests, and moving away from prior business models that required generators to finance all of the costs of new transmission lines.³⁴ BPA's second open season was in June 2009. BPA reported receiving 83 transmission service requests for 4,867 MW, 2,599 MW (49 requests) of which were for wind power projects.³⁵

³² Bonneville Power Administration, Network Open Season 2008, Decision Documents, accessed April 28, 2009, http://www.transmission.bpa.gov/customer_forums/open_season/default.cfm?page=nosupdates.

³³ Bonneville Power Administration, "BPA Outlines Major Transmission Expansion for Pacific Northwest," February 19, 2009, <http://bpa.gov/corporate/BPAnews/nreleases.cfm>.

³⁴ Bonneville Power Administration, "Transmission to Offer Network Open Seasons: Meeting Our Obligations to the Next Generation" factsheet, March 2008 at: http://www.transmission.bpa.gov/business/IssuesPolicySteeringCmttee/documents/NOS_Factsheet.pdf.

³⁵ Bonneville Power Administration, "Summary of Eligible TSRs for 2009 Network Open Season," July 22, 2009, http://www.transmission.bpa.gov/customer_forums/open_season_2009/NOS_Eligibility_summary_07-22-09.pdf.

VI. Southwest Power Pool's Balanced Portfolio Approach

The Southwest Power Pool, Inc. (SPP) has implemented a new system for evaluating and developing economic transmission system upgrade projects on a regional basis. Over a two-year period, the SPP's Cost Allocation Working Group (CAWG) worked with SPP stakeholders to develop the new methodology. The CAWG issued a concept paper outlining the Balanced Portfolio approach in late 2007. Subsequently, the SPP's Regional Tariff Working Group developed tariff language that resulted in a tariff filing to FERC on August 15, 2008.³⁶ FERC approved the filing (with modifications) on October 16, 2008.³⁷

The Balanced Portfolio approach evaluates groups, or portfolios of economic transmission projects, for inclusion into the SPP regional planning process, and allows SPP to allocate the entire cost of the upgrades to all SPP zones on a postage-stamp basis, under certain conditions. Portfolios will consist of transmission lines rated 345-kV or higher, but can also include supporting lower voltage infrastructure as needed, as long as the cost of the lower voltage support system does not exceed the cost of the higher voltage line. The aim is to find a portfolio of system-wide economic projects that will be both 'cost beneficial' and 'balanced.' To meet the cost beneficial criteria, the sum of the net present value of total benefits must be equal to or greater than the sum of the net present value of total costs over a 10-year period. To be considered balanced each zone must have total benefits greater than costs. For zones that have benefits below costs, SPP may include lower voltage transmission upgrades for that zone to determine whether that changes the benefit-cost ratio to positive rather than negative. In identifying portfolios, SPP will accept input from customers and stakeholders to complement their own assessments of the congestion and load relief required on their grid.

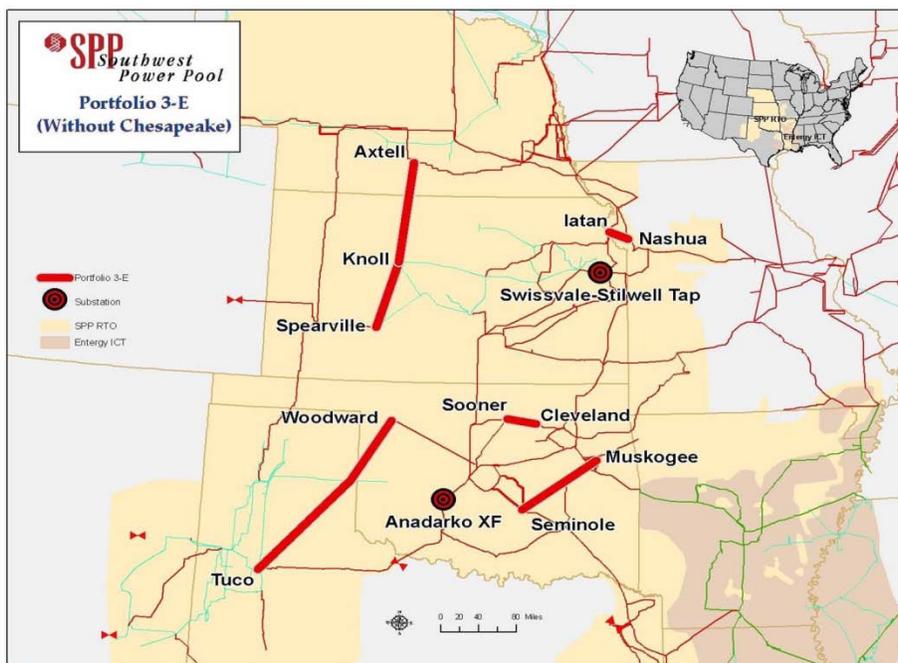
The CAWG examined various portfolios and requested that SPP staff conduct transmission development modeling and benefit-cost analysis on several options. On April 27 and 28, 2009 respectively, the SPP Regional State Committee and Board of Directors/Members Committee approved the first Balanced Portfolio. SPP had examined over 50 different projects to create a portfolio that met the regional criteria. The final portfolio (see Figure 4) consists of five new 345-kV transmission lines, a new 345-kV transformer, and a new connection between two existing 345-kV lines, and is projected to cost approximately \$700 million.³⁸

³⁶ Southwest Power Pool, "Submission of Revisions to Open Access Transmission Tariff to Add "Balanced Portfolio" Cost Allocation Process for Economic Planning Upgrades," FERC Filing Docket No. ER08-1419-000, August 15, 2008.

³⁷ FERC, "Order Accepting Tariff Revisions, as Modified," Docket No. ER08-1419-000, October 16, 2008.

³⁸ Southwest Power Pool press release, "Portfolio of New EHV Transmission Projects Approved: Benefits Will Be Balanced Across SPP Region," April 29, 2009, http://www.spp.org/publications/Transmission_Project_Portfolio_Approved_4_29_09.pdf.

Figure 4. SPP's Balanced Portfolio Projects.



Source: Southwest Power Pool press release, "Portfolio of New EHV Transmission Projects Approved: Benefits Will Be Balanced Across SPP Region," April 29, 2009, http://www.spp.org/publications/Transmission_Project_Portfolio_Approved_4_29_09.pdf.

In January 2009, SPP formed the Synergistic Planning Project Team (SPPT) with the aim of having it address the deficiencies in SPP's transmission planning process. More specifically, SPPT will examine how the annual SPP Transmission Expansion Plan, the Balanced Portfolio, the SPP Extra High Voltage (EHV) Overlay³⁹ studies, and the transmission and interconnection queues can work together. SPPT was directed to review all strategic issues with respect to transmission service, generation interconnection, EHV inter-regional transmission, and wind integration. Part of the impetus for forming the SPPT was the less-than-expected outcome from the Balanced Portfolio process, due mainly to the constraints created by the requirement that the overall portfolio be balanced among all zones and the short 10-year timeframe. One of the SPPT's recommendations was to create a single, integrated planning process that focuses on regional needs. This long-range plan would include back-bone transmission expansion projects that include fortifying ties to other interconnections, and would be updated every three years. The plan would have a 20-year time horizon with a 40-year financial assessment (terminal value for the last 20 years).⁴⁰ As a result, SPP is currently developing a new Integrated Transmission Planning process that will include both short-term and long-term regional plans. SPP is

³⁹ The SPP EHV Overlay project consists of an assessment of several high-voltage backbone transmission line scenarios needed over the next 20 years that could also enable over 20,000 MW of wind power development.

⁴⁰ Southwest Power Pool, "Report of the Synergistic Planning Project," April 23, 2009, <http://www.spp.org/publications/SPPT%20Report%20Version%20v6-1.pdf>.

considering prioritizing and fast tracking several EHV Overlay projects estimated to cost \$2 billion, as part of the new planning process.

VII. Conclusion

State-led transmission initiatives such as Texas Competitive Renewable Energy Zones, Colorado Energy Resource Zones, and the California Renewable Energy Transmission Initiative, as well as regional approaches such as the Bonneville Power Administration Network Open Season, and the Southwest Power Pool Balanced Portfolio Approach offer valuable insight for use in other states and regions. Emerging lessons from these initiatives could provide opportunities for replication elsewhere in the United States to advance transmission projects that would enable the development of new renewable energy projects. Highlights from these new state and regional initiatives include:

- Create open and transparent collaborative stakeholder processes for siting new transmission, facilitate active dissemination of information, and build support for specific transmission projects and related transmission development, especially for renewable energy projects;
- Identify whether particular transmission projects will be required to interconnect renewable energy resources in the state or region to meet RPS requirements, and consider whether to include transmission expansion and development initiatives in RPS legislation;
- Use Competitive Renewable Energy Zones or comparable mechanisms to ensure transmission solutions are developed in advance of building generation; and,
- Identify and employ innovative cost allocation models for financing new transmission lines, such as the pro rata approach in the CAISO's Location-Constrained Interconnection Process.

Debate will undoubtedly continue on how to overcome transmission paralysis and best meet the needs of upgrading and expanding the nation's grid, as well as the development of an extra-high-voltage transmission overlay. In the meantime, experience from state and regional transmission siting initiatives aimed at expanding renewable energy development might offer lessons on how to circumvent traditional barriers to new transmission. Absent a national approach or federal transmission plan to coordinate and plan multiple regional and inter-regional proposals, these early models will provide a framework for increasing interstate cooperation, and perhaps result in transmission projects that bring remote renewable energy resources to load centers.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing the burden, to Department of Defense, Executive Services and Communications Directorate (0704-0188). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION.

1. REPORT DATE (DD-MM-YYYY) October 2009		2. REPORT TYPE Subcontractor report		3. DATES COVERED (From - To) May 2009 - May 2010	
4. TITLE AND SUBTITLE Moving Beyond Paralysis: How States and Regions Are Creating Innovative Transmission Projects				5a. CONTRACT NUMBER DE-AC36-08-GO28308	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) A. Schumacher, S. Fink, and K. Porter				5d. PROJECT NUMBER NREL/SR-550-46691	
				5e. TASK NUMBER WER9.5501	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Exeter Associates, Inc. 5565 Sterrett Place, Suite 310 Columbia, MD 21044				8. PERFORMING ORGANIZATION REPORT NUMBER LAM-9-99431-01	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) National Renewable Energy Laboratory 1617 Cole Blvd. Golden, CO 80401-3393				10. SPONSOR/MONITOR'S ACRONYM(S) NREL	
				11. SPONSORING/MONITORING AGENCY REPORT NUMBER NREL/SR-550-46691	
12. DISTRIBUTION AVAILABILITY STATEMENT National Technical Information Service U.S. Department of Commerce 5285 Port Royal Road Springfield, VA 22161					
13. SUPPLEMENTARY NOTES NREL Technical Monitor: Lynn Coles					
14. ABSTRACT (Maximum 200 Words) This report profiles certain state and regional transmission policy initiatives aimed at promoting transmission development, mainly to access renewable resources – including renewable energy zones, location-constrained tariffs, open seasons, and balanced portfolio plans.					
15. SUBJECT TERMS wind; integration; grid; state, regional; policies; transmission					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UL	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (Include area code)

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.18