

High Lonesome Mesa 100 MW Wind Generation Project

(OASIS #IA-PNM-2006-02)

Interconnection Facility Study

**Final Report
November 2, 2007**

Prepared by:

Public Service Company of New Mexico



*Electric Services
Transmission Operations*



Foreword

This report was prepared for XXXXXX (“XXX”) by the Transmission Operations Department at the Public Service Company of New Mexico (“PNM”).

Any correspondence concerning this document, including technical and commercial questions should be referred to:

Gregory C. Miller
Lead Director of Transmission Operations
Public Service Company of New Mexico
Alvarado Square MS-0604
Albuquerque, NM 87158
Phone: (505) 241-4570
Fax: (505) 241-4363



1. Introduction

Public Service Company of New Mexico (“PNM”) preformed this Interconnection Facility Study (“Study”) in response to an interconnection request by XXXXXXXXXX (“Customer”). The purpose of the Study is to provide cost and construction schedule estimates for the facilities needed to interconnect the Customer’s proposed 100 MW wind power plant (“Project”) located approximately five miles south of the Willard 115 kV station in Torrance County, New Mexico. The proposed Point Of Interconnection is the Willard 115 kV station, which is owned and operated by Tri-State Generation and Transmission Association, Inc. (“TSGT”). The in-service date originally proposed is December 31, 2007.

The previously completed Feasibility Study¹ and System Impact Study² established the Facility Study components listed below. Figure 1 is a one-line diagram of the transmission system in the vicinity of the Project and facilities impacted.

- Component 1: Upgrade the Algodones – Willard 115 kV line and remove Algodones station terminal equipment limitations to allow the line to be operated at its thermal rating of 119 MVA.
- Component 2: Upgrade the Belen – Willard 115 kV line to be operated at 200 MVA.
- Component 3: Mitigate the Tome – Las Chavez overload on the Person-Tome 46 kV line.
- Component 4: Mitigate the Belen-Socorro 115 kV line overload.
- Component 5: Add a sixth bay position at the Willard 115 kV station to interconnect the Project, and remove any Willard station terminal equipment limitations associated with the Algodones – Willard and Belen – Willard 115 kV line upgrades.

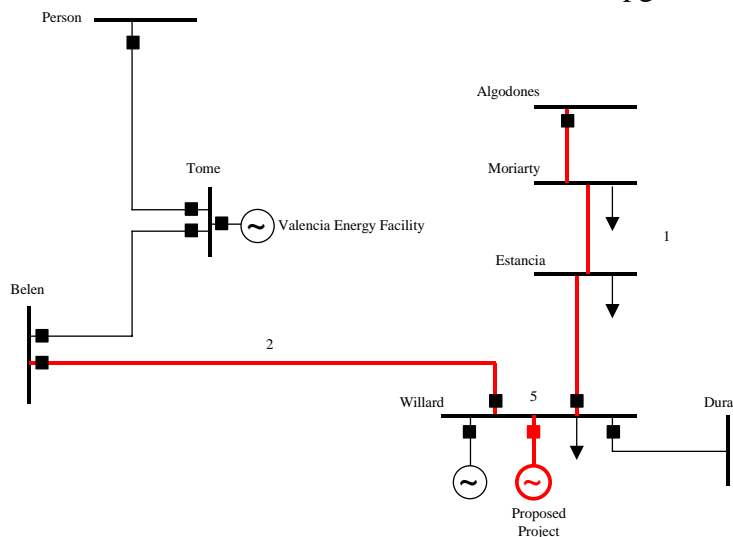


Figure 1: One-Line Diagram

¹ IA-PNM-2006-02 100 MW Wind Generation Project Interconnection Feasibility Study Final Report, September 13, 2006

² IA-PNM-2006-02 100 MW Wind Generation Project Interconnection System Impact Study Final Report, May 2007



Section 2 summarizes the results of the Study. Additional information is contained in the Exhibits. Cost and construction schedule estimates for Components 1 through 4 were provided by PNM. Cost and construction time estimates for Component 5 were provided by TSGT.

2. Summary of Cost Estimates and Work Schedule

The total cost and construction schedule estimates for each component are summarized in Table 1. Schedule is from the date the Customer provides written authorization to proceed, provided all interconnection agreements and funding arrangements are in place. Based on the construction schedule, the Project in-service date originally proposed cannot be met.

Table 1: Cost and Construction Schedule Estimates

Component	Cost (2007 \$)	Schedule
1	\$ 2,113,946	15 months
2	\$ 27,454,041	23 months
3	\$ 0	NA
4	\$ 1,524,258	13 months
5	\$ 805,583	11 months
Project Total	\$ 31,897,828	

Please note that there is no cost associated with Component 3. PNM’s planned San Clemente 115 kV station (projected in-service date of 2013), will address the Person – Tome 46 kV line overload. To address this issue on an interim basis, PNM plans to apply an operating procedure that would consist of switching feeder load from the Los Chaves 46 kV station to 1st Street station. The risk is acceptable given the low magnitude of the overload (1% above rating), and the low probability of occurring. The exposure is limited to an N-1 contingency condition during heavy loads, coinciding with high output from the proposed wind Project, and other proposed generation projects in the Willard and Belen areas at full output.

Additional planning studies conducted as part of the Study have concluded that the Belen – Socorro 115 kV line overload (Component 4) is a pre-existing condition and the Project exacerbates this overload.

To address this pre-existing overload condition, PNM is considering one of the following alternatives at Belen on the Belen – Socorro 115 kV line:

- A. Install a 27-ohm series reactor
- B. Install a phase shifting transformer

Cost estimate for Component 4 provided in Table 1 assumes that the series reactor option is pursued to address the pre-existing overload condition. In this case, a second 27-ohm series reactor stage would be needed to mitigate the impact of the Project. The cost estimate shown in Table 1 assumes that the second stage will be constructed adjacent to the first stage. If PNM chooses instead to pursue a phase shifting transformer, cost associated with Component 4 would not be Customer’s responsibility.



It is not anticipated that load-side generation is required to support the transmission system for these construction outages. However, PNM reserves the right to recover those costs in the event that they are incurred.

The following general assumptions apply to all PNM cost estimates:

1. For all estimates, pricing is based on 2007 unit costs. With likely fluctuations in the price of raw materials, fuel, and labor, actual costs may vary in future years.
2. Cost estimates are considered to be within +/- 20%.
3. Estimates include, rights-of-way, governmental permitting, design, materials, construction, construction management, and internal utility loads.
4. Project schedules are considered reasonably accurate but can be affected by permitting delays, equipment deliveries, weather, availability of workforce, and availability of outage clearance for construction.

Exhibit A contains itemized cost estimates as well as assumptions specific to each component.



Exhibit A

Component 1: Upgrade Algodones – Willard 115 kV line (AW line) and Algodones station upgrades

Assumptions

This is the upgrade of the AW line to allow the facility to operate at a higher capacity. Approximately 83 spans require clearance improvements to allow the conductor to operate at its full thermal capacity. Phase Raising technology will be the preferred method to make improvements. Where this technology is not appropriate, structures may be replaced or added. Improvements on the steel pole section of the line plan to be accomplished by changing our suspension insulators to a post configuration. The estimate also includes replacement of the AW relays at Willard. Much of the work can be done with the transmission line energized. However, short outages will be needed for structure replacements.

The Algodones station will be upgraded to match the new AW line rating. Work includes bus and related equipment. The estimate also includes one temporary tie line and the replacement of the Algodones relays for the AW line.

Estimate assumes that outages can be taken on various station equipment and transmission lines as needed. Outages may be limited to off-peak periods such as spring or fall. Outages may also be limited until the construction of the new Belen-Willard 115kV line is complete and can provide full backfeed to the Moriarty area.

Transmission costs	\$1,365,088
Station/Relays	\$ 615,671
Right-of-Way	\$ 25,356
Environmental and Regulatory permits	<u>\$ 107,831</u>
Total	\$2,113,946

Component 2: Upgrade Belen – Willard 115 kV line (WL line)

Assumptions

An extended WL line outage cannot be taken to rebuild this line. Therefore, a new line (approximately 50 miles) will be built paralleling the existing line. The existing line will be removed once the line is energized. Estimate assumes new right-of-way is acquired paralleling the existing line, including permitting of Federal land. The final design of this line will evaluate alternate routes. Estimate and schedule assumes that short outages will be available on the existing WL line to make cutovers to the new line. Outages may be limited to off peak periods such as spring or fall. Estimate assumes that the WL line relays at Willard will be upgraded prior to this interconnection.



Transmission costs	\$21,727,915
Station/Relays	\$ 0
Right-of-Way	\$ 5,336,802
Environmental and Regulatory permits	<u>\$ 389,324</u>
Total	\$27,454,041

Attachment 1 has the detail line cost estimate, which does not include environmental, regulatory permits, and right-of-way cost estimates. Right-of-way costs will be dependent on several factors including number of owners, willingness to provide land or easement, width of needed easement, etc. Where reasonable, PNM will consider utilizing public rights-of-way. Direct purchase of land is estimated at fair market value.

Component 4: Address Belen-Socorro 115 kV line overload by installing a second series reactor at Belen. PNM may pursue the installation of a phase shifting transformer at Belen to address this overload as discussion in Section 2 of this Report.

The estimate assumes PNM will install the first series reactor which includes most of the site civil work. Estimate assumes TSGT, owner of the Belen-Socorro 115kV line, is in agreement with the proposed system reinforcement. Short outages on this line will be needed to cut-in the series reactor.

Please see Attachment 2 for additional information.

Transmission costs	\$ 0
Station/Relays	\$1,503,886
Right-of-Way	\$ 13,747
Environmental and Regulatory permits	<u>\$ 6,626</u>
Total	\$1,524,258

Component 5: Expansion of the Willard station and removal of station limitations for the WL and AL line upgrades.

Design and Construction	\$631,407
Overheads	\$100,941
Contingency	<u>\$ 73,235</u>
Total	\$805,583

Please see the Attachment 3 for the assumptions and details cost for component 5.