DRAFT STUDY PLAN FOR 2008

Introduction

The Ten-year transmission planning process is intended to facilitate a timely, coordinated and transparent process that fosters the development of electric infrastructure that both maintains reliability and meets load growth so that PNM can provide reliable and cost-effective service to all transmission customers (native, network and point-to-point).

PNM will conduct these studies to ensure that all North American Electric Reliability Corporation ("NERC"), Western Electricity Coordinating Council ("WECC") and local reliability standards are met for each year of the ten-year planning horizon, for planned loads and resources. These reliability studies will be coordinated with the other regional transmission planning organizations through SWAT studies.

This assessment will concentrate on 10-year peak summer load conditions (specifically for years 2009, 2013, 2018) and one off-peak load condition as described in Appendix A.

Study Scope

- Review transmission adequacy with network customer updates to designated network resources and load.
- Determine if system mitigations are needed to serve expected obligations (load forecasts and expected firm transfers) during the 10 year planning horizon without violating WECC/NERC reliability standards.
- Develop operational mitigations or system improvements to maintain system reliability and associated cost estimates and schedule.
- Incorporate assessments of economic congestion to the extent a need is identified by PNM's or other's involvement in the WECC/TEPPC process for providing this type of assessment.

Planning Methodology/Criteria

PNM uses a deterministic approach for transmission system planning. Under this approach, system performance should meet certain criteria under normal conditions (all lines in service) and for outage conditions (element(s) out of service). PNM considers the following contingencies in its assessment of the transmission system.

- Single contingencies: Assessment identifying system impacts when a single branch is removed from service. All branches within PNM's control

area and adjacent branches in any control area with which PNM has interconnections are studied.
- Double circuit contingencies - Outages where an event of sufficient risk causes the loss of two branches. For PNM's system, this exposure is limited to certain double circuit scenarios.
- Breaker failure contingencies - Breaker failure operation involves the loss of two or more elements at a station.

The planning methodologies and assumptions described below are used as the basis for the development of future transmission facilities. As an alternative to system reinforcements for N-2 and breaker failure outages, it may be more cost-effective to implement a re-dispatch protocol and/or remedial action scheme (generator tripping or load dropping) considering the low probability of the occurrence of these types of outages.

Assumptions

- Committed projects identified in the prior ten-year assessment will be modeled in the base cases. These projects are listed in Appendix B. Committed projects may be reviewed during the study to determine if timing or other adjustments are needed.

- Use utility load forecasts for 1 in 2 load probability (a probability of 50% not to exceed the target load peak).

- Generation projects will be modeled if they are in service, under contract or in construction. Expected dispatch levels will be modeled for all generation.

- Load-side generation will be dispatched as required to maintain positive margin on Path 48.

- Wind Resources: The assumption for peak load conditions is that little wind generation will be available due to lack of wind (which matches historical conditions). Wind sensitivity cases will be run with wind dispatched and appropriate redispatch of other resources to meet the same load level for the off-peak case.

Methodology

Outage performance is assessed with power flow simulations using the methodologies listed below to reflect the system response to an outage before operator intervention.

- All manually operated voltage control and phase shifting devices will be fixed.
- All load-side resources are operated such that the pre-disturbance MVAr output is minimized while maintaining normal system voltage levels.
- All generators which control a high side remote bus will be set at the pre-disturbance voltage at the terminal bus except for generators/SVC that have line drop compensation.
- The load-side generation/SVC pre-outage reactive limits will be changed from their minimum MVAr limit to their corresponding MVAr limit as defined on their capability curves. Their corresponding voltage schedule will be changed to match the actual solved pre-outage voltage.

Short Circuit studies will be performed to determine if breaker interrupt ratings are exceeded when resource additions or transmission modifications could significantly increase fault current.

Modifications to the bulk transmission system will be reviewed for compliance with dynamic and voltage stability criteria through powerflow and transient stability simulations.

Criteria

PNM adheres to the following National Electric Reliability Council (NERC)/WECC Planning Standards[1] with a few exceptions as noted below.

The criteria from applicable NERC/WECC standards are listed below:

- Changes in bus voltages from pre- to post-contingency must be less than 5% and 10% for single and double contingencies, respectively.

- All equipment loadings must be below their normal ratings under normal conditions.

- All line loadings must be below their emergency ratings for both single and credible double contingencies. All transformers and equipment with emergency rating should be below their emergency rating.

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[1] This document is accessible through the Internet at http://www.wecc.biz.

- Stability is divided into two categories, which include 1) transient or dynamic stability, and 2) steady-state voltage stability (P-V and Q-V Analysis). The operating criteria for each of the performance criteria are discussed below.

  - The transient stability criteria require that all machines remain in synchronism, all voltage swings should be damped, and voltage/frequency performance must meet the following performance criteria:
    - Following fault clearing for single contingencies, voltage on load buses may not dip more than 25% of the pre-fault voltage or dip more than 20% of the pre-fault voltage for more than 20 cycles.
    - For double contingencies (i.e., breaker failures), voltage on load buses may not dip more than 30% of the pre-fault voltage or dip more than 20% of the pre-fault voltage for more than 40 cycles.

  - Voltage stability criteria requires: “The most reactive deficient bus must have adequate reactive power margin for the worst single contingency to satisfy either of the following conditions for n-1 outages, whichever is worse: (i) a 5% increase beyond maximum forecasted loads or (ii) a 5% increase beyond maximum allowable interface flows. The worst single contingency is one that causes the largest decrease in the reactive power margin.” For double contingencies (i.e., breaker failures) the reactive margin is reduced to 2.5%.

Listed below are additions and exceptions to the WECC reliability criteria for PNM’s control area.

- For voltage levels between 46 kV and 345 kV, the minimum and maximum are 0.925 p.u. and 1.05 p.u., respectively, for N-1 contingencies. For N-2 and breaker failures the minimum voltage level is 0.90 p.u. and the maximum voltage level is 1.05. p.u.

- Voltage drop for bus voltages between 46 kV and 345 kV from pre- to post-contingency must be no greater than 6%. PNM allows no greater than a 10% voltage drop for bus voltages between 46 kV and 345 kV from pre- to post-contingency for N-2 and breaker failures outages.

- The maximum steady state voltage and transient swing voltages for the Blackwater-BA 345 kV line are 1.1 p.u. and 1.2 p.u., respectively.

However, the steady state voltage level on the BA 345 kV bus and Blackwater 345 kV bus must be 1.05 p.u. or less.

Tri-State's additional criteria for contingencies are listed below:

- The minimum and maximum bus voltages for normal operation are 0.95 p.u. to 1.05 p.u., respectively.

- The minimum and maximum bus voltages for outage conditions are 0.90 p.u. to 1.10 p.u., respectively.

- Changes in bus voltages from pre- to post-contingency must be less than 6% for Tri-State buses adjacent to the PNM transmission system and 8% otherwise for n-1 outages. Tri-State allows no greater than a 10% voltage drop for N-2 and breaker failures outages.

LAC's additional criteria for contingencies are listed below:

- The 115 kV voltages within Los Alamos service territory are to be greater than 0.925 p.u.. Voltage drops within the Los Alamos Service territory are not to exceed 6.0% at the 13.8 kV level.

Appendix A
Base Case Development

2009 Peak Summer Base Case

WECC Base Case: 2008HS4-OP

Project to be included:
1. AT 115 kV line re-termination at Person
2. Corrales Bluffs to Southern Blvd 115 kV Line
3. Alamogordo Third Source
4. Mimbres Additional Shunt Capacitors
5. Sandia 46 kV bus tie closed

2009 Off Peak Case

WECC Base Case: 2007-08 LW1-OP or 2008 LS1-OP

Projects to be included:
1. AT 115 kV line re-termination at Person
2. Corrales Bluffs to Southern Blvd 115 kV Line
3. Alamogordo Third Source
4. Mimbres Additional Shunt Capacitors
5. Sandia 46 kV bus tie closed

2013 Peak Summer Base Case

WECC Base Case: 2012 HS2

Projects to be included:
1. AT 115 kV line re-termination at Person
2. Corrales Bluffs to Southern Blvd 115 kV Line
3. Alamogordo Third Source
4. Mimbres Additional Shunt Capacitors
5. Move Sandia transformer from position 3 to position 1 and open 46 kV bus tie
6. Rio Puerco
    a. Rio Puerco 115 kV switching station
    b. Rio Puerco – Veranda 115 kV line
7. Rio Puerco Phase II

2018 Peak Summer Base Case

WECC Base Case: 2018 HS1

Projects to be included:

1. AT 115 kV line re-termination at Person
2. Corrales Bluffs to Southern Blvd 115 kV Line
3. Alamogordo Third Source
4. Mimbres Additional Shunt Capacitors
5. Move Sandia transformer from position 3 to position 1 and open 46 kV bus tie
6. Rio Puerco
   a. Rio Puerco 115 kV switching station
   b. Rio Puerco – Veranda 115 kV line
7. Rio Puerco Phase II
8. Upgrade Turquoise Tap – Silver City 69 kV line
9. Rio Puerco – Progress 115 kV line

Appendix B
Study Timeline

The projected milestones and timetable to meet the overall schedule for the 2008 Study Plan is as follows:

February 25, 2008	Draft Study Plan distributed to stakeholders
March 1, 2008	Network Customer ten-year projected network load and network resources are due to PNM
March 6, 2008	Stakeholder Meeting to discuss study plan.
March 13, 2008	Finalize detailed Study Plan
March 14, 2008	Finalized base cases and contingency files.
March 26, 2008	Contingency runs completed and required improvements identified
April 18, 2008	Projects descriptions and one-line diagrams completed to determine cost estimates
April 25, 2008	Transient stability and short circuit analysis completed
May 30, 2008	Finalize project descriptions and cost estimates
June 13, 2008	Contingency analysis with new projects completed
June 20, 2008	Draft plan input for budget process.
August 19-20, 2008	SWAT meeting with preliminary discussion of draft utility plans to be included in 2008 SWAT Planning Report.
October 31, 2008	Incorporate with Annual SWAT/WestConnect Report
Nov 6, 2008	Stakeholder meeting to review transmission plan and follow-up for next study cycle.
Nov 11-12, 2008	SWAT meeting with 2008 SWAT Planning Report Review