New Mexico Transmission System Overview

A personal commitment to New Mexico

November 8, 2006
PNM Transmission System Uses

- **Retail**—PNM native load customers represent about 60% to 65% of system use
  - On 1/1/2007 PNM will merge TNMP’s NM facilities and customers

- **Wholesale**—Transmission customers represent 35% to 40% of system use
  - Network transmission customers include: Tri State, WAPA, LAC, NEC, NTUA, City of Aztec and PNM
  - Point-to-point transmission customers include: EPE, TNMP, WAPA and PNMM
A Few System Facts......

- 2006 PNM System Load 1855 MW
  - July 17, 2006 at 3 PM
  - Represents new all time peak, up 4.3% over 2005
  - Control Area peak load is about 2500 MW

- Line mileage (incl. jointly owned lines)
  - 165 miles of 500 kV (Outlet lines from Palo Verde)
  - 1556 miles of 345 kV
  - 180 miles of 230 kV
  - 1000 miles of 115 kV

- “Backbone” transmission lines are 150 to 200 miles in length.

- Majority of transmission lines built in late 1960s through the mid 1970s
NERC/WECC Reliability Standards form the basis for system studies
  - Adequacy
  - Security

Must provide uninterrupted service even with any one facility being out of service

Transmission limits are dependent upon many factors such as voltage control devices and power factor, generation on-line, etc.

Major path ratings subject to regional peer review, e.g. Path 48 in NNM and Path 47 in SNM

WECC Path Rating Catalog documents these major paths across the western grid (over 70 WECC Paths presently exist)

System limits are determined and compared to committed uses to form basis for op. procedures and capital expansion
## WECC Path 48-NNM Transmission Boundary Evaluation (North to Southeast)

<table>
<thead>
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<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tbody>
<tr>
<td>PNM Retail Loads</td>
<td>1474</td>
<td>1520</td>
<td>1562</td>
<td>1599</td>
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<tr>
<td>Customer Network Loads</td>
<td>680</td>
<td>683</td>
<td>707</td>
<td>713</td>
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<td>Point-to-point transmission Services</td>
<td>151</td>
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<td>48</td>
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<tr>
<td>Transmission Losses</td>
<td>91</td>
<td>89</td>
<td>86</td>
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<tr>
<td>Committed Uses</td>
<td>2396</td>
<td>2443</td>
<td>2403</td>
<td>2409</td>
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<tr>
<td>Path 48 Load-Side Resource</td>
<td>(521)</td>
<td>(604)</td>
<td>(628)</td>
<td>(628)</td>
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<tr>
<td>Total Path 48 Transmission Load</td>
<td>1875</td>
<td>1840</td>
<td>1763</td>
<td>1780</td>
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<tr>
<td>Transmission Reliability Margin (TRM)</td>
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<td>131</td>
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<tr>
<td>Fast Ramp Capability to Offset TRM</td>
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<td>(59)</td>
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<tr>
<td>Total Committed Use &amp; Residual TRM</td>
<td>1863</td>
<td>1912</td>
<td>1837</td>
<td>1854</td>
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<tr>
<td>Total NNM Transmission Capability (TTC)</td>
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<td>1912</td>
<td>1837</td>
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<td>Available Transmission Capability (ATC)</td>
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<td>0</td>
<td>0</td>
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</table>
WECC Path 48
2004-06 Frequency Duration Curve

Oct 2005 through September 2006
2005
2004

Number of hours at or "above" plotted MW level
Recently Completed System Upgrades

Valencia Division improvements, 10/2004
- Added needed capacity for growing loads

BA Station reconfiguration, 11/2004
- Improved reliability to “backbone” system

Project Power, June 2006
- Provided new transmission source for Santa Fe Area

Western NM Shunt Capacitor, 2006
- Provided voltage support for western 115 kV area

Upgrade of West Mesa-Algodones 115 kV line (“AL line”)
- Provided added thermal capacity for the AL line
PNM/TNMP-NM Planned Facilities

- Santa Fe to Las Vegas 115kV transmission line improvement to accommodate Tri-State’s CNMIP
  - Cost Estimate: $2.3 million (Tri-State will cost-share)
  - In-Service Date: Dec 2006

- TNMP and Tri-State are rebuilding Alamogordo-Hollywood 115 kV line. TNMP’s portion of this rebuild consists of 14 miles between Alamogordo, NM and Tularosa, NM
  - TNMP’s Cost Estimate: $4.3 million
  - In-Service Date: 1st quarter of 2007

- Pachmann Switching Station construction to serve growing Rio Rancho area
  - Cost Estimate: $6.6 million
  - In-Service Date: Nov 2007

- Blackwater HVDC Station Life Extension, cooling and control systems
  - Cost Estimate: $12.5 million
  - In-Service Date: 2007 and 2009

- Corrales Bluffs-Southern Blvd 115 kV line
  - Cost Estimate: $2.2 million
  - In-Service Date: Dec 2007

- Improve the reliability of service to loads served by Tri-State, TNMP, and EPE by operating all three lines into Alamogordo as a normally closed system
  - Cost Estimate: $3.2 million
  - In-Service Date: 2007

- Upgrade Belen-West Mesa 115 kV line
  - Cost Estimate: $1.22 million
  - In-Service Date: Dec 2007

- Southern NM voltage support
  - Cost Estimate: $1.2 million
  - In-Service Date: June 2008

- Rio Puerco Switching Station including 345/115 kV transformer and looping in the FW, WW and WN 345 kV lines
  - Cost Estimate: ~$50 million
  - In-Service Date: 2009

- Rio Puerco-Veranda 115 kV line
  - Cost Estimate: $9 million
  - In-Service Date: 2009

- Alamogordo SVC
  - Cost Estimate: $8.6 million
  - In-Service Date: 2009
Wind Energy Potential in NM

Map by created by TrueWind Solutions from MesoMap system using historical weather data.
# Existing Wind Generation in New Mexico

## Installed or under construction: 496 MW
- 204MW “NMWEC” near Fort Summer - FPLE, hosted by PNM (2003)
- 80MW “Caprock” near Tucumcari, Cielo Wind, hosted by Xcel Energy (2005)
- 120MW “San Juan Mesa Wind Project” near Elida, Padoma Wind Power, hosted by Xcel Energy- ISD 12/31/2005
- 90 MW “Aragonne Mesa” Superior Wind, west of Santa Rosa, hosted by APS (ISD 12/2006)

## Known Proposed Wind Farms
- 753MW in PNM’s interconnection queue (incl. Aragonne)
- 420 MW in Tri-State’s interconnection queue
- 500 MW in El Paso Electric’s interconnection queue
Wind Interconnection Interest Primarily in Eastern NM

Area of interest for wind generation interconnection to the PNM system

Existing New Mexico Wind Energy Center (204 MW)

“BB” 345kV line - 223-mile radial transmission facility terminated in HVDC converter station
System Considerations - Case Study

Installed and proposed projects on the BB line

- Present Use 404MW (204MW wind, 200MW power purchases)
- In queue as of 10/06: ~551MW (Wind)
- Withdrawn as of 10/06: 1200MW
- Line maximum capability 1000 MW
- New Mexico IRP Rule recommended for approval
- WestConnect Subregion
  - SWAT-AZ/NM/Southern NV, West TX
  - CCPG-Colorado
- WECC Transmission Expansion Policy Committee
  - Regional Congestion Studies
  - Coordinates the western subregions:
    - SWAT, CCPG, CAISO, STEP, RMATS, NTAC, and latest: Northern Tier Transmission Group
National Initiatives

- EPACT 2005 Brought about big changes
  - FERC regulatory reach extended

- Mandatory Reliability Standards
  - FERC certified NERC as the ERO 7/2006
  - NOPR issued approving 83 of 107 standards

- DOE’s National Interest Electric Transmission Corridor Identification
  - Congestion study issued 8/2006
  - FERC “backstop siting” could be complex
FERC Open Access Reform

Ot FERC Order 888 “Open Access” Reform Initiative

- NOPR issued 5/2006
- Comments and Replies filed
- Primary themes include:
  - Greater transparency in ATC
  - Open regional transmission planning
  - Reform energy imbalance penalties
  - Reform rollover rights policy
  - Increase customer access to information
  - Maintains protections for and State jurisdiction over bundled retail load
- FERC Tech Conference held 10/2006