

Lower Rio Grande Valley 345 kV line

ERCOT Regional Planning Group
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Prepared by AEPSC on behalf of ETT

South Texas Transmission Infrastructure

- Drivers for development
 - Shrinking windows for maintenance/clearances
 - Availability of generation during high demand
 - Development of infrastructure along the border
- Staging the plan for South Texas
 - Completion of San Miguel to Laredo Lobo in 2010
 - Linking Laredo to the Valley
 - Maximizing delivery capability of existing system
 - Closing the loop within load pockets
- South Texas Transmission Infrastructure Benefits
 - Enabling access to economic resources and renewable energy
 - Laredo: Two is better than One
 - Valley: Three is better than Two

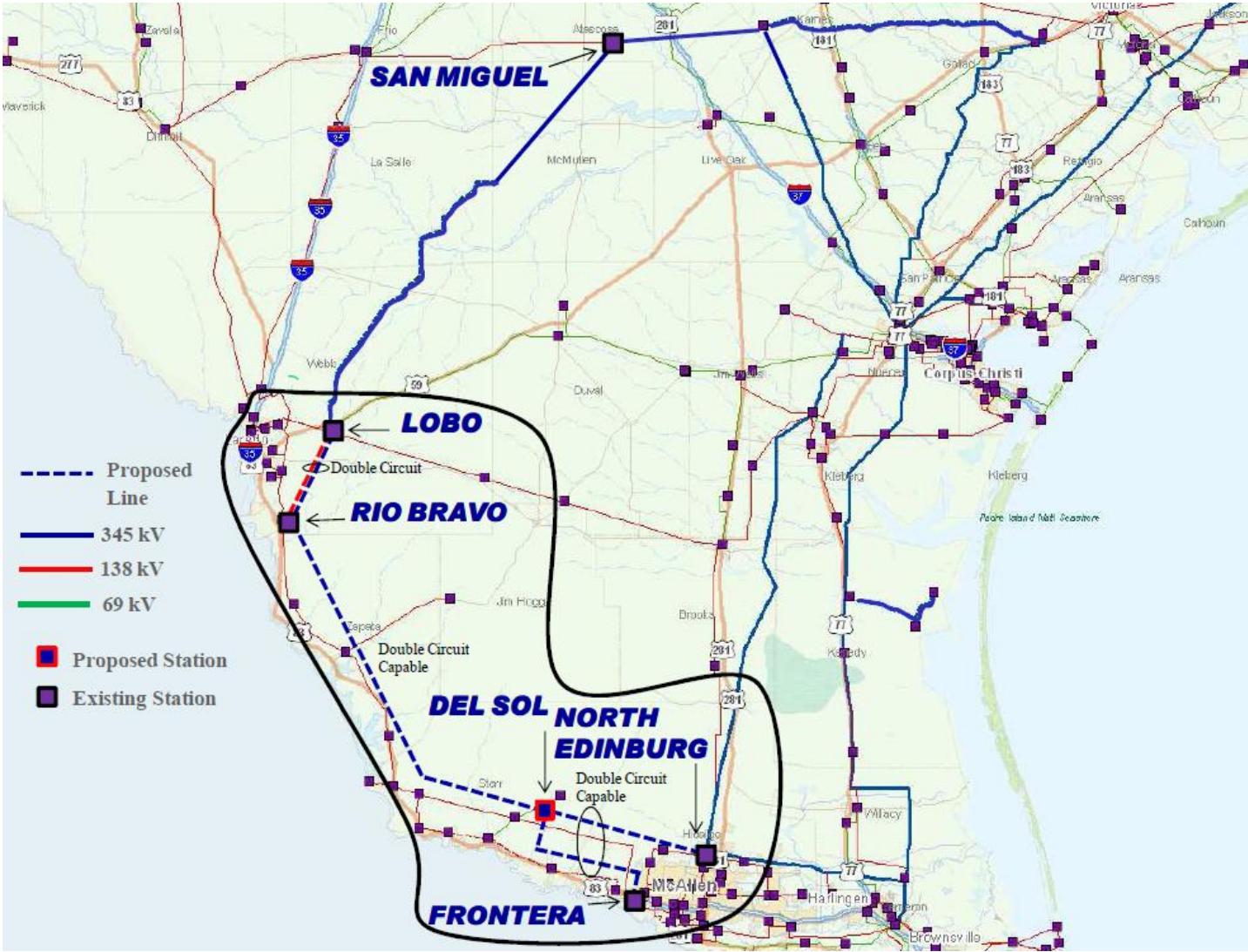
Drivers for development

- Shrinking windows for maintenance and/or clearances
 - N-1-1 windows are practically limited to March and November
 - Operational load forecast for February 4th did not anticipate the need for all generation in the Valley
 - 345 kV line clearances to replace corroded components nearly displaced STEC 138 kV upgrades within the Valley
- Availability of generation during high demand
 - Only one plant is located on the east side of the Valley
 - Recent information creates the need to plan for a plant outage
 - Valley import level exceeded security limit an average of 6 days per year for the last four years resulting in high scarcity pricing
 - Forward looking CRR pricing anticipates further congestion
- Development of infrastructure along the border
 - Within ten years infrastructure additions will be needed in Laredo
 - Over 1 GW of wind has already connected in South Texas
 - Over 1 GW of new wind is negotiating interconnection agreements

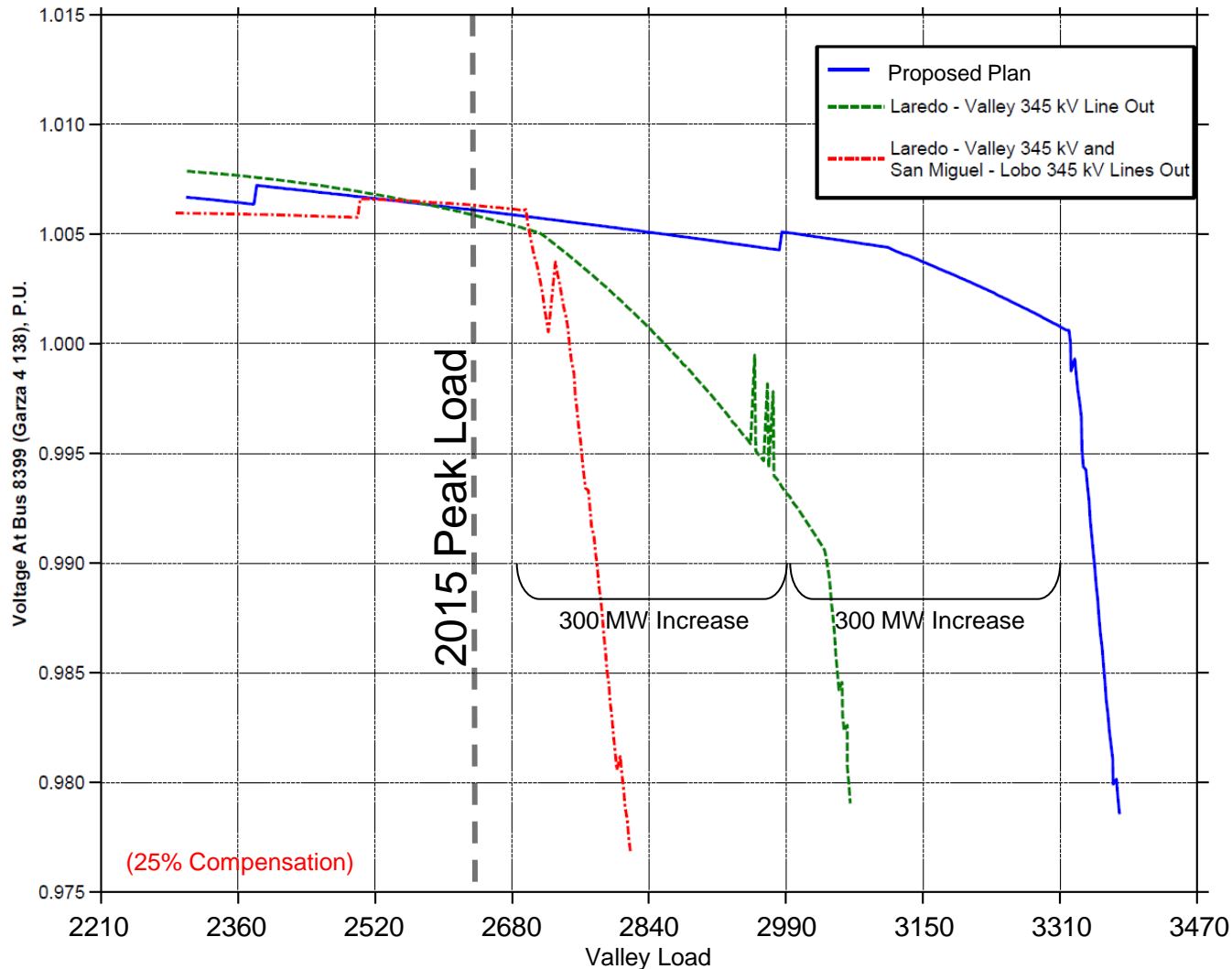
Staging the plan for South Texas

- Completion of San Miguel to Laredo Lobo
 - Relieved RMR in Laredo in 2010
 - Reversed power flow into Valley from west improving voltage stability for Valley
- Linking Laredo to the Valley
 - The Cross-Valley 345 kV line enabled the two existing 345 kV lines to share import into the Valley
 - Similarly, the Laredo to Valley 345 kV line enables both load pockets to share import among three lines
 - As a result, Voltage Stability limits are elevated well beyond thermal constraints

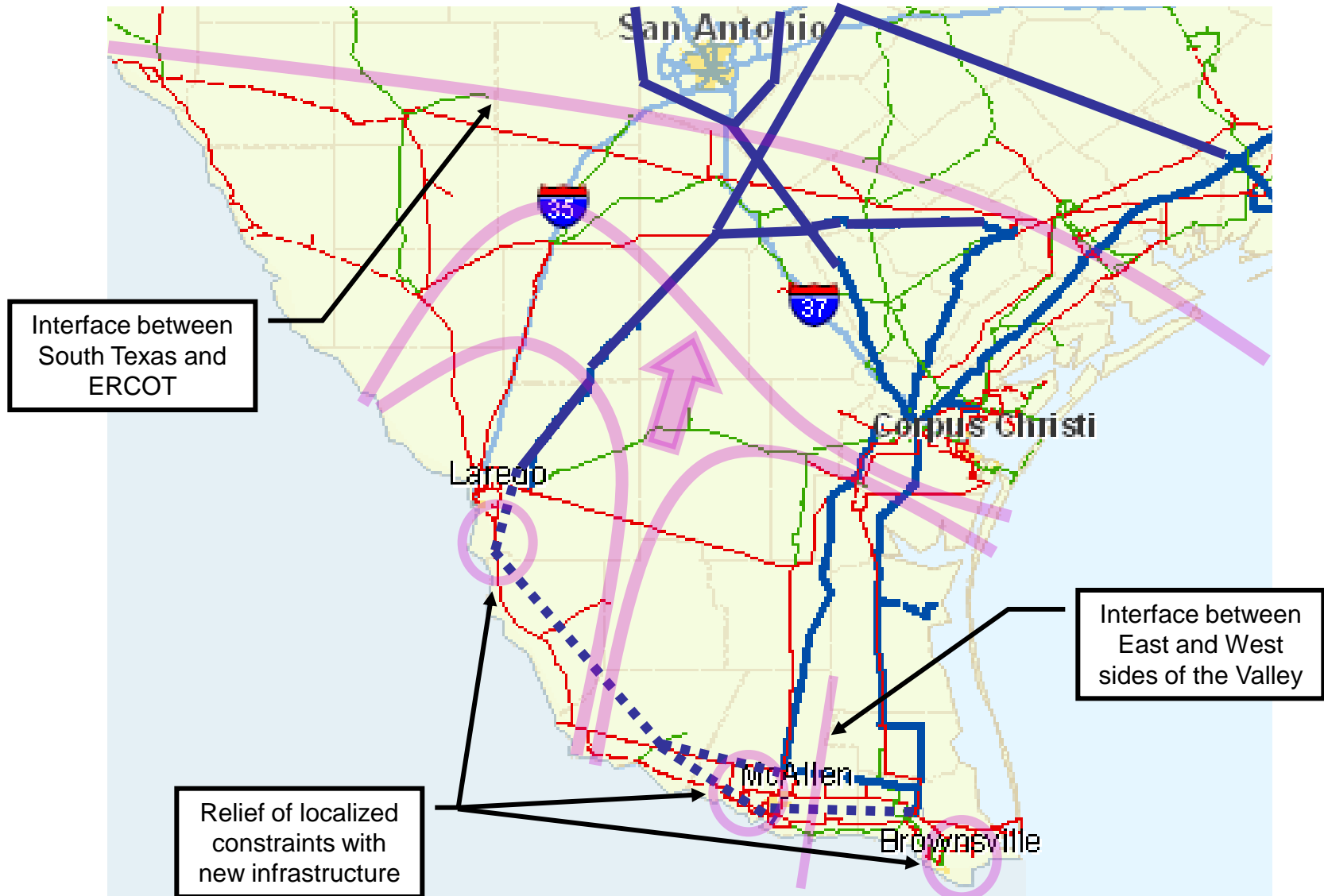
Proposed Laredo to Valley 345 kV Project



Power/Voltage Profile for Ajo to Rio Hondo 345 kV line contingency and one unit unavailable



Linking Laredo to the Valley



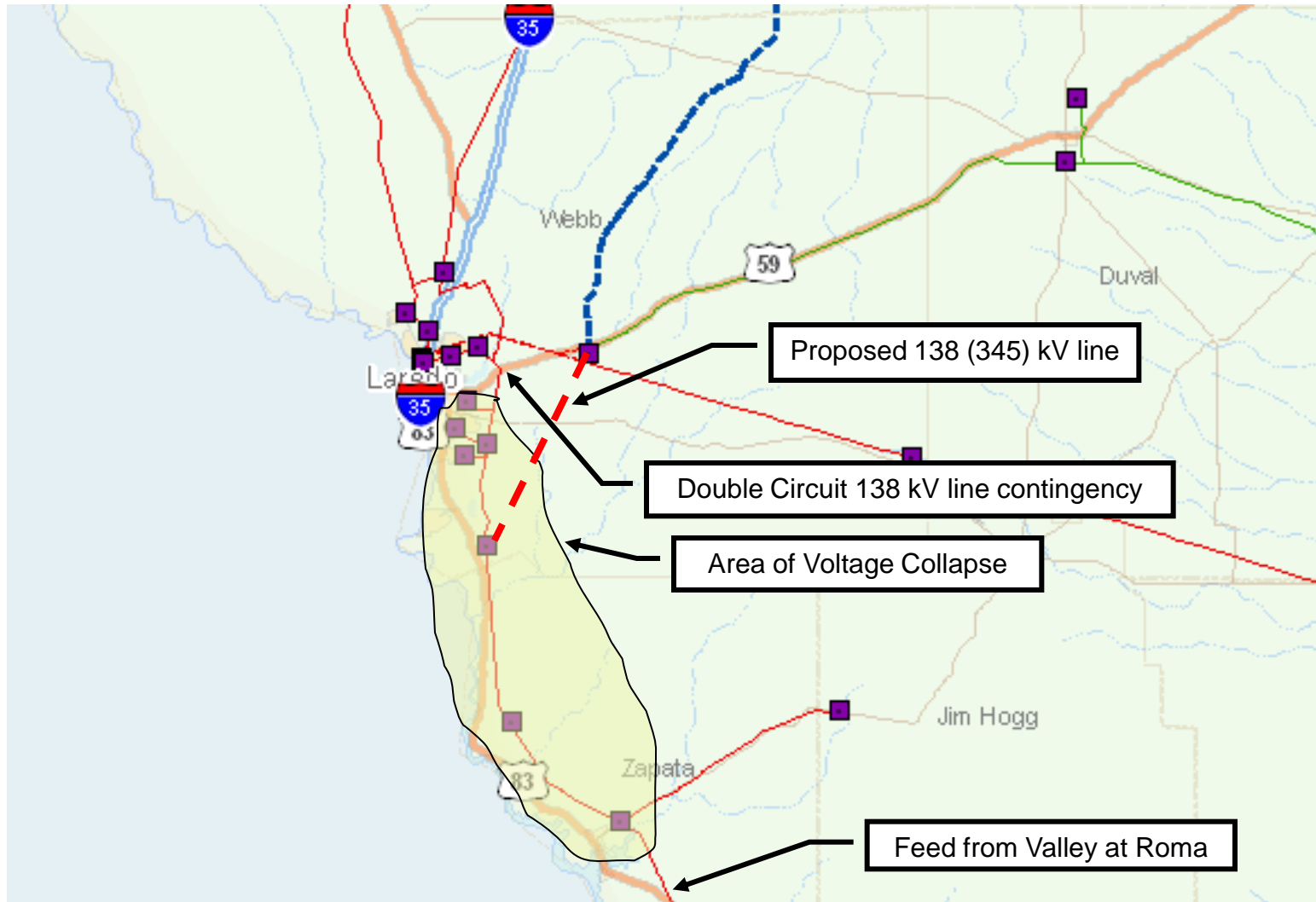
Staging the plan for South Texas

- Maximizing delivery capability of existing system
 - The existing Valley 345 kV lines are undersized relative to the new third line
 - High temperature composite core conductor can virtually double the rating of the existing lines
 - Series Capacitors can be reconfigured to double the rating, at half compensation level
 - Due to improved voltage stability and new SSCI issues, lower compensation is viable
 - Lower compensation improves the thermal import limit by balancing power flow between existing lines
 - Potentially, Lon Hill to Nelson Sharpe to Ajo to Rio Hondo 345 kV line may be rebuilt due to corrosion

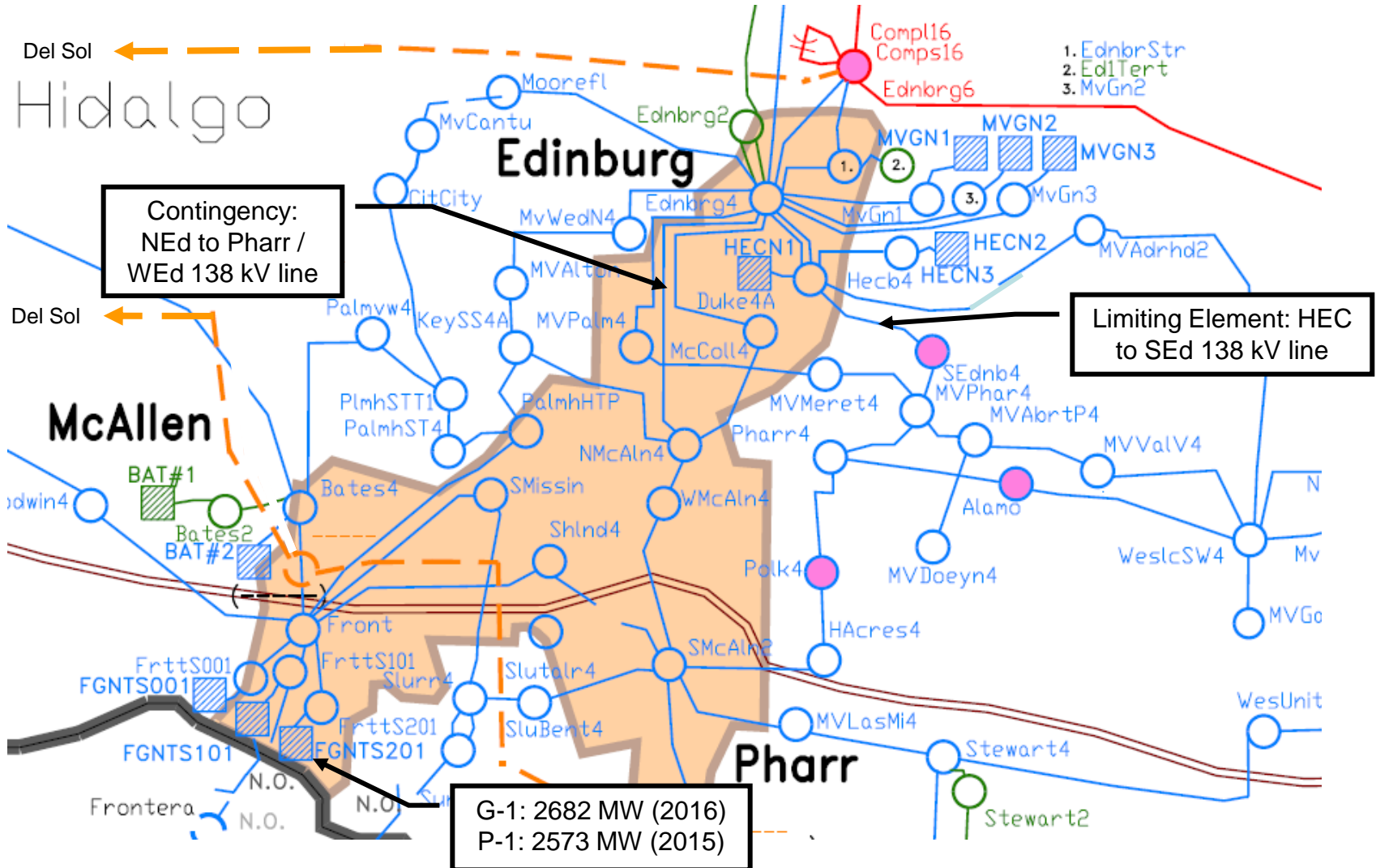
Staging the plan for South Texas

- Closing the loop within load pockets
 - Third line from Laredo to the Valley enables localized loops to serve growth within load pockets
 - Lobo to Rio Bravo relieves voltage collapse on south side of Laredo
 - Del Sol to Frontera relieves contingency overloads in McAllen
 - Future loop within the Valley addresses support of the eastern end

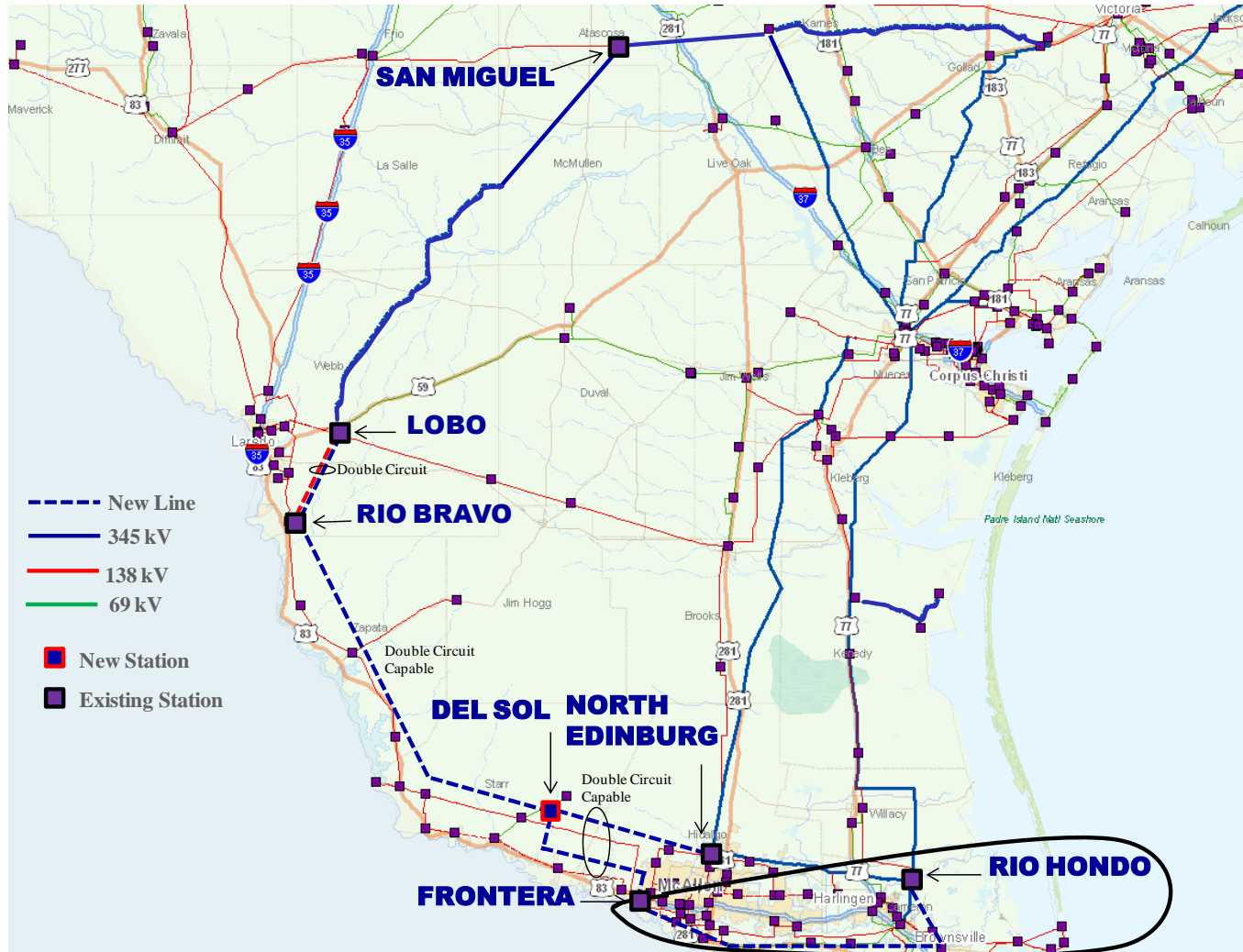
Loss of the Gateway to University / North Laredo double circuit 138 kV line results in voltage collapse



LRGV West Side Constraint



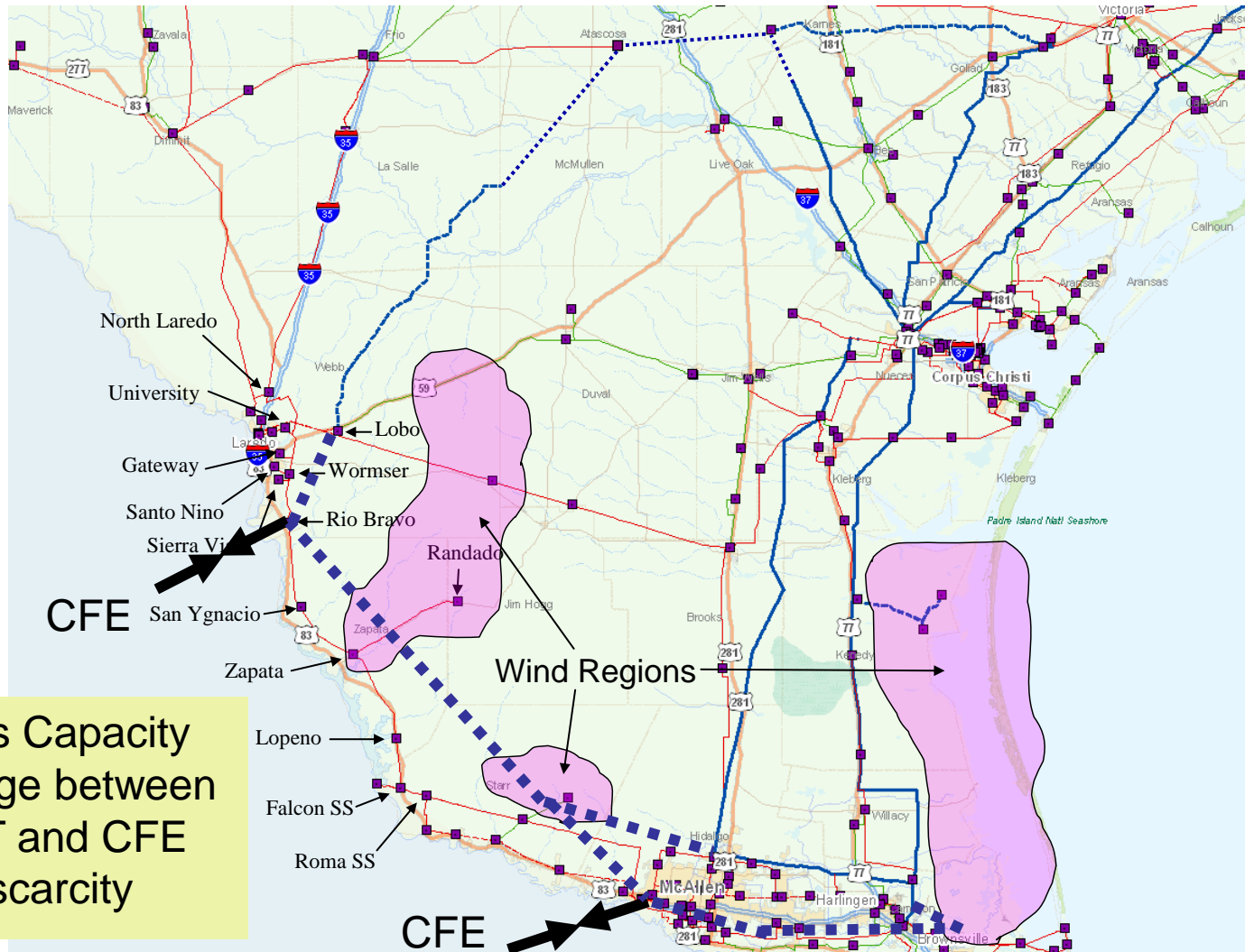
Second Cross-Valley line links East and West sides of the LRGV



South Texas Transmission Infrastructure Benefits

- Enabling access to economic resources and renewable energy
 - Enables the transfer of power in and out of South Texas and lowers marginal costs to consumers
 - Improves access to low cost wind resources that contribute across peak load periods
 - Creates infrastructure that allows ERCOT and CFE to share capacity during periods of scarcity

Improves access to low cost wind resources that contribute across peak load periods

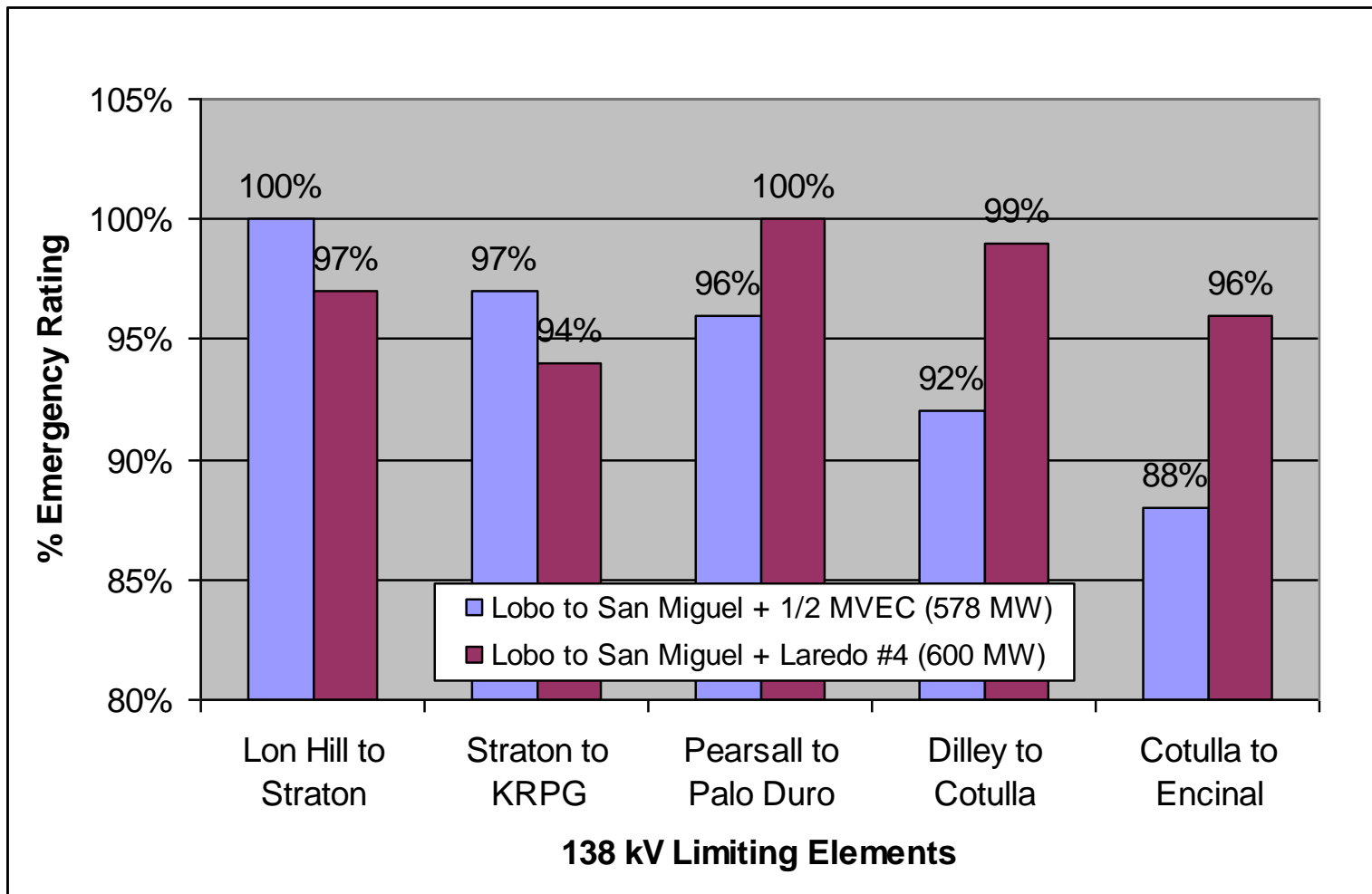


Enables Capacity exchange between ERCOT and CFE during scarcity

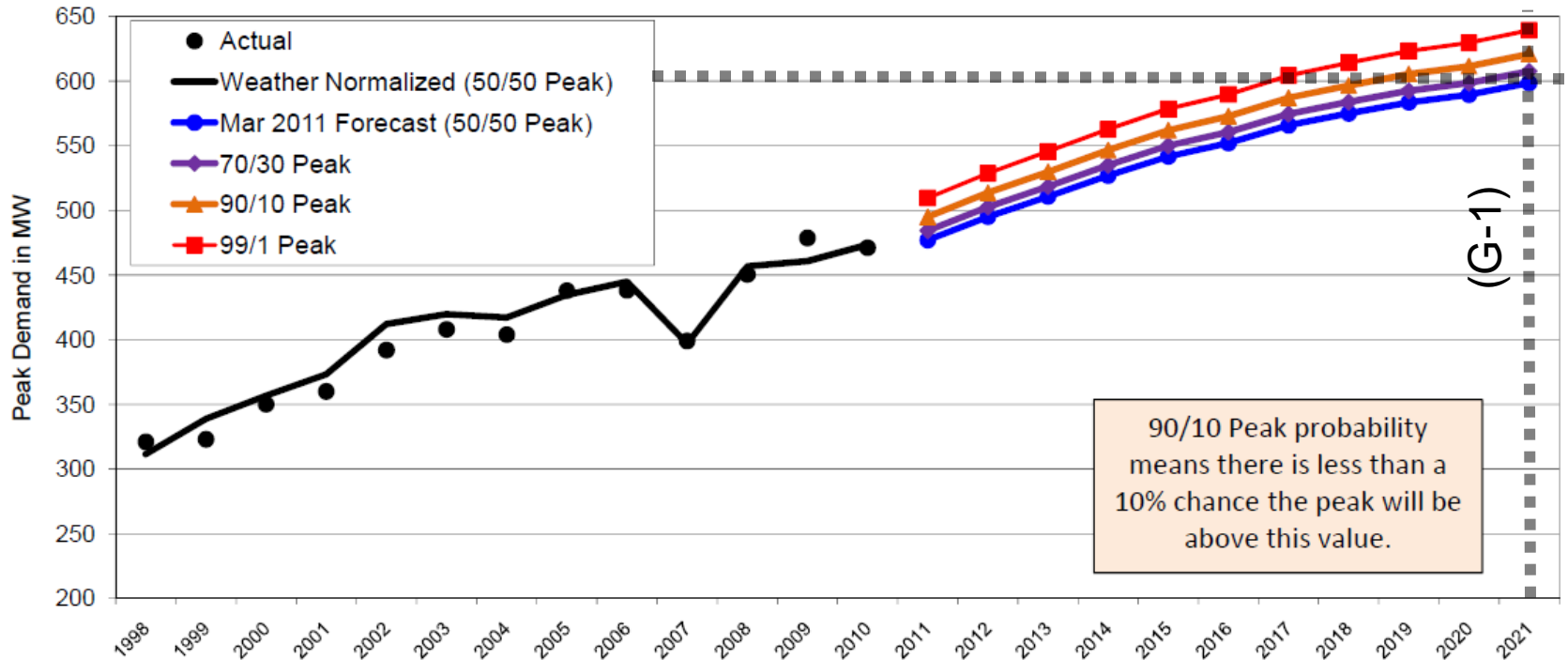
South Texas Transmission Infrastructure Benefits

- Laredo: Two is better than One
 - Load growth in Laredo is limited to 600 MW (2021) assuming availability of one of two combustion turbines
 - Load growth in Laredo is limited to 500 MW (2013) assuming availability of neither of the two combustion turbines
 - Extreme Summer peak demand can achieve 600 MW in 2018

Existing Transmission System Load Serving Capability in Laredo

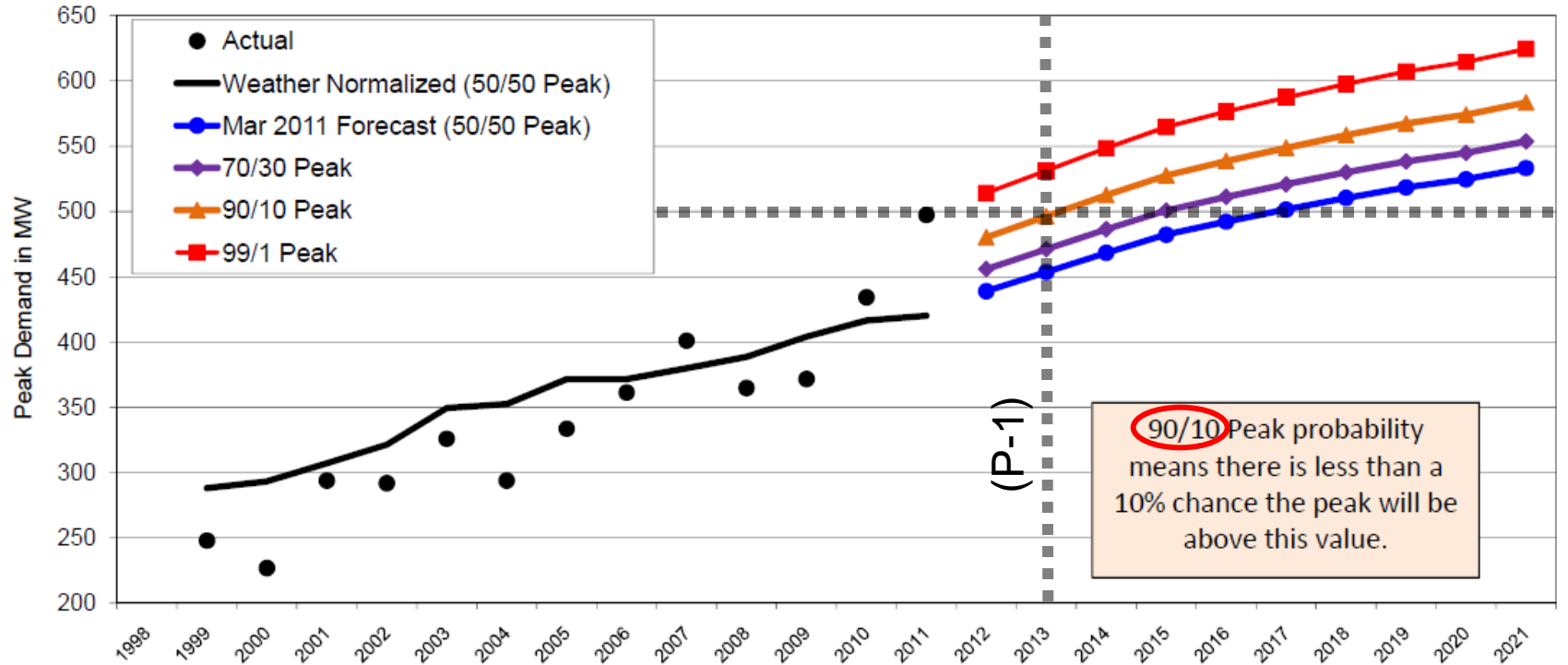


2011 Laredo Area Summer Peak Load Forecast at Varying Probability Intervals



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
50/50 Peak	477	495	511	527	542	552	566	575	584	589	598
70/30 Peak	484	503	519	535	550	561	574	584	592	598	608
90/10 Peak	495	514	530	547	562	573	587	597	605	611	621
99/1 Peak	509	529	545	563	579	590	604	614	623	629	639

2011 Laredo Area Winter Peak Load Forecast at Varying Probability Intervals

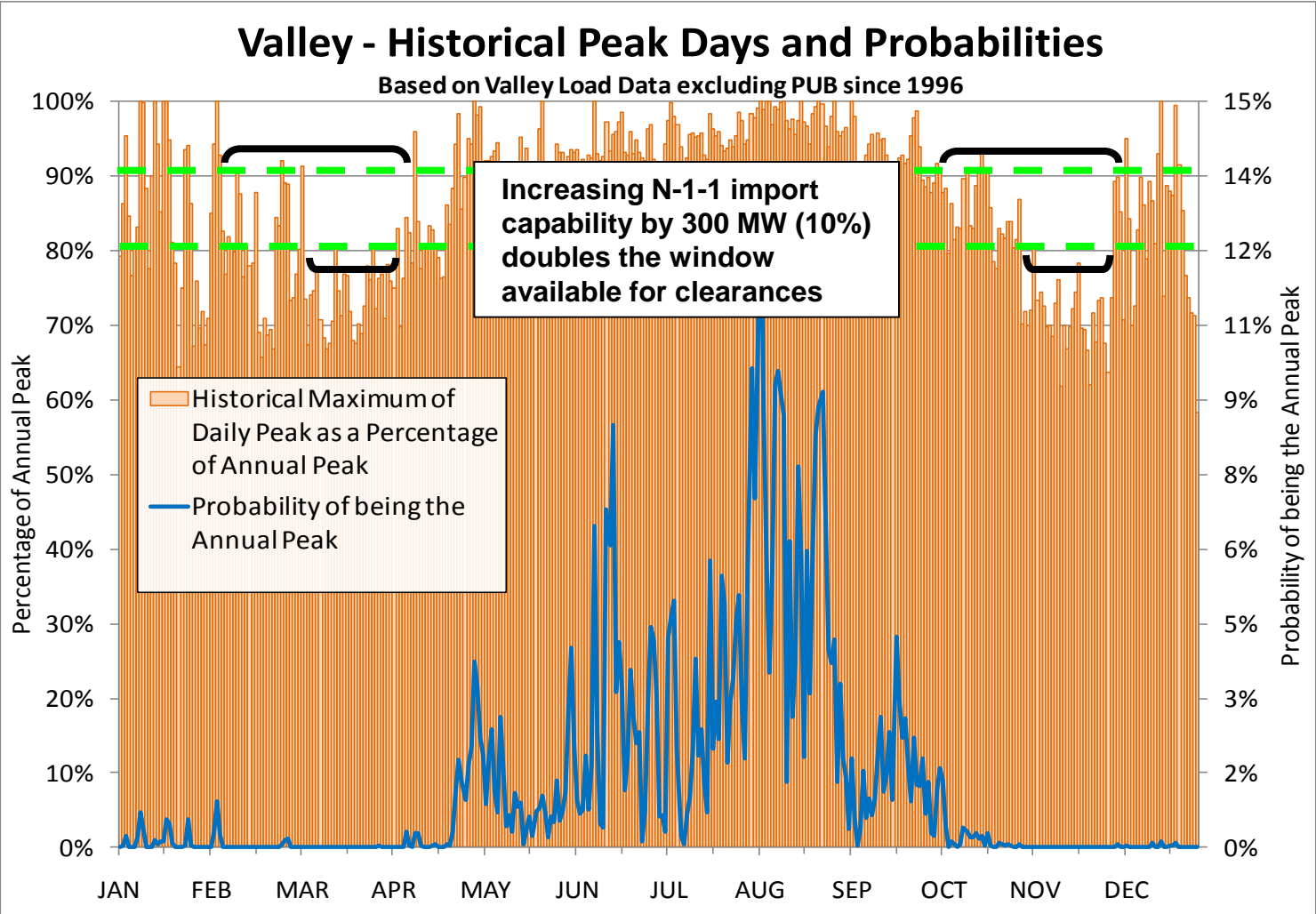


	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
50/50 Peak		439	454	468	482	492	502	510	518	525	533
70/30 Peak		456	471	486	501	511	521	530	538	545	554
90/10 Peak		480	496	513	528	539	549	559	567	574	584
99/1 Peak		514	531	549	565	576	587	598	607	615	625

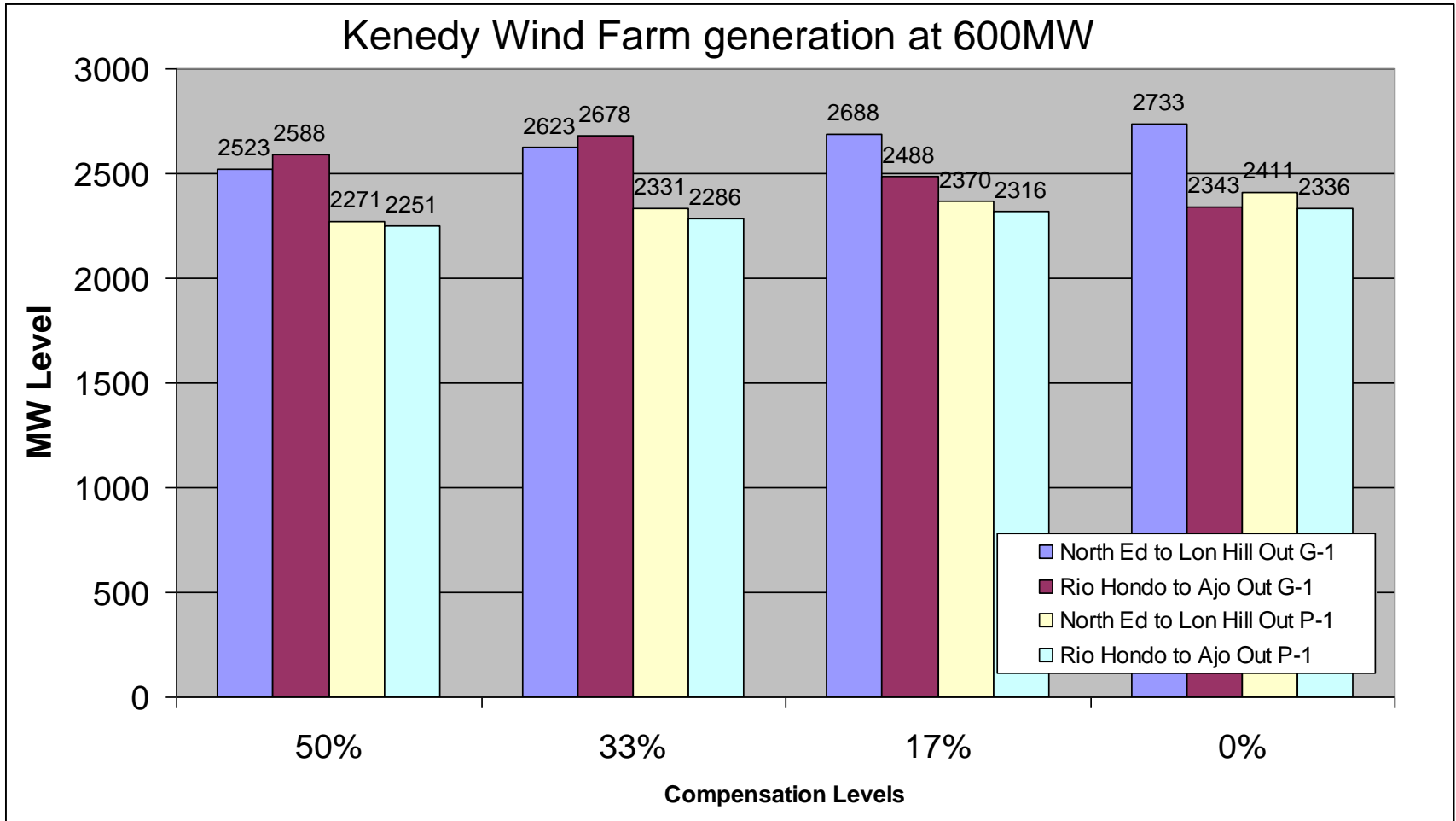
South Texas Transmission Infrastructure Benefits

- Valley: Three is better than Two
 - Opening clearance windows enables upgrades to existing Valley 345 kV lines
 - N-1-1: clearance on the Ajo to Rio Hondo and contingency of the Lon Hill to North Edinburg
 - Current 138 kV constraint of 300 MW doubles to 600 MW with the third 345 kV line
 - Combined effect of new line with upgrades to existing lines doubles import capability
 - Constraint: One Valley 345 kV line overloads the remaining Valley 345 kV line
 - Voltage stability limits are well in excess of thermal limitations

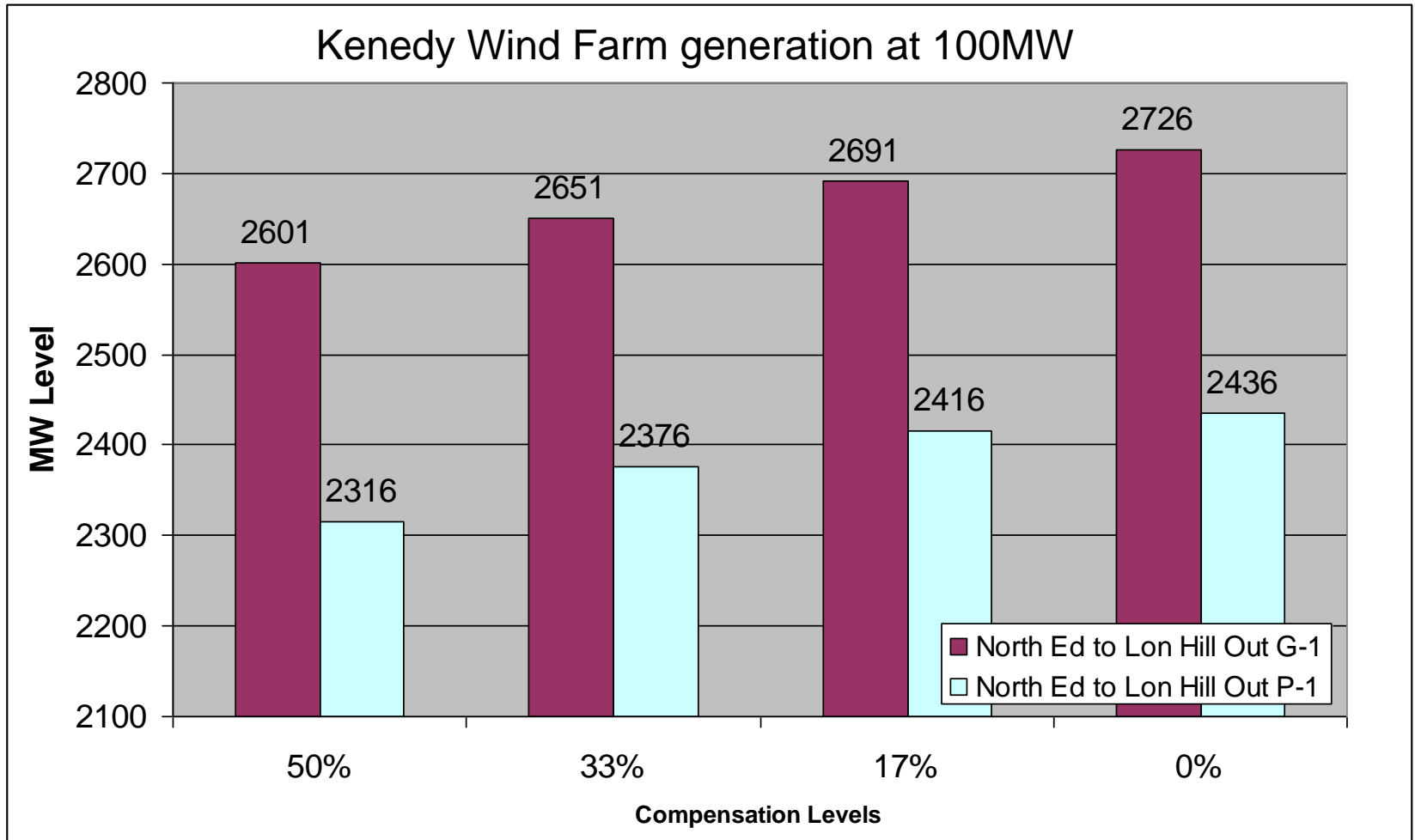
Opening clearance windows enables upgrades to existing 345 kV lines to Valley



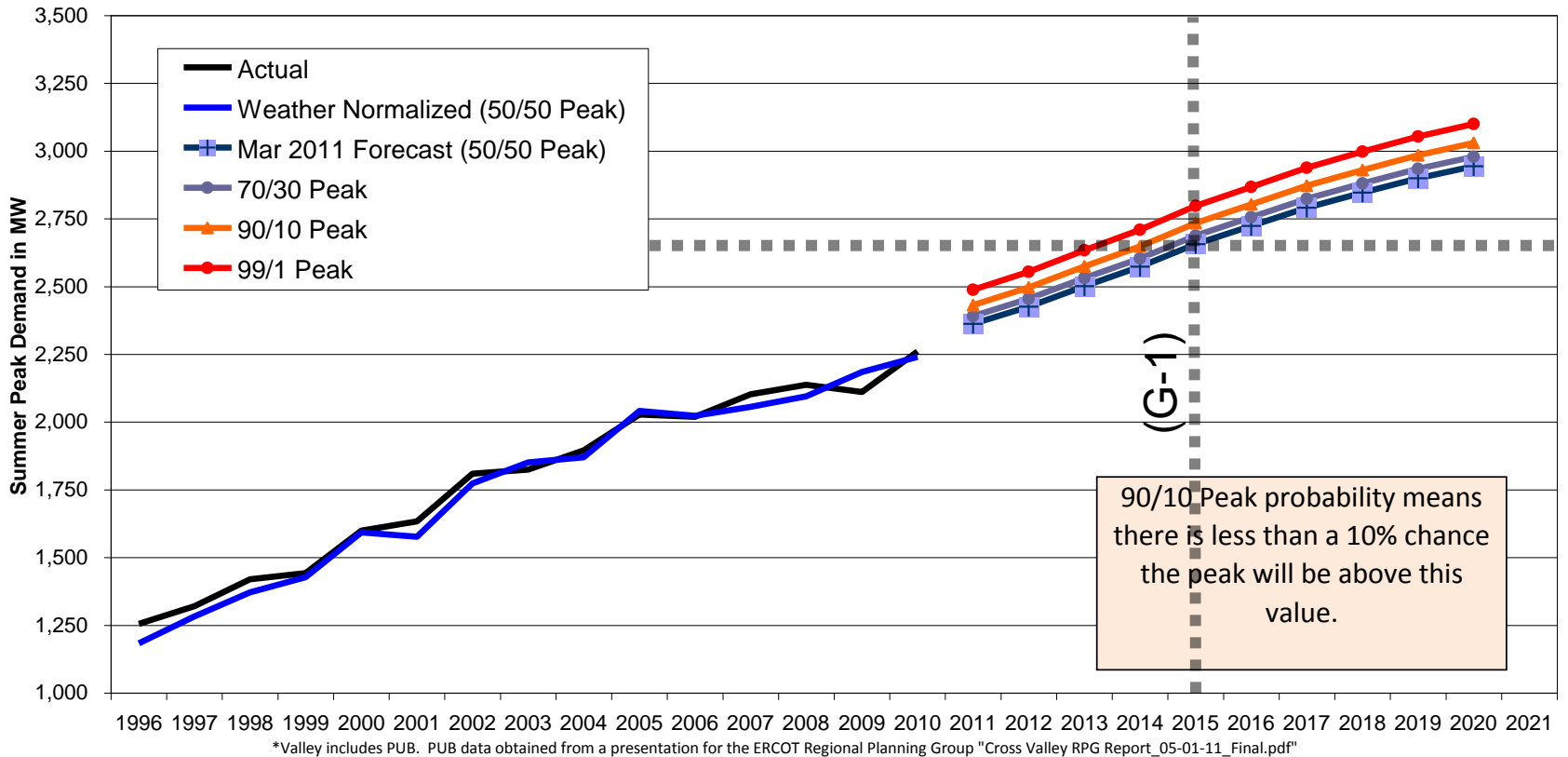
Existing Transmission System Load Serving Capability in the Valley



Existing Transmission System Load Serving Capability in the Valley

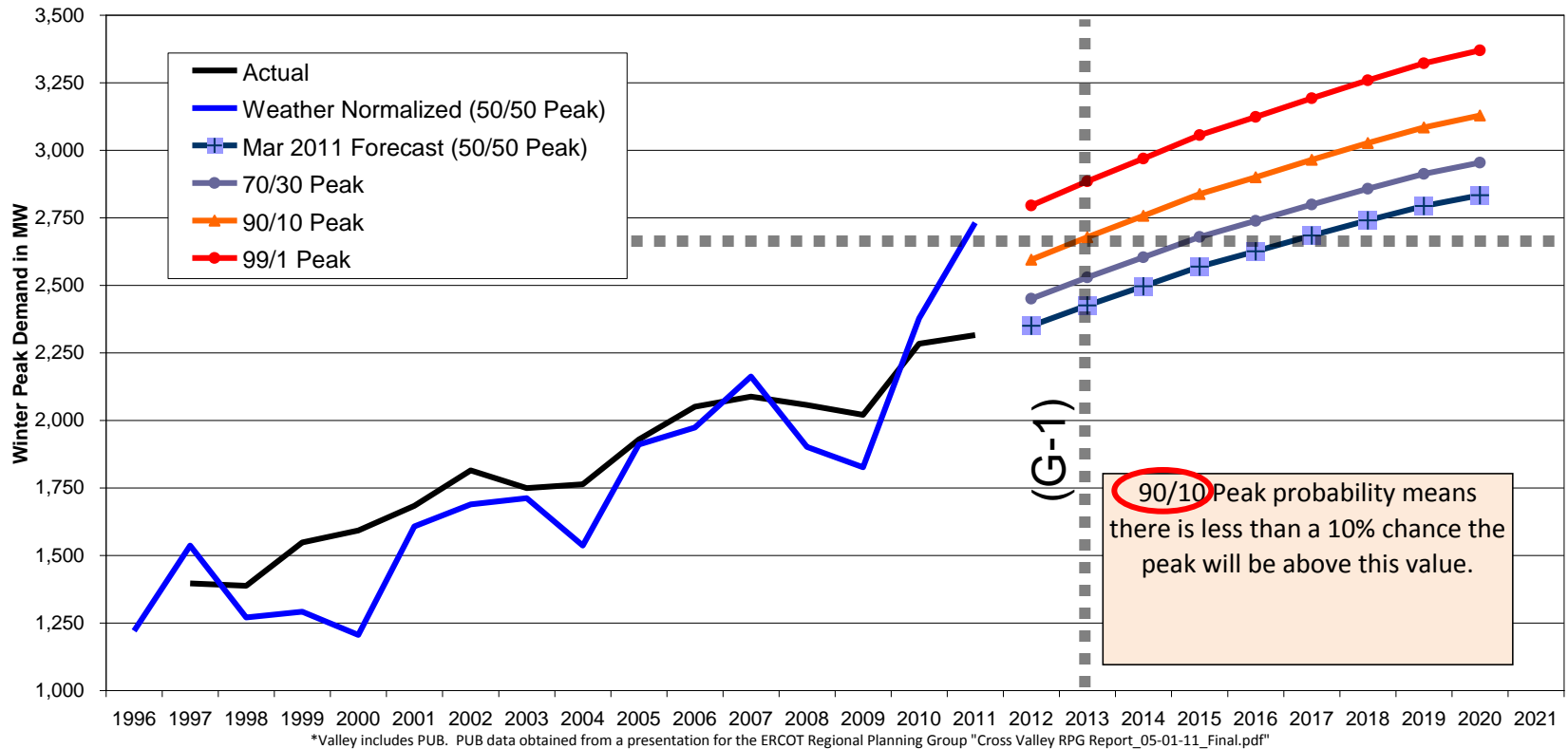


2011 Texas Valley* Area Summer Peak Load Forecast at Varying Probability Intervals



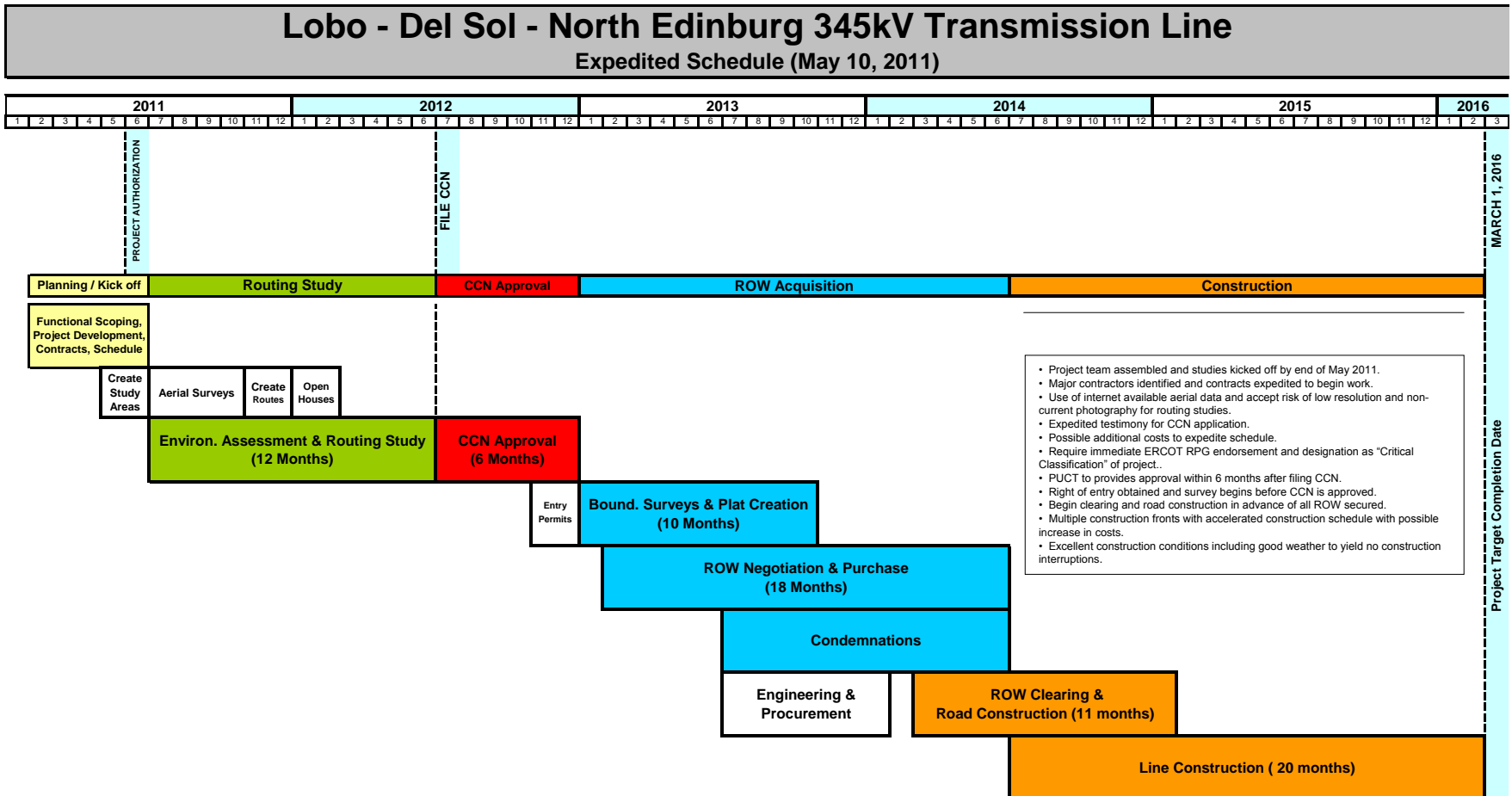
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
50/50 Peak	2,362	2,426	2,501	2,573	2,656	2,723	2,791	2,847	2,900	2,944
70/30 Peak	2,391	2,455	2,531	2,604	2,688	2,756	2,824	2,881	2,934	2,979
90/10 Peak	2,431	2,497	2,575	2,648	2,734	2,803	2,872	2,930	2,984	3,030
99/1 Peak	2,488	2,555	2,634	2,710	2,797	2,868	2,939	2,998	3,054	3,100

2011 Texas Valley* Area Winter Peak Load Forecast at Varying Probability Intervals

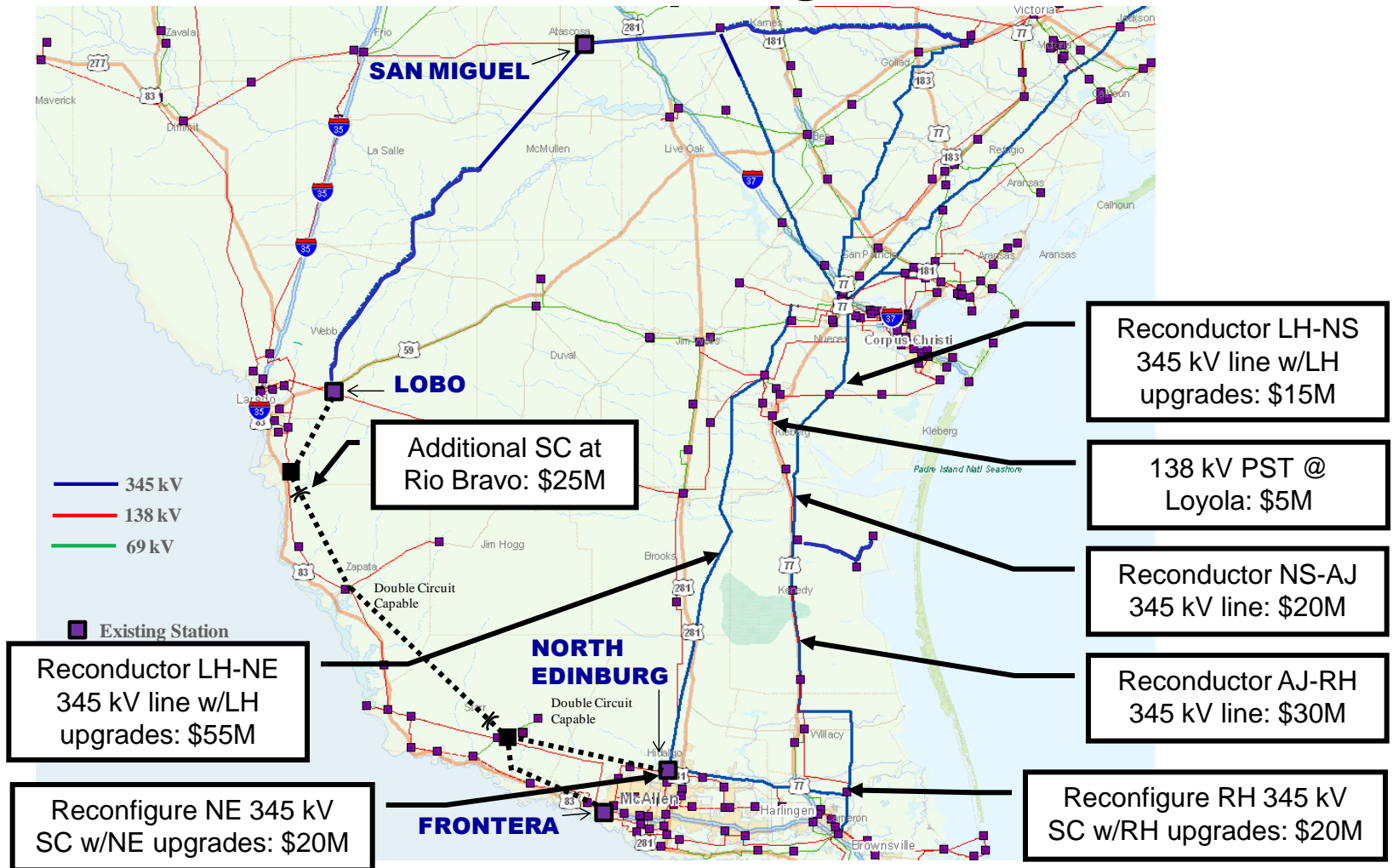


	2012	2013	2014	2015	2016	2017	2018	2019	2020
50/50 Peak	2,350	2,426	2,497	2,569	2,626	2,684	2,740	2,793	2,833
70/30 Peak	2,450	2,529	2,603	2,679	2,738	2,799	2,857	2,912	2,954
90/10 Peak	2,595	2,679	2,757	2,837	2,900	2,964	3,026	3,085	3,129
99/1 Peak	2,795	2,885	2,969	3,056	3,123	3,193	3,259	3,322	3,370

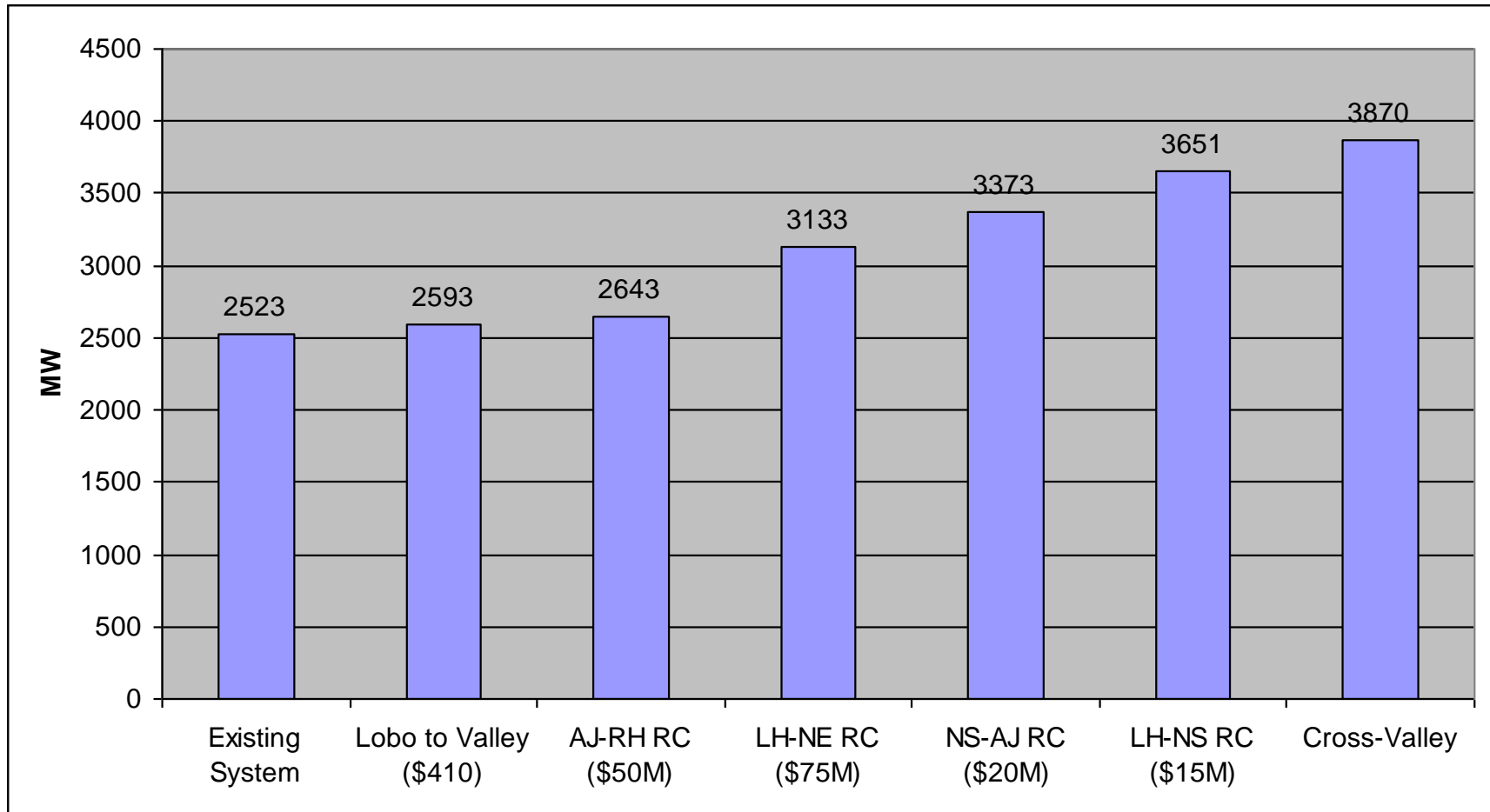
Need for Critical Status



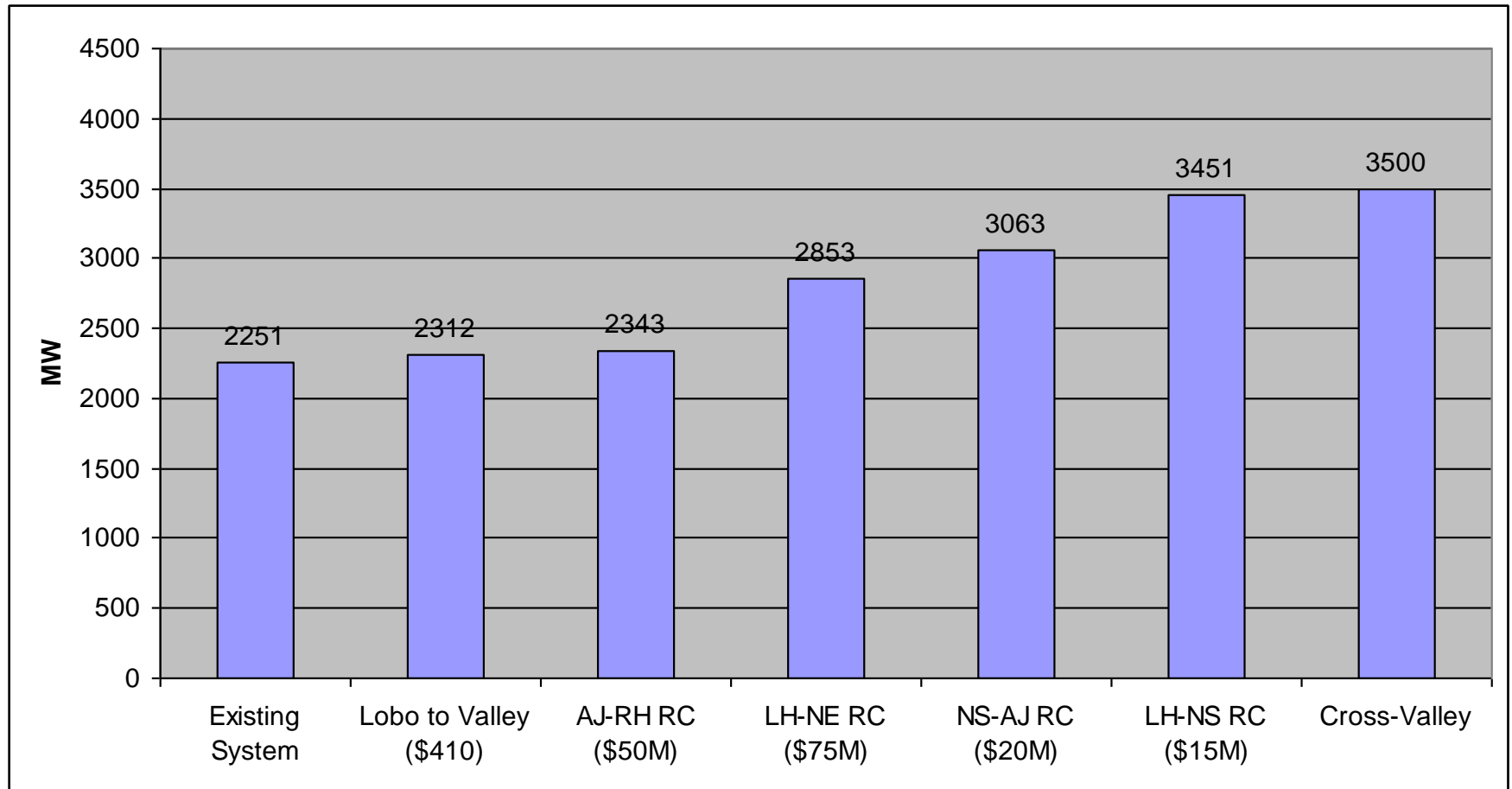
Upgrading Existing 345 kV system from 2000a rating to 4000a



Valley Load served by Stage with 300 MW of generation unavailable



Valley Load served by Stage with 600 MW of generation unavailable



Combined effect of new line with upgrades to existing lines doubles import capability

