



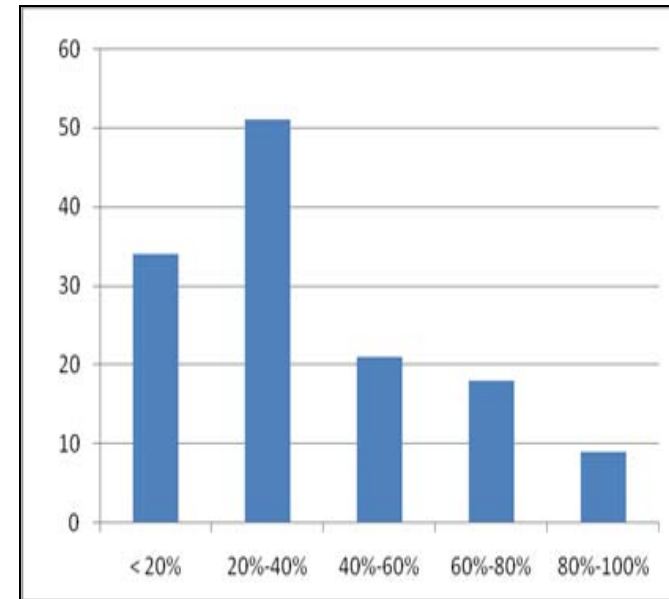
# Lower Rio Grande Valley (LRGV) 345 kV Project

July 15, 2011

# Wind Assumption

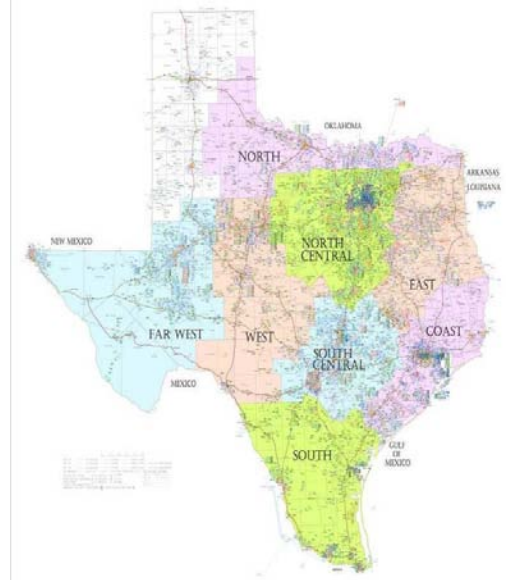
## 2010 Coastal Wind Data

- There were 133 hours (1.5% of the year) when the ERCOT system load was greater than 60 GW. For these hours:
  - The lowest coastal wind output was 1% of capacity
  - The average coastal wind output was 37% of capacity
  - The 10<sup>th</sup> percentile wind output was 9% of capacity
  - Number of these hours when the wind output was less than 10% of capacity = 14 (11% of these hours)
  - Number of these hours when the wind output was less than 20% of capacity = 34 (26% of these hours)
  - Coastal wind output was ~15% of capacity during the summer peak hour
- LRGV Study Assumption:  
Nearby (Coastal Wind) = 10% capacity for reliability analysis



# Project Options studied for 2016

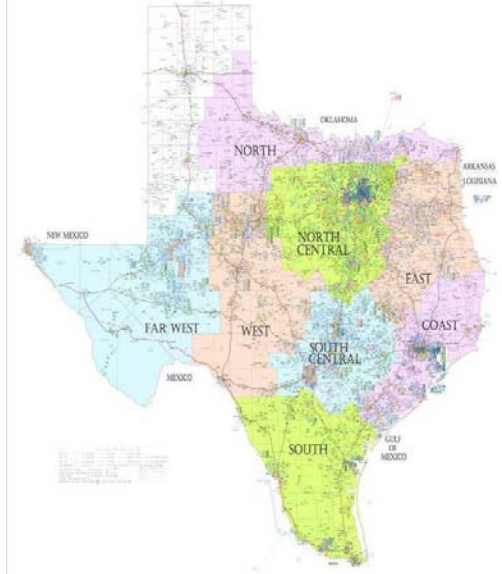
- **Option 1** - AEPSC proposal\*
- **Option 2** - AEPSC proposal\* with 600/750 MVA 345 kV,  $\pm 48^\circ$  Phase shifting transformer
- **Option 3** – Construct approximately 145 mile, 345kV transmission line from Laredo Lobo to North Edinburg, utilizing 2-954 ACSR conductor on double-circuit capable structures with 600/750 MVA 345 kV,  $\pm 48^\circ$  Phase shifting transformer
- **Option 4** – Construct approximately ~ 200 mile, 345kV transmission line from San Miguel to North Edinburg, utilizing 2-954 ACSR conductor on double-circuit capable structures with 50% Series Compensation
- **Option 5** – Construct approximately ~ 200 mile, 345kV transmission line from Pawnee to North Edinburg, utilizing 2-954 ACSR conductor on double-circuit capable structures with 50% Series Compensation



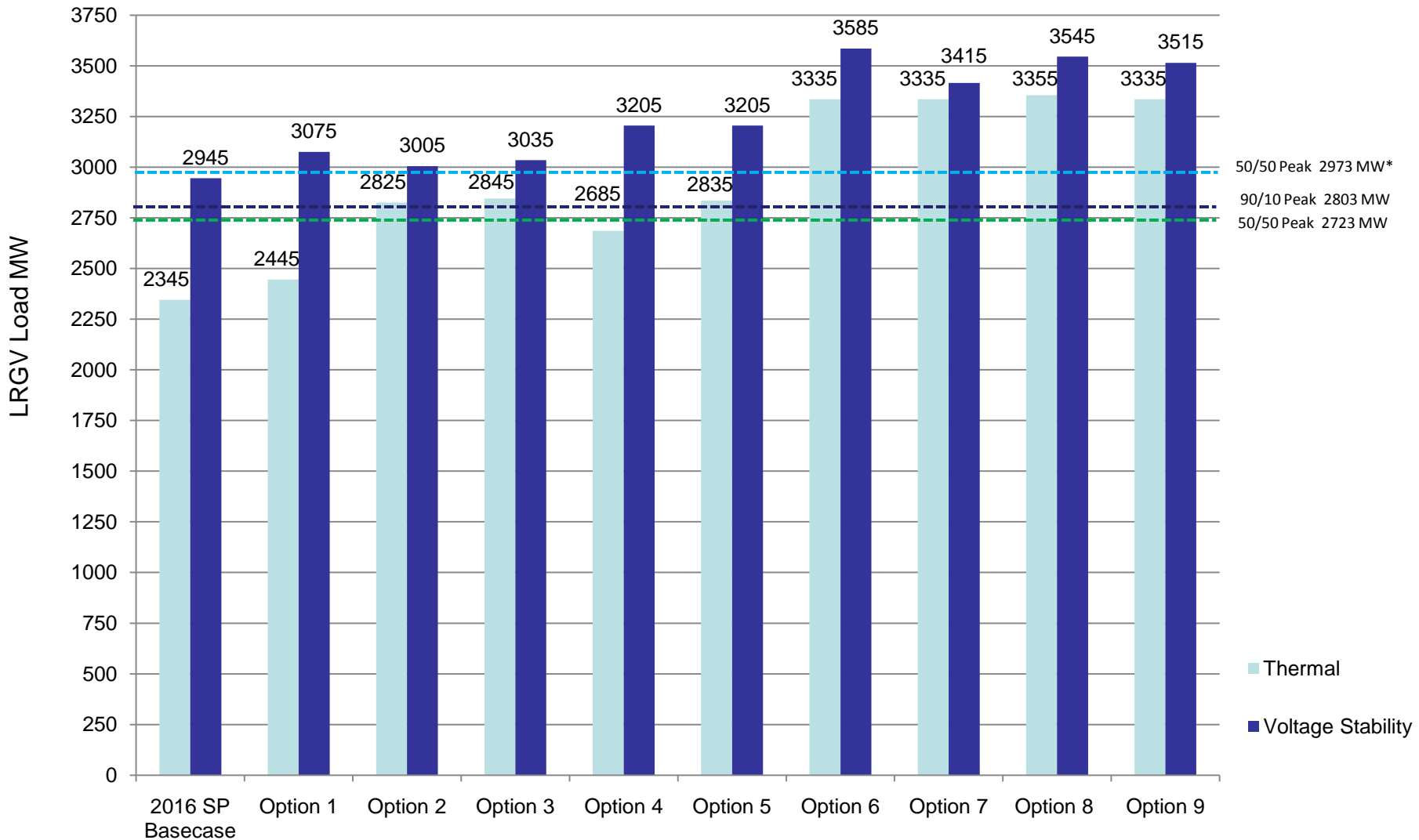
\* The Del Sol station and Del Sol-Frontera 345 kV line has been removed from the AEPSC proposal

# Project Options studied for 2016

- **Option 6** - Construct approximately 220 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to Loma Alta, Two 345/138kV 500 MVA autos at Loma Alta and a new 14 mile, 345 kV from LaPalma to Loma Alta
- **Option 7** - Construct approximately 200 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to North Edinburg
- **Option 8** - Construct approximately 200 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to Rio Hondo
- **Option 9** - Construct approximately 150 mile, +/- 320 kV 1000 MW submarine DC cable from Barney Davis to Loma Alta, Two 345/138kV 500 MVA autos at Loma Alta and a new 14 mile, 345 kV from LaPalma to Loma Alta



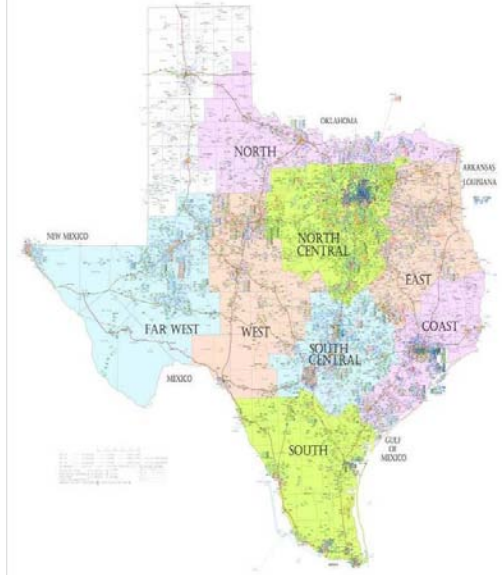
# 2016 Study Results for N-1 + G-1



\* Load forecasts including the 250 MW new load in Brownsville

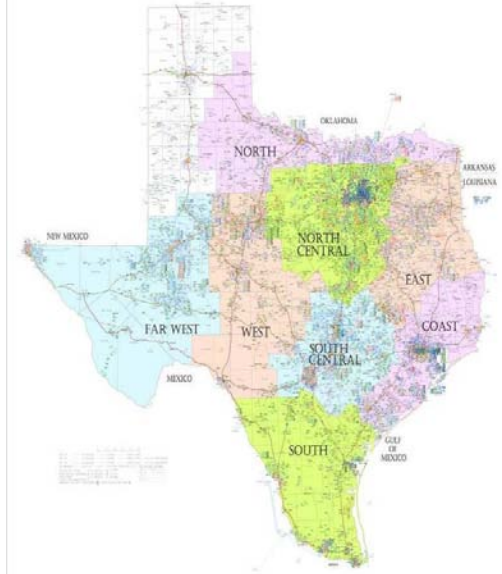
# Project Options studied for 2020

- **Option 1A** – Option 1 + Re-conductor both Lon Hill – North Edinburg 345 kV and Nelson Sharpe – Ajo – Rio Hondo 345 kV + new ~20 mile Caballo-Ajo 345 kV (tie the Lon Hill – North Edinburg 345 kV and Nelson Sharpe – Ajo – Rio Hondo 345 kV)
- **Option 3A** – Option 3 + Re-conductor both Lon Hill – North Edinburg 345 kV and Nelson Sharpe – Ajo – Rio Hondo 345 kV Re-Conductor + new ~20 mile Caballo-Ajo 345 kV
- **Option 5A** – Option 5 + Re-conductor both Lon Hill – North Edinburg 345 kV and Nelson Sharpe – Ajo – Rio Hondo 345 kV + new ~20 mile Caballo-Ajo 345 kV
- **Option 3\_5** – Option 3 + Option 5
- **Option 6** - Construct approximately 220 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to Loma Alta, Two 345/138kV 500 MVA autos at Loma Alta and a new 14 mile, 345 kV from LaPalma to Loma Alta

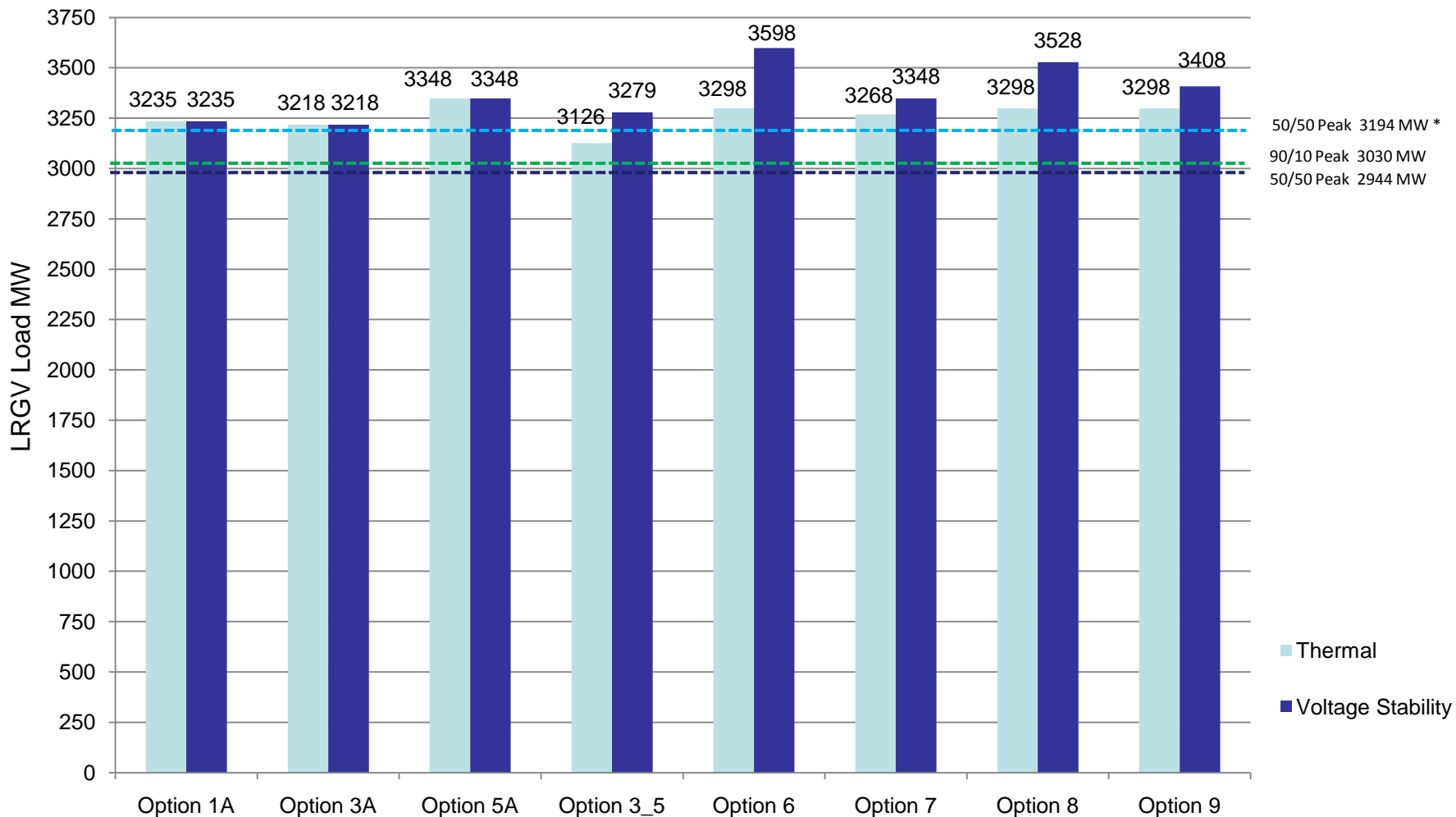


# Project Options studied for 2020

- **Option 7** - Construct approximately 200 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to North Edinburg
- **Option 8** - Construct approximately 200 mile, +/- 400 kV 1000 MW classic HVDC line from Pawnee to Rio Hondo
- **Option 9** - Construct approximately 150 mile, +/- 320 kV 1000 MW submarine DC cable from Barney Davis to Loma Alta, Two 345/138kV 500 MVA autos at Loma Alta and a new 14 mile, 345 kV from LaPalma to Loma Alta



# 2020 Study Results for N-1 + G-1



Options 1A, 3A & 5A are limited by voltage stability, no thermal limits

\* Load forecasts including the 250 MW new load in Brownsville



# 2016 Project Cost Estimates

Project Option	Project Base cost \$ M	Additional cost (project) \$ M	Total cost \$ M
Option 1	290		290
Option 2	300		300
Option 3	255		255
Option 4	365		365
Option 5	360		360
Option 6	626	33 (Loma Alta- LaPalma 345 kV)	659
Option 7	602*		602*
Option 8	602*		602*
Option 9	911	33 (Loma Alta- LaPalma 345 kV)	944

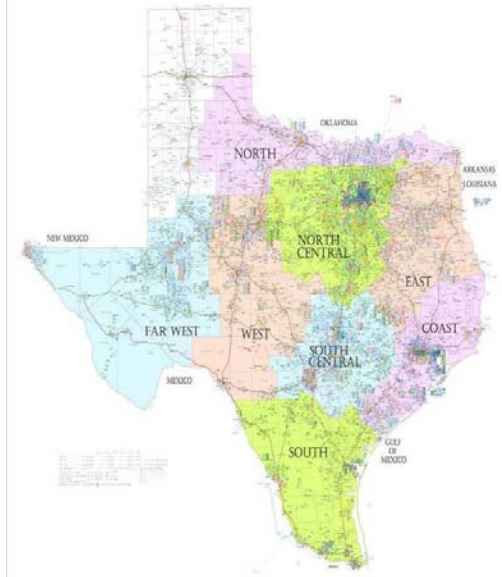
\*initial cost estimates by ERCOT

# 2020 Project Cost Estimates

Project Option	2016 Project cost \$ M	Existing 345 kV's Reconductor \$ M	Caballo-Ajo 345 kV \$ M	Lobo-Rio Bravo 138 kV \$ M	Loma Alta - LaPalma 345 kV \$ M	Total cost \$ M
Option 1A	290	160	40*	20	42	552
Option 3A	255	160	40*	50	42	547
Option 5A	360	160	40*	50	42	652
Option 3_5	255+360			50	42	707
Option 6	659			50		709
Option 7	602*			50	42	694
Option 8	602*			50	42	694
Option 9	944			50		994

\*initial cost estimates by ERCOT

- Evaluate the different options to assess the impact on the local area constraints/mitigation
- Update the cost estimates
- Perform a qualitative analysis to compare the different options to consider the following factors: geographical diversity, n-1 conditions (maintenance outage conditions), future system needs, technical, regulatory and market needs for new technology and construction feasibility.
- Complete the study report with final recommendation



Questions?