



ERCOT – LP&L Load Integration Study

Regional Planning Group
May 17, 2016

Lubbock Integration Study

- Objective: Identify transmission facilities that will be required to integrate the LP&L load and transmission network into the ERCOT Grid and satisfy ERCOT and NERC Transmission Planning reliability standards in the most efficient way possible.
- Scope and Assumptions:
<http://www.ercot.com/calendar/2015/12/15/31834-RPG>
- Previously presented results show that all options with at least three independent sources could meet the reliability requirements with additional margin:

<http://www.ercot.com/calendar/2016/3/22/77757-RPG>

Work Completed Since April RPG Meeting

- Updated cost estimates
- Completed Steady State Reliability and Economic Assessments
- Completed Dynamic Simulations
- Completed Sub-synchronous Resonance System Topology Check

Updated Cost Estimate Comparison

Case	Upgrade	Capital Cost Estimate	Relative Annual Capital Production Cost (\$Million)	% of Relative Capital
LP&L Option 1	McKenzie-North 115 kV & CO-OP-McKenzie 69 kV	\$311,818,800	0 0	
LP&L Option 4		\$344,443,600	+\$32.6 -\$0.3	-0.9%
LP&L Option 4ow	McKenzie-North 115 kV & CO-OP-McKenzie 69 kV	\$364,081,400	+\$52.3 -\$11.3	-21.6%
LP&L Option 8A		\$426,107,200	+\$114.3 -\$11.5	-10.1%
LP&L Option 8B		\$338,096,600	+\$26.3 -\$5.2	-19.8%
LP&L Option 11		\$492,368,200	+\$180.5 -\$2.6	-1.4%
LP&L Option 11	McKenzie-North 115 kV	\$492,368,200	+\$180.5 -\$5.7	-3.2%
LP&L Option 12		\$397,751,918	+\$85.9 +\$1.0	+1.2%
LP&L Option 12	Holly-Wadsworth 115 kV	\$397,751,918	+\$85.9 -\$3.5	-4.1%
LP&L Option 12c		\$391,751,918	+\$79.9 -\$0.2	-0.3%
LP&L Option 20		\$466,552,338	+\$154.7 +\$1.3	+0.8%
SHY Option 1-2a		\$383,800,200	+\$72.0 -\$0.6	-0.8%
SHY Option 1-2b		\$365,076,200	+\$53.3 -\$0.8	-1.5%

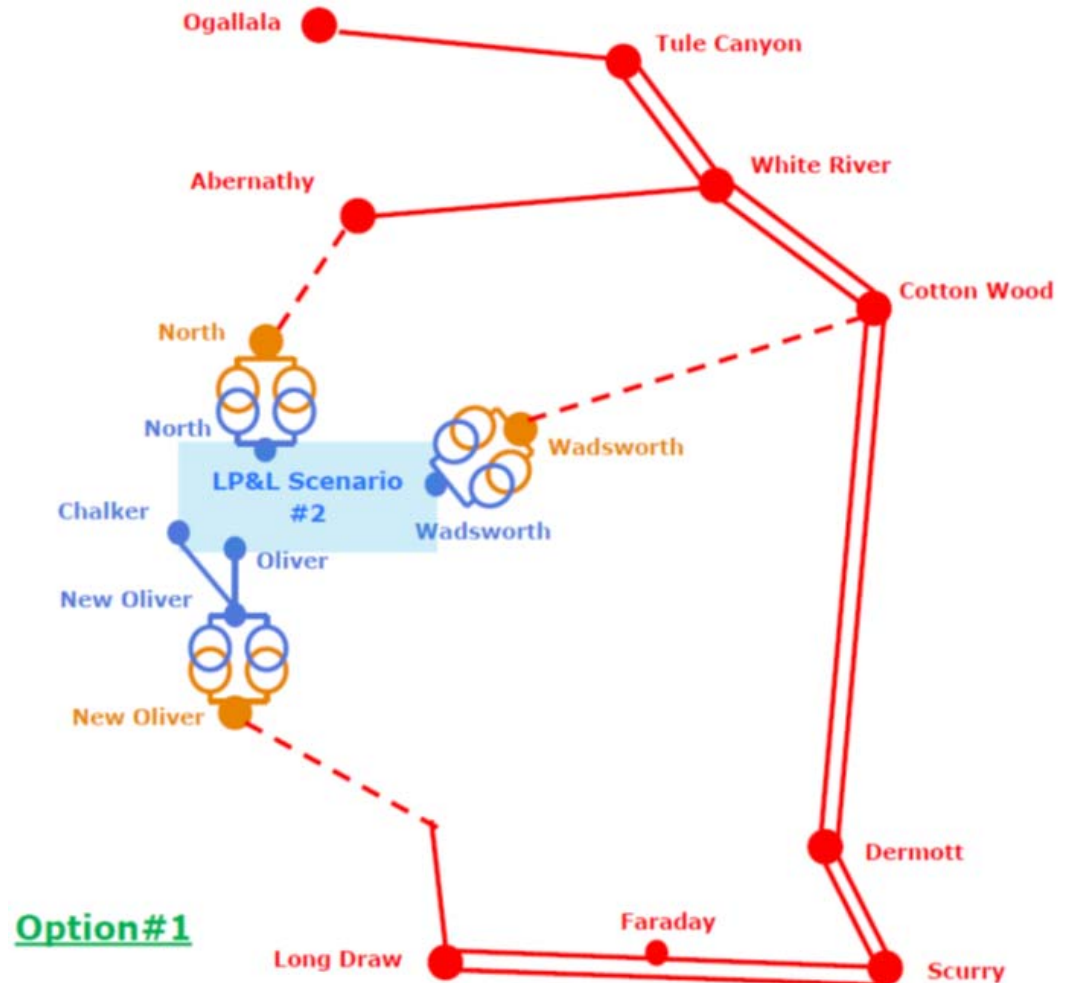
Note: Increased capital expenditure meets economic criteria per ERCOT Protocols 3.11.2(5)

Short-Listed Options: Option 1

Cost Estimate: \$312 million

New 345 kV ROW: 113 miles

Panhandle Export Limit: 3902 MW



Short-Listed Options: Option 4ow

Cost Estimate: \$364 million

New 345 kV ROW: 141 miles

Panhandle Export Limit: 4246 MW

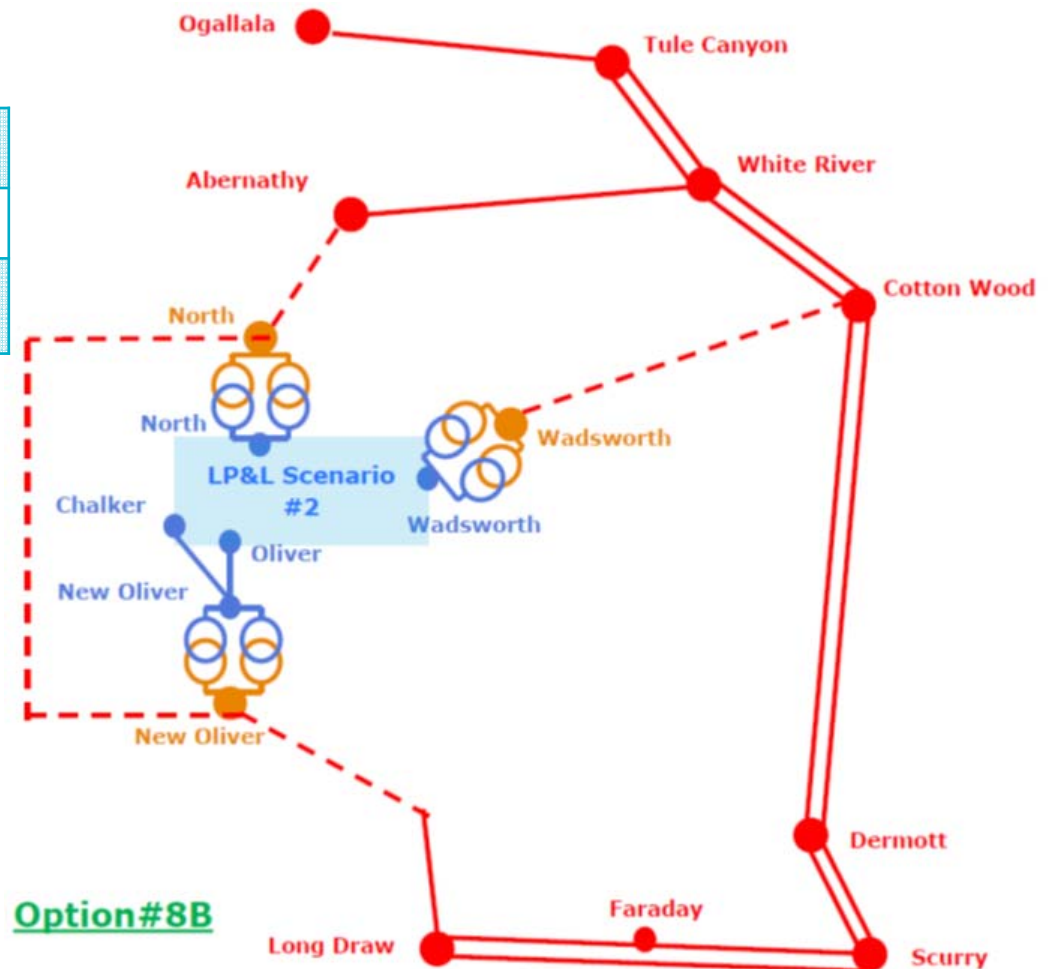


Short-Listed Options: Option 8B

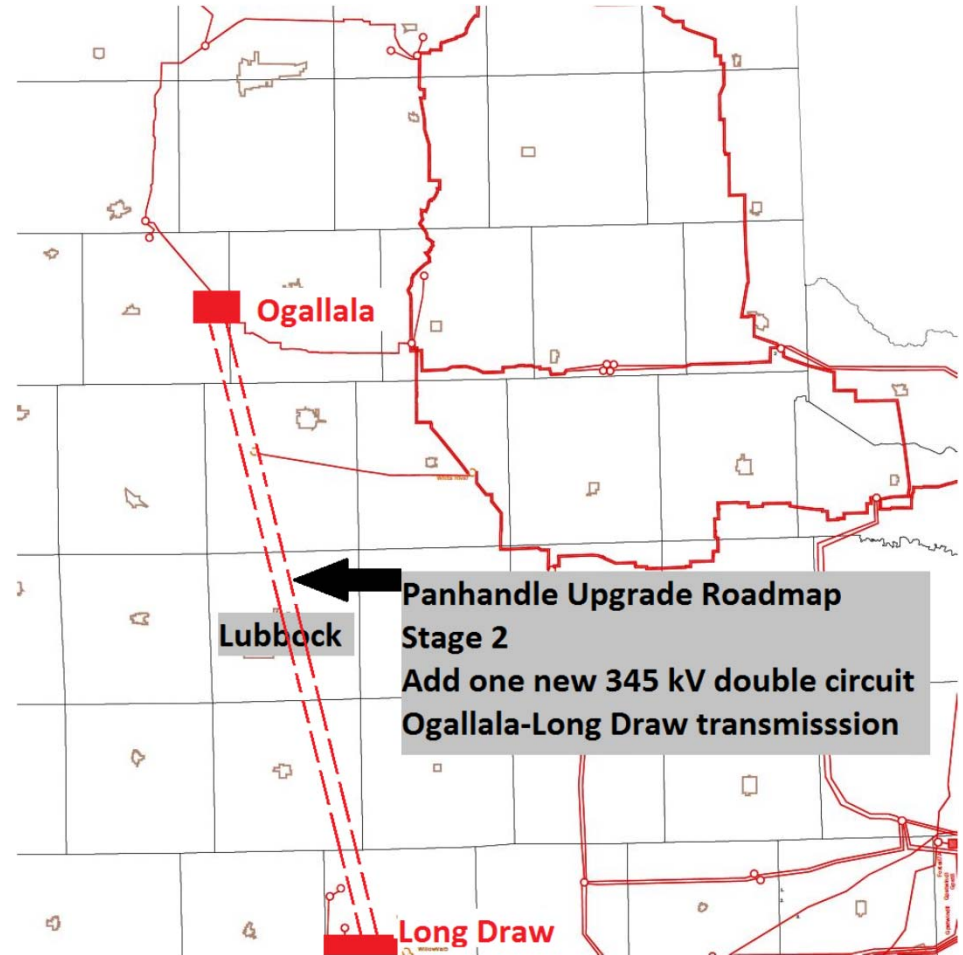
Cost Estimate: \$338 million

New 345 kV ROW: 129 miles

Panhandle Export Limit: 4029 MW



Stage 2 Panhandle Upgrade Roadmap



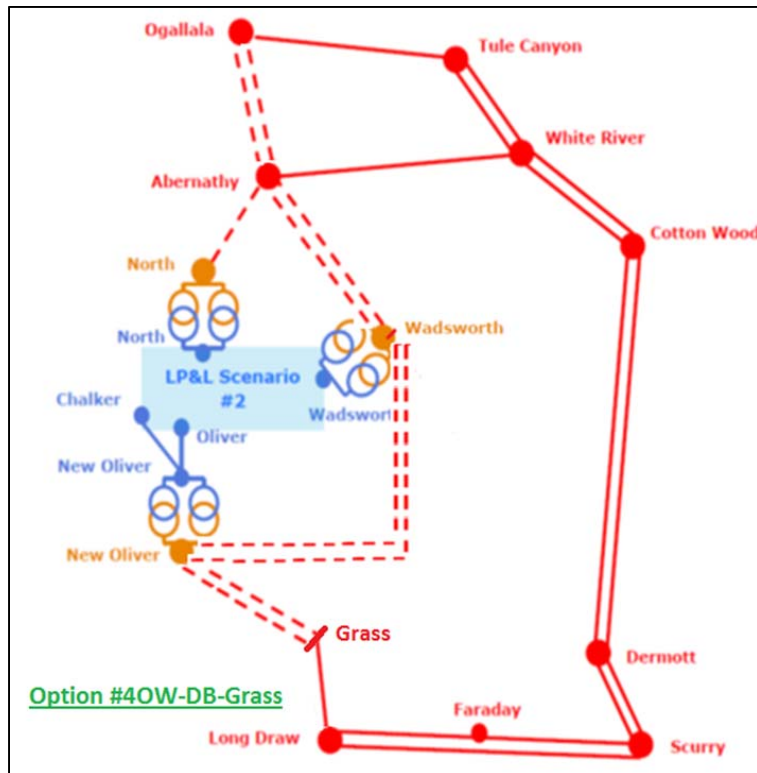
<http://www.ercot.com/news/presentations/2014>

Option 4ow Expandability

Additional 345 kV ROW: 0 miles

Internal LP&L Congestion = Yes

Panhandle Export Limit: 4454 MW



Additional 345 kV ROW: 16 miles

Internal LP&L Congestion = No

Panhandle Export Limit: 4350 MW



Comparison of Options

Metric	LP&L Option 1	LP&L Option 8B	LP&L Option 4ow
Total Capital Cost (\$M)	\$312	\$338	\$364
Relative Capital Cost Compared to Option 1 (\$M)	-	+\$26.3	+\$52.3
Relative Annual Production Cost Savings Compared to Option 1 (\$M)	-	-\$5.2	-\$11.3
Relative Production Cost as Percent of Relative Capital Cost	-	-19.8%	-21.6%
Panhandle Export Limit (Based on WSCR = 1.5)	3902 MW	4029 MW	4246 MW
Miles of new 345 kV Right of Way	113	129	141
Aligned with April 2014 Panhandle Study Roadmap	No	No	Yes
Lubbock Load Serving Capability (MW)	715	819	822

ERCOT Preferred Option highlighted in green

Stability Analysis

Dynamic stability analysis performed for Options 1 and 4ow

Both options were stable for all conditions tested

SSR topology check performed for Option 4ow

All LP&L units are 5 outages away from being radial to a series capacitor

ERCOT Recommendation

- Option 4ow is the most efficient alternative for integrating the Lubbock Power and Light System into ERCOT
 - Meets applicable reliability criteria with significant margin for future load growth and/or local generation retirement
 - Additional cost compared to lowest cost option is economically justified
 - Highest “bang-for-the-buck” among short-listed options
 - Increases Panhandle export capability the most of short-listed options
 - Aligns with 2014 Roadmap of future Panhandle upgrades and long-range ERCOT plans
 - Has identified expansion path

Next Steps/Timeline

Final Report
(May 26)

Informational
presentation to
TAC (Tentative -
May 26)

Informational
presentation to the
ERCOT Board
(June 14)

