

# **ERCOT RPG Project Submittal**

## **Tyler Transmission Upgrades Submitted by Luminant Energy (Ed Svihla)**

### **Executive Summary**

Luminant Energy requests acceleration and modification of three existing, inter-related, transmission upgrade projects, located in Smith County

1. Tyler Northeast - Tyler East 138 kV Line (3.7 miles) – Accelerate from 2012 to May 2009.
2. Tyler Southeast 345/138 kV Autotransformer – Increase planned rating from 493 MVA to 600 MVA, maintain planned installation date of May 2009.
3. Tyler Southeast – Tyler South 138 kV Line (4.1 miles) – Increase planned rating from 326 MVA to a minimum rating of 400 MVA; maintain planned completion date of May 2009

Accelerating and modifying these projects results in significant reduction to production costs while adding relatively small incremental capital cost increases.

These proposed East Texas projects reside in a generation pocket consisting of approximately 3,800 MW of generation (Tenaska Gateway, Martin Lake, and Stryker Creek), with low local loads, resulting in high exports levels. The estimated capital cost of these projects is \$7.1 - \$11.7 million, while estimated production cost savings of approximately \$4.9 million annually would be realized. Note that these capital costs are for the complete project set, not just the incremental costs that will actually be realized.

### **Loadflow Studies**

The ERCOT SSWG Dataset-B cases (dated 03/09/2007) were utilized to evaluate the steady-state impact of the proposed upgrades. Below is a short summary of each line loading problem:

1. Tyler Northeast – Tyler East 138 kV Line
  - Present rating: 214 MVA
  - Primary Contingency: Martin Lake – Elkton & Martin Lake – TriCorner 345 kV Double-Circuit
  - Worst contingency loading = 118%
  - Generation Shift Factors are as follows:
    - Martin Lake 5.4%
    - Tenaska Gateway 4.2%
    - Stryker Creek -2.5%
2. Tyler Southeast 345/138 kV Auto
  - Planned rating: 493 MVA
  - Primary contingency: Martin Lake – Elkton & Tyler SE – TriCorner 345 kV Double Circuit
  - Worst contingency loading = 109%
  - Generation Shift Factors are as follows:
    - Martin Lake 12.1%
    - Tenaska Gateway 9.8%
    - Stryker Creek -2.8%
  - This problem does not occur until the Tyler SE Auto (Project 1) is installed in 2009
3. Tyler Southeast – Tyler South 138 kV Line
  - Present rating: 214 MVA, current planned upgrade 326 MVA

- Primary contingency: Martin Lake – Elkton & Tyler SE – TriCorner 345 kV Double Circuit
- Worst contingency loading = 107%
- Generation Shift Factors are as follows:
  - Martin Lake 10.0%
  - Tenaska Gateway 8.4%
  - Stryker Creek 6.3%
- This problem does not occur until the Tyler SE 345/138 kV Auto (Project 2) is installed in 2009

Twelve generation scenarios were developed to represent typical operating conditions of the three local generating plants. In each scenario, Martin Lake was set at full output, consistent with normal operation of low cost lignite plants, while the gas plants were rotated to represent typical conditions.

Below are tables summarizing each loadflow scenario result. There were two primary observations from this portion of the study. Significant output from Stryker Creek is required to eliminate overload conditions on the Tyler NE – Tyler E 138 kV Line, yet Stryker Creek is an older, less efficient generator that sees limited economic run-time. Secondly, for ERCOT to solve a 10% overload (21.4 MW), significant and costly OOM instructions are required on Martin Lake (396 MW) or Tenaska Gateway (509 MW). Stryker Creek has insufficient capacity to relieve this overload condition. The loading on the Tyler SE Auto and Tyler SE – Tyler South Lines are less severe, but still lead to economic back-down of the units in East Texas (see Uplan results below).

TYLER NE - TYLER E 138 KV LINE LOADING								
	Generation Levels (MW)				% Line Loading			
	Martin Lake	Stryker-1	Stryker-2	Gateway	2008	2009	2010	2011
Scenario-1	2,353	0	0	824	118	117	117	116
Scenario-2	2,353	0	0	432	114	109	109	109
Scenario-3	2,353	0	0	0	110	101	101	101
Scenario-4	2,353	178	0	824	113	115	115	114
Scenario-5	2,353	178	0	432	109	107	108	107
Scenario-6	2,353	178	0	0	106	99	99	99
Scenario-7	2,353	0	510	824	104	111	112	111
Scenario-8	2,353	0	510	432	101	104	104	104
Scenario-9	2,353	0	510	0	97	95	96	96
Scenario-10	2,353	178	510	824	100	110	110	109
Scenario-11	2,353	178	510	432	97	102	103	102
Scenario-12	2,353	178	510	0	93	94	94	94

TYLER SOUTHEAST 345/138 KV AUTO								
	Generation Levels (MW)				% Line Loading			
	Martin Lake	Stryker-1	Stryker-2	Gateway	2008	2009	2010	2011
Scenario-1	2,353	0	0	824	n/a	107	108	109
Scenario-2	2,353	0	0	432	n/a	100	100	102
Scenario-3	2,353	0	0	0	n/a	92	92	93
Scenario-4	2,353	178	0	824	n/a	106	107	108
Scenario-5	2,353	178	0	432	n/a	99	100	101
Scenario-6	2,353	178	0	0	n/a	91	91	92
Scenario-7	2,353	0	510	824	n/a	105	105	106
Scenario-8	2,353	0	510	432	n/a	98	98	99
Scenario-9	2,353	0	510	0	n/a	89	89	90
Scenario-10	2,353	178	510	824	n/a	104	104	105
Scenario-11	2,353	178	510	432	n/a	97	97	98
Scenario-12	2,353	178	510	0	n/a	88	88	89

TYLER SOUTHEAST - TYLER SOUTH 138 KV LINE								
	Generation Levels (MW)				% Line Loading			
	Martin Lake	Stryker-1	Stryker-2	Gateway	2008	2009	2010	2011
Scenario-1	2,353	0	0	824	n/a	93	93	93
Scenario-2	2,353	0	0	432	n/a	83	83	84
Scenario-3	2,353	0	0	0	n/a	73	73	74
Scenario-4	2,353	178	0	824	n/a	96	96	97
Scenario-5	2,353	178	0	432	n/a	86	87	87
Scenario-6	2,353	178	0	0	n/a	76	76	77
Scenario-7	2,353	0	510	824	n/a	103	103	103
Scenario-8	2,353	0	510	432	n/a	94	93	94
Scenario-9	2,353	0	510	0	n/a	83	83	83
Scenario-10	2,353	178	510	824	n/a	106	106	107
Scenario-11	2,353	178	510	432	n/a	96	96	97
Scenario-12	2,353	178	510	0	n/a	86	86	87

### Production Cost Studies

Luminant Energy utilized the Uplan software to model and analyze the impact of the congestion in the Tyler area on the Martin Lake, Tenaska Gateway, and Stryker Creek units. The Uplan models were built from the ERCOT SSWG 2009-2011 summer loadflow cases. Potential upgrades were chosen by identifying the system elements associated with the highest congestion costs, and were attributable to the Martin Lake and Tenaska Gateway generation. While the congestion costs on the overloaded lines are not the direct measure for the economic planning criteria, they are a good indication as to which transmission upgrades will provide the most production cost benefit to the system.

Table-1 below shows the highest congested transmission elements, the production cost savings associated with each upgrade, and the cumulative savings of the project set. The production cost values in the table represent an estimated six years of savings. The production cost savings would need to exceed the capital cost of the project to be economically justified (equivalent to annual production cost savings exceeding the annual carrying cost of the project (TCOS)). Note that although projects 2 & 3 are shown separately, their interdependency dictates that they should be treated as a single project.

Project #	Line Section	PTI Bus #	Miles	PC Savings (\$)	Cumulative \$	
1	Tyler NE-Tyler E	3210-3211	3.7	23,000,000	23,000,000	
2	Tyler SE Auto	3102-3143	0	-27,100,000	-4,100,000	
3	Tyler SE-Tyler S	3143-3218	4.1	33,500,000	29,400,000	
2& 3	2&3 Combined			6,400,000		

**Table-1**

To clarify the interdependency between projects 2 & 3, note that the upgrade of the Tyler SE Auto (Project #2) appears to actually increase the production cost. However, what happens in the model (and arguably in real life) is that the congestion is pushed downstream to the next problem (in this case, Project #3), and it can become more costly to alleviate the congestion on the next element. In reality, it is the combination of projects 2&3 that provides an overall production cost savings of \$6,400,000.

Based on previous projects submitted through the RPG process, Luminant Energy is estimating per unit transmission costs of \$400,000-\$600,000 per mile for 138 kV upgrades, and \$4,000,000-\$7,000,000 to add/replace a 345/138 kV autotransformer. Table-2 shows the production cost savings of the proposed projects in reference to their estimated capital costs. Due to their interdependency, Items 2&3 have been combined as a group project.

Project #	Line Section	Miles	PC Savings (\$)	Low Cost Est.(\$)	High cost Est.(\$)
1	Tyler NE-Tyler E	3.7	23,000,000	1,500,000	2,200,000
2/3	2&3 Combined	4.1	6,400,000	5,600,000	9,500,000

**Table-2**

Utilizing the data in Table-2, it is apparent that the Tyler NE – Tyler E 138 kV Line upgrade is economically justified, and that the Tyler SE 345/138 kV Auto and Tyler SE – Tyler S 138 kV Line upgrade are justified depending on the actual capital cost of the projects. However, since the Tyler Southeast projects are already proposed by Oncor Electric Delivery, the appropriate economic test is to compare the production cost savings to the capital cost of the scope changes to these projects, rather than the entire project cost.

While it did not appear that any terminal equipment would need to be replaced in conjunction with these projects (based on SSWG ratings), this should be verified by ERCOT and Oncor Electric Delivery to ensure the proper upgrades are completed.

### Conclusion

Luminant Energy requests the completion of the upgrades on the Tyler Northeast – Tyler East 138 kV Line, the Tyler Southeast 345/138 kV Autotransformer, and the Tyler Southeast – Tyler South 138 kV Line prior to the summer of 2009 to help ensure a reliable economic generation dispatch in ERCOT. The proposed upgrades are justified based on ERCOT's Economic Planning Criteria; with an estimated total production cost savings of approximately \$29 million, and capital expenditures in the range of \$7-\$12 million.

