



***System Impact Study for
Generation Interconnection
Request
for
Lea County Electric Cooperative***

***SPP Coordinated Planning
(#GEN-2002-002)***

May, 2002

Executive Summary

Lea County Electric Cooperative has requested interconnection for 50 MW nominal generating facility consisting of a gas-fired turbine interconnecting at the Lea County Lovington 115kV substation near Lovington, New Mexico. The Lovington 115kV substation is connected to the XCEL Energy transmission system via two 115kV lines. One connects into the Lea County interchange near Cunningham power station and the other line connects in at the Denver City Interchange.

A short circuit study indicates that the proposed generation is not expected to require any network modifications on the XCEL Energy system.

A transient stability study indicates that the proposed generation is not expected to cause any transient stability or dynamics problems.

Powerflow analysis shows that the addition of the Lea County generation does not cause any overloads or voltage violations of any facilities on the local XCEL or SPP transmission systems. However, this study does not serve as an ATC study of available transmission capacity. The customer must request transmission service through the SPP OASIS in order to operate the facility.

Since the Lea County Electric Cooperative is interconnecting the plant into their own system, no directly assigned interconnection costs are applicable to this request. Also, network upgrade costs are zero since additional network facilities are not required.

Introduction

Lea County Electric Cooperative has requested interconnection for a 50 MW nominal generating facility consisting of a gas-fired turbine interconnecting at the Lea County Lovington 115kV substation near Lovington, New Mexico. The Lovington 115kV substation is connected to the XCEL Energy transmission system via two 115kV lines. One connects into the Lea County interchange near Cunningham power station and the other line connects in at the Denver City Interchange.

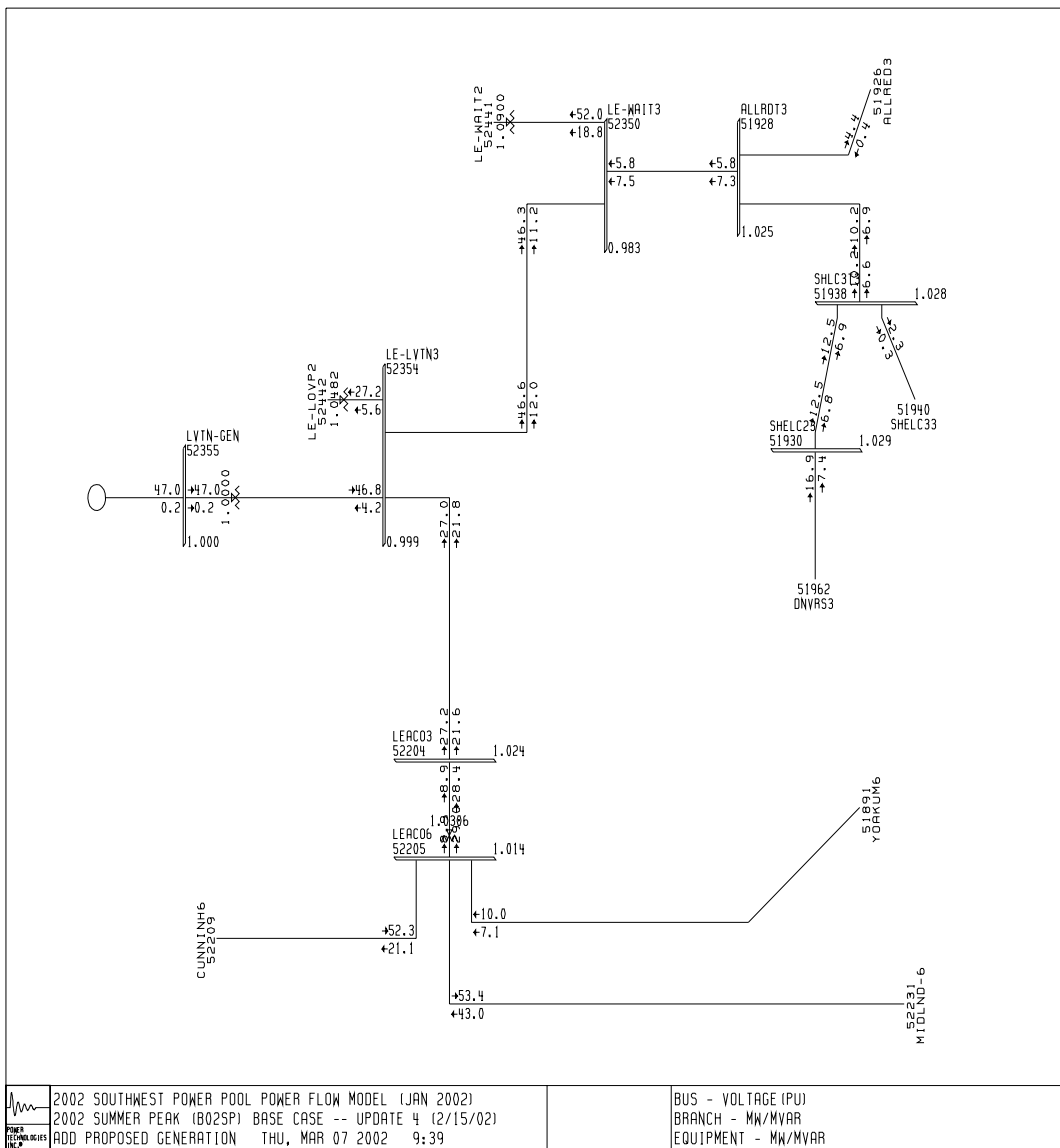


Figure 1. Transmission System in eastern New Mexico

The System Impact Study investigates the effect of the new generation on system performance during normal and contingency conditions. For purposes of this study, the power was absorbed into the system by lowering generation in a) Oklahoma Gas & Electric system and b) lowering generation on Lubbock municipal system.

The study investigated the plant's response in steady-state contingency, dynamic stability, and short circuit analysis.

The steady-state contingency analysis considers the impact of the new generation on transmission facility loading and transmission bus voltages for outages of transmission lines, autotransformers, and generators.

Stability analysis shows the effect of the new generation on the transient stability of XCEL transmission system and any surrounding utility generators. Transient stability is concerned with the recovery from faults on the transmission system that are in close proximity to generating facilities.

Short circuit analysis determines the whether the interruption capabilities of existing circuit breakers are exceeded with the addition of the new generation.

Steady State Analysis

A steady state analysis was conducted for the facility. The steady-state analysis considers the impact of a 50 MW transfer on transmission line loadings for local area of the Lovington 115kV substation. This study does not take into account ATC analysis, which is performed when a customer requests transmission service on Southwest Power Pool's OASIS. A modified version of the 02 Series Southwest Power Pool 2002 summer peak base case was used for this study. The modified model includes transmission transactions that have been confirmed on Southwest Power Pool's OASIS since the release of the last model.

The analysis of the Lea County project shows that the addition of the 50 MW of generation at the Lovington substation does not adversely affect the XCEL transmission system from a powerflow perspective. Single contingency analysis was performed in the area of the generation for four different scenarios. The scenarios are listed below.

1. 2002 summer base case conditions with only native load being served.
2. 2002 summer base case conditions with confirmed OASIS reservations deemed to be affected by the addition of the Lea County generation.
3. Lea County generation added to model #2 with a transfer simulated to Oklahoma Gas & Electric Company.
4. Lea County generation added to model #2 with a transfer simulated to city of Lubbock by backing down the Jones generators 50 MW.

The resulting overload reports are shown on Table 1.

Powerflow Analysis Methodology

The Southwest Power Pool (SPP) criteria state that the following conditions be met in order to maintain a reliable and stable system.

- 1) More probable contingency testing must conclude that
 - a) All facility loadings are within their emergency ratings and all voltages are within their emergency limits (0.90-1.05 per unit) and
 - b) Facility loadings can be returned to their normal limits within four hours
- 2) Less probable contingency testing ... shall conclude that
 - a) Neither uncontrolled islanding, nor uncontrolled loss of large amounts of load will result.

More probable contingency testing is defined as losing any single piece of equipment or multi-circuit transmission lines. Less probable contingency testing involves the loss of any two critical pieces of equipment such as 345kV autotransformers and generating units or the loss of critical transmission lines in the same right-of-way.

The 02 Series Southwest Power Pool 2002 summer peak base case was used to model the transmission network and system loads

Using the created models and the ACCC function of PSS/E, single contingencies in the eastern New Mexico zones of XCEL (Southwestern Public Service) transmission system were analyzed.

Table 1. Overload Report

| X----- CONTINGENCY EVENTS -----X | | X-- OVERLOADED LINES --X X- | | | | Percent Overload by Case | | | | | | | |
|---|--|-----------------------------|----------|------|--------|--------------------------|-----|--------|------|---|----------------|----------------------------|-------|
| | | FROM | NAME | TO | NAME | CKT | PR | Rating | Case | Base with LCEC Base Reservati ons | xfer to OGE | LCEC xfer to Lubbock | |
| BASE CASE | | ----- | | | | | | | | | | | |
| | | 51517 | FLOYD2 | 69.0 | 51518* | FLOYD3 | 115 | 1 | 40 | 107.1 | 107.4 | 107.5 | 107.4 |
| OPEN LINE FROM BUS 51959 [DENVRC2 69.000] TO BUS 51960 [DNVRN3 115.00] CKT 1 | | | | | | | | | | | | | |
| | | 51959 | DENVRC2 | 69.0 | 51962* | DNVRS3 | 115 | 2 | 44 | 114.5 | 114.5 | 114.5 | 114.5 |
| OPEN LINE FROM BUS 51959 [DENVRC2 69.000] TO BUS 51962 [DNVRS3 115.00] CKT 2 | | | | | | | | | | | | | |
| | | 51959 | DENVRC2 | 69.0 | 51960* | DNVRN3 | 115 | 1 | 40 | 125.9 | 125.9 | 125.9 | 125.9 |
| OPEN LINE FROM BUS 52029 [GAINES2 69.000] TO BUS 52030 [GAINES3 115.00] CKT 1 | | | | | | | | | | | | | |
| | | 52029 | GAINES2 | 69.0 | 52030* | GAINES3 | 115 | 2 | 40 | 186.8 | 186.8 | 186.8 | 186.8 |
| OPEN LINE FROM BUS 52029 [GAINES2 69.000] TO BUS 52030 [GAINES3 115.00] CKT 2 | | | | | | | | | | | | | |
| | | 52029 | GAINES2 | 69.0 | 52030* | GAINES3 | 115 | 1 | 44 | 169.8 | 169.8 | 169.8 | 169.8 |
| OPEN LINE FROM BUS 52073 [CHAVES6 230.00] TO BUS 52185 [EDDYCO6 230.00] CKT 1 | | | | | | | | | | | | | |
| | | 52184 | EDDYCO3 | 115 | 52185* | EDDYCO6 | 230 | 1 | 168 | 107.9 | 113.1 | 112.5 | 112.4 |
| OPEN LINE FROM BUS 52141 [CV-CTNW269.000] TO BUS 52145 [SMITH2 69.000] CKT 1 | | | | | | | | | | | | | |
| | | 52093* | ROSWIN2 | 69.0 | 52094 | ROSWIN3 | 115 | 1 | 40 | 101.6 | 101.7 | 101.7 | 101.7 |
| OPEN LINE FROM BUS 52145 [SMITH2 69.000] TO BUS 52153 [ARTESIA269.000] CKT 1 | | | | | | | | | | | | | |
| | | 52093 | ROSWIN2 | 69.0 | 52094* | ROSWIN3 | 115 | 1 | 40 | 113.1 | 113.1 | 113.1 | 113.1 |
| OPEN LINE FROM BUS 52184 [EDDYCO3 115.00] TO BUS 52185 [EDDYCO6 230.00] CKT 1 | | | | | | | | | | | | | |
| | | 52252 | POTJCT3 | 115 | 52310* | CARLSBD3 | 115 | 1 | 90 | 115.4 | 111.3 | 112.6 | 112.8 |
| OPEN LINE FROM BUS 52204 [LEACO3 115.00] TO BUS 52354 [LE-LVTN3115.00] CKT 1 | | | | | | | | | | | | | |
| | | 52350* | LE-WAIT3 | 115 | 52441 | LE-WAIT269.0 | 1 | | 56 | 109 | 108.9 | N/A | N/A |
| | | 52356* | LE-SNA3 | 115 | 52443 | LE-SNA2 69.0 | 1 | | 84 | 103.6 | 104.8 | N/A | N/A |
| OPEN LINE FROM BUS 52209 [CUNNINH6230.00] TO BUS 52253 [POTJCT6 230.00] CKT 1 | | | | | | | | | | | | | |
| | | 52184 | EDDYCO3 | 115 | 52185* | EDDYCO6 | 230 | 1 | 168 | 115.7 | 120.3 | 119.1 | 119 |
| OPEN LINE FROM BUS 52240 [PCA3 115.00] TO BUS 52310 [CARLSBD3115.00] CKT 1 | | | | | | | | | | | | | |
| | | 52252* | POTJCT3 | 115 | 52310 | CARLSBD3 | 115 | 1 | 90 | 102.4 | N/A | N/A | N/A |

Table 1. Overload Report

| | | | | | |
|---|------|-------|---------|-------|-------|
| OPEN LINE FROM BUS 52252 [POTJCT3 115.00] TO BUS 52253 [POTJCT6 230.00] CKT 1 | | | | | |
| 52184 EDDYCO3 115 52185*EDDYCO6 230 1 | 168 | 115.8 | 120.4 | 119.2 | 119.1 |
| OPEN LINE FROM BUS 52309 [CARLSBD269.000] TO BUS 52310 [CARLSBD3115.00] CKT 1 | | | | | |
| 52309 CARLSBD269.0 52310*CARLSBD3 115 2 | 25 | 173.3 | 173.1 | 173.2 | 173.2 |
| OPEN LINE FROM BUS 52310 [CARLSBD3115.00] TO BUS 52314 [PECOS3 115.00] CKT 1 | | | | | |
| 52184 EDDYCO3 115 52185*EDDYCO6 230 1 | 168 | 110.1 | 110.8 | 111.1 | 111.2 |
| OPEN LINE FROM BUS 52356 [LE-SNA3 115.00] TO BUS 52443 [LE-SNA2 69.000] CKT 1 | | | | | |
| 52350*LE-WAIT3 115 52441 LE-WAIT269.0 1 | 56 | 100.9 | 100.9 | | |
| 52354*LE-LVTN3 115 52442 LE-LOVP269.0 1 | 61.6 | 162.8 | 162.7 | 164.9 | 164.9 |
| 52442 LE-LOVP269.0 52447*LE-SNDR269.0 1 | 54 | 153.7 | 153.7 | 153.8 | 153.8 |
| 52445*LE-BUCK269.0 52447 LE-SNDR269.0 1 | 54 | 137.7 | 137.7 | 138.8 | 138.8 |
| OPEN LINE FROM BUS 52356 [LE-SNA3 115.00] TO BUS 52496 [LE-TXCO3115.00] CKT 1 | | | | | |
| 52350*LE-WAIT3 115 52441 LE-WAIT269.0 1 | 56 | 101 | 101 N/A | N/A | |
| 52354*LE-LVTN3 115 52442 LE-LOVP269.0 1 | 61.6 | 162.8 | 162.7 | 164.5 | 164.5 |
| 52442 LE-LOVP269.0 52447*LE-SNDR269.0 1 | 54 | 153.7 | 153.7 | 154.1 | 154.1 |
| 52445*LE-BUCK269.0 52447 LE-SNDR269.0 1 | 54 | 137.9 | 137.9 | 139.6 | 139.6 |

Transient Stability Study

A transient stability study was performed by ABB T&D Consulting. That study concluded that there are no transient or dynamic stability problems for the contingencies tested. The study report is available upon request.

Short Circuit Study

A short circuit study was performed by XCEL Energy. It indicates that the proposed generation is not expected to require any network modifications on the XCEL Energy system

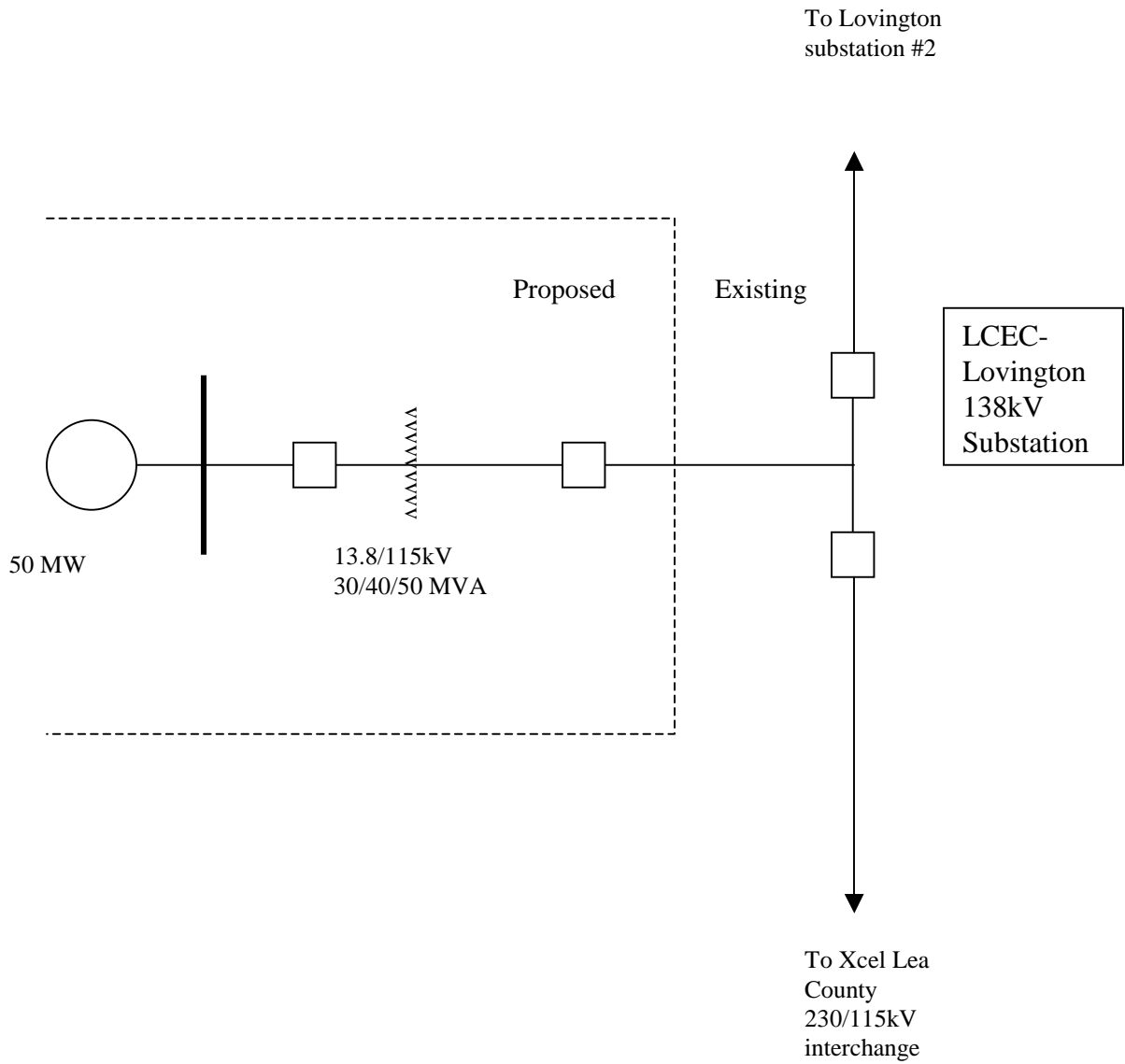
Facility Analysis

Lea County Electric Cooperative has asked to interconnect the proposed generation into their own substation located on their own transmission system, whose facilities are not under the control of the SPP OATT. Therefore, no direct assignable facilities for interconnection may be assigned to Lea County. Nor are there any network upgrades required for the proposed project.

Conclusions

The proposed addition of a generating unit by Lea County Electric Cooperative is not expected to force any upgrades or modifications to the transmission facilities of the neighboring utility companies. Furthermore, since the generating unit is to be added directly on the Lea County system, there are not any interconnection charges to be imposed by neighboring utility companies.

Appendix A. Facility Configuration



Lea County Electric Cooperative's Proposed Generation Interconnection

