# 14INR0003 - Confidential

## GENERATION INTERCONNECT SCREENING STUDY

**Version 1.0**

 

# Document Revisions

| Date | Version | Description | Author(s) |
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| 09/05/2008 | 1.0 | First draft | Lan Mao |

 

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# 14INR0003 Generation Interconnect Screening Study
# Nolan County, TX

## 1. SCREENING STUDY

### 1.1. INTRODUCTION

Tenaska, Inc. has requested interconnection for a proposed 850 MW coal generation facility in Nolan County, TX. The requested commercial operation date is June 1, 2014.

THIS SCREENING STUDY IS STRICTLY A TECHNICAL REVIEW OF THE PROPOSED INTERCONNECTION. THIS SCREENING STUDY IS NOT AN ANALYSIS OF, OR SUPPORT FOR, WHETHER THE PROPOSED INTERCONNECTION IS PERMISSIBLE OR IN COMPLIANCE WITH EXISTING STATE AND FEDERAL LAW, APPLICABLE AGREEMENTS, OR OTHER AUTHORITY. ERCOT RESERVES THE RIGHT TO CHALLENGE FURTHER ACTION ON THE PROPOSED INTERCONNECTION, INCLUDING THROUGH PARTICIPATION IN ANY RELATED PROCESSES OR PROCEEDINGS.

### 1.2. STUDY SCOPE

The purpose of this steady-state analysis is to determine bulk transmission system capacity with the increase of generation from the plant associated with the proposed interconnection in the year 2014. The 2013 summer peak power flow base case that was developed by the ERCOT Steady State Working Group (SSWG) and modified to contain the Competitive Renewable Energy Zone (CREZ) designated transmission improvements was used for these studies, including updates posted on the ERCOT website. System modifications were considered at the 138 and 345 kV voltage level. This study benchmarks system improvement needed to reduce thermal overloads caused by increased energy exports that would come from this plant associated with the proposed interconnection. Furthermore, due to the short time frame for this study, not all possible alternatives have been considered and other alternatives may develop based on further review of this report.

The purpose of this preliminary study is to measure the feasibility of adding generation in this area. Additional detailed studies are necessary with all parties to determine actual transmission projects. This investigation is based on the best information available at the time. Changes in system generation and transmission upgrades may have dramatic impact to the results provided.

Due to its very nature, transmission planning is a continuous process. Therefore, conclusions reached in this report are a snapshot in time that can change with the addition (or elimination) of plans for new generation, transmission facilities, equipment, or loads.

### 1.3. REPORT DEVELOPMENT AND PROCESS

Simulation of the transmission grid is necessary to develop this report. Such simulation requires several types of forecasted information that is supplied by various entities. Diversified station load forecasts are derived from the load serving entity system load forecasts and undiversified station load forecasts.

The performance criteria used in evaluating system security include NERC Planning Standards and the ERCOT Planning Criteria. These standards essentially require that the system be designed and operated to remain in a secure state with the outage of any transmission or generation facility. Projects included in the report are being studied for their ability to satisfy the requirements of these standards.

The planning process begins with computer modeling studies of the generation and transmission facilities, and substation loads under normal conditions. The 2013 summer on-peak power flow model used in this study was developed and approved by the ERCOT Steady State Working Group (SSWG) consisting of representatives of transmission service providers (TSP). Contingency conditions that might be expected to occur in operation of the transmission grid are also modeled. To maintain adequate service and minimize interruptions of service during facility outages, model simulations are used to identify adverse results and examine the effectiveness of various alternatives in alleviating those adverse results.

The effectiveness of each grid configuration and facility change must be evaluated under a variety of possible operating environments because loads and operating conditions cannot be predicted with certainty. As a result, repeated simulations under different conditions are often required. In addition, alternatives considered for future installation may affect other alternatives so that several different combinations must be evaluated, thereby multiplying the number of simulations required.

## 1.4. BASE ASSUMPTIONS

- The power flow case used for the study was created from the 2013 summer peak ERCOT base case that was originally created in December 2007 and updated in June 2008. The case was modified to contain future CREZ transmission facilities.
- Proposed ROW for upgrades is available and construction/upgrades can be performed.
- Transmission upgrade recommendations are based on the "Rate B" emergency thermal ratings. Rate B is the 2-hour emergency rating of the entire transmission facility, not just conductor.

## 1.5. BASE CASE CONSIDERATIONS

The result of this analysis showed the following transmission facilities were at or near one of their rating limitations in the base case.

| ** From bus ** ** To bus ** CKT | BaseFlow | Rating | Loading% |
|---|---|---|---|
| 705 HAWKINS9 69.0 707 HAWKINS8 138 1 | 42.0 | 40.0 | 104.9 |
| 709 CALLISBURG 69.0 726 GAINESVILL 69.0 1 | 21.7 | 15.0 | 144.3 |
| 709 CALLISBURG 69.0 738 SINCLAIRSW 69.0 1 | 19.1 | 15.0 | 127.2 |
| 738 SINCLAIRSW 69.0 742 SINCLAIR 69.0 1 | 16.8 | 15.0 | 111.7 |
| 779 SEYMOUR 69.0 782 LAKEKEMPSW 69.0 1 | 10.4 | 10.0 | 104.5 |
| 1627 RANGULF_9 69.0 37850 TNTHURBER_0 69.0 1 | 10.8 | 9.0 | 120.5 |
| 1860 EAGLEMNT1_8 138 2067 ROSEN2_T8 138 1 | 301.7 | 214.0 | 141.0 |
| 1957 SAGINAW1_8 138 2067 ROSEN2_T8 138 1 | 264.2 | 180.0 | 146.8 |
| 2370 COLLINSS1_8 138 2372 COLLINSS1_5 345 1 | 770.9 | 700.0 | 110.1 |
| 3160 DIALVILL_8 138 3161 DIALVILL_9 69.4 1 | 52.9 | 51.0 | 103.7 |
| 7488 L_SATTLE8_1Y 138 7491 L_HUNTER8_1Y 138 1 | 102.2 | 95.6 | 106.9 |
| 45500 T_H_W___345B 345 45510 T_H_W___138A 138 A1 | 808.6 | 800.0 | 101.1 |

Table I. AC Base Case Analysis of 2013 Summer Peak Case

The above elements are not near the proposed plant so they were ignored for this analysis.

Capricorn Ridge Project (550 MW) in Coke County is scheduled to be on-line by the year 2008. Jackson Mountain (90 MW) in Nolan County is scheduled to be on-line by the year 2010. For this analysis, the aforementioned generation plants were assumed to be in-service near 10% of their maximum capability.

An AC contingency analysis was run to identify transmission elements that are a concern before the new plant is interconnected and is presented in Appendix A. These identified transmission elements may be excluded from the interconnection analysis if they are not a result from adding the plant at this location.

## 1.6.SECURITY STUDY

Single contingency analysis (including double circuit lines) was run on the ERCOT transmission system and selected 345 kV double circuit contingencies of concern. Transfers from the Tenaska, Inc. site to several generation markets were calculated with the generation increased incrementally at the proposed site. Transmission overloads were reported for power flows on any element that exceeded Rate B. This report uses the First Contingency Incremental Transfer Capability (FCITC) as an indicator that system concerns exist. This value is identical to TTC if the base case transfer is zero. Only limiting elements that were affected by the installation of this facility were considered.

## 1.7. STUDY APPROACH

The Tenaska, Inc. project site, referred to as Tenaska Trailblazer Partners, LLC for the remainder of the study, was modeled as a single 850 MW generating unit with the following two interconnection alternatives:

1. Tenaska Trailblazer Partners, LLC connected to Sweetwater (Bus # 1420) 345 kV switch station.
2. Tenaska Trailblazer Partners, LLC tapped to the future CREZ Central-A to CREZ Central-C CKT1 345 kV transmission line.

Figure 1 shows the approximate location of Tenaska Trailblazer Partners, LLC for different point of interconnection.

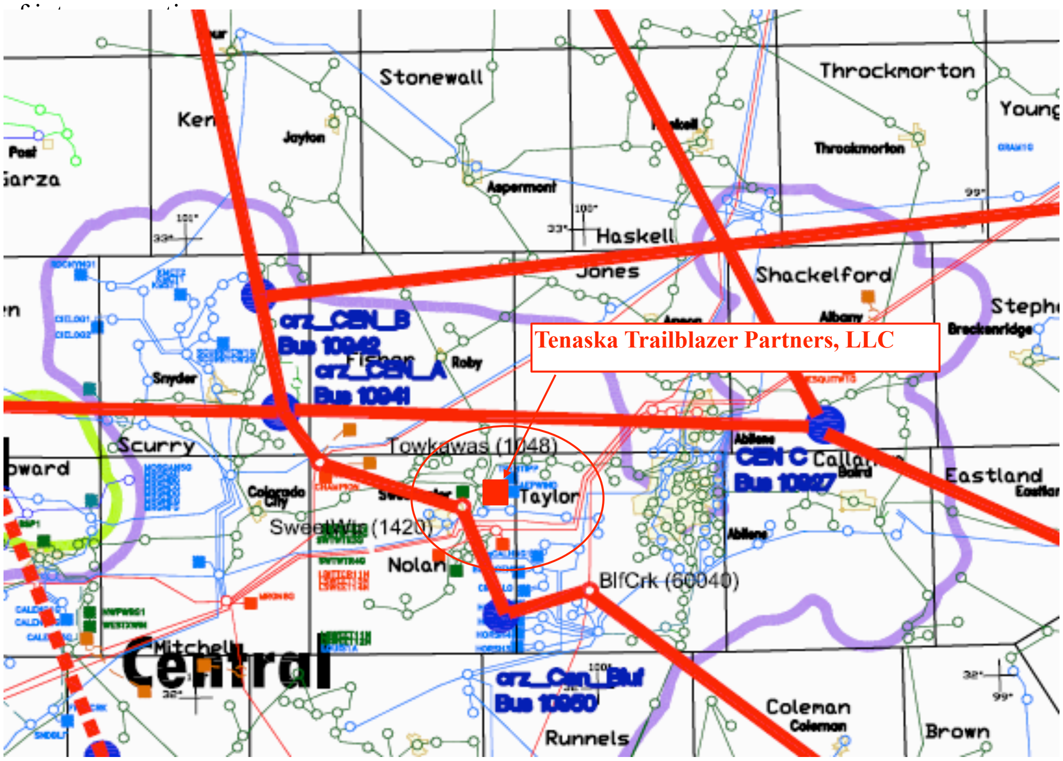


Figure 1: Approximate Location of Tenaska Trailblazer Partners, LLC

Gas generation units in Scurry, Mitchell and Nolan Counties respectively were modeled at their maximum output for the duration of this study. A detailed list of the aforementioned units may be found in Appendix C.

**Study I**

MVA transfers from Tenaska Trailblazer Partners, LLC to gas generation in the ERCOT Region were made incrementally up to 1020 MW, which is 20% greater than the 850 MW proposed output in order to quantify a margin in the transfer capability. Table 2 summarizes the results of transfers from Tenaska Trailblazer Partners, LLC in the base case for the two proposed interconnection alternatives. Full FCITC results for the entire study may be found in Appendices BI and BII.

| Alternative | Transfer Limit (MW) | Limiting Element | Limiting Contingencies |
|---|---|---|---|
| 1 | > 1020 | None | None |
| 2 | > 1020 | None | None |

Table 2: FCITC Summary for Tenaska Trailblazer Partners, LLC in the Base Case

The FCITC results show that Tenaska Trailblazer Partners, LLC was not constrained in the base case. It should be noted that the analysis revealed post-contingency overloaded elements that are regional problems. These elements were discarded from the analysis since there are other generators closer to the overloaded elements whose influence on those overloads are significantly greater than Tenaska Trailblazer Partners, LLC. These elements were shaded gray in Appendices BI and BII.

**Study II**

Study II involves the high wind case in order to quantify the effect Tenaska Trailblazer Partners, LLC would have if the west Texas wind output was higher than what is represented in the SSWG base case. The wind generation units in Nolan, Taylor, Scurry, Sterling and Coke Counties, were ramped up to 80 percent of their maximum generation capacity; and the generation of all other wind generating units was increased to 40 percent.

Full FCITC analysis was run and the most limiting element is listed in the following Table 3.

| Alternative | Transfer Limit (MW) | Limiting Element | Limiting Contingencies |
|---|---|---|---|
| 1 | > 1020 | None | None |
| 2 | > 1020 | None | None |

Table 3: FCITC Summary for Tenaska Trailblazer Partners, LLC in the High Wind Case

The FCITC results show that Tenaska Trailblazer Partners, LLC was able to achieve full plant output in the high wind study case.

## 1.8. CONCLUSION

In order for the Tenaska, Inc. project to be fully operational, no additional transmission facility may be necessary.

This study is based upon the addition of only the proposed interconnection and associated plant in the area of the interconnection. Other generation additions in the area will affect the results of this study. In addition, different generation dispatch may increase or reduce the loading on facilities in the area.

**Transmission Projects included in the analysis above are a snapshot in time that can change with the addition (or elimination) of plans for new generation, transmission facilities, equipment, or loads. The timing and/or cost of these projects may be changed as economic and system requirements warrant. Future conditions also may require the substitution of other projects or the cancellation of some projects.**

# 2. REFERENCE INFORMATION

## 2.1. REACTIVE POWER REQUIREMENTS (TAC Approved August 6, 2003)

Power system voltage control and stability involves all parties connected to the electric system including generation, transmission, distribution and load. Voltage is closely associated with other aspects of power system steady-state and dynamic performance. Voltage control, power factor correction (reactive power compensation) and management, generator rotor angle (synchronous) stability, protective relaying, and control center operations all influence voltage stability.

ERCOT's overriding concern to applying these requirements is the security of the complete power system and maintaining service to load. Failures, collapse, and blackouts of the complete power delivery system must be avoided. Economic system operation is of secondary importance during emergency conditions but is very important during normal conditions. In transmission system design and operation, there should be a balance between economy and security. To get the most out of the complete power system a good voltage profile, including controlled reactive compensation (power factor correction), must be maintained at all times.

Large interconnected power systems are exposed to many disturbances that threaten security. Recent requirements for more intensive use of available generation and transmission have magnified the possible effects of these disturbances. Many of these disturbances directly affect voltage control and stability.

Voltage stability is concerned with the ability of a power system to maintain acceptable voltages at all places in the system under normal and contingent conditions. A power system is said to have entered a state of voltage instability when a disturbance causes a progressive and uncontrolled variation in voltage. Voltage collapse is the result of irreversible voltage instability and is manifested by localized or system-wide load interruption. Voltage security is the ability of a system, not only to operate stably under normal conditions, but also to remain stable following any reasonably credible contingency or adverse system change as defined in the ERCOT Planning Criteria.

Inadequate reactive power support from generation units, transmission lines, and load power factor correction leads to voltage instability or voltage collapse, which has resulted in several major system failures in recent years. The voltage control and instability phenomenon is not new to power system managers, operators, engineers, and researchers. It is well recognized in radial distribution systems. Most of the early development of the major transmission network faced the classical generator machine angle stability problem limiting transactions. Innovations in both analytical techniques and stabilizing measures made it possible to maximize the power transfer capabilities of the transmission system. The result is increasing transfers of power over long distances of transmission, and voltage control becomes a major concern.

An electric system enters a state of voltage instability when a disturbance, such as an increase in load or loss of generation or system change causes voltage to drop quickly or drift downward, and operators and automatic system controls fail to halt the decay. The voltage decay may take just a few seconds or 10 to 20 minutes. If the decay continues unabated, voltage collapse and possible load interruption will occur.

During the period of voltage decay, many automatic and manual controls in the electric system and within customer load devices may come into play. These include generator field and exciter protective devices, plant operators (e.g., voltage regulator set point reduction to reduce generator reactive loading), system operators (e.g., to adjust load tap changers [LTCs] ), distribution transformer LTCs and regulators, voltage-controlled shunt capacitor banks, thermostatically controlled loads, manually controlled loads, and others. The actions and interactions of such devices following disturbances affecting voltage have caused this period to be called a period of "slow dynamics."

If voltages reach a level at which torque on the most marginal motor drops below load torque, that motor may stall, causing voltage to drop further and other motors to stall in cascade fashion. The collapse may be followed by loss of some load and voltage recovery, or alternately tripping of lines or generators and a complete shutdown of the affected area.

Voltage security has been defined as the ability of a system to remain stable (voltage-wise) following first and/or second contingencies as might be specified in voltage criteria. A system may also be deemed to be voltage secure only if voltages at customer service points remain within an acceptable band. However, having voltage within tolerances at customer service points does not necessarily ensure a secure system. A system may enter a state of voltage instability with voltages at or close to nominal levels.

Generator reactive capability is commonly derived from the generator real and reactive capability curves supplied by the manufacturer. Reactive power generation limits derived in this manner can be optimistic as heating or auxiliary bus voltage limits may be encountered before the generator reaches its maximum sustained reactive power capability. Manufacturer-provided design data may also not accurately reflect the characteristics of operational field equipment because settings can drift and components deteriorate over time. Field personnel may also change equipment settings (to resolve specific local problems) that may not be communicated to those responsible for developing a system modeling database and conducting system assessments. It is important to know the actual reactive power limits, control settings, and response times of generation equipment and to represent this information accurately in the system-modeling data that is supplied to those entities responsible for the reliability of the interconnected transmission systems.

### 2.1.1. Application (Generator and QSE Requirements)

- All generating units (including self-serve generating units) that have a gross generating unit rating greater than 20 MVA or those units connected to the same transmission bus that have gross generating unit ratings aggregating to greater than 20 MVA, that supply power to the ERCOT transmission grid, and that were not in operation prior to Board approval of this standard shall meet all of the requirements of this Standard.
- Any such generating units in operation earlier than the ERCOT Board approval date for this Standard shall meet the requirements of Standards applicable to that generating unit prior to the Board approval date for this Standard, and shall also meet all of the requirements of this Standard except the Installed Capability Requirements. Previously applicable Standards include the Interim Standards approved by the ERCOT Board, the Standards enumerated in the Protocols Section 6.5.7, and such other Standards outlined in interconnection requirements and Operating Guides.

- Upon submission by a Generation Resource to ERCOT of a specific proposal for requirements to substitute for those of the applicable Standard, ERCOT shall either approve such alternative requirements or provide the submitter an explanation of its objections to the proposal. Alternative requirements may include supplying additional static and/or dynamic reactive power capability as necessary to meet the area's reactive power requirements. Pending changes to PUCT Rules, an induction generator may elect to make a contribution to be credited to TCOS in lieu of meeting the Installed Capability Requirements contained herein. Also, ERCOT shall apply previous standards to new generating units connected within 15 months after Board approval whose owners demonstrate to ERCOT's satisfaction that design and/or equipment procurement decisions were made prior to Board approval based upon previous standards.

### 2.1.2. Installed Capability Requirements

- Power Factor Requirements
    - Generating unit installations to which this Standard applies shall have and maintain an overexcited (lagging) power factor capability, of 0.95 or less and an under-excited (leading) power factor capability of 0.95 or less, both determined at the generating unit's maximum net power to be supplied to the transmission grid and at the transmission system voltage profile established by ERCOT, and both measured at the point of interconnection to the TDSP.
    - Upon request to and with the approval of ERCOT, multiple generating units connected to the same transmission bus may be treated as a single generating unit for the purposes of these Power Factor Requirements only. For any unit so aggregated, specific power factor requirements based upon the reactive power contribution of that unit to the total reactive power obligation of the aggregation will be assigned to that unit and shall become that unit's required installed reactive capability at the generating unit's maximum net active power output.
    - No generating unit equipment replacement or modification shall reduce the reactive capability of the generating unit below the requirements to be met by that generating unit prior to the replacement/modification, unless specifically approved by ERCOT.
- Other Installed Capability Requirements
    - Generating unit installations to which this Standard applies shall have and maintain the following capability:
    - Over-excitation limiters shall be provided and coordinated with the thermal capability of the generator field winding and protective relays in order to permit short-term reactive capability that allows at least 80% of the unit design standard (ANSI C50.13-1989), as follows:
        - Time (seconds) 10 30 60 120
        - Field Voltage % 208 146 125 112
    - After allowing temporary field current overload, the limiter shall operate through the automatic AC voltage regulator to reduce field current to the

continuous rating. Return to normal AC voltage regulation after current reduction shall be automatic. The over-excitation limiter shall be coordinated with the over-excitation protection so that over-excitation protection only operates for failure of the voltage regulator/limiter.

- Under-excitation limiters shall be provided and coordinated with loss-of-field protection to eliminate unnecessary generating unit disconnection as a result of operator error or equipment misoperation.

### 2.1.3. Operating Requirements

- All generating units shall maintain the transmission voltage at the point of interconnection to the transmission grid as directed by ERCOT within the operating reactive power capability of the unit(s).
- At all times a generating unit is on line, the required installed reactive capability must be available for utilization at the generating unit's continuous rated active power output, and reactive power up to the unit's operating capability must be available for utilization at lower active power output levels. In no event shall the reactive power available be less than the required installed reactive capability multiplied by the ratio of the lower active power output to the generating unit's continuous rated active power output, and any reactive power available for utilization must be fully deployed to support system voltage upon request by ERCOT, or a Transmission Operator designated by ERCOT.
- Each generating unit shall be operated with any automatic voltage regulator (AVR) set to regulate generator terminal voltage and any power system stabilizers (PSS) in use unless specifically permitted to operate otherwise by ERCOT.
- Generation Resources shall not reduce high reactive loading on individual units during abnormal conditions without the consent of ERCOT (conveyed by way of their QSE) unless equipment damage is imminent.

### 2.1.4. Information Supply Requirements

- Unit AVR and PSS modeling information required in the ERCOT Planning Criteria shall be determined from actual unit testing described in the Operating Guides. Within 30 days of ERCOT's request, Tenaska, Inc. shall provide results of the latest test performed to ERCOT and the TSP.
- When the operating mode of a generating unit's AVR or PSS is changed while the unit is operating, the QSE shall promptly inform ERCOT. The QSE shall also supply AVR or PSS status logs to ERCOT upon request.
- Within 30 days of ERCOT's request, Tenaska, Inc. shall provide ERCOT with the operating characteristics of any generating unit's equipment protective relay system or controls that may respond to temporary excursions in voltage with actions that could lead to tripping of the generating unit.
- Any short-term inability of a generating unit to meet its reactive capability requirements shall be immediately reported to ERCOT and the Transmission Operator.

- ERCOT and the TSP shall be notified of any equipment changes that affect the reactive capability of an operating generating unit no less than 60 days prior to implementation of the changes, and any such changes that decrease the reactive capability of the generating unit below the required level must be approved by ERCOT prior to implementation.
- High reactive loading and reactive oscillations on generation units should be immediately communicated to the QSE, the Transmission Operator, and ERCOT.
- The tripping off line of a generating unit due to voltage or reactive problems should be immediately reported to ERCOT, the Transmission Operator, and the QSE.

### 2.1.5. Compliance Monitoring

- Tenaska, Inc. shall conduct generating unit reactive capability tests as specified in ERCOT Protocols and Operating Guides. Test results shall be reported to ERCOT who shall forward them to the TSPs. If reactive output of the generating units is limited by transmission system conditions during the tests, this shall be noted on the test report.
- Failure of a generating unit to provide either leading or lagging reactive up to the required capability of the unit upon request from a Transmission Operator or ERCOT may, at the discretion of ERCOT, be reported to the ERCOT Compliance Office, except under Force Majeure conditions or ERCOT-permitted operation of the generating unit.
- If Tenaska, Inc. fails to maintain transmission system voltage at the point of interconnection with the TSP within 2% of the scheduled voltage while operating at less than the maximum reactive capability of the generating unit, ERCOT may, at its discretion, report this to the ERCOT Compliance Office, except under Force Majeure conditions or ERCOT-permitted operation of the generating unit.
- The ERCOT Compliance Office will investigate claims of alleged non-compliance and Force Majeure conditions using ERCOT Compliance Office Procedures. The ERCOT Compliance Office will use its Compliance Procedures to address confirmed non-compliance situations. The ERCOT Compliance Office will advise the Generation Resource, its QSE, ERCOT and the TSP planning and operating staffs of the results of such investigations.

## 2.2. TRANSMISSION LINE CONSTRUCTION INFORMATION

The Public Utility Commission of Texas (PUCT) Substantive Rules requires a TSP to build facilities to interconnect a new generating plant. The rules indicate that the interconnection planning will include transmission line interconnection and grid upgrading. The rules do not address what additional transmission facilities may be required for the new generator to reach the market or all customers in ERCOT and outside of ERCOT. The TSP's shall provide transmission service including the construction of the transmission line and upgrading the transmission grid within reasonable effort considering economics and good utility practice.

Direct connects of generation can probably be built by TSP without obtaining a Certificate of Convenience and Necessity (CCN). If they have to build a substation or short span of transmission line, for example, the Commission's rules may not require a CCN. Building full interconnection facilities and grid upgrades may or may not require a CCN, depending upon the circumstances specific to the individual project, and is addressed in the appropriate sections of the PUCT rules. When ERCOT identifies specific transmission expansion that will facilitate the competitive market while mitigating any constraints, ERCOT will develop transmission additions using ERCOT transmission planning procedures. The generation owner should identify expected markets, and ERCOT along with the TSPs would identify transmission constraints that impair the generator's ability to reach those markets. In many instances, additional transmission lines would be needed for the generator to reach the market. In such cases, ERCOT's evaluation of need would be important, but the Commission via the CCN process would decide whether the transmission line should be built.

Both new transmission line construction and some line reconstruction require the approval of the PUCT, granted in the form of a CCN. The present PUCT rules allow the PUCT up to 12 months for processing a CCN. The need to use a consultant to route future transmission lines and the TSP to hold public meetings also adds around 12 months to the time required to certificate and build a new transmission line. In most new transmission projects, the acquisition of right-of-way and construction will take 10 to 12 months after a CCN is granted by the PUCT. As a result, **firm commitments must be made at least three years ahead of required in-service dates for most transmission line projects and some projects may require commitments four to eight years in advance of system needs.**

## 2.3. POWER SYSTEM STABILIZER REQUIREMENTS

Tenaska, Inc. shall install, tune, and place in-service a power system stabilizer (PSS) for each new synchronous generating unit added. A dual input integral-of-accelerating power type PSS is recommended. The PSS shall be tuned to damp oscillatory modes within the range of 0.2 Hz to 2 Hz. The incremental cost for a PSS is minimal and should be included for all new generation additions in ERCOT**.** Many times the cost of a determination study is about the same cost as adding a tuned PSS to the generation project.

Maintenance and periodic tuning of the PSS along with the excitation system is the only way to sustain the benefits of the PSS. It is necessary to re-tune the PSS/exciter anytime the voltage regulation system (including field windings) is modified. The PSS and excitation system should also be periodically tested with the longest time period between testing being no longer than five years. A poorly tuned PSS and exciter will adversely affect system stability and may result in oscillations. If these oscillations continue, it could result in separation of the transmission system, loss of generation and/or damage to generation units.

Generation owners and transmission service providers shall work jointly to prevent these possible adverse conditions by communicating changes in a timely manner.

## 2.4. GENERATION PLANT DESCRIPTION & DATA REQUIREMENTS

The acquisition of data to realistically simulate the electrical behavior of system components is a fundamental requirement for the development of a reliable interconnected transmission system and accurate studies. Therefore, Tenaska, Inc. is required to submit specific information regarding the electrical characteristics of their facilities along with their request. Failure to supply the required data may result in delay of the study. Data in the initial submissions shall be the most current facility design or expected performance data. Data submitted for stability models shall be compatible with ERCOT standard models (PTI PSSE). If there is no compatible model, Tenaska, Inc. will work with a consultant to develop and supply a standard model and associated data.

Prior to commercial operation, Tenaska, Inc. shall supplement the initial data submissions with any and all as-built facility data or as-tested performance data, which differs from the initial submissions, or, alternatively, written confirmation that no such differences exist.

Subsequent to commercial operation, Tenaska, Inc. shall provide ERCOT and TSP any data changes made appropriate by equipment replacement, repair, or adjustment. Tenaska, Inc. shall provide such data no later than 60 days after the date of the actual change in equipment characteristics.

Each request should include the following information or best estimate about the generating facility when submitted to ERCOT. Required data is indicated below:

GENERATION ENTITY INFORMATION SHEET – required for Security Screening Study

GENERATION SUMMARY – required for Security Screening Study

DETAILED GENERATION INFORMATION - BY UNIT FOR EACH UNIT – required for Full Interconnection Study

GENERATOR DATA FOR TRANSIENT STABILITY STUDIES UNIT – required for Full Interconnection Study

GENERATOR STEP-UP OR UNIT MAIN POWER TRANSFORMER DATA – required for Full Interconnection Study

SUBSYNCHRONOUS RESONANCE (SSR) DATA – BY UNIT FOR EACH UNIT – required by Commercial Date

# 3. APPENDICES

| | | |
|---|---|---|
| **Appendix A** | 14INR0003_AC_Con<br>tingency.xls | |
| **Appendix B** | 14INR0003_FCITC_P<br>OI#1.xls<br>**BI** | 14INR0003_FCITC_P<br>OI#2.xls<br>**BII** |

**Appendix C**

| Plant Name | Units | County |
|---|---|---|
| Kinder Morgan CT1 | 1 | Scurry |
| Kinder Morgan CT2 | 1 | |
| Kinder Morgan ST1 | 1 | |
| Morgan Creek | A, B, C, D, E ,F, 5 | Mitchell |
| Sweetwater Generation Plant | 1, 2, 3, 4 | Nolan |