**SOAH DOCKET NO. 473-16-4342**
**PUC DOCKET NO. 45866**

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| **APPLICATION OF LCRA TRANSMISSION SERVICES CORPORATION TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE PROPOSED 138-KV TRANSMISSION LINE PROJECT IN WILLIAMSON COUNTY, TEXAS** | **§** | **BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS** |

# DIRECT TESTIMONY AND EXHIBITS

# OF

# SERGIO GARZA, P.E. #76629

**ON BEHALF OF**

**APPLICANT**
**LCRA TRANSMISSION SERVICES CORPORATION**

**July 15, 2016**

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**DIRECT TESTIMONY AND EXHIBITS OF SERGIO GARZA**

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**DIRECT TESTIMONY OF SERGIO GARZA**

## I. INTRODUCTION

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. My name is Sergio Garza. My business address is: Lower Colorado River Authority, 3505 Montopolis Drive, Building D, Austin, Texas 78744.

**Q. WHAT IS YOUR OCCUPATION?**

A. I am an electrical engineer employed by the Lower Colorado River Authority (LCRA) as Vice President, Transmission Design and Protection.

**Q. WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?**

A. I hold a Bachelor's Degree in Electrical Engineering from the University of Texas at Austin, and I am a licensed Professional Engineer in the State of Texas (License Number 76629.)

I have over 30 years of experience in the electric utility business, all of which have been in public power. In 1985, I began work at the City of Austin Electric Utility Department (presently Austin Energy) as a Project Engineer in the area of System Control Engineering where I designed relay and control systems for transmission equipment such as transmission lines, large transformers, and substations. In 1990, I transferred to the Generation Department where I engineered electrical projects supporting the reliable operation of power plant facilities and also as a project manager supervising non-electrical projects in City of Austin-owned power plants. In 1994, I was employed by LCRA where I worked in the System Control Section of the Transmission Engineering Department. In 1995, I became responsible for the system protection function at LCRA within the Transmission Engineering Department. In 1996, I became responsible for both the system planning and system protection functions as an Engineering Supervisor under the Planning and Project Implementation Department. In 2001, I was promoted to Manager of System Planning and Protection. My department's title was changed in 2014 to Transmission Resource Planning (TRP). In November 2015, I was assigned a different function within LCRA Transmission Services as Vice President Transmission Design and Protection

(TDP). Currently, I am one of four vice presidents in Transmission Services who reports directly to the Executive Vice President of Transmission Services at LCRA and Chief Operating Officer of LCRA TSC.

I have served as Chair of various Electric Reliability Council of Texas (ERCOT) working groups supporting Dynamics, System Protection, and Planning. I have participated in the ERCOT Regional Planning Group (RPG) activities and associated study and project reviews. I have also served in various North American Electric Reliability Corporation (NERC) forums, including the Interconnection Dynamics Working Group, Planning Standards Subcommittee, Disturbance Analysis Working Group, Standards Evaluation Subcommittee, and AC Substation Equipment Failure Task Force.

I have also participated in or contributed to other key LCRA and/or local technical forums including:

- LCRA Collaborative Operations and Planning forum, which was set up to coordinate the operational and long-term planning needs of LCRA TSC and more than 40 municipally-owned utilities and electric cooperatives whose electric systems connect to LCRA TSC's or for which LCRA TSC provides regulated transmission services.
- Power Improvement Action Committee (PIAC) set up by Austin Energy to investigate electric reliability issues associated with service to sensitive end-users' equipment.
- Presented technical topics at various technical forums including a local chapter of the Institute of Electrical and Electronics Engineers (IEEE); Municipal Electric System Association (MESA); LCRA's Substation, Transmission, Operations, Reliability, Maintenance (STORM) forum; and the Texas Electric Cooperatives (TEC) Engineering Conference.
- Participated in a technical panel supporting a Texas Reliability Entity (TRE) workshop on transmission planning-related NERC Reliability Standards.

**Q. IN YOUR PRESENT CAPACITY, WHAT ARE YOUR RESPONSIBILITIES?**

A. The department I oversee provides two primary functions. One of these functions is the engineering of designs for LCRA TSC's transmission lines, substations, transformation, telecommunication systems, metering facilities, and relay and control systems. This function includes the provision of system documentation, coordination with ERCOT for system metering requirements, transmission system interconnection agreement negotiation, and assistance with asset management, system oversight, system reliability analysis, and planning for projects through estimating and alternative analysis.

The second function is system protection. This function includes ensuring dependable and secure electric service while protecting the general public, personnel, and electrical equipment from abnormal conditions created when electrical faults occur in the system. Specifically, staff responsible for this function produce protective relay settings, evaluate overall protective relay coordination, conduct fault duty, and conduct equipment rating studies.

**Q. HAVE YOU PREVIOUSLY PERFORMED WORK RELATED TO TRANSMISSION LINE REGULATORY PROCEEDINGS?**

A. Yes, I have provided supervisory oversight or sponsored testimony in the following Public Utility Commission of Texas (PUC or Commission) dockets:

| Project Name | PUC Docket No. | SOAH Docket Number |
|---|---|---|
| Application of the Lower Colorado River Authority for a CCN for a 138-kV Transmission Line in Culberson, Reeves, Loving, and Winkler Counties | 22762 | 473-00-2302 |
| Application of the Lower Colorado River Authority and the LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Harris and Waller Counties | 24380 | 473-02-0429 |
| LCRA TSC Rate Case (2002) | 25421/ 26937 | 473-02-2037/ 473-03-1051 |
| LCRA TSC Rate Case (2003) | 28906 | 473-04-1662 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Williamson County | 28450 | 473-04-3536 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Kendall and Bexar Counties | 29684 | 473-04-7609 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 345-kV Transmission Line in Kendall County | 29065 | 473-05-1671 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Llano County | 29833 | 473-05-0215 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Medina and Bandera Counties | 32934 | 473-07-0448 |
| Commission's Staff Petition for Designation of Competitive Renewable Energy Zones | 33672 | N/A |
| LCRA TSC Rate Case (2007) | 35020 | N/A |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 345-kV Transmission Line in Caldwell, Guadalupe, Hays, Travis, and Williamson Counties | 33978 | 473-07-2585 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for the Gillespie to Newton 345-kV CREZ Transmission Line in Gillespie, Llano, San Saba, Burnet, and Lampasas Counties | 37448 | 473-10-1097 |

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| Application of LCRA Transmission Services Corporation to Amend its CCN for the McCamey D to Kendall to Gillespie 345-kV CREZ Transmission Line in Schleicher, Sutton, Menard, Kimble, Mason, Gillespie, Kerr, and Kendall Counties | 38354 | 473-10-5546 |
| Application of LCRA Transmission Services Corporation to Amend its CCN for a 138-kV Transmission Line in Guadalupe County | 39479 | 473-12-0019 |
| LCRA TSC Rate Case (2011) | 39891 | N/A |
| Application of LCRA Transmission Services Corporation to Amend its CCN for the Proposed Blumenthal Substation and 138-kV Transmission Line Project in Blanco, Gillespie and Kendall Counties, Texas | 43599 | 473-15-1589 |

**Q. PLEASE DESCRIBE THE PROJECT IN THIS PROCEEDING.**

A. The project in this proceeding is the proposed Leander to Round Rock 138-kilovolt (kV) Transmission Line Project (Project), which consists of the construction of two new load-serving substations in Williamson County and the associated 138-kV transmission line required to interconnect the two new proposed substations to the interconnected high voltage electrical grid at the existing Leander and Round Rock substations.

**Q. WERE YOUR TESTIMONY AND THE PORTIONS OF THE APPLICATION YOU SPONSOR PREPARED BY YOU OR BY KNOWLEDGEABLE PERSONS UPON WHOSE EXPERTISE, JUDGMENT, AND OPINIONS YOU RELY IN PERFORMING YOUR DUTIES?**

A. Yes, they were.

**Q. IS THE INFORMATION CONTAINED IN YOUR TESTIMONY AND IN THE PORTIONS OF THE APPLICATION YOU SPONSOR TRUE AND CORRECT TO THE BEST OF YOUR KNOWLEDGE AND BELIEF?**

A. Yes, it is.

## II. PURPOSE OF TESTIMONY

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. The purpose of my testimony is to sponsor certain portions of LCRA TSC's application to amend its Certificate of Convenience and Necessity (CCN) filed in this docket on April 28, 2016 (Application) and to describe and support:

1) The need and requirements for the two new load serving substations associated with the Project, including the proposed configuration and costs of the new substations;
2) The need for the associated 138-kV transmission line that is required to interconnect the two new proposed substations with the existing Leander and Round Rock substations, including the associated substation costs and the reasons why this proposed transmission line is the best solution when compared to other alternatives; and
3) The electric system analyses used in the planning process, including the analyses performed and reviewed by ERCOT.

**Q. WHICH QUESTIONS IN LCRA TSC'S APPLICATION IN THIS DOCKET DO YOU SPONSOR?**

A. I sponsor the responses to Questions 7, 11, 14, 15, and 16 in the Application along with associated attachments, Attachments 2, 3, 5, 6, and 7. I co-sponsor Attachment 4 to the Application with Ms. Jessica Melendez as it was amended by the errata filed in this proceeding on June 1, 2016. I also co-sponsor the response to Question 13 of the Application with Ms. Melendez, the responses to Questions 8 and 9 with Mr. Christian Powell, and the responses to Question 4 with Ms. Melendez and Mr. Powell. I also co-sponsor Section 1 of the *Leander to Round Rock 138-kV Transmission Line Project Environmental Assessment and Alternative Route Analysis, Williamson County, Texas* (EA) prepared by POWER Engineers, Inc. (POWER), which is included as Attachment 1 to the Application with Ms. Melendez. Please refer to Exhibit CTP-1 in Mr. Powell's direct testimony for an overview of LCRA TSC sponsorship of the Application in this case.

**Q. WHAT HAVE YOU RELIED ON IN SPONSORING THE NEED FOR THE PROJECT?**

A. In sponsoring the need for the Project, I have reviewed and relied on the following:

- The input about the Project received through the ERCOT RPG stakeholder process;
- ERCOT's conclusions in its independent assessment of the Project;

- The review and approval of the Project by the ERCOT Technical Advisory Committee at their May 2014 meeting;
- The review and approval of the Project by the ERCOT Board of Directors at its June 2014 meeting and subsequently recommending that LCRA TSC proceed with the certification and construction of the Project;
- The oversight I provided on several electric system planning studies performed by LCRA TSC associated with the Project;
- My general knowledge of growth-related issues in serving electric load in general, as well as in the Project area specifically;
- Information I reviewed in an engineering study conducted by Pedernales Electric Cooperative, Inc. (PEC) to assess the ability of its distribution system to reliably serve electric load that includes the Round Rock, Cedar Park, and Leander areas;
- An assessment I directed to validate key findings identified in the PEC engineering study;
- My discussions with PEC engineering staff and evaluation of information provided by PEC regarding the Project;
- My electric system planning knowledge of the area's existing transmission system capabilities and opportunities for improvement and optimization; and
- The oversight I provided on developing the Project's scope of work and associated cost estimates.

## III. PROJECT OVERVIEW

**Q. WHY IS THE PROJECT NEEDED?**

A. The Project is needed because existing electric system infrastructure is not adequate to meet the forecasted growth in electric demand in southwestern Williamson County. The need for the Project is driven by two key factors for adequately and reliably serving local area electric load requirements. These factors are:

1) The existing and forecasted growth in electric demand (i.e., the increase in the number of end-use consumers requiring electric service and the increase in power demands from existing end-use consumers) that has been occurring at a steady pace in the Williamson County area; and
2) The distribution-level service reliability requirements driven by high electric demand that cannot be addressed by adding or upgrading existing distribution facilities in the area.

In light of these factors, two new load-serving substations are required to meet existing and forecasted electric load growth requirements. It is the primary objective of the Project to

provide a transmission connection to these two new load-serving substations from the existing electric grid.

**Q. DID THE ERCOT RPG REVIEW THE NEED AND SOLUTIONS ASSOCIATED WITH THE PROJECT?**

A. Yes. LCRA TSC submitted the Project for ERCOT RPG review in accordance with Section 3.11 of the ERCOT Nodal Protocols. ERCOT posted the project for RPG review as a Tier 1 project on December 10, 2013 (reference Exhibit SG-1).

**Q. DID ERCOT CONDUCT AN INDEPENDENT ASSESSMENT OF THE NEED FOR AND SOLUTIONS ASSOCIATED WITH THE PROJECT?**

A. Yes. In adherence with the established ERCOT project review process, after the RPG review, ERCOT conducted its own independent assessment of the need for the project as well as all the technical solutions. ERCOT presented the independent assessment results to the RPG participants. ERCOT's independent assessment report is provided as Attachment 2 to the Application.

**Q. DID THE ERCOT TECHNICAL ADVISORY COMMITTEE REVIEW THE PROJECT?**

A. Yes, at its May 2014 meeting, the ERCOT Technical Advisory Committee voted, with no dissent, to approve the Project after ERCOT staff presented the need for the project and the technical solutions (reference Exhibit SG-2 at page 6 of 7).

**Q. DID THE ERCOT BOARD OF DIRECTORS REVIEW THE PROJECT?**

A. Yes, at its June 2014 meeting, the ERCOT Board of Directors voted unanimously to approve the Project after ERCOT staff presented the need for the project and the technical solutions. The ERCOT letter discussing the endorsement of the Project by the Board of Directors is provided as Attachment 2 to the Application, and the meeting minutes are provided at page 4 of Exhibit SG-3.

**Q. PLEASE DESCRIBE THE EXISTING ELECTRIC SYSTEM INFRASTRUCTURE IN THE GENERAL AREA OF THE PROJECT.**

A. Attachment 7 to the Application shows the general location of existing transmission lines and substations in the Project area. Transmission service in the area consists of two main north-to-south paths: a 138-kV corridor along Interstate Highway 35 (IH 35), and a 138-kV corridor along US Highway 183 (US 183). The 138-kV transmission path that runs along US 183 is used to provide connectivity to eight substations (Avery Ranch, Balcones, Kent Street, Buttercup, Whitestone, Blockhouse, Leander, and Seward Junction substations) presently serving most of the area between these two corridors. In total, there are presently 21 substation transformers connected throughout the eight substations in this US 183 corridor. The 138-kV transmission path that runs along IH 35 presently provides connectivity to several substations, including the Round Rock South, Round Rock, and Chief Brady substations. The distance between these two 138-kV transmission paths within this high growth area is as much as nine miles.

**Q. PLEASE DESCRIBE THE PEC SERVICE AREA IN SOUTHWESTERN WILLIAMSON COUNTY THAT IS THE SUBJECT OF THE APPLICATION.**

A. PEC provides retail electric service in a broad area of the Texas Hill Country, and has supported the growth of these communities for over 75 years. The PEC retail service area is spread across 24 counties and totals over 250,000 accounts. Williamson County is one of the 24 counties in which PEC provides service. Specifically, retail electric service to the area in southwestern Williamson County, generally between Austin and Leander along US 183 and west of IH 35, is primarily served by PEC through the eight electric load-serving substations that I discussed previously. Most of the capacity at these eight substations was installed in the last 20 years to be able to keep pace with the rapidly increasing demand for electricity in the area. The end-use consumers include, but are not limited to, residential, small and large commercial, public offices, emergency response, urgent care facilities, churches, schools, ranch and farm operations, communications towers and systems, and water treatment plants.

**Q. PLEASE DISCUSS THE ELECTRIC SYSTEM'S LIMITATIONS IN SERVING THE AREA ELECTRIC LOAD.**

A. There are limitations in serving the area's current and projected electric load with the existing electric infrastructure. These limitations are present in both the distribution and transmission systems that serve the area's electrical power needs. I will first discuss the distribution-related limitations that are driven by both continued area growth and limited electric system infrastructure, followed by a discussion of the transmission-related limitations that are driven mostly by the absence of a transmission source in the high growth area.

To assist in better understanding several complex technical issues that I discuss in my testimony, I will start with a brief and basic discussion of how electricity travels from the power generating station to the end-use consumers.

To meet the electric needs of end-use consumers (also called "demand" or "load"), electrical power (or electricity) first travels from power generating plants to the electrical loads through high-voltage transmission lines and voltage transformation equipment connected in a network (grid) configuration at voltage levels (classes) of 345- kV, 138-kV, and 69-kV. For the most part, these are the voltage classes used in the ERCOT high voltage transmission grid. The "mesh-like" interconnected transmission grid configuration helps ensure transmission service reliability such that when one component becomes unavailable, power is safely and automatically re-routed or diverted within the grid to reach its destination. This configuration also assists in grid expansion without having to always connect back to a large source.

At the 138-kV and 69-kV voltage level, electrical power is transformed or "stepped down" at a substation through voltage transformers to a distribution-level voltage, which is typically 24.9-kV or 12.5-kV. Depending on the general area and operating practices of the local utilities, substations are located closer or farther apart depending on the density of the electrical loads (i.e., urban or rural). In urban areas, in large part due to population density, it is common for substations to be located two to three miles apart. In some cases, the separation between substations could be even less. This distance allows for safe, reliable, and efficient service as well as effective back-up during emergency restoration, maintenance, or construction efforts.

The electricity is then distributed out of the substation at distribution level voltages along distribution lines to the end-use consumers through one last level of voltage transformation typically located near the end-use consumer (pole or pad mounted distribution transformers).

The level of electricity that flows through the equipment described above must be maintained by the utility provider at a safe level which is within the equipment's rated capacity to avoid electrical overloads and eventual failures. Furthermore, to accommodate anticipated electric power needs, contingencies, emergency response, maintenance, and construction efforts, the electrical power flows are typically maintained at or below "planning capacity" levels that are significantly lower than the equipment's rated capacity.

A simple pictorial representation of how electricity is delivered from the generating substation to the end-use consumer is provided as Exhibit SG-4.

**Q. YOU STATED PREVIOUSLY THAT LOAD GROWTH HAS POSED DISTRIBUTION-LEVEL LIMITATIONS IN SERVING END-USE CUSTOMERS IN THE PROJECT AREA. HOW HAS THIS AREA GROWN OVER THE LAST FEW YEARS?**

A. This area of Williamson County has experienced significant growth over the last several years. The peak electric demand for PEC electric load in the area has increased by a factor of 1.52 times, from 296.2 MW in 2005 to 452.2 MW in 2015. This corresponds to an electric load annual average growth rate of 4.32 percent per year.

PEC information indicates that meter growth (i.e., new end-use consumers) between 2001 and 2012 in the southwestern Williamson County area increased at a rate that is approximately 1.5 times the overall PEC system meter growth rate. Over 32,000 PEC customer electric meters were added over this 11-year period between 2001 and 2012. The average meter growth for this area has been nearly eight percent per year.

**Q. IS THIS GROWTH FORECASTED TO CONTINUE?**

A. Yes, the total electric demand served by PEC for the southwestern Williamson County area is forecasted by PEC to reach 486 MW by 2020. This electric load level is 1.22 times the demand for electricity in 2014 in this area. The electric load growth forecast provided

annually by PEC aligns with recent growth history for the area and, at 4.34 percent per year, is similar to the 2005 to 2015 electric load annual average growth rate.

**Q. HOW HAS THE AREA GROWTH AFFECTED ELECTRIC SERVICE REQUIREMENTS?**

A. As the area continues to transition from mostly rural to mostly urban in the form of new residential subdivisions, small and large commercial development, emergency response facilities, churches, schools, and other civic service facilities, new load-serving substation capacity and distribution infrastructure is required to continue to provide adequate and reliable electrical service. As I stated previously, most of the capacity at the existing eight substations was installed in the last 20 years to be able to keep pace with the rapidly increasing demand for electricity in the area. The addition of new capacity has been achieved mostly by connecting new substations to available 138-kV transmission lines in the area between Austin and Leander or by increasing the transformer capacity at existing substations.

In spite of the high and fast growth over the last 20 years, PEC has been able to manage this growth without adding new transmission lines to this specific area in over 15 years. The last transmission line built in the area was the four-mile Jollyville to Buttercup Ranch 138-kV transmission line constructed in 2000. However, as the growth in electric demand continues and as it develops further east away from the US 183 path, PEC has exhausted opportunities to effectively, efficiently, and reliably serve the continued demand for electricity from load-serving substations whose capacity may be increased or from new substations that may be sited adjacent to existing transmission lines. Left unaddressed, the continued growth will result in equipment overloads and excessive voltage drop negatively impacting electric service to a broad area in Williamson County.

**Q. WHY IS EXCEEDING THE EQUIPMENT CAPACITY RATINGS AND EXCESSIVE VOLTAGE DROP A CONCERN THAT MUST BE ADDRESSED BY UTILITIES?**

A. Electrical loading exceeding equipment capacity ratings is a significant concern because allowing equipment to carry more electrical power than the equipment capacity rating may result in damage to the equipment (e.g., transformers, electrical switches, etc.) and a

subsequent loss of electric service. On distribution lines, allowing the lines to carry more electrical power than the line rating, in addition to damage and subsequent loss of service, may also result in the line sagging beyond its limits and into underlying objects resulting in a public safety concern.

Similarly, excessive voltage drop is of concern because this abnormal operating condition can result in damage to, or poor performance of, end-use consumer electrical equipment. Furthermore, the substation's and transmission grid's ability to support normal voltage deviations is significantly reduced.

**Q. WHAT DO YOU MEAN BY SAYING THAT EXCESSIVE VOLTAGE DROP CAN RESULT IN POOR PERFORMANCE OF END-USE CONSUMER EQUIPMENT?**

A. When the operating voltage is not within an appropriate range, electrical equipment such as air conditioners, lighting and electronic equipment (e.g., televisions, computers, cash registers) may not function properly or at all.

**Q. WILL THE GROWTH FORECASTED FOR THE AREA AFFECT SERVICE RELIABILITY?**

A. Yes it will, absent the Project.

**Q. PLEASE DESCRIBE THESE SERVICE RELIABILITY CONCERNS AND THE STEPS TAKEN TO ADDRESS THEM.**

A. Due to growing concerns about how to support the area's recent and forecasted growth, PEC commissioned an engineering study to identify the effectiveness of its electric distribution system in meeting the growth in electric demand and to identify system improvements that ensure PEC distributes power in a safe, reliable, and cost-effective manner. The study revealed that continuing to serve the electrical needs of the area from the existing load-serving substations will result in the following:

- Loss of electric service to a large number of end-use consumers in this area;
- Loading levels exceeding equipment capacity, leading to widespread outages;
- Voltage levels falling below acceptable operational limits, leading to widespread outages; and
- Decreased electric system efficiencies due to increased electric system losses.

Specifically, the study revealed that as a result of the high electric load growth projected for the area, 42 percent of the transformers will exceed their rated capacity and 90 percent will exceed their planning capacity by 2020. Furthermore, on the distribution side, electrical loading on 27 distribution lines out of the eight substations is projected to exceed rated capacity by 2020, and 10 distribution lines out of four of the substations are projected to reach excessive voltage drop in the same time period.

In summary, the area's high electric load growth, coupled with the limited available electric delivery system, collectively confirm that the present electric system's capability to reliably and adequately serve the electric load is near its limits and will soon be exceeded. The PEC-commissioned engineering study is provided as Attachment 6 to the Application.

**Q. WHAT ACTIONS DID PEC TAKE IN RESPONSE TO THE FINDINGS IN THE ENGINEERING STUDY?**

A. In June 2012, PEC communicated to LCRA TSC that the need for several new load-serving substations should be addressed in the upcoming annual planning cycle. In a letter dated July 12, 2013, PEC reiterated the need for the two load-serving substations (see Attachment 6 to the Application).

**Q. DID LCRA TSC VALIDATE THE FINDINGS IN THE PEC-COMMISSIONED ENGINEERING STUDY?**

A. Yes, LCRA TSC verified the key findings in the engineering study.

**Q. WHAT FACTORS DID LCRA TSC CONSIDER IN VALIDATING PEC'S CONCLUSION THAT TWO NEW SUBSTATIONS ARE REQUIRED IN THE PROJECT AREA?**

A. LCRA TSC considered several factors in validating PEC's conclusions regarding the need for the two new substations. Among the most important are the following:

- PEC's conclusions are based on engineering assessment findings and recommendations that LCRA TSC verified by conducting power flow assessments associated with area infrastructure and electric load projections;
- PEC's conclusions are based on known and measurable electric load growth; and

- PEC's conclusions are based on engineering and utility practices that would be employed by any other electric service provider in the business to provide reliable, cost-effective, and efficient electric service.

**Q. PLEASE DISCUSS THE POWER FLOW ASSESSMENT LCRA TSC CONDUCTED TO VALIDATE KEY FINDINGS IN PEC'S ENGINEERING STUDY.**

A. The assessment LCRA TSC conducted to validate the key findings identified in PEC's engineering study consisted of three components. The first component was to validate the forecasted electric load growth stated in the PEC study. The second component was to assess the performance of the area's existing electric distribution system at the forecasted electric load levels. The third component was to reassess the same system at the same loading levels with the two new substations in service. LCRA TSC utilized industry-standard power flow analysis software to conduct the assessment

**Q. WHAT WERE THE CONCLUSIONS OF LCRA TSC'S ASSESSMENT OF PEC'S SYSTEM IN SOUTHWESTERN WILLIAMSON COUNTY?**

A. Based on its assessment, LCRA TSC concluded the following:

1. The electric load forecast in the PEC study, a key driver of the need and timing for the Project, is reasonable. LCRA TSC's review of the electric load forecast data shows that the forecasted load levels in the PEC study align closely with historical electric load growth for the PEC system, for the broader Central Texas area, and for the southwestern part of Williamson County. This finding is also consistent with the City of Cedar Park's statement during the ERCOT RPG project review process that "Williamson County continues its nation-leading growth."
2. PEC's electric distribution system in southwestern Williamson County cannot support the forecasted electric load levels at year 2020. The LCRA TSC-conducted assessment revealed that system deterioration will occur as follows:
    a) The electric loading of all Avery Ranch Substation transformers will exceed the transformer nameplate rating, with one of the transformers exceeding its rating by as much 32.2 percent.
    b) The electric loading of distribution lines out of the Avery Ranch Substation will exceed the conductor planning capacity, with one of the lines exceeding this capacity by as much as 52 percent.

c) The electric losses out of the Avery Ranch Substation will exceed normal levels, in some cases reaching as high as 11 percent.

d) The voltage out of the Avery Ranch Substation will fall below acceptable levels, in most cases falling as low as 94.1 percent.

e) The electric loading of distribution lines out of the Leander Substation will start to exceed acceptable levels.

f) The electric losses out of the Leander Substation will reach 5 percent, exceeding normal levels.

g) The electric loading of one of the Seward Junction Substation transformers will exceed transformer nameplate ratings, with one of the transformers exceeding its rating by as much 17.9 percent.

h) The electric losses out of the Seward Junction Substation will reach 5.9 percent, exceeding normal levels.

i) The voltage out of the Seward Junction Substation will fall below acceptable levels to 98.3 percent.

3. The addition of the two new substations that are associated with the Project will effectively and efficiently support the forecasted electric load levels. The LCRA TSC-conducted assessment revealed that the proposed electric system additions will support and accommodate existing and forecasted electric load as follows:

a) The electric loading of the Avery Ranch Substation transformers will be maintained within acceptable levels and reduced to below 90 percent.

b) The electric loading of distribution lines out of the Avery Ranch Substation will be maintained within acceptable levels and reduced to less than 60 percent.

c) The electric losses out of the Avery Ranch Substation will be maintained within 4 percent.

d) The voltage out of the Avery Ranch Substation will be maintained within acceptable limits at or above 120 Volts.

e) The electric loading of distribution lines out of the Leander Substation will be maintained within acceptable levels and reduced to less than 60 percent.

f) The electric losses out of the Leander Substation will be maintained within 4 percent.

g) The electric loading of the Seward Junction Substation transformer will be maintained within acceptable levels and reduced to below than 90 percent.

h) The electric losses out of the Seward Junction Substation will be maintained within 4 percent.

i) The voltage out of the Seward Junction Substation will be maintained within acceptable limits at or above 120 Volts.

One of the present limitations addressed by the Project is that the existing substations have become too remote from significant new load growth areas to provide effective, efficient, flexible, and cost-effective electric service. This distance constraint will only continue to worsen as development occurs, particularly near and generally east of the Ronald Reagan Boulevard and FM 1431 intersection for Substation 1 and the Ronald Reagan Boulevard and Crystal Falls Parkway intersection for Substation 2 (i.e., even further away from the existing substations in the area).

**Q. DID LCRA TSC COMMUNICATE THESE FINDINGS TO PEC?**

A. Yes, at a June 23, 2015 meeting, I communicated the findings of the LCRA TSC assessment to PEC staff. The objective of this meeting was to ensure that the basic engineering assumptions (regarding, e.g., electric load forecast and PEC delivery system infrastructure) used in LCRA TSC's assessment had not changed significantly and to ensure any PEC-known deficiencies in the general area were not overlooked. PEC validated these assumptions and agreed with LCRA TSC's technical assessment findings.

At that meeting, PEC also reiterated the high electric load growth that is forecasted for the study area. Additionally, PEC noted that, consistent with PEC planning criteria, a more urban-type area requires additional substation transformer capacity to provide back-up electric service during emergency conditions. Similarly, PEC plans for feeders to operate below their rated capacity for the same reason.

**Q. HOW WILL THE TWO NEW SUBSTATIONS LCRA TSC AND PEC IDENTIFIED BE CONNECTED TO THE EXISTING GRID?**

A. The new substations will be connected to the existing grid via a new 138-kV line from Leander to Round Rock.

**Q. WHAT FACTORS WERE CONSIDERED IN IDENTIFYING THE POTENTIAL END POINTS FOR THIS NEW 138-KV TRANSMISSION LINE?**

A. The potential end points were initially identified by LCRA TSC based on the following factors:

- The proximity to the Project area where the two new substations are needed to be constructed;

- The need to provide transmission service to each of the two new substations in a loop-connected configuration from different points of the electric grid;
- The requirement to avoid results that cause the electric grid to violate ERCOT and NERC performance requirements;
- The need to optimize the use of existing facilities that are connected to the ERCOT grid, thereby reducing the requirement to construct additional new substations;
- The need to provide electrical connectivity that will support the power flows anticipated on the transmission line associated with the Project; and
- The expansion capability of the substation property to accommodate the new 138-kV transmission line terminations associated with the Project.

Based on these factors, nine potential end points—using both existing and new substations—were identified for further study.

**Q. WHAT ATTRIBUTES MAKE THE TWO SELECTED END POINTS MORE EFFECTIVE WHEN COMPARED TO THE OTHER POTENTIAL END POINTS?**

A. Primarily, the combination of the Leander and Round Rock end points most cost-effectively addresses the reliability needs of the Project when compared to the other end point combinations considered. Furthermore:

- The combination of the Leander and Round Rock substations as the Project end points did not violate ERCOT and NERC electric grid performance requirements;
- The Round Rock Substation provides the strongest transmission source for the new transmission line;
- Electric service reliability is improved to a larger number of end-use consumers (e.g., the Round Rock Substation presently serves a total electric load of approximately 100 MW and thus the benefit of an additional transmission connection is significantly greater when compared to a connection to another substation, such as Chief Brady, where the electric load is significantly less, at approximately 20 MW); and
- All end-use consumers served out of the Leander and Round Rock substations will benefit from an additional transmission source into those substations.

**Q. HOW DO THE LEANDER AND ROUND ROCK SUBSTATIONS BENEFIT FROM THE ADDITION OF AN ADDITIONAL TRANSMISSION LINE INTERCONNECTION FROM THE PROJECT?**

A. The Project provides an additional transmission source at the Leander Substation that, based on year 2020 electric load levels and at normal system conditions, provides

approximately 91 percent of the power into the Leander Substation. Thus, the Project is a very strong 138-kV transmission source to the Leander Substation. Similarly, under certain contingency conditions that naturally divert the electric power flow into the Round Rock Substation, the Project will also provide a strong 138-kV transmission source into the Round Rock Substation by providing the majority of electric power from the west.

In other words, the Project contributes significantly to the electric power requirements at each of the end points in a manner that positively supports electric service reliability to end-use consumers served from these two substations.

**Q. CAN THE TWO NEW SUBSTATIONS BE CONNECTED TO THE EXISTING GRID AT ONE END POINT ONLY (E.G., ONLY AT LEANDER SUBSTATION)?**

A. No. Given the size of the electric load that will be served from the two new substations, the new 138-kV transmission line connecting those substations to the grid cannot be reliably connected to one end point only. A line connected at one end only is referred to as a "radial-connected" configuration. The transmission line associated with the Project must be connected at the two end points to establish a "looped-connected" configuration.

**Q. CAN THE PROJECT BE LOOPED-CONNECTED FROM THE WESTERN SIDE OF THE PROJECT AREA ONLY?**

A. No. Several transmission alternatives where both end points are on the western side of the Project area were studied by LCRA TSC and ERCOT. Overall, none of those alternatives performed as effectively as the Project.

**Q. DID ERCOT AGREE WITH THE END POINTS IDENTIFIED BY LCRA TSC FOR EVALUATION?**

A. Yes. When LCRA TSC filed the Project with ERCOT for ERCOT RPG review and ERCOT independent assessment, all nine end points identified by LCRA TSC were also considered by ERCOT. In its independent assessment, ERCOT evaluated another existing substation in the Project area as a tenth potential end point for the Project (Westinghouse Substation). Ultimately, the ERCOT RPG, ERCOT independent assessment, ERCOT TAC, and ERCOT Board of Directors all recommended the Project utilizing the Leander and Round Rock Substation end points.

**Q. PLEASE DESCRIBE THE TRANSMISSION SYSTEM LIMITATIONS IN SERVING THE AREA ELECTRIC LOAD.**

A. As I previously discussed over the last several pages of testimony, there is a paramount need for adding two load-serving substations to reliably, efficiently, and cost-effectively provide electric power to the area. In order to provide the necessary transmission level service to those two electric load-serving substations in the area of electric load growth, a new transmission line must be constructed that connects at different points of the existing interconnected electric grid. Thus, the most obvious transmission-related limitation is that this broad, high growth area does not have any transmission source of electrical power from which to connect the electric load-serving substations to the interconnected ERCOT electric grid. Existing transmission lines in the area consist of two main north-to-south paths: 138-kV corridors along IH 35 and US Highway 183. The distance between these two transmission paths is as much as nine miles. This configuration leaves a wide gap in which electric load between the existing lines has to be served remotely and thus ineffectively, with significantly less reliability, higher losses, little to no flexibility to address emergency conditions, and eventually more frequent and extended power interruptions.

**Q. DOES THE PROJECT ADDRESS ALL THE IDENTIFIED ELECTRIC SYSTEM REQUIREMENTS?**

A. Yes, the Project provides an appropriate transmission source to connect the two new substations from the existing electric transmission grid thus supporting the area's projected future development in terms of electric demand.

**Q. DOES THE PROJECT REQUIRE ADDITIONAL TRANSMISSION PROJECTS TO BE CONSTRUCTED TO MEET ITS INTENDED OBJECTIVE?**

A. No, it does not. As demonstrated in the LCRA TSC transmission assessment and the ERCOT independent assessment, the Project effectively addresses the stated need without requiring other transmission level infrastructure to be constructed. Stated another way, LCRA TSC's studies and ERCOT's independent assessment confirmed that the ERCOT grid is sufficiently robust at the Leander and Round Rock substations that additional projects are not required to interconnect this Project at those locations with the associated

loads that will be served out of the two new proposed substations. This is a planning consideration and a key area of focus during the ERCOT independent assessment phases. As stated above, the Project provides an appropriate transmission source to connect the two new substations from the existing electric transmission grid, thus supporting the area's projected future development in terms of electric demand.

**Q. DO ALL OF THE ROUTING OPTIONS PROPOSED IN THE APPLICATION ADDRESS THE NEED FOR THE PROJECT?**

A. Yes, any of the 31 routes filed in the Application address the need for the Project by providing a diverse set of options for a transmission source for each of the two new substations that are components of the Project. Likewise, any combination of route segments presented in the Application that terminate at the Project end points and that provide connectivity options for both of the new substation siting areas would also address the need for the Project.

**Q. DOES THE PROJECT COMPLY WITH PUC, ERCOT, AND NERC REQUIREMENTS?**

A. Yes, the Project complies with PUC, ERCOT, and NERC requirements.

## IV. SUBSTATION SITING AREA FACTORS

**Q. PLEASE DESCRIBE THE PHYSICAL COMPONENTS OF THE PROJECT RELATING TO SUBSTATION SITING AREA FOR SUBSTATION 1.**

A. The two new substations associated with the Project are needed to serve the existing and continued growth in electric load requirements in the area. The substations must serve the area electric load reliably (i.e., within short distances to the electrical load and within supportable facility loading levels), effectively (i.e., within acceptable voltage drop), and efficiently (i.e., without excessive electric losses). They must also be sited in a generally flat area outside of the floodplain with sufficient space to accommodate necessary equipment.

For Substation 1, LCRA TSC proposes to build the substation on approximately 5 to 7 acres of land located within a substation siting area northeast of the intersection of Ronald Reagan Boulevard and FM 1431. This substation siting area, approximately 2.4

square miles, as delineated by PEC, effectively aligns with the overall objective of the Project because it:

1. Balances the requirements identified in the PEC engineering study and the input from various area public officials received during the ERCOT project review phase in December 2013 as well as in the City of Cedar Park's response dated March 13, 2015 to LCRA TSC's Consultation Letter.
2. Balances the consideration for continued high density development in the area immediately to the west with less dense area options to the east and does so without compromising the ability to provide or receive effective and efficient back-up service to or from area substations.
3. Is located within the PEC certificated service boundary, and therefore it will effectively optimize the use of the substation to a broad area.
4. Is within a reasonable proximity to existing load-serving substations in the area (Avery Ranch, Kent Street, Whitestone, and Blockhouse substations), allowing for effective and efficient operation of the electric system, as I verified through power flow assessments and by a review of the PEC distribution system infrastructure in the area.
5. Is sufficiently sized to accommodate several alternatives for installing a 5-7 acre substation within the technically required location for an effective solution.
6. Is within close proximity to the existing and future electric load to be served.
7. Maximizes the substation's ability to efficiently serve future development.
8. Best uses available distribution infrastructure, minimizing the need for additional infrastructure.
9. Provides the immediate ability for Substation 1 to back up existing area substations during emergencies,
10. Allows for appropriate alignment associated with substation location practices in urban areas that are approximately 2-3 miles apart.

**Q. DO ALL OF THE POSSIBLE SUBSTATION SITES IDENTIFIED IN SITING AREA 1 MEET THE OBJECTIVE OF THE PROJECT?**

A. Yes, all eight substation sites identified within substation siting area 1 meet the objective of the Project.

**Q. DOES ANY ONE SITE STAND OUT AS THE BEST SITE FOR LOCATING SUBSTATION 1?**

A. No. All of the possible identified sites are located within the siting circle and thus all meet the objective of the Project.

**Q. PLEASE DESCRIBE THE PHYSICAL COMPONENTS OF THE PROJECT RELATING TO SUBSTATION SITING AREA 2.**

A. For Substation 2, LCRA TSC proposes to build the substation on approximately 5 to 7 acres of land located within a substation siting area near the intersection of Crystal Falls Parkway and Ronald Reagan Boulevard. This substation siting area, approximately 2.4 square miles, as delineated by PEC, effectively aligns with the overall objective of the Project because it:

1. Balances the requirements identified in the PEC engineering study and the input from various area public officials received during the ERCOT project review phase in December 2013.
2. Balances the consideration for continued high density development in the area immediately to the west with less dense area options to the east and does so without compromising the ability to provide or receive effective and efficient back-up service to or from area substations.
3. Is located within the PEC certificated service boundary.
4. Is within a reasonable proximity to existing load-serving substations in the area (Blockhouse, Leander, and Seward Junction substations).
5. Is sufficiently sized to accommodate several alternatives for installing a 5-7 acre substation within the technically required location for an effective solution.
6. Is within the existing and future electric load to be served.
7. Maximizes the substation's ability to efficiently serve future development.
8. Optimizes the use of available distribution infrastructure minimizing the need for additional infrastructure.
9. Provides the ability for Substation 2 to back-up existing area substations during emergencies.
10. Allows for appropriate alignment associated with substation location practices in urban areas that are approximately 2-3 miles apart.

**Q. DO ALL OF THE POSSIBLE SUBSTATION SITES IDENTIFIED IN SITING AREA 2 MEET THE OBJECTIVE OF THE PROJECT?**

A. Yes, all eight substation sites identified within substation siting area 2 meet the objective of the Project.

**Q. DOES ANY ONE SITE STAND OUT AS THE BEST SITE FOR LOCATING SUBSTATION 2?**

A. No. All of the possible identified sites are located within the siting circle and thus all meet the objective of the Project.

**Q. WHAT ARE THE IMPACTS OF CONSTRUCTING THE NEW SUBSTATION(S) OUTSIDE OF THE IDENTIFIED SUBSTATION SITING AREAS?**

A. Broadening the siting areas would significantly decrease the value and effectiveness of the service they are intended to provide. Siting either Substation 1 or Substation 2 outside its respective substation siting area delineated by PEC reduces the effectiveness and efficiency of the Project by decreasing the ability of the Project to safely, reliably, and efficiently serve the area's long-term future development needs. If the substations are not located within the identified areas, the load-serving requirements out of the substations may not develop as planned and additional substations sites may be required sooner than would otherwise be necessary. Furthermore, siting Substation 1 or Substation 2 outside its respective substation siting area does not assist in minimizing the need for additional infrastructure both in the immediate term as well as long-term. Siting Substation 1 or Substation 2 outside its respective substation siting area introduces risk and will require that additional infrastructure be installed to compensate for the less effective site selection. Several critical factors, of the ten noted previously, would be compromised. Siting Substation 1 or Substation 2 outside its respective substation siting area would not only result in a higher initial cost, but it would also result in a continued higher cost for operation and maintenance that will have to be managed for the life of the assets. These unnecessary costs are paid for by PEC members.

## V. SUBSTATION CONFIGURATIONS, CONNECTIONS, AND COSTS

**Q. PLEASE DESCRIBE THE WORK ASSOCIATED WITH THE NEW SUBSTATIONS AND THE CONNECTIONS AT THE END POINTS.**

A. Regarding the substation work associated with this Project, LCRA TSC will construct the two new substations (Substation 1 and Substation 2), add 138-kV line termination facilities at the existing Leander substation, and coordinate with Oncor at the existing Round Rock

Substation. The substation configuration and connection facilities at each of these sites are described in more detail below.

**End Point at Leander Substation**

The connection of the Project to the existing Leander Substation requires certain modifications at that substation. The LCRA TSC portion of work at the Leander Substation consists of adding:

- One 138-kV A-frame bay
- One 138-kV circuit breaker
- Three 138-kV disconnect switches
- Associated protective relaying and control equipment (inside PEC's existing control house)

Additional work inside the Leander Substation to be provided by PEC consists of extending the 138-kV buss work owned by PEC.

**End Point at Round Rock Substation**

The connection of the Project to the existing Round Rock Substation requires certain modifications at that substation. The LCRA TSC work inside the Round Rock Substation is limited to the addition of telecommunications equipment that support the control systems associated with the Project. All major work inside the Round Rock Substation to connect the Project will be completed by Oncor.

**Substation 1**

Eight possible alternate sites for Substation 1 are presented in the Application. Each alternate substation location includes the same basic configuration and facilities, a 5 to 7-acre site that will initially contain the following major open-air design facilities:

- Four A-frame bays
- Four 138-kV circuit breakers
- 10 disconnect switches
- Two 47 MVA transformers
- Two 138-kV circuit switchers
- 12 low voltage (distribution) bays at 24.9-kV

- Substation control house equipped with associated telecommunications, relay, metering, and control panels
- Edwards Aquafer water quality and detention pond

The substation will be fenced around the perimeter to ensure the safety of the public and LED-lighted to adhere with industry security and safety measures and requirements. The substation lighting is photocell-controlled and would typically be powered down to 20 percent luminosity and would power-up to 100 percent luminosity upon detection of motion. A gravel access road will be built between the nearest existing road and the substation.

PEC will own and direct the installation of the low voltage (distribution) line exits, distribution line circuit breakers, and low voltage disconnect switches.

**Substation 2**

Eight possible alternate sites for Substation 2 are presented in the Application. Each alternate substation location includes the same basic configuration and facilities, a 5 to 7-acre site that will initially contain the following major open-air design facilities:

- Two A-frame bays
- Three 138-kV circuit breakers
- Seven disconnect switches
- One 47 MVA transformer
- One 138-kV circuit switcher
- Six low voltage (distribution) bays at 24.9-kV
- Substation control house equipped with associated telecommunications, relay, metering, and control panels
- Edwards Aquafer water quality and detention pond

The substation will be fenced around the perimeter to ensure the safety of the public and LED-lighted to adhere with industry security and safety measures and requirements. The substation lighting is photocell-controlled and would typically be powered down to 20 percent luminosity and would power-up to 100 percent luminosity upon detection of motion. A gravel access road will be built between the nearest existing road and the substation.

PEC will own and direct the installation of the low voltage (distribution) line exits, distribution line circuit breakers, and low voltage disconnect switches.

**Q. WHAT IS THE ESTIMATED COST OF THE NEW SUBSTATION PORTION OF THE PROJECT?**

A. Attachment 4 to the Application provides the cost by substation site. These cost estimates are subject to change depending on the substation site, facilities' final design, and component cost variations.

**Q. WHAT IS THE ESTIMATED COST FOR THE LCRA TSC PORTION OF THE WORK AT EACH OF THE END POINTS?**

A. LCRA TSC's estimated costs for the substation-related work is $712,400 at the Leander Substation and $57,000 at the Round Rock Substation. These estimated costs are uniform for all of the 31 routing options presented in the Application or any other route that might be configured using the route segments proposed in the Application.

**Q. ARE THE PEC AND ONCOR COSTS ASSOCIATED WITH THIS PROJECT INCLUDED IN LCRA TCS'S COSTS ESTIMATE?**

A. No, the costs for which PEC and Oncor have responsibility are not included in LCRA TSC's costs estimates. These costs for PEC and Oncor at the Leander and Round Rock substations, respectively, are anticipated to be the same for any route approved for the Project. The cost for PEC work at the Leander Substation is estimated to be approximately $600,000, and the cost for Oncor work at the Round Rock Substation is estimated to be approximately $2,000,000.

**Q. DO YOU FIND THE LCRA TSC COSTS TO BE REASONABLE, CUSTOMARY, AND SIMILAR TO OTHER PROJECTS OF SIMILAR SCOPE GIVEN THE SERVICE REQUIREMENTS OF THE PROJECT?**

A. Yes, based on my experience with other projects of a similar scope, the substation cost estimates presented in the Application are budgetary level estimates and are reasonable based on the location of the substations and general objective of a cost estimate at this stage of the Project.

**Q. ARE ALL THE IDENTIFIED POSSIBLE SUBSTATION SITES ACCEPTABLE FOR CONSTRUCTION OF AN ELECTRICAL SUBSTATION?**

A. Yes, all 16 of the new substation sites presented in the Application are acceptable for construction of electrical substations. The sites are relatively flat, avoid the flood plain, are of sufficient size for the intended design, and have available public access for construction, operation, inspection, and maintenance purposes.

Q. **PLEASE DESCRIBE THE SAFETY CONSIDERATIONS IN THE DESIGN OF THE TWO NEW SUBSTATIONS.**

A. LCRA TSC will design the substations in adherence with National Electrical Safety Code (NESC) requirements. The proposed substations will be designed such that any abnormalities that could occur are contained within the perimeter of the substation.

## VI. ELECTRIC SYSTEM PLANNING PROCESS AND ERCOT RECOMMENDATION

**Q. DESCRIBE THE ERCOT RPG FUNCTION AND ITS REVIEW PROCESS.**

A. Pursuant to Section 39.155(b) of the Public Utility Regulatory Act (PURA), ERCOT is responsible for coordinating the transmission planning activities for transmission service providers (TSPs) within its borders. To assist with this responsibility, ERCOT has established a stakeholder group—the RPG—that conducts studies and reviews proposed project alternatives. This group is made up of ERCOT System Planning staff, engineers and/or planners from TSPs, and other stakeholders throughout ERCOT. The purpose of the RPG is to consider and review proposed projects to address transmission constraints and other ERCOT system needs. It is a non-voting, consensus-based organization focused on identifying needs, identifying potential solutions, communicating varying viewpoints, and evaluating analyses related to the ERCOT transmission grid in the planning horizon. Participation in the RPG is required of all TSPs and is open to all Market Participants, consumers, other stakeholders, and PUC Staff.

TSPs and other stakeholders submit project recommendations to ERCOT for review by the RPG. The RPG reviews the purpose and need for the proposed project, electrical alternatives considered, and effectiveness of the proposed solution. The RPG then

provides comments to the requesting TSP for any clarification, if needed, to complete the review of the project, ensuring adequate coordination and oversight.

**Q. PLEASE DISCUSS HOW THE PROJECT WENT THROUGH THE RPG PROCESS.**

A. LCRA TSC and PEC first submitted the project proposal to ERCOT for RPG review in December 2013, indicating in the proposal that the project was needed by December 31, 2018. The LCRA TSC project proposal included the new double-circuit capable 138-kV transmission line, a new load-serving substation by 2018 and another one by 2020, and the connections to the existing electrical grid.

The RPG concluded that there is a need for multiple electric load-serving substations. LCRA TSC's response to comments received though the ERCOT RPG review process are provided as Exhibit SG-5.

Following the RPG recommendation, the Project was reviewed by ERCOT in its independent review. The ERCOT independent review was completed on May 22, 2014.

**Q. WHAT HAS CHANGED SINCE THE TIME ERCOT REVIEWED THE PROPOSED PROJECT?**

A. A couple of timeframe-related matters have emerged to re-define the Project's in-service date and scope.

First, the process to energize the new transmission line and associated first substation will be longer than the four-year lead time assumed in the planning study. Instead of completing this project by December 2018, the new in-service date is now December 2019.

Second, the electric load reporting at ERCOT (Annual Load Data Request or ALDR) now includes year 2020 and the second substation is now in the ERCOT models.

**Q. HAS LCRA TSC COMMUNICATED THIS CHANGE TO ERCOT?**

A. Yes. In 2015, the new load projections for the area and the revised in-service date were communicated to ERCOT through the various processes ERCOT has in place to communicate these types of project or system updates. First, ERCOT was notified through the filing of the ALDR in March 2015. Second, ERCOT was notified through the updates

of the ERCOT Power Flow cases in June 2015 where this second substation is included. Finally, in July 2015, LCRA TSC communicated to ERCOT the need to construct the second substation as part of the Project as a result of the increased electric load growth projections (see Attachment 3 in the Application). Specifically, LCRA TSC communicated that including this substation did not constitute a significant change as contemplated by ERCOT Nodal Protocols Section 3.11.4.10 Modifications to ERCOT Endorsed Projects.

**Q. WHAT WAS ERCOT'S RESPONSE TO LCRA TSC'S NOTIFICATION OF THE NEED TO INCLUDE SUBSTATION 2 IN THE PROJECT?**

A. After its review, ERCOT concurred that the inclusion of the second substation as part of the Project did not represent a significant change to the project. (See Attachment 3 to the Application.)

## VII. THE PROJECT MEETS THE CRITERIA OF PURA AND OTHER CRITERIA CONSIDERED BY THE COMMISSION

**Q. PLEASE SUMMARIZE YOUR FINDINGS AND RECOMMENDATIONS IN THIS MATTER.**

A. The Project is needed to satisfy reliability and adequacy needs for electric service in accordance with LCRA TSC standard planning criteria and good utility practice as well as state and federal electric service reliability standards. The Project is necessary for the service, accommodation, convenience, and public safety, and the Project is also the best option to meet the reliability needs when compared to other solutions including employing distribution facilities.

**Q. PLEASE SUMMARIZE THE STATE OF EXISTING SERVICE WITHOUT THE PROJECT.**

A. By 2020, without the Project in service, 42 percent of the presently installed substation transformers in the southwestern Williamson County area will exceed their rated capacity and 90 percent will exceed their planning capacity. Furthermore, on the distribution side, electrical loading on 27 distribution lines are projected to exceed their rated capacity and 10 distribution lines are projected to reach excessive voltage drop by 2020 without the Project in service.

As the growth in electric demand continues and as it develops further east and away from the US Highway 183 path, PEC has exhausted opportunities to effectively, efficiently, and reliably serve the continued demand for electricity from existing load-serving substations whose capacity may be increased or new ones that may be sited adjacent to the existing transmission lines. As the electric load continues to grow, the impact to end-use consumers will increase accordingly.

Under the projected electric load levels, encountering certain contingencies with the existing system configuration may lead to even more catastrophic failures and/or costly restoration efforts.

**Q. WILL CONSTRUCTION OF THE PROJECT RESULT IN IMPROVED SERVICE OR LOWER COSTS TO THE ELECTRIC SERVICE CUSTOMERS?**

A. Yes, it will result in both. The Project will provide a transmission source sized with adequate capacity (i.e., a 138-kV, 446 MVA transmission line) to serve the long-term electric service requirements at the two new substations that are required for the area. The Project will result in improved electric service to end-use consumers because electric system adequacy and reliability will be strengthened as described previously. The resulting improved operating efficiencies (in the form of reduced electric line losses in distribution and transmission facilities) will result in overall cost savings opportunities to end-use consumers as well.

**Q. WHAT WILL BE THE EFFECT ON LCRA TSC AND OTHER UTILITIES IN THE AREA IF THE PROJECT IS BUILT?**

A. By implementing the Project, LCRA TSC will have met its adequacy and reliability obligation to electric loads connected to its system. The adequacy and reliability of the electric system will be enhanced for the near term and sustained for the long term for electric loads served in southwestern Williamson County.

**Q. IS THE PROJECT NEEDED TO CONNECT A NEW CUSTOMER OR TO IMPROVE WHOLESALE COMPETITION?**

A. No, the Project is needed to address reliability needs of existing and future end-use consumers based on actual and forecasted electric load and identified system limitations in meeting this electric load.

**Q. DO THE PROPOSED ROUTING ALTERNATIVES INCLUDED IN THE APPLICATION (INCLUDING THE END POINTS AND THE TWO NEW SUBSTATIONS) ADEQUATELY CONSIDER ELECTRICAL EFFICIENCY AND RELIABILITY?**

A. Yes, the alternative routes, new substation siting areas, and the end points associated with the Project will provide for the immediate efficiency and reliability benefits envisioned and supported by the directly impacted service providers. Furthermore, the transmission line configuration for all of the alternative routes contained in the Application does not raise any efficiency or reliability issues in addressing the identified or anticipated needs.

## VIII. ELECTRIC SYSTEM ALTERNATIVE IMPROVEMENTS CONSIDERED

**Q. DID LCRA TSC CONSIDER DISTRIBUTION ALTERNATIVES TO THE PROJECT?**

A. Yes, the assessments conducted by PEC, and validated by LCRA TSC, considered distribution solutions. However, these types of solutions were determined to be inadequate for addressing the problems identified for the area. Supporting documents are provided as Attachment 6 to the Application.

**Q. PLEASE DISCUSS THE TRANSMISSION ALTERNATIVES CONSIDERED AND THE REASON FOR REJECTING ALL BUT ONE OF THEM.**

A. The evaluation of transmission alternatives is described in Attachments 2 and 5 to the Application. Alternative 11 described in Attachment 2 to the Application is the Project.

The Project was selected because it addresses all of the problems identified for the area of concern in the most cost-effective and efficient manner. Specifically, the Project provides the required 138-kV source to the project area while providing secondary benefits

to the transmission system at the same time. The Project provides the capacity to accommodate a larger electric load without causing thermal violations on the transmission system. Lastly, the Project provides transmission service diversity, increasing reliability to a broader area, especially during severe weather and/or emergency conditions.

**Q. DID LCRA TSC CONSIDER DISTRIBUTED GENERATION AS AN ALTERNATIVE TO THE PROJECT?**

A. Because LCRA TSC is subject to the unbundling requirements of PURA § 39.051, it is not required to consider distributed generation as an alternative to transmission-related problems. Furthermore, the problems identified for the area are not generation capacity-based limitations nor are the electric load levels small enough to consider distributed generation as an economic, long-term, equal value solution.

**Q. IS THE PROJECT THE BEST ALTERNATIVE TAKING INTO ACCOUNT CONSIDERATIONS OF EFFICIENCY, RELIABILITY, AND COST BENEFITS?**

A. Yes. After studying the needs of the area and the transmission and distribution systems surrounding it to serve the forecasted electric load growth, LCRA TSC determined the Project provides the most reliable and most efficient transmission configuration to increase the reliability of the transmission and distribution systems.

## IX. SUMMARY AND CONCLUSIONS

**Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THIS PROJECT.**

A. The purpose and need for the Project has been evaluated and supported by the appropriate stakeholders (e.g., utility companies that have an obligation and are held accountable to provide reliable and cost-effective electric service; ERCOT, which is responsible for the overall reliability of the grid and for major project coordination; and public officials, who are tasked with ensuring the availability of cost-effective resources and basic utility infrastructure that supports the continued growth, health, and successful development of their communities.)

LCRA TSC has demonstrated that applicable processes and procedures, including internal, state, and national requirements, have been considered to determine the best solution, in the form of the Project, to address the issues and system limitations described

in this testimony. The Project optimizes the use of existing electric system infrastructure, ensures the long-term adequacy of transmission service to electric loads served in the overall project area, and ensures the reliability of service for forecasted electric load growth.

The facilities to be added to the existing Leander and Round Rock substations and installed at the two new substations are consistent with standard industry practice to achieve reliable designs meeting the objective of the Project, and the associated costs are reasonable.

The Project provides the most reliable and most efficient transmission configuration to increase the reliability of the transmission and distribution systems surrounding the project area when compared to other solutions such as employing distribution solutions and/or other transmission solutions.

**Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

A. Yes, it does.