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SOAH DOCKET NO. 473-21-0247
PUC DOCKET NO. 51023

APPLICATION OF THE CITY OF SAN ANTONIO TO AMEND ITS CERTIFICATE OF CONVENIENCE AND NECESSITY FOR THE SCENIC LOOP 138-KV TRANSMISSION LINE IN BEXAR COUNTY	§ § § § § §	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND EXHIBITS

OF

GEORGE J. TAMEZ, P.E. #90313

ON BEHALF OF

APPLICANT
CPS ENERGY

November 6, 2020

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DIRECT TESTIMONY AND EXHIBITS OF GEORGE J. TAMEZ, P.E.

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EXHIBITS

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is George J. Tamez. My business address is: 500 McCullough Ave, San Antonio, Texas 78215.

Q. WHAT IS YOUR OCCUPATION?

A. I am a professional electrical engineer employed by the City of San Antonio (City), acting by and through the City Public Service Board (CPS Energy) as Director of Grid Transformation and Planning.

Q. WHAT IS YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND?

A. I am a graduate of Texas A&M University, I am a professional engineer, and I have over 24 years of experience in the electric utility industry. My resume is attached as Exhibit GJT-1 to my testimony.

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

A. In my role as Director of Grid Transformation and Planning, I manage three areas for CPS Energy, including Transmission Planning, Distribution Planning, and Infrastructure Innovation. Previously I managed both the engineering and construction areas of the company. I currently oversee the Transmission and Distribution Planning departments, which administer all aspects of the short and long range planning for the CPS Energy electric delivery system (EDS). In addition, I manage the Innovation Infrastructure team that is developing projects to leverage advanced resources such as electric vehicles and energy storage in order to advance resiliency, reliability, and affordable integration into the CPS Energy electric system. I have collaborated with stakeholders across the organization on the development of the EDS Transmission & Distribution Long Range Plan to address forecasted load growth, aging infrastructure, and reliability enhancements. I have also led the development of the Strategic Asset Management Plan for EDS.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC UTILITY COMMISSION OF TEXAS (COMMISSION OR PUC)?

A. No, I have not.

Q. PLEASE DESCRIBE THE PROJECT PROPOSED IN THIS PROCEEDING.

A. The project proposed in this proceeding, the Scenic Loop 138-kilovolt (kV) transmission line project (Project), consists of a new double circuit 138 kV transmission line located in Bexar County, Texas. The Project is proposed in order to connect the new Scenic Loop Substation with the existing electric grid at the Ranchtown to Menger Creek 138 kV transmission line, which is approximately five miles to the west of the area for the new substation. The new Scenic Loop Substation is proposed in the area of the intersection of Scenic Loop Road and Toutant Beauregard Road. The new transmission line will be approximately 4.6 to 6.9 miles long, depending on the route selected.

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 CPS Energy's application to amend its CCN filed in this docket on July 22, 2020 (Application) and to describe and support:

(1) The need and requirements for a new load-serving Scenic Loop Substation associated with the proposed Project;

(2) The need for the 138 kV transmission line that is required to connect the proposed Scenic Loop Substation to the existing Ranchtown to Menger Creek 138 kV transmission line to the west; and

(3) The reasons why the Project is the best solution when compared to other alternatives.

Q. WHAT PORTIONS OF CPS ENERGY'S APPLICATION DO YOU SPONSOR?

A. I sponsor the responses to Questions 14, 15, and 16 in the Application. I co-sponsor the response to Questions 4 and 7 of the Application with Mr. Scott Lyssy and Mr. Adam Marin, the response to Question 8 with Mr. Lyssy, the response to Question 11 with Mr. Marin, and the response to Question 17 with Mr. Lyssy, Mr. Marin, and Ms. Lisa Meaux. Additionally, I sponsor Attachments 4 and 13 to the Application. I also co-sponsor with Mr. Lyssy, Mr. Marin, and Ms. Meaux Section 1 of the *Scenic Loop 138 kV Transmission Line and Substation Project Environmental Assessment and Alternative Route Analysis Bexar County, Texas* (EA), prepared by POWER Engineers, Inc., which is included as Attachment 1 to the Application. Last, I co-sponsor Attachment 2 to the Application with Mr. Marin. Please refer to Exhibit ARM-5 to Mr. Marin's direct testimony for an overview of the sponsorship of the Application in this case.

III. PROJECT NEED

Q. WHY IS THE PROJECT NEEDED?

A. The Project is needed to address capacity limitations and reliability concerns on CPS Energy's distribution system in the northwest region of Bexar County. The Project will provide additional electric capacity to support community growth and improve the reliability of electric service to greater than 25,000 homes and businesses in the area. Electric service to the Project area is currently provided from two existing CPS Energy substations—the La Sierra Substation and the Fair Oaks Ranch Substation, which are located to the southeast and northeast of the Project area, respectively.

Capacity Limitations

The existing CPS Energy electrical infrastructure in the northwest area of Bexar County will be challenged by increasing load along the IH-10 corridor north of Loop 1604. The Scenic Loop Substation is needed to improve the load serving capability in the area. Based

on the growth rate experienced by CPS Energy in the area over the last five years and CPS Energy's reasonable projections for load growth in the coming years, informed by the extensive SA Tomorrow Comprehensive Plan (SA Tomorrow) recently undertaken by the City, the Project area will experience significant load growth in the next five, ten, fifteen years and up thru 2040. The geographic area of the City that includes the University of Texas as San Antonio (UTSA) campus is targeted in SA Tomorrow as a regional development center and is one of the fastest growing areas of the City. As a member of the Technical Working Group of SA Tomorrow, I have come to understand that the dynamic growth from UTSA and its associated Main Campus Master Plan will significantly increase the current UTSA and the surrounding community load growth and move the region toward becoming a premier destination to live, work, and play. SA Tomorrow projects additional electrical load growth in the region of approximately 8-9 MW/year. Historic and projected load growth for the area served by the La Sierra and Fair Oaks Ranch substations is presented in Tables 14-1 and 14-2 and Figure 14-3 of the Application.

Geographic Limitations

As can be seen on Attachment 4 to the Application, the existing substations within the northwest region of Bexar County are in close proximity to each other. The La Sierra, Hill Country, De Zavala, and UTSA substations are all within three miles of each other to the south of the Project area. Similarly, the Stonegate, Panther Springs, and Bulverde substations are within three to six miles of each other to the east. The Ranchtown, Helotes, and UTSA substations are all six to eight miles of each other to the south/southwest. As a result of their proximity, the circuits between these stations are not very long and the existing substations can be reliably called upon to back each other up in the event of a transformer outage. In contrast, the La Sierra and Fair Oaks Ranch substations are approximately 11 miles (straight line) apart and many of the circuits served by these substations are significantly longer than the CPS Energy system average.

The average length of CPS Energy's primary overhead distribution circuits (both 35 kV and 13 kV) is 12.8 miles. The average length of the 34.5 kV circuits is approximately 20 miles. The line lengths for the distribution circuits served from the La Sierra and Fair Oaks Ranch substations are two to four times longer than the CPS Energy system average

for 34.5 kV circuits (see page 14 of the Application and pages 10-16 of Attachment 13 to the Application).

Again, referring to Attachment 4 to the Application, the existing Ranchtown, La Sierra, and Fair Oaks Ranch substations are located a significant distance from each other such that the significant load growth of new homes and commercial development to the north, northwest, and west of these existing substations (respectively), is and will be, served by long and increasingly loaded distribution circuits. The new Scenic Loop Substation, geographically central to those existing three substations, will serve a significant portion of that area with shorter, less loaded distribution circuits. Compare for example, the large geographic area served from the La Sierra and Fair Oaks Ranch substations today, as shown in Figure 14-1 of the Application, with the equally divided smaller geographic areas served when the Scenic Loop Substation is constructed in the area proposed for the Project as shown in Figure 14-5 of the Application.

Significantly shortening and unloading the circuits served from the existing substations will enhance the load serving capacity in the La Sierra and Fair Oaks Ranch substations and also the overall load serving capability in the region. As I will discuss below, connecting the existing long, low reliability circuits into the new Scenic Loop Substation will reduce the number of customers impacted from outages and improve reliability in the area to closer to the CPS Energy system averages.

Reliability

Based on historical outage data, the customers served from the La Sierra and Fair Oaks Ranch circuits have experienced approximately 8-10 times more outages compared to the entire CPS Energy system average over the last few years. Whereas the total load served from the La Sierra and Fair Oaks Ranch substations represents approximately 3 percent of the total load that CPS Energy serves, the frequency of outages and duration of outages for the entire CPS Energy system are notably skewed because of the poor reliability of the area. For example: (1) in 2019, 32 percent of ***all*** customers affected (known as "CA") by distribution system outages in the CPS Energy system reside in the area served by the La Sierra and Fair Oaks Ranch substations; and (2) in 2017, 20 percent of ***all*** the CPS Energy customer minutes of interruptions (known as "CMI") were associated with the customers

served in this area. Between 2010 and 2019, one or more of the La Sierra and Fair Oaks Ranch circuits were on CPS Energy's poor performing circuits (PPC) list for six different years, and six of the 11 circuits have been on the list since 2010 (see Table 14-5 in the Application). Additionally, five circuits from La Sierra and Fair Oaks Ranch were on the PPC list in 2018, which was the most of any year within the past ten years.

Construction of the proposed Scenic Loop Substation will provide CPS Energy with a load serving substation geographically intermediate to the Fair Oaks Ranch and La Sierra substations in a manner that will cut the average length and loading of distribution circuits serving end-use customers by 50 percent or more. The Scenic Loop Substation will significantly improve the reliability in the northwest area of Bexar County and provide CPS Energy with the electric system capacity needed to serve this growing area for many years into the future.

Q. DID CPS ENERGY PREPARE A NEED ASSESSMENT ASSOCIATED WITH THE PROJECT?

A. Yes. CPS Energy worked with electrical planning experts at Burns McDonnell to prepare the *Scenic Loop Substation Analysis Report*, which is included as Attachment 13 to the Application. I oversaw preparation of the report and sponsor its inclusion in the Application. Details regarding reliability metrics for the area, load growth trends, system modeling, and power flow analysis performed by electric planning experts at Burns McDonnell and CPS Energy are presented in the report.

Q. DID CPS ENERGY SUBMIT THE PROJECT FOR REVIEW BY THE ELECTRIC RELIABILITY COUNCIL OF TEXAS (ERCOT)?

A. No. As discussed in response to Questions 4 and 15 of the Application, the Project has not been submitted to ERCOT for review. The Project is a Tier 4 Neutral project pursuant to the classifications established by ERCOT. Accordingly, the Project is not required to be submitted to the ERCOT Regional Planning Group for review and comment. Notably, however, CPS Energy has concluded that the Project will not result in any violation of

North American Electric Reliability Corporation (NERC) or ERCOT performance requirements.

Q. PLEASE DESCRIBE THE EXISTING ELECTRIC SYSTEM TOPOLOGY IN THE AREA OF THE PROJECT.

A. Figure 15-1 in the Application and Attachment 4 to the Application provide an illustration of the existing transmission system in the area. As can be seen from these figures, the Ranchtown to Menger Creek 138 kV transmission line (to the west), the Fair Oaks to Esperanza 138 kV transmission line (to the north), and the La Sierra to UTSA BTAP 138 kV transmission line (to the south) are all located several miles from the area where the new Scenic Loop Substation is needed. As a result, a new transmission line is needed to connect the Scenic Loop Substation to the existing transmission grid. Because of the shorter distance and lower estimated cost (see Figure 15-2, Table 15-1, and pages 22-25 of the Application), the Project is proposed to connect the Scenic Loop Substation with the existing Ranchtown to Menger Creek 138 kV transmission line to the west.

Q. WHY DOES THE NEW SUBSTATION NEED TO BE LOCATED AT OR NEAR THE INTERSECTION OF SCENIC LOOP ROAD AND TOUTANT BEAUREGARD ROAD?

A. As can be seen from Attachment 4 to the Application, the intersection of Scenic Loop Road and Toutant Beauregard Road is nearly equidistant between the Ranchtown, Fair Oaks Ranch, and La Sierra substations. Centering the new substation geographically between those three substations serves several purposes. First, it places the substation as close as possible to the center of the current and forecasted load of this growing service area. The optimal location (at the intersection of Scenic Loop Road and Toutant Beauregard Road) allows CPS Energy to serve the growing area load in all four directions along major existing roadway infrastructure (Scenic Loop Road to the south, Toutant Beauregard to the east and west, and Boerne Stage Road to the north). Second, the major backbone distribution infrastructure to the area is currently at the intersection of Scenic Loop Road and Toutant Beauregard Road. Constructing the substation at or near that location will allow CPS Energy to connect to the existing distribution network at the center of the area to be served. Moving the substation significantly any direction will require significant

distribution infrastructure to be installed to the area at significant cost to CPS Energy customers and, in some areas, may be physically constrained. The ideal location at the intersection of Scenic Loop Road and Toutant Beauregard Road allows CPS Energy to utilize the ultimate build out of the substation (three transformers) extending 12 circuits from the substation with a maximum of four in each direction along the existing major roadways (two circuits on either side). Third, locating the substation equidistant between the Ranchtown, Fair Oaks Ranch, and La Sierra substations provides the optimal location for the substations to provide back up and support to each other in the event of a transformer outage. In addition, the equidistant configuration of the substations will provide for best longer term development opportunities for the region. Fourth, one of the primary needs of the Scenic Loop Substation is to address the reliability issues CPS Energy has experienced with the long, heavily loaded distribution circuits serving the area. Placing the new substation central to the load minimizes the distance and loading of all of the distribution circuits from all of the area substations.

As can be seen from the intervention and participation in this proceeding, constructing a significant transmission line project and load serving substation in a developing suburban area is a significant endeavor. Based on prudent, good utility, long term distribution system planning principles, the optimal location for the new Scenic Loop Substation is at the intersection of Scenic Loop Road and Toutant Beauregard Road (Sites 2 and 3). In order to provide the Commission with geographically diverse route alternatives, CPS Energy carefully evaluated alternative substation sites in proximity to the intersection and identified five other sites (Sites 1 and 4-7) that meet the need for the Project in a manner that can reasonably be constructed and operated without significant additional distribution infrastructure construction and expense within constrained corridors. All of the proposed substation locations result in significant shortening of distribution circuits serving the area along diverse corridors. Any substation location further south, west, or north of the proposed substation locations would significantly impact both the short and long-term functionality and reliability of the Scenic Loop Substation and are not reasonable alternatives to the Project need.

Q. WHAT ALTERNATIVES TO THE PROJECT DID CPS ENERGY CONSIDER?

A. CPS Energy considered multiple alternatives to the Project, including transmission, distribution, and distributed energy resource solutions. CPS Energy's responses to Question 15 of the Application and Section 5 of the *Scenic Loop Substation Analysis Report* describe the options CPS Energy considered as alternatives to the Project. Based on the analysis conducted, none of the options considered provide the same reliability, capacity, and long term system advantages as the Project at a comparable cost.

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

A. Yes. Any of the 29 routes included in the Application address the need for the Project. Likewise, any combination of route segments presented in the Application that connects the Ranchtown to Menger Creek transmission line to one of the proposed Scenic Loop Substation sites would also address the need for the Project.

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

A. Yes, the Project complies with all applicable PUC, ERCOT, and NERC transmission system planning requirements.

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

Q. PLEASE SUMMARIZE YOUR FINDINGS AND RECOMMENDATIONS IN THIS PROCEEDING.

A. The Project is needed to satisfy reliability and adequacy needs for electric service in accordance with CPS Energy 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 safety of the public, 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 SERVICE WITHOUT THE PROJECT.

A. Absent the Project, CPS Energy's ability to provide reliable delivery of electricity to the Project area will diminish and limit CPS Energy's ability to provide service to new customers. CPS Energy has taken steps to temporarily improve reliability to the area through distribution circuit reconfiguration and installation of reclosers, but due to the rugged terrain and distance of the load from the existing substations at La Sierra and Fair Oaks Ranch, the new Scenic Loop Substation is necessary to ensure the long term reliability of the local distribution system in accordance with the standards and expectations of CPS Energy, its customers, and the Commission. In addition, within the next few years CPS Energy will not have the necessary system capacity to serve the growing load in northwest Bexar County without the new Scenic Loop Substation in service.

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

A. Yes. As described in detail in response to Question 14 of the Application and in Attachment 13 to the Application, the Project will result in improved service to CPS Energy's electric service customers in northwest Bexar County. Even with recent system reconfiguration improvements on the existing distribution system immediately prior to the filing of the Application, without a new substation in northwest Bexar County, the CPS Energy customers served from the La Sierra and Fair Oaks Ranch substations will continue to experience significantly lower reliability than CPS Energy's system averages. The Project will also ensure CPS Energy has sufficient capacity to provide service to both new and existing customers throughout northwest Bexar County.

Q. WHAT WILL BE THE EFFECT ON CPS ENERGY AND OTHER UTILITIES IN THE AREA IF THE PROJECT IS BUILT?

A. The Project will significantly improve CPS Energy's ability to provide reliable electric delivery service in the northwest Bexar County and provide capacity to serve the load growth in that area for many years into the future. Because the Project taps into an existing CPS Energy transmission line and is proposed to provide service wholly within CPS Energy's existing service territory, the Project will not have a negative effect on other

utilities in the area. The other utility connected to the Ranchtown to Menger Creek transmission line (LCRA Transmission Services Corporation) has coordinated with CPS Energy on the Project and, other than the identification of protective relay setting changes at the Menger Creek Substation, has not raised any concerns with the Project (see Application Attachment 2).

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

A. 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. As a local Tier 4 project in ERCOT, the Project is not anticipated to notably impact wholesale competition in Texas.

Q. DO THE PROPOSED ROUTING ALTERNATIVES INCLUDED IN THE APPLICATION (INCLUDING THE ENDPOINTS AND THE PROPOSED NEW SUBSTATION LOCATIONS) ADEQUATELY CONSIDER ELECTRICAL EFFICIENCY AND RELIABILITY?

A. Yes, the alternative routes, new substation siting alternatives, and the endpoints associated with the Project will provide for immediate efficiency and reliability benefits to CPS Energy and its customers.

Q. DID CPS ENERGY CONSIDER DISTRIBUTION ALTERNATIVES TO THE PROJECT?

A. Yes, CPS Energy considered distribution system improvements to address the electric system reliability and capacity needs in the area of the Project. Specifically, Options A, E, and F in CPS Energy's response to Question 15 of the Application and in Section 5 of Attachment 13 to the Application, are distribution alternatives CPS Energy considered.

For the reasons discussed in detail in response to Question 15 of the Application and in Section 5 of Attachment 13, CPS Energy concluded that the distribution alternatives considered did not provide the same long term reliability and system capacity improvements as the Project or were significantly more expensive than the Project proposed in the Application.

Q. DID CPS ENERGY CONSIDER DISTRIBUTED GENERATION AS AN ALTERNATIVE TO THE PROJECT?

A. Yes. Options C and D discussed in response to Question 15 of the Application and in Section 5 of Attachment 13 are renewable energy and natural gas fired distributed generation projects considered by CPS Energy as alternatives to the Project. For the reasons presented more fully in the Application and Attachment 13, distributed generation does not provide the same reliability and capacity benefits as the Project at a comparable cost.

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

A. Yes. After studying the immediate and long-term reliability and capacity needs of the area, the Project provides the overall most reliable and most efficient configuration to increase the reliability of the existing distribution system now and throughout the timeframe studied.

Q. IF THE COMMISSION ISSUES A FINAL ORDER GRANTING CPS ENERGY AUTHORITY TO AMEND ITS CCN FOR THE PROJECT, ARE YOU PRESENTLY AWARE OF ANY CIRCUMSTANCE THAT WOULD WARRANT THE EXTENSION OF THE SEVEN-YEAR DEFAULT PERIOD FOR WHICH SUCH AUTHORITY WOULD REMAIN IN EFFECT?

A. No, not at this time.

V. SUMMARY AND CONCLUSIONS

Q. PLEASE SUMMARIZE YOUR CONCLUSIONS REGARDING THE PROJECT.

A. The purpose and need for the Project has been studied and evaluated extensively by transmission and distribution planning professionals at CPS Energy and Burns McDonnell. The Project provides the most reliable and most efficient solution to increase the reliability and capacity of the distribution system surrounding the Project area when compared to other solutions.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes, it does.

GEORGE J. TAMEZ, P.E.

Objective

Electric power experience including over 24 years with CPS Energy. My career goal is to continue on a pathway to progressional development consistent with the organizational success of CPS Energy and self development including building relationships, achieving projects and goals and leadership strength.

Experience

Jan 2019 to August 2020	CPS Energy	San Antonio, TX

Director – 1.5 years

- Responsible for Infrastructure Innovation & Transmission and Distribution Planning.
- Supervise areas (Infrastructure Innovation, Transmission Planning, Distribution Planning).

Jan 2017 to Dec 2018	CPS Energy	San Antonio, TX

Director – 2 years.

- Responsible for Transmission and Distribution Planning, Asset Management and GIS.
- Supervise Engineering area (Transmission Planning, Distribution Planning, Asset Mgmt, and GIS Services).

Aug 2011 to Jan 2017	CPS Energy	San Antonio, TX

Director – 5.5 years.

- Responsible for Distribution Engineering.
- Supervise Engineering area (Overhead, Underground, Network, Standards and Specifications, Utility Coordination, and GIS Services-since 2015).

Aug 2008 to Aug 2011	CPS Energy	San Antonio, TX

Senior Manager – 3 years.

- Responsible for construction and maintenance activities at Southwest Service District and UG Construction
- Supervise Electric (Overhead, URD, S/M), Civil UED, UG Craft and UG Civil workgroups.

May 2005 to Aug 2008	CPS Energy	San Antonio, TX

Senior Manager – 3 years.

- Responsible for construction and maintenance activities at Southwest Service District.
- Supervise Electric (Overhead, URD, S/M), and Civil UED groups

Jan 2003 to May 2005	CPS Energy	San Antonio, TX

Manager – 2.5 years.

- Manager of Overhead Engineering Section.
- Responsible for engineering, planning of system & civic improvement, maintenance and comm. jobs.

Aug 2002 to Jan 2003	CPS Energy	San Antonio, TX

Senior Engineer – 0.5 years.

- Supervisor of Overhead Engineering Section.
- Responsible for engineering, planning of system and civic improvement, maintenance and comm. jobs.

Sept 1999 to Aug 2002	CPS Energy	San Antonio, TX

Project Engineer – 3 years.

- Overhead Engineering Engineer planning and coordinating system improvement projects.
- Underground Engineering Engineer planning and coordinating system and conversion projects.

Sept 1996 to Sept 1999	CPS Energy	San Antonio, TX
Junior Engineer – 3 years. ▪ Underground Engineering Engineer planning and coordinating electric jobs. ▪ Standard and Specifications Engineer creating and revising specs, CU's and material description		
May 1993 to Sept 1996	Industry Work Experience	Various
Energy Manager & Support – 3 years ▪ Manage and coordinate energy management project such as lighting retrofits, air conditioning retrofits, monitoring & controls of HVAC systems and conducting energy audits. Assist in data and analysis of hvac systems.		
Assistant to Energy Manager, Univ. of Texas – Medical Branch Energy Manager, Brownsville Independent School District		Galveston, TX Brownsville, TX
Education	Texas A&M University	College Station, TX
Bachelor of Science in Electrical Engineering – May 1993 ▪ Power Systems emphasis with a Minor in Math; ▪ (additional 12 hours at UTSA on MBA)		
Certification		
June 2002, Professional Engineer License in Texas	Texas P. E certification	San Antonio, TX