Cost/Benefit Analysis

of

CenterPoint Energy’s Intelligent Grid Project

Contributors:

Electric Power Research Institute (EPRI)
- Bernie N. Neenan, Technical Executive
- Jeffrey D. Roark, Principal Technical Leader

CenterPoint Energy Houston Electric (CEHE)
- Stephen W. Bezecny, Director, Regulatory Affairs
- Walter Bartel, Director, Grid Performance & Reliability
- Kristin Senechal, Director, Strategic Planning
- Melvin Schoech, Manager, Grid Performance
- William Rice, Analyst, Regulatory Affairs

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Executive Summary

This study evaluates the costs and benefits of deploying a system-wide intelligent grid across CenterPoint Energy Houston Electric's electric distribution system. Specifically, this study estimates the reduction in customer interruption costs from improved reliability as a result of deploying distribution automation equipment on substations and distribution feeders. While CenterPoint may also be able to reduce expenses related to service restoration (e.g., fewer truck rolls), those impacts were not expressly assessed.

Distribution automation involves the deployment of "intelligent" devices capable of communication and remote (i.e., automatic) operation. The principal component is the Intelligent Grid Switching Device (IGSD). Placed at strategic locations along distribution feeders, these IGSDs may be operated to isolate faulted line segments while rerouting power to restore service to unfaulted segments within. In addition to enhancing system operations, IGSDs provide valuable information that can help locate a fault more quickly, which can expedite the restoration process. Besides IGSDs, other investments considered in this study include line sensors, communications equipment, substation modifications and system upgrades necessary to coordinate the actions of the IGSDs and facilitate remote operation of the distribution grid.

In estimating the benefits of distribution automation, two different deployment schedules were considered. The first (i.e., the Automation Base Case) assumes that CenterPoint continues to install distribution automation equipment consistent with its recent practices, which has been around 33 IGSDs per year. This is more or less a business-as-usual scenario rather than a pre-planned approach. Under this scenario, an estimated $280 million in net customer benefits were projected over the study period.

In contrast to the Automation Base Case, this study also evaluated the reliability benefits associated with CenterPoint’s specific Intelligent Grid Design plan, which would deploy state-of-the-art distribution automation equipment, including substation upgrades across the Company’s entire service territory over the next ten years. CenterPoint’s Intelligent Grid Design plan includes upgrading roughly 20 substations per year, including IGSDs on all associated feeders, line sensors, communications infrastructure, and substation relay upgrades that provide fault locating and automated reconfiguration capabilities for all feeders on each substation. Under this scenario, the net benefits to customers were estimated to be approximately $1.8 billion over the 2016 - 2030 period, which is more than six-fold larger than the
benefits estimated in the Automation Base Case. A summary of the present value results for the two scenarios evaluated in this study are shown in the table below.

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<thead>
<tr>
<th>Information</th>
<th>2014 Present Value ($000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base Case</td>
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<tr>
<td>Customer Reliability Savings</td>
<td>$ 295,482</td>
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<tr>
<td>Less Revenue Requirements</td>
<td>$ 15,920</td>
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<tr>
<td>Net Customer Benefits</td>
<td>$ 279,562</td>
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</table>
I. Introduction and Background

This study was conducted in cooperation with personnel from CenterPoint Energy Houston Electric ("CEHE" or "CenterPoint") and evaluates the costs and benefits of deploying a system-wide intelligent grid across CEHE’s electric distribution system. Distribution automation improves system reliability and therefore provides significant value to CEHE’s customers. CEHE may also be able to reduce expenses related to service restoration activities, but those impacts, other than fewer truck rolls, were not expressly assessed in this study, which focuses primarily on customer reliability benefits.

Distribution automation centers on the deployment of "intelligent" devices along the distribution system and are capable of communication and remote (i.e., automatic) operation. The principal component is the Intelligent Grid Switching Device (IGSD). The IGSD is a pole mounted breaker that may be remotely operated as an intelligent switch or recloser and plays an essential role in restoring electric service to customers following a "sustained" fault. A sustained fault is defined as a fault that short-circuits a line long enough to either lock-out the substation breaker or one of the IGSDs on the circuit. Placed at strategic locations along a distribution feeder, these IGSDs may be operated to isolate faulted line segments while rerouting power to restore service to unfaulted segments within minutes. Unfortunately, there is no technology available today that can avoid dispatching a work crew to repair the cause of the sustained fault. In addition to their ability to re-route power automatically, IGSDs also provide useful information that can help identify the location of the fault more quickly and expedite the restoration of electric service to customers.

Distribution automation is however, more than just IGSDs; it also includes line sensors, communications infrastructure, substation microprocessor relays, and other system upgrades that not only serve to control the distribution system but also provide valuable information to crews in the field. Whereas in the past several crews might be dispatched to search for the cause of the fault, perhaps searching over many miles, the intelligent grid can provide crews an estimated fault location thereby reducing the time it takes to physically locate the fault and begin the restoration process.

Cost/Benefit Analysis for Smart Grid Projects

The Cost/Benefit analysis utilized in this study follows the framework jointly developed by EPRI and the Department of Energy and described in Methodological Approach for
Estimating the Costs and Benefits of Smart Grid Demonstration Projects.\(^1\) While much of the documented methodology deals with measurement and verification issues dealing with physical demonstration equipment deployed in the field, the Cost/Benefit analysis portions of the methodology are still clearly applicable to a study such as this one.

The Cost/Benefit methodology itself does not stray from long-standing principles of economic analysis as it is usually applied in utility planning. An important characteristic of conventional utility planning analysis is that its revenue-requirement approach takes a customer point of view towards costs and benefits. In the narrow traditional sense, utility planning analysis views utility decisions in terms of changes in customer cost of service over time, sometimes trading off near-term costs for long-term benefits, or even vice versa. Such analysis proceeds under the assumption that the utility recovers its cost including return on capital.

Impacts and Benefits of Smart Grid Investments

EPRI’s *Guidebook for Cost/Benefit Analysis of Smart Grid Demonstration Projects*\(^2\) lists six general categories in which impacts (physical changes) and benefits (monetized changes) of Smart Grid investments are typically found. These include:

- **Reliability** (frequency and duration of customer interruptions: SAIDI, SAIFI and CAIDI)
- **Utility Operations** (people and how they do their jobs: non-fuel O&M, non-production assets, public and employee safety)
- **System Operations** (the power system and how efficiently it runs: losses, combustion, dispatch optimization, emissions)
- **Utility Assets** (production assets required to provide service)
- **Power Quality** (harmonics, sags/swells, voltage violations)
- **Customer** (customer-borne costs, changes in service amount or value)

For the most part, the costs and benefits within each of these six categories occur either within the utility or on the customer side of the meter. In fact, an electric utility’s entire

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\(^1\) EPRI, Palo Alto, CA: 2010. Product ID 1020342

\(^2\) EPRI, Palo Alto, CA: 2013. Product ID 3002002266
cost function (as would be reflected in the utility's balance sheet and income statement) can be slotted into (a) utility operations, (b) system operations, and (c) utility assets. The remaining categories (i.e., Reliability, Quality, and Customer) characterize the electricity product as it is received by the customer, or as the customer perceives, controls, and uses the product.³

Utilities can often invest in equipment that lowers their cost of providing service, perhaps raising the investment in utility assets (e.g., smart meters) while reducing the cost of utility operations (e.g., meter reading expense) or system operations (e.g., investments that reduce conversion and delivery losses). In some instances it is possible to invest in one kind of asset (e.g., demand response) in order to reduce investment in another such as peaking generation, for example. Such trade-offs are common in the utility industry, and can generally be analyzed in a conventional cost-minimization framework, assuming that the quantity and quality of service are unchanged. The result of least-cost planning is that customers pay less for electric service over the long term.

The traditional utility cost-minimization framework is not sufficient, however, in evaluating utility investments that impact the quality of electric service, or programs that cause or require expenditures on the part of customers. In such cases, the costs and benefits for affected customers must be weighed against the costs expended by the utility. If the utility invests in technologies that have benefits only on the customer side of the meter, then the cost of electricity is slightly higher, but the customers receive a higher-quality product (in terms of reliability and/or power quality).

The intelligent grid plan examined in this study primarily improves the reliability experienced by the end-use customer, although some benefits may arise in utility operations as well. That is, the customer costs associated with service interruptions will be reduced, but these assets will also positively impact the utility's service restoration process. This study estimates the reduction in customer interruption costs from deploying distribution automation equipment on both substations and distribution feeders across CEHE's service territory.

³ Power Quality can be considered a sub-section of reliability. Power quality problems may result in customer equipment damage, or may cause interruptions of specific customer equipment. In either case, customers are exposed to costs and interruptions of their normal energy use. The problems, and often the solutions, are more local and specific than higher level reliability concerns, yet they are all problems where customers' desired patterns of electric-energy usage are interrupted.
Benefits of Distribution Automation

The investments considered in CEHE's Intelligent Grid Design plan include IGSDs, line sensors, communications equipment, substation modifications and system upgrades to remotely operate the distribution grid. Once deployed, the IGSDs will separate each of the feeder backbones into segments, which can ultimately be supplied with power from multiple directions, although there is a single normal configuration.

The simplest distribution feeder has a large circuit breaker at the substation and no other interrupting devices along the feeder, with the exception of fuses on taps and transformers. If a sustained fault occurs on the main backbone of the feeder, the breaker will lock-out, interrupting service to all customers on the feeder until a crew can be dispatched to locate and repair the fault. On long feeders this process is particularly challenging and time consuming if no additional information is available other than the fact that the breaker locked out.

Reliability performance is improved to some extent by simply inserting an interrupting device or "recloser," in the middle of the feeder, separating the customers into two groups: those closest to the substation and those on the far side of the device. In this situation, a fault occurring beyond the recloser will cause the recloser to lock-out, but those customers closest to the substation will continue to have power. However, if a fault occurs between the substation and the recloser, the breaker at the substation will lock-out, interrupting the entire circuit. Assuming an even distribution of faults on both sides of the recloser, the customers nearest the substation will suffer half the number of the interruptions that they would normally experience without the recloser, while the reliability of the customers beyond the recloser will see no improvement in reliability at all. While this approach improves overall reliability statistics such as SAIDI or SAIFI and clearly improves reliability for some customers (i.e., those nearest the substation), it does nothing for those customers more distant from the substation.

In an effort to address that type of situation, CEHE's Intelligent Grid Design places IGSDs not just along the main backbone of feeders, but also places them between separate feeders. The IGSDs connecting feeder-to-feeder will normally be in the “open” condition, (i.e., they will NOT be conducting electricity). Many distribution systems have long had normally open switches between feeders, but these were manual switches operated by crews on the scene. In contrast, under CEHE's Intelligent Grid Design these IGSDs, will, for the most part, be operated remotely and automatically. There will still be some instances where work crews arriving on the scene will need to manually operate some switches but those occurrences will be greatly reduced. In addition, the IGSDs will also continually collect system and device data and send it to centralized control systems and system operators via the communications infrastructure.
Consequently, when a sustained fault occurs along a feeder backbone, the IGSDs and line sensors will be able to determine which segment along the feeder is faulted and whether unaffected segments can safely be re-energized and automatically send that information to system operators. The faulted segment can then be isolated by opening IGSDs located at both ends of the segment. At that time, the unaffected segments can be re-energized by closing a normally open IGSD connection to another feeder.

In the best of circumstances, only customers served by the faulted segment remain without power until the dispatched crew can clear the fault. Other segments will have been re-energized automatically within a few minutes after the initial fault. Moreover, crews arriving on the scene will already know which segment is faulted, as that information was communicated as soon as the determination was made. While that information alone would narrow down the search for the fault, additional data provided by substation relays, IGSDs and line sensors is also analyzed to improve the estimate of the fault location.

In the past, once the crew located the fault, they determined the extent of any damage. They might quickly repair a simple problem, but if there were significant damage they most likely would begin a process of manually operating switches between feeders to re-energize as many customers as possible. Under CEHE's Intelligent Grid Design, the IGSDs will have likely already performed many of these actions before the crews even begin to go in route. So, while the actual process to repair the fault will likely be the same, the intelligent grid reduces the crew time spent searching for the fault, and minimizes the time spent operating manual switches. Since multiple crews have typically been dispatched to aid in manually searching for a fault, fewer crews would be needed if the location of the fault were already known with sufficient accuracy, freeing those crews to begin the repair process much sooner.

Although some faults occur under normal "blue sky" conditions, obviously more occur during adverse weather conditions. In Harris County alone there have been 166 days with storm events in the past ten years, and 127 of those days were listed by NOAA as resulting in property damage. Hail, thunderstorms, lightning and flash floods are relatively common, with substantial incidence of funnel clouds and tornadoes. Distribution automation systems such as the intelligent grid will not affect the damage done to distribution systems caused by lightning or falling trees in common storms, much less the outright destruction wrought by tornadoes and hurricanes. However, the automated switching capabilities have been shown to benefit customers in undamaged areas if a reconnection path to an undamaged substation remains intact. In addition, the presence of additional sensors reporting data on system conditions provides utility crews with valuable information about where damage is likely to be found. As a result,
customers at the periphery of damaged areas may be able to avoid lengthy interruptions because the time to complete restoration activities may be reduced.

The physical impacts of an intelligent grid system such as CEHE's include:

- Reduced customer interruption time
- Reduced truck rolls
- Reduced crew search time
- Reduced crew switching time

This study concentrates on the benefits to customers from reduced interruption time. The evaluation concentrates on improvements to reliability in response to non-major events. While many storm-related interruptions are included within the definition of non-major events, changes in the specific responses to storm conditions, such as reduced crew switching time, are not quantified.

II. Structure of the Study

Two Major Analytical Tracks

The analytical approach taken in this study consists of two major tracks from input data and assumptions to end results, as illustrated in Figure 1. This approach is followed for both the Automation Base Case and Intelligent Grid Design scenarios analyzed by EPRI in this study. One track includes the processing of reliability indices and customer data for estimating the customer value of reducing interruption time, a track that uses an online ICE calculator provided by the Department of Energy. The other track accounts for the capital expenditures and expenses associated with the intelligent grid investments, and conversion of those capital expenditures into revenue requirements.

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4 Reliability statistics are separated into indices describing major and non-major events. Major events are determined at the total system level through a statistical procedure specified in IEEE standard 1366-2003.
Alternatives Evaluated

Based on the two analytical tracks outlined above, the study considered two alternative investment schedules, the Intelligent Grid Design and the Automation Base Case (ABC). The Intelligent Grid Design reflects a 10-year IGSD deployment schedule that upgrades about 20 substations, and associated distribution feeders, annually. In contrast, the Automation Base Case assumes normal upgrading of facilities and deployment of fault locating devices based on CEHE's historical practices with respect to device installations. These alternatives are further defined below.

- **Intelligent Grid Design**— The Intelligent Grid Design is a specific 10-year plan, specified by both substation and year. Capital Investment is assumed to begin in 2016 and continue for ten years through 2025 under CEHE’s plan. This case assumes that roughly 20 substations are upgraded per year, including IGSDs on all associated feeders, line sensors, communications infrastructure, and substation relay upgrades that provide fault locating and automated reconfiguration capabilities for all feeders on each substation.

- **Automation Base Case** — In contrast, the Automation Base Case is not a pre-specified plan but rather business as usual with respect to deployment of IGSDs. The base case assumes that 33 IGSDs are installed per year without substation upgrades, and with only limited fault locating or automated reconfiguration capabilities. These IGSDs are assumed to be installed for either reliability or protection. So, while the Intelligent Grid Design deals in specific circuits with
known characteristics, the Automation Base Case deals in anonymous circuits with generic characteristics, with a limited number of specific selection criteria employed to classify projects in terms of voltage level and the reason for the project (i.e., reliability or protection). Since this scenario is a reflection of CEHE's normal business practice, capital investments start in 2014 and continue for fifteen years through 2028. Moreover, given the generic nature of the investment any number of alternative base scenarios can be generated, although statistically they will all be very similar with similar costs and benefits when accumulated over a ten or twenty year period.

These two alternative schedules were each analyzed through the two study tracks described as diagramed in Figure 2.

![Figure 2 — Parallel study tracks for reliability and financial analysis for the Intelligent Grid Design and the Automation Base Case Analysis](image)

Figure 2 – Parallel study tracks for reliability and financial analysis for the Intelligent Grid Design and the Automation Base Case Analysis
Reliability Analysis Methodology

The reliability analysis used feeder-level reliability data from CEHE with five complete years of history, 2008-2012. The basic interruption data were obtained, including Customer-Interruptions (CI) for sustained interruptions and Customer-Minutes of Interruption (CMI) for sustained interruptions and customer counts by class. CMI are the number of minutes of a sustained interruption’s duration multiplied by the number of customers affected, or the sum of sustained-interruption minutes counted for each customer affected by an event, all summed over a period of time. CI is the sum of customers affected by all sustained interruptions in the period.

While additional reliability data was available from CEHE, only reliability data associated with events that would be affected by the devices being evaluated was used for this study. In other words, the interruptions and duration’s data were included for only those events related to faults on the circuit main backbone for non-major occurrences. Interruptions on the transmission system, for instance, were not included, nor were interruptions associated with blown fuses on taps since reclosers, or IGSDs, will not improve reliability associated with those types of interruptions.

In order to convert the reliability improvements into customer benefits, the Interruption Cost Estimate (ICE) Calculator developed for the Department of Energy, specifically with that purpose in mind, was used. As key inputs, the ICE Model, utilizes standard reliability indices for each circuit or substation being evaluated. The standard formulas for the reliability indices are given in Figure 3. These indices can be calculated for any circuit or group of circuits and for any period of time, but are usually reported annually and for entire systems.

$$SAIDI = \frac{\sum \text{Customer - Minutes of Interruption}}{\text{Customer Count}} = \text{System Average Interruption Duration Index}$$

$$SAIFI = \frac{\sum \text{Customer - Interruptions}}{\text{Customer Count}} = \text{System Average Interruption Frequency Index}$$

$$CAIDI = \frac{SAIDI}{SAIFI} = \text{Customer Average Interruption Duration Index (Average Time to Repair)}$$

Figure 3 – Formulas for the Reliability Indices used in the ICE Calculator
The IEEE standard 1366-2003 specifies the formulas for calculating reliability performance, but there are variations in definitions and practices utilized from state to state and utility to utility. Under the standard IEEE definition, a sustained interruption is defined as any interruption lasting 5 minutes or longer. Shorter interruptions are classified as momentary, and their statistics may be reported in a separate set of indices also defined in the standard.

In contrast to the IEEE 5-minute standard, CenterPoint’s reliability statistics are normally reported using a 1-minute threshold for sustained interruptions. Since the ICE Calculator relies on the 5-minute cut-off for sustained interruptions, CEHE also provided those measures for inclusion although they are not normally reported by the Company.

Comparison of the IEEE 5-minute and the CenterPoint 1-minute indices did produce one seemingly counter-intuitive result. Intuitively, one would expect the number of IEEE sustained interruptions to be less than CenterPoint’s 1-minute definition since the IEEE definition would drop out any interruptions that lasted between one and five minutes. However, on some circuits in some years, the IEEE 5-minute standard produced higher values than the 1-minute CenterPoint index. Further investigation determined that the difference was related to the handling of major events at the circuit/substation level. The IEEE 5-minute definition of major events is based on system-wide statistics. However, with weather-related events such as tornadoes it is possible to have major destruction in a small concentrated area, yet not be sufficient enough to rise to the threshold for a system-wide major event. Ultimately, it was decided that the interruption counts and durations for the IEEE indices should be reduced to the level of the CenterPoint 1-minute counts, thereby creating a hybrid index that eliminated most of the local-major events. As a result, the frequencies and durations for sustained interruptions on the IEEE indices were always less than or equal to the frequencies and durations determined under the CenterPoint 1-minute threshold.

Following this hybridization of the reliability statistics, 5-year average reliability indices were calculated for each of the 1,504 circuits included in this study, as shown in Figure 4.
Figure 4 — Distribution of 5-year Average SAIDI for 1,504 individual circuits, 5-minute or longer interruptions from faults at the circuit level resulting from non-major system and local events.

For the Automation Base Case, the 1,504 circuits were clustered into five groups of approximately 300 circuits that were averaged together in terms of reliability performance, potential reliability improvement, and customer class. The group SAIDI is graphed in Figure 5. Although both 12kV and 35kV circuits were included in each group, voltage levels were separated in the reliability analysis since the customer counts were very different for the different voltage levels.
Figure 5 - SAIDI Calculated for the Five Groups of Circuits

The characteristics of the five SAIDI groups by voltage level are shown in Table 1.

Table 1 – Characteristics of SAIDI Groups by Voltage

<table>
<thead>
<tr>
<th>Voltage</th>
<th>No. of Circuits</th>
<th>Residential kWh</th>
<th>Commercial kWh</th>
<th>Industrial kWh</th>
<th>Residential Customers</th>
<th>Commercial Customers</th>
<th>Industrial Customers</th>
<th>5-yr SAIDI High</th>
<th>6-yr SAIFI High</th>
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</thead>
<tbody>
<tr>
<td>12 kV</td>
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<td>162</td>
<td>12,509</td>
<td>8,249</td>
<td>23,657</td>
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<td>137</td>
<td>3</td>
<td>83.5</td>
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<td>5</td>
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</table>
For the Intelligent Grid Design, the actual substation's reliability performance and customer classes were used. The distribution of the 5-year average SAIDI for substations is shown in Figure 6 below.

**Figure 6 — Distribution of 5-year Average SAIDI for 218 substations, 5-minute or longer interruptions from faults at the circuit level resulting from non-major system and local events.**

Reliability Improvement

The circuits and substations were not modeled electrically or stochastically as a part of this study, rather the Intelligent Grid Design plan is the result of detailed studies performed by CEHE over time. The reliability improvements assumed in this study were based on results of those studies as well as CEHE's knowledge and experience with the IGSDs already deployed on its system.
Reliability Improvement in the Automation Base Case Scenario

In recent years, the intelligent grid devices deployed by CEHE on circuits have been undertaken for several reasons, and their costs and reliability impacts vary with the primary voltage level as well as the reason for the project. For example, some projects were intended to improve reliability, although the devices are operated as conventional reclosers without any automation or circuit reconfiguration capabilities. As noted previously, simple reclosers installed along a distribution line will improve reliability for customers closest to the substation, but not for customers who take service further down the line from the reclosers. Other device installations have been installed to satisfy circuit protection requirements, such as when the substation breaker is unable to sense and react to all faults because some faults may be located too far down the line from the breaker. In this case, a fault current may be too low to trip the substation breaker. A recloser mounted within the zone that the breaker can sense can be set to respond to these faults further down the line. While these reclosers improve overall reliability of the circuit, they do not have the same impact on reliability as the installation of a device optimized specifically for reliability. Historical statistics for these types of projects installed by CEHE are shown in Table 2. During some years between 2008 and 2012, at least a few projects were completed for both reliability improvement and protection on both 35kV and 12kV circuits. However, most of the time when 12kV circuits were upgraded it was more likely for protection purposes rather than for reliability improvement. In contrast, for 35kV circuits most of the historical installations have been for reliability reasons.
Table 2 – Historical statistics for device installs by type of project used in the Automation Base Case.

<table>
<thead>
<tr>
<th>Year</th>
<th>Voltage</th>
<th>Protection</th>
<th>Reliability</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>12 kV</td>
<td>10</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>2009</td>
<td>12 kV</td>
<td>20</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>2010</td>
<td>12 kV</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>2011</td>
<td>12 kV</td>
<td>7</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>2012</td>
<td>12 kV</td>
<td>15</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>5-yr. average</td>
<td>12 kV</td>
<td>11.2</td>
<td>3.4</td>
<td>14.6</td>
</tr>
<tr>
<td>2008</td>
<td>35 kV</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>2009</td>
<td>35 kV</td>
<td>4</td>
<td>21</td>
<td>25</td>
</tr>
<tr>
<td>2010</td>
<td>35 kV</td>
<td>0</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>2011</td>
<td>35 kV</td>
<td>2</td>
<td>15</td>
<td>17</td>
</tr>
<tr>
<td>2012</td>
<td>35 kV</td>
<td>0</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5-yr. average</td>
<td>12 kV</td>
<td>1.2</td>
<td>17.2</td>
<td>18.4</td>
</tr>
<tr>
<td>5-yr. average</td>
<td>All</td>
<td>12.4</td>
<td>20.6</td>
<td>33</td>
</tr>
</tbody>
</table>

Reliability impacts for the different types of projects were assumed primarily in terms of their impact on SAIDI. Their impact on either SAIFI or CAIDI was then estimated by logic related to the type of project. That is, if the project was going to have limited impact on repair time for the faulted segment, then CAIDI, for example, was not changed. Moreover, once any two of the indices is determined, the third is implied by the formulas from Figure 3 on page 9. For example:

\[
\text{CAIDI} = \frac{\text{SAIDI}}{\text{SAIFI}}
\]

The basic assumptions for the Automation Base Case are shown in Table 3. The average SAIDI values for the five SAIDI groups are shown, as well as the statistics for incidence of the various reasons for the IGSD installations. The projects are distributed 62%/38% between reliability and protection intent, and of those designated "reliability," 83% are assumed to be 35kV circuits. Of those designated "protection," only 10% were assumed to be 35kV circuits. Further, those circuits upgraded for reliability improvement are assumed to come 60% from the highest SAIDI group (i.e., SAIDI Group 1), with smaller percentages for the groups with lower average SAIDI numbers. In contrast, circuits upgraded for protection were drawn equally across all SAIDI groups (i.e., 20% from each SAIDI group). Regardless of the SAIDI group, when an installation occurred for reliability reasons, SAIDI was assumed to decrease by 25%, while SAIDI improved by only 15% when the installation was principally for protection purposes. While the
improvements are assumed to have a steady impact over time, they are assumed to have no impact in the year of installation. The base case scenario was constructed assuming the installation of approximately 33 devices per year. (In contrast, approximately 370 IGSDs are installed per year under the Intelligent Grid Design).

Table 3 – Assumptions for the Automation Base Case

<table>
<thead>
<tr>
<th>SAIDI Group</th>
<th>Average Group SAIDI</th>
<th>% of Device Installs by Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Reliability</td>
<td>Protection</td>
</tr>
<tr>
<td>1</td>
<td>90.3</td>
<td>60%</td>
<td>20%</td>
</tr>
<tr>
<td>2</td>
<td>40.7</td>
<td>30%</td>
<td>20%</td>
</tr>
<tr>
<td>3</td>
<td>23.4</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>11.1</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>5</td>
<td>1.1</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason for Install</th>
<th>% of Devices</th>
<th>% 35kV</th>
<th>% 12kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>62%</td>
<td>83%</td>
<td>17%</td>
</tr>
<tr>
<td>Protection</td>
<td>38%</td>
<td>10%</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Reliability Improvement under the Intelligent Grid Design

CEHE’s Intelligent Grid Design is a comprehensive distribution automation plan that once fully deployed will allow the system to automatically reconfigure circuits following sustained faults, restoring service to many customers within a few minutes. Under this plan, customers' reliability will not be as dependent on proximity to the substation as is currently the case. Moreover, not only will system operators be able to isolate the faulted segment, but fault-location logic will shorten search time for the crews dispatched to repair faults, reducing the interruption time even for those circuit segments that are faulted.
The Intelligent Grid Design's impact on reliability improvement was estimated at the individual substation level, but with relatively simple heuristics. Substations receiving intelligent grid upgrades at 35kV were assumed to improve SAIDI by 75%, with the proviso that the improvement was limited to events that would most clearly be impacted by the upgrade (i.e. sustained faults on the main feeder backbone). SAIDI for 12kV substations was assumed to improve by 66%. In both instances, CAIDI was assumed to improve by 15%, reflecting a reduced amount of search time in combination with the normal time to repair a located fault.

III. Benefits of Reliability Improvement

When a utility such as CEHE invests in assets that improve reliability above historical experience, its delivery customers receive value in the form of reduced interruption costs. Of course, these are not always direct out of pocket costs that are paid to anyone in particular. Often times they are costs in terms of lost time, lost production, lost business, and perhaps lost profits. These costs may or may not be even known by most customers, although some customers know well the cost of an inopportune interruption in the middle of a production run. Residential customers may think of losing air conditioning on an especially hot day, or losing power to run heating equipment during a winter storm, but there are also mundane interruptions that occur at random times throughout the year. Even a momentary interruption may cause frustration and lost time as a resident resets clocks on various devices or redoes work lost on a computer project.

The cost of interruptions is therefore diverse and spread widely over all customers that experience them, and range from thousands of dollars in some industrial and commercial customers to minor irritations to residential customers. Investments to reduce the frequency and/or duration of these service interruptions subsequently reduces these losses of customer value, which are sometimes termed "soft-dollar savings," even though to some customers the losses are clearly monetary. The value proposition for reliability improvement is clear and well-documented, with the proviso that the costs of providing higher reliability appear in the utility's cost accounting, while the value gained is widely dispersed and perhaps in certain circumstances barely noticed.

Recognizing the need for a measure of interruption cost at the distribution-level, the U.S. Department of Energy commissioned a study to quantify the cost of interruptions characterized over a variety of conditions so as to be appropriate for evaluation of
distribution system interruptions distributed at random across the year. The result of that study is the Interruption Cost Estimator, which was used to quantify the impacts of increased reliability on the CEHE distribution system in this study. The ICE model, available for running online at icecalculator.com, provides an estimate of interruption costs for a feeder, area, or company service territory based on input data that describes the types of loads and the reliability indices that characterize the distribution system being evaluated. A flow diagram illustrating the role of the ICE Calculator in the study methodology is shown in Figure 7.

The basis for the interruption costs imbedded in the ICE model is 28 customer surveys that were conducted by ten major utilities over a 16 year period covering 1989 - 2005. The process of converting these survey results into a consistent set of "damage functions" involved many compromises and estimates, but the results are well documented and widely recognized as a groundbreaking effort and referenced extensively in other reliability studies. As with the VOLL calculations, the cost rates are

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high for some classes of customers, suggesting a high value associated with reliability improvement in those instances.

As mentioned earlier, the ICE calculator requires detailed information concerning the composition of loads on the subject area or feeder. The data reflect all of the various dimensions across which the cost of interruptions have been estimated, and while some utilities have this information for their service territories, it may be unusual for a utility to have such information at the feeder or substation level. To facilitate running the ICE calculator, census data for each state is included that characterizes the total makeup of load at the state level, so that the user can select a state and obtain a run with only a few bits of unsupplied data.

For this survey study, most of the data items reflected state-level data, with only top level data specific to the substation. The specific data were SAIDI, SAIFI, and the number of customers and average consumption for residential, small commercial and industrial (< 50,000 kWh/year) and large commercial and industrial.

Benefits of Reliability Improvement in the Automation Base Case

The ICE Model was used to estimate the benefits of reliability for each of the five SAIDI groups, by voltage level, and purpose (i.e., reliability or protection) as shown in Table 4.

<table>
<thead>
<tr>
<th>SAIDI Group</th>
<th>12kV Circuits</th>
<th>35kV Circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reliability</td>
<td>Protection</td>
</tr>
<tr>
<td>1</td>
<td>$183</td>
<td>$117</td>
</tr>
<tr>
<td>2</td>
<td>$95</td>
<td>$54</td>
</tr>
<tr>
<td>3</td>
<td>$67</td>
<td>$34</td>
</tr>
<tr>
<td>4</td>
<td>$33</td>
<td>$22</td>
</tr>
<tr>
<td>5</td>
<td>$9</td>
<td>$5</td>
</tr>
</tbody>
</table>

Benefits of Reliability Improvement in the Intelligent Grid

The annual benefits of reliability improvement under the Intelligent Grid Design are shown in Figure 8, sorted from high to low.
IV. Cost Analysis of Alternatives Evaluated

The second major track of analysis in the study is accounting for the cost of the devices deployed, their installation costs, and their operating and maintenance (O&M) costs. This part of the analysis is quite conventional in a regulated-utility context, in that capital expenditures give rise to revenue requirements that recover the investment costs over time.

An important aspect of revenue requirement calculations is the asset depreciation class, which is a group of assets with similar useful life characteristics. The asset class determines the depreciation rate and the tax-depreciation rate. (Asset class and depreciation rates for this study were provided by CEHE). Of course, the depreciation rate determines how many years the revenue requirement stream extends for any investment. The depreciation classes for the types of assets considered in this cost/benefit analysis all extend well beyond the ten year capital investment period, so it is important that cost recovery extends beyond the end of the period. However, the benefits of reliability improvement should be steady over time as long as the assets are operable, while revenue requirements related to capital investments decline over time.
The revenue requirement calculations used in this study are typical of the type used in any high-level analysis. While they account for income taxes, tax depreciation, and debt/equity financing typical of CEHE's data, they are calculated annually and most likely don't include all of the intricacies of CEHE's own rate base calculations. Nevertheless, the revenue requirement calculation follows accelerated depreciation schedules for tax purposes, and the accumulated deferred income taxes partially displace both debt and equity financing gradually during the tax-depreciation period, then declining to zero at the end of the asset life.

O&M expenses associated with the new devices and systems were included in the analysis, but the amounts were not the result of any detailed analysis. Rather, they were simply assumed to 2% of the capital invested each year. These expenses were then escalated at inflation over the study period.

Device and Substation Costs

Device costs are shown in Table 5. Not surprisingly, higher voltage (35kV) IGSD devices are more costly than those used on lower voltage (12kV) circuits. The number of devices varies by project, with the numbers in the Intelligent Grid Design scenario defined specifically by the blueprint for each substation. The number of IGSDs installed in the Automation Base Case scenario, on the other hand, is determined by rule: circuit upgrades done for reliability purposes receive two IGSDs, while those one for protection receive only one ISGD. Each installed IGSD requires the associated communications infrastructure.

<table>
<thead>
<tr>
<th>Circuit Voltage</th>
<th>Costs per Device ($2013)</th>
<th>Annual O&amp;M (% of Initial Capital)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IGSD</td>
<td>Radio</td>
</tr>
<tr>
<td>12kV</td>
<td>$31,000</td>
<td>$8,200</td>
</tr>
<tr>
<td>35kV</td>
<td>$43,000</td>
<td>$8,200</td>
</tr>
</tbody>
</table>

Results of the Automation Base Case Scenario

As previously indicated, the Automation Base Case is not a pre-specified plan, but rather is a reflection of historical practice with respect to installing devices designed to improve reliability. However, because the devices are installed in isolation, and not part of an automatic reconfiguring of the system at the substation level, their impact on reliability is limited. The results reported here are representative of the historical
patterns experienced by CEHE and projected forward assuming generic feeders are selected from the five SAIDI groups, which is fairly representative of current deployment practice.

Table 6 – Projects in the Automation Base Case by SAIDI Group and Voltage Level

<table>
<thead>
<tr>
<th>SAIDI Group</th>
<th>12 kV Circuits</th>
<th>35 kV Circuits</th>
<th>Total Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>41</td>
<td>86</td>
<td>127</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>58</td>
<td>89</td>
</tr>
<tr>
<td>3</td>
<td>23</td>
<td>22</td>
<td>45</td>
</tr>
<tr>
<td>4</td>
<td>26</td>
<td>3</td>
<td>29</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>TOTAL</td>
<td>135</td>
<td>169</td>
<td>304</td>
</tr>
</tbody>
</table>

For the Automation Base Case scenario evaluated in this study, the number of projects and device installs, their voltage levels, and the reasons for the install (e.g., protection or reliability) are given in Table 6 and Table 7. A “project” may consist of either one device (for protection) or two (for reliability). Again, the schedule of projects by reason and voltage level is intended to be representative of CEHE’s historical practice, but not specific to given circuits.
Table 7 — ISGD Devices Installed per Year, by Voltage and Reason for Upgrade (i.e., Reliability or Protection) in the Automation Base Case

<table>
<thead>
<tr>
<th>Year</th>
<th>Protection 12kV</th>
<th>Protection 35kV</th>
<th>Protection Total</th>
<th>Reliability 12kV</th>
<th>Reliability 35kV</th>
<th>Reliability Total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>5</td>
<td></td>
<td>5</td>
<td>2</td>
<td></td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>2015</td>
<td>11</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td>18</td>
<td>20</td>
<td>32</td>
</tr>
<tr>
<td>2016</td>
<td>1</td>
<td></td>
<td>1</td>
<td>6</td>
<td>26</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>2017</td>
<td>6</td>
<td></td>
<td>6</td>
<td>6</td>
<td>22</td>
<td>28</td>
<td>34</td>
</tr>
<tr>
<td>2018</td>
<td>8</td>
<td></td>
<td>8</td>
<td>2</td>
<td>22</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>2019</td>
<td>1</td>
<td></td>
<td>1</td>
<td>2</td>
<td>30</td>
<td>32</td>
<td>33</td>
</tr>
<tr>
<td>2020</td>
<td>10</td>
<td></td>
<td>10</td>
<td>4</td>
<td>20</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>2021</td>
<td>10</td>
<td>1</td>
<td>11</td>
<td>6</td>
<td>16</td>
<td>22</td>
<td>33</td>
</tr>
<tr>
<td>2022</td>
<td>8</td>
<td></td>
<td>9</td>
<td>2</td>
<td>22</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>2023</td>
<td>5</td>
<td></td>
<td>5</td>
<td>6</td>
<td>22</td>
<td>28</td>
<td>33</td>
</tr>
<tr>
<td>2024</td>
<td>8</td>
<td>1</td>
<td>9</td>
<td>4</td>
<td>20</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>2025</td>
<td>9</td>
<td>2</td>
<td>11</td>
<td>4</td>
<td>18</td>
<td>22</td>
<td>33</td>
</tr>
<tr>
<td>2026</td>
<td>7</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>16</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>2027</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>4</td>
<td>20</td>
<td>24</td>
<td>32</td>
</tr>
<tr>
<td>2028</td>
<td>9</td>
<td></td>
<td>9</td>
<td>2</td>
<td>22</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>105</td>
<td>9</td>
<td>114</td>
<td>60</td>
<td>320</td>
<td>380</td>
<td>494</td>
</tr>
</tbody>
</table>

The stream of capital expenditures associated with the Automation Base Case is shown in Table 8. IGSD devices are kept separate from the communications costs because they are in a different asset depreciation class. With respect to O&M costs, the base amount is assumed to be 2% of device costs added in the year shown. For example, in the year 2014, total device costs are $1,674,000 (i.e., the sum of the IGSD and radio costs). In this instance, O&M costs would be 2% of $1,674,000 or $33,000. These numbers are accumulated over time in the revenue requirement calculations, shown in Table 9. Similarly, the reliability improvement savings are associated with the devices installed in the year shown and are assumed to continue over time.
Table 8 – 15-Year Capital, O&M Costs and Annual Contributions to Reliability Improvement Savings in the Automation Base Case ($000)

<table>
<thead>
<tr>
<th>Year</th>
<th>IGSD Cost</th>
<th>Radio Cost</th>
<th>O&amp;M Cost</th>
<th>SAIDI Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>$1,392</td>
<td>$282</td>
<td>$33</td>
<td>$5,423</td>
</tr>
<tr>
<td>2015</td>
<td>$1,298</td>
<td>$279</td>
<td>$32</td>
<td>$4,569</td>
</tr>
<tr>
<td>2016</td>
<td>$1,451</td>
<td>$294</td>
<td>$35</td>
<td>$6,232</td>
</tr>
<tr>
<td>2017</td>
<td>$1,462</td>
<td>$309</td>
<td>$35</td>
<td>$4,982</td>
</tr>
<tr>
<td>2018</td>
<td>$1,423</td>
<td>$297</td>
<td>$34</td>
<td>$5,307</td>
</tr>
<tr>
<td>2019</td>
<td>$1,600</td>
<td>$313</td>
<td>$38</td>
<td>$5,312</td>
</tr>
<tr>
<td>2020</td>
<td>$1,528</td>
<td>$329</td>
<td>$37</td>
<td>$4,904</td>
</tr>
<tr>
<td>2021</td>
<td>$1,479</td>
<td>$326</td>
<td>$36</td>
<td>$4,486</td>
</tr>
<tr>
<td>2022</td>
<td>$1,599</td>
<td>$333</td>
<td>$39</td>
<td>$5,553</td>
</tr>
<tr>
<td>2023</td>
<td>$1,618</td>
<td>$340</td>
<td>$39</td>
<td>$5,538</td>
</tr>
<tr>
<td>2024</td>
<td>$1,636</td>
<td>$347</td>
<td>$40</td>
<td>$5,586</td>
</tr>
<tr>
<td>2025</td>
<td>$1,655</td>
<td>$355</td>
<td>$40</td>
<td>$5,769</td>
</tr>
<tr>
<td>2026</td>
<td>$1,657</td>
<td>$362</td>
<td>$40</td>
<td>$5,157</td>
</tr>
<tr>
<td>2027</td>
<td>$1,699</td>
<td>$358</td>
<td>$41</td>
<td>$5,799</td>
</tr>
<tr>
<td>2028</td>
<td>$1,795</td>
<td>$377</td>
<td>$43</td>
<td>$5,190</td>
</tr>
</tbody>
</table>

For references purposes, a summation of the capital costs as well as the SAIDI savings is shown in Table 9. Over the 15-year period (2014 – 2028), investment in the Automation Base Case totals about $28 million. Of course, the revenue requirements associated with these investments would build more slowly than the capital itself. As shown in the table, both the O&M expenses and interruption savings (i.e., reliability improvement savings) accumulate over time, but the stream of benefits is delayed one year under the assumption that the benefits won’t begin accruing until the first full year after the devices are installed.
Table 9 – 15-Year Capital Costs, Revenue Requirements, and Interruption Savings in the Automation Base Case ($000)

<table>
<thead>
<tr>
<th>Year</th>
<th>Capital Cost Summary</th>
<th>Revenue Requirements</th>
<th>Interruption Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Capital</td>
<td>Ownership Costs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>IGSD</td>
<td>Radio</td>
</tr>
<tr>
<td>2014</td>
<td>$ 1,674</td>
<td>$ 181</td>
<td>$ 40</td>
</tr>
<tr>
<td>2015</td>
<td>$ 1,578</td>
<td>$ 345</td>
<td>$ 78</td>
</tr>
<tr>
<td>2016</td>
<td>$ 1,745</td>
<td>$ 523</td>
<td>$ 115</td>
</tr>
<tr>
<td>2017</td>
<td>$ 1,772</td>
<td>$ 696</td>
<td>$ 151</td>
</tr>
<tr>
<td>2018</td>
<td>$ 1,720</td>
<td>$ 859</td>
<td>$ 183</td>
</tr>
<tr>
<td>2019</td>
<td>$ 1,913</td>
<td>$ 1,038</td>
<td>$ 216</td>
</tr>
<tr>
<td>2020</td>
<td>$ 1,857</td>
<td>$ 1,203</td>
<td>$ 249</td>
</tr>
<tr>
<td>2021</td>
<td>$ 1,806</td>
<td>$ 1,355</td>
<td>$ 279</td>
</tr>
<tr>
<td>2022</td>
<td>$ 1,932</td>
<td>$ 1,518</td>
<td>$ 309</td>
</tr>
<tr>
<td>2023</td>
<td>$ 1,958</td>
<td>$ 1,677</td>
<td>$ 339</td>
</tr>
<tr>
<td>2024</td>
<td>$ 1,983</td>
<td>$ 1,833</td>
<td>$ 369</td>
</tr>
<tr>
<td>2025</td>
<td>$ 2,009</td>
<td>$ 1,986</td>
<td>$ 398</td>
</tr>
<tr>
<td>2026</td>
<td>$ 2,019</td>
<td>$ 2,133</td>
<td>$ 427</td>
</tr>
<tr>
<td>2027</td>
<td>$ 2,057</td>
<td>$ 2,280</td>
<td>$ 455</td>
</tr>
<tr>
<td>2028</td>
<td>$ 2,172</td>
<td>$ 2,434</td>
<td>$ 484</td>
</tr>
</tbody>
</table>

The 15-year present-value summary for the Automation Base Case is shown in Table 10. The revenue requirements associated with the investments are clearly overwhelmed by the interruption savings from reliability improvement. Although the full cost of the $28 million investment is not recovered during the 15-year evaluation period, the annual benefits outweigh annual costs throughout the period. In fact, the reliability benefits are so large, the benefits would still outweigh costs on an annual basis even if they were smaller by an order of magnitude (i.e., divided by 10).

The Automation Base Case shows substantial benefit from moderate reliability improvement despite the slower pace of upgrades that are neither as sophisticated nor as effective (in reliability improvement) as in the Intelligent Grid. The Intelligent Grid Design, which applies state-of-the-art distribution automation at a much faster pace, will increase and accelerate the reliability improvement benefits seen here, but naturally will be more costly.
Table 10 – 15-Year Present Value Summary (2014 – 2028) in the Automation Base Case ($000)

<table>
<thead>
<tr>
<th>Components</th>
<th>2014 Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Reliability Savings (from ICE Model)</td>
<td>$ 295,482</td>
</tr>
<tr>
<td>Less PV of Ownership Revenue Requirements</td>
<td>$ 13,355</td>
</tr>
<tr>
<td>Less PV of O&amp;M Expenses</td>
<td>$ 2,564</td>
</tr>
<tr>
<td>Net Customer Surplus</td>
<td>$ 279,562</td>
</tr>
</tbody>
</table>

Results of the Intelligent Grid Design Scenario

As shown in Table 11, CEHE's Intelligent Grid Design embodies a much faster pace of capital investment in reliability improvements than the Company's historical practice. For example, the Intelligent Grid Design scenario reflects upgrading approximately 20 substations per year, plus more than 120 circuits and 370 IGSDs per year (compared with a pace of about 30 devices per year in the Automation Base Case). Moreover, these upgrades add new capabilities at each substation, and provide automatic circuit reconfiguration capabilities that further reduce interruption durations, as well as frequency of sustained interruptions.

Table 11 – Summary of Devices Added in the Intelligent Grid Design

<table>
<thead>
<tr>
<th>Year</th>
<th>Substations</th>
<th>Circuits</th>
<th>IGSDs</th>
<th>Auto Devices</th>
<th>New CPU Panels</th>
<th>New RTUs Substations</th>
<th>Transformer Monitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>18</td>
<td>111</td>
<td>372</td>
<td>179</td>
<td>18</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>2017</td>
<td>19</td>
<td>116</td>
<td>384</td>
<td>106</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2018</td>
<td>19</td>
<td>114</td>
<td>383</td>
<td>90</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>2019</td>
<td>17</td>
<td>123</td>
<td>361</td>
<td>32</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>2020</td>
<td>17</td>
<td>132</td>
<td>376</td>
<td>34</td>
<td>17</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>2021</td>
<td>16</td>
<td>125</td>
<td>376</td>
<td>51</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2022</td>
<td>17</td>
<td>133</td>
<td>385</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>2023</td>
<td>22</td>
<td>120</td>
<td>348</td>
<td>39</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>2024</td>
<td>21</td>
<td>128</td>
<td>387</td>
<td>30</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>2025</td>
<td>19</td>
<td>129</td>
<td>357</td>
<td>19</td>
<td>19</td>
<td>19</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>1,231</td>
<td>3,708</td>
<td>596</td>
<td>184</td>
<td>184</td>
<td>184</td>
</tr>
</tbody>
</table>
Table 12 provides the estimated capital expenditures for CEHE’s 10-year intelligent grid plan, which totals approximately $300 million. O&M is added on the same basis as in the Automation Base Case, with a base amount being added to every device, and then escalated forward in time. Interruption savings are accumulated similarly, that is, they are assumed to recur in every year from the year after the upgrade. Miles saved are based on a simple assumption of one fewer truck roll per event. The numbers of events are, in turn, derived from the implied estimates of SAIFI. In reality, there are likely more events than this simplistic determination would imply but nevertheless serves as a reasonable proxy.

Table 12 – 10-Year Capital, O&M Costs and Annual Contributions to Interruption Savings in the Intelligent Grid Design

<table>
<thead>
<tr>
<th>Year</th>
<th>Capital (000)</th>
<th>O&amp;M (000)</th>
<th>Annual</th>
<th>Cumulative</th>
<th>Interruption Savings</th>
<th>Truck Miles Saved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISGD</td>
<td>Radio</td>
<td>Substation</td>
<td></td>
<td></td>
<td>Residential</td>
</tr>
<tr>
<td>2016</td>
<td>$ 14,783</td>
<td>$ 3,247</td>
<td>$ 9,386</td>
<td>$ 548</td>
<td>$ 548</td>
<td>$ 2,217</td>
</tr>
<tr>
<td>2017</td>
<td>$ 18,132</td>
<td>$ 3,418</td>
<td>$ 9,621</td>
<td>$ 587</td>
<td>$ 1,147</td>
<td>$ 2,121</td>
</tr>
<tr>
<td>2018</td>
<td>$ 14,884</td>
<td>$ 3,500</td>
<td>$ 12,692</td>
<td>$ 618</td>
<td>$ 1,790</td>
<td>$ 1,606</td>
</tr>
<tr>
<td>2019</td>
<td>$ 13,789</td>
<td>$ 3,357</td>
<td>$ 11,048</td>
<td>$ 554</td>
<td>$ 2,391</td>
<td>$ 902</td>
</tr>
<tr>
<td>2020</td>
<td>$ 14,382</td>
<td>$ 3,085</td>
<td>$ 11,260</td>
<td>$ 564</td>
<td>$ 3,025</td>
<td>$ 661</td>
</tr>
<tr>
<td>2021</td>
<td>$ 15,334</td>
<td>$ 3,637</td>
<td>$ 11,670</td>
<td>$ 613</td>
<td>$ 3,702</td>
<td>$ 844</td>
</tr>
<tr>
<td>2022</td>
<td>$ 15,179</td>
<td>$ 3,809</td>
<td>$ 10,265</td>
<td>$ 585</td>
<td>$ 4,364</td>
<td>$ 1,069</td>
</tr>
<tr>
<td>2023</td>
<td>$ 14,175</td>
<td>$ 3,500</td>
<td>$ 13,110</td>
<td>$ 616</td>
<td>$ 5,072</td>
<td>$ 675</td>
</tr>
<tr>
<td>2024</td>
<td>$ 16,758</td>
<td>$ 3,987</td>
<td>$ 12,502</td>
<td>$ 685</td>
<td>$ 5,843</td>
<td>$ 1,548</td>
</tr>
<tr>
<td>2025</td>
<td>$ 14,318</td>
<td>$ 3,756</td>
<td>$ 13,390</td>
<td>$ 629</td>
<td>$ 6,586</td>
<td>$ 1,403</td>
</tr>
</tbody>
</table>

The 15-year revenue requirements associated with the Intelligent Grid Design are shown in Table 13. Although direct capital investment ends in 2025, the ownership revenue requirements continue through 2030 and O&M costs continue to escalate with inflation. The interruption savings continue as well, but these are not being inflated, so their real value is falling in time.
Table 13 – 15-Year Revenue Requirements and Annual Savings in the Intelligent Grid Design ($000)

<table>
<thead>
<tr>
<th>Year</th>
<th>IGSDs</th>
<th>Radio</th>
<th>Substation</th>
<th>O&amp;M</th>
<th>Total</th>
<th>Interruption</th>
<th>Truck Miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>$1,920</td>
<td>$466</td>
<td>$1,134</td>
<td>$548</td>
<td>$4,068</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>2017</td>
<td>$3,967</td>
<td>$930</td>
<td>$2,295</td>
<td>$1,147</td>
<td>$8,339</td>
<td>$48,793</td>
<td>$13</td>
</tr>
<tr>
<td>2018</td>
<td>$5,782</td>
<td>$1,338</td>
<td>$3,766</td>
<td>$1,790</td>
<td>$12,676</td>
<td>111,614</td>
<td>$27</td>
</tr>
<tr>
<td>2019</td>
<td>$7,389</td>
<td>$1,725</td>
<td>$4,995</td>
<td>$2,391</td>
<td>$16,499</td>
<td>163,714</td>
<td>$34</td>
</tr>
<tr>
<td>2020</td>
<td>$9,016</td>
<td>$2,117</td>
<td>$6,207</td>
<td>$3,025</td>
<td>$20,365</td>
<td>199,832</td>
<td>$42</td>
</tr>
<tr>
<td>2021</td>
<td>$10,712</td>
<td>$2,497</td>
<td>$7,432</td>
<td>$3,702</td>
<td>$24,342</td>
<td>223,602</td>
<td>$49</td>
</tr>
<tr>
<td>2022</td>
<td>$12,330</td>
<td>$2,879</td>
<td>$8,450</td>
<td>$4,364</td>
<td>$28,023</td>
<td>258,032</td>
<td>$56</td>
</tr>
<tr>
<td>2023</td>
<td>$13,763</td>
<td>$3,194</td>
<td>$9,779</td>
<td>$5,072</td>
<td>$31,807</td>
<td>291,533</td>
<td>$61</td>
</tr>
<tr>
<td>2024</td>
<td>$15,481</td>
<td>$3,560</td>
<td>$10,998</td>
<td>$5,843</td>
<td>$35,883</td>
<td>323,205</td>
<td>$70</td>
</tr>
<tr>
<td>2025</td>
<td>$16,825</td>
<td>$3,881</td>
<td>$12,287</td>
<td>$6,596</td>
<td>$39,589</td>
<td>371,171</td>
<td>$75</td>
</tr>
<tr>
<td>2026</td>
<td>$16,257</td>
<td>$3,650</td>
<td>$11,919</td>
<td>$6,734</td>
<td>$38,561</td>
<td>407,980</td>
<td>$83</td>
</tr>
<tr>
<td>2027</td>
<td>$15,687</td>
<td>$3,437</td>
<td>$11,546</td>
<td>$6,876</td>
<td>$37,546</td>
<td>407,980</td>
<td>$83</td>
</tr>
<tr>
<td>2028</td>
<td>$15,132</td>
<td>$3,257</td>
<td>$11,184</td>
<td>$7,020</td>
<td>$36,593</td>
<td>407,980</td>
<td>$83</td>
</tr>
<tr>
<td>2029</td>
<td>$14,588</td>
<td>$3,100</td>
<td>$10,833</td>
<td>$7,167</td>
<td>$35,689</td>
<td>407,980</td>
<td>$83</td>
</tr>
<tr>
<td>2030</td>
<td>$14,054</td>
<td>$2,960</td>
<td>$10,489</td>
<td>$7,318</td>
<td>$34,821</td>
<td>407,980</td>
<td>$83</td>
</tr>
</tbody>
</table>

Present Value $100,112 $22,786 $70,589 $38,756 $232,194 $2,241,763 $473

The 15-year present-value summary results for the Intelligent Grid Design, shown in Table 14, reveal that the reliability benefits significantly outweigh the costs of the investments and are more than six times the level of benefits shown in the Automation Base Case.

Table 14 – 15-Year Present Value Summary (2016 – 2030) in the Intelligent Grid Design ($000)

<table>
<thead>
<tr>
<th>Components</th>
<th>2014 Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Reliability Savings (from ICE Model)</td>
<td>$1,958,456</td>
</tr>
<tr>
<td>Less PV of Ownership Revenue Requirements</td>
<td>$168,956</td>
</tr>
<tr>
<td>Less PV of O&amp;M Expenses</td>
<td>$33,438</td>
</tr>
<tr>
<td>Net Customer Surplus</td>
<td>$1,756,062</td>
</tr>
</tbody>
</table>
V. Conclusions

For some time CEHE has been investing in technologies that provide reliability benefits to customers and furtherance of its practice would continue to provide net benefits for many years. However, advanced, intelligent grid technologies are available today that provide much greater reliability benefits. This analysis shows that customer savings from reduced interruptions clearly outweigh the cost of these investments in intelligent remote control, automation, and sensing equipment.

The study evaluated two scenarios based on different deployment schedules: A business-as-usual Automation Base Case and a pre-planned Intelligent Grid Design, which characterizes CEHE’s 10-year plan to deploy distribution automation equipment across its Houston-based service territory. Through the use of a Department of Energy supplied tool (i.e., the Interruption Cost Calculator) for estimating the value of reliability improvement, the customer benefits from reliability improvements are shown to outweigh the costs in either case, although the benefits offered by the intelligent grid design are more than six times greater than simply following historical deployment patterns.
VI. Appendix

The Interruption Cost Estimation Calculator (ICE)

Use the ICE Calculator to:
- Estimate Interruption Costs
  Estimate the cost per interruption event per average kW per unserved kWh and the total cost of sustained electric power interruptions
- Estimate Value of Reliability improvement in a Static Environment
  Estimate the value associated with a given reliability improvement. The environment is "static" because the expected reliability with and without the improvement does not change over time.
- Estimate Value of Reliability improvement in a Dynamic Environment
  Estimate the value associated with a given reliability improvement. The environment is "dynamic" because the expected reliability with and without the improvement changes over time based on forecasts of SAIFI, SAIDI and CAIDI

Figure A9 - Home page for the ICE Calculator.
THERE ARE NO WORKPAPERS TO THE DIRECT TESTIMONY OF SHACHELLA D. JAMES
DIRECT TESTIMONY

OF

REBECCA DEMARR

ON BEHALF OF

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

April 2019
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EXECUTIVE SUMMARY OF REBECCA DEMARR

The Customer Operations organization supports the electric utility service offered by CenterPoint Energy Houston Electric, LLC ("CenterPoint Houston" or the "Company"). The Customer Operations organization is responsible for providing support services to Competitive Retailers and end-use retail electric customers to whom the Company delivers electricity. To deliver and ensure positive customer experiences and maintain operational efficiency, the Customer Operations organization oversees many end-user touch points. This customer-focused structure aligns responsibilities under centralized leadership assuring training, performance management, contact center operations, customer account support, quality assurance, credit, claims, marketing communications, marketing strategy, energy solutions and vendor management activities are consistently meeting the needs of customers and retailers in an affordable and efficient manner.

My testimony:

- describes the Customer Operations organization and its responsibilities;
- outlines the cost controls that are in place to monitor Customer Services’ activities while delivering superior service;
- demonstrates that exceptional customer service is being provided; and
- defines how Customer Operations cost allocations are made to ensure only expenses related to CenterPoint Houston’s electric operations are included in this filing.

My testimony demonstrates that the affiliate costs for Customer Operations are reasonable and necessary. As explained in the direct testimony of Company witness Michelle M. Townsend, these costs are not priced higher to CenterPoint Houston than the prices charged for the same services to other affiliates. My testimony also supports the costs directly incurred by CenterPoint Houston. Thus, Customer Operations costs should be fully recovered in CenterPoint Houston’s rates.
I. INTRODUCTION

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Rebecca Demarr. I am the Division Vice President of Customer Services for CenterPoint Energy Service Company, LLC (“Service Company”). My business address is 1111 Louisiana St., Houston, Texas 77002.

Q. WHAT IS YOUR EDUCATIONAL BACKGROUND, PROFESSIONAL QUALIFICATIONS, AND PREVIOUS WORK EXPERIENCE?

A. I graduated from DePaul University with a bachelor’s degree in finance. In 2002, I earned a master’s degree from Keller Graduate School of Management in business administration. I began my career with CenterPoint Energy, Inc. (“CNP”) in 1998 in Chicago, Illinois as the Managing Director of Operations. Following that, I held multiple positions in the competitive businesses division. In 2008, I was relocated to Houston where I filled the role of Marketing Director, and in 2018, I was promoted to Vice President of CenterPoint Energy Services Marketing and Business Development. In 2019, I became Vice President of Customer Services and that is my current position.

Q. WHAT ARE YOUR CURRENT RESPONSIBILITIES?

A. As Division Vice President of Customer Services, my responsibilities include overseeing contact center operations, credit operations, billing and receivable operations and customer account support operations. I oversee Customer Services for the entire CNP electric service area, which covers 5,000 square miles and delivers electricity to over 2.5 million meters.
Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS PROCEEDING?

A. I am testifying on behalf of CenterPoint Energy Houston Electric, LLC ("CenterPoint Houston" or the "Company").

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to describe the functions and organizational structure of Customer Operations and the affiliate services each department provided to CenterPoint Houston during the 2018 test year. I will explain how the unadjusted affiliate costs, which total approximately $20.1 million for Customer Operations are charged to CenterPoint Houston, and that the costs for these services were reasonable and necessary and charged at rates no higher than those charged to other CNP business units for the same services. Company witness Michelle M. Townsend addresses any necessary test year adjustments to Customer Operations costs. In addition, I support approximately $2.8 million of unadjusted expenses incurred directly by CenterPoint Houston related to the Energy Solutions group. Company witness Kristie L. Colvin addresses any necessary test year adjustments to the direct costs.

Q. DO YOU SPONSOR ANY SCHEDULES IN THIS RATE FILING PACKAGE?

A. Yes, I co-sponsor Schedule L with Ms. Colvin. In addition, I co-sponsor, with Ms. Townsend, Schedules V-K-7 and V-K-12, as they relate to Customer Operations costs.
Q. HOW DOES YOUR TESTIMONY RELATE TO THE TESTIMONY OF OTHER WITNESSES?

A. The parts of my testimony that relate to planning, budgeting and the assignment of affiliate costs to CenterPoint Houston support and supplement the testimony of Ms. Townsend, who testifies about the overall role and benefits of having a service company, of which I am a part, including the budgeting and allocation methodologies for Service Company affiliate costs charged to CenterPoint Houston.

II. OVERVIEW OF CUSTOMER OPERATIONS ORGANIZATION

Q. WHAT IS THE CURRENT ORGANIZATIONAL STRUCTURE OF CUSTOMER OPERATIONS?

A. The Customer Operations organization is a part of the Service Company, which is an affiliate of CenterPoint Houston that provides administrative and operational support services. The eight functional departments within the Customer Operations organization are:

- Chief Customer Officer
- Customer Services
- Customer Operations Planning & Analytics
- Energy Solutions (Sales and Energy Efficiency)
- Marketing Communications
- Marketing Strategy and Support
- Corporate Claims & Third-Party Damages
- Home Service Plus ("HSP") – A retail competitive service specific to our Minnesota Service area with no charges to CenterPoint Houston.
Q. WHAT CHANGES HAVE BEEN MADE TO THE CUSTOMER OPERATIONS ORGANIZATIONAL STRUCTURE SINCE THE LAST CENTERPOINT HOUSTON RATE CASE?

A. The Customer Operations organization now reports directly to the Chief Customer Officer. This structure, put in place in 2015, aligns multiple business units with customer touchpoints under a common leader and assures the implementation of a customer-centric vision and strategy. This centralized reporting allows for efficiencies in technology, planning, project implementation and customer life cycle maintenance. In addition, the centralization of marketing communication efforts and energy solution offerings ensures consistent offerings and opportunities are presented to customers. This effort has enhanced operational effectiveness and improved service to Competitive Retailers (“CR”) and end-use retail customers.

Q. WHAT SERVICES DOES CUSTOMER OPERATIONS PROVIDE TO CENTERPOINT HOUSTON?

A. Customer Operations is responsible for providing support services to CR and end-use retail electric customers to whom CenterPoint Houston delivers electricity. The services provided are needed to support CenterPoint Houston’s role in the retail electric market, and absent this combined Customer Operations group’s timely and accurate processing of transactions, retail market functions and customers’ services would be at risk. The Customer Operations activities outlined in this testimony are essential to the provision of electric utility service.
Q. WHAT TECHNOLOGY DOES CUSTOMER OPERATIONS USE TO PROVIDE CONSISTENT QUALITY SERVICE?

A. Customer Operations has invested heavily in technology to build the customer experience and manage organizational size and structure. These efforts began with the 2015 introduction of our Customer Vision Platform ("CVP") and have continued with the unification of our contact centers. The CVP has consolidated customer information and introduced predictive analytics which can be used to proactively assist the customer. The CVP is expandable and capable of supporting the decommissioning of our older technology platforms. The unification of Customer Operations contact centers has assured our resources are and remain right-sized.

Q. DID THIS INVESTMENT IN TECHNOLOGY ASSIST CUSTOMERS DURING HURRICANE HARVEY?

A. Yes, during Hurricane Harvey, the Customer Operations organization relied heavily on technology to support unprecedented call volumes which were 342% above normal operations. These volumes were handled within an average response time of 92 seconds and received an overall customer satisfaction score of 3.77 on a 5-point scale. In addition, investments in Interactive Voice Response ("IVR") technology that provided restoration times, status updates and Power Alert Service preference management. The technical investments made in the Power Alert Service allowed over 352,629 messages to be delivered during Hurricane Harvey, assuring our customers were safe and well informed of the restoration efforts that were taking place. During Hurricane Harvey, the ability to seamlessly route calls
amongst multiple contact centers reduced prior dependencies and cost associated
with third-party call support. This enhanced technology, resource alignment and
call routing flexibility assured that we could efficiently respond to customers while
simultaneously addressing local employees’ commuting challenges.

Q. WHAT ACTIONS DOES CUSTOMER OPERATIONS TAKE TO ENSURE
THAT IT PROVIDES QUALITY CUSTOMER CARE?

A. The Customer Operations organization has both internal and external controls and
measures in place to ensure quality customer care is being provided. One of these
measures employs post-call surveying to capture customer sentiment about their
experiences with Customer Service agents and our IVR system. In 2018, surveys
of over 34,500 callers were conducted, yielding an overall satisfaction score of 3.96
out of 5. Of those surveyed, 70% of customers indicate that they were either
satisfied or extremely satisfied with the service they received. Additionally,
surveys were conducted with customers who receive phone, text message, or e-mail
alerts via our Power Alert Service. In 2018, over 15,000 Power Alert Service
customers were surveyed resulting in a 91% customer satisfaction and an overall
satisfaction score of 4.54 out of 5. These quality measures are in addition to internal
audits that help analyze business processes, procedures, and activities. The internal
audits monitor and assess the adequacy and effectiveness of the Company’s
operational, financial, information systems, and administrative controls and
recommend solutions that allow the organization to better achieve its objectives.
Q. WHAT DOES THE CUSTOMER OPERATIONS ORGANIZATION DO TO
BUDGET, MONITOR AND CONTROL COSTS?

A. An important part of the Customer Operations organization’s cost control efforts involves the preparation of a budget. Customer Operations has also integrated its Planning & Analytics team within the organization. This team provides financial support and modeling that is heavily leveraged throughout the year. The Customer Operations budget is monitored and managed on a monthly basis, and variances are investigated against historical call volume trends, current retail market activity, planned changes and other key drivers. The Customer Operations Planning & Analytics team facilitates monthly projections and changes to the budget allowing system-wide cost control and timely responsiveness.

Q. DO ANY EMPLOYEES WITHIN THE CUSTOMER OPERATIONS ORGANIZATION PROVIDE SERVICES FOR CNP BUSINESS UNITS OTHER THAN CENTERPOINT HOUSTON?

A. Yes. The Customer Operations organization provides services to both CenterPoint Houston and its affiliates.

Q. WHAT ACTIONS DOES THE SERVICE COMPANY TAKE TO ENSURE THE PROPER ASSIGNMENT OF CUSTOMER OPERATIONS ORGANIZATION COSTS TO CENTERPOINT HOUSTON?

A. Extensive efforts are taken to assure proper cost allocations are in place and a regular review of the allocation methodology is conducted. As discussed by Ms. Townsend, the Service Company assigns costs to CenterPoint Houston via two methods:
(1) Direct-billed; or
(2) Allocated costs.

Costs are direct-billed when Customer Operations personnel determine that the cost
is directly related to CenterPoint Houston services or operations. For example, the
marketing expense of Power Alert Services is direct-billed to CenterPoint Houston.
An example of allocated costs includes the call minutes handled by Customer
Service Representatives. Call Minutes are allocated based on the duration of the
call. The total monthly electric minutes are then used to allocate Customer Services
costs to CenterPoint Houston on a monthly basis. Ms. Townsend supports the
affiliate costs charged to CenterPoint Houston and describes the overall affiliate
services provided to CenterPoint Houston.

Q. WERE CUSTOMER OPERATIONS SERVICE COST ALLOCATIONS
   UPDATED IN 2018?

A Yes, as previously noted, the Customer Operations Planning & Analytics group is
responsible for managing and reviewing the Customer Operations budget. As part
of this group’s regular review, following formation of the Customer Operations
organization and additional investments in technology, cost of service expenses
were updated. These changes were made to identify and reflect all expenses
incurred by the entire Customer Operations organization and allocate those
expenses that were for the benefit of CenterPoint Houston.
Q. PLEASE EXPLAIN HOW THE COMPANY MEASURES THE SUCCESS AND THE OVERALL SATISFACTION WITH THE CUSTOMER OPERATIONS ORGANIZATION.

A. CenterPoint Houston has received broad industry recognition for our advancements in outage responsiveness, social media support, IVR and self-service offerings and technical deployments. This recognition includes:

- Chartwell 2018 Gold Award – Outage Communications
- American Customer Satisfaction Index 2018 (Based on 2017 ACSI Energy Utility Sector Study) – #1 in Energy Utility Sector in the following variables:
  - #1 in Customer Satisfaction
  - #1 In Perceived Value
  - #1 in Customer Retention
  - Sector Leader in Customer Loyalty
  - Sector Leader in Perceived Overall Quality
  - #1 in Efforts to Support Green Programs
  - #1 in Customers’ trust of the utility
- Utility Trusted Brand and Customer Engagement Study: TX TDSP, a Cogent Energy Report by Market Strategies International
- Frost & Sullivan Excellence in Resourcefulness Best Practice Award – for Smart Grid, 2016
- Site Selection Magazine Top Utility – for economic development, 2016
- International Smart Grid Action Network – Award of Excellence – for Grid Reliability, 2016
- Global Smart Grid Federation – Smart Grid Project of the Year – 2016
- EPRI Power Delivery and Utilization Technology Transfer Award – 2016
• AESP Energy Awards – Pricing & Demand Response Award Residential Demand Response from CenterPoint Energy Houston Electric, 2016

• POWERGRID International – Project of the Year – for grid optimization, 2016

• SEE Industry Excellence Award – Cable Life Extension Program, 2016

• 2016 Silver Stevie Award for Sales and Customer Service – Natural Language IVR automated system

• Edison Electric Institute’s Emergency Recovery and Emergency Assistance Awards for May 2017 storm recovery in Sealy, TX, Hurricane Harvey in August 2017 and Hurricane Irma in September 2017

A. Chief Customer Officer

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE CHIEF CUSTOMER OFFICER?

A. The Chief Customer Officer provides executive oversight of the organization which is necessary to ensure that the Customer Operations organizational units operate in an efficient and cost-effective manner. This centralized structure allows CenterPoint Houston to leverage resources across multiple business units, thereby giving the business units access to specialized skills and resources in an efficient and cost-effective manner.

B. Customer Services Group

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE CUSTOMER SERVICES DEPARTMENT?

A. The Customer Services department is comprised of the following functional areas: Contact Center Operations; Performance Management & Strategy; Credit Collections; and Customer Billing. Credit Collections and Customer Billing does not provide any services to CenterPoint Houston. The services provided by Contact
Center Operations and Performance Management & Strategy are further described below.

Contact Center Operations. With respect to electric utility service function, this business unit is responsible for responding to customer and competitive retailer inquiries regarding: (1) service order status updates for the connection and disconnection of power; (2) customer usage disputes; (3) order processing for meter relocation, electric outages, and downed power lines; and (4) establishment of new service locations and creation of ESIDs. Contact Center Operations is the first point of contact for reporting system or premise emergencies. Contact Center personnel conduct research and interface with other departments to resolve customer inquiries regarding their electric utility service.

Performance Management & Strategy. This business unit includes the following customer service support teams: Call Center Workforce Management ("WFM"), Customer Service Program and Project Management, as well as Organizational Change Management. This group also serves as business owner for existing customer technologies and future technology roadmaps. WFM is responsible for call volume forecasting, financial planning, agent schedules, and real-time management for our universal call center operations. The other teams primarily lead and support ongoing process improvement initiatives across all lines of business and any associated change management activities and communications. From a technology perspective, the team administers and outlines strategic roadmaps for the call handling and routing systems, agent interaction screens, and
our inbound/outbound IVR application as well as the web customer self-service applications and CNP’s Power Alert Service.

Q. WHY DOES THE CONTACT CENTER RECEIVE CALLS FROM CR’S?
A. The calls that the Contact Center receives from CRs concern the status of service orders, permitting, ESID validations or other transaction inquiries. CR calls may also involve support needs for CenterPoint Houston’s on-line competitive retail portal or Smart Meter Texas data questions. These calls are in addition to transferred customer calls we receive from CRs.

Q. DOES CUSTOMER OPERATIONS RELY ON AUTOMATED PROCESSES TO PROVIDE CUSTOMER CARE?
A. Yes. Customer Operations has invested heavily to build both IVR and web-based automated solutions for CRs and end-use retail customers. At this time, we have built our IVR containment rates to 47%, which combined with our award-winning Power Alert Service has led to increased customer satisfaction and operating efficiencies. Additional web enhancements have also simplified how customers establish preference settings and review usage history.

Q. WHAT ARE YOUR EXPECTATIONS REGARDING FUTURE CONTACT CENTER VOLUMES?
A. Customer Operations expects overall call volumes will continue to increase as part of new meter additions, but there could be some relief afforded as self-service adoption continues to grow. Customer Operations anticipates call lengths for agent handled calls to grow as the more complex issues will still require a phone interaction.
C. Customer Operations Planning & Analytics

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE CUSTOMER OPERATIONS PLANNING & ANALYTICS GROUP?

A. The Customer Operations Planning & Analytics group is responsible for strategic and financial planning, forecasting and analytics for Customer Operations and HSP. In addition, this team has responsibility for all Customer Service Training including Solutions Based Sales Training that supports our contact centers.

Q. PLEASE DESCRIBE SOME OF THE SPECIFIC SERVICES THE CUSTOMER OPERATIONS PLANNING & ANALYTICS GROUP PROVIDED DURING THE 2018 TEST YEAR.

A. The Customer Operations Planning & Analytics team transformed reporting methodology for Customer Operations by moving from email push reports to Tableau dashboards. These dashboards provide users enhanced data visibility and deeper decision-making insight into operational metrics such as Average Handle Time, Service Levels, agent level details, etc.

D. Energy Solutions Group

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE ENERGY SOLUTIONS GROUP?

A. In addition to energy conservation work (which are not included in this case), the Energy Solutions group is also responsible for economic growth and development throughout the CenterPoint Houston service area. CenterPoint Houston’s economic development activities remain an integral part of the communities we serve as they facilitate growth, provide a stable community tax base and grow employment within our service area. The department also functions as a regional coordinator.

Direct Testimony of Rebecca Demarr
CenterPoint Energy Houston Electric, LLC

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for project leads generated through the Governor’s Office of Economic Development and Tourism. Our Economic Development team serves in more than 40 leadership roles within these local Economic Development Organizations (“EDOs”).

Q. PLEASE DESCRIBE SOME OF THE SPECIFIC SERVICES THE ENERGY SOLUTIONS GROUP PROVIDED DURING THE 2018 TEST YEAR.

A. The Energy Solutions team—in collaboration with regional partners—has engaged in economic development projects that created over 2,000 direct new jobs, more than $1.5 billion in positive annual economic impacts and produced more than $4 billion in new capital investments for the region. Including the test year, and over the past 10 years, the team has been involved in projects that have yielded nearly 30,000 direct new jobs as well as tens of thousands of indirect regional jobs.

The Energy Solutions staff is partnering with EDOs on community issues impacting future economic development, infrastructure improvements and community resiliency efforts following Hurricane Harvey. The group has been recognized through the International Economic Development Council as an Accredited Economic Development Organization (“AEDO”). CNP Customer Operations’ Energy Solutions team is one of only two utility companies in the nation to receive the AEDO certification.
Q. WITHIN THE ENERGY SOLUTIONS GROUP, WHAT SPECIFIC SERVICES DID THE CLEAN AIR TECHNOLOGIES TEAM PROVIDE DURING THE 2018 TEST YEAR?

A. The Energy Solutions group manages the Clean Air Technologies ("CAT") Program, which focuses on promoting the beneficial electrification of various technologies in the Greater Houston Area for the purpose of reducing emissions in non-attainment areas. The CAT Program’s efforts have been primarily focused on displacing internal combustion engines and compressors such as propane fueled forklifts and pipeline compression motors. Since 2006, the program has been successful with 4,044 electric forklifts installed thereby reducing nitrous oxide ("NOx") emissions by 1,119 tons and the motors program has installed 305,000 Hp resulting in reducing NOx emissions by 589 tons.

E. Marketing Communications Group

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE MARKETING COMMUNICATIONS GROUP?

A. The Marketing Communications group is responsible for communicating important operational, service and safety information to residential, commercial and industrial end-use customers, the general public and other stakeholders. This group designs and produces, alone or in collaboration with agency partners, a variety of materials in print, digital and multi-media formats to raise awareness and understanding of electric safety and service through multiple channels, including advertising (television, radio, outdoor, print, internet, social media, streaming audio), the Company’s website, social media (Facebook, Twitter, LinkedIn, YouTube), email, IVR and on-hold scripts, newsletters, videos, speeches and presentations. This
group manages the Company's brand and corporate sponsorships and collaborates closely with related functions such as customer service, community relations, media relations and research.

Q. PLEASE DESCRIBE THE SPECIFIC SERVICES THAT THE MARKETING COMMUNICATIONS GROUP PROVIDED DURING THE 2018 TEST YEAR.

A. During 2018, the Company executed an electric safety advertising campaign in English and Spanish that delivered 178 million impressions to stakeholders including construction crews as well as home and business owners via TV, radio, print and streaming audio and video. Another ad campaign to educate homeowners about the energy- and money-saving benefits of high-efficiency homes made 29.4 million impressions. A 21-week retrospective on Hurricane Harvey in the Houston Chronicle, on the web and through social media reinforced electric safety messages. It also promoted free, valuable customer services such as CNP Customer Operations' Outage Tracker and Power Alert Service while raising public understanding of improvements to power restoration and resiliency through the Company's investment in and use of innovative technology such as the Intelligent Grid and drones. The campaign delivered over 40 million print and digital impressions and resulted in higher brand recognition and engagement than other national averages.

In 2018, the Company has reached over one million customers during dozens of weather events through social media in addition to delivering over six million email, text and phone messages through Power Alert Service.

Direct Testimony of Rebecca Demarr
CenterPoint Energy Houston Electric, LLC
CenterPoint Houston’s electric utility web pages, which promote electric safety, efficiency, and technology as well as Power Alert Service received 4.4 million page views.

Customer Operations’ marketing and customer communications have helped earn the Company awards such as Chartwell’s 2018 Outage Communications Gold Award, Cogent’s #1 Engaged Customer Relationship, Brand Trust and Product Experience, Smart Energy Consumer Collaborative’s 2018 Customer-Centric Culture Change and #1 in the American Customer Satisfaction Index for Customer Satisfaction, Retention, Loyalty, and Trust as well as Information on Energy-Saving Ideas, Efforts Supporting Green Programs, and Website Satisfaction.

F. Marketing Strategy and Support Group

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE MARKETING STRATEGY AND SUPPORT GROUP?

A. The Marketing Strategy and Support group is responsible for the development and execution of marketing strategies which support operational expense reduction and customer experience initiatives. Functions within the team include new product development, product and program marketing, and market research and consumer insights.

Q. PLEASE DESCRIBE THE SPECIFIC SERVICES THE MARKETING STRATEGY AND SUPPORT GROUP PROVIDED DURING THE 2018 TEST YEAR.

A. The Marketing Strategy and Support group supports the growth and continued success of our Power Alert Service program, which provides customers with

Direct Testimony of Rebecca Demarr
CenterPoint Energy Houston Electric, LLC
highly-satisfying (CSAT of 91%), in-the-moment notifications about potential power issues. In addition to a highly satisfying user experience, Power Alert Service reduces registered user calls made to Customer Service during outage events. The team also conducts, analyzes, and reports on customer and stakeholder opinion research. This research facilitates the development of products and services, such as our ServiceConnect new commercial construction portal. Post transaction survey research and customer satisfaction results are also used to identify improvement opportunities throughout the organization. Product development supported the update to the Top Customer data which was led by Strategic Planning in 2018. Top Customer data is used to support the Key Accounts Managers in the Power Delivery Solutions organization and the Commercial & Industrial Customer Relationship Manager.

G. Corporate Claims and Third-Party Damages Group

Q. WHAT ARE THE FUNCTIONS AND RESPONSIBILITIES OF THE CORPORATE CLAIMS AND THIRD-PARTY DAMAGES GROUP?

A. The core claims function and responsibility is to investigate and resolve any general liability, auto claim or other incident that has the potential to become a claim or lawsuit against the Company. This role is carried out from the inception of the claim until settlement, including litigation. Risk mitigation is another core function which evolves through investigations, trend analysis and partnering with stakeholders on strategies to mitigate.

The core Corporate Claims and Third-Party Damage function and responsibility is to investigate and pursue recovery of incurred expenses on our
assets due to the negligence of a third party. This role is carried out from the
inception of the event until settlement, including litigation.

Q. PLEASE DESCRIBE THE SPECIFIC SERVICES THE CORPORATE
CLAIMS AND THIRD-PARTY DAMAGE GROUP PROVIDED DURING
THE 2018 TEST YEAR.

A. Electric third-party damage collection remained relatively constant in 2018, down
-1% compared to 2017. However, the number of claims collected increased by
+23%. Third-party streetlight damage collection increased by +8% as compared to
2017. The group continues to deliver strong results as damage awareness and
damage prevention activities are advanced in the field.

Q. WHAT MEASURES ARE IN PLACE TO TRACK AND MONITOR
LIABILITY SETTLEMENTS?

A. In 2018, electric liability claims decreased by -7%. The claims received were
managed with an average nine-day closure window. The group also introduced
efficiencies that have increased overall satisfaction via post interaction customer
surveys.

III. CONCLUSION

Q. ARE THE COMPANY'S TEST YEAR COSTS FOR CUSTOMER
OPERATIONS REASONABLE AND NECESSARY?

A. Yes, Customer Operations provides critical support between CenterPoint Houston,
CRs and end-use customers. As described in my testimony and that of
Ms. Townsend, Customer Operations costs are necessarily incurred and accurately
charged to CenterPoint Houston and should be recovered in rates. In addition, the
direct costs that originate within CenterPoint Houston are reasonable and necessarily incurred and should be recovered in rates.

Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A. Yes.
STATE OF TX
COUNTY OF Harris

AFFIDAVIT OF REBECCA DEMARR

BEFORE ME, the undersigned authority, on this day personally appeared Rebecca Demarr who having been placed under oath by me did depose as follows:

1. "My name is Rebecca Demarr. I am of sound mind and capable of making this affidavit. The facts stated herein are true and correct based upon my personal knowledge.

2. I have prepared the foregoing Direct Testimony and the information contained in this document is true and correct to the best of my knowledge."

Further affiant sayeth not.

Rebecca Demarr

SUBSCRIBED AND SWORN TO BEFORE ME on this 5th day of March, 2019.

TERRY L TALLEY
NOTARY ID #106958-7
My Commission Expires June 17, 2022

My commission expires: 06/17/22
THERE ARE NO WORKPAPERS TO THE DIRECT TESTIMONY OF REBECCA DEMARR
APPLICATION OF CENTERPOINT § PUBLIC UTILITY COMMISSION
ENERGY HOUSTON ELECTRIC, LLC §
FOR AUTHORITY TO CHANGE RATES § OF TEXAS

DIRECT TESTIMONY

OF

M. SHANE KIMZEY

ON BEHALF OF

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

April 2019
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# LIST OF EXHIBITS

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EXECUTIVE SUMMARY OF M. SHANE KIMZEK

The affiliate services that the Legal and Regulatory Affairs departments (collectively, "Legal and Regulatory") provide to CenterPoint Energy Houston Electric, LLC ("CenterPoint Houston" or the "Company") are critical to the Company's provision of safe and reliable electric service and ensuring compliance with federal and state regulatory requirements. In this regard, my testimony:

- describes the organization, function, and responsibilities of the Legal and Regulatory organization;
- describes how Legal and Regulatory costs are controlled and monitored through the budgeting process and other strategies;
- addresses how the costs of Legal and Regulatory are assigned; and
- supports the reasonableness of the Legal and Regulatory affiliate services incurred by CenterPoint Houston during the test year.

My testimony demonstrates that the affiliate costs of approximately $18.1 million for Legal and Regulatory are reasonable and necessary and, as explained in the direct testimony of Company witness Michelle M. Townsend, are not priced higher to CenterPoint Houston than the prices charged for the same services to other affiliates. Thus, CenterPoint Houston's costs should be recovered in full through rates.

My testimony also demonstrates that municipal franchise fee payments are a reasonable and necessary operating expense and should be fully recovered in rates. Finally, I provide an overview of the recent transaction with Vectren Corporation.
DIRECT TESTIMONY OF M. SHANE KIMZEY

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND CURRENT POSITION.

A. My name is Michael Shane Kimzey. I am Chief Ethics & Compliance Officer and Vice President & Associate General Counsel – Litigation of CenterPoint Energy Service Company, LLC (“Service Company”).

Q. PLEASE SUMMARIZE YOUR BACKGROUND AND CURRENT RESPONSIBILITIES.

A. I received a B.A. in History from Washington & Lee University in 1992 and a law degree from the University of Texas School of Law in 1997. I was a law clerk to the Hon. Lynn N. Hughes from 1997-1998 and worked in private practice at Baker Botts LLP. I have worked as in-house counsel at Burlington Resources and ConocoPhillips and as Global Litigation Director, Deputy Chief Legal Officer, and Chief Compliance Officer at CEVA Logistics.

I joined CenterPoint Energy, Inc. (“CNP”) in November 2014 as Vice President & Associate General Counsel – Litigation. Along with my team, I am responsible for (i) managing litigation and other disputes in which the Company is involved; (ii) advising management and the business on litigation risk; and (iii) developing and implementing litigation prevention and risk mitigation plans.

The Litigation team is also responsible for supporting CNP’s environmental program, including assisting in (i) managing regulatory aspects and disputes of legacy environmental sites; (ii) advising and supporting the Company before environmental agencies; and (iii) developing and implementing environmental
programs and strategies, as well as supporting our business with regard to land use
and facilities including capital investments, transactions and disputed matters.

Effective February 1, 2019, I am also responsible for the Claims
Department. Also effective February 1, I now have responsibilities for the Ethics &
Compliance Program, including Integrated Records and Information Management
and Data Privacy.

I also serve on our General Counsel’s Legal Leadership Team and assist in
managing the Legal function. I also consult with and advise internal clients on a
range of issues.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to describe the organization and affiliate services
provided by Legal and Regulatory, which are part of the overall legal organization.¹
My testimony demonstrates that Legal and Regulatory efficiently and effectively
provides legal and regulatory services to CenterPoint Houston and that these
departments maintain proper controls to ensure that the costs for each of these
services are reasonable and necessary. My testimony further establishes that the
approximately $18.1 million of Legal and Regulatory affiliate costs incurred by the
Company during the test year are properly assigned to CenterPoint Houston, are
reasonable and necessary, and, as explained by Company witness Michelle M.
Townsend, are not priced higher to CenterPoint Houston than the prices charged
for the same services to other affiliates. Additionally, my testimony supports the

¹ The Audit Services Department also falls within the Legal and Regulatory organization. Company witness
Kelly C. Gauger supports the services and associated costs with the Audit Services department. Additionally,
as of February 1, 2019, Environmental and Claims also report into the Legal Department.

Direct Testimony of M. Shane Kimzey
CenterPoint Energy Houston Electric, LLC

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recovery of CenterPoint Houston’s municipal franchise costs incurred during the
test year. Finally, I provide an overview of the recent transaction involving Vectren
Corporation (“Vectren”).

Q. **DO YOU SPONSOR ANY EXHIBITS OR SCHEDULES INCLUDED IN**
**THE RATE FILING PACKAGE?**

A. Yes. I sponsor the exhibits listed in the table of contents. These exhibits were
prepared by me or under my direct supervision. Additionally, I sponsor Schedule
II-C-4, which provides a list of Board of Directors meetings held during and
subsequent to the test year as well as the date of the meetings and agendas. I also
co-sponsor the reasonableness and necessity of various costs included in Schedules
V-K-7 and V-K-12 sponsored by Ms. Townsend, insofar as they are related to Legal
and Regulatory services and Schedule II-E-2 with Company witness Kristie L.
Colvin related to municipal franchise fees.

Q. **HOW DOES YOUR TESTIMONY RELATE TO THAT OF OTHER**
**WITNESSES IN THIS PROCEEDING?**

A. I serve as CenterPoint Houston’s witness supporting the recovery of reasonable and
necessary test year costs for the Legal and Regulatory departments. These are all
affiliate costs that CenterPoint Houston seeks to recover as part of its cost of
service. Additionally, I provide testimony in support of the recovery of the test
year franchise fees paid by CenterPoint Houston under its municipal franchise
ordinances.

Ms. Townsend provides direct testimony that supports CenterPoint
Houston’s recovery of its affiliate costs, including affiliate billings and
methodologies, budgeting, cost controls, and the use of Service Level Agreements.

Ms. Colvin provides direct testimony that also supports the $152.8 million in franchise fees that CenterPoint Houston seeks to recover as part of its cost of service.

II. LEGAL AND REGULATORY

Q. WHERE DOES LEGAL AND REGULATORY FALL WITHIN THE SERVICE COMPANY ORGANIZATION?

A. As shown in the figure below, Legal and Regulatory falls within Corporate Services:

---

Figure 1

Direct Testimony of M. Shane Kimzey
CenterPoint Energy Houston Electric, LLC
A. Legal and Regulatory Services Provided to CenterPoint Houston

Q. WHAT IS THE LEGAL DEPARTMENT'S PRIMARY FUNCTION?

A. The primary function of the Legal Department is to ensure that client needs for legal services are satisfied in a competent and cost effective manner. Those services are provided through use of the Legal Department’s attorneys, paralegals, and support staff, and through the retention of and consultation with outside counsel where it is determined that services can best be provided from sources outside the Legal Department. In addition to these services, the Legal Department oversees the Ethics & Compliance Departments, including Integrated Records & Information Management and Data Privacy.

Q. DOES THE LEGAL DEPARTMENT HANDLE OR SUPERVISE ALL LEGAL MATTERS FOR CENTERPOINT HOUSTON?

A. Yes, the Legal Department handles or supervises all legal matters for CenterPoint Houston. The General Counsel (or the General Counsel’s designee) is responsible for engaging all lawyers providing advice and legal services to CenterPoint Houston, regardless of whether those lawyers are members of the Legal Department or are from private law firms retained for specific matters. Moreover, in all instances where outside counsel is retained, at least one attorney within the Legal Department monitors the quality and progress of the legal work being performed.

When a new matter arises requiring legal advice, the matter is referred to the General Counsel, or the General Counsel’s designee, who determines whether the matter can be most effectively and efficiently handled by attorneys in the Legal Department or by outside counsel. In general, outside counsel is retained for matters that call for expertise not available within the Legal Department or could
be more efficiently handled by outside counsel or when the overall volume of legal work exceeds the capabilities of the Legal Department. Where appropriate, attorneys within the Legal Department will coordinate efforts with outside counsel to maximize the most efficient use of resources, including the use of fixed fee or alternate fee arrangements, as described in more detail below.

Q. CAN YOU BRIEFLY ELABORATE ON THE VARIOUS LEGAL SERVICES PROVIDED BY THE LEGAL DEPARTMENT TO CENTERPOINT HOUSTON?

A. Yes. The Legal Department provides multiple services to the Company, including:

   **Regulatory Legal Services.** The Regulatory group within the Legal Department is responsible for representing the Company in proceedings subject to the jurisdiction of the Public Utility Commission of Texas ("Commission") and municipalities that retain original jurisdiction over CenterPoint Houston’s rates, operations, and services under the Public Utility Regulatory Act ("PURA") and in other matters which involve regulatory or administrative law, including for other affiliates in other jurisdictions and/or before other regulatory agencies. The Regulatory Legal team is also responsible for (i) implementing the Commission’s Code of Conduct and setting up procedures to help ensure compliance; (ii) assisting management in the development and implementation of regulatory strategies, including regulatory compliance programs; and (iii) directly supporting the Company’s and its affiliates’ state and federal legislative activities. This team is also responsible for negotiating municipal franchise agreements on behalf of CNP’s electric and gas utilities.
Corporate Securities, Transactions and Governance. The lawyers and others on this team are responsible for (i) maintaining compliance with securities laws and regulations, including periodic filings with the Securities & Exchange Commission; (ii) representing the Company in corporate transactions such as mergers, acquisitions and financings; (iii) overseeing matters of corporate governance; (iv) maintaining accurate records relating to the legal entities in the CNP group of companies; (v) insider trading training and awareness; and (vi) advising on benefits plans and various other matters.

Litigation, Environmental, Land & Right of Way. The lawyers on this team are responsible for managing litigation and other disputes that CNP and its subsidiaries become involved in, as well as supporting CenterPoint Houston’s and other entities’ Land and Right of Work, such as procuring easements and other such rights and working with landowners, and providing legal advice on various environmental matters, including litigation and regulatory proceedings.

Commercial. The Commercial Legal team of CNP’s Legal Department is responsible for the legal aspects of the Company’s commercial contracting process. Our commercial team (i) drafts, reviews, and negotiates contracts with customers and vendors; and (ii) provides guidance on commercial and contracting risks and issues more generally. This team is also responsible for the Company’s intellectual property work.

Corporate Ethics and Compliance. Collectively, this team is responsible for (i) overseeing, supporting, and educating the organization on ethics and compliance with laws and regulations, and investigating and
responding to ethics or compliance concerns; (ii) records and information management; and (iii) providing guidance on data privacy laws and regulations, privacy incident management, and privacy risk mitigation. The team is also responsible for providing guidance and overseeing (i) fines and penalties imposed by any government or regulatory authority; (ii) compliance-related inquiries from any government or regulatory authority; and (iii) compliance-related audits or due diligence requests from third parties.

Q. WHAT SERVICES DOES THE REGULATORY AFFAIRS DEPARTMENT PROVIDE?

A. The Regulatory Affairs Department provides services for all of CNP’s regulated electric and gas operations. Services provided to CenterPoint Houston include:

- developing regulatory policy and strategy;
- overseeing rules and procedures to ensure regulatory compliance;
- representing the Company’s interests in interactions with national and regional trade, industry, and professional organizations;
- providing litigation support in regulatory proceedings; and
- preparing and managing regulatory filings, including tariff filings, annual affiliate reports, and other regulatory documentation, such as the earnings monitoring report filed with the Commission.

In addition, Regulatory Affairs employees promote and maintain collaborative relationships with regulators and third parties and represent the Company’s position in regulatory matters before the Commission and act as the Company’s primary liaison in these matters. Regulatory Affairs supports the Company’s state and federal legislative activities and interacts with local governments on behalf of CNP’s electric and gas utilities. Regulatory Affairs employees also prepare and

Direct Testimony of M. Shane Kimzey
CenterPoint Energy Houston Electric, LLC
oversee all aspects of the rate case process, including the preparation of the rate filing package, which is comprised of cost of service schedules, testimony and supporting workpapers, responding to discovery, and providing hearing support.

**B. Legal and Regulatory Costs and Cost Assignments**

Q. **PLEASE DESCRIBE THE COSTS ASSIGNED TO CENTERPOINT HOUSTON FOR LEGAL AND REGULATORY SERVICES AND THE METHODOLOGY USED TO ASSIGN THOSE COSTS.**

A. The costs assigned to CenterPoint Houston for the test year ended December 31, 2018, for Legal and Regulatory were approximately $18.1 million. Costs for Company-specific work are directly assigned to the Company. For example, the Legal Department provides legal services directly to CenterPoint Houston using both inside and outside attorneys. The costs of these services are directly billed (or “direct billed”) whenever possible. Legal services provided to other affiliates are tracked separately so that costs attributable to other affiliates are not charged to CenterPoint Houston.

Certain corporate services and projects that benefit all CNP business units are allocated to the Company and are billed at the same rate to all affiliates, including CenterPoint Houston. These rates are designed to cover only the costs of providing such services. The manner by which costs are allocated for all activities and expenses related to services that Legal and Regulatory provided directly to the Company is discussed in Ms. Townsend’s testimony. Ms. Townsend explains that these cost allocation methodologies ensure that CenterPoint Houston is charged for Legal and Regulatory services at rates that are no higher than those charged to other CNP business units for the same services.

Direct Testimony of M. Shane Kimzey
CenterPoint Energy Houston Electric, LLC
Q. HOW DOES THE LEGAL DEPARTMENT MONITOR EXPENSES TO
ENSURE THAT THE COSTS IT INCURS ARE REASONABLE AND
NECESSARY AND THAT COSTS ARE PROPERLY ASSIGNED?

A. The Legal Department ensures that incurred costs are reasonable and necessary in
a number of ways, including budgeting, the use of matter management software,
and comparing and controlling labor costs.

**Budgeting and Cost Control.** Legal’s budget is established annually as
part of CNP’s budget process. Each year, in consultation with the various business
units that Legal supports, the department identifies legal resources that are needed
to support the strategic objectives of the business. Actual expenditures throughout
the year are compared to the budgeted amounts, and efforts are made to improve
efficiency and effectiveness. Monthly forecasts of legal fees by sub-function are
performed and roll up to business units. These forecasts are reviewed by
responsible lawyers as well as business unit owners. In addition, legal expenses
are tracked on a quarter-by-quarter and year-over-year basis to spot trends and
opportunities for savings. The Legal Department’s budgeting process coupled with
the monitoring process ensures that costs incurred by the Legal Department and
thus billed to CenterPoint Houston are controlled, reasonable, and necessary. The
Service Company’s annual budget process is described further in Ms. Townsend’s
testimony.

**Matter Management Software.** In addition to budgeting, the Legal
Department uses a matter management system, Passport (formerly TeamConnect),
to track cases and files and associated expenses. Using these systems, attorneys
can access engagement letters with outside counsel, view billing guidelines and approved timekeepers for a matter, verify that billing rates charged by outside counsel have previously been approved, and approve or reject invoices. Outside counsel must obtain approval before adding new timekeepers to a matter, and any such changes are reflected in the system. The system also facilitates review of legal invoices by flagging billing entries that may be duplicative or incorrect.

Labor Costs. As discussed in the direct testimony of Company witness Lynne Harkel-Rumford, the Compensation Section of the Human Resources Department regularly evaluates salary levels for Legal and Regulatory employees based on published indices and benchmarking studies in order to ensure that these costs remain reasonable and necessary.

Q. HOW DOES THE LEGAL DEPARTMENT MANAGE OUTSIDE COUNSEL TO ENSURE THAT THEIR CHARGES FOR LEGAL SERVICES ARE REASONABLE AND NECESSARY?

A. The Legal Department determines that the charges by outside counsel are reasonable and necessarily incurred through a variety of practices, policies, and procedures. First, the Legal Department has established processes to help manage legal costs and expenses. For example, effective management of outside counsel and overall expenses is a key part of our overall Legal Department strategy. Additionally, the Legal Services Policy helps drive legal efficiencies with our business clients, and CNP has an Authorization Policy that also assists with expenditure management. Finally, the Legal Department has worked to reduce the
number of outside law firms retained to perform legal work in order to leverage our spend and more effectively manage our firms.

Second, our in-house lawyers are expected to manage their matters and outside lawyers directly and effectively to ensure our strategy and expectations are being met and that work and costs are reasonable. Almost all of the attorneys in the Legal Department were in private practice before joining the Legal Department and are familiar with the type of legal work for which they now select outside counsel and review bills. This fact combined with our matter management system (Passport) is used to ensure that invoices are properly reviewed and that the charges are reasonable. All fee statements from outside counsel are sent to the General Counsel or the General Counsel’s designee and are reviewed by attorneys within the Legal Department, such as myself, who monitor the work of outside counsel in the particular matter for which the bill is rendered. In reviewing bills, the attorneys within the Legal Department analyze not only the amount of time and the fees charged, but also the nature of the services provided and the quality of the work provided. This review assures that payments are made only for services that were needed, that the fees charged are reasonable, and that costs for which reimbursement is sought were incurred in conjunction with the legal services rendered and were necessary.

Third, the Legal Department requires outside counsel to comply with CNP’s Outside Counsel Guidelines, which contain many requirements related to billing, staffing of matters, non-permitted charges, etc., and monitors compliance with them. Moreover, the Legal Department does not allow law firms to raise rates on...
an annual basis, as many firms do, without first obtaining approval from our General Counsel.

In addition to these internal controls and process, the Legal Department also periodically issues Requests for Proposal on various dockets, particular matters, or specific projects to ensure competitive rates and bidding. Alternative Fee Arrangements are also used to drive efficiencies and align incentives, and we periodically review the effectiveness of such arrangements. Finally, the Legal Department periodically conducts benchmarking exercises through outside organizations to ensure our legal spend is reasonable and commensurate with other companies.

Q. WHAT PROCESSES ARE IN PLACE TO ENSURE THAT THE COSTS INCURRED BY THE REGULATORY AFFAIRS DEPARTMENT ARE REASONABLE AND NECESSARY?

A. As with the Legal Department, Regulatory Affairs prepares an annual budget and compares actual expenditures throughout the year to budgeted amounts, and the Human Resources Department evaluates salary levels for these employees based on published indices and benchmarking studies in order to ensure that these costs remain reasonable and necessary.

Q. DOES CENTERPOINT HOUSTON PAY HIGHER RATES FOR LEGAL AND REGULATORY SERVICES THAN OTHER BUSINESS UNITS OR AFFILIATES?

A. No.
Q. WAS IT REASONABLE AND NECESSARY FOR CENTERPOINT HOUSTON TO USE LEGAL AND REGULATORY CORPORATE SERVICES DURING THE TEST YEAR?

A. Yes. Legal and Regulatory corporate services are reasonable and necessary to the Company’s operation. As Ms. Townsend explains in her direct testimony, CenterPoint Houston received the benefit of sharing staff that could perform legal, regulatory affairs, government affairs and other services without having to hire a full-time staff.

III. MUNICIPAL FRANCHISE FEES

Q. WHAT ARE MUNICIPAL FRANCHISE ORDINANCES AND FRANCHISE FEES?

A. A municipal franchise ordinance is an agreed ordinance between the Company and a city whereby the Company pays a negotiated franchise fee in exchange for certain rights from the city, such as the right to use the city’s public rights-of-way to install, use, and maintain utility poles, transmission and distribution lines, and other equipment necessary to conduct its electric delivery business. The agreement is called an “ordinance” because it is actually passed into law by the various city governments in the Company’s service area.

Q. HOW MANY FRANCHISE ORDINANCES DOES THE COMPANY HAVE TODAY?

A. The Company has franchise ordinances with 93 cities in its service area.
Q. PLEASE BRIEFLY DESCRIBE THE FRANCHISE FEES PAID BY CENTERPOINT HOUSTON UNDER THESE FRANCHISE ORDINANCES.

A. As provided for under PURA § 33.008(f), upon the expiration of any franchise agreement that existed on September 1, 1999, CenterPoint Houston has negotiated with the cities in its service territory to reach a new franchise agreement that provides for an agreed upon level of compensation. As of December 31, 2018, 73 cities have passed renewal franchise ordinances approving agreed-to franchise fee amounts as a result of these negotiations. A list of those cities and the date of passage for each of the renewal franchise ordinances is included in my testimony as Exhibit MSK-1. Sixteen cities have franchise agreements that existed on September 1, 1999, which have not been renewed. The Company’s annual municipal franchise fee for these 16 cities is determined by applying the formula set out in PURA § 33.008(b). In addition, CenterPoint Houston has franchise agreements with four cities who are newly incorporated. For these cities, the Company’s annual municipal franchise fee is determined by applying the formula set out in PURA § 33.008(g).

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2 The Cities of Alvin, Arcola, Dickinson, El Lago, Friendswood, Iowa Colony, League City, La Marque, Manvel, Missouri City, Oakridge North, Pattison, Pearland, Prairie View, Shoreacres, and Taylor Lake Village.

3 The Cities of Brazos Country, East Bernard, Sandy Point, and Weston Lakes.
Q. HAS THE COMMISSION PREVIOUSLY CONSIDERED WHETHER CENTERPOINT HOUSTON MAY NEGOTIATE AND RECOVER THROUGH RATES FRANCHISE FEE PAYMENTS THAT DIFFER FROM THE FORMULA SET FORTH IN PURA § 33.008(b)?

A. Yes. In its Order on Rehearing in Docket No. 38339, the Commission concluded that upon the expiration of any franchise fee agreement existing on September 1, 1999, CenterPoint Houston could negotiate agreed-upon franchise fees with its cities and that such agreed-to amounts are reasonable and necessary operating expenses of the utility under PURA § 33.008(c) and (f).  

Q. ARE MUNICIPAL FRANCHISE PAYMENTS A REASONABLE AND NECESSARY EXPENSE ASSOCIATED WITH THE PROVISION OF ELECTRIC SERVICE?

A. Yes. PURA § 33.008(c) states that municipal franchise fees shall be considered a reasonable and necessary operating expense of an electric utility. My testimony establishes that the municipal franchise fees paid by CenterPoint Houston comply with the requirements of PURA § 33.008(b), (f), and (g) and therefore, should be recovered in the Company’s rates. Ms. Colvin further supports the approximately $152.8 million in franchise fees requested in the Company’s rate filing. This amount is presented on Schedule II-E-2 in the Rate Filing Package.

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4 Application of CenterPoint Energy Houston Electric, LLC for Authority to Change Rates, Docket No. 38339, Order on Rehearing at 11-12, Finding of Fact No. 167A (June 23, 2011).

Direct Testimony of M. Shane Kimzey
CenterPoint Energy Houston Electric, LLC
IV. TRANSACTION WITH VECTREN CORPORATION

Q. CAN YOU BRIEFLY DISCUSS CNP'S RECENT ACQUISITION OF VECTREN?

A. Yes. In April 2018, CNP entered into an agreement and plan of merger with Vectren. Following the satisfaction of various closing conditions, including federal and state regulatory approvals, the transaction closed on February 1, 2019. Following the close of the transaction, Vectren became a direct wholly-owned subsidiary of CNP. Exhibit MSK-2 shows Vectren's post-closing ownership structure under CNP.

Q. PLEASE BRIEFLY DESCRIBE VECTREN'S CURRENT OPERATIONS.

A. With respect to Vectren's utilities, its natural gas operations (comprised of Indiana Gas Company, Inc., Vectren Energy Delivery of Ohio, Inc. and Southern Indiana Gas and Electric Company) provide natural gas distribution and transportation services to nearly 67% of Indiana and about 20% of Ohio, primarily in the west-central area. Its electric operations (comprised of Indiana Electric) provide electric transmission and distribution services to southwestern Indiana, and include power generating and wholesale power operations. In total, these utility operations supply natural gas and electricity to over one million customers in Indiana and Ohio. Vectren is also involved in non-utility activities in two primary business areas: infrastructure services (provided through MVerge) and energy services (provided through Energy Systems Group, LLC ("ESG"). MVerge provides underground pipeline construction, repair services, and other infrastructure services. ESG's energy services include providing energy performance contracting and sustainable
infrastructure, such as renewables, distributed generation and combined heat and power projects.

Q. WILL CENTERPOINT HOUSTON CUSTOMERS BE RESPONSIBLE FOR ANY TRANSACTION COSTS?

A. No. CenterPoint Houston will not seek recovery of any transaction costs from Texas ratepayers.

Q. PLEASE DESCRIBE THE INTEGRATION EFFORTS THAT ARE UNDERWAY TO COMBINE THE COMPANIES.

A. CNP and Vectren are both committed to seamlessly integrating our talent, processes, systems and infrastructure into a combined company. These integration efforts are ongoing.

Q. DID THE TRANSACTION WITH VECTREN REQUIRE CNP TO SEEK ANY REGULATORY REVIEW OR APPROVAL FROM THE COMMISSION?

A. No. The transaction with Vectren did not require CNP to report to or obtain approval of the transaction from the Commission prior to its close. In addition, the PURA § 14.101 reporting requirement and related public interest considerations that allow the Commission to take the effect of the transaction into consideration in setting CenterPoint Houston’s rates also do not apply to the Vectren transaction.

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1 See PURA §§ 39.262 and 39.915.
V. CONCLUSION

Q. WHAT ARE YOUR CONCLUSIONS REGARDING LEGAL AND REGULATORY COSTS INCURRED DURING THE TEST YEAR?

A. As I have discussed above, the organizational structure of Legal and Regulatory assures that appropriate, effective services are provided to CenterPoint Houston at a reasonable cost no greater than those to any other CNP affiliate. These departments are appropriately staffed and their expenses are reasonable and necessary for the provision of regulated electric utility service.

Q. WHAT ARE YOUR CONCLUSIONS REGARDING THE MUNICIPAL FRANCHISE FEES PAID BY CENTERPOINT HOUSTON DURING THE TEST YEAR?

A. The Company’s municipal franchise fee payments are a reasonable and necessary operating expense and should be fully recovered in rates.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.
STATE OF TEXAS

COUNTY OF HARRIS

AFFIDAVIT OF MICHAEL SHANE KIMZEY

BEFORE ME, the undersigned authority, on this day personally appeared Michael Shane Kimzey who having been placed under oath by me did depose as follows:

1. "My name is Michael Shane Kimzey. I am of sound mind and capable of making this affidavit. The facts stated herein are true and correct based upon my personal knowledge.

2. I have prepared the foregoing Direct Testimony and the information contained in this document is true and correct to the best of my knowledge."

Further affiant sayeth not.

SUBSCRIBED AND SWORN TO BEFORE ME on this 19th day of March, 2019.

My commission expires: 04-14-2020
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<tr>
<th>City</th>
<th>Expiration Date of Franchise Ordinance existing on 9/1/99</th>
<th>Effective Date of Renewal Franchise Ordinance under PURA 33.008 (f)</th>
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CenterPoint Energy, Inc.
Legal Structure as of February 1, 2019
THERE ARE NO WORKPAPERS TO THE DIRECT TESTIMONY OF M. SHANE KIMZEY
APPLICATION OF CENTERPOINT § PUBLIC UTILITY COMMISSION
ENERGY HOUSTON ELECTRIC, LLC §
FOR AUTHORITY TO CHANGE RATES § OF TEXAS

DIRECT TESTIMONY

OF

KELLY C. GAUGER

ON BEHALF OF

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC

April 2019
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EXECUTIVE SUMMARY OF KELLY C. GAUGER

With its staff of highly qualified personnel, Audit Services provides assurance on the overall system of internal control within CenterPoint Energy, Inc. ("CNP"), and its subsidiaries and affiliates, including CenterPoint Energy Houston Electric, LLC ("CenterPoint Houston"). Audit Services provides auditing services, including financial, compliance, operational and information technology activity to CenterPoint Houston at reasonable costs. The services provided by Audit Services create a more efficient organization through the identification of process improvements, which ultimately lead to lower costs for customers.

My testimony:

• describes the structure of the Audit Services Department and the types of services it provides to ensure that CenterPoint Houston complies with all legal and regulatory requirements;

• describes how Audit Services costs are controlled and monitored through the budgeting process;

• addresses how the costs of Audit Services are assigned and allocated; and

• supports the reasonableness of the Audit Services costs charged to CenterPoint Houston during the test year.

My testimony will demonstrate that the Audit Services affiliate costs are reasonable and necessary and are not priced higher to CenterPoint Houston than the prices charged for the same services to other affiliates. Thus, CenterPoint Houston's Audit Services affiliate costs should be recovered in full through rates.
DIRECT TESTIMONY OF KELLY C. GAUGER

I. INTRODUCTION

Q. PLEASE STATE YOUR NAME AND CURRENT POSITION.

A. My name is Kelly C. Gauger and I am the Vice President, Audit Services for CenterPoint Energy Service Company, LLC (“Service Company”).

Q. PLEASE SUMMARIZE YOUR BACKGROUND AND CURRENT POSITION.

A. Prior to my current role as Vice President, Audit Services, I served as Director, Financial Accounting for CenterPoint Energy, Inc. (“CNPR”) since June 2006. Prior to the Director, Financial Accounting position, I served as Manager, Financial Reporting for CNP from January 2001 to May 2006 and was responsible for CNP’s external financial reporting to the Securities and Exchange Commission (“SEC”). Before joining CNP in 2001, I served as Director, SEC Reporting and Treasury Operations for Drypers Corporation, a manufacturer of baby diapers with both domestic and international operations from January 1993 to November 2000. Prior to working at Drypers Corporation, I managed the corporate reporting function for Stewart and Stevenson from 1989 to 1992. I began my public accounting career with the accounting firm of Arthur Andersen LLP in Houston, Texas specializing in the audit of public companies, primarily in the manufacturing and wholesale distribution sectors. I graduated cum laude from Texas A&M University in 1984 with a B.B.A. in Accounting and Business Analysis, and I am a Certified Public Accountant in the State of Texas.
Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?
A. I describe the services provided by the Audit Services function ("Audit Services") to CenterPoint Energy Houston Electric, LLC ("CenterPoint Houston" or the "Company"), the necessity for providing such services, and the reasonableness of the associated charges to CenterPoint Houston. I will discuss the requirements for Audit Services, and the structure, authority, and responsibilities of Audit Services.

Q. HOW DOES YOUR TESTIMONY RELATE TO THAT OF OTHER WITNESSES?
A. My testimony supports the inclusion of Audit Services costs in CenterPoint Houston's recoverable affiliate charges discussed and requested in the Direct Testimony of Michelle M. Townsend, which I reference throughout my testimony.

Q. WHAT RATE FILING SCHEDULES ARE YOU SPONSORING?
A. I sponsor Schedule II-C-3: Internal/External Audits. I also co-sponsor Schedules V-K-7 and V-K-12 with Ms. Townsend as they relate to Audit Services.

Q. PLEASE SUMMARIZE YOUR TESTIMONY.
A. Audit Services provides internal auditing services to CenterPoint Houston, as required to comply with laws, regulations, and rules addressing corporate governance. For the 2018 test year, Audit Services costs to CenterPoint Houston in the unadjusted amount of approximately $2.1 million are reasonable for the services provided. Audit Services expects to maintain the same level of expenditures to continue to provide the appropriate level of audit coverage. The amount of the charges to CenterPoint Houston is based on the composite ratio allocation method discussed by Ms. Townsend.
II. ORGANIZATION AND RESPONSIBILITIES OF AUDIT SERVICES

Q. HOW IS AUDIT SERVICES ORGANIZED?

A. Audit Services is within Corporate Services. For further discussion on Corporate Services and its role in Service Company please refer to Ms. Townsend.

Q. PLEASE DESCRIBE THE ACTIVITIES PROVIDED BY AUDIT SERVICES TO CENTERPOINT HOUSTON DURING THE TEST YEAR.

A. The table shown in Figure 1 below lists the typical audit activities performed by Audit Services.

<table>
<thead>
<tr>
<th>Financial Audit</th>
<th>Review and testing of selected financial accounts, supporting records for the general ledger, sub-ledgers, reconciliations, and any management adjustments.</th>
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</thead>
<tbody>
<tr>
<td>Integrated Audits</td>
<td>Review and testing of controls related to financial, operational, technology, and compliance activity.</td>
</tr>
<tr>
<td>Operational Audits</td>
<td>Process driven audits concentrating on the effectiveness of operations and/or internal controls for a function, business, location, and/or department.</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Audits focused on information systems, technology, and related processes.</td>
</tr>
<tr>
<td>Compliance Audits</td>
<td>Review of compliance with established CNP policies and procedures, regulatory, statutory, contract compliance, or other defined requirements.</td>
</tr>
</tbody>
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Q. ARE THERE BENEFITS TO HAVING A CENTRALIZED AUDIT SERVICES DEPARTMENT?

A. Yes. Having a centralized Audit Services department is important for efficiency, cost containment, and consistency in audit practices and protocol. If each subsidiary of CNP maintained a separate Audit Services function, they would
require the same type of Audit Services activities.

Q. HOW DO THESE SERVICES BENEFIT CENTERPOINT HOUSTON AND ITS CUSTOMERS?

A. Audit Services is responsible for performing the internal audit function for the entire CNP organization, including CenterPoint Houston, as required by various charters and internal policies. These services benefit CNP and its subsidiaries and affiliates, including CenterPoint Houston, by monitoring and assessing CNP’s operational, financial, information systems, and administrative controls. Additionally, Audit Services evaluates compliance with applicable policies, procedures, contracts, and laws and regulations. These services help to ensure an efficient organization through the identification of process improvements which ultimately leads to reduced costs paid by CenterPoint Houston’s customers. Please refer to Ms. Townsend for a discussion of the benefits of corporate governance activities, including the Audit Services function, to customers.

Q. HOW DOES AUDIT SERVICES CARRY OUT ITS RESPONSIBILITY FOR PERFORMING THE INTERNAL AUDIT FUNCTION?

A. Audit Services serves as an independent compliance and monitoring function, as follows:

- Audit Services has been granted specific authority by the Audit Committee of the Board of Directors (“Audit Committee”) through the Audit Services Charter to monitor and assess the adequacy and effectiveness of CNP’s operational, financial, information systems, and administrative controls, as well as compliance with all applicable policies, procedures, and regulations, including the Ethics and Compliance Code. In addition, where contractually authorized, Audit Services reviews accounting and other relevant records of joint ventures, contractors, suppliers, and other third-party business associates;
Audit Services operates independently of the management of CNP and its subsidiaries and affiliates, and it reports functionally to the Audit Committee, thereby ensuring its ability to independently monitor and review all activities within the CNP organization. The Audit Committee consists of four outside members of CNP’s Board of Directors. I meet with the Audit Committee at formal Audit Committee meetings at least five times per year to discuss the results of Audit Services activities. I typically have at least one meeting per quarter (in person) with the Audit Committee chairperson;

Audit Services has assembled a team of experienced and qualified professionals, described later in my testimony, to perform the internal audit function;

Audit Services utilizes a risk-based approach in the annual planning process to identify auditable areas; and

Audit Services follows a defined internal audit process for each individual audit project through the performance of planning, fieldwork, and reporting. The client responses to recommendations from each audit are monitored through the Management Action Plan follow-up process.

Q. WHAT AUTHORITY HAS THE AUDIT COMMITTEE CONFERRED UPON AUDIT SERVICES?

A. Through the Audit Services Charter, which is reviewed and approved by the Audit Committee, Audit Services is granted authority to review all aspects of CNP’s functions, including business and operations of its subsidiaries and affiliates. Audit Services has free and complete access to all records, property, and personnel relevant to the subject under review. Additionally, my staff and I have full and independent access to all levels of management, as well as to the Audit Committee. Audit Services exercises complete discretion to assure confidentiality of all matters. Additionally, Audit Services is authorized to:

- Select process/activities to review, determine scope of work, allocate resources, establish frequency of audit/review activity, and apply the techniques required to accomplish audit objectives;
• Obtain the necessary assistance of CNP personnel in areas where audits are performed, as well as other specialized services from inside or outside of CNP and its subsidiaries and affiliates; and

• Maintain its objectivity and independence by not having an operating role or direct authority over the activities that it reviews.

Q. WHAT RESPONSIBILITIES DOES THE AUDIT COMMITTEE HAVE FOR OVERSEEING AUDIT SERVICES?

A. The Audit Committee reviews at least annually the Audit Services organizational structure, qualifications, and Charter. The Audit Committee has the responsibility of reviewing the budget and staffing of the Audit Services function. It also reviews and approves the audit plan and modifications to the approved plan, including changes to the annual budget as needed based on requested changes to specified audit projects.

Q. HOW DOES AUDIT SERVICES MAINTAIN ITS INDEPENDENCE FROM CORPORATE MANAGEMENT?

A. In order to preserve its independence, Audit Services personnel are not allowed to do the following with the exception of storm restoration duties:

• Perform any operational duties for CNP or its subsidiaries and affiliates. In this regard, Audit Services personnel are not to be used as auxiliary line accounting or finance staff;

• Initiate or approve accounting transactions, implement internal controls, develop procedures, install systems, prepare records, or engage in any other activity other than those directly related to Audit Services activities;

• Direct the activities of any employee not employed by Audit Services, except to the extent such employees have been appropriately assigned to auditing teams or to otherwise assist the auditors.

Direct Testimony of Kelly C. Gauger
CenterPoint Energy Houston Electric, LLC
Q. WHAT GUIDELINES DOES AUDIT SERVICES FOLLOW IN PERFORMING ITS FUNCTION?

A. Audit Services follows the guidelines established by The International Professional Practices Framework ("IPPF") which are issued by The Institute of Internal Auditors ("The IIA"). In February 2015, in order to be compliant with IPPF - Standard 1312, which states that an "External Assessment must be conducted at least once every five years by a qualified, independent reviewer or review team from outside the organization," Audit Services completed an external assessment. The review was performed by The IIA, and Audit Services received a rating of "Generally Conforms," the highest rating possible.


A. Audit Services is part of Service Company. I lead Audit Services and serve as Vice President. I functionally report directly to the Audit Committee, and I administratively report to the General Counsel of CNP. In addition to me, in 2018, Audit Services was comprised of two audit directors, one audit manager, two administrative assistants and sixteen staff and senior auditors. We utilized outside professional resources when certain subject matter expertise was necessary for a specific audit.

Q. PLEASE DISCUSS THE PROFESSIONAL QUALIFICATIONS OF THE MEMBERS OF THE AUDIT SERVICES DEPARTMENT.

A. Audit Services has assembled a team of highly qualified and experienced personnel to provide audit services for its clients. Many members of the organization have