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PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF

SCOTT NORWOOD

ON BEHALF OF

TEXAS COAST UTILITIES COALITION

APRIL 8, 2025

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DIRECT TESTIMONY AND ATTACHMENTS OF SCOTT NORWOOD

I. INTRODUCTION

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

A. My name is Scott Norwood. I am President of Norwood Energy Consulting, L.L.C. My business address is P.O. Box 30197, Austin, Texas 78755-3197.

Q. WHAT IS YOUR OCCUPATION?

A. I am an energy consultant specializing in the areas of electric utility regulation, resource planning, and energy procurement.

Q. PLEASE SUMMARIZE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I am an electrical engineer with over 40 years of experience in the electric utility industry. I began my career as a power plant engineer for Austin Energy, a municipality's Electric Utility Department where I was responsible for electrical maintenance and design projects for the City's three gas-fired power plants. In January 1984, I joined the Staff of the Public Utility Commission of Texas ("Commission" or "PUC"), where I was responsible for addressing resource planning, fuel, and purchased power cost issues in electric rate and plant certification proceedings before the Texas PUC. From 1986 to 2003 I was employed by GDS Associates, Inc., an electric utility consulting firm based in Georgia, where I served as a Principal and Director of the firm's Deregulation Services Department. In January of 2004, I formed Norwood Energy Consulting, LLC, and have provided utility regulatory consulting services to public utilities, electric consumers, industrial interests, municipalities, and state government clients since that time.

Q. ON WHOSE BEHALF ARE YOU TESTIFYING IN THIS CASE?

A. I am testifying on behalf of the Texas Coast Utilities Coalition ("TCUC"). TCUC is a coalition of municipalities located in the service territory of Centerpoint Energy Houston Electric, LLC ("CEHE" or "Company"). TCUC was formed to address the municipalities' concerns with, and interest in, utility rates, services, and operations.

Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUCT AND OTHER REGULATORY COMMISSIONS?

A. Yes. I have testified in more than 200 regulatory proceedings involving electric restructuring, base rate, plant certification, and fuel reconciliation issues, as a consultant to electric consumers and as a former member of the PUC's staff. I have testified in numerous past CEHE regulatory proceedings, including several past Distribution Cost Recovery Factor ("DCRF") and base rate cases.[1] Through my work in these past cases I have become familiar with issues impacting the Company's DCRF, transmission and distribution ("T&D") spending levels and base rate charges. I have also testified on behalf of consumer clients in regulatory proceedings involving all other major investor-owned electric utilities operating in Texas. In addition to my work in Texas, I have testified on electric utility ratemaking, operational, and planning issues before state regulatory commissions in Alaska, Arkansas, Florida, Georgia, Illinois, Iowa, Michigan, Missouri, New Jersey, Louisiana, Oklahoma, Virginia, Washington, and Wisconsin.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to present my evaluation and recommendations regarding certain aspects of CEHE's proposed $5.75 billion System Resiliency Plan ("SRP") for the period 2026-2028, including: 1) the extent to which the Company's proposed SRP is expected to enhance system resiliency; 2) the extent to which the plan prioritizes areas of CEHE's system that have lower performance; and 3) whether CEHE's estimated costs of implementing the resiliency measures ("RM") proposed in the plan are reasonable. In particular, my analysis focuses on CEHE's Vegetation Management ("RM-5") and

[1] *See* Attachment SN-1 which provides a summary of my background and work experience.

Transmission System Hardening ("RM-6"), which together comprise approximately $1.61 billion (28%) of the Company's total SRP cost.

Q. HAVE YOU PREPARED ANY ATTACHMENTS TO SUPPORT YOUR TESTIMONY?

A. Yes. I have prepared 7 attachments, which are included with my testimony.

II. SUMMARY OF TESTIMONY

Q. PLEASE SUMMARIZE YOUR TESTIMONY AND RECOMMENDATIONS.

A. My conclusions and recommendations are as follows:

1) CEHE's SRP Request - CEHE requests approval to expend $5.75 billion over the 2026-2028 period to implement its proposed SRP.[2] CEHE's proposed SRP would cost $3.562 billion (162%) *more* than the Company's original SRP filed last year in PUC Docket No. 56548. CEHE has not fully justified the large increase in spending for its SRP in this case.

2) Guidehouse Inc. Cost/Benefit Analysis for SRP - CEHE retained Guidehouse Inc. ("Guidehouse") to prepare an independent cost/benefit analysis ("CBA") for the Company's proposed SRP. The results of Guidehouse's CBA SRP are not verifiable due to the fact that the Company has not provided a fully unprotected electronic copy of the CBA model. In addition, Guidehouse's CBA model incorporates numerous unsupported input assumptions that impact the projected benefits of the SRP.

3) Guidehouse's Usage of Value of Lost Load ("VOLL") Estimates - Guidehouse's CBA model questionably includes a $35,000 per MWh VOLL estimate as a benefit to customers of CEHE's SRP measures. The $35,000 VOLL estimate should not serve as the basis for justifying major utility investments such as CEHE's proposed SRP. This $35,000 value estimate is based on a VOLL analysis prepared for ERCOT to be used in transmission planning studies and accordingly does not make for a good VOLL estimate input for a plan

[2] *See* the Direct Testimony of CEHE witness Nathan Brownell at 30.

that mostly contemplates distribution related investments. The VOLL estimates do not represent electric cost savings but rather represent a proxy for the economic costs that customers incur due to a power outage, or the average customer's willingness to pay to avoid an outage. The VOLL benefits are based on subjective customer surveys, are uncertain, and vary depending on factors such as the type of customer (i.e., residential, commercial or industrial), as well as the location, intensity, duration and time of severe weather events. Moreover, CEHE is not willing to guarantee that these benefits would even occur.[3] VOLL benefits should instead be treated as a qualitative benefit of electric reliability improvements rather than as a quantifiable electric cost benefit. For these reasons, I recommend that the Commission disallow CEHE's proposed use of the VOLL to justify SRP resiliency investments proposed in this case.

4) Vegetation Management Initiative (RM-5) - I recommend that the Commission reduce CEHE's request of $146.1 million to $25 million for VM resiliency spending for the 2026-2028 period.[4] My recommendation is based on the fact that the Company has not demonstrated that the proposed level of spending is justified, likely to benefit customers, the best available alternative, or otherwise in the public interest. While there are strong arguments for total disallowance of CEHE's VM resiliency spending request, I recommend that the Company be allowed to recover a total of $25.0 million for VM resiliency for the 2026-2028 SRP period ($8.33 million per year), which would provide a 23.9% increase over the $34.8 million per year average VM spending incurred in the five years before the SRP Rule was enacted.[5] My recommendation is equivalent to the amount requested by CEHE for the VM resiliency measure proposed in PUC Docket No. 56548.[6] My recommended allowed spending level for VM resiliency would result in a $121.1 million (2.1%) reduction to CEHE's $5.75 billion total SRP request in this case. I further recommend that the Commission require CEHE to maintain data on the cost and reliability

[3] *See* Attachment SN-5.

[4] *See* the Direct Testimony of CEHE witness Nathan Brownell, Exhibit NB-6.

[5] *See* Table 2 of my testimony.

[6] *See* the Direct Testimony of CEHE witness Nathan Brownell, Exhibit NB-6.

benefits of its VM resiliency measure over the next three years as a guide for evaluating any future levels of spending for VM resiliency.

5) Transmission System Hardening Initiative (RM-6) – I recommend that the Commission reduce CEHE's request of $1.47 billion to $501.7 million for Transmission Hardening resiliency spending for the 2026-2028 period.[7] My recommendation is based on the fact that the Company has not demonstrated that the proposed level of spending is justified, likely to benefit customers, the best available alternative, or otherwise in the public interest. The projected improvement in system reliability due to the proposed additional Transmission Hardening spending is only 0.005%. However, my recommendation still contemplates recommending CEHE be allowed to recover $501.7 million for transmission hardening for the 2026-2028 SRP period. I base my recommended investment amount on the Company's average spending on transmission hardening resiliency of $167.2 million per year over the last four years.[8] My recommended allowed spending level for transmission hardening resiliency would result in a $966.3 million (16.8%) reduction to CEHE's $5.75 billion total SRP request in this case.

I further recommend that the Commission require CEHE to maintain data on the cost and reliability benefits of its Transmission Hardening resiliency measure over the next three years as a guide for evaluating any future levels of spending for Transmission Hardening.

III. SUMMARY OF CEHE'S SRP APPLICATION

Q. WHAT ARE CEHE'S REQUESTS RELATED TO THE SRP PRESENTED IN THIS CASE?

A. CEHE's SRP Application ("Application") requests that the Commission:

- approve the Company's System Resiliency Plan and the Company's proposed Resiliency Measures pursuant to Public Utility Regulatory Act ("PURA") Sec. 38.078. Transmission and Distribution System Resiliency Plan and Cost Recovery;

[7] *See* the Direct Testimony of CEHE witness Nathan Brownell, Exhibit NB-6.

[8] Sources are CEHE's response to TCUC 1-15 and SRP Application page 16.

- approve the Company's microgrid pilot program;
- include the Company's requested accounting language in the Commission's order approving the Company's SRP; and
- include language in the Commission's order that would provide the Company the flexibility to immediately begin implementation of all or portions of the SRP.[9]

Q. WHAT IS YOUR UNDERSTANDING OF THE KEY PURA REQUIREMENTS FOR APPROVAL OF CEHE'S SRP?

A. It is my understanding that key provisions of PURA Sec. 38.078 ("T&D Resiliency Statute") related to approval of CEHE's SRP include:

> (b) An electric utility may file, in a manner authorized by commission rule, a plan to enhance the resiliency of the utility's transmission and distribution system through at least one of the following methods:
>
> 1. hardening electrical transmission and distribution facilities;
> 2. modernizing electrical transmission and distribution facilities;
> 3. undergrounding certain electrical distribution lines;
> 4. lightning mitigation measures;
> 5. flood mitigation measures;
> 6. information technology;
> 7. cybersecurity measures;
> 8. physical security measures;
> 9. vegetation management; or
> 10. wildfire mitigation and response.
>
> (c) A plan must explain the systematic approach the electric utility will use to carry out the plan during at least a three-year period.
>
> (d) In determining whether to approve a plan filed under this section, the commission shall consider:
>
> (1) the extent to which the plan is expected to enhance system resiliency, including whether the plan prioritizes areas of lower performance; and
>
> (2) the estimated costs of implementing the measures proposed in the plan.
>
> (h) An electric utility's implementation of a plan approved under this section may be reviewed for the purposes of Chapter 36 or this chapter. If the commission determines that the costs to implement an approved plan were imprudently incurred or otherwise unreasonable, those costs are subject to disallowance.
>
> (l) Plan costs considered by the commission to be reasonable and prudent may include only incremental costs that are not already being recovered through the electric utility's base rates

[9] *See* CEHE's SRP Application at 20.

or any other rate rider and must be allocated to customer classes pursuant to the rate design most recently approved by the commission.

Q. DOES CEHE MAINTAIN THE BURDEN OF PROOF WITH REGARD TO THE REASONABLENESS OF COSTS AND BENEFITS OF THE PROPOSED SRP?

A. Yes, it is my understanding that the Commission's Transmission and Distribution System Resiliency Plan rules ("T&D SRP Rule") specifies that "A utility seeking approval of a resiliency plan bears the burden of proof on each aspect of its resiliency plan".[10]

Q. WHAT IS THE DEFINITION OF RESILIENCY EVENT UNDER THE COMMISSION'S T&D SRP RULE?

A. The Commission's T&D SRP rule defines Resiliency Event as "an event involving extreme weather conditions, wildfires, cybersecurity threats, or physical security threats that poses a material risk to the safe and reliable operation of an electric utility's transmission and distribution systems."[11] CEHE indicates that resiliency is the ability "to prevent, withstand, mitigate, or promptly recover from the risks posed by" resiliency events that impact the Company's T&D system.[12]

Q. PLEASE DESCRIBE CEHE'S T&D SYSTEM.

A. CEHE's T&D system is comprised of approximately 3,900 miles of overhead transmission lines, 260 substations, and approximately 30,000 miles of overhead distribution lines and 28,000 miles of underground distribution lines, along with streetlights, SCADA equipment, a telecommunications network, and miscellaneous associated equipment.[13]

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[10] *See* 16 Tex. Admin. Code § 25.62(a)(2).

[11] *See* 16 Tex. Admin. Code § 25.62(b)(3).

[12] *See* the Direct Testimony of CEHE witness Nathan Brownell at 21.

[13] *See* Brownell Direct Testimony at 10.

Q. DID CEHE INVEST IN T&D RESILIENCY PROJECTS PRIOR TO THE ADOPTION OF THE COMMISSION'S T&E SRP RULE IN FEBRUARY OF 2024?

A. Yes. CEHE invested approximately $4.9 billion in its Transmission and Distribution (T&D) system since 2020 and approximately $1.3 billion of that investment was related to T&D resiliency projects.[14] In addition, in response to impacts of severe storms in May 2024 (the "May 2024 Storms") and Hurricane Beryl in July 2024, the Company established the Greater Houston Resiliency Initiative ("GHRI"), a set of commitments to further enhance the resiliency of its T&D system, to improve communications with customers, and to strengthen community partnerships.[15] The Company indicates that the investments to meet its reliability commitments under the GHRI will be completed by July of 2025 and once completed are expected to reduce annual CEHE system CMI by 125 million minutes annually.[16]

Q. WHAT IS THE TOTAL ESTIMATED COST OF CEHE'S SRP?

A. The estimated cost of CEHE's SRP, which includes 39 resiliency measures, is approximately $5.75 billion over the 2026-2028 period.[17] The Company estimates that this proposed SRP investment will serve to reduce customer outage time due to extreme weather events by approximately 1.31 billion minutes per year.[18]

Q. WHAT IS THE ESTIMATED RATE IMPACT OF CEHE'S SRP ON CUSTOMERS?

A. The Company estimates the proposed capital investment under the SRP will increase customer bills by approximately $7.33 per month over the 2026 – 2028 period.[19]

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[14] *See* Brownell Direct Testimony at 25-26.

[15] *See* Brownell Direct Testimony at 27-30.

[16] *See* Brownell Direct Testimony at 28-29.

[17] *See* Brownell Direct Testimony at 16-18.

[18] *See* Brownell Direct Testimony at 18.

[19] *See* CEHE's SRP Application at 11.

IV. GUIDEHOUSE COST/BENEFIT ANALYSIS

Q. HAS CEHE PROVIDED TESTIMONY ADDRESSING THE COSTS AND BENEFITS OF THE PROPOSED SRP?

A. Yes. CEHE engaged Guidehouse Inc. ("Guidehouse") to provide an independent analysis of the SRP, which included interviews with Company subject matter experts, vulnerability analysis for weather-related Resiliency Events, assessment of the proposed Resiliency Measures using a cost-benefit framework, and a comparison of the proposed Resiliency Measures to those adopted by other electric utilities.[20]

Q. HAVE YOU REVIEWED THE GUIDEHOUSE TESTIMONY AND ANALYSIS OF CEHE'S SRP?

A. Yes. I have reviewed the testimony of Guidehouse witnesses Eugene Shlatz and Joseph Baugh along with the Guidehouse report attached as Exhibit ELS-2 to Mr. Shlatz's testimony, which describes Guidehouse's analysis of CEHE's SRP.

Q. DOES GUIDEHOUSE ADDRESS THE OVERALL SYSTEM RELIABILITY IMPACTS OF CEHE'S PROPOSED RESILIENCY MEASURES?

A. No. For example, Guidehouse did not evaluate the predicted reliability impacts[21] of CEHE's proposed resiliency measures on extreme weather or total system outage minutes.

Q. IS THE FORECASTED IMPACT OF EXTREME WEATHER EVENTS ON CEHE'S SYSTEM RELIABILITY SIGNIFICANT?

A. No. As summarized in Table 1 below, CEHE's system reliability over the last 7 years has averaged approximately 99.80% with major weather events and would only improve to 99.83% (i.e., by 0.03%) with major events assuming CEHE's estimate of CMI reductions under the proposed $5.75 billion SRP are realized.

[20] *See* CEHE's SRP Application at 18.

[21] "Reliability impacts" are the percentage of total time in an annual period that electric service was provided to CEHE customers on average.

Table 1
Impact of CEHE's SRP on System Reliability[22]

	T&D CMI w Major Events All SRP Measures
2017-24 Average CMI	2,885,903,447
2017-24 Reliability w/o SRP	99.8039%
SRP Est. CMI Reduction	436,312,459
Total w SRP CMI Reduction	2,449,590,988
2026-28 T&D Reliability w SRP	99.8336%
Reliability Change w SRP	**0.030%**

Q. DO YOU HAVE ANY CONCERNS REGARDING THE GUIDEHOUSE CBA FOR CEHE'S SRP?

A. Yes. I have serious concerns regarding Guidehouse's analysis of the SRP, including:

- the reasonableness of costs of CEHE's proposed SRP measures cannot be verified because the Company has not yet produced a fully unprotected version of Guidehouse's CBA model;
- Guidehouse's CBA modeling improperly treated non-electric VOLL estimates as if they are actual economic benefits of the SRP to CEHE customers; and
- The lack of analysis or historical data to support key input assumptions used for Guidehouse's CBA modeling.

[22] Data sources are CEHE's responses to TCUC 1-11 and TCUC 1-13 for 2017-2024 average CMI data, and CEHE witness Shlatz's Direct Testimony, Exhibit ELS-2, page 16, Table 1-1 for SRP CMI data.

Q. COULD YOU EXPLAIN YOUR CONCERN REGARDING THE VERIFIABILITY OF GUIDEHOUSE'S CBA MODEL?

A. Yes. The Guidehouse CBA model is complex with thousands of calculations and input assumptions. In order to verify the reasonableness of the results of the Guidehouse model it is necessary to be able adjust model input assumptions to see if the model output results are responding appropriately. In my experience, it is standard practice for intervenors to have access to fully unprotected versions of CBA models that support major utility investments in regulatory proceedings in Texas and other jurisdictions. Unfortunately, despite multiple data requests and follow-up discussions with CEHE representatives, a fully unprotected version of the model TCUC requested from CEHE in TCUC's RFI No. 1-1 and 1-8 were not provided to TCUC. CEHE did ultimately provide a version of the model that allowed for certain inputs to be adjusted, however, this version of the Guidehouse model still had some tabs in "read only" format and was not the exact model used by CEHE during the March 17, 2025 Technical Conference.

Q. PLEASE EXPLAIN YOUR CONCERN REGARDING GUIDEHOUSE'S USE OF VOLL FOR QUANTIFYING ELECTRIC CUSTOMER BENEFITS OF CEHE'S RESILIENCY MEASURES?

A. Guidehouse's CBA for the SRP used a VOLL estimate of $35,000 per MWh as a direct quantified benefit to customers resulting from the estimated reduction in customer minutes interrupted ("CMI") attributed to resiliency measures included in CEHE's resiliency plan. The VOLL benefits reflected in Guidehouse's CBA are based on an analysis prepared for the Electric Reliability Council of Texas ("ERCOT") by the Brattle Group ("Brattle Report") for the use in ERCOT transmission planning studies. The Brattle Report notes that its VOLL estimates are for the ERCOT region and do not represent electric cost savings, but rather represent a proxy for the economic costs that customers incur due to a power outage, or the average customer's willingness to pay to avoid an outage.[23] These non-electric VOLL benefits do not show up on customer's electric bills and vary depending on factors such as the type of customer (i.e., residential, commercial or industrial), as well as the location, intensity, duration and time of severe weather events. Because of this

[23] *See* Attachment SN-2, excerpts from Brattle Report for ERCOT on VOLL.

uncertainty and the variability of VOLL estimates among customers classes and storm events, VOLL benefits should be treated as a qualitative benefit of electric reliability improvements rather than as a quantifiable electric cost benefit (such as fuel savings) for evaluating resiliency measures. Unfortunately, Guidehouse included estimated VOLL benefits directly in its CBA and these VOLL benefits are one of the largest components of the forecasted benefits of CEHE's SRP resiliency measures.

Q. HAVE OTHER PARTIES RECOGNIZED THE UNCERTAINTY AND LIMITED USEFULNESS OF VOLL ESTIMATES?

A. Yes. The PUC Staff memorandum in PUC Project No. 55837 also notes that VOLL estimates can vary widely between customer classes as well as with the duration and other characteristics of outage events.[24]

Q. DOES GUIDEHOUSE'S CBA FOR CEHE'S SRP ACCOUNT FOR THE VARIABILITY IN VOLL DUE TO THE DIFFERENCES IN CUSTOMER TYPES AND STORM CHARACTERISTICS?

A. No. The Guidehouse CBA applies the same $35,000 per MWh VOLL estimate to all resiliency measures, regardless of the differences in customer usage types, service voltage levels or extreme weather outage characteristics on CEHE's system. This ignores the Brattle Report VOLL estimates which differ significantly among classes.[25]

Q. GUIDEHOUSE WITNESS SHLATZ SUGGESTS THAT THE COMMISSIION PREVIOUSLY APPROVED A VOLL ESTIMATE THAT SUPPORTS THE VOLL GUIDEHOUSE USED FOR THE CBA OF CEHE'S SRP IN THIS. DO YOU AGREE?

A. No. While PUCT Chairman Gleeson endorsed a VOLL of $35,685 per MWh in a memo he filed in PUC Project No. 55837 "to provide guidance to ERCOT on the Value of Lost Load (VOLL) for use in planning studies and the Performance Credit Mechanism analysis",[26] to my knowledge there have been no Commission orders approving Brattle's

[24] *See* Attachment SN-3, excerpts from PUC Staff memorandum in PUC Project No. 55837.

[25] *See* Attachment SN-2.

[26] *See* Attachment SN-4, PUCT Chairman Gleeson's memorandum in PUC Project No. 55837.

ERCOT VOLL estimate for use in approving major utility investments such as the SRP or for other purposes. Moreover, the PUC Staff Recommendation filed in Project No. 55837 concluded that VOLL estimates should only be used for the purpose of cost-benefit analyses in ERCOT planning models.[27]

Q. IS CEHE WILLING TO GUARANTEE THE FORECASTED CMI SAVINGS THAT ARE REFLECTED IN GUIDEHOUSE'S CBA FOR THE SRP?

A. No. CEHE states that it cannot guarantee the estimated CMI savings of its proposed resilience measures because actual CMI savings may differ, depending on the specific types of resiliency events that occur and the impact of such events on specific portions of CEHE's transmission and distribution system.[28]

Q. PLEASE SUMMARIZE YOUR RECOMMENDATION ON GUIDEHOUSE'S USE OF VOLL FOR ITS CBA OF CEHE'S SRP?

A. I recommend that the Commission disallow Guidehouse's proposed use of a $35,000 VOLL estimate as the basis for calculating the CMI (outage reduction) benefits of CEHE's proposed SRP resiliency measures. It is improper to use a VOLL estimate that was intended for use only for ERCOT transmission planning studies for evaluating the prudence of major investments such as CEHE's proposed $5.75 billion SRP. The evaluation of major utility investments should be based on actual electric costs and benefits that are reflected in electric bills, not on highly uncertain non-electric value estimates derived from customer surveys that are not guaranteed to occur. The use of societal benefits such as the VOLL to justify major utility investments is likely to result in unjustified electric cost increases to CEHE's customers that are not in the public interest.

[27] *See* Attachment SN-3, Staff Memo at 5.

[28] *See* Attachment SN-5, CEHE's response to TCUC 1-19.

Q. PLEASE EXPLAIN YOUR CONCERN REGARDING THE LACK OF SUPPORT FOR KEY ASSUMPTIONS USED IN GUIDEHOUSE'S CBA FOR THE SRP.

A. The Guidehouse CBA includes numerous assumptions[29] that are not supported by analysis or supporting historical data. For example, Guidehouse has not evaluated historical CMI levels associated with proposed areas to be addressed by CEHE's SRP[30] and the Company has no information for the CMI related to past extreme weather events prior to 2020, therefore it is not possible to determine whether the forecasted CMI "benefits" reflected in Guidehouse's CBA of the SRP are realistic.

V. VEGETATION MANAGEMENT (RM-5)

Q. WHAT AMOUNT IS CEHE REQUESTING FOR ITS PROPOSED VEGETATION MANAGEMENT ("VM") RESILIENCY MEASURE?

A. CEHE is requesting approval of approximately $146.1 million over the 2026-2028 period ($48.7 million per year) for its proposed VM resiliency measure (RM-5).[31]

Q. HOW DOES THE AMOUNT REQUESTED BY CEHE FOR ITS PROPOSED VM RESILIENCY MEASURE COMPARE TO THE COMPANY'S VM EXPENDITURES BEFORE THE T&D SRP RULE WAS IN EFFECT?

A. As shown in Table 2 below, CEHE's proposed $48.7 million per year spending for VM resiliency would result in a 140% increase over the $34.8 million average annual VM spending in the five years before the T&D SRP Rule was placed into effect.

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[29] *See* Attachment SN-6 (CONFIDENTIAL), Summary of Guidehouse CBA Input Assumptions.

[30] *See* Attachment SN-7, CEHE's responses to TCUC 1-19 and TCUC 1-20.

[31] *See* the Direct Testimony of CEHE witness Nathan Brownell, Exhibit NB-6.

Table 2
CEHE's Proposed VM Resiliency Spending vs Historical VM Costs[32]

2019	$32.6
2020	$29.6
2021	$31.4
2022	$34.6
2023	$45.8
2019-23 Avg	$34.8
2026-28 SRP Avg	$48.7
Increase, %	140%

Q. HOW DOES THE AMOUNT REQUESTED BY CEHE FOR ITS PROPOSED VM RESILIENCY MEASURE COMPARE TO THE COMPANY'S REQUEST FOR THE VM RESILIENCY MEASURE IN CEHE'S 2024 SRP APPLICATION FILED IN PUC DOCKET NO. 56548?

A. CEHE's $146.1 million three-year VM request in this case would represent a $121.1 million (484%) increase over the Company's $25.0 million three-year VM resiliency request in PUC Docket No. 56548.[33]

Q. HAS CEHE CITED ANY OTHER FACTORS THAT MIGHT JUSTIFY THE 140% INCREASE IN VM RESILIENCY SPENDING PROPOSED IN THIS CASE WHEN COMPARED TO LEVELS EXPENDED OVER THE LAST SEVERAL YEARS OR THE 484% INCREASE COMPARED TO THE AMOUNT THE COMPANY REQUESTED IN DOCKET NO. 56548?

A. No. The Company generally asserts that the changes in spending from its proposed SRP in Docket No. 56548 were due to 1) the feedback and recommendations received since Hurricane Beryl, and 2) implementation of measures at a more granular project level based on recently conducted service area LiDAR mapping data and predictive modeling and analysis.[34] However, these general explanations do not justify the $121 million proposed increase in VM resiliency spending.

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[32] Sources are CEHE's response to TCUC 1-15 and SRP Application page 16.

[33] *See* Brownell Direct Testimony, Exhibit NB-6, page 1.

[34] *See* Brownell Direct Testimony, pages 44-45.

Q. IS THERE ANY HISTORICAL EVIDENCE THAT VM RESILIENCY SPENDING IS AN EFFECTIVE MEASURE FOR REDUCING OUTAGES DURING EXTREME WEATHER EVENTS?

A. No. CEHE's T&D system reliability including VM and other major events averaged 99.8039% over the period 2017-2024. As summarized in Table 3 below, CEHE's projected reduction in outage time for the VM resiliency measure (45.6 million CMI per year) would only improve CEHE's historical system average T&D reliability by approximately 0.003%.

Table 3
System Reliability Impact of CEHE's VM Resiliency Measure[35]

	T&D CMI w Major Events
	VegMgt Measure
2017-24 Average CMI	2,885,903,447
2017-24 Reliability w/o SRP	99.8039%
SRP Est. CMI Reduction	45,666,667
Total w SRP CMI Reduction	2,840,236,780
2026-28 T&D Reliability w SRP	99.8070%
Reliability Change w SRP	**0.003%**

Q. WHAT IS YOUR RECOMMENDATION REGARDING CEHE'S REQUEST FOR ADDITIONAL VM RESILIENCY SPENDING?

A. I recommend that the Commission disallow CEHE's request of $146.1 million for VM resiliency spending for the 2026-2028 period. My recommendation is based on the fact that the Company has not demonstrated that the proposed level of spending is justified, likely to benefit customers, the best available alternative, or otherwise in the public interest. A strong argument exists that no additional spending for VM resiliency should be allowed at this time considering the additional amount CEHE has already expended on VM to meet

[35] Data sources are CEHE's responses to TCUC 1-11 and TCUC 1-13 for 2017-2024 average CMI data, and CEHE witness Shlatz's Direct Testimony, Exhibit ELS-2, page 16, Table 1-1 for SRP CMI data.

commitments under the GHRI, and the fact that that the projected improvement in system reliability due to the proposed additional VM spending is 0.003%. However, I recommend that the Company be allowed to recover a total of $25.0 million for VM resiliency for the 2026-2028 SRP period, which is equivalent to the amount requested by CEHE for VM resiliency spending in PUC Docket No. 56548. My recommended allowed spending level for VM resiliency would result in a $121.1 million (2.1%) reduction to CEHE's $5.75 billion total SRP request in this case.

I further recommend that the Commission require CEHE to maintain data on the cost and reliability benefits of its VM resiliency measure over the next three years as a guide for evaluating any future levels of spending for VM resiliency.

Q. IS YOUR PROPOSED ADJUSTMENT TO CEHE'S REQUEST FOR VM RESILIENCY SPENDING A DISALLOWANCE?

A. No. My recommendation, would provide CEHE a 23.9% increase over average VM spending for the five-year period before the Commission's T&D SRP Rule was placed into effect.

VI. TRANSMISSION SYSTEM HARDENING (RM-6)

Q. WHAT AMOUNT IS CEHE REQUESTING FOR ITS PROPOSED VEGETATION MANAGEMENT ("VM") RESILIENCY MEASURE?

A. CEHE is requesting approval of approximately $1.47 billion over the 2026-2028 period ($489.6 million per year) for its proposed VM resiliency measure (RM-6).[36]

Q. HOW DOES THE AMOUNT REQUESTED BY CEHE FOR ITS PROPOSED TRANSMISSION HARDENING RESILIENCY MEASURE COMPARE TO THE COMPANY'S TRANSMISSION HARDENING EXPENDITURES BEFORE THE T&D SRP RULE WAS IN EFFECT?

A. As shown in Table 4 below, CEHE's proposed $489.6 million per year spending for Transmission Hardening resiliency (RM-6) would result in a 390% increase over the

[36] *See* Brownell Direct Testimony, Exhibit NB-6.

$125.5 million average annual spending for Transmission Hardening in the five years before the T&D SRP Rule was placed into effect.

Table 4
CEHE's SRP Transmission System Hardening vs Historical Costs[37]

2019	$10.8
2020	$13.3
2021	$160.4
2022	$275.3
2023	$167.9
2019-23 Avg	$125.5
2026-28 SRP Avg	$489.6
Increase, %	390%

Q. HOW DOES THE AMOUNT REQUESTED BY CEHE FOR ITS PROPOSED TRANSMISSION HARDENING RESILIENCY MEASURE COMPARE TO THE COMPANY'S REQUEST FOR THE TRANSMISSION HARDENING MEASURE IN CEHE'S 2024 SRP APPLICATION FILED IN PUC DOCKET NO. 56548?

A. CEHE's $1.47 billion three-year Transmission Hardening request in this case would represent a $1.09 billion (290%) increase over the Company's $377.0 million three-year Transmission Hardening resiliency request in PUC Docket No. 56548.[38]

Q. HAS CEHE CITED ANY OTHER FACTORS THAT MIGHT JUSTIFY THE 290% INCREASE IN TRANSMISSION HARDENING RESILIENCY SPENDING PROPOSED IN THIS CASE WHEN COMPARED TO THE AMOUNT REQUESTED BY THE COMPANY IN DOCKET NO. 56548?

A. No. As explained earlier in my testimony, CEHE has generally asserted that the changes in spending from its proposed SRP in Docket No. 56548 were due to feedback and recommendations received since Hurricane Beryl and certain enhancements in predictive modeling and analysis underlying the Company's CBA for the SRP.[39] However, these

[37] Sources are CEHE's response to TCUC 1-15 and SRP Application page 16.

[38] *See* Brownell Direct Testimony, Exhibit NB-6, page 1.

[39] *See* Brownell Direct Testimony, pages 44-45.

general explanations do not justify CEHE's proposed $1.09 million increase in Transmission Hardening resiliency spending.

Q. IS THERE ANY HISTORICAL EVIDENCE THAT TRANSMISSION HARDENING RESILIENCY SPENDING IS AN EFFECTIVE MEASURE FOR REDUCING OUTAGES DURING EXTREME WEATHER EVENTS?

A. No. In fact, as summarized in Table 5 below, CEHE's projected reduction in outage time for the Transmission Hardening resiliency measure (74.6 million CMI per year) is projected to improve the 99.8039% historical average reliability of its T&D system including major events by approximately 0.005%. Such a small improvement in system reliability would not be noticeable by most customers.

Table 5
System Reliability Impact of CEHE's Transmission Hardening Resiliency Measure[40]

	T&D CMI w Major Events Trans Hard Measure
2017-24 Average CMI	2,885,903,447
2017-24 Reliability w/o SRP	99.8039%
SRP Est. CMI Reduction	74,600,000
Total w SRP CMI Reduction	2,811,303,447
2026-28 T&D Reliability w SRP	99.8090%
Reliability Change w SRP	**0.005%**

[40] Data sources are CEHE's responses to TCUC 1-11 and TCUC 1-13 for 2017-2024 average CMI data, and CEHE witness Shlatz's Direct Testimony, Exhibit ELS-2, page 16, Table 1-1 for SRP CMI data.

Q. WHAT IS YOUR RECOMMENDATION REGARDING CEHE'S REQUEST FOR ADDITIONAL TRANSMISSION HARDENING RESILIENCY SPENDING?

A. I recommend that the Commission reduce CEHE's $1.47 billion request for Transmission Hardening resiliency spending for the 2026-2028 period by $966.3 million. My recommendation is based on the fact that the Company has not demonstrated that the proposed level of spending is justified, likely to benefit customers, the best available alternative, or otherwise in the public interest. A strong argument exists that no additional spending for Transmission Hardening resiliency should be allowed at this time considering the fact that CEHE has already expended $669 million[41] on transmission system hardening since 2021 and the fact that that CEHE's projected improvement in T&D system reliability including major events with the proposed additional Transmission Hardening spending under the SRP is only 0.005%. However, I recommend that the Company be allowed to recover a total of $501.7 million for the 2026-2028 SRP period, which is based on the Company's average spending on Transmission Hardening resiliency of $167.2 million per year over the last four years. My recommended allowed spending level for Transmission Hardening resiliency would result in a $966.3 million (16.8%) reduction to CEHE's $5.75 billion total SRP request in this case.

I further recommend that the Commission require CEHE to maintain data on the cost and reliability benefits of its Transmission Hardening resiliency measure over the next three years as a guide for evaluating any future levels of spending for Transmission Hardening.

Q. IS YOUR PROPOSED ADJUSTMENT TO CEHE'S REQUEST FOR TRANSMISSION HARDENING RESILIENCY A DISALLOWANCE?

A. No. My recommendation, would provide CEHE a $41.7 million per year (33.2%) increase over average annual Transmission Hardening spending for the five-year period before the Commission's T&D SRP Rule was placed into effect.

[41] Source is CEHE's response to TCUC 1-15.

Q. DOES THE FACT THAT YOU HAVE NOT ADDRESSED OTHER RESILIENCY MEASURES INCLUDED IN CEHE'S PROPOSED SRP MEAN THAT YOU SUPPORT THOSE MEASURES IN THE COMPANY'S REQUESTS?

A. No.

VII. TCUC'S RATE CASE EXPENSE

Q. PLEASE SUMMARIZE THE SERVICES PROVIDED TO TCUC BY NORWOOD ENERGY CONSULTING IN THIS CASE.

A. Norwood Energy Consulting has provided TCUC with technical analysis, advice and expert testimony addressing the issues presented in my testimony. The services provided by Norwood Energy Consulting to TCUC have included and/or will include: 1) review and analysis of CEHE's direct testimony and discovery responses; 2) review of past testimony and orders addressing issues in this case; 3) identification of issues and preparation of direct testimony; 4) analysis of CEHE's rebuttal testimony; 5) assistance with analysis of settlement proposals; 6) the provision of technical support to TCUC's legal team with regard to cross examination during the hearing, depositions and in preparation of post-hearing briefs; and 7) potential assistance with related appeals.

Q. WHAT ARE THE TOTAL CHARGES BILLED TO DATE BY NORWOOD ENERGY CONSULTING FOR SERVICES PROVIDED TO TCUC ON THIS CASE?

A. Norwood Energy Consulting has incurred total charges of $11,125 for services provided to TCUC on this case through March 31, 2025.

Q. ARE THE HOURLY RATES CHARGED TO TCUC BY NORWOOD ENERGY CONSULTING IN THIS PROCEEDING COMPARABLE TO THE FEES CHARGED BY OTHER FIRMS FOR SIMILAR CONSULTING SERVICES?

A. Yes. My hourly rate of $240 for services provided to TCUC in this proceeding is comparable to or lower than the hourly rates charged by other regulatory consultants with similar experience, based on my knowledge of rates charged in other proceedings. The hourly rate charged for this project is equal to or less than the hourly rates charged to other

clients for similar services for contracts entered into during the time period contemporaneous with this proceeding.

Q. HAVE THE SERVICES PERFORMED BY NORWOOD ENERGY CONSULTING FOR TCUC IN THIS PROCEEDING BEEN PROVIDED IN A PROFESSIONAL, TIMELY, AND EFFICIENT MANNER?

A. Yes. The services that Norwood Energy Consulting provided to TCUC are detailed on monthly invoices, which include a detailed description of the services performed, the number of hours charged, and the hourly rate for each consultant. The individual charges and rates are reasonable, consistent with the rates billed to others for similar work, and comparable to rates charged by other professionals with the same level of expertise and experience. The amounts charged for such service are reasonable, the calculation of the charges is correct, and there has been no double billing of charges. All work performed was relevant and reasonably necessary to the proceeding.

Q. HAS NORWOOD ENERGY CONSULTING CHARGED ANY AMOUNTS FOR TRAVEL, LODGING, MEALS, OR OTHER EXPENSES INCURRED DIRECTLY FOR THIS PROJECT?

A. No.

Q. ARE THE CHARGES INCURRED TO DATE BY HERRERA LAW & ASSOCIATES, PLLC FOR LEGAL SERVICES RELATED TO TCUC'S INTERVENTION IN THIS CASE REASONABLE AND IN ACCORDANCE WITH COMMISSION STANDARDS?

A. Yes. The to-be-filed Affidavit of Alfred R. Herrera, which addresses the reasonableness of Herrera Law & Associates, PLLC's legal charges for this proceeding will be filed before the conclusion of this proceeding.

Q. DOES THAT CONCLUDE YOUR TESTIMONY?

A. Yes.

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-1:

Background and Experience of Scott Norwood

DON SCOTT NORWOOD

Norwood Energy Consulting, L.L.C.

P. O. Box 30197
Austin, Texas 78755-3197
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SUMMARY

Scott Norwood is an energy consultant with over 40 years of utility industry experience in the areas of regulatory consulting, resource planning and energy procurement. His clients include government agencies, publicly-owned utilities, public service commissions, municipalities and various electric consumer interests. Over the last 15 years Mr. Norwood has presented expert testimony on electric utility ratemaking, resource planning, and electric utility restructuring issues in over 200 regulatory proceedings in Arkansas, Georgia, Iowa, Illinois, Michigan, Missouri, New Jersey, Oklahoma, South Dakota, Texas, Virginia, Washington and Wisconsin.

Prior to founding Norwood Energy Consulting in January of 2004, Mr. Norwood was employed for 18 years by GDS Associates, Inc., a Marietta, Georgia based energy consulting firm. Mr. Norwood was a Principal of GDS and directed the firm's Deregulated Services Department which provided a range of consulting services including merchant plant due diligence studies, deregulated market price forecasts, power supply planning and procurement projects, electric restructuring policy analyses, and studies of power plant dispatch and production costs.

Before joining GDS, Mr. Norwood was employed by the Public Utility Commission of Texas as Manager of Power Plant Engineering from 1984 through 1986. He began his career in 1980 as Staff Electrical Engineer with the City of Austin's Electric Utility Department where he was in charge of electrical maintenance and design projects at three gas-fired power plants.

Mr. Norwood is a graduate of the college of electrical engineering of the University of Texas.

EXPERIENCE

The following summaries are representative of the range of projects conducted by Mr. Norwood over his 30-year consulting career.

Regulatory Consulting

Oklahoma Industrial Energy Consumers - Assisted client with technical and economic analysis of proposed EPA regulations and compliance plans involving control of air emissions and potential conversion of coal-to-gas conversion options.

Cities Served by Southwestern Electric Power Company Analyzed and presented testimony regarding the prudence of a $1.7 billion coal-fired power plant and related settlement agreements with Sierra Club.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Consolidated Edison Company to provide the New York Public Service Commission with guidance in determining areas that should be reviewed in detailed management audit of the company.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony on affiliate energy trading transactions by AEP in ERCOT.

Virginia Attorney General Analyzed and presented testimony regarding distribution tap line undergrounding program proposed by Dominion Virginia Power Company.

Cities Served by Southwestern Electric Power Company – Analyzed and presented testimony regarding the prudence of the utility's decision to retire the Welsh Unit 2 coal-fired generating unit in conjunction with a litigation settlement agreement with Sierra Club.

Georgia Public Service Commission - Presented testimony before the Georgia Public Service Commission in Docket 3840-U, providing recommendations on nuclear O&M levels for Hatch and Vogtle and recommending that a nuclear performance standard be implemented in the State of Georgia.

Oklahoma Industrial Energy Consumers - Analyzed and presented testimony addressing power production and coal plant dispatch issues in fuel prudence cases involving Oklahoma Gas and Electric Company.

Georgia Public Service Commission - Analyzed and provided recommendations regarding the reasonableness of nuclear O&M costs, fossil O&M costs and coal inventory levels reported in GPC's 1990 Surveillance Filing.

City of Houston - Analyzed and presented comments on various legislative proposals impacting retail electric and gas utility operations and rates in Texas.

New York Public Service Commission - Conducted inter-company statistical benchmarking analysis of Rochester Gas & Electric Company to provide the New York Public Service Commission with guidance in determining areas which should be reviewed in detailed management audit of the company.

Virginia Attorney General Analyzed and presented testimony regarding an accelerated vegetation management program and rider proposed by Appalachian Power Company.

Oklahoma Attorney General – Analyzed and presented testimony regarding fuel and purchased power, depreciation and other expense items in Oklahoma Gas & Electric Company's 2001 rate case before the Oklahoma Corporation Commission.

City of Houston - Analyzed and presented testimony regarding fossil plant O&M expense levels in Houston Lighting & Power Company's rate case before the Public Utility Commission of Texas.

City of El Paso - Analyzed and presented testimony regarding regulatory and technical issues related to the Central & Southwest/El Paso Electric Company merger and rate proceedings before the PUCT, including analysis of merger synergy studies, fossil O&M and purchased power margins.

Residential Ratepayer Consortium - Analyzed Fermi 2 replacement power and operating performance issues in fuel reconciliation proceedings for Detroit Edison Company before the Michigan Public Service Commission.

Residential Ratepayer Consortium - Analyzed and prepared testimony addressing coal plant outage rate projections in the Consumer's Power Company fuel proceeding before the Michigan Public Service Commission.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1991 rate case before the Public Utility Commission of Texas.

City of Houston - Analyzed and developed testimony regarding the operations and maintenance expenses and performance standards for the South Texas Nuclear Project, and operations and maintenance expenses for the Limestone and Parish coal-fired power plants in HL&P's 1991 rate case before the PUCT.

City of El Paso - Analyzed and developed testimony regarding Palo Verde operations and maintenance expenses in El Paso Electric Company's 1990 rate case before the Public Utility Commission of Texas. Recommendations were adopted.

Energy Planning and Procurement Services

Virginia Attorney General – Review and provide comments or testimony regarding annual integrated resource plan filings made by Dominion Virginia Power and Appalachian Power Company.

Dell Computer Corporation – Negotiated retail power supply agreement for Dell's Round Rock, Texas facilities producing annual savings in excess of $2 million.

Texas Association of School Boards Electric Aggregation Program Serve as TASB's consultant in the development, marketing and administration of a retail electric aggregation program consisting of 2,500 Texas schools with a total load of over 300 MW. Program produced annual savings of more than $30 million in its first year.

Oklahoma Industrial Energy Consumers - Analyzed and drafted comments addressing integrated resource plan filings by Public Service Company of Oklahoma and Oklahoma Gas and Electric Company.

S.C. Johnson - Analyzed and presented testimony addressing Wisconsin Electric Power Company's $4.1 billion CPCN application to construct three coal-fired generating units in southeast Wisconsin.

Oklahoma Industrial Energy Consumers - Analyzed wind energy project ownership proposals by Oklahoma Gas and Electric Company and presented testimony addressing project economics and operational impacts.

City of Chicago, Illinois Attorney General, Illinois Citizens' Utility Board - Analyzed Commonwealth Edison's proposed divestiture of the Kincaid and State Line power plants to SEI and Dominion Resources.

Georgia Public Service Commission - Analyzed and presented testimony on Georgia Power Company's integrated resource plan in a certification proceeding for an eight unit, 640 MW combustion turbine facility.

South Dakota Public Service Commission - Evaluated integrated resource plan and power plant certification filing of Black Hills Power & Light Company.

Shell Leasing Co. - Evaluated market value of 540 MW western coal-fired power plant.

Community Energy Electric Aggregation Program – Served as Community Energy's consultant in the development, marketing and start-up of a retail electric aggregation program consisting of major charitable organizations and their donors in Texas.

Austin Energy – Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Austin Energy - Provided technical assistance in the evaluation of the economic viability of the

City of Austin's ownership interest in the South Texas Project.

Austin Energy - Assisted with regional production cost modeling analysis to assess production cost savings associated with various public power merger and power pool alternatives.

Sam Rayburn G&T Electric Cooperative - Conducted competitive solicitation for peaking capacity. Developed request for proposal, administered solicitation and evaluated bids.

Rio Grande Electric Cooperative, Inc. - Directed preparation of power supply solicitation and conducted economic and technical analysis of offers.

Virginia Attorney General Review and provide comments or testimony regarding annual demand-side management program programs and rider proposals made by Dominion Virginia Power and Appalachian Power Company.

Austin Energy – Conducted modeling to assess potential costs and benefits of a municipal power pool in Texas.

Electric Restructuring Analyses

Electric Power Research Institute - Evaluated regional resource planning and power market dispatch impacts on rail transportation and coal supply procurement strategies and costs.

Arkansas House of Representatives – Critiqued proposed electric restructuring legislation and identified suggested amendments to provide increased protections for small consumers.

Virginia Legislative Committee on Electric Utility Restructuring – Presented report on status of stranded cost recovery for Virginia's electric utilities.

Georgia Public Service Commission – Developed models and a modeling process for preparing initial estimates of stranded costs for major electric utilities serving the state of Georgia.

City of Houston – Evaluated and recommended adjustments to Reliant Energy's stranded cost proposal before the Public Utility Commission of Texas.

Oklahoma Attorney General – Evaluated and advised the Attorney General on technical, economic and regulatory policy issues arising from various electric restructuring proposals considered by the Oklahoma Electric Restructuring Advisory Committee.

State of Hawaii Department of Business, Economics and Tourism – Evaluated electric restructuring proposals and developed models to assess the potential savings from deregulation of the Oahu power market.

Virginia Attorney General - Served as the Attorney General's consultant and expert witness in the evaluation of electric restructuring legislation, restructuring rulemakings and utility proposals addressing retail pilot programs, stranded costs, rate unbundling, functional separation plans, and competitive metering.

Western Public Power Producers, Inc. - Evaluated operational, cost and regional competitive impacts of the proposed merger of Southwestern Public Service Company and Public Service Company of Colorado.

Iowa Department of Justice, Consumer Advocate Division - Analyzed stranded investment and fuel recover issues resulting from a market-based pricing proposal submitted by MidAmerican Energy Company.

Cullen Weston Pines & Bach/Citizens' Utility Board - Evaluated estimated costs and benefits of the proposed merger of Wisconsin Energy Corporation and Northern States Power Company (Primergy).

City of El Paso - Evaluated merger synergies and plant valuation issues related to the proposed acquisition and merger of El Paso Electric Company and Central & Southwest Company.

Rio Grande Electric Cooperative, Inc. - Analyzed stranded generation investment issues for Central Power & Light Company.

Power Plant Management

City of Austin Electric Utility Department - Analyzed the 1994 Operating Budget for the South Texas Nuclear Project (STNP) and assisted in the development of long-term performance and expense projections and divestiture strategies for Austin's ownership interest in the STNP.

City of Austin Electric Utility Department - Analyzed and provided recommendations regarding the 1991 capital and O&M budgets for the South Texas Nuclear Project.

Sam Rayburn G&T Electric Cooperative - Developed and conducted operational monitoring program relative to minority owner's interest in Nelson 6 Coal Station operated by Gulf States Utilities.

KAMO Electric Cooperative, City of Brownsville and Oklahoma Municipal Power Agency - Directed an operational audit of the Oklaunion coal-fired power plant.

Sam Rayburn G&T Electric Cooperative - Conducted a management/technical assessment of the Big Cajun II coal-fired power plant in conjunction with ownership feasibility studies for the project.

Kamo Electric Power Cooperative - Developed and conducted operational monitoring program for client's minority interest in GRDA Unit 2 Coal Fired Station.

Northeast Texas Electric Cooperative - Developed and conducted operational monitoring program concerning NTEC's interest in Pirkey Coal Station operated by Southwestern Electric Power Company and Dolet Hills Station operated by Central Louisiana Electric Company.

Corn Belt Electric Cooperative/Central Iowa Power Cooperative - Perform operational monitoring and budget analysis on behalf of co-owners of the Duane Arnold Energy Center.

PRESENTATIONS

Quantifying Impacts of Electric Restructuring: Dynamic Analysis of Power Markets, 1997 NARUC Winter Meetings, Committee on Finance and Technology.

Quantifying Costs and Benefits of Electric Utility Deregulation: Dynamic Analysis of Regional Power Markets, International Association for Energy Economics, 1996 Annual North American Conference.

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-2:

Excerpts from Brattle Report for ERCOT on VOLL

PROJECT NO. 55837

REVIEW OF VALUE OF LOST LOAD	§	**PUBLIC UTILITY COMMISSION**
	§	
IN THE ERCOT MARKET	§	**OF TEXAS**

VALUE OF LOST LOAD STUDY FINAL REPORT

The Brattle Group (Brattle) has completed its analysis of the Value of Lost Load (VOLL) survey results and included its findings in the attached *VOLL Study Final Report* (**Attachment A**). Electric Reliability Council of Texas, Inc. (ERCOT) recommends that the one-hour ERCOT-wide value identified by the survey of ~$35,000[1] per megawatt hour (MWh) be adopted for use in planning activities, including the reliability standard.

I. BACKGROUND

At the February 16, 2023 Open Meeting, the Public Utility Commission of Texas (Commission) discussed the need for a VOLL study in order to support the development of a reliability standard for the ERCOT Region.[2] VOLL represents a proxy for the costs and impacts experienced by customers due to an outage and is an important input to inform the benefits of future investments to improve reliable electric supply. As far back as 2013, the Commission had considered a survey to estimate VOLL and the consultant at that time, London Economics International, LLC, recommended that "arriving at an accurate VOLL estimate for the purposes identified by ERCOT will require a comprehensive customer survey process."[3] The present VOLL Study achieves that objective and provides the first comprehensive survey of VOLL for the ERCOT Region.

Following the Commission's request, ERCOT engaged Brattle and its survey administration subcontractor, PlanBeyond, to conduct the VOLL Study, including a customer survey. The *VOLL Study Final Report* presents the results and conclusions of the VOLL Study

[1] The one-hour, system-wide VOLL for the ERCOT Region yielded by the VOLL survey is $35,685 per MWh.

[2] *See also, Review of Wholesale Electric Market Design*, Project No. 52373, Commissioner McAdam's Memorandum (Feb. 15, 2023) (recommending a review of VOLL).

[3] *Commission Proceeding to Ensure Resource Adequacy in Texas*, Project No. 40000, Value of Lost Load Literature Review and Macroeconomic Analysis Prepared for ERCOT by London Economics International, LLC at bates 3 (June 18, 2013).

performed by Brattle. Part 1 of the VOLL Study entailed a review of 11 VOLL studies conducted in recent years in North America, the United Kingdom, and Germany and identified six key takeaways that informed development and analysis of the customer survey.[4] Under Part 1, Brattle also applied Lawrence Berkeley National Laboratory's (LBNL) econometric model to publicly-available, ERCOT-specific outage and customer data in order to provide options to use as an interim VOLL during the pendency of the VOLL Study.[5] The Commission adopted Commission Staff's recommendation to use $25,000 per MWh as an interim VOLL for planning purposes.[6]

Part 2 of the VOLL Study entailed a survey of retail customers throughout the ERCOT Region. Brattle adapted LBNL's Interruption Cost Estimate (ICE) 2.0 customer surveys for use as the VOLL survey for the ERCOT Region. This resulted in two adapted survey instruments: one for residential customers and one for commercial customers.[7] Brattle's subcontractor, PlanBeyond, utilized the Customer Billing Contact Information (CBCI) submitted by Retail Electric Providers (REPs) to ERCOT in March 2024 to email an individualized survey link to retail customers in competitive areas of the ERCOT Region beginning on March 26, 2024. ERCOT also partnered with five Non-Opt-In Entities (NOIEs) to facilitate distribution of the VOLL survey by those NOIEs to their respective retail customers.[8] The survey concluded on May 31, 2024. As further explained in the *VOLL Study Final Report*, customer completions of the VOLL survey significantly exceeded targets, representing a robust and statistically significant level of customer response. Brattle then developed population-weighted models of customers' willingness-to-pay (WTP), in the case of residential customers, and outage-related cost estimates, in the case of commercial customers, to develop VOLL estimates by length of outage duration and by customer class. These two separate models were necessary based on the differing methodology used for residential and commercial VOLL survey instruments.

[4] VOLL Study Literature Review and Interim VOLL (Dec. 21, 2023).

[5] Note that the interim VOLL was only used for planning purposes, including ERCOT's Reliability Standard Study, and was not considered for wholesale market pricing.

[6] *See* Commission Staff Recommendation Memorandum on Interim VOLL (Jan. 25, 2024) (selecting a value between Options 2a and 2b presented by Brattle).

[7] The survey instruments were previously filed with the Commission and are also included as Appendix A to the *VOLL Study Final Report*. *See* VOLL Study Update at 18-50 (Mar. 14, 2024).

[8] As previously identified, the five NOIEs that chose to partner with ERCOT for performance of the VOLL Study included Bandera Electric Cooperative, CPS Energy, Garland Power & Light, Guadalupe Valley Electric Cooperative, and Pedernales Electric Cooperative, Inc.

II. VOLL RECOMMENDATION

The *VOLL Study Final Report* includes four main sections: (1) a description of VOLL use cases and Brattle's literature review from Part I of the VOLL Study, (2) an explanation of the survey design and administration of the survey, (3) a description of the methodology to estimate VOLL based on the survey responses, and (4) Brattle's conclusions. Table ES.1 from the *Report* presents the topline results of the VOLL survey with VOLL per unserved MWh presented by customer class and by length of outage duration:[9]

Table ES.1: VOLL per Unserved MWh by Customer Class and Duration[10]

	Residential	Commercial & Industrial		ERCOT-Wide
		Small	Medium/Large	
1 hour	$3,964	$666,907	$22,721	**$35,685**
2 hours	$3,303	$407,229	$12,783	**$21,326**
4 hours	$2,039	$253,454	$8,064	**$13,340**
8 hours	$1,407	$195,591	$6,507	**$10,435**
16 hours	$1,091	$239,280	$9,463	**$13,581**

These values represent estimates for an outage occurring on a weekday afternoon with no advance notice and are applicable to both the summer and winter seasons. As further explained in the *Report*, this was determined to be the most representative example based on customer survey responses. For further context on the values yielded by the survey, Brattle explains:

> "Based on the literature reviewed in Part I of this study, ERCOT residential VOLLs are on the lower side of the distribution, whereas ERCOT medium/large C&I estimates are comparable to those from other VOLL studies. ERCOT small C&I VOLL estimates, however, are very large and at the high end of the estimates from other studies. The latter is mainly driven by moderate levels of VOLLs per event

[9] In Section IV(D) of the *VOLL Study Final Report*, Brattle notes that transmission-interconnected customers do not typically experience the same level of load shed as distribution-interconnected customers and accordingly presents alternative VOLLs that exclude transmission-interconnected customers. This would result in a one-hour ERCOT-wide VOLL of $61,394 per MWh. While a noteworthy observation, this does not appear to align with any practice identified in other regions or studies and raises questions beyond the scope of the instruction to develop VOLLs for each customer class and a system-wide VOLL. ERCOT recommends proceeding with the $35,000 per MWh VOLL identified in the main body of the report.

[10] Amounts are presented in 2024 dollars.

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-3:

Excerpts from PUC Staff memorandum in PUC Project No. 55837

Public Utility Commission of Texas

Memorandum

TO: Chairman Thomas J. Gleeson
Commissioner Lori Cobos
Commissioner Jimmy Glotfelty
Commissioner Kathleen Jackson
Commissioner Courtney K. Hjaltman

FROM: Chris Brown PhD, Market Analysis
Jacob Bulzak, Market Analysis

DATE: August 22, 2024

RE: **August 29, 2024, Open Meeting – Item No. 15**
Project No. 55837 – *Review of Value of Lost Load in the ERCOT Market*

Staff recommendation for VOLL in ERCOT

During the August 15, 2024 open meeting, Commission Staff (Staff) provided a verbal update about the ongoing Value of Lost Load (VOLL) study for the ERCOT region and committed to filing a memo discussing the results of the VOLL survey and any resulting recommendations ahead of the August 29, 2024 open meeting. ERCOT recently filed the final VOLL study, which included a report on the results of the survey of consumers in the ERCOT region (Report) conducted by ERCOT's contractor, The Brattle Group (Brattle), and survey administrator subcontractor, PlanBeyond.[1] This memo provides Staff's recommendations related to adoption of a VOLL for use in planning studies and the upcoming Performance Credit Mechanism cost-benefit analysis.

Survey Overview

The Brattle team developed a VOLL survey study consistent with the methodology employed by Lawrence Berkeley National Laboratory (LBNL).[2] The survey instruments presented various outage scenarios which differed across several characteristics, including season (winter or summer), duration, start time, day type (weekday or weekend), and whether advance warning of the outage was provided. Survey participants were classified as either residential consumers or commercial and industrial (C&I) consumers, with C&I respondents being further divided into small, medium, and large categories, based on their annual electricity usage. Each survey respondent was presented with a variety of different outage scenarios.

[1] *See* ERCOT Value of Lost Load Study Final Report, AIS Item No. 12 (August 22, 2024).

[2] As a result, the data obtained in this survey may be used to update LBNL's Interruption Cost Estimate (ICE) Calculator, which will improve the coverage and representativeness of the ICE Calculator. The complete survey instruments are presented in Appendix A of the Report.

- Residential consumers were asked if they would be willing to pay a certain amount to avoid a described outage. In the economics literature, this approach is known as a stated preference survey because the researchers are eliciting what respondents say they will do, rather than observing actual choice behavior. The literature review previously conducted by Brattle identified this approach as the most comprehensive way to measure residential consumers' willingness to pay for reliable electricity service.[3]
- C&I consumers were asked to take a more direct approach and estimate the total costs they would incur as a result of a described outage, as well as their least-cost and highest-cost estimates. In particular, respondents were asked to consider aspects such as lost revenues, impacts on labor-related costs, damage to equipment, material damage or spoilage, and savings on wages, unused materials, and fuel or electricity.

The survey effort began with a 'soft' launch to a limited subset of consumers on March 26, 2024. The full roll-out to randomly selected consumers in competitive areas of the ERCOT region began on April 9, 2024. Additionally, five Non-Opt In Entities (NOIEs) sent the survey to a subset of their respective customers during the week of April 15, 2024.[4] All consumers invited to participate also received a reminder email one week after the initial invitation. Data collection concluded on May 31, 2024. Table 1 details the number of survey invitations sent out, the number of completions, and the final dataset sample sizes, by consumer class.

Table 1: Survey Outreach, Completion, and Final Dataset

	Invitations	Completions	Final Dataset
RESIDENTIAL			
Areas open to competition	81,565	2,507	2,494
NOIE Partners	7,102	484	481
Total	88,667	2,991	2,975
SMALL C&I			
Areas open to competition	**114,413**	**1,194**	**1,075**
NOIE Partners	3,333	25	23
Total	**117,746**	**1,219**	**1,098**
MEDIUM C&I			
Areas open to competition	28,444	435	406
NOIE Partners	1,430	21	20
Total	29,874	456	426
LARGE C&I			
Areas open to competition	928	33	27
NOIE Partners	181	3	3
AEP	—	26	26
Total	**1,109**	**62**	**56**
TOTAL C&I			
Areas open to competition	143,785	1,662	1,508
NOIE Partners	4,944	49	46
AEP	--	26	26
Total	148,729	1,737	1,580

[3] *See* VOLL Study Literature Review and Interim VOLL, AIS Item 7 (December 21, 2023).

[4] The NOIEs that participated in the survey were Bandera Electric Cooperative, CPS Energy, Garland Power & Light, Guadalupe Valley Electric Cooperative, and Pedernales Electric Cooperative Inc.

To account for the low number of survey responses by Large C&I consumers, Brattle supplemented the data collected with analogous data from a survey previously conducted by American Electric Power Texas (AEP), in coordination with LBNL, of customers located in its service territory. After compiling all the data, Brattle conducted a series of data validation procedures, including checking for irrational responses and unreasonably rapid completion times.[5] The final dataset sample sizes differed from the number of survey completions for two reasons: (1) some responses were excluded due to the data validation procedures, and (2) Large C&I survey respondents located in the AEP service area were excluded to avoid potential double counting. It is also worth noting that, while the supplemental AEP data is helpful, the number of Medium and Large C&I respondents was still relatively low. To reduce the amount of statistical uncertainty driven by small sample sizes, these classes were pooled together in the final analysis to obtain a single Medium/Large C&I VOLL estimate.

SURVEY RESULTS

Using the data collected, Brattle employed well-established econometric methods to determine VOLL estimates (by consumer class), which were subsequently reweighted to better match ERCOT-wide population and business characteristics. For residential consumers, US Census Bureau data was employed to account for characteristics such as electricity usage, income, location (rural or urban), medical conditions requiring access to reliable electricity service, and whether the respondent works from home. For C&I respondents, Brattle employed County Business Pattern data from the US Census Bureau to account for characteristics such as industry, facility employment, and location (rural or urban).

Table 2 reports VOLL estimates for each consumer class and an ERCOT-wide VOLL, calculated as the load-share weighted average of the consumer class estimates, on a dollars per megawatt-hour (MWh) basis for a variety of outage durations. It is important to note that, while the survey instruments were designed to elicit willingness to pay to avoid outages that differed across various dimensions (e.g., season, time of day, with or without advanced warning), Brattle found no substantive differences in the VOLL estimates across seasons or time of day. It did, however, find that advanced warning lowered the VOLL estimate for all classes. The VOLL estimates described here are for a weekday afternoon outage without warning.

Table 2: VOLL per Unserved MWh by Consumer Class and Duration

	Residential	Commercial & Industrial		ERCOT-Wide
		Small	Medium/Large	
1 hour	$3,964	$666,907	$22,721	$35,685
2 hours	**$3,303**	**$407,229**	**$12,783**	**$21,326**
4 hours	$2,039	$253,454	$8,064	$13,340
8 hours	**$1,407**	**$195,591**	**$6,507**	**$10,435**
16 hours	$1,091	$239,280	$9,463	$13,581
Load Share[6]	30%	3%	67%	

[5] *See* Appendix B of the Report for the details of these data validation procedures.

[6] Calculated using ERCOT-provided usage data.

Staff's primary focus in this memo is on the 1-hour ERCOT-wide VOLL estimate. In comparison to the interim VOLL previously approved by the Commission,[7] the 1-hour ERCOT-wide VOLL estimate of $35,685/MWh described in the Report is approximately $10,000/MWh higher. This difference can be explained, in part, by examining the individual consumer class VOLL estimates. Comparing these estimates against the literature previously reviewed by Brattle[8] reveals that:

- Residential estimates are on the lower end of the distribution.
- Small C&I estimates are large and at the high end of the distribution.
- Medium/Large C&I estimates are comparable to the results of other VOLL studies.

The Small C&I VOLL estimate, at first glance, seems quite large when compared against the estimates for other consumer classes. This is due to the relatively low average hourly consumption of 1.9 kilowatt-hours (kWh) for respondents in this class.[9] Brattle found that the average (population weighted) cost for a one-hour outage event was $1,268 for Small C&I consumers. Converting to a dollars per unserved MWh basis results in the $666,907/MWh figure reported above.

OTHER CONSIDERATIONS

For the primary analysis in the Report, Brattle included data from all consumer classes when determining VOLL estimates. The Report also includes a supplemental analysis with estimates obtained using a subset of the data that excludes Large C&I consumers who are directly connected to the transmission system. Brattle's motivation for this approach was the practice of ERCOT Transmission Service Providers (TSPs) typically excluding transmission-level consumers during a system-wide load shed event. Brattle did not, however, provide any specific reference to Commission rules or ERCOT protocols that mandate this practice, discuss how widely this practice is followed by different TSPs, or discuss how this topic was included in the scope of the study when this survey was planned. While Staff appreciates the level of detail in this analysis, neither the Commission nor Staff were afforded an opportunity to review this novel approach, and Staff does not believe it is an appropriate methodology for determining an ERCOT-wide VOLL. Load shed events resulting from system shortage conditions are not the only cause of interruptions in service and, as such, should not be the sole consideration for determining the value that consumers place on reliable electric service.

[7] *See* Staff Recommendation Memo on Interim VOLL, AIS Item 9 (January 25, 2024).

[8] *See* VOLL Study Literature Review and Interim VOLL, AIS Item 7 (December 21, 2023).

[9] For comparison, the average hourly consumption levels for residential and Medium/Large C&I consumers were found to be 1.8 kWh and 326.3 kWh, respectively.

Staff believes it is also helpful to reiterate a few additional data points discussed previously.[10] Based on the information described below, Staff recommended, and the Commission agreed, that the interim VOLL should be set at $25,000 per MWh.

- In the *2022 State of the Market Report for the MISO Electricity Markets*, Potomac Economics (Potomac) found a region-wide VOLL estimate of $25,000 per MWh.[11]
- In the *2022 State of the Market Report for the ERCOT Electricity Markets*, Potomac noted that the shape of the Operating Reserve Demand Curve (ORDC) implied an underlying VOLL of approximately $47,000 per MWh; however, it also noted that an average VOLL of between $20,000 and $30,000 per MWh is reasonable.[12]
- Based on a review of prior literature and econometric analysis, Brattle proposed interim VOLL values ranging from approximately $25,000 to $60,000 per MWh.[13]

STAFF RECOMMENDATION

Based on the results of the survey of consumers in the ERCOT region and other estimates described in this memo, **Staff recommends that VOLL be set at $30,000 per MWh.**

The VOLL estimate of $35,685 per MWh described in the Report suggests that the interim VOLL of $25,000 per MWh may understate the true VOLL for the ERCOT region. As such, Staff finds this analysis supports an increase from the previously approved interim value. However, based on Staff's review of the Report, Brattle's estimate of the ERCOT-wide VOLL may overstate the true value because the VOLL estimate of $666,907 per MWh for Small C&I consumers is at the high end of the distribution of estimates from similar studies. Since the ERCOT-wide VOLL estimate is calculated as a load-share weighted average of the individual consumer class estimates, over-estimation of any one class will drive up the ERCOT-wide VOLL estimate. The Report states that the 95% confidence interval for the ERCOT-wide VOLL estimate ranges from approximately $25,000 to $53,000 per MWh. Given Staff's opinion that VOLL is likely over-estimated for Small C&I consumers, which in turn drives up the ERCOT-wide VOLL estimate, Staff recommends the Commission take a more conservative approach and select a value on the lower end of this range.

Finally, Staff reiterates that this updated VOLL will be used only for the purpose of cost-benefit analyses in ERCOT planning models. It will not be used to update the ORDC or change any other current market design elements.

[10] *See* Staff Recommendation Memo on Interim VOLL, AIS Item 9 (January 25, 2024).

[11] 2022 State of the Market Report for the MISO Electricity Markets, prepared by Potomac Economics (June 15, 2023).

[12] 2022 State of the Market Report for the ERCOT Electricity Markets, prepared by Potomac Economics (May 2023).

[13] *See* VOLL Study Literature Review and Interim VOLL, AIS Item 7 (December 21, 2023).

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-4:

PUCT Chairman Gleeson's Memorandum in PUC Project No. 55837

Public Utility Commission of Texas

Commissioner Memorandum

TO: Commissioner Lori Cobos
Commissioner Jimmy Glotfelty
Commissioner Kathleen Jackson
Commissioner Courtney K. Hjaltman

FROM: Chairman Thomas J. Gleeson

DATE: August 28, 2024

RE: August 29, 2024 Open Meeting – Item No. 15
Project No. 55837- *Review of Value of Lost Load in the ERCOT Market*

In this project the Commission is being asked to provide guidance to ERCOT on the Value of Lost Load (VOLL) for use in planning studies and the Performance Credit Mechanism analysis. I appreciate the significant work of everyone involved in compiling the VOLL report including ERCOT, the Brattle Group (Brattle), PlanBeyond, market participants and Commission Staff.

In its August 22, 2024 memo, Staff recommends that VOLL be set at $30,000 per MWh.[1] The Brattle report recommends that VOLL be set at $35,685 per MWh.[2] I believe VOLL should be set at $35,685 per MWh as recommended by Brattle. Brattle conducted a detailed and thorough analysis which I believe resulted in a reasonable VOLL recommendation. While I appreciate Staff's analysis and recommendation, I believe we should go with the VOLL recommended by Brattle.

I look forward to discussing this matter with you at the open meeting.

[1] *See* Staff recommendation for VOLL in ERCOT memo at 5, AIS Item 13 (August 22, 2024).
[2] *Id.*

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-5:

CEHE's response to TCUC 1-19

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 57579
SOAH DOCKET NO. 473-25-11558

TEXAS COAST UTILITIES COALITION
REQUEST NO.: TCUC-RFI01-18

QUESTION:

Reference Figure APP-15 on pages 16-18 of CEHE's Application, please indicate whether CEHE is willing to guarantee the level of assumed CMI savings for each proposed resiliency measure as presented in this figure. If not, explain why not.

ANSWER:

The CMI savings stated in Figure APP-15 are estimates of CMI savings and thus actual CMI savings may differ, depending on the specific types of resiliency events that occur and the impact of such events on specific portions of CEHE's transmission and distribution system. For example, if there are no extreme water events (e.g. flooding), then the actual CMI savings for Substation Flood Control (RM-10) would differ from the estimated CMI savings of 3.9 million CMI. Similarly, if there are no substation fire events, then the actual CMI savings for Substation Fire Barriers (RM-20) would differ from the estimated CMI savings of 1.5 million CMI. Thus, CEHE is unable to guarantee the level of CMI savings that are estimated for each proposed resiliency measure.

SPONSOR:
Nathan Brownell

RESPONSIVE DOCUMENTS:
None

SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

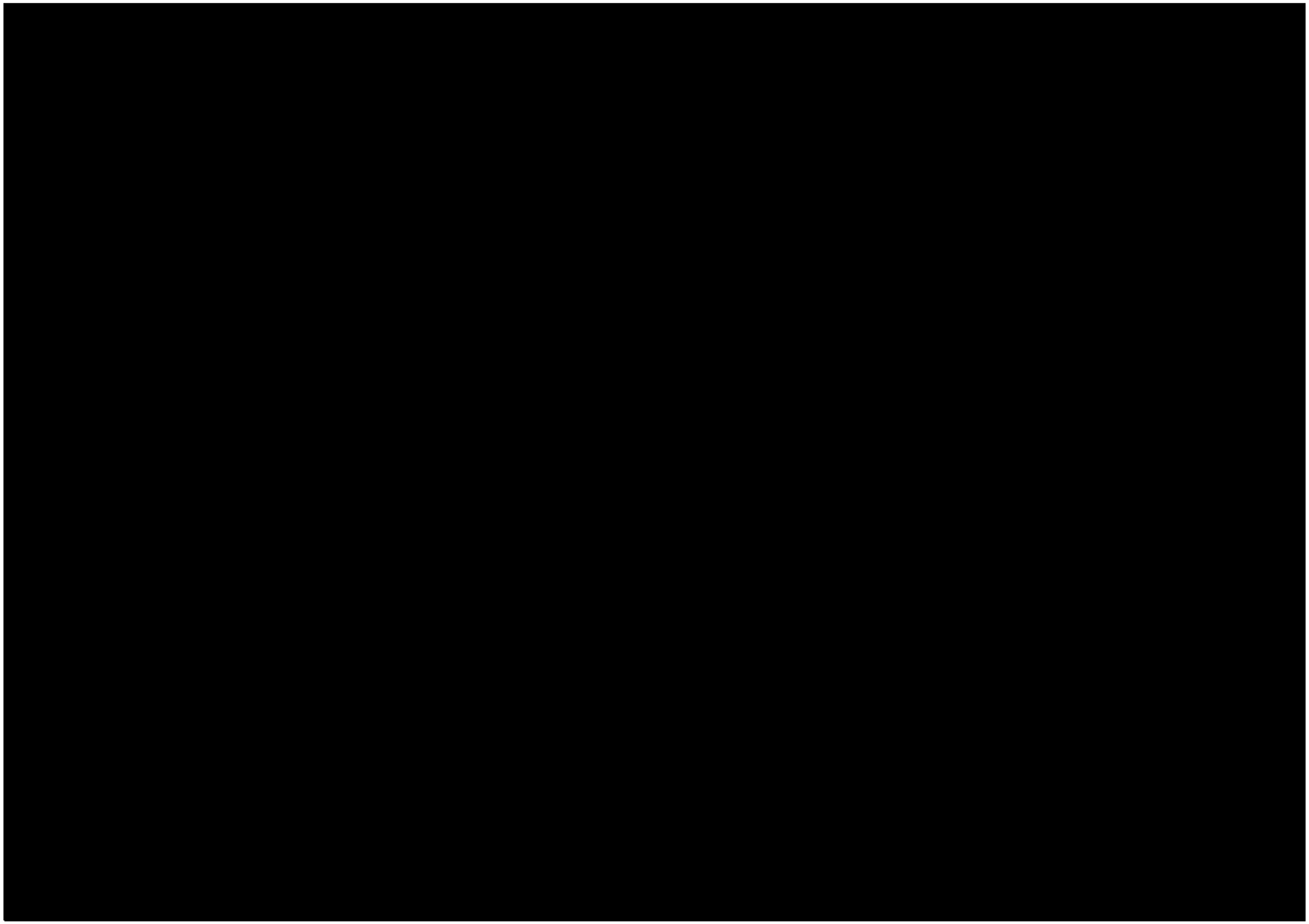
APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	**§ § § § §**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-6:

(REDACTED) Summary of Guidehouse CBA Input Assumptions



SOAH DOCKET NO. 473-25-11558
PUC DOCKET NO. 57579

APPLICATION OF CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC FOR APPROVAL OF ITS 2026-2028 TRANSMISSION AND DISTRIBUTION SYSTEM RESILIENCY PLAN	§ § § § §	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

DIRECT TESTIMONY AND ATTACHMENTS

OF SCOTT NORWOOD

ATTACHMENT SN-7:

CEHE's responses to TCUC 1-19 and TCUC 1-20

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 57579
SOAH DOCKET NO. 473-25-11558

TEXAS COAST UTILITIES COALITION
REQUEST NO.: TCUC-RFI01-19

QUESTION:

Reference Figure APP-15 on pages 16-18 of CEHE's Application, please provide the total CMI for each year since 2017 related to:

a. Distribution circuit resiliency

b. Strategic undergrounding

c. Distribution pole replacement and bracing

d. Transmission system hardening

e. Vegetation management

f. 69kV conversion projects

g. S90 tower replacements

h. Distribution capacity enhancements/substations

i. Substation flood control

ANSWER:

A historical analysis of CMI savings by resiliency measures since 2017 has not been completed. Please refer to responses in TCUC RFI 1-11 through 1-15 for historical CMI impact from various resiliency events.

SPONSOR:
Nathan Brownell

RESPONSIVE DOCUMENTS:
None

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 57579
SOAH DOCKET NO. 473-25-11558

TEXAS COAST UTILITIES COALITION
REQUEST NO.: TCUC-RFI01-20

QUESTION:

Reference Figure APP-15 on pages 16-18 of CEHE's Application, please identify and provide the category (e.g., extreme wind, extreme temperature) and total CMI associated with each extreme weather event that has been experienced by the CEHE system for each year since 2010.

ANSWER:

Please see attachment TCUC RFI 1-20.xlsx for total CMI associated with each extreme weather event referenced in Figure APP-12. Detailed records of extreme weather events prior to 2020 are incomplete for analysis purposes due to the Company's 5-year data retention policy for outage data.

SPONSOR:
Nathan Brownell

RESPONSIVE DOCUMENTS:
TCUC RFI 1-20.xls