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Control Number - 57579

Item Number - 158

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

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

REDACTED

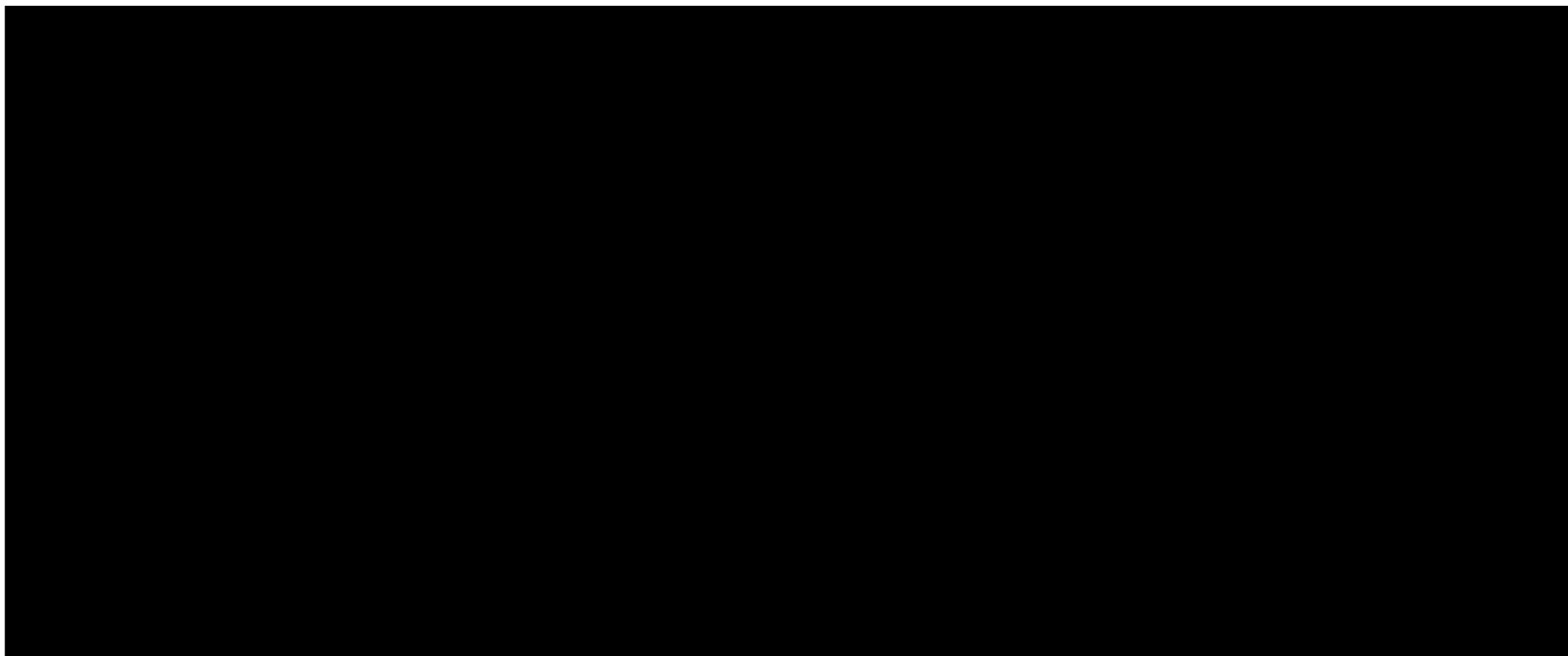
**WORKPAPERS TO THE
DIRECT TESTIMONY AND ATTACHMENTS**

OF

SCOTT NORWOOD

**ON BEHALF OF
TEXAS COAST UTILITIES COALITION**

APRIL 8, 2025



TBL 1 - Total 25 SRP Rel Impact			TBL 3 - VM Reliab Impact			TBL-5 Trans Hard Reliab Impact		
	T&D CMI w Major Events <u>All SRP Measures</u>	Major Events w RSP, CMI	T&D CMI w Major Events <u>Veg Mgt. Measures</u>			T&D CMI w Major Events <u>Trans Hard Measures</u>		
2017-21 Average CMI	2,885,903,447		2,885,903,447			2,885,903,447		
2017-21 Reliability w/o SRP	99.8039%		99.8039%			99.8039%		
SRP Rel. CMI Reduction	<u>436,312,459</u>		<u>436,666,667</u>			<u>74,600,000</u>		
Total w SRP CMI Reduction	2,449,590,988		2,449,236,780			2,811,303,447		
2024-28 T&D Reliability w SRP	99.8336%		99.8070%			99.8090%		
Reliability Change w SRP	<u>0.030%</u>		<u>0.003%</u>			<u>0.005%</u>		
T&D Major events	14,306,379	68,928,123	165,088,512	5,850,589,197	7,320,959	592,776,754	11,802,693,446	2,394,270,532
T&D Total w ME	459,152,176	584,616,320	591,492,659	6,323,080,823	630,907,847	1,080,759,706	12,294,062,804	

TCUC RFI 1-11: CEHE's Annual Distribution System SAIDI, SAIFI and CMI Including Extreme Weather Events

	2018	2019	2020	2021	2022	2023	2024	2017-24 AVG	
SAIFI									
Major Event	0.033	0.082	0.265	3.159	0.015	0.374	2.049		0.8
Forced Interruptions	1.163	1.263	1.144	1.207	1.414	1.376	1.476		1.3
Scheduled Interruptions	0.338	0.373	0.304	0.319	0.446	0.38	0.364		0.4
Outside Causes	0.142	0.107	0.113	0.094	0.111	0.099	0.079		0.1
SAIDI									
Major Event	4.85	26.73	63.24	2,189.01	2.89	177.57	4,143.98		865.0
Forced Interruptions	116.46	152.68	122.03	135.94	164.65	140.16	138.53		134.1
Scheduled Interruptions	50.05	45.31	37.47	37.46	59.65	32.16	30.94		41.2
Outside Causes	7.23	3.08	3.84	3.46	4.79	4.15	3.07		4.0
CMI									
Major Event	12,203,208	68,528,756	165,088,512	5,838,852,536	7,320,959	490,418,220	11,801,265,064		2,394,270,532
Forced Interruptions	293,154,830	391,495,997	318,564,024	362,598,293	448,165,125	387,107,632	394,495,481		356,145,095
Scheduled Interruptions	125,984,919	116,185,635	97,810,773	99,909,742	162,373,734	88,828,657	88,121,291		108,768,763
Outside Causes	18,201,066	7,906,990	10,028,762	9,240,980	13,028,029	11,471,972	8,752,587		10,638,172
	449,554,023	584,116,378	591,492,071	6,310,601,560	630,907,847	977,826,481	12,292,634,423		2,869,822,561

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TCUC01-13 - CEHE Transmission SAIDI, SAIFI, and CMI Including Extreme Weather Events.xlsx
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SAIFI	2018	2019	2020	2021	2022	2023	2024	2017-24 AVG
Outside Causes - Transmission (Major Eve	0.002	0.003	0.000	0.000	0.000	0.009	0.000	0.007
Outside Causes - Transmission (Non-Majo	0.011	0.003	0.000	0.000	0.000	0.002	0.000	0.002
Outside Causes - Total	0.013	0.006	0.000	0.002	0.000	0.011	0.000	0.009
SAIDI	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Eve	0.84	0.16	0.00	4.40	0.00	17.06	0.50	5.4
Outside Causes - Transmission (Non-Majo	2.98	0.04	0.00	0.28	0.00	0.21	0.00	0.5
Outside Causes - Total	3.82	0.20	0.00	4.68	0.00	17.27	0.50	5.9
CMI	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Eve	2,303,471	399,367	0	11,736,661	0	102,158,534	1,428,381	14,837,309
Outside Causes - Transmission (Non-Majo	7,194,982	100,575	988	712,612	0	574,091	0	1,243,577
Outside Causes - Total	9,498,454	499,942	988	12,449,273	0	102,733,224	1,428,381	16,080,886

Tbl 2 - VM Spending Incr

2019	\$32.6	
2020	\$29.6	
2021	\$31.4	
2022	\$34.6	
2023	<u>\$45.8</u>	
2019-23 Avg	\$34.8	
2026-28 RSP Avg	\$48.7	48.7
Increase, %	140%	

56548	25
57579	146.1
Increase	121.1
% Increase x	

	<u>VceMgt Expense</u>	<u>% Change</u>
2019	\$27,379,592	
2020	\$26,109,117	-4.6%
2021	\$27,423,869	5.0%
2022	<u>\$29,954,796</u>	9.2%
2019-22 Avg	\$27,716,851	
2023	\$39,831,198	43.7%

System Readiness Plan Programs
Comparison of Budget 565-98 vs Budget 575-79

Readiness Measure	CAPITAL		OSAM		BCA		OMI		Change
	565-98	575-79	565-98	575-79	565-98	575-79	565-98	575-79	
Extreme Wind									
Enhance Local Resiliency	517.8	511.4	-	-	7.0	17.1	117.4	161.0	177.4
Strengthen Underwriting	31.2	350.0	-	-	3.8	2.8	4.4	83.1	76.7
Resilience ROP	53.8	307.3	0.3	0.5	15.7	49.3	58.1	97.0	38.9
Distribution Pole Replacement/Bracing	99.3	251.6	-	-	6.2	9.9	41.3	321.0	79.7
Vegetation Management	-	-	25.0	186.1	1.5	3.7	13.9	337.0	123.1
Transmission System Hardening	176.0	1,497.1	0.8	0.8	1.0	3.9	406.0	771.8	171.8
68KV Conversion Projects	208.4	359.3	-	-	1.9	2.7	46.8	65.5	18.7
500 Tower Replacements	101.8	313.4	-	-	4.9	9.4	41.7	59.5	17.8
Costal Resilience Projects	299.0	377.4	-	-	1.4	2.0	21.9	7.8	(11.1)
	1,548.1	3,864.4	74.1	1,851	74.1	2.0	771.1	1,001.7	684.7
Extreme Weather									
Substation Flood Control	30.6	43.8	-	-	7.5	2.1	31.2	3.9	(40.3)
Control Center Flood Control	7.0	7.0	-	-	12.5	2.7	6.1	2.5	(5.6)
WHAAM	-	10.8	-	-	N/A	1.3	N/A	0.6	0.6
Mobile Substations	-	91.0	-	-	N/A	3.0	N/A	1.9	1.9
	37.6	91.6	-	-	-	-	20.3	31.0	(9.4)
Extreme Temperature (Heat)									
Asset Reliability (Technology)	-	14.0	-	1.0	N/A	7.1	N/A	7.1	7.1
Control Center	-	4.1	-	0.1	N/A	N/A	N/A	N/A	N/A
Microgrid Pilot Program	35.0	35.0	1.5	1.5	N/A	N/A	N/A	5.3	5.3
	35.0	53.5	1.5	2.6	-	-	-	-	-
Extreme Temperature (Cold)									
Asset Reliability (Heat)	-	14.0	-	1.0	N/A	7.1	N/A	7.1	7.1
Control Center	-	4.1	-	0.1	N/A	N/A	N/A	N/A	N/A
Microgrid Pilot Program	35.0	35.0	1.5	1.5	N/A	N/A	N/A	5.3	5.3
	35.0	53.5	1.5	2.6	-	-	-	-	-
Extreme Temperature (Heat)									
Distribution Capacity Enhancement/Substations	-	579.6	-	-	N/A	5.6	N/A	138.1	138.1
MDG Economics	-	285.0	-	-	N/A	1.4	N/A	33.6	33.6
UDG Cable Modernization	-	328.4	-	-	N/A	2.2	N/A	13.0	13.0
Communication Migration	-	144.0	-	6.0	N/A	2.4	N/A	15.7	15.7
Substation Tier 1/2	7.4	9.0	-	-	1.7	0.5	0.1	1.1	1.0
Digital Substation	25.0	31.8	10.6	-	1.9	3.8	3.3	1.2	(0.1)
Weather Advanced Analytics	38.7	-	6.0	0.9	N/A	N/A	N/A	N/A	N/A
Weather Stationing Upgrade	79.2	90.0	-	-	N/A	N/A	N/A	N/A	N/A
Weather Stationing Management	-	-	-	-	N/A	N/A	N/A	N/A	N/A
Weather in AI	4.0	19.4	0.1	0.1	N/A	N/A	N/A	N/A	N/A
	125.3	1,207.2	35.5	37.2	-	-	1.3	133.1	133.1
Physical Attack									
Substation Physical Security Training	11.0	18.0	-	-	1.1	1.1	1.1	1.1	1.1
Substation Security Upgrade	34.5	19.4	0.1	0.1	10.9	8.6	25.1	25.1	-
	34.5	37.4	0.1	0.1	-	-	39.3	42.7	2.9
Technology & Cybersecurity									
Spectrum Acquisition	47.0	47.0	-	-	N/A	N/A	N/A	N/A	N/A
Data Center Modernization	2.9	12.7	0.2	1.3	N/A	N/A	N/A	N/A	N/A
Network Security & Vulnerability Management	1.0	7.5	-	2.0	N/A	N/A	N/A	N/A	N/A
IT/OT Cybersecurity Monitoring	22.5	13.4	-	4.2	N/A	N/A	N/A	N/A	N/A
Local Security, Incident Security & Risk Management	76.4	77.4	0.1	11.1	N/A	N/A	N/A	N/A	N/A
	76.4	77.4	0.1	11.1	-	-	-	-	-
Operational Awareness									
Advanced Digital Imaging/Digital Twin	9.9	13.4	0.1	2.0	3.4	4.8	0.8	10.5	10.0
Weather Camera	-	-	-	0.1	N/A	N/A	N/A	N/A	N/A
Weather Camera	5.0	-	1.0	0.3	N/A	N/A	N/A	N/A	N/A
Distributed Camera Communication	12.1	12.7	-	-	N/A	N/A	N/A	N/A	N/A
Value & Mobile Data Public System	21.6	20.9	-	-	N/A	N/A	N/A	N/A	N/A
Emergency Operations Center	-	50.0	-	6.0	N/A	N/A	N/A	N/A	N/A
Hardware of Server Farms	42.6	209.5	1.1	9.2	N/A	N/A	0.8	10.8	10.0

Tbl 4 - TRANS HARD Spending Incr

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

48.7

56548	377
57579	1488.8
Increase	1091.8
% Increase	290%

TCUC RFI 1-15: CEHE's annual capital additions and O&M expenses for the following resilience measures for each year since 2017

Annual Capital (\$ in mill)	2017	2018	2019	2020	2021	2022	2023	2024	2021-24 TOTAL	2021-24 AVG/YR	2017-20 TOTAL	2017-20 AVG/YR
a. Distribution circuit resiliency						\$40.0	\$40.0	\$17.0	\$97	\$32	\$0	#DIV/0!
b. Strategic undergrounding					\$0.6	\$8.0	\$11.0	\$14.0	\$34	\$8	\$0	#DIV/0!
c. Distribution pole repl	\$18.0	\$17.0	\$19.0	\$29.0	\$30.0	\$61.0	\$52.0	\$78.0	\$221	\$55	\$83	\$21
d. Transmission system	\$0.7	\$4.0	\$10.0	\$12.0	\$159.0	\$274.0	\$166.0	\$65.0	\$664	\$166	\$27	\$7
e. Vegetation manager	\$0.0										\$0	\$0
f. 69kV conversion projects				\$16.0	\$3.0	\$49.0	\$90.0	\$22.0	\$164	\$41	\$16	\$16
g. S90 tower replacements			\$0.9	\$3.0	\$20.0	\$24.0	\$10.0	\$10.0	\$64	\$16	\$4	\$2
h. Distribution capacity i	\$13.0	\$9.0	\$13.0	\$22.0	\$14.0	\$20.0	\$81.0	\$57.0	\$172	\$43	\$57	\$14
i. Substation flood control		\$0.9	\$5.0	\$18.0	\$13.0	\$20.0	\$20.0	\$4.0	\$57	\$14	\$24	\$8
TOTAL	\$31.7	\$30.9	\$47.9	\$100.0	\$239.6	\$496.0	\$470.0	\$267.0	\$1,473	\$368	\$211	\$53
Annual O&M (\$ in millio	\$2,017.0	\$2,018.0	\$2,019.0	\$2,020.0	\$2,021.0	\$2,022.0	\$2,023.0	\$2,024.0				
a. Distribution circuit resiliency									\$0	#DIV/0!	\$0	#DIV/0!
b. Strategic undergrounding									\$0	#DIV/0!	\$0	#DIV/0!
c. Distribution pole replacement and bracing									\$0	#DIV/0!	\$0	#DIV/0!
d. Transmission system	\$0.9	\$1.4	\$0.8	\$1.3	\$1.4	\$1.3	\$1.9	\$0.3	\$5	\$1	\$4	\$1
e. Vegetation manager	\$28.5	\$35.7	\$32.6	\$29.6	\$31.4	\$34.6	\$45.8	\$147.1	\$259	\$65	\$126	\$32
f. 69kV conversion projects									\$0	#DIV/0!	\$0	#DIV/0!
g. S90 tower replacements									\$0	#DIV/0!	\$0	#DIV/0!
h. Distribution capacity enhancements/substations			\$0.0				\$0.0	\$0.0	\$0	\$0	\$0	\$0
i. Substation flood control									\$0	#DIV/0!	\$0	#DIV/0!
TOTAL	\$29.4	\$37.1	\$33.4	\$30.9	\$32.8	\$35.9	\$47.7	\$147.4	\$264	\$66	\$131	\$33

* This data can also be found in Project 41381 - ANNUAL VEGETATION MANAGEMENT PLANS AND REPORTS PURSUANT TO PUC SUBST. R. §25.96.

TOTAL O&M/CAPITAL	2017	2018	2019	2020	2021	2022	2023	2024	26-28 PLAN T	26-28 AVG	2019-23 TOTAL	2019-23 AVG/YR	2017-20 TOTAL	2017-20 AVG/YR
a. Distribution circuit res	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$40.0	\$40.0	\$17.0	\$245	\$82	\$80	\$16	\$0	\$0
b. Strategic undergrou	\$0.0	\$0.0	\$0.0	\$0.0	\$0.6	\$8.0	\$11.0	\$14.0	\$128	\$43	\$20	\$4	\$0	\$0
c. Distribution pole repl	\$18.0	\$17.0	\$19.0	\$29.0	\$30.0	\$61.0	\$52.0	\$78.0	\$9	\$3	\$191	\$38	\$83	\$21
d. Transmission syste	\$1.6	\$5.4	\$10.8	\$13.3	\$160.4	\$275.3	\$167.9	\$65.3	\$508.5	\$1	\$0	\$628	\$126	\$376.8
e. Vegetation manager	\$28.5	\$35.7	\$32.6	\$29.6	\$31.4	\$34.6	\$45.8	\$147.1	\$227.5	\$32	\$11	\$174	\$35	
f. 69kV conversion proje	\$0.0	\$0.0	\$0.0	\$16.0	\$3.0	\$49.0	\$90.0	\$22.0	\$30	\$10	\$158	\$32	\$16	\$4
g. S90 tower replaceme	\$0.0	\$0.0	\$0.9	\$3.0	\$20.0	\$24.0	\$10.0	\$10.0	\$50	\$17	\$58	\$12	\$4	\$1
h. Distribution capacity i	\$13.0	\$9.0	\$13.0	\$22.0	\$14.0	\$20.0	\$81.0	\$57.0	\$219	\$73	\$150	\$30	\$57	\$14
i. Substation flood contr	\$0.0	\$0.9	\$5.0	\$18.0	\$13.0	\$20.0	\$20.0	\$4.0	\$18	\$6	\$76	\$15	\$24	\$6
TOTAL	\$61.1	\$68.0	\$81.3	\$130.9	\$272.4	\$531.9	\$517.7	\$414.4			\$1,534	\$307	\$341	\$85
TIMES 2017-20											4.5	3.6		

	<u>Dkt 57579 CUE Request</u>	<u>Dkt 57579 TCUC Recommended</u>	<u>Dkt 57579 TCUC Adjustment</u>		<u>2019-23 Avg</u>	<u>TCUC RUC INCR/YR</u>	<u>TCUC Recommended Increase</u>
Vegetation Management	\$147.1	\$25.0	-\$122.1	-2.1%	\$34.8	\$8.3	23.9%
Transmission System Hardening	\$1,468.0	\$501.7	-\$966.3	-16.8%	\$125.5	\$41.7	33.2%
Amount Not Addressed by TCUC	<u>\$4,138.9</u>	<u>N/A</u>	<u>N/A</u>				
Total CEHE SRP Amount	\$5,754.0	\$526.7	-\$1,088.4				
			-18.9%				
	\$2,314.0						
	67.3%						

TCUC RFI 1-15: CEHE's annual capital additions and O&M expenses for the following resilience measures for each year since 2017

	2017	2018	2019	2020	2021	2022	2023	2024	2021-24 TOTAL	2021-24 AVG/YR	2017-20 TOTAL	2017-20 AVG/YR
Annual Capital (\$ in millions)												
a. Distribution circuit resiliency						\$40.0	\$40.0	\$17.0	\$97	\$32	\$0	#DIV/0!
b. Strategic undergrounding					\$0.6	\$8.0	\$11.0	\$14.0	\$34	\$8	\$0	#DIV/0!
c. Distribution pole replacement and bracing	\$18.0	\$17.0	\$19.0	\$29.0	\$30.0	\$61.0	\$52.0	\$78.0	\$221	\$55	\$83	\$21
d. Transmission system hardening	\$0.7	\$4.0	\$10.0	\$12.0	\$159.0	\$274.0	\$166.0	\$65.0	\$664	\$166	\$27	\$7
e. Vegetation management	\$0.0										\$0	\$0
f. 69kV conversion projects				\$16.0	\$3.0	\$49.0	\$90.0	\$22.0	\$164	\$41	\$16	\$16
g. S90 tower replacements			\$0.9	\$3.0	\$20.0	\$24.0	\$10.0	\$10.0	\$64	\$16	\$4	\$2
h. Distribution capacity enhancements/substations	\$13.0	\$9.0	\$13.0	\$22.0	\$14.0	\$20.0	\$81.0	\$57.0	\$172	\$43	\$67	\$14
i. Substation flood control		\$0.9	\$5.0	\$18.0	\$13.0	\$20.0	\$20.0	\$4.0	\$57	\$14	\$24	\$8
TOTAL	\$31.7	\$30.9	\$47.9	\$100.0	\$239.6	\$496.0	\$470.0	\$267.0	\$1,473	\$368	\$211	\$53
Annual O&M (\$ in millions)	\$2,017.0	\$2,018.0	\$2,019.0	\$2,020.0	\$2,021.0	\$2,022.0	\$2,023.0	\$2,024.0				
a. Distribution circuit resiliency									\$0	#DIV/0!	\$0	#DIV/0!
b. Strategic undergrounding									\$0	#DIV/0!	\$0	#DIV/0!
c. Distribution pole replacement and bracing									\$0	#DIV/0!	\$0	#DIV/0!
d. Transmission system hardening	\$0.9	\$1.4	\$0.8	\$1.3	\$1.4	\$1.3	\$1.9	\$0.3	\$5	\$1	\$4	\$1
e. Vegetation management*	\$28.5	\$35.7	\$32.6	\$29.6	\$31.4	\$34.6	\$45.8	\$147.1	\$269	\$65	\$126	\$32
f. 69kV conversion projects									\$0	#DIV/0!	\$0	#DIV/0!
g. S90 tower replacements									\$0	#DIV/0!	\$0	#DIV/0!
h. Distribution capacity enhancements/substations			\$0.0				\$0.0	\$0.0	\$0	\$0	\$0	\$0
i. Substation flood control									\$0	#DIV/0!	\$0	#DIV/0!
TOTAL	\$29.4	\$37.1	\$33.4	\$30.9	\$32.8	\$35.9	\$47.7	\$147.4	\$264	\$66	\$131	\$33

* This data can also be found in Project 41381 - ANNUAL VEGETATION MANAGEMENT PLANS AND REPORTS PURSUANT TO PUC SUBST. R. §25.96.

	2017	2018	2019	2020	2021	2022	2023	2024	2021-24 TOT	2021-24 AVG	2019-23 AVG	26-28 PLAN TO	26-28 AVG	2019-23 TOTAL	2019-23 AVG/YR	2017-20 TOTAL	2017-20 AVG/YR
TOTAL O&M/CAPITAL																	
a. Distribution circuit resiliency	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$40.0	\$40.0	\$17.0			\$16.0	\$513	\$171	\$80	\$16	\$0	\$0
b. Strategic undergrounding	\$0.0	\$0.0	\$0.0	\$0.0	\$0.6	\$8.0	\$11.0	\$14.0			\$3.9	\$860	\$287	\$20	\$4	\$0	\$0
c. Distribution pole replacement and bracing	\$18.0	\$17.0	\$19.0	\$29.0	\$30.0	\$61.0	\$52.0	\$78.0			\$38.2	\$252	\$84	\$191	\$38	\$83	\$21
d. Transmission system hardening	\$1.6	\$5.4	\$10.8	\$13.3	\$160.4	\$275.3	\$167.9	\$65.3	\$668.9	\$167.2	\$125.5	\$1,468	\$489	\$828	\$126	\$31	\$8
e. Vegetation management*	\$28.5	\$35.7	\$32.6	\$29.6	\$31.4	\$34.6	\$45.8	\$147.1		\$64.7	\$34.8	\$146	\$49	\$174	\$35	\$126	\$32
f. 69kV conversion projects	\$0.0	\$0.0	\$0.0	\$16.0	\$3.0	\$49.0	\$90.0	\$22.0			\$31.6	\$369	\$123	\$158	\$32	\$16	\$4
g. S90 tower replacements	\$0.0	\$0.0	\$0.9	\$3.0	\$20.0	\$24.0	\$10.0	\$10.0			\$11.6	\$118	\$39	\$58	\$12	\$4	\$1
h. Distribution capacity enhancements/substations	\$13.0	\$9.0	\$13.0	\$22.0	\$14.0	\$20.0	\$81.0	\$57.0			\$30.0	\$580	\$193	\$150	\$30	\$57	\$14
i. Substation flood control	\$0.0	\$0.9	\$5.0	\$18.0	\$13.0	\$20.0	\$20.0	\$4.0			\$15.2	\$44	\$15	\$76	\$15	\$24	\$6
TOTAL	\$61.1	\$68.0	\$81.3	\$130.9	\$272.4	\$531.9	\$517.7	\$414.4			\$306.8			\$1,534	\$307	\$341	\$85
												TIMES 2017-20		4.5	3.6		

TCUC RFI 1-11: CEHE's Annual Distribution System SAIDI, SAIFI and CMI Including Extreme Weather Events

<u>SAIFI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Major Event	0.449	0.033	0.082	0.265	3.159	0.015	0.374	2.049
Forced Interruptions	1.038	1.163	1.263	1.144	1.207	1.414	1.376	1.476
Scheduled Interruptions	0.288	0.338	0.373	0.304	0.319	0.446	0.38	0.364
Outside Causes	0.086	0.142	0.107	0.113	0.094	0.111	0.099	0.079
<u>SAIDI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Major Event	312.17	4.85	26.73	63.24	2,189.01	2.69	177.57	4,143.98
Forced Interruptions	102.73	116.46	152.68	122.03	135.94	164.65	140.16	138.53
Scheduled Interruptions	36.84	50.05	45.31	37.47	37.46	59.65	32.16	30.94
Outside Causes	2.62	7.23	3.08	3.84	3.46	4.79	4.15	3.07
<u>CMI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Major Event	770,486,997	12,203,208	68,528,756	165,088,512	5,838,852,536	7,320,959	490,418,220	11,801,265,064
Forced Interruptions	253,559,379	293,154,830	391,495,997	318,564,024	362,598,293	448,185,125	387,107,632	394,495,481
Scheduled Interruptions	90,925,354	125,994,919	116,185,635	97,810,773	99,909,742	162,373,734	88,828,657	88,121,291
Outside Causes	6,475,986	18,201,066	7,905,990	10,028,762	9,240,980	13,028,029	11,471,972	8,752,587
	1,121,447,716	449,554,023	584,116,378	591,492,071	6,310,601,550	630,907,847	977,626,481	12,292,634,423

2017-24 AVG % of Hours/Year

0.8
1.3
0.4
0.1

865.0 0.1646%
134.1 0.0255%
41.2 0.0078%
4.0 0.0008%

2,394,270,532
356,145,095
108,768,763
10,638,172
2,869,822,561

TCUC RFI 1-12: Distribution System SAIDI, SAIFI, and CMI Excluding Extreme Weather Events

<u>SAIFI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Forced Interruptions	1.038	1.163	1.263	1.144	1.207	1.414	1.376	1.476
Scheduled Interruptions	0.288	0.338	0.373	0.304	0.319	0.446	0.38	0.364
Outside Causes	0.086	0.142	0.107	0.113	0.094	0.111	0.099	0.079
<u>SAIDI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Forced Interruptions	102.73	116.46	152.68	122.03	135.94	164.65	140.16	138.53
Scheduled Interruptions	36.84	50.05	45.31	37.47	37.46	59.65	32.16	30.94
Outside Causes	2.62	7.23	3.08	3.84	3.46	4.79	4.15	3.07
<u>CMI</u>	2017	2018	2019	2020	2021	2022	2023	2024
Forced Interruptions	253,559,379	293,154,830	391,495,997	318,564,024	362,598,293	448,185,125	387,107,632	394,495,481
Scheduled Interruptions	90,925,354	125,994,919	116,185,635	97,810,773	99,909,742	162,373,734	88,828,657	88,121,291
Outside Causes	6,475,986	18,201,066	7,905,990	10,028,762	9,240,980	13,028,029	11,471,972	8,752,587

1.3
0.4
0.1

134.1
41.2
4.0

356,145,095
108,768,763
10,638,172

SOAH DOCKET NO. 473-25-11558

PUC Docket No. 57579

TCUC01-13 - CEHE Transmission SAIDI, SAIFI, and CMI Including Extreme Weather Events.xlsx

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<u>SAIFI</u>									2017-24 AVG
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	0.000	0.012	0.003	0.000	0.012	0.000	0.029	0.000	
Outside Causes - Transmission (Non-Major Event)	0.002	0.011	0.003	0.000	0.000	0.000	0.002	0.000	
Outside Causes - Total	0.002	0.023	0.006	0.000	0.012	0.000	0.031	0.000	
<u>SAIDI</u>									2017-24 AVG
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	0.27	0.84	0.16	0.00	4.40	0.00	37.06	0.50	
Outside Causes - Transmission (Non-Major Event)	0.42	2.98	0.04	0.00	0.28	0.00	0.21	0.00	
Outside Causes - Total	0.69	3.82	0.20	0.00	4.68	0.00	37.27	0.50	
<u>CMI</u>									2017-24 AVG
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	672,355	2,103,171	399,367	0	11,736,661	0	102,358,534	1,428,381	
Outside Causes - Transmission (Non-Major Event)	1,035,167	7,494,982	100,575	588	742,612	0	574,691	0	
Outside Causes - Total	1,707,522	9,598,154	499,942	588	12,479,273	0	102,933,224	1,428,381	

However, crews focusing on the rapid restoration of power are not always precise in their cause selection. Therefore, the Company does not believe this source of information is reliable for

ALL MEASURES

RELIABILITY MEASURE	Planning Review RM	% of Total	3-Yr Cost (\$MM)	5-Yr O&M Expense	RCA	3-Yr O&M	2025 O&M	2027 O&M	2028 O&M
Extreme Wind									
Distribution Circuit Resiliency	RM-1	8.8%	\$ 313.4	\$ -	12.1	263.9	42.4	67.2	735.4
Strategic Undergrounding	RM-3	14.7%	\$ 668.8	\$ -	2.8	81.1	7.1	23.0	81.0
Resilience O&M	RM-7	1.8%	\$ 107.8	\$ 0.0	19.3	87.8	16.1	32.4	48.8
Distribution Pole Replacement/Bracing	RM-4	4.2%	\$ 129.5	\$ -	9.9	121.8	19.9	40.0	98.8
Vegetation Management	RM-5	5.8%	\$ 148.1	\$ -	3.7	137.8	62.3	61.7	22.9
Transmission System Hardening	RM-6	10.1%	\$ 1,488.0	\$ 0.0	3.9	223.8	23.4	77.7	122.8
500 Tower Replacements	RM-9	2.8%	\$ 118.4	\$ -	8.4	89.8	14.6	21.1	23.8
69kV-138kV Conversion Projects	RM-8	8.3%	\$ 368.0	\$ -	2.7	68.8	12.9	38.4	27.8
Coastal Transmission Resiliency	RM-8	1.1%	\$ 178.1	\$ 0.0	2.0	8.3	0.1	0.3	7.8
Group Subtotal		71.8%	\$ 4,812.7	\$ 148.1	6.8	1086.1	198.8	389.2	466.3
Extreme Water (Flood)									
Substation Flood Control	RM-10	8.7%	\$ 48.8	\$ -	2.1	3.8	0.6	1.8	2.8
Control Center Facility Upgrades	RM-11	8.1%	\$ 7.8	\$ -	15.2	2.5	0.0	0.0	2.8
MCC/SCADA	RM-12	8.2%	\$ 10.8	\$ -	1.9	8.8	0.1	0.2	0.2
Mobile Substations	RM-13	8.8%	\$ 38.0	\$ -	3.8	3.8	0.6	1.8	2.8
Group Subtotal		18.1%	\$ 81.6	\$ -	3.3	11.8	1.4	2.8	6.6
Extreme Temperature (Freezing)									
Anti-Icing Technology	RM-14	8.2%	\$ 18.8	\$ 1.8	1.1	8.8	0.8	1.8	2.8
Load Shed O&M	RM-15	8.5%	\$ 4.8	\$ 0.2	-	-	-	-	-
Monitoring	RM-17	8.8%	\$ 36.8	\$ 1.8	-	-	-	-	-
Group Subtotal		16.1%	\$ 58.1	\$ 3.8	1.1	8.8	0.8	1.8	2.8
Extreme Temperature (Drought)									
Distribution Capacity Enhancement	RM-16	8.8%	\$ 879.8	\$ -	8.8	188.1	22.0	48.8	78.8
MO&G Reconductoring	RM-17	4.2%	\$ 348.0	\$ -	1.4	13.8	1.7	4.8	7.4
UPD Cable Modernization	RM-18	2.2%	\$ 128.4	\$ -	2.2	18.8	0.1	4.8	8.8
Contamination Mitigation	RM-19	2.7%	\$ 188.0	\$ 8.08	2.4	18.7	2.8	0.2	7.8
Substation Transformer Fire Protection Systems	RM-20	8.2%	\$ 8.8	\$ -	4.8	1.8	0.2	0.8	0.7
Digital Substation	RM-21	8.8%	\$ 31.8	\$ -	1.8	1.2	0.2	0.4	0.7
Weather-Adapted Analysis	RM-22	8.8%	\$ 0.8	\$ 0.8	-	-	-	-	-
Weather Strategic Undergrounding	RM-23	8.8%	\$ 88.0	\$ -	-	-	-	-	-
Weather Vegetation Management	RM-24	1.8%	\$ 38.0	\$ 38.0	-	-	-	-	-
Weather O&M	RM-25	8.3%	\$ 18.7	\$ 0.2	-	-	-	-	-
Group Subtotal		71.8%	\$ 1,244.4	\$ 47.2	3.8	182.1	28.8	68.8	92.8
Physical Attack									
Substation Physical Security/Fencing	RM-26	8.8%	\$ 18.8	\$ -	21.8	77.8	2.8	8.8	8.8
Substation Security Upgrades	RM-27	8.2%	\$ 18.8	\$ 3.88	28.7	28.1	4.2	8.4	12.8
Group Subtotal		8.8%	\$ 37.8	\$ 3.88	28.4	42.7	7.1	14.2	21.3
Operational Awareness									
Advanced Asset Imagery Platform/Digital Twin	RM-28	8.4%	\$ 22.4	\$ 3.88	4.8	10.8	1.8	0.7	8.7
Weather Stations	RM-34	8.8%	\$ 0.8	\$ 0.8	-	-	-	-	-
Weather Cameras	RM-35	8.8%	\$ 0.8	\$ 0.8	-	-	-	-	-
Statistical Modeling Communication	RM-36	8.2%	\$ 12.7	\$ -	-	-	-	-	-
Voice & Mobile Data Radio System Redundancy	RM-37	8.4%	\$ 28.8	\$ -	-	-	-	-	-
Emergency Operations Center	RM-38	1.1%	\$ 88.0	\$ 8.88	-	-	-	-	-
Hardened Service Centers	RM-39	1.8%	\$ 107.8	\$ -	-	-	-	-	-
Group Subtotal		18.1%	\$ 218.8	\$ 8.2	4.8	18.8	1.8	3.7	8.1
Totals		100.0%	\$ 8,881.1	\$ 197.2	8.8	1,309	238	442	628

\$ 5,858.28

438

RELIABILITY MEASURE	Planning Review RM	% of Total	3-Yr Cost (\$MM)	5-Yr O&M Expense	RCA	3-Yr O&M	2025 O&M	2027 O&M	2028 O&M
Strategic Undergrounding	RM - 2	14.7%	\$960	\$0	2.8	81.1	7.1	23.0	81.0
Vegetation Management	RM - 5	5.0%	\$148	\$148	3.7	137.0	62.3	61.7	22.9
Transmission System Hardening	RM - 6	25.1%	\$1,468	\$1	3.9	223.8	23.6	77.7	122.5
		44.7%	\$2,474	\$147		441.9	93.0	152.5	196.4
		RM Reviewed	\$2,621						
		Total RM	\$5,858						
		Rev.% of Total	44.7%						

224,190187

CMR TDR	RM Rev. \$58,858	RCA
269.0	9,20369E+12 \$	17,926.74

RELIABILITY MEASURE	% of Total Cost	Cost (\$MM)	3-Yr O&M	RCA	3-Yr O&M	2025 O&M	2026 O&M	2027 O&M
System Hardening								
Transmission System Hardening	18.4%	\$378	\$1	8.0	208.0	41.8	79.7	87.8
500 Tower Replacements	5.1%	\$104	\$0	4.8	43.7	11.4	13.9	16.4
69kV-138kV Conversion Projects	13.1%	\$268	\$0	1.8	48.8	10.8	18.2	20.0
Control Transformer Resiliency	12.7%	\$258	\$1	1.4	21.9	8.8	8.8	21.9
Substation Transformer Fire Protection Systems	0.1%	\$2	\$0	3.7	0.5	0.1	0.2	0.3
Distribution Pole Replacement/Bracing	4.9%	\$88	\$0	6.2	41.8	6.7	13.8	20.8
Distribution Resiliency - Circuit Rebuilds	15.3%	\$313	\$0	7.8	137.4	22.5	48.7	88.4
Strategic Undergrounding/Feeder Crossings	1.8%	\$31	\$0	3.8	4.4	0.7	1.5	2.2
Group Subtotal	71.2%	\$1,453	\$2	4.8	600.0	93.8	167.8	238.6
Grid Modernization								
Tap Saver	2.9%	\$59	\$0	81.3	280.3	38.5	79.8	105.8
UG&O Installation Program	2.7%	\$54	\$1	15.7	58.1	11.0	18.4	27.7
Medical Center Substation	5.0%	\$102	\$0	0.7	4.9	0.8	8.8	4.9
Group Subtotal	10.8%	\$215	\$1	21.1	333.4	49.5	99.0	138.4
Flood Control								
Substation Flood Control	1.8%	\$31	\$0	7.5	14.2	2.7	4.7	6.7
Control Center Facility Upgrades	8.8%	\$7	\$0	12.5	8.1	1.2	2.4	2.8
Group Subtotal	1.8%	\$38	\$0	8.4	20.3	3.9	7.1	9.2
Information Technology								
Advanced Asset Imagery Platform/Digital Twin	0.9%	\$18	\$0	3.4	8.8	0.2	0.3	0.3
Advanced Distribution Technology	11.8%	\$238	\$15	4.8	61.1	0.0	20.5	48.6
Digital Substation	1.2%	\$25	\$1	1.8	1.3	0.2	0.4	0.8
Group Subtotal	13.5%	\$281	\$14	4.8	62.2	0.2	21.2	41.7
System Security								
Substation Physical Security/Fencing	0.2%	\$15	\$0	15.8	14.7	2.5	4.8	7.3
Substation Security Upgrades	1.0%	\$20	\$0	20.5	25.1	4.2	8.4	12.5
Group Subtotal	1.2%	\$36	\$0	18.4	39.7	6.8	13.3	19.8
Vegetation Management								
Targeted Critical Circuit Vegetation Management	1.2%	\$8	\$25	1.8	13.9	4.2	5.5	4.2
Group Subtotal	1.2%	\$8	\$25	1.8	13.9	4.2	5.5	4.2
Totals	100.0%	\$2,000	\$42	6.8	840	166	314	452

2024 SRP	\$2,042
2025 SRP	\$5,858
2025 Increase	\$3,816
2025%incr	187%

RESILIENCE MEASURE	2025 FORT PIERCE	COST (\$MM)	Q&M (\$MM)	BCA	2025 CMI	2026 CMI	2027 CMI	2028 CMI
System Hardening								
Transmission System Hardening	18.4%	\$ 376.0	\$ 0.75	6.0	206.0	41.6	76.7	87.6
S90 Tower Replacements	5.1%	\$ 103.8	\$ -	4.9	41.7	11.4	13.9	16.4
69KV-138KV Conversion Projects	13.1%	\$ 268.4	\$ -	1.9	46.8	10.6	16.2	20.0
Coastal Transmission Resiliency	12.7%	\$ 258.0	\$ 0.75	1.4	21.9	0.0	0.0	21.9
Substation Transformer Fire Protection Barriers	0.1%	\$ 2.4	\$ -	3.7	0.5	0.1	0.2	0.2
Distribution Pole Replacements/Bracing	4.9%	\$ 99.3	\$ -	6.2	41.3	6.7	13.8	20.8
Distribution Resiliency – Circuit Rebuilds	15.3%	\$ 312.8	\$ -	7.0	137.4	22.3	45.7	69.4
Strategic Undergrounding/Freeway Crossings	1.5%	\$ 31.2	\$ -	3.8	4.4	0.7	1.5	2.2
Group Subtotal	71.2%	\$ 1,452.9	\$ 1.50	4.5	500.0	93.6	167.9	238.5
Grid Modernization								
Trip Savers	2.9%	\$ 58.9	\$ 0.03	61.3	240.3	38.5	79.6	105.8
IGSD Installation Program	2.7%	\$ 53.8	\$ 0.82	15.7	58.1	11.0	19.4	27.7
Medical Center Substation	5.0%	\$ 102.0	\$ 0.15	0.7	4.9	0.0	0.0	4.9
Group Subtotal	10.6%	\$ 214.7	\$ 1.00	21.1	303.4	49.5	99.0	138.4
Flood Control								
Substation Flood Control	1.5%	\$ 30.6	\$ -	7.5	14.2	2.7	4.7	6.7
Control Center Facility Upgrades	0.3%	\$ 7.0	\$ -	12.5	6.1	1.2	2.4	2.5
Group Subtotal	1.8%	\$ 37.6	\$ -	8.4	20.3	3.9	7.1	9.2
Information Technology								
Advanced Aerial Imagery Platform/Digital Twin	0.5%	\$ 9.9	\$ 0.06	3.4	0.8	0.2	0.3	0.3
Advanced Distribution Technology	11.8%	\$ 225.8	\$ 15.00	4.8	61.1	0.0	20.5	40.6
Digital Substation	1.2%	\$ 25.0	\$ (0.60)	1.9	1.3	0.2	0.4	0.8
Group Subtotal	13.5%	\$ 260.7	\$ 14.46	4.5	63.2	0.3	21.2	41.7
System Security								
Substation Physical Security Fencing	0.7%	\$ 15.0	\$ -	15.6	14.7	2.5	4.9	7.3
Substation Security Upgrades	1.0%	\$ 19.5	\$ 0.09	20.5	25.1	4.2	8.4	12.5
Group Subtotal	1.7%	\$ 34.5	\$ 0.09	18.4	39.7	6.6	13.3	19.8
Vegetation Management								
Targeted Critical Circuit Vegetation Management	1.2%	\$ -	\$ 25.00	1.8	13.9	4.2	5.5	4.2
Group Subtotal	1.2%	\$ -	\$ 25.00	1.8	13.9	4.2	5.5	4.2
Totals	100.0%	\$ 2,000.4	\$ 42.05	6.6	940	158	314	452

Resiliency Program	Program Cost (\$MM)	Q&M (\$MM)	BCA	2025 CMI	2026 CMI
System Hardening					
Transmission System Hardening	\$ 376.0	1.2	2.1	6.0	15.5
S90 Tower Replacements	\$ 103.8	1.0	1.8	4.9	12.8
69KV-138KV Conversion Projects	\$ 268.4	0.4	0.7	1.9	5.0
Coastal Islands Upgrades	\$ 258.0	0.3	0.5	1.4	3.7
Substation Fire Protection Barriers	\$ 2.4	1.0	1.5	3.7	9.1
Distribution Pole Replacements/Bracing	\$ 99.3	1.4	2.4	6.2	15.9
Distribution Resiliency – Circuit Rebuilds	\$ 312.8	1.9	2.9	7.0	17.2
Strategic Undergrounding/Freeway Crossings	\$ 31.2	1.1	1.7	3.8	9.1
Group Subtotal	\$ 1,452.9	1.0	1.7	4.5	11.6
Grid Modernization					
Trip Savers	\$ 58.9	13.5	23.0	61.3	156.9
IGSD Installation Program	\$ 53.8	3.2	5.7	15.7	40.9
Medical Center Substation	\$ 102.0	0.1	0.3	0.7	1.9
Group Subtotal	\$ 214.7	4.6	7.9	21.1	54.2
Flood Control					
Substation Flood Mitigation	\$ 30.6	1.7	2.9	7.5	19.2
Control Center Facility Upgrades	\$ 7.0	3.0	4.9	12.5	31.3
Group Subtotal	\$ 37.6	1.9	3.2	8.4	21.4
Information Technology					
Advanced Aerial Imagery Platform/Digital Twin	\$ 9.9	0.6	1.2	3.4	8.9
Advanced Distribution Technology	\$ 225.8	0.1	1.0	4.8	14.3
Digital Substation	\$ 25.0	0.6	0.9	1.9	4.4
Group Subtotal	\$ 260.7	0.2	1.0	4.5	13.1
System Security					
Substation Physical Security Fencing	\$ 15.0	3.2	5.7	15.6	40.3
Substation Security Upgrades	\$ 19.5	4.3	7.5	20.5	53.1
Group Subtotal	\$ 34.5	3.8	6.7	18.4	47.6
Vegetation Management					
Targeted Critical Circuit Vegetation Management	\$ -	0.4	0.7	1.8	4.5
Group Subtotal	\$ -	0.4	0.7	1.8	4.5
Totals	\$ 2,000.4	1.4	2.4	6.6	17.2

Measure	Cost (\$MM)	Q&M (\$MM)	BCA Ratio
System Hardening			
Transmission System Hardening	\$ 376.0	\$ 0.75	6.0
S90 Tower Replacements	\$ 103.8	\$ -	4.9
69KV-138KV Conversion Projects	\$ 268.4	\$ -	1.9
Coastal Resiliency Upgrades	\$ 258.0	\$ 0.75	1.4
Substation Transformer Fire Protection Barriers	\$ 2.4	\$ -	3.7
Distribution Pole Replacements/Bracing	\$ 99.3	\$ -	6.2
Distribution Resiliency – Circuit Rebuilds	\$ 312.8	\$ -	7.0
Strategic Undergrounding/Freeway Crossings	\$ 31.2	\$ -	3.8
Grid Modernization			
Trip Savers	\$ 58.9	\$ 0.03	61.3
IGSD Installations	\$ 53.8	\$ 0.82	15.7
Texas Medical Center Substation	\$ 102.0	\$ 0.15	0.7
Flood Control			
Substation Flood Control	\$ 30.6	\$ -	7.5
Control Center Facility Upgrades	\$ 7.0	\$ -	12.5
Information Technology			
Advanced Aerial Imagery Platform/Digital Twin	\$ 9.9	\$ 0.06	3.4
Advanced Distribution Technology	\$ 225.8	\$ 15.00	4.8
Digital Substation	\$ 25.0	\$ (0.60)	1.9
System Security			
Substation Physical Security Fencing	\$ 15.0	\$ -	15.6
Substation Security Upgrades	\$ 19.5	\$ 0.09	20.5
Vegetation Management			
Targeted Critical Circuit Vegetation Management	\$ -	\$ 25.00	1.8
Totals	\$ 2,000.4	\$ 42.05	6.6

SAIFI									2017-24 AVG
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	0.000	0.012	0.003	0.000	0.012	0.000	0.029	0.000	
Outside Causes - Transmission (Non-Major Event)	0.002	0.011	0.003	0.000	0.000	0.000	0.002	0.000	
Outside Causes - Total	0.002	0.023	0.006	0.000	0.012	0.000	0.031	0.000	
									0.007
									0.002
									0.009
SAIDI									
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	0.27	0.84	0.16	0.00	4.40	0.00	37.06	0.50	
Outside Causes - Transmission (Non-Major Event)	0.42	2.98	0.04	0.00	0.28	0.00	0.21	0.00	
Outside Causes - Total	0.69	3.82	0.20	0.00	4.68	0.00	37.27	0.50	
									5.4
									0.5
									5.9
CMI									
	2017	2018	2019	2020	2021	2022	2023	2024	
Outside Causes - Transmission (Major Event)	672,355	2,103,171	399,367	0	11,736,661	0	102,358,534	1,428,381	
Outside Causes - Transmission (Non-Major Event)	1,035,167	7,494,982	100,575	588	742,612	0	574,691	0	
Outside Causes - Total	1,707,522	9,598,154	499,942	588	12,479,273	0	102,933,224	1,428,381	
									14,837,309
									1,243,577
									16,080,886

Note: CenterPoint Houston’s focus during an extreme weather event is on the rapid restoration of power to our customers. The Company does track the cause of a particular outage;

Source: CEHE Annual Service Quality Reports

Causes of CEHE Distribution Forced Outages, % of Total

	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>	<u>2024</u>	<u>2020-24 AVG</u>
Weather (Including Lightning)	13.8%	15.5%	16.5%	14.4%	14.1%	14.9%
Vegetation	13.3%	13.9%	12.4%	13.1%	15.9%	13.7%
Animals and Birds	7.8%	6.8%	8.0%	7.5%	7.3%	7.5%
People (Including cars and farm equip)	1.4%	1.3%	2.2%	2.3%	2.2%	1.9%
Utility-owned Equipment	26.0%	25.0%	35.6%	46.4%	45.6%	35.7%
Other	19.3%	19.5%	18.2%	10.4%	9.3%	15.3%
Unknown	<u>18.3%</u>	<u>18.0%</u>	<u>7.1%</u>	<u>5.9%</u>	<u>5.8%</u>	<u>11.0%</u>



Exhibit ELS-2: Guidehouse Independent Analysis and Review of
CenterPoint Energy Houston Electric, LLC's System Resiliency Plan

Table 1-1: Resiliency Measure Costs and Benefits

Resiliency Measure	Resiliency Measure No. (RM)	3-Year Capital Cost (\$MM)	3-Year O&M Expense (\$MM)	BCA Ratio	3-Yr CMI 2028-2028 (million)	Annual CMI 2028 (million)
Extreme Wind						
Distribution Circuit Resiliency	RM-1	\$513.4	\$0.0	12.1	263.0	133.4
Strategic Undergrounding	RM-2	\$360.0	\$0.0	2.8	\$1.1	\$1.0
Restoration (GSD)	RM-3	\$107.3	\$0.5	19.3	97.0	48.5
Distribution Pole Replacements/Dracing	RM-4	\$251.6	\$0.0	9.9	121.0	60.8
Vegetation Management	RM-5	\$0.0	\$148.1	3.7	137.0	77.9
Transmission System Hardening	RM-6	\$1,467.3	\$0.8	3.9	223.8	122.5
69kV Conversion Projects	RM-7	\$369.3	\$0.0	2.7	65.5	27.6
990 Tower Replacements	RM-8	\$118.4	\$0.0	9.4	59.5	23.8
Overhead Transmission Resiliency	RM-9	\$177.3	\$0.8	2.0	7.8	7.8
Group Subtotal		\$3,654.6	\$148.1	5.5	1,055.7	495.2
Extreme Water (Flood)						
Substation Flood Control	RM-10	\$43.8	\$0.0	2.1	3.9	2.0
Control Center Facility Upgrades	RM-11	\$7.0	\$0.0	15.2	2.5	2.5
MUX/AVES	RM-12	\$10.8	\$0.0	1.3	0.6	0.7
Mobile Substations	RM-13	\$30.0	\$0.0	3.0	3.9	2.0
Group Subtotal		\$91.6	\$0.0	3.3	11.3	6.6
Extreme Temperature (Freezing)						
Anti-Galloping Technologies	RM-14	\$14.0	\$1.0	7.1	5.3	2.6
Group Subtotal		\$14.0	\$1.0	7.1	5.3	2.6
Extreme Temperature (Heat)						
Distribution Capacity Enhancement/Substations	RM-16	\$579.6	\$0.0	5.6	135.1	70.6
MUG Reconductoring	RM-17	\$245.0	\$0.0	1.4	13.6	7.4
UG Cable Modernization	RM-18	\$128.4	\$0.0	2.2	13.0	6.6
Contamination Mitigation	RM-19	\$144.0	\$6.0	2.4	15.7	7.9
Substation Transformer Fire Barriers	RM-20	\$9.0	\$0.0	4.0	1.5	0.7
Digital Substation	RM-21	\$31.8	\$0.0	1.8	1.2	0.7
Group Subtotal		\$1,137.8	\$6.0	3.3	163.1	83.8
Physical Attack						
Substation Physical Security Fencing	RM-26	\$16.0	\$0.0	21.8	17.6	8.8
Substation Security Upgrades	RM-27	\$10.4	\$0.1	28.7	25.1	12.5
Group Subtotal		\$26.4	\$0.1	25.4	42.7	21.3
Situational Awareness						
Advanced Aerial Imagery/Digital Twin	RM-33	\$10.4	\$2.0	4.8	10.8	5.1
Group Subtotal		\$10.4	\$2.0	4.8	10.8	5.1
Totals		\$5,163.6	\$157.2	5.1	1,309.0	\$28

*Average BCA weighted by resiliency measure cost.
Source: Guidehouse BCA of CenterPoint Houston's proposed resiliency measures.

RM	Cost	BCA	3yr CMI	3yr HRS	Est VOLL	Est RestorBen	RestorCost/Hr
Trans Hardening	\$1,468	3.9	223.8	3.7	\$1,958	\$3,767	\$1,010
Veg Mgt	\$146	3.7	137.0	2.3	\$1,199	-\$658	-\$288
Total	\$5,321	5.0	1309.0	21.8	\$11,454	\$15,151	\$694

Figure JG-1
Resiliency Plan Capital Cost Estimates

Resiliency Plan Capital Cost Estimates (in millions)		
Resiliency Plan Event Categories	Estimated Capital Cost	Estimated Distribution - Related
Extreme Wind	\$ 3,864.6	\$ 1,851.5
Extreme Water	\$ 91.6	\$ 76.4
Extreme Temperature (Freeze)	\$ 53.5	\$ 40.2
Extreme Temperature (Drought)	\$ 1,207.2	\$ 1,178.4
Physical Attack	\$ 37.4	\$ 9.1
Technology & Cybersecurity	\$ 79.6	\$ 39.8
Situational Awareness	\$ 209.5	\$ 192.7
Total	\$ 5,543.4	\$ 3,388.1

Likewise, O&M investment estimates are summarized in Figure JG-2 below:

Figure JG-2
Resiliency Plan O&M Estimates

Total Estimated O&M (in millions)		
Resiliency Plan Event Categories	Estimated O&M Cost	Estimated Distribution - Related
Extreme Wind	\$ 148.1	\$ 146.7
Extreme Water	\$ -	\$ -
Extreme Temperature (Freeze)	\$ 2.6	\$ 1.7
Extreme Temperature (Drought)	\$ 37.2	\$ 36.0
Physical Attack	\$ 0.1	\$ -
Technology & Cybersecurity	\$ 13.5	\$ 6.7
Situational Awareness	\$ 9.2	\$ 9.2
Total	\$ 210.7	\$ 200.3

The amounts shown in Figures JG-1 and JG-2 above are for the entire term of the SRP from 2026-2028. As explained later in my testimony, the Company will seek

Direct Testimony of Jeff W. Garmon
CenterPoint Energy Houston Electric, LLC
2026-2028 T&D SRP

CENTERPOINT ENERGY HOUSTON ELECTRIC, LLC
PUC DOCKET NO. 57579
SOAH DOCKET NO. 473-25-11558
TEXAS COAST UTILITIES COALITION
REQUEST NO.: TCUC-RFI01-30

QUESTION:

Reference page 21 of witness Shlatz's direct testimony, please provide the Commission Order that approved the estimated \$35,000 per MWh VoLL for use in planning studies.

ANSWER:

There is no such order, because the Commission issued its directive to use a \$35,000 VOLL during the August 29, 2024 open meeting and did not memorialize its vote in a written order. On August 22, 2024, ERCOT filed the "Value of Lost Load Study Final Report" in Project No. 55837. In that filing, ERCOT recommended that the one-hour ERCOT-wide value identified by the survey of -\$35,000 per MWh be adopted for use in planning activities." Please see Project No. 55837, Item No. 12 at page 6. Also on August 22, 2024, Commission Staff filed a memorandum in Project No. 55837 recommending "that VOLL be set at \$30,000 per MWh." Please see Project No. 55837, Item No. 13 at page 6. On August 28, 2024, PUC Chairman Gleeson filed a memorandum stating his belief that "VOLL should be set at \$35,685 per MWh as recommended by Brattle." Please see Project No. 55837, Item No. 14. In discussions at the Commission's open meeting on August 29, 2024, the Commissioners agreed unanimously that \$35,000/MWh was the correct VOLL to use for planning purposes. Though not memorialized in a written order, the Commission's decision was noted in a PUC Press Release that same day. See TCUC-RFI01-30 Attachment 1, PUC Press Release, "Public Utility Commission of Texas Adopts Reliability Standard for the ERCOT Market," at page 2 (August 29, 2024).

SPONSOR:

Eugene Shlatz

RESPONSIVE DOCUMENTS:

TCUC01-30 Attachment 1 -- Public Utility Commission of Texas Adopts Reliability Standard for the ERCOT Market



The rule also establishes a process for a regular assessment of the ERCOT region's reliability. Beginning January 1, 2026, ERCOT must conduct a probability-based assessment every three years to determine whether the power system is meeting the reliability standard and is expected to continue meeting the standard for the next three years. If ERCOT determines that the system fails to meet the reliability standard, it must include in its report to the Commission recommended changes to the ERCOT market design that could address the deficiency and outline the potential cost of those changes. The PUCT would then provide 30 days for the public to comment on the ERCOT assessment.

If ERCOT's assessment shows that the system fails to meet the reliability standard, the independent market monitor (IMM) must conduct an independent review and Commission staff must provide their own recommendations on potential market design changes and associated costs. The Commission would then review ERCOT's assessment, the IMM's review, Commission staff's recommendations, and public comments to determine whether any market design changes may be necessary.

At the open meeting today, Commissioners also approved a Value of Lost Load (VOLL), which is an estimate of the value of electric reliability to consumers, for the ERCOT region. Using results from a survey of consumers in the ERCOT region and an ERCOT analysis, Commissioners approved a VOLL of \$35,000 per megawatt-hour. This value will also help the PUCT evaluate potential market or reliability improvements.

More information related to the development of the reliability standard is available in PUCT Docket No. 54584. More information related to the VOLL and consumer survey is available in PUCT Docket No. 55837.

About the Public Utility Commission of Texas

Our mission is to serve Texans by regulating the state's electric, telecommunication, and water and sewer utilities, implementing respective legislation, and offering customer assistance in resolving consumer complaints. Since its founding in 1975, the Commission has a long and proud history of service to Texas, protecting customers, fostering competition, and promoting high quality infrastructure. To learn more, please visit <https://www.puc.texas.gov>.



Appendix C. VoLL Sensitivity Analysis: \$5,000/MWh to \$65,000/MWh

Table C-1 summarizes the results of BCA sensitivity analysis in which VoLL was varied between \$5,000/MWh and \$65,000/MWh.

Table C-1: VoLL Sensitivity Analysis

Resiliency Measure	Resiliency Measure No. (RM)	3-Year Total Cost (\$MM)	VoLL (\$5,000 per MWhr)	VoLL (\$9,000 per MWhr)	VoLL (\$35,000 per MWhr)	VoLL (\$65,000 per MWhr)
Extreme Wind						
Distribution Circuit Resiliency	IRM - 1	\$513.4	1.8	3.2	12.1	22.5
Strategic Undergrounding	IRM - 2	\$860.0	0.5	0.8	2.8	5.2
Restoration IGSD	IRM - 3	\$107.0	2.0	5.0	19.3	35.7
Distribution Pole Replacements/Trimming	IRM - 4	\$251.8	1.8	2.7	9.9	18.3
Vegetation Management	IRM - 5	\$146.1	0.6	1.0	3.7	6.7
Transmission System Hardening	IRM - 6	\$1,462.0	0.6	1.0	3.9	7.2
59kV Conversion Projects	IRM - 7	\$369.3	0.4	0.7	2.7	5.0
590 Tower Replacements	IRM - 8	\$118.1	1.3	2.4	9.4	17.4
Coastal Transmission Resiliency	IRM - 9	\$178.1	0.3	0.5	2.0	3.8
Group Subtotal		\$4,012.7	0.8	1.4	5.5	10.1
Extreme Water (Flood)						
Substation Flood Control	IRM - 10	\$43.8	0.3	0.6	2.1	3.9
Control Center Facility Upgrades	IRM - 11	\$7.0	2.7	4.4	15.2	27.8
MUCAMS	IRM - 12	\$10.8	0.2	0.3	1.3	2.5
Mobile Substations	IRM - 13	\$30.0	0.4	0.7	3.0	5.6
Group Subtotal		\$91.6	0.6	0.9	3.3	6.1
Extreme Temperature (Freezing)						
Anti Galloping Technologies	IRM - 14	\$15.0	1.0	1.8	7.1	13.2
Group Subtotal		\$15.0	1.0	1.8	7.1	13.2
Extreme Temperature (Drought)						
Transmission Capacity Enhancement of Substations	IRM - 16	\$579.6	0.8	1.4	5.6	10.5
MUES Reconductoring	IRM - 17	\$245.0	0.2	0.4	1.4	2.6
URD Cabin Modernization	IRM - 18	\$128.4	0.7	0.9	2.2	3.7
Contamination Mitigation	IRM - 19	\$150.0	0.4	0.6	2.4	4.5
Substation Transformer Fire Barriers	IRM - 20	\$9.0	0.6	1.2	4.0	7.3
Digital Substation	IRM - 21	\$31.8	0.4	0.6	1.9	3.1
Group Subtotal		\$1,143.8	0.6	1.0	3.8	7.0
Physical Attack						
Substation Physical Security Fencing	IRM - 26	\$10.0	3.2	5.7	21.6	40.3
Substation Security Upgrades	IRM - 27	\$19.5	4.3	7.5	28.7	53.1
Group Subtotal		\$37.5	3.8	6.7	25.4	47.0
Situational Awareness						
Advanced Aerial Imagery/Digital Twin	IRM - 33	\$20.4	0.7	1.2	4.6	9.0
Group Subtotal		\$20.4	0.7	1.2	4.6	9.0
Totals		\$6,321.0	0.8	1.3	5.0	9.3

*Average BCA weighted by resiliency measure cost

Source: Guidehouse BCA of CenterPoint Houston's proposed resiliency measure

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CEHE 2026-2028 System Resiliency Plan
Docket 57579
RFI: TCUC 01-10

	Year End Customer Count							
	2017	2018	2019	2020	2021	2022	2023	2024
Residential	2,164,073	2,198,225	2,243,188	2,303,315	2,359,168	2,402,329	2,455,309	2,506,284
COM_SVS	145,282	148,123	151,254	152,854	154,578	153,597	155,776	158,557
COM_SVL_AMS	130,144	134,120	134,844	138,589	142,056	145,458	147,146	148,076
COM_SVL_IDR	2,152	2,226	2,281	2,326	2,388	2,455	2,545	2,658
COM_PVS_AMS	395	413	407	420	418	414	402	400
COM_PVS_IDR	229	234	246	250	260	273	294	309
COM_MLS	13,222	12,698	12,229	11,837	11,460	11,035	10,660	10,204
COM_SLS	4,072	4,237	4,310	4,432	4,520	4,635	4,744	4,813
Commercial	295,496	302,051	305,571	310,708	315,680	317,867	321,567	325,017
IND_SVL_IDR	1,514	1,516	1,507	1,505	1,497	1,488	1,479	1,467
IND_PVS_IDR	347	352	352	350	350	351	351	350
Small Industrial	1,861	1,868	1,859	1,855	1,847	1,839	1,830	1,817
Large Industrial	196	204	207	218	223	233	233	242
Municipal	826	863	916	898	897	912	910	918
TOTAL	2,462,452	2,503,211	2,551,741	2,616,994	2,677,815	2,723,180	2,779,849	2,834,278

The following files are not convertible:

57579 Workpapers to the Direct
Testimony of Scott Norwood (REDACTED)_4.08.25.xlsx

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