ATTACHMENT 4

"New 138 kV Kilgore Substation" Study

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New 138 kV Kilgore Substation

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Executive Summary

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy or CNP) is proposing a new 138 kV transmission line that is needed to deliver electric power to the new 138/35 kV Kilgore substation in the Jordan/Trinity Bay/Mont Belvieu area. This project includes the following:

- Double tap new CenterPoint Energy Kilgore substation on 138 kV circuits: EAGLE to WINFRE ckt 52 and LNGSTN to Mont Belvieu ckt 86.
  - Construction of a new CenterPoint Energy 138/35 kV Kilgore substation
  - Connection of a Kilgore substation by tapping into ckt 52 between EAGLE to WINFRE and ckt 86 between LNGSTN and Mont Belvieu, with construction of approximately 3.3 miles of new double circuit line.

This project is the most cost-effective solution to reliably serve the projected load demand and to support existing customers in the area, which is currently served by the existing Mont Belvieu, Jordan, and Trinity Bay substations. This project also provides capacity for future area load growth, including a configuration that meets CenterPoint Energy Transmission System Design Criteria.

The estimated cost of the proposed project is approximately $29.43 M. This project is considered a “Neutral Project” by the Electric Reliability Council of Texas, Inc (“ERCOT”), per ERCOT Protocols Section 3.11.4.3(1)(f), as it is a project to connect new load and will not create a new transmission circuit connection between two stations. The project will therefore follow the same process as ERCOT Tier 4 projects and does not require submittal to the Regional Planning Group (RPG) for review. The project requires a Certificate of Convenience and Necessity (CCN), from the Public Utility Commission of Texas (PUCT), as it involves the construction of more than a mile-long double circuit line to connect the proposed new Kilgore substation. The project is expected to be completed before peak 2025, taking into consideration typical lead times necessary to implement the proposed project, including PUCT CCN process review and approval, materials and construction lead times.

2. Background

The Jordan/Trinity Bay/Mont Belvieu service area located in the far Northeastern part of CenterPoint Energy’s service territory and is a highly industrialized area with several large chemical facilities served by the CenterPoint Energy transmission system. In addition to the transmission level industrial load growth, the area is also experiencing a significant distribution load increase with multiple commercial and residential developments planned in the area. To serve this distribution load growth and to support existing customers in the area, CenterPoint Energy is proposing a new 138/35 kV substation to be connected/looped with a new 138 kV transmission line (longer than 1 mi) to the 138 kV transmission system in the Grand Parkway (HWY 99) and FM565 area.

The area under study shown in Figure 2-1 is currently being served mainly by 138/35 kV Jordan substation, 138/12 kV Mont Belvieu substation, and dual voltage 138/35 kV and 138/12 kV Trinity Bay substation.

Over the last five years (2016-2020), the three substations have experienced a 15% combined load growth, as shown in Table 2-1. During this period, it was observed that there has been a transfer of approximately 30 MW of load from Mont Belvieu (138/12 kV) substation to Jordan (138/35 kV) substation.

Table 2-1: Historical Combined Load (Jordan/Trinity Bay/Mont Belvieu) 2016 -2020

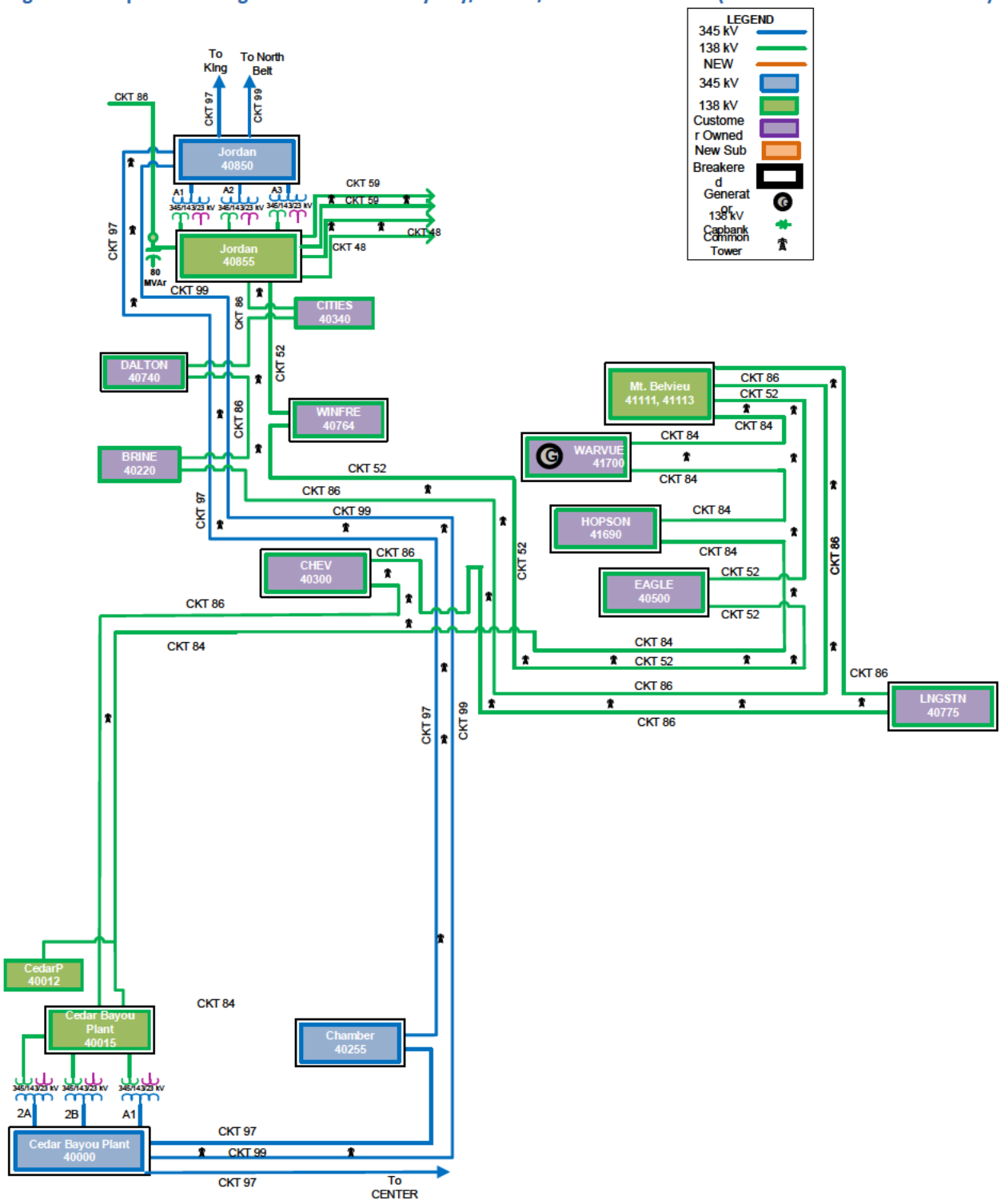
	Substation Load (MW)				
Substation Name	2016	2017	2018	2019	2020
JORDAN	7.85	9.87	20.31	30.70	45.10
MONT_BELVIEU	71.61	68.67	61.00	58.19	40.98
TRINITY BAY 12KV	23.80	26.07	31.89	0.00	30.75
TRINITY BAY 35KV	11.24	14.56	14.00	51.68	14.80
Total (MW)	114.50	119.18	127.20	140.57	131.62

With the large industrial, commercial, and residential developments planned in the area, the distribution load in this area that is currently served from the three existing substations is forecast to grow by 50 MW between 2021 and 2030, with a combined load increase of 26% between 2021 and 2025, as shown in Table 2-2. Further development is expected in the area following the completion of highway extensions for Grand Parkway and FM 1409. Locating a new substation closer to the load center will increase circuit capacity to better serve existing distribution customers and new distribution load growth in this fast-growing area. In addition, the new substation will also help to reduce distribution overhead feeder exposure, circuit customer counts, and average feeder loading, which will improve circuit reliability in the area. This report summarizes the analysis to identify reliable and cost-effective alternatives for providing loop or tap service to a new nearby 138/35 kV substation, which will relieve the capacity limitations of the existing substations anticipated by 2025 that will be caused by the high growth in the area.

Table 2-2: Forecast Combined Load (Jordan/Trinity Bay/Mont Belvieu) 2021-2030

	Substation Load (MW)									
Substation Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jordan	78.62	83.47	87.73	91.37	91.01	90.66	90.31	89.95	89.61	89.26
Mont Belvieu	29.89	33	35.82	38.67	38.91	39.14	39.38	39.62	39.87	40.11
Trinity Bay 12 kV	35.37	40.8	45.9	50.27	50.58	50.89	51.2	51.51	51.83	52.14
Trinity Bay 35 kV	41.02	44.51	48.02	51.55	51.86	52.18	52.5	52.82	53.14	53.47
Total (MW)	184.9	201.78	217.47	231.86	232.36	232.87	233.39	233.9	234.45	234.98

Figure 2-1: Expected Configuration in the Trinity Bay/Jordan/Mont Belvieu Area (2025 Summer Peak Base Case)



3. Study Cases

The following study is based on the load forecast, generation pattern, and network topology projected for the 2025 and 2026 summer peak conditions contained in ERCOT Steady State Working Group (SSWG) base cases posted on October 15, 2020. Load at Jordan and Trinity Bay substations have been reduced and transferred to the new substation by the amounts shown in Table 3-1. Mont Belvieu load was updated based on projected load as shown in Table 2-2. The final future load distribution for year 2025 is shown in Table 3-2.

Table 3-1: Load Forecast

Year 2025 Load Transferred to New Kilgore Substation Grand Parkway (HWY 99) - FM 565 Area			
Jordan		Trinity Bay	
CKT	MVA	CKT	MVA
JOR41	10.5	TRN41	14.8
JOR44	13.6	TRN42	6
TOTAL	24.1	TOTAL	20.8
TOTAL NEW KILGORE SUBSTATION LOAD (MW)			44.9

Table 3-2: Future Year 2025 Load Modeled per Substation

	2025 Substation Load	
	Existing Load	New Load
Jordan	91.01	66.91
Mont Belvieu	38.91	38.91
Trinity Bay 12 kV	50.58	50.58
Trinity Bay 35 kV	51.86	31.06
Kilgore 35 kV	0	44.9
Total (MW)	232.36	232.36

The following CenterPoint Energy internal cases were used for performing the study.

- CNP_2025_SUM1_U1_10082020_20201210.sav
- CNP_2026_SUM1_U1_10082020_20201210.sav
- CNP_2024_MIN_U1_10082020_20201210.sav

The 2024 MIN case was used as it is the only minimum load case provided by ERCOT, CNP is not expecting any difference in system performance for year 2025 under minimum load conditions. Changes made to the ERCOT 2020 SSWG base cases to create CenterPoint Energy's internal cases are listed in Appendix A.

4. Transmission Options

CenterPoint Energy evaluated four interconnection options to connect the new Transmission/Distribution substation. All options require a CCN from the PUCT. The detailed options are as follows:

- Option 1: Loop the new Kilgore 138/35 kV substation via an approximately 2.6-mi long 138 kV double circuit line on ckt 86 between CHEV and LNGSTN. The one line-diagram for Option 1 configuration is shown in Figure 4-1.

- Option 2: Double-tap the new Kilgore 138/35 kV substation via an approximately 3 mi long 138 kV double circuit line to ckt 52 EAGLE - WINFRE and ckt 86 LNGSTN to Mont Belvieu. The one line-diagram for Option 2 configuration is shown in Figure 4-2.

- Option 3: Loop the new Kilgore 138/35 kV substation via an approximately 3.4-mi long 138 kV double circuit line on ckt 84 between Cedar Bayou Plant and HOPSON. The one line-diagram for Option 3 configuration is shown in Figure 4-3.

- Option 4: Loop the new Kilgore 138/35 kV substation via an approximately 7.8-mi long 138 kV double circuit line on ckt 03 between Cedar Bayou Plant and Trinity Bay. The one line-diagram for Option 4 configuration is shown in Figure 4-4.

As the final route is not known, no interconnection option has been selected, and the substation site is not known at the time of the study, CenterPoint Energy included an additional 30% to the straight-line point-to-point distances discussed above to account for variations in routes.

Figure 4-1: Option 1 – Loop Kilgore Substation on Chevron to Langston ckt 86

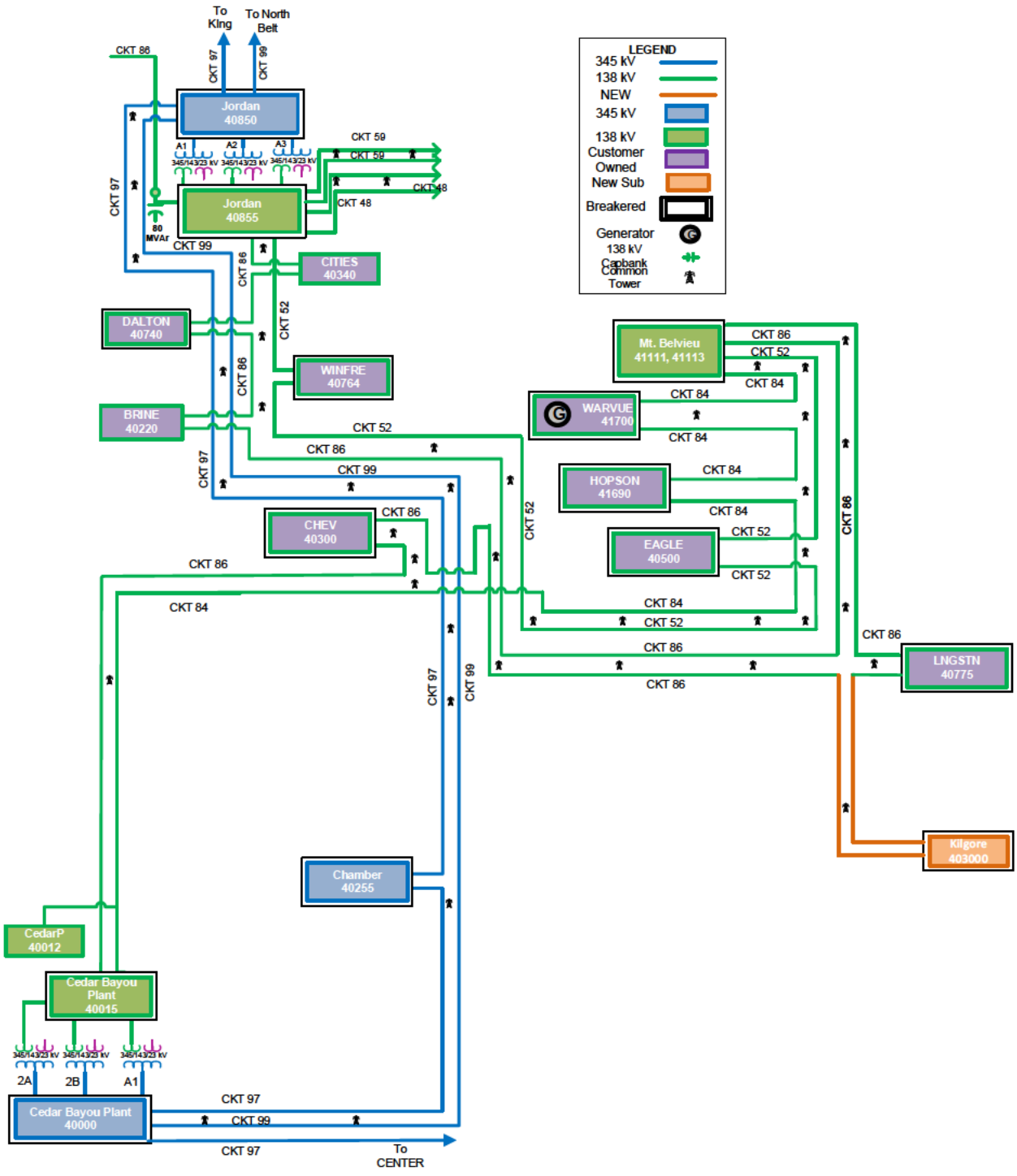


Figure 4-2: Option 2 – Double Tap Kilgore on ckt 52 EAGLE to WINFRE and on ckt 86 LNGSTN to Mont Belvieu

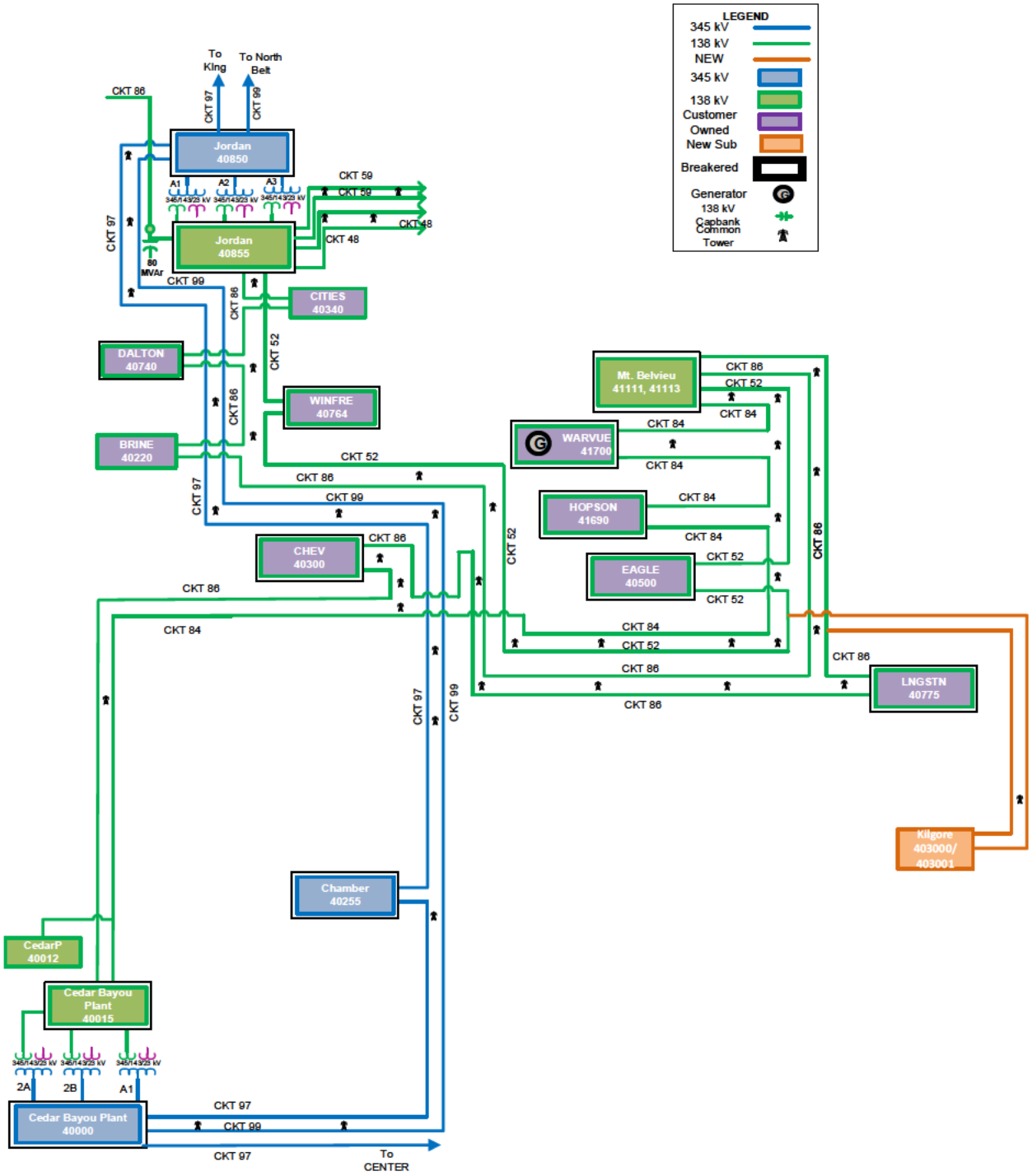


Figure 4-3: Option 3 – Kilgore looped on 138 kV ckt 84 Cedar Bayou Plant to HOPSON

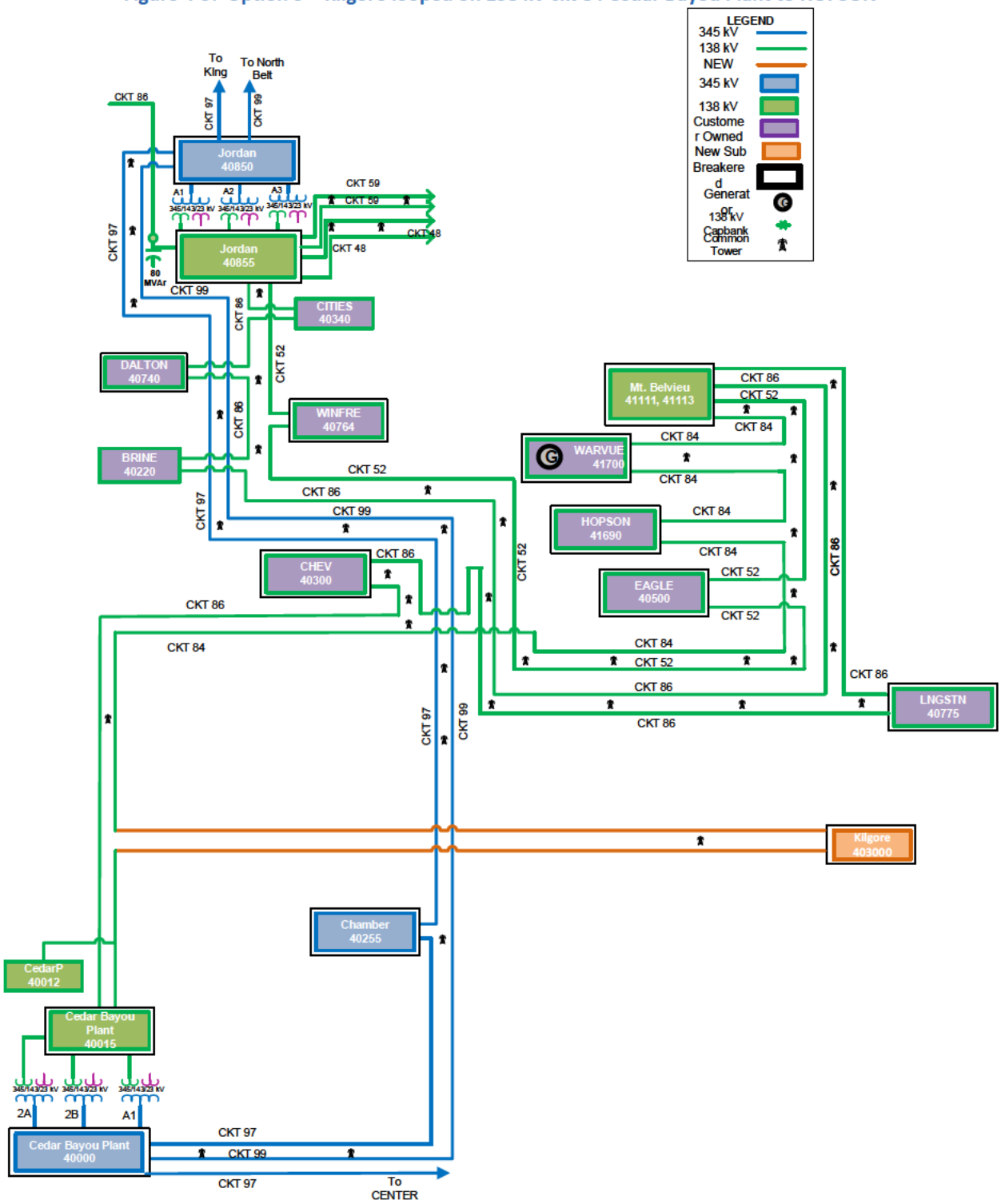
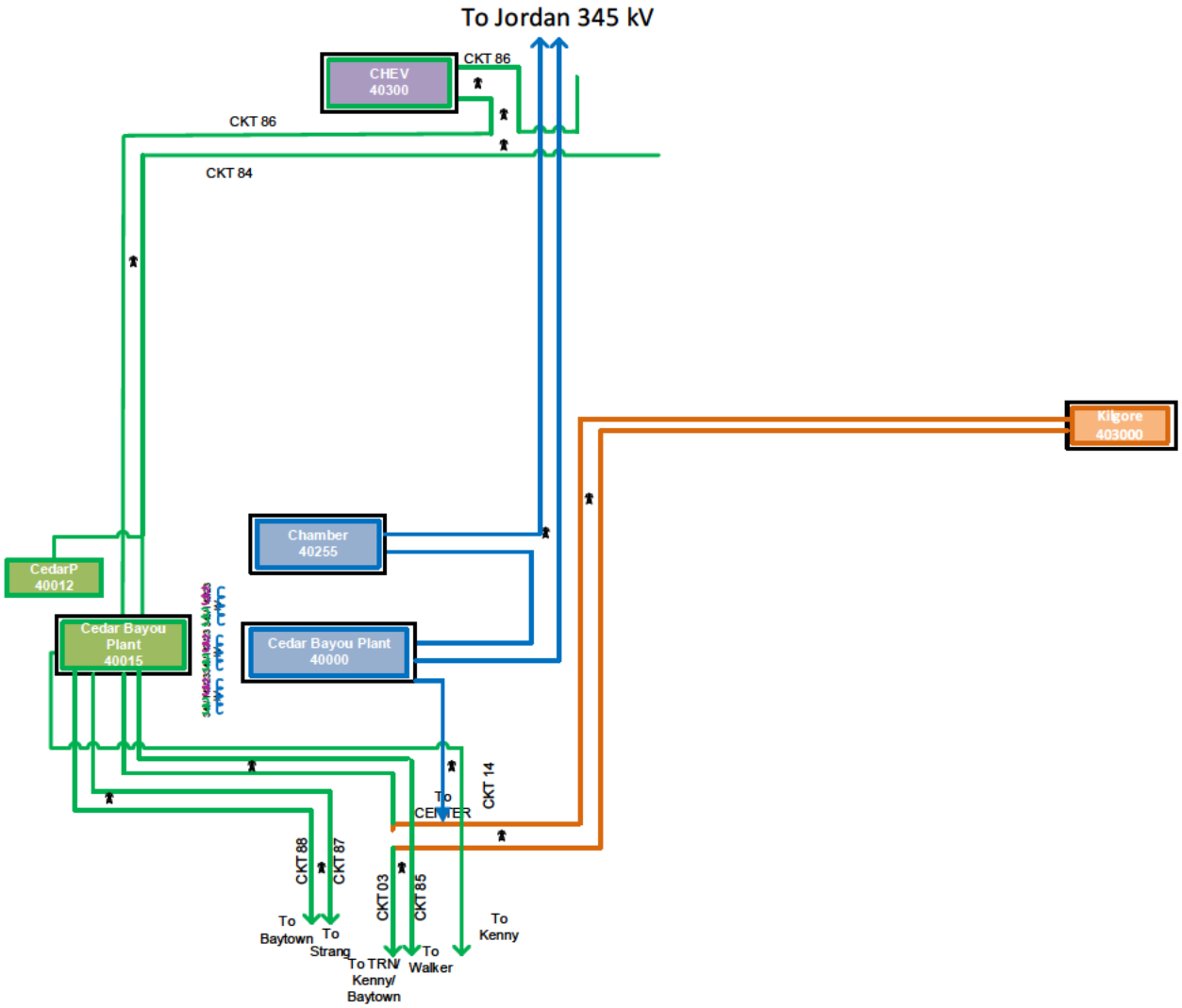


Figure 4-4: Option 4 – Kilgore Substation looped on 138 kV ckt 03 Cedar Bayou Plant to Trinity Bay-Baytown



5. Steady-State Power Flow Analysis

CenterPoint Energy performed steady-state power flow analysis using the internal cases described above. Designs were tested against the applicable North American Electric Reliability Corporation (NERC) Reliability Standard TPL- 001- 4, ERCOT Transmission Planning Criteria, and CenterPoint Energy Transmission System Design Criteria. CenterPoint Energy has developed planning events based on this reliability standard and performance criteria. The CenterPoint Energy Planning Events are defined as follows:

- CNP Planning Event P0 (no contingency) which is equivalent to NERC Category P0.

- CNP Planning Event P1 (consists of normal initial conditions followed by loss of one transmission element (generator, transmission circuit, transformer, or shunt device)) which is equivalent to NERC Category P1.
- CNP Planning Event P2 (consists of normal initial conditions followed by outage of two or more circuits due to failure of a breaker to operate under fault conditions or due to a bus section fault) which is equivalent to NERC Category P2.
- CNP Planning Event P3 (consists of normal initial conditions followed by loss of a generator and an additional outage of any of the following: (single circuit, single (A-1) autotransformer outage, or a single (G-1) generator outage)) which is equivalent to NERC Category P3, but also includes ERCOT-specific Reliability Performance Criteria Event 2 (consists of any single generating unit unavailable, followed by manual system adjustment, followed by a common tower outage, which includes outage of two circuits sharing a common tower for more than half a mile).
- NERC Category P4 Events are equivalent to NERC Category P2 Events for CenterPoint Energy's system; therefore, no specific P4 events are included in CenterPoint Energy's analysis.
- CNP Planning Event P5 (consists of normal initial conditions followed by delayed fault clearing due to the failure of a non-redundant relay protecting the faulted element to operate as designed, for one of the following: (generator, transmission circuit, transformer, shunt device, or bus section)) which is equivalent to NERC Category P5.
- CNP Planning Event P6 (consists of the outage of a 345/138 kV autotransformer (A-1) followed by an outage of any of the following: single circuit, single (A-1) autotransformer, or a single (G-1) generator) which is equivalent to NERC Category P6-2, but also includes ERCOT-specific Reliability Performance Criteria Event 3 (consist of unavailability of a 345/138 kV transformer, followed by manual system adjustments, followed by the common tower outage for circuits sharing a common tower for more than half a mile).
- CNP Planning Event P7 (consists of normal initial conditions followed by the outage of circuits sharing a common tower for more than a mile) which is equivalent to NERC Category P7, but also includes ERCOT–specific Reliability Performance Criteria Event 1 (consist of the outage of circuits sharing a common tower for more than half a mile).
- CNP Maintenance Outage Scenario (consists of planned outage of either a 345/138 kV autotransformer, a 138 kV circuit, or a 345 kV circuit in the Mont Belvieu area followed by the outage of a 138 or a 345 kV circuit, or circuits sharing a common tower for more than half a mile or a stuck-breaker contingency on any of the Mont Belvieu buses).

Studies were conducted in accordance with CenterPoint Energy Transmission System Design Criteria, which includes monitoring Rate A (normal rating) for CNP Planning Events P0 and P1 and

Rate B (emergency rating) for CNP Planning Events P2 through P7. Bus voltages should remain within the 0.95 p.u. to 1.05 p.u. range for CNP Planning Events P0 and P1 and the 0.92 p.u. to 1.05 p.u. range for CNP Planning Events P2 through P7.

5.1 AC Contingency Analysis - Results

CenterPoint Energy performed contingency analysis to evaluate the impact of transferring the load to the new Kilgore substation for all the four interconnection options for years 2025 and 2026. A summary of the results for the summer peak cases of 2025 and 2026 are shown in the following sections. Results for the minimum case show no thermal violations or voltages concerns. Only thermal loading in the area higher than 95% of the corresponding rating and flows on transmission circuits out of Kilgore substation are shown in the tables. The complete sets of results for all three cases and the four interconnection options are included in Appendix A.

5.1.1 CNP Planning Event P0

Under normal operating conditions, there were no base case thermal loading or voltage concerns identified for the CenterPoint Energy transmission system for any of the different options.

5.1.2 CNP Planning Event P1

Under the CNP Planning Event P1, thermal loading concern for Option 4 was identified as shown below in Table 5-1 and Table 5-2. No voltage concerns were identified under CNP Planning Event P1.

Table 5-1: Summer Peak Year 2025 - Thermal Loading Results under CNP Planning Event P1

Branch Loading	Rating (MVA)	Contingency	CNP_2025_SP_ BaseCase	CNP_2025_SP_ Option1	CNP_2025_SP_ Option2	CNP_2025_SP_ Option3	CNP_2025_SP_ Option4
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	38.6 % (0x)	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	33.2 % (0x)	BNV	BNV
		SINGLE 40015-41690(&1): 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	35.2 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	41.7 % (0x)	BNV	BNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	31.6 % (0x)	BNV	BNV	BNV
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	Rate A: 838	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	22.3 % (0x)	BNV
		SINGLE 41111-41700(84): 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8	BNV	BNV	BNV	18.9 % (0x)	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	Rate A: 838	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	27.4 % (0x)	BNV
		SINGLE 41111-41700(84): 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8	BNV	BNV	BNV	24.2 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	Rate A: 360	SINGLE 40010-40430(&1): 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8	BNV	BNV	BNV	BNV	43.2 % (0x)
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	Rate A: 360	SINGLE 40010-40430(&1): 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8	BNV	BNV	BNV	BNV	55.2 % (0x)
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	Rate A: 360	SINGLE 40740-40855(&1): 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138	BNV	BNV	13.2 % (0x)	BNV	BNV
		SINGLE 40764-40855(&1): 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	47.7 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	Rate A: 360	SINGLE 40740-40855(&1): 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138	BNV	BNV	10.5 % (0x)	BNV	BNV
		SINGLE 40764-40855(&1): 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	53.2 % (0x)	BNV	BNV
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate A: 384	SINGLE 40010-41500(87): 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	90.3 % (0x)	91.1 % (0x)	91.2 % (0x)	90.9 % (0x)	101.7 % (1x)

*CNV: Contingency not valid, BNV: Branch not valid

Table 5-2: Summer Peak Year 2026 - Thermal Loading Results under CNP Planning Event P1

Branch Loading	Rating (MVA)	Contingency	CNP_2026_SP_ BaseCase	CNP_2026_SP_ Option1	CNP_2026_SP_ Option2	CNP_2026_SP_ Option3	CNP_2026_SP_ Option4
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	38.6 % (0x)	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	33.2 % (0x)	BNV	BNV
		SINGLE 40015-41690(&1): 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	35.1 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	41.7 % (0x)	BNV	BNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	Rate A: 440	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	31.6 % (0x)	BNV	BNV	BNV
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	Rate A: 838	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	22.2 % (0x)	BNV
		SINGLE 41111-41700(84): 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8	BNV	BNV	BNV	18.9 % (0x)	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	Rate A: 838	SINGLE 40015-40300(86): 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	27.4 % (0x)	BNV
		SINGLE 41111-41700(84): 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8	BNV	BNV	BNV	24.2 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	Rate A: 360	SINGLE 40010-40430(&1): 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8	BNV	BNV	BNV	BNV	43.3 % (0x)
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	Rate A: 360	SINGLE 40010-40430(&1): 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8	BNV	BNV	BNV	BNV	55.3 % (0x)
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	Rate A: 360	SINGLE 40740-40855(&1): 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138	BNV	BNV	13.3 % (0x)	BNV	BNV
		SINGLE 40764-40855(&1): 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	47.7 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	Rate A: 360	SINGLE 40740-40855(&1): 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138	BNV	BNV	10.5 % (0x)	BNV	BNV
		SINGLE 40764-40855(&1): 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	53.2 % (0x)	BNV	BNV
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate A: 384	SINGLE 40010-41500(87): 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	90.4 % (0x)	91.2 % (0x)	91.3 % (0x)	91.0 % (0x)	101.9 % (1x)

*CNV: Contingency not valid, BNV: Branch not valid

5.1.3 CNP Planning Event P2

Under the CNP Planning Event P2, there were no thermal loading or voltage concerns were identified for the CenterPoint Energy transmission system as shown below in Table 5-3 and Table 5-4.

Table 5-3: Summer Peak Year 2025 - Thermal Loading Results under CNP Planning Event P2

Branch Loading	Rating (MVA)	Contingency	CNP_2025_SP _BaseCase	CNP_2025_SP _Option1	CNP_2025_SP _Option2	CNP_2025_SP _Option3	CNP_2025_SP _Option4
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	32.6 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	Rate B: 525	P2-3_CBY-E680: 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8 & 40005 - 40020 <2A> CEDARPB AUTOTRANSFORMER 2A & 40005 - 40020 <2B> CEDARPB AUTOTRANSFORMER 2B	BNV	BNV	28.7 % (0x)	BNV CNV	BNV
		P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	28.0 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	35.2 % (0x)	BNV	BNV CNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	26.7 % (0x)	BNV	BNV CNV	BNV
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	Rate B: 893	P2-3_CBY-E660X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	19.0 % (0x)	BNV
		P2-3_MB-M160X_OPT2: 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8 & 40500 - 41111 <CKT 52> EAGLE__X52B8 TO MT_BEL__B138	BNV	BNV	BNV	17.8 % (0x)	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	Rate B: 893	P2-3_CBY-E660X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	23.8 % (0x)	BNV
		P2-3_MB-M160X_OPT2: 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8 & 40500 - 41111 <CKT 52> EAGLE__X52B8 TO MT_BEL__B138	BNV	BNV	BNV	22.7 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	Rate B: 440	P2-3_CBY-E370X: 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8 & 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1	BNV	BNV	BNV	BNV	40.6 % (0x)
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	Rate B: 440	P2-3_CBY-E530X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40870 <CKT 14> CEDARP_B138B TO KENNY__X14R8	BNV	BNV	BNV	BNV	35.1 % (0x)
		P2-3_CBY-E370X: 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8 & 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1	BNV	BNV	BNV	BNV	50.4 % (0x)
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	Rate B: 440	P2-3_JOR-Y470X: 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138 & 40510 - 40855 <CKT 48> ENPROD_X48B8 TO JORDAN__B138	BNV	BNV	10.8 % (0x)	BNV	BNV
		P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	47.3 % (0x)	BNV CNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	Rate B: 440	P2-3_JOR-Y470X: 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138 & 40510 - 40855 <CKT 48> ENPROD_X48B8 TO JORDAN__B138	BNV	BNV	8.6 % (0x)	BNV	BNV
		P2-3_JOR-Y500: 40850 - 40855 <A3> JORDAN AUTOTRANSFORMER A3 & 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	43.7 % (0x)	BNV	BNV
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate B: 498	P2-3_CBY-E550_OPT4B: 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8 & 40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	CNV	CNV	CNV	CNV	95.3 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

Table 5-4: Summer Peak Year 2026 - Thermal Loading Results under CNP Planning Event P2

Branch Loading	Rating (MVA)	Contingency	CNP_2026_SP _BaseCase	CNP_2026_SP _Option1	CNP_2026_SP _Option2	CNP_2026_SP _Option3	CNP_2026_SP _Option4
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	32.6 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	Rate B: 525	P2-3_CBY-E680: 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8 & 40005 - 40020 <2A> CEDARPB AUTOTRANSFORMER 2A & 40005 - 40020 <2B> CEDARPB AUTOTRANSFORMER 2B	BNV	BNV	28.6 % (0x)	BNV CNV	BNV
		P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	28.0 % (0x)	BNV CNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	35.2 % (0x)	BNV	BNV CNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	Rate B: 525	P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	26.7 % (0x)	BNV	BNV CNV	BNV
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	Rate B: 893	P2-3_CBY-E660X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	18.9 % (0x)	BNV
		P2-3_MB-M160X_OPT2: 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8 & 40500 - 41111 <CKT 52> EAGLE__X52B8 TO MT_BEL__B138	BNV	BNV	BNV	17.8 % (0x)	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	Rate B: 893	P2-3_CBY-E660X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8	BNV	BNV	BNV	23.8 % (0x)	BNV
		P2-3_MB-M160X_OPT2: 41111 - 41700 <CKT 84> MT_BEL__B138 TO WARVUE_POI_8 & 40500 - 41111 <CKT 52> EAGLE__X52B8 TO MT_BEL__B138	BNV	BNV	BNV	22.7 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	Rate B: 440	P2-3_CBY-E370X: 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8 & 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1	BNV	BNV	BNV	BNV	40.6 % (0x)
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	Rate B: 440	P2-3_CBY-E530X: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 & 40015 - 40870 <CKT 14> CEDARP_B138B TO KENNY__X14R8	BNV	BNV	BNV	BNV	35.2 % (0x)
		P2-3_CBY-E370X: 40010 - 40430 <CKT &1> CEDARP_B138A TO DECKER_X83B8 & 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1	BNV	BNV	BNV	BNV	50.4 % (0x)
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	Rate B: 440	P2-3_JOR-Y470X: 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138 & 40510 - 40855 <CKT 48> ENPROD_X48B8 TO JORDAN__B138	BNV	BNV	10.9 % (0x)	BNV	BNV
		P2-3_CBY-E670: 40015 - 40300 <CKT 86> CEDARP_B138B TO CHEV___X86B8 & 40015 - 41690 <CKT &1> CEDARP_B138B TO HOPSON_X84B8	BNV	BNV	47.3 % (0x)	BNV CNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	Rate B: 440	P2-3_JOR-Y470X: 40740 - 40855 <CKT &1> DALTON_X86B8 TO JORDAN__B138 & 40510 - 40855 <CKT 48> ENPROD_X48B8 TO JORDAN__B138	BNV	BNV	8.6 % (0x)	BNV	BNV
		P2-3_JOR-Y500: 40850 - 40855 <A3> JORDAN AUTOTRANSFORMER A3 & 40764 - 40855 <CKT &1> WINFRE_X52B8 TO JORDAN__B138	BNV	BNV	43.7 % (0x)	BNV	BNV
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate B: 498	P2-3_CBY-E550_OPT4B: 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8 & 40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	CNV	CNV	CNV	CNV	95.5 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

5.1.4 CNP Planning Event P3

Table 5-5 and Table 5-6, show branch loading above 95 % for the circuits in the area for the four different options under CNP Planning Event P3. It was observed that the autotransformer at Cedar Bayou Plant is very close to its limit for Option 4, which is a concern as the load will continue to grow for years to follow. No voltage concerns were identified under CNP Planning Event P3.

Table 5-5: Summer Peak Year 2025 - Thermal Loading Results under CNP Planning Event P3

Branch Loading	Rating (MVA)	Contingency	CNP_2025_SP _BaseCase	CNP_2025_SP _Option1	CNP_2025_SP _Option2	CNP_2025_SP _Option3	CNP_2025_SP _Option4
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	55.7 % (0x)	BNV	BNV
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	51.3 % (0x)	BNV	BNV
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	440	P1-1_CAL_1_COMBINED-CYCLE: 110522 CAL_CALSTG1 & 110521 CAL_CALGT1 AND P7-1_E1>>T8587D: 40010 - 41330 <CKT &1> CEDARP_B138A TO QUANUM_X85B8 & 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	BNV	BNV	BNV	BNV	47.6 % *
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	45.7 % (0x)	BNV	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	37.5 % (0x)	BNV	BNV	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	893	P1-1_CVC_2_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110822 CVC_CVC_G2 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	39.3 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	440	P1-1_CAL_1_COMBINED-CYCLE: 110522 CAL_CALSTG1 & 110521 CAL_CALGT1 AND P7-1_E1>>T8587D: 40010 - 41330 <CKT &1> CEDARP_B138A TO QUANUM_X85B8 & 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	BNV	BNV	BNV	BNV	37.8 % *
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	893	P1-1_CVC_2_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110822 CVC_CVC_G2 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	34.4 % (0x)	BNV
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	440	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	61.1 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	440	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	65.7 % (0x)	BNV	BNV
40000 - 3WNDTR <A3> CEDARP_B345A TO 4009660	Rate B: 897	P1-1_GEN_CBY_N1_110071: 110071 CBY_CBY_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	96.8 % (0x)	96.8 % (0x)	97.4 % (0x)	95.7 % (0x)	98.8 % (0x)
40015 - 3WNDTR <A3> CEDARP_B138B TO 4009660	Rate B: 897	P1-1_GEN_CBY_N1_110071: 110071 CBY_CBY_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	94.4 % (0x)	94.3 % (0x)	94.9 % (0x)	93.3 % (0x)	96.3 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

Table 5-6: Summer Peak Year 2026 - Thermal Loading Results under CNP Planning Event P3

Branch Loading	Rating (MVA)	Contingency	CNP_2026_SP _BaseCase	CNP_2026_SP _Option1	CNP_2026_SP _Option2	CNP_2026_SP _Option3	CNP_2026_SP _Option4
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	55.5 % (0x)	BNV	BNV
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	51.2 % (0x)	BNV	BNV
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	440	P1-1_CAL_1_COMBINED-CYCLE: 110522 CAL_CALSTG1 & 110521 CAL_CALGT1 AND P7-1_E1>>T8587D: 40010 - 41330 <CKT &1> CEDARP_B138A TO QUANUM_X85B8 & 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	BNV	BNV	BNV	BNV	47.7 % *
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	45.6 % (0x)	BNV	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	525	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	37.4 % (0x)	BNV	BNV	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	893	P1-1_CVC_2_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110822 CVC_CVC_G2 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	39.2 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	440	P1-1_CAL_1_COMBINED-CYCLE: 110522 CAL_CALSTG1 & 110521 CAL_CALGT1 AND P7-1_E1>>T8587D: 40010 - 41330 <CKT &1> CEDARP_B138A TO QUANUM_X85B8 & 40010 - 41500 <CKT 87> CEDARP_B138A TO STRANG_X87B8	BNV	BNV	BNV	BNV	37.9 % *
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	893	P1-1_CVC_2_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110822 CVC_CVC_G2 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	34.3 % (0x)	BNV
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	440	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	60.9 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	440	P1-1_CVC_1_COMBINED-CYCLE: 110824 CVC_CVC_G5 & 110821 CVC_CVC_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	65.5 % (0x)	BNV	BNV
40000 - 3WNDTR <A3> CEDARP_B345A TO 4009660	Rate B: 897	P1-1_GEN_CBY_N1_110071: 110071 CBY_CBY_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	96.8 % (0x)	96.8 % (0x)	97.4 % (0x)	95.7 % (0x)	98.8 % (0x)
40015 - 3WNDTR <A3> CEDARP_B138B TO 4009660	Rate B: 897	P1-1_GEN_CBY_N1_110071: 110071 CBY_CBY_G1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	94.4 % (0x)	94.3 % (0x)	94.9 % (0x)	93.3 % (0x)	96.3 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

5.1.5 CNP Planning Event P5

Under the CNP Planning Event P5, there were no thermal loading or voltage concerns identified for the CenterPoint Energy transmission system.

5.1.6 CNP Planning Event P6

Under the CNP Planning Event P6, thermal loading concerns for Option 4 were identified as shown below in Table 5-7 and Table 5-8. No voltage concerns were identified under CNP Planning Event P6.

Table 5-7: Summer Peak Year 2025 - Thermal Loading Results under CNP Planning Event P6X

Branch Loading	Rating (MVA)	Contingency	CNP_2025_SP _BaseCase	CNP_2025_SP _Option1	CNP_2025_SP _Option2	CNP_2025_SP _Option3	CNP_2025_SP _Option4
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	59.1 % (0x)	BNV	BNV
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	440	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	BNV	51.7 % (0x)
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	54.8 % (0x)	BNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	48.4 % (0x)	BNV	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	40.2 % (0x)	BNV	BNV	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	893	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	41.0 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T6687AX: 40170 - 40570 <CKT 66> BAYTWN__B138 TO EXXON__POI_8 & 41400 - 41540 <CKT 87> S_R_B__POI8A TO TEXAS__X87B8	BNV	BNV	BNV	BNV	41.9 % *
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	893	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	36.1 % (0x)	BNV
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	65.8 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	70.4 % (0x)	BNV	BNV
40010 - 40439 <CKT 83> CEDARP_B138A TO DKRCM01_83_8	Rate B: 561	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	86.0 % (0x)	86.7 % (0x)	86.7 % (0x)	86.6 % (0x)	96.8 % (0x)
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate B: 498	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	96.9 % (0x)	97.6 % (0x)	97.6 % (0x)	97.6 % (0x)	109.0 % (2x)
40430 - 40570 <CKT 83> DECKER_X83B8 TO EXXON__POI_8	Rate B: 478	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	87.5 % (0x)	88.2 % (0x)	88.2 % (0x)	88.2 % (0x)	100.1 % (1x)
40000 - 3WNDTR <A3> CEDARP_B345A TO 4009660	Rate B: 897	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	98.6 % (0x)	97.8 % (0x)	98.7 % (0x)	96.6 % (0x)	98.8 % (0x)
40015 - 3WNDTR <A3> CEDARP_B138B TO 4009660	Rate B: 897	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	97.1 % (0x)	96.3 % (0x)	97.2 % (0x)	95.1 % (0x)	97.3 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

Table 5-8: Summer Peak Year 2026- Thermal Loading Results under CNP Planning Event P6X

Branch Loading	Rating (MVA)	Contingency	CNP_2026_SP _BaseCase	CNP_2026_SP _Option1	CNP_2026_SP _Option2	CNP_2026_SP _Option3	CNP_2026_SP _Option4
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR_1	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	58.9 % (0x)	BNV	BNV
40010 - 403000 <CKT 03> CEDARP_B138A TO KILGOR	440	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	BNV	51.8 % (0x)
41111 - 403000 <CKT 86> MT_BEL__B138 TO KILGOR_1	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	54.6 % (0x)	BNV	BNV
40300 - 403000 <CKT 86> CHEV___X86B8 TO KILGOR	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	48.2 % (0x)	BNV	BNV	BNV
40775 - 403000 <CKT 86> LNGSTN_X86B8 TO KILGOR	525	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	40.1 % (0x)	BNV	BNV	BNV
40012 - 403000 <CKT 84> CEDAR_84T2_8 TO KILGOR	893	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	40.9 % (0x)	BNV
41610 - 403000 <CKT 03> TRINTY_S03_8 TO KILGOR	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>T6687AX: 40170 - 40570 <CKT 66> BAYTWN__B138 TO EXXON__POI_8 & 41400 - 41540 <CKT 87> S_R_B__POI8A TO TEXAS__X87B8	BNV	BNV	BNV	BNV	41.9 % *
41690 - 403000 <CKT 84> HOPSON_X84B8 TO KILGOR	893	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	BNV	36.0 % (0x)	BNV
40764 - 403001 <CKT 52> WINFRE_X52B8 TO KILGOR_34	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	65.5 % (0x)	BNV	BNV
40500 - 403001 <CKT 52> EAGLE__X52B8 TO KILGOR_34	440	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	BNV	BNV	70.1 % (0x)	BNV	BNV
40010 - 40439 <CKT 83> CEDARP_B138A TO DKRCM01_83_8	Rate B: 561	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	86.0 % (0x)	86.7 % (0x)	86.7 % (0x)	86.6 % (0x)	96.8 % (0x)
40430 - 40439 <CKT 83> DECKER_X83B8 TO DKRCM01_83_8	Rate B: 498	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	96.9 % (0x)	97.6 % (0x)	97.7 % (0x)	97.6 % (0x)	109.0 % (2x)
40430 - 40570 <CKT 83> DECKER_X83B8 TO EXXON__POI_8	Rate B: 478	BUS 49008: 40000 - 40015 <A3> CEDARPB AUTOTRANSFORMER A3 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	87.5 % (0x)	88.2 % (0x)	88.2 % (0x)	88.2 % (0x)	100.1 % (1x)
40000 - 3WNDTR <A3> CEDARP_B345A TO 4009660	Rate B: 897	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	98.6 % (0x)	97.8 % (0x)	98.8 % (0x)	96.6 % (0x)	98.9 % (0x)
40015 - 3WNDTR <A3> CEDARP_B138B TO 4009660	Rate B: 897	BUS 49005: 40000 - 40010 <A1> CEDARPB AUTOTRANSFORMER A1 AND P7-1_E1>>T9799DX: 40255 - 40850 <CKT 97> CHAMBR_POI_5 TO JORDAN__B345 & 40000 - 40850 <CKT 99> CEDARP_B345A TO JORDAN__B345	97.1 % (0x)	96.3 % (0x)	97.2 % (0x)	95.1 % (0x)	97.3 % (0x)

*CNV: Contingency not valid, BNV: Branch not valid

5.1.7 CNP Planning Event P7

Under the CNP Planning Event P7, there were no thermal loading or voltage concerns identified for the CenterPoint Energy transmission system for the interconnection options.

5.2 Steady State Analysis Conclusion

Contingency analysis indicates that for Option 4 there are thermal loading concerns for the 0.27 mi long circuit between DECKER and Decker Mutual bus location under CNP P1 and P6 Planning Events. Also, for CNP P6 Planning Events, the DECKER to EXXON ckt 83 is a potential loading concern due to station equipment limitation that should be addressed if this option is considered.

6. Short Circuit Analysis

No short-circuit analysis was performed, as all the options loop of tap existing circuits, which represent an increase in the corresponding circuit impedance, and this combined with the load at the new substation will reduce the fault currents for all breaker stations near the new substation.

7. Stability Analysis and SSR Assessment

CenterPoint Energy recently performed a stability analysis in the area as part of the RPG project "Mont Belvieu Reliability Upgrades". The results for Critical Clearing Time (CCT) at selected 138 and 345 kV CenterPoint Energy buses in that study demonstrate ample stability margin. Since system conditions are similar, the circuit impedance increase is small, and more load is added (or transferred to a different location in the area) with its corresponding damping effect. CenterPoint Energy did not consider it necessary to perform a new transient stability analysis.

In accordance with ERCOT Protocol Section 3.22.2, CenterPoint Energy has performed a topology-check of all the transmission options and concludes that this will not result in any Generation Resource becoming radial to a series capacitor in the event of less than 14 concurrent transmission outages.

8. Planning Estimates

The following assumptions were made for the new substation estimates shown on Table 8-1 to Table 8-4:

1) Substation estimates include a $2.5M for property cost.
2) Costs to elevate equipment has been included as the site may be located in a storm surge area.
3) For loop installations, a 2-bkr 138 kV loop with transmission relaying was considered.
4) Fiber optic cable requirement assumptions for Option 1: to extend existing LNGSTN/CHEV fiber optic cable to new substation creating a LNGSTN/New Sub/CHEV path.
5) Several relay upgrades in the area have been completed after the RPG approval of the 2021/22 Mont Belvieu Area Reliability Upgrades study.
6) Routing study needed to identify and avoid constraints to help determine feasibility of the preliminary options and true-up estimated costs will be required.

Any project that provides service to a substation that is 1.0 mile or greater would require a CCN application, the estimated timeframe to complete any of these options is between 24 – 27 months if all right-of-ways (ROWs) are secured before the CCN application is ready to be filed, and an estimated 36 months if ROWs are not secured and there is a need to perform the routing study.

These timelines do not include ROW acquisition, LIDAR acquisition, transmission design, material procurement, construction, etc. after receiving PUCT approval. Completing these items could range from 18-24 months based on past CCN project timelines in addition to the CCN application timeline.

Table 8-1: Option 1 – Planning Estimate

	Option 1 - New CNP Kilgore substation looped into Chevron to Langston ckt 86		
Location	**Description**	**Transmission Cost ($)**	**Substation Cost ($)**
Ckt 86	New Kilgore substation – build 138kV 2-bkr loop 35kV substation, include fiber connected on both ckts)		$15,700,000
Ckt 86	Build 2 new 138 kV circuits from the new Kilgore substation (aprox 2.6 mi) and loop NewSub into ckt 86 LANGSTON to CHEVRON Route 1A: Estimated Cost = $16.02 M, approximate length = 3.45 ckt miles Route 1B: Estimated Cost = $20.5 M, approximate length = 4.17 ckt miles Route 1C: Estimated Cost = $20.06 M, approximate length = 5.12 ckt miles	$ 16,020,000 - $ 20,500,000	
Total			$31,450,000 - $ 36,200,000

Table 8-2: - Option 2 – Planning Estimate

	Option 2 - Double tap new CNP Kilgore substation into ckt 52 EAGLE to WINFRE and ckt 86 LANGSTON to Mont Belvieu		
Location	**Description**	**Transmission Cost ($)**	**Substation Cost ($)**
	Double tap new Kilgore substation on 138 kV EAGLE/WINFRE ckt 52 & LANGSTON/Mont Belvieu ckt 86		$14,000,000
Ckt 52	tap ckt 52 between EAGLE to WINFRE and LANGSTON to Mont Belvieu to new Kilgore substation Preliminary Route 2: Estimated Cost = $15.43 M, approximate length = 3.3 ckt miles	$15,430,000	
Total			$29,430,000

Table 8-3: - Option 3– Planning Estimate

	Option 3- New CNP Kilgore substation looped into Hopson Cedar Bayou Plant to Langston ckt 84		
Location	**Description**	**Transmission Cost ($)**	**Substation Cost ($)**
Ckt 84	New Kilgore substation – build 138kV 2-bkr loop 35kV substation, includes install dual DCB schemes on both circuits		$15,900,000
Ckt 84	Build 2 new 138 kV circuits from the Kilgore substation (aprox 3.4 mi) and loop Kilgore into ckt 84 Cedar Bayou Plant to Hopson Route 3A: Estimated Cost = $20.66 M, approximate length = 4.18 ckt miles Route 3B: Estimated Cost = $20.12 M, approximate length = 5.13 ckt miles	$ 20,120,000 - $ 20,660,000	
Total			$ 36,020,000 - $ 36,560,000

Table 8-4: - Option 4 – Planning Estimate

	Option 4 - New CNP Kilgore substation looped into Cedar Bayou Plant to Baytown ckt 03		
Location	**Description**	**Transmission Cost ($)**	**Substation Cost ($)**
Ckt 03	New Kilgore substation – build 138kV 2-bkr loop 35kV substation		$15,650,000
ckt 03	upgrade relaying on ckt 03 Cedar Bayou Plant		$50,000
Ckt 03	Build 2 new 138 kV circuits from the Kilgore substation (aprox 6.89 mi) and loop Kilgore substation into into Cedar Bayou Plant to TrinityBay /Kenny/Baytown ckt 03	$25,970,000	
ckt 83	DECKER - upgrade EXXON ckt 83 to minimum 440/561 MVA (replace line switch, wave trap, jumpers, tubing)	$1,260,000	$200,000
ckt 83	EXXON - upgrade DECKER ckt 83 to minimum 440/561 MVA (replace wave trap, jumpers, tubing)		$150,000
Ckt 83	Thermally uprate or reconductor 0.27 mi between DECKER_X83B8 and DKRCM01_83_8 Normal rating 440 MVA, Emergency rating 561 MVA	$1,260,000	
Total			$44,540,000

Table 8-5: Substation Diagram

Options 1,3,4 Looped Kilgore Arrangements	 New Sub DP Loop Arrangement Optio
Option 2 Double Tap Kilgore Arrangements	 New Sub DP Double Tap Arrange

9. Conclusions

CenterPoint Energy Transmission Planning analyzed four different options to serve a future Kilgore 138/35 kV substation in the Jordan/Trinity Bay/Mont Belvieu area near the Grand Parkway (HWY 99) and FM 565.

This project is the most cost-effective solution to interconnect the new Kilgore substation which will relieve capacity concerns on the existing Mont Belvieu, Jordan, and Trinity Bay substations by transferring load from the existing substations to the new Kilgore substation. This project also provides capacity for future area load growth.

Based upon the results and as discussed in the preceding sections, all the proposed options will satisfy NERC Reliability Standard TPL-001-4, ERCOT Planning Guide Section 4 (ERCOT Transmission Planning Criteria), and CenterPoint Energy Transmission System Design Criteria. CenterPoint Energy recommends Option 2 which consists of:

- Double tap new substation (Kilgore) on 138 kV circuits: EAGLE-WINFRE ckt 52 and LNGSTN to Mont Belvieu ckt 86.
    - Construction of a new CenterPoint Energy 138/35 kV Kilgore substation
    - Connection of a Kilgore substation by tapping into ckt 52 between EAGLE to WINFRE and ckt 86 between LNGSTN and Mont Belvieu, with construction of approximately 3.3 miles of new double circuit line.

CenterPoint Energy recommends Option 2 as the most cost-effective option. The estimated cost of Option 2 is approximately $29.43 M.

The project requires a CCN, as it involves the construction of more than a mile-long double circuit line to connect the new substation. The project is expected to be completed before peak 2025, taking into consideration typical lead times necessary to implement the proposed project, including PUCT (CCN process) review and approval, materials and construction lead times.

10. Appendix A – Support Files

File Description	File
Changes Made to Base Cases	 20SSWG_Oct_Base_ Case_Changes_to_C
Load Flow Cases	 LOADFLOWS.zip
Study Case Detailed Results	 newload_0510.zip

Addendum: New 138 kV Kilgore Substation

July 2023

Prepared by:
CenterPoint Energy Houston Electric, LLC
Transmission Planning Division

CenterPoint Energy Houston Electric, LLC (CenterPoint Energy or CNP) is proposing a new 138 kV transmission line that is needed to deliver electric power to the new 138/35 kV Kilgore substation in the Jordan/Trinity Bay/Mont Belvieu area. Distribution Planning initially requested Transmission Planning study the interconnection of the new Kilgore substation in November 2020. Transmission Planning completed this study in July 2021 using the load forecast for the new and surrounding substations available at the time. Tables 2-1 and 2-2 show the historical and forecasted loads at the time of the original study. Distribution Planning recently completed their latest load forecast which includes Kilgore substation. Updated historical loads (2018-2022) for area substations are shown in Table 1-3, while the latest load forecast is shown in Table 1-4.

Table 1-1: Historical Combined Load (Jordan/Trinity Bay/Mont Belvieu) 2016 -2020

	Substation Load (MW)				
Substation Name	2016	2017	2018	2019	2020
JORDAN	7.85	9.87	20.31	30.70	45.10
MONT_BELVIEU	71.61	68.67	61.00	58.19	40.98
TRINITY BAY 12KV	23.80	26.07	31.89	0.00	30.75
TRINITY BAY 35KV	11.24	14.56	14.00	51.68	14.80
Total (MW)	114.50	119.18	127.20	140.57	131.62

Table 1-2: Forecast Combined Load (Jordan/Trinity Bay/Mont Belvieu) 2021-2030

	Substation Load (MW)									
Substation Name	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Jordan	78.62	83.47	87.73	91.37	91.01	90.66	90.31	89.95	89.61	89.26
Mont Belvieu	29.89	33	35.82	38.67	38.91	39.14	39.38	39.62	39.87	40.11
Trinity Bay 12 kV	35.37	40.8	45.9	50.27	50.58	50.89	51.2	51.51	51.83	52.14
Trinity Bay 35 kV	41.02	44.51	48.02	51.55	51.86	52.18	52.5	52.82	53.14	53.47
Total (MW)	184.9	201.78	217.47	231.86	232.36	232.87	233.39	233.9	234.45	234.98

Table 1-3: Historical Combined Load (Jordan/Trinity Bay/Mont Belvieu) 2018 -2022

	Substation Load (MW)				
SUBSTATION NAME	**2018**	**2019**	**2020**	**2021**	**2022**
JORDAN	20.31	30.70	45.10	45.08	49.60
MONT_BELVIEU	61.00	58.19	40.98	31.70	28.19
TRINITY BAY 12KV	35.29	35.29	30.75	23.03	29.29
TRINITY BAY 35KV	16.39	16.39	14.80	31.60	44.85
Total (MW)	132.99	140.57	131.62	131.41	151.94

Table 1-4: Forecast Combined Load (Jordan/Trinity Bay/Mont Belvieu/Kilgore) 2023-2032

	Substation Load (MW)									
SUBSTATION NAME	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
JORDAN	62.39	66.13	41.77	41.61	41.45	41.29	41.13	40.97	40.81	40.65
MONT_BELVIEU	33.16	36.17	36.76	37.35	37.95	38.56	39.18	39.81	40.46	41.11
KILGORE (FUTURE)	0.00	0.00	44.90	45.62	46.36	46.64	46.93	47.22	47.52	47.82
TRINITY BAY 12KV	36.73	40.49	41.14	41.80	42.48	43.16	43.86	44.57	45.30	46.04
TRINITY BAY 35KV	63.22	71.79	54.30	56.80	57.15	57.50	57.85	58.20	58.57	58.95
Total	195.50	214.58	218.87	223.19	225.38	227.15	228.95	230.77	232.65	234.56

The 2021 Transmission Planning study was performed with the original load forecast for summer peak 2025 and 2026 base cases. It evaluated four transmission connection options while showing that only Option 4 had any potential thermal loading or voltage concerns. Option 4 was the highest cost option and was rejected as a potential connection option. The two lowest cost options were Option 1 and Option 2, shown below in Figures 1-1 and 1-2. The detailed description of Options 1 and 2 are as follows:

- Option 1: Loop the new Kilgore 138/35 kV substation via an approximately 2.6-mi long 138 kV double circuit line on ckt 86 between CHEV and LNGSTN.

- Option 2: Double-tap the new Kilgore 138/35 kV substation via an approximately 3 mi long 138 kV double circuit line to ckt 52 EAGLE - WINFRE and ckt 86 LNGSTN to Mont Belvieu.

Figure 1-1: Option 1 – Loop Kilgore Substation on CHEV to LNGSTN ckt 86

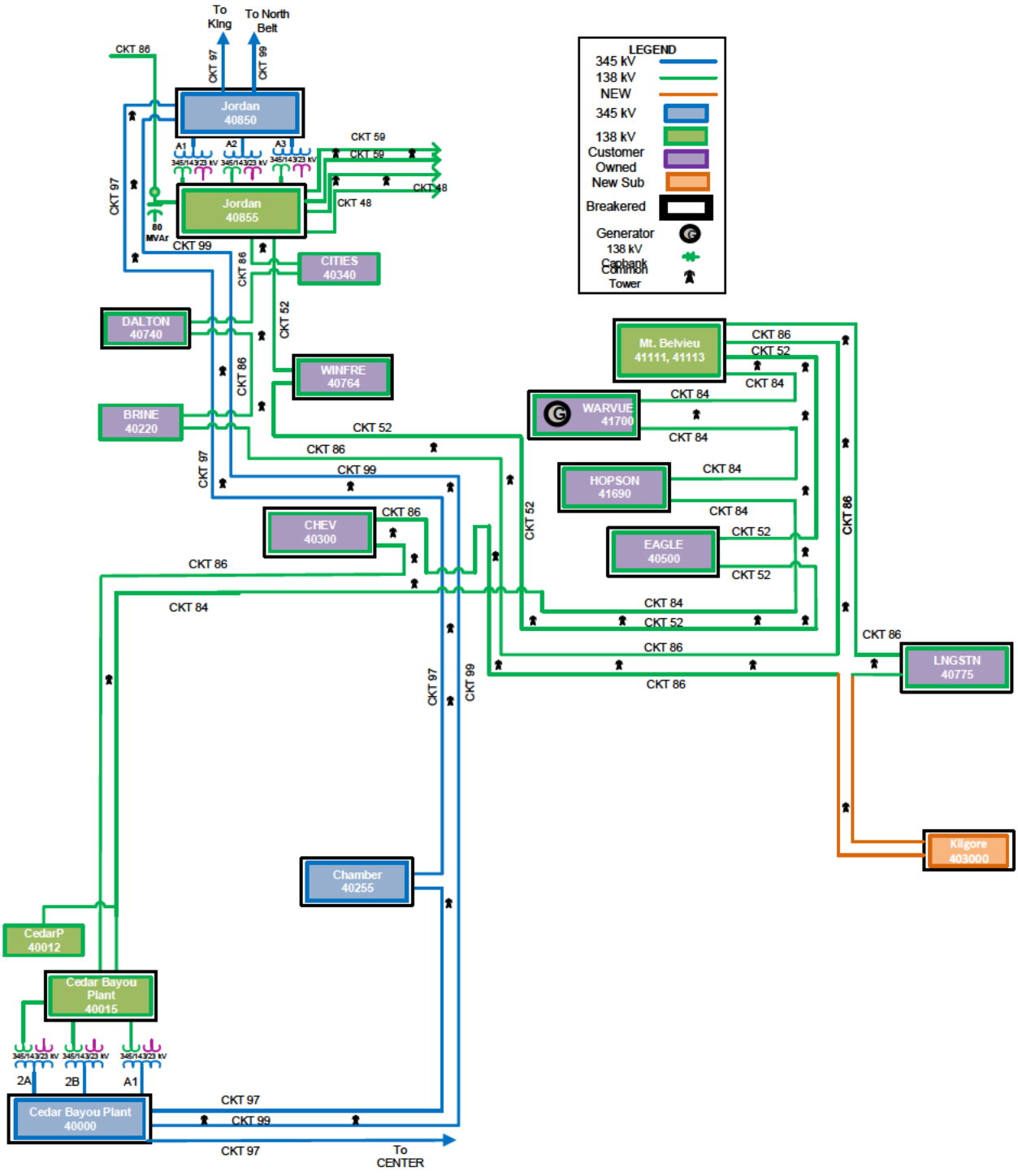
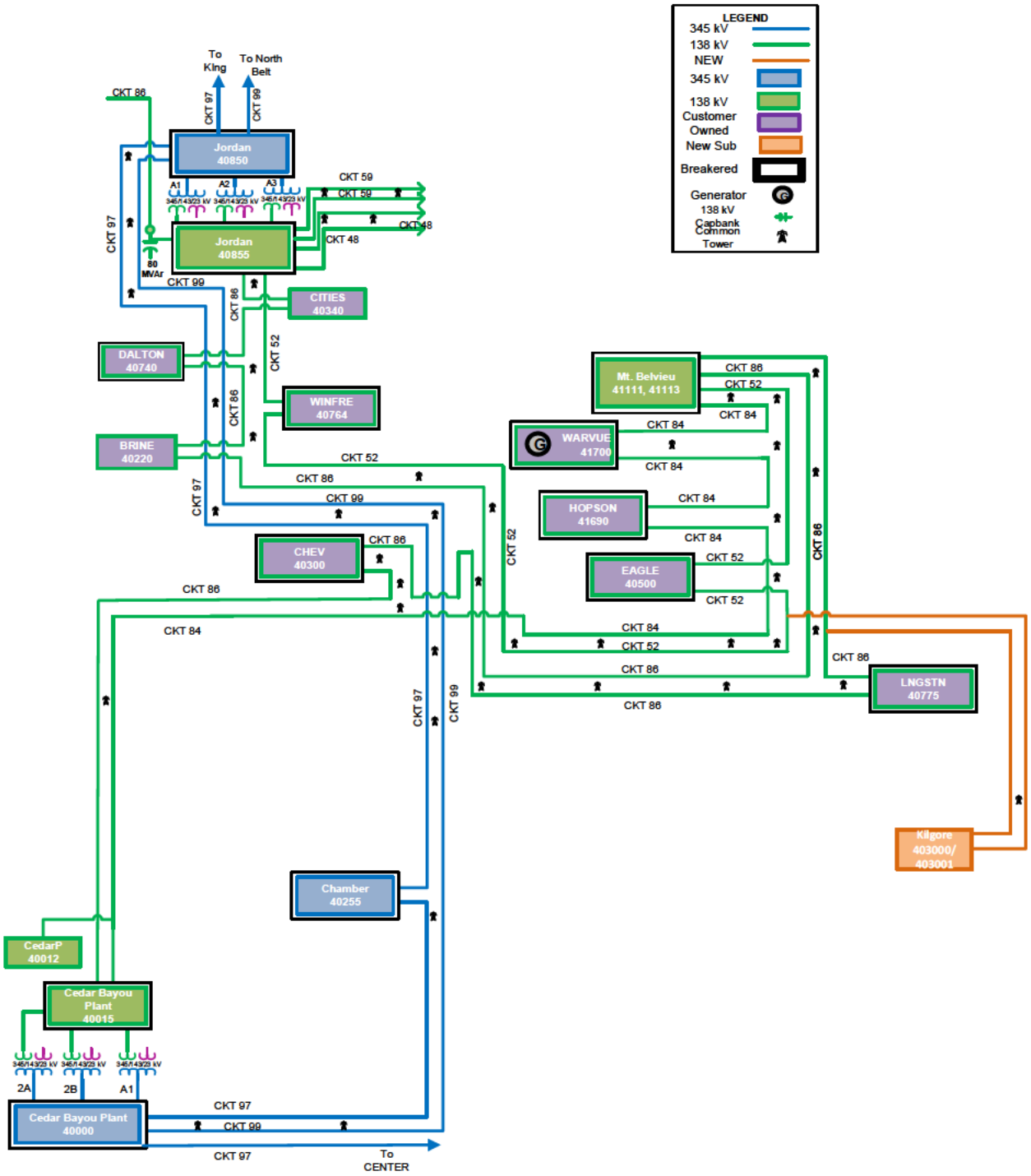


Figure 1-2: Option 2 – Double Tap Kilgore on ckt 52 EAGLE to WINFRE and on ckt 86 LNGSTN to Mont Belvieu



A comparison of the 2021 load forecast used in the original Transmission Planning study versus the latest 2023 load forecast show lower loads in the 2023 forecast. For example, the total 2026 peak load from the 2021 load forecast was 233 MW while the latest forecast is only 223 MW. The latest forecast does not show the area total load reaching 233 MW until 2031. Since no reliability issues were seen with higher forecasted loads in the original study, it stands to reason that no reliability issues will be seen with the lower forecasted loads. Therefore, a revised analysis is deemed unnecessary since the original study modeled higher loads than the latest forecast.

The original study had recommended Option 2 as the most cost-effective option; however, neither routing studies nor detailed engineering had taken place. Neither option caused any reliability concerns. The recommendation was solely based on the 2021 planning estimates included in the study report. Those preliminary estimates were $31.45M - $36.2M for Option 1 and $29.43M for Option 2. However, these costs were developed prior to the routing study which determined proposed routes to be submitted to the Public Utility Commission of Texas (PUCT) as part of the Certificate of Convenience and Necessity (CCN). The detailed engineering estimates were then developed and the cost estimates increased to $59.7M - $98.8M for the 20 routes estimated; however, it should be noted that the cost estimate increase applied to both Options 1 and 2. It was determined that connecting Kilgore as in Option 1 rather than Option 2 was on average about 12% less expensive. This is due to the location where the double tap needed to occur to match the transmission planning study and the work needed to connect to the second circuit for the second tap. Based on the new information, the recommended option is changed from Option 2 to Option 1, Loop Kilgore substation on 138 kV CHEV to LNGSTN ckt 86.

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