March 20, 2025

Ms. Lisa Felice
Executive Secretary
Michigan Public Service Commission
7109 West Saginaw Highway
Lansing, MI 48917

RE: Case No. U-21258 – In the matter of the application of CONSUMERS ENERGY COMPANY for reconciliation of its power supply cost recovery plan (Case No. U-21257) for the 12 months ending December 31, 2023.

Dear Ms. Felice:

Enclosed for electronic filing in the above captioned case please find **Consumers Energy Company's Official Exhibits** as admitted into evidence during the hearing in this case. Also attached is a Proof of Service.

Sincerely,

Digitally signed by Spencer A. Sattler
Date: 2025.03.20 09:32:42 -04'00'

Spencer A. Sattler
Phone: 517-474-6638
Email: spencer.sattler@cmsenergy.com

cc: Parties per Attachment 1 to the Proof of Service

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-1 (ZSC-1)
Page: 1 of 1
Witness: ZSCole
Date: March 2024

PA 295 PURCHASED POWER AND COMPANY OWNED RENEWABLES - 2023

Line No.	(a) Generator	(b) Energy Delivered (MWh)	(c) Energy Cost ($)	(d) Admin Fee ($)	(e) Net Energy ($)	(f) Capacity Cost ($)	(g) Total Net Transfer Cost ($)	(h) Average Energy Cost ($/MWh)	(i) Average Total Cost ($/MWh)
1	Apple Blossom Wind Farm	229,368	5,414,281	0	5,414,281	4,448,533	9,862,814	23.61	43.00
2	Blissfield Renewable (Beebe)	183,623	16,201,694	0	16,201,694	1,958,168	18,159,863	88.23	98.90
3	Brook View Dairy-AD	668	(6,524)	0	(6,524)	22,429	15,905	(9.76)	23.80
4	Generate Fremont Digester LLC	10,967	1,101,103	0	1,101,103	492,498	1,593,601	100.40	145.31
5	Harvest II Windfarm	183,062	16,225,858	0	16,225,858	1,742,343	17,968,201	88.64	98.15
6	Heritage Garden Wind Farm I	47,296	4,695,131	(3,583)	4,691,548	361,494	5,053,041	99.27	106.84
7	Heritage Garden Solar	3,837	415,709	0	415,709	0	415,709	108.34	108.34
8	Heritage Stoney Corners I	24,167	2,390,163	(3,583)	2,386,579	356,134	2,742,713	98.90	113.49
9	Heritage Stoney Corners I (Phase 3)	15,497	1,531,498	(3,583)	1,527,915	381,493	1,909,408	98.83	123.21
10	Michigan Wind 2	260,221	22,989,189	0	22,989,189	2,782,407	25,771,596	88.34	99.04
11	NANR Lennon Generating	8,431	305,208	0	305,208	285,568	590,776	36.20	70.07
12	EARP	3,948	191,414	0	191,414	128,708	320,122	48.49	81.09
13	Scenic View Dairy-AD	388	8,279	0	8,279	13,019	21,298	21.36	54.95
14	WM Renewable - Northern Oaks	7,737	158,736	0	158,736	281,451	440,187	20.52	56.89
15	WM Renewable Pine Tree Acres	74,426	6,902,006	0	6,902,006	1,411,050	8,313,056	92.74	111.70
16	Solar Gardens - Subscribed	5,980	158,529	0	158,529	208,231	366,760	26.51	61.33
17	**SUBTOTAL-Purchased Power**	**1,059,615**	**78,682,274**	**(10,750)**	**78,671,524**	**14,873,524**	**93,545,048**	**74.26**	**88.28**
18	LC-REP - Unsubscribed	0	0	0	0	0	0	0.00	0.00
19	Solar Gardens-Unsubscribed	296	13,340	0	13,340	10,298	23,638	45.07	79.86
20	Cross Winds Energy Park	314,558	15,076,757	0	15,076,757	9,713,546	24,790,303	47.93	78.81
21	Lake Winds Energy Park	241,535	23,847,510	0	23,847,510	3,063,209	26,910,719	98.73	111.42
22	Gratiot Wind Park	341,715	16,279,295	0	16,279,295	11,949,768	28,229,062	47.64	82.61
23	Cresent Wind Park	355,991	14,253,867	0	14,253,867	11,925,688	26,179,556	40.04	73.54
24	Circuit West	458	21,816	0	21,816	16,014	37,831	47.64	82.61
25	Heartland	1,515	41,314	0	41,314	50,895	92,210	27.27	60.86
26	**SUBTOTAL - Company Owned Renewables**	**1,256,067**	**69,533,900**	**0**	**69,533,900**	**36,729,419**	**106,263,319**	**55.36**	**84.60**
27	**SUBTOTAL - Transfer Price Applicable**	**2,315,681**	**148,216,174**	**(10,750)**	**148,205,424**	**51,602,943**	**199,808,366**	**64.01**	**86.28**
28	LC-REP-Subscribed	354,940	8,838,091	0	8,838,091	784,119	9,622,210	24.90	27.11

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company
Summary of FCM Collections

Case No.: U-21258
Exhibit No.: A-2 (LMC-1)
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Date: March 2024

Line	Description	(a) Forecasted Collections [1]	(b) Forecasted Financial Compensation Mechanism[2]	(c) (Over)/Under
		($000)	($000)	($000)
1	2023 Ending Over Recovery Amount[3]			$ (2,518)
2	2024 Forecasted Collections	$ 5,496	$ 4,847	(650)
3	2025 Forecasted Collections	8,255	8,391	136
4	Total Expected (Over)/Under Recovery Thru 2025			(3,032)
5	2026 Forecasted FCM		$ 9,730	
6	Total to be collected			$ 6,698

(1) WP-LMC-1
(2) Exhibit A-32 (BAS-2)
(3) Exhibit A-20 (HLP-1)

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company
Calculation of the FCM Surcharge

Case No.: U-21258
Exhibit No.: A-3 (LMC-2)
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Witness: LMConnolly
Date: March 2024

Line No.	(a) Description	(b) 2026 Forecasted Sales (MWh)	(c) FCM Incentive [1] ($000)	(d) 2026 FCM Surcharge ($ / kWh)
1	Residential Class	12,509,845	$ 3,035	0.000243
	Secondary Class			
2	Energy-only GS	3,966,896	934	0.000235
3	Time-of-Use GSTU	58,388	14	0.000235
4	Demand GSD	2,905,769	644	0.000222
	Primary Class			
	Energy-only GP			
5	Voltage Level 1	13,768	3	0.000197
6	Voltage Level 2	31,010	7	0.000227
7	Voltage Level 3	664,210	163	0.000245
	Demand GPD			
8	Voltage Level 1	1,128,023	150	0.000133
9	Voltage Level 2	1,415,266	218	0.000154
10	Voltage Level 3	2,846,472	473	0.000166
	Time-of-Use GPTU			
11	Voltage Level 1	394,535	83	0.000209
12	Voltage Level 2	480,439	116	0.000242
13	Voltage Level 3	2,823,718	738	0.000261
	Energy Intensive EIP			
14	Voltage Level 1	313,052	64	0.000204
15	Voltage Level 2	55,905	13	0.000236
16	Voltage Level 3	7,982	2	0.000255
	Lighting & Unmetered Class			
17	Metered Lighting GML	10,907	2	0.000146
18	Universal Unmetered Lighting UUL	72,927	11	0.000146
19	Unmetered GU	94,231	14	0.000146
	Self-generation Class			
20	Large Self-generation GSG-2			
21	Voltage Level 1	64,140	7	0.000116
22	Voltage Level 2	57,508	8	0.000134
23	Voltage Level 3	681	0	0.000145
24	Total Jurisdictional Bundled Service	29,915,671	$ 6,698	

Notes
(1) U-21389 Cost of Service Allocation

SURCHARGES

Rate Schedule	***Financial Compensation Mechanism Surcharge (Case No. U-21258) Effective for service rendered On and after January 1, 2026 through December 31, 2026***
Rate RSP	*$0.000243/kWh*
Rate RSH	*0.000243/kWh*
Rate RPM	*0.000243/kWh*
Rate RSM	*0.000243/kWh*
Rate GS	*0.000235/kWh*
Rate GSTU	*0.000235/kWh*
Rate GSD	*0.000222/kWh*
Rate GP	
Customer Voltage Level 1	*0.000197/kWh*
Customer Voltage Level 2	*0.000227/kWh*
Customer Voltage Level 3	*0.000245/kWh*
Rate GPD	
Customer Voltage Level 1	*0.000133/kWh*
Customer Voltage Level 2	*0.000154/kWh*
Customer Voltage Level 3	*0.000166/kWh*
Rate GPTU	
Customer Voltage Level 1	*0.000209/kWh*
Customer Voltage Level 2	*0.000242/kWh*
Customer Voltage Level 3	*0.000261/kWh*
Rate EIP	
Customer Voltage Level 1	*0.000204/kWh*
Customer Voltage Level 2	*0.000236/kWh*
Customer Voltage Level 3	*0.000255/kWh*
Rate LED	*NA*
Rate LTILRR	*NA*
Rate GSG-2	
Customer Voltage Level 1	*0.000116/kWh*
Customer Voltage Level 2	*0.000134/kWh*
Customer Voltage Level 3	*0.000145/kWh*
Rate GML	*0.000146/kWh*
Rate GUL	*0.000146/kWh*
Rate GU-LED	*0.000146/kWh*
Rate GU	*0.000146/kWh*
Rate PA	*NA*
Rate ROA-R	*NA*
Rate ROA-S	*NA*
Rate ROA-P	*NA*

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-5 (LEF-1) Revised
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Witness: LEFeazel
Date: March 2024

Consumers Energy Company
2023 Power Supply Cost Recovery Reconciliation

(kWh)	(a)	January (b)	February (c)	March (d)	April (e)	May (f)	June (g)	July (h)	August (i)	September (j)	October (k)	November (l)	December (m)	Total (n)
1.	Cycle Billed PSCR Sales (a)	2,599,390,612	2,512,103,519	2,470,269,168	2,356,618,451	2,248,743,389	2,444,342,771	2,755,940,825	2,841,220,040	2,712,049,981	2,431,161,477	2,318,737,671	2,401,155,121	30,091,733,025
2.	Current Month Unbilled PSCR Sales	1,913,489,829	1,714,188,864	1,687,733,608	1,560,492,835	1,708,635,694	1,917,263,421	2,127,824,874	2,090,025,063	1,837,730,302	1,777,891,346	1,837,111,810	1,921,640,239	22,094,027,885
3.	Prior Month Unbilled PSCR Sales	(1,957,311,697)	(1,913,489,829)	(1,714,188,864)	(1,687,733,608)	(1,560,492,835)	(1,708,635,694)	(1,917,263,421)	(2,127,824,874)	(2,090,025,063)	(1,837,730,302)	(1,777,891,346)	(1,837,111,810)	(22,129,699,343)
4.	Total Calendar PSCR Sales (Sum of Lines 1 through 3)	2,555,568,744	2,312,802,554	2,443,813,912	2,229,377,678	2,396,886,248	2,652,970,498	2,966,502,278	2,803,420,229	2,459,755,220	2,371,322,521	2,377,958,135	2,485,683,550	30,056,061,567
5.	Total Calendar Sales	2,786,560,266	2,508,021,994	2,691,159,099	2,456,867,071	2,581,350,854	2,893,316,373	3,210,623,394	3,055,733,209	2,665,427,716	2,592,581,691	2,595,057,755	2,694,521,662	32,731,221,084
6.	Interruptible Wholesale, GSG-2 sales and GI-2 sales (b)	4,042,767	9,099,564	14,474,523	15,867,318	12,159,463	10,889,605	16,596,332	23,010,996	15,392,084	16,154,963	13,929,959	12,810,936	164,428,510
7.	Total Sales Less Interruptible Wholesale, GSG-2 and GI2	2,782,517,499	2,498,922,430	2,676,684,576	2,440,999,753	2,569,191,391	2,882,426,768	3,194,027,062	3,032,722,213	2,650,035,632	2,576,426,728	2,581,127,796	2,681,710,726	32,566,792,574
8.	Jurisdictional Percentage	99.05%	99.22%	99.06%	99.05%	99.24%	99.21%	99.17%	99.18%	99.00%	99.14%	99.02%	99.12%	
(Fuel Factor in Dollars per kWh)														
9.	Base Recovery Factor	*	*	0.06013	0.06013	0.06013	0.06013	0.06013	0.06013	0.06013	0.06013	0.06013	0.06013	
10.	Billed PSCR Factor (c)	0.02209	0.01845	0.00161	0.00232	(0.00105)	(0.00038)	0.00044	0.00138	0.00156	0.00168	0.00247	0.00897	
11.	Current Month Unbilled PSCR Factor (c)	0.01845	0.00161	0.00232	(0.00105)	(0.00038)	0.00044	0.00138	0.00156	0.00168	0.00247	0.00897	0.00648	
12.	Prior Month Unbilled PSCR Factor (c)	0.02209	0.01845	0.00161	0.00232	(0.00105)	(0.00038)	0.00044	0.00138	0.00156	0.00168	0.00247	0.00897	
(Dollars)														
13.	Billed PSCR (Line 1*(Line 9 + Line 10))	213,390,734	197,286,794	152,514,418	147,170,822	132,855,759	146,049,481	166,927,336	174,763,445	167,306,363	150,270,091	145,152,978	165,919,819	1,959,608,040
14.	Current Month Unbilled PSCR (Line 2*(Line 9 + Line 11))	150,242,629	105,834,020	105,398,964	92,193,917	102,090,983	116,128,645	130,882,508	128,933,646	113,590,110	111,295,998	126,944,426	128,000,456	1,411,536,302
15.	Prior Month Unbilled PSCR (Line 3*(Line 9 + Line 12))	(160,675,717)	(150,242,629)	(105,834,020)	(105,398,964)	(92,193,917)	(102,090,983)	(116,128,645)	(130,882,508)	(128,933,646)	(113,590,110)	(111,295,998)	(126,944,426)	(1,444,211,564)
16.	Long-Term Industrial Load Retention Rate (LTILRR)	10,177,421	7,000,400	4,638,218	2,948,254	2,067,613	4,592,582	4,355,457	5,215,476	4,582,475	4,093,570	8,488,156	7,109,296	65,268,918
17.	Total PSCR Revenue	213,135,067	159,878,585	156,717,580	136,914,029	144,820,438	164,679,725	186,036,655	178,030,059	156,545,302	152,069,549	169,289,562	174,085,145	1,992,201,697
(Power Supply Cost)														
18.	Fuel for Generation (d)	37,370,403	26,610,767	30,331,076	18,316,532	23,975,948	40,715,496	44,105,619	43,752,050	39,615,557	42,297,101	36,440,993	38,843,454	422,374,997
19.	Purchased and Interchange Power (e)(i)	124,425,242	121,031,205	124,011,757	102,683,596	128,263,327	117,725,042	132,505,364	128,019,247	115,137,601	105,247,358	105,128,872	105,791,584	1,409,970,193
20.	Environmental Costs (f)	1,627,801	1,057,308	796,668	786,056	790,942	1,238,481	1,109,102	1,134,000	840,269	1,241,671	1,389,255	952,771	12,964,323
21.	Total Costs (Sum of Lines 18 through 20) (j)	163,423,446	148,699,279	155,139,500	121,786,184	153,030,217	159,679,020	177,720,085	172,905,297	155,593,427	148,786,130	142,959,120	145,587,808	1,845,309,513
22.	Less Costs of Interruptible Wholesale, GSG-2 and GI2	459,675	535,465	763,744	972,516	718,963	495,197	849,692	1,329,941	1,005,826	891,131	792,440	623,060	9,437,650
23.	Total Costs Less Incremental Costs (Line 21 - Line 22) (j)	162,963,771	148,163,814	154,375,756	120,813,668	152,311,254	159,183,823	176,870,393	171,575,355	154,587,601	147,894,999	142,166,681	144,964,748	1,835,871,863
24.	Jurisdictional Percentage	99.05%	99.22%	99.06%	99.05%	99.24%	99.21%	99.17%	99.18%	99.00%	99.14%	99.02%	99.12%	
25.	Total Cost Allocated to PSCR (Line 23 * Line 24) (j)	161,415,517	147,004,039	152,932,298	119,671,016	151,153,690	157,918,407	175,403,851	170,165,737	153,034,132	146,625,612	140,776,949	143,690,761	1,819,792,010
26.	Current Year Over/(Under) Recovery (Line 17 - Line 25) (j)	51,719,550	12,874,546	3,785,282	17,243,014	(6,333,251)	6,761,318	10,632,804	7,864,321	3,511,170	5,443,938	28,512,613	30,394,384	172,409,687
27.	Prior Year Over/(Under) Recovery (h)	(415,386,250)												(415,386,250)
28.	Cumulative Over/(Under) Recovery (j)	(363,666,700)	(350,792,154)	(347,006,873)	(329,763,859)	(336,097,110)	(329,335,792)	(318,702,988)	(310,838,667)	(307,327,497)	(301,883,560)	(273,370,947)	(242,976,563)	(242,976,563)
29.	Total PSCR Interest (g)(j)													(16,003,404)
30.	Cumulative Over/(Under) Recovery Including Interest (j)													(258,979,967)

(a) Provided by Customer Billing System
(b) Interruptible Wholesale Sales, GSG-2 Sales and GI2 Sales
(c) Monthly PSCR factor letters filed with MPSC
(d) Provided by Company witness Angie Rissman
(e) Provided by Company witness Raymond T. Scaife
(f) Provided by Company witness Nathan J. Hoffman
(g) A-6 (LEF-2) line 13 column f
(h) Line 27, the Prior Year Under Recovery, was updated to reflect the anticipated $330,563 disallowance and associated interest impact relating to Campbell 2 February 2022 outage as stated in the U-21049 Proposal for Decision.
(i) Line 19, Purchased and Interchange Power, was updated in December 2023 to include the additional amount due to BMPs of $4,272,893 as calculated in Staff Exhibit S-1.0. This line was also updated to remove an additional $89,372 of replacement power costs associated with Ludington outages as discovered in U21258-AB-CE-0113.
(j) Due to the changes mentioned in footnotes (h) and (i), Line 21, Line 23, Lines 25-26 and Lines 28-30 have been recalculated.

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-6 (LEF-2) Revised
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Date: March 2024

Consumers Energy Company
PSCR Interest Calculation - 2023

	Month	Prior Month Cumulative Over/(Under) Recovery	Current Month Over/(Under) Recovery	O/(U) for Interest	Interest Rate	Interest (Income)/Expense
	(a)	(b)	(c)	(d)	(e)	(f)
1.	January	(415,386,250)	51,719,550	(389,526,475)	0.00352	(1,369,186)
2.	February	(363,666,700)	12,874,546	(357,229,427)	0.00365	(1,302,631)
3.	March	(350,792,154)	3,785,282	(348,899,513)	0.00375	(1,307,824)
4.	April	(347,006,873)	17,243,014	(338,385,366)	0.00389	(1,317,974)
5.	May	(329,763,859)	(6,333,251)	(332,930,485)	0.00406	(1,350,213)
6.	June	(336,097,110)	6,761,318	(332,716,451)	0.00419	(1,393,633)
7.	July	(329,335,792)	10,632,804	(324,019,390)	0.00423	(1,372,020)
8.	August	(318,702,988)	7,864,321	(314,770,828)	0.00429	(1,349,842)
9.	September	(310,838,667)	3,511,170	(309,083,082)	0.00441	(1,362,843)
10.	October	(307,327,497)	5,443,938	(304,605,528)	0.00455	(1,384,823)
11.	November	(301,883,560)	28,512,613	(287,627,253)	0.00453	(1,302,376)
12.	December	(273,370,947)	30,394,384	(258,173,755)	0.00461	(1,190,039)
13.			172,409,687			(16,003,404)

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-7 (JWH-1) Revised
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Date: March 2024

FORECASTED AND ACTUAL GENERATION REQUIREMENTS AND PURCHASED AND INTERCHANGE EXPENSE - 2023

2023 Energy

	(a)	(b)	(c)	(d)
Line No.	**Description**	**Plan [1]** MWh	**Actual [2]** MWh	**Actual vs Plan** %
1	Steam Coal	10,536,584	6,883,825	-34.67%
2	Gas & Oil	11,871,213	10,023,093	-15.57%
3	Station Power While Off Line	-	-	-
4	Owned Renewables [6]	2,182,321	1,631,688	-25.23%
5	Combustion Turbine (Peaker)	318,153	1,199,933	277.16%
6	Pumped Storage Generation	993,973	920,459	-7.40%
7	Total Generated	25,902,244	20,658,996	-20.24%
8	Pumped Storage Pumping	(1,290,876)	(1,269,127)	-1.68%
9	Total Generated Less Pumping	24,611,368	19,389,869	-21.22%
10	Purchased Power (NUG) [4] [6]	8,056,409	10,507,992	30.43%
11	Nuclear PPA	-	-	
12	Interchange Received [5]	5,790,496	8,375,594	44.64%
13	Interchange Delivered	(3,109,181)	(3,843,591)	23.62%
14	Total MWh Requirement	35,349,092	34,429,864	-2.60%

2023 Purchased and Interchange Power Expense/(Revenue)

Line No.	**Description**	**Plan [1]** $*1000	**Actual [3]** $*1000	**Actual vs Plan** %
15	Purchased Power (Capacity and Energy)	$ 773,785	$ 731,207	-5.50%
16	Nuclear PPA	$ -	$ -	
17	Interchange Received	$ 297,493	$ 206,494	-30.59%
18	Purchase of Zonal Resource Credits	$ -	$ 333	
19	Transmisson Service	$ 505,387	$ 474,019	-6.21%
20	Total Received	$ 1,576,665	$ 1,412,054	-10.44%
21	Interchange Delivered	$ (239,687)	$ (103,949)	-56.63%
22	Schedule 2-Reactive Supply Revenue	$ (4,500)	$ (4,398)	-2.27%
23	Total Delivered	$ (244,187)	$ (108,347)	-55.63%

[1] MPSC Case No. U-21257, Exhibit A-7 (JWH-1), except lines 19 and 22.

Line 19 is from MPSC Case No. U-21257, Exhibit A-1 (DSA-1).

Line 22 is from MPSC Case No. U-21257, Direct Testimony of Company witness Daniel S. Alfred.

[2] General Accounting Department, Production Summary Report, Period Ending 12/31/23, Except lines 10, 11, 12, & 13, which are from Exhibit A-26 (RTS-1).

For comparison to plan purposes:

Line 12 was reduced by the amount shown on Exhibit A-26 (RTS-1), line 10, column (b).

Line 13 was increased by the amount shown on Exhibit A-26 (RTS-1), line 10, column (b).

[3] Exhibit A-26 (RTS-1).

[4] Palisades PPA generation removed from actual purchased power and added to line 11 for comparison to plan purposes.

[5] Cross Winds generation of 699,497 MWh was removed from actual Interchange Received and subscribed portion (354,940 MWh) removed from line 4 for comparison to plan purposes.

[6] Line 4 includes the unsubscribed portion of Solar Gardens.

Line 10 includes the subscribed portion of Solar Gardens.

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-8 (JWH-2)
Page: 1 of 1
Witness: JWHahn
Date: March 2024

2023 Expense and Revenue resulting from Congestion, FTR and ARR Transactions

Line No.		(a) January	(b) February	(c) March	(d) April	(e) May	(f) June	(g) July	(h) August	(i) September	(j) October	(k) November	(l) December	(m) Total
	TOTAL FTR COST													
1	Congestion (revenue)/expense	210,322	551,650	185,065	(30,373)	219,577	39,044	199,328	13,345	92,573	276,108	386,316	684,931	2,827,887
2	FTR (revenue)/expense	(119,743)	(460,900)	(349,840)	(405,754)	(282,663)	(1,107,158)	(204,783)	(37,957)	(104,202)	(78,742)	(455,552)	(441,406)	(4,048,701)
3	Auction (revenue)/expense	60,803	54,006	29,606	33,244	8,342	(128,730)	(128,730)	(128,730)	(224,511)	(222,219)	(260,860)	(163,614)	(1,071,394)
4	Stage 2 (revenue)/expense	(1,074,049)	(1,074,049)	(1,074,049)	(1,074,049)	(1,074,049)	(1,616,384)	(1,616,384)	(1,616,384)	(1,881,107)	(1,881,107)	(1,881,107)	(1,771,690)	(17,634,407)
5	ARR Infeasibility Uplift expense	49,033	49,033	49,033	49,033	49,033	16,911	16,911	16,911	15,128	15,128	15,128	42,521	383,800
6	Schedule 16 expense	8,385	10,567	6,647	8,990	8,691	12,920	9,283	9,120	7,391	7,559	5,657	6,844	102,056
7	Total	(865,250)	(869,693)	(1,153,538)	(1,418,910)	(1,071,069)	(2,783,396)	(1,724,375)	(1,743,696)	(2,094,727)	(1,883,274)	(2,190,418)	(1,642,413)	(19,440,760)

2023 Economic Loss for Each Ludington Unit Outage Event

LUDINGTON - LUDINGTON 1					
Event	Start	End	Eq Hrs	Potential MWh Loss	Economic MWh Loss
33	1/23/23 7:02	1/23/23 15:02	8	2,769.60	-
34	1/23/23 15:02	1/27/23 19:34	100.53	34,804.64	818.21
80	2/12/23 0:31	2/12/23 1:45	1.23	426.98	-
84	2/28/23 23:02	2/28/23 23:40	0.63	219.26	-
126	4/3/23 7:00	4/21/23 16:33	441.55	152,864.61	5,246.32
163	5/15/23 4:00	5/19/23 18:37	110.62	38,295.49	-
170	5/24/23 8:07	5/24/23 12:46	4.65	1,609.83	-
219	7/7/23 0:04	7/7/23 10:07	10.05	3,646.14	-
267	8/14/23 7:05	8/16/23 14:21	55.27	20,050.75	458.10
298	9/13/23 8:00	9/13/23 12:00	4	1,462.80	-
299	9/13/23 12:00	9/13/23 12:10	0.17	60.95	-
318	9/26/23 10:17	10/17/23 16:17	510	186,507.00	549.08
327	10/21/23 9:00	10/21/23 14:32	5.53	2,023.54	-
341	10/29/23 7:59	10/29/23 11:26	3.45	1,261.67	-
344	10/23/23 9:02	10/23/23 13:47	4.75	1,737.08	-
361	11/7/23 7:01	11/7/23 12:46	5.75	2,102.78	-
433	12/16/23 5:55	12/19/23 11:48	77.88	28,575.40	859.52

LUDINGTON - LUDINGTON 2					
Event	Start	End	Eq Hrs	Potential MWh Loss	Economic MWh Loss
32	1/24/23 7:00	1/24/23 14:09	7.15	2,474.62	409.61
80	2/28/23 23:00	2/28/23 23:30	0.5	173.05	-
89	3/5/23 0:29	3/6/23 15:04	38.58	13,353.69	-
125	4/3/23 7:00	4/21/23 14:46	439.77	152,203.25	5,246.32
159	5/15/23 4:00	5/19/23 18:37	110.62	38,284.43	-
215	7/11/23 8:10	7/11/23 12:30	4.33	1,573.87	-
239	8/1/23 7:01	8/1/23 11:41	4.67	1,694.93	-
259	8/15/23 7:00	8/15/23 13:46	6.77	2,457.65	-
292	9/13/23 8:00	9/13/23 12:00	4	1,464.40	-
293	9/13/23 12:00	9/13/23 12:10	0.17	61.02	-
308	9/26/23 10:17	10/17/23 10:15	503.97	184,502.20	549.08
317	10/21/23 9:00	10/21/23 14:32	5.53	2,025.75	-
331	10/29/23 7:59	10/29/23 11:26	3.45	1,263.05	-
334	10/23/23 9:02	10/23/23 13:47	4.75	1,738.98	-
336	10/17/23 10:15	10/17/23 16:17	6.03	2,208.80	-
354	11/7/23 7:01	11/7/23 12:46	5.75	2,105.08	-

LUDINGTON - LUDINGTON 3					
Event	**Start**	**End**	**Eq Hrs**	**Potential MWh Loss**	**Economic MWh Loss**
7	1/7/23 16:52	1/7/23 17:59	1.12	388.60	-
36	1/25/23 7:01	1/25/23 15:00	7.98	2,778.20	-
37	1/25/23 15:00	1/25/23 15:38	0.63	220.40	-
83	2/12/23 2:02	2/12/23 2:20	0.3	104.40	-
86	2/28/23 23:00	3/1/23 9:15	10.25	3,567.00	157.26
105	3/14/23 7:00	3/15/23 17:00	34	11,832.00	595.36
128	4/4/23 8:32	4/4/23 17:05	8.55	2,975.40	-
133	4/7/23 8:07	4/7/23 18:14	10.12	3,520.60	-
136	4/8/23 10:30	4/8/23 16:39	6.15	2,140.20	-
145	4/14/23 8:21	4/14/23 14:15	5.9	2,053.20	-
161	4/24/23 6:45	5/12/23 23:59	449.23	156,333.20	8,510.30
163	5/22/23 16:00	5/30/23 12:32	188.53	65,609.60	4,205.12
167	5/12/23 23:59	5/22/23 16:00	232.02	80,741.80	1,109.65
232	8/2/23 7:10	8/2/23 11:55	4.75	1,727.10	-
250	8/16/23 5:00	8/16/23 14:21	9.35	3,399.66	-
259	8/22/23 12:30	8/22/23 15:13	2.72	987.78	-
287	9/13/23 8:00	9/13/23 12:00	4	1,466.00	-
288	9/13/23 12:00	9/13/23 12:10	0.17	61.08	-
302	9/26/23 10:17	10/18/23 9:16	526.98	193,139.39	718.33
309	10/21/23 9:00	10/21/23 14:32	5.53	2,027.97	-
323	10/29/23 7:59	10/29/23 11:26	3.45	1,264.43	-
326	10/23/23 9:02	10/23/23 13:47	4.75	1,740.88	-
345	11/7/23 7:01	11/7/23 12:46	5.75	2,107.38	-

LUDINGTON - LUDINGTON 4					
Event	**Start**	**End**	**Eq Hrs**	**Potential MWh Loss**	**Economic MWh Loss**
20	1/26/23 7:02	1/26/23 12:49	5.78	1,998.72	-
42	2/13/23 8:09	2/17/23 15:23	103.23	35,677.44	1,725.40
49	2/12/23 0:15	2/12/23 1:42	1.45	501.12	-
71	3/27/23 7:19	3/27/23 12:45	5.43	1,877.76	-
83	4/4/23 8:32	4/4/23 17:05	8.55	2,954.88	-
88	4/7/23 8:07	4/7/23 18:14	10.12	3,496.32	-
91	4/8/23 10:30	4/8/23 16:39	6.15	2,125.44	-
98	4/14/23 8:21	4/14/23 14:15	5.9	2,039.04	-
113	4/24/23 6:51	5/12/23 23:59	449.13	155,220.49	8,510.30
115	5/12/23 23:59	5/15/23 4:00	52.02	17,976.96	269.32
116	5/15/23 4:00	5/19/23 16:26	108.43	37,474.56	-
117	5/19/23 16:39	5/19/23 18:37	1.97	679.68	-
157	6/26/23 15:15	6/26/23 15:48	0.55	203.01	-
161	6/27/23 10:00	6/27/23 11:43	1.72	633.62	-
169	7/5/23 8:12	7/5/23 13:32	5.33	1,968.53	-
197	8/2/23 7:11	8/3/23 16:00	32.82	12,112.63	882.16
213	8/17/23 7:00	8/17/23 13:41	6.68	2,466.82	-
244	9/13/23 8:00	9/13/23 12:00	4	1,488.00	-
245	9/13/23 12:00	9/13/23 12:10	0.17	62.00	-
261	9/26/23 10:17	10/14/23 10:40	432.38	160,846.60	-
265	10/16/23 8:03	10/16/23 16:16	8.22	3,056.60	-
269	10/17/23 8:06	10/17/23 16:10	8.07	3,000.80	-
278	10/21/23 9:00	10/21/23 14:32	5.53	2,058.40	-
286	10/29/23 7:59	10/29/23 11:26	3.45	1,283.40	-
288	10/23/23 9:02	10/23/23 13:47	4.75	1,767.00	-
300	11/7/23 7:01	11/7/23 12:46	5.75	2,139.00	-

LUDINGTON - LUDINGTON 5					
Event	**Start**	**End**	**Eq Hrs**	**Potential MWh Loss**	**Economic MWh Loss**
39	1/30/23 9:12	2/1/23 12:06	50.9	17,621.58	960.20
125	3/27/23 7:19	4/3/23 11:17	171.97	59,534.86	1,190.63
127	4/4/23 8:32	4/4/23 17:05	8.55	2,960.01	-
130	4/7/23 8:07	4/7/23 18:14	10.12	3,502.39	-
135	4/8/23 10:30	4/8/23 16:39	6.15	2,129.13	-
146	4/14/23 8:21	4/14/23 14:15	5.9	2,042.58	-
152	4/17/23 3:20	4/17/23 15:22	12.03	4,165.94	-
190	5/15/23 4:37	6/27/23 2:00	1029.4	366,826.70	21,679.97
191	6/27/23 2:00	6/30/23 15:57	85.95	31,191.25	1,286.32
253	8/28/23 6:35	8/30/23 9:39	51.07	18,532.09	1,634.98
269	9/13/23 8:00	9/13/23 12:00	4	1,463.20	-
270	9/13/23 12:00	9/13/23 12:10	0.17	60.97	-
280	9/20/23 7:09	9/22/23 13:04	53.92	19,722.72	418.32
285	9/26/23 10:17	10/14/23 10:40	432.38	158,165.82	-
286	10/14/23 10:40	10/19/23 9:23	118.72	43,426.56	877.64
288	10/21/23 9:00	10/21/23 14:32	5.53	2,024.09	-
299	10/29/23 7:59	10/29/23 11:26	3.45	1,262.01	-
302	10/23/23 9:02	10/23/23 13:47	4.75	1,737.55	-
317	11/7/23 7:01	11/7/23 12:46	5.75	2,103.35	-
366	12/11/23 10:03	12/11/23 11:15	1.2	438.96	-

LUDINGTON - LUDINGTON 6					
Event	**Start**	**End**	**Eq Hrs**	**Potential MWh Loss**	**Economic MWh Loss**
8	1/7/23 5:57	1/7/23 18:05	12.13	4,200.56	-
38	1/27/23 7:03	1/27/23 13:23	6.33	2,192.60	137.94
57	2/10/23 0:37	2/10/23 11:57	11.33	3,923.60	-
139	4/4/23 8:32	4/4/23 17:05	8.55	2,960.01	-
145	4/7/23 8:07	4/7/23 18:14	10.12	3,502.39	-
148	4/8/23 10:30	4/8/23 16:39	6.15	2,129.13	-
159	4/14/23 8:21	4/14/23 14:15	5.9	2,042.58	-
207	5/15/23 4:37	6/23/23 17:36	948.98	337,922.34	20,753.13
208	6/23/23 18:12	6/23/23 18:44	0.53	193.81	-
220	7/4/23 22:52	7/5/23 10:46	11.9	4,324.46	-
269	8/18/23 7:03	8/18/23 13:07	6.07	2,204.63	-
298	9/13/23 8:00	9/13/23 12:00	4	1,465.20	-
299	9/13/23 12:00	9/13/23 12:10	0.17	61.05	-
303	9/14/23 6:36	10/5/23 11:48	509.2	186,519.95	4,685.77
304	10/5/23 11:48	10/13/23 13:57	194.15	71,117.14	-
306	10/14/23 10:59	10/14/23 12:05	1.1	402.93	-
310	10/16/23 8:03	10/16/23 16:16	8.22	3,009.77	-
314	10/17/23 8:06	10/17/23 16:10	8.07	2,954.82	-
323	10/21/23 9:00	10/21/23 14:32	5.53	2,026.86	-
336	10/29/23 7:59	10/29/23 11:26	3.45	1,263.74	-
339	10/23/23 9:02	10/23/23 13:47	4.75	1,739.93	-
353	11/7/23 7:01	11/7/23 12:46	5.75	2,106.23	-

Report Period: January 2023 to December 2023

CAMPBELL 1-2 - CAMPBELL 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
20	MO	3/7/2023 0:01	3/17/2023 23:59	1400	Economic Reserve Shutdown. Maintenance Outage 3/7 - 3/17. 1A FDF repair	262.97	68371.34
23	ME	3/17/2023 23:59	3/21/2023 1:01	1400	Economic Reserve Shutdown. 1A FD fan repairs	73.03	18988.67
24	MO	4/26/2023 10:41	4/26/2023 11:15	4460	Turbine overspeed tests.	0.57	147.33
25	U1	4/26/2023 11:15	4/28/2023 20:52	740	1C BCWP pump replacement	57.62	14980.33
41	U1	6/6/2023 5:09	6/7/2023 1:24	9900	U1 Tripped during simulated OS test portion of valve test.	20.25	5265
49	U1	6/23/2023 22:34	6/24/2023 21:57	250	1E feeder speed sensor failure, all other feeders hogged in, trip on drum lvl.	23.38	6079.67
56	U1	7/6/2023 21:56	7/15/2023 4:31	760	1D BCWP S. discharge valve large packing leak	198.58	51631.66
65	U1	7/24/2023 13:31	7/25/2023 6:07	310	1B mill capacitor failed during PMT, all feeders tripped causing MFT.	16.6	4316
66	U1	7/25/2023 9:22	7/25/2023 14:28	9900	low drum lvl trip, high throttle pressure	5.1	1326
81	U2	8/16/2023 19:06	9/5/2023 1:51	1000	boiler tube leak(s)	462.75	120315

CAMPBELL 1-2 - CAMPBELL 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
3	MO	1/3/2023 0:16	1/14/2023 13:32	1000	Maintenance Outage, boiler tube leak.	277.27	98429.66
16	U1	1/14/2023 14:06	1/14/2023 21:16	1400	FD fans tripped while automating.	7.17	2544.17
17	MO	1/15/2023 2:54	1/15/2023 5:23	4460	Turbine overspeed testing.	2.48	881.58
35	MO	3/6/2023 0:01	3/11/2023 0:26	1060	Economic Reserve Shutdown. MO 3/6 - 3/10. 1x RH tube leak. Ash pit trough repair	120.42	42747.91
38	U1	3/14/2023 18:21	3/15/2023 9:35	3831	Lost aux steam/steam seals.	15.23	5407.83
73	U1	5/16/2023 18:47	6/3/2023 7:48	640	201B packing leak, worse.	421.02	149460.92
107	U1	8/4/2023 20:35	8/10/2023 11:42	4291	Circuit oil cooler leak (water into the oil)	135.12	47966.42
108	U1	8/10/2023 13:39	9/29/2023 9:30	3401	SUBFP failure.	1195.85	424526.73
109	SF	8/10/2023 11:42	8/10/2023 13:39	3401	SUBFP failure.	1.95	692.25
110	SF	9/29/2023 9:30	9/29/2023 12:50	3401	SUBFP failure.	3.33	1183.33
111	U1	9/29/2023 12:50	1/1/2024 0:00	3401	SUBFP failure.	2244.17	796679.17

CAMPBELL 3 - CAMPBELL 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
67	U1	3/10/2023 10:32	3/10/2023 15:40	800	Unit trip due to drum level swing. Hot restart.	5.13	4319.19
98	PO	3/31/2023 16:47	5/10/2023 8:46	1000	Planned Outage. Boiler Tube leak repair. Catalyst replacement.	951.98	800998.78
111	U1	5/14/2023 18:59	5/30/2023 8:44	1035	Boiler leak. Unit in Forced Outage.	373.75	314473.25
112	MO	5/11/2023 8:21	5/11/2023 9:09	4460	Turbine Overspeed Test.	0.8	673.12
202	MO	7/7/2023 17:03	7/25/2023 10:37	4040	#2 Turbine bearing vibration issues.	425.57	357731.34
231	U1	8/28/2023 10:24	9/4/2023 4:56	800	Drum swing after south side mills tripped due to breaker issue.	162.53	136571.67
324	U1	11/20/2023 16:15	12/12/2023 19:52	1040	Superheat tube leak. Unit offline.	531.62	448094.5

COVERT GENERATING STATION - COVERT UNIT 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
4	U1	6/18/2023 5:17	6/24/2023 8:07	561	reheater non-return valve stuck at 50%	146.83	53814.41
6	PO	9/30/2023 0:36	10/6/2023 20:05	5274	planned outage for general unit inspection and repair	163.48	60619.62
7	MO	11/8/2023 0:36	11/10/2023 19:24	6110	repair steam leak on HP steam piping	66.8	24769.44

COVERT GENERATING STATION - COVERT UNIT 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
7	U1	6/8/2023 7:35	6/9/2023 4:16	3420	Unit taken offline to repair leak on boiler feed pump balance line.	20.68	7464.62
13	U1	8/4/2023 19:45	8/16/2023 15:00	3210	circ water pump failure at base load caused unit to trip on low condenser vacuum	283.25	102224.92
16	U1	10/10/2023 15:27	10/14/2023 0:01	3210	2A circ water pump failed, unit tripped on low condenser vacuum	80.57	29406.83
17	PO	10/14/2023 0:01	10/23/2023 23:59	5274	planned outage for general unit inspection and repair	239.97	87587.83
18	PE	10/23/2023 23:59	10/26/2023 9:54	5274	Original scope including circ pump replacement took longer than originally estimated	57.92	21139.58

COVERT GENERATING STATION - COVERT UNIT 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
4	U1	8/5/2023 8:35	8/5/2023 16:01	801	HP drum level transmitters dropped out causing control valve to open, high lvl trip	7.43	2681.95
5	U1	8/5/2023 17:24	8/5/2023 20:58	1710	HP steam temp indication failed	3.57	1286.85
6	PO	10/28/2023 0:35	11/3/2023 10:30	5274	planned outage for general unit inspection and repair	153.92	56148.8
7	U1	11/3/2023 12:38	11/3/2023 15:11	6171	IP/HRH bypass failed@ 30% causing unit to trip on low combustor cooling steam pressure	2.55	930.24
9	U1	12/30/2023 12:22	1/1/2024 0:00	6010	HP steam line leak	35.63	14253.33

HYDROS - ALCONA 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	5/11/2023 7:57	5/11/2023 14:30	3644	Unit Tripped/Gate Operator Pressure Failure	6.55	12.18
2	U1	5/15/2023 8:48	5/15/2023 13:05	7050	Replacing motor starter contactor on gate operator.	4.28	7.97
4	MO	8/1/2023 8:09	8/2/2023 13:50	7201	Dive Inspection	29.68	44.53
5	U1	11/2/2023 8:32	11/2/2023 13:34	7110	Cleaning Trash Rack	5.03	8.31

HYDROS - ALCONA 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	3/6/2023 11:45	3/21/2023 15:00	7201	Periodic Outage w/Electrical Test	362.25	673.79
2	MO	7/31/2023 8:28	7/31/2023 12:23	7201	Dive Inspection	3.92	5.88
3	U1	11/1/2023 8:34	11/1/2023 15:25	7110	Cleaning Trash Rack and Buoy Repair	6.85	11.3

HYDROS - ALLEGAN 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
2	U1	5/31/2023 10:03	5/31/2023 13:25	3690	Black Light Testing/Station Outage	3.37	0.91
3	U1	6/13/2023 8:00	6/13/2023 14:30	7201	Dive Inspection and Breaker Switch Installation	6.5	1.24
4	U1	8/6/2023 4:15	8/6/2023 8:28	3644	Loss of Station Power	4.22	0.8
5	U1	8/6/2023 12:16	8/6/2023 14:50	3644	Loss of Station Power	2.57	0.49
6	U1	8/7/2023 4:28	8/7/2023 8:45	3644	Loss of Station Power	4.28	0.81
7	MO	8/16/2023 8:00	8/18/2023 8:48	7201	Runner & Wicket Gate Inspection	48.8	9.27
8	MO	10/25/2023 8:30	10/26/2023 13:00	7201	Inspect bottom/head plate and adjust wicket gate closure	28.5	5.7

HYDROS - ALLEGAN 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	3/10/2023 6:06	3/10/2023 15:40	3644	Loss of Station Power - 27/59/81 Relay Trip	9.57	5.84
2	U1	5/31/2023 10:03	5/31/2023 13:25	3690	Black Light Testing/Station Outage	3.37	2.05
3	MO	6/13/2023 8:00	6/13/2023 14:30	7201	Dive Inspection and Breaker Switch Installation	6.5	2.73
4	U1	8/6/2023 4:15	8/6/2023 8:25	3644	Loss of Station Power	4.17	1.75
5	U1	8/6/2023 12:16	8/6/2023 14:45	3644	Loss of Station Power	2.48	1.04
6	U1	8/7/2023 4:28	8/7/2023 8:40	3644	Loss of Station Power	4.2	1.76
7	U1	9/6/2023 19:08	9/6/2023 20:18	3644	Tripped relays 27/59,81,24 due to thunderstorm	1.17	0.54
8	U1	11/29/2023 9:00	1/1/2024 0:00	7140	Replace link	783	360.18

HYDROS - ALLEGAN 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	3/10/2023 6:06	3/10/2023 15:35	3644	Loss of Station Power - 27/59/81 Relay Trip	9.48	6.92
2	U1	5/31/2023 10:03	5/31/2023 13:25	3690	Black Light Testing/Station Outage	3.37	2.46
3	MO	6/13/2023 8:00	6/13/2023 14:30	7201	Dive Inspection and Breaker Switch Installation	6.5	3.19
4	U1	8/6/2023 4:15	8/6/2023 8:15	3644	Loss of Station Power	4	1.96
5	U1	8/6/2023 12:16	8/6/2023 14:30	3644	Loss of Station Power	2.23	1.09
6	U1	8/7/2023 4:28	8/7/2023 8:25	3644	Loss of Station Power	3.95	1.94
7	U1	11/8/2023 9:50	11/9/2023 9:07	7050	Replace loader/unloader flange gasket.	23.28	12.57

HYDROS - COOKE 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	7/28/2023 15:13	7/28/2023 18:20	3644	Unit 2 Breaker Trip due to voltage spike.	3.12	9.1
2	U1	8/7/2023 10:36	8/8/2023 14:27	3641	Breaker not closing	27.85	81.32
3	PO	8/21/2023 8:19	9/2/2023 8:19	7201	Periodic Outage	288	840.96
4	PE	9/2/2023 8:19	9/5/2023 11:45	7201	Periodic Outage Extension	75.43	220.27
5	U1	9/5/2023 14:25	9/5/2023 14:37	3644	Unit 2 Governor Trip 265ESD Alarm	0.2	0.58
6	U1	9/30/2023 16:37	9/30/2023 17:29	3644	Unit tripped for unknown reasons	0.87	2.53
7	U1	10/1/2023 19:00	10/1/2023 19:57	3644	Unit tripped for unknown reasons	0.95	2.77

HYDROS - COOKE 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	8/21/2023 8:19	8/21/2023 11:01	7201	Divers sealing headgates for Cooke Unit 2 Periodic Outage	2.7	7.48
2	PO	9/5/2023 11:45	9/5/2023 14:42	3644	Started Periodic Outage then stopped it due to Unit 2 Governor Trip 265ESD Alarm	2.95	8.17
3	PO	11/7/2023 7:55	11/21/2023 14:12	7201	Periodic Outage	342.28	948.13

HYDROS - CROTON 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	1/1/2023 0:00	9/28/2023 13:00	7140	Wicket Gate Replacement Periodic Outage Extension	6492	9070.46

HYDROS - CROTON 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	1/1/2023 0:00	9/28/2023 13:00	7140	Wicket Gate Replacement Periodic Outage Extension	6492	9070.46

HYDROS - CROTON 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	6/14/2023 10:03	6/14/2023 17:00	7009	Oil Leak in Thrust Bearing Area	6.95	3.13
2	U1	8/12/2023 5:48	8/12/2023 13:30	3644	Governor Trip/Loss of all speed signals/Faulty Governor	7.7	3.47
3	U1	10/10/2023 13:30	10/10/2023 15:30	7201	Drone inspection of legacy grease lines.	2	1.12
5	U1	11/9/2023 9:00	11/17/2023 10:30	7050	Unit unable to spin	193.5	108.36
6	PO	11/27/2023 9:30	1/1/2024 0:00	7201	Periodic Maintenance Outage w/Thrust Bearing Inspection & Remove Legacy Grease Lines	830.5	465.08

HYDROS - CROTON 4							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	1/1/2023 0:00	1/20/2023 11:55	4602	Exciter brushes worn out/arcing - Need replaced.	467.92	299.47
3	U1	5/29/2023 10:29	5/30/2023 12:30	3644	Oil Pressure Swich /HPU Oil Pressure LO LO Transducer/Unit Tripped	26.02	16.65
4	U1	7/16/2023 10:57	7/17/2023 14:30	4602	Commutator brush holder spring tensioner repair	27.55	12.4
5	U1	10/10/2023 13:30	10/10/2023 15:30	7201	Drone inspection of legacy grease lines.	2	1.12
6	PO	11/27/2023 9:30	1/1/2024 0:00	7201	Periodic Maintenance Outage w/Electrical Test & Remove Legacy Grease Lines	830.5	465.08

HYDROS - FIVE CHANNELS 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	1/6/2023 8:11	1/6/2023 9:30	7050	Replaced Governor Motor Starter Contactors.	1.32	4.04
2	MO	2/14/2023 7:55	2/15/2023 8:55	7120	Contractor taking headgate measurements for future project work.	25	76.75
3	U1	3/20/2023 11:53	3/20/2023 12:53	3644	86T1 LOR Trip	1	3.07
4	U1	5/11/2023 8:28	5/14/2023 9:00	7120	Headgate Replacement Project Work	72.53	222.68
5	U1	5/15/2023 10:50	5/16/2023 8:35	7050	Divers in water/Headgate Replacement Project Work	21.75	66.77
6	MO	8/3/2023 14:41	9/18/2023 6:00	7120	Headgate Replacement Project	1095.32	3285.95
7	PO	9/18/2023 6:00	9/28/2023 10:58	7201	Periodic Outage w/Electrical Test	244.97	734.9
8	U1	10/7/2023 8:35	10/7/2023 11:30	3644	Unit tripped on disparity due to Loud trip	2.92	8.75

HYDROS - FIVE CHANNELS 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	2/14/2023 7:55	2/14/2023 13:30	7120	Contractor taking headgate measurements for future project work.	5.58	16.47
2	U1	3/20/2023 11:53	3/20/2023 12:53	3644	86T2 LOR Trip	1	2.95
3	PO	5/2/2023 7:41	8/22/2023 11:20	7120	Headgate/Log Chute/Dead Bay	2691.65	7841.4
4	U1	9/13/2023 7:35	9/13/2023 12:45	7110	Divers removing stop logs	5.17	14.98
5	U1	11/4/2023 7:08	11/4/2023 7:45	3644	Unit tripped on disparity due to Loud trip	0.62	1.79
6	MO	11/20/2023 8:27	11/20/2023 11:00	7190	Core Drilling	2.55	7.4

HYDROS - FOOTE 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	7/23/2023 10:47	8/7/2023 13:22	7053	Aux Oil Pump Failure	362.58	348.08
2	U1	8/7/2023 14:31	8/8/2023 13:00	7053	GTS light issue	22.48	21.58
3	U1	8/20/2023 12:58	8/21/2023 12:35	7009	Auxiliary Oil Pump Issues	23.62	22.67
4	U1	10/4/2023 12:45	10/17/2023 10:17	7009	Auxiliary Oil Pump Leak	309.53	346.68

HYDROS - FOOTE 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	1/8/2023 11:03	1/28/2023 11:03	7201	Periodic Outage w/Thrust Bearing Inspection	480	619.2
2	MO	1/28/2023 11:03	2/2/2023 13:30	7140	Scope was added during PO for wicket gate packing seal and installed arrestors	122.45	157.96
3	MO	2/7/2023 8:30	2/7/2023 16:23	7050	Auto Sync Switch Installation	7.88	10.17
4	U1	6/1/2023 8:39	6/6/2023 10:28	7053	Oil Leak Unit 2 Governor	121.82	116.94
5	U1	7/1/2023 10:12	7/5/2023 9:32	7008	Cooling water to thrust bearing plugged.	95.33	91.52
6	U1	8/7/2023 13:22	8/7/2023 14:31	7053	Replace oil lines	1.15	1.1
7	U1	8/8/2023 13:00	8/16/2023 11:42	7053	Replace oil lines	190.7	183.07

HYDROS - FOOTE 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	8/20/2023 12:58	8/21/2023 12:35	3644	Breaker Issue at Start Up	23.62	22.67
2	MO	12/4/2023 12:18	12/18/2023 12:42	7003	Replace Oil Lines	336.4	376.77
3	U1	12/19/2023 9:28	1/1/2024 0:00	4630	Strainer cooling water leak	302.53	338.84

HYDROS - HARDY 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
5	U1	7/12/2023 10:00	7/12/2023 14:00	3710	Rewire 480V power to intake tower	4	42.4
6	MO	7/17/2023 9:30	7/17/2023 12:10	7201	Tailrace Dive Inspection	2.67	28.27

HYDROS - HARDY 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
3	PO	3/13/2023 13:21	3/25/2023 13:21	7201	Periodic Outage/Permanent Magnetic Refurbishment	288	3024
5	PE	3/25/2023 13:21	6/28/2023 13:20	7201	Periodic Outage Extension/Permanent Magnetic Refurbishment	2279.98	23925.69
7	U1	7/12/2023 10:00	7/12/2023 14:00	3710	Rewire 480V power to intake tower	4	42.8
8	MO	7/17/2023 9:30	7/17/2023 12:10	7201	Tailrace Dive Inspection	2.67	28.53

HYDROS - HARDY 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
2	PO	2/13/2023 13:10	2/25/2023 13:10	7201	Periodic Outage	288	3427.2
3	PE	2/25/2023 13:10	3/10/2023 13:20	7201	Periodic Outage Extension	312.17	3714.78
7	U1	7/12/2023 10:00	7/12/2023 14:00	3710	Rewire 480V power to intake tower	4	48.4
8	MO	7/17/2023 9:30	7/17/2023 12:10	7201	Tailrace Dive Inspection	2.67	32.27

HYDROS - HODENPYL 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	5/25/2023 10:47	5/25/2023 14:34	4590	Repairing brake air line	3.78	11.43
2	MO	6/20/2023 8:43	6/20/2023 18:14	3623	Generator Tie-in	9.52	21.41
3	MO	6/27/2023 10:45	6/27/2023 14:05	7201	Headgate Hoist Inspection with Divers	3.33	7.5
4	PO	8/2/2023 14:19	1/1/2024 0:00	4500	Generator Rewind	3634.68	9349.64

HYDROS - HODENPYL 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	6/20/2023 8:43	6/20/2023 18:14	3623	Generator Tie-in	9.52	21.41
2	MO	6/26/2023 9:00	6/26/2023 14:16	7201	Headgate Hoist Inspection with Divers	5.27	11.85
3	U1	11/15/2023 7:45	11/15/2023 14:30	3623	Commissioning of auxiliary generator	6.75	17.89

HYDROS - LOUD 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	3/20/2023 11:52	3/20/2023 12:53	3644	Overall 86 LOR Trip	1.02	2.24
2	U1	5/15/2023 8:30	5/16/2023 9:30	7000	Replacing brakes	25	55
3	PO	10/9/2023 7:43	11/1/2023 9:21	7201	Periodic Outage with Thrust Bearing Inspection	553.63	1384.08
4	U1	11/4/2023 6:58	11/4/2023 7:45	3644	Unit Tripped/116 Breaker Alarm	0.78	1.96
5	U1	11/5/2023 18:53	11/5/2023 20:11	3644	Unit tripped/Suspect relay in HCMS cabinet	1.3	3.25

HYDROS - LOUD 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	3/20/2023 11:52	3/20/2023 12:53	3644	Overall 86 LOR Trip	1.02	2.24
2	U1	10/7/2023 8:22	10/7/2023 15:30	3644	266 Breaker Trip/Lightening Arrestor Issue	7.13	17.12
3	U1	10/11/2023 13:48	10/11/2023 20:38	3644	Replace lightening arrestor	6.83	16.4
4	PO	11/1/2023 9:21	11/2/2023 11:36	7110	Trash Rack Replacement	26.25	63
5	U1	11/4/2023 8:40	11/8/2023 11:00	7201	Didn''t sound normal on start up/Made unit unavailable and will investigate	99.33	238.4

HYDROS - MIO 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	2/6/2023 9:21	2/25/2023 9:21	7201	Periodic Inspection Outage w/Thrust Bearing Inspection	456	456
2	PE	2/25/2023 9:21	3/6/2023 9:50	7201	Periodic Outage Extension	216.48	216.48
3	MO	7/6/2023 9:20	7/6/2023 13:00	3730	Temporary Power Transfer	3.67	2.75
4	PO	7/10/2023 9:00	10/6/2023 9:00	3690	Electrical Safety Project	2112	1711.35
5	PE	10/6/2023 9:00	11/10/2023 11:36	3690	Electrical Safety Project Outage Extension	843.6	759.24

HYDROS - MIO 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	2/7/2023 10:17	2/7/2023 10:50	3644	Unit Trip - First Out Shutdown/Unit 2 Governor Oil Flow Switch	0.55	0.55
2	U1	4/3/2023 8:59	6/1/2023 10:15	3644	Hi-Hi Steady Bearing Temp Trip/Bearing is wiped.	1417.27	1414.71
3	MO	7/6/2023 9:20	7/6/2023 13:00	3730	Temporary Power Transfer	3.67	2.75
4	PO	7/10/2023 9:00	10/6/2023 9:00	3690	Electrical Safety Project	2112	1711.35
5	PE	10/6/2023 9:00	11/9/2023 12:01	3690	Electrical Safety Project Outage Extension	820.02	738.02

HYDROS - ROGERS 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	3/28/2023 10:00	3/30/2023 11:00	4551	Oil Leak - Upper Generator Guide Bearing	49	31.36
2	PO	4/13/2023 9:30	5/1/2023 9:30	7201	Periodic Outage	432	276.48
3	PE	5/1/2023 9:30	6/5/2023 11:30	7201	Periodic Outage Extension	842	532.43
4	MO	6/20/2023 8:00	6/20/2023 12:30	7201	Upstream & Downstream Powerhouse Dive Inspection	4.5	2.61

HYDROS - ROGERS 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	1/1/2023 0:00	1/9/2023 14:20	3644	Extended outage into 2023/Sensor for Speed Ring Failed.	206.33	132.05
2	PO	4/13/2023 9:30	5/1/2023 9:30	7201	Periodic Outage	432	276.48
3	PE	5/1/2023 9:30	6/5/2023 11:30	7201	Periodic Outage Extension	842	532.43
4	MO	6/20/2023 8:00	6/20/2023 12:30	7201	Upstream & Downstream Powerhouse Dive Inspection	4.5	2.61

HYDROS - ROGERS 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	6/5/2023 11:30	1/1/2024 0:00	4500	Periodic Outage Generator Rewind Unit 4	5029.5	2975.69

HYDROS - ROGERS 4							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	6/5/2023 11:30	1/1/2024 0:00	4500	Periodic Outage Generator Rewind Unit 4	5029.5	2975.69

HYDROS - TIPPY 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	U1	1/1/2023 0:00	1/1/2024 0:00	7007	High Thrust Bearing Temp	8760	20128.91

HYDROS - TIPPY 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	7/26/2023 8:35	7/26/2023 12:08	7201	Downstream Powerhouse Dive	3.55	7.35
2	MO	7/27/2023 8:00	7/27/2023 14:35	7201	Upstream Powerhouse Dive Inspection	6.58	13.63
4	U1	10/12/2023 9:46	10/12/2023 18:26	3644	Z-Phase Pothead Repair	8.67	18.81

HYDROS - TIPPY 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	7/26/2023 8:35	7/26/2023 12:08	7201	Downstream Powerhouse Dive	3.55	7.35
2	MO	7/27/2023 8:00	7/27/2023 14:35	7201	Upstream Powerhouse Dive Inspection	6.58	13.63
3	U1	8/1/2023 9:00	8/1/2023 16:45	7120	Star Wheel Motor and Cooling Water Valve Repairs	7.75	16.04
4	U1	10/12/2023 9:46	10/12/2023 18:26	3644	Z-Phase Pothead Repair	8.67	18.81

HYDROS - WEBBER 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	4/17/2023 7:48	5/1/2023 8:00	9590	Annual Smolt Passage per DNR	336.2	359.73
2	U1	5/1/2023 8:00	6/9/2023 8:35	7201	Unplanned Periodic Outage	936.58	933.95
3	U1	10/29/2023 1:11	10/30/2023 8:30	3644	Unit Tripped/Possible Issue w/Marquette Substation/Will Troubleshoot	31.32	24.11

HYDROS - WEBBER 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	4/17/2023 7:44	5/1/2023 8:00	7201	Annual Smolt Passage per DNR	336.27	158.05
2	U1	5/2/2023 14:02	5/3/2023 8:40	7099	High vibration due to cavitation at 100% wicket gate position due to slug of debris.	18.63	8.76
3	MO	9/13/2023 9:01	9/15/2023 13:30	7140	Wicket Gate Inspection	52.48	17.32
4	ME	9/15/2023 13:30	1/1/2024 0:00	7140	Need to make repairs to broken wicket gate/pin which was discovered during MO	2579.5	851.24

JACKSON GENERATING STATION - JACKSON GENERATING STATION							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
9	U1	1/14/2023 7:23	1/14/2023 10:34	3684	177 Line Trip Remaining Units Shutdown Until Cause Determined	3.18	1783.62
35	MO	2/21/2023 10:00	2/21/2023 14:24	3983	Plant Outage - Reconfigure CTW PLC	4.4	2465.32
41	MO	2/21/2023 14:41	2/21/2023 16:30	3983	Plant Outage - Reconfigure CTW PLC	1.82	1017.88
73	U1	4/3/2023 19:02	4/3/2023 21:35	3674	Protective Relay Plant Trip	2.55	1428.77
106	MO	4/23/2023 0:08	4/23/2023 23:00	3431	B BFP Arc Valve and BPR Replacement	22.87	12812.19
127	U1	4/30/2023 2:09	4/30/2023 13:13	3360	Condensate has Water High Silica Content	11.07	6200.65
130	U1	5/6/2023 8:53	5/6/2023 10:50	3670	ETR-103 Trip Caused Loss of Plant Stability	1.95	1092.59
159	U1	5/31/2023 5:00	5/31/2023 9:04	3410	C BFP Cooling Water Failure	4.07	2278.55
181	U1	6/16/2023 12:26	6/16/2023 15:34	3410	C BFP Cooling Water Failure	3.13	1684.92
194	MO	6/27/2023 17:22	6/28/2023 8:07	9130	Vector Gas Line Outage for Pipeline Pigging	14.75	7931.67
282	U1	9/19/2023 22:10	9/21/2023 17:08	3671	277 Line Trip Due to Breaker Failure Relay	42.97	23339.49
286	PO	9/25/2023 0:00	10/13/2023 13:00	3700	Plant Periodic Outage	445	241724.01
288	PE	10/13/2023 13:00	10/13/2023 14:00	3700	Plant Periodic Outage Extension - STG 8 Lube Oil Breaker	1	543.2

KARN 1-2 - KARN 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
31	U1	4/3/2023 23:42	4/20/2023 23:59	330	Coal leaks due to excessive pyrites.	408.28	93905.16
33	U1	4/20/2023 23:59	5/2/2023 9:20	4262	South upper intercept valve stuck open, not closing even when tripped manually.	273.35	62870.5
36	SF	5/2/2023 9:20	5/4/2023 11:39	3210	Boiler BCWP seal injection valve failure.	50.32	11572.83
37	U1	5/4/2023 15:17	5/10/2023 4:23	1700	Faulty feedwater control valve (stuck open).	133.1	30613
43	U1	5/25/2023 21:02	6/1/2023 0:00	9291	K1 EOL. Poor fuel quality + SO2 emission limited.	146.97	33802.33

KARN 1-2 - KARN 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
35	U1	2/3/2023 18:02	3/2/2023 23:59	1000	Boiler Leak 7th Floor	653.95	153155.09
45	MO	5/1/2023 0:00	5/12/2023 0:07	3999	Pre-retirement cessation activities.	264.12	61856.12

KARN 3-4 - KARN 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
3	MO	1/3/2023 0:01	1/6/2023 11:08	1710	CAH	83.12	50950.52
5	U1	1/11/2023 10:25	1/17/2023 10:25	3411	Emergency DC oil Pump on Turbine driven BFP out of service	144	88272
9	SF	1/24/2023 18:42	1/25/2023 0:35	9700	startup delayed due to waiting on scaffolding to sign off inspection	5.88	3606.48
10	SF	1/25/2023 2:20	1/25/2023 2:38	1999	tripped due to low water level	0.3	183.9
11	SF	1/25/2023 5:20	1/25/2023 5:53	1999	tripped due to low water level	0.55	337.15
12	U1	1/25/2023 10:37	1/25/2023 15:22	3123	Unit tripped due to loss of hotwell level	4.75	2911.75
15	U1	1/27/2023 12:45	1/28/2023 14:20	1999	Repairs on B Aux Boiler	25.58	15682.58
17	U1	1/31/2023 7:50	1/31/2023 12:20	3840	Alpha aux boiler SH outlet vent valve OOS.	4.5	2758.5
24	U1	2/14/2023 14:00	2/17/2023 8:00	3899	Control room alarm panels (non DCS) loss of power.	66	40458
27	PO	3/5/2023 0:01	4/15/2023 21:02	3248	Cooling tower overhaul	1004.02	615462.2
29	SF	4/19/2023 7:50	4/24/2023 12:08	3899	Bravo aux boiler OOS. Need both aux boilers when Karn 4 is FO.	124.3	76195.9
31	SF	4/27/2023 10:01	5/1/2023 15:40	4700	Voltage regulator OOS. Faulty card.	101.65	62311.45
33	SF	5/31/2023 16:00	6/1/2023 11:04	4609	Exciter rotor open circuit.	19.07	11472.07
34	U1	6/1/2023 11:04	9/10/2023 10:43	4609	Exciter rotor open circuit.	2423.65	1439048.41
43	U1	9/28/2023 1:05	9/28/2023 14:36	4610	Plug blew out on H2 Cooler west side.	13.52	8058.64
47	MO	10/9/2023 10:00	10/11/2023 19:04	1450	Installing blank flanges to fully isolate Combustion Air Heater section BB & BC.	57.07	34023.15
49	SF	10/18/2023 3:25	10/19/2023 10:03	1450	Blown gasket on blank flange for CAH. Changed gasket	30.63	18263.59
51	U1	10/27/2023 12:10	10/27/2023 16:50	3869	Karn 1&2 station power loss. No Fire protection water supply from HSWPs.	4.67	2782.27
55	MO	11/13/2023 0:11	11/16/2023 17:03	1000	Repair boiler tube leak.	88.87	52982.31
59	U1	11/29/2023 9:48	11/29/2023 10:20	9900	Tripped offline due to high steam drum level.	0.53	317.97

KARN 3-4 - KARN 4							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
3	MO	1/23/2023 0:01	2/3/2023 12:05	3245	Repair EHC System and cooling tower underground leak	276.07	173783.97
5	SF	2/8/2023 21:44	2/16/2023 16:34	3419	MBFTP gear problems as well as gas valve issue	186.83	117611.58
8	MO	3/13/2023 0:01	3/17/2023 14:56	3998	Sump line tie-in.	110.92	69822.04
11	U1	4/5/2023 9:15	4/6/2023 11:41	8656	Lightning strike to stack, Emissions flow meter inoperable.	26.43	16639.78
13	U1	4/20/2023 16:31	5/2/2023 11:23	4140	Oil leak number 3 pedestal	282.87	178064.58
15	MO	5/8/2023 16:00	5/9/2023 16:16	3246	Chemical cleaning to remove zebra mussels.	24.27	15275.87
17	SF	4/19/2023 7:50	4/20/2023 10:22	3834	Aux boiler leak	26.53	16702.73
19	U1	5/18/2023 15:16	5/28/2023 14:06	4552	Identified hole in vapor extractor line blowing into plant.	238.83	150345.58
22	MO	6/12/2023 0:01	6/16/2023 23:59	1080	Boiler leak repair in economizer.	119.97	70996.27
24	U1	6/16/2023 23:59	6/17/2023 8:34	9020	U1 due to tagging restoration delay due to lightning strike investigation at plant.	8.58	5079.62
25	SF	6/29/2023 13:21	6/29/2023 17:51	359	Main Gas Header Trip Valve not operating correctly	4.5	2663.1
28	SF	7/3/2023 10:40	7/3/2023 17:43	3412	MBFP Latching issue	7.05	4172.19
30	U1	7/26/2023 9:26	7/26/2023 12:28	1480	Unit tripped due to loss of 4B ID Fan for high vibration.	3.03	1795.13
32	U1	8/9/2023 11:09	8/9/2023 14:58	4293	Hydraulic fluid leak on MSV3 developed during latch testing.	3.82	2258.7
34	U1	8/13/2023 22:35	8/14/2023 8:38	9290	Gas pressure issues on DCP supply caused boiler trip.	10.05	5947.59
40	U1	10/27/2023 12:10	10/27/2023 16:50	3869	Karn 1&2 station power loss. No Fire protection water supply from HSWPs.	4.67	2776.67
43	PO	11/27/2023 0:18	12/11/2023 20:34	4293	Periodic outage for EHC leaks-warranty work	356.27	217137.89

LUDINGTON - LUDINGTON 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
33	PO	1/23/2023 7:02	1/23/2023 15:02	4540	U1 PO for Quarterly Brush Insp., Pony Motor Rotor Insp., & Upper Air Shroud Repairs	8	2769.6
34	PE	1/23/2023 15:02	1/27/2023 19:34	4899	U1 PE due to repairs of cracks found in Upper Air Shroud.	100.53	34804.64
80	U1	2/12/2023 0:31	2/12/2023 1:45	4609	LUD1 FO due to exciter issues when leading LUD4 in Pump.	1.23	426.98
84	U1	2/28/2023 23:02	2/28/2023 23:40	3690	LUD1 FO for 315MOD failure to open	0.63	219.26
126	PO	4/3/2023 7:00	4/21/2023 16:33	7201	LUD1 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	441.55	152864.61
163	PO	5/15/2023 4:00	5/19/2023 18:37	7100	LUD1 - PO (All-Plant Outage) for Reservoir Liner inspections.	110.62	38295.49
170	U1	5/24/2023 8:07	5/24/2023 12:46	7050	LUD1 - U1 Immediate Outage for Governor instability (hunting).	4.65	1609.83
219	U1	7/7/2023 0:04	7/7/2023 10:07	7052	LUD1 unavailable for wicket gate shear pin failure indication	10.05	3646.14
267	PO	8/14/2023 7:05	8/16/2023 14:21	7230	LUD1 PO for pony motor rotor spider inspection and quarterly BI	55.27	20050.75
298	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD1 unavailable during LUD5 black start testing	4	1462.8
299	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD1 unavailable during LUD5 black start testing - contd	0.17	60.95
318	U1	9/26/2023 10:17	10/17/2023 16:17	3999	LUD1 unavailable for sump/oil water separator and unit inspections	510	186507
327	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD1 - All units unavailable for barrier net extraction	5.53	2023.54
341	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD1 - All units unavailable for barrier net extraction	3.45	1261.67
344	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD1 - All units unavailable for barrier net extraction	4.75	1737.08
361	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD1 - MO all units unavailable for intake battery bank restoration	5.75	2102.78
433	MO	12/16/2023 5:55	12/19/2023 11:48	4570	LUD1 - MO for generator upper air shroud crack repairs	77.88	28575.4

LUDINGTON - LUDINGTON 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
32	PO	1/24/2023 7:00	1/24/2023 14:09	4540	U2 PO for Quarterly Brush Inspection.	7.15	2474.62
80	U1	2/28/2023 23:00	2/28/2023 23:30	3690	LUD2 FO for unavailable as a pump due to 315MOD failing to open	0.5	173.05
89	U1	3/5/2023 0:29	3/6/2023 15:04	4740	LUD2 - Immediate Outage for NERC Generator Protection Relay trip (Diff. Current)	38.58	13353.69
125	PO	4/3/2023 7:00	4/21/2023 14:46	7201	LUD2 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	439.77	152203.25
159	PO	5/15/2023 4:00	5/19/2023 18:37	7100	LUD2 - PO (All-Plant Outage) for Reservoir Liner inspections.	110.62	38284.43
215	MO	7/11/2023 8:10	7/11/2023 12:30	7052	LUD2 MO for main depression vent valve solenoid replacement, solenoid manifold failing	4.33	1573.87
239	MO	8/1/2023 7:01	8/1/2023 11:41	3899	LUD2 MO for main depression vent valve actuator replacement	4.67	1694.93
259	PO	8/15/2023 7:00	8/15/2023 13:46	7008	LUD2 PO for quarterly BI and cooling water strainer inspections	6.77	2457.65
292	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD2 unavailable during LUD5 black start testing	4	1464.4
293	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD2 unavailable during LUD5 black start testing - contd	0.17	61.02
308	U1	9/26/2023 10:17	10/17/2023 10:15	3999	LUD2 unavailable for sump/oil water separator and unit inspections	503.97	184502.2
317	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD2 - All units unavailable for barrier net extraction	5.53	2025.75
331	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD2 - All units unavailable for barrier net extraction	3.45	1263.05
334	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD2 - All units unavailable for barrier net extraction	4.75	1738.98
336	PO	10/17/2023 10:15	10/17/2023 16:17	3999	LUD2 - All units unavailable for barrier net extraction	6.03	2208.8
354	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD2 - MO all units unavailable for intake battery bank restoration	5.75	2105.08

LUDINGTON - LUDINGTON 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
7	SF	1/7/2023 16:52	1/7/2023 17:59	7170	U3 unavailable as a Pump & Generator due to Draft Tube Vent Valve failure to close	1.12	388.6
36	PO	1/25/2023 7:01	1/25/2023 15:00	4540	U3 PO for Quarterly Brush Inspection.	7.98	2778.2
37	PE	1/25/2023 15:00	1/25/2023 15:38	4540	U3 PE for additional time needed for Cooling Water Strainer cleaning.	0.63	220.4
83	U1	2/12/2023 2:02	2/12/2023 2:20	4609	LUD3 FO for Exciter alarm while attempting to lead LUD3 with LUD1.	0.3	104.4
86	U1	2/28/2023 23:00	3/1/2023 9:15	3690	LUD3 - FO for 315MOD failed to open following pump start attempt	10.25	3567
105	MO	3/14/2023 7:00	3/15/2023 17:00	7201	LUD3 Maintenance Outage to inspect and repair 315MOD.	34	11832
128	PO	4/4/2023 8:32	4/4/2023 17:05	9510	All-Unit Planned Outage for installation of barrier net.	8.55	2975.4
133	PO	4/7/2023 8:07	4/7/2023 18:14	9510	All-Unit Planned Outage for installation of barrier net.	10.12	3520.6
136	PO	4/8/2023 10:30	4/8/2023 16:39	9510	All-Unit Planned Outage for installation of barrier net.	6.15	2140.2
145	PO	4/14/2023 8:21	4/14/2023 14:15	9510	All-Unit Planned Outage for installation of barrier net.	5.9	2053.2
161	PO	4/24/2023 6:45	5/12/2023 23:59	7201	LUD3 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	449.23	156333.2
163	U1	5/22/2023 16:00	5/30/2023 12:32	4899	LUD3 - U1 Immediate Outage for cleaning of brake dust due to operator error.	188.53	65609.6
167	PE	5/12/2023 23:59	5/22/2023 16:00	7201	LUD3 - PE Outage Extension for additional work scope added for Wicket Gate repairs	232.02	80741.8
232	MO	8/2/2023 7:10	8/2/2023 11:55	3811	LUD3 MO for seal water filter housing attempted leak repair	4.75	1727.1
250	PO	8/16/2023 5:00	8/16/2023 14:21	7008	LUD3 PO for quarterly BI and cooling water strainer inspections, remove 313 links	9.35	3399.66
259	U1	8/22/2023 12:30	8/22/2023 15:13	3999	LUD3 unavailable due to 315MOD inspection - unintended impact preventing unit start	2.72	987.78
287	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD3 unavailable during LUD5 black start testing	4	1466
288	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD3 unavailable during LUD5 black start testing - contd	0.17	61.08
302	U1	9/26/2023 10:17	10/18/2023 9:16	3999	LUD3 unavailable for sump/oil water separator and unit inspections	526.98	193139.39
309	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD3 - All units unavailable for barrier net extraction	5.53	2027.97
323	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD3 - All units unavailable for barrier net extraction	3.45	1264.43
326	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD3 - All units unavailable for barrier net extraction	4.75	1740.88
345	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD3 - MO all units unavailable for intake battery bank restoration	5.75	2107.38

LUDINGTON - LUDINGTON 4							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
20	PO	1/26/2023 7:02	1/26/2023 12:49	4540	U4 PO for Quarterly Brush Inspection.	5.78	1998.72
42	U1	2/13/2023 8:09	2/17/2023 15:23	4740	LUD4 FO for NERC Relay Flag -Generator Protection Relay - Neg. Seq. O.C.	103.23	35677.44
49	U1	2/12/2023 0:15	2/12/2023 1:42	4609	LUD4 FO for Exciter alarm.	1.45	501.12
71	MO	3/27/2023 7:19	3/27/2023 12:45	7050	LUD4 Maintenance Outage to install instrumentation on Governor Unloader.	5.43	1877.76
83	PO	4/4/2023 8:32	4/4/2023 17:05	9510	All-Unit Planned Outage for installation of barrier net.	8.55	2954.88
88	PO	4/7/2023 8:07	4/7/2023 18:14	9510	All-Unit Planned Outage for installation of barrier net.	10.12	3496.32
91	PO	4/8/2023 10:30	4/8/2023 16:39	9510	All-Unit Planned Outage for installation of barrier net.	6.15	2125.44
98	PO	4/14/2023 8:21	4/14/2023 14:15	9510	All-Unit Planned Outage for installation of barrier net.	5.9	2039.04
113	PO	4/24/2023 6:51	5/12/2023 23:59	7201	LUD4 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	449.13	155220.49
115	PE	5/12/2023 23:59	5/15/2023 4:00	7201	LUD4 - PE Outage Extension for additional Wicket Gate repairs found during inspections	52.02	17976.96
116	PO	5/15/2023 4:00	5/19/2023 16:26	7100	LUD4 - PO (All-Plant Outage) for Reservoir Liner inspections.	108.43	37474.56
117	PO	5/19/2023 16:39	5/19/2023 18:37	4609	LUD4 - PE Outage Extension to test Exciter circuit upgrades made during outage.	1.97	679.68
157	U1	6/26/2023 15:15	6/26/2023 15:48	3999	LUD4 unavailable - misc valves permissive not met, act issue on depression vent vlv	0.55	203.01
161	U1	6/27/2023 10:00	6/27/2023 11:43	3999	LUD4 unavailable for repair and PMT of depression vent valve	1.72	633.62
169	MO	7/5/2023 8:12	7/5/2023 13:32	7009	LUD4 MO for HPOS pump suction filter gasket repair/replacement - leaking	5.33	1968.53
197	MO	8/2/2023 7:11	8/3/2023 16:00	3899	LUD4 MO for governor unloader inspection to support pump failures problem investigatio	32.82	12112.63
213	PO	8/17/2023 7:00	8/17/2023 13:41	7008	LUD4 PO for quarterly BI and cooling water strainer inspections	6.68	2466.82
244	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD4 unavailable during LUD5 black start testing	4	1488
245	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD4 unavailable during LUD5 black start testing - contd	0.17	62
261	U1	9/26/2023 10:17	10/14/2023 10:40	3999	LUD4 unavailable for sump/oil water separator and unit inspections	432.38	160846.6
265	MO	10/16/2023 8:03	10/16/2023 16:16	3999	All plant outage to support intake battery project inverter tie over to temp bank	8.22	3056.6
269	PO	10/17/2023 8:06	10/17/2023 16:10	3999	LUD4 - All units unavailable for barrier net extraction	8.07	3000.8
278	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD4 - All units unavailable for barrier net extraction	5.53	2058.4
286	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD4 - All units unavailable for barrier net extraction	3.45	1283.4
288	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD4 - All units unavailable for barrier net extraction	4.75	1767
300	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD4 - MO all units unavailable for intake battery bank restoration	5.75	2139

LUDINGTON - LUDINGTON 5							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
39	PO	1/30/2023 9:12	2/1/2023 12:06	7141	LUD5 PO for Quarterly Brush Inspection and Wicket Gate Manual Greasing	50.9	17621.58
125	MO	3/27/2023 7:19	4/3/2023 11:17	7140	LUD5 Maintenance Outage to inspect Wicket Gates for excessive leak-by.	171.97	59534.86
127	PO	4/4/2023 8:32	4/4/2023 17:05	9510	All-Unit Planned Outage for installation of barrier net.	8.55	2960.01
130	PO	4/7/2023 8:07	4/7/2023 18:14	9510	All-Unit Planned Outage for installation of barrier net.	10.12	3502.39
135	PO	4/8/2023 10:30	4/8/2023 16:39	9510	All-Unit Planned Outage for installation of barrier net.	6.15	2129.13
146	PO	4/14/2023 8:21	4/14/2023 14:15	9510	All-Unit Planned Outage for installation of barrier net.	5.9	2042.58
152	U1	4/17/2023 3:20	4/17/2023 15:22	7050	LUD5 Immediate Outage for Governor Control Valve failure.	12.03	4165.94
190	PO	5/15/2023 4:37	6/27/2023 2:00	7201	LUD5 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	1029.38	366826.7
191	PE	6/27/2023 2:00	6/30/2023 15:57	7201	LUD5 Planned Outage Ext - intake gate Emer Lwr Ckt and Gov calibration	85.95	31191.25
253	PO	8/28/2023 6:35	8/30/2023 9:39	7140	LUD5 PO for manual wicket gate greasing	51.07	18532.09
269	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD5 unavailable for black start testing	4	1463.2
270	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD5 unavailable for black start testing - contd	0.17	60.97
280	U1	9/20/2023 7:09	9/22/2023 13:04	7050	LUD5 unavailable for high governor oil temperature - abnormal governor response	53.92	19722.72
285	U1	9/26/2023 10:17	10/14/2023 10:40	3999	LUD5 unavailable for sump/oil water separator and unit inspections	432.38	158165.82
286	MO	10/14/2023 10:40	10/19/2023 9:23	7300	LUD5 unavailable for spring PO work scope carryover outage	118.72	43426.56
288	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD5 - All units unavailable for barrier net extraction	5.53	2024.09
299	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD5 - All units unavailable for barrier net extraction	3.45	1262.01
302	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD5 - All units unavailable for barrier net extraction	4.75	1737.55
317	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD5 - MO all units unavailable for intake battery bank restoration	5.75	2103.35
366	U1	12/11/2023 10:03	12/11/2023 11:15	7008	LUD5 - FO Unavailable as Generator/Pump-notified ES&T. Oil cooler strainer cleaning	1.2	438.96

LUDINGTON - LUDINGTON 6							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
8	MO	1/7/2023 5:57	1/7/2023 18:05	4535	U6 MO for Generator Inspection to look for missing door bolt and washer.	12.13	4200.56
38	PO	1/27/2023 7:03	1/27/2023 13:23	4540	U6 - PO for Quarterly Brush Inspection	6.33	2192.6
57	U1	2/10/2023 0:37	2/10/2023 11:57	7142	LUD6 FO Wicket Gate Shear Pin Limit Switch replacement/conduit repair.	11.33	3923.6
139	PO	4/4/2023 8:32	4/4/2023 17:05	9510	All-Unit Planned Outage for installation of barrier net.	8.55	2960.01
145	PO	4/7/2023 8:07	4/7/2023 18:14	9510	All-Unit Planned Outage for installation of barrier net.	10.12	3502.39
148	PO	4/8/2023 10:30	4/8/2023 16:39	9510	All-Unit Planned Outage for installation of barrier net.	6.15	2129.13
159	PO	4/14/2023 8:21	4/14/2023 14:15	9510	All-Unit Planned Outage for installation of barrier net.	5.9	2042.58
207	PO	5/15/2023 4:37	6/23/2023 17:36	7201	LUD6 Planned Outage for warranty inspections and repairs and T.B. oil cooler cleaning.	948.98	337922.34
208	PO	6/23/2023 18:12	6/23/2023 18:44	7201	LUD6 Planned Outage Ext. for inspections and repairs - PMT	0.53	193.81
220	U1	7/4/2023 22:52	7/5/2023 10:46	7052	LUD6 unavailable as a pump/gen for #11 wicket gate shear pin limit switch indication	11.9	4324.46
269	PO	8/18/2023 7:03	8/18/2023 13:07	7008	LUD2 PO for quarterly BI and cooling water strainer inspections	6.07	2204.63
298	PO	9/13/2023 8:00	9/13/2023 12:00	9998	LUD5 unavailable during LUD5 black start testing	4	1465.2
299	PE	9/13/2023 12:00	9/13/2023 12:10	9998	LUD6 unavailable during LUD5 black start testing - contd	0.17	61.05
303	MO	9/14/2023 6:36	10/5/2023 11:48	7300	LUD6 MO for completion of work scope remaindered from spring outage	509.2	186519.95
304	U1	10/5/2023 11:48	10/13/2023 13:57	3999	LUD6 unavailable for sump/oil water separator and unit inspections	194.15	71117.14
306	U1	10/14/2023 10:59	10/14/2023 12:05	7052	LUD6 unavailable for lack of HPOS start at commanded unit start, control relay adjust	1.1	402.93
310	MO	10/16/2023 8:03	10/16/2023 16:16	3999	All plant outage to support intake battery project inverter tie over to temp bank	8.22	3009.77
314	PO	10/17/2023 8:06	10/17/2023 16:10	3999	LUD6 - All units unavailable for barrier net extraction	8.07	2954.82
323	PO	10/21/2023 9:00	10/21/2023 14:32	3999	LUD6 - All units unavailable for barrier net extraction	5.53	2026.86
336	PO	10/29/2023 7:59	10/29/2023 11:26	3999	LUD6 - All units unavailable for barrier net extraction	3.45	1263.74
339	PO	10/23/2023 9:02	10/23/2023 13:47	3999	LUD6 - All units unavailable for barrier net extraction	4.75	1739.93
353	MO	11/7/2023 7:01	11/7/2023 12:46	3999	LUD6 - MO all units unavailable for intake battery bank restoration	5.75	2106.23

ZEELAND CC - ZEELAND 3							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	1/1/2023 0:00	1/23/2023 8:55	4810	MO-Removal of 2C GSU for Overhaul, Replacing with Leased Transformer from 1A	536.92	95356.41
2	U1	1/24/2023 20:18	1/30/2023 10:22	3620	Small cable fire on Leased GSU that was just installed on ZEE5. ETR 2/8/23	134.07	23810.24
3	U1	2/6/2023 12:46	2/6/2023 22:11	3661	Investigating 4160 PT problem on Phase 2. Unit was tripped by opening PT cabinet door.	9.42	1672.4
6	PO	5/6/2023 1:30	5/8/2023 21:16	5035	PH 2 Spring Water Wash Outage	67.77	12035.36
17	U1	6/29/2023 13:26	6/30/2023 9:23	4740	Speed control Sensor failure-Time Delayed SRV Command P Controller	19.95	3102.23
18	U1	7/29/2023 11:16	7/31/2023 17:38	3660	Aux transformer Breaker contact failed on Phase 2 tripped 2A, 2B, and 2C.	54.37	8454.02
22	U1	9/3/2023 20:22	9/8/2023 19:24	540	10 ft of pipe broke off the 2B HRH steam line-ETR 9/8/23 @2359	119.03	18771.56
25	U1	9/19/2023 7:21	9/20/2023 10:49	730	Failed Blowdown Sump Pump Replacement-ETR 9/20/23 @ 2359	27.47	4331.49
27	U1	9/24/2023 16:53	9/25/2023 11:33	8823	Breaker Failed main heater control HRSG SCR ammonia injection system.	18.67	2943.73
30	PO	11/4/2023 1:09	12/14/2023 14:16	5270	Periodic Outage ETR 12/22/23 @2359	974.12	159327.86

ZEELAND CC - ZEELAND 4							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	1/1/2023 0:00	1/23/2023 8:09	4810	MO-Removal of 2C GSU for Overhaul, Replacing with Leased Transformer from 1A	536.15	95541.93
2	U1	1/24/2023 20:20	1/30/2023 10:45	3620	Small cable fire on Leased GSU that was just installed on ZEE5. ETR 2/8/23	134.42	23953.05
3	U1	2/6/2023 12:46	2/6/2023 22:35	3661	Investigating 4160 PT problem on Phase 2. Unit was tripped by opening PT cabinet door	9.82	1749.33
6	PO	5/6/2023 1:30	5/8/2023 21:39	5035	PH 2 Spring Water Wash Outage	68.15	12144.33
17	U1	7/29/2023 11:16	7/31/2023 17:38	3660	Aux transformer Breaker contact failed on Phase 2 tripped 2A, 2B, and 2C.	54.37	8367.03
21	U1	9/3/2023 20:22	9/8/2023 19:50	540	10 ft of pipe broke off the 2B HRH steam line-ETR 9/8/23 @2359	119.47	18648.75
24	PO	10/7/2023 1:06	10/8/2023 19:58	5261	ZEE 4 Water Wash Compressor. 1X1 Configuration Available	42.87	6691.49
26	U1	10/22/2023 7:56	10/22/2023 11:41	801	TRIP HP DRUM LOW LEVEL DUE TO HP DRUM LEVEL CONTROL VALVE MALFUNCTION.	3.75	585.38
28	PO	11/4/2023 1:09	12/13/2023 9:59	5270	Periodic Outage ETR 12/22/23 @2359	945.83	152829.49

ZEELAND CC - ZEELAND 5							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	MO	1/1/2023 0:00	1/23/2023 11:44	4810	MO-Removal of 2C GSU for Overhaul, Replacing with Leased Transformer from 1A	539.73	120036.69
2	U1	1/24/2023 20:10	1/30/2023 12:08	3620	Small cable fire on Leased GSU that was just installed on ZEE5. ETR 2/8/23	135.97	30238.98
4	U1	2/6/2023 12:46	2/6/2023 22:56	3661	Investigating 4160 PT problem on Phase 2. Unit was tripped by opening PT cabinet door	10.17	2261.07
7	U1	2/6/2023 23:01	2/7/2023 0:39	4309	ZEE 5 -TRIPPED HAD A BAD RESISTER CAUSING ETD #2 LOCK OUT	1.63	363.25
10	PO	5/6/2023 1:28	5/8/2023 22:40	5035	PH 2 Spring Water Wash Outage	69.2	15390.08
23	U1	7/29/2023 11:16	7/31/2023 17:38	3660	Aux transformer Breaker Contact failed on Phase 2 tripped 2A, 2B, and 2C.	54.37	12096.58
29	U1	9/3/2023 20:20	9/8/2023 21:14	540	10 ft of pipe broke off the 2B HRH steam line-ETR 9/8/23 @2359	120.9	27178.32
39	PO	11/4/2023 1:04	12/13/2023 13:43	5270	Periodic Outage ETR 12/22/23 @2359	949.65	215623.52
40	U1	12/14/2023 13:38	12/14/2023 14:16	801	ZEE3 HRSG HP Drum Level Low tripped ZEE5	0.63	146.87

ZEELAND ST - ZEELAND 1							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
1	PO	1/1/2023 0:00	4/7/2023 8:50	4810	Remove Leased GSU From GT1A and move to PH2 Failed GSU ETR- 4/30/2023	2311.83	416130
4	SF	4/10/2023 0:41	4/10/2023 13:13	5048	FO-Mouse Nest in Control Panel, Minor wire Damage, ETR 4/13/23 @ 1500	12.53	2256
9	U1	4/15/2023 9:55	4/18/2023 12:17	5240	ZEE1 Fire Protection Sensor issue- Investigating bad sensor	74.37	13386
12	PO	4/22/2023 0:01	4/22/2023 18:10	3670	GSU Oil Leak Repair-Bad Valve from Recent Rebuild	18.15	3267
32	SF	6/14/2023 7:15	6/14/2023 7:49	3829	ZEE 1 start aborted due to low closed cooling water pressure	0.57	90.27
103	PO	9/22/2023 0:01	9/22/2023 15:05	5240	ZEE1 CO2 Fire Suppressing System Check (Puff test)	15.07	2436.28
109	PO	10/28/2023 0:01	10/28/2023 17:00	5261	ZEE 1 Compressor Water Wash ETR 10/29/23 @ 2359	16.98	2746.21

ZEELAND ST - ZEELAND 2							
Event	Type	Start	End	Cause	Description	Eq Hrs	Eq MWH
11	SF	2/17/2023 5:59	2/17/2023 20:00	4810	ZEE 2 Breaker Failed to close during start-up	14.02	2523
23	MO	3/23/2023 7:12	3/23/2023 10:27	3661	Updating new line relay settings needed prior to the spring outage	3.25	585
27	SF	4/1/2023 17:42	4/1/2023 18:38	4605	EX2K tripped when transferring to generator	0.93	168
28	U1	4/1/2023 19:59	4/3/2023 7:43	9613	Could not get 1B into emissions compliance, Need a Tune ,Forced Outage	35.73	6432
32	MO	4/7/2023 7:00	4/7/2023 7:16	3620	restoring station power through Phase 1 aux transformer	0.27	48
38	PO	4/22/2023 0:01	4/27/2023 16:15	5042	Spring Outage- Water Wash/GE Borescope/Replace Fuel Nozzles	136.23	24522
41	U1	5/3/2023 5:47	5/7/2023 12:24	4740	ZEE2 Unit Trip-IGV Valve Control Arm Broken	102.62	18471
45	SF	4/10/2023 0:30	4/10/2023 0:41	5048	ZEE 2-Trip-Loss of Flame trip after breaker closed	0.18	33
56	U1	5/7/2023 12:24	5/7/2023 16:25	4740	ZEE2 Unit Trip-IGV Control Valve Cable was found pinched causing the IGV to Fluctuate	4.02	723
70	SF	5/7/2023 16:25	5/7/2023 16:38	4740	Unit tripped on start-up. Restarted with No issues	0.22	39
98	SF	45113.28472	45113.3125	5121	Lost Pressure on Hyd Pump. Repaired and Restarted.	0.67	105.87
105	SF	45137.48819	45137.51667	4609	Exciter LCI Alarm Trip during Start-up.	0.68	108.51
145	PO	45209.00069	45210.64167	5261	CO2 Puff Testing/ Compressor Water Wash. ETR 10/11/23 @ 2359	39.38	6344.66
154	U1	45235.31389	45235.35278	5017	ZEE 2 Trip compressor bleed valves opened, low discharge pres. opened Gen Breaker	0.93	150.36
160	PO	45248.00069	45249.77917	5272	ZEE2 Boroscope Inspection-ETR 12/19/23 @ 2359	42.68	6876.29

EVENT IDENTIFICATION – OUTAGES[1]

PO – Planned Outage

An outage that is scheduled well in advance and is of a predetermined duration, can last for several weeks, and occurs only once or twice a year. Typically, these events are specifically listed in the plant budget. Turbine and boiler overhauls or inspections, testing, and nuclear refueling are typical planned outages. For a planned outage, all of the specific individual maintenance and operational tasks to be performed are determined in advance and are referred to as the "original scope of work." The general task of repairing turbines, boilers, pumps, etc. is not considered a work scope because it does not define the individual tasks to be performed. For example, if a general task such as repair boiler is considered the work scope, it is impossible to conclude that any boiler work falls outside of the original scope of work. Discovery work and re-work which render the unit out of service beyond the estimated PO end date are not considered part of the original scope of work. A planned extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the planned outage takes longer than scheduled, the extra time should be coded as an extension (PE). However, if damage found during the inspection results in an extension of the outage, the extra time required to make repairs should be coded as a forced outage.

MO – Maintenance Outage

An outage that can be deferred beyond the end of the next weekend (defined as Sunday at 2400 hours or as Sunday turns into Monday), but requires that the unit be removed from service, another outage state, or Reserve Shutdown state before the next Planned Outage (PO). Characteristically, a MO can occur any time during the year, has a flexible start date, may or may not have a predetermined duration, and is usually much shorter than a PO. Discovery work and re-work which render the unit out of service beyond the estimated MO end date are not considered part of the original scope of work. A maintenance extension may be used only in instances where the original scope of work requires more time to complete than the estimated time. For example, if an inspection that is in the original scope of work for the outage takes longer than scheduled, the extra time should be coded as an extension (ME). If the damage found during the inspection is of a nature that the unit could be put back on-line and be operational past the end of the upcoming weekend, the work could be considered MO. If the inspection reveals damage that prevents the unit from operating past the upcoming weekend, the extended work time should be Forced Outage (U1).

Note: If an outage occurs before Friday at 2400 hours (or before Friday turns into Saturday), the above definition applies. But if the outage occurs after Friday at 2400 hours and before Sunday at 2400 hours (the 48 hours of Saturday and Sunday), the MO will only apply if the outage can be delayed past the next, not current, weekend. If the outage cannot be deferred, the outage shall be a forced event.

PE – Planned Outage Extension

GADS defines a planned outage extension as an extension of a Planned Outage (PO) beyond its estimated completion date. This means that at the start of the PO, the outage had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the PO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

ME – Maintenance Outage Extension

GADS defines a maintenance outage extension as an extension of a Maintenance Outage (MO) beyond its estimated completion date. This means that at the start of the MO, the outage had an estimated duration (time period) for the work and a date set for the unit to return to service. All work during the MO is scheduled (part of the original scope of work) and all repair times are determined before the outage started.

SF – Startup Failure

This is an outage that results when a unit is unable to synchronize within a specified startup time following an outage or reserve shutdown. The startup period for each unit is determined by the operating company. It is unique for each unit, and depends on the condition of the unit at the time of startup (cold, warm, and hot). A typical unit startup occurs in three phases: warm up, synchronization, and ramp up. NERC defines a startup period to begin with the command to start and end when the unit is synchronized. An SF begins when a problem preventing the unit from synchronizing occurs. The SF ends when the unit is synchronized, another SF occurs, or the unit enters another permissible state. Problems encountered during ramp up that force the unit offline are considered outages not SF events.

U1 - Unplanned (Forced) Outage – Immediate

This is an outage that requires immediate removal of a unit from service, another outage state, or a reserve shutdown state. This type of outage usually results from automatic control system trips or operator-initiated manual trips of the unit in response to unit alarms but can also occur while the unit offline.

U2 - Unplanned (Forced) Outage – Delayed

This is an outage that does not require immediate removal of a unit from the in-service state, instead requiring removal within six hours. This type of outage can only occur while the unit is in service.

U3 – Unplanned (Forced) Outage – Postponed

This is an outage that can be postponed beyond six hours but requires that a unit be removed from the in-service state before the end of the next weekend (Sunday at 2400 or before Sunday turns into Monday). This type of outage can only occur while the unit is in service.

[1]From January 2019 GADS data reporting instructions.

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-1
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	3
Start Date:	1/3/2023 0:16
End Date:	1/14/2023 13:32
Outage Type:	MO
Duration (Hours):	277.27
MWh Loss:	99,788.27
NERC Cause Code:	1000
NERC Cause Code Description:	Waterwall (Furnace wall)
Root Cause Description:	South side waterwall tube leak
Event Description:	Maintenance Outage, boiler tube leak.
Additional Description:	Fireside tube corrosion on furnace south sidewall
Mode of Failure:	External tube wastage
Final Corrective Action:	Replaced four sections of damaged boiler tubes
Mechanism Causing:	Fireside tube corrosion
Final Root Cause	Fireside tube corrosion
Scope to Correct Root Cause:	Replaced four sections of damaged boiler tubes and pad welded six areas on the furnace south sidewall near the leak, which were found to be thinned as a result of fireside corrosion
Additional Scope:	Reheat tube leak identified and repaired. Planned work including furnace deslagging, repair of leaking pressure reducing valve and repair of two high pressure heater leaks.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-2
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	16
Start Date:	1/14/2023 14:06
End Date:	1/14/2023 21:16
Outage Type:	U1
Duration (Hours):	7.17
MWh Loss:	2,579.28
NERC Cause Code:	1400
NERC Cause Code Description:	Forced draft fans
Root Cause Description:	Unit trip from incorrect air flow
Event Description:	FD fans tripped while automating.
Additional Description:	Unit trip from incorrect air flow
Mode of Failure:	Forced draft fans not automated early enough in the process of starting the unit
Final Corrective Action:	Perform restart and automate the fans at the correct point of startup of the unit
Mechanism Causing:	Forced draft fans not automated early enough in the process of starting the unit
Final Root Cause	Unit trip from incorrect air flow balance
Scope to Correct Root Cause:	Review incident and unit startup procedure in operations training
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-3
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	17
Start Date:	1/15/2023 2:54
End Date:	1/15/2023 5:23
Outage Type:	MO
Duration (Hours):	2.48
MWh Loss:	893.75
NERC Cause Code:	4460
NERC Cause Code Description:	Turbine overspeed trip test
Root Cause Description:	Required functional testing of the mechanical overspeed trip device
Event Description:	Turbine overspeed testing.
Additional Description:	Verify the functionality of the overspeed trip device
Mode of Failure:	Planned post outage maintenance activity
Final Corrective Action:	Perform required testing
Mechanism Causing:	Planned post outage maintenance activity
Final Root Cause	Planned post outage maintenance activity
Scope to Correct Root Cause:	Perform required testing
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-4
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	35
Start Date:	3/6/2023 0:01
End Date:	3/11/2023 0:26
Outage Type:	MO
Duration (Hours):	120.42
MWh Loss:	43,337.96
NERC Cause Code:	1060
NERC Cause Code Description:	First reheater
Root Cause Description:	Reheater pendant tube leak
Event Description:	Economic Reserve Shutdown. MO 3/6 - 3/10. 1x RH tube leak. Ash pit trough repair
Additional Description:	Reheater pendant tube leak 6th floor elevation
Mode of Failure:	Stress corrosion cracking
Final Corrective Action:	Pad weld repair of tube
Mechanism Causing:	Stress corrosion cracking
Final Root Cause	Stress corrosion cracking
Scope to Correct Root Cause:	Pad weld repair of tube
Additional Scope:	Planned maintenance outage activities including boiler deslagging, condenser cleaning and resecuring of loose boiler ash pit trough liner
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-5
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	38
Start Date:	3/14/2023 18:21
End Date:	3/15/2023 9:35
Outage Type:	U1
Duration (Hours):	15.23
MWh Loss:	5,482.48
NERC Cause Code:	3831
NERC Cause Code Description:	Auxiliary steam piping
Root Cause Description:	Turbine tripped due to insufficient steam supply to the steam seals
Event Description:	Lost aux steam/steam seals.
Additional Description:	Auxiliary boiler tripped while isolating auxiliary steam from other running unit
Mode of Failure:	Insufficient steam supply to the turbine's steam seals
Final Corrective Action:	Restore auxiliary steam supply and perform hot restart on the unit
Mechanism Causing:	Auxiliary boiler tripped while isolating steam supply from other running unit
Final Root Cause	Loss of auxiliary steam supply
Scope to Correct Root Cause:	Review incident in operator training
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-6
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	73
Start Date:	5/16/2023 18:37
End Date:	6/3/2023 7:48
Outage Type:	U1
Duration (Hours):	421.02
MWh Loss:	131,441.48
NERC Cause Code:	640
NERC Cause Code Description:	Startup bypass system valves
Root Cause Description:	Superheat pressure reducing valve 201B packing steam leak
Event Description:	201B packing leak, worse.
Additional Description:	Superheat pressure reducing valve 201B packing failure causing a steam leak that forced the unit off to repair
Mode of Failure:	Steam leak on the 201B valve jeopardizing personnel safety
Final Corrective Action:	Remove unit from service and replace valve packing
Mechanism Causing:	Packing failure of the 201B valve
Final Root Cause	Valve packing at end of useful life
Scope to Correct Root Cause:	Remove unit from service and replace valve packing
Additional Scope:	Replaced 2A primary air fan outboard bearing due to excessive vibrations and nearing the point of failure
If outage Extended for Additional Work & Why:	Upon restart of the unit, the startup boiler feed pump gearbox low speed inboard bearings failed. Repair required re-babbiting of the bearings, reworking of the low speed shaft and fabrication of a new oil seal. The unit was returned to service after this repair.

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-107
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	107
Start Date:	8/4/2023 20:35
End Date:	8/10/2023 11:42
Outage Type:	U1
Duration (Hours):	135.12
MWh Loss:	48,033.98
NERC Cause Code:	4291
NERC Cause Code Description:	Hydraulic system coolers
Root Cause Description:	Tube leak in hydraulic coupling circuit oil cooler
Event Description:	Circuit oil cooler leak (water into the oil)
Additional Description:	Tube leak in hydraulic coupling circuit oil cooler causing water intrusion into the oil system which forced the unit to be removed from service.
Mode of Failure:	Tube failure allowing water intrusion into oil system. Mode of failure was not determined as the tube bundle was not pulled due to short plant life remaining and no spare tube bundle in stock.
Final Corrective Action:	Tube leak was repaired by plugging the tube
Mechanism Causing:	Failed tube caused water intrusion into the oil system
Final Root Cause	Failed tube caused water intrusion into the oil system
Scope to Correct Root Cause:	Tube leak was repaired by plugging the tube. Water was removed from the oil system by vacuum dehydrating the oil.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-109
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	109
Start Date:	8/10/2023 11:42
End Date:	8/10/2023 13:39
Outage Type:	SF
Duration (Hours):	1.95
MWh Loss:	693.23
NERC Cause Code:	3401
NERC Cause Code Description:	Startup feedwater pump
Root Cause Description:	Start-Up Boiler Feed Pump (SUBFP) damaged during post-maintenance testing
Event Description:	SUBFP failure.
Additional Description:	During post-maintenance testing, the start-up boiler feedpump experienced a thrust event causing damage to the internal flow element, thrust bearing, and drive coupling.
Mode of Failure:	Inability of the SUBFP to generate sufficient pressure and mass flow rate to allow for unit escalation
Final Corrective Action:	Disassemble and rebuild pump
Mechanism Causing:	Damaged internal flow element and associated hardware
Final Root Cause	Thrusting of the internal pump flow element during operation.
Scope to Correct Root Cause:	Disassemble and rebuild pump
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-108
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	108
Start Date:	8/10/2023 13:39
End Date:	9/29/2023 9:30
Outage Type:	U1
Duration (Hours):	1,195.85
MWh Loss:	425,124.67
NERC Cause Code:	3401
NERC Cause Code Description:	Startup feedwater pump
Root Cause Description:	Start-Up Boiler Feed Pump (SUBFP) damaged during post-maintenance testing
Event Description:	SUBFP failure.
Additional Description:	During post-maintenance testing, the start-up boiler feedpump experienced a thrust event causing damage to the internal flow element, thrust bearing, and drive coupling.
Mode of Failure:	Damaged internal flow element, drive coupling, and associated hardware
Final Corrective Action:	Disassemble and rebuild pump
Mechanism Causing:	Operational contact between the internal flow element and the pump housing occurring during the thrust event.
Final Root Cause	Indeterminant.
Scope to Correct Root Cause:	Disassemble and rebuild pump
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-110
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	110
Start Date:	9/29/2023 9:30
End Date:	9/29/2023 12:50
Outage Type:	SF
Duration (Hours):	3.3
MWh Loss:	1,185.0
NERC Cause Code:	3401
NERC Cause Code Description:	Startup feedwater pump
Root Cause Description:	Start-Up Boiler Feed Pump (SUBFP) experience unacceptable vibration levels during post-maintenance testing. Deemed unsafe to operate.
Event Description:	SUBFP failure.
Additional Description:	During post-maintenance testing, the start-up boiler feedpump experienced high radial vibrations during start up on both the inboard and outboard bearings
Mode of Failure:	High radial vibration deemed unacceptable for safe operation of the SUBFP
Final Corrective Action:	Shut down the SUBFP and investigate the possible causes of the vibrations
Mechanism Causing:	High radial vibration at operating speed (6,300 rpm) indicative of rotational imbalance with in the unit
Final Root Cause	Currently under investigation
Scope to Correct Root Cause:	Disassemble and inspect the pump and its associated components
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 2
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 2-2023-111
Plant/Unit:	Campbell Unit 2
MW Derate:	
Event Year:	2023
Event Number:	111
Start Date:	9/29/2023 12:50
End Date:	1/1/2024 0:00
Outage Type:	U1
Duration (Hours):	2,244.2
MWh Loss:	745,423.7
NERC Cause Code:	3401
NERC Cause Code Description:	Startup feedwater pump
Root Cause Description:	Start-Up Boiler Feed Pump (SUBFP) experience unacceptable vibration levels during post-maintenance testing. Deemed unsafe to operate.
Event Description:	SUBFP failure.
Additional Description:	During post-maintenance testing, the start-up boiler feedpump experienced high radial vibrations during start up on both the inboard and outboard bearings
Mode of Failure:	High radial vibration deemed unacceptable for safe operation of the SUBFP
Final Corrective Action:	Shut down the SUBFP and investigate the possible causes of the vibrations
Mechanism Causing:	High radial vibration at operating speed (6,300 rpm) indicative of rotational imbalance with in the unit operating at or near resonant frequencies.
Final Root Cause	Currently under investigation. Believed to be related to replacement of the drive coupling (identical coupling had a 33-week lead time). The replacement coupling is approximately 67 pounds heavier. Detailed analysis by industry experts (HydroAire) point to the source of the vibrations related to the change in rotational inertia caused by this change in coupling mass.
Scope to Correct Root Cause:	*Removed pump internal, rebuilt, and performed high speed balance with no success. *Inspected the structural frame and housing of the pump for damage that could cause a shift in the natural operating frequency of the pump with no findings. *Installed dynamic vibration absorbers (DVA) on both the inboard and outboard bearings to shift the structural natural frequency away from the pump operating frequency. Radial vibrations were improved but not to acceptable levels and vibration anomalies were transmitted to the pump motor placing that component at risk of failure. *Currently performing detailed modeling of the pump/motor/gearbox assembly in order to select and/or design new coupling options.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-67
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	67
Start Date:	3/10/2023 10:32
End Date:	3/10/2023 15:40
Outage Type:	U1
Duration (Hours):	5.13
MWh Loss:	4,319.19
NERC Cause Code:	800
NERC Cause Code Description:	Drums and drum internals (single drum only)
Root Cause Description:	Level transmitter failure
Event Description:	Unit trip due to drum level swing. Hot restart.
Additional Description:	Transmitter failure - caused false high level trip
Mode of Failure:	Transmitter in early stages of failure, signal went high briefly, long enough to trip the unit. Hot restart was initiated.
Final Corrective Action:	Change trip logic in near term, run unit at lower load to better control drum level, replace transmitter at next outage.
Mechanism Causing:	Drum level transmitter failure
Final Root Cause	Drum level transmitter failure
Scope to Correct Root Cause:	Replace drum level transmitter
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-1
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	98
Start Date:	3/31/2023 16:47
End Date:	5/10/2023 8:46
Outage Type:	PO
Duration (Hours):	951.98
MWh Loss:	800,998.78
NERC Cause Code:	1000
NERC Cause Code Description:	Waterwall (Furnace wall)
Root Cause Description:	Periodic Outage
Event Description:	Planned Outage. Boiler Tube leak repair. Catalyst replacement.
Additional Description:	Planned replacement of catalyst layer in the Selective Catalytic Reduction (SCR) vessel and repair of a suspected boiler waterwall leak.
Mode of Failure:	Planned periodic outage
Final Corrective Action:	Perform the planned work scope
Mechanism Causing:	Planned periodic outage
Final Root Cause	Planned periodic outage
Scope to Correct Root Cause:	Perform the planned work scope
Additional Scope:	Perform NERC required substation modifications necessary to support site decommissioning
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-112
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	112
Start Date:	5/11/2023 8:21
End Date:	5/11/2023 9:09
Outage Type:	MO
Duration (Hours):	0.80
MWh Loss:	673.12
NERC Cause Code:	4460
NERC Cause Code Description:	Turbine overspeed trip test
Root Cause Description:	Required functional testing of the mechanical overspeed trip device
Event Description:	Turbine Overspeed Test.
Additional Description:	Verify the functionality of the overspeed trip device
Mode of Failure:	Planned post outage maintenance activity
Final Corrective Action:	Perform required testing
Mechanism Causing:	Planned post outage maintenance activity
Final Root Cause	Planned post outage maintenance activity
Scope to Correct Root Cause:	Perform required testing
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-2
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	111
Start Date:	5/14/2023 18:59
End Date:	5/30/2023 8:44
Outage Type:	U1
Duration (Hours):	373.75
MWh Loss:	314,473.25
NERC Cause Code:	1035
NERC Cause Code Description:	Platen superheater
Root Cause Description:	Platen Superheater tube leak
Event Description:	Boiler leak. Unit in Forced Outage.
Additional Description:	Incorrect material installed in the platen SH tube element.
Mode of Failure:	Original Equipment Manufacturer fabrication error.
Final Corrective Action:	Replace failed tubing section
Mechanism Causing:	Insufficient tubing material properties were not sufficient to handle the long-term design conditions.
Final Root Cause	Insufficient material (non-specified tubing) installed in circuit during original fabrication (2004 era). Material properties were not sufficient to handle the long-term design conditions.
Scope to Correct Root Cause:	Replace failed tubing section
Additional Scope:	Inspect adjacent tubing for signs of swelling and inspection of the inlet header for possible obstructions.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-202
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	202
Start Date:	7/7/2023 17:03
End Date:	7/25/2023 10:37
Outage Type:	MO
Duration (Hours):	425.57
MWh Loss:	357,773.91
NERC Cause Code:	4040
NERC Cause Code Description:	Bearings
Root Cause Description:	Turbine bearing vibration routinely exceeding alarm limits
Event Description:	#2 Turbine bearing vibration issues.
Additional Description:	#2 turbine bearing vibration increasing and approaching trip point. Attempted mitigation operational strategies proving ineffective at keeping unit operating below critical threshold vibration levels. Bearing last inspected and aligned in 2016 (passed all OEM and Consumers quality checks).
Mode of Failure:	Unsustainable level of bearing vibration placing long-term turbine operation at an unacceptable level of risk
Final Corrective Action:	Remove, refurbish, and reinstall affected bearing.
Mechanism Causing:	Loss of shaft stability due to bearing wear.
Final Root Cause	Multiple unit hard trips caused change in bearing contact profile
Scope to Correct Root Cause:	Remove, refurbish, and reinstall affected bearing.
Additional Scope:	Verify alignment of the High-Pressure (HP) to Intermediate-Pressure (IP) turbine bearing coupling.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-231
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	231
Start Date:	8/28/2023 10:24
End Date:	9/4/2023 4:56
Outage Type:	U1
Duration (Hours):	162.53
MWh Loss:	136580.23
NERC Cause Code:	800
NERC Cause Code Description:	Drums and drum internals
Root Cause Description:	Fault on 33D1 motor control center (MCC)
Event Description:	Drum swing after south side mills tripped due to breaker issue.
Additional Description:	Unit trip initiated by a drum imbalance, caused by loss of four of the unit's eight coal pulverizers resulting from the fault on the 33D1 MCC.
Mode of Failure:	Protective relay trip caused by boiler drum upset
Final Corrective Action:	Repair 33D1 Motor Control Center (MCC) and return to service
Mechanism Causing:	Boiler firing imbalance caused by a loss half of the unit's coal pulverizers.
Final Root Cause	Failure of the 33D1 Motor Control Center (MCC) breaker
Scope to Correct Root Cause:	Repair 33D1 and return to service.
Additional Scope:	Inspection of the other MCCs of this same style for similar conditions.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Campbell Unit 3
PERIODIC OUTAGE

Sequence Number:	Campbell Unit 3-2023-324
Plant/Unit:	Campbell Unit 3
MW Derate:	
Event Year:	2023
Event Number:	324
Start Date:	11/20/2023 16:15
End Date:	12/12/2023 19:52
Outage Type:	U1
Duration (Hours):	531.62
MWh Loss:	448094.5
NERC Cause Code:	1040
NERC Cause Code Description:	First superheater
Root Cause Description:	Penthouse tube leak in finishing superheat terminal tube
Event Description:	Superheat tube leak. Unit offline.
Additional Description:	Tube failure in original tubing in finishing superheat. Additional leaks found in the reheater during offline pressure test.
Mode of Failure:	Long-term overheat (tube operating past designed life span)
Final Corrective Action:	Replace failed tubing with new and inspect adjacent tubing for similar damage mechanisms.
Mechanism Causing:	Long-term overheat (tube operating past designed life span)
Final Root Cause	Long-term overheat (tube operating past designed life span)
Scope to Correct Root Cause:	Replace failed tubing with new and inspect adjacent tubing for similar damage mechanisms.
Additional Scope:	Fly ash erosion damage on horizontal reheater. Weld repair performed on damaged area and then shielded to prevent further erosion
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 1
PERIODIC OUTAGE

Sequence Number:	Karn Unit 1-2023-1
Plant/Unit:	Karn Unit 1
MW Derate:	
Event Year:	2023
Event Number:	31
Start Date:	4/3/2023 23:42
End Date:	4/20/2023 23:59
Outage Type:	U1
Duration (Hours):	408.28
MWh Loss:	93905.16
NERC Cause Code:	330
NERC Cause Code Description:	Pulverizer coal leak (pulverizers only)
Root Cause Description:	Excessive coal dust accumulation on 'hot surfaces' exceeding NFPA 654 - Section 7.2.3 recommendations.
Event Description:	Coal leaks due to excessive pyrites.
Additional Description:	Unit removed from service to clean accumulated coal dust from 'hot surfaces' and perform repairs on worn coal conduits
Mode of Failure:	Leaking coal conduits causing excessive accumulation of combustible dust on potential ignition surfaces
Final Corrective Action:	Remove buildup of accumulated combustible material and perform offline repair of coal conduits to limit future dust discharge
Mechanism Causing:	Accelerated thinning of coal conduits due to the inclusion of high silica content material with the coal taken from the pile
Final Root Cause	Utilization of exterior coal storage prior to cessation of unit operation
Scope to Correct Root Cause:	Offline repair of leaking coal conduits and identification/repair additional thinning to safely run the unit until cessation of operations.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 1
PERIODIC OUTAGE

Sequence Number:	Karn Unit 1-2023-2
Plant/Unit:	Karn Unit 1
MW Derate:	
Event Year:	2023
Event Number:	33
Start Date:	4/20/2023 23:59
End Date:	5/2/2023 9:20
Outage Type:	U1
Duration (Hours):	273.35
MWh Loss:	62870.50
NERC Cause Code:	4262
NERC Cause Code Description:	Intercept valves
Root Cause Description:	The 1B Turbine South Upper Intercept valve unable to close to less than 20% open
Event Description:	South upper intercept valve stuck open, not closing even when tripped manually.
Additional Description:	During unit restoration activities, the 1B turbine south intercept valve would not cycle properly (unable to close).
Mode of Failure:	Turbine Intercept Control Valve stuck in position, not able to close.
Final Corrective Action:	Perform diagnostic testing and temporary repairs on the turbine intercept valve.
Mechanism Causing:	Binding of the control valve shaft.
Final Root Cause	Turbine intercept control valve shaft developed 'blue blush' which caused added interference on the shaft bushing (causing binding). 'Blue blush' is an oxidation layer that builds up on valve components during operation.
Scope to Correct Root Cause:	Disassembly, cleaning, and reassembly of the turbine intercept valve to allow for temporary operations until cessation of unit operation.
Additional Scope:	Functional testing of the reheat stop valve to provide overspeed protection of the turbine.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 1
PERIODIC OUTAGE

Sequence Number:	Karn Unit 1-2023-4
Plant/Unit:	Karn Unit 1
MW Derate:	
Event Year:	2023
Event Number:	36
Start Date:	5/2/23 9:20
End Date:	5/4/23 11:39
Outage Type:	SF
Duration (Hours):	50.32
MWh Loss:	11572.83
NERC Cause Code:	3210
NERC Cause Code Description:	Circulating water pumps
Root Cause Description:	Leak off line valve would not close
Event Description:	Boiler BCWP seal injection valve failure.
Additional Description:	Remove unit from service to repair
Mode of Failure:	Unable to close isolation valve on the boiler circulating water pump's leak off line
Final Corrective Action:	Valve permanently isolated in the closed position
Mechanism Causing:	Valve at end of life
Final Root Cause	Valve Failure
Scope to Correct Root Cause:	Remove Unit from service and permanently isolated valve
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 1
PERIODIC OUTAGE

Sequence Number:	Karn Unit 1-2023-5
Plant/Unit:	Karn Unit 1
MW Derate:	
Event Year:	2023
Event Number:	37
Start Date:	5/4/2023 15:17
End Date:	5/10/2023 4:23
Outage Type:	U1
Duration (Hours):	133.10
MWh Loss:	30613.00
NERC Cause Code:	1700
NERC Cause Code Description:	Feedwater controls (report local controls - feedwater pump, feedwater regulator valve, etc., - with component or system)
Root Cause Description:	Feedwater valve control failed
Event Description:	Faulty feedwater control valve (stuck open).
Additional Description:	Main Feedwater Regulating Valve Actuator Sticking
Mode of Failure:	Feedwater valve automatic unable to match demand requirements
Final Corrective Action:	Feedwater valve automatic control valve was replaced
Mechanism Causing:	Actuator sticking/end of life
Final Root Cause	Faulty actuator
Scope to Correct Root Cause:	Replaced Actuator with similar from offline unit.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 1
PERIODIC OUTAGE

Sequence Number:	Karn Unit 1-2023-6
Plant/Unit:	Karn Unit 1
MW Derate:	
Event Year:	2023
Event Number:	43
Start Date:	5/25/2023 21:01
End Date:	6/1/2023 0:00
Outage Type:	U1
Duration (Hours):	146.97
MWh Loss:	33802.33
NERC Cause Code:	9291
NERC Cause Code Description:	Other fuel quality problems (not OMC)
Root Cause Description:	Original Eastern Coal Mixed with Western Coal
Event Description:	K1 EOL. Poor fuel quality + SO2 emission limited.
Additional Description:	Coal pile clean up resulting in low quality coal and unknown debris
Mode of Failure:	Unable to operate unit within environmental requirements
Final Corrective Action:	Remove unit from service
Mechanism Causing:	Unable to segregate high sulfur eastern coal contained within the coal pile
Final Root Cause	Attempted consumption of residual coal pile prior to unit retirement
Scope to Correct Root Cause:	Retirement of unit
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 2
PERIODIC OUTAGE

Sequence Number:	Karn Unit 2-2023-1
Plant/Unit:	Karn Unit 2
MW Derate:	
Event Year:	2023
Event Number:	35
Start Date:	2/3/2023 18:20
End Date:	3/2/2023 23:59
Outage Type:	U1
Duration (Hours):	653.95
MWh Loss:	153155.09
NERC Cause Code:	1000
NERC Cause Code Description:	Waterwall (Furnace wall)
Root Cause Description:	Boiler Reheat steam pendant tube failure
Event Description:	Boiler Leak 7th Floor
Additional Description:	The boiler experienced a tube failure in the reheat steam inlet pendant section, South side 7th floor area
Mode of Failure:	Main Furnace reheat steam pendant loop tube failure at bottom section
Final Corrective Action:	Removal of unit from service to affect weld repairs to failed boiler tubes
Mechanism Causing:	Boiler Tube Inside Diameter (ID) pitting/corrosion
Final Root Cause	Boiler tube inside diameter corrosion at bottom section of two reheat steam pendant loops
Scope to Correct Root Cause:	Removal of unit from service and repair of two failed reheat pendant lower bend sections
Additional Scope:	Weld repair of 4 additional tube sections with collateral steam erosion damage due to the reheat tube failures
If outage Extended for Additional Work & Why:	NA

INFORMATION FOR UNIT - Karn Unit 2
PERIODIC OUTAGE

Sequence Number:	Karn Unit 2-2023-2
Plant/Unit:	Karn Unit 2
MW Derate:	
Event Year:	2023
Event Number:	45
Start Date:	5/1/2023 0:00
End Date:	5/12/2023 0:07
Outage Type:	MO
Duration (Hours):	264.12
MWh Loss:	61856.12
NERC Cause Code:	3999
NERC Cause Code Description:	Other miscellaneous balance of plant problems
Root Cause Description:	Inspections for heavy fly ash build up prior to unit retirement
Event Description:	Pre-retirement cessation activities.
Additional Description:	Visual inspections of backpass, pulse jet fabric filters, and the selective catalytic reduction vessels to quantify the ash accumulation needing to be abated upon cessation of operations
Mode of Failure:	Planned maintenance activities required prior to the start of decommissioning activities
Final Corrective Action:	Performed inspections required to finalize the scope of work for unit retirement
Mechanism Causing:	Planned maintenance activities
Final Root Cause	Planned maintenance activities
Scope to Correct Root Cause:	Perform necessary inspections
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 3
PERIODIC OUTAGE

Sequence Number:	Karn Unit 3-2023-1
Plant/Unit:	Karn Unit 3
MW Derate:	
Event Year:	2023
Event Number:	27
Start Date:	3/5/2023 0:01
End Date:	4/15/2023 21:02
Outage Type:	PO
Duration (Hours):	1004.02
MWh Loss:	619779.49
NERC Cause Code:	3248
NERC Cause Code Description:	Cooling Tower Overhaul
Root Cause Description:	Cooling Tower Structural support member inspection and Replacement
Event Description:	Cooling tower overhaul
Additional Description:	Periodic outage planned for inspection and replacement of cooling tower structural support members consisting of treated wood beams and decking. Requires periodic repair and replacement
Mode of Failure:	Structural Support treated wood members degradation and weathering
Final Corrective Action:	Periodic outage to complete repair and replacement of treated wood structural members
Mechanism Causing:	Environmental damage and deterioration of treated wood
Final Root Cause	Weakened and deteriorated treated wood structural supports
Scope to Correct Root Cause:	Inspection and replacement of cooling tower structural support members
Additional Scope:	NERC Relay Testing, Substation Generator Circuit Breaker Control Replacements, Miscellaneous Balance of Plant Mechanical Repairs, removal of three cooling fan assemblies for overhaul
If outage Extended for Additional Work & Why:	NA

INFORMATION FOR UNIT - Karn Unit 3
PERIODIC OUTAGE

Sequence Number:	Karn Unit 3-2023-33
Plant/Unit:	Karn Unit 3
MW Derate:	
Event Year:	2023
Event Number:	33
Start Date:	5/31/2023 16:00
End Date:	6/1/2023 11:04
Outage Type:	SF
Duration (Hours):	19.07
MWh Loss:	11,506.47
NERC Cause Code:	4609
NERC Cause Code Description:	Other exciter problems
Root Cause Description:	Start-up aborted due to voltage regulator unable to raise the generator field voltage
Event Description:	Exciter rotor open circuit.
Additional Description:	Data collected and sent to GE field services for evaluation. GE field technician to be dispatched for troubleshooting and diagnostics.
Mode of Failure:	Insufficient exciter voltage to build the generator magnetic field
Final Corrective Action:	Perform diagnostics and troubleshooting
Mechanism Causing:	Open circuit identified within the exciter
Final Root Cause	Material fatigue of one of the exciter's 'J-strap' connector
Scope to Correct Root Cause:	Disassemble and rewind the exciter
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Karn Unit 3
PERIODIC OUTAGE

Sequence Number:	Karn Unit 3-2023-034
Plant/Unit:	Karn Unit 3
MW Derate:	
Event Year:	2023
Event Number:	34
Start Date:	6/1/2023 11:04
End Date:	9/10/2023 10:43
Outage Type:	U1
Duration (Hours):	2,423.7
MWh Loss:	1,432,927.1
NERC Cause Code:	4609
NERC Cause Code Description:	Other exciter problems
Root Cause Description:	Karn #3 Exciter Open Circuit
Event Description:	Exciter rotor open circuit.
Additional Description:	Failure of one of the exciter's 'J-strap connectors' which connects the exciter rotor to its windings. The exciter was last electrically tested during the 2022 outage with no indication of failing.
Mode of Failure:	Open electrical circuit failing to provide proper excitation to the generator
Final Corrective Action:	Disassemble exciter and ship to offsite vendor to perform an in-depth inspection and then rewind the rotor windings
Mechanism Causing:	Cyclic fatigue on of one of the J-strap connectors used to provide flexibility as the exciter heats up under load.
Final Root Cause	Weakness of the J-strap connectors used to help accommodate thermal growth. The J-straps are not able to be visually inspected without removal of the rotor's end caps (which can only be done during a tear down in a vendor's shop).
Scope to Correct Root Cause:	Disassemble exciter and ship to offsite vendor to perform a inspection and then a rewind of the rotor windings.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Ludington Unit 5
PERIODIC OUTAGE

Sequence Number:	Ludington Unit 5-2023-1
Plant/Unit:	Ludington Unit 5
MW Derate:	
Event Year:	2023
Event Number:	190
Start Date:	5/15/2023 4:37
End Date:	6/27/2023 2:00
Outage Type:	PO
Duration (Hours):	1029.38
MWh Loss:	366889.31
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Planned Unit Periodic Outage for Inspection
Event Description:	LUD5 Planned Outage for warranty inspections and repairs and T.B. oil
Additional Description:	Planned annual periodic outage warranty inspections, Main Transformer Bank #3 inspections, Turbine Lube Oil Coolers Maintenance, and Wicket Gate Thrust Collar and Seal Inspections
Mode of Failure:	Planned maintenance inspection
Final Corrective Action:	Perform the planned scope of work
Mechanism Causing:	Planned maintenance inspection
Final Root Cause	Planned maintenance inspection
Scope to Correct Root Cause:	Perform the planned scope of work
Additional Scope:	Wicket Gate Thrust Collar and seals repair
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Ludington Unit 5
PERIODIC OUTAGE

Sequence Number:	Ludington Unit 5-2023-191
Plant/Unit:	Ludington Unit 5
MW Derate:	
Event Year:	2023
Event Number:	191
Start Date:	6/27/2023 2:00
End Date:	6/30/2023 15:57
Outage Type:	PE
Duration (Hours):	86.0
MWh Loss:	31,199.9
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Intake Gate Emergency Hoist closing system failed testing upon outage return
Event Description:	LUD5 Planned Outage Ext - intake gate Emer Lwr Ckt and Gov calibration
Additional Description:	Standard testing was performed on the emergency intake gate hoist control and the system failed
Mode of Failure:	Emergency Closing system for intake gate failed DC circuit testing
Final Corrective Action:	Perform troubleshooting and repair of the emergency intake gate control circuit
Mechanism Causing:	Age based circuity degradation leading to failure of the electronics
Final Root Cause	Failed Silicon Controlled Rectifier (SCR) and Power Resistor for the DC control
Scope to Correct Root Cause:	Replacement of failed Power Resistor and SCR with components testing satisfactory prior to being placed into service.
Additional Scope:	All other components of the unit #5 DC emergency intake gate control circuit checked and check of all other unit intake gate controls
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Ludington Unit 6
PERIODIC OUTAGE

Sequence Number:	Ludington Unit 6-2023-1
Plant/Unit:	Ludington Unit 6
MW Derate:	
Event Year:	2023
Event Number:	207
Start Date:	5/15/2023 4:37
End Date:	6/23/2023 17:36
Outage Type:	PO
Duration (Hours):	948.98
MWh Loss:	139651.31
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Planned Unit Periodic Outage for Inspection
Event Description:	LUD6 Planned Outage for warranty inspections and repairs and T.B. oil
Additional Description:	Planned annual periodic outage warranty inspections, Main Transformer Bank #3 inspections, Turbine Lube Oil Coolers Maintenance, and Wicket Gate Thrust Collar and Seal Inspections
Mode of Failure:	Planned maintenance inspection
Final Corrective Action:	Perform the planned scope of work
Mechanism Causing:	Planned maintenance inspection
Final Root Cause	Planned maintenance inspection
Scope to Correct Root Cause:	Perform the planned scope of work
Additional Scope:	Wicket Gate Thrust Collar and seals repair
If outage Extended for Additional Work & Why:	NA

INFORMATION FOR UNIT - Zeeland Unit 1
PERIODIC OUTAGE

Sequence Number:	Zeeland Unit 1-1
Plant/Unit:	Zeeland Unit 1
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	1/1/2023 0:00
End Date:	4/7/2023 8:50
Outage Type:	PO
Duration (Hours):	2311.83
MWh Loss:	416130.00
NERC Cause Code:	4810
NERC Cause Code Description:	Generator output breaker
Root Cause Description:	Economic decision to move leased Generator Step-up Transformer (GSU) from Zeeland Unit 1 to Zeeland Unit 5
Event Description:	Remove Leased GSU From GT1A and move to PH2 Failed GSU ETR-4/30/2023
Additional Description:	Zeeland Unit 5's GSU showing indications of imminent failure
Mode of Failure:	Economic decision to run Zeeland Units 3,4, &5 instead of Zeeland Unit 1
Final Corrective Action:	Move leased GSU installed on Zeeland Unit 1 to Zeeland Unit 5
Mechanism Causing:	Economics
Final Root Cause	Zeeland Units 3, 4, & 5 have higher output and more efficient than Zeeland Unit 1. Therefore it was deemed to move the leased GSU from the smaller unit to the combined cycle unit
Scope to Correct Root Cause:	New GSU for Zeeland Unit 1 to be delivered and installed by 04/30/23
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Zeeland Unit 3
PERIODIC OUTAGE

Sequence Number:	Zeeland Unit 3-30
Plant/Unit:	Zeeland Unit 3
MW Derate:	
Event Year:	2023
Event Number:	30
Start Date:	11/4/2023 1:09
End Date:	12/14/2023 14:16
Outage Type:	PO
Duration (Hours):	974.12
MWh Loss:	159327.86
NERC Cause Code:	5270
NERC Cause Code Description:	Hot end inspection
Root Cause Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA) with General Electric (OEM)
Event Description:	Periodic Outage ETR 12/22/23 @2359
Additional Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA)
Mode of Failure:	Planned maintenance activity based on unit operating hours
Final Corrective Action:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Mechanism Causing:	Planned maintenance activity based on unit operating hours
Final Root Cause	Planned maintenance activity based on unit operating hours
Scope to Correct Root Cause:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Additional Scope:	Gas Turbine generator field exchange & Steam Turbine valve work
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Zeeland Unit 3
PERIODIC OUTAGE

Sequence Number:	Zeeland Unit 4-28
Plant/Unit:	Zeeland Unit 4
MW Derate:	
Event Year:	2023
Event Number:	28
Start Date:	11/4/2023 1:09
End Date:	12/13/2023 9:59
Outage Type:	PO
Duration (Hours):	945.83
MWh Loss:	152829.49
NERC Cause Code:	5270
NERC Cause Code Description:	Hot end inspection
Root Cause Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA) with General Electric (OEM)
Event Description:	Periodic Outage ETR 12/22/23 @2359
Additional Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA)
Mode of Failure:	Planned maintenance activity based on unit operating hours
Final Corrective Action:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Mechanism Causing:	Planned maintenance activity based on unit operating hours
Final Root Cause	Planned maintenance activity based on unit operating hours
Scope to Correct Root Cause:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Additional Scope:	Gas Turbine generator field exchange & Steam Turbine valve work
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Zeeland Unit 3
PERIODIC OUTAGE

Sequence Number:	Zeeland Unit 5-39
Plant/Unit:	Zeeland Unit 5
MW Derate:	
Event Year:	2023
Event Number:	39
Start Date:	11/4/2023 1:04
End Date:	12/13/2023 13:43
Outage Type:	PO
Duration (Hours):	949.65
MWh Loss:	215623.52
NERC Cause Code:	5270
NERC Cause Code Description:	Hot end inspection
Root Cause Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA) with General Electric (OEM)
Event Description:	Periodic Outage ETR 12/22/23 @2359
Additional Description:	Planned inspection and repair of the unit due to requirements of the Long-Term Service Agreement (LTSA)
Mode of Failure:	Planned maintenance activity based on unit operating hours
Final Corrective Action:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Mechanism Causing:	Planned maintenance activity based on unit operating hours
Final Root Cause	Planned maintenance activity based on unit operating hours
Scope to Correct Root Cause:	Perform required inspections and make necessary repairs based on both inspection results and industry experience
Additional Scope:	Gas Turbine generator field exchange & Steam Turbine valve work
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Croton unit 1
PERIODIC OUTAGE

Sequence Number:	Croton unit 1-2023-2
Plant/Unit:	Croton unit 1
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	1/1/2023 0:00
End Date:	9/28/2023 13:00
Outage Type:	PO
Duration (Hours):	6492.00
MWh Loss:	8118.62
NERC Cause Code:	7140
NERC Cause Code Description:	Wicket gate assembly
Root Cause Description:	During unit disassembly for wicket gate replacement, components identified requiring repair or replacement
Event Description:	Wicket Gate Replacement
Additional Description:	Outage extended due to extensive amount of worn components found during inspection requiring funding approval and coordination of vendor shop space.
Mode of Failure:	Components at end of life
Final Corrective Action:	Replace or refurbish worn out components.
Mechanism Causing:	Components at end of life
Final Root Cause	Components at end of life
Scope to Correct Root Cause:	Replace or refurbish worn out components.
Additional Scope:	Generator guide bearings, Thrust bearing, resurfacing of head covers, discharge rings, and machining of turbine shaft.
If outage Extended for Additional Work & Why:	Outage scheduled to return to service June 8, 2023

INFORMATION FOR UNIT - Croton unit 2
PERIODIC OUTAGE

Sequence Number:	Croton unit 2-2023-2
Plant/Unit:	Croton unit 2
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	1/1/2023 0:00
End Date:	9/28/2023 13:00
Outage Type:	PO
Duration (Hours):	6492.00
MWh Loss:	8118.62
NERC Cause Code:	7140
NERC Cause Code Description:	Wicket gate assembly
Root Cause Description:	During unit disassembly for wicket gate replacement, components identified requiring repair or replacement
Event Description:	Wicket Gate Replacement
Additional Description:	Outage extended due to extensive amount of worn components found during inspection requiring funding approval and coordination of vendor shop space.
Mode of Failure:	Components at end of life
Final Corrective Action:	Replace or refurbish worn out components.
Mechanism Causing:	Components at end of life
Final Root Cause	Components at end of life
Scope to Correct Root Cause:	Replace or refurbish worn out components.
Additional Scope:	Generator guide bearings, Thrust bearing, resurfacing of head covers, discharge rings, and machining of turbine shaft.
If outage Extended for Additional Work & Why:	Outage scheduled to return to service June 8, 2023

INFORMATION FOR UNIT - Croton Unit 3
PERIODIC OUTAGE

Sequence Number:	Croton Unit 4-2023-6
Plant/Unit:	Croton Unit 4
MW Derate:	
Event Year:	2023
Event Number:	6
Start Date:	11/27/2023 9:30
End Date:	1/1/2024 0:00
Outage Type:	PO
Duration (Hours):	830.50
MWh Loss:	48.44
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Planned periodic outage
Event Description:	Periodic Inspection Outage w/Thrust Bearing Inspection
Additional Description:	This outage was a normal scheduled periodic outage to due routine maintenance with thrust bearing inspection. Additionally old grease line removal in the combined unit 3 & 4 penstock.
Mode of Failure:	Scheduled periodic outage to perform required maintenance with thrust bearing inspection.
Final Corrective Action:	Completed planned scope of work
Mechanism Causing:	Planned periodic outage
Final Root Cause	Planned periodic outage
Scope to Correct Root Cause:	Perform planned required maintenance necessary to operate the unit
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Five Channel unit 1
PERIODIC OUTAGE

Sequence Number:	Five Channel unit 1-2023-6
Plant/Unit:	Five Channel unit 1
MW Derate:	
Event Year:	2023
Event Number:	6
Start Date:	8/3/2023 14:41
End Date:	9/18/2023 6:00
Outage Type:	MO
Duration (Hours):	1095.32
MWh Loss:	2043.95
NERC Cause Code:	7120
NERC Cause Code Description:	Headgates
Root Cause Description:	Head Gate Replacement
Event Description:	Headgate/Log Chute/Dead Bay
Additional Description:	Unit off line to replace the unit's head gate.
Mode of Failure:	Equipment at end of life.
Final Corrective Action:	Replacement of the head gate.
Mechanism Causing:	Equipment at end of life.
Final Root Cause	Equipment at end of life.
Scope to Correct Root Cause:	Replacement of the head gate.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Five Channel unit 2
PERIODIC OUTAGE

Sequence Number:	Five Channel unit 2-2023-3
Plant/Unit:	Five Channel unit 2
MW Derate:	
Event Year:	2023
Event Number:	3
Start Date:	5/2/2023 7:41
End Date:	8/22/2023 11:20
Outage Type:	PO
Duration (Hours):	2691.65
MWh Loss:	7841.40
NERC Cause Code:	7120
NERC Cause Code Description:	Headgates
Root Cause Description:	Head Gate Replacement
Event Description:	Headgate/Log Chute/Dead Bay
Additional Description:	Unit off line to replace the units head gate.
Mode of Failure:	Component at end of useful life.
Final Corrective Action:	Replace the head gate.
Mechanism Causing:	Component at end of useful life.
Final Root Cause	Component at end of useful life.
Scope to Correct Root Cause:	Replace the head gate.
Additional Scope:	Concurrent work to perform structural repairs of the log chute and to fill in the dead bay.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Hardy unit 2
PERIODIC OUTAGE

Sequence Number:	Hardy Unit 2-2023-1
Plant/Unit:	Hardy Unit 2
MW Derate:	
Event Year:	2023
Event Number:	3
Start Date:	3/13/2023 13:21
End Date:	3/25/2023 13:21
Outage Type:	PO
Duration (Hours):	288.00
MWh Loss:	3024.00
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Planned periodic outage
Event Description:	Periodic Outage
Additional Description:	Scheduled periodic outage to perform routine maintenance.
Mode of Failure:	Periodic Inspection Outage
Final Corrective Action:	Completed required maintenance.
Mechanism Causing:	Planned periodic outage.
Final Root Cause	Scheduled maintenance necessary to maintain the unit.
Scope to Correct Root Cause:	Perform required maintenance necessary to maintain unit.
Additional Scope:	Inspection of the Permanent Magnetic Generator (PMG)
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Hardy unit 2
PERIODIC OUTAGE

Sequence Number:	Hardy Unit 2-2023-2
Plant/Unit:	Hardy Unit 2
MW Derate:	
Event Year:	2023
Event Number:	5
Start Date:	3/25/2023 13:21
End Date:	6/28/2023 13:20
Outage Type:	PE
Duration (Hours):	2279.98
MWh Loss:	23925.69
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Outage extension due to periodic inspection findings
Event Description:	Periodic Outage Extension
Additional Description:	Two magnets on the Permanent Magnetic Generator (PMG) identified as damaged and in need of replacement. The PMG is an integral part of the turbine protective trip scheme.
Mode of Failure:	Damaged magnets not suitable for turbine overspeed protection
Final Corrective Action:	Replace magnets and perform post repair testing
Mechanism Causing:	Magnets operating beyond expected life span
Final Root Cause	Partial failure of the magnets on the protective relay
Scope to Correct Root Cause:	Magnets replaced at offsite repair facility
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Hodenpyl unit 1
PERIODIC OUTAGE

Sequence Number:	Hodenpyl Unit 4-2023-1
Plant/Unit:	Hodenpyl Unit 1
MW Derate:	
Event Year:	2023
Event Number:	3
Start Date:	8/2/2023 14:19
End Date:	1/1/2024 0:00
Outage Type:	PO
Duration (Hours):	3634.68
MWh Loss:	9349.64
NERC Cause Code:	4500
NERC Cause Code Description:	Rotor windings (including damper windings and fan blades on hydro units)
Root Cause Description:	Stator windings failing
Event Description:	Generator Rewind
Additional Description:	Replacement of Stator windings
Mode of Failure:	Windings operating past end of expected life.
Final Corrective Action:	Replace windings
Mechanism Causing:	Components operating past expected life
Final Root Cause	Components operating past expected life
Scope to Correct Root Cause:	Replace windings
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Mio unit 2
PERIODIC OUTAGE

Sequence Number:	Mio Unit 2-2023-1
Plant/Unit:	Mio Unit 2
MW Derate:	
Event Year:	2023
Event Number:	2
Start Date:	4/3/2023 8:59
End Date:	6/1/2023 10:15
Outage Type:	U1
Duration (Hours):	1417.27
MWh Loss:	663.02
NERC Cause Code:	3644
NERC Cause Code Description:	AC Protection devices
Root Cause Description:	Unit tripped on high bearing temperature.
Event Description:	Hi-Hi Steady Bearing Temp Trip/Bearing is wiped.
Additional Description:	Generator Babbitted Steady bearing wiped
Mode of Failure:	Insufficient oil lubrication film on bearing due to generator shaft movement while in operation.
Final Corrective Action:	Remove, rebabbitt, and reinstall the generator shaft steady bearing.
Mechanism Causing:	Insufficient local clearance between the generator shaft and the steady bearing surface caused loss of oil lubricating film.
Final Root Cause	Unit operated for extended time unloaded (shaft not magnetically centered in the bearing) for testing related to the monitoring sensors used in measuring high bearing temperatures.
Scope to Correct Root Cause:	Installed operational guidance into the procedures for when operating the unit without being loaded.
Additional Scope:	Modified the oil supply valve to prevent inadvertent operations, including potential oil ingress into the stator/generator.
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - Mio unit 2
PERIODIC OUTAGE

Sequence Number:	Mio Unit 2-2023-005
Plant/Unit:	Mio Unit 2
MW Derate:	
Event Year:	2023
Event Number:	5
Start Date:	10/6/2023 9:00
End Date:	11/9/2023 12:01
Outage Type:	PE
Duration (Hours):	820.0
MWh Loss:	738.02
NERC Cause Code:	3690
NERC Cause Code Description:	Station Service Power Distribution System, General
Root Cause Description:	Outage extension
Event Description:	Electrical Safety Project Outage Extension
Additional Description:	Supply chain issues with receiving parts on time for the outage.
Mode of Failure:	Supply chain issues with delayed parts
Final Corrective Action:	Received delayed parts and finished the project.
Mechanism Causing:	Supply chain issues with delayed parts
Final Root Cause	Supply chain issues with delayed parts
Scope to Correct Root Cause:	Received delayed parts and finished the project.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Rogers Unit 2
PERIODIC OUTAGE

Sequence Number:	Rogers Unit 3-2023-001
Plant/Unit:	Rogers Unit 3
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	6/5/2023 11:30
End Date:	1/1/2024 0:00
Outage Type:	PO
Duration (Hours):	5,029.5
MWh Loss:	2975.69
NERC Cause Code:	4500
NERC Cause Code Description:	Rotor windings (including damper windings and fan blades on hydro units)
Root Cause Description:	Penstock shared between Units 3 & 4 rending unit 3 unavailable to operate with Unit 4 in its overhaul outage.
Event Description:	Periodic Outage Generator Rewind Unit 4
Additional Description:	Rewind of the generator and field poles on unit 4
Mode of Failure:	Planned outage activity
Final Corrective Action:	Replace unit 4 generator copper windings and field pole copper windings.
Mechanism Causing:	Penstock shared between Units 3 & 4 rendering unit 3 unavailable to operate with Unit 4 in its overhaul outage.
Final Root Cause	Penstock shared between Units 3 & 4 rendering unit 3 unavailable to operate with Unit 4 in its overhaul outage.
Scope to Correct Root Cause:	Replace unit 4 generator copper windings and field pole copper windings.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Rogers Unit 2
PERIODIC OUTAGE

Sequence Number:	Rogers Unit 4-2023-001
Plant/Unit:	Rogers Unit 4
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	6/5/2023 11:30
End Date:	1/1/2024 0:00
Outage Type:	PO
Duration (Hours):	5,029.5
MWh Loss:	2975.69
NERC Cause Code:	4500
NERC Cause Code Description:	Rotor windings (including damper windings and fan blades on hydro units)
Root Cause Description:	Rewind Generator stator and field pole windings.
Event Description:	Periodic Outage Generator Rewind Unit 4
Additional Description:	Rewind Generator stator and field pole windings.
Mode of Failure:	Equipment at end of life (copper windings 100 years old)
Final Corrective Action:	Replace generator and field pole copper windings.
Mechanism Causing:	Components operating at end of useful life.
Final Root Cause	Components operating at end of useful life.
Scope to Correct Root Cause:	Replace generator and field pole copper windings.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Webber Unit 1
PERIODIC OUTAGE

Sequence Number:	Webber Unit 1-2023-1
Plant/Unit:	Webber Unit 1
MW Derate:	
Event Year:	2023
Event Number:	1
Start Date:	4/17/2023 7:48
End Date:	5/1/2023 8:00
Outage Type:	PO
Duration (Hours):	336.20
MWh Loss:	351.17
NERC Cause Code:	9590
NERC Cause Code Description:	Miscellaneous regulatory
Root Cause Description:	DNR release Smolt upstream of Webber
Event Description:	Smolt Spill Outage/Fix leaking penstock drain/Dive Inspection
Additional Description:	The DNR release Smolt upstream of the Dam, when spotted at the Dam we are required to shut the units off and spill until no more Smolt are spotted or notified by the DNR.
Mode of Failure:	Smolt passage
Final Corrective Action:	Smolt passage completed
Mechanism Causing:	Smolt passage
Final Root Cause	Smolt passage
Scope to Correct Root Cause:	Wait for Smolt to pass then put units back online
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Webber Unit 1
PERIODIC OUTAGE

Sequence Number:	Webber Unit 1-2023-002
Plant/Unit:	Webber Unit 1
MW Derate:	
Event Year:	2023
Event Number:	2
Start Date:	5/1/2023 8:00
End Date:	6/9/2023 8:35
Outage Type:	U1
Duration (Hours):	936.6
MWh Loss:	933.95
NERC Cause Code:	7201
NERC Cause Code Description:	Inspection
Root Cause Description:	Outage inspection discovery - insufficient clearances on runner band seals
Event Description:	Unplanned Periodic Outage
Additional Description:	All six (6) turbine runners found to be rubbing on their respective runner band seals
Mode of Failure:	Equipment operating beyond expected life span.
Final Corrective Action:	Lift and align all three (3) turbine shafts to provide sufficient runner band clearances.
Mechanism Causing:	Long-term wear.
Final Root Cause	Long-term wear of the turbine shafts' Lignum Vitae wooden bearings.
Scope to Correct Root Cause:	Lift and align all three (3) turbine shafts to provide sufficient runner band clearances.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	Outage extended due to manpower scarcity to execute this unidentified scope of repair during the timeframe of the original outage.

INFORMATION FOR UNIT - 'Webber Unit 2
PERIODIC OUTAGE

Sequence Number:	Webber Unit 2-2023-3
Plant/Unit:	Webber Unit 2
MW Derate:	
Event Year:	2023
Event Number:	3
Start Date:	9/13/2023 9:01
End Date:	9/15/2023 13:30
Outage Type:	MO
Duration (Hours):	52.48
MWh Loss:	17.32
NERC Cause Code:	7140
NERC Cause Code Description:	Wicket gate assembly
Root Cause Description:	Scheduled inspection of the unit to identify suspected failure of a wicket gate
Event Description:	Wicket Gate Inspection
Additional Description:	Unit difficult to bring to a stop due to a suspected broken wicket gate
Mode of Failure:	External debris lodged between wicket gates during closing caused a stress overload condition of the wicket gate pin area and associated linkages
Final Corrective Action:	Perform inspections and develop repair strategy based on findings
Mechanism Causing:	Something got between gates when closing causing failure
Final Root Cause	Failure of gates and pins due to foreign debris being lodged between wicket gates while attempting to close.
Scope to Correct Root Cause:	Fabricate and replace parts identified during inspection
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

INFORMATION FOR UNIT - 'Webber Unit 2
PERIODIC OUTAGE

Sequence Number:	Webber Unit 2-2023-4
Plant/Unit:	Webber Unit 2
MW Derate:	
Event Year:	2023
Event Number:	4
Start Date:	9/15/2023 13:30
End Date:	1/1/2024 0:00
Outage Type:	ME
Duration (Hours):	2,579.50
MWh Loss:	851.24
NERC Cause Code:	7140
NERC Cause Code Description:	Wicket gate assembly
Root Cause Description:	New wicket gates, links and pins have to be manufactured
Event Description:	Need to make repairs to broken wicket gate/pin which was discovered during MO
Additional Description:	Long lead items to get manufactured.
Mode of Failure:	Parts have to be manufactured
Final Corrective Action:	Get replacement parts manufactured.
Mechanism Causing:	No spare parts for the unit.
Final Root Cause	Long lead time to get replacement parts
Scope to Correct Root Cause:	Replace 2 wicket gates, pins and links.
Additional Scope:	N/A
If outage Extended for Additional Work & Why:	N/A

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-13 (NJH-4)
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Date: March 2024

2023 FOSSIL AND PUMPED STORAGE OUTAGES OCCURRING FOR TWENTY-EIGHT DAYS OR MORE

Line No.	(a)	(b)	(c)	(d)
	Unit	Planned Days in 2023	Actual Days in 2023	Event Number
1	Campbell 2		149	107-111
2	Campbell 3	42	40	98
3	Karn 3	41	42	27
4	Karn 3		102	33, 34
5	Ludington 5	40	46	190, 191
6	Ludington 6	40	40	207
7	Zeeland 1	30	96	1
8	Zeeland 3	57	41	30
9	Zeeland 4	57	40	28
10	Zeeland 5	57	40	39

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-14 (NJH-5)
Page: 1 of 1
Witness: NJHoffman
Date: March 2024

GENERATION PERFORMANCE STATISTICS
JANUARY 1, 2023 TO DECEMBER 31, 2023

Line No.	(a)	(b)	(c)	(d)	(e)
	Unit	Unit Availability	MWh Availability	Periodic Factor	Random Outage Rate
1	Campbell 1	87.20%	81.34%	0.00%	18.66%
2	Campbell 2	49.50%	38.70%	9.33%	57.32%
3	Campbell 3 (CE)	72.02%	69.16%	10.87%	22.41%
4	Karn 1	72.07%	65.59%	3.77%	31.84%
5	Karn 2	74.66%	69.09%	5.33%	27.02%
6	Karn 3	52.02%	46.19%	11.46%	47.83%
7	Karn 4	80.70%	77.86%	4.07%	18.84%
8	Zeeland Simple Cycle	83.84%	77.97%	14.73%	8.56%
9	Zeeland Combined Cycle	78.09%	73.41%	11.86%	16.71%
10	Jackson CC	93.62%	85.75%	7.37%	7.43%
11	Covert CC	89.21%	83.30%	8.18%	9.28%
12	Total Fossil CE[1]	80.50%	74.58%	9.43%	17.65%
13	Base Load Fossil CE	70.39%	63.99%	6.26%	31.74%
14	Ludington 1-6	82.64%	80.58%	9.58%	10.88%
15	Total Hydro	78.60%	69.68%	15.48%	17.56%

[1] Does not include Karn 3 and Karn 4.

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-15 (NJH-6)
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Date: March 2024

COMPARISON OF CONSUMERS ENERGY AND GADS AVERAGES FOR SIMILAR UNITS
EQUIVALENT AVAILABILITY

Line No.	(a)	(b)	(c)	(d)	(e)	(f)
		GADS AVERAGES		CONSUMERS ENERGY		CE VERSUS
	UNIT	2016-2022	2022	2019-2023	2023	GADS **
1	Campbell 1	78.46%	74.27%	74.84%	81.34%	Higher
2	Campbell 2	75.48%	70.32%	55.11%	38.70%	Lower
3	Campbell 3	77.47%	76.76%	76.56%	69.16%	Lower
4	Karn 1	78.46%	74.27%	66.37%	65.59%	Lower
5	Karn 2	78.46%	74.27%	71.92%	69.09%	Lower

** Higher indicates one-year and/or five-year were higher than the GADs average.
Lower indicates both tests were lower than the GADS average.

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-16 (NJH-7)
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Date: March 2024

2023 BASE LOAD GENERATION POWER PLANT COST EFFICIENCY

Line No.	(a)	(b)	(c)	(d)	(e)	(f)	(g)
			FERC Form 1 data	GADS Perf measure report	GADS Perf measure report	GADS Gen Sum report	GADS Gen Sum report
		Heat Rate	On-line Hours	Planned Outage	Unplanned Outage	Gross MWh	Net MWh
	Plant	BTU/kWh	Hours	Factor	Factor	Generated	Delivered
1	Campbell 1	10,629	6,348	0.00%	18.66%	1,344,045	1,245,436
2	Campbell 2	10,949	6,326	9.33%	51.97%	857,774	779,654
3	Campbell 3	9,924	3,767	10.87%	19.30%	4,601,605	4,260,013
4	Karn 1	10,469	2,609	3.77%	30.64%	491,013	438,520
5	Karn 2	10,529	810	5.33%	25.58%	187,679	160,198

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-17 (NJH-8)
Page: 1 of 1
Witness: NJHoffman
Date: March 2024

CHEMICAL REAGENT EXPENSE
JANUARY 1, 2023 TO DECEMBER 31, 2023

Line No.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
		UREA EXPENSE		AQUEOUS AMMONIA		LIME		ACTIVATED CARBON		TOTAL	
	UNIT	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual	Projected	Actual
1	Campbell 1	$ -	$ -	$ -	$ -	$ 4,425,956	$ 4,721,090	$ 1,427,074	$ 698,703	$ 6,635,786	$ 5,698,768
2	Campbell 2	$ 782,756	$ 278,974	$ -	$ -						
3	Campbell 3	$ 3,362,009	$ 1,791,256	$ -	$ -	$ 3,277,918	$ 2,704,345	$ 737,448	$ 985,389	$ 7,377,375	$ 5,480,990
4	Karn 1	$ -	$ -	$ 508,698	$ 677,869	$ 501,375	$ 335,499	$ 106,458	$ -	$ 1,116,531	$ 1,013,367
5	Karn 2										
6	Covert	$ -	$ -	$ -	$ 637,946	$ -	$ -	$ -	$ -	$ -	$ 637,946
7	Zeeland	$ -	$ -	$ 290,784	$ 133,312	$ -	$ -	$ -	$ -	$ 290,784	$ 133,312
8	Total	$ 4,144,765	$ 2,070,231	$ 799,482	$ 1,449,126	$ 8,205,249	$ 7,760,934	$ 2,270,980	$ 1,684,092	$ 15,420,476	$ 12,964,383

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-18 (NJH-9)
Page: 1 of 1
Witness: NJHoffman
Date: March 2024

COMPANY-OWNED WIND GENERATION PERFORMANCE DATA
JANUARY 1, 2023 TO DECEMBER 31, 2023

Line No.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	UNIT	Gross Actual Energy (MWh)	Capacity Factor (%)	Target CF (%)	Time-Based Availability (%)	Target TBA (%)	Planned Maintenance Energy (MWh)	Repair Energy (MWh)	Regulatory Curtailment (MWh)
1	Lake Winds	246,922.79	28.0	30.1	98.2	96.0	187.10	6,733.36	2,859.40
2	Cross Winds	684,143.14	33.8	38.9	99.2	97.0	7,579.66	661.73	4,985.52
3	Gratiot Farms	351,361.68	26.8	30.2	95.2	97.0	1,838.77	8,847.01	4,192.80
4	Crescent Wind	362,857.21	24.9	27.6	97.9	97.0	2,469.76	5,277.42	14,645.22

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-19 (NJH-10) Revised
Page: 1 of 1
Witness: NJHoffman
Date: March 2024

2023 Ludington Outages

Line No.	(a)	(b)	(c)	(d)	(e)	
	Unit	Event	Date Start	Date End	Replacement Power Cost	Revised Replacement Power Cost
1	LUDINGTON 1	34	1/23/2023 15:02	1/27/2023 19:34	$2,881	$4,155
2	LUDINGTON 1	84	2/28/2023 23:02	2/28/2023 23:40	$0	$0
3	LUDINGTON 1	126	4/3/2023 7:00	4/21/2023 16:33	$5,145	$14,593
4	LUDINGTON 1	267	8/14/2023 7:05	8/16/2023 14:21	$3,617	$4,334
5	LUDINGTON 1	433	12/16/2023 5:55	12/19/2023 11:48	$10,486	$10,486
6	LUDINGTON 2	80	2/28/2023 23:00	2/28/2023 23:30	$0	$0
7	LUDINGTON 2	125	4/3/2023 7:00	4/21/2023 14:46	$5,145	$14,593
8	LUDINGTON 3	86	2/28/2023 23:00	3/1/2023 9:15	$110	$204
9	LUDINGTON 3	105	3/14/2023 7:00	3/15/2023 17:00	$0	$2,268
10	LUDINGTON 3	161	4/24/2023 6:45	5/12/2023 23:59	$22,588	$34,408
11	LUDINGTON 3	259	8/22/2023 12:30	8/22/2023 15:13	$0	$5,895
12	LUDINGTON 4	113	4/24/2023 6:51	5/12/2023 23:59	$22,588	$34,408
13	LUDINGTON 4	117	5/19/2023 16:39	5/19/2023 18:37	$0	$0
14	LUDINGTON 5	39	1/30/2023 9:12	2/1/2023 12:06	$1,935	$5,960
15	LUDINGTON 5	125	3/27/2023 7:19	4/3/2023 11:17	$0	$108
16	LUDINGTON 5	190	5/15/2023 4:37	6/27/2023 2:00	$380,014	$396,747
17	LUDINGTON 5	253	8/28/2023 6:35	8/30/2023 9:39	$17,704	$17,975
18	LUDINGTON 5	366	12/11/2023 10:03	12/11/2023 11:15	$0	$0
19	LUDINGTON 6	207	5/15/2023 4:37	6/23/2023 17:36	$366,321	$381,770
20	Total				$838,535	$927,907

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company
Summary of the FCM Recovery

Case No.: U-21258
Exhibit No.: A-20 (HLP-1)
Page: 1 of 1
Witness: HLPatton
Date: March 2024

	(a)		(b)	(c)
Line	**Item**		**Total $**	**Source**
1	Beginning Balance Over-Recovery	$	1,968,924	U-21049 Exhibit A-20 (HLP-1) Revised Line 6
2	Total FCM Surcharge Billed		2,975,075	Per Company Billing Records
3	Total Earned FCM Revenue	$	2,568,664	Exhibit A-20 (HLP-2) Line 59 column (j)
4	Total Over-Recovery Amount FCM	$	2,375,334	Line 1 + Line 2 - Line 3
5	Total Interest (Expense) Income	$	142,827	Exhibit A-22 (HLP-3) Line 14 column (f)
6	Total Over-Recovery Amount FCM Including Interest	**$**	**2,518,161**	

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-21 (HLP-2)
Page: 1 of 1
Witness: HLPatton
Date: March 2024

Total Earned FCM Incentive Revenue
TOTAL 2023

Line	(a) Company Name	(b) Commission Case Number	(c) Execution Date of PPA Contract	(d) Total MWH	(e) Total Purchased Power $	(f) WACC	(g) = e * f FCM Revenue Based on WACC ($)	(h) FCM CAP ($/MWH)	(i) = d * f * h Capped FCM Total $	(j) = Lesser of (g) or (i) Lesser of FCM Revenue or Capped FCM
1	13 Mile Solar	U-20604	9/26/19	3,964	380,475	5.96%	22,676	55.54	13,120	13,120
2	Angola Solar	U-20604	9/26/19	3,841	382,271	5.96%	22,783	55.54	12,716	12,716
3	Autocam Medical	Energy Only Contract	5/2/23	45	1,458	5.66%	83	63.25	160	83
4	Bay Windpower	U-20604	6/10/21	1,324	58,072	5.67%	3,293	59.38	4,459	3,293
5	Bingham Solar	U-20604	9/26/19	38,478	3,315,689	5.96%	197,615	55.54	127,369	127,369
6	Black River	U-20838	12/18/19	3,150	322,458	5.96%	19,219	55.54	10,426	10,426
7	Blue Elk Solar VII	U-20604	2/11/20	29	3,988	5.96%	238	57.49	98	98
8	Bullhead Solar	U-20604	9/26/19	3,795	359,204	5.96%	21,409	55.54	12,562	12,562
9	Byrne Solar	U-20604	2/11/20	47	3,128	5.96%	186	57.49	160	160
10	Calhoun Solar	U-20165	12/23/20	214,330	12,478,226	5.96%	743,702	57.49	734,383	734,383
11	Captain Solar	U-20604	9/26/19	3,659	367,438	5.96%	21,899	55.54	12,111	12,111
12	Cement City	U-20604	10/24/19	30,871	2,404,373	5.96%	143,301	55.54	102,190	102,190
13	City of Beaverton	U-20838	12/18/19	2,446	205,469	5.96%	12,246	55.54	8,095	8,095
14	Coldwater Solar	U-20604	9/26/19	3,412	335,776	5.96%	20,012	55.54	11,293	11,293
15	Commonwealth Labarge	U-20604	6/28/19	3,140	216,632	5.96%	12,911	55.54	10,394	10,394
16	Dow Corp	U-20604	9/8/21	26	1,720	5.67%	98	59.38	87	87
17	EDL Granger - Byron Center	U-20838	11/19/20	23,973	1,898,467	5.96%	113,149	57.49	82,139	82,139
18	EDL Granger - Coopersville	U-20838	11/19/20	20,246	1,665,330	5.96%	99,254	57.49	69,370	69,370
19	EDL Granger - Grand Blanc	U-20838	11/19/20	16,776	1,388,182	5.96%	82,736	57.49	57,483	57,483
20	EDL Granger - Pinconning	U-20838	11/19/20	45,837	3,449,371	5.96%	205,582	57.49	157,057	157,057
21	Elk Rapids 2	U-20838	12/18/19	2,608	228,200	5.96%	13,601	55.54	8,631	8,631
22	Geddes 1 Solar	U-20604	9/26/19	3,976	388,033	5.96%	23,127	55.54	13,161	13,161
23	Geddes 2 Solar	U-20604	9/26/19	3,952	379,997	5.96%	22,648	55.54	13,083	13,083
24	Good Fruit Storage	U-20604	12/22/20	347	20,558	5.96%	1,225	57.49	1,190	1,190
25	Greenstone Solar	U-20604	2/12/20	2,863	131,406	5.96%	7,832	57.49	9,810	7,832
26	Grenfell Hydro	U-20604	8/28/19	1,509	92,064	5.96%	5,487	55.54	4,994	4,994
27	Hazel Solar	U-20604	9/26/19	3,818	374,286	5.96%	22,307	55.54	12,640	12,640
28	Hendershot Solar	U-20604	9/26/19	3,811	359,879	5.96%	21,449	55.54	12,615	12,615
29	Interchange Solar	U-20604	9/26/19	3,605	365,158	5.96%	21,763	55.54	11,934	11,934
30	Jack Francis Solar	U-20604	9/26/19	3,782	372,708	5.96%	22,213	55.54	12,519	12,519
31	Kent County	U-20838	12/19/19	94,723	7,806,280	5.96%	465,254	55.54	313,549	313,549
32	Kleber Hydro	U-20838	12/18/19	4,789	319,486	5.96%	19,041	55.54	15,852	15,852
33	Letts Creek Solar	U-20604	10/24/19	26,457	2,116,325	5.96%	126,133	55.54	87,576	87,576
34	Lightfoot Solar	U-20604	2/4/20	214	11,425	5.96%	681	57.49	734	681
35	Lyons Road Solar	U-20604	2/6/20	36,953	2,068,098	5.96%	123,259	57.49	126,615	123,259
36	Macbeth Solar	U-20604	9/26/19	36,083	3,212,093	5.96%	191,441	55.54	119,441	119,441
37	May Shannon Solar	U-20604	9/26/19	3,784	372,836	5.96%	22,221	55.54	12,527	12,527
38	Michiana Hydro	U-20838	12/18/19	228	19,416	5.96%	1,157	55.54	756	756
39	Michigan Apple Packers	U-20604	10/26/21	264	15,604	5.67%	885	59.38	887	885
40	Midcontinent Solar	U-20604	2/12/20	2,141	100,330	5.96%	5,980	57.49	7,335	5,980
41	NANR - Rathbun	U-20604	7/8/19	6,196	470,394	5.96%	28,035	55.54	20,508	20,508
42	Otsego Paper	Energy Only Contract	7/1/19	7,129	307,965	5.96%	18,355	55.54	23,597	18,355
43	Prairie View Dairy	Energy Only Contract	9/5/23	130	4,587	5.66%	260	63.25	466	260
44	Pullman Solar	U-20604	10/24/19	35,886	2,848,018	5.96%	169,742	55.54	118,789	118,789
45	Shipsterns Solar	U-20604	2/6/20	547	27,733	5.96%	1,653	57.49	1,875	1,653
46	South Christian	U-20604	9/28/21	345	21,924	5.67%	1,243	59.38	1,162	1,162
47	Stoneheart Solar	U-20604	9/26/19	3,977	388,088	5.96%	23,130	55.54	13,165	13,165
48	STS Ada	U-18425	6/23/22	793	44,563	5.62%	2,504	61.28	2,732	2,504
49	STS Cascade	U-20833	5/4/20	1,778	157,979	5.96%	9,416	57.49	6,091	6,091
50	STS Fallasburg	U-20833	5/4/20	1,251	72,791	5.96%	4,338	57.49	4,285	4,285
51	STS Morrow	U-20833	1/31/22	332	22,854	5.62%	1,284	61.28	1,142	1,142
52	Superior Sales	U-20604	4/21/23	201	7,430	5.66%	421	63.25	718	421
53	Temperance Solar	U-20604	9/26/19	41,741	3,375,872	5.96%	201,202	55.54	138,171	138,171
54	Tower Hydro	U-20838	12/18/19	1,927	128,562	5.96%	7,662	55.54	6,379	6,379
55	White's Bridge	U-20838	12/18/19	4,109	335,483	5.96%	19,995	55.54	13,601	13,601
56	Willford Solar	U-20604	2/6/20	324	18,252	5.96%	1,088	57.49	1,110	1,088
57	Woodley Solar	U-20604	10/21/19	1,666	134,585	5.96%	8,021	55.54	5,516	5,516
58	Workman Rd Solar	U-20604	9/26/19	3,639	366,624	5.96%	21,851	55.54	12,044	12,044
59	**TOTAL**			**767,262**	**56,725,609**		**3,380,294**		**2,582,870**	**2,568,664**

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company
FCM Interest Calculation

Case No.: U-21258
Exhibit No.: A-22 (HLP-3)
Page: 1 of 1
Witness: HLPatton
Date: March 2024

		(a)	(b)	(c)	(d)	(e)	(f)
Line	**Month**	**FCM Surcharge Billed**	**Lesser of FCM Revenue or Capped FCM**	**FCM Over/ (Under) Recovery**	**Average Balance**	**Monthly Interest Rate**	**Interest (Income)/ Expense**
1	Beginning Balance			$ 1,968,924			
2	Jan-23	257,438		2,226,362	2,097,643	0.470%	9,851
3	Feb-23	248,448		2,474,810	2,350,586	0.472%	11,087
4	Mar-23	244,617	$ 305,490	2,413,937	2,444,374	0.472%	11,529
5	Apr-23	232,545		2,646,482	2,530,209	0.472%	11,934
6	May-23	221,402		2,867,884	2,757,183	0.472%	13,005
7	Jun-23	240,963	$ 676,802	2,432,045	2,649,964	0.472%	12,499
8	Jul-23	273,457		2,705,501	2,568,773	0.472%	12,116
9	Aug-23	282,516		2,988,018	2,846,759	0.472%	13,427
10	Sep-23	268,174	$ 1,037,583	2,218,608	2,603,313	0.472%	12,279
11	Oct-23	239,808		2,458,416	2,338,512	0.472%	11,030
12	Nov-23	228,077		2,686,493	2,572,454	0.472%	12,133
13	Dec-23	237,631	$ 548,789	2,375,335	2,530,914	0.472%	11,937
14	Total	$ 2,975,075	$ 2,568,664				**$ 142,827**

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-23 (AKR-1)
Page: 1 of 1
Witness: AKRissman
Date: March 2024

2023 Western Sub-bituminous Coal Receipts - Plan and Actual

Line	Contract ID	Contract Start Date	Contract End Date	Plan Volume (Tons)	Actual Received Volume (Tons)	Variation from Plan (Tons)
	(a)	(b)	(c)	(d)	(e)	(f)
1	**Western Contract Receipts**					
2	2022-354	1/1/2022	12/31/2022	-	94,378	94,378
3	2022-355	1/1/2022	12/31/2022	-	109,297	109,297
4	2022-363	1/1/2022	12/31/2022	-	94,615	94,615
5	2022-365	1/1/2022	12/31/2022	-	63,028	63,028
6	2022-367	1/1/2022	12/31/2022	-	125,834	125,834
7	2023-363	1/1/2023	12/31/2023	1,187,160	1,188,802	1,642
8	2023-365	1/1/2023	12/31/2023	1,187,160	936,379	(250,781)
9	2023-372	1/1/2023	12/31/2023	364,135	221,788	(142,347)
10	2023-378	1/1/2023	12/31/2023	193,440	284,663	91,223
11	2023-383	1/1/2023	12/31/2023	382,200	253,109	(129,091)
12	2023-386	1/1/2023	12/31/2023	705,120	710,829	5,709
13	**Total Western Contract Receipts (lines 2-12):**			**4,019,215**	**4,082,723**	**63,508**
14	**Western Spot Receipts**					
15	2022-384			34,320	15,792	(18,528)
16	2023-389			-	377,910	377,910
17	(New)	N/A	N/A	1,894,818	-	(1,894,818)
18	**Total Western Spot Receipts (lines 16-17):**			**1,929,138**	**393,702**	**(1,535,436)**
19	**Total Western Coal Receipts (lines 13 & 18):**			**5,948,354**	**4,476,425**	**(1,471,928)**

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-24 (AKR-2)
Page: 1 of 1
Witness: AKRissman
Date: March 2024

Projected Versus Actual As-Burned Western Sub-bituminous Coal Volume and Costs - 2023

Line	(a) Plant	(b) Projected Burn Volume (Tons)	(c) Projected Burn Costs	(d) Actual Burn Volume (Tons)	(e) Actual Burn Costs
1	**Coal Units (Tons)**				
2	JHCampbell 1-2	2,118,878	$ 100,109,416	1,222,166	$ 60,341,149
3	JHCampbell 3 (CE Owned)	3,055,291	$ 143,827,620	2,359,129	$ 114,210,459
4	DEKarn 1-2	659,385	$ 31,878,467	359,340	$ 17,968,427
5	**Total Coal (lines 2-4):**	**5,833,555**	**275,815,503**	**3,940,635**	**192,520,035**
6	**Total Expense:**				**$ 192,520,035**

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-25 (AKR-3)
Page: 1 of 1
Witness: AKRissman
Date: March 2024

Projected Versus Actual As-Burned Natural Gas Quantities and Costs - 2023

Line	(a)	(b)	(c)	(d)	(e)	(f)	(g)
	Plant	Projected Burn Volumes (MCF)	Projected Plan Cost	Projected Cost per Unit ($/MCF)	Actual Burn Volumes (MCF)	Actual Cost	Actual Cost per Unit ($/MCF)
1	**Natural Gas Units**						
2	DEKarn 3-4	0	$5,566,679	N/A	788,514	$9,460,379	$11.998
3	Jackson Plant	19,540,866	$149,812,517	$7.667	15,059,020	$45,953,260	$3.052
4	Zeeland Generating Station	29,885,011	$214,622,528	$7.182	35,921,042	$92,534,870	$2.576
5	Covert Generating Station	36,126,033	$224,998,238	$6.228	31,642,650	$81,906,454	$2.588
6	**Total Expense (lines 2-5):**		**$ 594,999,961**			**$ 229,854,962**	

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-26 (RTS-1) Revised
Page: 1 of 1
Witness: RTScaife
Date: March 2024

Purchased, Interchanged, and Renewable Power Transactions
Total Year 2023

Line	(a) Description	(b) MWH	(c) Variable Energy	(d) Admin Fees	(e) Net Energy $	(f) Fixed Energy $	(g) Capacity $	(h) Total $	(i) Energy Cost $/Mwh	(j) Total Cost $/Mwh
	Purchased & Interchange Power Received									
1	Purchased Power[2,4]	9,093,437	306,264,119	(630,758)	305,633,361	73,560,047	248,846,591	628,040,000	33.61	69.07
2	Purchased Power & Programs - PA 295[1]	1,414,555	87,520,365	(10,750)	87,509,615	-	15,657,643	103,167,258	61.86	72.93
3	Interchange Received - Non-MISO[3,4]	-	-	-	(927,907)	-	(1,579,093)	(2,507,000)	0.00	0.00
4	Interchange Received - MISO	9,274,460	-	-	207,421,948	-	1,119,633	208,541,581	22.36	22.49
5	Transmission	-	-	-	474,019,019	-	-	474,019,019	0.00	0.00
6	Short-Term Capacity Purchases	-	-	-	-	-	1,060,160	1,060,160	0.00	0.00
7	Total P & I Received	19,782,452	393,784,484	(641,508)	1,073,656,036	73,560,047	265,104,934	1,412,321,017	54.27	71.39
	Purchased & Interchange Power Delivered									
8	Interchange Delivered - Non-MISO	-	-	-	-	-	-	-	0.00	0.00
9	Interchange Delivered - MISO	2,812,086	-	-	72,668,824	-	267,456	72,936,280	25.84	25.94
10	Interchange Delivered by Counterparties - MISO	1,031,505			31,280,224			31,280,224	30.32	30.32
11	Schedule 2 Reactive	-			4,397,640			4,397,640	0.00	0.00
12	Total P & I Delivered	3,843,591	-	-	108,346,688	-	267,456	108,614,144	28.19	28.26
	Non PPA PA 295 PSCR Cost									
13	PA 295 Company Owned Renewables	1,256,067	69,533,900	-	69,533,900	-	36,729,419	106,263,319	84.60	84.60
14	Total PA 295 Company Owned Renewables	1,256,067	69,533,900	-	69,533,900	-	36,729,419	106,263,319	55.36	84.60
15	Total Net Purchased & Interchanged Power[4] (line 7 - line 12 + line 14)	17,194,927	463,318,384	(641,508)	1,034,843,248	73,560,047	301,566,897	1,409,970,192	60.18	82.00
16	Net MISO Interchange (line 4 - line 9)	6,462,374	-	-	134,753,124	-	852,177	135,605,301	20.85	20.98

[1] Sum of Exhibit A-1 (ZSC-1) rows 17 and 28

[2] Line 1(c) was updated to include the additional amount due to BMPs of $4,272,893 as calculated in Staff Exhibit S-1.0.

[3] Line 3(e) was updated to remove an additional $89,372 of replacement power costs associated with Ludington outages as discovered in U21258-AB-CE-0113.

[4] Due to the changes mentioned in footnotes 2 and 3, the following amounts have been recalculated 1(e), 1(h-j), 3(h-j), 7(c), 7(e), 7(h-j), 15(c), 15(e), 15(h-j)

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-27 (RTS-2)
Page: 1 of 1
Witness: RTScaife
Date: March 2024

2023 - Summary of MISO Market and Tariff Administration Charges/(Credits) Settlement

	(a)	(b)	(c)
Line	Year	Charge Description	
1	2023	MISO Financial Transmission and Auction Revenue Rights	($22,664,959)
2	2023	Schedule 16 - Financial Transmission Rights Administration Service Cost	$103,209
3	2023	Schedule 24 - Local Balancing Authority Cost Recovery	$856,547
4	2023	Schedule 49 - Cost Allocation for Available System Capacity	$1,770,098
5	2023	MISO Energy Market Purchases and Sales	$157,881,749
6	2023	Schedule 17 - Energy Market Support Administration Service Cost	$6,262,242
7	2023	MISO Ancillary Service Market Transactions	($1,317,021)
8		**Total Settlement of MISO Market and Tariff Administration Charges/(Credits)**	**$142,891,865**
9		MISO Market Charges Charactized as Transmission Charges (Sum of lines 2, 3, 4, 6, and 7)	($7,675,075)
10		Accrual, Adjustments, and Other	$388,510
11		**Adjusted Total Settlement of MISO Market and Tariff Administation Charges/(Credits)**	**$135,605,301**

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-28 (RTS-3)
Page: 1 of 1
Witness: RTScaife
Date: March 2024

2023 Energy Sales Revenue Net of Fuel Cost

Line	(a) Description	(b) Order U-21224 ($ millions)	(c) 2023 Actual ($ millions)	(d) Variance ($ millions)
	Energy Sales Revenue			
1	2023 Energy Market Sales	$ 1,314	$ 946	$ 368
2	Off-System Energy Sales	10	10	0
3	Ancillary Service Sales - Schedule 2	11	4	7
4	Ancillary Service Sales - Regulation, Spinning, and Supplemental		5	(5)
5	Bilateral Energy Sales			-
6	Total 2023 Energy Sales Revenue	$ 1,335	$ 965	$ 370
	Fuel Related Generation Costs			
7	Total 2023 Fuel & Fuel Related Generation Expense	$ 663	$ 435	$ 228
8	2023 Energy Sales Net of Fuel Related Costs	672	529	143

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-29 (RTS-4) Revised
Page: 1 of 1
Witness: RTScaife
Date: March 2024

PURCHASED POWER AND COGENERATION - ENERGY AND EXPENSE
TOTAL 2023

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
Line	Company Name	MWH	Variable Energy $	Admin Fees $	Net Energy $	Fixed Energy $	Capacity $	Total $	Variable Energy Cost $/Mwh	Total Cost $/Mwh
1	Bay Windpower	1,324	51,409	0	51,409	0	6,662	58,072	38.81	43.84
2	Black River	3,150	213,204	(3,150)	210,054	0	112,404	322,458	66.69	102.38
3	C & C Energy LLC (C&C Electric 2)	18,233	889,422	(18,233)	871,190	0	0	871,190	47.78	47.78
4	City of Beaverton	2,446	165,763	(2,446)	163,317	0	42,152	205,469	66.78	84.02
5	City of Midland	781	15,142	(5,201)	9,941	0	0	9,941	12.72	12.72
6	Commonwealth Irving	1,781	75,943	(1,373)	74,570	0	53,847	128,416	41.87	72.10
7	Commonwealth Labarge	3,140	169,282	0	169,282	0	47,350	216,632	53.91	68.99
8	Commonwealth Middleville	1,103	42,577	(1,082)	41,495	0	42,433	83,928	37.64	76.12
9	Elk Rapids 2	2,608	184,300	(2,608)	181,693	0	46,507	228,200	69.68	87.52
10	Good Fruit Storage	347	11,467	0	11,467	0	9,091	20,558	33.02	59.20
11	Great Lake Tissue	1,285	55,822	(1,285)	54,537	0	0	54,537	42.45	42.45
12	Grenfell Hydro	1,509	81,541	0	81,541	0	10,522	92,064	54.05	61.03
13	Kleber Hydro	4,789	324,274	(4,789)	319,486	0	0	319,486	66.71	66.71
14	MAHLE Engine Components	11	341	(5,201)	(4,860)	0	0	(4,860)	(448.80)	(448.80)
15	Michiana Hydro	228	15,921	(228)	15,693	0	3,723	19,416	68.71	85.02
16	Michigan State University	3,862	183,778	(2,179)	181,599	0	0	181,599	47.03	47.03
17	NANR - Rathbun	6,196	312,561	0	312,561	0	157,833	470,394	50.45	75.92
18	Otsego Paper	7,129	315,094	(7,129)	307,965	0	0	307,965	43.20	43.20
19	STS Ada	793	27,286	0	27,286	0	17,276	44,563	34.40	56.18
20	STS Cascade	1,778	94,845	0	94,845	0	63,133	157,979	53.35	88.86
21	STS Fallasburg	1,251	67,530	0	67,530	0	5,261	72,791	54.00	58.21
22	STS Morrow	332	12,860	0	12,860	0	9,993	22,854	38.78	68.91
23	Tower Hydro	1,927	130,489	(1,927)	128,562	0	0	128,562	66.71	66.71
24	White's Bridge	4,109	290,415	(4,109)	286,306	0	49,177	335,483	69.68	81.65
25	North American Central Venice Park	8,100	409,077	(8,532)	400,545	0	0	400,545	49.45	49.45
26	13 Mile Solar	3,964	169,717	0	169,717	0	210,758	380,475	42.82	95.99
27	Bingham Solar	38,478	1,671,053	(13,323)	1,657,730	0	1,657,959	3,315,689	43.08	86.17
28	Captain Solar	3,659	156,680	0	156,680	0	210,758	367,438	42.82	100.43
29	Coldwater Solar	3,412	146,094	0	146,094	0	189,682	335,776	42.82	98.42
30	Geddes 1 Solar	3,976	170,250	0	170,250	0	217,783	388,033	42.82	97.60
31	Interchange Solar	3,605	154,400	0	154,400	0	210,758	365,158	42.83	101.28
32	Jack Francis Solar	3,782	161,950	0	161,950	0	210,758	372,708	42.82	98.55
33	May Shannon Solar	3,784	162,079	0	162,079	0	210,758	372,836	42.83	98.52
34	Stoneheart Solar	3,977	170,305	0	170,305	0	217,783	388,088	42.82	97.58
35	Temperance Solar	41,741	1,812,718	(14,015)	1,798,704	0	1,577,169	3,375,872	43.09	80.88
36	Workman Rd Solar	3,639	155,866	0	155,866	0	210,758	366,624	42.84	100.76
37	Angola Solar	3,841	164,488	0	164,488	0	217,783	382,271	42.82	99.51
38	Bullhead Solar	3,795	162,497	0	162,497	0	196,707	359,204	42.82	94.65
39	Geddes 2 Solar	3,952	169,239	0	169,239	0	210,758	379,997	42.82	96.15
40	Hazel Solar	3,818	163,528	0	163,528	0	210,758	374,286	42.83	98.02
41	Hendershot Solar	3,811	163,172	0	163,172	0	196,707	359,879	42.82	94.43
42	Dow Corp	26	1,003	0	1,003	0	716	1,720	38.99	66.82
43	Woodley Solar	1,666	71,358	0	71,358	0	63,227	134,585	42.82	80.76
44	Michigan Apple Packers	264	8,432	0	8,432	0	7,171	15,604	32.00	59.21
45	South Christian	345	11,157	0	11,157	0	10,768	21,924	32.34	63.55
46	Lyons Road Solar	36,953	1,604,986	(13,448)	1,591,538	0	476,560	2,068,098	43.07	55.97
47	Macbeth Solar	36,083	1,567,301	(13,167)	1,554,134	0	1,657,959	3,212,093	43.07	89.02
48	Letts Creek Solar	26,457	1,124,008	0	1,124,008	0	992,317	2,116,325	42.48	79.99
49	Pullman Solar	35,886	1,522,587	0	1,522,587	0	1,325,431	2,848,018	42.43	79.36
50	Cement City	30,871	1,322,485	0	1,322,485	0	1,081,889	2,404,373	42.84	77.88
51	Autocam Medical	45	1,512	(54)	1,458	0	0	1,458	32.67	32.67
52	Superior Sales	201	7,430	0	7,430	0	0	7,430	37.05	37.05
53	Prairie View Dairy	130	4,717	(130)	4,587	0	0	4,587	35.25	35.25
54	Greenstone Solar	2,863	124,428	(2,172)	122,256	0	9,150	131,406	42.70	45.90
55	Midcontinent Solar	2,141	93,034	(1,854)	91,180	0	9,150	100,330	42.59	46.87
56	Blue Elk Solar VII	29	1,242	(29)	1,213	0	2,775	3,988	42.46	139.56
57	Brook View Dairy	615	19,002	(615)	18,387	0	0	18,387	29.90	29.90
58	Byrne Solar	47	2,050	(47)	2,003	0	1,125	3,128	42.85	66.91
59	Lightfoot Solar	214	9,389	(214)	9,175	0	2,250	11,425	42.85	53.36
60	Scenic View Dairy	480	14,497	(480)	14,017	0	0	14,017	29.21	29.21
61	Shipsterns Solar	547	23,780	(547)	23,233	0	4,500	27,733	42.46	50.68
62	Willford Solar	324	14,075	(324)	13,752	0	4,500	18,252	42.46	56.35
63	Energy Only - Solar	178	6,483	(77)	6,407	0	0	6,407	35.93	35.93
64	DG Purchase Pwr	22,920	1,693,763		1,693,763		518,409	2,212,172	73.90	96.52
65	Ada Cogeneration	180,947	5,909,049	(24,000)	5,885,049	1,498,136	9,445,561	16,828,746	32.52	93.00
66	Adrian Energy	9,252	356,753	(9,240)	347,513	0	404,971	752,484	37.56	81.33
67	C & C Energy LLC (C&C Electric 1)	0	0	(5,201)	(5,201)	0	0	(5,201)	0.00	0.00
68	Cadillac Renewable	127,642	3,734,813	(24,000)	3,710,813	1,734,788	11,435,026	16,880,627	29.07	132.25
69	Filer City	318,385	12,242,029	(24,000)	12,218,029	0	26,510,623	38,728,652	38.37	121.64
70	Genesse Power Station	114,890	3,358,180	(24,000)	3,334,180	1,670,607	12,499,704	17,504,491	29.02	152.36
71	Grayling	134,111	4,047,574	(52,014)	3,995,560	1,816,294	12,089,418	17,901,273	29.79	133.48
72	Kent County	94,723	5,982,111	(52,014)	5,930,097	0	1,876,182	7,806,280	62.60	82.41
73	MCV	6,028,596	162,737,053	(24,000)	162,713,053	66,675,070	110,934,536	340,322,658	26.99	56.45
74	Michigan Power Limited	1,023,478	39,860,143	(24,000)	39,836,143	0	38,355,705	78,191,848	38.92	76.40
75	Michigan Wind 1, LLC (PPA 2)	25,046	1,228,509	0	1,228,509	0	0	1,228,509	49.05	49.05
76	North American Resources (Peoples)	16,395	535,978	(16,078)	519,901	100,204	698,701	1,318,806	31.71	80.44
77	Viking - Lincoln	141,450	6,181,387	(52,014)	6,129,374	0	2,637,870	8,767,243	43.33	61.98
78	Viking - McBain	135,989	5,942,674	(52,014)	5,890,660	0	2,684,479	8,575,139	43.32	63.06
79	WM Renewable Energy	10,646	347,650	(11,080)	336,570	64,947	511,825	913,343	31.62	85.79
80	EDL Granger - Byron Center	23,973	1,534,188	(23,916)	1,510,273	0	388,194	1,898,467	63.00	79.19
81	EDL Granger - Grand Blanc	20,246	1,294,833	(20,197)	1,274,636	0	390,694	1,665,330	62.96	82.26
82	EDL Granger - Pinconning	16,776	1,074,992	(16,795)	1,058,197	0	329,985	1,388,182	63.08	82.75
83	EDL Granger - Coopersville	45,837	2,944,531	(46,233)	2,898,298	0	551,073	3,449,371	63.23	75.25
84	Calhoun Solar	214,330	8,379,074	0	8,379,074	0	4,099,151	12,478,226	39.09	58.22
85	**Subtotal**	9,093,437	286,834,625	(630,758)	286,203,867	73,560,047	248,846,591	608,610,506	31.47	66.93
86	Biomass Merchant Plant	0	19,429,494		19,429,494		0	19,429,494	0.00	0.00
87	**TOTAL**	9,093,437	306,264,119	(630,758)	305,633,361	73,560,047	248,846,591	628,040,000	33.61	69.07

[1] Line 86 was updated to include the additional amount due to BMPs of $4,272,893 as calculated in Staff Exhibit S-1.0. This change will flow through to the total in Line 87.

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-30 (RTS-5)
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Witness: RTScaife
Date: March 2024

2023 Interchange Delivered by Counterparties to MISO

Revenue Received ($)

line		January	February	March	April	May	June	July	August	September	October	November	December	Total By Counterparty
1	Beebe Renewable Energy	$ (393,639)	$ (771,820)	$ (557,879)	$ (461,236)	$ (388,420)	$ (231,689)	$ (290,560)	$ (341,809)	$ (271,997)	$ (436,426)	$ (660,518)	$ (462,426)	$ (5,268,419)
2	Calhoun Solar	-	(73,633)	(741,031)	(624,725)	(764,751)	(2,210,679)	(256,170)	(1,192,655)	(763,531)	(1,009,153)	212,504	(142,090)	(7,565,916)
3	Harvest II	(2,441,765)	1,054,043	(507,853)	(478,206)	(348,021)	(235,666)	(264,080)	(353,598)	(293,500)	(483,297)	(654,813)	(270,266)	(5,277,020)
4	Heritage Garden Wind	(123,390)	(164,498)	(106,752)	(115,709)	(96,167)	(73,695)	(52,884)	(97,802)	(83,086)	(119,989)	(242,679)	(165,497)	(1,442,146)
5	Heritage Garden Solar	3,413	(2,696)	(12,214)	(14,111)	(13,040)	(23,255)	(25,274)	(23,448)	(12,027)	(10,392)	(1,688)	(5,332)	(140,063)
6	Heritage Stoney Corners I Phase 2	(38,970)	(102,995)	(49,549)	(81,949)	(31,384)	(31,747)	(41,451)	(56,755)	(48,414)	(34,036)	(103,016)	(116,093)	(736,360)
7	Heritage Stoney Corners I Phase 3	(55,394)	(17,321)	(33,387)	(51,599)	(17,204)	(13,223)	(26,687)	(20,992)	(40,749)	(45,727)	(69,738)	(79,288)	(471,309)
8	Michigan Wind 1, Unit 2	(235,763)	13,450	(66,864)	(50,790)	(42,846)	(26,685)	(30,237)	(53,358)	(30,172)	(61,519)	(79,482)	(88,537)	(752,804)
9	Michigan Wind 2	(619,432)	(1,259,302)	(872,846)	(725,103)	(604,264)	(375,138)	(499,097)	(557,350)	(548,246)	(794,495)	(538,190)	(30,286)	(7,423,748)
10	WM Renewable Pine Tree Acres	(39,737)	(151,674)	(121,207)	(154,688)	(191,813)	(206,146)	(241,569)	(180,413)	(225,904)	(237,862)	(255,658)	(195,769)	(2,202,438)
11	Total	$ (3,944,678)	$ (1,476,446)	$ (3,069,581)	$ (2,758,115)	$ (2,497,911)	$ (3,427,922)	$ (1,728,010)	$ (2,878,181)	$ (2,317,626)	$ (3,232,893)	$ (2,393,278)	$ (1,555,583)	$ (31,280,224)

Energy Delivered (MWh)

		January	February	March	April	May	June	July	August	September	October	November	December	Total By Counterparty
12	Beebe Renewable Energy	(14,936)	(24,935)	(20,396)	(18,507)	(14,515)	(7,770)	(8,079)	(11,659)	(8,313)	(15,000)	(21,775)	(17,737)	(183,623)
13	Calhoun Solar	0	(2,725)	(25,721)	(20,193)	(23,990)	(63,737)	2,639	(29,586)	(21,972)	(27,415)	3,569	(5,200)	(214,330)
14	Harvest II	(15,009)	(22,604)	(18,905)	(18,654)	(13,244)	(7,672)	(7,442)	(12,350)	(8,981)	(17,053)	(21,767)	(19,382)	(183,062)
15	Heritage Garden Wind	(3,504)	(5,574)	(4,018)	(5,083)	(3,859)	(2,413)	(1,344)	(2,627)	(2,543)	(3,272)	(7,037)	(6,022)	(47,296)
16	Heritage Garden Solar	22	(80)	(411)	(542)	(388)	(567)	(513)	(493)	(347)	(284)	(54)	(180)	(3,837)
17	Heritage Stoney Corners I Phase 2	(958)	(3,736)	(1,729)	(2,681)	(1,341)	(1,036)	(1,000)	(2,216)	(1,552)	(793)	(3,360)	(3,766)	(24,167)
18	Heritage Stoney Corners I Phase 3	(1,573)	(877)	(1,170)	(1,671)	(695)	(458)	(710)	(733)	(1,448)	(1,316)	(2,276)	(2,570)	(15,497)
19	Michigan Wind 1, Unit 2	(3,194)	(2,277)	(3,519)	(1,927)	(1,686)	(987)	(926)	(1,481)	(1,178)	(2,138)	(2,861)	(2,873)	(25,046)
20	Michigan Wind 2	(24,505)	(39,874)	(32,300)	(28,049)	(23,759)	(12,849)	(14,754)	(20,345)	(17,209)	(28,272)	(17,221)	(1,083)	(260,221)
21	WM Renewable Pine Tree Acres	(3,106)	(4,329)	(4,350)	(5,570)	(6,754)	(7,012)	(7,077)	(5,329)	(7,384)	(8,250)	(7,878)	(7,386)	(74,426)
22	Total	(66,764)	(107,011)	(112,520)	(102,877)	(90,232)	(104,500)	(39,205)	(86,817)	(70,927)	(103,792)	(80,661)	(66,198)	(1,031,505)

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-31 (BAS-1)
Page: 1 of 5
Witness: BASkowronski
Date: March 2024

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

ENERGY AND CAPACITY CONTRACTS

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Line	Energy & Capacity Company	Contract Capacity	Fuel Type	Variable Energy Rate		Capacity Rate			Admistrative Charge		MPSC Order Approving Capacity Rate	Expected Termination Date
				On-Peak	Off-Peak	On-Peak	Off-Peak	$/ZRC-month	Rate	Special Notes		
		MW		¢/kWh	¢/kWh	¢/kWh	¢/kWh		¢/kWh			
1	Ada Cogeneration Ltd Partnership	29.400	Nat Gas	Twelve-month rolling average cost of CE coal generation		4.024	3.822	N/A	0.100	Not to exceed $2,000/month	June 22, 1989 – U-8871/U-8833	1/4/26
2	Adrian Energy Associates	2.500	Landfill Gas	Twelve-month rolling average cost of CE coal generation		3.110	3.110	N/A	0.100	Not to exceed $2,000/month	March 31, 1993 – U-10127	12/12/29
3	Bay Windpower I	1.800	Wind	3.898	3.898	N/A	N/A	5,551.92	N/A	Included in variable energy rate	September 9, 2021 - U-20604	11/30/23
4	Black River Power Limited Partnership	1.200	Hydro	6.768		N/A	N/A	11,708.75	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/39
5	Beaverton, City of	0.500	Hydro	6.768		N/A	N/A	11,708.75	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/39
6	C&C Energy, LLC - C&C 1 (f/k/a Gas Recovery Systems)	2.750	Landfill Gas	Twelve-month rolling average cost of CE coal generation		4.374	4.155	N/A	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	July 21, 1993 – U-10270	2/19/30
7	Cadillac Renewable Energy	34.000	Wood Waste	Twelve-month rolling average cost of CE coal generation		4.320	4.110	N/A	0.100	Not to exceed $2,000/month	June 22, 1989 – U-8871	7/15/28
8	Commonwealth Power Company – Irving	0.240	Hydro	Twelve-month rolling average cost of CE coal generation		4.034	3.832	N/A	0.100	Not to exceed $2,000/month	March 31, 1993 – U-10127	8/24/30
9	Commonwealth Power Company – LaBarge [1]	0.700	Hydro	5.400		N/A	N/A	8,768.50	N/A	Included in variable energy rate	September 26, 2019 - U-20604	5/31/39
10	Commonwealth Power Company – Middleville	0.200	Hydro	Twelve-month rolling average cost of CE coal generation		4.034	3.832	N/A	0.100	Not to exceed $2,000/month	March 31, 1993 – U-10127	12/31/30
11	DTE Garden Solar	2.350	Solar	106.07	73.52	N/A	N/A	N/A	N/A	Included in variable energy rate	November 19, 2010 - U-15805	9/13/32
12	Dow Silicones Corporation (DCC)	0.031	Solar	3.898		N/A	N/A	5,551.92	N/A	Included in variable energy rate	November 4, 2021 - U-20604	5/31/32
13	Elk Rapids Hydroelectric Power, LLC	0.600	Hydro	7.068		N/A	N/A	11,708.75	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/39
14	Energy Developments Byron Center, LLC (f/k/a Granger Electric of Byron Center)	3.000	Landfill Gas	6.396		N/A	N/A	11,708.75	N/A	Included in variable energy rate	February 4, 2021 - U-20604	5/31/39
15	Energy Developments Coopersville, LLC (f/k/a Granger Electric of Coopersville, LLC - Ottawa)	6.109	Landfill Gas	6.396		N/A	N/A	11,708.75	N/A	Included in variable energy rate	February 4, 2021 - U-20604	5/31/39
16	Energy Developments Grand Blanc, LLC (f/k/a Granger Electric Company – Grand Blanc)	3.812	Landfill Gas	6.396		N/A	N/A	11,708.75	N/A	Included in variable energy rate	February 4, 2021 - U-20604	5/31/39
17	Energy Developments Pinconning, LLC (f/k/a Granger Electric of Pinconning)	3.042	Landfill Gas	6.396		N/A	N/A	11,708.75	N/A	Included in variable energy rate	February 4, 2021 - U-20604	5/31/39
18	Genesee Power Station Limited Partnership	35.000	Wood Waste	Twelve-month rolling average cost of CE coal generation		4.650	4.420	N/A	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	June 22, 1989 - U-8871	12/12/30
19	Good Fruit Storage	0.429	Solar	3.474	2.935	N/A	N/A	PRA	N/A	Included in variable energy rate	February 18, 2021 - U-20604	5/31/31
20	Grayling Generating Station Limited Partnership	36.170	Wood Waste	Twelve-month rolling average cost of CE coal generation		4.180	3.970	N/A	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	June 22, 1989 - U-8871/U-10274	12/31/27
21	Grenfell Hydro, Inc	0.300	Hydro	5.405		N/A	N/A	8,768.50	N/A	Included in variable energy rate	November 14, 2019 - U-20604	5/31/39
22	Kent County	15.680	Solid Waste	6.315		N/A	N/A	11,708.75	0.100	Not to exceed $2,000/month	July 23, 2020 - U-20838	5/31/39
23	Michiana Hydroelectric Co (Bellevue)	0.045	Hydro	7.068		N/A	N/A	11,708.75	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/39
24	Michigan Apple Packers Cooperative, Inc. (MAP)	0.150	Solar	3.474	2.935	N/A	N/A	PRA	N/A	Included in variable energy rate	January 20,2022 - U-20604	5/31/30
25	Michigan Power Limited Partnership	123.000	Nat Gas	Twelve-month rolling average cost of CE coal generation		3.880	3.686	N/A	0.100	Not to exceed $2,000/month	March 31, 1993 – U-10127	12/31/30
26	Michigan Wind I, LLC (f/k/a Noble Thumb Windpark, LLC.)	57.000	Wind	Monthly Energy Rate Letter		LMP	LMP	PRA	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	N/A	MTM
27	Midland Cogeneration Venture Limited Partnership	1240.000	Nat Gas	MCV Cost of Production		1.014	1.014	N/A	0.100	Not to exceed $2,000/month	March 4, 2021 U-20896 June 10, 2008 - U-15320	5/31/30
28	South Christian High School (SCHS2021)	0.550	Solar	3.474	2.935	N/A	N/A	PRA	N/A	Included in variable energy rate	November 18, 2021 - U-20604	5/31/32

[1] LaBarge REC cost is recovered through RRP as shown on page 3

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

ENERGY AND CAPACITY CONTRACTS - CONTINUED

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
Line	**Energy & Capacity Company**	**Contract Capacity**	**Fuel Type**	**Variable Energy Rate**		**Capacity Rate**			**Admistrative Charge**		**MPSC Order Approving Capacity Rate**	**Expected Termination Date**
				On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**	**$/ZRC-month**	**Rate**	**Special Notes**		
		MW		¢/kWh	¢/kWh	¢/kWh	¢/kWh		¢/kWh			
29	North American Natural Resources -Peoples	3.061	Landfill Gas	Twelve-month rolling average cost of CE coal generation		4.374	4.155	N/A	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	July 21, 1993 – U-10266	9/7/30
30	North American Natural Resources -Rathbun	1.600	Landfill Gas	5.052		N/A	N/A	8,768.50	N/A	Included in variable energy rate	September 26, 2019 - U-20604	5/31/39
31	STS Hydropower Ltd – Cascade Hydro Plant	1.400	Hydro	5.335		N/A	N/A	8,768.50	N/A	Included in variable energy rate	July 23, 2020 - U20833	5/31/39
32	STS Hydropower Ltd – Fallasburg Hydro Plant	0.850	Hydro	5.400		N/A	N/A	8,768.50	N/A	Included in variable energy rate	July 23, 2020 - U20833	5/31/39
33	STS Hydropower Ltd – Morrow Hydro Plant	1.000	Hydro	3.898	3.898	N/A	N/A	N/A	N/A		December 13, 1988 - U-8868	5/31/27
34	T.E.S. Filer City Station Limited Partnership	50.000	Coal	Twelve-month rolling average cost of CE coal generation		6.460	5.460	N/A	0.100	Not to exceed $2,000/month	February 19, 1987 - U-8562	6/16/25
35	Tower Kleber LP, Kleber Hydro	1.200	Hydro	6.787		N/A	N/A	PRA	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/2039
36	Tower Kleber LP, Tower Hydro	0.560	Hydro	6.787		N/A	N/A	PRA	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/2039
37	Viking Energy of Lincoln, LLC (Amendment Start Date January 1, 2019)	18.000	Wood Waste	4.370		N/A	N/A	11,708.75	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	April 18, 2019 - U-20496	5/31/27
38	Viking Energy of McBain, LLC (Amendment Start Date January 1, 2019)	18.000	Wood Waste	4.370		N/A	N/A	11,708.75	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	April 18, 2019 - U-20496	5/31/27
39	White's Bridge Hydro Company	0.817	Hydro	7.068		N/A	N/A	11,708.75	N/A	Included in variable energy rate	July 23, 2020 - U-20838	5/31/2039
40	WM Renewable Energy - Venice Park (f/k/a Bio Energy Partners)	1.500	Landfill Gas	Twelve-month rolling average cost of CE coal generation		4.190	3.980	N/A	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	June 22, 1989 – U-8871/U-10272	5/3/27
41	13 Mile Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
42	Bingham Solar	20.000	Solar	4.346		N/A	N/A	11,708.75	0.100	Not to exceed $1,000/month	December 6, 2019 - U-20604	5/31/41
43	Captain Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
44	Coldwater Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
45	Geddes 1 Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
46	Interchange Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
47	Jack Francis Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
48	May Shannon Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
49	Stoneheart Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
50	Temperance Solar	20.000	Solar	4.346		N/A	N/A	11,708.75	0.100	Not to exceed $1,000/month	December 6, 2019 - U-20604	5/31/41
51	Workman Rd Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
52	Angola Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
53	Bullhead Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
54	Geddes 2 Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
55	Macbeth Solar	20.000	Solar	4.346	4.346	N/A	N/A	N/A	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
56	Lyons Road	20.000	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	9/1/40
57	Letts Creek	15.000	Solar	4.223	4.223	N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 19, 2019 U-20604	12/31/41
58	Pullman	20.000	Solar	4.223	4.223	N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 19, 2019 U-20604	12/31/41
59	Cement City	20.000	Solar	4.223	4.223	N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 19, 2019 U-20604	12/31/41
60	Greenstone	20.000	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	5/5/43
61	Midcontinent	20.000	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	5/5/43
62	Blue Elk VII	12.331	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	5/5/43
63	Byrne Solar	5.000	Solar	4.385	4.385	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	7/15/41
64	Lightfoot Solar	10.000	Solar	4.385	4.385	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	10/15/40
65	Shipsterns Solar	20.000	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	5/15/41
66	Willford Solar	20.000	Solar	4.346	4.346	N/A	N/A	PRA	N/A	Included in variable energy rate	April 15, 2020 U-20604	9/1/40
67	Calhoun Solar	140.000	Solar	3.965	3.965	N/A	N/A	5,551.92	N/A	Included in variable energy rate	April 8, 2021 U-20165	5/31/48
68	Hazel Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
69	Hendershot Solar	2.000	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/41
70	Woodley Solar	0.821	Solar	4.285		N/A	N/A	11,708.75	N/A	Included in variable energy rate	December 6, 2019 - U-20604	5/31/42
71	Addle Solar, LLC	20.000	Solar	4.346		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	7/4/44
72	Blue Elk Solar II, LLC	20.000	Solar	4.102		N/A	N/A	3,208.34	0.100	Not to exceed $1,000/month	October 5, 2022 - U-20604	9/15/43
73	Copenhagen Solar, LLC	20.000	Solar	4.346		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	7/4/44
74	Holly Solar, LLC	20.000	Solar	4.346		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	4/5/45
75	Olivier Solar, LLC	20.000	Solar	4.346		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	4/5/45
76	Puck Solar, LLC	20.000	Solar	4.346		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	7/4/44
77	Shoreline Solar, LLC	20.000	Solar	4.336		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	4/5/45
78	Sunbelievable Solar, LLC	12.000	Solar	4.336		N/A	N/A	11,708.75	N/A	Included in variable energy rate	October 27, 2022 - U-20604	7/4/44
79	STS Hydropower, LLC-Ada Hydro Plant	0.6	Hydro	DA_LMP		N/A	N/A	N/A	N/A	Included in variable energy rate	October 24, 2023 - U-18425	5/31/24
80	Superior Sales Inc.	0.605	Solar	DA_LMP		N/A	N/A	N/A	N/A	Included in variable energy rate	June 22, 2023 - U-20604	5/31/41
81	Freshwater Solar, LLC	300	Solar	5.990		N/A	N/A	N/A	N/A	Included in variable energy rate	March 15, 2024 - U-21090	5/31/42
82	Tibbits Energy Storage, LLC	100	Battery	1.454		N/A	N/A	N/A	N/A	Included in variable energy rate	Pending in U-21090	5/31/45

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

ENERGY-ONLY CONTRACTS

Line	**Energy-Only Company**	**Contract Capacity**	**Fuel Type**	**Variable Energy Rate**		**Capacity Rate**			**Admistrative Charge**		**MPSC Order Approving Capacity Rate**	**Expected Termination Date**
				On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**	**$/ZRC-month**	**Rate**	**Special Notes**		
		MW		¢/kWh	¢/kWh	¢/kWh	¢/kWh		¢/kWh			
83	City of Grand Rapids-Waste Water Treatment Facility	2.822	Combined Heat & Power	MISO Real - Time LMP					0.100			
84	City of Midland	N/A	Landfill Gas	90% of (Load Locational Marginal Price - $5/MWh)		-	-	-	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	N/A	MTM
85	Grand Valley State University	N/A	Fuel Cell	90% of the hourly top incremental cost		-	-	-	None		N/A	3/22/23
86	Great Lakes Tissue Company	N/A	Hydro	Three-month rolling average top incremental cost		-	-	-	0.100	Not to exceed $2,000/month	N/A	11/28/2023
87	Mahle Engine Components USA, Inc.	N/A	Waste Energy	90% of (Load Locational Marginal Price - $5/MWh)		-	-	-	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	N/A	MTM
88	Michigan State University	N/A	Coal	Three-month rolling average top incremental cost		-	-	-	0.100	Not to exceed $200/month	N/A	YTY
89	Otsego Paper	20.000	Natural Gas	MISO Real - Time LMP		-	-	-	0.100		N/A	MTM
90	Western Michigan University	N/A	Nat Gas	Hourly top incremental cost		-	-	-	0.100	Min of $384/Mo, but not to exceed $3,845/Mo	N/A	MTM

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS
RENEWABLE RESOURCE PROGRAM CONTRACTS

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
Line	**Renewable Resource Company**	**Contract Capacity** MW	**Fuel Type**	**Variable Energy Rate**		**Renewable Rate**		**Admistrative Charge**	**MPSC Order Approving Capacity Rate**	**Expected Termination Date**
				On-Peak ¢/kWh	**Off-Peak** ¢/kWh	**On-Peak** ¢/kWh	**Off-Peak** ¢/kWh	**Rate** ¢/kWh / **Special Notes**		
92	C&C Energy, LLC (C&C Electric 2 Plant)	2.500	Landfill Gas	Average PSCR cost		3.772	3.772	0.100 Not less than $442.12, Not to exceed $4,421.16	October 18, 2005 - U-14626	2/27/27
93	Michigan Wind I, LLC (f/k/a Noble Thumb Windpark, LLC.)	12.000	Wind	Average PSCR cost		Redacted	Redacted	0.100 Min of $384/Mo, but not to exceed $3,845/Mo	October 18, 2005 - U-14626	12/17/28
94	North American - Central, LLC (Pierson Station No. 1; f/k/a Venice Park)	3.200	Landfill Gas	Average PSCR cost		2.510	2.310	0.100 Min of $384/Mo, but not to exceed $3,845/Mo	July 23, 2020 - U-15805	5/31/26

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

PUBLIC ACT 295 CONTRACTS

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Line	**Public Act 295 Company**	**Contract Capacity** MW	**Fuel Type**	**Capacity Price** $/ZRC - Month	**Variable Energy Rate** **On-Peak** $/MWh	**Off-Peak** $/MWh	**REC Price** $/REC	**MPSC Order Approving Capacity Rate**	**Expected Termination Date**
96	Apple Blossom Wind, LLC (f/k/a Geronimo Huron Wind, LLC)	100.000	Wind	Redacted	0.430		Redacted	November 19, 2015 - U-15805	5/31/33
97	Beebe Renewable Energy (f/k/a Blissfield)	81.600	Wind	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	July 27, 2010 - U-15805	12/17/32
98	Generate Fremont Digester, LLC (f/k/a Fremont Community Digester)	2.850	Gas Digester	33,743.28	5.128		28.61	October 13, 2009 - U-15805	12/26/32
99	Harvest II Windfarm	59.400	Wind	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	July 27, 2010 - U-15805	10/31/32
100	DTE Garden Wind Farm, LLC	20.880	Wind/Solar	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	November 19, 2010 - U-15805	9/13/32
101	DTE Stoney Corners Wind Farm, LLC (Phase 2)	12.250	Wind	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	November 19, 2010 - U-15805	12/31/31
102	DTE Stoney Corners Wind Farm, LLC (Phase 3)	8.350	Wind	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	January 26, 2012 - U-15805	12/31/31
103	Michigan Wind 2	90.000	Wind	Redacted	2009 Renewable Energy Plan forecasted LMP		Redacted	July 27, 2010 - U-15805	12/31/31
104	North American-Central, LLC (Pierson Rd No. 2)	1.600	Landfill Gas	0.00	Day-Ahead LMP		32.03	July 23, 2020 - U-15805	12/15/30
105	WM Renewable Energy (Northern Oaks)	1.600	Landfill Gas	6,000.00	Day-Ahead LMP		10.88	October 13, 2009 - U-15805	11/10/30
106	WM Renewable Energy (Pine Tree Acres)	12.800	Landfill Gas	Redacted	2009 Renewable Energy Plan forecasted LMP		7.35	July 27, 2010 - U-15805	2/28/32

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

PUBLIC ACT 295 CONTRACTS - EXPERIMENTAL ADVANCED RENEWABLE PROGRAM - ANAEROBIC DIGESTION

Line	**Public Act 295 Company**	**Contract Capacity** MW	**Fuel Type**	**Capacity Price** $/ZRC - Month	**Variable Energy Rate** **On-Peak** $/MWh	**Off-Peak** $/MWh	**REC Price** $/REC	**MPSC Order Approving Capacity Rate**	**Expected Termination Date**
107	Green Meadow Farms, Inc.	0.800	Gas Digester	0.00	82.12		0.00	April 23, 2015 - U-15805	4/13/23
108	Brook View Dairy	0.600	Gas Digester	0.00	RT_LMP		0.00	April 23, 2015 - U-15805	7/31/23
109	Scenic View Dairy	0.400	Gas Digester	0.00	RT_LMP		0.00	April 23, 2015 - U-15805	7/31/23

PURCHASED POWER CONTRACT RATES AND MPSC APPROVAL ORDERS

PUBLIC ACT 295 CONTRACTS - EXPERIMENTAL ADVANCED RENEWABLE PROGRAM - SOLAR

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Line	**Public Act 295 Company**	**Contract Capacity**	**Fuel Type**	**Capacity Price**	**Variable Energy On-Peak**	**Variable Energy Off-Peak**	**REC Price**	**MPSC Order Approving Capacity Rate**	**Expected Termination Date[2]**
		MW		$/ZRC - Month	$/MWh	$/MWh	$/REC		
109	Experimental Advanced Renewable Program ("EARP") residential Phase 1[3]	0.180	Solar	-	650		-	December 21, 2010 - U-15805	Varies
110	Experimental Advanced Renewable Program ("EARP") non- residential Phase 1[3]	1.002	Solar	-	450		-	December 21, 2010 - U-15805	Varies
111	Experimental Advanced Renewable Program ("EARP") residential Phase 2[3]	0.291	Solar	-	525		-	May 10, 2011 - U-15805	Varies
112	Experimental Advanced Renewable Program ("EARP") non-residential Phase 2[3]	0.548	Solar	-	375		-	May 10, 2011 - U-15805	Varies
113	Experimental Advanced Renewable Program ("EARP") non-residential Phase 3	0.024	Solar	-	229 (1)		-	February 28, 2013 - U-15805	Varies
114	Experimental Advanced Renewable Program ("EARP") residential Phase 4	0.108	Solar	-	259 (1)		-	February 28, 2013 - U-15805	Varies
115	Experimental Advanced Renewable Program ("EARP") non-residential Phase 5	0.050	Solar	-	229 (1)		-	February 28, 2013 - U-15805	Varies
116	Experimental Advanced Renewable Program ("EARP") residential Phase 6	0.093	Solar	-	259 (1)		-	February 28, 2013 - U-15805	Varies
117	Experimental Advanced Renewable Program ("EARP") residential Phase 7	0.091	Solar	-	249 (1)		-	February 28, 2013 - U-15805	Varies
118	Experimental Advanced Renewable Program ("EARP") non-residential Phase 8	0.029	Solar	-	219 (1)		-	February 28, 2013 - U-15805	Varies
119	Experimental Advanced Renewable Program ("EARP") residential Phase 9	0.105	Solar	-	249 (1)		-	February 28, 2013 - U-15805	Varies
120	Experimental Advanced Renewable Program ("EARP") residential Phase 10	0.078	Solar	-	249 (1)		-	May 2, 2014 - U-15805	Varies
121	Experimental Advanced Renewable Program ("EARP") non-residential Phase 11	0.334	Solar	-	209 (1)		-	May 2, 2014 - U-15805	Varies
122	Experimental Advanced Renewable Program ("EARP") residential Phase 12	0.068	Solar	-	249 (1)		-	May 2, 2014 - U-15805	Varies
123	Experimental Advanced Renewable Program ("EARP") residential Phase 13	0.051	Solar	-	243 (1)		-	May 2, 2014 - U-15805	Varies
124	Experimental Advanced Renewable Program ("EARP") non-residential Phase 14	0.281	Solar	-	199 (1)		-	May 2, 2014 - U-15805	Varies
125	Experimental Advanced Renewable Program ("EARP") residential Phase 15	0.133	Solar	-	243 (1)		-	May 2, 2014 - U-15805	Varies
126	Experimental Advanced Renewable Program ("EARP") residential Phase 16	0.104	Solar	-	243 (1)		-	April 23, 2015 - U-15805	Varies
127	Experimental Advanced Renewable Program ("EARP") non-residential Phase 17	0.171	Solar	-	199 (1)		-	April 23, 2015 - U-15805	Varies
128	Experimental Advanced Renewable Program ("EARP") residential Phase 18	0.085	Solar	-	243 (1)		-	April 23, 2015 - U-15805	Varies
129	Experimental Advanced Renewable Program ("EARP") residential Phase 19	0.119	Solar	-	243 (1)		-	April 23, 2015 - U-15805	Varies
130	Experimental Advanced Renewable Program ("EARP") non-residential Phase 20	0.580	Solar	-	199 (1)		-	April 23, 2015 - U-15805	Varies
131	Experimental Advanced Renewable Program ("EARP") residential Phase 21	0.149	Solar	-	240 (1)		-	April 23, 2015 - U-15805	Varies
132	Experimental Advanced Renewable Program ("EARP") residential Phase 26	0.179	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
133	Experimental Advanced Renewable Program ("EARP") non-residential Phase 27	0.430	Solar	-	199 (1)		-	February 11, 2016 - U-15805	Varies
134	Experimental Advanced Renewable Program ("EARP") residential Phase 28	0.161	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
135	Experimental Advanced Renewable Program ("EARP") residential Phase 29	0.222	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
136	Experimental Advanced Renewable Program ("EARP") non-residential Phase 30	0.208	Solar	-	199 (1)		-	February 11, 2016 - U-15805	Varies
137	Experimental Advanced Renewable Program ("EARP") residential Phase 31	0.120	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
138	Experimental Advanced Renewable Program ("EARP") residential Phase 32	0.091	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
139	Experimental Advanced Renewable Program ("EARP") non-residential Phase 33	0.148	Solar	-	199 (1)		-	February 11, 2016 - U-15805	Varies
140	Experimental Advanced Renewable Program ("EARP") residential Phase 34	0.068	Solar	-	240 (1)		-	February 11, 2016 - U-15805	Varies
141	Experimental Advanced Renewable Program ("EARP") non-residential Phase 35	0.101	Solar	-	199 (1)		-	February 11, 2016 - U-15805	Varies

[1] Contracts awarded as part of EARP since Phase 3 inlcude a provision to pay an additional $1/MWh if certain conditions are satisfied. Most participants failed to satisfy the incentive provision.

[2] Contracts terminate no later than August 31, 2029

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-32 (BAS-2)
Page: 1 of 1
Witness: BASkowronski
Date: March 2024

FINANCIAL COMPENSATION MECHANISM (FCM) FORECAST

Line No.		(a)	(b)	(c)
		2024	2025	2026
1	Variable (Typcially Energy)	$ 2,683,476	$ 4,708,674	$ 5,328,715
2	Fixed (Typically Capacity)	$ 2,163,462	$ 3,682,452	$ 4,401,307
3	Total	$ 4,846,938	$ 8,391,126	$ 9,730,022

UNIT 2 START-UP, COLD BOILER START-UP PROCEDURE

Feedwater Circulation and Cleanup — Date — Initial

10. Have the SUBFP vented and drain any water that may have accumulated in the Oil Reservoir through the low point drain line using P-9-V-200 (O-floor) and P-9-V-202 (on the Mezz).

a. Check the four DRX's reset.

b. On the CONDENSATE / FEEDWATER OVERVIEW screen;
   (1) Check the Start-up BFP Recirc Valve in "Auto".
   (2) Start the Start-up BFP2 Lube Oil Pump by placing its control to "Start". Obseve oil flowing through bearing before starting pump.
   (3) Open the Start-up BFP2 Discharge Valve.
   (4) Start the Start-up Boiler Feed Pump while the discharge valve is still in travel (otherwise when it reaches full open it will automatically start to close) and open the SUBFP Flow Control Valve to decrease SUBFP discharge to less than 4700 psi.
   (5) Stop the Start-up BFP2 Lube Oil Pump, verify it transfers to 'Auto' and stays off.
   (6) See that the Main BFP recirc valve opens.

c. After flow is established on the Start-up Boiler Feed Pump, notify Unit 3, then begin admitting steam from Unit 3 to the Unit 2 deaerator extraction line as follows (if Unit 3 steam is unavailable, do not peg the DA):
   (1) Close Plant Heating Steam To No.2 Glycol Heat Exchanger Isolation Valve P-19-V-143 (6" valve).
   (2) Open Glycol Heat Exchanger Extraction Steam Supply Valve 2-40-V-231 (10" valve).
   (3) Slowly open Heating Steam Header Supply From No.2 Glycol Heat Exchanger Steam Line Valve P-19-V-199 exchanger steam supply line.
   (4) Open Steam Line Attemperator Outlet Valve P-19-V-202
   (5) Crack open Steam Tie Line Aux Steam Isolation Valve P-19-V-293.

d. If any boiler circuits, including economizer, were drained, the economizer outlet header vent valves 2-33-V-018 and 2-33-V-019, the furnace west wall outlet header vent valves 2-33-V-020 and 2-33-V-021, the roof outlet header vent valves 2-33-V-015 and 2-33-V-089 and the SH west wall header vent valves 2-33-V-010 and 2-33-V-011 should be open.

e. Gradually increase feedwater flow to 400,000 lb/h. Close in order as water appears at the vent stack drain, the economizer outlet header vents, the furnace west wall outlet header vent, the roof outlet header vent and finally the SH west wall header vent. The estimated time to fill the economizer is 30 minutes; the remainder of the boiler will, depending upon what circuits were drained, require up to 60 minutes to fill. When SH enclosure vent is closed, increase feedwater flow to minimum as described below.

f. After the boiler has been filled, have the economizer outlet header vent root valve

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-34 (RTS-6)
Page: 1 of 1
Witness: RTScaife
Date: January 2025

TES Filer Booked Expense Reconciliation 2023

Line No.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
	Month	Total MWH	Delivered Energy	Monthly Security Payment	Mitigated Energy	Capacity	Fixed Energy	Adminstrative Fee	Escrow Amount	Total Invoice
1	January	40,278.000	$ 1,500,661.16		$ -	$ 2,017,087.18	$ -	$ (2,000.00)		$ 3,515,748.34
2	February	40,194.000	$ 1,513,110.59		$ -	$ 1,977,750.37	$ -	$ (2,000.00)		$ 3,488,860.96
3	March	44,730.000	$ 1,703,743.75		$ -	$ 2,204,870.00	$ -	$ (2,000.00)		$ 3,906,613.75
4	April	44,344.000	$ 1,650,269.54		$ -	$ 2,119,800.00	$ -	$ (2,000.00)		$ 3,768,069.54
5	May	12,697.425	$ 486,939.84	$ 200,000.00	$ -	$ 1,765,956.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,250,895.84
6	June	14,754.463	$ 574,191.46	$ 200,000.00	$ -	$ 2,134,500.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,706,691.46
7	July	14,798.142	$ 609,554.64	$ 200,000.00	$ -	$ 2,185,560.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,793,114.64
8	August	19,208.279	$ 760,555.28	$ 200,000.00	$ -	$ 2,207,610.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,966,165.28
9	September	14,343.813	$ 559,927.08	$ 200,000.00	$ -	$ 2,058,256.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,616,183.08
10	October	29,625.787	$ 1,179,931.30	$ 200,000.00	$ -	$ 2,181,272.45	$ -	$ (2,000.00)	$ (200,000.00)	$ 3,359,203.75
11	November	26,268.535	$ 1,032,616.66	$ 200,000.00	$ -	$ 2,054,490.88	$ -	$ (2,000.00)	$ (200,000.00)	$ 3,085,107.54
12	December	17,101.434	$ 670,527.65	$ 200,000.00	$ -	$ 2,185,560.00	$ -	$ (2,000.00)	$ (200,000.00)	$ 2,854,087.65
13	**Total of Final Invoices**	**318,343.878**	**$ 12,242,029**	**$ 1,600,000**	**$ -**	**$ 25,092,713**	**$ -**	**$ (24,000)**	**$ (1,600,000)**	**$ 37,310,742**
14	December 2022 True-Up (recorded in January 2023)	96.000				$ (2,093.94)				$ (2,093.94)
15	December 2023 True-Up (Recorded in January 2024)	54.434				$ 179,996.21				$ 179,996.21
16	**Net Adjustments**	**41.57**	**$ -**	**$ -**	**$ -**	**$ (182,090)**	**$ -**	**$ -**	**$ -**	**(182,090.150)**
17	**Total Booked Expense**	**318,385.444**	**$ 12,242,029**	**$ 1,600,000**	**$ -**	**$ 24,910,623**	**$ -**	**$ (24,000)**	**$ (1,600,000)**	**37,128,651.680**

From PSCR Reconciliation Case (U-21258 A-29 (RTS-4))

	Company Name	MWH	Variable Energy $	Admin Fees $	Net Energy $	Fixed Energy $	Capacity $	Total $	
18	Line 69. Filer City	318,385	12,242,029	(24,000)	12,218,029	0	26,510,623	38,728,652	1,600,000.000
		0.00	$ (0)	$ -		$ -	$ -		

MICHIGAN PUBLIC SERVICE COMMISSION
Consumers Energy Company

Case No.: U-21258
Exhibit No.: A-35 (RTS-7)
Page: 1 of 1
Witness: RTScaife
Date: January 2025

Cadillac Booked Expense Reconciliation 2023

Line No.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
	Month	Total MWH	Delivered Energy	Mitigated Energy	Capacity	Fixed Energy	Admin Fee	Other	Total Invoice
1	January	10,401.860	$ 327,658.59	$ (146,976.96)	$ 1,063,227.60	$ 152,612.40	$ (2,000.00)		$ 1,394,521.63
2	February	9,443.696	$ 300,309.52	$ (37,519.51)	$ 960,472.80	$ 137,863.20	$ (2,000.00)		$ 1,359,126.01
3	March	7,998.545	$ 256,753.30	$ (27,098.55)	$ 817,016.13	$ 117,271.15	$ (2,000.00)		$ 1,161,942.03
4	April	10,066.824	$ 326,165.11	$ (35,039.65)	$ 1,027,548.00	$ 149,940.00	$ (2,000.00)		$ 1,466,613.46
5	May	10,705.515	$ 348,999.81	$ (35,196.87)	$ 1,063,227.60	$ 155,142.00	$ (2,000.00)		$ 1,530,172.54
6	June	11,095.620	$ 362,826.80	$ (29,269.84)	$ 1,029,690.00	$ 150,246.00	$ (2,000.00)		$ 1,511,492.96
7	July	12,772.511	$ 417,594.07	$ (40,944.56)	$ 1,061,085.60	$ 154,836.00	$ (2,000.00)		$ 1,590,571.11
8	August	10,646.751	$ 350,278.09	$ (26,871.15)	$ 968,012.25	$ 141,246.78	$ (2,000.00)		$ 1,430,665.97
9	September	9,156.926	$ 304,925.63	$ (14,506.05)	$ 798,470.78	$ 116,514.83	$ (2,000.00)		$ 1,203,405.19
10	October	12,541.443	$ 420,138.40	$ (15,450.49)	$ 1,063,056.68	$ 155,117.06	$ (2,000.00)		$ 1,620,861.65
11	November	11,429.608	$ 382,891.87	$ (18,037.36)	$ 1,022,240.40	$ 149,163.00	$ (2,000.00)		$ 1,534,257.91
12	December	11,297.133	$ 377,324.23	$ (14,141.19)	$ 1,061,085.60	$ 154,836.00	$ (2,000.00)	$ (398,228.75)	$ 1,178,875.89
13	**Total of Final Invoices**	**127,556.432**	**$ 4,175,865**	**$ (441,052)**	**$ 11,935,133**	**$ 1,734,788**	**$ (24,000)**	**$ (398,229)**	**$ 16,982,506**
14	December 2022 True-Up (recorded in January 2023)	111.070			$ (436,076.99)				$ (436,076.99)
15	December 2023 True-Up (Recorded in January 2024)	25.133			$ (334,197.87)				$ (334,197.87)
16	**Net Adjustments**	**85.94**	**$ -**	**$ -**	**$ (101,879)**	**$ -**	**$ -**	**$ -**	**(101,879.120)**
17	**Total Booked Expense**	**127,642.369**	**$ 4,175,865**	**$ (441,052)**	**$ 11,833,254**	**$ 1,734,788**	**$ (24,000)**	**$ (398,229)**	**16,880,627.230**

From PSCR Reconciliation Case (U-21258 A-29 (RTS-4))

	Company Name	MWH	Variable Energy $	Admin Fees $	Net Energy $	Fixed Energy $	Capacity $	Total $
18	Line 68. Cadillac Renewable	127,642	3,734,813	(24,000)	3,710,813	1,734,788	11,435,026	16,880,627
		-	$ 0	$ -		$ 0.00	$ 0	

U21258-AG-CE-0120
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Question:

85. Refer to lines 9-12 on page 11 of Mr. Hoffman's rebuttal testimony on the Campbell Unit 3 Outage Event 111 and the discussion about other tubing failing. Please confirm the fact that other tubing may fail due to continued operation under temperature and pressure does not justify or explain the installation of incorrect tubing material that it was determined resulted in the power outage for this event. If not confirming, please explain how the other tubing relates to a failure due to the incorrect tubing being installed.

Response:

The tubing material and its operation under temperature and pressure are discrete issues, as the question suggests, although both could be contributing factors to tube failure. The sheer volume of superheat platen tubing used in the boiler at Campbell Unit 3 makes it impossible to cost-effectively inspect, replace, or analyze all the tubing. Each platen element is made up of 26 tubes configured in a U-loop, approximately 45 feet in length, giving approximately 90 linear feet of tubing. This totals 2340 linear feet per loop assembly. Each superheat platen is made up of a pair of loops, bringing the total to 4,680 linear feet of tubing. There are 22 of these pairs in Campbell Unit 3, resulting in over 100,000 linear feet of tubing. Assuming each U-loop is made up of 6 individual tubes, the Company would have up to 264 locations to access, clean, and sample, leaving the Company with a large undertaking, considering the components are hanging from the roof, more than 100 feet above the bottom of the furnace. Estimated costs to replace each of these tubes would be approximately $5-10 million in material and another $5-10 million for labor, crane, equipment, scaffolding, etc. Now consider the potential replacement power costs for an outage to complete this work, which would take approximately 4 weeks. Considering the unit is retiring in May of 2025 and the tube in question lasted 17 of the expected 25 years of life, it would not have been reasonable, nor prudent, to replace the remaining tubing nor perform metallurgical analysis on all original tubing prior to installation.

Witness: Nathan J. Hoffman
Date: March 11, 2025

U21258-AG-CE-0124
Page **1** of **1**

Question:

89. Refer to lines 3-8 on page 15 of Mr. Hoffman's rebuttal testimony on the Campbell Unit 3 Outage Event 231. If preventive maintenance would not have prevented the fault or eliminated the outage, what would have prevented it?

Response:

The only way the Company could have prevented the outage from occurring – the outage discussed on page 15 of my rebuttal testimony – was to have known that damage was occurring from cycling the breakers over time. It would have required a far more invasive inspection of the motor control center ("MCC"), and there was no known reason to do that based on information available at the time. Further, it was not a recommended action by the manufacturer.

Witness: Nathan J. Hoffman
Date: March 11, 2025

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter of the application of **CONSUMERS ENERGY COMPANY** for reconciliation of its power supply cost recovery plan (Case No. U-21257) for the 12 months ended December 31, 2023.	))))))	Case No. U-21258

PROOF OF SERVICE

STATE OF MICHIGAN)
) SS
COUNTY OF JACKSON)

Crystal L. Chacon, being first duly sworn, deposes and says that she is employed in the Legal Department of Consumers Energy Company; that on March 20, 2025, she served an electronic copy of **Consumers Energy Company's Official Exhibits** upon the persons listed in Attachment 1 hereto, at the e-mail addresses listed therein.

Crystal L. Chacon

Crystal L. Chacon

Subscribed and sworn to before me this 20th day of March, 2025.

Melissa K. Harris

Melissa K. Harris, Notary Public
State of Michigan, County of Jackson
My Commission Expires: 06/11/2027
Acting in the County of Hillsdale

ATTACHMENT 1 TO CASE NO. U-21258

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* Receives Confidential Materials