



GRAIN BELT EXPRESS PRICE STUDY

March 2023

CONFIDENTIAL & PROPRIETARY

SYSTEM-WIDE MARGINAL ENERGY COST REDUCTION

Month	GBE_Retire	BAU_Retire	Delta (GBE - BAU)
Jan	79.82	83.07	(3.25)
Feb	56.85	58.23	(1.38)
Mar	49.51	51.59	(2.08)
Apr	34.99	35.80	(0.81)
May	35.61	36.58	(0.97)
Jun	47.28	48.60	(1.32)
Jul	60.40	62.36	(1.96)
Aug	54.45	56.32	(1.87)
Sep	48.52	50.71	(2.19)
Oct	44.19	45.62	(1.43)
Nov	46.96	48.69	(1.72)
Dec	56.22	58.46	(2.24)
Annual Avg MEC	51.23	53.00	(1.77)

Projected 2028 cost savings to serve MISO load by reducing MEC on average \$1.77/MWh

	GBE_Retire	BAU_Retire	Delta (GBE_Retire - BAU_Retire)
Annual Energy Cost to Serve Load (\$)	\$40,259,232,258	\$41,415,591,325	(\$1,156,359,066)
Annual Energy_MISO (MWh)	748,054,275		

- $LMP = MEC + MCC + MLC$
- MEC – Marginal Energy Component; MCC – Marginal Congestion Component; MLC – Marginal Loss Component

APPENDIX

MONTHLY AVERAGE LMP (\$/MWH)

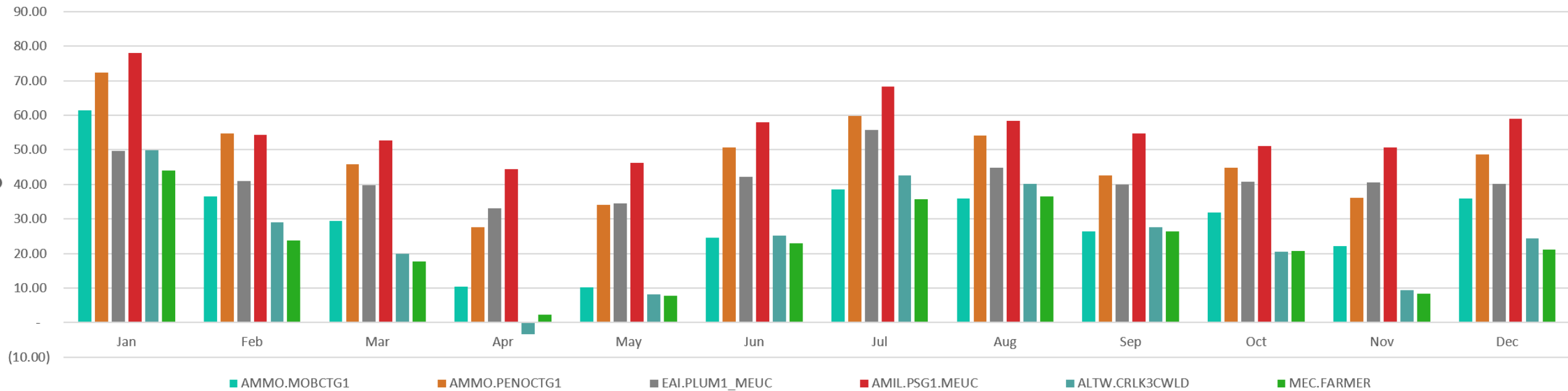
GBE_Retire Monthly Avg LMP (\$/MWh)

Month	AMMO.MOBCTG1	AMMO.PENOGT1	EAI.PLUM1_MEUC	AMIL.PSG1.MEUC	ALTW.CRLK3CWLD	MEC.FARMER	AECI	Injection to AECI	Injection to MISO	AMMO.HANN_1.AZ	SWPP	CWLD.CWLD	AMMO.KIRK	WR.MOWR
Jan	61.42	72.45	49.62	78.05	49.82	44.07	53.45	58.04	57.04	77.85	51.89	63.89	77.14	78.16
Feb	36.47	54.68	40.95	54.35	29.07	23.77	34.14	32.06	29.97	58.60	32.95	37.72	55.07	58.05
Mar	29.43	45.78	39.83	52.80	19.84	17.61	27.23	24.95	24.23	49.32	24.94	30.96	51.83	61.11
Apr	10.42	27.63	33.18	44.49	(3.29)	2.22	14.20	4.88	2.74	28.98	12.30	11.25	42.03	40.56
May	10.23	34.19	34.54	46.27	8.20	7.70	16.85	2.87	0.38	30.48	17.12	9.80	45.55	31.65
Jun	24.60	50.71	42.11	57.90	25.23	23.03	28.14	18.47	14.88	48.27	27.14	24.44	56.75	44.75
Jul	38.63	59.79	55.85	68.33	42.54	35.74	41.37	33.97	31.46	59.34	38.63	39.80	67.28	57.43
Aug	35.91	54.12	44.73	58.41	40.24	36.60	40.20	31.75	27.43	51.66	38.87	35.15	58.39	51.13
Sep	26.30	42.55	39.94	54.67	27.66	26.50	31.64	22.12	16.25	43.37	29.95	25.81	51.75	43.21
Oct	31.86	44.76	40.84	51.06	20.43	20.78	33.68	27.78	24.97	45.51	29.66	31.23	50.65	48.58
Nov	22.13	36.07	40.66	50.77	9.34	8.42	25.40	19.91	17.17	44.58	22.99	24.04	47.69	62.21
Dec	35.87	48.64	40.25	58.97	24.33	21.24	34.90	33.22	30.83	55.27	32.50	37.92	56.70	62.49

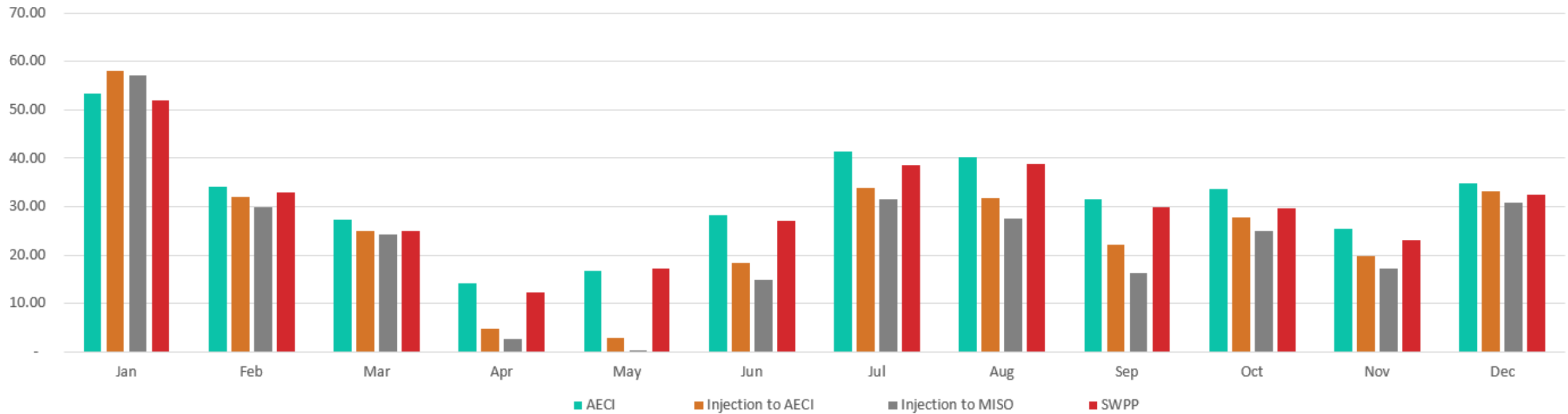
BAU_Retire Monthly Avg LMP (\$/MWh)

Month	AMMO.MOBCTG1	AMMO.PENOGT1	EAI.PLUM1_MEUC	AMIL.PSG1.MEUC	ALTW.CRLK3CWLD	MEC.FARMER	AECI	Injection to AECI	Injection to MISO	AMMO.HANN_1.AZ	SWPP	CWLD.CWLD	AMMO.KIRK	WR.MOWR
Jan	92.59	83.88	52.13	85.04	53.28	46.24	63.73	86.40	85.13	86.25	56.26	99.69	86.41	89.10
Feb	70.91	60.86	42.05	60.02	31.13	22.97	42.75	64.22	61.15	62.77	35.09	78.91	61.53	63.94
Mar	66.06	54.18	40.96	56.07	22.86	18.04	36.16	58.83	55.57	55.51	27.70	74.07	57.44	58.20
Apr	30.57	33.53	33.91	44.04	(2.04)	3.57	20.74	23.79	36.28	34.89	14.75	32.04	44.31	46.70
May	23.07	34.32	35.01	45.97	10.32	11.78	24.45	18.18	33.93	34.97	22.35	20.17	45.58	43.57
Jun	46.83	50.95	42.37	56.38	28.04	26.70	36.43	43.57	46.58	52.55	31.36	48.75	56.49	53.49
Jul	61.81	63.69	56.87	68.66	45.87	41.18	50.55	59.54	60.07	66.53	44.01	64.47	68.50	66.05
Aug	54.73	55.93	44.54	59.19	43.23	42.65	49.15	54.31	54.33	56.93	44.80	54.26	59.37	58.29
Sep	46.91	47.34	40.37	55.05	29.33	31.75	41.13	45.41	49.28	50.03	35.63	46.11	54.40	52.76
Oct	49.29	48.16	41.64	52.51	22.00	23.19	40.46	45.76	49.93	48.94	33.08	49.53	53.11	52.90
Nov	63.43	50.06	43.02	55.65	10.58	8.18	35.39	56.95	53.76	53.23	24.88	74.06	56.03	59.29
Dec	68.94	59.27	42.15	63.30	26.02	21.09	44.44	63.35	60.85	62.23	35.79	77.09	63.94	65.26

GBE_Retire: Monthly Average LMP (\$/MWh) - 1/3



GBE_Retire: Monthly Average LMP (\$/MWh) - 2/3



GBE_Retire: Monthly Average LMP (\$/MWh) - 3/3



ASSUMPTIONS IN DAYZER

- Dayzer RTO models come from IDC planning model topology + custom additions built on top
- Units modeled in Dayzer come from RTO GIQ that have substantial expectation to be operational in the future
- Units with executed GIAs, Projects mentioned in Press Statements, featured in IRPs are filtered by CES in the model
- The Unit Installation Dates, Capacity and unit characteristics come from RTO and public sources
- Transmission network assumptions are updated based on RTO quarterly reports, Step reports, NTC trackers
- Retirement dates of Units are based on CES's planning studies and public information
- Unit Gen_Schedules for Wind by default comes from CES
- CES uses RTMA (Real Time Mesoscale Analysis) data from NOAA to generate wind schedules based on lat/long of the future units

UNITS DELAYED RETIREMENT DATE IN RETIRE SENSITIVITY SCENARIO

Generation Unit	Zone	Type	Capacity	Submarket	Owner	Unit Id	Installation Date	Retirement Date	LifeSpan
Sioux 1	Central Illinois Public Service	STc+	475	MISO	Ameren	6874	1/1/1970	10/1/2027	57
Sioux 2	Central Illinois Public Service	STc+	475	MISO	Ameren	6875	1/1/1970	10/1/2027	57
Warrick 1	Southern Indiana Gas	STc+	155	MISO	SIGE_CO	11064	11/1/1970	10/1/2027	57
Warrick 2	Southern Indiana Gas	STc+	155	MISO	SIGE_CO	11065	11/1/1970	10/1/2027	57
Warrick 3	Southern Indiana Gas	STc+	155	MISO	SIGE_CO	11066	11/1/1970	10/1/2027	57
Warrick 4	Southern Indiana Gas	STc+	300	MISO	SIGE_CO	7185	11/1/1970	10/1/2027	57
Merom 1	Hoosier Energy	STc+	507	MISO	HEC_CO	6109	1/1/1970	10/1/2026	56
Merom 2	Hoosier Energy	STc+	493	MISO	HEC_CO	6110	1/1/1970	10/1/2026	56
Monroe 3	Detroit Edison	STc+	750	MISO	DECO_CO	6192	5/1/1973	5/31/2028	55
Monroe 4	Detroit Edison	STc+	750	MISO	DECO_CO	6193	5/1/1974	5/31/2028	54
Michigan City 12	Northern Indiana Public Service	STc+	469	MISO	NIPS_CO	6130	5/1/1974	10/1/2026	52
White Bluff 1	Entergy	STc+2	815	MISO South	DEFAULT	7254	8/1/1980	12/31/2027	47
White Bluff 2	Entergy	STc+2	844	MISO South	DEFAULT	7255	7/1/1981	12/31/2028	47
Clinton	Illinois Power - Soyland/Ameren	NU	1073	MISO	IPSP_CO	4733	10/2/2003	5/31/2027	24
Dallman 4	Springfield - Illinois/City Wat	STc+1	200	MISO	SPFI_CO	7395	11/1/2009	5/31/2027	18

BAU Case Retirements



Existing Model Retirement Assumptions (retirements between 2023-2028)							
	Coal	Deisel	Gas	Nuclear	Water	Wind	Total
Retired Capacity	20,867	638	7,230	1,085	22	15	29,857

Revised Case Retirements



Revised Model Retirement Assumptions (retaining all units with less than 60 year life by 2028)							
	Coal	Deisel	Gas	Nuclear	Water	Wind	Total
Retired Capacity	8,593		1,027	1,085		15	10,720

Additional Capacity



Retirement Assumptions Delta							
	Coal	Deisel	Gas	Nuclear	Water	Wind	Total
Retired Capacity	12,274	638	6,203	-	22	-	19,137