Chapter 9 - Appendix A

Candidate Resource Plans

Table 9.A.1 Type, Size, Timing of Resource Addition/Retirement[1]

	Plan B1: Combined Cycle - No Secondary - Prop C Renewables - Low Risk DSM - Mer continues - Nor continues	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	16	16	20	21	24	26	29	31	34	37	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-47	-78	-105	-137	-171	-205	-239	-287	-333	-372	-412	-450	-489	-526	-567	-606	-642	-675	-708	-735
-	Demand response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-20	-83	-158	-236	-329
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-67	295	659	618	604	476	512	483	426	411	358	302	245	184	119	75	67	61	58	60
	Purchases(+) or sales(-)	67	-295	-659	-618	-604	-476	-512	-483	-426	-411	-358	-302	-245	-184	-119	-75	-67	-61	-58	-60

	Plan B2: Combined Cycle - Nuke 30% - Prop C Renewables - Low Risk DSM - Mer continues - Nor continues	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	15	85	85	85	91	91	91	91	68	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	480	480	480
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	286	643	593	567	513	569	534	461	407	332	258	178	73	-17	-103	-194	185	85	-20
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-513	-569	-534	-461	-407	-332	-258	-178	-73	17	103	194	-185	-85	20

	Plan B3: Combined Cycle - Simple Cycle - Prop C Renewables - Low Risk DSM - Mer continues - Nor continues	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	15	85	85	85	91	91	91	91	68	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	692	692
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	286	643	593	567	513	569	534	461	407	332	258	178	73	-17	-103	-194	-295	297	192
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-513	-569	-534	-461	-407	-332	-258	-178	-73	17	103	194	295	-297	-192

	Plan B4: Combined Cycle - Wind/Simple Cyc - Prop C Renewables - Low Risk DSM - Mer continues - Nor continues	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	15	85	85	85	91	91	91	91	68	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	410	410
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	286	643	593	567	513	569	534	461	407	332	258	178	73	-17	-103	-194	115	15	-90
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-513	-569	-534	-461	-407	-332	-258	-178	-73	17	103	194	-115	-15	90

	Plan C1: Combined Cycle - No Secondary - Prop C Renewables - Low Risk DSM - Mer controlled - Nor continues	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	286	643	593	567	439	495	460	387	357	282	208	128	46	-45	-131	-222	277	177	72
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-439	-495	-460	-387	-357	-282	-208	-128	-46	45	131	222	-277	-177	-72

[1] For the 14 final candidate resource plans: 4 CSR 240-22.060(6)(A)

Plan C2: Combined Cycle - No Secondary - Prop C Renewables - Low Risk DSM - Mer nat gas convert - Nor continues

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	277	209	127	24	-63	-157	-253	-352	-453	-561	-667	-777	-893	-1,010	-1,130
+	Total plant upgrades/adjustmts	2	6	30	34	38	-31	39	39	39	69	69	69	69	69	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	286	643	593	567	426	482	447	374	344	269	195	115	33	-58	-144	-235	264	164	59
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-426	-482	-447	-374	-344	-269	-195	-115	-33	58	144	235	-264	-164	-59

Plan C3: Combined Cycle - Combined Cycle - Prop C Renewables - Low Risk DSM - Mer retire 2016 - Nor continues

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600	600	600	600
=	Capacity position after adjustmts	-66	286	643	593	567	185	241	206	133	103	28	-46	-126	-208	-299	215	124	23	-77	-182
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-185	-241	-206	-133	-103	-28	46	126	208	299	-215	-124	-23	77	182

Plan H1: Combined Cycle - Nuke 30% - Prop C Renewables - Low Risk DSM - Mer retire 2016 - Nor continues

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	480	480	480	480	480	480
=	Capacity position after adjustmts	-66	286	643	593	567	185	241	206	133	103	28	-46	-126	-208	181	95	4	-97	-197	-302
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-185	-241	-206	-133	-103	-28	46	126	208	-181	-95	-4	97	197	302

Plan H2: Combined Cycle - Simple Cycle - Prop C Renewables - Low Risk DSM - Mer retire 2016 - Nor continues

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	692	692	692	692
=	Capacity position after adjustmts	-66	286	643	593	567	185	241	206	133	103	28	-46	-126	-208	-299	307	216	115	15	-90
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-185	-241	-206	-133	-103	-28	46	126	208	299	-307	-216	-115	-15	90

Plan H3: Combined Cycle - Wind/Simple Cyc - Prop C Renewables - Low Risk DSM - Mer retire 2016 - Nor continues

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854
+	Renewables	0	0	8	8	8	12	12	17	17	20	21	23	26	28	31	33	36	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-49	-69	-88	-111	-134	-154	-172	-189	-201	-206	-216	-223	-228	-232	-235	-235	-235	-236	-235	-232
-	Demand response	0	0	0	0	0	-14	-49	-75	-93	-111	-121	-133	-145	-157	-167	-185	-202	-213	-229	-244
+	New primary supply side	0	0	0	0	0	600	600	600	600	600	600	600	600	600	600	600	600	600	600	600
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	410	410	410	410	410	410	410
=	Capacity position after adjustmts	-66	286	643	593	567	185	241	206	133	103	28	-46	-126	202	111	25	-66	-167	-267	-372
	Purchases(+) or sales(-)	66	-286	-643	-593	-567	-185	-241	-206	-133	-103	-28	46	126	-202	-111	-25	66	167	267	372

	Plan R0: No Primary - No Secondary - Prop C Renewables - RAP DSM - Mer continues - Nor continues																			
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	15	85	85	85	91	91	91	91	68	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	16	16	20	21	24	26	29	31	34	37	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-48	-85	-134	-210	-306	-407	-507	-603	-688	-758	-825	-883	-927	-955	-977	-989	-1,000	-1,006	-1,009	-1,007
-	Demand response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	302	688	692	739	752	854	873	855	847	821	785	733	639	557	466	370	262	151	31
	Purchases(+) or sales(-)	66	-302	-688	-692	-739	-752	-854	-873	-855	-847	-821	-785	-733	-639	-557	-466	-370	-262	-151	-31

	Plan R1: No Primary - No Secondary - Prop C Renewables - RAP DSM - Mer controlled - Nor continues																			
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	16	16	20	21	24	26	29	31	34	37	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-48	-85	-134	-210	-306	-407	-507	-603	-688	-758	-825	-883	-927	-955	-977	-989	-1,000	-1,006	-1,009	-1,007
-	Demand response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	302	688	692	739	678	780	799	781	797	771	735	683	612	529	438	342	234	123	3
	Purchases(+) or sales(-)	66	-302	-688	-692	-739	-678	-780	-799	-781	-797	-771	-735	-683	-612	-529	-438	-342	-234	-123	-3

	Plan R2: No Primary - No Secondary - Prop C Renewables - RAP DSM - Mer nat gas convert - Nor continues																			
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	277	209	127	24	-63	-157	-253	-352	-453	-561	-667	-777	-893	-1,010	-1,130
+	Total plant upgrades/adjustmts	2	6	30	34	38	-31	39	39	39	69	69	69	69	69	69	69	69	69	69	69
+	Meramec retirement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	Renewables	0	0	8	8	8	12	12	16	16	20	21	24	26	29	31	34	37	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-48	-85	-134	-210	-306	-407	-507	-603	-688	-758	-825	-883	-927	-955	-977	-989	-1,000	-1,006	-1,009	-1,007
-	Demand response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-20
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	302	688	692	739	665	767	786	768	784	758	722	670	599	516	425	329	221	110	10
	Purchases(+) or sales(-)	66	-302	-688	-692	-739	-665	-767	-786	-768	-784	-758	-722	-670	-599	-516	-425	-329	-221	-110	-10

	Plan R3: No Primary - No Secondary - Prop C Renewables - RAP DSM - Mer retire 2016 - Nor continues																			
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	Existing capacity position	-117	211	516	440	387	318	250	168	65	-22	-116	-212	-311	-412	-520	-626	-736	-852	-969	-1,089
+	Total plant upgrades/adjustmts	2	6	30	34	38	-59	11	11	11	41	41	41	41	41	41	41	41	41	41	41
+	Meramec retirement	0	0	0	0	0	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854	-854
+	Renewables	0	0	8	8	8	12	12	16	16	20	21	24	26	29	31	34	37	39	41	44
+	Noranda termination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	Energy efficiency	-48	-85	-134	-210	-306	-407	-507	-603	-688	-758	-825	-883	-927	-955	-977	-989	-1,000	-1,006	-1,009	-1,007
-	Demand response	0	0	0	0	0	-20	-83	-158	-236	-329	-399	-474	-549	-620	-679	-732	-765	-784	-805	-826
+	New primary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+	New secondary supply side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
=	Capacity position after adjustmts	-66	302	688	692	739	-156	10	103	163	272	316	355	378	378	354	316	252	164	74	-25
	Purchases(+) or sales(-)	66	-302	-688	-692	-739	156	-10	-103	-163	-272	-316	-355	-378	-378	-354	-316	-252	-164	-74	25

Figure 9.A.1 Combined Impact of DSM on Summer Peak Demand[2]

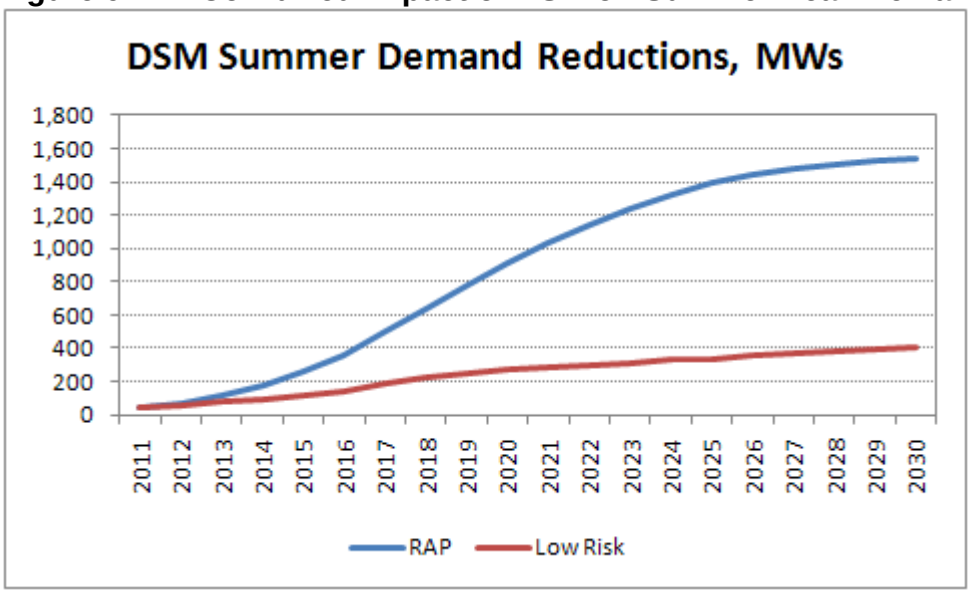
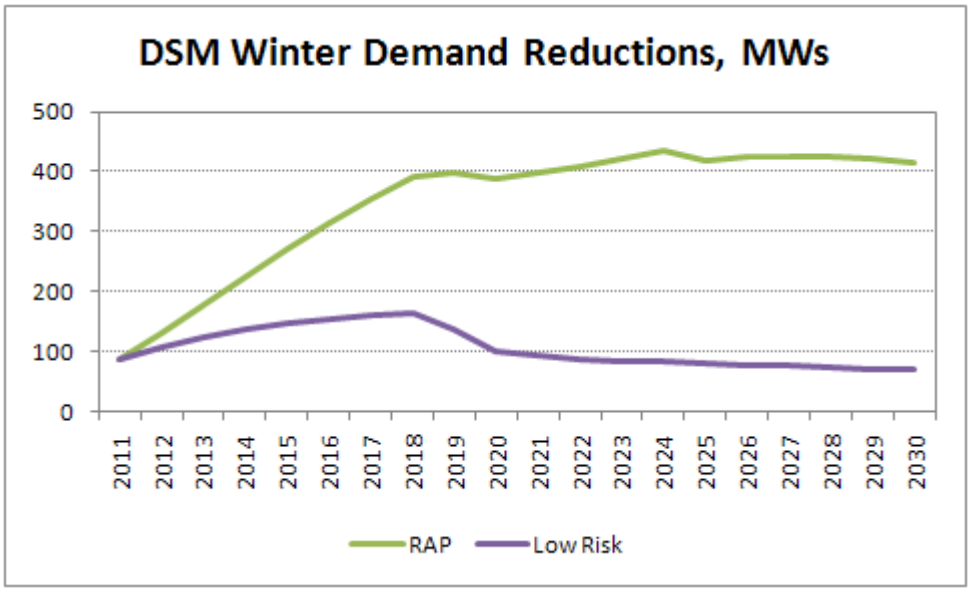
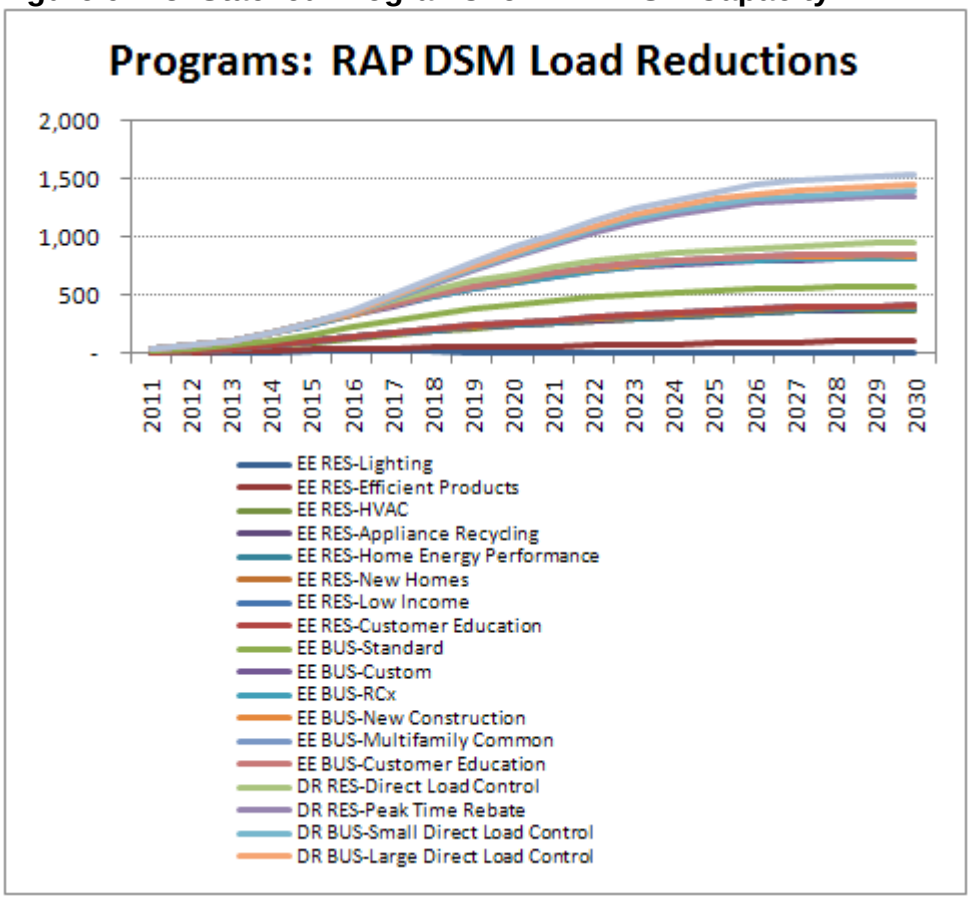


Figure 9.A.2 Combined Impact of DSM on Winter Peak Demand[3]



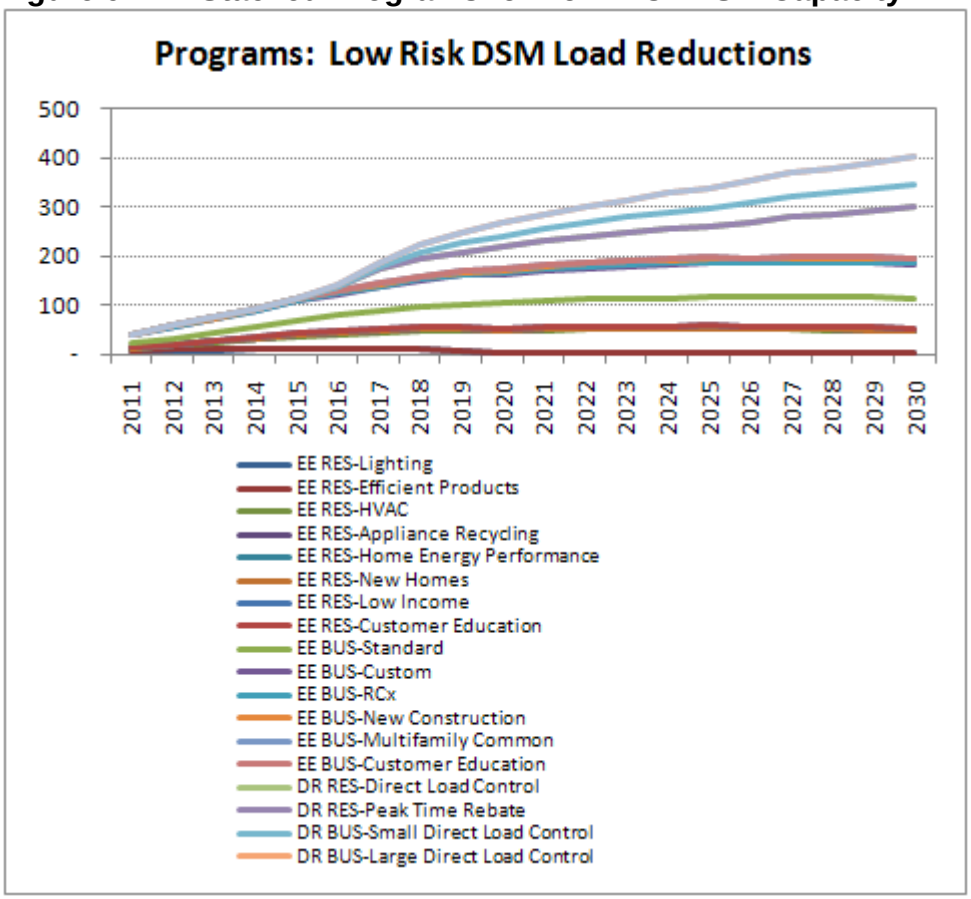
[2] 4 CSR 240-22.060(6)(C)1.
[3] 4 CSR 240-22.060(6)(C)1.
14 candidate resource plans - 060(6)(C)(1,2,4,5).xlsx

Figure 9.A.3 Stacked Programs for RAP DSM Capacity[4]



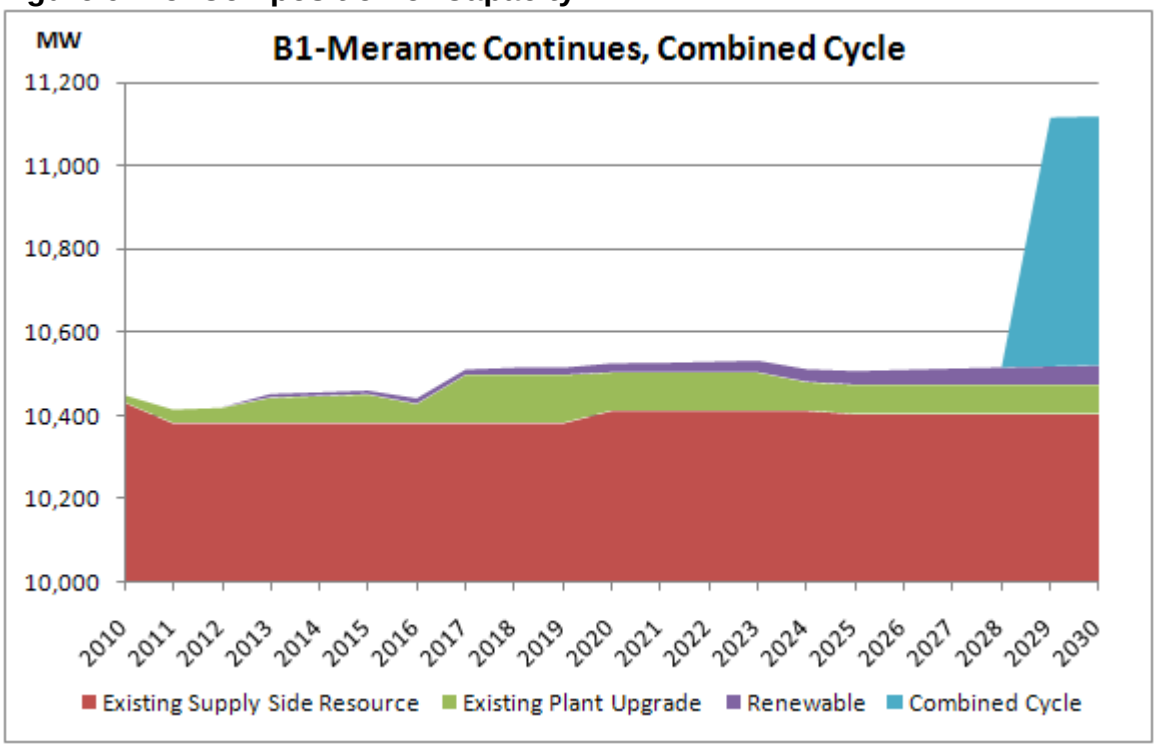
[4] 4 CSR 240-22.060(6)(C)2.
14 candidate resource plans - 060(6)(C)(1,2,4,5).xlsx

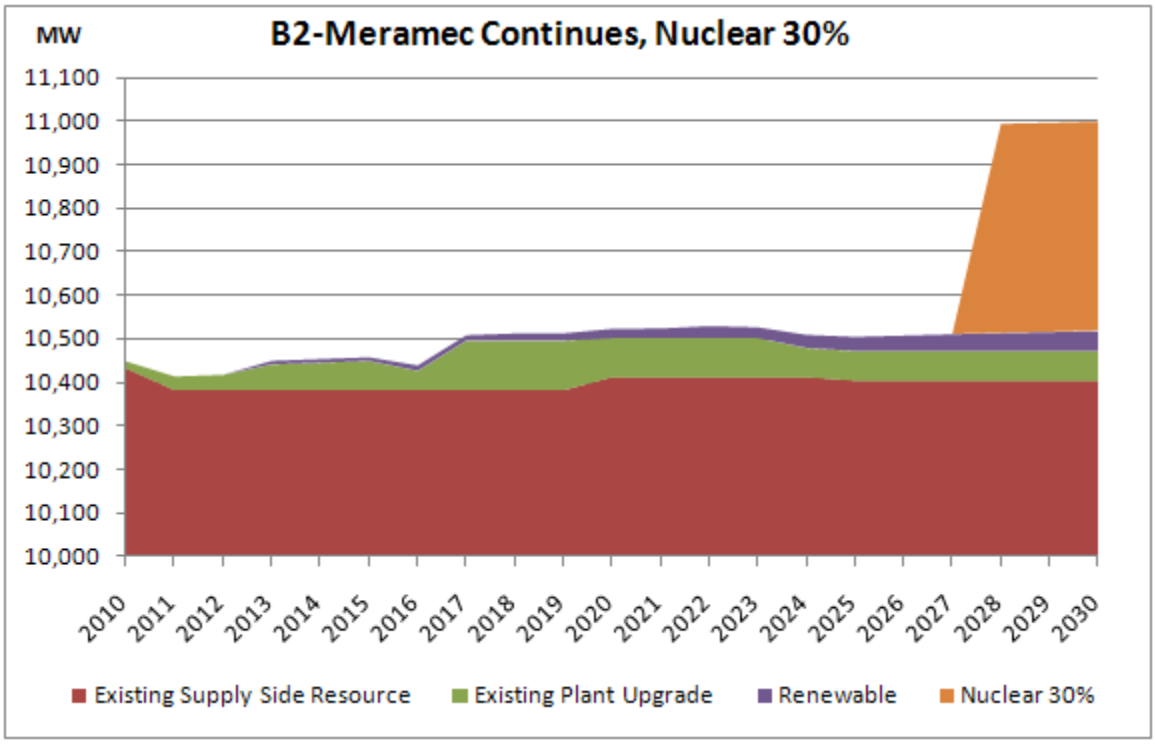
Figure 9.A.4 Stacked Programs for Low Risk DSM Capacity[5]



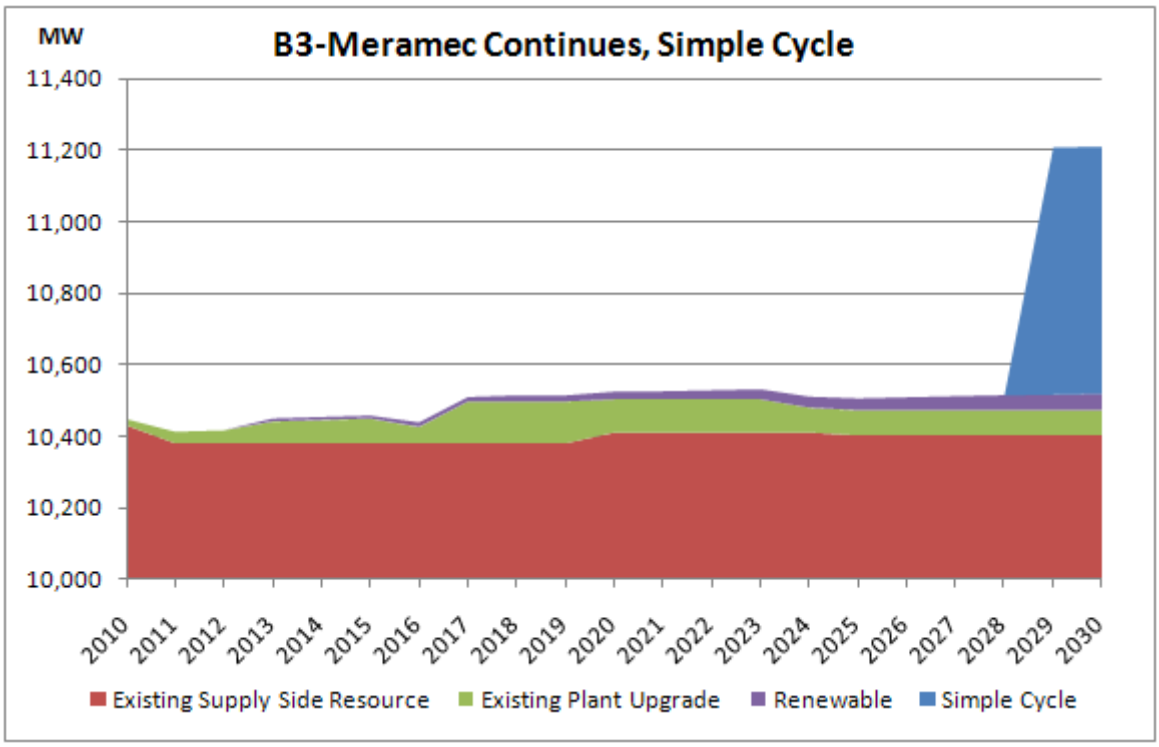
[5] 4 CSR 240-22.060(6)(C)2.
14 candidate resource plans - 060(6)(C)(1,2,4,5).xlsx

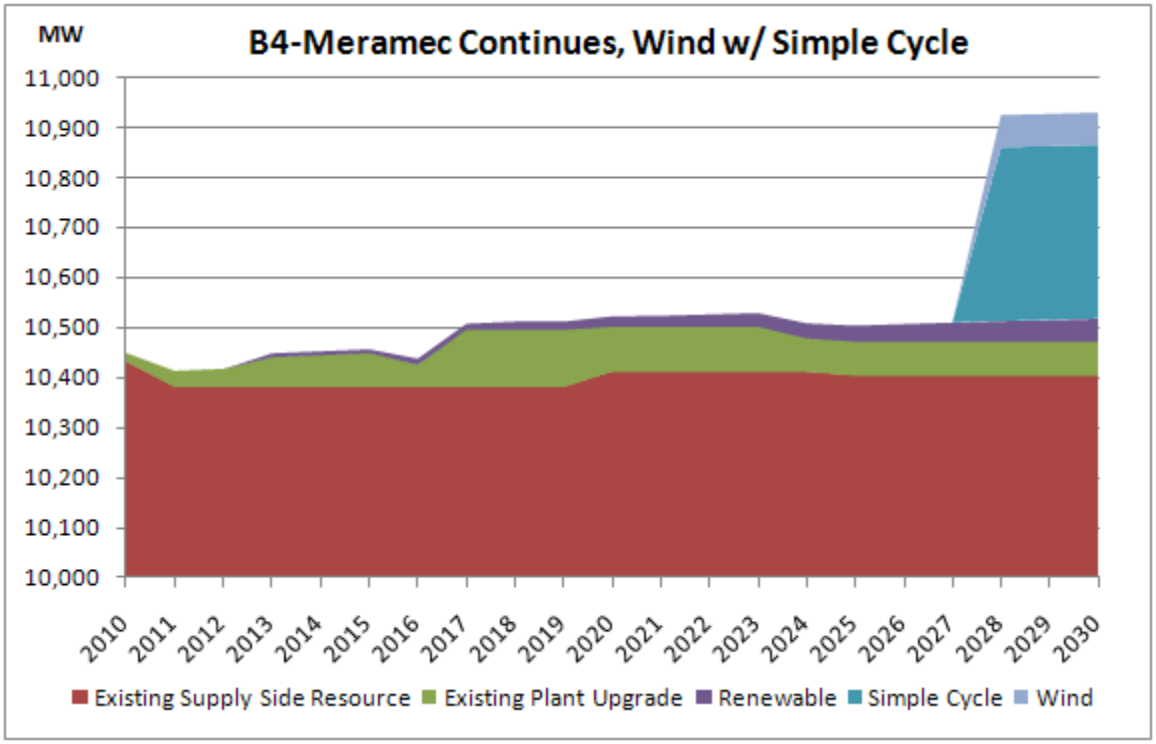
Figure 9.A.5 Composition of Capacity[6]

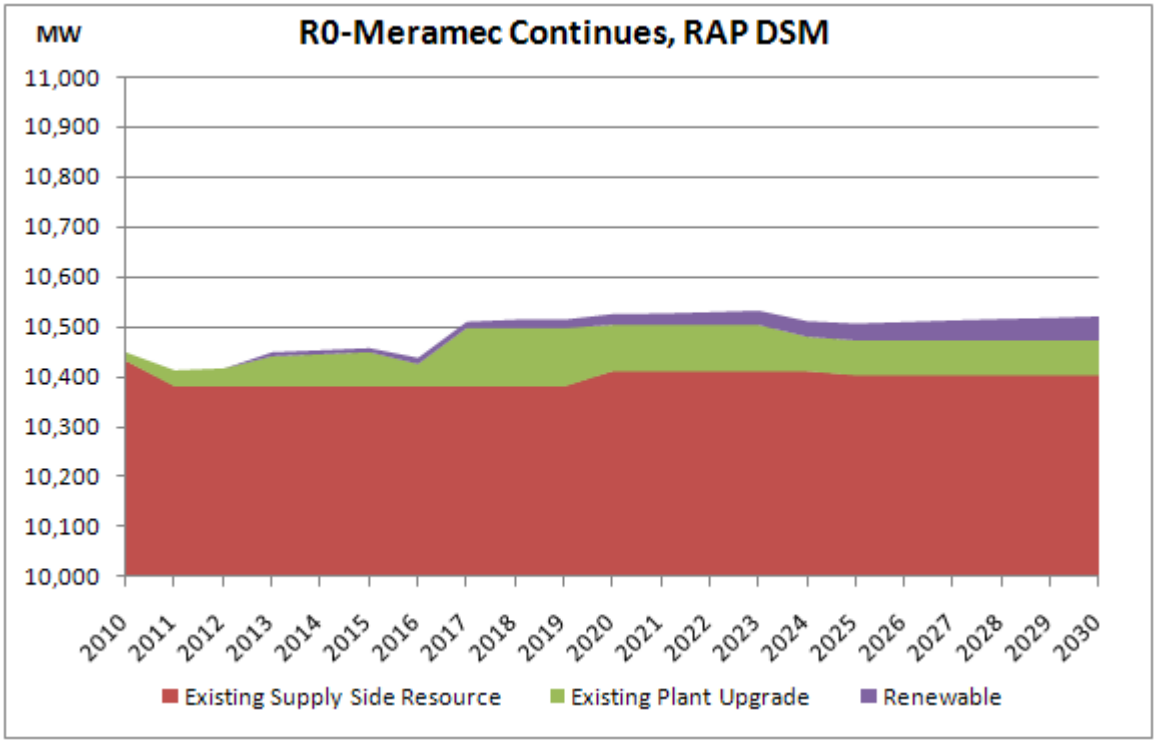


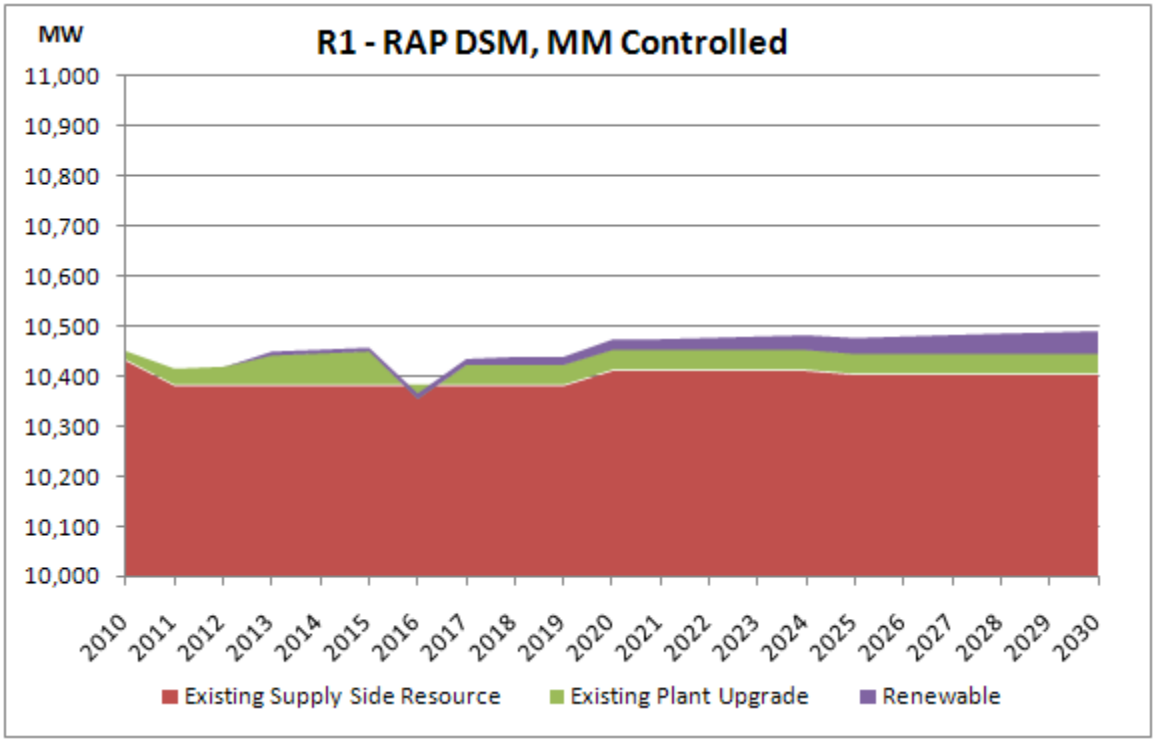


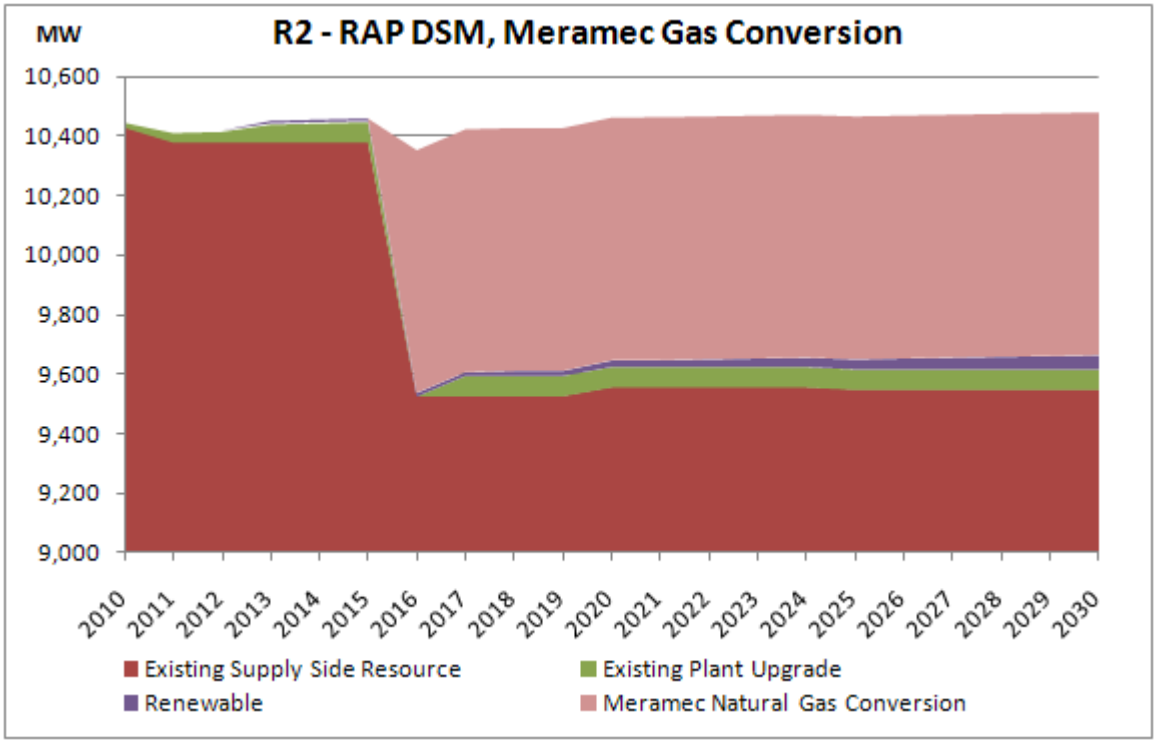
[6] 4 CSR 240-22.060(6)(C)3.
14 candidate resource plans - 060(6)(C)(3).xlsm

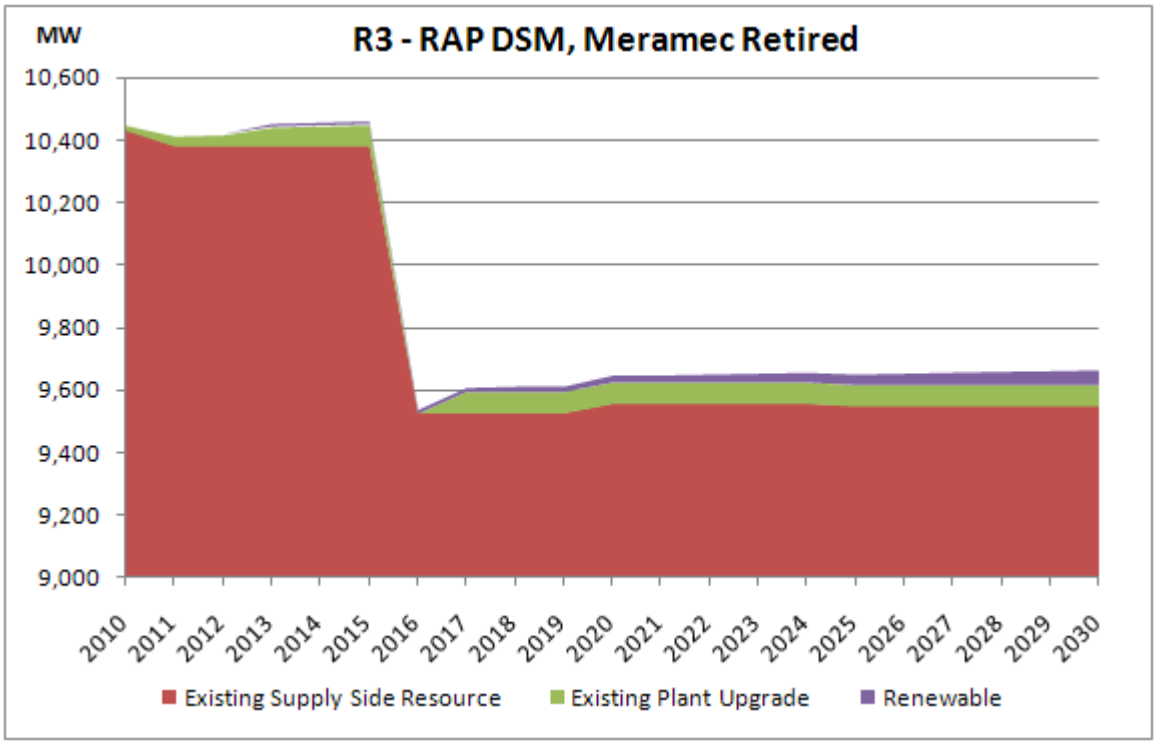

MW
B3-Meramec Continues, Simple Cycle
11,400
11,200
11,000
10,800
10,600
10,400
10,200
10,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Simple Cycle

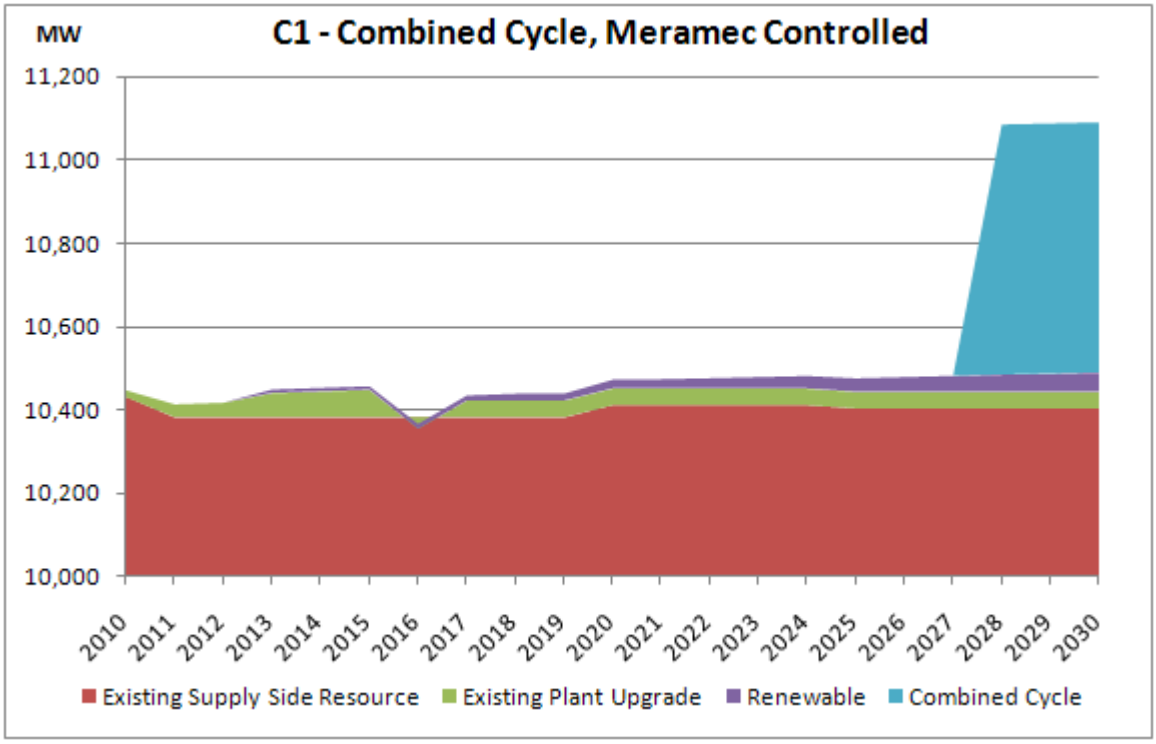

MW
B4-Meramec Continues, Wind w/ Simple Cycle
11,000
10,900
10,800
10,700
10,600
10,500
10,400
10,300
10,200
10,100
10,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Simple Cycle
Wind

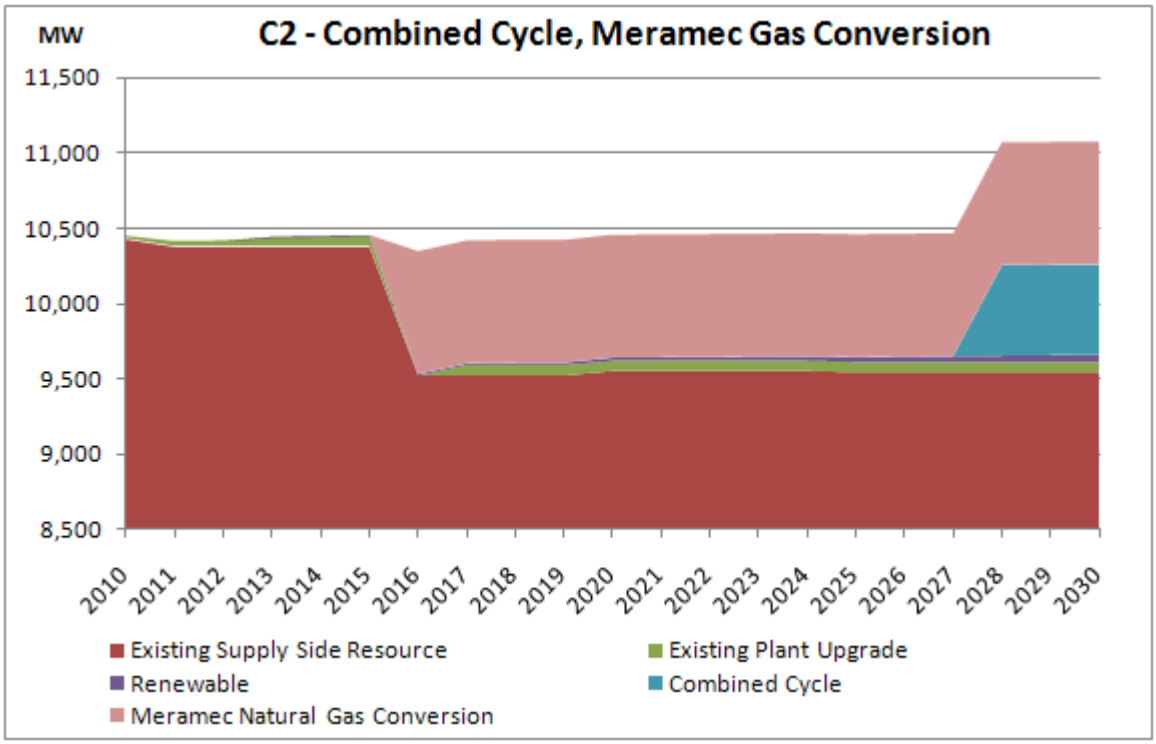

MW
R0-Meramec Continues, RAP DSM
11,000
10,900
10,800
10,700
10,600
10,500
10,400
10,300
10,200
10,100
10,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable

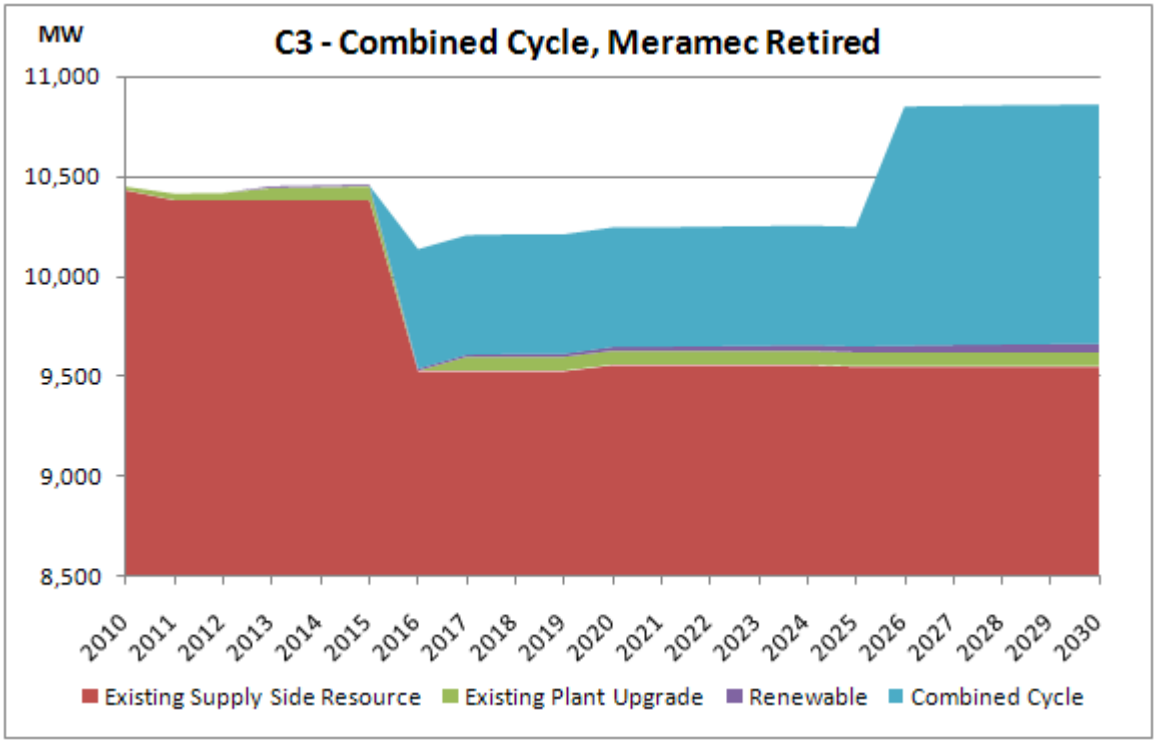

MW
R1 - RAP DSM, MM Controlled
11,000
10,900
10,800
10,700
10,600
10,500
10,400
10,300
10,200
10,100
10,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable

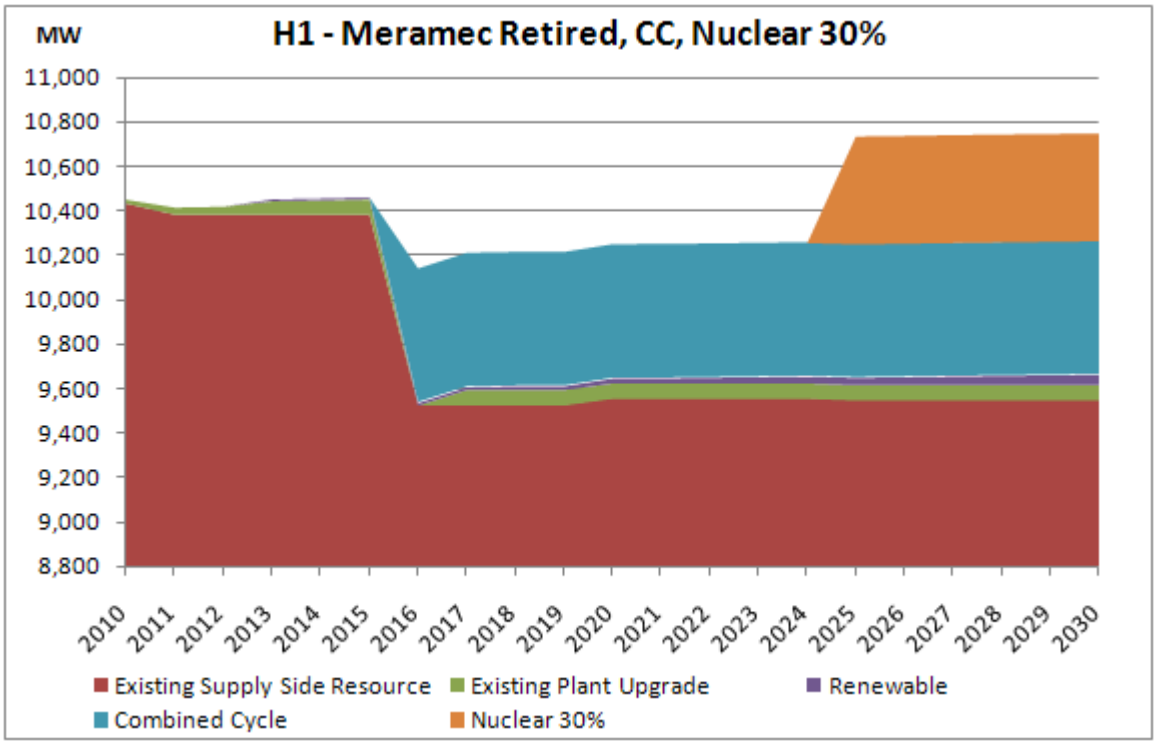

MW
R2 - RAP DSM, Meramec Gas Conversion
10,600
10,400
10,200
10,000
9,800
9,600
9,400
9,200
9,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Meramec Natural Gas Conversion

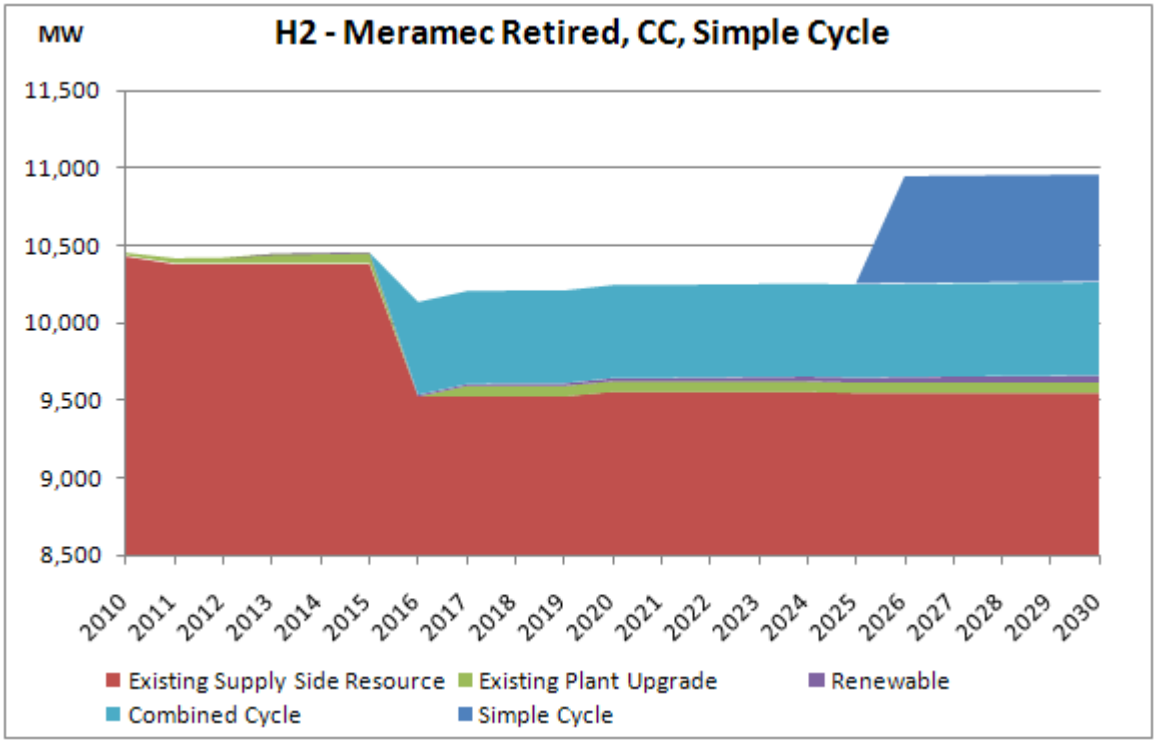

MW
R3 - RAP DSM, Meramec Retired
10,600
10,400
10,200
10,000
9,800
9,600
9,400
9,200
9,000
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable


MW
C1 - Combined Cycle, Meramec Controlled
11,200
11,000
10,800
10,600
10,400
10,200
10,000
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle


MW
C2 - Combined Cycle, Meramec Gas Conversion
11,500
11,000
10,500
10,000
9,500
9,000
8,500
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle
Meramec Natural Gas Conversion


MW
C3 - Combined Cycle, Meramec Retired
11,000
10,500
10,000
9,500
9,000
8,500
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle


MW
H1 - Meramec Retired, CC, Nuclear 30%
11,000
10,800
10,600
10,400
10,200
10,000
9,800
9,600
9,400
9,200
9,000
8,800
2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle
Nuclear 30%


MW
H2 - Meramec Retired, CC, Simple Cycle
11,500
11,000
10,500
10,000
9,500
9,000
8,500
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle
Simple Cycle

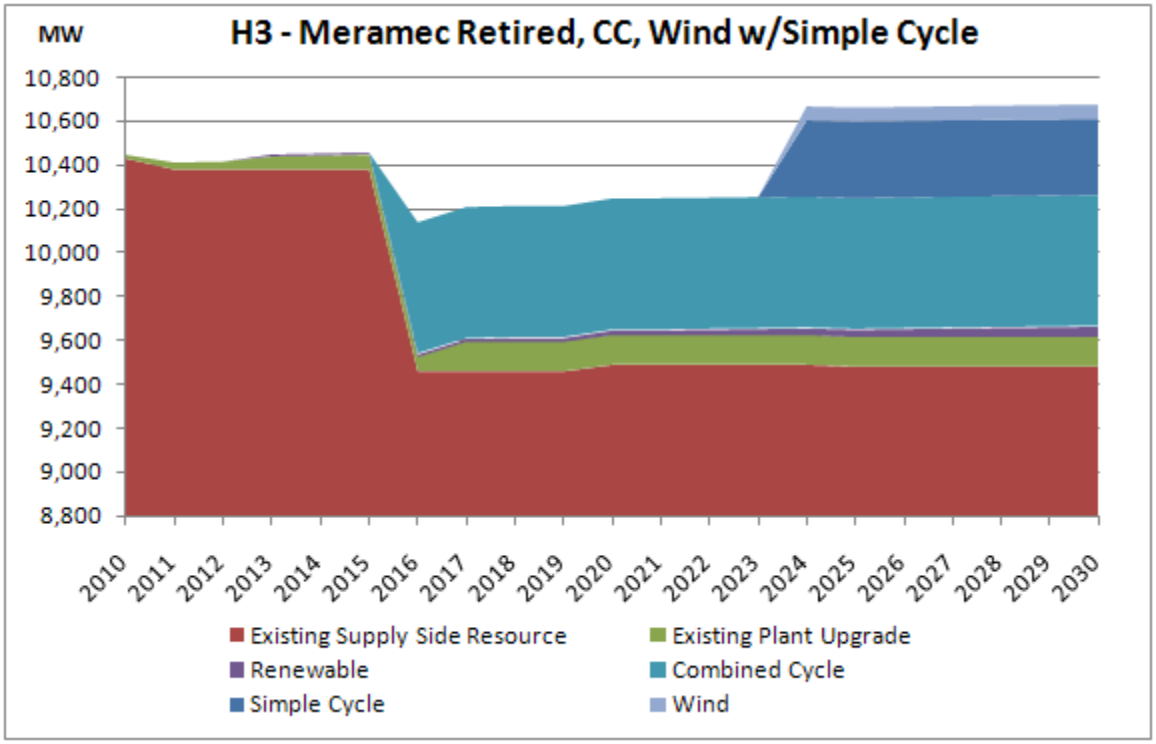

MW
H3 - Meramec Retired, CC, Wind w/Simple Cycle
10,800
10,600
10,400
10,200
10,000
9,800
9,600
9,400
9,200
9,000
8,800
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
Existing Supply Side Resource
Existing Plant Upgrade
Renewable
Combined Cycle
Simple Cycle
Wind

Figure 9.A.6 Combined Impact of DSM Resources on Energy[7]

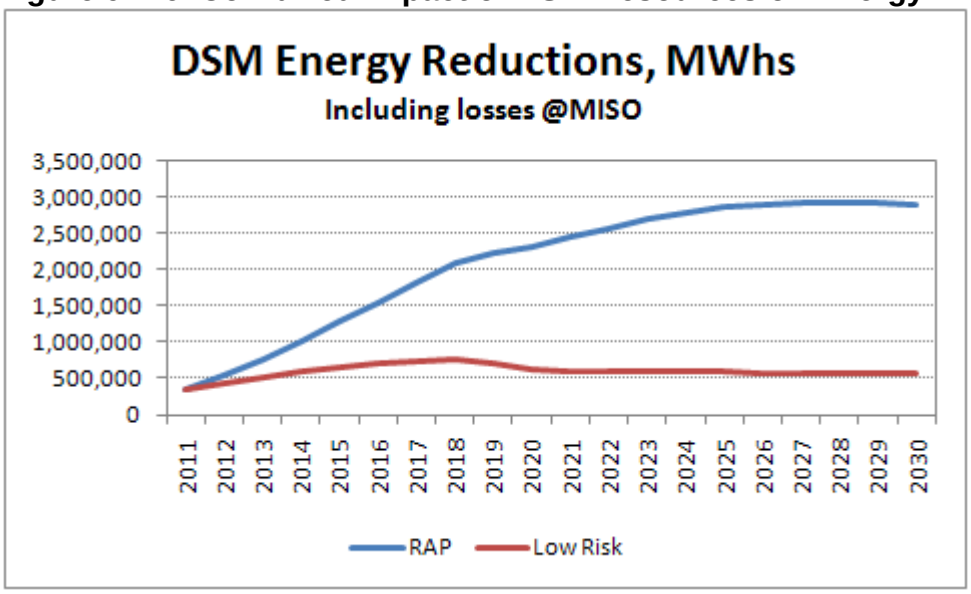
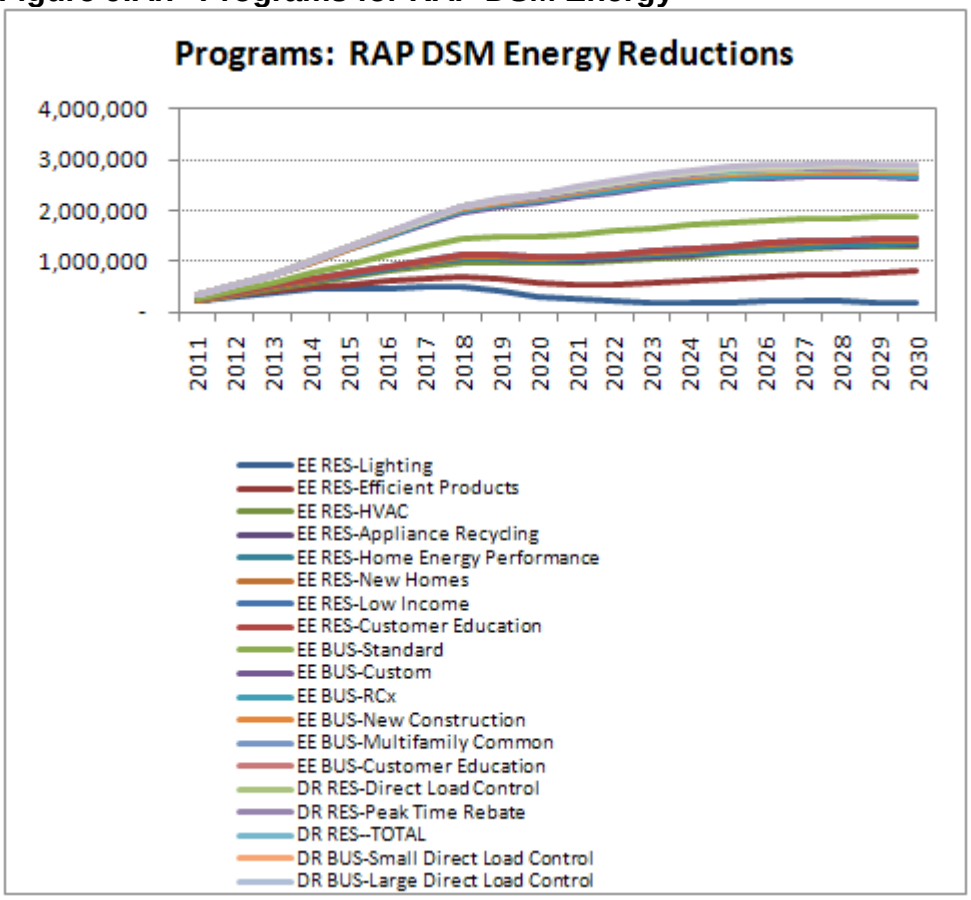
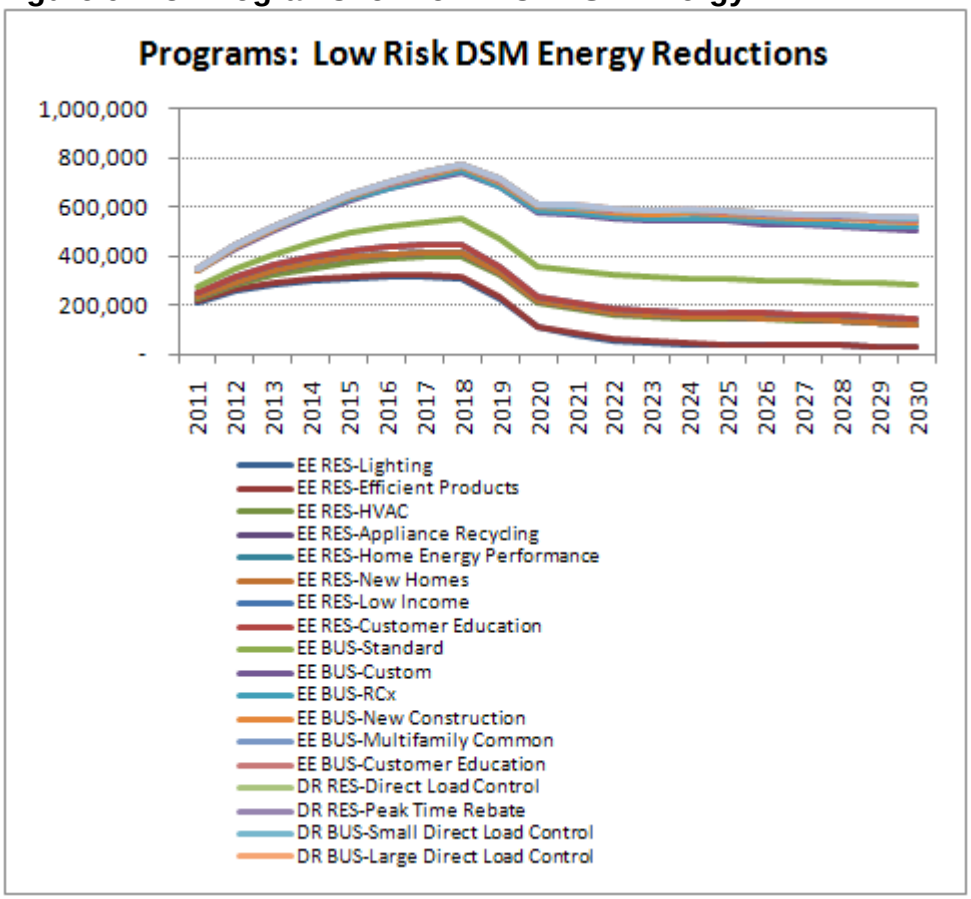


Figure 9.A.7 Programs for RAP DSM Energy[8]



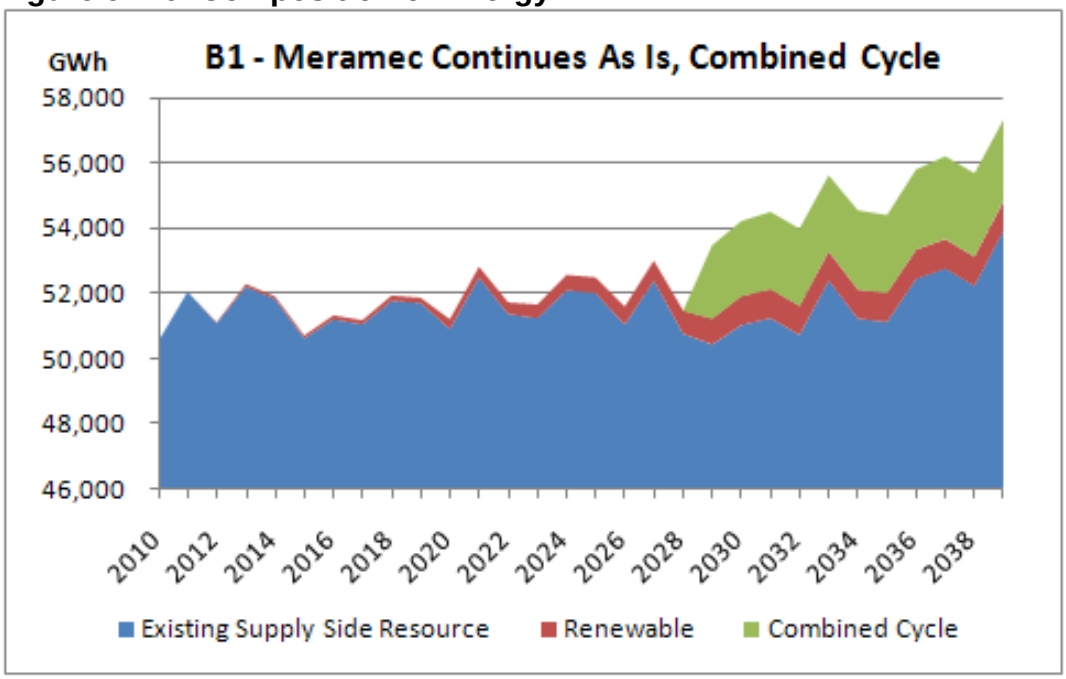
[7] 4 CSR 240-22.060(6)(C)4.
[8] 4 CSR 240-22.060(6)(C)5.
14 candidate resource plans - 060(6)(C)(1,2,4,5).xlsx

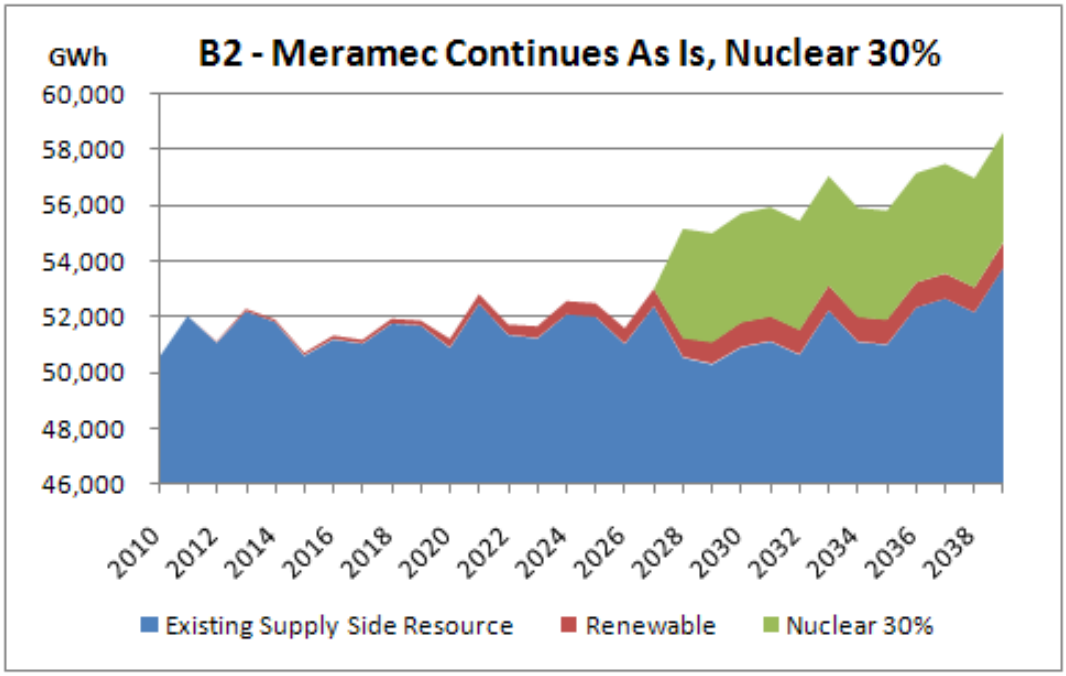
Figure 9.A.8 Programs for Low Risk DSM Energy[9]



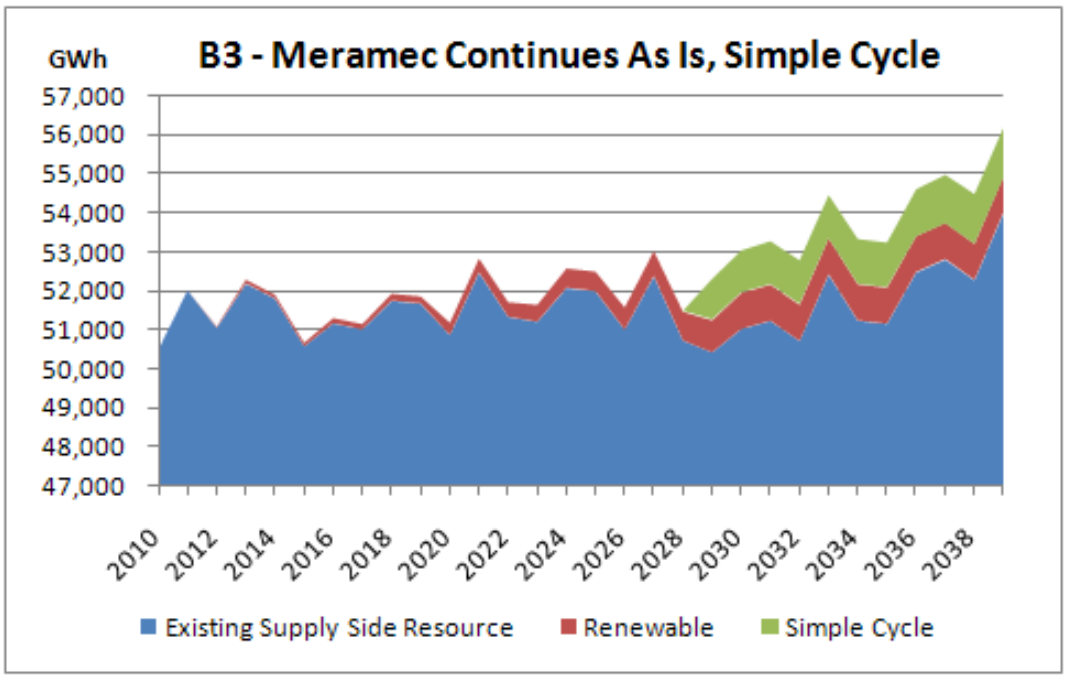
[9] 4 CSR 240-22.060(6)(C)5.
14 candidate resource plans - 060(6)(C)(1,2,4,5).xlsx

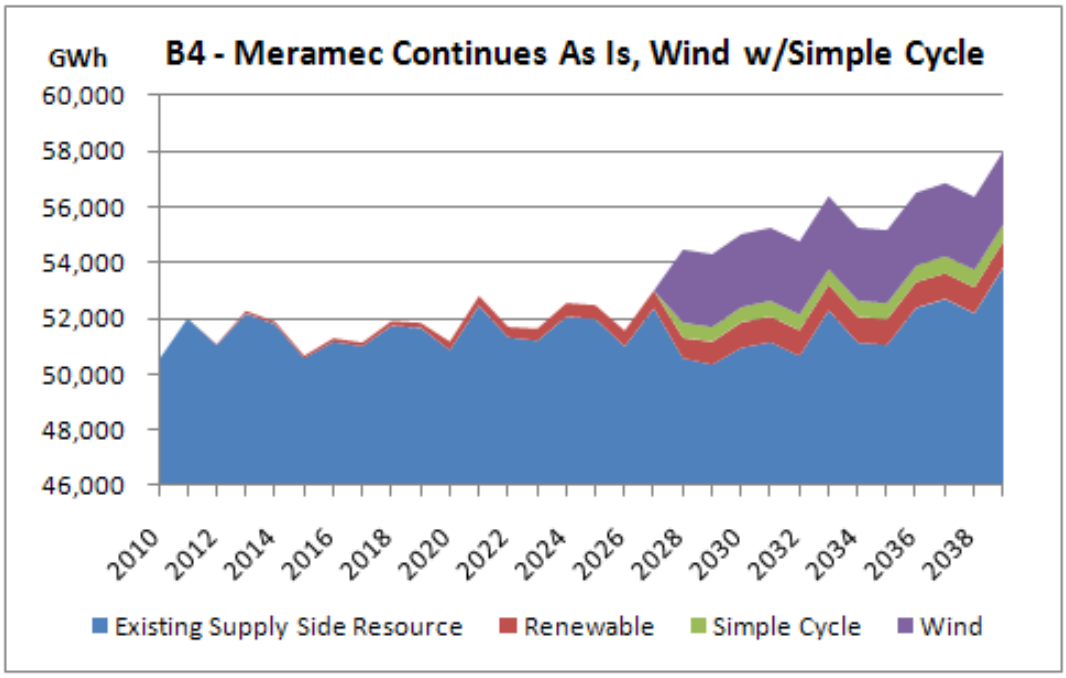
Figure 9.A.9 Composition of Energy[10]

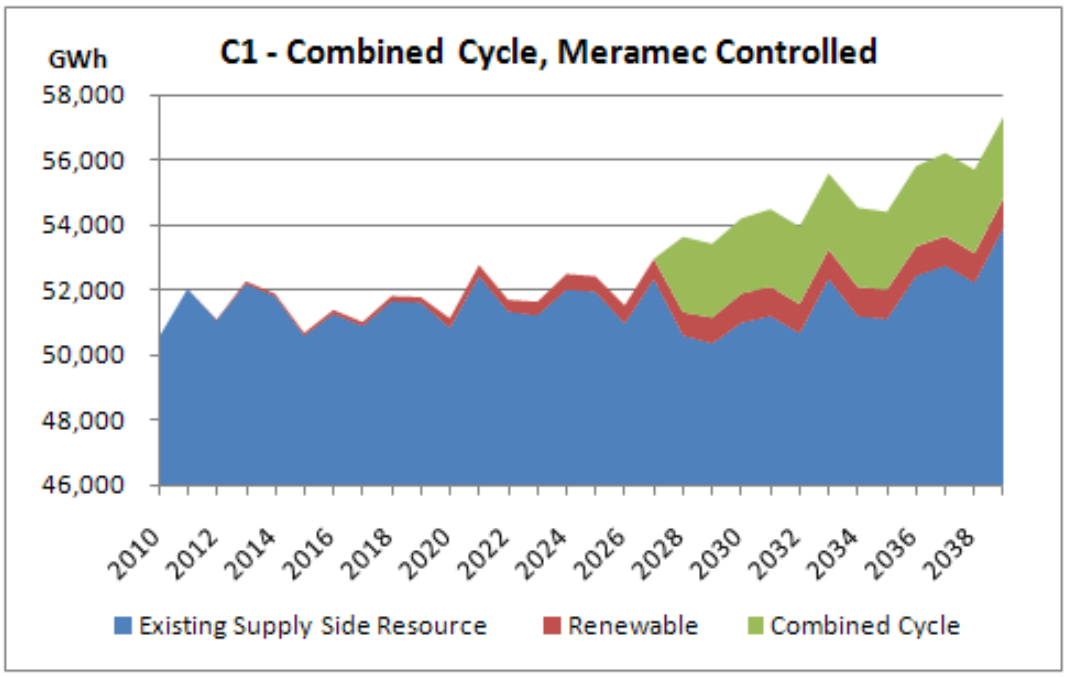


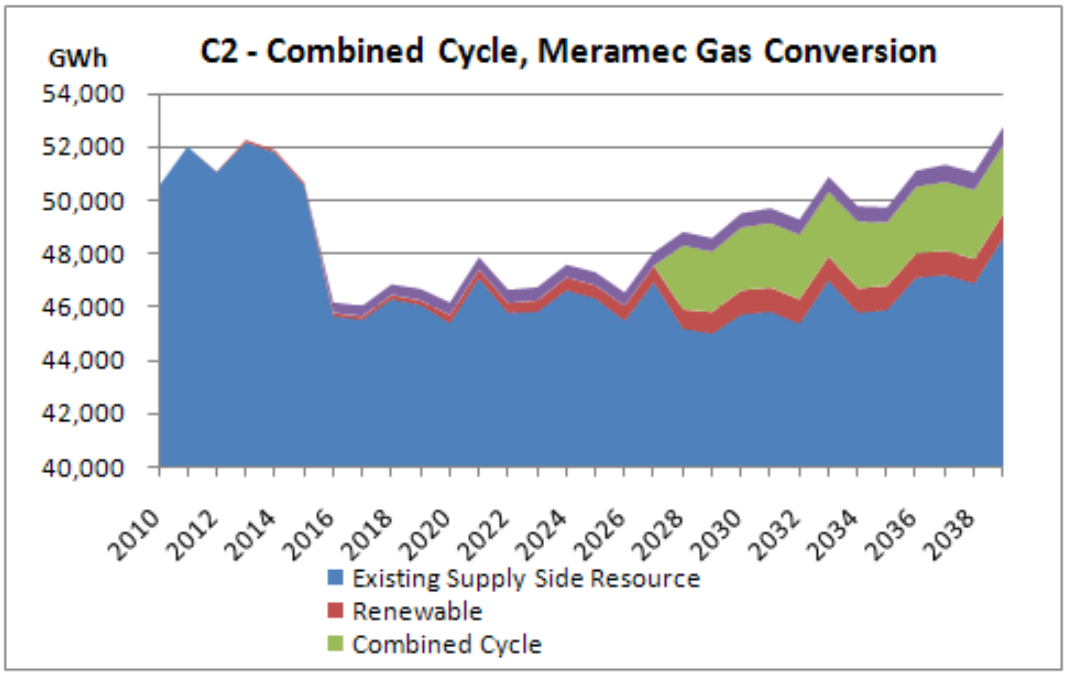


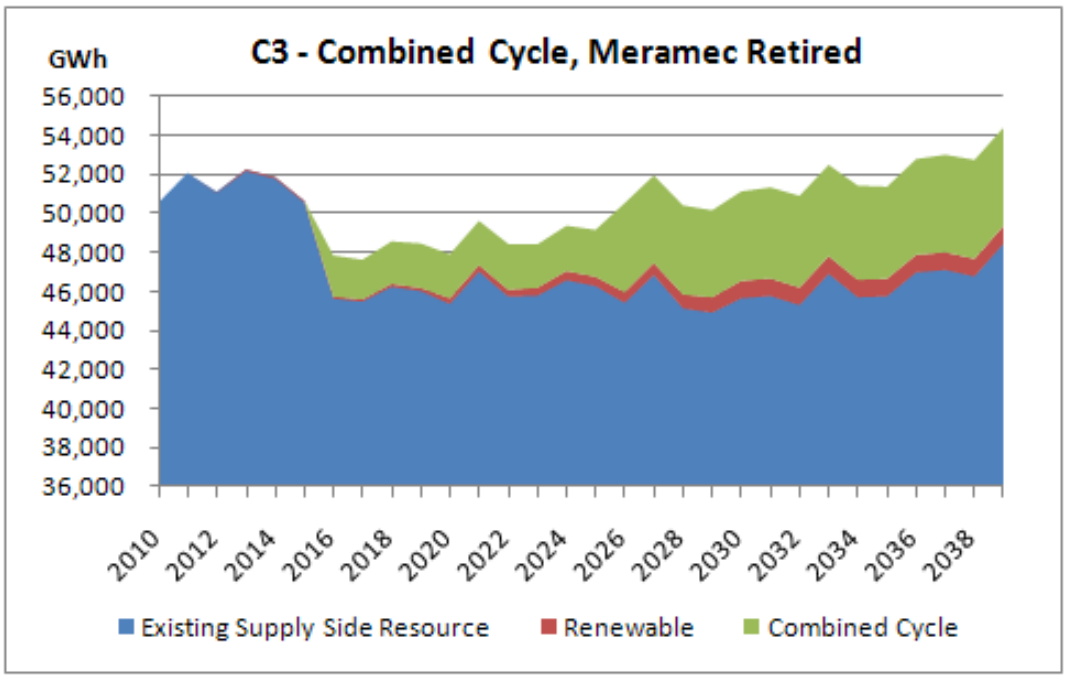
[10] 4 CSR 240-22.060(6)(C)6.
14 candidate resource plans - 060(6)(C)(6).xlsx

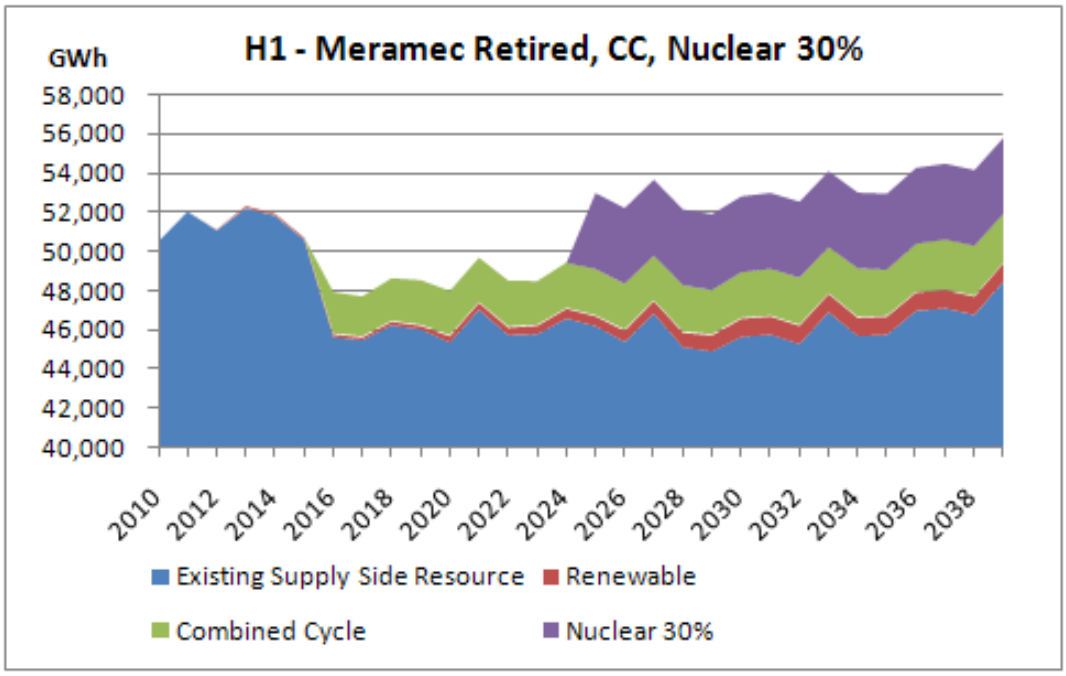

GWh
B3 - Meramec Continues As Is, Simple Cycle
57,000
56,000
55,000
54,000
53,000
52,000
51,000
50,000
49,000
48,000
47,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Simple Cycle

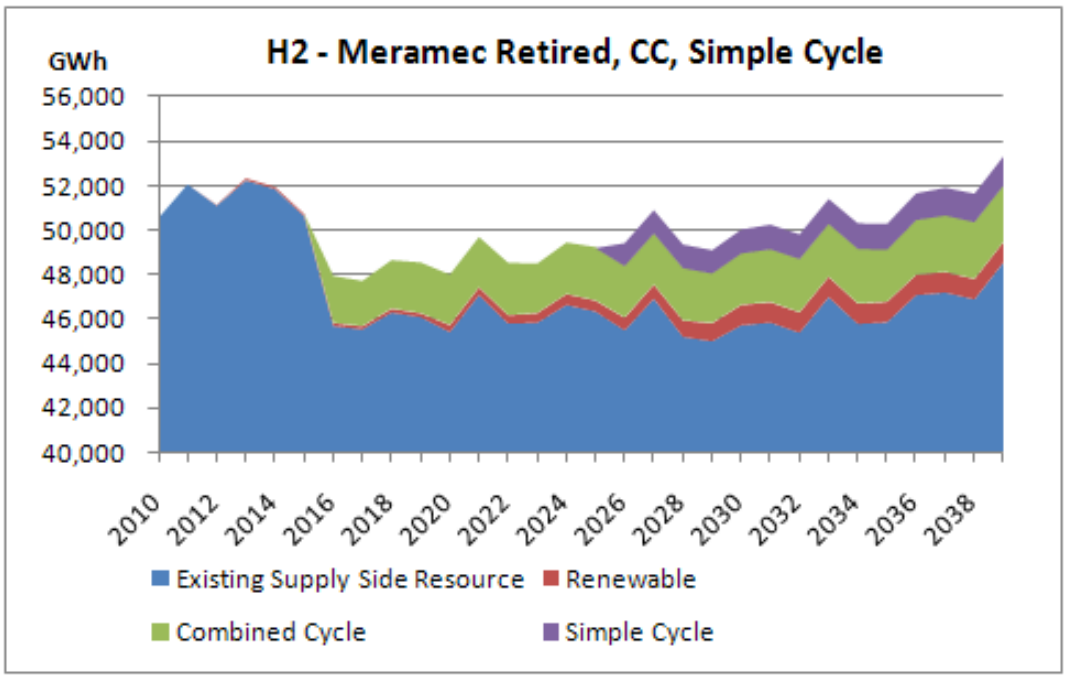

GWh
B4 - Meramec Continues As Is, Wind w/Simple Cycle
60,000
58,000
56,000
54,000
52,000
50,000
48,000
46,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Simple Cycle
Wind

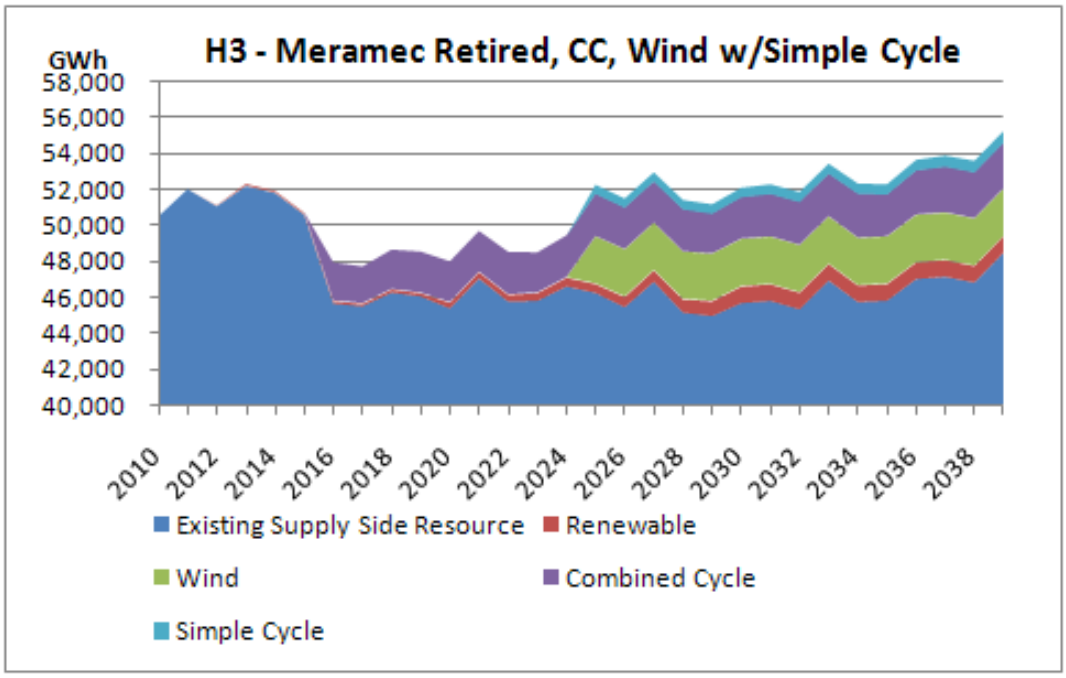

GWh
C1 - Combined Cycle, Meramec Controlled
58,000
56,000
54,000
52,000
50,000
48,000
46,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Combined Cycle

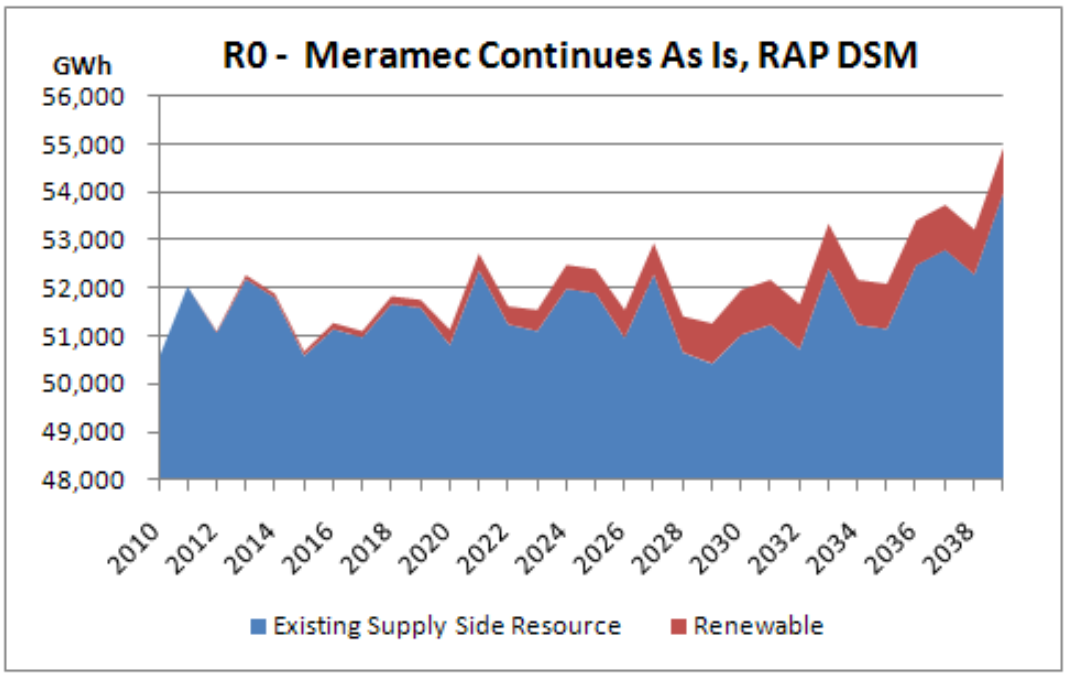

GWh
C2 - Combined Cycle, Meramec Gas Conversion
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Combined Cycle

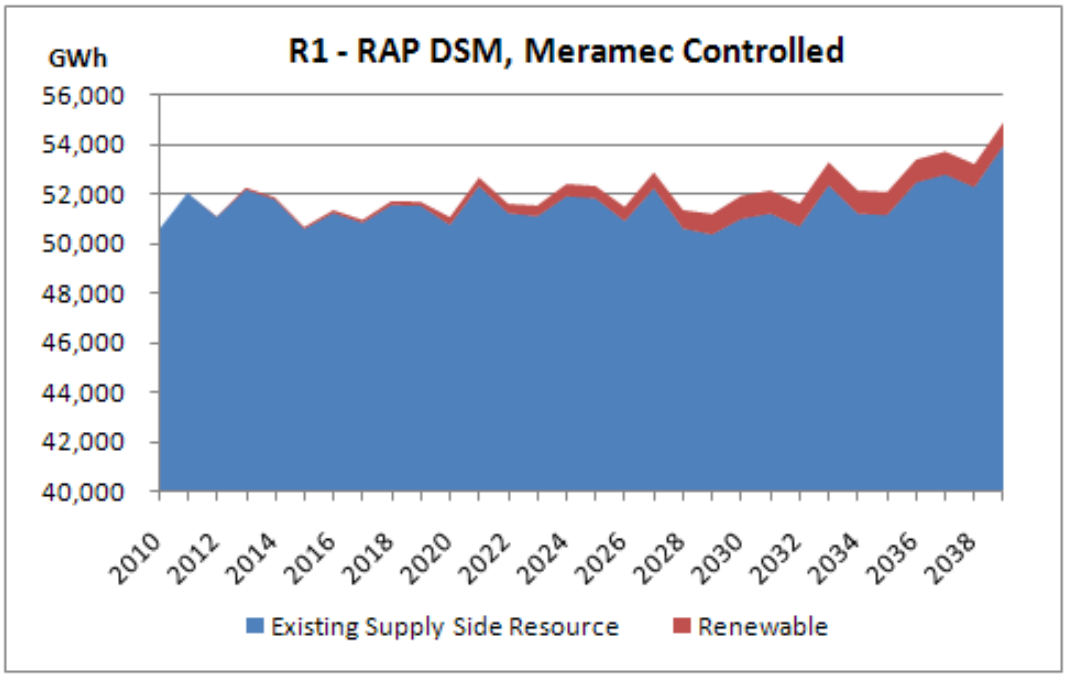

C3 - Combined Cycle, Meramec Retired
GWh
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Combined Cycle

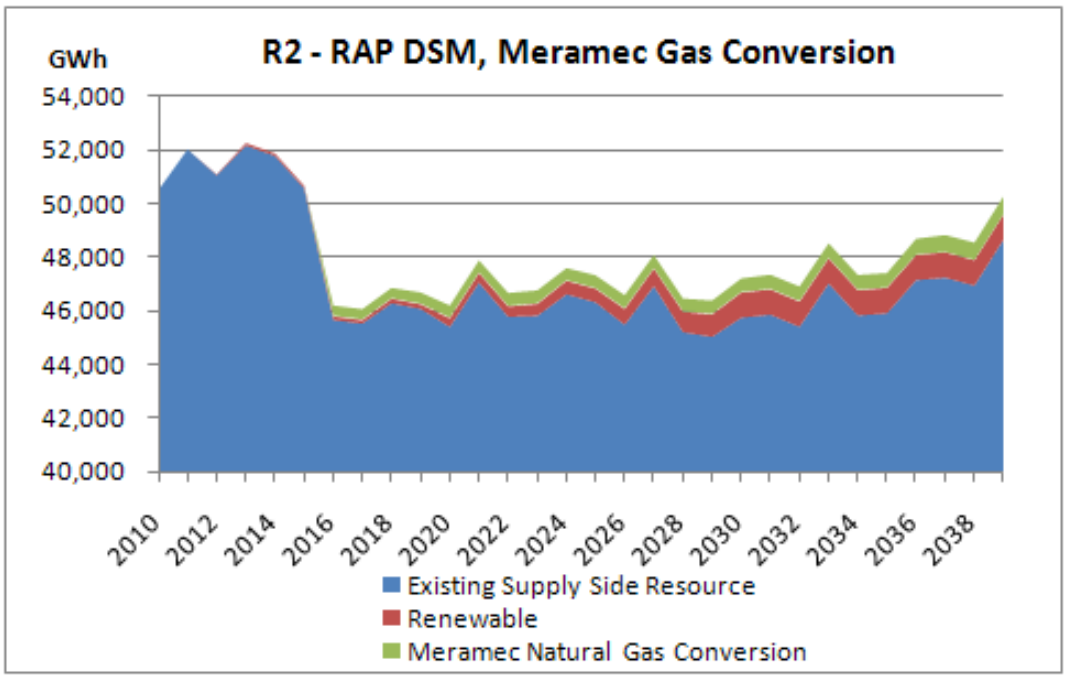

H1 - Meramec Retired, CC, Nuclear 30%
GWh
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Combined Cycle
Nuclear 30%


H2 - Meramec Retired, CC, Simple Cycle
GWh
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Combined Cycle
Simple Cycle


H3 - Meramec Retired, CC, Wind w/Simple Cycle
GWh
58,000
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Wind
Combined Cycle
Simple Cycle


R0 - Meramec Continues As Is, RAP DSM
GWh
56,000
55,000
54,000
53,000
52,000
51,000
50,000
49,000
48,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable


R1 - RAP DSM, Meramec Controlled
GWh
56,000
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable


R2 - RAP DSM, Meramec Gas Conversion
GWh
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable
Meramec Natural Gas Conversion

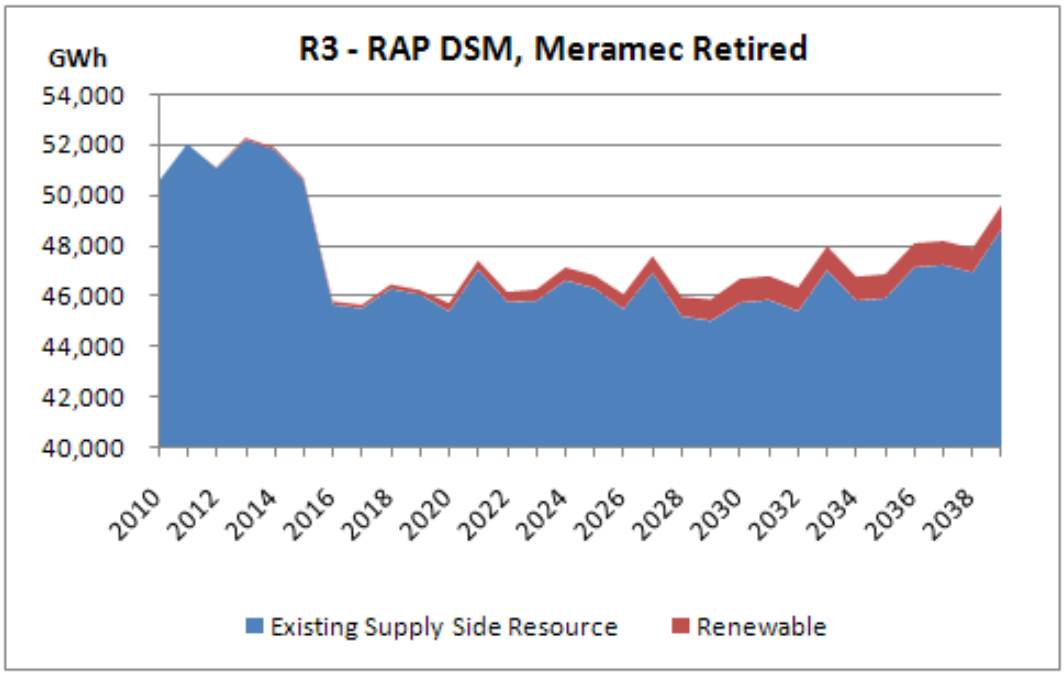
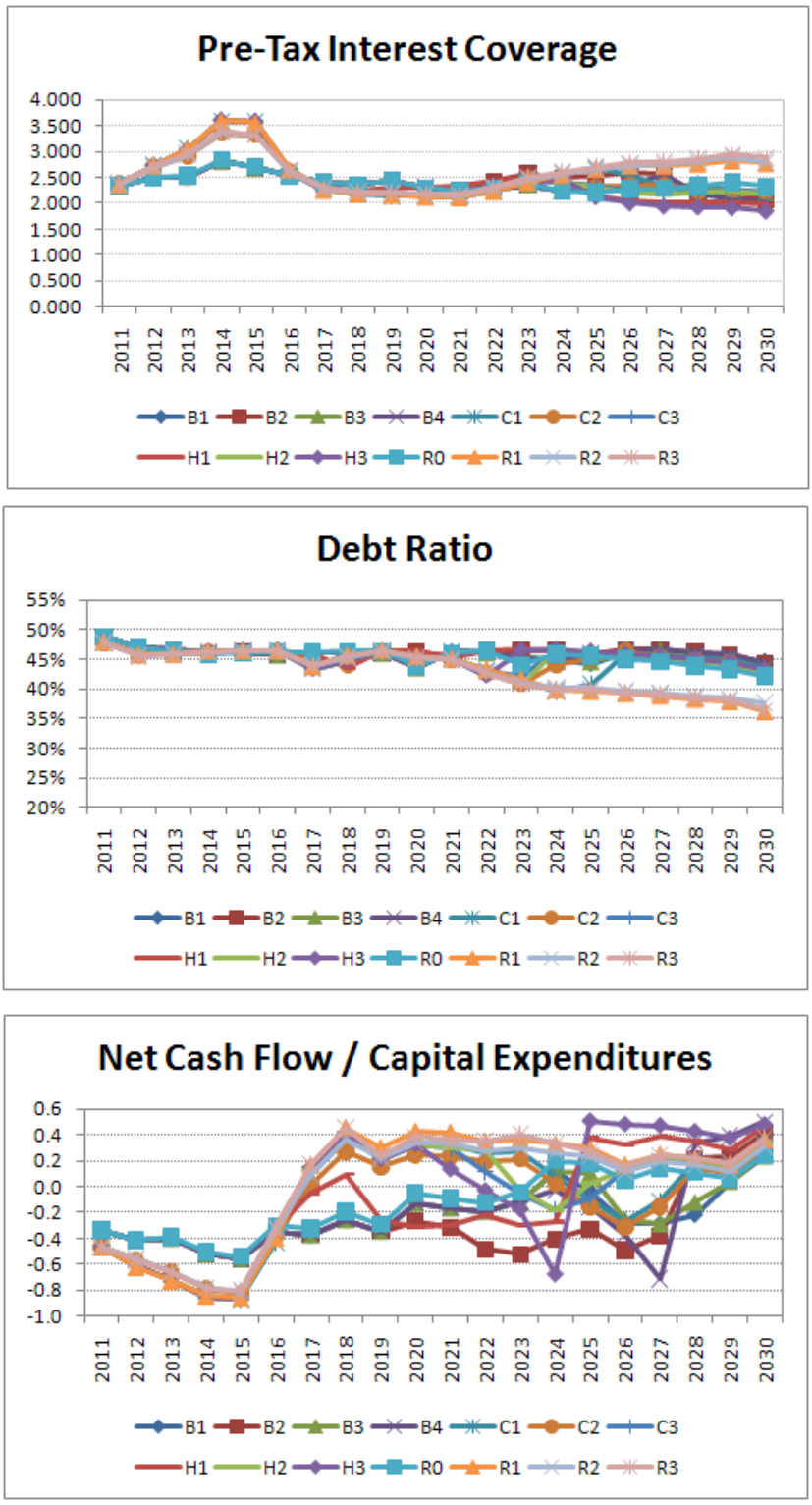
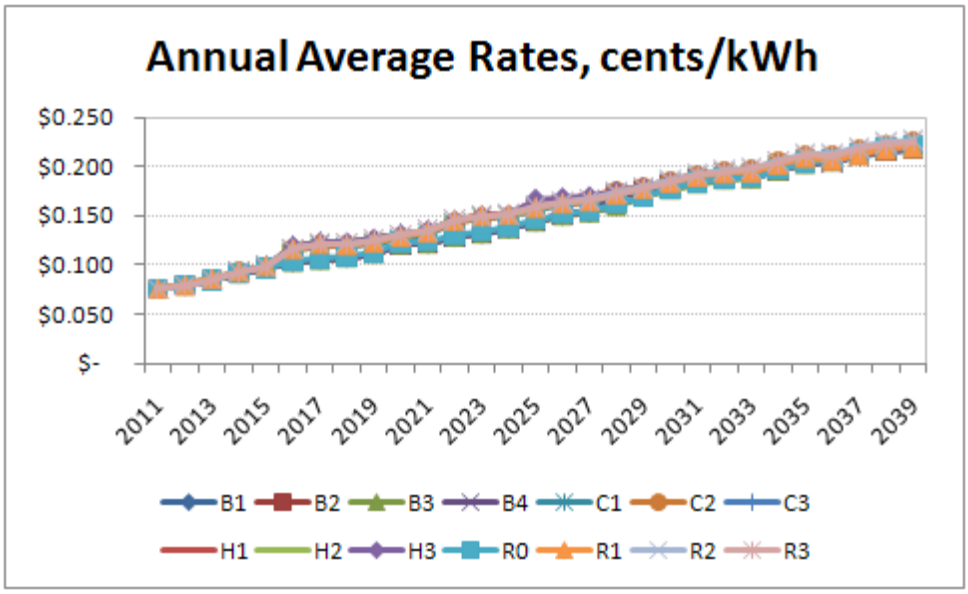

R3 - RAP DSM, Meramec Retired
GWh
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
Existing Supply Side Resource
Renewable

Figure 9.A.10 Financial Measures[11]



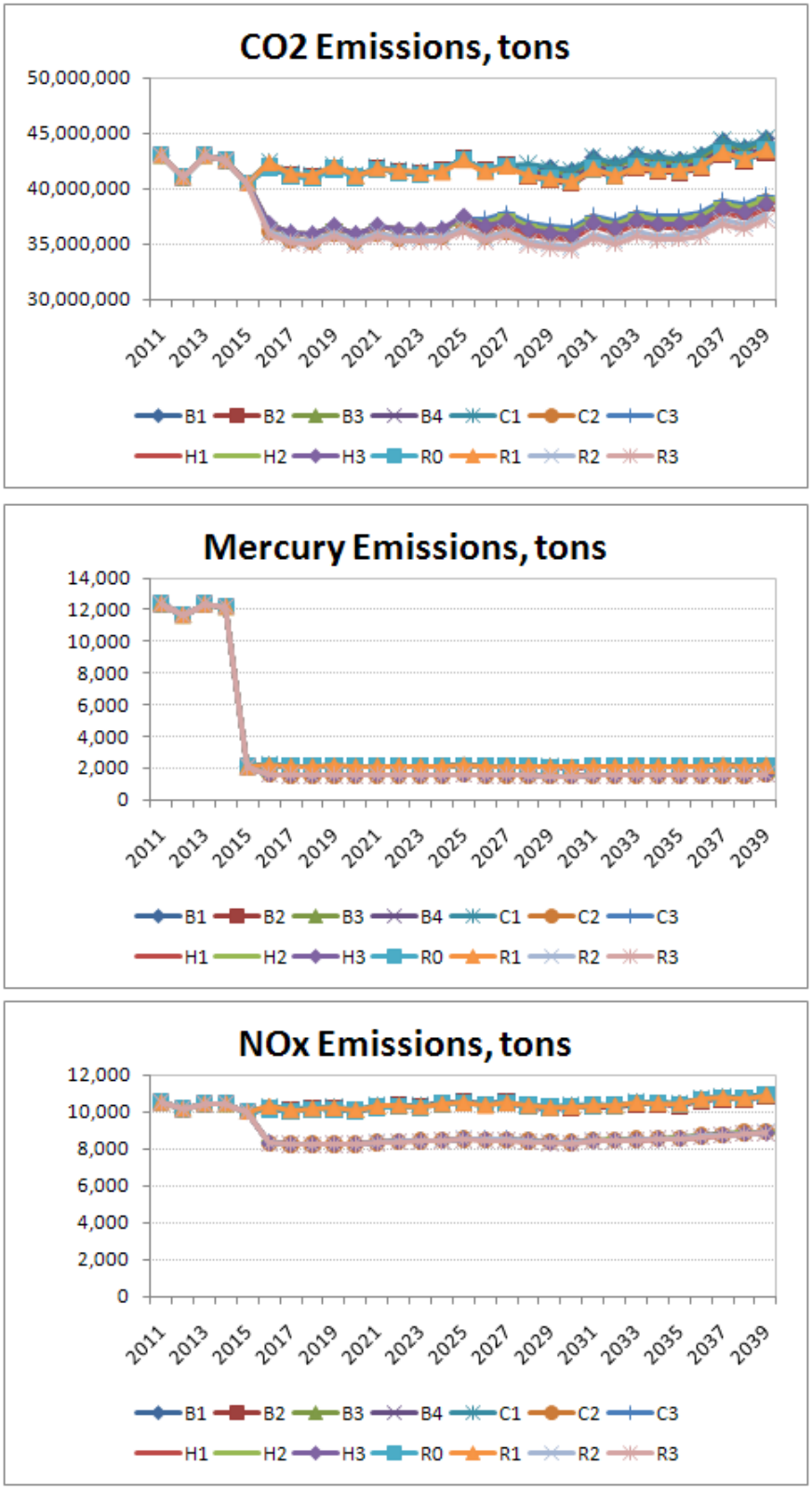
[11] 4 CSR 240-22.060(6)(C)7.
14 candidate resource plans - 060(6)(C)(7).xlsx

Figure 9.A.11 Annual Average Rates[12]



[12] 4 CSR 240-22.060(6)(C)8.
14 candidate resource plans - 060(6)(B), 060(6)(C)(8 thru 10), 070(5), 070(5)(A thru B).xlsx

Figure 9.A.12 Annual Emissions[13]



[13] 4 CSR 240-22.060(6)(C)9.
14 candidate resource plans - 060(6)(B), 060(6)(C)(8 thru 10), 070(5), 070(5)(A thru B).xlsx

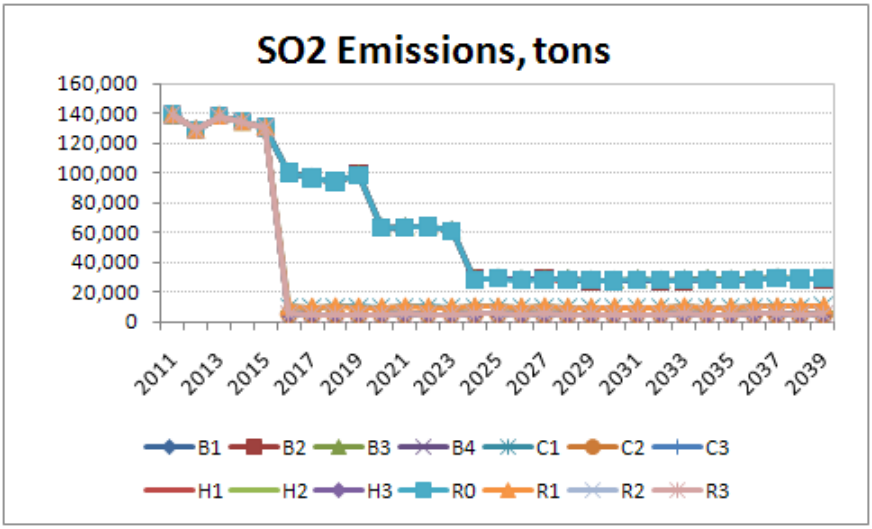
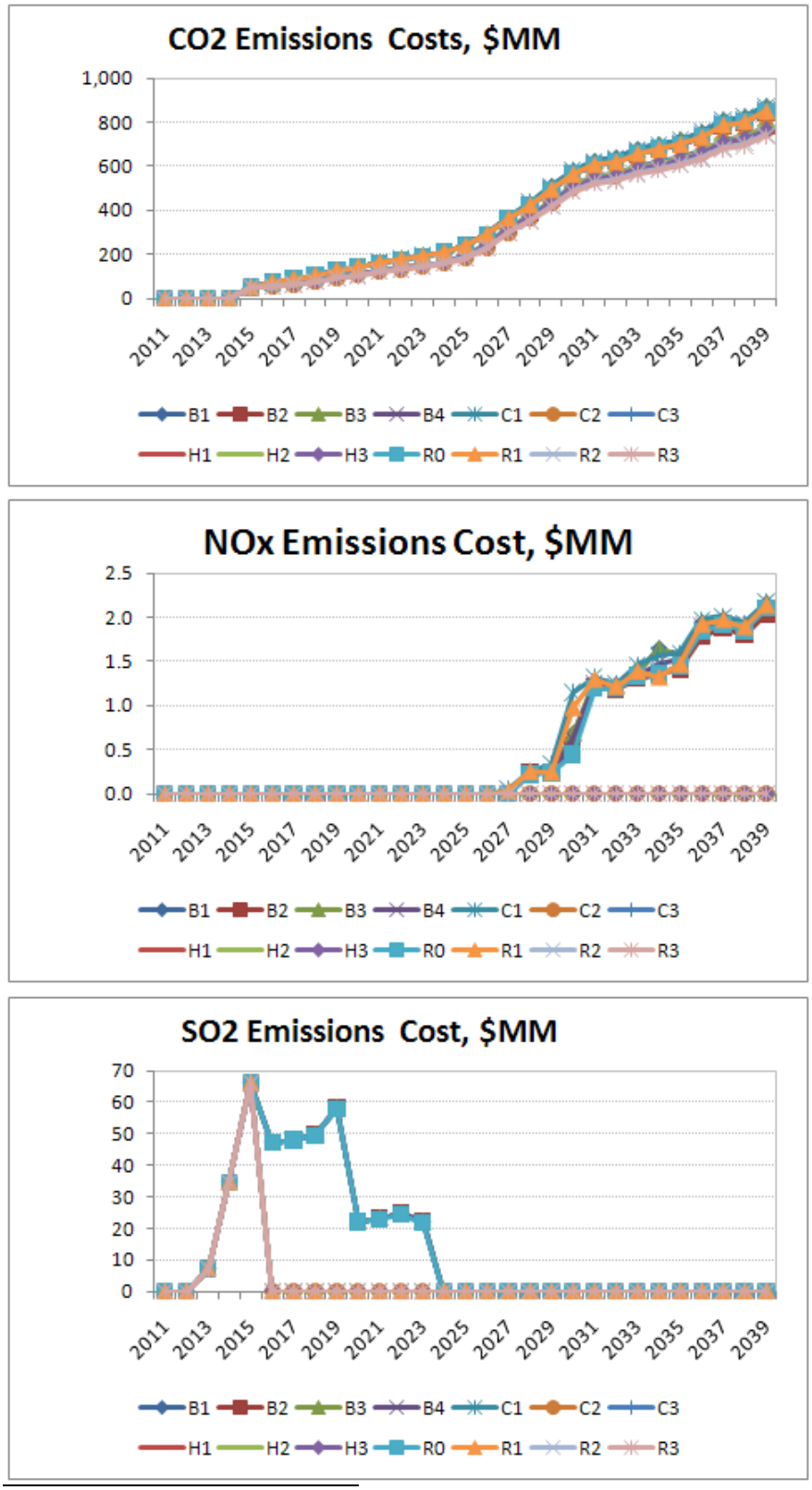

SO2 Emissions, tons
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
2011
2013
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
B1
B2
B3
B4
C1
C2
C3
H1
H2
H3
R0
R1
R2
R3

Figure 9.A.13 Probable Environmental Costs[14]

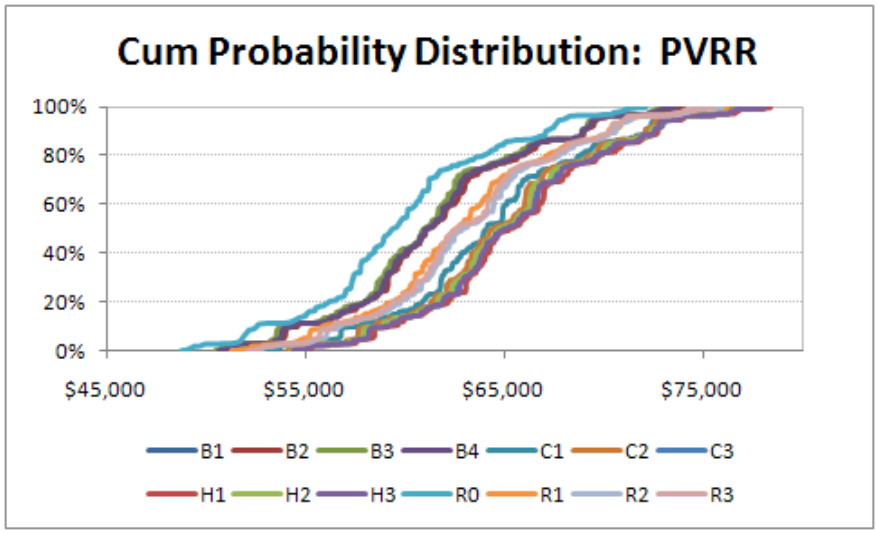


[14] 4 CSR 240-22.060(6)(C)10.
14 candidate resource plans - 060(6)(B), 060(6)(C)(8 thru 10), 070(5), 070(5)(A thru B).xlsx

Selected Performance Measures[15]

The CDF for PVRR is shown in Figure 9.A.144 for the 14 final candidate resource plans, identified by their 2-digit plan codes, while a more summarized measure, the expected value for PVRR is shown in the table next to the chart, in rank order of PVRRs.

Figure 9.A.14 Cum Probability Distribution of PVRR & Probability Weighted PVRR



14 Final Candidate Plans	Probability-Weighted PVRR, $MM
R0	$59,661
B3	$61,161
B1	$61,259
B4	$61,403
B2	$61,568
R1	$62,867
R3	$63,101
R2	$63,358
C1	$64,403
C2	$64,875
H2	$65,198
C3	$65,356
H3	$65,420
H1	$65,596

Both the chart and the table provide the same ranking results, but it was more difficult to reach a conclusion using the CDF lines compared to using the single number for the expected values. This was because a conclusion using CDF lines required evaluating how all 270 points on each line compared the 270 points on each of the other CDF lines, how much of each line was to the left (better) of any other line, how each line started and ended compared to the start and end of other CDF lines, and the overall tendency of each CDF line. By comparison, the expected value for each line captured all of this information in a single number; essentially the CDF lines and the expected values were the same data in two different formats.

Since it was more difficult to make conclusions using CDFs than by using expected values, Ameren Missouri first examined the ranks of these plans using expected values for these 5 measures. The data for these 5 measures and their ranks on each measure are shown in Table 9.A.. This table is arranged in ascending rank order of PVRRs.

[15] 4 CSR 240-22.070(5); 4 CSR 240-22.070(11)(B)

Table 9.A.2 Expected Values and Rank Order for Selected Performance Measures

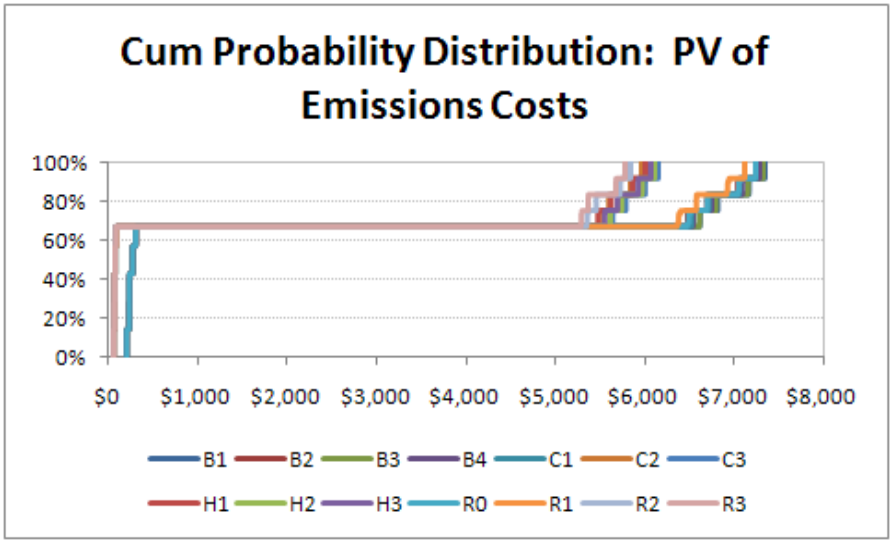
14 Final Candidate Plans	Expected Value of PVRR, $MM	Expected Value of PV of Emissions Costs, $MM	Expected Value of Costs for DSM Participants, $MM	Expected Value for Levelized Annual Rates	Expected Value for Maximum Single Year Rate Increase	Rank on PVRR	Rank on Emissions	Rank on DSM Costs	Rank on Rates	Rank on Rate Increase
R0	$59,661	$2,428	$1,001	$0.1249	22.1%	1	11	11	3	9
B3	$61,161	$2,458	$162	$0.1245	21.9%	2	13	1	1	6
B1	$61,259	$2,468	$162	$0.1247	22.0%	3	14	1	2	8
B4	$61,403	$2,443	$162	$0.1250	21.8%	4	12	1	4	4
B2	$61,568	$2,427	$162	$0.1253	21.8%	5	10	1	5	2
R1	$62,867	$2,281	$1,001	$0.1316	22.0%	6	8	11	7	7
R3	$63,101	$1,878	$1,001	$0.1321	22.6%	7	1	11	9	13
R2	$63,358	$1,899	$1,001	$0.1326	22.7%	8	2	11	10	14
C1	$64,403	$2,323	$162	$0.1311	21.7%	9	9	1	6	1
C2	$64,875	$1,940	$162	$0.1320	22.5%	10	3	1	8	12
H2	$65,198	$1,981	$162	$0.1327	22.2%	11	6	1	11	10
C3	$65,356	$1,994	$162	$0.1330	22.2%	12	7	1	12	11
H3	$65,420	$1,965	$162	$0.1331	21.9%	13	5	1	13	5
H1	$65,596	$1,947	$162	$0.1334	21.8%	14	4	1	14	3
Min	$59,661	$1,878	$162	$0.1245	21.7%					
Max	$65,596	$2,468	$1,001	$0.1334	22.7%					
Range	$5,935	$590	$839	$0.0089	1.0%					
Avg	$63,230	$2,174	$402	$0.1297	22.1%					
StDev	$1,962	$246	$393	$0.0038	0.3%					

PV items are dollars in millions

The expected values for 1 of the 4 measures besides PVRR, levelized annual average rates, had essentially the same rank order as the PVRR rank order, so no CDF was produced for this measure.

Two of the remaining 3 other measures had technical issues that made their rank meaningless or not useful. The technical issue for DSM costs was that there were only 2 possible values for this measure among the 14 plans, so a rank order for this measure would be not very useful. The technical issue for the maximum single-year rate increase was that there was very little variation among the 14 values (minimum of 21.7%, maximum 22.7%) so a ranking on this measure would also not be very useful.

Figure 9.A.15 Cumulative Probability Distribution of PV of Emissions Costs



The final remaining measure besides PVRR, the present value of probable environmental costs, had a substantially different rank order on its expected values versus the rank order of PVRR.

Thus a CDF was developed for this

measure, which is shown in Figure 9.A.155.

Expected Value & Standard Deviations, Selected Performance Measures[16]

IRP rules also required expected values and some measure of the dispersion of the probability distribution of the 5 performance measures discussed in the prior section. These are provided in Table 9.A.3 and Table 9.A.4.

Table 9.A.3 Expected Values for Performance Measures

14 Final Candidate Plans	Expected Value of 2011-2039 PVRR, $MM	Expected Value of PV of 2011-2039 Emissions Costs, $MM	Expected Value of 2011-2030 Costs for DSM Participants, $MM	Expected Value for 2011-2039 Levelized Annual Rates	Expected Value for Maximum Single Year Rate Increase 2011-2039	Expected Value of Avg Annual 2011-2039 Carbon Emissions, MM tons	Expected Value of 2011-2039 PV of Free Cash Flow, $MM	Expected Value for 2011-2039 Average Return on Equity	Net Jobs 2011-2030 in FTE-Years	Energy Savings 2011-2030, GWH
R0	$59,661	$2,428	$1,001	$0.1249	22.1%	41.8	3,460	12.44%	11,991	41,092
B3	$61,161	$2,458	$162	$0.1245	21.9%	42.1	2,796	12.37%	4,749	11,875
B1	$61,259	$2,468	$162	$0.1247	22.0%	42.2	2,747	12.34%	5,095	11,875
B4	$61,403	$2,443	$162	$0.1250	21.8%	41.9	2,661	11.74%	4,662	11,875
B2	$61,568	$2,427	$162	$0.1253	21.8%	41.7	2,566	11.81%	28,403	11,875
R1	$62,867	$2,281	$1,001	$0.1316	22.0%	41.8	3,775	11.56%	11,991	41,092
R3	$63,101	$1,878	$1,001	$0.1321	22.6%	36.6	4,084	11.95%	8,496	41,092
R2	$63,358	$1,899	$1,001	$0.1326	22.7%	36.9	3,740	12.03%	11,991	41,092
C1	$64,403	$2,323	$162	$0.1311	21.7%	42.3	2,932	11.90%	5,125	11,875
C2	$64,875	$1,940	$162	$0.1320	22.5%	37.4	2,881	12.15%	5,125	11,875
H2	$65,198	$1,981	$162	$0.1327	22.2%	37.8	3,020	11.73%	3,321	11,875
C3	$65,356	$1,994	$162	$0.1330	22.2%	38.0	2,995	11.80%	3,652	11,875
H3	$65,420	$1,965	$162	$0.1331	21.9%	37.6	2,826	11.01%	3,345	11,875
H1	$65,596	$1,947	$162	$0.1334	21.8%	37.4	2,725	11.15%	28,070	11,875

Table 9.A.4 Standard Deviations for Performance Measures

14 Final Candidate Plans	Standard Deviation of 2011-2039 PVRR, $MM	Standard Deviation of PV of 2011-2039 Emissions Costs, $MM	Standard Deviation of 2011-2030 Costs for DSM Participants, $MM	Standard Deviation for 2011-2039 Levelized Annual Rates	Standard Deviation for Maximum Single Year Rate Increase 2011-2039	Standard Deviation of Avg Annual 2011-2039 Carbon Emissions, MM tons	Standard Deviation of 2011-2039 PV of Free Cash Flow, $MM	Standard Deviation for 2011-2039 Average Return on Equity	Standard Deviation of Net Jobs 2011-2030 in FTE-Years	Standard Deviation of Energy Savings 2011-2030, GWH
R0	$5,075	$18		$0.0085	0.10%	0.205	16.9	0.15%		
B3	$5,129	$18	With only	$0.0085	0.10%	0.207	13.8	0.15%	This item was	With only
B1	$5,125	$18	2 different	$0.0084	0.10%	0.207	13.7	0.15%	not addressed	2 different
B4	$5,104	$18	values among	$0.0084	0.10%	0.206	13.2	0.14%	by a probabilty	values among
B2	$5,135	$18	14 plans,	$0.0084	0.10%	0.205	12.8	0.15%	tree, thus it	14 plans,
R1	$5,245	$18	this is not a	$0.0090	0.10%	0.205	18.5	0.14%	only had 1	this is not a
R3	$5,012	$15	meaningful	$0.0083	0.11%	0.180	20.2	0.15%	estimate per	meaningful
R2	$5,046	$15	calculation	$0.0085	0.11%	0.181	18.5	0.15%	plan, and thus	calculation
C1	$5,303	$18		$0.0090	0.10%	0.208	14.6	0.15%	insufficient data	
C2	$5,074	$15		$0.0084	0.11%	0.183	14.3	0.15%	to calculate	
H2	$5,094	$16		$0.0084	0.10%	0.185	14.9	0.14%	a standard	
C3	$5,100	$16		$0.0085	0.10%	0.186	14.8	0.15%	deviation for	
H3	$5,083	$15		$0.0084	0.10%	0.184	14.0	0.14%	each plan's	
H1	$5,136	$15		$0.0085	0.10%	0.184	13.6	0.14%	estimate	

CDF of PVRR Differences from Endpoint Best PVRR

Ameren Missouri also used a variation of the cumulative probability distribution (CDF) for PVRR in its IRP analyses. Instead of estimating a CDF for PVRR, Ameren Missouri estimated a CDF of the PVRR differences from the endpoint best PVRR among all 14 candidate plans. This alternative calculation provided the same ranking as a ranking

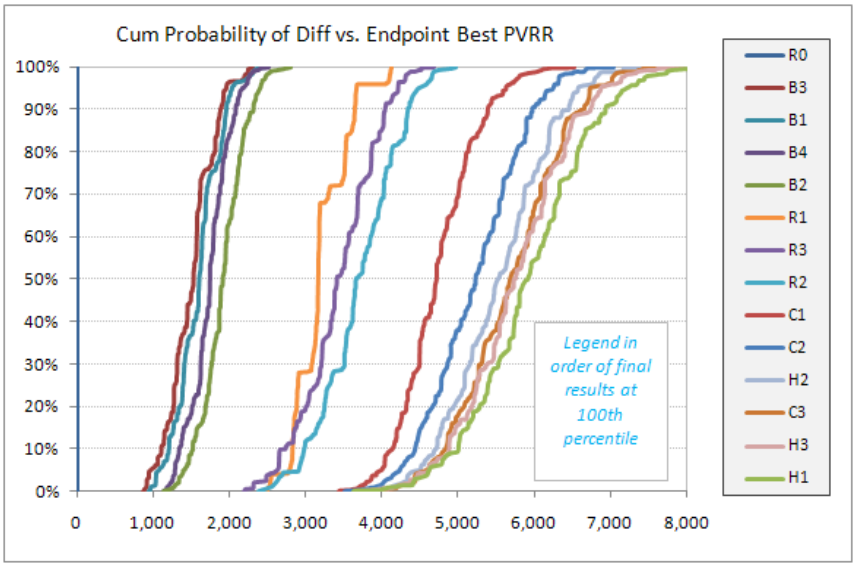
[16] 4 CSR 240-22.070(5)(A); 4 CSR 240-22.070(5)(B); 4 CSR 240-22.060(6)(B)

done simply on the PVRR itself or on the CDF of the PVRR. However, this alternative approach more clearly identified the differences among plans.

Each of the 14 plans had the same 270 endpoints, but each plan had different PVRR outcomes for its own set of those same 270 endpoints from the probability tree. An example of one of the 270 endpoints on the probability tree was: "High Load – High Gas Prices – Mandates Carbon Policy – Base DSM Cost together with Base DSM Load Impact – Low Project Cost – High Interest Rates together with High Return on Equity."

This particular endpoint existed for each of the 14 plans, but only one of the 14 plans had the best PVRR for this particular endpoint. All other plans had some positive difference (were worse) on this particular endpoint. Each of any plan's 270 endpoints' PVRRs was compared to the one best endpoint PVRR, and the difference versus the endpoint best PVRR was captured for each of the 270 endpoints of each plan. This data is shown .

Figure 9.A.16 Cumulative Probability of Difference vs. Endpoint Best PVRR



In this chart, the vertical axis shows the range of each candidate plan's difference from the best PVRR for each of 270 endpoints, and the vertical axis shows the probability of the difference from the best PVRR in percentile terms.

For example, the value at the 40% level on the vertical axis shows the PVRR difference that has a 40% probability of occurring for each plan, while the value at the 80% level shows the PVRR difference that has an 80% chance of occurring for each plan. It is clear that plans to the left are more desirable plans, since any plan to the left of any other plan has a lower PVRR difference.

Compliance References