Chapter 9 - Appendix A

Alternative Resource Plans

Table 9A.1 2017 IRP Renewable Compliance Filing Model

TERM 1											
	2018	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	
MW's Installed New Solar	0.0	0.0	0.0	0.0	25.0	0.0	0.0	11.0	0.0	0.0	36.0
MW's Installed New LFG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MW's Installed New Wind	0.0	0.0	0.0	700.0	0.0	0.0	0.0	0.0	0.0	0.0	700.0
Revenue Requirement-1% Rate Cap limit	$3,167	$3,123	$3,211	$3,372	$3,608	$3,565	$3,568	$3,694	$3,735	$3,745	$34,712
										% Increase	0.069%
TERM 2											
	2028	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	
MW's Installed New Solar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MW's Installed New LFG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MW's Installed New Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Revenue Requirement-1% Rate Cap limit	$3,737	$3,730	$3,721	$3,818	$3,814	$3,810	$3,804	$3,798	$3,792	$3,786	$37,807
										% Increase	-0.012%
										$72,443	0.027%

Table 9A.2 Type, Size, Timing of Resource Addition/Retirement[1]

Plan A - RAP EE & DR

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Primary Supply Side	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	2,550	2,627	1,978	1,949	2,105	2,235	2,381	2,503	2,558	2,615	2,654	2,696	2,723	1,769	1,785	1,799	652
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-2,550	-2,627	-1,978	-1,949	-2,105	-2,235	-2,381	-2,503	-2,558	-2,615	-2,654	-2,696	-2,723	-1,769	-1,785	-1,799	-652

Plan B - RAP EE Only

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	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	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	0
= Capacity Position after Adjustment	1,456	1,637	1,830	2,010	2,246	2,202	1,494	1,432	1,557	1,656	1,772	1,863	1,920	1,980	2,021	2,065	2,112	1,160	1,177	1,191	45
Purchases (+) or sales (-)	-1,456	-1,637	-1,830	-2,010	-2,246	-2,202	-1,494	-1,432	-1,557	-1,656	-1,772	-1,863	-1,920	-1,980	-2,021	-2,065	-2,112	-1,160	-1,177	-1,191	-45

Plan C - RAP DR & 2 CCs in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,734	1,891	2,170	2,114	1,319	1,167	1,193	1,209	1,242	1,253	1,206	1,159	1,110	1,078	1,016	0	-34	-78	-694
Purchases (+) or sales (-)	-1,456	-1,637	-1,734	-1,891	-2,170	-2,114	-1,319	-1,167	-1,193	-1,209	-1,242	-1,253	-1,206	-1,159	-1,110	-1,078	-1,016	0	34	78	694

Plan D - MAP EE & DR

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	307	519	682	861	1,033	1,195	1,358	1,507	1,654	1,791	1,917	2,052	2,163	2,253	2,369	2,433	2,487	2,560	2,637
+ Demand Response	0	0	175	380	591	723	810	884	956	1,026	1,096	1,166	1,161	1,157	1,154	1,150	1,146	1,144	1,143	1,142	1,141
+ New Combined Cycle	0	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	0
= Capacity Position after Adjustment	1,456	1,637	2,190	2,667	3,139	3,274	2,678	2,729	2,959	3,163	3,382	3,571	3,647	3,732	3,793	3,849	3,921	2,968	2,988	3,017	1,878
Purchases (+) or sales (-)	-1,456	-1,637	-2,190	-2,667	-3,139	-3,274	-2,678	-2,729	-2,959	-3,163	-3,382	-3,571	-3,647	-3,732	-3,793	-3,849	-3,921	-2,968	-2,988	-3,017	-1,878

[1] 4 CSR 240-22.060(4)(B)9

Plan F - MAP EE Only

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	307	519	682	861	1,033	1,195	1,358	1,507	1,654	1,791	1,917	2,052	2,163	2,253	2,369	2,433	2,487	2,560	2,637
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ New Combined Cycle	0	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	0
= Capacity Position after Adjustment	1,456	1,637	2,015	2,287	2,548	2,550	1,867	1,845	2,003	2,137	2,286	2,404	2,486	2,576	2,639	2,699	2,775	1,824	1,844	1,875	736
Purchases (+) or sales (-)	-1,456	-1,637	-2,015	-2,287	-2,548	-2,550	-1,867	-1,845	-2,003	-2,137	-2,286	-2,404	-2,486	-2,576	-2,639	-2,699	-2,775	-1,824	-1,844	-1,875	-736

Plan F - MAP DR Only CC in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	175	380	591	723	810	884	956	1,026	1,096	1,166	1,161	1,157	1,154	1,150	1,146	1,144	1,143	1,142	1,141
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,882	2,148	2,457	2,412	1,645	1,534	1,601	1,656	1,728	1,779	1,730	1,681	1,630	1,597	1,552	536	501	457	-160
Purchases (+) or sales (-)	-1,456	-1,637	-1,882	-2,148	-2,457	-2,412	-1,645	-1,534	-1,601	-1,656	-1,728	-1,779	-1,730	-1,681	-1,630	-1,597	-1,552	-536	-501	-457	160

Plan G - No DSM - CC in 2034 - 2 CsC in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600	600	1,800
+ New Secondary Supply Side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	477	447	406	-9	-43	-85	-101
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-477	-447	-406	9	43	85	101

Plan H - No DSM - 2 SCs in 2034 - 2 CCs in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ New Simple Cylce	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	704	704	704	704
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,200
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	477	447	406	95	61	19	3
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-477	-447	-406	-95	-61	-19	-3

Plan I - No DSM - Pumped Hydro in 2034 - 2 CCs in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ New Pumped Storage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	600	600	600
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	477	447	406	-9	-43	-85	-101
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-477	-447	-406	9	43	85	101

Plan J - No DSM - Nuclear in 2034 - CC in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ New Nuclear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,100	1,100	1,100	1,100
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	477	447	406	491	457	415	-201
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-477	-447	-406	-491	-457	-415	201

Plan K - No DSM - Wind & SC in 2034 - 2 CCs in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Wind	0	0	0	0	0	0	0	0	0	0	0	0	0	0	78	156	234	312	312	312	312
+ Simple Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	352	352	352	352
+ Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,200
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	555	603	640	55	21	-21	-37
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-555	-603	-640	-55	-21	21	37

Plan L - No DSM - Solar

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Demand Response	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
+ Solar	0	0	0	0	0	0	0	0	0	0	0	0	0	0	250	500	750	1,250	1,500	1,750	2,000
+ New Secondary Supply Side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
= Capacity Position after Adjustment	1,456	1,637	1,708	1,768	1,866	1,689	835	650	645	630	632	613	569	524	727	947	1,156	641	857	1,065	99
Purchases (+) or sales (-)	-1,456	-1,637	-1,708	-1,768	-1,866	-1,689	-835	-650	-645	-630	-632	-613	-569	-524	-727	-947	-1,156	-641	-857	-1,065	-99

Plan M - Rush Retired in 2024 - CC in 2037

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	7,896	7,896	7,896	7,896	7,896	7,896	7,896	7,896	7,896	6,926	6,926	6,926	5,740
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	2,550	2,627	1,978	1,949	927	1,057	1,203	1,325	1,380	1,437	1,476	1,518	1,545	591	607	621	74
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-2,550	-2,627	-1,978	-1,949	-927	-1,057	-1,203	-1,325	-1,380	-1,437	-1,476	-1,518	-1,545	-591	-607	-621	-74

Plan N - Labadie Retired in 2024 - CC in 2034

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	6,702	6,702	6,702	6,702	6,702	6,702	6,702	6,702	6,702	5,732	5,732	5,732	5,732
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	2,550	2,627	1,978	1,949	-267	-137	9	131	186	243	282	324	351	-3	13	27	66
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-2,550	-2,627	-1,978	-1,949	267	137	-9	-131	-186	-243	-282	-324	-351	3	-13	-27	-66

Plan O - Meramec Retired in 2020 - Labadie Retirde in 2024 - CC in 2034

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	9,398	9,233	9,233	9,074	6,702	6,702	6,702	6,702	6,702	6,702	6,702	6,702	6,702	5,732	5,732	5,732	5,732
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ Combined Cycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	600	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	1,718	1,795	1,978	1,949	-267	-137	9	131	186	243	282	324	351	-3	13	27	66
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-1,718	-1,795	-1,978	-1,949	267	137	-9	-131	-186	-243	-282	-324	-351	3	-13	-27	-66

Plan P - Meramec Retired in 2020

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	9,398	9,233	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Primary Supply Side	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	1,718	1,795	1,978	1,949	2,105	2,235	2,381	2,503	2,558	2,615	2,654	2,696	2,723	1,769	1,785	1,799	652
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-1,718	-1,795	-1,978	-1,949	-2,105	-2,235	-2,381	-2,503	-2,558	-2,615	-2,654	-2,696	-2,723	-1,769	-1,785	-1,799	-652

Plan Q - RES Compliance Only

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	127	127	127	127	127	127	127	127	127	127	127	127	127
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Primary Supply Side	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	2,550	2,627	1,978	1,949	2,098	2,228	2,349	2,471	2,526	2,583	2,622	2,664	2,691	1,737	1,753	1,767	620
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-2,550	-2,627	-1,978	-1,949	-2,098	-2,228	-2,349	-2,471	-2,526	-2,583	-2,622	-2,664	-2,691	-1,737	-1,753	-1,767	-620

Plan R - RAP - 35% CO2 Reduction

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Existing Resources	10,200	10,200	10,200	10,230	10,230	10,065	9,233	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	9,074	8,104	8,104	8,104	6,918
- Existing Sales and Load	-8,745	-8,564	-8,493	-8,463	-8,474	-8,498	-8,521	-8,546	-8,564	-8,579	-8,601	-8,621	-8,665	-8,710	-8,757	-8,787	-8,828	-8,872	-8,906	-8,949	-8,979
+ Renewables	0	0	0	0	109	122	122	122	134	134	159	159	159	159	159	159	159	159	159	159	159
+ Energy Efficiency	0	0	122	242	381	513	659	782	912	1,026	1,140	1,250	1,352	1,456	1,544	1,618	1,707	1,769	1,820	1,877	1,946
+ Demand Response	0	0	26	123	304	425	485	517	548	579	609	640	637	635	633	631	610	609	608	608	607
+ New Primary Supply Side	0	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	0
= Capacity Position after Adjustment	1,456	1,637	1,856	2,134	2,550	2,627	1,978	1,949	2,105	2,235	2,381	2,503	2,558	2,615	2,654	2,696	2,723	1,769	1,785	1,799	652
Purchases (+) or sales (-)	-1,456	-1,637	-1,856	-2,134	-2,550	-2,627	-1,978	-1,949	-2,105	-2,235	-2,381	-2,503	-2,558	-2,615	-2,654	-2,696	-2,723	-1,769	-1,785	-1,799	-652

Table 9A.3 Deviation and Probability: Project Cost Grid, Project Cost, FOM, OM, Project Schedule, EFOR, Environmental CapEx, and Transmission[2]

Project Cost Uncertainty Grid[3]

Estimate Class	Degree of Project Definition (Expressed as % of complete definition)	Established Standard	Maturing	Evolving	Emerging
Class 5	0% to 2%	Low: -20%, High: +30%	Low: -25%, High: +45%	Low: -30%, High: +75%	Low: -35%, High: +120%
Class 4	1% to 15%	Low: -15%, High: +20%	Low: -20%, High: +35%	Low: -25%, High: +55%	Low: -30%, High: +90%
Class 3	10% to 40%	Low: -10%, High: +10%	Low: -15%, High: +25%	Low: -20%, High: +45%	Low: -25%, High: +70%
Class 2	30% to 75%	Low: -5%, High: +5%	Low: -10%, High: +15%	Low: -15%, High: +35%	Low: -20%, High: +55%
Class 1	65% to 100%	Low: -3%, High: +3%	Low: -5%, High: +8%	Low: -10%, High: +17%	Low: -15%, High: +40%

Ameren Missouri used the project cost uncertainty grid above to help guide the subject matter experts in their project cost deviation and probability assignments. Columns (Established Standard, Maturing, etc.) show the degree of technological maturity for a supply side type, whereas the rows, Estimate Classes, show the degree of project definition. Subject matter experts first determined which maturity and class level each supply side option falls under, and then, using that information, made assessments on how much project costs might deviate and the probabilities associated with that. This approach was an attempt to standardize and add more objectivity to a subjective step and also was consistent with Ameren's project approval and project management practices.

Project Cost Uncertainty Distribution

Technology	Estimate Class	Item	Low Project Cost	Low Mid Point Cost	Expected Value Project Cost	High Mid Point Cost	High Project Cost
Combined Cycle	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	0%	20%	50%	20%	10%
Simple Cycle	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	5%	20%	50%	20%	5%
Nuclear	Class 5	Deviation	-20%	-10%	0%	60%	120%
		Probability	5%	15%	40%	25%	15%
Pumped Storage	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	5%	15%	60%	15%	5%
Hydro	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	5%	15%	60%	15%	5%
Regional Wind	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	5%	20%	50%	20%	5%
MO Wind	Class 5	Deviation	-20%	-10%	0%	15%	30%
		Probability	5%	20%	50%	20%	5%
Solar PV	Class 5	Deviation	-10%	-5%	0%	5%	10%
		Probability	5%	20%	50%	20%	5%

[2] 4 CSR 240-22.060(7)(C)1A; 4 CSR 240-22.060(7)(C)1B
[3] 4 CSR 240-22.060(5)(E)

FOM Uncertainty Distribution [4]

Technology	Item	Low Cost	Low Mid Point Cost	Expected Value	High Mid Point Cost	High Cost
Combined Cycle	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
Simple Cycle	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
Nuclear	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	20%	35%	30%	10%
Pumped Storage	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
Hydro	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
Regional Wind	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
MO Wind	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%
Solar PV	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	25%	40%	25%	5%

VOM Uncertainty Distribution

Technology	Item	Low Cost	Low Mid Point Cost	Expected Value	Mid High Point Cost	High Mid Point Cost	High Cost
Combined Cycle	Deviation		-50%	0%	33%	83%	
	Probability		25%	45%	25%	5%	
Simple Cycle	Deviation		-50%	0%	50%		
	Probability		25%	50%	25%		
Nuclear	Deviation	-25%	-10%	0%	10%	25%	40%
	Probability	5%	20%	40%	20%	10%	5%
Pumped Storage	Deviation	-25%	-10%	0%	10%	25%	40%
	Probability	5%	20%	40%	20%	10%	5%
Hydro	Deviation	-25%	-10%	0%	10%	25%	40%
	Probability	5%	20%	40%	20%	10%	5%
Regional Wind	Deviation	**Assumed all O&M costs are fixed**					
	Probability						
MO Wind	Deviation	**Assumed all O&M costs are fixed**					
	Probability						
Solar PV	Deviation	**Assumed all O&M costs are fixed**					
	Probability						

[4] 4 CSR 240-22.060(5)(I)

Project Schedule Uncertainty Distribution [5]

Technology	Item	Low	Low Mid Point	Expected Value	High Mid Point	High
Combined Cycle	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Simple Cycle	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Nuclear	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Pumped Storage	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Hydro	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Regional Wind	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
MO Wind	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Solar PV	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%

EFOR Uncertainty Distribution [6]

Technology	Item	Low	Low Mid Point	Expected Value	High Mid Point	High
Combined Cycle	Deviation		-1%	0%	2%	
	Probability		25%	50%	25%	
Simple Cycle	Deviation		-4%	0%	4%	
	Probability		25%	50%	25%	
Nuclear	Deviation		-1%	0%	1%	
	Probability		20%	50%	30%	
Pumped Storage	Deviation		-4%	0%	4%	
	Probability		25%	50%	25%	
Hydro		-30%	-15%	0%	20%	40%
		5%	25%	40%	25%	5%
Regional Wind	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
MO Wind	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%
Solar PV	Deviation	-30%	-15%	0%	20%	40%
	Probability	5%	25%	40%	25%	5%

[5] 4 CSR 240-22.060(5)(F)
[6] 4 CSR 240-22.060(5)(J)

Environmental CapEx Uncertainty Distribution[7]

Technology	Item	Low Project Cost	Low Mid Point Cost	Expected Value Project Cost	High Mid Point Cost	High Project Cost
Labadie - Ash Landfill	Deviation	-20%	-10%	0%	15%	30%
	Probability	5%	10%	55%	20%	10%
Labadie - Fine Mesh Screens	Deviation	-30%	-11%	0%	17%	40%
	Probability	5%	10%	60%	20%	10%
Rush Island - Fine Mesh Screens	Deviation	-29%	-10%	0%	19%	42%
	Probability	5%	15%	60%	15%	5%

Retirement Transmission CapEx Uncertainty Distribution[8]

Technology	Item	Low Project Cost	Low Mid Point Cost	Expected Value Project Cost	High Mid Point Cost	High Project Cost
Meramec	Deviation	-20%	-10%	0%	20%	40%
	Probability	5%	15%	40%	30%	10%
Sioux	Deviation	-40%	-20%	0%	35%	70%
	Probability	5%	15%	40%	30%	10%
Labadie	Deviation	-40%	-20%	0%	35%	70%
	Probability	5%	15%	40%	30%	10%
Rush Island	Deviation	-40%	-20%	0%	35%	70%
	Probability	5%	15%	40%	30%	10%

[7] 4 CSR 240-22.060(5)(E)
[8] 4 CSR 240-22.060(5)(E)

Table 9A.4 Sensitivity Analysis: Resource Specific Uncertain Factors[9]

Change in PVRR Ranking

Plan	Integration Ranking	Project Cost			Project Schedule			Fixed and Variable O&M			EFOR		
		PWA	Low	High	PWA	Low	High	PWA	Low	High	PWA	Low	High
A-RAP	3	0	0	0	0	0	0	0	0	0	0	0	0
B-RAP EE only	7	0	0	0	0	0	0	0	0	0	0	0	0
C-RAP DR only	12	0	0	0	0	0	0	0	0	0	0	0	0
D-MAP	1	0	0	0	0	0	0	0	0	0	0	0	0
E-MAP EE only	5	0	0	0	0	0	0	0	0	0	0	0	0
F-MAP DR only	11	0	0	0	0	0	0	0	0	0	0	0	0
G-No DSM-CC	14	0	0	1	0	0	0	0	0	0	0	0	0
H-No DSM-SC	13	0	0	0	0	0	0	0	0	0	0	0	0
I-No DSM-Pumped Storage	16	0	0	0	0	0	0	0	0	0	0	0	0
J-No DSM-Nuclear	18	0	0	0	0	0	0	0	0	0	0	0	0
K-No DSM-Wind&SC	17	0	0	0	0	0	0	0	0	0	0	0	0
L-No DSM-Solar	15	0	0	-1	0	0	0	0	0	0	0	0	0
M-Rush Island Retired 2024	8	0	0	0	0	0	0	0	0	0	0	0	0
N-Labadie Retired 2024	9	0	0	0	0	0	0	0	0	0	0	0	0
O-Meramec 2020-Labadie 2024	10	0	0	0	0	0	0	0	0	0	0	0	0
P-Meramec Retired 2020	4	0	0	0	0	0	0	0	0	0	0	0	0
Q-RES Compliance only	2	0	0	0	0	0	0	0	0	0	0	0	0
R-RAP-35% CO2 Reduction	6	0	0	0	0	0	0	0	0	0	0	0	0

Change in PVRR

Plan	Integration PVRR	Project Cost			Project Schedule			Fixed and Variable O&M			EFOR		
		PWA	Low	High	PWA	Low	High	PWA	Low	High	PWA	Low	High
A-RAP	55,037	49	-1,102	1,591	10	-13	111	2	-35	51	0	0	0
B-RAP EE only	55,374	49	-1,102	1,591	10	-13	111	2	-35	51	0	0	0
C-RAP DR only	58,041	52	-1,273	1,789	10	-31	135	1	-102	108	0	-3	3
D-MAP	54,398	49	-1,102	1,591	10	-13	111	2	-35	51	0	0	0
E-MAP EE only	55,083	49	-1,102	1,591	10	-13	111	2	-35	51	0	0	0
F-MAP DR only	57,485	50	-1,188	1,690	10	-22	123	1	-68	80	0	-1	2
G-No DSM-CC	58,614	53	-1,381	1,914	11	-41	151	0	-150	148	0	-5	5
H-No DSM-SC	58,457	52	-1,316	1,835	11	-38	145	1	-113	120	0	-5	5
I-No DSM-Pumped Storage	59,182	52	-1,371	1,887	12	-71	193	0	-87	90	0	7	-9
J-No DSM-Nuclear	64,610	253	-4,890	7,422	16	-570	732	6	-260	322	0	-22	18
K-No DSM-Wind&SC	59,761	47	-1,674	2,141	29	-60	346	4	-179	219	0	-3	4
L-No DSM-Solar	58,695	46	-1,332	1,792	15	-13	162	4	-93	137	0	0	0
M-Rush Island Retired 2024	56,202	41	-1,060	1,469	10	-22	123	1	-68	80	0	-1	2
N-Labadie Retired 2024	56,736	30	-939	1,240	10	-24	126	1	-82	91	0	-2	2
O-Meramec 2020-Labadie 2024	56,766	30	-939	1,240	10	-24	126	1	-82	91	0	-2	2
P-Meramec Retired 2020	55,067	49	-1,103	1,591	10	-13	111	2	-35	51	0	0	0
Q-RES Compliance only	55,018	49	-1,096	1,585	10	-13	109	2	-33	48	0	0	0
R-RAP-35% CO2 Reduction	55,102	49	-1,102	1,591	10	-13	111	2	-35	51	0	0	0

[9] 4 CSR 240-22.060(6)

Table 9A.5 Sensitivity Analysis: Non-Resource Specific Uncertain Factors[10]

Change in PVRR Ranking

Plan	Integration Ranking	DSM Load Impact and Cost			DSM Cost Only			ROE - Interest Rate			Coal Price		
		PWA	Low	High	PWA	Low	High	PWA	Low	High	PWA	Low	High
A-RAP	3	0	1	0	0	1	0	0	0	0	0	0	0
B-RAP EE only	7	0	0	0	0	0	-1	0	0	0	0	0	0
C-RAP DR only	12	0	0	0	0	0	0	0	0	0	0	0	0
D-MAP	1	0	0	0	0	0	0	0	0	0	0	0	0
E-MAP EE only	5	0	-3	1	0	-3	2	0	0	0	0	-1	1
F-MAP DR only	11	0	0	0	0	0	0	0	0	0	0	0	0
G-No DSM-CC	14	0	0	0	0	0	0	0	0	0	0	0	0
H-No DSM-SC	13	0	0	0	0	0	0	0	0	0	0	0	0
I-No DSM-Pumped Storage	16	0	0	0	0	0	0	0	0	0	0	0	0
J-No DSM-Nuclear	18	0	0	0	0	0	0	0	0	0	0	0	0
K-No DSM-Wind&SC	17	0	0	0	0	0	0	0	0	0	0	0	0
L-No DSM-Solar	15	0	0	0	0	0	0	0	0	0	0	0	0
M-Rush Island Retired 2024	8	0	0	0	0	0	0	0	0	0	0	0	0
N-Labadie Retired 2024	9	0	0	0	0	0	0	0	0	0	0	0	0
O-Meramec 2020-Labadie 2024	10	0	0	0	0	0	0	0	0	0	0	0	0
P-Meramec Retired 2020	4	0	1	0	0	1	0	0	0	0	0	1	1
Q-RES Compliance only	2	0	1	0	0	1	0	0	0	0	0	0	0
R-RAP-35% CO2 Reduction	6	0	0	-1	0	0	-1	0	0	0	0	0	-2

Change in PVRR

Plan	Integration PVRR	DSM Load Impact and Cost			DSM Cost Only			ROE - Interest Rate			Coal Price		
		PWA	Low	High	PWA	Low	High	PWA	Low	High	PWA	Low	High
A-RAP	55,037	33	305	38	25	-336	589	0	-612	613	-51	-1,878	1,364
B-RAP EE only	55,374	15	95	55	21	-281	493	0	-616	616	-51	-1,878	1,364
C-RAP DR only	58,041	18	210	-16	4	-55	96	0	-656	656	-51	-1,878	1,364
D-MAP	54,398	55	409	145	46	-609	1,068	0	-605	606	-51	-1,878	1,364
E-MAP EE only	55,083	21	32	178	39	-517	904	0	-612	613	-51	-1,878	1,364
F-MAP DR only	57,485	34	377	-34	7	-92	164	0	-636	636	-51	-1,878	1,364
G-No DSM-CC	58,614	0	0	0	0	0	0	0	-680	681	-51	-1,878	1,364
H-No DSM-SC	58,457	0	0	0	0	0	0	0	-672	673	-51	-1,878	1,364
I-No DSM-Pumped Storage	59,182	0	0	0	0	0	0	0	-699	701	-51	-1,878	1,364
J-No DSM-Nuclear	64,610	0	0	0	0	0	0	2	-1,052	1,067	-51	-1,878	1,364
K-No DSM-Wind&SC	59,761	0	0	0	0	0	0	0	-765	766	-51	-1,878	1,364
L-No DSM-Solar	58,695	0	0	0	0	0	0	0	-701	702	-51	-1,878	1,364
M-Rush Island Retired 2024	56,202	33	305	38	25	-336	589	0	-607	608	-45	-1,465	1,019
N-Labadie Retired 2024	56,736	33	305	38	25	-336	589	0	-593	593	-40	-1,294	897
O-Meramec 2020-Labadie 2024	56,766	33	305	38	25	-336	589	0	-592	593	-37	-1,252	884
P-Meramec Retired 2020	55,067	33	305	38	25	-336	589	0	-612	613	-49	-1,836	1,351
Q-RES Compliance only	55,018	33	305	38	25	-336	589	0	-610	611	-51	-1,878	1,364
R-RAP-35% CO2 Reduction	55,102	33	305	38	25	-336	589	0	-612	613	-52	-1,828	1,311

[10] 4 CSR 240-22.060(6)

Table 9A.6 DSM Participant Costs[11]

DSM Load Impact and Cost

DSM Program	Value ($Million)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
RAP	Low	24	32	38	40	41	41	42	42	42	41	40	40	40	40	40	40	40	38	38
	Base	28	38	46	48	49	50	50	50	50	50	48	48	48	48	48	48	48	46	45
	High	33	45	54	56	58	58	59	59	59	58	57	56	56	56	56	56	56	54	53
MID	Low	12	16	19	20	21	21	21	21	21	21	20	20	20	20	20	20	20	19	19
	Base	14	19	23	24	25	25	25	25	25	25	24	24	24	24	24	24	24	23	23
	High	17	22	27	28	29	29	29	29	30	29	28	28	28	28	28	28	28	27	27
MAP	Low	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	High	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

DSM Cost Only

DSM Program	Value ($Million)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
RAP	Low	23	30	37	38	39	40	40	40	40	40	39	38	38	38	38	38	38	37	36
	Base	28	38	46	48	49	50	50	50	50	50	48	48	48	48	48	48	48	46	45
	High	38	51	62	64	66	67	68	68	68	67	65	65	65	65	64	65	65	62	61
MID	Low	11	15	18	19	20	20	20	20	20	20	19	19	19	19	19	19	19	18	18
	Base	14	19	23	24	25	25	25	25	25	25	24	24	24	24	24	24	24	23	23
	High	19	26	31	32	33	33	34	34	34	33	33	32	32	32	32	32	32	31	30
MAP	Low	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Base	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	High	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

[11] 4 CSR 240-22.060(2)(A)3

Figure 9A.1 Combined Impact of DSM on Summer Peak Demand[12]

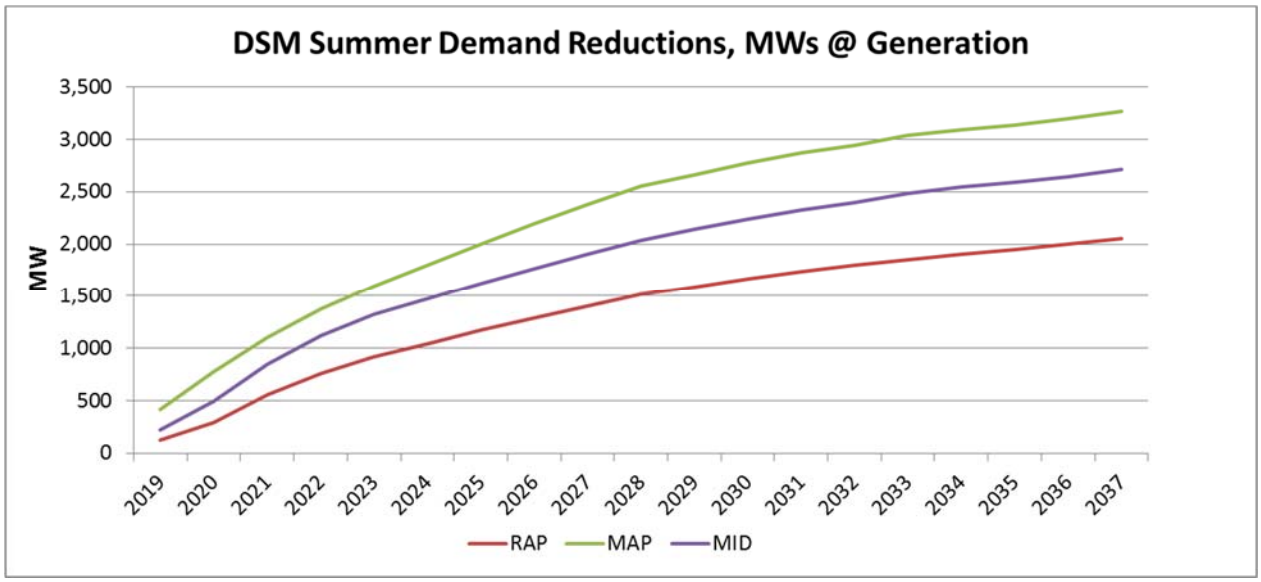
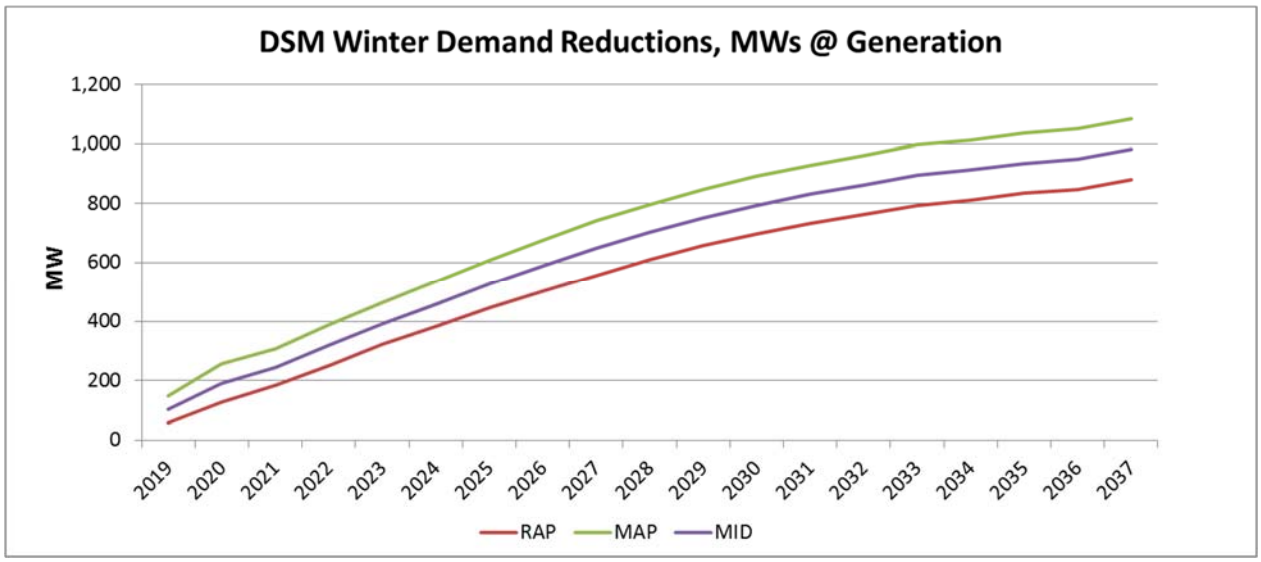


Figure 9A.2 Combined Impact of DSM on Winter Peak Demand[13]



[12] 4 CSR 240-22.060(4)(B)1
[13] 4 CSR 240-22.060(4)(B)1

Figure 9A.3 Stacked Programs for RAP DSM Capacity[14]

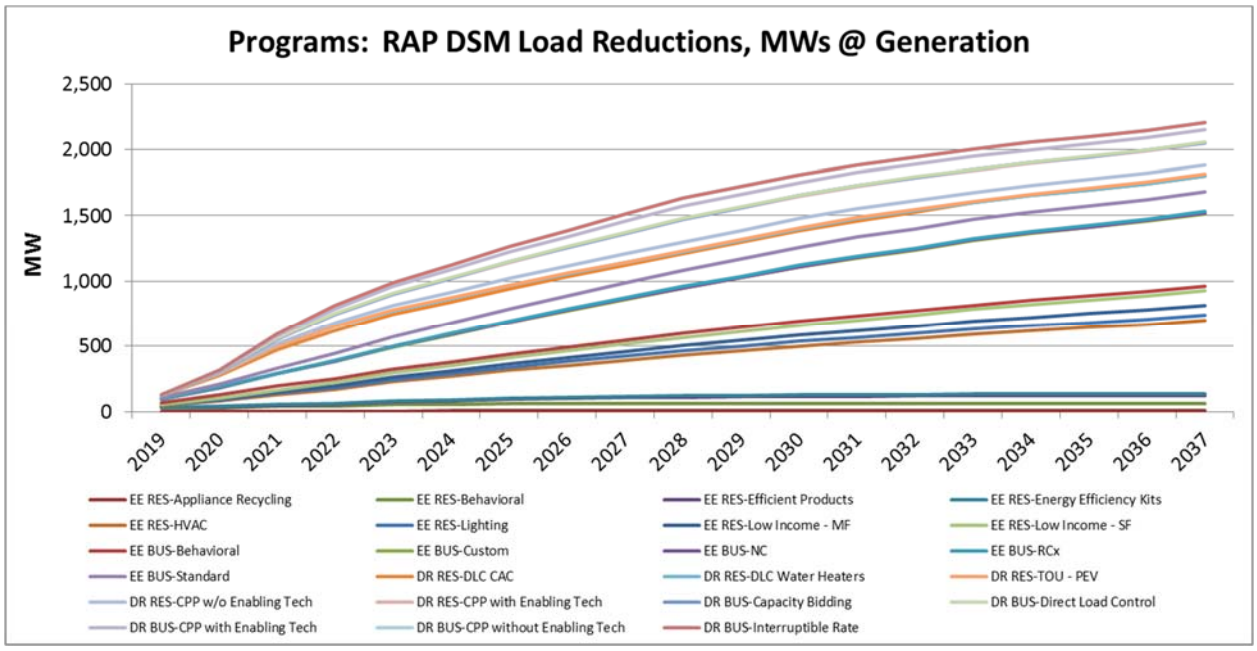
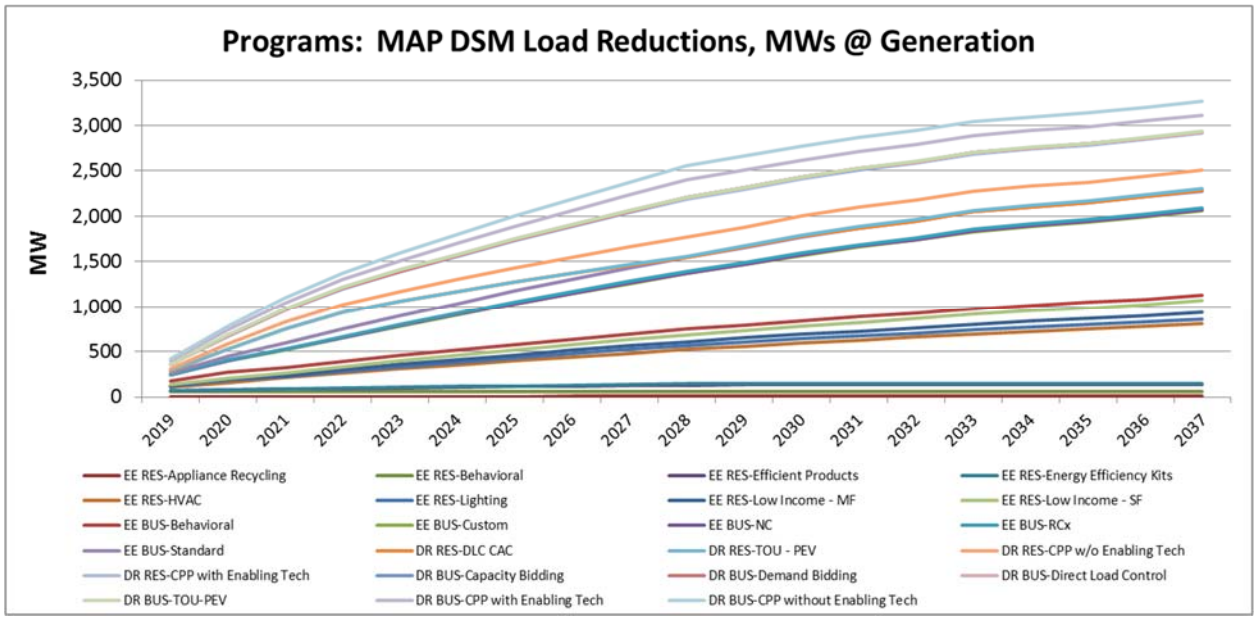
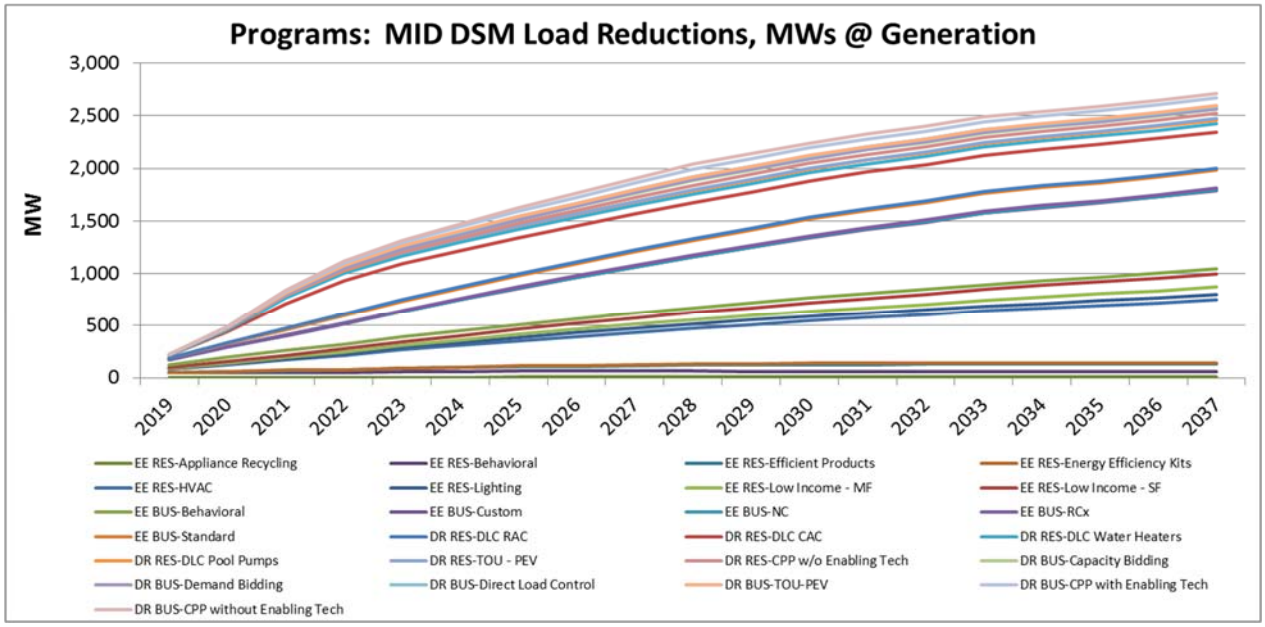


Figure 9A.4 Stacked Programs for MAP DSM Capacity[15]



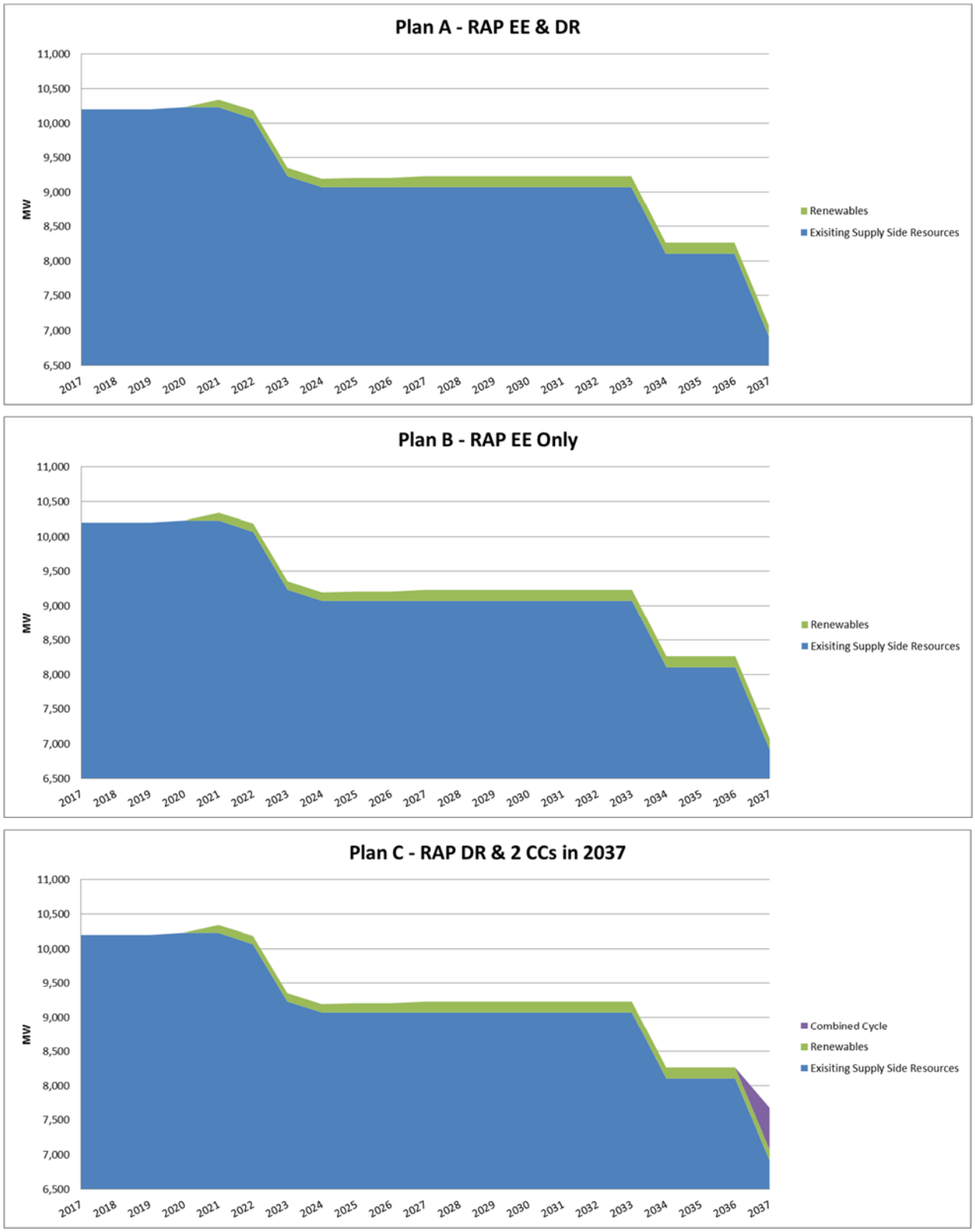
[14] 4 CSR 240-22.060(4)(B)2
[15] 4 CSR 240-22.060(4)(B)2

Figure 9A.5 Stacked Programs for MID DSM Capacity[16]

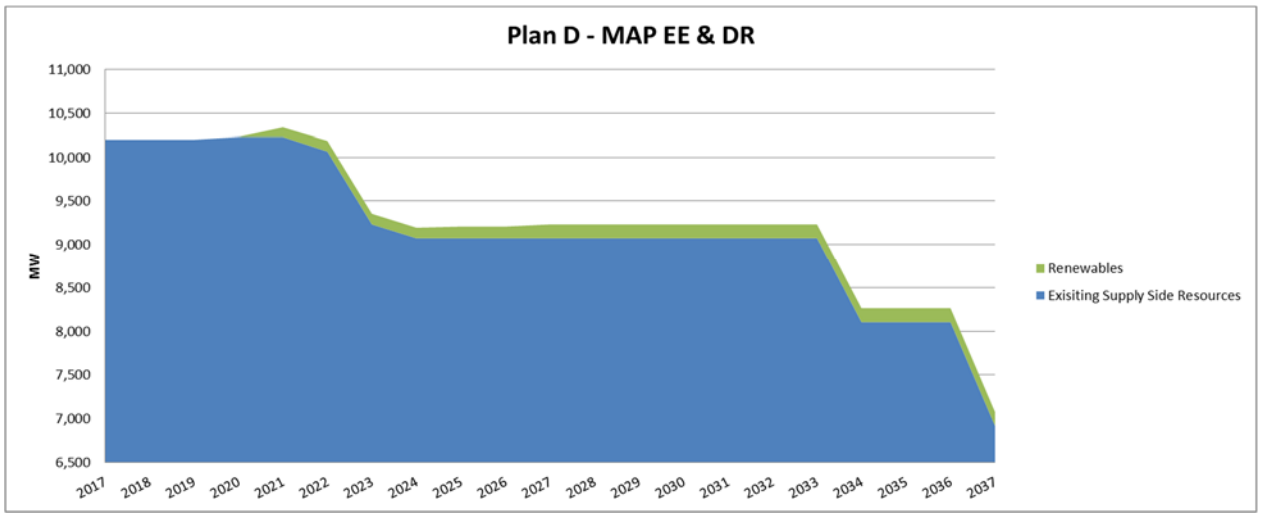


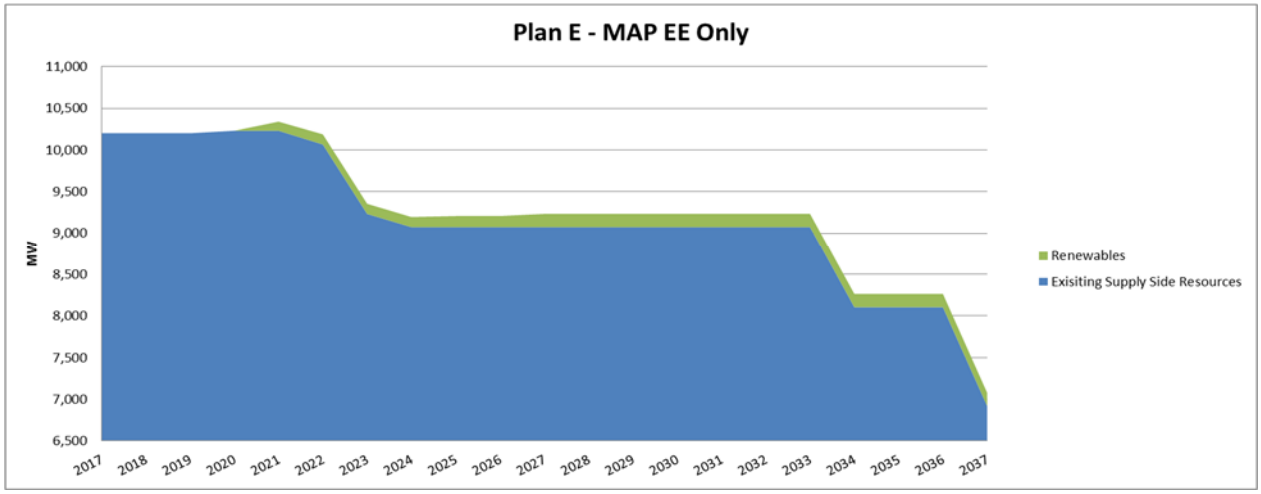
[16] 4 CSR 240-22.060(4)(B)2

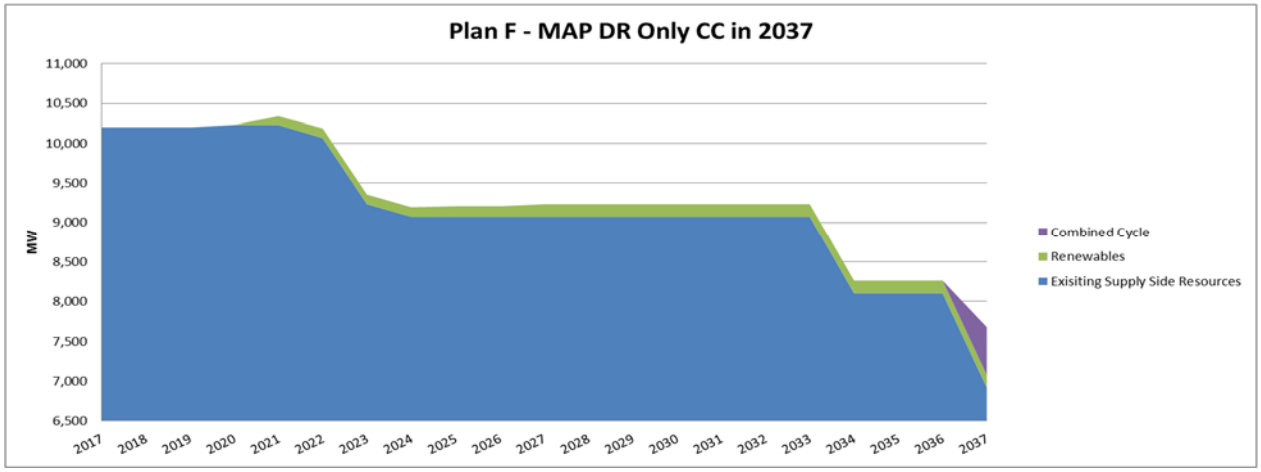
Figure 9A.6 Composition of Capacity[17]

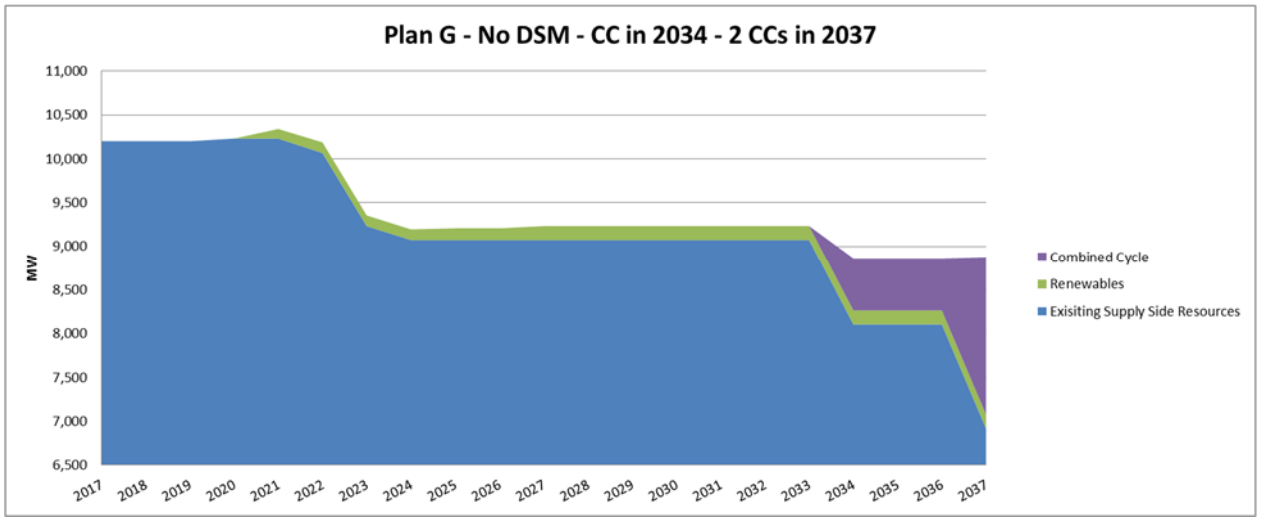


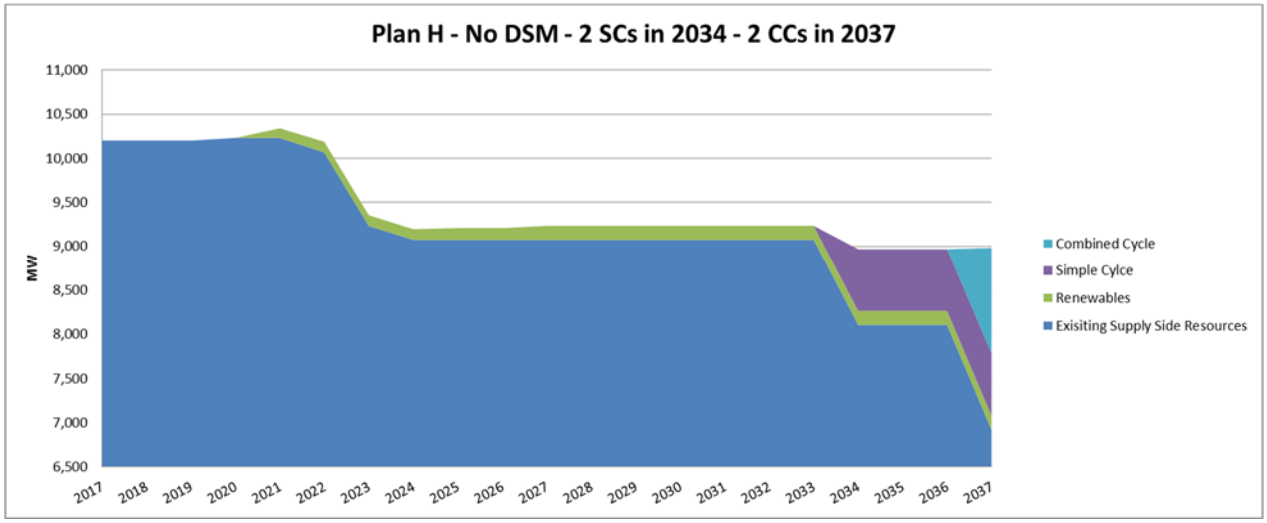
[17] 4 CSR 240-22.060(4)(B)3

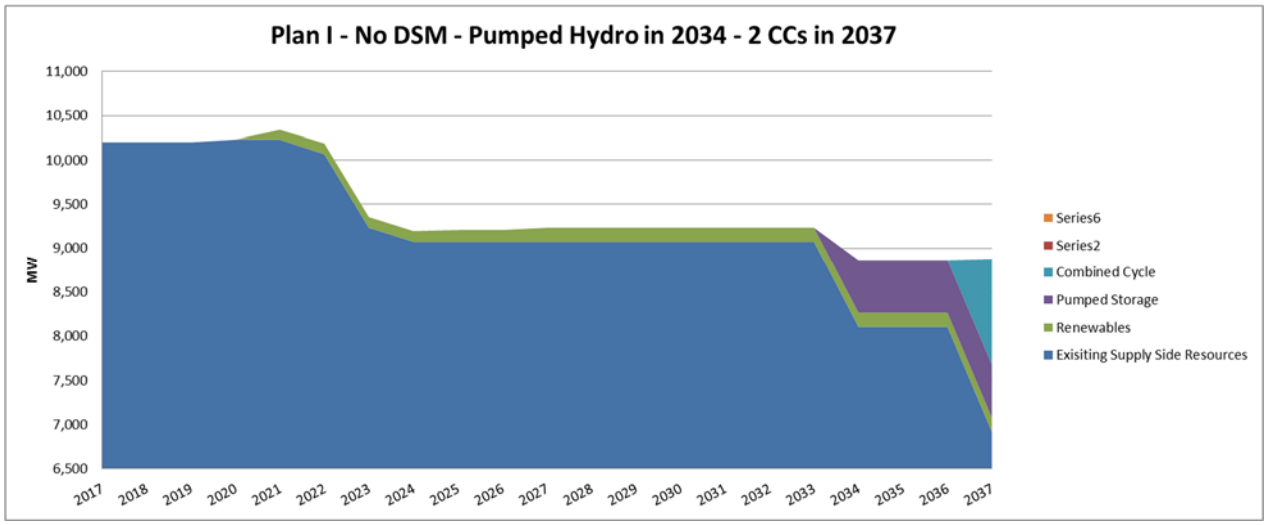

Plan D - MAP EE & DR
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Renewables
Exisiting Supply Side Resources

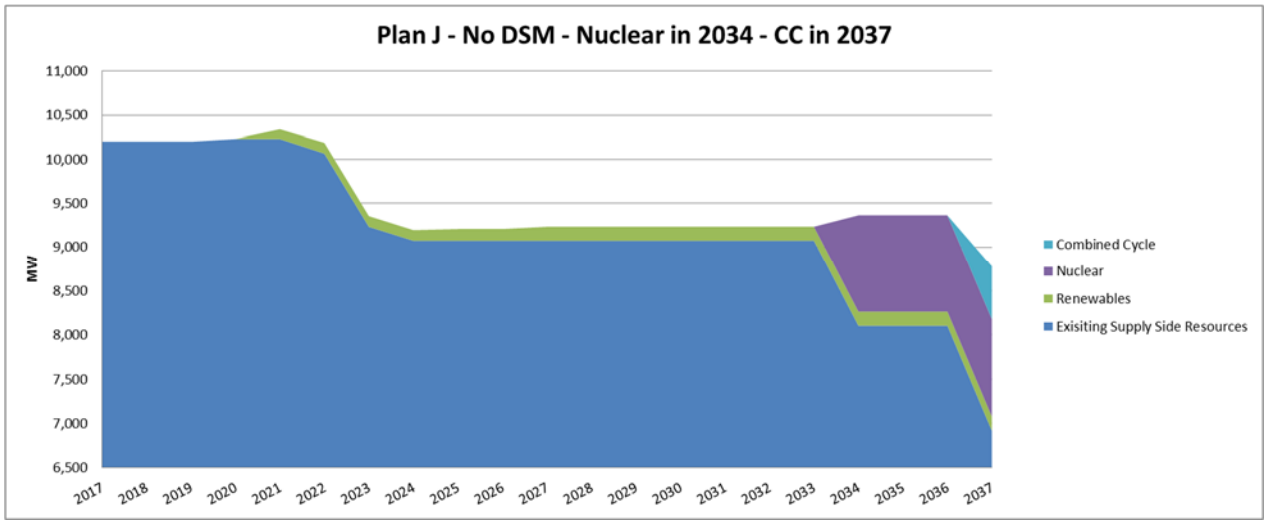

Plan E - MAP EE Only
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Renewables
Exisiting Supply Side Resources

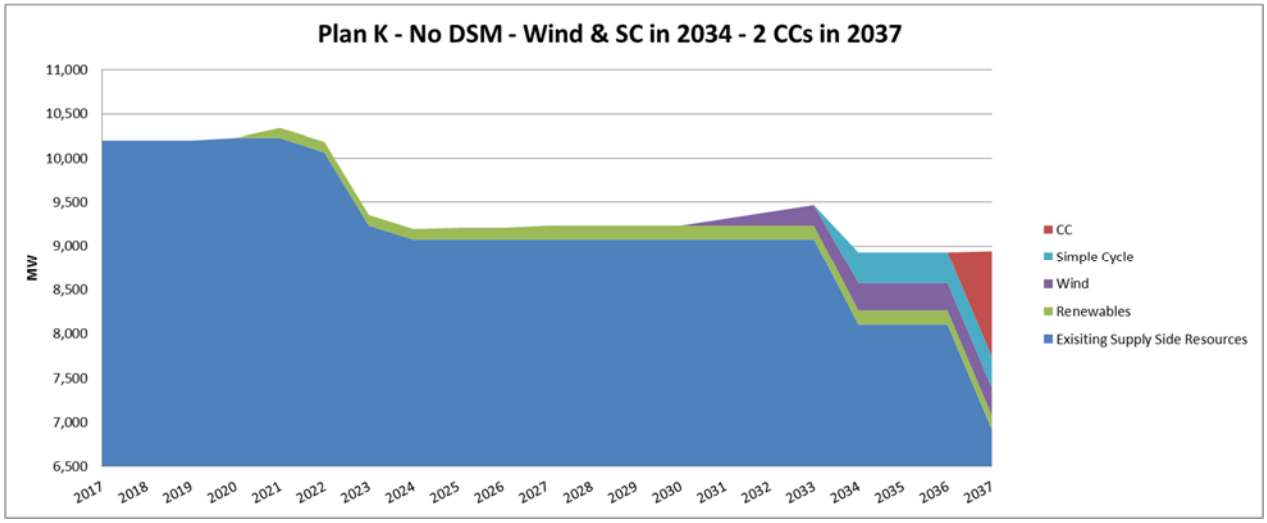

Plan F - MAP DR Only CC in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Renewables
Exisiting Supply Side Resources

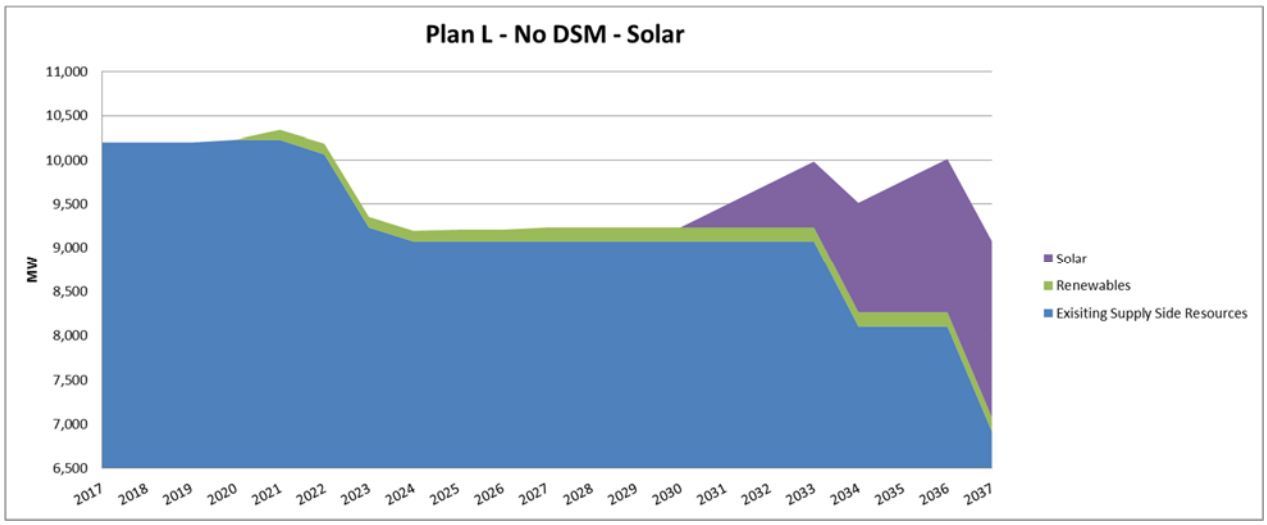

Plan G - No DSM - CC in 2034 - 2 CCs in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Renewables
Exisiting Supply Side Resources

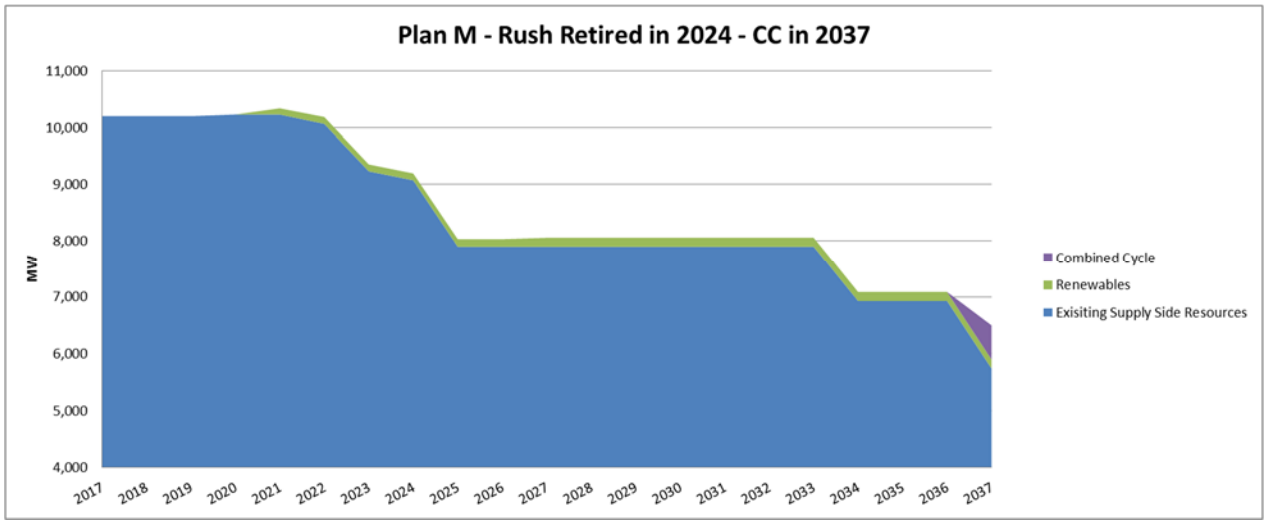

Plan H - No DSM - 2 SCs in 2034 - 2 CCs in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Simple Cylce
Renewables
Exisiting Supply Side Resources

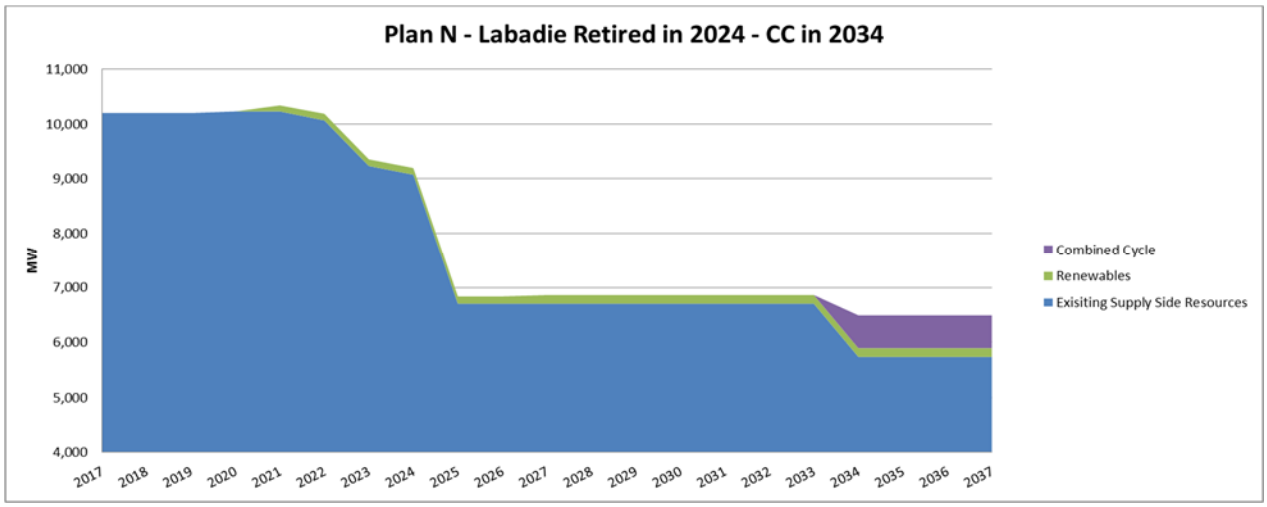

Plan I - No DSM - Pumped Hydro in 2034 - 2 CCs in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Series6
Series2
Combined Cycle
Pumped Storage
Renewables
Exisiting Supply Side Resources

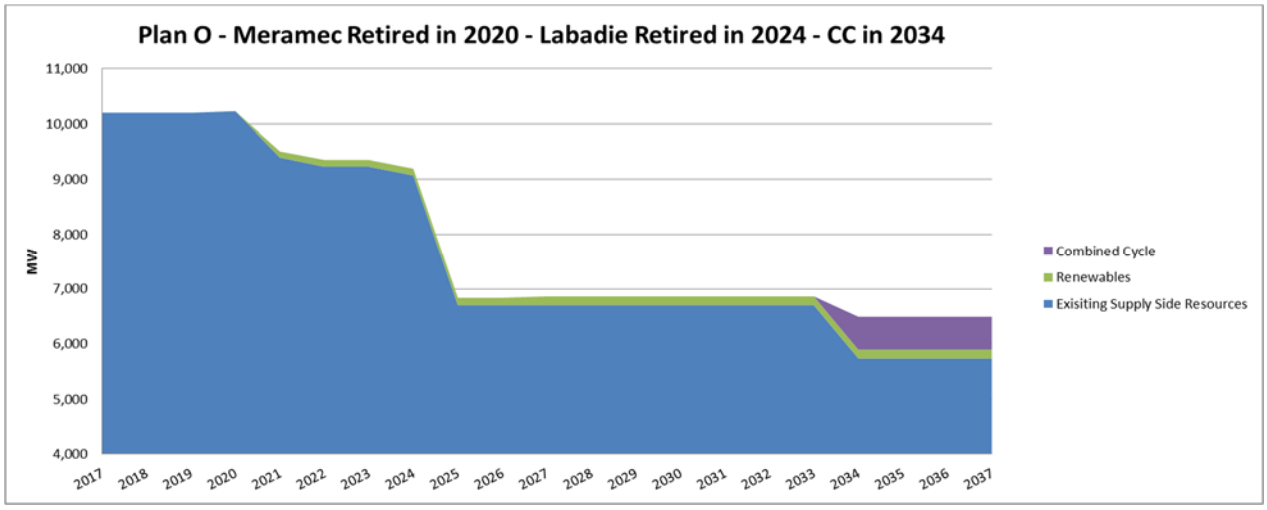

Plan J - No DSM - Nuclear in 2034 - CC in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Nuclear
Renewables
Exisiting Supply Side Resources

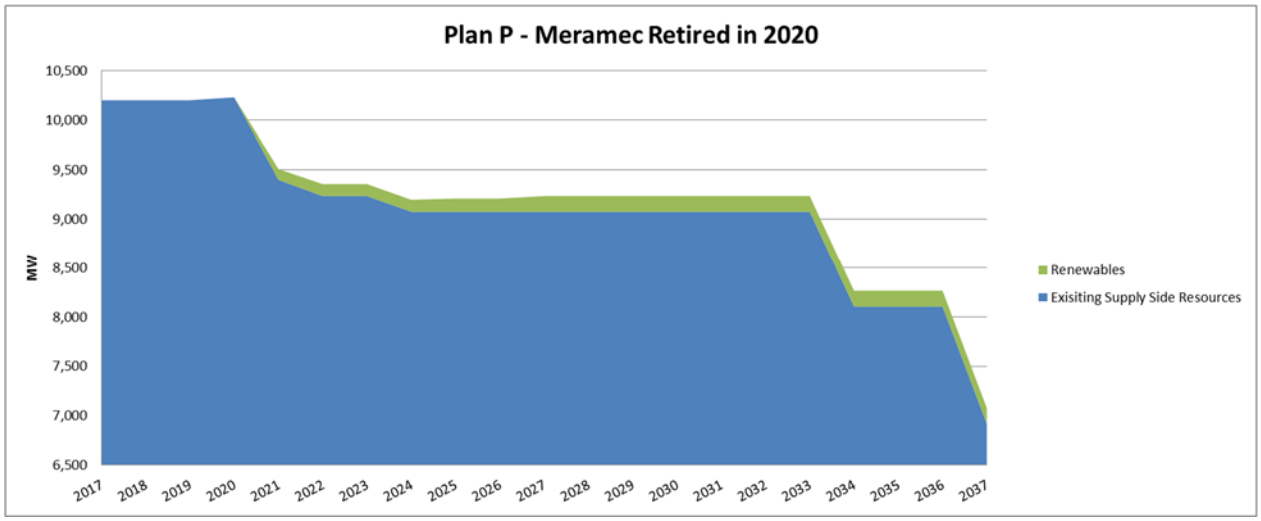

Plan K - No DSM - Wind & SC in 2034 - 2 CCs in 2037
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
CC
Simple Cycle
Wind
Renewables
Exisiting Supply Side Resources

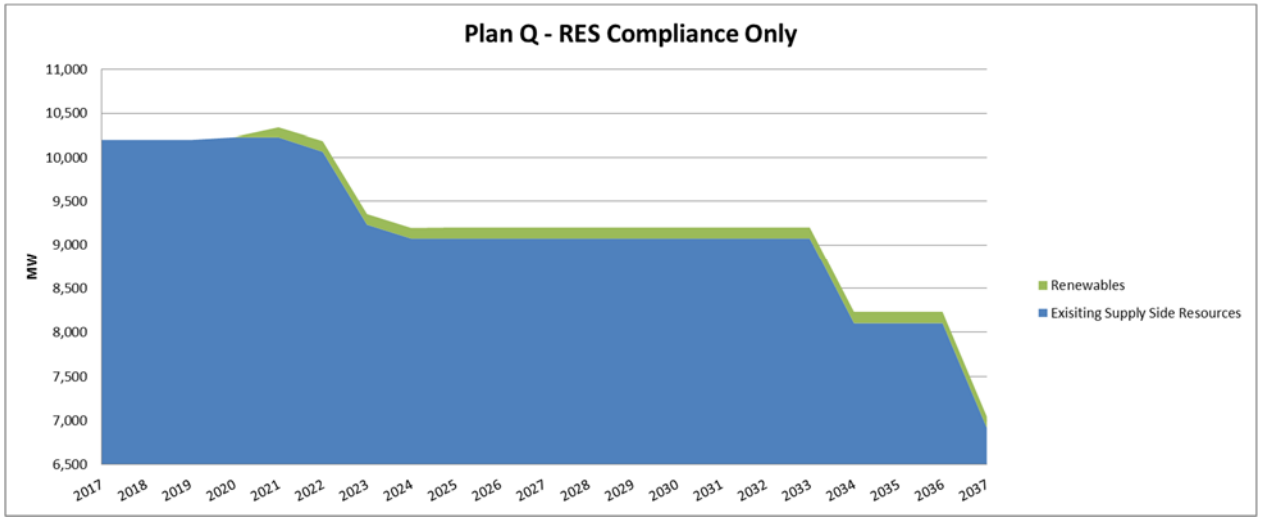

Plan L - No DSM - Solar
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Solar
Renewables
Exisiting Supply Side Resources


Plan M - Rush Retired in 2024 - CC in 2037
MW
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Renewables
Exisiting Supply Side Resources


Plan N - Labadie Retired in 2024 - CC in 2034
MW
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Renewables
Exisiting Supply Side Resources


Plan O - Meramec Retired in 2020 - Labadie Retired in 2024 - CC in 2034
MW
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Combined Cycle
Renewables
Exisiting Supply Side Resources


Plan P - Meramec Retired in 2020
MW
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Renewables
Exisiting Supply Side Resources


Plan Q - RES Compliance Only
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Renewables
Exisiting Supply Side Resources

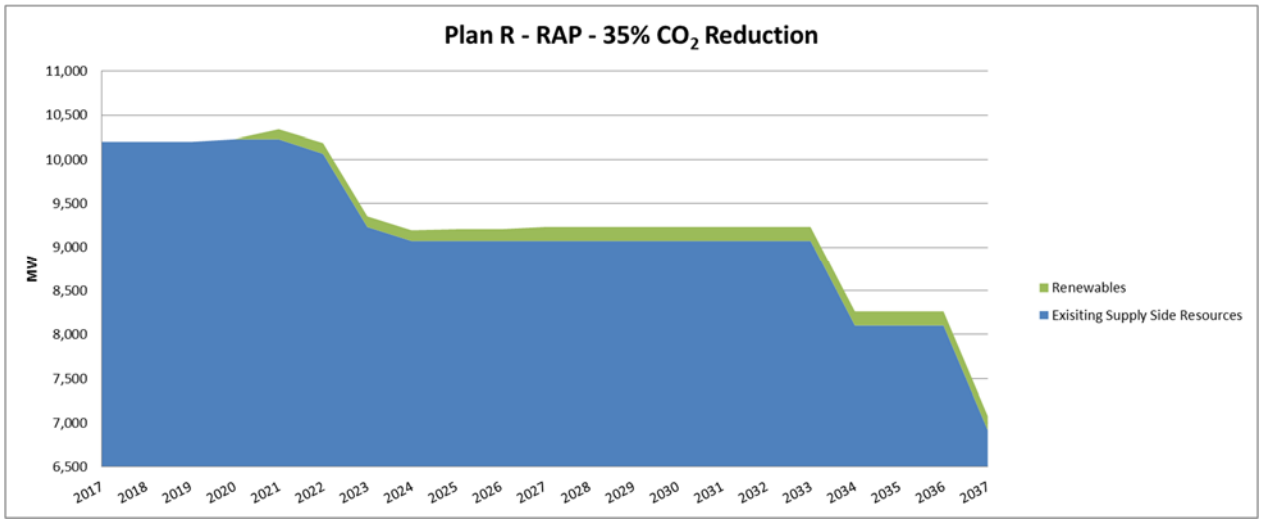

Plan R - RAP - 35% CO2 Reduction
MW
11,000
10,500
10,000
9,500
9,000
8,500
8,000
7,500
7,000
6,500
2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037
Renewables
Exisiting Supply Side Resources

Figure 9A.7 Combined Impact of DSM Resources on Energy[18]

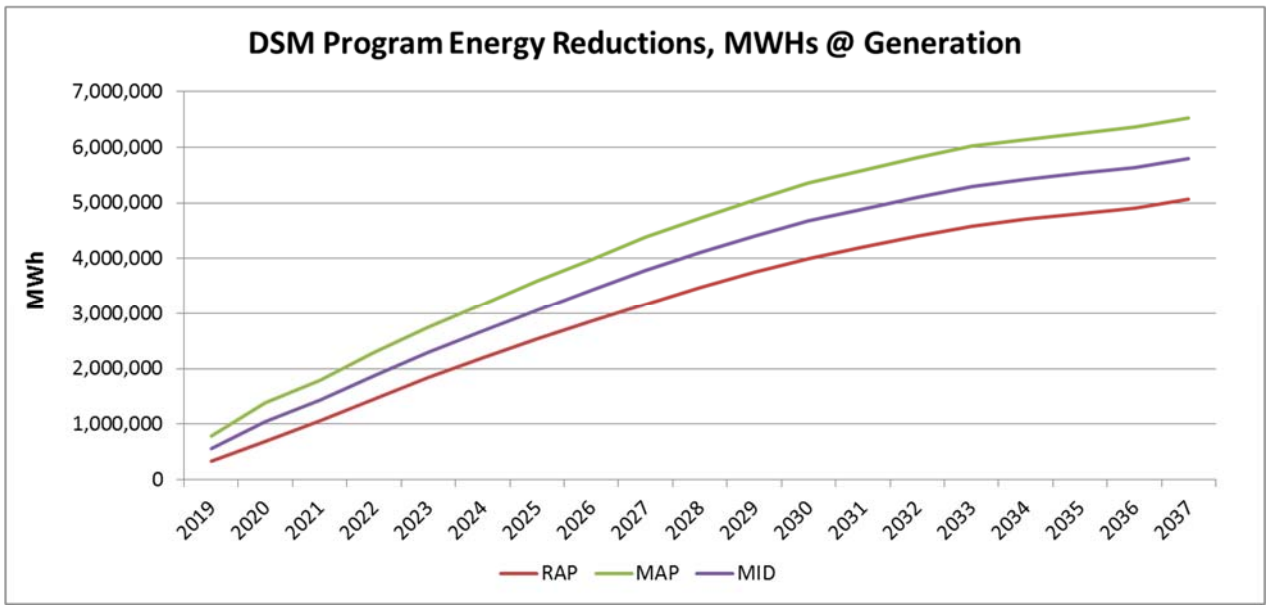
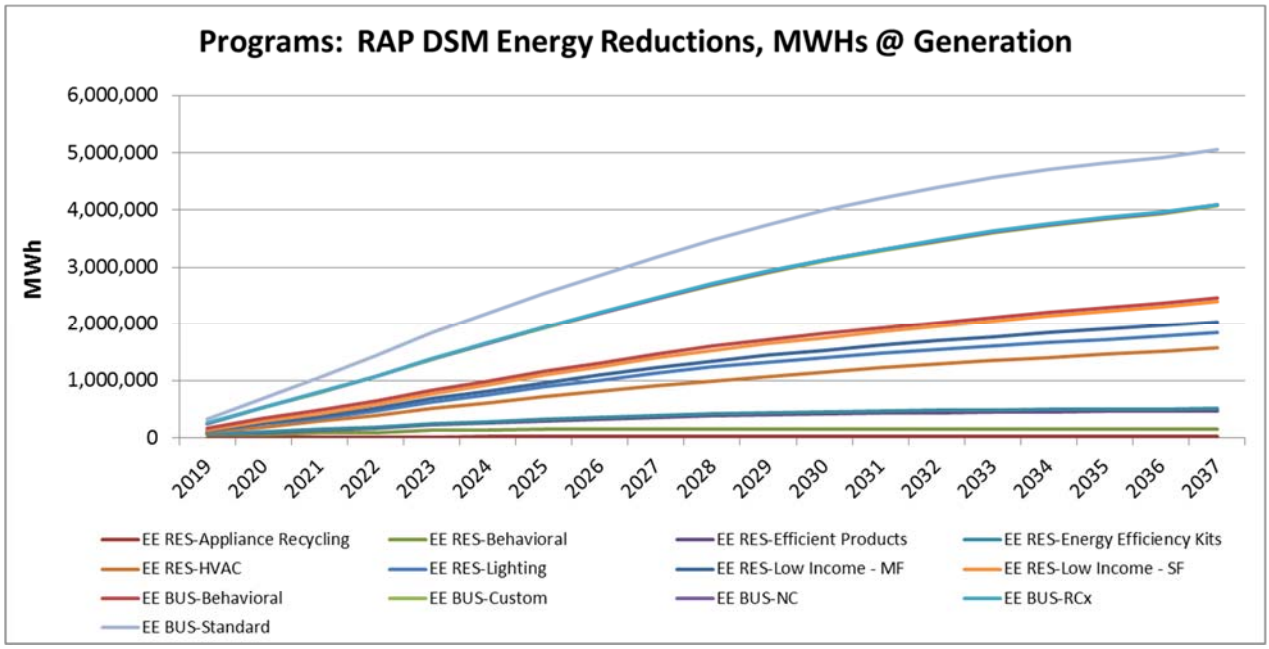


Figure 9A.8 Programs for RAP DSM Energy[19]



[18] 4 CSR 240-22.060(4)(B)4
[19] 4 CSR 240-22.060(4)(B)5

Figure 9A.9 Programs for MAP DSM Energy[20]

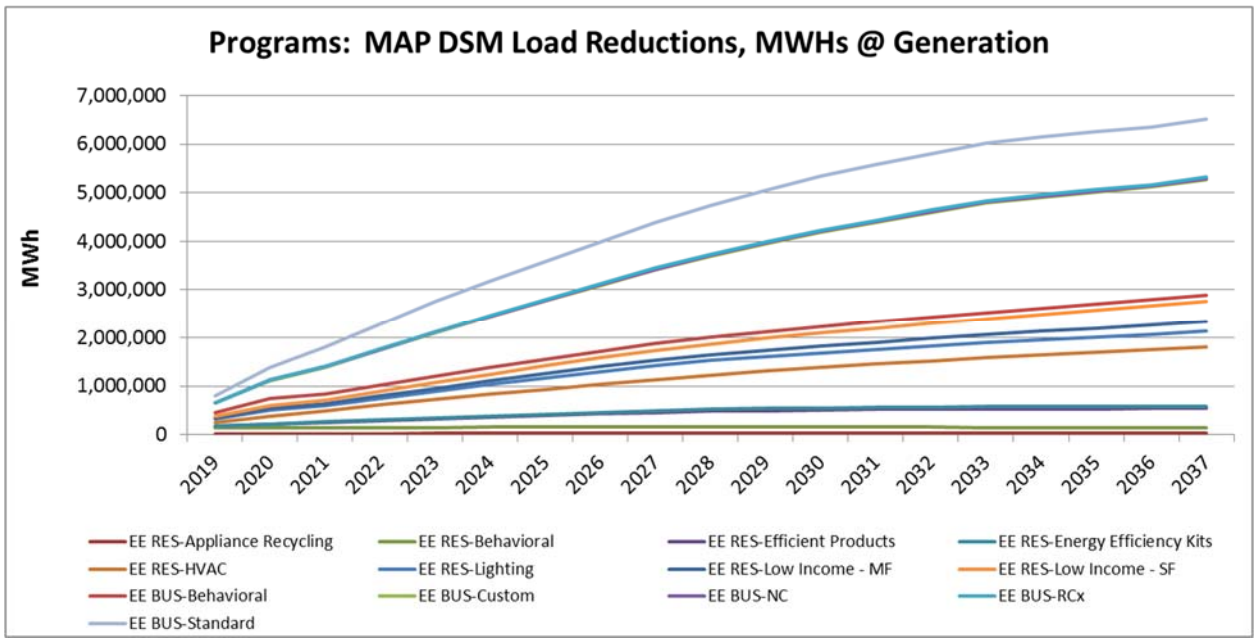
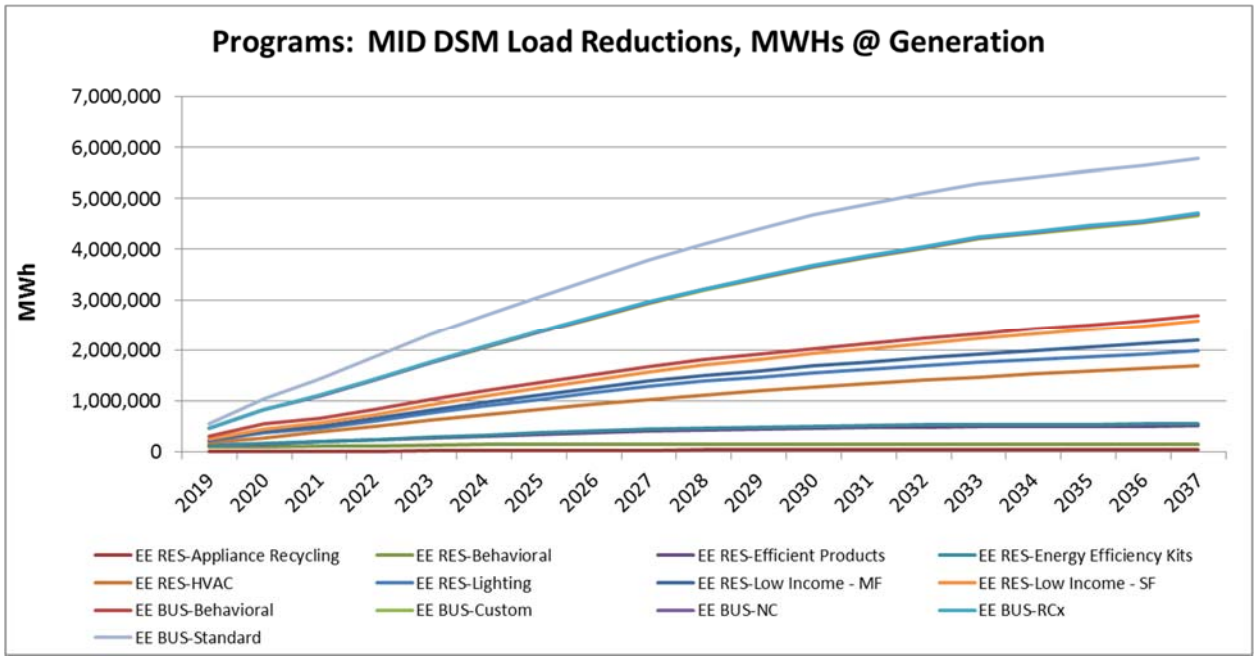
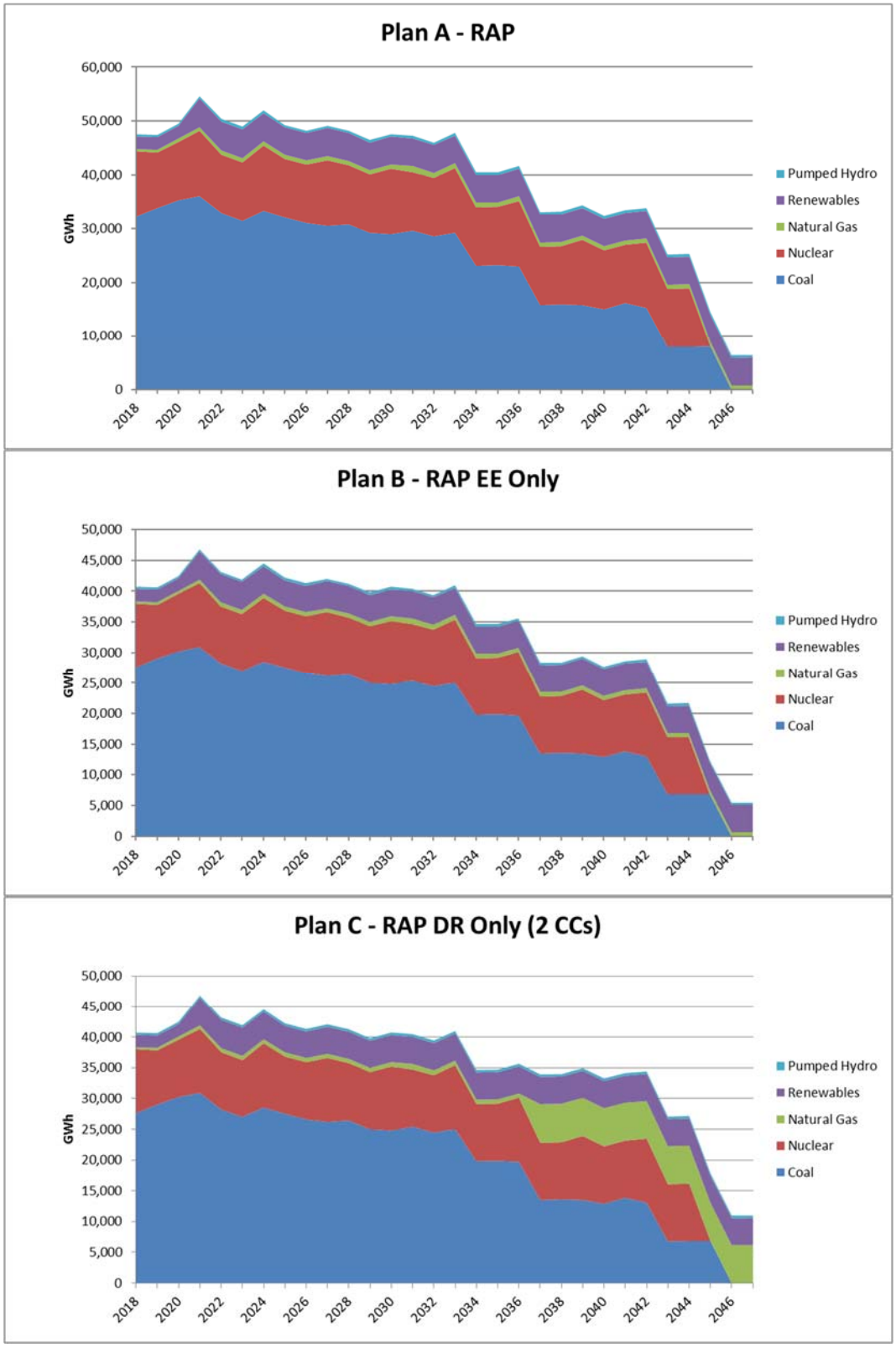


Figure 9A.10 Programs for MID DSM Energy[21]

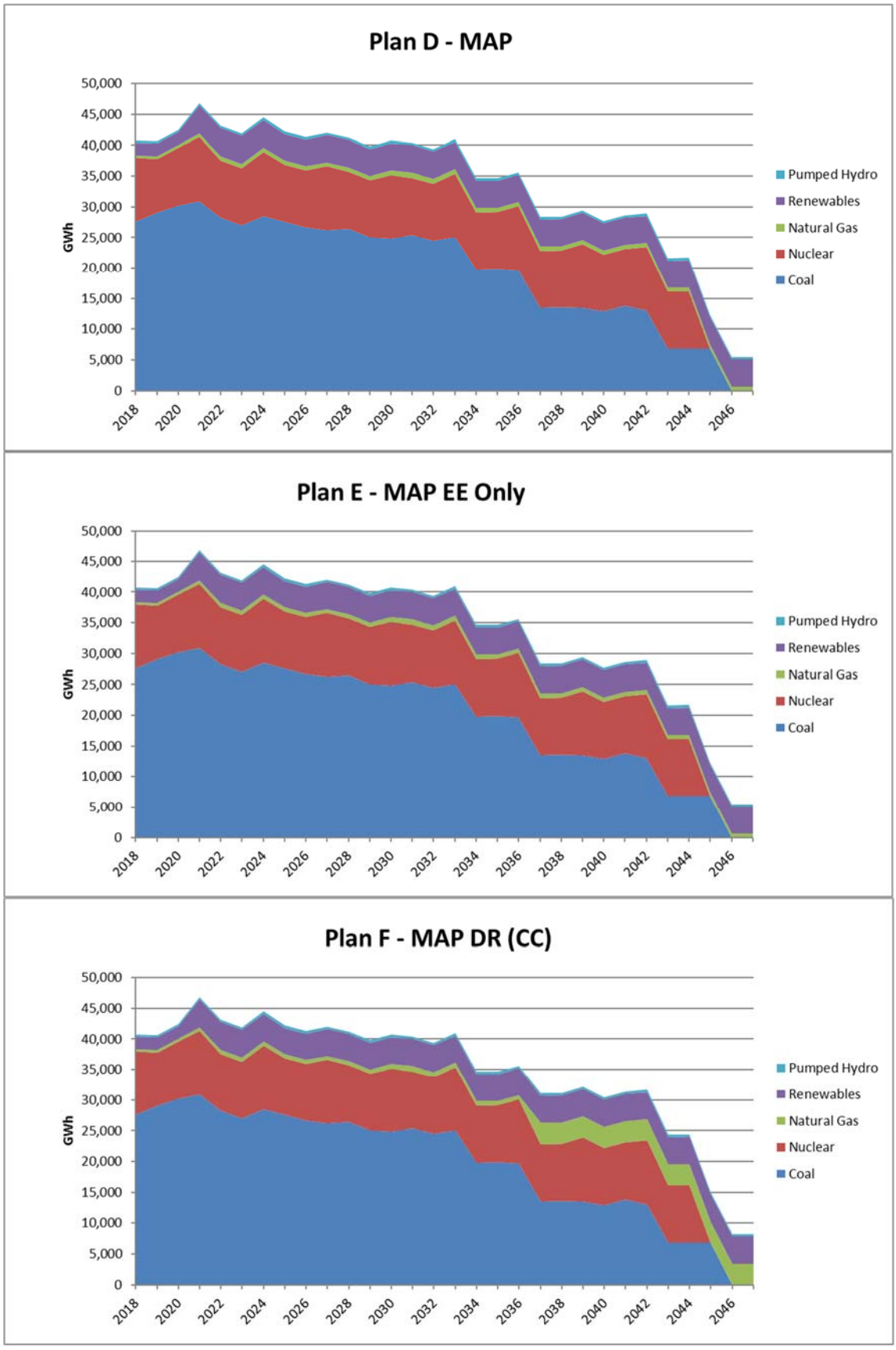


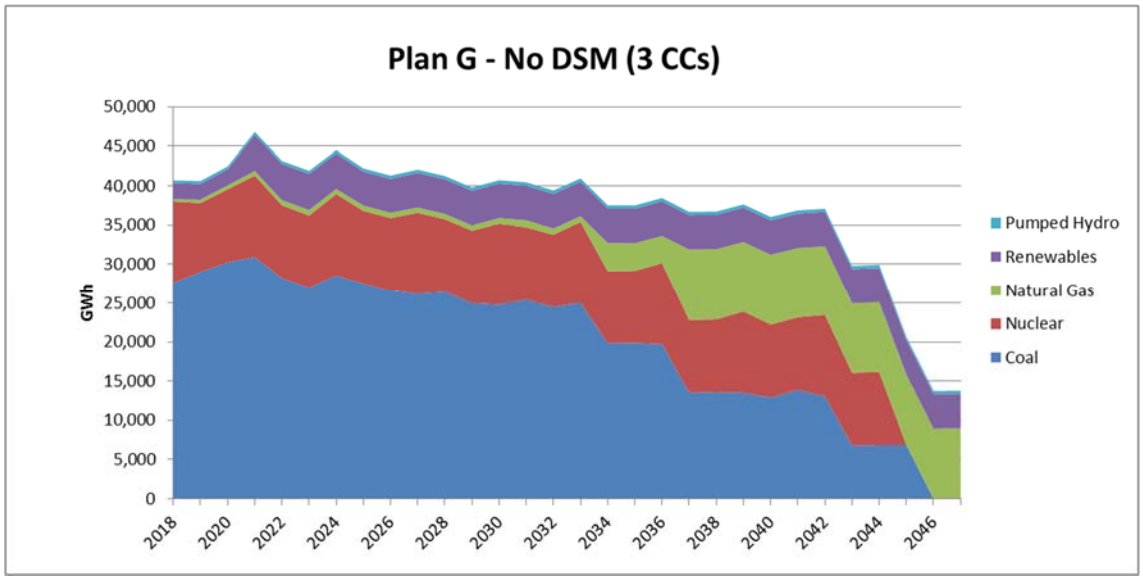
[20] 4 CSR 240-22.060(4)(B)5
[21] 4 CSR 240-22.060(4)(B)5

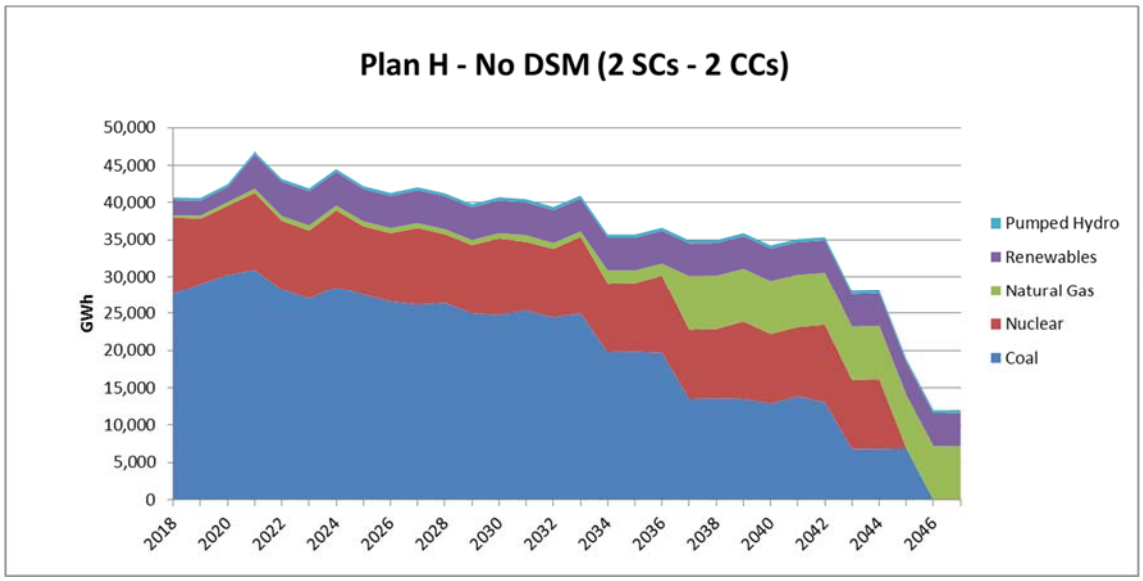
Figure 9A.11 Composition of Energy by Supply-Side Resource[22]

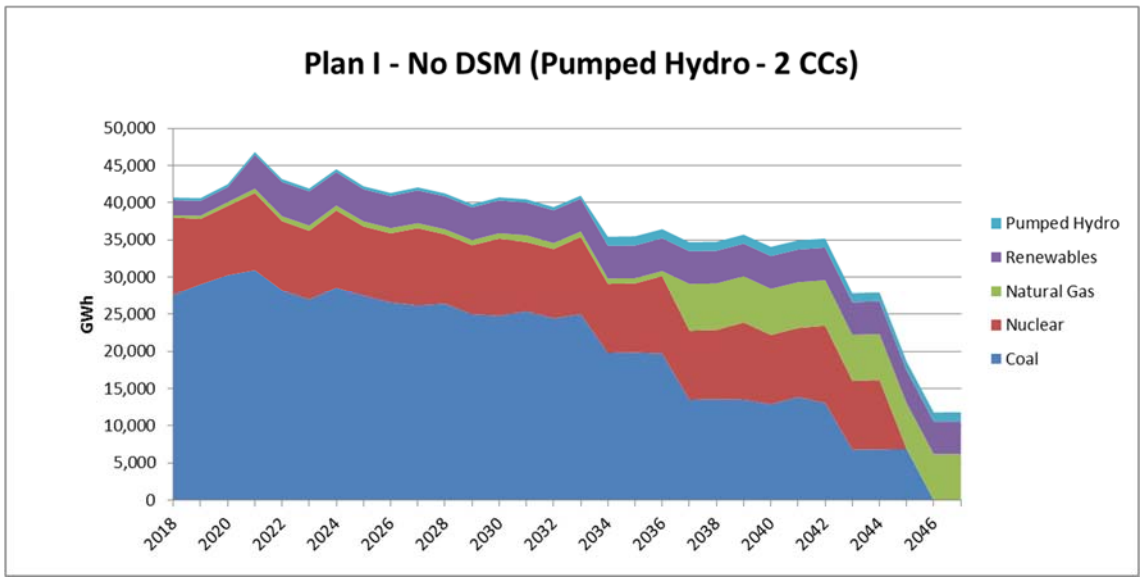


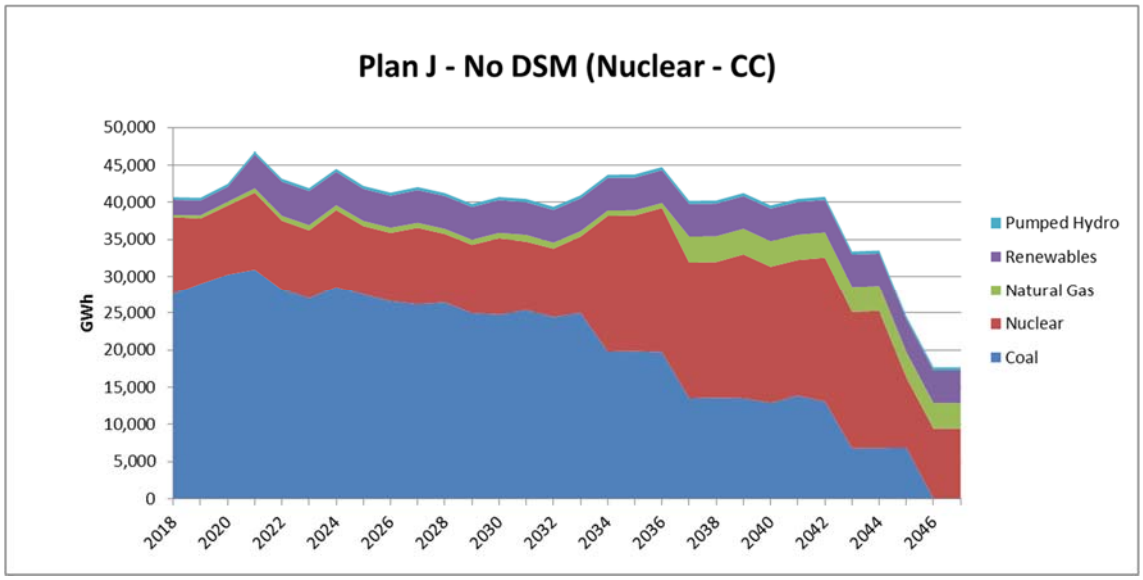
[22] 4 CSR 240-22.060(4)(B)6

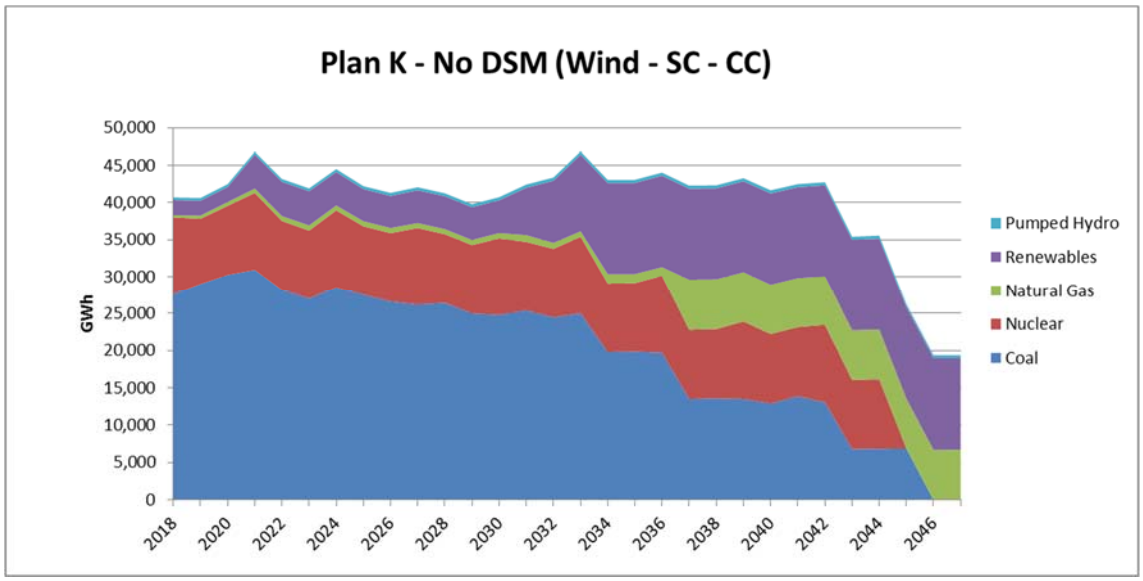

Plan D - MAP
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal
Plan E - MAP EE Only
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal
Plan F - MAP DR (CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

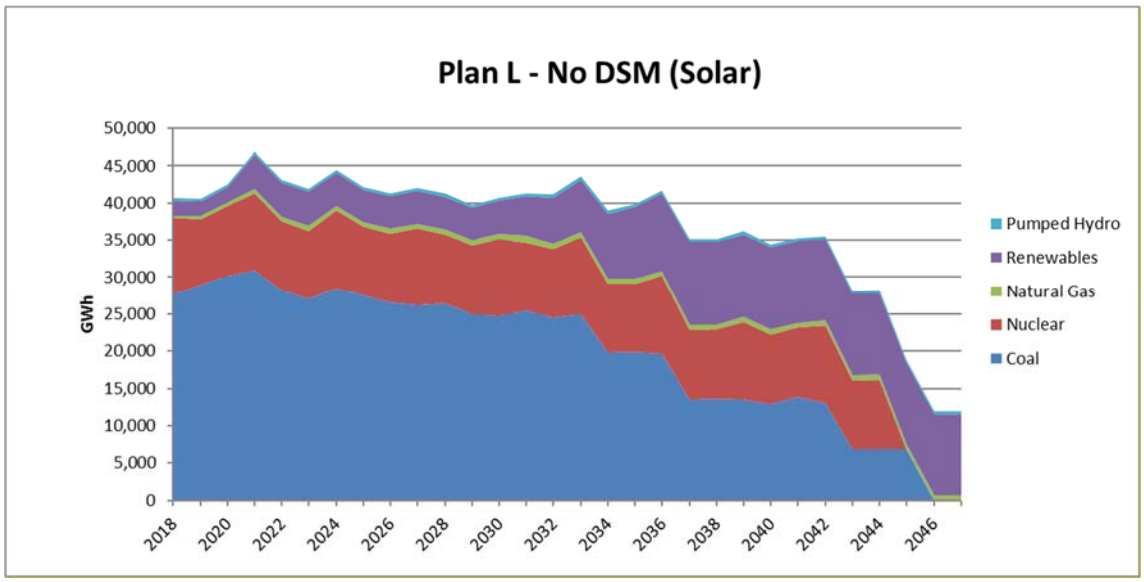

Plan G - No DSM (3 CCs)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

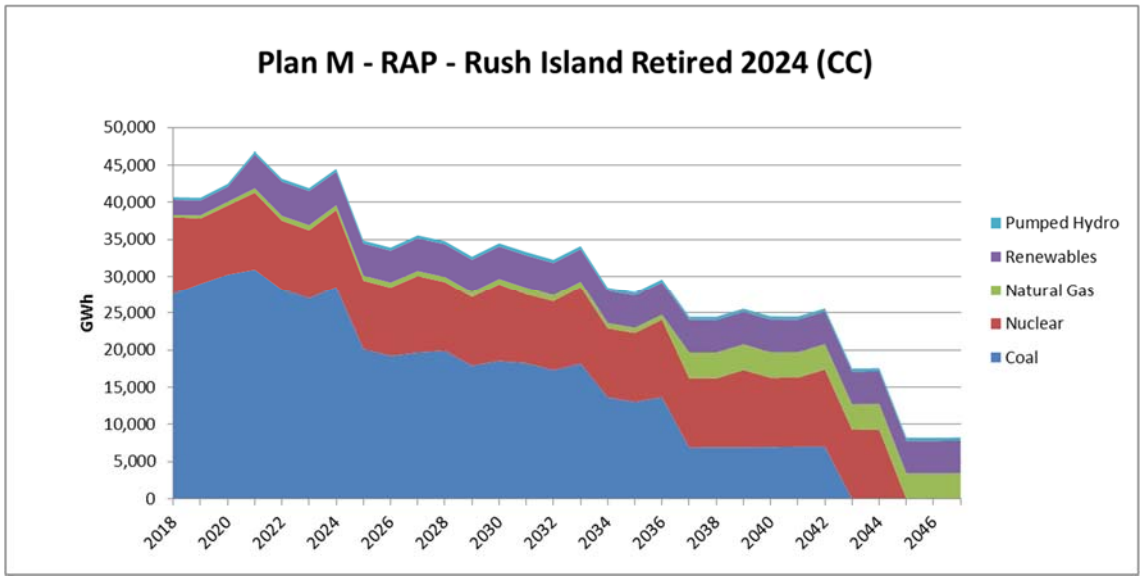

Plan H - No DSM (2 SCs - 2 CCs)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

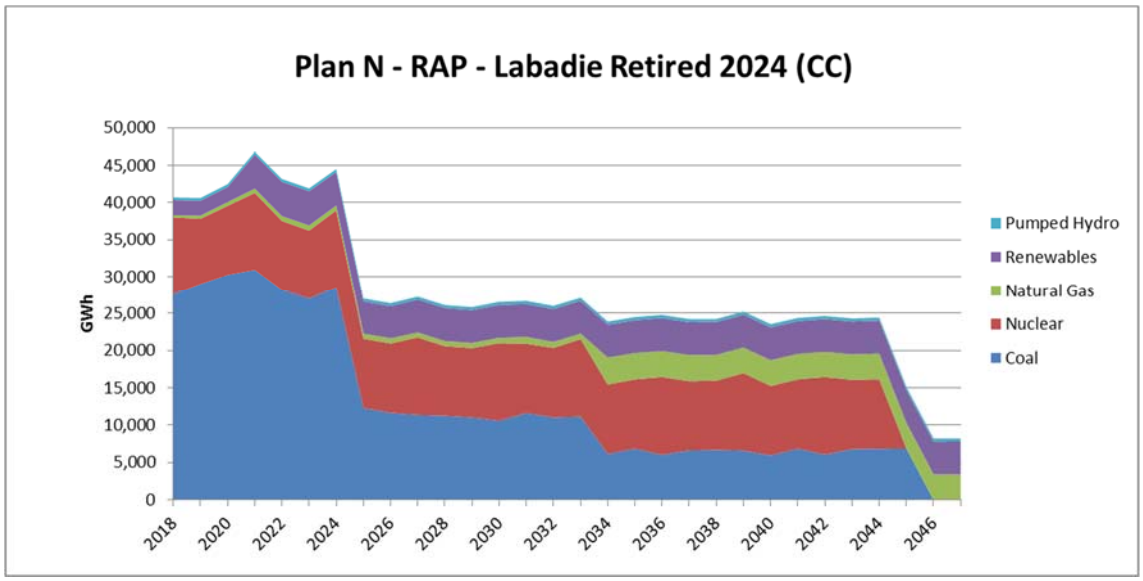

Plan I - No DSM (Pumped Hydro - 2 CCs)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

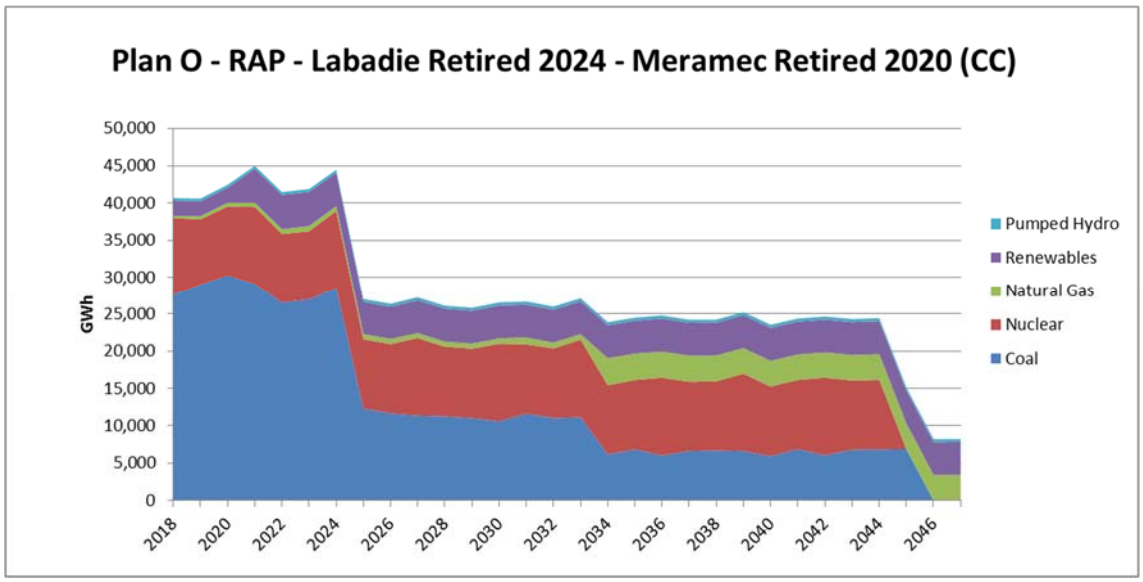

Plan J - No DSM (Nuclear - CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

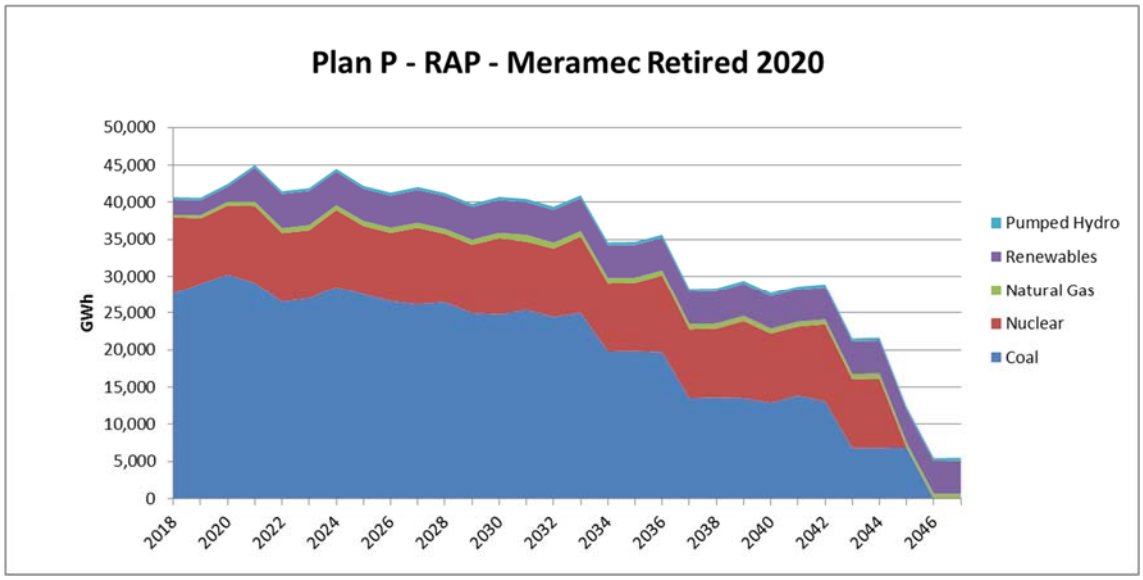

Plan K - No DSM (Wind - SC - CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

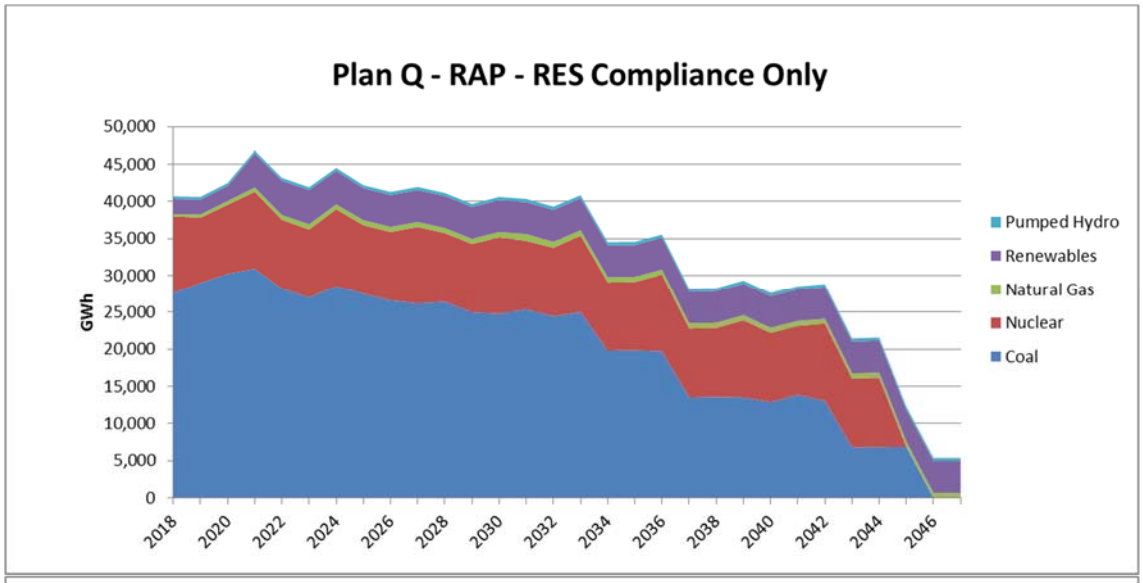

Plan L - No DSM (Solar)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal


Plan M - RAP - Rush Island Retired 2024 (CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal


Plan N - RAP - Labadie Retired 2024 (CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal


Plan O - RAP - Labadie Retired 2024 - Meramec Retired 2020 (CC)
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal


Plan P - RAP - Meramec Retired 2020
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal


Plan Q - RAP - RES Compliance Only
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

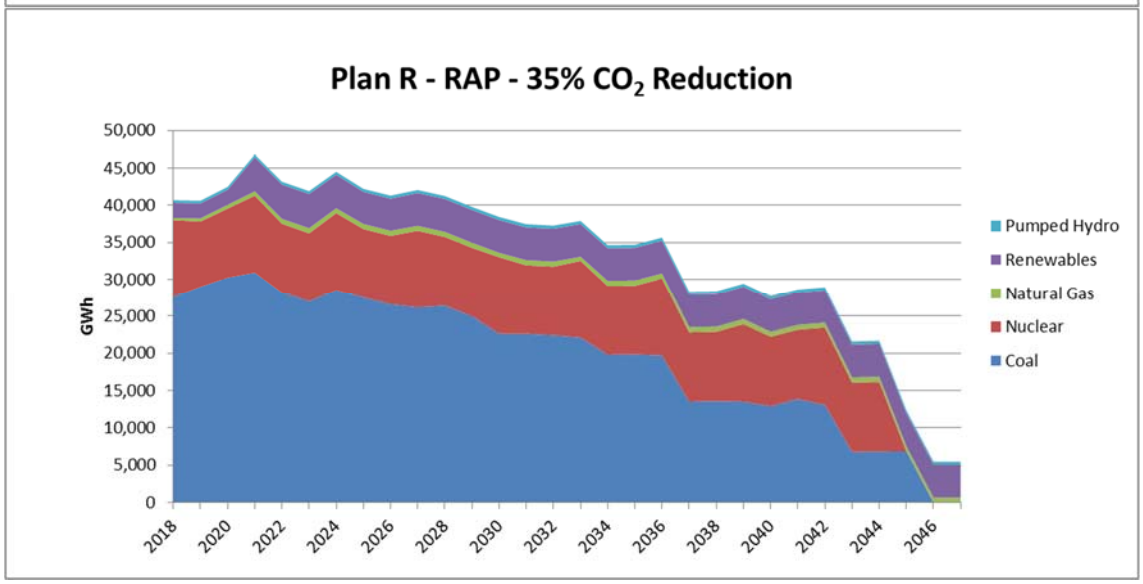
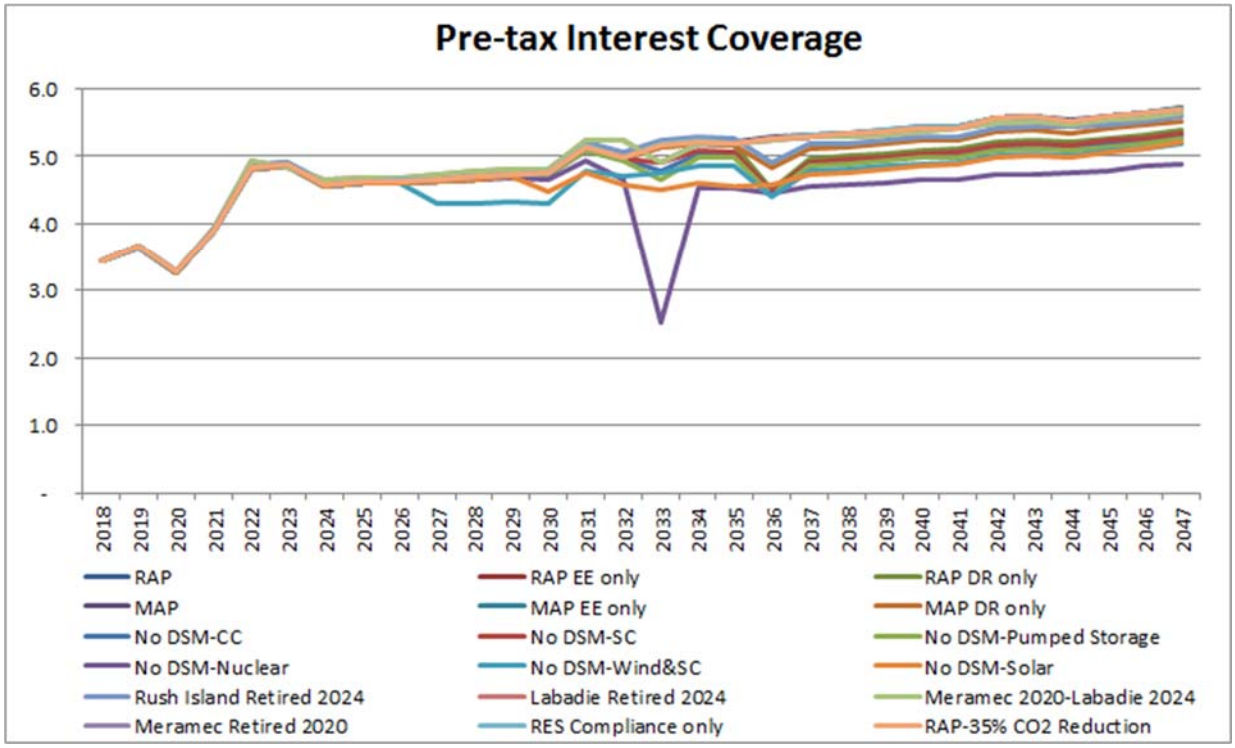
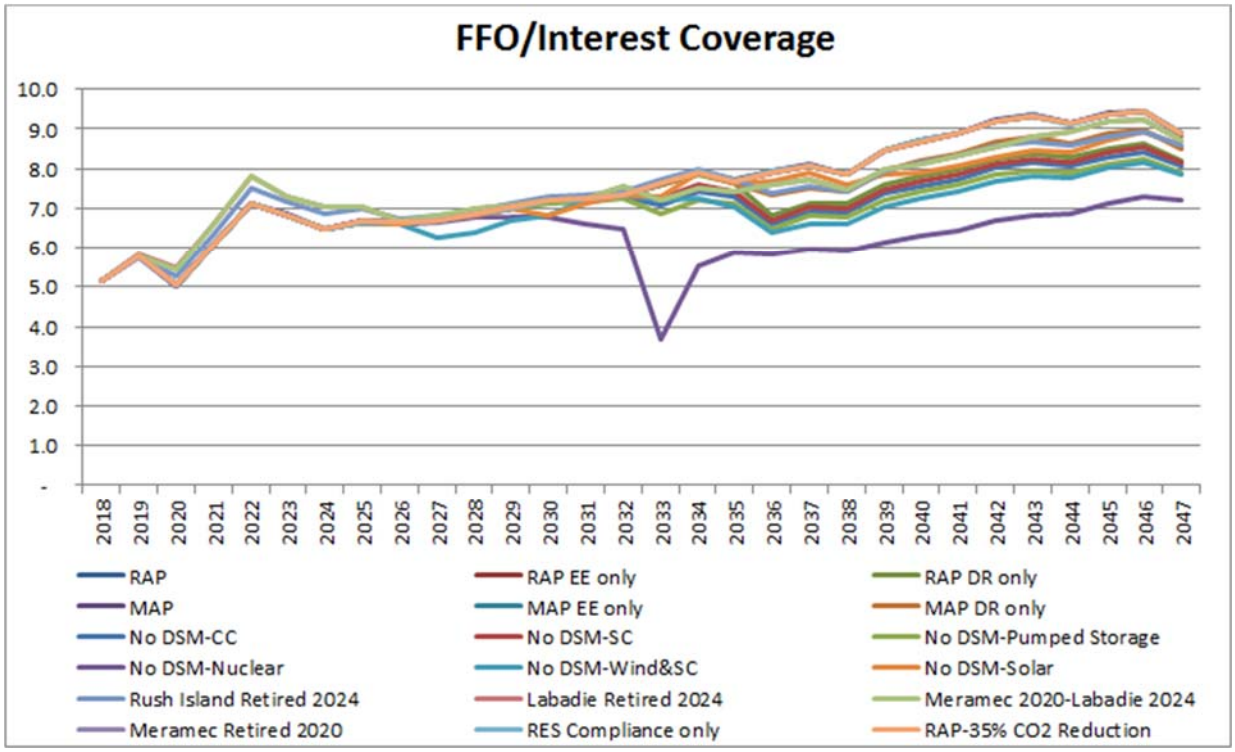
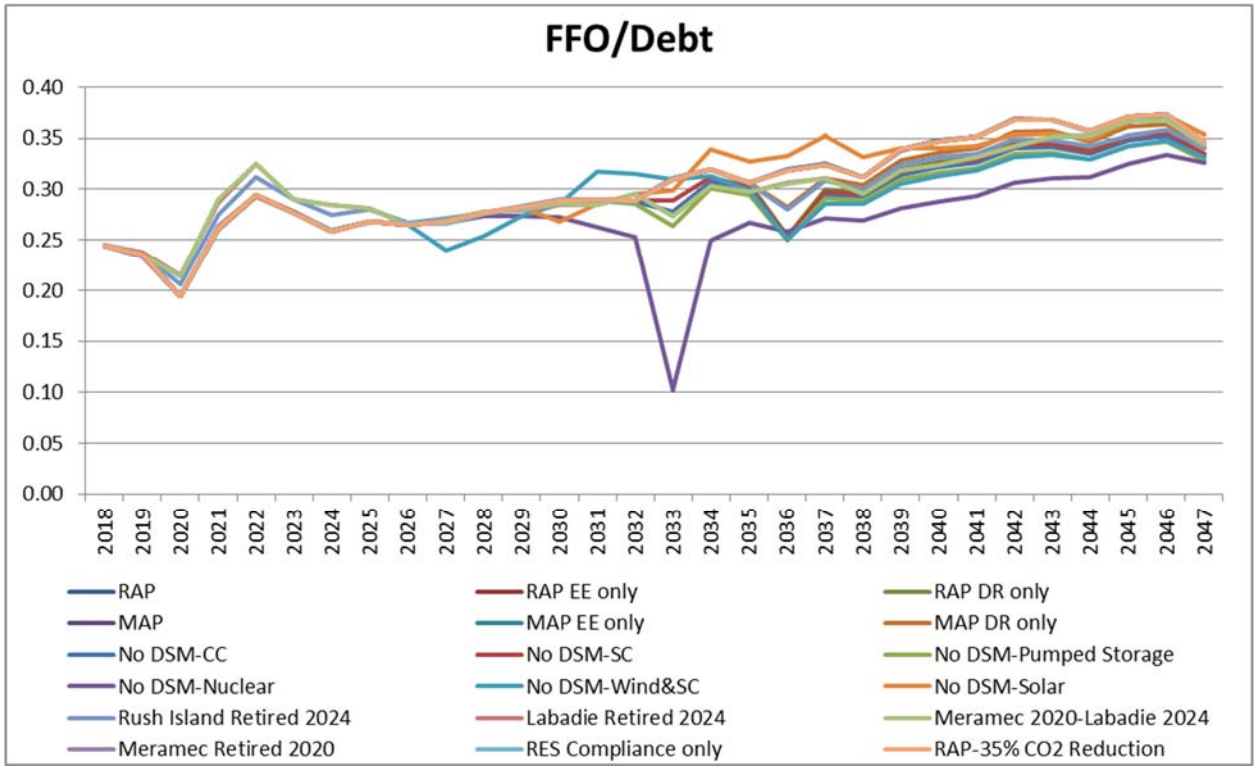

Plan R - RAP - 35% CO_2 Reduction
GWh
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
2046
Pumped Hydro
Renewables
Natural Gas
Nuclear
Coal

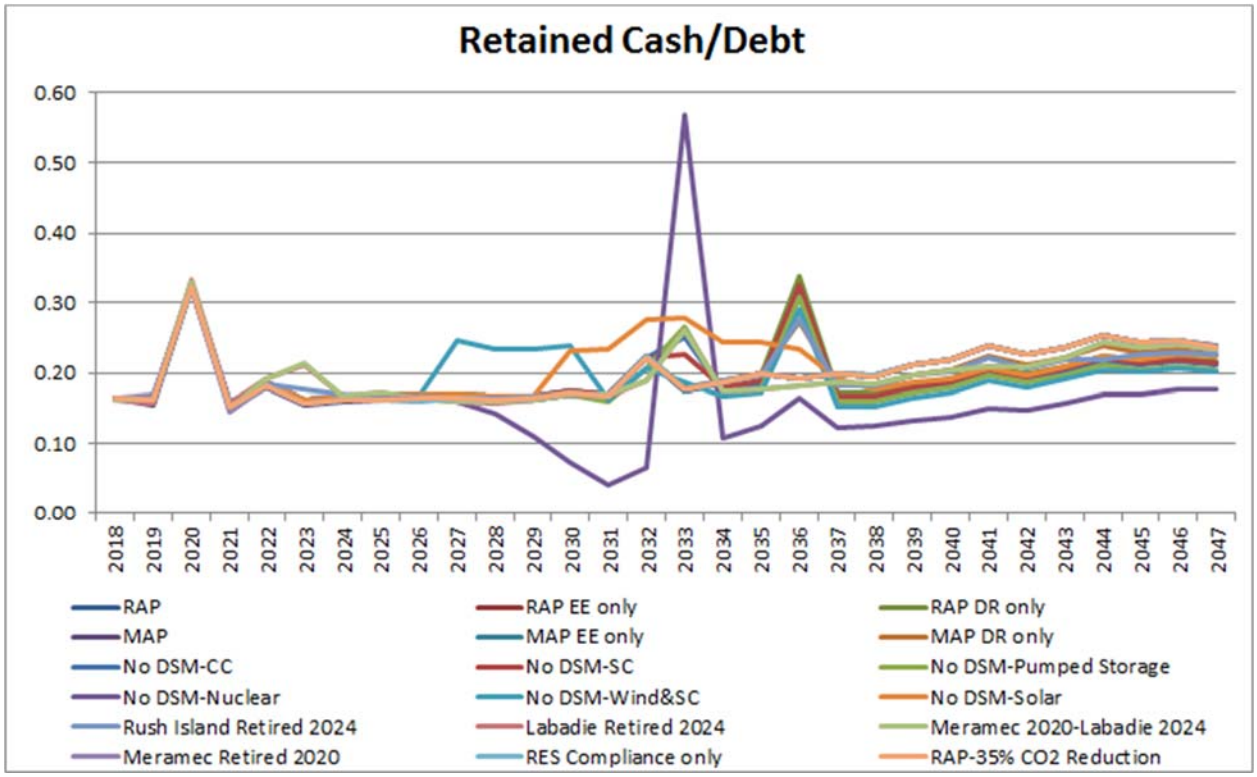
Figure 9A.12 Financial Measures[23] **

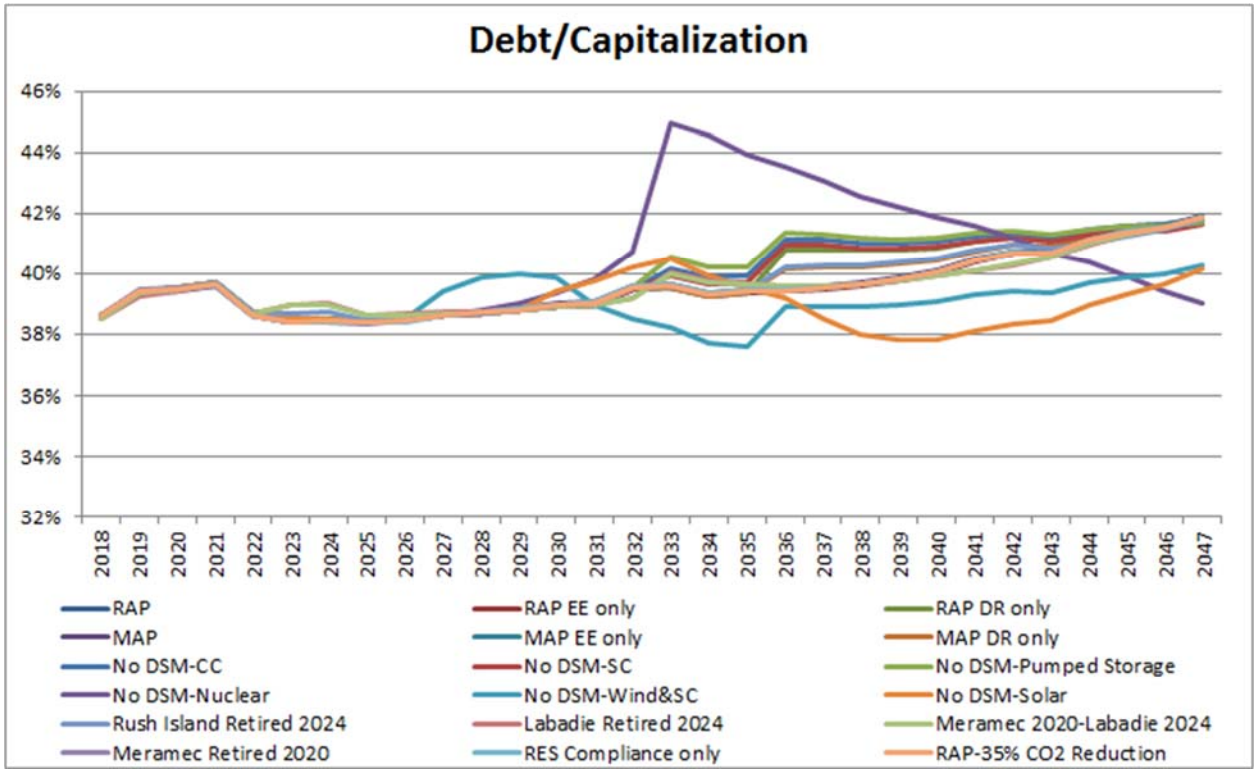


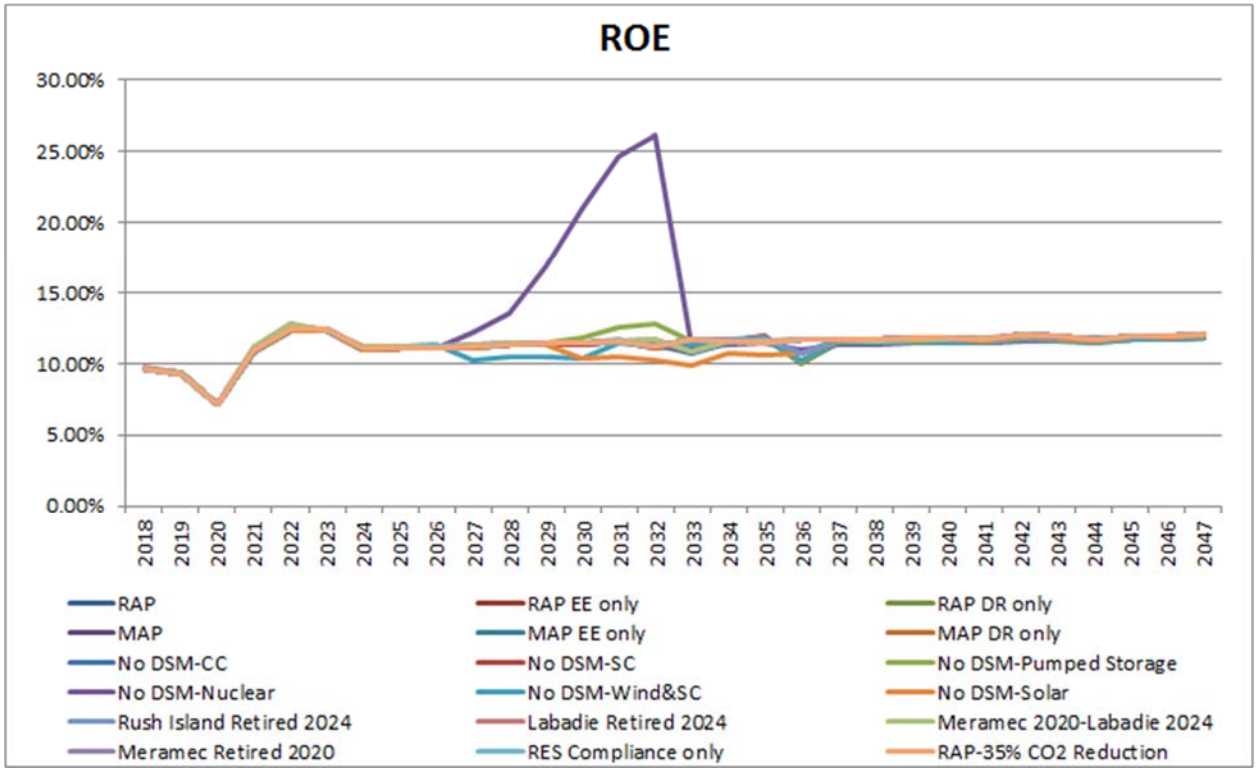


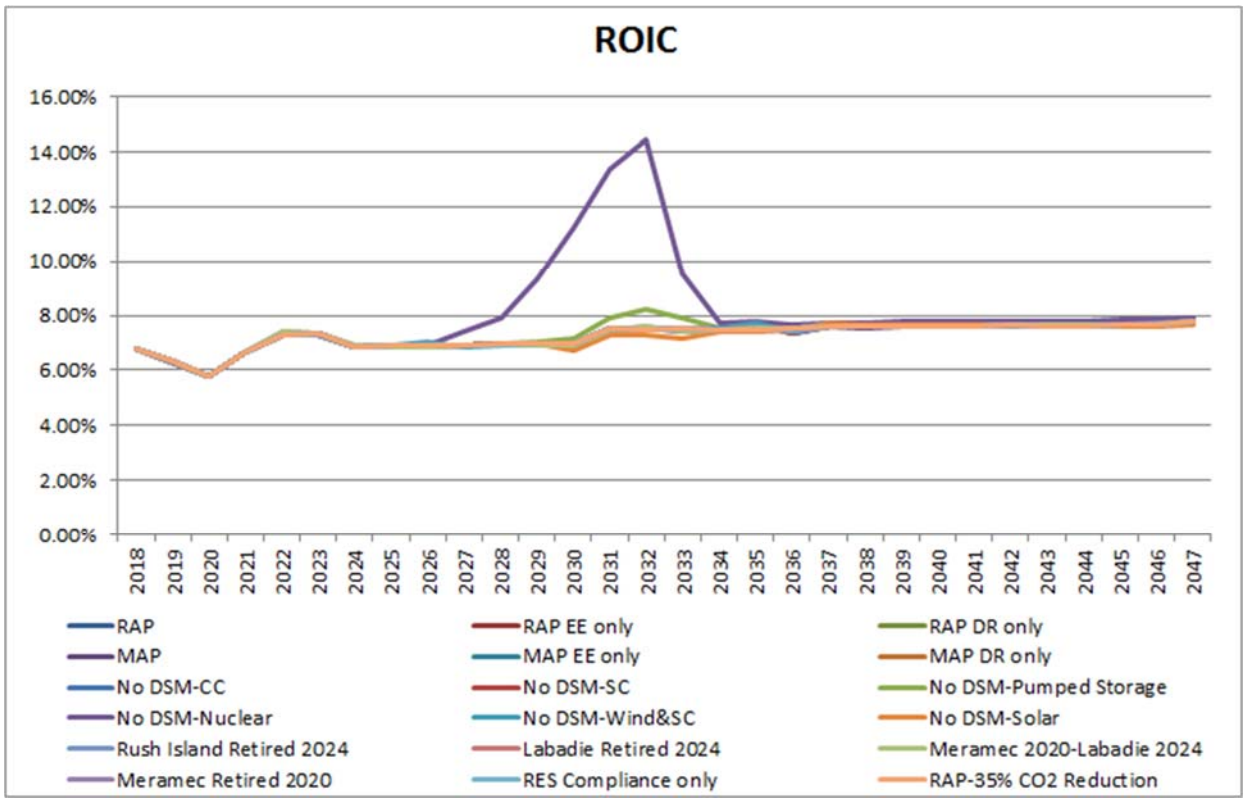
[23] 4 CSR 240-22.060(2)(A)6






Debt/Capitalization
46%
44%
42%
40%
38%
36%
34%
32%
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


ROE
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction



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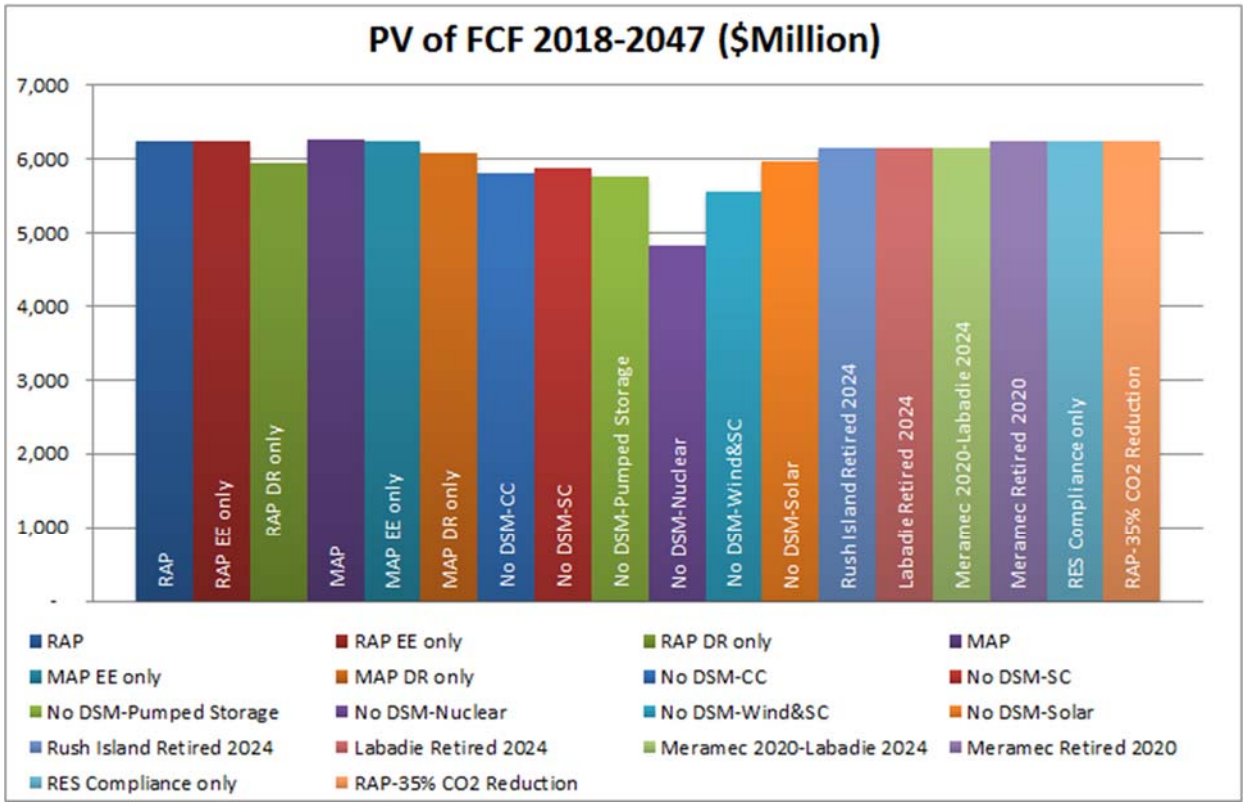

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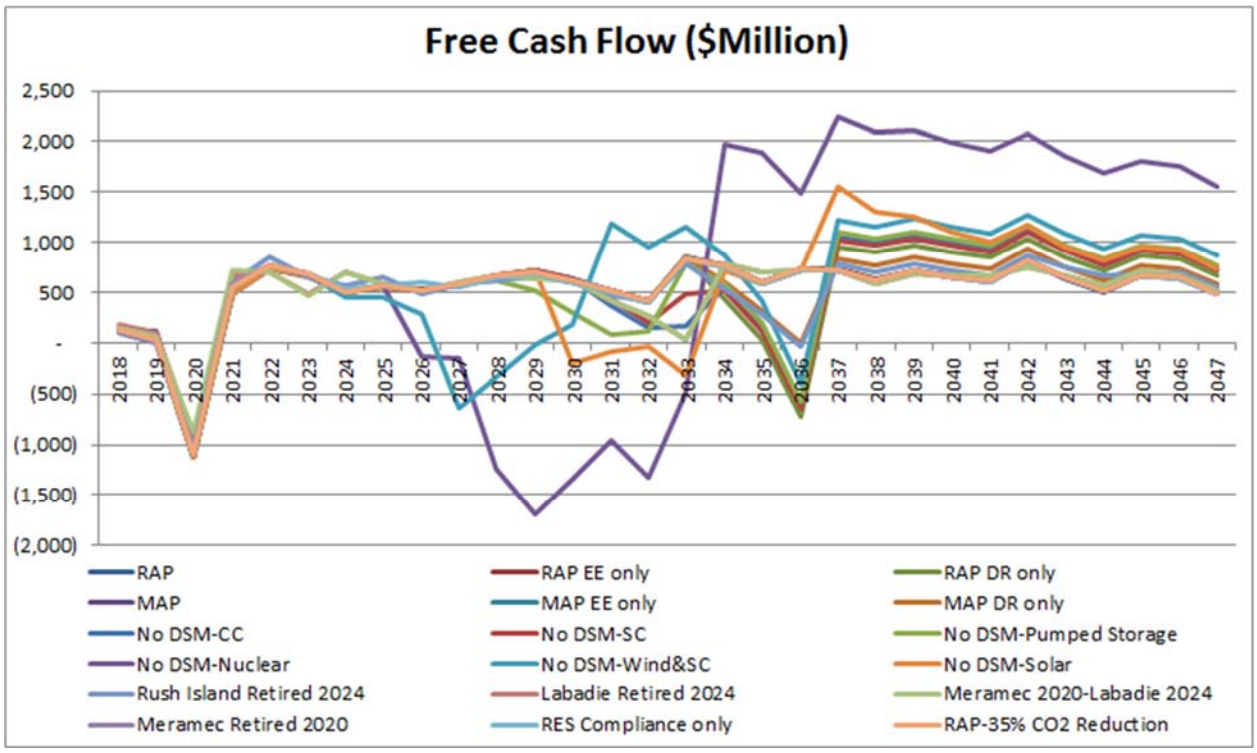

Free Cash Flow ($Million)
2,500
2,000
1,500
1,000
500
-
(500)
(1,000)
(1,500)
(2,000)
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction

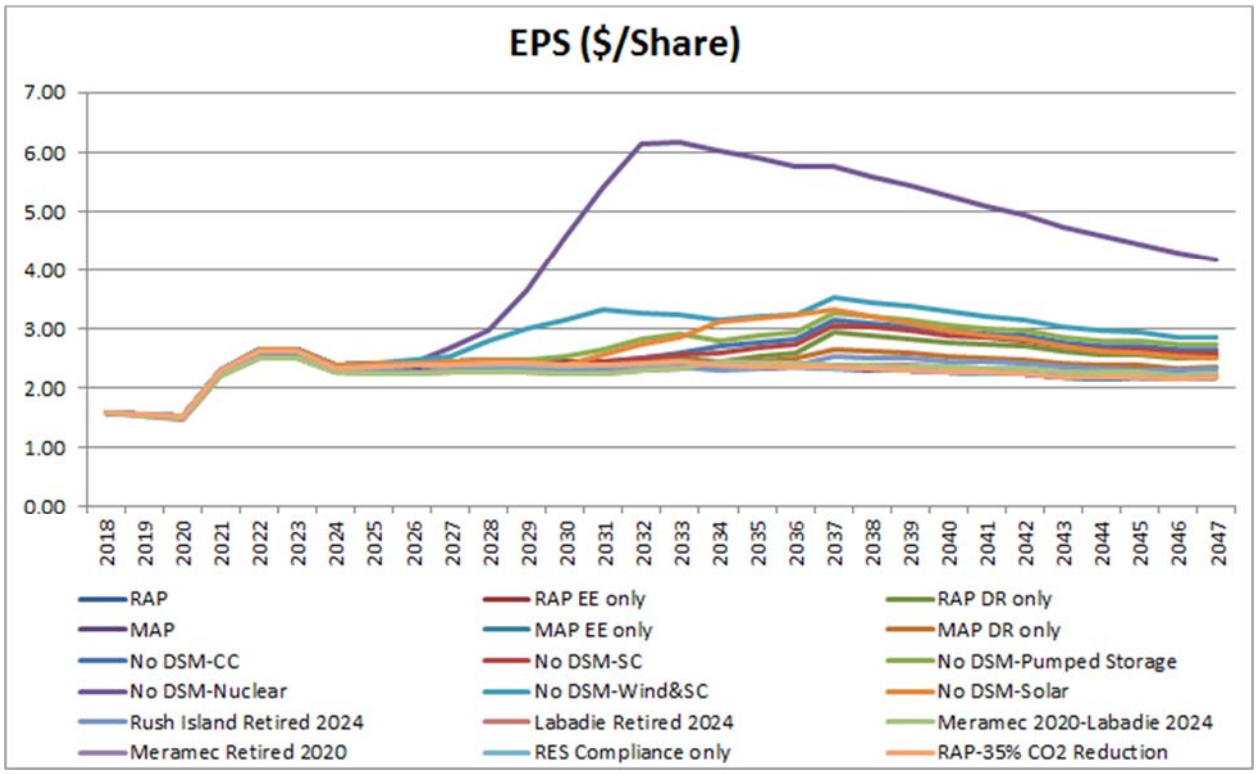
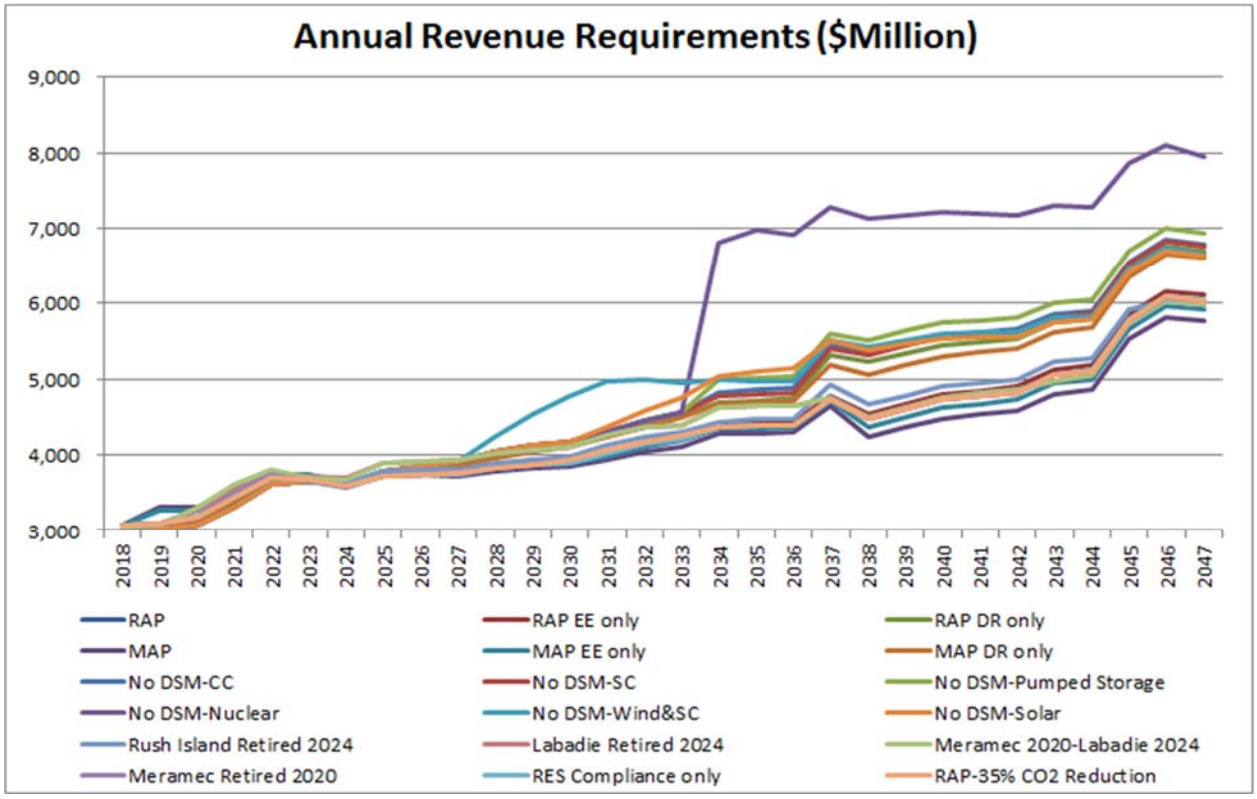
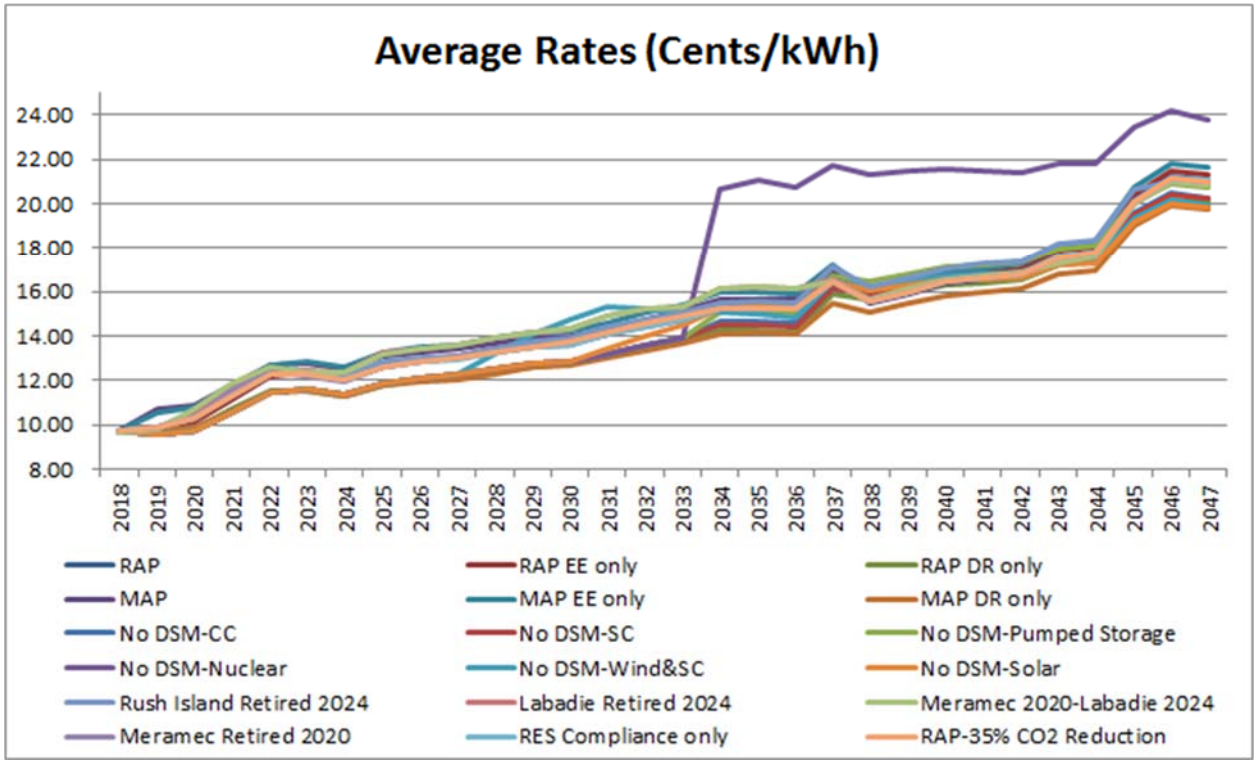

EPS ($/Share)
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction

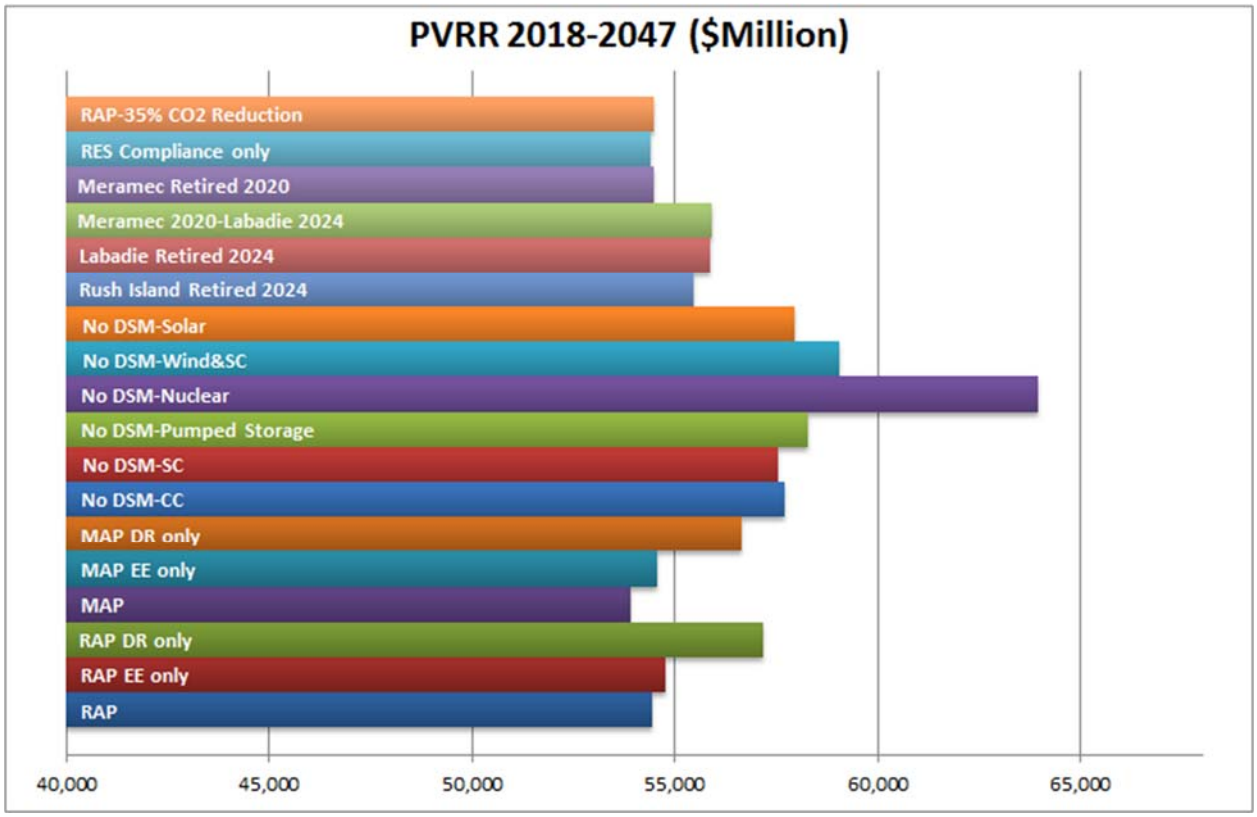
Figure 9A.13 Revenue Requirements and Rates[24]

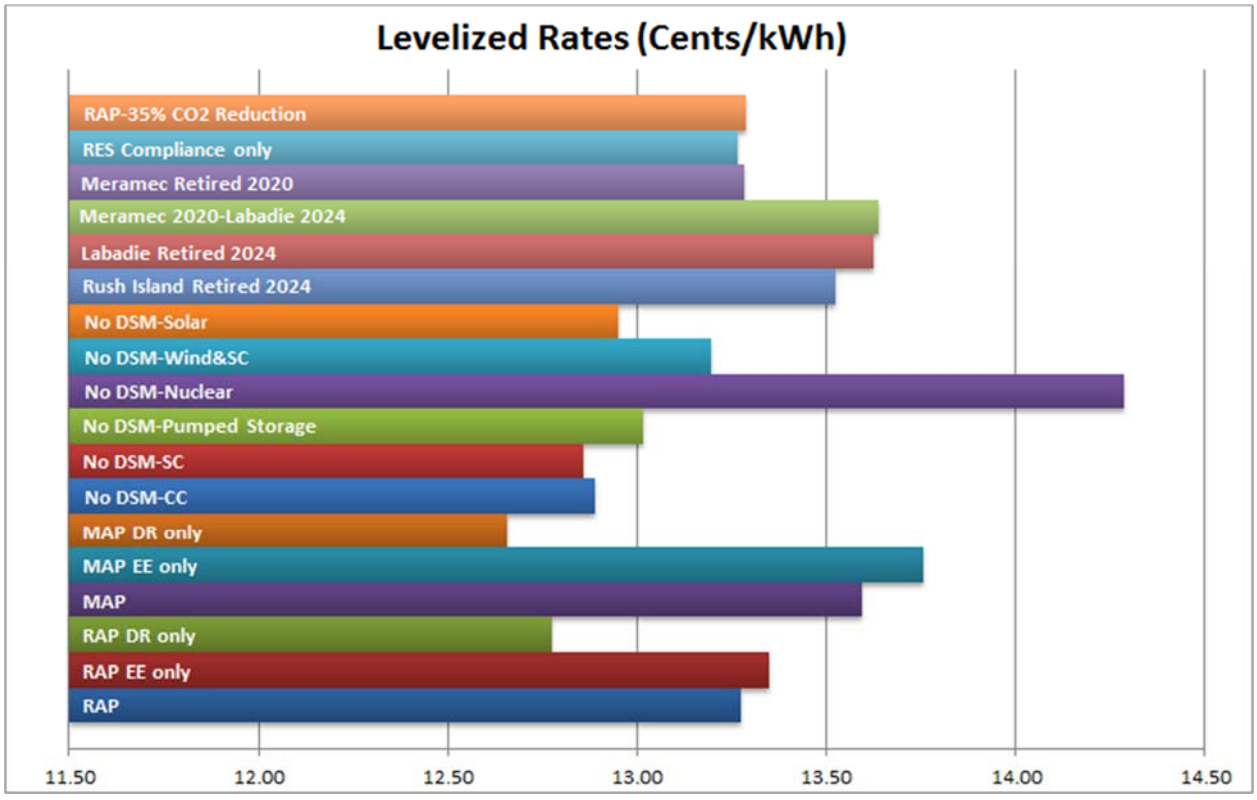


**



[24] 4 CSR 240-22.060(2)(A)4; 4 CSR 240-22.060(2)(A)5


PVRR 2018-2047 ($Million)
RAP-35% CO2 Reduction
RES Compliance only
Meramec Retired 2020
Meramec 2020-Labadie 2024
Labadie Retired 2024
Rush Island Retired 2024
No DSM-Solar
No DSM-Wind&SC
No DSM-Nuclear
No DSM-Pumped Storage
No DSM-SC
No DSM-CC
MAP DR only
MAP EE only
MAP
RAP DR only
RAP EE only
RAP
40,000
45,000
50,000
55,000
60,000
65,000


Levelized Rates (Cents/kWh)
RAP-35% CO2 Reduction
RES Compliance only
Meramec Retired 2020
Meramec 2020-Labadie 2024
Labadie Retired 2024
Rush Island Retired 2024
No DSM-Solar
No DSM-Wind&SC
No DSM-Nuclear
No DSM-Pumped Storage
No DSM-SC
No DSM-CC
MAP DR only
MAP EE only
MAP
RAP DR only
RAP EE only
RAP
11.50
12.00
12.50
13.00
13.50
14.00
14.50

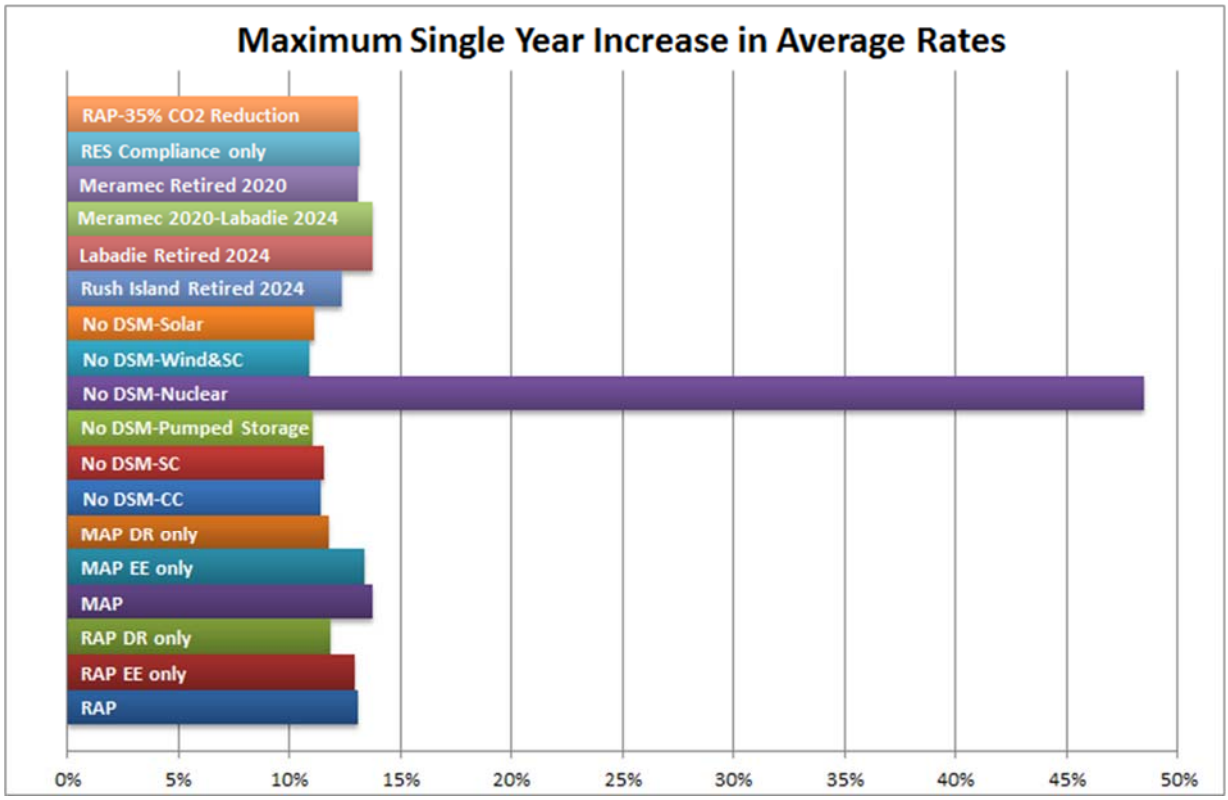
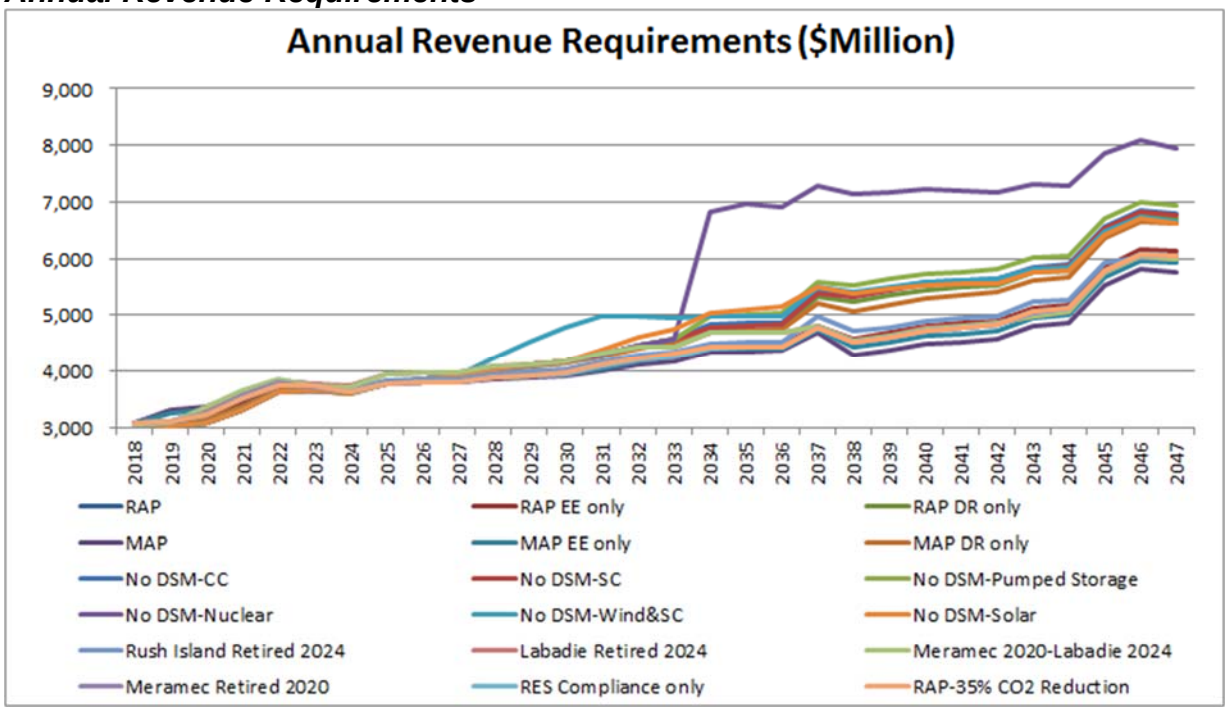


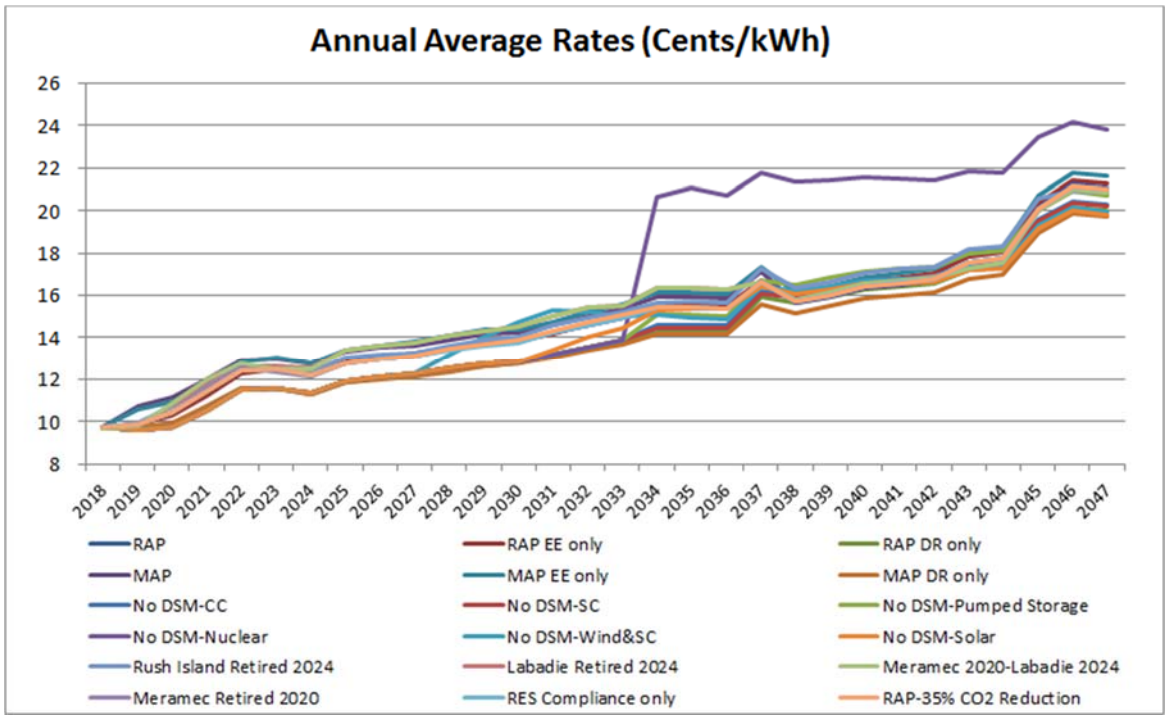
Figure 9A.14 Results with Financial Incentives for DSM[25]

Annual Revenue Requirements[26] **

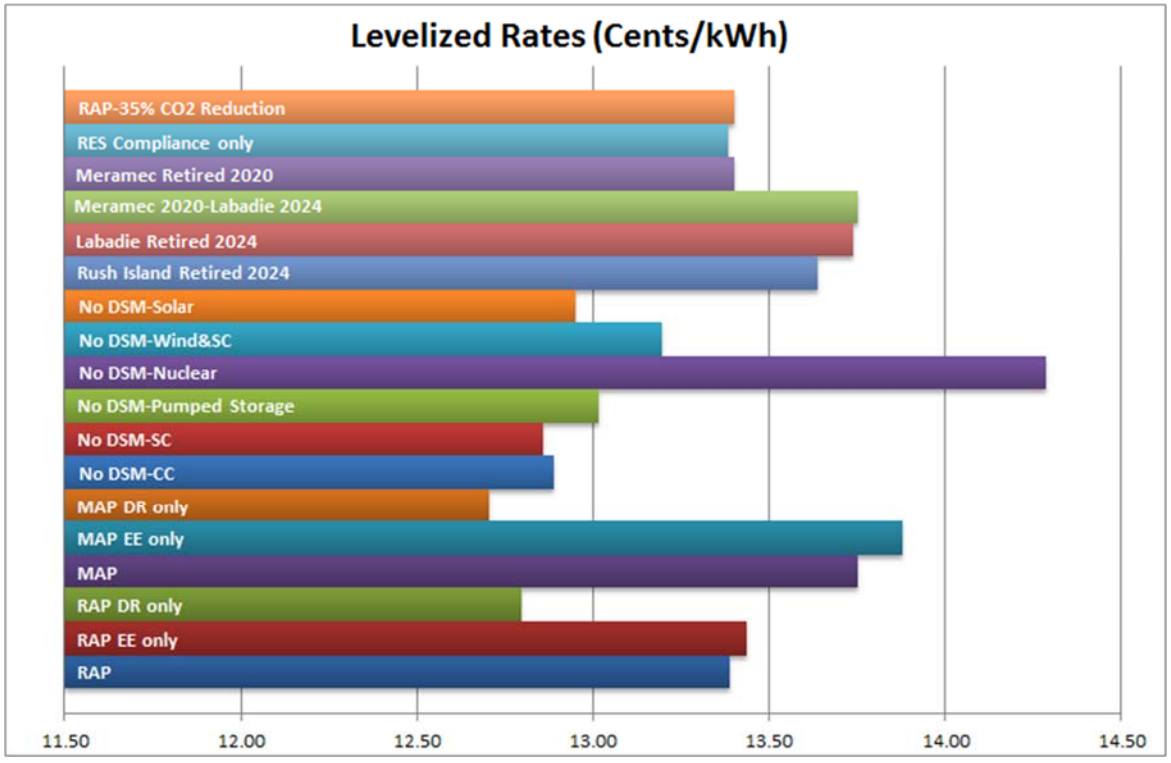


[25] 4 CSR 240-22.060(4)(C)
[26] 4 CSR 240-22.060(4)(C)1A

Annual Average Rates[27]



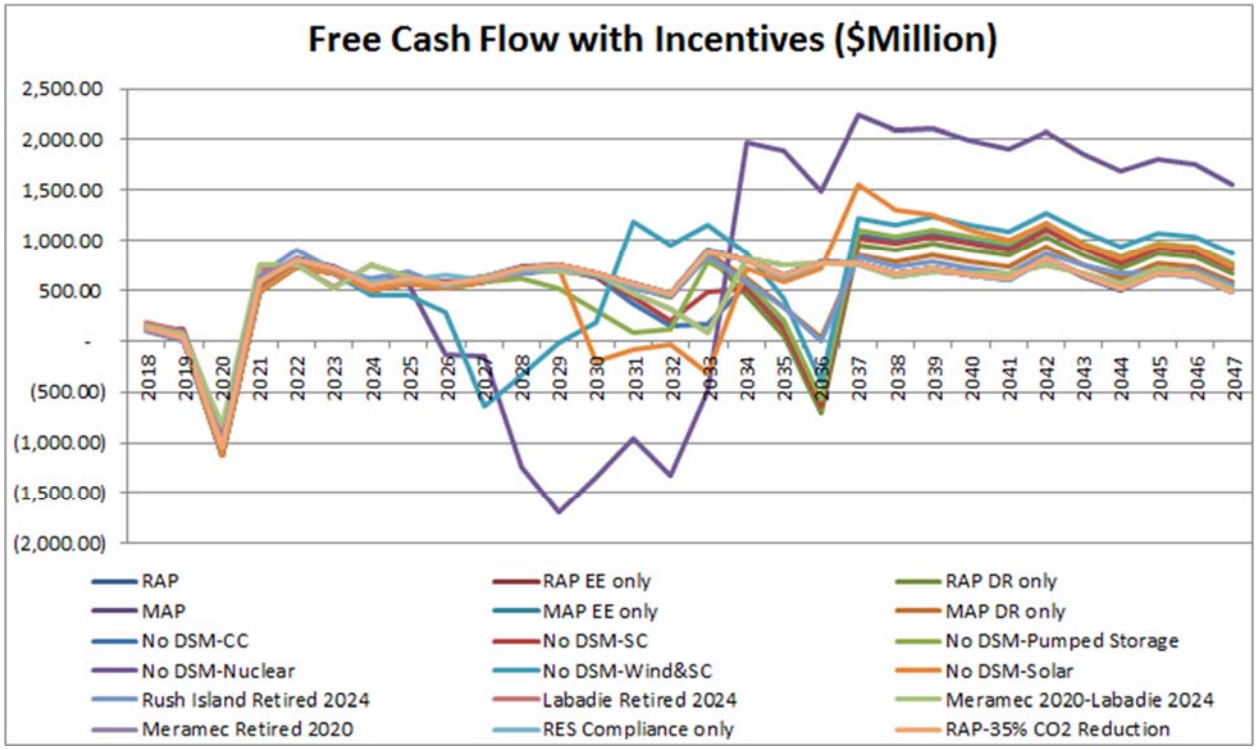
**



Tabulation for annual % increases in rates with and without financial incentives is provided in the workpapers.

[27] 4 CSR 240-22.060(4)(C)1B; 4 CSR 240-22.060(4)(C)1C

Free Cash Flows **



******

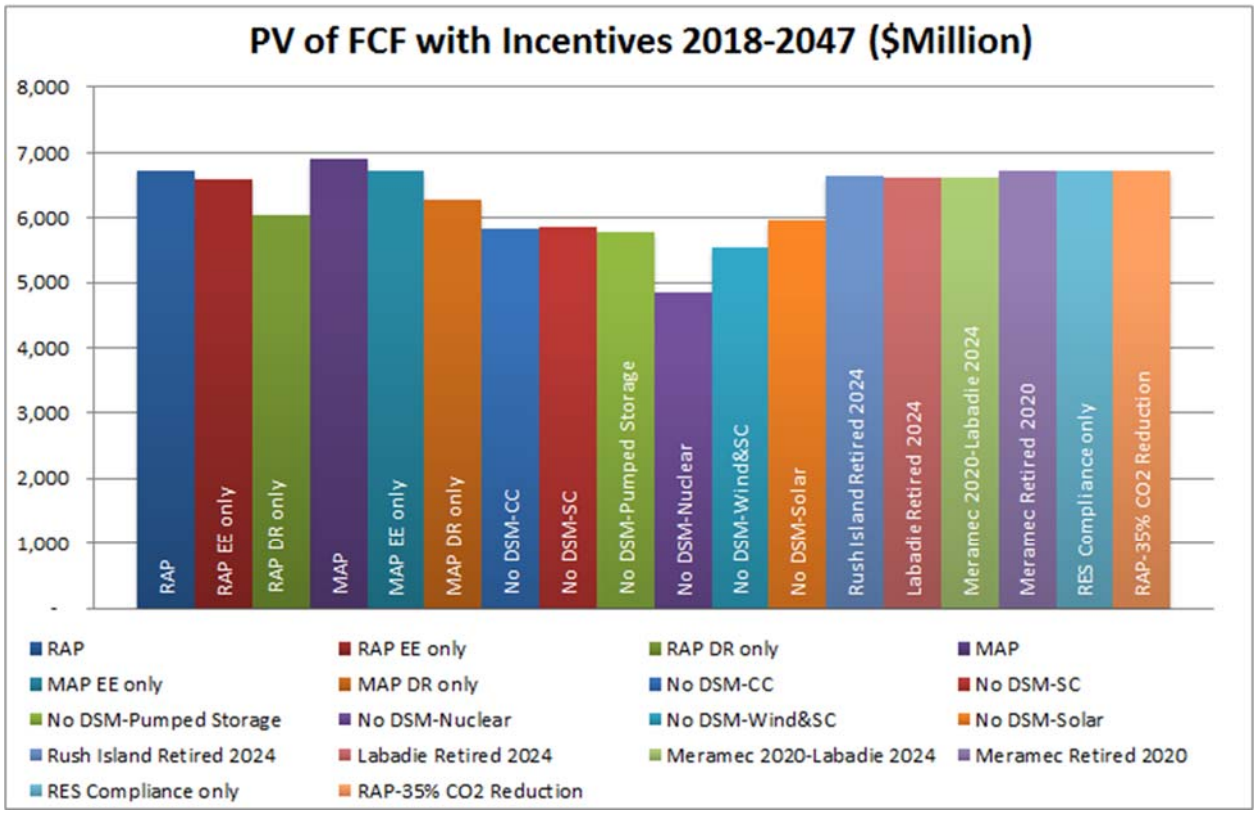
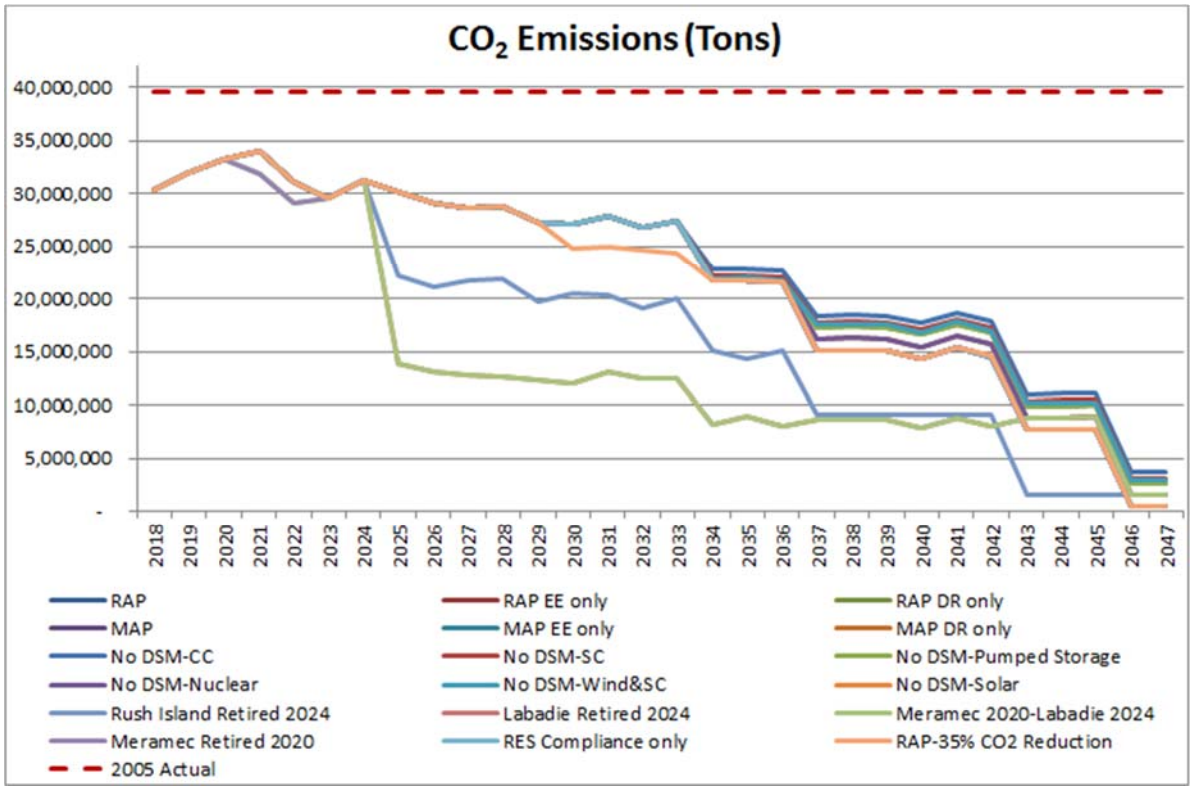
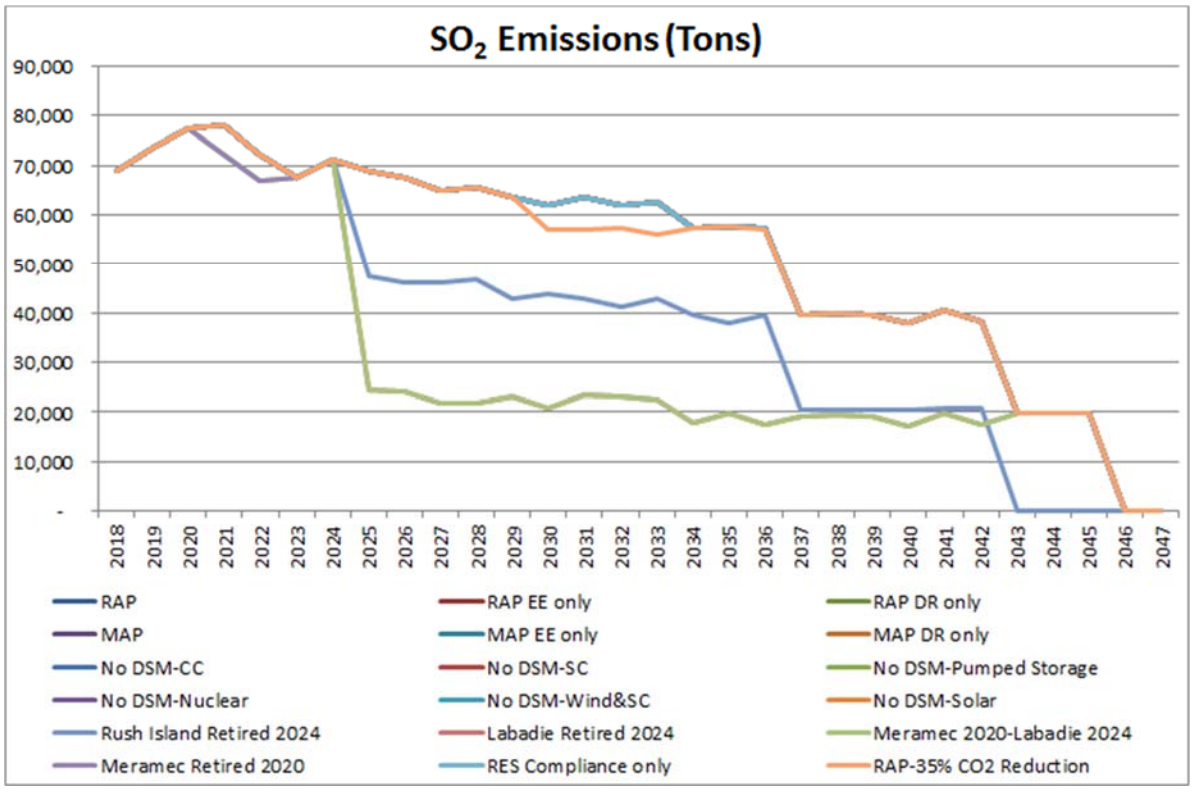
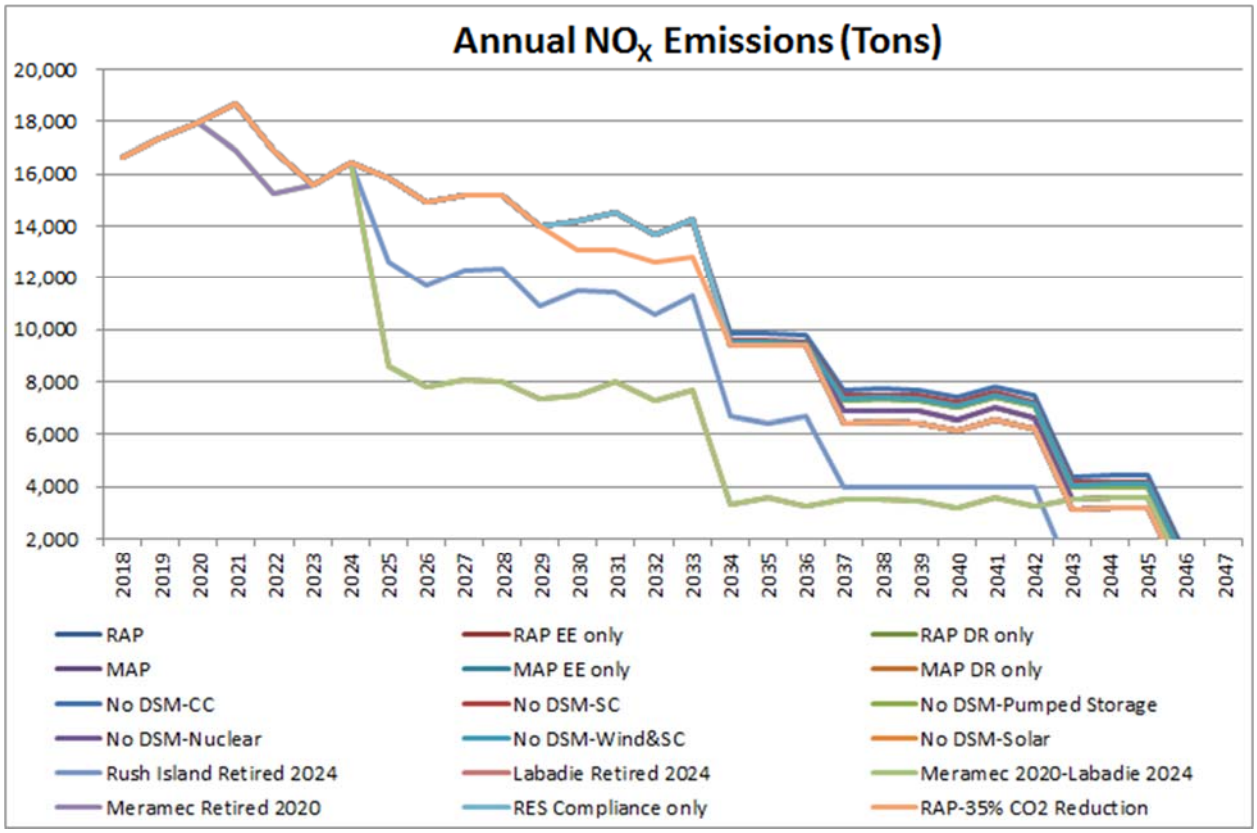


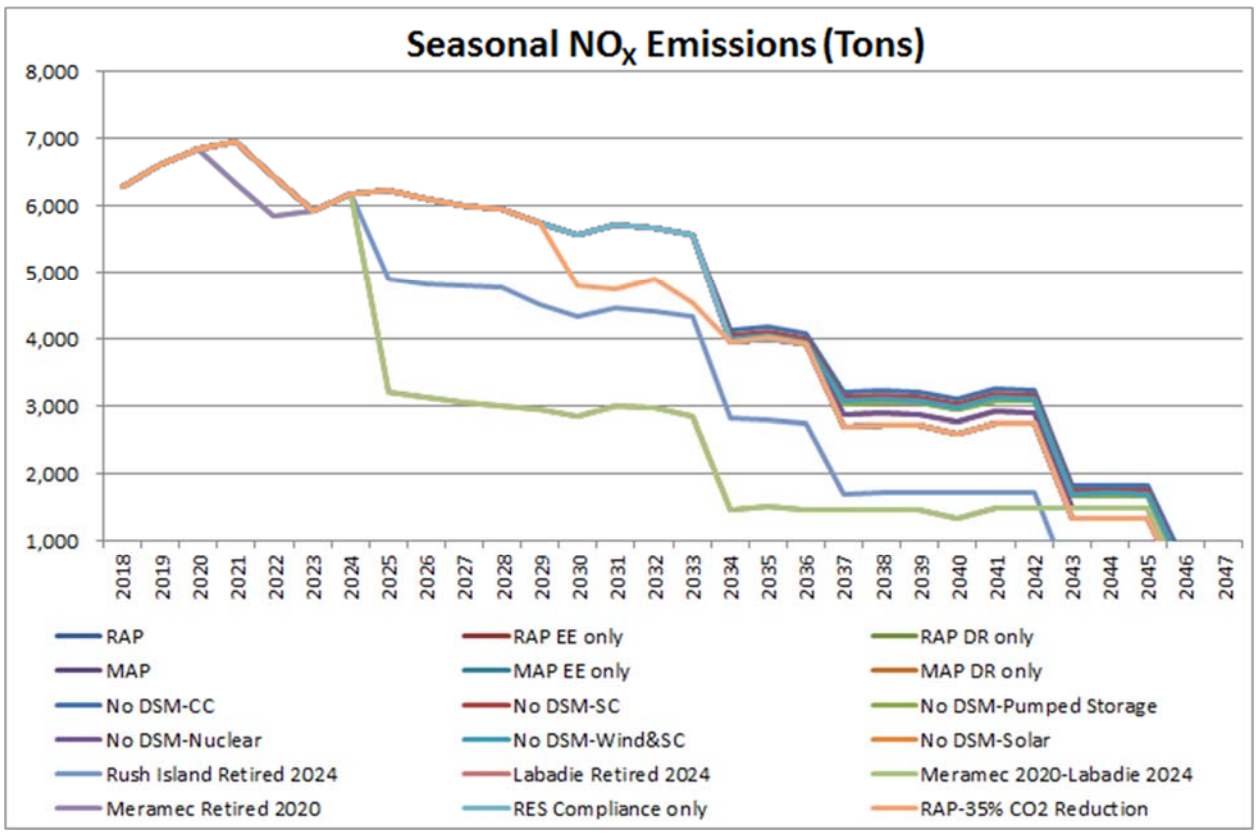
Figure 9A.15 Annual Emissions[28]





[28] 4 CSR 240-22.060(4)(B)7


Annual NOx Emissions (Tons)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


Seasonal NOx Emissions (Tons)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction

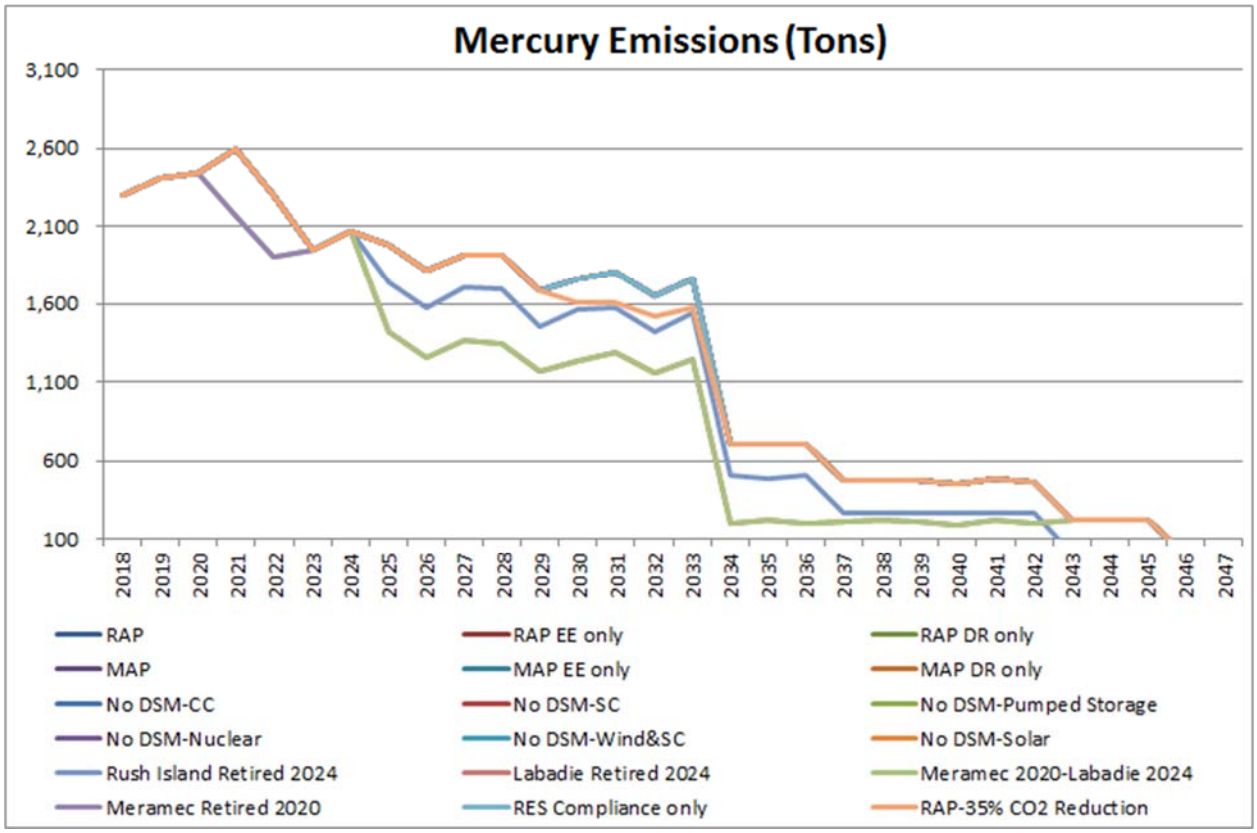
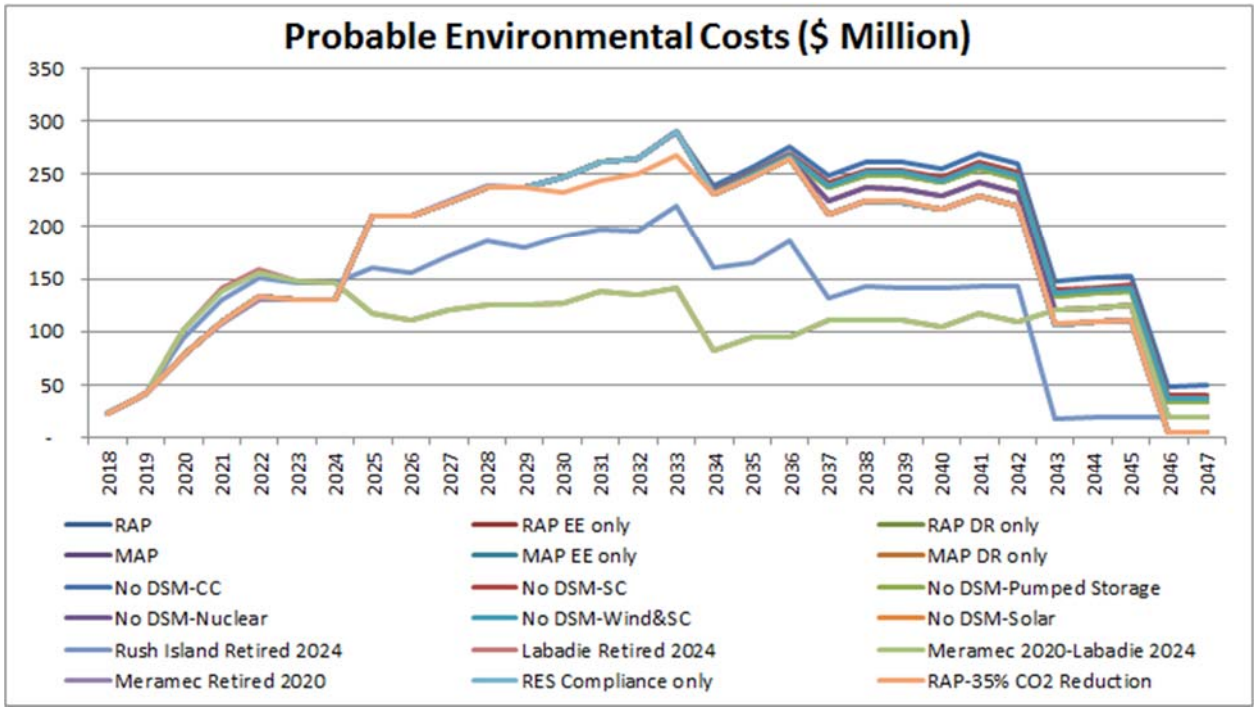
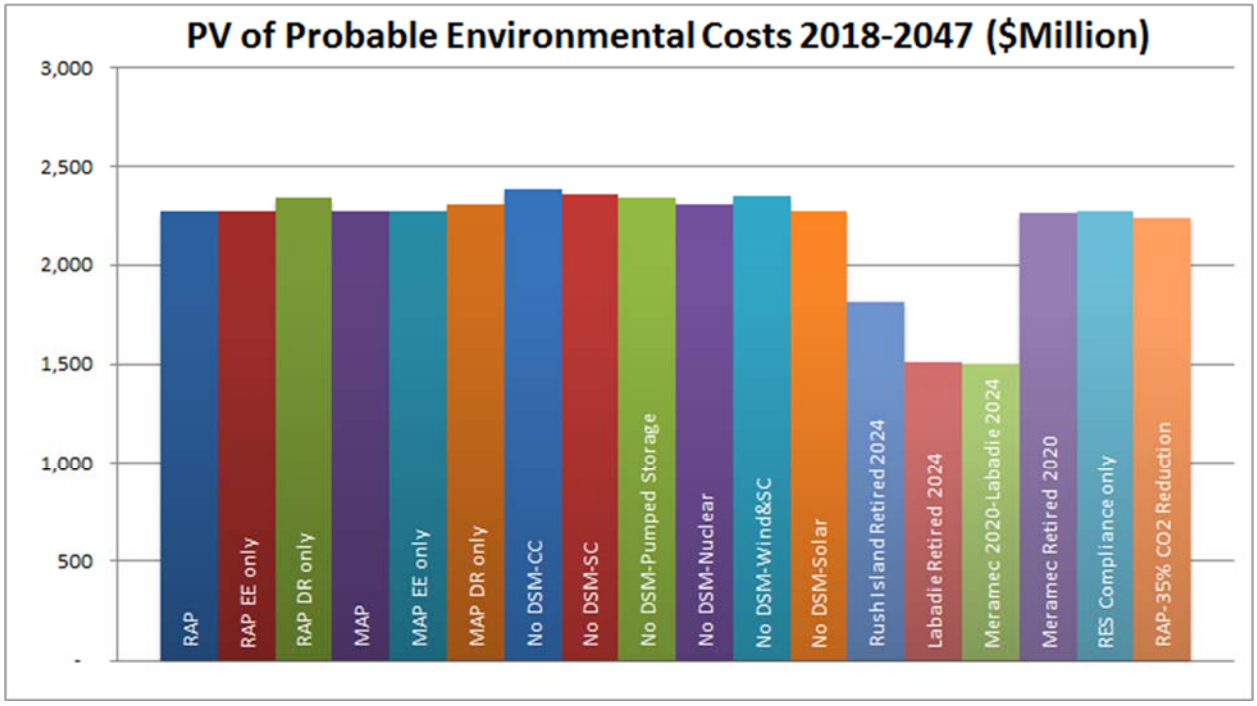
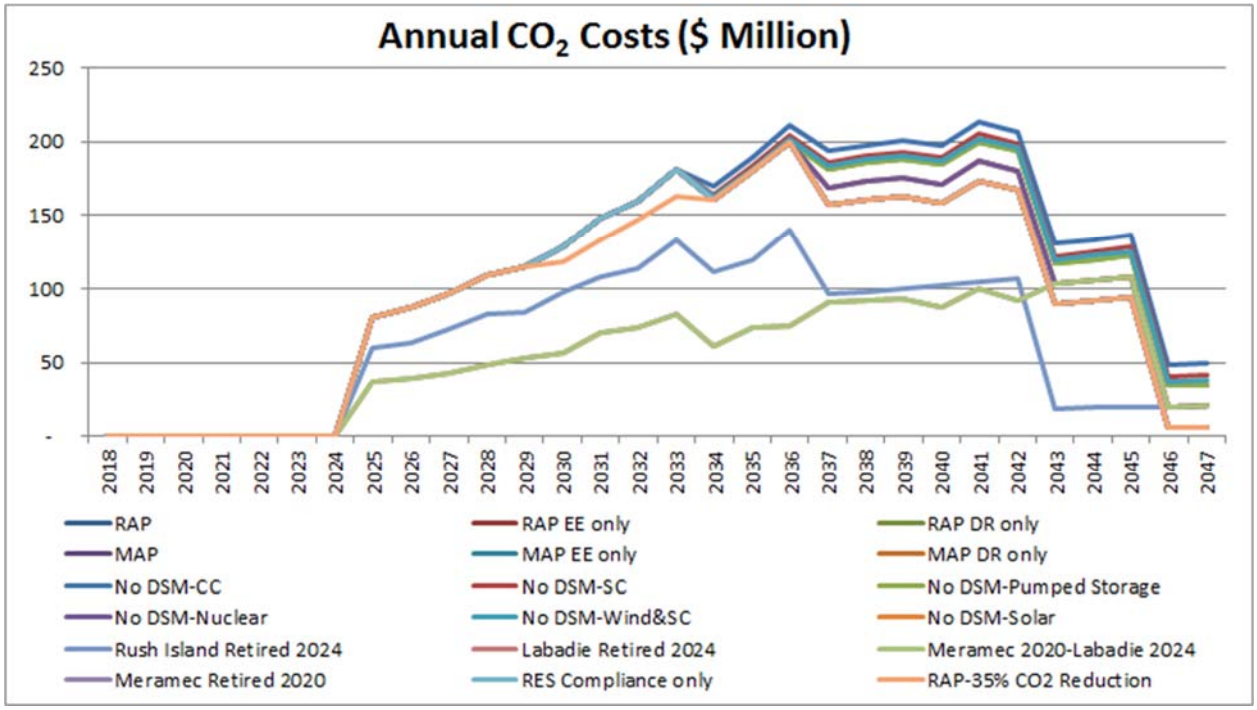

Mercury Emissions (Tons)
3,100
2,600
2,100
1,600
1,100
600
100
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction

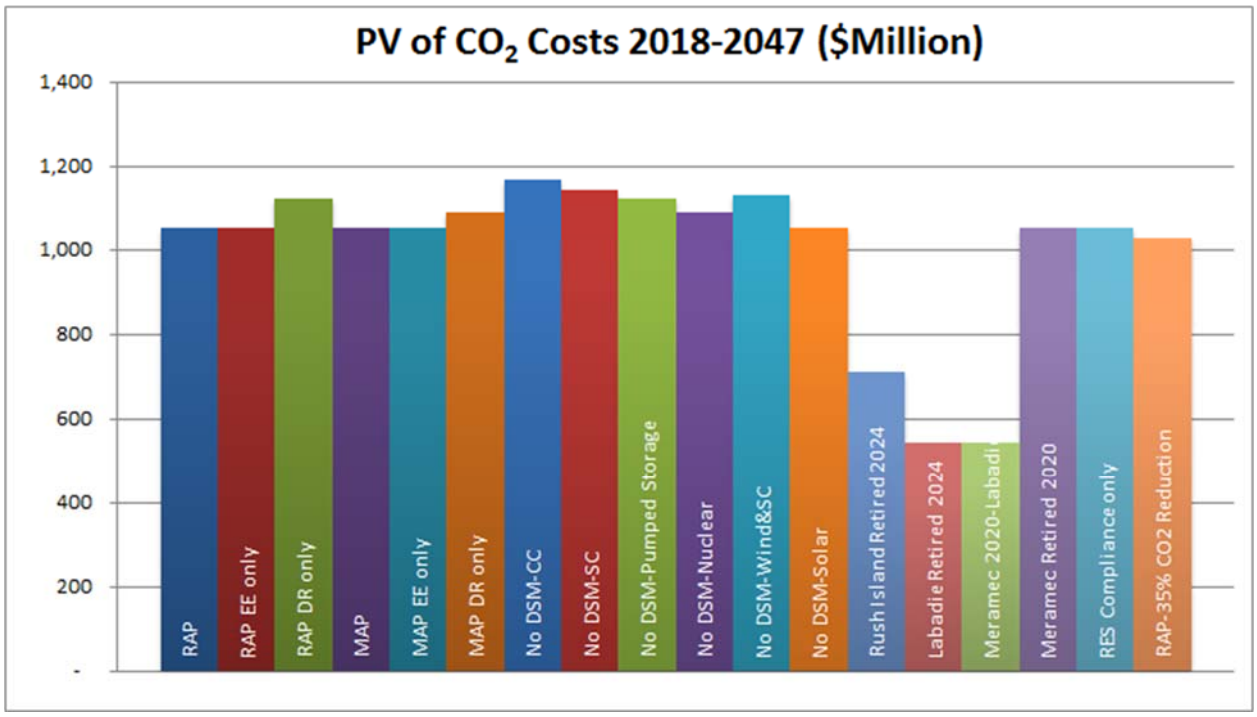
Figure 9A.16 Probable Environmental Costs[29]

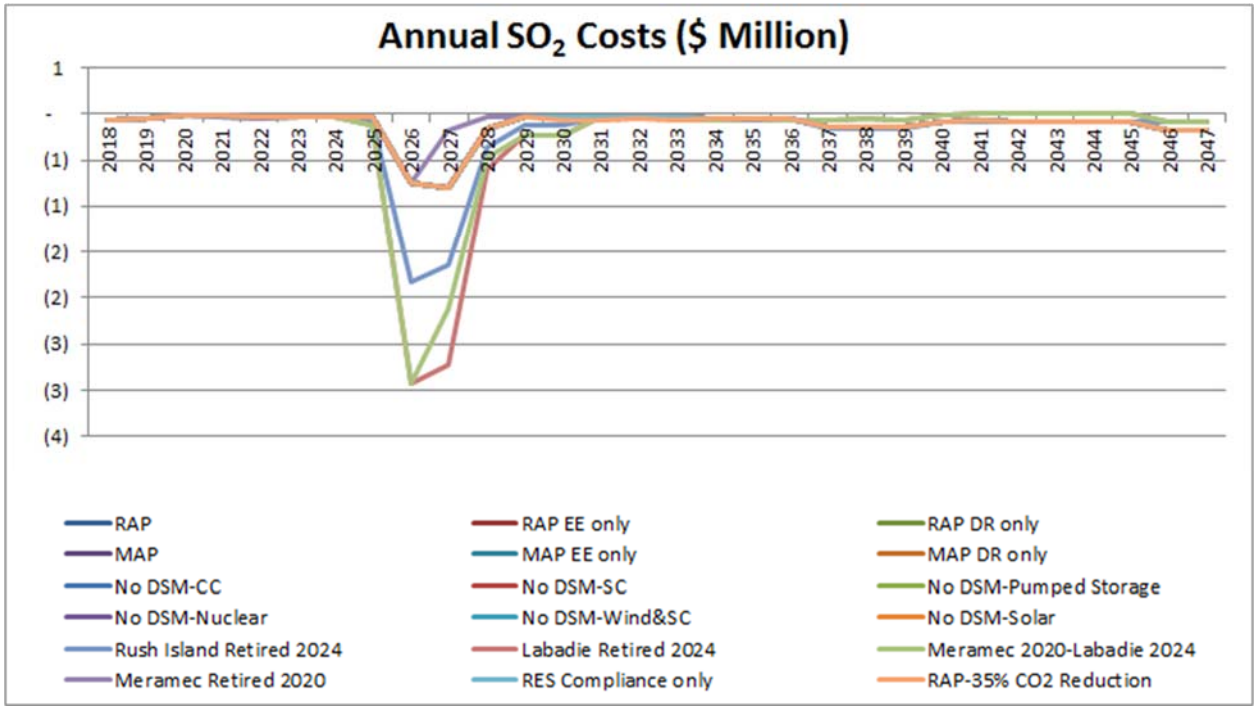


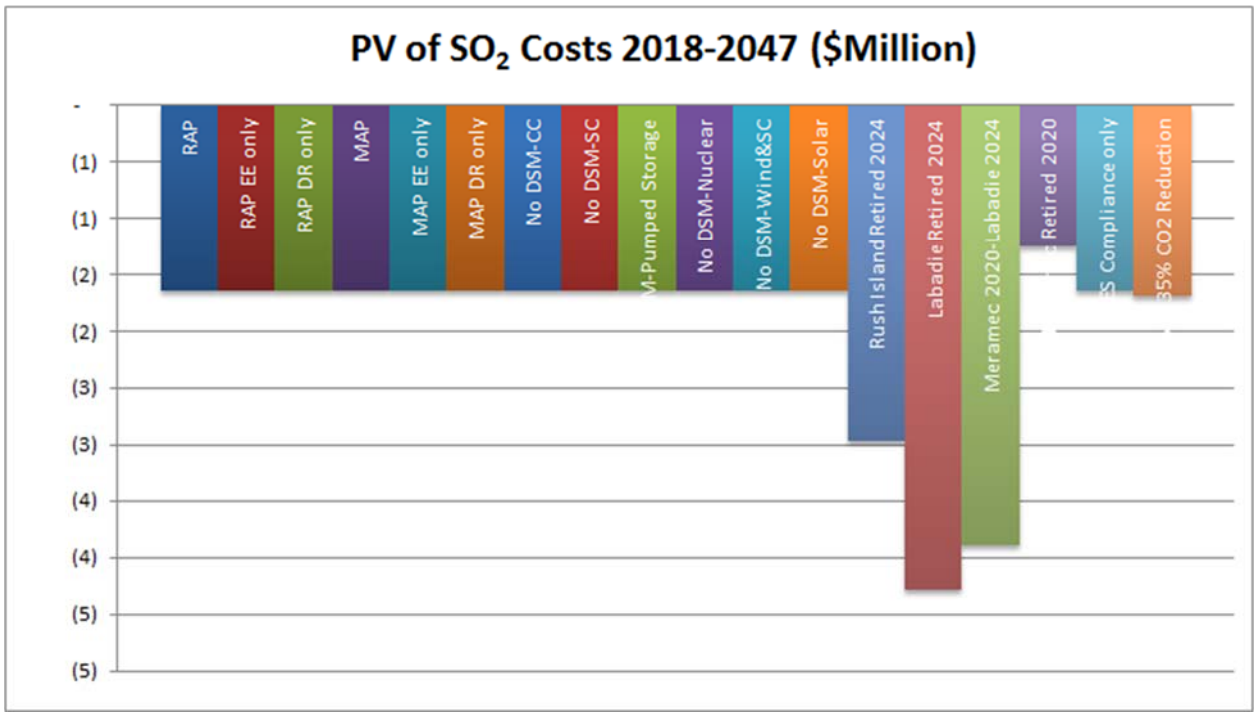


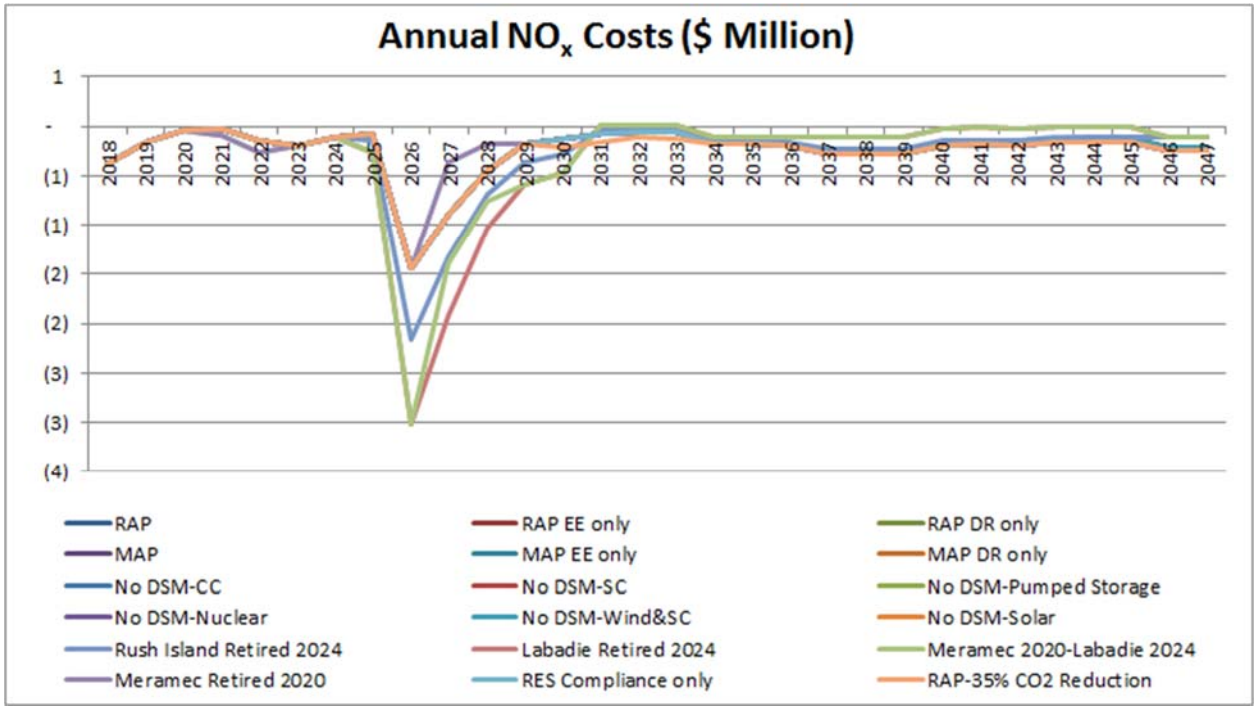
[29] 4 CSR 240-22.060(2)(A)2; 4 CSR 240-22.060(4)(B)8

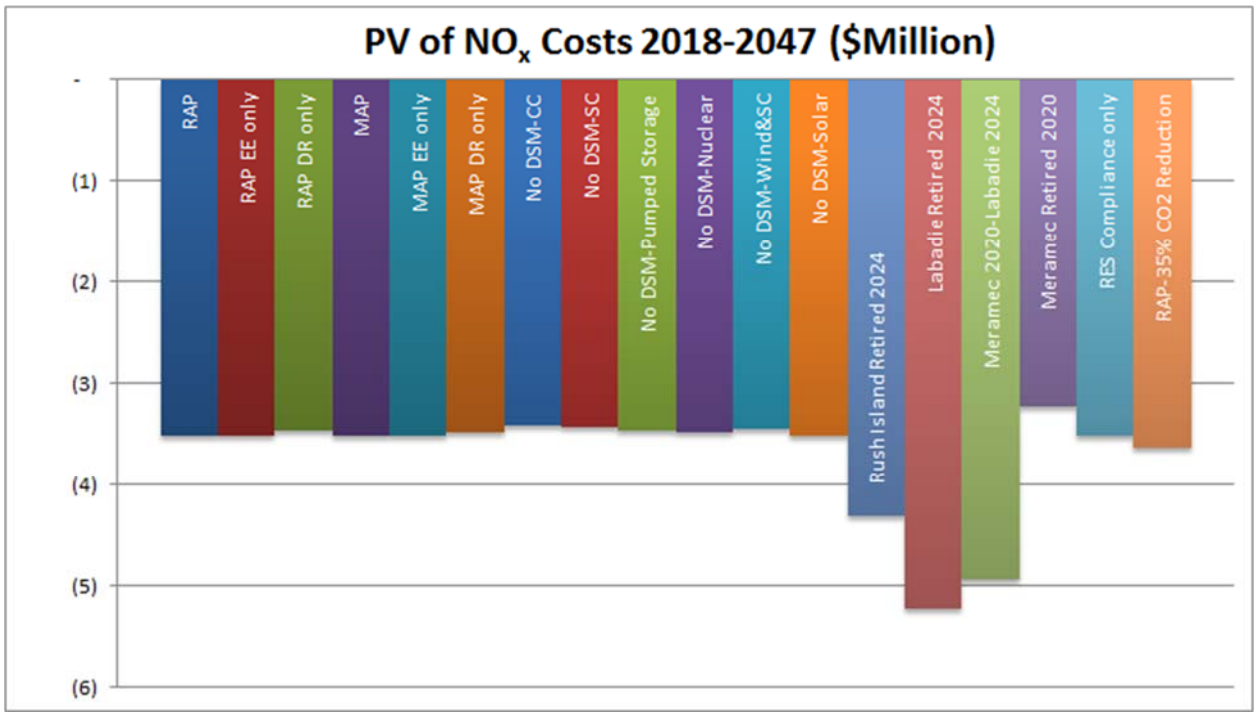

Annual CO_2 Costs ($ Million)
250
200
150
100
50
-
2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


PV of CO_2 Costs 2018-2047 ($Million)
1,400
1,200
1,000
800
600
400
200
-
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadi
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


Annual SO2 Costs ($ Million)
1
-
(1)
(1)
(2)
(2)
(3)
(3)
(4)
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


PV of SO2 Costs 2018-2047 ($Million)
-
(1)
(1)
(2)
(2)
(3)
(3)
(4)
(4)
(5)
(5)
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Retired 2020
S Compliance only
35% CO2 Reduction


Annual NOx Costs ($ Million)
1
-
(1)
(1)
(2)
(2)
(3)
(3)
(4)
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction


PV of NOx Costs 2018-2047 ($Million)
-
(1)
(2)
(3)
(4)
(5)
(6)
RAP
RAP EE only
RAP DR only
MAP
MAP EE only
MAP DR only
No DSM-CC
No DSM-SC
No DSM-Pumped Storage
No DSM-Nuclear
No DSM-Wind&SC
No DSM-Solar
Rush Island Retired 2024
Labadie Retired 2024
Meramec 2020-Labadie 2024
Meramec Retired 2020
RES Compliance only
RAP-35% CO2 Reduction

Expected Values, Rankings and Cumulative Probability Distributions for Selected Performance Measures[30]

Ameren Missouri first examined the ranks of the alternative resource plans using the probability-weighted averages or the expected values for the selected performance measures. The electronic workpapers also provide data for the alternative resource plans and the performance of each plan by each selected performance measure: PVRR, PVRR with utility financial incentives, PVRR with PV of out-of-pocket costs to participants in DSM programs, PV of probable environmental costs, emissions, levelized annual average rates, annual and maximum single-year increase in average rates, pre-tax interest coverage, FFO/interest coverage, FFO/debt, debt/capitalization, ROE, PV of FCF, EPS and FTE jobs.[31]

The expected value data for the measures and their ranks on each measure are shown in Table 9A.7 and Table 9A.8, respectively.

Since Ameren Missouri is a market participant in MISO, the modeling used in integration analysis assumes electric energy can be bought and sold within MISO market. Any energy unable to be served with Ameren Missouri resources is served with other MISO market resources; therefore, the unserved hours will always be zero.[32]

[30] 4 CSR 240-22.060(7)
[31] 4 CSR 240-22.060(2)
[32] 4 CSR 240-22.060(7)(C)4

Table 9A.7 Expected Values for Selected Performance Measures[33]

	EXPECTED VALUE														
Plan	PVRR $MM	PVRR w/ Incentives $MM	Levelized Rates Cents/kWh	Max Single Yr Rate Increase	PV of Participant Cost $MM	PV of Probable Environmental Cost $MM	Avg CO2 Emissions (MM Tons)	PreTax Interest Coverage	FFO-Interest Coverage	FFO/Debt	Debt/ Capitalization	ROE	FCF $MM	EPS	Jobs
A-RAP	54,429	54,905	13.27	13%	492	2,272	22	4.94	7.56	30%	40%	11%	6,250	2.26	24,164
B-RAP EE only	54,740	55,099	13.35	13%	492	2,272	22	4.93	7.55	30%	40%	11%	6,242	2.27	19,562
C-RAP DR only	57,158	57,268	12.77	12%	0	2,341	23	4.78	7.19	29%	40%	11%	5,944	2.46	10,999
D-MAP	53,892	54,522	13.59	14%	0	2,272	22	4.95	7.57	30%	40%	11%	6,267	2.24	27,496
E-MAP EE only	54,534	55,012	13.76	13%	0	2,272	22	4.94	7.56	30%	40%	11%	6,252	2.26	22,023
F-MAP DR only	56,641	56,843	12.66	12%	0	2,307	22	4.84	7.35	30%	40%	11%	6,089	2.37	9,889
G-No DSM-CC	57,679	57,679	12.89	11%	0	2,387	23	4.72	7.06	29%	40%	11%	5,824	2.56	8,648
H-No DSM-SC	57,532	57,532	12.86	12%	0	2,359	23	4.74	7.12	29%	40%	11%	5,875	2.52	9,039
I-No DSM-Pumped Storage	58,250	58,250	13.02	11%	0	2,341	23	4.70	6.97	29%	40%	11%	5,778	2.63	10,327
J-No DSM-Nuclear	63,924	63,924	14.29	48%	0	2,307	22	4.46	6.32	27%	41%	13%	4,840	4.10	20,216
K-No DSM-Wind&SC	59,042	59,042	13.19	11%	0	2,350	23	4.60	6.88	29%	39%	11%	5,557	2.84	16,495
L-No DSM-Solar	57,947	57,947	12.95	11%	0	2,272	22	4.61	7.29	30%	39%	11%	5,969	2.61	7,555
M-Rush Island Retired 2024	55,450	55,927	13.52	12%	492	1,810	17	4.90	7.44	30%	40%	11%	6,162	2.28	24,429
N-Labadie Retired 2024	55,869	56,345	13.62	14%	492	1,508	15	4.94	7.49	30%	40%	11%	6,151	2.24	23,464
O-Meramec 2020-Labadie 2024	55,918	56,394	13.64	14%	492	1,506	15	4.94	7.49	30%	40%	11%	6,150	2.24	23,260
P-Meramec Retired 2020	54,478	54,954	13.28	13%	492	2,269	22	4.94	7.56	30%	40%	11%	6,249	2.26	23,960
Q-RES Compliance only	54,406	54,882	13.27	13%	492	2,272	22	4.94	7.56	30%	40%	11%	6,251	2.26	24,043
R-RAP-35% CO2 Reduction	54,481	54,957	13.29	13%	492	2,242	21	4.94	7.56	30%	40%	11%	6,250	2.26	24,164

Table 9A.8 Rankings for Selected Performance Measures

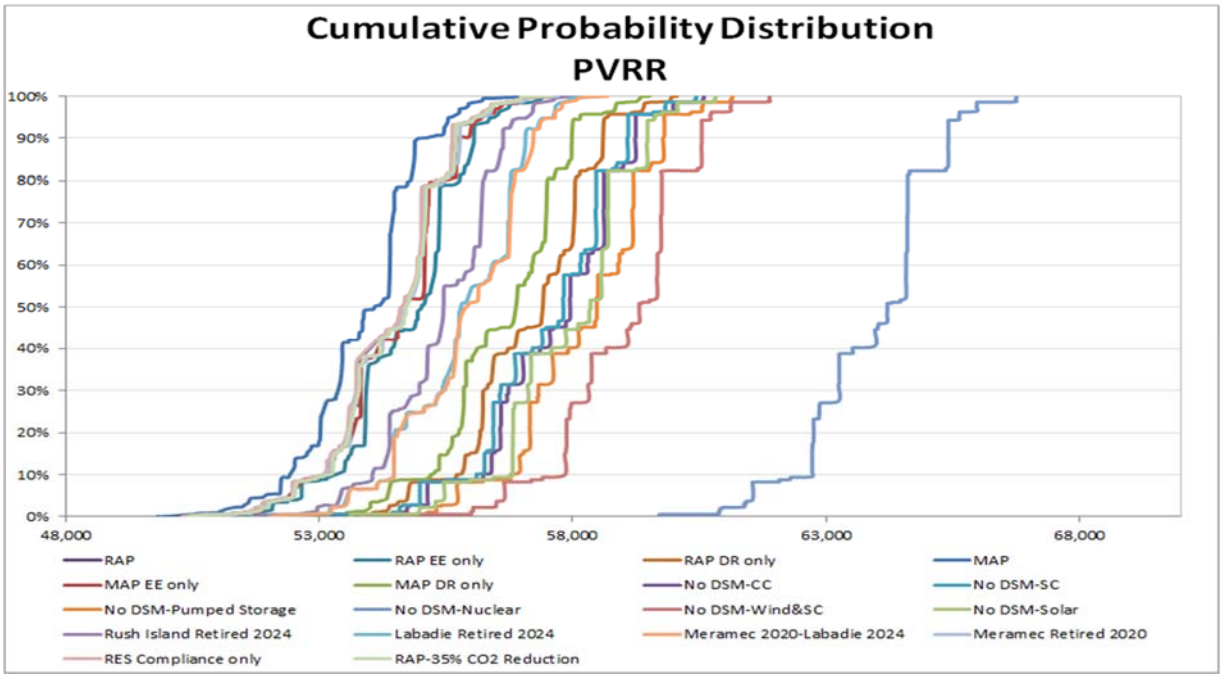
	RANKING														
Plan	PVRR $MM	PVRR w/ Incentives $MM	Levelized Rates Cents/kWh	Max Single Yr Rate Increase	PV of Participant Cost $MM	PV of Probable Environmental Cost $MM	Avg CO2 Emissions (MM Tons)	PreTax Interest Coverage	FFO-Interest Coverage	FFO/Debt	Debt/ Capitalization	ROE	FCF $MM	EPS	Jobs
A-RAP	3	3	9	10	14	6	6	7	6	5	5	8	5	11	3
B-RAP EE only	7	7	12	9	14	6	6	9	7	3	3	11	7	10	11
C-RAP DR only	12	12	2	7	1	14	14	12	13	13	14	14	13	7	13
D-MAP	1	1	14	16	1	6	6	1	1	7	9	4	1	16	1
E-MAP EE only	6	6	17	14	1	6	6	3	2	2	7	6	2	14	9
F-MAP DR only	11	11	1	6	1	12	12	11	11	12	12	13	11	8	15
G-No DSM-CC	14	14	4	4	1	18	18	14	15	15	16	16	15	5	17
H-No DSM-SC	13	13	3	5	1	17	17	13	14	14	15	15	14	6	16
I-No DSM-Pumped Storage	16	16	6	2	1	14	14	15	16	17	17	12	16	3	14
J-No DSM-Nuclear	18	18	18	18	1	12	12	18	18	18	18	1	18	1	10
K-No DSM-Wind&SC	17	17	7	1	1	16	16	17	17	16	2	17	17	2	12
L-No DSM-Solar	15	15	5	3	1	6	6	16	12	1	1	18	12	4	18
M-Rush Island Retired 2024	8	8	13	8	17	3	3	10	10	11	13	10	8	9	2
N-Labadie Retired 2024	9	9	15	15	14	2	2	8	9	10	11	2	9	17	7
O-Meramec 2020-Labadie 2024	10	10	16	17	18	1	1	5	8	9	10	3	10	18	8
P-Meramec Retired 2020	4	4	10	11	11	5	5	4	3	4	4	9	6	13	6
Q-RES Compliance only	2	2	8	13	12	6	6	2	4	8	8	5	3	15	5
R-RAP-35% CO2 Reduction	5	5	11	12	12	4	4	6	5	5	5	7	4	11	3

[33] 4 CSR 240-22.060(4)(A); 4 CSR 240-22.060(7)(A); 4 CSR 240-22.060(7)(C)3

The expected values for one of the selected performance measures, PVRR with utility incentives for DSM, had essentially the same rank order as the PVRR rank order, so no cumulative distribution function (CDF) was produced for this measure. Additionally, since only plans with RAP EE would have DSM participant costs at this stage, a CDF would not be useful for this measure. Since the two uncertain factors (project cost and ROE&interest rates) that would cause variability in financial measures within the end points of each plan were not found to be critical in the sensitivity analysis, and hence, were not included in the final probability tree in the risk analysis, CDFs for these measures are also not very meaningful; therefore, the CDFs for financial measures are not included in this report, but can be found in the workpapers. CDFs for the remaining performance measures are shown in Figures 9A.17 – 28.[34]

To create the CDFs, Ameren Missouri looked at the unique outcomes for the performance measures for each of the 135 branches on the full probability tree for each alternative resource plan and their associated joint probabilities. To create the CDF for PVRR for each plan, for example, the 135 PVRR values were sorted from lowest to highest, and the associated probabilities were accumulated. The lowest PVRR would then be assigned the probability of its same branch, the second lowest PVRR would be assigned its own branch summed with the probability of the lowest PVRR, the third lowest PVRR would have a cumulative probability of its own and of the lower two, and so on. This process essentially shows the PVRR values (or the values for the other selected performance measures) and the percentiles for a plan.[35]

Figure 9A.17 Cumulative Probability Distribution of PVRR



[34] 4 CSR 240-22.060(7)(C)2
[35] 4 CSR 240-22.060(7)(C)1

Figure 9A.18 Cumulative Probability Distribution of PV of Environmental Costs

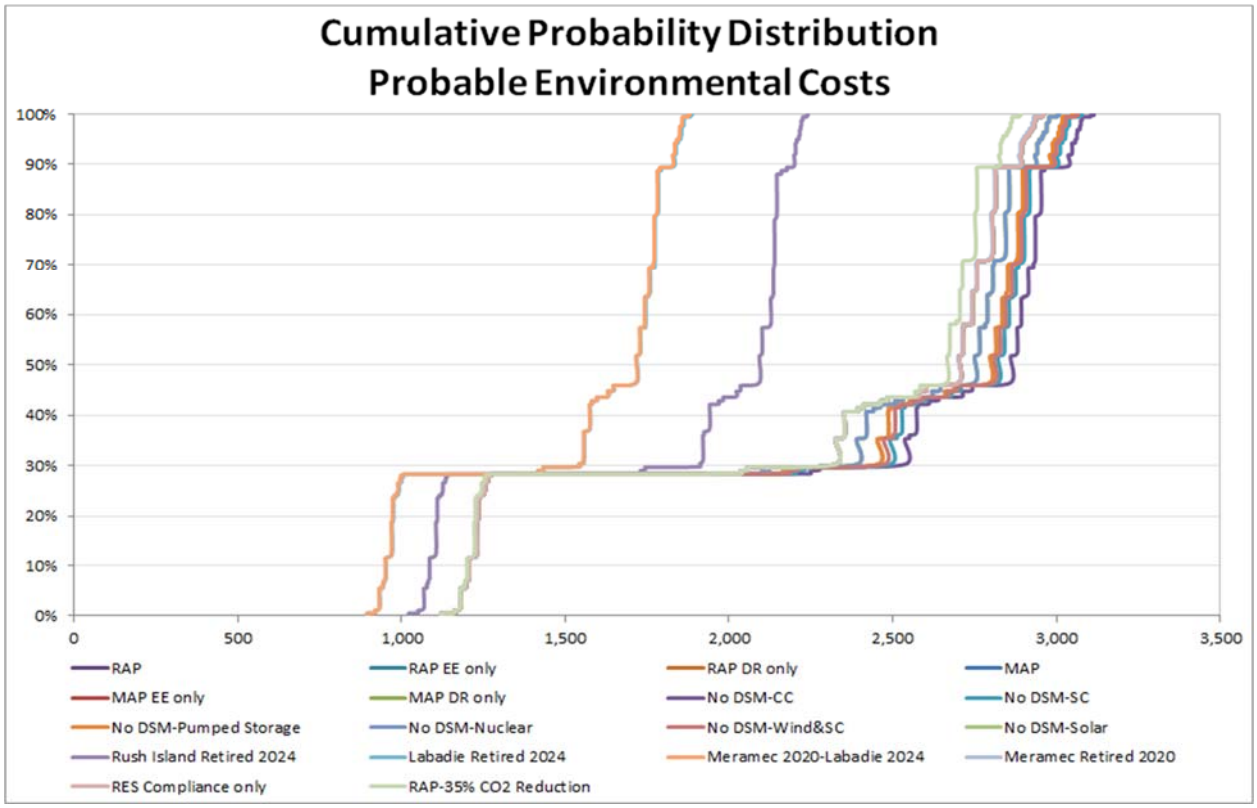


Figure 9A.19 Cumulative Probability Distribution of PV of CO_2 Costs

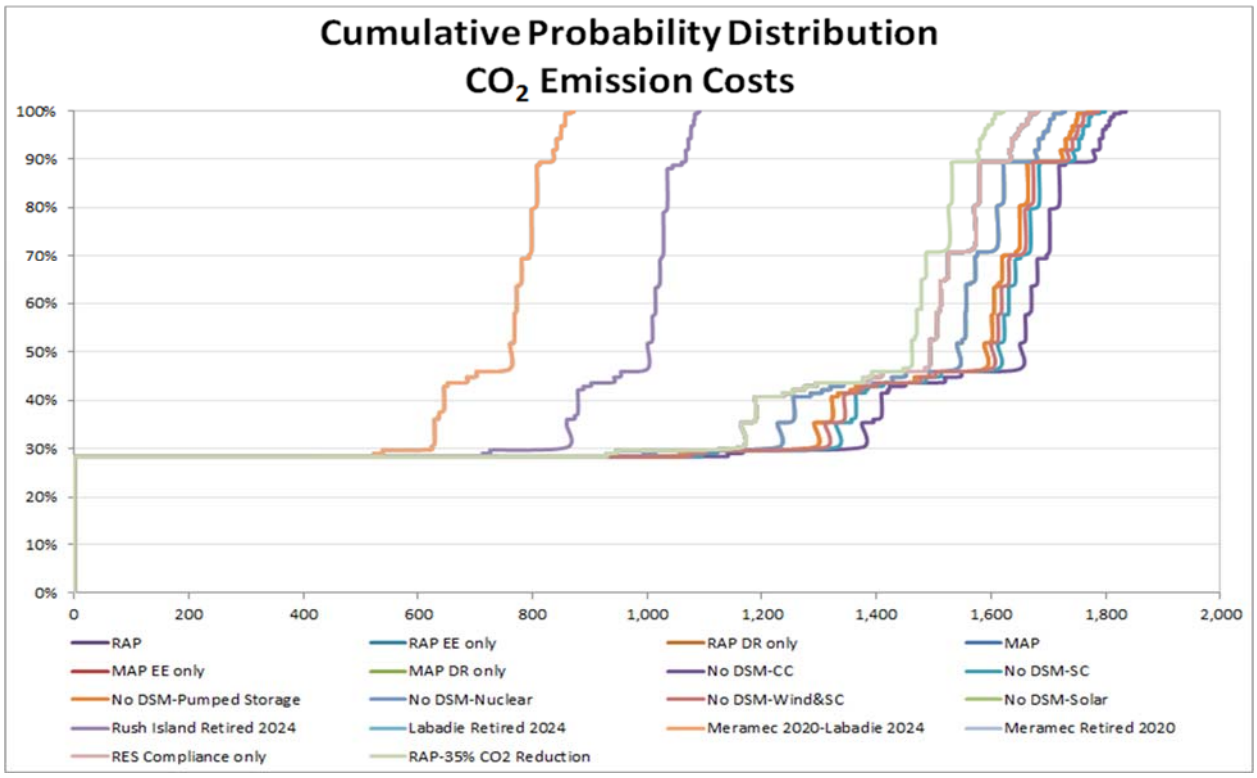


Figure 9A.20 Cumulative Probability Distribution of Levelized Rates

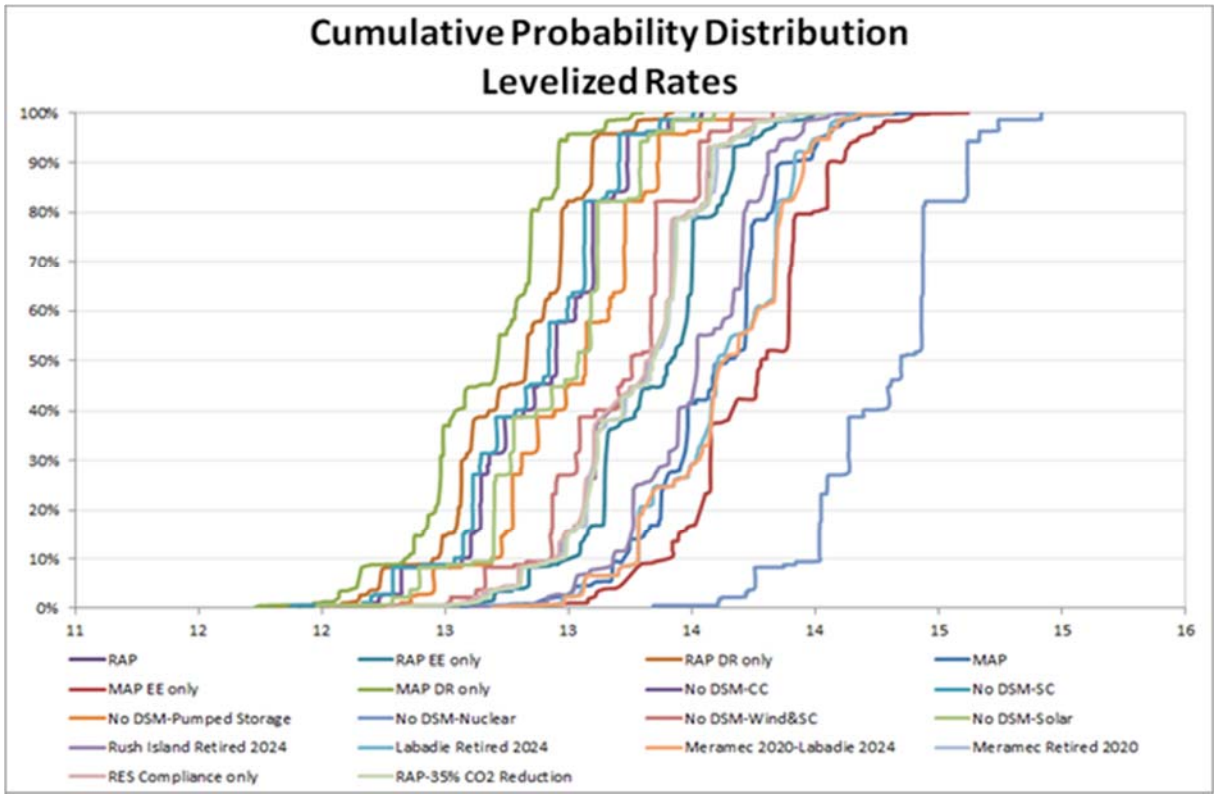
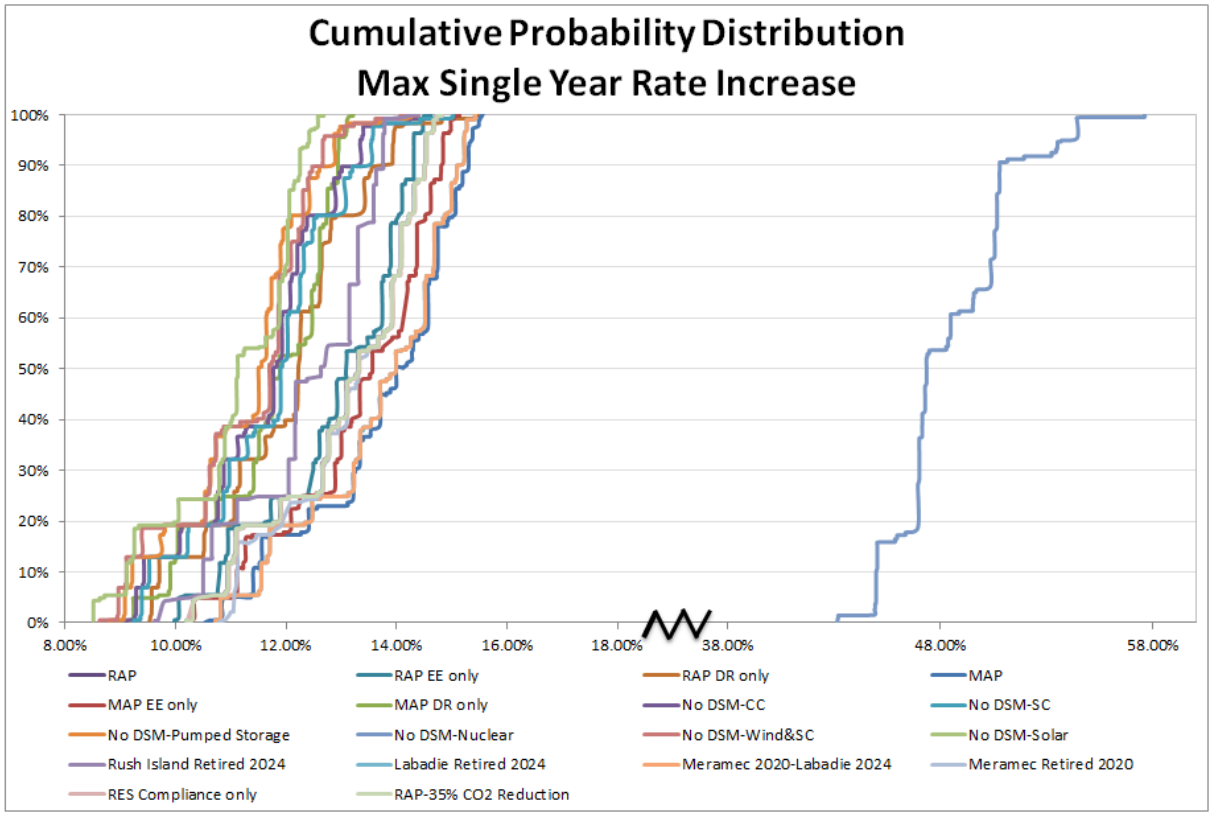


Figure 9A.21 Cumulative Probability Distribution of Max Single Year Rate Increase



Measures of Dispersion

Ameren Missouri also estimated the standard deviation of the performance measures shown as in Table 9A.9.

Table 9A.9 Standard Deviation for Selected Performance Measures[36]

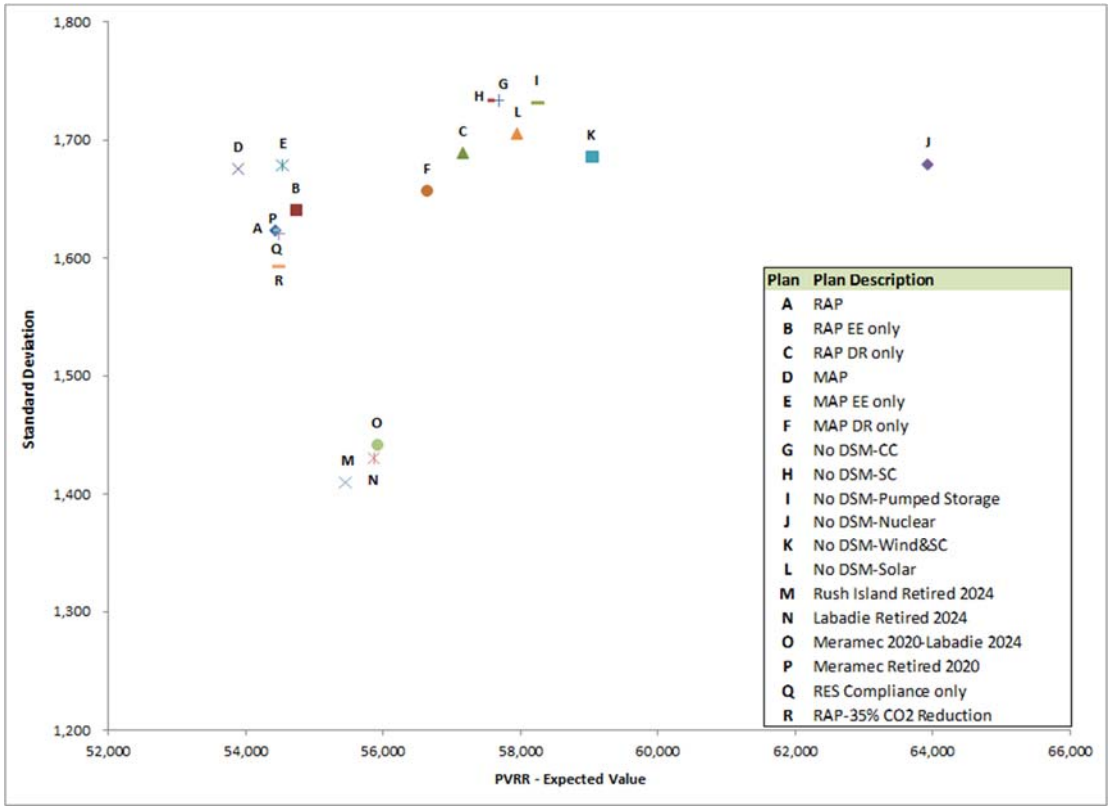
	STANDARD DEVIATION														
Plan	PVRR $MM	PVRR w/ Incentives $MM	Levelized Rates Cents/kWh	Max Single Yr Rate Increase	PV of Participant Cost $MM	PV of Probable Environmental Cost $MM	Avg CO2 Emissions (MM Tons)	PreTax Interest Coverage	FFO-Interest Coverage	FFO/Debt	Debt/ Capitalization	ROE	FCF $MM	EPS	Jobs
A-RAP	1,624	1,624	0.40	1%	110	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
B-RAP EE only	1,641	1,641	0.40	1%	110	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
C-RAP DR only	1,689	1,689	0.38	2%	0	765	2.36	0.00	0.00	0%	0%	0%	0	0.00	N/A
D-MAP	1,676	1,676	0.42	1%	0	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
E-MAP EE only	1,679	1,679	0.42	1%	0	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
F-MAP DR only	1,657	1,657	0.37	1%	0	743	2.40	0.00	0.00	0%	0%	0%	0	0.00	N/A
G-No DSM-CC	1,734	1,734	0.39	1%	0	793	2.32	0.00	0.00	0%	0%	0%	0	0.00	N/A
H-No DSM-SC	1,734	1,734	0.39	1%	0	776	2.34	0.00	0.00	0%	0%	0%	0	0.00	N/A
I-No DSM-Pumped Storage	1,732	1,732	0.39	1%	0	765	2.36	0.00	0.00	0%	0%	0%	0	0.00	N/A
J-No DSM-Nuclear	1,679	1,679	0.38	3%	0	743	2.40	0.00	0.00	0%	0%	0%	0	0.00	N/A
K-No DSM-Wind&SC	1,686	1,686	0.38	1%	0	770	2.35	0.00	0.00	0%	0%	0%	0	0.00	N/A
L-No DSM-Solar	1,706	1,706	0.38	1%	0	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
M-Rush Island Retired 2024	1,410	1,410	0.34	1%	110	483	1.58	0.00	0.00	0%	0%	0%	0	0.00	N/A
N-Labadie Retired 2024	1,431	1,431	0.35	1%	110	375	1.55	0.00	0.00	0%	0%	0%	0	0.00	N/A
O-Meramec 2020-Labadie 2024	1,442	1,442	0.35	1%	110	374	1.48	0.00	0.00	0%	0%	0%	0	0.00	N/A
P-Meramec Retired 2020	1,621	1,621	0.40	1%	110	721	2.36	0.00	0.00	0%	0%	0%	0	0.00	N/A
Q-RES Compliance only	1,624	1,624	0.40	1%	110	722	2.43	0.00	0.00	0%	0%	0%	0	0.00	N/A
R-RAP-35% CO2 Reduction	1,593	1,593	0.39	1%	110	701	2.22	0.00	0.00	0%	0%	0%	0	0.00	N/A

Standard deviation for “Jobs” has not been estimated since there was only one estimate per plan, it would be 0.

Charts 9A.22-24 display the expected value and standard deviation for each plan’s PVRR. Also, in chart 9A.25, the 5th and 95th percentiles along with the expected PVRR are shown. [37]

[36] 4 CSR 240-22.060(7)(C)3
[37] 4 CSR 240-22.060(7)(B)

Figure 9A.22 PVRR – Expected Value and Standard Deviation



PVRR – Expected Value and Standard Deviation (without Plan J)

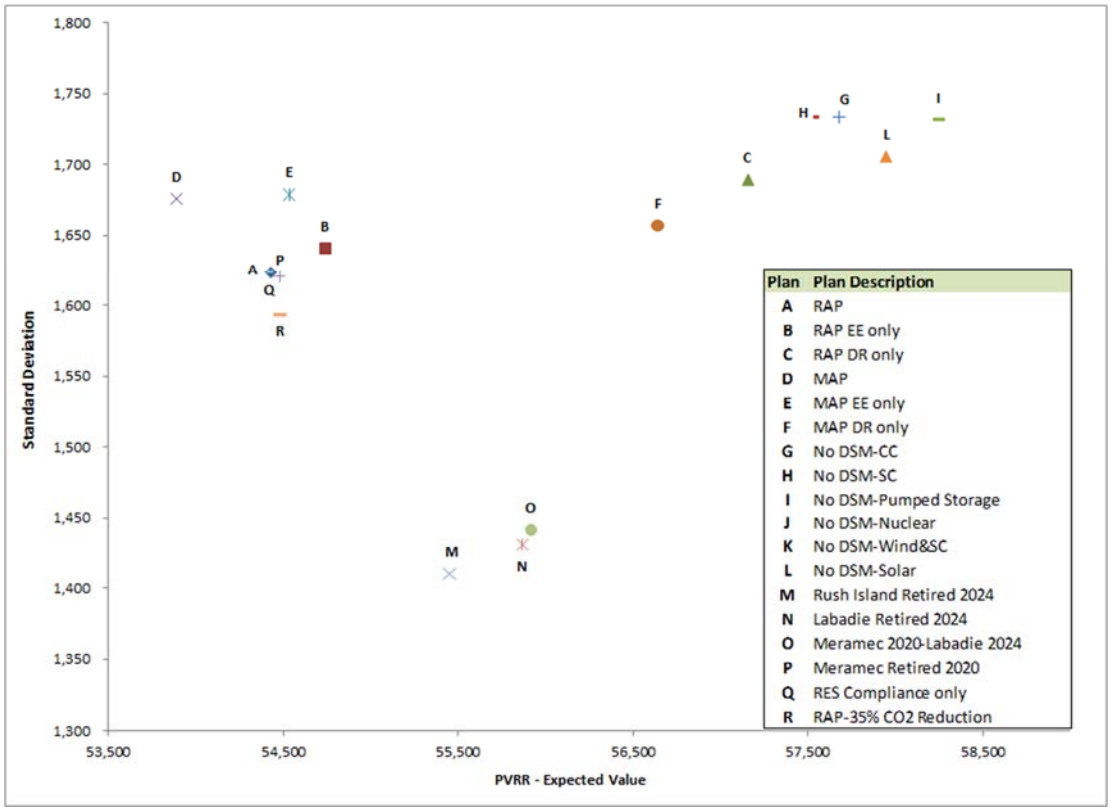


Figure 9A.23 PVRR – Expected Value and Standard Deviation

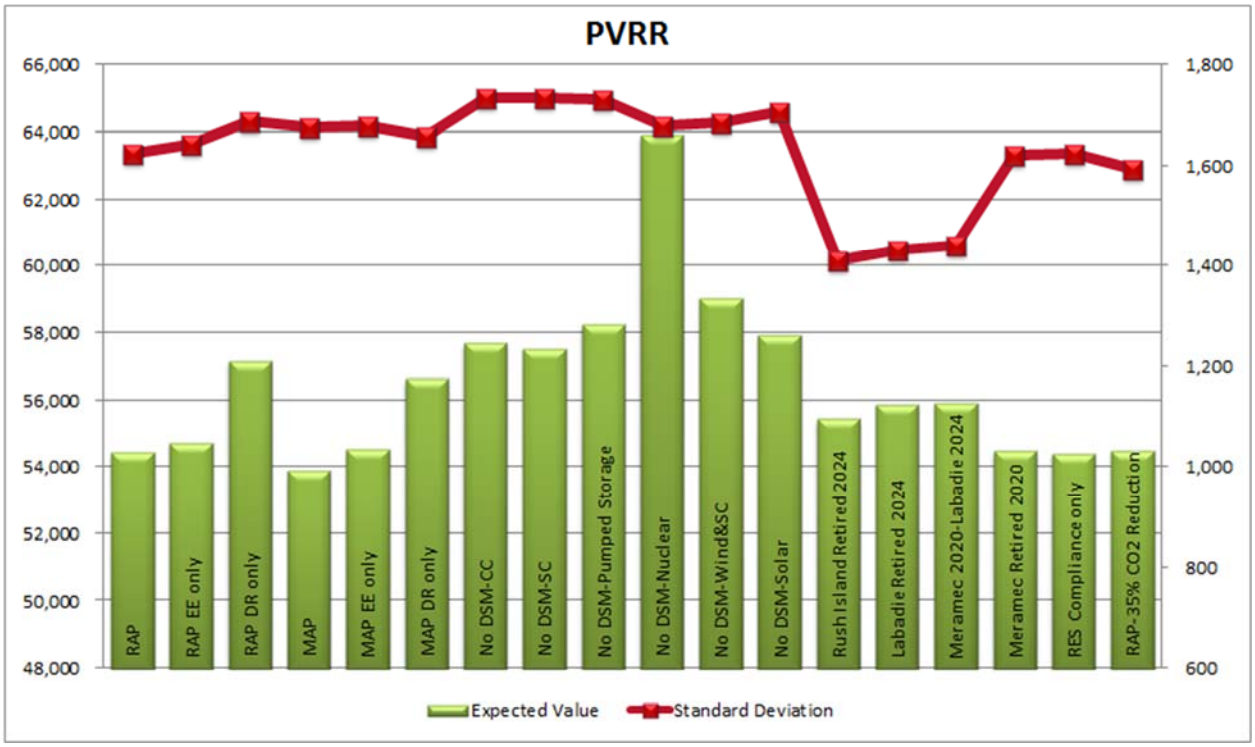
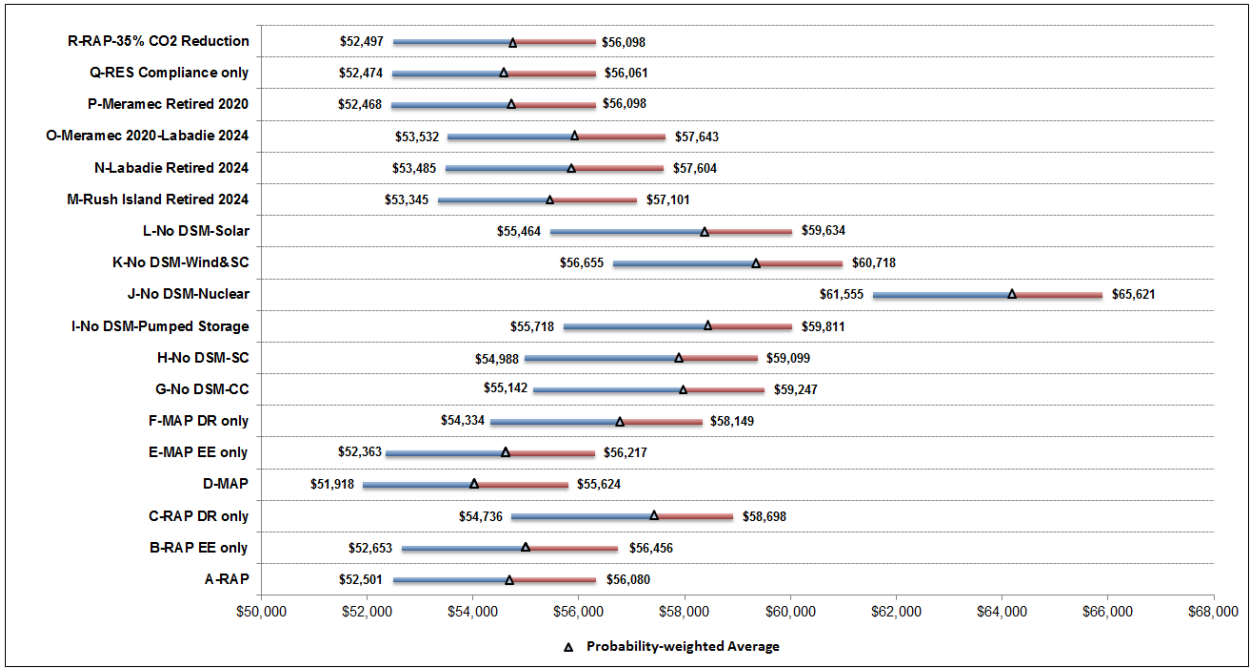


Figure 9A.24 PVRR – Expected Value, 5th and 95th Percentiles



Compliance References