	Reliability Standard Framework Inputs			Scenario Parameters				Scenario Outcomes									
No.	FREQUENCY (LOLE)	DURATION (Hours)	MAGNITUDE (MW)	MW Retired	Capacity Mix to Achieve Frequency Target: 100% CT vs. May CDR proportional mix of planned Wind, Solar, ESR, Gas	Portfolio Reserve Margin for Summer**	Portfolio Reserve Margin for Winter**	Expected Unserved Energy EUE (MWh)	MWs of Additional (new) Dispatchable Generation	Fixed Cost of Additional CT Generation (thousand $/year)	Total Variable Costs (million $)	Total Cost (million $)	Max Duration	Max Magnitude	Exceedance Probability Required for Duration	Exceedance Probability Required for Magnitude	Annual Incremental Fixed Cost of EUE Reduction ($/year per MWh of avoided EUE)
1	1 in 5 *	15	14,000	900	100% CT	10%	14%	7,633	0	0	14,931	14,931	16	26,256	0.06%	3.01%	--
2	1 in 10	15	14,000	900	100% CT	17%	22%	2,597	2,968	353,192	14,756	15,109	15	21,016	0.02%	0.42%	70,133
3	1 in 15	15	14,000	900	100% CT	20%	26%	1,296	5,936	706,384	14,730	15,436	13	16,112	0.00%	0.11%	271,477
4	1 in 20	15	14,000	900	100% CT	22%	28%	853	7,420	882,980	14,720	15,603	13	17,115	0.00%	0.08%	398,637
9	1 in 5*	15	14,000	900	CDR Mix	10%	14%	7,731	0	0	14,929	14,929	16	24,525	0.06%	2.84%	--
10	1 in 10	15	14,000	900	CDR Mix	18%	22%	3,031	2,226	264,894	14,690	14,955	14	20,120	0.00%	0.74%	56,360
11	1 in 15	15	14,000	900	CDR Mix	21%	27%	1,460	5,565	662,235	14,659	15,321	13	17,076	0.00%	0.17%	252,922
12	1 in 20	15	14,000	900	CDR Mix	23%	29%	982	7,049	838,831	14,654	15,493	13	17,930	0.00%	0.10%	369,448
17	1 in 5 *	10	10,000	900	100% CT	10%	14%	7,633	0	0	14,931	14,931	16	26,256	4.69%	6.78%	--
18	1 in 10	10	10,000	900	100% CT	17%	22%	2,597	2,968	353,192	14,756	15,109	15	21,016	1.20%	2.32%	70,133
19	1 in 15	10	10,000	900	100% CT	20%	26%	1,296	5,936	706,384	14,730	15,436	13	16,112	0.38%	1.01%	271,477
20	1 in 20	10	10,000	900	100% CT	22%	28%	853	7,420	882,980	14,720	15,603	13	17,115	0.13%	0.51%	398,637
25	1 in 5*	10	10,000	900	CDR Mix	10%	14%	7,731	0	0	14,929	14,929	16	24,525	4.70%	6.84%	--
26	1 in 10	10	10,000	900	CDR Mix	18%	22%	3,031	2,226	264,894	14,690	14,955	14	20,120	1.87%	2.63%	56,360
27	1 in 15	10	10,000	900	CDR Mix	21%	27%	1,460	5,565	662,235	14,659	15,321	13	17,076	0.48%	1.24%	252,922
28	1 in 20	10	10,000	900	CDR Mix	23%	29%	982	7,049	838,831	14,654	15,493	13	17,930	0.19%	0.88%	369,448
33	1 in 5 *	5	5,000	900	100% CT	10%	14%	7,633	0	0	14,931	14,931	16	26,256	5.90%	11.52%	--
34	1 in 10	5	5,000	900	100% CT	17%	22%	2,597	2,968	353,192	14,756	15,109	15	21,016	2.95%	6.51%	70,133
35	1 in 15	5	5,000	900	100% CT	20%	26%	1,296	5,936	706,384	14,730	15,436	13	16,112	1.92%	3.85%	271,477
36	1 in 20	5	5,000	900	100% CT	22%	28%	853	7,420	882,980	14,720	15,603	13	17,115	1.26%	2.59%	398,637
41	1 in 5*	5	5,000	900	CDR Mix	10%	14%	7,731	0	0	14,929	14,929	16	24,525	6.19%	12.06%	--
42	1 in 10	5	5,000	900	CDR Mix	18%	22%	3,031	2,226	264,894	14,690	14,955	14	20,120	3.35%	6.61%	56,360
43	1 in 15	5	5,000	900	CDR Mix	21%	27%	1,460	5,565	662,235	14,659	15,321	13	17,076	1.98%	3.81%	252,922
44	1 in 20	5	5,000	900	CDR Mix	23%	29%	982	7,049	838,831	14,654	15,493	13	17,930	1.41%	2.93%	369,448
5	1 in 5 *	15	14,000	3,300	100% CT	9%	13%	8,970	0	0	14,949	14,949	17	25,826	0.17%	3.54%	--
6	1 in 10	15	14,000	3,300	100% CT	17%	22%	2,580	5,194	618,086	14,771	15,389	14	18,427	0.00%	0.53%	96,727
7	1 in 15	15	14,000	3,300	100% CT	20%	26%	1,476	8,162	971,278	14,748	15,719	13	15,869	0.00%	0.08%	320,120
8	1 in 20	15	14,000	3,300	100% CT	22%	28%	846	9,646	1,147,874	14,744	15,892	12	16,028	0.00%	0.04%	280,048
13	1 in 5*	15	14,000	3,300	CDR Mix	10%	13%	7,570	0	0	14,831	14,831	15	24,461	0.02%	3.05%	--
14	1 in 10	15	14,000	3,300	CDR Mix	17%	22%	2,987	4,081	485,639	14,700	15,185	14	20,043	0.00%	0.57%	105,963
15	1 in 15	15	14,000	3,300	CDR Mix	21%	27%	1,270	7,791	927,129	14,674	15,601	13	17,040	0.00%	0.13%	257,197
16	1 in 20	15	14,000	3,300	CDR Mix	22%	29%	880	8,904	1,059,576	14,673	15,733	13	17,267	0.00%	0.10%	339,769
21	1 in 5 *	10	10,000	3,300	100% CT	9%	13%	8,970	0	0	14,949	14,949	17	25,826	5.62%	7.43%	--
22	1 in 10	10	10,000	3,300	100% CT	17%	22%	2,580	5,194	618,086	14,771	15,389	14	18,427	1.35%	2.13%	96,727
23	1 in 15	10	10,000	3,300	100% CT	20%	26%	1,476	8,162	971,278	14,748	15,719	13	15,869	0.46%	1.39%	320,120
24	1 in 20	10	10,000	3,300	100% CT	22%	28%	846	9,646	1,147,874	14,744	15,892	12	16,028	0.10%	0.90%	280,048
29	1 in 5*	10	10,000	3,300	CDR Mix	10%	13%	7,570	0	0	14,831	14,831	15	24,461	4.90%	6.86%	--
30	1 in 10	10	10,000	3,300	CDR Mix	17%	22%	2,987	4,081	485,639	14,700	15,185	14	20,043	1.66%	2.78%	105,963
31	1 in 15	10	10,000	3,300	CDR Mix	21%	27%	1,270	7,791	927,129	14,674	15,601	13	17,040	0.30%	1.09%	257,197
32	1 in 20	10	10,000	3,300	CDR Mix	22%	29%	880	8,904	1,059,576	14,673	15,733	13	17,267	0.19%	0.78%	339,769
37	1 in 5 *	5	5,000	3,300	100% CT	9%	13%	8,970	0	0	14,949	14,949	17	25,826	6.74%	12.67%	--
38	1 in 10	5	5,000	3,300	100% CT	17%	22%	2,580	5,194	618,086	14,771	15,389	14	18,427	3.05%	6.27%	96,727
39	1 in 15	5	5,000	3,300	100% CT	20%	26%	1,476	8,162	971,278	14,748	15,719	13	15,869	1.90%	3.85%	320,120
40	1 in 20	5	5,000	3,300	100% CT	22%	28%	846	9,646	1,147,874	14,744	15,892	12	16,028	1.33%	2.65%	280,048
45	1 in 5*	5	5,000	3,300	CDR Mix	10%	13%	7,570	0	0	14,831	14,831	15	24,461	5.89%	10.82%	--
46	1 in 10	5	5,000	3,300	CDR Mix	17%	22%	2,987	4,081	485,639	14,700	15,185	14	20,043	3.31%	6.67%	105,963
47	1 in 15	5	5,000	3,300	CDR Mix	21%	27%	1,270	7,791	927,129	14,674	15,601	13	17,040	1.81%	3.75%	257,197
48	1 in 20	5	5,000	3,300	CDR Mix	22%	29%	880	8,904	1,059,576	14,673	15,733	13	17,267	1.41%	2.90%	339,769

* The 1 in 5 frequency scenarios required removal of 3,000 MW of coal capacity to achieve this reliability level.
** Reserve margins are calculated with Effective Load Carrying Capabilities for wind, solar, battery storage, and non-PUN thermal resources.

PROPOSED ADDITIONAL 27 SCENARIOS FOR THE NEXT SIMULATION ITERATION

	Reliability Standard Framework Inputs			Scenario Parameters		Scenario Outcomes								
No.	FREQUENCY (LOLE)	DURATION (Hours)	MAGNITUDE (MW)	MW Retired	Capacity Mix to Achieve Frequency Target: 1. May CDR proportional mix of planned Wind, Solar, ESR, Gas 2. May CDR mix with removal of half of the incremental gas and replacement with IBRs (wind, solar and ESR)*	Expected Unserved Energy EUE (MWh)	MWs of Additional (new) Dispatchable Generation	Fixed Cost of Additional CT Generation (thousand $/year)	Total Variable Costs (million $)	Max Duration	Max Magnitude	Exceedance Probability Required for Duration	Exceedance Probability Required for Magnitude	Annual Incremental Fixed Cost of EUE Reduction ($/year per MWh of avoided EUE)
1	1 in 10	15	14,000	900	CDR Mix plus IBRs									
2	1 in 15	15	14,000	900	CDR Mix plus IBRs									
3	1 in 20	15	14,000	900	CDR Mix plus IBRs									
4	1 in 10	15	14,000	8,300	CDR Mix plus IBRs									
5	1 in 15	15	14,000	8,300	CDR Mix plus IBRs									
6	1 in 20	15	14,000	8,300	CDR Mix plus IBRs									
7	1 in 10	15	14,000	8,300	CDR Mix									
8	1 in 15	15	14,000	8,300	CDR Mix									
9	1 in 20	15	14,000	8,300	CDR Mix									
10	1 in 10	10	10,000	900	CDR Mix plus IBRs									
11	1 in 15	10	10,000	900	CDR Mix plus IBRs									
12	1 in 20	10	10,000	900	CDR Mix plus IBRs									
13	1 in 10	10	10,000	8,300	CDR Mix plus IBRs									
14	1 in 15	10	10,000	8,300	CDR Mix plus IBRs									
15	1 in 20	10	10,000	8,300	CDR Mix plus IBRs									
16	1 in 10	10	10,000	8,300	CDR Mix									
17	1 in 15	10	10,000	8,300	CDR Mix									
18	1 in 20	10	10,000	8,300	CDR Mix									
19	1 in 10	5	5,000	900	CDR Mix plus IBRs									
20	1 in 15	5	5,000	900	CDR Mix plus IBRs									
21	1 in 20	5	5,000	900	CDR Mix plus IBRs									
22	1 in 10	5	5,000	8,300	CDR Mix plus IBRs									
23	1 in 15	5	5,000	8,300	CDR Mix plus IBRs									
24	1 in 20	5	5,000	8,300	CDR Mix plus IBRs									
25	1 in 10	5	5,000	8,300	CDR Mix									
26	1 in 15	5	5,000	8,300	CDR Mix									
27	1 in 20	5	5,000	8,300	CDR Mix									

* Exact amounts of replacement IBR resources for the "CDR Mix plus IBRs" scenarios requires model runs to determine the quantities that will achieve the target frequency levels.

The table below illustrates the three steps to building the portfolios: (1) initial removal of coal capacity to create the least reliable portfolios (1 in 5 frequency), (2) removal of coal and gas capacity to achieve the scenario retirement levels, and (3) the addition of combustion turbine capacity to achieve the remaining frequency levels.

900 MW Retirement Scenario										
	Initial Portfolios		100% CT Scenario				CDR Mix			
Resource Type	Dec 2022 CDR	Portfolio after Retiring 900 MW of Gas Capacity	Capacity Changes to Achieve 1 in 5 Frequency	Capacity Changes to Achieve 1 in 10 Frequency	Capacity Changes to Achieve 1 in 15 Frequency	Capacity Changes to Achieve 1 in 20 Frequency	Capacity Changes to Achieve 1 in 5 Frequency	Capacity Changes to Achieve 1 in 10 Frequency	Capacity Changes to Achieve 1 in 15 Frequency	Capacity Changes to Achieve 1 in 20 Frequency
Coal	13,630	13,630	(3,000)				(3,000)			
Gas	55,415	54,515								
Wind	41,853	41,853								
Solar	44,775	44,775						782	782	782
Battery Storage	10,945	10,945						3,082	3,082	3,082
New CTs	-	-		2,968	5,936	7,420		2,226	5,565	7,049
TOTAL	**166,618**	**165,718**	**162,718**	**168,686**	**171,654**	**173,138**	**162,718**	**171,808**	**175,147**	**176,631**

3,300 MW Retirement Scenario										
	Initial Portfolios		100% CT Scenario				CDR Mix			
Resource Type	Dec 2022 CDR	Portfolio after Retiring 3,300 MW (900 Gas/2,400 Coal)	Capacity Changes to Achieve 1 in 5 Frequency	Capacity Changes to Achieve 1 in 10 Frequency	Capacity Changes to Achieve 1 in 15 Frequency	Capacity Changes to Achieve 1 in 20 Frequency	Capacity Change to Achieve 1 in 5 Frequency*	Capacity Changes to Achieve 1 in 10 Frequency	Capacity Changes to Achieve 1 in 15 Frequency	Capacity Changes to Achieve 1 in 20 Frequency
Coal	13,630	11,230	(1,500)	-	-	-	(965)	-	-	-
Gas	55,415	54,515	-	-	-	-	-	-	-	-
Wind	41,853	41,853	-	-	-	-	-	-	-	-
Solar	44,775	44,775	-	-	-	-	782	782	782	782
Battery Storage	10,945	10,945	-	-	-	-	3,082	3,082	3,082	3,082
New CTs	-	-	-	5,194	8,162	9,646	-	4,081	7,791	8,904
TOTAL	**166,618**	**163,318**	**164,218**	**170,912**	**173,880**	**175,364**	**168,617**	**173,663**	**177,373**	**178,486**

* For the CDR Mix scenario, the addition of IBR resources reduces the amount of coal capacity needed to achieve the 1 in 5 frequency target relative to the amount needed for the 100% CT scenario.