

Northwestern Energy ETAC Meeting # 12
2026 MT IRP Planning Cycle

November 12, 2026

Agenda

Agenda

- Introduction/Welcome (15 min)
- PSC Deficiency Progress Update (90 min)
  - Local resource adequacy: events, duration and frequency
  - Portfolio risk and the number of simulations
  - Load forecast regression analysis and data
  - Demand response
  - PowerSIMM transparency and auditability
- 2027 ETAC (30 min)
- Questions/Comments (15 min)

MPSC Deficiency Progress Update

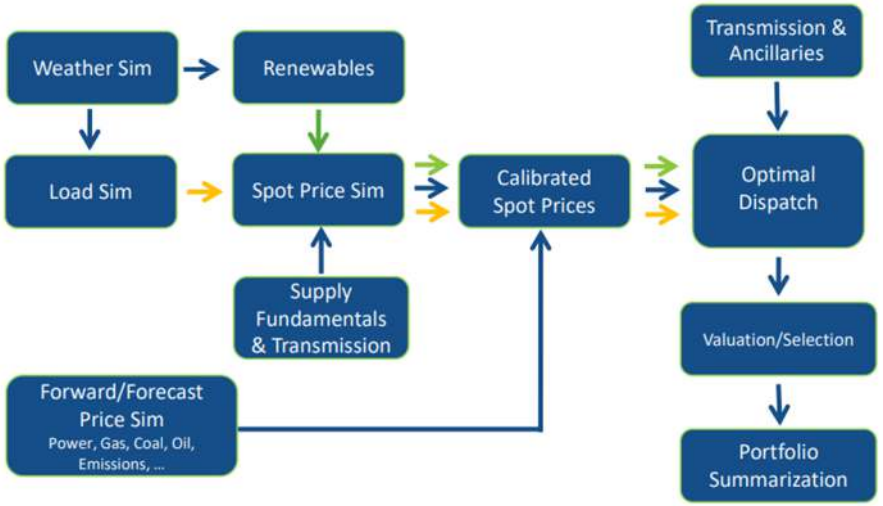
PowerSIMM Simulation Quantity

- 10 simrep study – 26 hours and 4.3 GB
  - Net Total Portfolio Cost = $5,712,048,919
- 100 simrep study – 137 hours and 138 GB, Δ111 hours (>4.5 days) and Δ134 GB
  - Net Total Portfolio Cost = $5,712,388,474, Δ$-339,555 or 0%

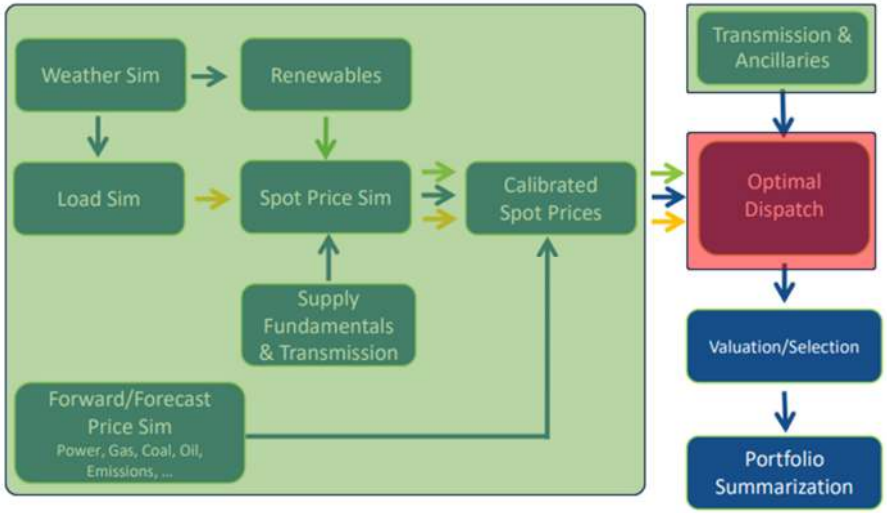
Simulated PowerSIMM Variable	PCM Base Case Results			
	10 Simrep Study	100 Simrep Study	Difference (units)	Difference (%)
Total Production Cost ($)	$3,327,433,685	$3,322,250,639	$5,183,046	0.2%
Total Export Cost ($)	$(2,718,752,494)	$(2,714,193,025)	$(4,559,469)	0.2%
Total Import Cost ($)	$89,729,310	$90,692,442	$(963,133)	-1.1%
20-year Net Energy Production (MWh)	185,475,196	185,477,975	(2,780)	0.0%
20-year Total Retail Load Consumption (MWh)	(139,652,894)	(139,652,886)	(7)	0.0%
20-year Colstrip Emissions (MT)	51,748,347	51,709,584	38,763	0.1%
20-year CELP & YELP Emissions (MT)	24,842,803	24,849,652	(6,849)	0.0%
20-year Remaining Emissions (MT)	16,805,373	16,764,273	41,100	0.2%
20-year Total Exports (MWh)	54,951,899	54,970,444	(18,546)	0.0%
20-year Total Imports (MWh)	(9,167,358)	(9,180,476)	13,118	-0.1%
Net Total Cost per 20-year Total Load ($/MWh)	$40.90	$40.90	$(0.00)	0.0%

PowerSIMM Anchoring and Removing Old Results

Study 1

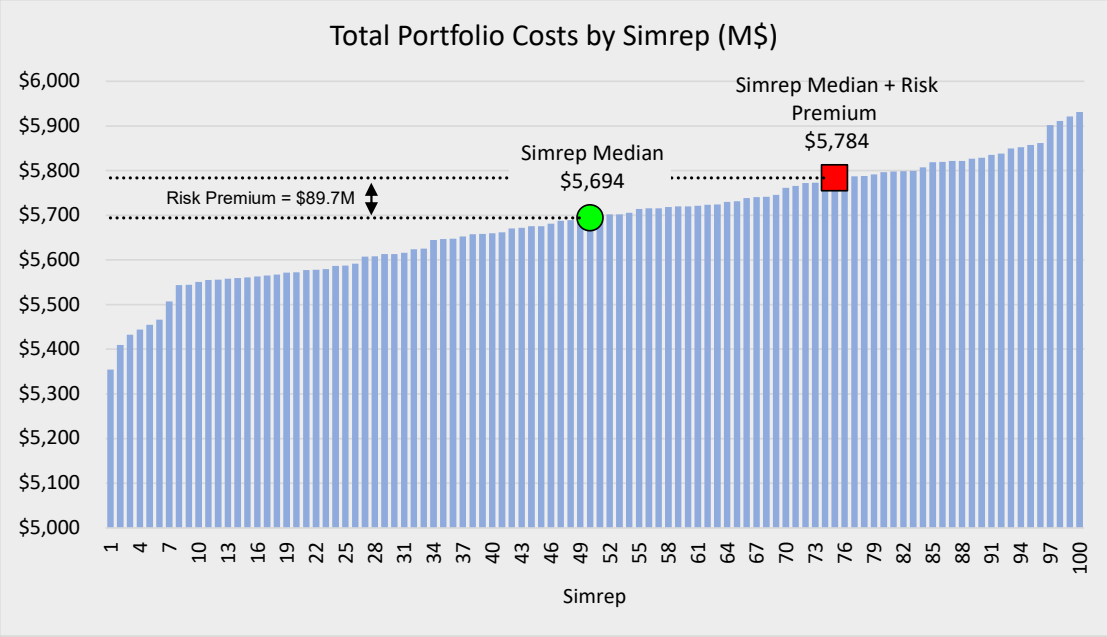


Study 2

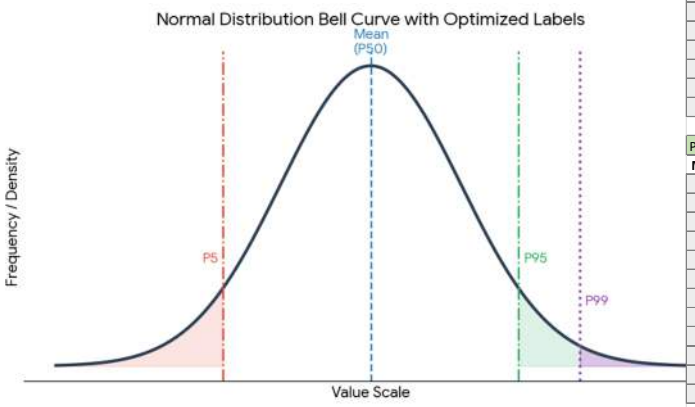


Risk Premium (draft results)

- Analysis requires 100 simrep studies so we are still working on these results



Resource Adequacy - 2028



MaxLoad

MEAN

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	827	898	844	815	800	791	820	986	1,181	1,217	1,202	1,184	1,158	1,123	1,096	1,076	1,091	1,142	1,262	1,276	1,241	1,166	1,060	919	1,293
2	807	769	748	739	736	749	802	938	1,070	1,108	1,102	1,092	1,073	1,050	1,027	1,013	1,022	1,052	1,130	1,148	1,128	1,072	998	891	
3	756	713	695	686	684	696	753	910	1,066	1,113	1,107	1,093	1,068	1,042	1,017	1,004	1,003	1,023	1,066	1,081	1,088	1,058	981	863	
4	669	630	612	600	598	608	654	787	928	984	991	979	957	942	928	918	913	915	913	901	897	916	873	765	
5	634	590	569	556	552	562	604	709	857	934	955	962	951	955	948	942	938	941	932	896	867	862	849	739	
6	762	705	672	650	641	648	679	756	839	896	928	944	962	975	987	1,001	1,012	1,020	1,013	988	959	932	909	846	
7	837	759	713	686	667	669	695	767	872	969	1,033	1,087	1,142	1,196	1,224	1,257	1,281	1,293	1,270	1,242	1,197	1,137	1,082	969	
8	835	770	727	698	681	683	714	784	867	940	986	1,022	1,063	1,097	1,125	1,154	1,172	1,182	1,166	1,134	1,089	1,046	1,024	935	
9	708	658	627	609	601	607	647	743	823	864	887	900	914	936	952	969	985	995	985	951	921	905	866	792	
10	680	638	620	608	605	619	676	819	972	1,026	1,017	1,006	989	978	963	954	953	979	1,013	1,013	1,013	967	887	771	
11	789	746	727	715	709	726	785	912	1,030	1,074	1,057	1,043	1,024	1,012	994	988	995	1,043	1,120	1,124	1,093	1,040	970	871	
12	826	788	764	753	751	764	819	984	1,171	1,212	1,197	1,176	1,152	1,124	1,097	1,081	1,097	1,153	1,280	1,280	1,242	1,167	1,067	929	

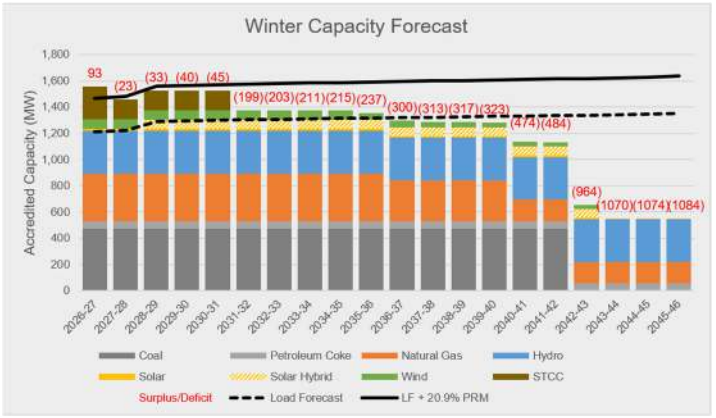
P95

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	915	939	892	863	845	834	899	1,099	1,291	1,319	1,305	1,285	1,256	1,217	1,199	1,171	1,189	1,237	1,373	1,379	1,347	1,271	1,162	1,022	1,417
2	868	822	802	791	789	801	871	1,024	1,149	1,183	1,181	1,171	1,150	1,123	1,100	1,084	1,101	1,128	1,207	1,226	1,201	1,145	1,074	968	
3	821	767	737	733	733	746	834	997	1,163	1,200	1,188	1,171	1,144	1,110	1,084	1,074	1,074	1,093	1,151	1,170	1,174	1,133	1,052	943	
4	715	668	648	635	632	649	701	855	997	1,051	1,055	1,038	1,012	998	983	972	966	965	966	963	963	986	931	819	
5	671	625	601	587	586	596	641	771	922	996	1,017	1,022	1,010	1,019	1,029	1,033	1,025	1,031	1,016	972	935	921	908	798	
6	806	746	709	690	680	689	720	794	874	935	969	990	1,018	1,034	1,054	1,084	1,101	1,111	1,104	1,071	1,029	994	967	897	
7	901	805	754	727	706	705	736	801	920	1,022	1,093	1,163	1,241	1,314	1,345	1,383	1,407	1,417	1,390	1,366	1,311	1,242	1,178	1,050	
8	887	819	775	742	721	722	751	820	906	977	1,029	1,071	1,123	1,166	1,203	1,234	1,255	1,264	1,247	1,212	1,163	1,114	1,085	992	
9	755	700	668	647	637	642	683	781	863	903	929	942	964	1,001	1,030	1,053	1,071	1,081	1,067	1,024	976	958	919	841	
10	743	684	667	659	652	673	759	905	1,063	1,123	1,098	1,090	1,067	1,052	1,039	1,025	1,022	1,051	1,092	1,094	1,084	1,031	954	834	
11	856	807	784	775	771	790	862	991	1,118	1,159	1,129	1,108	1,083	1,070	1,048	1,045	1,052	1,113	1,205	1,209	1,170	1,112	1,045	939	
12	891	837	813	804	800	817	897	1,081	1,271	1,303	1,295	1,267	1,245	1,207	1,179	1,166	1,180	1,240	1,369	1,362	1,327	1,254	1,147	1,018	

P99

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	982	954	910	893	877	873	938	1,141	1,333	1,363	1,350	1,327	1,306	1,261	1,238	1,206	1,244	1,296	1,426	1,438	1,411	1,328	1,213	1,081	1,466
2	898	844	815	815	809	836	912	1,061	1,183	1,221	1,211	1,205	1,179	1,157	1,140	1,126	1,131	1,160	1,239	1,268	1,234	1,171	1,096	999	
3	864	805	778	765	766	791	874	1,045	1,196	1,233	1,225	1,204	1,174	1,145	1,110	1,099	1,105	1,121	1,179	1,215	1,218	1,172	1,090	967	
4	743	689	666	657	662	667	729	877	1,029	1,078	1,087	1,060	1,046	1,018	1,007	996	997	989	994	989	996	1,011	966	847	
5	700	641	619	610	601	616	664	805	950	1,033	1,051	1,061	1,045	1,076	1,084	1,086	1,080	1,077	1,070	1,016	965	945	938	830	
6	823	759	728	706	698	713	742	809	895	955	993	1,009	1,044	1,070	1,084	1,120	1,139	1,145	1,128	1,101	1,055	1,023	988	920	
7	929	831	776	753	723	724	753	823	948	1,047	1,126	1,205	1,276	1,362	1,393	1,436	1,462	1,466	1,429	1,414	1,346	1,276	1,213	1,080	
8	909	840	800	762	740	738	763	838	920	1,002	1,055	1,094	1,160	1,213	1,249	1,283	1,302	1,313	1,288	1,250	1,201	1,149	1,117	1,012	
9	777	721	686	660	661	660	703	795	886	926	952	963	989	1,033	1,070	1,091	1,113	1,130	1,113	1,055	1,007	987	945	868	
10	763	711	686	677	683	709	805	965	1,111	1,168	1,134	1,115	1,103	1,084	1,059	1,054	1,048	1,077	1,120	1,120	1,123	1,062	996	868	
11	901	847	823	807	790	834	899	1,030	1,153	1,200	1,167	1,140	1,120	1,101	1,083	1,072	1,084	1,145	1,242	1,245	1,196	1,139	1,071	973	
12	928	877	835	825	823	840	948	1,131	1,319	1,355	1,343	1,314	1,285	1,241	1,207	1,193	1,210	1,264	1,409	1,407	1,369	1,303	1,191	1,054	

Resource Adequacy – LOLE in 2028



LOLE

MEAN

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	-	-	0.2	0.1	-	-	-	-	-	-	0.1	0.1	0.4	0.2	-	-	-	-	0.5
2	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	-	
3	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	-	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	
12	-	-	-	-	-	-	-	-	0.3	0.1	-	0.1	-	-	-	0.1	0.1	0.1	0.5	0.2	0.1	-	-	-	

P95

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	1.0	1.0	2.0	1.0	-	-	-	-	2.0
2	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	-	-	-	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	-	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12	-	-	-	-	-	-	-	-	2.0	1.0	-	0.5	-	-	-	1.0	1.0	1.0	2.0	1.0	1.0	-	-	-	

P99

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	0.5	1.0	3.0	1.5	1.0	1.0	1.0	-	0.5	1.0	2.0	2.0	3.5	2.0	1.0	-	-	-	4.0
2	-	-	-	-	-	-	-	1.0	2.0	1.0	1.0	1.0	-	-	-	-	1.0	1.0	2.0	1.0	1.0	0.5	-	-	
3	-	-	-	-	-	-	-	-	2.0	1.0	-	-	-	-	-	-	-	1.0	1.5	1.0	1.0	1.0	-	-	
4	-	-	-	-	-	-	-	-	1.0	1.0	1.0	0.5	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	-	
5	-	-	-	-	-	-	-	-	-	1.0	-	-	-	1.0	-	-	-	-	1.0	0.5	-	1.0	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.5	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.5	2.0	1.0	2.0	2.0	1.0	1.0	-	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	2.0	-	1.0	-	-	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	1.0	1.0	0.5	-	-	-	
11	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	-	-	-	
12	-	-	-	-	-	-	0.5	1.0	3.0	1.5	1.0	1.0	1.0	1.0	1.0	2.0	1.0	2.5	4.0	2.0	1.0	-	-	-	

Resource Adequacy – LOLH in 2028

LOLH

MEAN

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	-	-	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.6	0.7	0.5	0.3	0.1	-	0.8
2	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	-	-	-	0.1	0.1	0.2	0.3	0.2	0.1	0.1	-	
3	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	-	
4	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	-	
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.3	0.2	0.1	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	
12	-	-	-	-	-	-	-	-	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.2	0.2	0.4	0.8	0.8	0.6	0.3	0.2	-	

P95

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	-	-	1.5	2.0	2.0	1.5	1.0	1.0	1.0	0.5	1.0	2.0	3.0	3.0	3.0	2.0	1.0	-	4.0
2	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	-	-	-	1.0	1.0	2.0	1.0	1.0	1.0	-	
3	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	-	
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	2.0	2.0	2.0	3.0	2.0	1.0	1.0	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	2.0	1.0	1.0	-	-	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	
12	-	-	-	-	-	-	-	-	2.0	2.0	2.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	4.0	4.0	4.0	2.0	1.0	-	

P99

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	0.5	1.0	-	-	-	0.5	1.0	1.0	4.0	4.5	4.0	4.0	3.0	2.0	2.0	2.0	3.0	3.0	5.0	6.0	4.5	3.0	3.0	2.0	8.0
2	0.5	-	-	0.5	-	-	-	1.0	2.0	2.5	2.0	2.0	2.0	1.5	1.5	1.5	2.0	3.0	4.0	5.0	4.0	3.5	2.0	1.0	
3	-	-	-	-	-	-	0.5	1.0	2.0	2.0	2.0	2.0	1.0	0.5	-	-	-	1.0	2.0	2.0	3.0	3.0	2.0	1.0	
4	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	-	0.5	1.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	
5	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	
7	1.0	-	-	-	-	-	-	-	-	-	0.5	1.0	1.0	2.0	2.0	3.0	3.0	3.5	3.5	3.5	4.5	4.0	3.0	2.0	
8	1.0	-	-	-	-	-	-	-	-	-	0.5	-	0.5	1.0	1.0	2.0	2.0	3.0	3.0	4.0	3.0	2.0	2.0	2.0	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5	-	-	-	-	
10	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	-	
11	-	-	-	-	-	-	-	0.5	1.0	1.5	1.0	1.0	1.0	1.0	-	-	1.0	1.5	2.0	2.5	2.0	1.0	1.0	0.5	
12	-	-	-	-	-	-	1.0	1.5	4.0	4.0	4.0	4.0	3.0	3.0	2.5	3.0	4.0	4.5	8.0	7.0	6.0	5.0	4.0	2.0	

Resource Adequacy – EUE in 2028

MWHShort

MEAN

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	1	-	-	-	-	-	1	4	23	32	27	22	16	12	10	9	14	22	63	68	49	25	10	3	88
2	1	-	-	-	-	-	-	2	8	9	6	5	4	3	2	2	3	9	19	24	18	9	4	2	
3	-	-	-	-	-	-	-	1	8	8	5	3	1	1	-	-	-	2	6	8	12	8	3	1	
4	-	-	-	-	-	-	-	-	2	2	1	1	1	1	-	-	-	-	2	3	3	6	4	1	
5	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	1	1	1	3	3	2	2	2	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	-	
7	1	-	-	-	-	-	-	-	-	-	-	1	2	4	7	12	16	24	22	24	33	18	10	3	
8	1	-	-	-	-	-	-	-	-	1	1	1	1	1	2	3	6	10	13	18	13	7	5	3	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	
10	-	-	-	-	-	-	-	-	2	2	1	-	-	-	-	-	-	-	1	1	2	1	1	-	
11	-	-	-	-	-	-	-	-	2	4	3	2	1	1	1	1	2	3	7	8	5	3	1	-	
12	-	-	-	-	-	-	-	3	30	42	33	26	19	12	10	14	17	29	88	84	60	31	12	3	

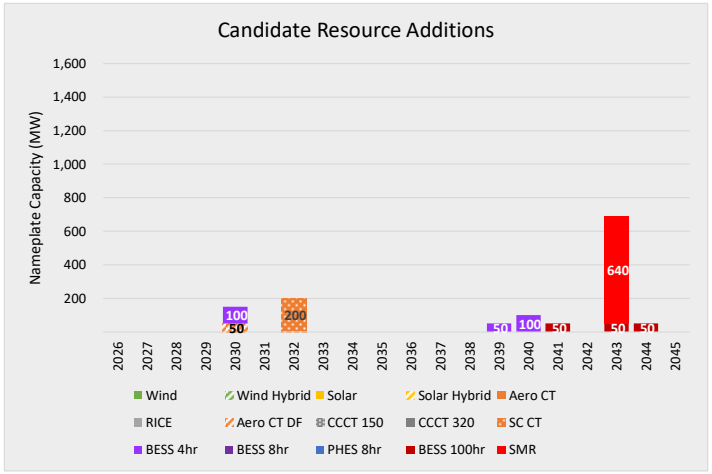
P95

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	-	-	-	-	-	-	-	-	128	165	148	102	76	11	22	2	53	112	340	376	289	161	40	-	481
2	-	-	-	-	-	-	-	-	9	23	9	-	-	-	-	-	-	41	98	144	92	52	6	-	
3	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	6	15	58	24	-	-	
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	27	13	-	
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7	-	-	-	-	-	-	-	-	-	-	-	-	-	7	47	82	118	173	161	163	188	121	56	9	
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	51	62	111	62	6	-	-	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24	31	12	-	-	-	
12	-	-	-	-	-	-	-	-	176	237	199	170	117	71	63	76	94	163	481	448	333	161	57	-	

P99

Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
1	1	4	-	-	-	0	4	72	359	528	492	500	387	281	178	165	280	376	980	875	781	390	252	81	1,388
2	0	-	-	0	-	-	-	64	223	291	231	198	137	109	93	126	126	319	458	584	368	290	144	64	
3	-	-	-	-	-	-	2	32	244	296	230	152	64	22	-	-	-	87	175	252	256	211	91	21	
4	-	-	-	-	-	-	-	-	59	67	49	34	18	16	-	2	3	1	68	89	72	165	137	30	
5	-	-	-	-	-	-	-	-	-	34	40	6	2	11	3	7	17	29	113	97	54	70	64	20	
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	30	12	7	-	
7	18	-	-	-	-	-	-	-	-	-	3	32	99	126	185	245	330	381	336	383	489	345	223	104	
8	24	-	-	-	-	-	-	-	-	-	0	-	38	73	84	106	172	255	335	397	308	181	150	110	
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	6	-	-	-	-	
10	-	-	-	-	-	-	-	-	60	78	-	-	-	-	-	-	-	-	24	47	53	20	-	-	
11	-	-	-	-	-	-	-	1	88	108	73	48	42	23	-	-	51	107	232	197	141	76	32	9	
12	-	-	-	-	-	-	7	100	676	761	686	505	413	298	245	438	466	688	1,387	1,388	1,059	736	413	146	

Resource Adequacy – Base Case LOLE in 2030



LOLE

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	0.2	0.1	-	-	-	-	-	-	0.1	0.1	0.3	0.1	-	-	-	-	0.3
	2	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	
	3	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	0.1	0.1	-	-	-	
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	

P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	0.5	0.5	2.0	1.0	-	-	-	-	2.0
-	2	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	1.0	0.5	-	-	-	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	1.0	1.0	-	-	-	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	0.5	2.0	1.0	1.0	1.0	1.0	-	1.0	1.0	1.0	1.0	3.0	1.5	1.0	1.0	-	-	3.0
-	2	-	-	-	-	-	-	1.0	-	1.5	1.0	1.0	-	-	0.5	-	1.0	1.0	1.0	2.0	1.0	1.0	-	-	-	
-	3	-	-	-	-	-	-	-	-	1.5	1.0	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	0.5	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	-	-	-	0.5	1.0	-	0.5	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	0.5	-	-	1.0	1.0	1.0	1.0	2.0	1.0	2.0	1.5	-	-	1.0	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	-	-	1.0	1.0	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	1.0	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	1.0	1.0	1.0	0.5	0.5	1.0	-	1.0	1.0	1.0	2.0	1.0	1.0	-	-	-	

Resource Adequacy – Base Case LOLH in 2030

LOLH

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.5	0.5	0.3	0.2	0.1	-	0.5
-	2	-	-	-	-	-	-	-	-	0.1	0.1	0.1	-	-	-	-	-	0.1	0.1	0.2	0.2	0.2	0.1	0.1	-	
-	3	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.2	0.1	0.1	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	0.1	

P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	2.0	1.0	1.0	-	3.0
-	2	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	-	-	-	1.0	1.0	2.0	1.0	1.0	1.0	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.5	1.0	2.0	2.0	1.0	1.0	-	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	-	0.5	-	-	-	0.5	-	-	1.0	1.0	2.0	2.0	2.0	1.0	1.0	-	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	1.0	2.5	3.5	3.0	2.0	2.0	2.0	1.5	1.0	2.0	3.0	4.5	5.0	4.0	3.0	2.0	1.0	5.0
-	2	1.0	1.0	-	-	-	0.5	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.5	3.0	3.0	3.0	2.5	2.0	2.0	
-	3	-	-	-	-	-	-	-	0.5	2.0	2.0	1.5	1.5	1.0	-	-	-	0.5	1.0	2.0	2.0	3.0	2.0	1.0	1.0	
-	4	0.5	-	-	-	-	-	-	-	-	0.5	-	-	-	-	-	-	-	-	0.5	1.0	1.0	1.0	1.0	0.5	
-	5	-	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	0.5	-	-	1.0	1.0	1.0	1.0	1.0	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	1.5	1.0	0.5	-	-	-	-	-	-	-	0.5	1.0	1.0	1.0	2.0	3.5	3.5	4.0	5.0	4.5	4.5	3.5	3.0	3.0	
-	8	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	-	0.5	-	
-	10	-	-	-	-	-	-	-	-	0.5	1.0	0.5	-	-	-	-	-	-	0.5	1.0	1.0	1.0	1.0	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5	1.0	1.0	1.0	1.5	1.5	1.5	1.0	0.5	
-	12	1.0	-	-	-	-	-	-	-	1.5	2.0	2.0	2.0	2.0	1.5	1.0	1.5	1.5	2.5	4.0	4.0	4.0	3.0	2.0	2.0	

Resource Adequacy – Base Case EUE in 2030

MWHShort

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	12	17	15	11	9	6	6	5	8	12	38	44	30	14	5	2	44
-	2	1	-	-	-	-	-	1	1	6	6	5	4	4	3	3	3	5	8	13	17	15	9	4	3	
-	3	-	-	-	-	-	-	-	1	5	5	4	3	1	-	-	1	1	2	6	8	9	6	4	2	
-	4	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	1	1	1	1	1	
-	5	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	1	1	1	1	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	
-	7	3	1	-	1	-	-	-	-	-	-	1	2	2	3	5	9	13	18	17	20	28	15	9	6	
-	8	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	4	6	9	6	4	3	5	
-	9	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	4	2	2	2	1	
-	10	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1	1	2	2	1	-	-	
100	11	-	-	-	-	-	-	-	1	2	3	2	2	2	1	2	2	2	4	6	6	5	4	3	2	
-	12	-	-	-	-	-	-	-	-	4	6	6	6	8	6	5	6	7	11	29	29	25	16	7	4	

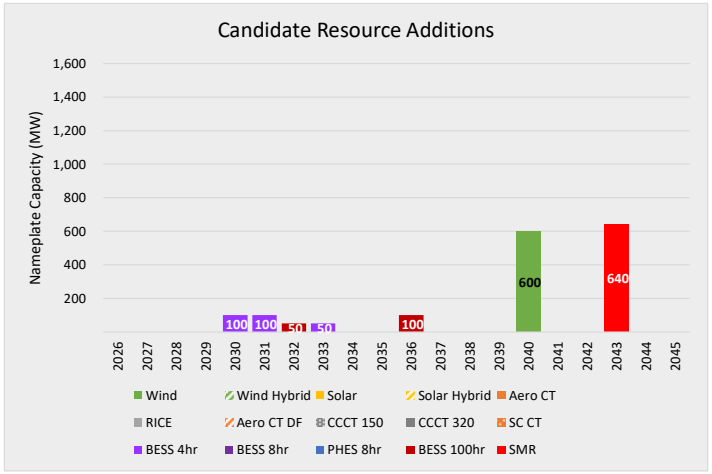
P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	-	82	126	96	78	48	15	12	23	50	71	233	253	197	89	14	-	253
-	2	-	-	-	-	-	-	-	-	10	13	4	-	-	-	-	-	-	17	78	103	74	45	4	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	39	52	18	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34	53	90	78	97	174	62	12	-	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	39	9	-	-	-	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	-	0	-	-	-	4	-	-	8	58	210	210	168	97	16	-	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
50	1	-	-	-	-	-	-	-	22	255	279	293	286	228	144	160	119	251	268	624	713	472	350	112	51	713
-	2	27	19	-	-	-	1	13	17	195	154	159	173	156	133	122	115	191	248	357	393	357	225	164	143	
-	3	-	-	-	-	-	-	-	3	199	177	163	104	36	-	-	-	13	84	136	178	244	140	69	63	
-	4	7	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	6	27	19	49	41	7	
-	5	-	-	-	-	-	-	-	-	-	14	18	-	-	-	-	0	-	-	33	45	16	26	14	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	57	4	0	-	-	-	-	-	-	-	3	22	23	52	151	276	374	440	388	457	705	401	290	168	
-	8	76	-	-	-	-	-	-	-	-	-	-	-	-	-	6	68	65	130	177	224	177	137	136	189	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	72	71	15	-	15	-	
-	10	-	-	-	-	-	-	-	-	5	36	7	-	-	-	-	-	-	3	52	59	67	49	-	-	
100	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	18	38	59	123	157	155	150	52	3	
-	12	9	-	-	-	-	-	-	-	125	178	208	192	224	204	144	154	187	261	584	574	589	407	188	131	

Resource Adequacy – Sensitivity N LOLE in 2030



LOLE

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	-	-	-	0.1	0.2	0.1	-	-	-	-	0.2
	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	0.1	0.1	-	-	-	
	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	12	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	-	-	-	0.1	0.2	0.1	-	-	-	-	

P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	1.5
-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	0.5	-	-	-	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	-	1.0	1.5	1.0	-	-	-	-	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	0.5	-	-	-	-	-	-	1.0	2.0	1.0	1.0	1.0	1.0	1.0	-	1.0	1.0	1.0	2.0	2.0	1.0	1.0	-	-	3.0
-	2	-	-	-	-	-	-	0.5	-	1.0	1.0	-	1.0	-	0.5	-	0.5	0.5	1.0	1.0	1.0	1.0	-	-	-	
-	3	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	-	0.5	1.0	1.0	1.0	1.0	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	-	-	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	1.0	1.0	1.0	-	-	-	-	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	11	-	-	-	-	-	-	-	-	1.0	1.0	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	2.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	3.0	1.0	1.0	0.5	-	-	

Resource Adequacy – Sensitivity N LOLH in 2030

LOLH

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	-	-	-	-	-	-	-	-	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.3	0.2	0.1	0.1	0.5
-	2	0.1	-	-	-	-	-	-	-	0.1	0.1	-	-	0.1	0.1	-	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	
-	3	-	-	-	-	-	-	-	-	0.1	0.1	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.1	0.1	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	0.1	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.1	0.1	0.1	-	-	
-	12	-	-	-	-	-	-	-	-	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.5	0.4	0.4	0.3	0.2	0.1	

P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	-	-	1.0	1.0	2.0	2.0	2.0	2.0	1.0	1.0	3.0
-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.5	1.0	1.0	1.0	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	-	-	0.5	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3.0	3.0	2.0	2.0	1.0	1.0	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	1.0	0.5	-	0.5	0.5	-	0.5	1.0	2.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	5.0	4.0	3.0	2.0	2.0	5.0
-	2	2.0	1.0	1.0	1.0	1.0	-	1.0	1.0	2.0	2.0	1.5	1.0	1.5	2.0	1.5	1.0	1.5	2.0	3.0	3.0	3.0	3.0	2.0	2.0	
-	3	1.0	-	-	-	-	-	-	1.0	2.0	1.5	1.0	1.5	1.5	1.0	1.0	1.0	0.5	1.0	2.0	2.0	2.0	2.5	2.0	1.5	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.0	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	0.5	0.5	-	-	-	-	-	1.0	1.0	1.0	1.0	1.0	1.0	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	1.0	1.0	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.5	3.0	2.5	2.0	
-	8	1.0	1.0	0.5	-	-	-	-	-	-	-	-	-	-	-	-	1.0	1.0	1.5	1.5	2.0	2.0	2.0	2.0	2.0	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	0.5	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	1.0	1.0	-	-	
-	11	0.5	-	-	-	-	-	-	-	1.0	2.0	1.5	1.5	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.5	3.0	2.5	2.0	1.0	
-	12	1.0	1.0	-	-	-	-	-	-	2.0	3.0	2.5	3.0	2.5	2.0	2.0	3.0	3.0	3.0	4.0	5.0	5.0	4.0	3.0	2.0	

Resource Adequacy – Sensitivity N EUE in 2030

MWHShort

MEAN

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	1	1	-	-	-	-	1	1	8	12	11	12	11	7	6	6	10	15	37	43	35	23	11	5	58
-	2	3	1	1	1	-	-	1	1	5	5	5	6	6	6	4	4	5	9	14	17	18	14	9	8	
-	3	2	2	1	1	-	1	1	1	5	5	4	3	2	2	1	1	1	3	7	8	9	9	6	5	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	1	
-	5	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	2	1	1	1	1	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	
-	7	2	1	-	-	-	-	-	-	-	-	-	-	1	2	2	4	7	12	13	16	23	16	11	9	
-	8	3	1	1	-	-	-	-	-	-	-	-	1	1	1	1	2	3	4	5	8	7	5	5	6	
-	9	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	2	3	3	3	3	3	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	2	1	1	
-	11	1	1	1	1	1	1	1	2	3	5	4	5	4	3	3	4	5	7	11	12	11	8	5	3	
-	12	2	1	1	-	1	-	-	1	9	13	11	15	16	12	10	12	15	23	57	58	48	31	13	7	

P95

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	-	-	-	-	-	-	-	-	45	70	74	64	48	9	-	-	6	99	240	263	214	157	71	4	380
-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	71	128	123	86	30	-	
-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	14	9	-	-	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	18	47	80	123	153	108	73	41	
-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19	5	-	-	0	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	12	-	-	-	-	-	-	-	-	52	93	90	124	139	102	85	109	128	174	346	380	304	208	77	32	

P99

MW	Month\Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Max
100	1	42	0	-	1	0	-	0	11	190	276	264	346	299	212	196	209	258	339	628	693	651	435	290	161	853
-	2	125	49	30	16	8	-	19	51	201	170	185	190	213	197	137	133	165	243	376	436	419	369	250	247	
-	3	26	-	-	-	-	-	-	23	127	146	105	89	97	91	52	64	9	123	231	298	269	322	172	151	
-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	23	-	
-	5	-	-	-	-	-	-	-	-	-	-	-	10	7	-	-	-	-	-	28	51	33	42	72	40	
-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
-	7	79	10	-	-	-	-	-	-	-	-	-	-	-	31	26	88	215	278	325	342	399	325	281	258	
-	8	72	16	5	-	-	-	-	-	-	-	-	-	-	-	-	66	79	74	146	203	220	178	142	158	
-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	-	-	3	-	
-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30	20	50	-	-	
-	11	2	-	-	-	-	-	-	-	48	146	107	169	114	74	68	150	161	294	425	350	317	229	149	96	
-	12	55	7	-	-	-	-	-	-	216	243	210	299	329	231	255	235	294	449	853	794	786	522	255	159	

Resource Adequacy Summary

- RA studies were repeated for the Base Case and Sensitivity N for 2040.
- All RA results were summarized in table below using sum of metric.

Case	LOLE P99			LOLH P99			EUE P99		
	Shoulder	Summer	Winter	Shoulder	Summer	Winter	Shoulder	Summer	Winter
2028 Existing Portfolio	17	24	72	39	70	215	1,660	5,628	24,584
2030 Base Case	5	21	50	20	64	151	604	5,380	14,732
2030 Sensitivty N	-	14	54	22	198	937	409	4,039	21,218
2040 Base Case	16	15	46	85	55	186	11,914	7,057	26,393
2040 Sensitivty N	15	29	87	109	179	408	9,888	26,084	69,666

Demand Response in the 2029 IRP

- NorthWestern will evaluate demand response (DR) in the 2029 IRP as a candidate resource consistent with WRAP's accreditation methodology. The DR evaluation will include developing modeling inputs including capacity contribution, availability, dispatch limitations, duration, customer participation, and program costs. DR programs, modeling assumptions, and valuation methodologies to be used in the 2029 IRP modeling will be presented to ETAC and stakeholders. NorthWestern will also evaluate the costs and benefits of DR programs such as time of use rates.

Demand Response in an RFP

- Consistent with current resource procurement rules, demand response is an eligible resource option, and demand response proposals may compete with other resource alternatives in future resource procurement RFPs. NorthWestern will evaluate demand response proposals by using the information provided in the bid such as capacity contribution, availability, dispatch limitations, duration, customer participation, and program costs.

Other Topics

- Modeling Parameters
- NorthWestern's Proposal for PowerSIMM Access and Verification
- Downside-risk of Wholesale Revenue
- Load Shapes
- Load Forecast Regressions Formulas and Backcasting
- Candidate Resource Revenue Requirements

2027 ETAC Update

2027 ETAC

- Looking ahead – Application for next cycle of ETAC will be posted soon
  - Planning to retain current participants if interested and also add new participants
  - More details forthcoming in the next month
- Settlement in merger
  - JEA participant one ETAC
  - ETAC Meeting within 90 days of merger closing (if approved)
- ETAC Participation necessary if NWE issues a RFP
- Still planning to have Stakeholder Working Group in addition to ETAC for the next planning cycle

Questions/Comments?