New York ISO
Independent System Operator

System & Resource Outlook Update

Economic Planning Department

Electric System Planning Working Group (ESPWG)

November 19th, 2021

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Agenda

- Preliminary Base Case Results
- Contract Case Update
- Capacity Expansion Detailed Assumption Review
- Next Steps

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Preliminary Base Case Results

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Base Case Input Data Postings

- Input Assumptions & Data Tables Posted to Meeting
- Links Provided Below
  - Fuel Price Forecast
  - Emissions Price

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Base Case Background

- Goldbook Baseline Load Forecast
- Aligned with Reliability Planning and Short-Term Reliability Planning Process inclusion rules of generator and transmission projects
  - Does not consider reliability-based generation solutions beyond initial 10-year study period

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Metrics Reported

- **Transmission Congestion**
  - Demand Congestion ($M) of Top 15 Congested Transmission Paths
- **Generation Output**
  - Annual Generation by NYISO Zone (GWh)
- **Import/Export Energy**
  - Net Import Energy by External Interface or Controllable Transmission Line (GWh)
- **Locational Based Marginal Prices (LBMPs)**
  - Average Annual LBMP by NYISO Zone ($/MWh)
- **Generator Payments**
  - Annual Generator Payments by NYISO Zone ($M)
- **Load Payments**
  - Annual Load Payments by NYISO Zone ($M)
  - Production cost software post-processing calculation adjustment was required to accommodate for impact of large loads on Load Payment metric in NYISO system
- **Curtailment**
  - Renewable Energy Curtailment by NYISO Zone (% and GWh)

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Projected Demand Congestion by Constraint ($M)

Preliminary

Demand Congestion ($M)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
MOSES-REYNOLDS_115	-	-	-	-	-	0	43	43	49	53	52	56	63	70	86	89	102	117	133	156
CENTRAL EAST	594	276	114	23	4	0	1	6	1	3	1	2	2	5	4	6	6	7	3	1
DUNWOODIE TO LONG ISLAND	56	39	29	26	27	27	29	28	30	32	38	39	47	46	58	54	59	63	73	78
N.WAV-E.SAYR_115	26	29	19	12	15	17	18	18	20	20	21	21	24	21	23	26	30	32	35	36
ELWOOD-PULASKI_69	25	24	14	8	5	4	1	1	6	8	9	12	13	15	18	21	25	27	31	37
VOLNEY SCRIBA	6	6	8	6	7	8	7	8	9	9	10	10	13	12	15	13	16	15	18	19
CHESTR-SHOEMAKR_138	31	28	28	2	1	0	1	2	3	2	1	1	4	2	5	4	3	4	4	6
NEW SCOTLAND KNCKRBOC	-	-	-	21	7	2	5	14	6	8	7	10	6	13	13	4	6	3	3	2
SGRLF-RAMAPO_138	-	-	-	8	6	4	5	4	5	4	7	7	6	7	9	7	15	15	9	8
GREENBSH-STEPHTWN_115	0	0	0	5	5	5	4	5	5	5	5	5	6	6	7	7	8	8	9	9
DUNWOODIE MOTTHAVEN	3	2	0	1	2	3	4	2	3	3	4	7	4	3	5	6	9	7	5	29
NORTHPORT PILGRIM	7	8	5	4	2	2	1	1	2	4	4	4	4	4	6	6	7	8	9	9
INGHAMS CD-INGHAMS E_115	-	-	-	11	3	2	2	5	2	3	2	2	6	10	5	8	11	8	11	9
OWENSCRN-SABICO_115	0	0	0	3	3	3	3	2	3	3	3	4	4	5	5	6	5	7	7	9
FERND-W.WDB_115	14	7	9	2	2	1	0	0	2	1	2	1	2	3	2	3	4	4	3	1

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Projected Demand Congestion by Constraint ($M)

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Projected Demand Congestion by Zone ($M)

Preliminary

Demand Congestion ($M)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	31	13	6	3	3	3	4	9	10	13	13	18	19	20	23	30	31	37	38	42
Genesee	16	8	3	2	2	2	2	4	5	5	6	8	8	8	10	13	13	16	17	19
Central	51	43	26	25	33	41	41	44	47	47	49	48	52	50	53	56	63	65	70	75
North	3	2	1	1	2	3	46	46	53	57	56	59	68	75	91	94	107	122	138	162
Mohawk Valley	11	5	1	0	1	2	2	2	2	2	3	4	2	2	2	3	4	4	4	4
Capital	94	43	17	12	4	1	1	3	1	0	0	0	3	5	2	1	3	1	1	2
Hudson Valley	50	21	11	0	4	7	7	7	8	9	9	11	11	10	10	13	14	16	17	20
Millwood	16	7	3	1	1	2	2	2	2	3	3	3	3	2	3	4	3	4	5	5
Dunwoodie	30	13	6	1	2	4	4	4	5	5	5	6	6	5	5	8	7	8	9	10
NY City	261	124	63	19	11	23	20	22	29	31	29	32	38	33	31	47	36	53	64	43
Long Island	243	150	92	57	44	35	35	32	38	42	54	56	67	78	97	85	104	113	132	138
NYCA Total	804	428	229	121	105	123	163	175	200	215	227	245	279	288	328	353	384	439	495	520

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Projected Demand Congestion by Zone ($M)

Preliminary

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Projected Generation by Zone (GWh)

Preliminary

Generation (GWh)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	18,183	18,815	19,544	19,667	20,002	20,219	20,210	20,311	20,325	20,446	20,445	20,443	20,425	20,479	20,537	20,649	20,591	20,697	20,613	20,798
Genesee	5,553	5,230	5,304	5,819	5,469	5,528	5,979	5,560	5,575	6,044	5,615	5,649	6,049	5,637	5,651	6,096	5,650	5,663	6,101	5,688
Central	30,740	31,845	34,523	34,499	35,975	34,879	35,871	34,971	35,979	34,826	36,309	35,153	36,164	35,296	36,117	35,295	36,451	35,425	36,520	35,621
North	9,473	9,546	9,629	9,699	9,757	9,773	9,781	9,769	9,785	9,774	9,785	9,811	9,787	9,783	9,788	9,798	9,795	9,781	9,805	9,841
Mohawk Valley	3,807	4,273	4,636	4,813	4,917	5,001	5,057	5,065	5,163	5,194	5,220	5,265	5,278	5,280	5,314	5,338	5,350	5,370	5,376	5,417
Capital	15,132	17,074	17,840	18,037	17,587	17,727	17,593	17,792	17,679	18,216	18,290	18,786	18,360	18,952	18,893	19,593	19,805	20,446	20,200	21,235
Hudson Valley	7,809	9,607	10,007	10,336	10,121	10,262	10,109	10,065	10,169	10,604	10,597	10,636	10,395	10,569	10,878	11,267	11,279	11,546	11,356	11,845
Millwood	2,638	454	461	471	474	479	484	490	491	494	497	501	503	505	505	509	510	511	511	512
Dunwoodie	75	83	89	99	104	108	112	117	122	125	129	132	134	136	139	142	144	145	144	146
NY City	22,608	23,311	25,698	24,713	24,551	23,961	24,143	24,582	24,305	24,078	24,424	24,172	24,861	25,129	24,827	24,951	25,507	25,733	26,432	26,758
Long Island	8,145	8,436	8,090	8,254	8,120	7,996	8,060	8,079	8,078	8,230	8,381	8,371	8,486	8,572	8,748	8,805	8,899	9,005	9,159	9,312
NYCA Total	124,162	128,673	135,821	136,408	137,078	135,934	137,398	136,801	137,672	138,032	139,692	138,920	140,443	140,338	141,399	142,443	143,981	144,321	146,218	147,174
Total IESO	154,633	151,831	144,311	150,941	145,756	145,510	146,522	149,141	152,057	154,160	153,836	154,627	154,643	155,396	155,591	155,688	155,596	155,785	155,842	156,087
Total PJM	807,811	812,371	823,066	823,234	830,620	837,594	839,039	843,929	845,943	847,476	847,356	848,621	848,797	849,057	849,906	850,676	850,691	851,858	852,637	853,069
Total ISONE	104,591	107,234	107,745	109,045	109,715	110,581	111,783	113,715	114,797	117,421	117,620	117,779	117,905	118,564	118,434	118,936	119,684	120,087	120,366	120,990
Total HQ*	25,204	25,648	25,616	25,638	25,542	25,517	25,492	25,667	25,561	25,540	25,526	25,564	25,612	25,590	25,563	25,590	25,511	25,490	25,610	25,639
Total System	1,216,400	1,225,756	1,236,560	1,245,265	1,248,711	1,255,136	1,260,235	1,269,253	1,276,030	1,282,629	1,284,029	1,285,510	1,287,399	1,288,945	1,290,893	1,293,334	1,295,463	1,297,540	1,300,674	1,302,959

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Projected NYCA Generation (GWh)

Preliminary

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Projected Net Imports (GWh)

Preliminary

NET IMPORTS (GWh)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
PJM - NYISO	12,994	11,431	11,524	9,429	11,649	14,122	13,834	13,931	14,940	14,935	14,776	15,046	14,894	14,945	15,210	15,372	15,042	15,462	15,640	15,841
LINDEN VFT	2,218	2,185	1,741	1,422	1,427	1,485	1,368	1,424	1,403	1,485	1,384	1,571	1,487	1,542	1,665	1,687	1,662	1,844	1,866	1,917
NEPTUNE	5,400	5,166	4,185	3,892	3,836	3,991	3,841	4,018	4,213	4,251	4,066	4,398	4,434	4,492	4,581	4,714	4,780	4,992	4,979	5,111
HTP	2,857	2,463	1,711	1,191	1,317	1,680	1,426	1,602	1,625	1,648	1,566	1,891	1,779	1,909	2,048	2,059	2,062	2,347	2,334	2,485
ISONE - NYISO	(5,442)	(4,774)	(4,934)	(4,140)	(3,978)	(3,993)	(4,234)	(4,309)	(4,949)	(4,671)	(4,767)	(4,544)	(4,637)	(4,131)	(4,366)	(3,959)	(3,496)	(3,158)	(3,089)	(2,531)
CROSS SOUND CABLE	1,628	1,555	1,449	1,363	1,349	1,279	1,288	1,266	1,300	1,320	1,458	1,444	1,520	1,601	1,593	1,685	1,795	1,814	1,887	1,949
NORTHPORT NORWALK	475	399	305	167	209	228	202	169	167	151	264	228	257	308	392	369	466	504	560	616
IESO - NYISO	(731)	(2,048)	(5,143)	(3,224)	(6,271)	(7,875)	(7,850)	(7,258)	(8,164)	(8,005)	(8,277)	(7,688)	(7,642)	(7,055)	(6,909)	(6,945)	(6,931)	(6,741)	(6,769)	(6,580)
HQ - NYISO CHAT	10,034	10,132	10,116	10,109	10,067	10,053	10,034	10,148	10,092	10,076	10,067	10,066	10,132	10,116	10,092	10,089	10,053	10,034	10,132	10,131
HQ - NYISO CEDARS	1,081	1,421	1,409	1,400	1,387	1,376	1,368	1,386	1,377	1,376	1,371	1,369	1,385	1,383	1,379	1,377	1,370	1,366	1,382	1,378
TOTAL	30,513	27,930	22,362	21,608	20,991	22,347	21,278	22,377	22,004	22,566	21,908	23,780	23,609	25,111	25,685	26,448	26,803	28,465	28,921	30,316

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Projected Net Imports (GWh)

Preliminary

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Projected NYCA Generation and Net Imports

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Projected LBMP ($/MWh)

Preliminary

LBMP ($/MWh)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	27.21	26.62	31.01	30.72	33.40	35.89	37.34	39.55	42.21	44.12	45.85	48.03	49.89	51.72	53.82	56.43	58.31	61.22	62.81	66.57
Genesee	26.37	26.50	30.93	30.78	33.41	35.85	37.27	39.50	42.11	43.97	45.66	47.92	49.70	51.60	53.75	56.21	58.13	61.04	62.56	66.43
Central	28.18	28.24	31.94	32.00	34.86	37.70	39.11	41.34	44.10	45.99	47.68	49.76	51.80	53.57	55.68	58.22	60.34	63.13	64.90	68.79
North	23.07	24.03	29.11	29.38	31.95	34.34	39.59	41.62	44.72	46.86	48.24	50.55	53.16	55.47	58.74	61.15	63.89	67.68	70.51	75.93
Mohawk Valley	26.73	26.60	30.99	30.83	33.19	35.45	36.95	39.02	41.56	43.49	44.96	47.08	49.12	50.96	52.95	55.22	56.96	59.67	61.23	64.86
Capital	33.72	29.90	32.77	32.04	33.90	36.03	37.62	39.77	42.35	44.19	45.78	47.98	50.17	52.10	53.96	56.26	58.20	60.75	62.40	65.72
Hudson Valley	32.09	29.55	33.42	32.36	34.35	36.38	38.01	40.16	42.83	44.67	46.36	48.53	50.64	52.62	54.74	56.90	58.80	61.42	63.12	66.54
Millwood	32.40	29.86	33.73	32.83	34.81	36.84	38.51	40.68	43.40	45.26	46.99	49.22	51.34	53.37	55.54	57.71	59.73	62.41	64.08	67.59
Dunwoodie	32.24	29.76	33.65	32.80	34.76	36.77	38.44	40.60	43.32	45.17	46.91	49.13	51.25	53.28	55.46	57.61	59.66	62.32	63.98	67.53
NY City	32.56	30.09	33.90	33.09	34.93	37.00	38.68	40.79	43.55	45.44	47.22	49.51	51.59	53.58	55.83	58.05	60.17	62.80	64.44	68.38
Long Island	37.16	33.40	36.21	35.00	36.98	38.92	40.62	42.65	45.71	47.80	50.09	52.31	54.96	57.11	60.23	62.00	64.55	67.66	70.07	73.90
Average LBMP ($/MWh)	30.16	28.59	32.51	31.98	34.23	36.47	38.37	40.52	43.26	45.18	46.89	49.09	51.24	53.22	55.52	57.80	59.89	62.74	64.56	68.39

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Projected LBMP ($/MWh)

Preliminary

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Projected Generator Payments ($M)

Preliminary

Generator Payment ($M)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	489	498	604	608	669	719	748	799	852	896	930	977	1,017	1,055	1,104	1,163	1,199	1,266	1,293	1,385
Genesee	142	135	160	174	180	192	217	215	232	259	252	265	293	286	296	333	322	339	372	372
Central	736	767	971	979	1,096	1,153	1,235	1,272	1,387	1,414	1,502	1,542	1,616	1,659	1,721	1,808	1,887	1,956	2,020	2,109
North	215	225	275	280	306	329	345	363	388	405	419	441	459	475	494	515	532	556	573	610
Mohawk Valley	89	101	130	136	150	163	172	181	198	209	216	229	239	248	260	272	281	296	304	326
Capital	525	524	591	572	596	637	663	707	757	811	846	911	930	986	1,029	1,100	1,148	1,230	1,256	1,392
Hudson Valley	240	274	322	328	342	367	376	395	429	462	481	504	513	542	586	629	651	697	704	776
Millwood	90	13	15	15	16	18	19	20	21	22	23	24	25	27	28	29	31	32	33	35
Dunwoodie	3	3	3	3	4	4	4	5	5	6	6	7	7	7	8	8	9	9	10	10
NY City	755	712	888	833	871	898	947	1,023	1,082	1,124	1,176	1,217	1,316	1,385	1,429	1,493	1,584	1,667	1,767	1,884
Long Island	328	295	307	303	308	320	335	358	387	413	430	458	488	513	545	575	606	645	678	729
NYCA Total	3612	3548	4266	4231	4539	4800	5061	5337	5738	6021	6282	6574	6902	7184	7499	7925	8249	8693	9008	9628

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Projected Generator Payments ($M)

Preliminary

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Projected Load Payments ($M)

Preliminary

Load Payment ($M)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	404	419	524	528	579	628	658	699	747	783	814	857	895	933	979	1,032	1,074	1,135	1,174	1,256
Genesee	266	266	310	310	332	353	365	387	414	432	449	473	493	514	540	567	591	624	646	694
Central	443	447	518	528	577	624	647	685	730	759	784	817	852	881	919	965	1,006	1,061	1,101	1,179
North	128	160	212	219	244	268	317	334	359	376	388	407	428	448	476	497	520	553	577	625
Mohawk Valley	218	217	254	253	273	293	306	324	347	364	377	396	415	433	452	474	491	517	535	573
Capital	415	371	407	413	432	458	478	509	547	573	598	631	667	698	729	766	799	842	875	932
Hudson Valley	309	281	316	304	321	340	356	377	404	423	441	464	488	511	537	564	589	622	649	696
Millwood	93	85	97	95	100	106	112	119	127	133	139	146	153	161	169	178	186	197	205	219
Dunwoodie	189	175	198	192	202	212	223	236	253	265	278	293	309	324	342	360	378	401	418	449
NY City	1,634	1,503	1,677	1,631	1,708	1,802	1,888	2,001	2,158	2,265	2,368	2,504	2,636	2,771	2,931	3,085	3,247	3,438	3,587	3,887
Long Island	830	733	772	734	762	791	822	869	945	1,002	1,062	1,126	1,199	1,267	1,356	1,417	1,501	1,599	1,685	1,806
NYCA Total	4928	4657	5283	5206	5531	5876	6170	6540	7029	7374	7697	8114	8536	8941	9431	9905	10382	10990	11453	12316

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Projected Load Payments ($M)

Preliminary

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Projected Zonal Curtailment (GWh)

Preliminary

Curtailment (GWh)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
WEST	0	1	0	0	0	2	2	2	2	3	2	2	2	2	2	2	1	1	1	2
GENESEE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CENTRAL	-	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
NORTH	24	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
MOHAWKVA	11	1	0	3	0	0	0	1	1	1	0	1	1	1	1	1	1	1	1	1
CAPITAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
HUDSONVA	0	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
MILLWOOD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DUNWOODI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NYCITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LONGISLA	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Grand Total	35	9	1	3	1	2	2	3	3	4	2	4	2	3	4	2	1	2	3	4

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Projected Zonal Curtailment (GWh)

Preliminary

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Projected Zonal Curtailment (%)

Preliminary

Curtailment (%)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
West	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.00%	0.01%	0.01%	0.01%
Genesee	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Central	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.03%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%
North	0.25%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Mohawk Valley	0.28%	0.02%	0.01%	0.06%	0.01%	0.00%	0.01%	0.02%	0.01%	0.01%	0.00%	0.01%	0.01%	0.02%	0.02%	0.01%	0.02%	0.02%	0.03%	0.02%
Capital	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hudson Valley	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Millwood	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Dunwoodie	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NY City	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Long Island	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NYCA Total	0.09%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.00%	0.01%	0.01%	0.01%

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Projected Zonal Curtailment (%)

Preliminary

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Base Case Next Steps

- Historic Congestion
- Transmission Groupings
- Congestion Relief Analysis

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Historic Congestion & Preliminary Transmission Congestion Groupings

Demand Congestion ($M)	Historic					Projected																			
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
CENTRAL EAST	641	598	540	516	402	594	276	114	23	4	0	1	6	1	3	1	2	2	5	4	6	6	7	3	1
DUNWOODIE TO LONG ISLAND	164	88	133	82	98	56	39	29	26	27	27	29	28	30	32	38	39	47	46	58	54	59	63	73	78
MOSES-REYNOLDS_115	-	-	-	-	-	-	-	-	-	-	0	43	43	49	53	52	56	63	70	86	89	102	117	133	156
N.WAV-E.SAYR_115	-	-	-	-	-	26	29	19	12	15	17	18	18	20	20	21	21	24	21	23	26	30	32	35	36
ELWOOD-PULASKI_69	-	-	-	-	-	25	24	14	8	5	4	1	1	6	8	9	12	13	15	18	21	25	27	31	37
EDIC MARCY	32	125	107	4	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
DUNWOODIE MOTTHAVEN	2	30	65	28	4	3	2	0	1	2	3	4	2	3	3	4	7	4	3	5	6	9	7	5	29
VOLNEY SCRIBA	0	1	1	3	1	6	6	8	6	7	8	7	8	9	9	10	10	13	12	15	13	16	15	18	19
LEEDS PLEASANT VALLEY	63	101	9	20	1	4	1	0	-	-	-	-	-	-	-	-	-	-	-	0	-	-	-	0	0
GREENWOOD	31	18	62	25	22	7	7	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
CHESTR-SHOEMAKR_138	-	-	-	19	10	31	28	28	2	1	0	1	2	3	2	1	1	4	2	5	4	3	4	4	6
PACKARD HUNTLEY	54	30	41	9	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NEW SCOTLAND KNCKRBOC	-	-	-	-	-	-	-	-	21	7	2	5	14	6	8	7	10	6	13	13	4	6	3	3	2
SGRLF-RAMAPO_138	-	-	-	-	-	-	-	-	8	6	4	5	4	5	4	7	7	6	7	9	7	15	15	9	8
GREENBSH-STEPHTWN_115	-	-	-	-	-	0	0	0	5	5	5	4	5	5	5	5	5	6	6	7	7	8	8	9	9

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Congestion Relief Analysis

- **"Relax" Constraint Groups Individually**
- **Calculate & Report Relevant Metrics**
  - Production Cost Savings
  - Congestion Savings
  - New Congestion Created
  - Flow Duration Curves

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Contract Case Update

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Contract Case Additional Generation

- Referenced NYSERDA LSR Database
- Renewable generators filtered from the complete NYSERDA LSR database to represent all resources currently holding active state contracts, some of which are included in the base case

Filter Criteria

Step 1	Step 2	Step 3	Step 4
Project Status	Eligibility	Renewable Technology	New Renewable Capacity (MW)
Operational	Tier 1	Offshore Wind	>= 10
Under Development	Non-Tier 1	Hydroelectric	< 10
Cancelled	OREC	Land Based Wind	
Completed	Tier 2	Solar	
	Maintenance	Biogas - ADG	
		Biogas - LFG	
		Biomass	
		Maintenance Biomass	
		Fuel Cell	
		Maintenance Hydroelectric	

- LIPA South Fork Wind Project added from LIPA procurements
- Resulting dataset posted here

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Summary of Capacity Additions

- Charts show capacity added to the base case generation resources

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REC Contract Prices and Modeling

- REC contract prices to be included as negative bid adder in the contract and policy case to represent impact of out of market payments
- Aggregate premium of Index REC Strike price to Fixed RECs would be used as proxy to represent negative bid adder for Index RECs

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Contract Case Next Steps

- Assumptions Lockdown Date 12/1
- Simulation & Analysis
- Renewable Generation Pocket Identification
- Preliminary results presentation @ December ESPWG

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Capacity Expansion Model Detailed Assumption Review

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Capacity Expansion Planning

- **Capacity Expansion Planning simulates optimal investment and retirement in resources to meet load, policy targets, and other operational/capacity constraints over the entire model horizon**
- **Long Term (LT) plan is used in PLEXOS to produce a least-cost generator build and retirement plan for the system**
  - The capacity expansion model assumes linear expansion, which allows for partial build/retirement decisions
    - Capacity builds are assumed at the zonal level, such that a single generator by technology type can be built in each applicable zone
      - For example, the model limits Zone K OSW builds to one OSW generator that can increase its capacity (MW) each model year
    - Retirements are enabled such that individual generators could retire in part or in its entirety
      - The model considers a generator's fixed O&M costs and its variable O&M costs over the entire model horizon when determining whether to retire the generator

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Proposed Capacity Expansion Methodology

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Nodal to Zonal Reduction

- PLEXOS creates a pipe-and-bubble equivalent model in Long Term (LT) Planning by performing a nodal to zonal reduction of the transmission system
  - Bubbles = 11 NYISO Zones
  - Pipes = Interzonal transmission with appropriate interface limits
- Example of the nodal to zonal reduction used in the capacity expansion model is included on the following slide for illustrative purposes

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Nodal to Zonal Reduction

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Pipe & Bubble Representation

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Capacity Expansion Time Slice Detail

- **PLEXOS creates time slices to represent the 8760-hour load and generation profiles**
  - Capacity expansion optimization is computationally intensive
  - There are 16 time slices per each year, grouped by season and hour of the day
  - The time slices capture seasonal and diurnal variation in wind, solar, and load profile
- **Examples of the time slicing methodology used in the capacity expansion model are included on the following slides for illustrative purposes**

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Time Slice Detail (cont.)

		1 am 2 am 3 am 4 am 5 am 6 am	7 am 8 am 9 am 10 am 11 am 12 pm	1 pm 2 pm 3 pm 4 pm 5 pm 6 pm	7 pm 8 pm 9 pm 10 pm 11 pm 12 am
Jan Feb	*Winter*	Overnight	Morning	Afternoon	Evening	Overnight
Mar Apr May	*Spring*	Overnight	Morning	Afternoon	Evening	Overnight
Jun Jul Aug	*Summer*	Overnight	Morning	Afternoon	Evening	Overnight
Sep Oct Nov	*Fall*	Overnight	Morning	Afternoon	Evening	Overnight
Dec	*Winter*	Overnight	Morning	Afternoon	Evening	Overnight

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Time Slice Detail (cont.)

- The following diagrams illustrate how the hourly load forecast for a single year is represented in the capacity expansion model through the 16 time slices

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Time Slice Detail (cont.)

- The following diagram illustrates how the load forecast is represented in the capacity expansion model over the 20-year study period

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Time Slice Detail (cont.)

- The following diagrams illustrate how the hourly load forecast for **four (4) example seasonal days** is represented in the capacity expansion model through the representative time slices

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Next Steps

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Next Steps

- Base Case Constraint Relax Process
- Contract Case Simulation
- Contract Case Preliminary Results Presentation
- Policy Case
  - Input Assumptions & Methodology Feedback
  - Proxy Technology Implementation
  - Preliminary Capacity Expansion Results Presentation

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Questions, Feedback, Comments?

- Email additional feedback to: JFrasier@nyiso.com

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2021 Outlook Data Catalog

ESPWG/TPAS Presentations

May 20, 2021

- Model Benchmark Results

September 22, 2021

- System & Resource Outlook Update

October 25, 2021

- Capacity Expansion Model Primer
- System & Resource Outlook Update

November 19, 2021

- System & Resource Outlook Update

Final Reports

Early 2022 Release

Data Posted to ESPWG

- Assumptions Matrix v1
- Updated Capacity Expansion Assumptions Matrix
- Contract Case Renewable Projects
- Emissions Price Forecast
- Fuel Price Forecast

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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