

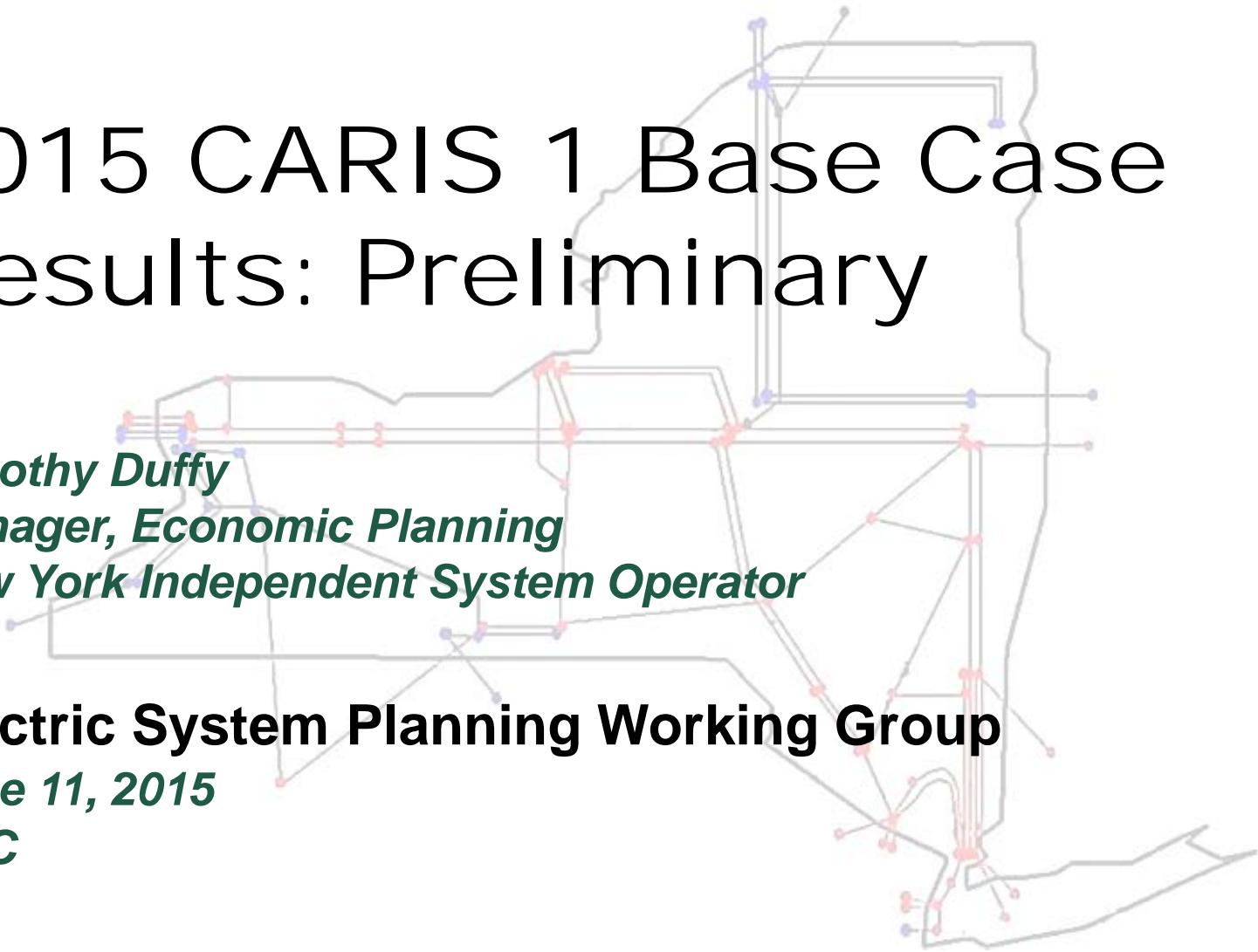
2015 CARIS 1 Base Case Results: Preliminary

Timothy Duffy
Manager, Economic Planning
New York Independent System Operator

Electric System Planning Working Group

June 11, 2015

KCC



NYCA Generation Status

- ◆ **Removed for 2015 CARIS Phase 1**
 - *Ravenswood 3-3, 38MW (MB - 10/31/14)*
 - *Cayuga 1&2, 307MW (12/1/2017)*

- ◆ **Retirement date change**
 - *Dunkirk 2, 75MW (1/1/2016)*

NYCA Generation Status

◆ Returned to service

- *Danskammer 1 repower, 61MW (10/1/14)*
- *Danskammer 2 repower, 60MW (10/1/14)*
- *Danskammer 3 repower, 138MW (12/16/14)*
- *Danskammer 4 repower, 179MW (11/1/14)*
- *Astoria 2, 167MW (12/31/14)*
- *Dunkirk 2 repower, 75 MW (4/1/2016)*
- *Dunkirk 3 repower, 180 MW (4/1/2016)*
- *Dunkirk 4 repower, 180 MW (4/1/2016)*

NYCA Generation Status

- ◆ **Returned to service (Cont.)**
 - *Binghamton, 47 MW (12/16/2014)*
 - *Ravenswood GT 3-4, 39 MW (8/20/14)*

NYCA Generation Status

◆ Addition

- *Distributed Solar PV across state (3TWh by 2024)*
- *Taylor Biomass, 19 MW (postpone to 2/1/2017)*

◆ Re-ratings

- *Bowline 2, 557MW (7/1/2015)*

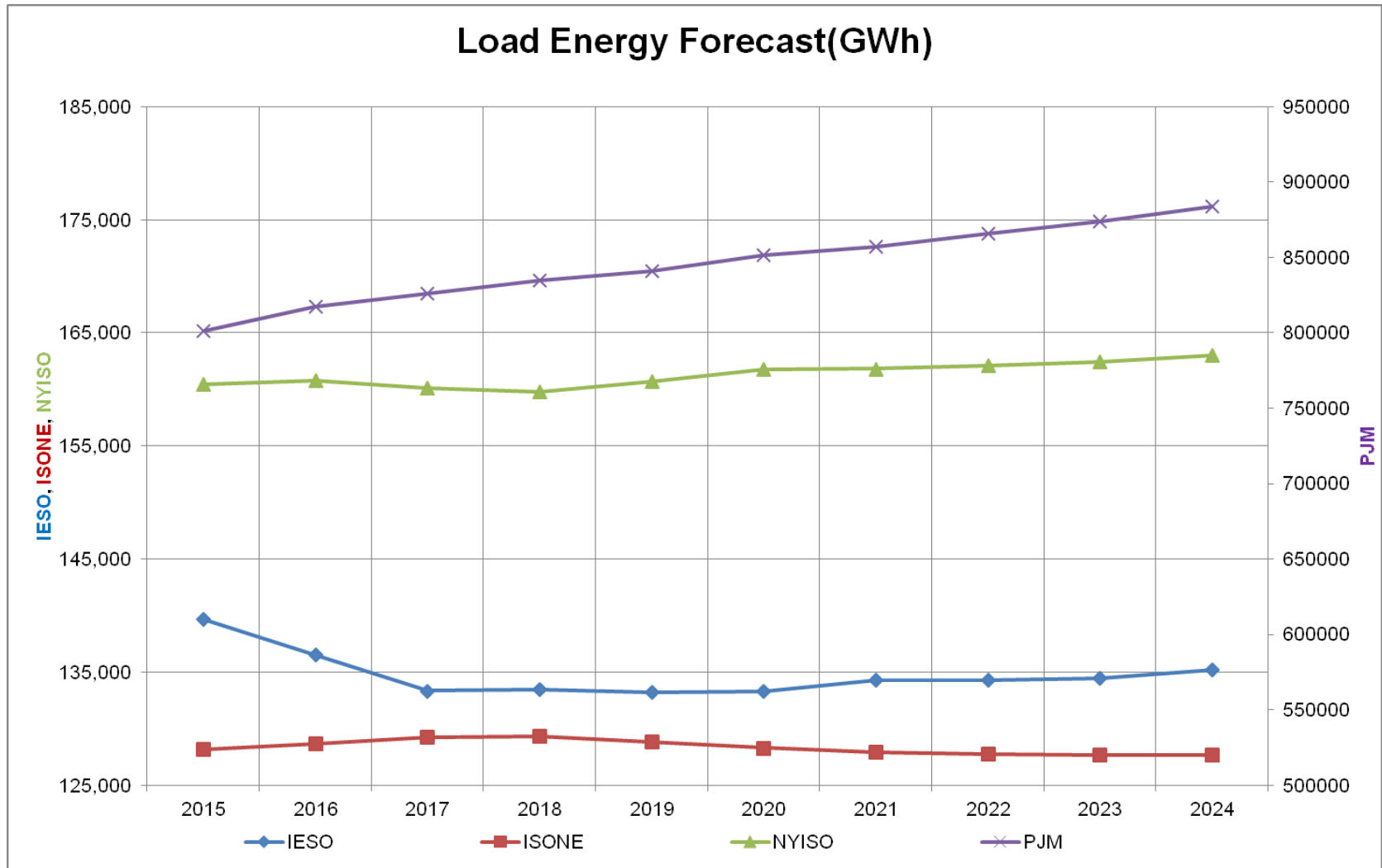
NYCA Transmission Updates

- ◆ **TOTS included in the base case**
 - *In service in 2016*
 - *Impact on UPNY-SENY secured by updated contingencies*
 - *150 MW derate on Central East voltage limit*
 - *Staten Island Unbottling*
- ◆ **Athens SPS removal**
 - *June 1, 2024*

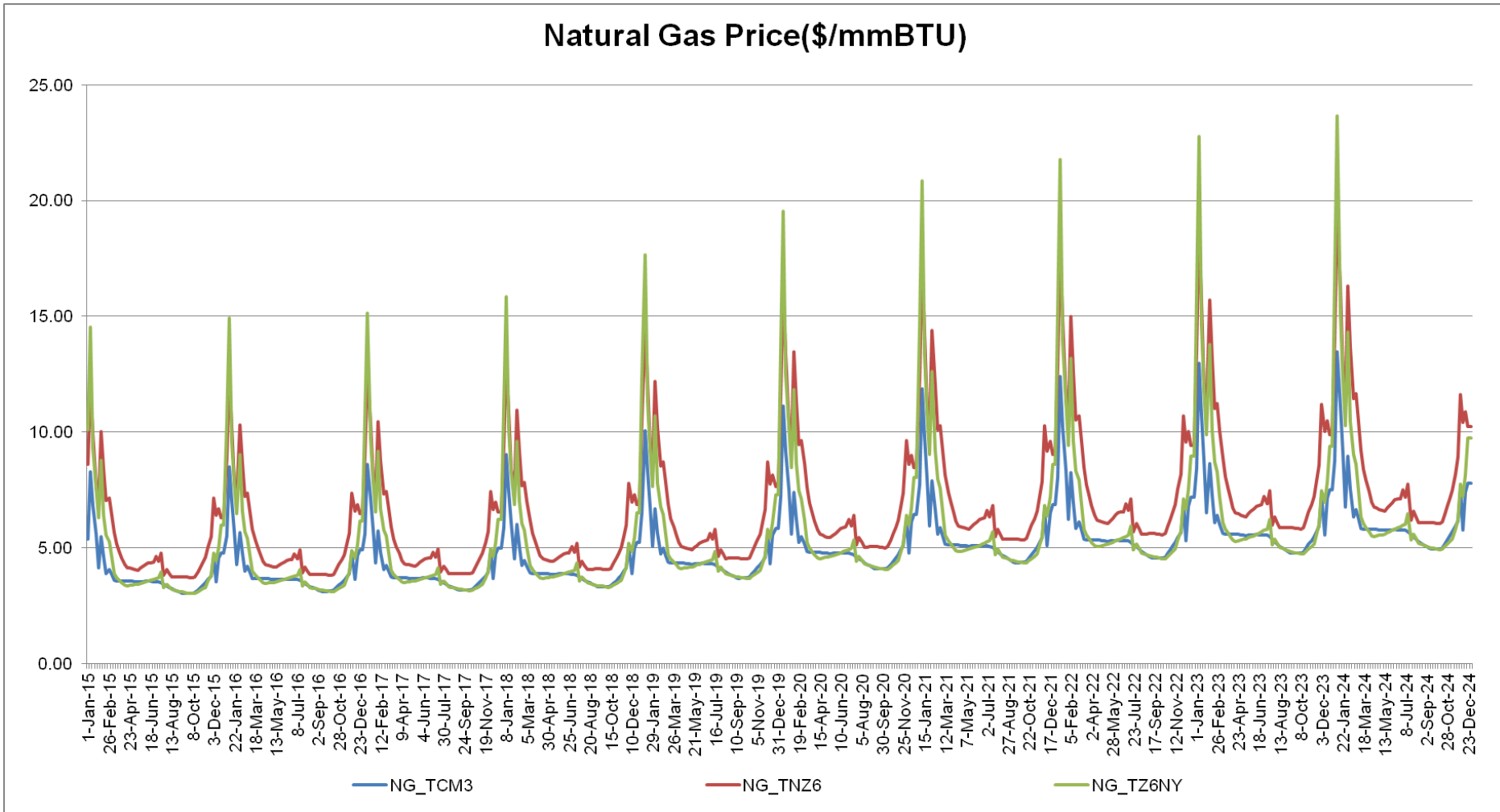
MAPS Modeling Updates

- ◆ **Spinning reserve modeling**
 - *Explicitly modeled East of Total East Requirement (F-K)*
- ◆ **Central-East Voltage Collapse Transfer Limit**
 - *Incorporated new Central East operating limits*
- ◆ **Thunderstorm alert (TSA)**
 - *Utilized 2013 historic pattern*
- ◆ **Random and planned generation outage**
 - *Utilized 2015 CRP MARS base case*

Baseline Load Forecast Updates

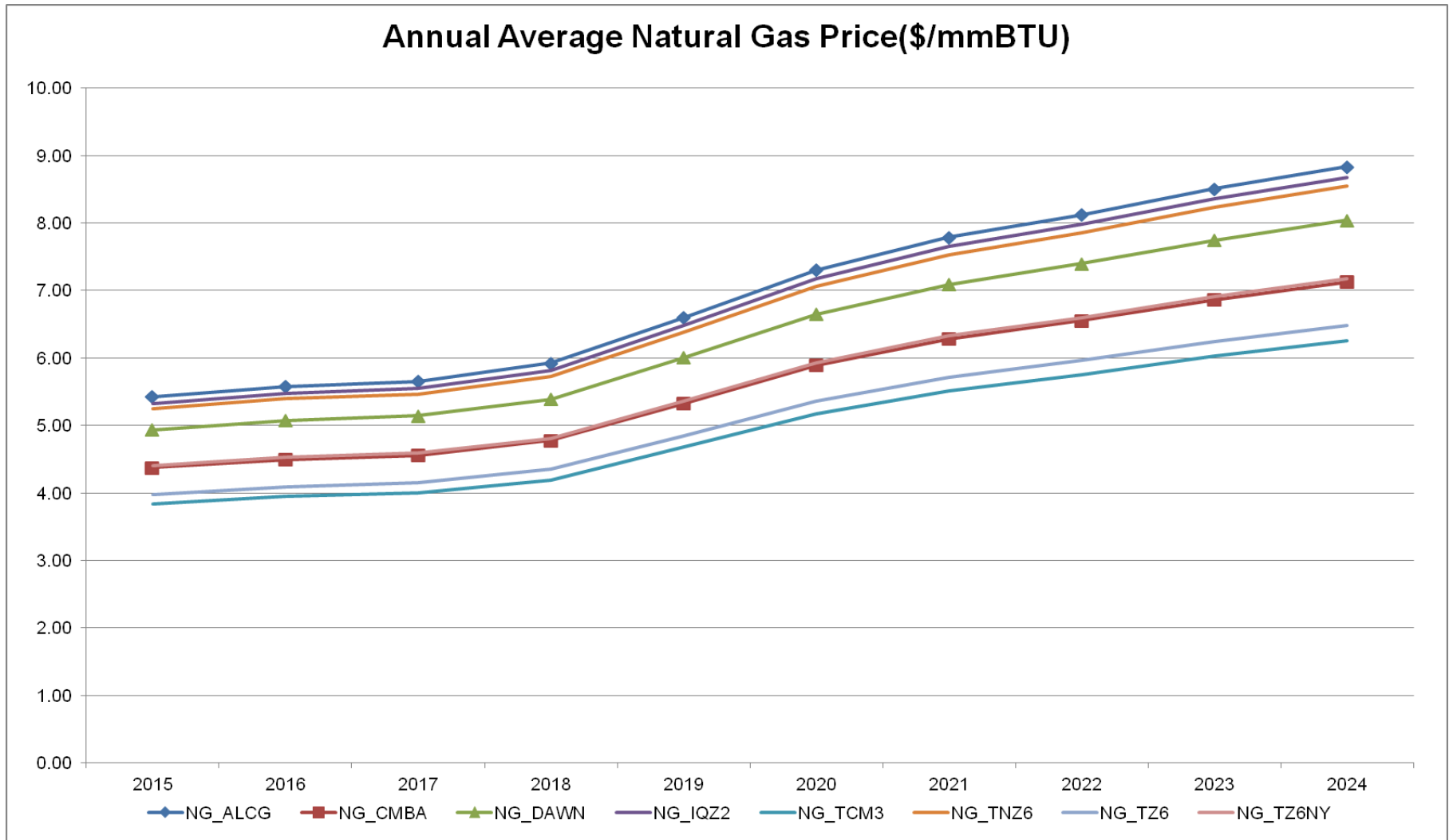


Natural Gas Forecast Updates

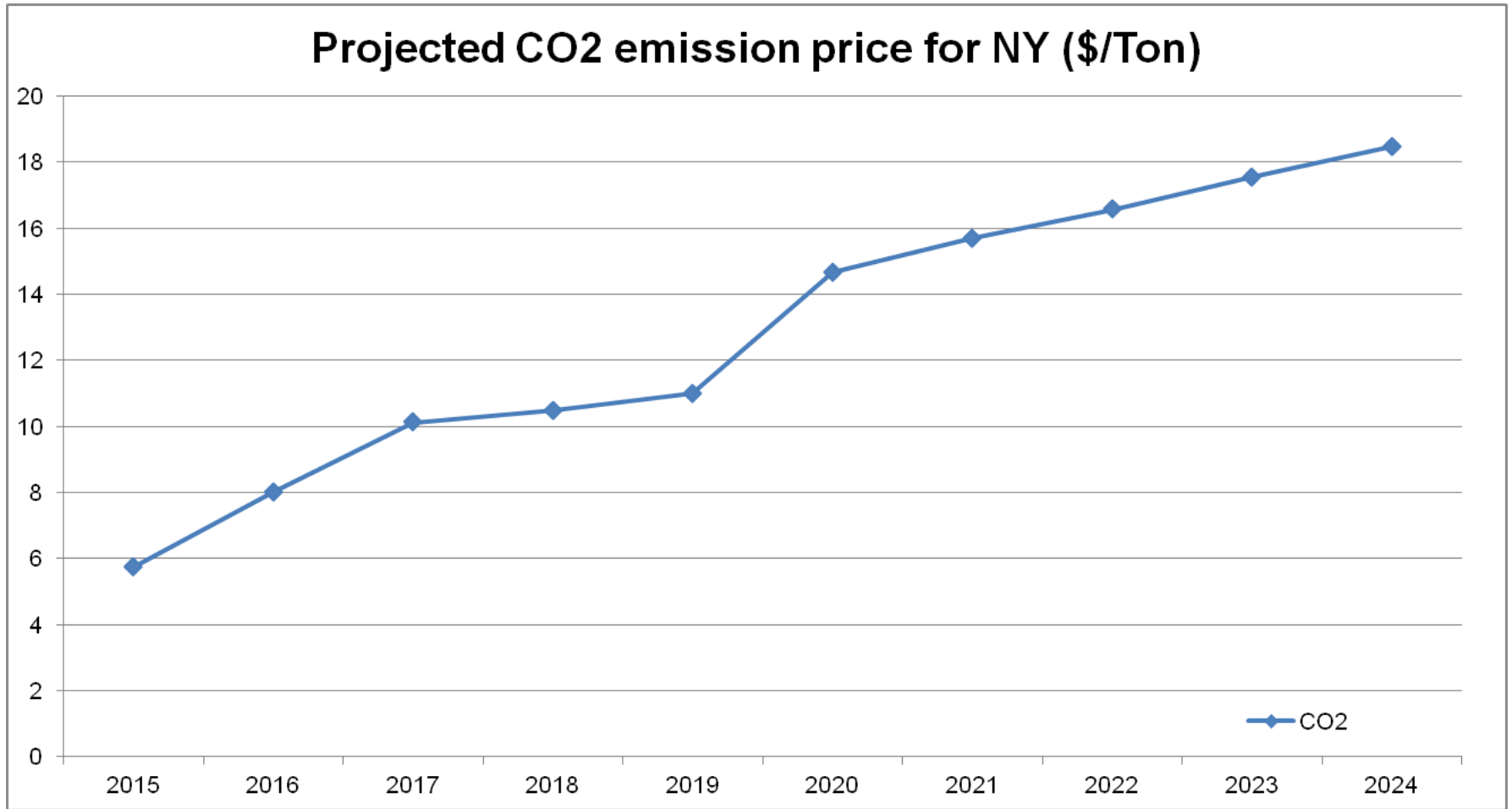


Natural Gas Forecast Updates

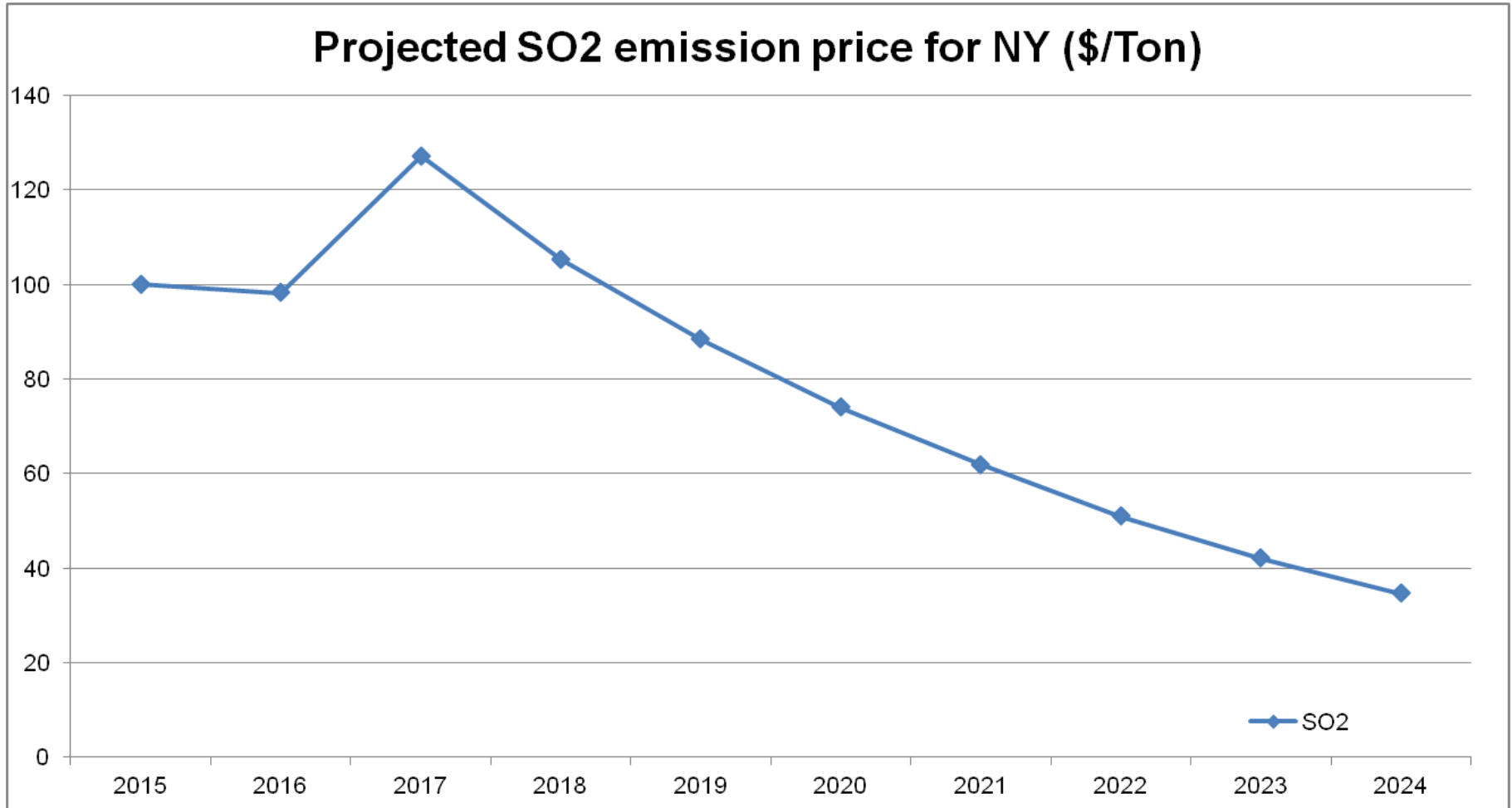
Annual Average Natural Gas Price(\$/mmBTU)



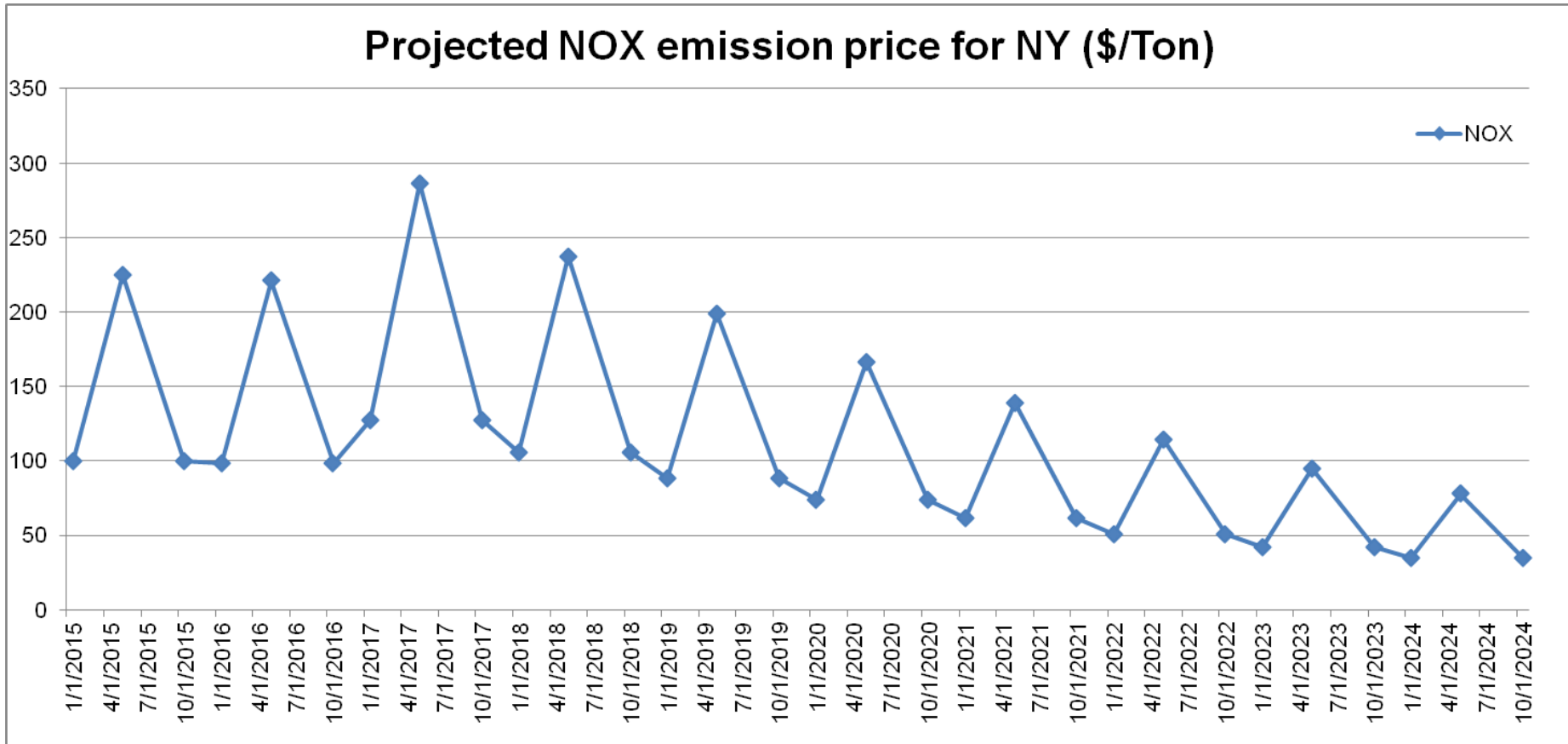
Emission Forecast Updates



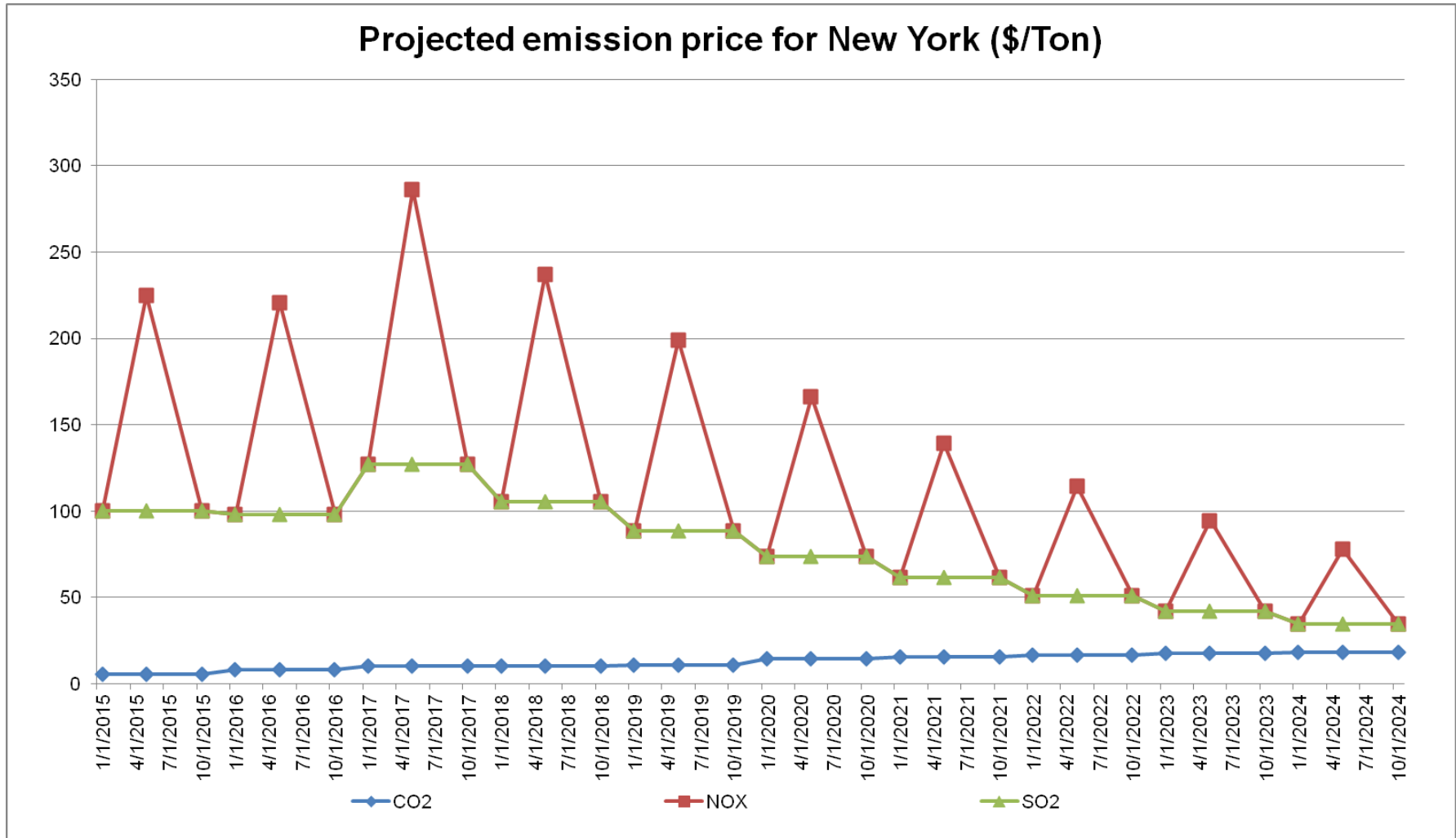
Emission Forecast Updates



Emission Forecast Updates



Emission Forecast Updates



Commitment Hurdle Rate

Commitment Hurdle Rate	Export (from NYCA)				Import (into NYCA)			
	Transaction	2014 CARIS	2015 CARIS		Transaction	2014 CARIS	2015 CARIS	
	Cost**	2	1		Cost**	2	1	
PJM	8.0 \$	10.0 \$	8.0 \$		5.0 \$	4.0 \$	5.0 \$	
Linden VFT	8.0 \$	10.0 \$	8.0 \$		5.0 \$	3.8 \$	5.0 \$	
Neptune	8.0 \$	10.0 \$	8.0 \$		5.0 \$	3.6 \$	5.0 \$	
HTP	8.0 \$	10.0 \$	8.0 \$		5.0 \$	4.0 \$	5.0 \$	
ISONE	2.0 \$	3.0 \$	2.0 \$		2.0 \$	3.0 \$	2.0 \$	
Cross Sound Cable	2.0 \$	2.2 \$	2.0 \$		2.0 \$	2.2 \$	2.0 \$	
Northport Norwalk Cable	2.0 \$	2.5 \$	2.0 \$		2.0 \$	2.5 \$	2.0 \$	
IMO	6.0 \$	6.0 \$	6.0 \$		4.0 \$	11.5 \$	8.0 \$	

** Transaction Costs are annual average costs per CRA report

(Export Transmission Service (ETS) Tariff Study, IESO, Charles River Associates, May 16, 2012)

Dispatch Hurdle Rate *

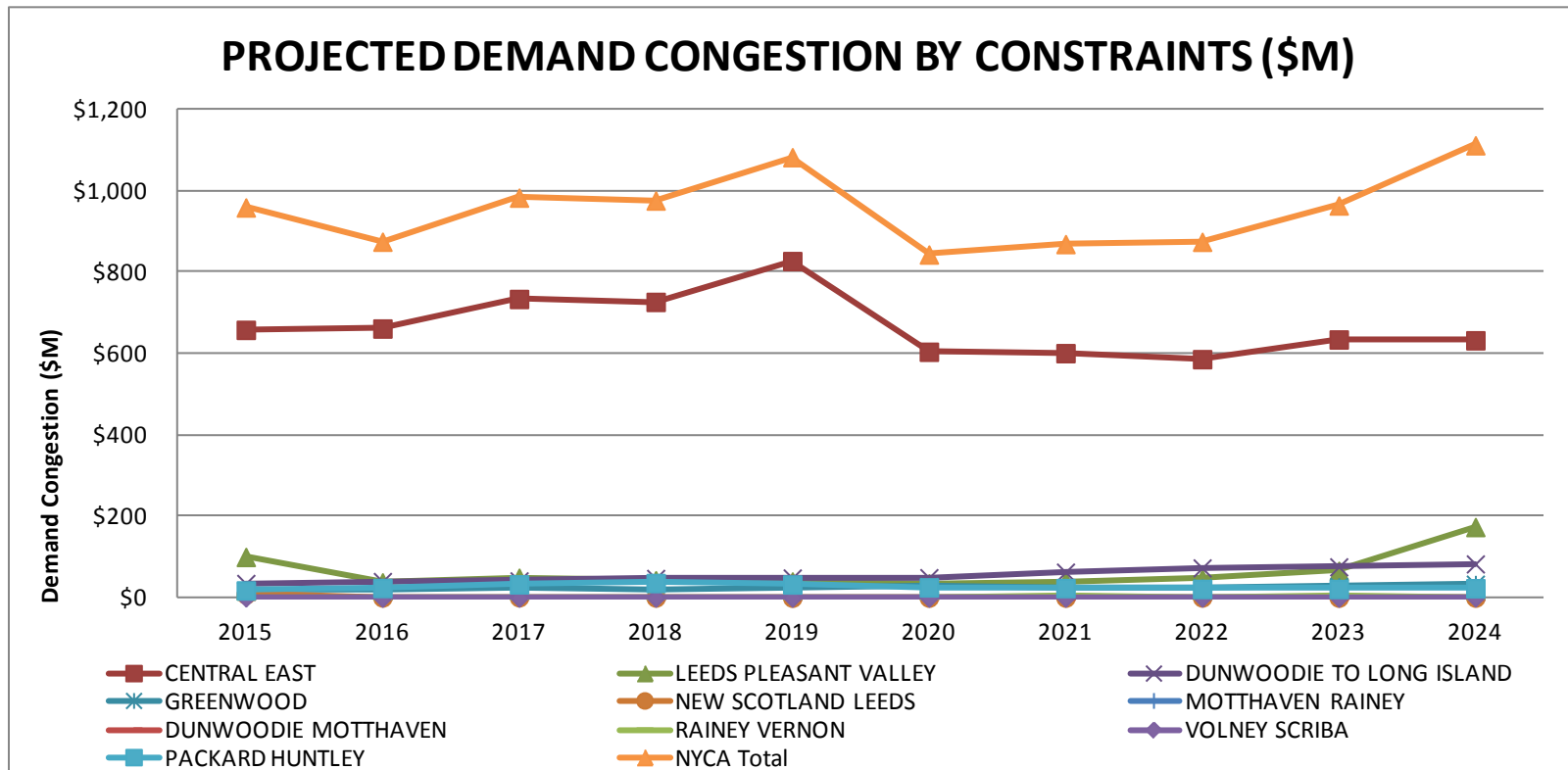
Dispatch Hurdle Rate	Export (from NYCA)			Import (into NYCA)		
	Transaction	2014 CARIS	2015 CARIS	Transaction	2014 CARIS	2015 CARIS
	Cost*	2	1	Cost*	2	1
PJM	\$ 6.0	\$ 8.0	\$ 6.0	\$ 3.0	\$ 2.0	\$ 3.0
Linden VFT	\$ 6.0	\$ 8.0	\$ 6.0	\$ 3.0	\$ 1.8	\$ 3.0
Neptune	\$ 6.0	\$ 8.0	\$ 6.0	\$ 3.0	\$ 1.6	\$ 3.0
HTP	\$ 6.0	\$ 8.0	\$ 6.0	\$ 3.0	\$ 2.0	\$ 3.0
ISONE	\$ -	\$ 1.0	\$ -	\$ -	\$ 1.0	\$ -
Cross Sound Cable	\$ -	\$ 0.2	\$ -	\$ -	\$ 0.2	\$ -
Northport Norwalk Cable	\$ -	\$ 0.5	\$ -	\$ -	\$ 0.5	\$ -
IMO	\$ 4.0	\$ 4.0	\$ 4.0	\$ 2.0	\$ 9.5	\$ 6.0

****Dispatch Hurdle Rate = Commitment Hurdle Rate - \$2.0***

Projected Demand Congestion by Constraint (\$M)

Demand Congestion (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
CENTRAL EAST	\$659	\$662	\$735	\$727	\$828	\$605	\$601	\$587	\$635	\$633
LEEDS PLEASANT VALLEY	\$100	\$38	\$49	\$43	\$40	\$35	\$41	\$47	\$66	\$174
DUNWOODIE TO LONG ISLAND	\$35	\$40	\$42	\$48	\$49	\$50	\$63	\$73	\$76	\$83
GREENWOOD	\$17	\$19	\$24	\$20	\$23	\$28	\$22	\$25	\$28	\$33
NEW SCOTLAND LEEDS	\$8	\$1	\$1	\$1	\$0	\$0	\$0	\$1	\$0	\$0
MOTTHAVEN RAINEY	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
DUNWOODIE MOTTHAVEN	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
RAINEY VERNON	\$1	\$1	\$1	\$2	\$2	\$1	\$3	\$2	\$3	\$2
VOLNEY SCRIBA	\$1	\$0	\$0	\$0	\$1	\$0	\$0	\$1	\$0	\$1
PACKARD HUNTLEY	\$18	\$24	\$33	\$36	\$33	\$26	\$24	\$22	\$22	\$23
NYCA Total	\$ 960	\$ 875	\$ 984	\$ 977	\$ 1,083	\$ 844	\$ 870	\$ 875	\$ 965	\$ 1,113

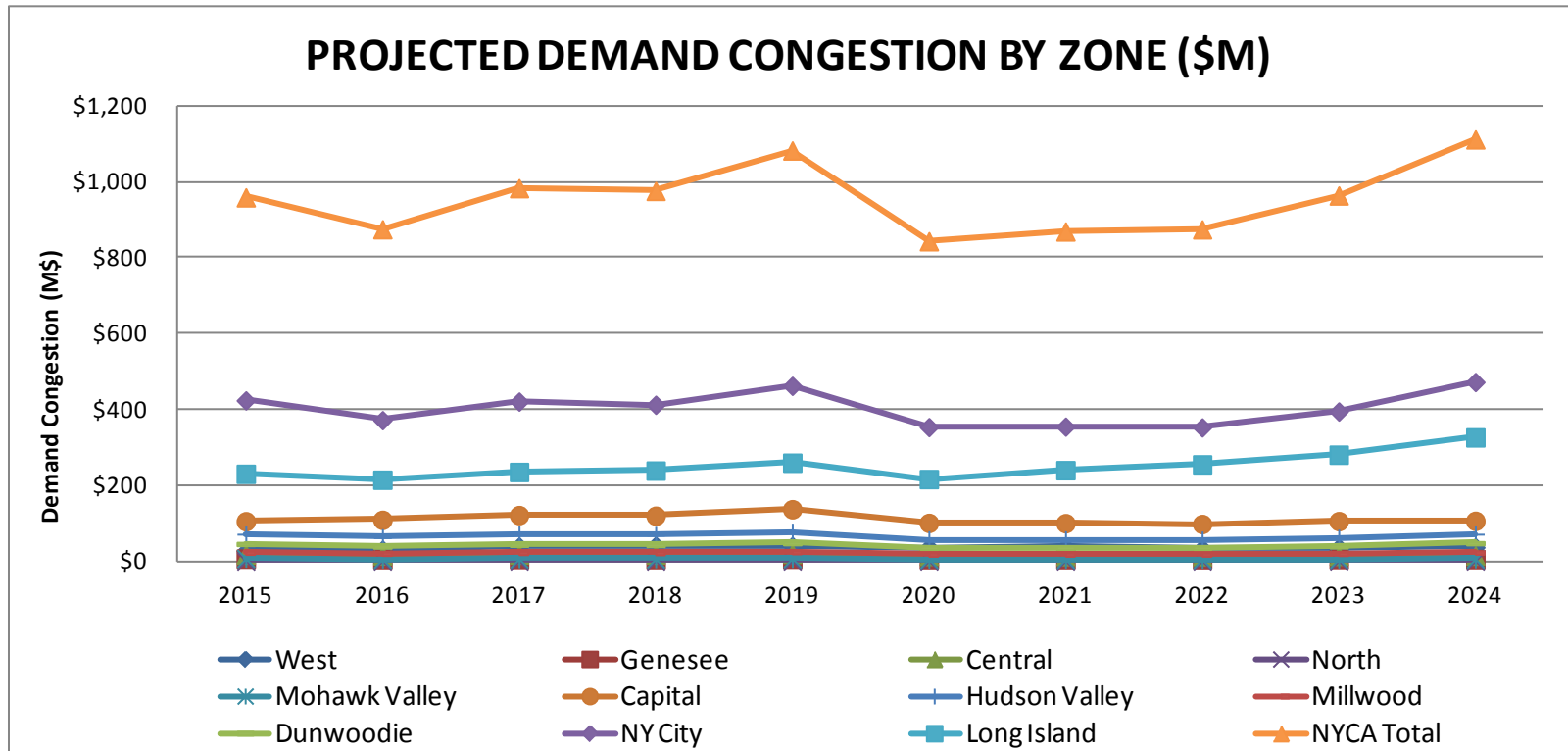
Projected Demand Congestion by Constraint (\$M)



Projected Demand Congestion by Zone (\$M)

Demand Congestion (M\$)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$27	\$30	\$39	\$41	\$40	\$36	\$38	\$34	\$36	\$37
Genesee	\$7	\$6	\$6	\$6	\$7	\$6	\$6	\$6	\$6	\$6
Central	\$18	\$16	\$18	\$18	\$20	\$14	\$14	\$13	\$14	\$15
North	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1	\$1
Mohawk Valley	\$7	\$6	\$6	\$6	\$7	\$5	\$5	\$5	\$5	\$6
Capital	\$106	\$109	\$122	\$120	\$137	\$101	\$100	\$98	\$106	\$107
Hudson Valley	\$71	\$63	\$70	\$69	\$77	\$57	\$57	\$56	\$62	\$71
Millwood	\$23	\$20	\$22	\$22	\$24	\$18	\$18	\$18	\$19	\$23
Dunwoodie	\$46	\$39	\$43	\$43	\$48	\$36	\$36	\$36	\$39	\$48
NY City	\$424	\$372	\$421	\$413	\$463	\$354	\$355	\$353	\$395	\$473
Long Island	\$231	\$215	\$236	\$239	\$260	\$217	\$240	\$255	\$281	\$327
NYCA Total	\$ 960	\$ 875	\$ 984	\$ 977	\$ 1,083	\$ 844	\$ 870	\$ 875	\$ 965	\$ 1,113

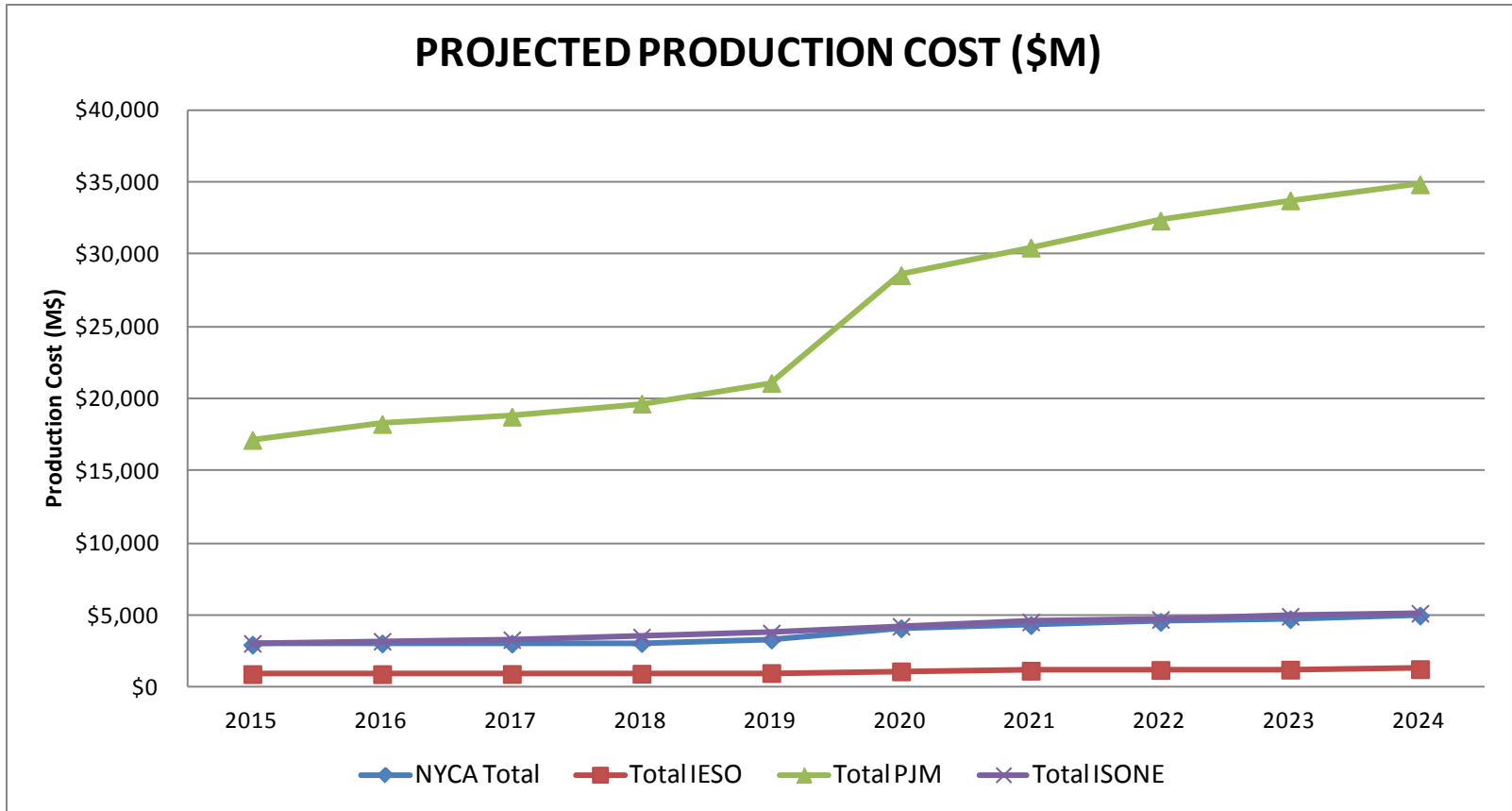
Projected Demand Congestion by Zone (\$M)



Projected Production Costs (\$M)

Production Cost (M\$)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$147	\$165	\$169	\$173	\$189	\$330	\$343	\$367	\$387	\$415
Genesee	\$42	\$41	\$40	\$44	\$42	\$50	\$53	\$52	\$53	\$60
Central	\$414	\$411	\$408	\$406	\$447	\$522	\$571	\$578	\$602	\$626
North	\$33	\$27	\$27	\$27	\$29	\$43	\$44	\$48	\$43	\$52
Mohawk Valley	\$28	\$28	\$26	\$28	\$30	\$40	\$39	\$43	\$39	\$43
Capital	\$601	\$607	\$621	\$626	\$659	\$839	\$865	\$933	\$963	\$997
Hudson Valley	\$27	\$25	\$25	\$23	\$22	\$37	\$43	\$41	\$44	\$45
Millwood	\$108	\$111	\$115	\$117	\$119	\$124	\$126	\$130	\$132	\$136
Dunwoodie	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
NY City	\$1,128	\$1,182	\$1,171	\$1,191	\$1,307	\$1,526	\$1,616	\$1,698	\$1,776	\$1,874
Long Island	\$456	\$470	\$458	\$462	\$496	\$606	\$640	\$669	\$711	\$752
NYCA Total	\$2,984	\$3,068	\$3,059	\$3,097	\$3,341	\$4,118	\$4,340	\$4,560	\$4,750	\$4,999
NYCA Imports	\$899	\$1,015	\$1,059	\$1,163	\$1,296	\$1,352	\$1,436	\$1,521	\$1,601	\$1,681
NYCA Exports	\$357	\$370	\$403	\$411	\$471	\$489	\$511	\$507	\$572	\$573
NYCA + Imports - Exports	\$3,526	\$3,713	\$3,714	\$3,849	\$4,166	\$4,980	\$5,264	\$5,574	\$5,779	\$6,107
Total IESO	\$947	\$946	\$955	\$974	\$1,022	\$1,137	\$1,184	\$1,233	\$1,257	\$1,294
Total PJM	\$17,156	\$18,258	\$18,767	\$19,670	\$21,098	\$28,558	\$30,467	\$32,336	\$33,738	\$34,847
Total ISONE	\$3,073	\$3,222	\$3,330	\$3,516	\$3,794	\$4,257	\$4,556	\$4,727	\$4,951	\$5,160
Total System	\$24,161	\$25,495	\$26,110	\$27,257	\$29,255	\$38,069	\$40,548	\$42,856	\$44,695	\$46,301

Projected Production Costs (\$M)

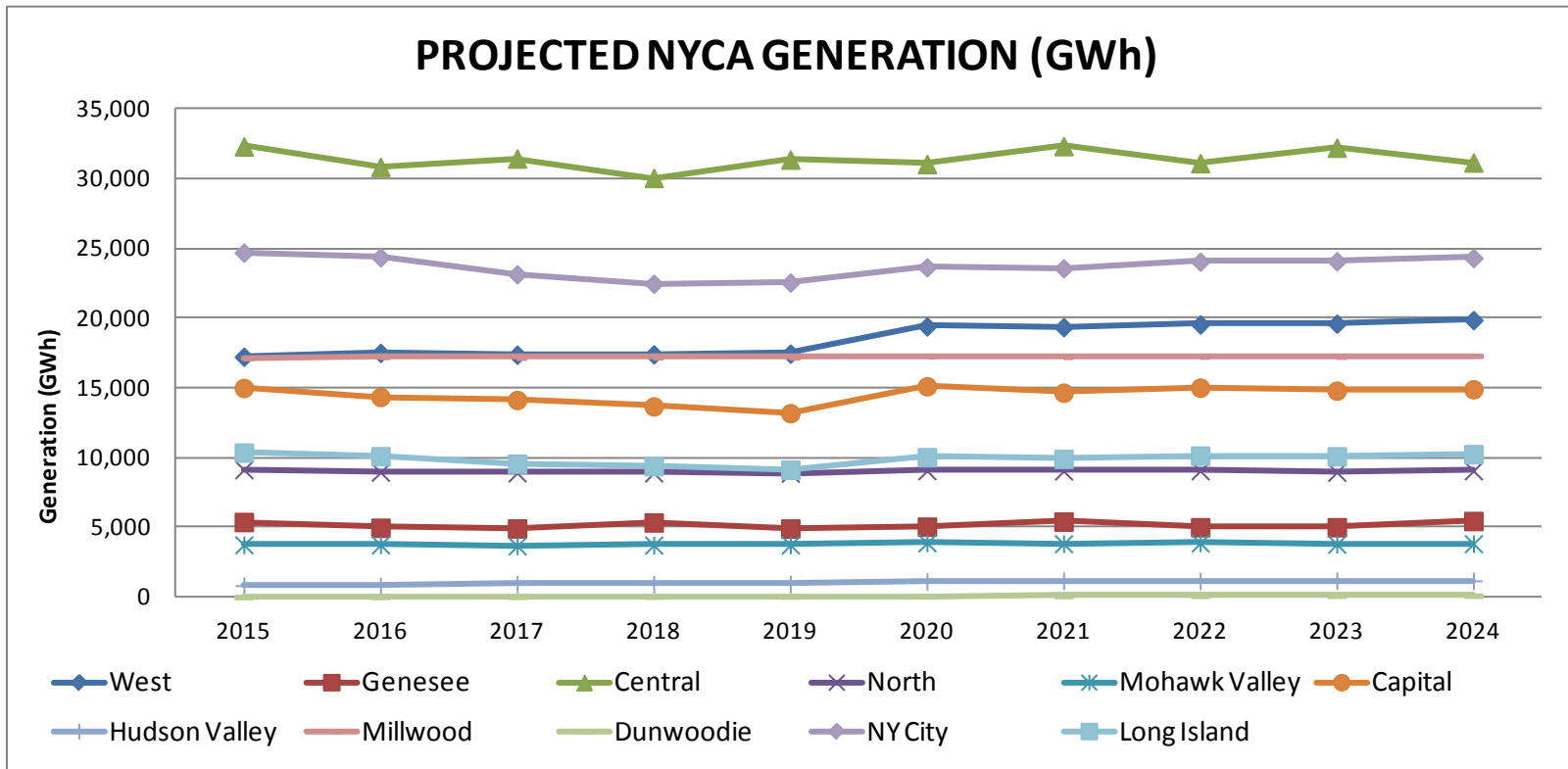


Projected Generation by Zone (GWh)

Generation (GWh)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	17,237	17,514	17,383	17,410	17,462	19,414	19,357	19,553	19,604	19,865
Genesee	5,386	4,971	4,922	5,353	4,919	5,052	5,415	5,008	5,010	5,455
Central	32,320	30,853	31,450	30,058	31,376	31,056	32,342	31,123	32,227	31,166
North	9,137	8,956	8,907	8,906	8,885	9,064	9,041	9,060	8,951	9,058
Mohawk Valley	3,749	3,747	3,672	3,731	3,740	3,891	3,829	3,879	3,793	3,831
Capital	14,999	14,350	14,134	13,677	13,190	15,119	14,659	15,018	14,806	14,905
Hudson Valley	827	810	935	922	941	1,118	1,179	1,162	1,182	1,170
Millwood	17,149	17,220	17,167	17,190	17,188	17,272	17,226	17,248	17,243	17,303
Dunwoodie	4	10	17	28	40	53	75	89	98	103
NY City	24,704	24,372	23,149	22,473	22,556	23,652	23,579	24,054	24,085	24,319
Long Island	10,362	10,102	9,571	9,387	9,134	10,032	9,915	10,146	10,098	10,249
NYCA Total	135,872	132,905	131,305	129,135	129,429	135,724	136,617	136,339	137,096	137,425
Total IESO	157,373	157,722	156,050	155,973	155,807	156,298	156,508	156,483	156,438	156,797
Total PJM	815,383	831,755	840,807	851,062	857,081	858,786	864,288	872,045	879,800	889,326
Total ISONE	109,410	109,905	109,597	109,952	109,136	110,630	110,164	110,661	110,342	110,792
Total HQ *	24,576	24,638	24,674	24,622	24,586	24,643	24,581	24,691	24,674	24,659
Total System	1,242,615	1,256,925	1,262,434	1,270,745	1,276,039	1,286,081	1,292,159	1,300,219	1,308,350	1,318,999

* Only interchange flow is modeled.

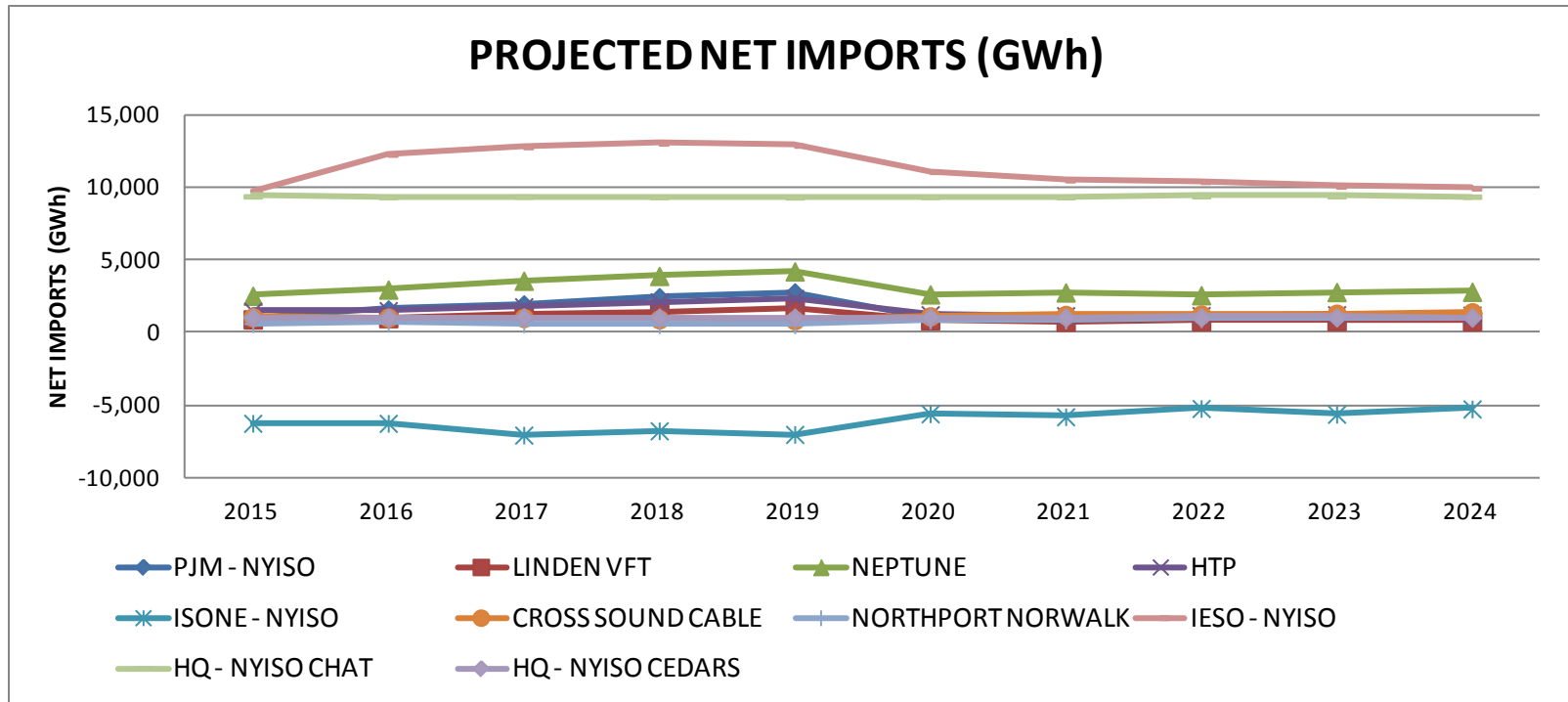
Projected NYCA Generation by Zone (GWh)



Projected NYCA Net Imports (GWh)

NET IMPORTS (GWh)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
PJM - NYISO	954	1,599	1,947	2,446	2,776	982	958	939	878	852
LINDEN VFT	915	1,005	1,221	1,461	1,598	855	761	796	807	792
NEPTUNE	2,542	2,970	3,579	3,909	4,217	2,641	2,773	2,582	2,799	2,818
HTP	1,477	1,520	1,786	2,130	2,360	1,242	1,177	1,184	1,243	1,207
ISONE - NYISO	-6,229	-6,232	-7,041	-6,749	-6,994	-5,579	-5,782	-5,213	-5,607	-5,245
CROSS SOUND CABLE	1,070	1,040	1,018	926	864	1,123	1,221	1,252	1,307	1,404
NORTHPORT NORWALK	627	696	609	558	542	862	857	963	1,028	1,026
IESO - NYISO	9,703	12,254	12,774	13,022	12,877	11,070	10,489	10,381	10,062	9,934
HQ - NYISO CHAT	9,384	9,336	9,368	9,339	9,316	9,343	9,329	9,394	9,391	9,359
HQ - NYISO CEDARS	1,047	1,046	1,052	1,044	1,045	1,052	1,051	1,062	1,059	1,051
TOTAL	21,489	25,234	26,313	28,087	28,600	23,591	22,834	23,339	22,967	23,197

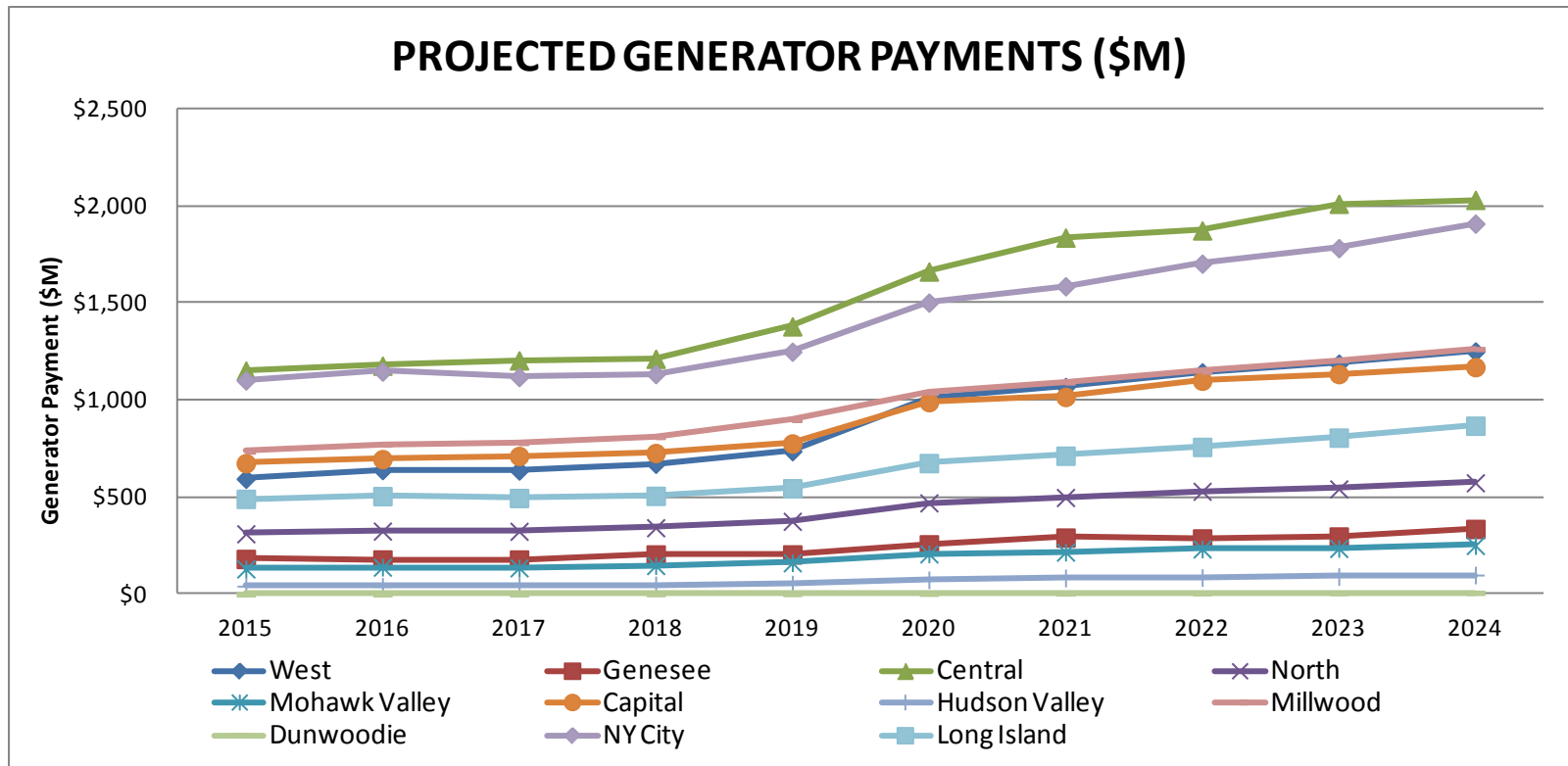
Projected NYCA Net Imports (GWh)



Projected Generator Payments (\$M)

Generator Payment (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$595	\$640	\$638	\$673	\$737	\$1,007	\$1,068	\$1,143	\$1,188	\$1,251
Genesee	\$182	\$180	\$179	\$205	\$206	\$258	\$292	\$288	\$298	\$337
Central	\$1,152	\$1,178	\$1,205	\$1,213	\$1,380	\$1,662	\$1,837	\$1,874	\$2,011	\$2,032
North	\$312	\$326	\$325	\$343	\$376	\$471	\$499	\$531	\$543	\$575
Mohawk Valley	\$131	\$140	\$137	\$148	\$162	\$208	\$217	\$234	\$237	\$251
Capital	\$675	\$696	\$713	\$728	\$777	\$990	\$1,017	\$1,100	\$1,134	\$1,170
Hudson Valley	\$42	\$41	\$47	\$49	\$53	\$75	\$84	\$87	\$92	\$100
Millwood	\$736	\$772	\$780	\$811	\$898	\$1,039	\$1,092	\$1,147	\$1,205	\$1,263
Dunwoodie	\$0	\$0	\$1	\$1	\$2	\$3	\$5	\$6	\$7	\$8
NY City	\$1,102	\$1,147	\$1,119	\$1,134	\$1,250	\$1,502	\$1,586	\$1,703	\$1,783	\$1,909
Long Island	\$492	\$506	\$496	\$507	\$546	\$676	\$714	\$759	\$807	\$868
NYCA Total	\$5,420	\$5,625	\$5,640	\$5,812	\$6,388	\$7,892	\$8,412	\$8,871	\$9,305	\$9,763

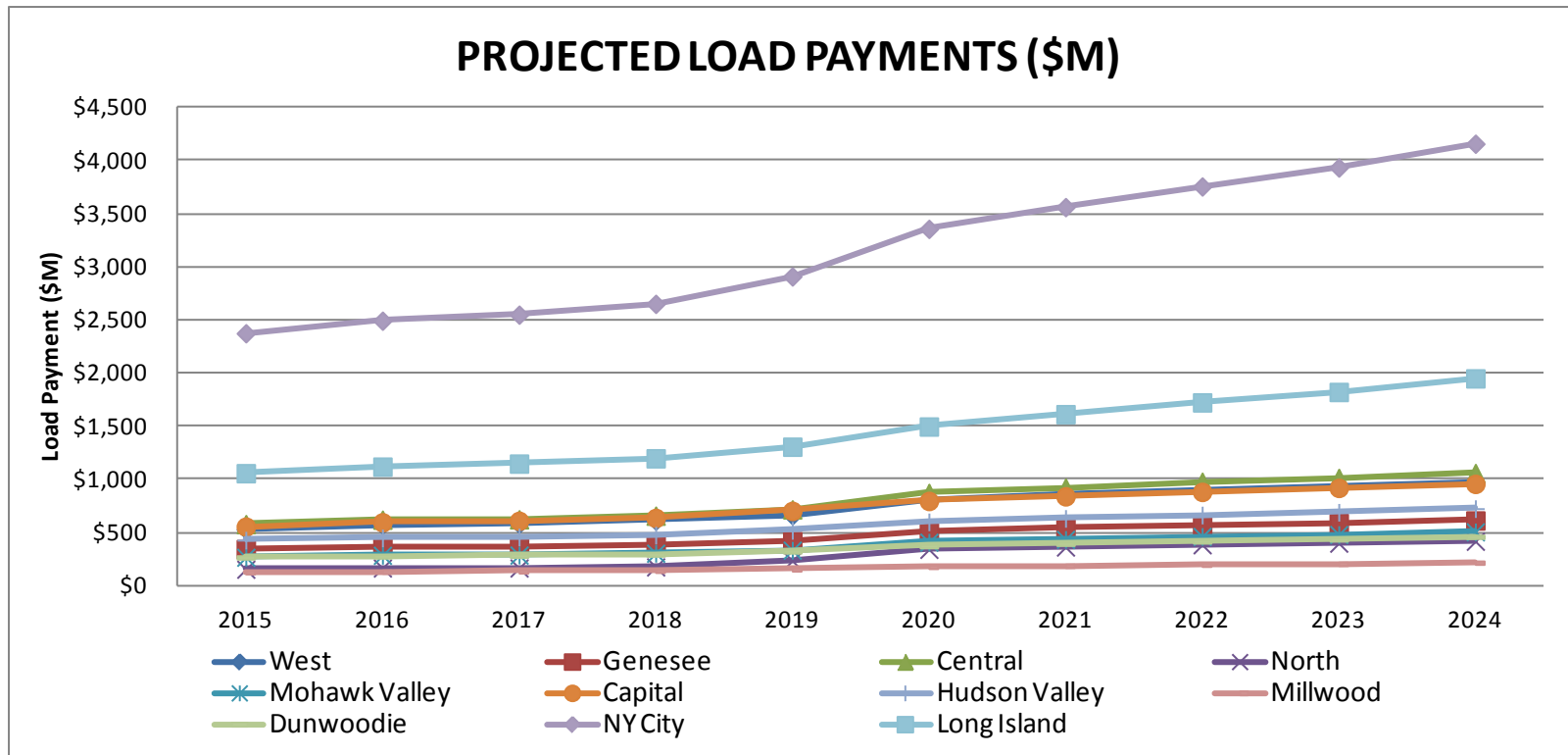
Projected Generator Payments (\$M)



Projected Load Payments (\$M)

Load Payment (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$531	\$575	\$585	\$615	\$665	\$806	\$854	\$897	\$931	\$972
Genesee	\$346	\$367	\$367	\$385	\$420	\$512	\$540	\$572	\$591	\$615
Central	\$581	\$622	\$626	\$660	\$719	\$874	\$924	\$979	\$1,015	\$1,061
North	\$156	\$168	\$168	\$178	\$237	\$343	\$365	\$387	\$401	\$419
Mohawk Valley	\$269	\$288	\$290	\$307	\$336	\$411	\$437	\$465	\$483	\$508
Capital	\$557	\$598	\$612	\$639	\$705	\$798	\$842	\$884	\$921	\$959
Hudson Valley	\$430	\$451	\$459	\$478	\$522	\$602	\$634	\$666	\$692	\$726
Millwood	\$128	\$134	\$136	\$142	\$155	\$178	\$189	\$198	\$207	\$218
Dunwoodie	\$267	\$278	\$284	\$295	\$324	\$373	\$396	\$418	\$437	\$461
NY City	\$2,376	\$2,494	\$2,550	\$2,652	\$2,910	\$3,357	\$3,562	\$3,756	\$3,934	\$4,158
Long Island	\$1,060	\$1,121	\$1,150	\$1,200	\$1,309	\$1,499	\$1,615	\$1,725	\$1,824	\$1,951
NYCA Total	\$6,701	\$7,095	\$7,225	\$7,549	\$8,300	\$9,754	\$10,357	\$10,947	\$11,436	\$12,049

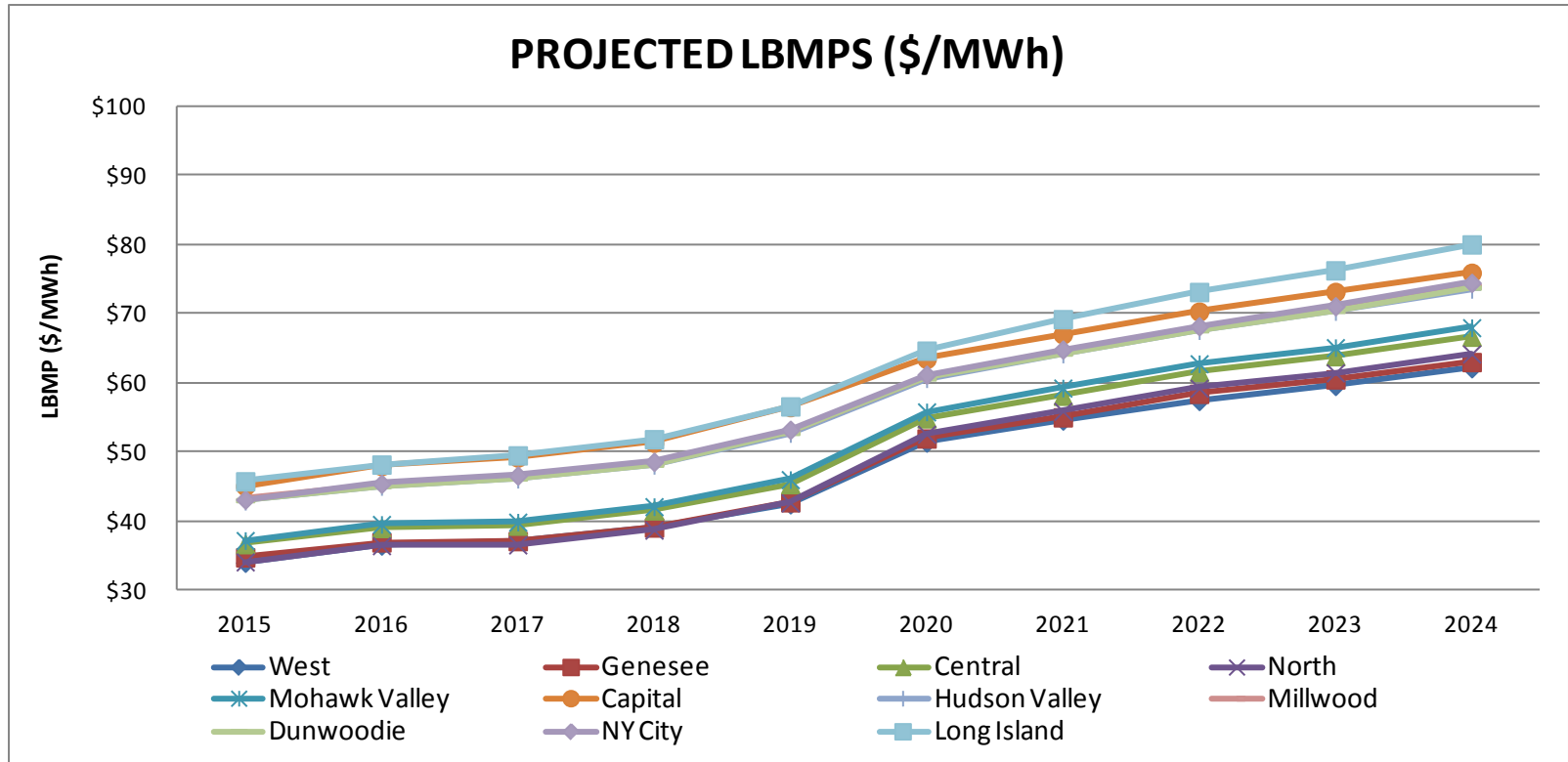
Projected Load Payments (\$M)



Projected LBMPs (\$/MWh)

LBMP (\$/MWh)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$ 34.06	\$ 36.55	\$ 37.29	\$ 39.26	\$ 42.51	\$ 51.43	\$ 54.62	\$ 57.45	\$ 59.62	\$ 62.18
Genesee	\$ 34.84	\$ 37.01	\$ 37.19	\$ 39.15	\$ 42.80	\$ 52.02	\$ 55.08	\$ 58.48	\$ 60.57	\$ 63.07
Central	\$ 36.75	\$ 39.08	\$ 39.42	\$ 41.63	\$ 45.41	\$ 54.93	\$ 58.20	\$ 61.68	\$ 63.92	\$ 66.74
North	\$ 34.18	\$ 36.53	\$ 36.64	\$ 38.78	\$ 42.71	\$ 52.64	\$ 55.95	\$ 59.29	\$ 61.51	\$ 64.24
Mohawk Valley	\$ 37.27	\$ 39.60	\$ 39.93	\$ 42.17	\$ 46.08	\$ 55.87	\$ 59.31	\$ 62.83	\$ 65.16	\$ 68.04
Capital	\$ 45.14	\$ 48.03	\$ 49.27	\$ 51.41	\$ 56.56	\$ 63.52	\$ 67.08	\$ 70.37	\$ 73.21	\$ 75.98
Hudson Valley	\$ 42.95	\$ 45.08	\$ 46.13	\$ 48.14	\$ 52.74	\$ 60.66	\$ 64.23	\$ 67.61	\$ 70.37	\$ 73.58
Millwood	\$ 43.25	\$ 45.30	\$ 46.40	\$ 48.39	\$ 53.01	\$ 60.87	\$ 64.46	\$ 67.84	\$ 70.65	\$ 74.02
Dunwoodie	\$ 43.11	\$ 45.14	\$ 46.24	\$ 48.23	\$ 52.83	\$ 60.71	\$ 64.30	\$ 67.67	\$ 70.48	\$ 73.84
NY City	\$ 43.19	\$ 45.48	\$ 46.66	\$ 48.65	\$ 53.28	\$ 61.25	\$ 64.88	\$ 68.25	\$ 71.14	\$ 74.52
Long Island	\$ 45.83	\$ 48.25	\$ 49.58	\$ 51.92	\$ 56.66	\$ 64.72	\$ 69.27	\$ 73.20	\$ 76.33	\$ 80.08

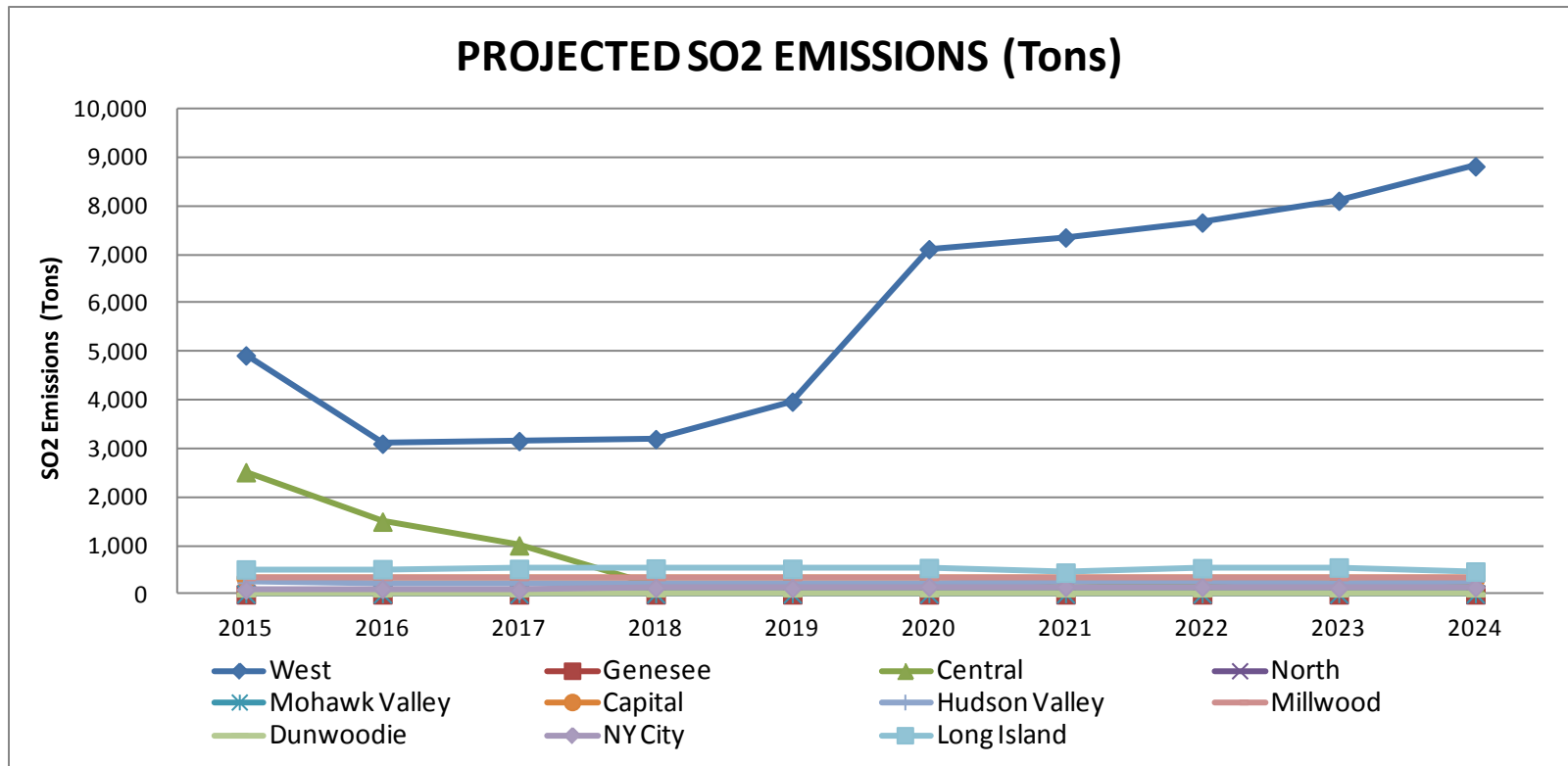
Projected LBMPs (\$/MWh)



Projected SO₂ Emissions (Tons)

SO ₂ Emissions (Tons)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	4,922	3,103	3,158	3,199	3,970	7,110	7,351	7,658	8,107	8,816
Genesee	0	0	0	0	0	0	0	0	0	0
Central	2,516	1,498	1,009	162	162	167	273	201	228	194
North	2	2	2	2	1	2	2	2	2	2
Mohawk Valley	9	9	9	9	9	9	9	9	9	9
Capital	335	335	333	332	331	335	334	335	335	335
Hudson Valley	240	212	229	230	212	224	251	249	220	270
Millwood	337	338	337	337	336	338	337	336	336	337
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	100	114	89	137	130	157	153	154	132	148
Long Island	513	519	525	532	527	543	448	540	554	471
NYCA Total	8,974	6,128	5,690	4,939	5,678	8,886	9,156	9,483	9,921	10,582

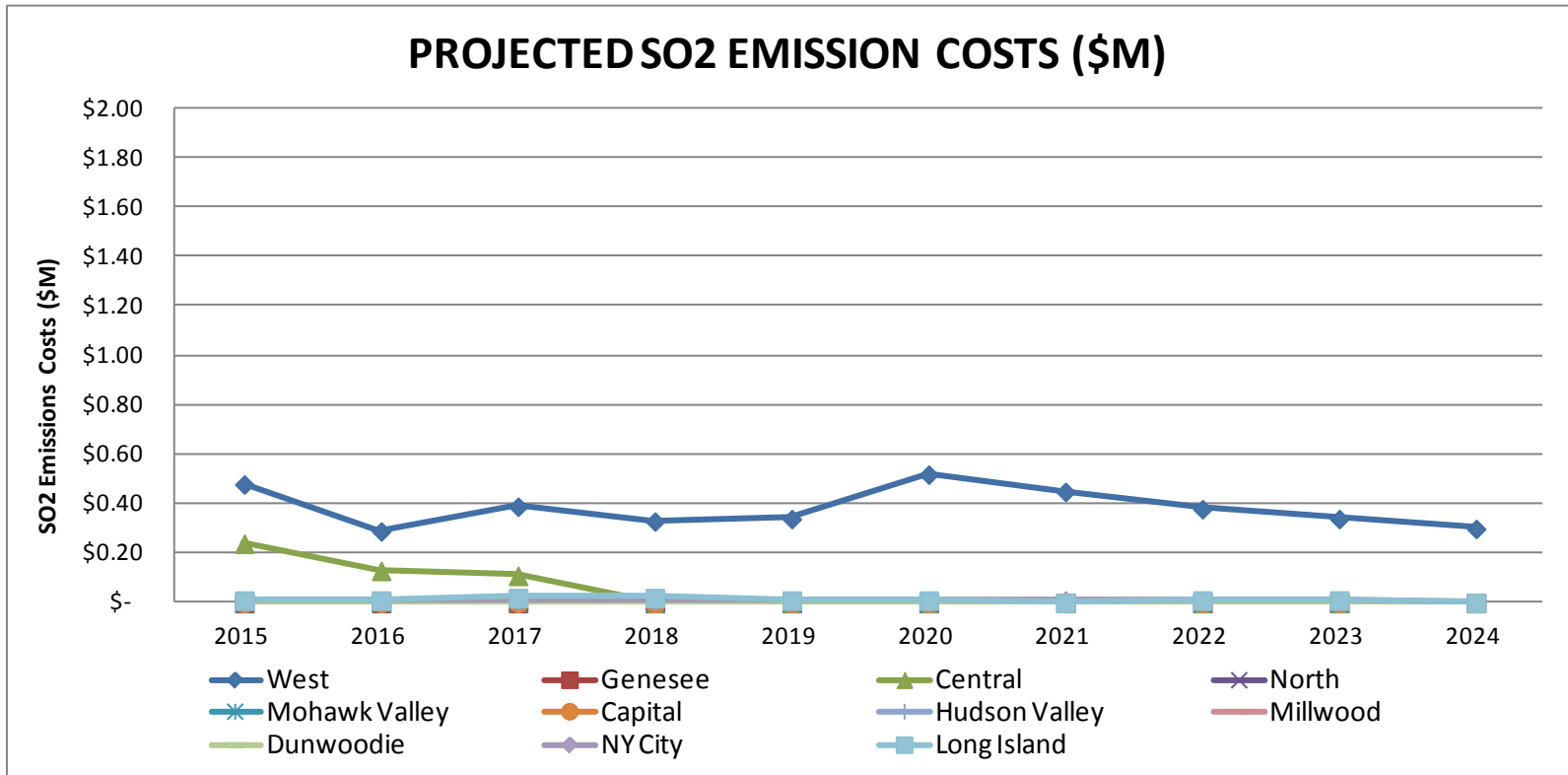
Projected SO₂ Emissions (Tons)



Projected SO₂ Emission Costs (\$M)

SO ₂ Emissions Costs (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$0.5	\$0.3	\$0.4	\$0.3	\$0.3	\$0.5	\$0.4	\$0.4	\$0.3	\$0.3
Genesee	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Central	\$0.2	\$0.1	\$0.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
North	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Mohawk Valley	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Capital	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Hudson Valley	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Millwood	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Dunwoodie	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
NY City	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Long Island	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
NYCA Total	\$0.7	\$0.4	\$0.5	\$0.4	\$0.4	\$0.5	\$0.5	\$0.4	\$0.4	\$0.3

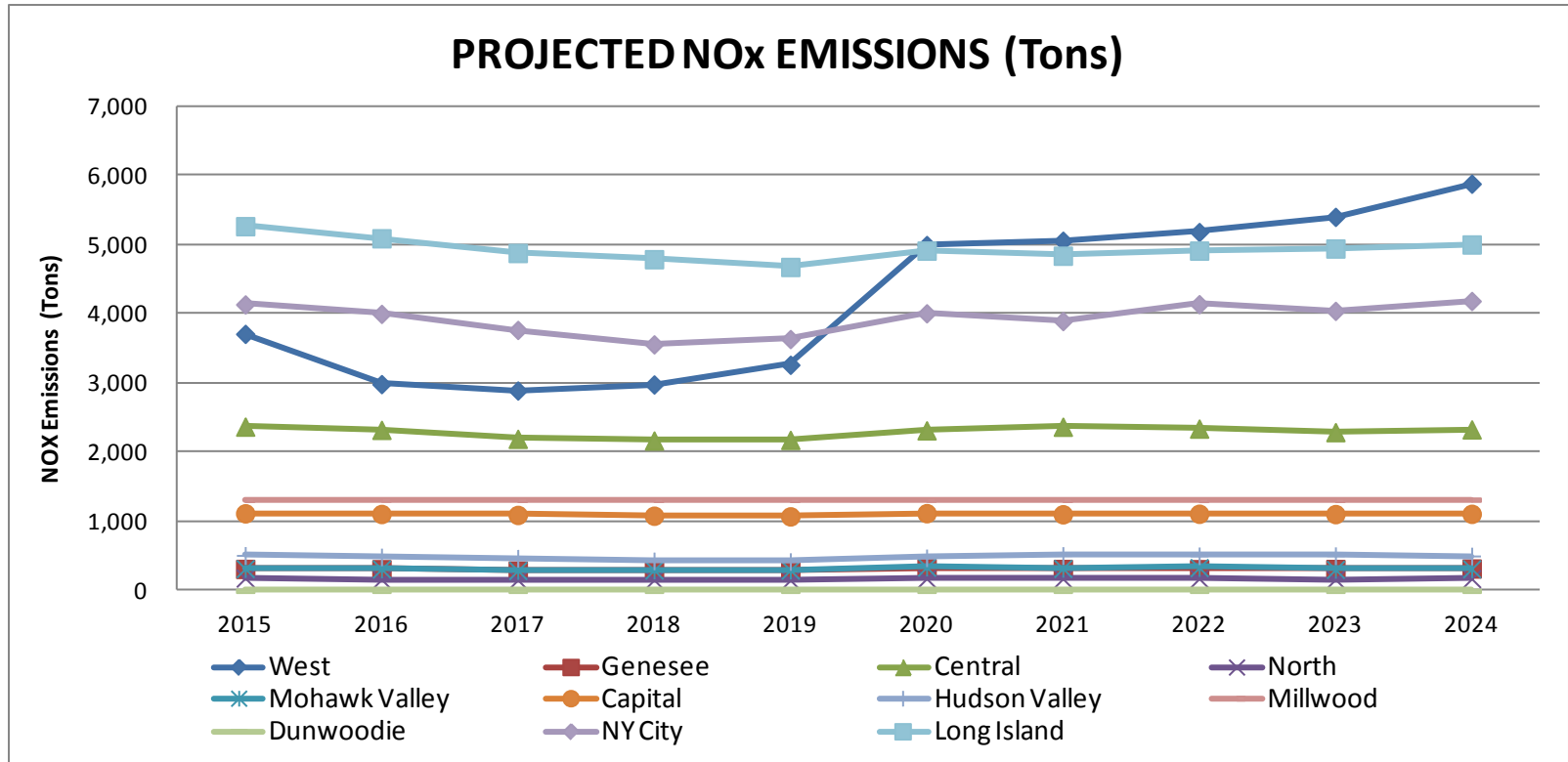
Projected SO₂ Emission Costs (\$M)



Projected NO_x Emissions (Tons)

NO _x Emissions (Tons)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	3,715	2,988	2,896	2,983	3,268	4,999	5,061	5,187	5,406	5,885
Genesee	317	313	293	300	292	328	316	313	315	322
Central	2,374	2,327	2,198	2,173	2,182	2,320	2,372	2,345	2,294	2,333
North	184	165	158	159	155	177	175	177	166	175
Mohawk Valley	321	315	294	301	300	342	323	336	309	318
Capital	1,120	1,111	1,097	1,086	1,076	1,122	1,107	1,114	1,109	1,113
Hudson Valley	513	490	471	433	423	477	512	507	509	504
Millwood	1,315	1,319	1,315	1,315	1,315	1,319	1,315	1,314	1,315	1,318
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	4,141	4,003	3,772	3,563	3,640	4,012	3,900	4,144	4,047	4,190
Long Island	5,272	5,097	4,884	4,794	4,682	4,918	4,844	4,918	4,949	5,007
NYCA Total	19,270	18,128	17,377	17,105	17,332	20,016	19,924	20,355	20,419	21,167

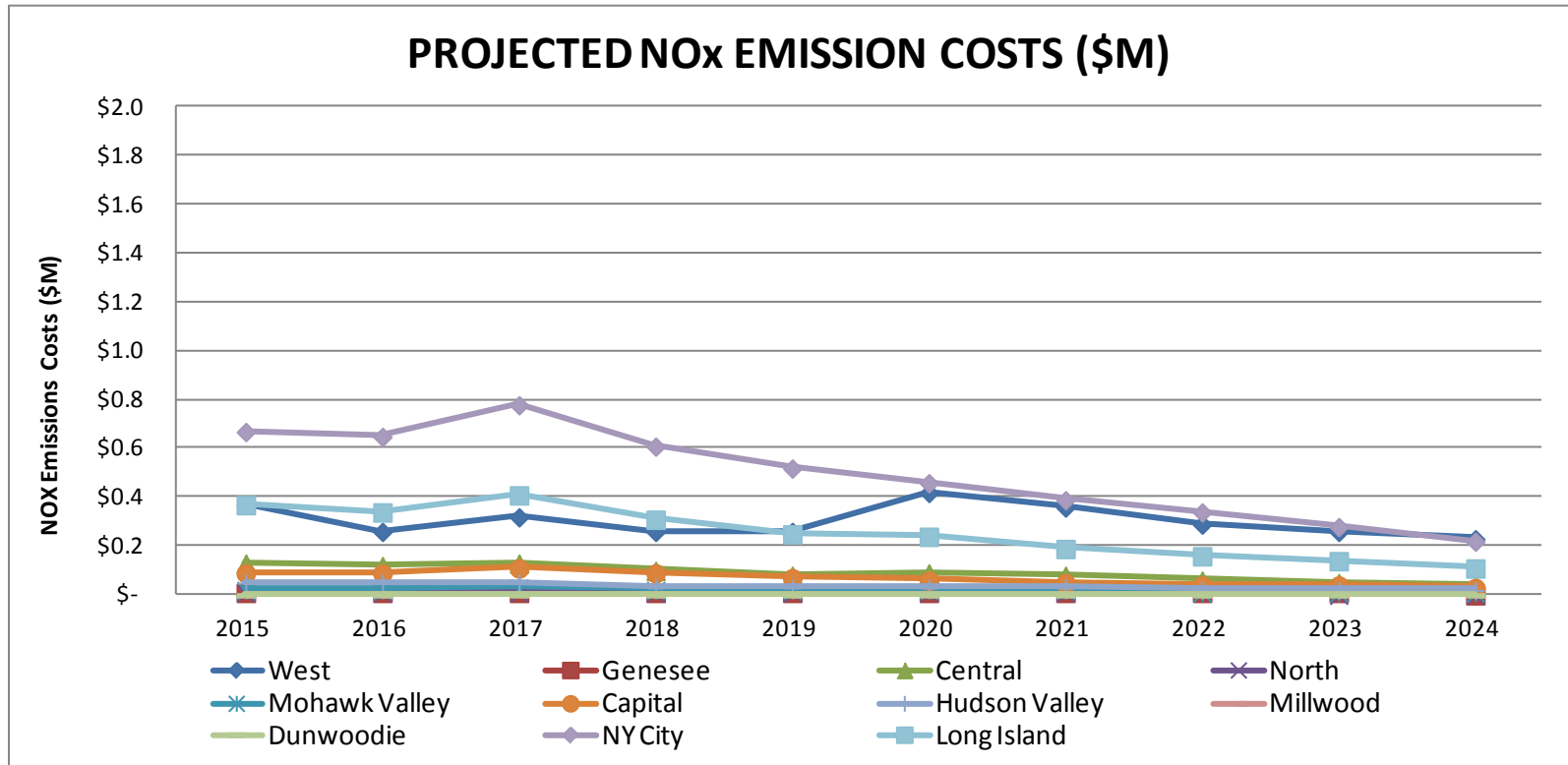
Projected NO_x Emissions (Tons)



Projected NO_x Emission Costs (\$M)

NO _x Emissions Costs (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$0.4	\$0.3	\$0.3	\$0.3	\$0.3	\$0.4	\$0.4	\$0.3	\$0.3	\$0.2
Genesee	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Central	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.0
North	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Mohawk Valley	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Capital	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.1	\$0.0	\$0.0	\$0.0
Hudson Valley	\$0.1	\$0.1	\$0.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Millwood	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Dunwoodie	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
NY City	\$0.7	\$0.6	\$0.8	\$0.6	\$0.5	\$0.5	\$0.4	\$0.3	\$0.3	\$0.2
Long Island	\$0.4	\$0.3	\$0.4	\$0.3	\$0.3	\$0.2	\$0.2	\$0.2	\$0.1	\$0.1
NYCA Total	\$1.7	\$1.5	\$1.8	\$1.4	\$1.2	\$1.3	\$1.1	\$0.9	\$0.8	\$0.7

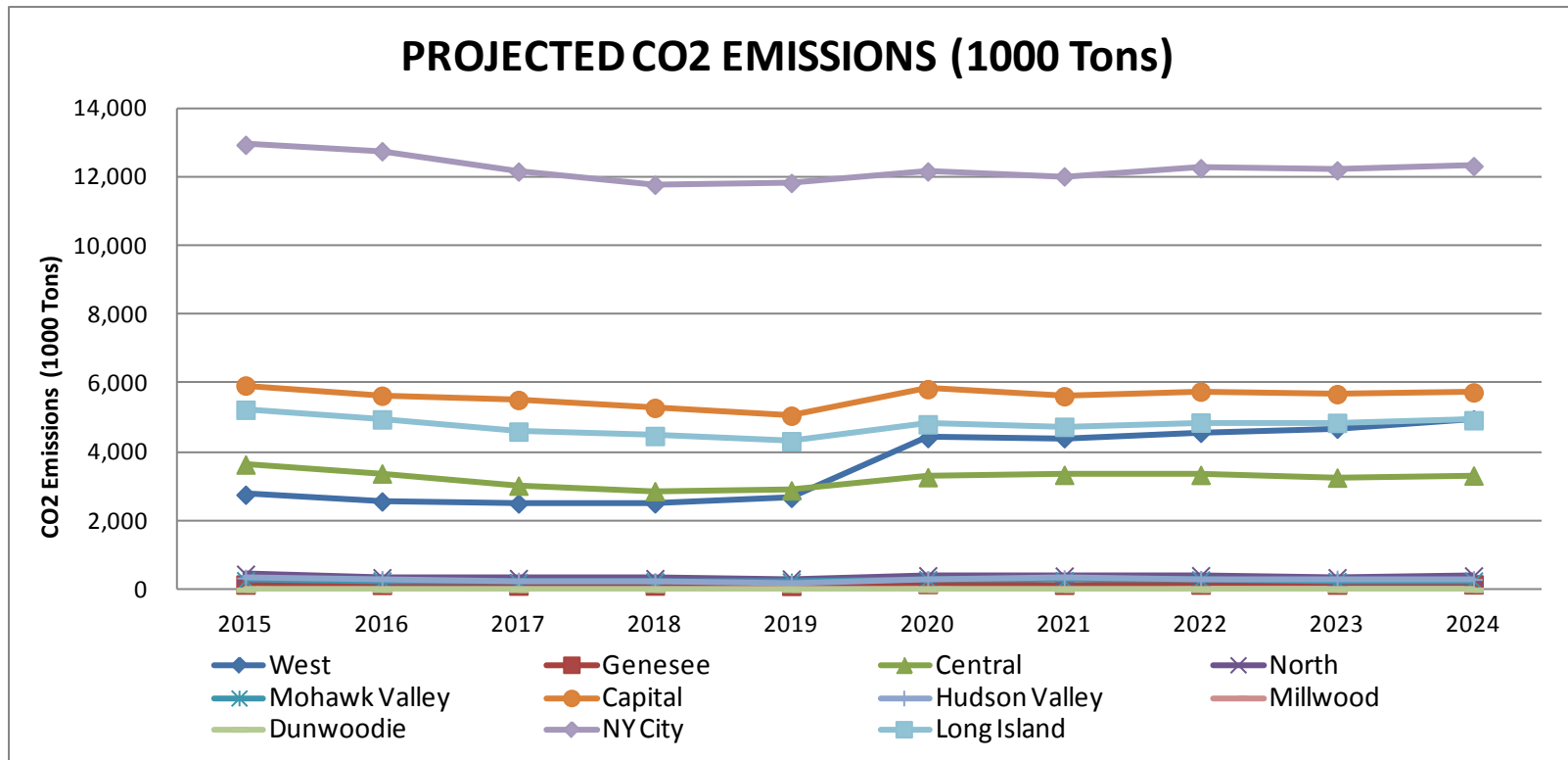
Projected NO_x Emission Costs (\$M)



Projected CO₂ Emissions (1,000 Tons)

CO ₂ Emissions (1000 Tons)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	2,762	2,566	2,508	2,510	2,671	4,408	4,404	4,562	4,681	4,952
Genesee	152	142	121	123	113	167	145	151	150	157
Central	3,640	3,379	3,026	2,864	2,889	3,272	3,340	3,338	3,259	3,321
North	454	352	329	326	314	409	399	411	352	405
Mohawk Valley	267	258	212	233	229	295	266	289	242	256
Capital	5,935	5,639	5,515	5,286	5,058	5,830	5,624	5,758	5,686	5,735
Hudson Valley	342	303	256	208	192	298	326	307	314	300
Millwood	0	0	0	0	0	0	0	0	0	0
Dunwoodie	0	0	0	0	0	0	0	0	0	0
NY City	12,932	12,746	12,154	11,771	11,823	12,158	12,014	12,252	12,190	12,314
Long Island	5,232	4,951	4,597	4,469	4,317	4,809	4,736	4,859	4,850	4,927
NYCA Total	31,715	30,337	28,718	27,791	27,606	31,646	31,255	31,927	31,724	32,368

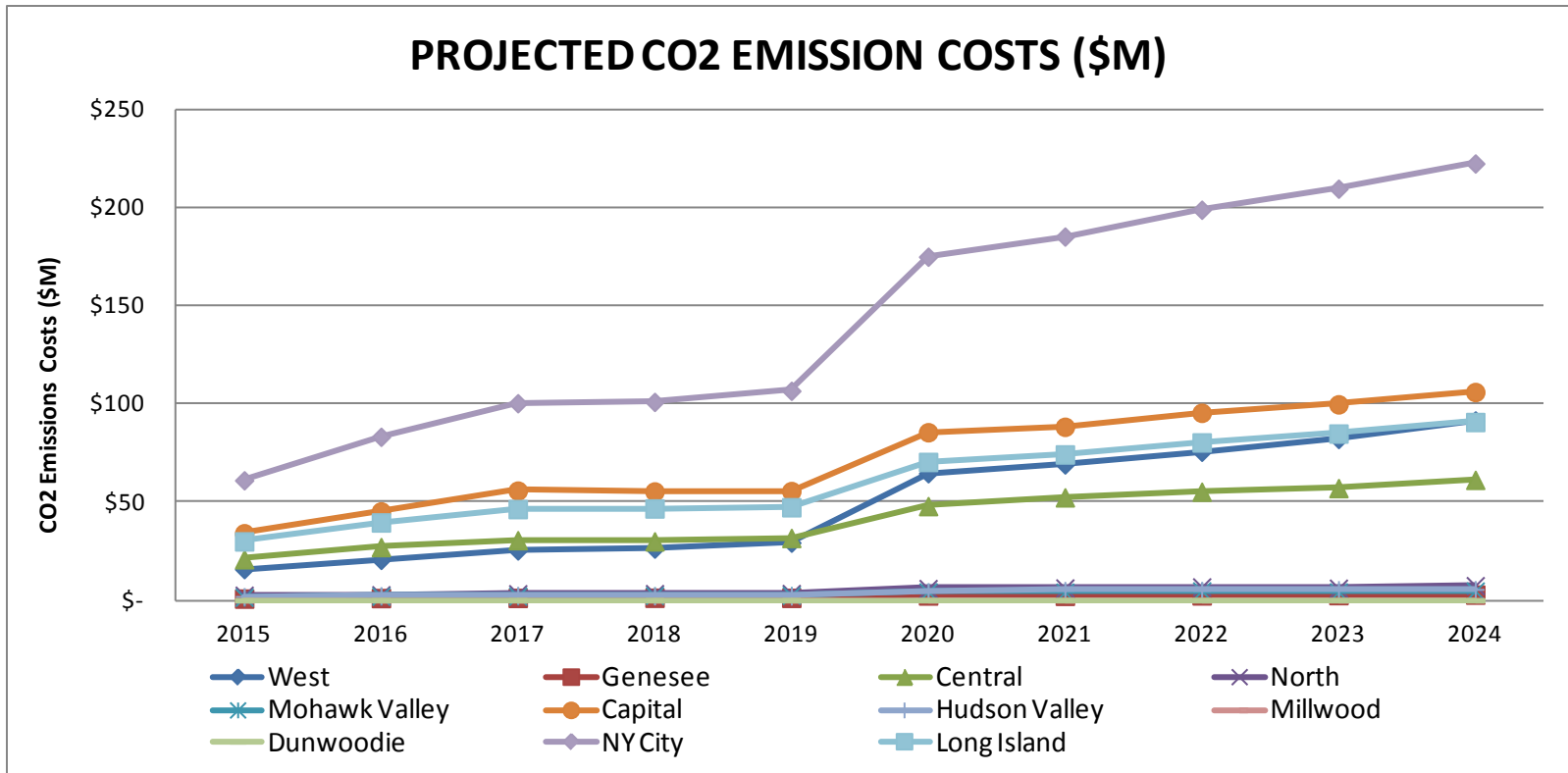
Projected CO₂ Emissions (1,000 Tons)



Projected CO₂ Emission Costs (\$M)

CO ₂ Emissions Costs (\$M)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
West	\$15.9	\$20.6	\$25.4	\$26.3	\$29.4	\$64.7	\$69.2	\$75.6	\$82.1	\$91.5
Genesee	\$0.9	\$1.1	\$1.2	\$1.3	\$1.2	\$2.5	\$2.3	\$2.5	\$2.6	\$2.9
Central	\$20.9	\$27.1	\$30.6	\$30.0	\$31.7	\$48.0	\$52.4	\$55.3	\$57.1	\$61.3
North	\$2.6	\$2.8	\$3.3	\$3.4	\$3.5	\$6.0	\$6.3	\$6.8	\$6.2	\$7.5
Mohawk Valley	\$1.5	\$2.1	\$2.2	\$2.4	\$2.5	\$4.3	\$4.2	\$4.8	\$4.2	\$4.7
Capital	\$34.1	\$45.2	\$55.8	\$55.4	\$55.6	\$85.5	\$88.3	\$95.4	\$99.7	\$106.0
Hudson Valley	\$2.0	\$2.4	\$2.6	\$2.2	\$2.1	\$4.4	\$5.1	\$5.1	\$5.5	\$5.6
Millwood	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Dunwoodie	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
NY City	\$61.1	\$83.2	\$100.3	\$101.0	\$106.6	\$174.9	\$185.1	\$198.8	\$209.5	\$222.3
Long Island	\$30.0	\$39.6	\$46.4	\$46.8	\$47.4	\$70.4	\$74.2	\$80.3	\$84.9	\$90.7
NYCA Total	\$169.0	\$224.2	\$267.8	\$268.7	\$280.0	\$460.6	\$487.0	\$524.6	\$551.8	\$592.5

Projected CO₂ Emission Costs (\$M)



The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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