

# 2023-2042 System & Resource Outlook Update

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Manager, Long Term Assessments

**Electric System Planning Working Group (ESPWG)**

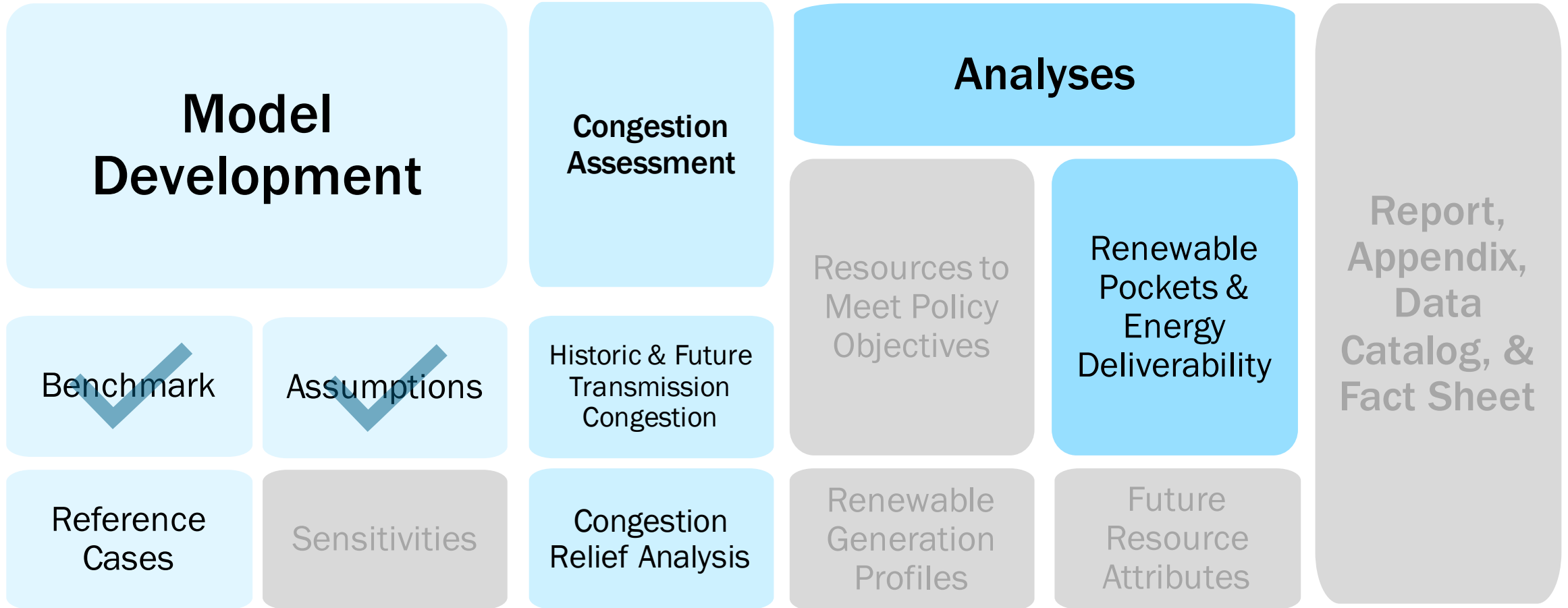
February 22, 2024, NYISO

# Agenda

- **Scope & Schedule Review**
- **Reference Case Updates**
  - Base & Contract Case Results
  - Contract Case
  - Policy Case
- **Next Steps**
- **Outlook Data Catalog**
- **Appendix**
  - Contract Case Timeline
  - Final Base & Contract Case Results

# Scope & Schedule Review

# System & Resource Outlook Scope



# Preliminary Targeted Study Schedule

2024 Q1	Month	January					February				March			
	Week	1	2	3	4	5	1	2	3	4	1	2	3	4
	Benchmarking													
	Assumptions Development													
	CapEx Model Development	X	X	X	X	X	X	X	X	X				
	CapEx Results & Analyses						X	X	X	X	X	X	X	X
	Production Cost Model Development	X	X	X	X	X	X	X	X	X	X	X	X	X
	Production Cost Results & Analyses	X	X	X	X	X	X	X	X	X	X	X	X	X

2024 Q2	Month	April					May				June			
	Week	1	2	3	4	5	1	2	3	4	1	2	3	4
	CapEx Model Development													
	CapEx Results & Analyses													
	Production Cost Model Development													
	Production Cost Results & Analyses	X	X											
	Report	X	X	X	X	X	X	X	X	X	X	X	X	X

# Base & Contract Case Results

# Final Base & Contract Case Results

- The 2023-2042 Outlook Base and Contract cases were re-run with updates to more accurately reflect the amount of offshore wind energy expected in ISO NE
- Updated results for both reference cases are included in the appendix
- Overall, the trends remain the same compared to previously presented results with the primary differences being:
  - Increased exports from NYISO to ISO NE
  - Increased generation in Capital, NYC, and Long Island

# Contract Case

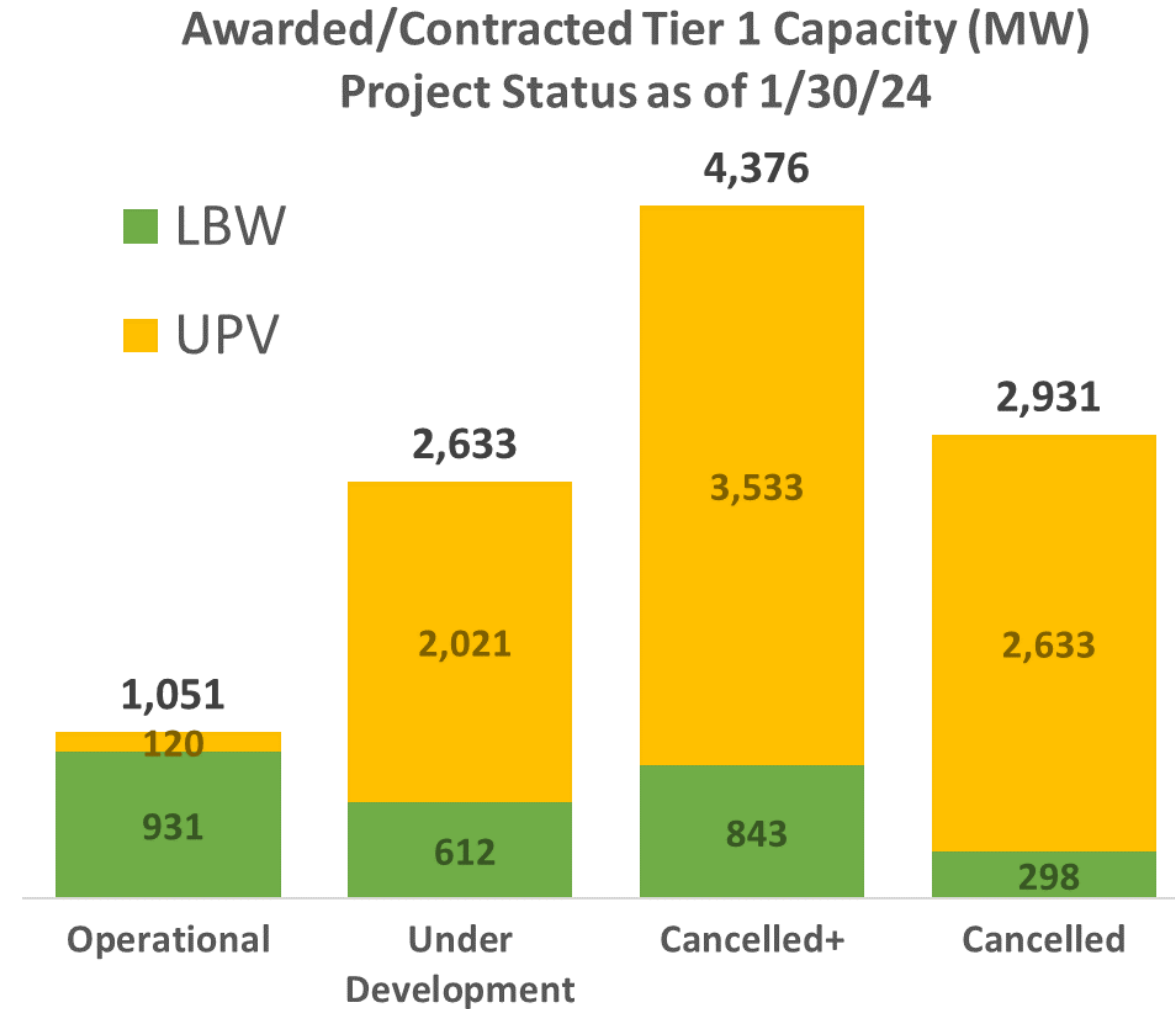


# Contract Case Updates

- **Address stakeholder feedback**
  - Quantify awarded resources assumed in the Contract Case
  - Detailed timeline is included in the Appendix
- **Preliminary results for transmission relaxation analysis**
- **Address next steps**

# Tier 1 REC Contract Status

- Tier 1 total awarded projects represent nearly 11 GW
- Projects status of “Cancelled+” means that the project:
  - (1) is identified in the LSR database as “Cancelled, subject to providing replacement contract security,”
  - (2) has an executed Mutual Termination Agreement, and
  - (3) is expected to rebid in the 2023 or 2024 Tier 1 REC solicitation
- All “Cancelled” and “Cancelled+” projects were listed as “Under Development” in October



<https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/data>

# OREC Contact Status

- OSW awards through NYSERDA represent nearly 8.3 GW
- CES Annual Progress Report and LSR Database both report OREC contract status

Offshore Wind						
OSW Project	Capacity (MW)	Solicitation	Expected COD	Zone (POI)	January 30, 2024 NYSERDA LSRDB	January 31, 2024 CES Annual Progress Report
South Fork	132	2017 LIPA	2023	K (LIPA Buell)	N/A	Under construction
Empire 1	816	2018 OREC	2026	J (Gowanus)	Under Development	Rebid in ORECRFP23-1
Sunrise	924	2018 OREC	2025	K (Holbrook)	Under Development	Rebid in ORECRFP23-1
Empire 2	1,260	2020 OREC	2027 Q4	K (Barrett)	Cancelled	Conditional Termination Agreement signed
Beacon 1	1,230	2020 OREC	2028	J (Astoria)	Cancelled	Conditional Termination Agreement signed
Attentive Energy One	1,404	2022 OREC	2030	J (Ravenswood)	N/A	Under Development
Community 1	1,314	2022 OREC	2030	J (ConEd BCEH)	N/A	Under Development
Excelsior	1,314	2022 OREC	2030	K (East Garden City)	N/A	Under Development
NYCA	8,394					

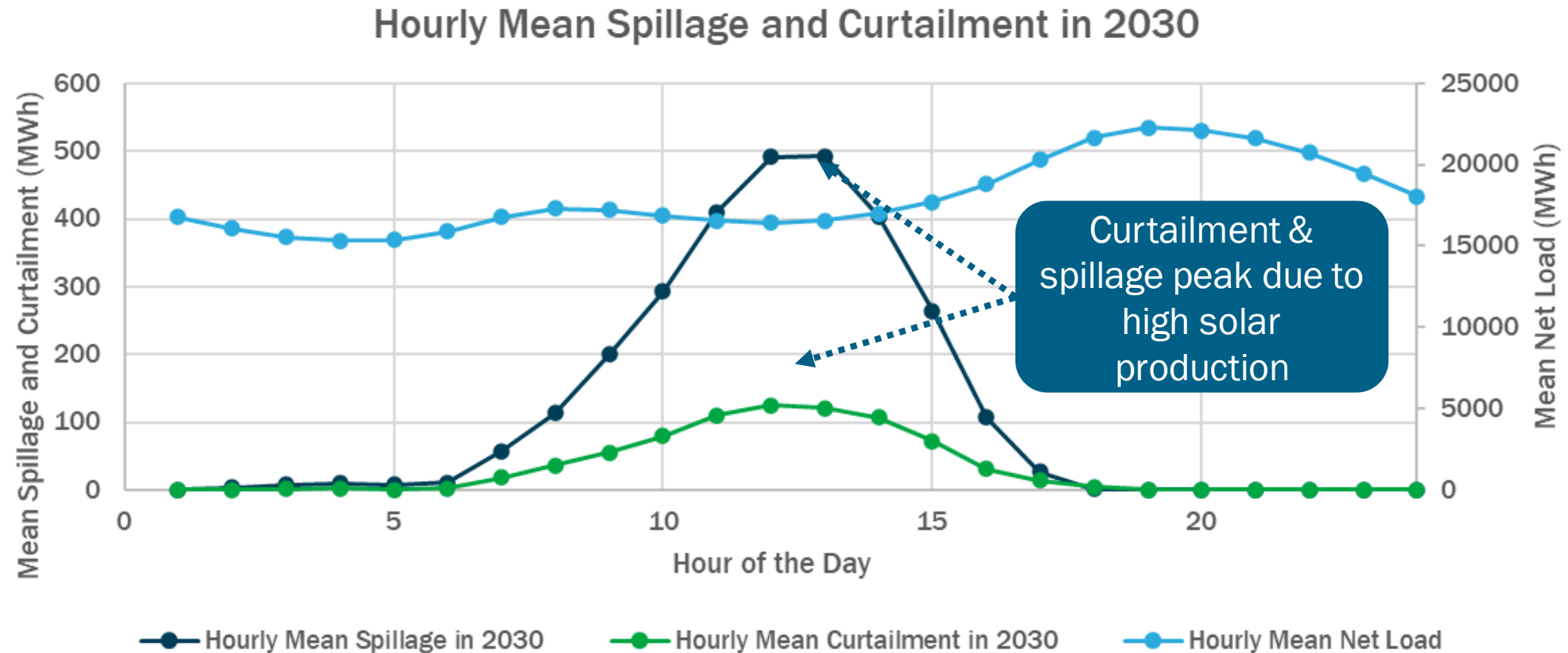
# Transmission Relaxation Analysis

- **The transmission relaxation analysis for the Contract Case assumes that all NYCA internal lines and interface ratings are relaxed (i.e., unbounded, “copper sheet”)**
  - This analysis is intended to measure the impact of transmission constraints on renewable energy curtailment and other metrics
  - Note that inter-pool tie lines still enforce limits as well as hurdle rates

# Relaxation Case Spillage and Curtailment

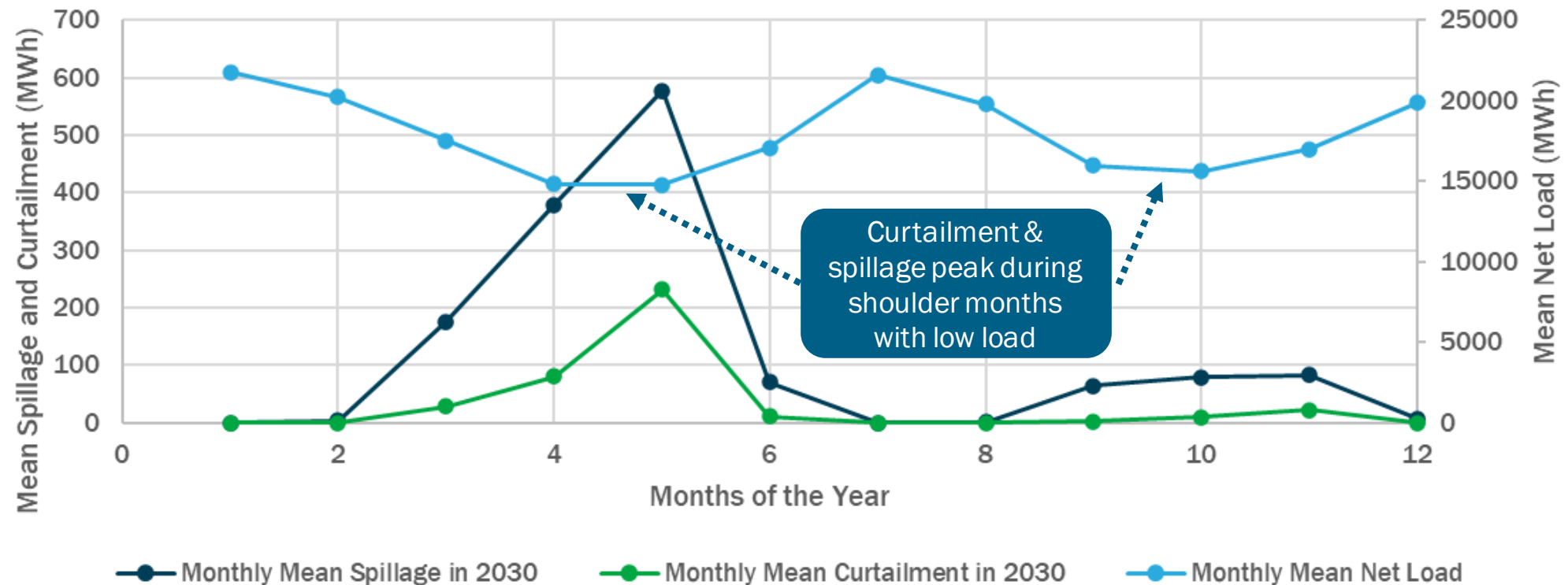
- **Spillage: Sum of Scheduled Generation minus Net Load**
  - Net load is the gross load minus behind the meter solar generation
  - Utility scale solar, land-based wind, offshore wind, run of river hydro, and nuclear generation were considered for this analysis
  - Spillage is calculated from a spreadsheet analysis. Imports/exports are not considered
- **Curtailment: Scheduled Generation minus Actual Generation**
  - Generators can be forced to lower their output by a combination of low loads levels and congested transmission lines
  - Curtailment is calculated in production cost simulations

# Relaxation Case Hourly Mean Spillage and Curtailment



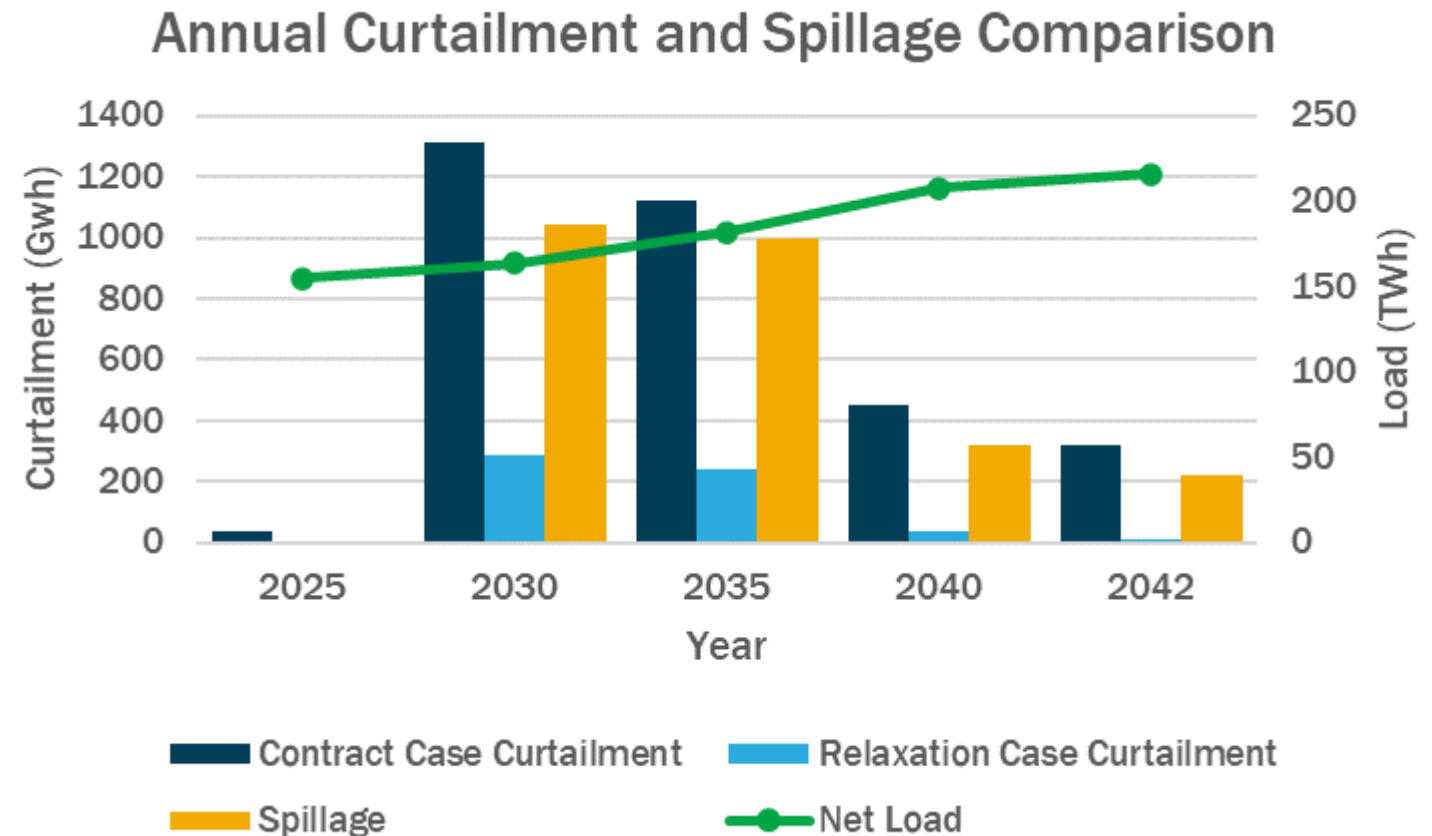
# Relaxation Case Monthly Mean Spillage and Curtailment

Monthly Mean Spillage and Curtailment in 2030



# Contract Case and Relaxation Case Annual Curtailment Comparison

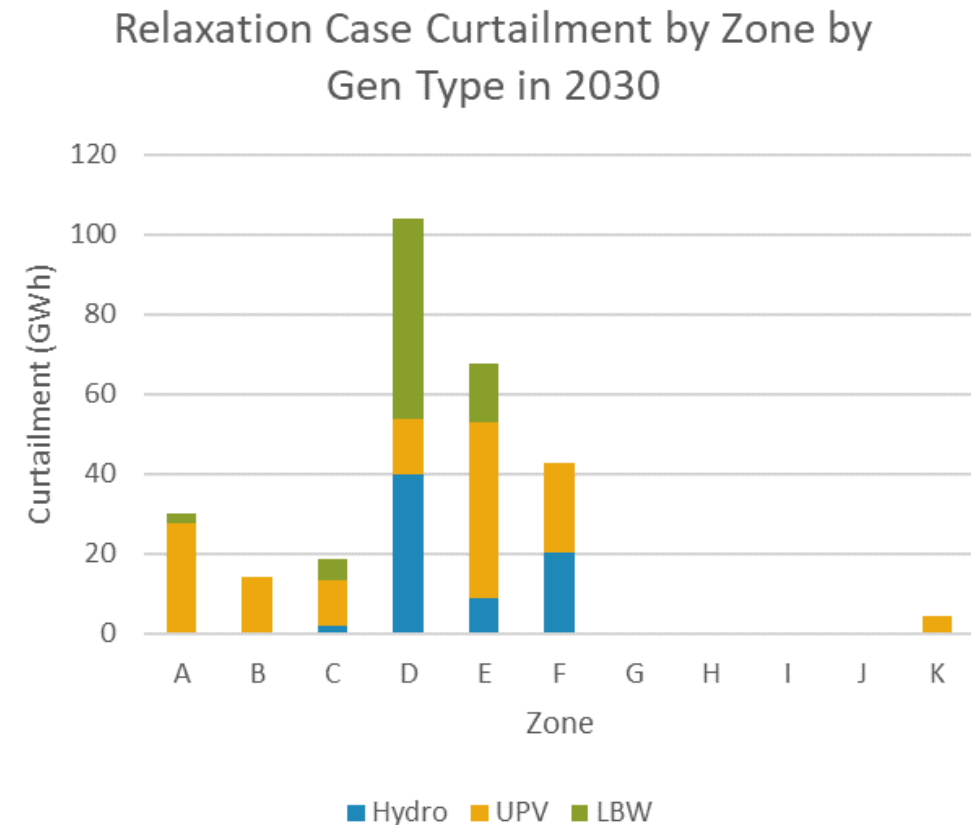
- Transmission relaxation results in significant decreases in curtailment
- Both cases exhibit an increase in curtailment as awarded resources come online as compared to the Base Case
- As load increases overtime, both curtailment and spillage decrease



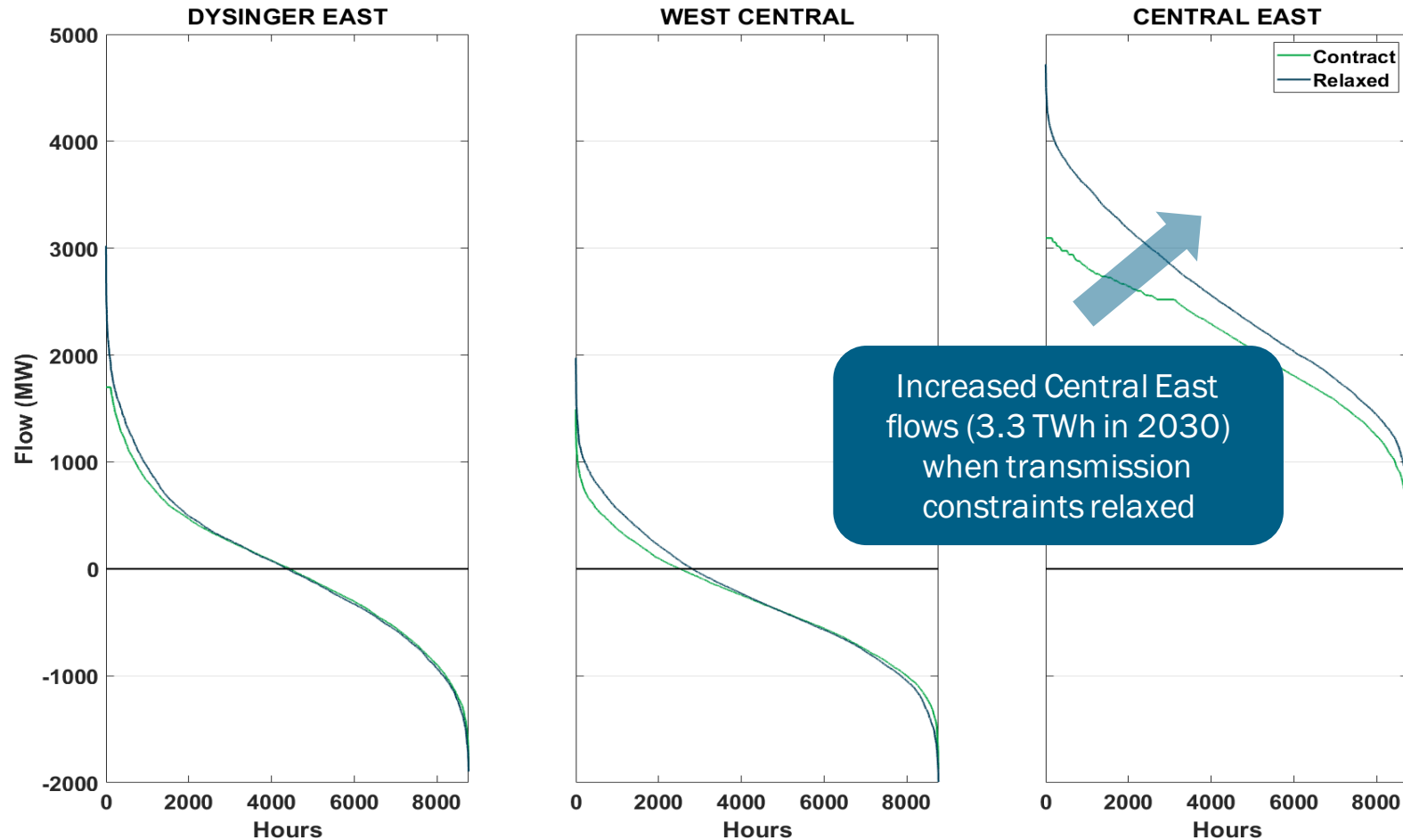


# Relaxation Case Zonal Curtailment

- Zones with lower load and higher renewable penetration exhibit higher curtailment levels
- The magnitude of curtailment in a zone is correlated with the sum of scheduled generation within that zone
- The distribution of curtailment between the gen types is also correlated with zonal scheduled generation of each generation type

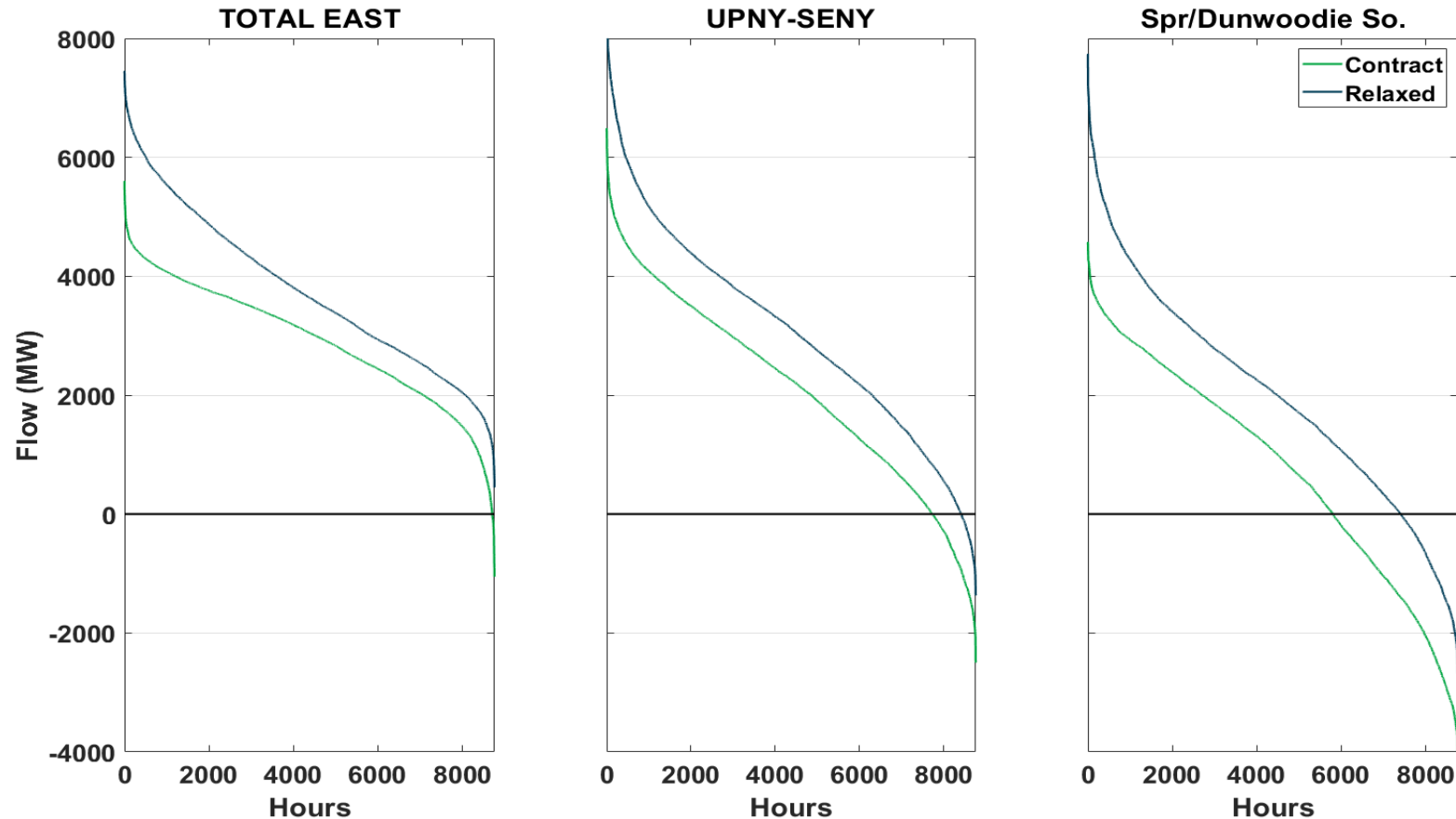


# Relaxation Case Flows Across Major Interfaces



- Flows are generally higher in the Relaxation Case across all interfaces.

# Relaxation Case Flows Across Major Interfaces



- Flow increase is more prominent in interfaces that show upstate to downstate transfers

# Contract Case: Next Steps

- Return to ESPWG with preliminary results for renewable pocket analysis
- See here for 2021-2040 renewable pocket analysis: [link](#)

# Policy Case

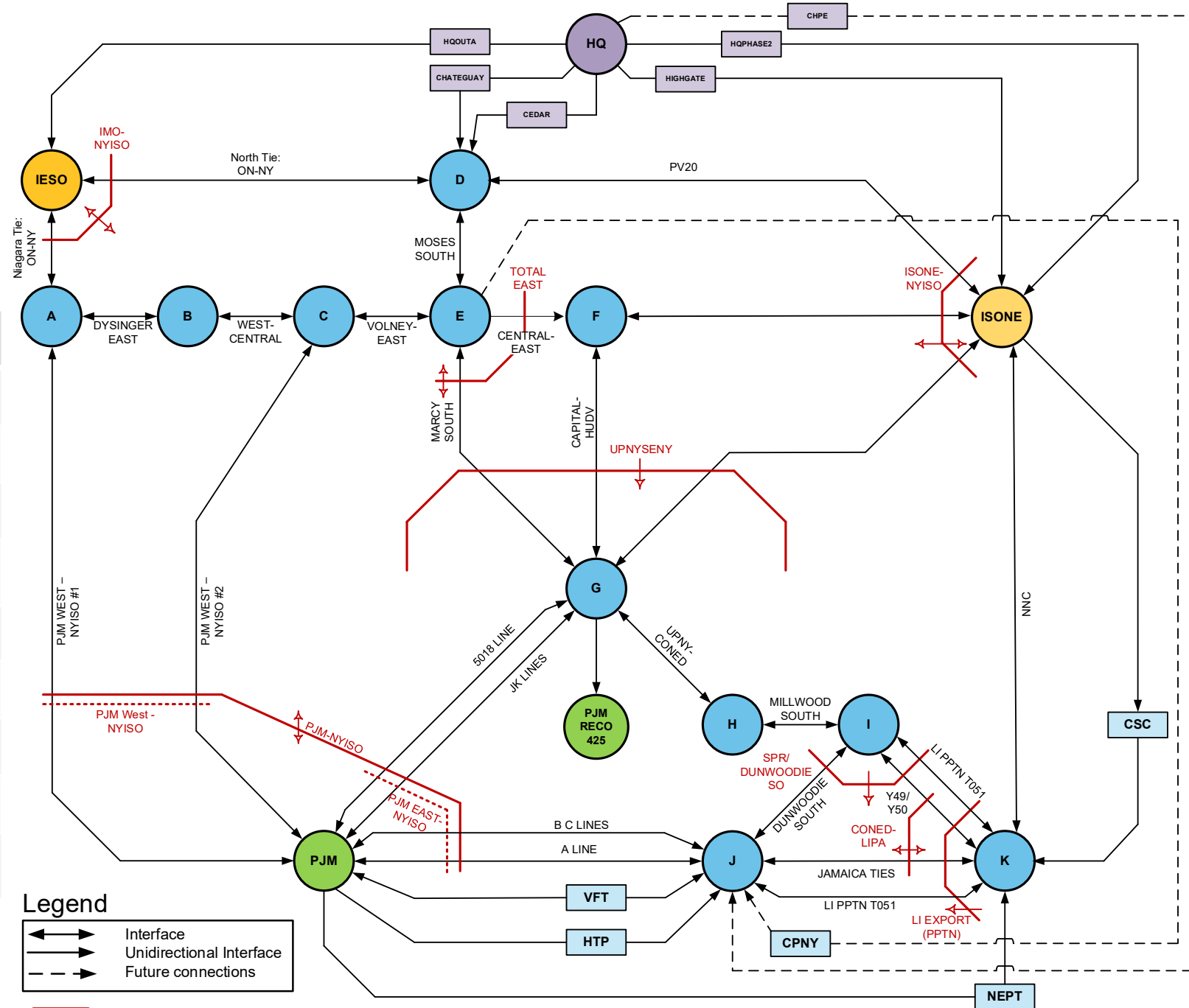
# Policy Case Updates

- **Address stakeholder feedback on details for capacity expansion model implementation**
  - Capacity expansion model topology
  - Generator firm capacity (i.e., UCAP)
- **Address next steps**

# Capacity Expansion Model: Pipe & Bubble Representation

Interface	2023 Limits (MW)	Source
Dysinger East	1700	2020 ATR
West Central	575	2020 ATR
Moses South *	2325	2020 ATR
Central East	3785	2023 Central East Voltage Limit Study
Total East	6175	2020 ATR
UPNY-SENY	6325	2020 ATR
UPNY-ConEd *	7500	2020 ATR
Clean Path New York	1300	NYSERDA Contract
Champlain Hudson Power Express	1250	NYSERDA Contract

\*Interface limits are assumed to increase through study period consistent with proposed project upgrades



# Generator Firm Capacity

- The assumptions for firm capacity (i.e., UCAP) ratings for existing generators, renewable resources, and battery storage resources are detailed in the capacity expansion assumptions matrix
- The firm capacity assumptions for dispatchable emission free resources are as follows:
  - Lower & Higher Demand Policy Case scenarios: DEFR firm capacity ratings align with default derating factor value for combined cycles from NERC GADS
  - State Scenario: hydrogen powered CC/CT firm capacity rating aligns with fleet average derating factor value from existing CC/CT units
- The final capacity expansion assumptions matrix for the 2023-2042 Outlook will be updated to reflect these assumptions



# Policy Case: Next Steps

- **Finalize scenario development in the capacity expansion model**
  - Lower Demand Policy Case
  - Higher Demand Policy Case
  - State Scenario
- **Return to ESPWG with preliminary results for capacity expansion scenarios**
- **Continue production cost model development for Policy Case scenarios**

# Next Steps

# Next Steps

- **Preliminary renewable pockets analysis for Contract Case**
- **Preliminary capacity expansion model results for Policy Cases**
- **Continue stakeholder engagement**
  - Next presentation: March 1, 2024 ESPWG
  - Post excel spreadsheet with final Base & Contract Case results

# Questions, Comments, & Feedback?

Email additional feedback to:  
SCarkner@nyiso.com  
one week prior the next ESPWG

# 2023-2042 System & Resource Outlook Data Catalog

Report



Report Appendices

<a href="#">Production Cost Model Benchmark DRAFT</a>
<a href="#">Production Cost Assumptions Matrix DRAFT</a>
<a href="#">Capacity Expansion Assumptions Matrix DRAFT</a>

Study Summary



Data Documents

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## Stakeholder Presentations

<a href="#">November 18, 2022</a> <a href="#">2021 Outlook Lessons Learned</a> <a href="#">NYSERDA Outlook Suggestions</a>	<a href="#">December 19, 2023</a> <a href="#">2023-2042 Outlook Reference Case Updates &amp; Preliminary Contract Case Results</a>
<a href="#">June 16, 2023</a> <a href="#">2023-2042 Outlook Kickoff</a>	<a href="#">January 23, 2024</a> <a href="#">2023-2042 Outlook Reference Case Updates</a>
<a href="#">July 17, 2023</a> <a href="#">2023-2042 Outlook Benchmark</a> <a href="#">2023-2042 Outlook Update</a>	<a href="#">February 22, 2024</a> <a href="#">2023-2042 Outlook Reference Case Updates &amp; Final Base &amp; Contract Case Results</a>
<a href="#">August 22, 2023</a> <a href="#">2023-2042 Outlook Preliminary Reference Case Assumptions</a>	
<a href="#">September 21, 2023</a> <a href="#">2023-2042 Outlook Reference Case Assumptions Update</a>	
<a href="#">October 24, 2023</a> <a href="#">2023-2042 Outlook Reference Case Assumptions Update</a>	
<a href="#">November 2, 2023</a> <a href="#">2023-2042 Outlook Reference Case Assumptions Update &amp; Preliminary Base Case Results</a>	
<a href="#">November 21, 2023</a> <a href="#">2023-2042 Outlook Reference Case Updates</a>	

# Our Mission & Vision



## Mission

Ensure power system reliability and competitive markets for New York in a clean energy future



## Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

# Appendix: Contract Case Timeline

# Contract Case Resources

- **October 12, 2023: PSC Order Denying Petitions and NYS 10-Point Action Plan**
- **October 13, 2023: NYSERDA posted updated Large-Scale Renewable Database on OpenNY**
- **October 24, 2023: Awards announced for 2022 Tier 1 REC and OREC RFPs**
- **October 30, 2023: The Contract Case lock-down date**
  - Included awarded/contracted projects that met filter criteria in October 13 LSR database and project awards announced on October 24
- **November 30, 2023: NYSERDA issued expedited solicitations for Tier 1 RECs and ORECs**
- **December 14, 2023: Tier 1 Mutual Termination Agreements due to NYSERDA**
- **January 25, 2024: 2023 OREC solicitation closed, Conditional Termination Agreements due; awards expected February 2024**
  - Proposals received from Community 2, Empire 1, and Sunrise
- **January 30, 2024: NYSERDA posted updated Large-Scale Renewable Database on OpenNY**
- **January 31, 2024: 2023 Tier 1 REC solicitation closed; awards expected April 2024**
  - 60 of the 68 projects which submitted Step One eligibility were previously awarded NYSERDA RECs
  - 51 of the 57 projects which submitted for the Step Two evaluation were previously awarded NYSERDA RECs

<https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/data>

<https://www.nyserdera.ny.gov/All-Programs/Large-Scale-Renewables/RES-Tier-One-Eligibility/Solicitations-for-Long-term-Contracts>

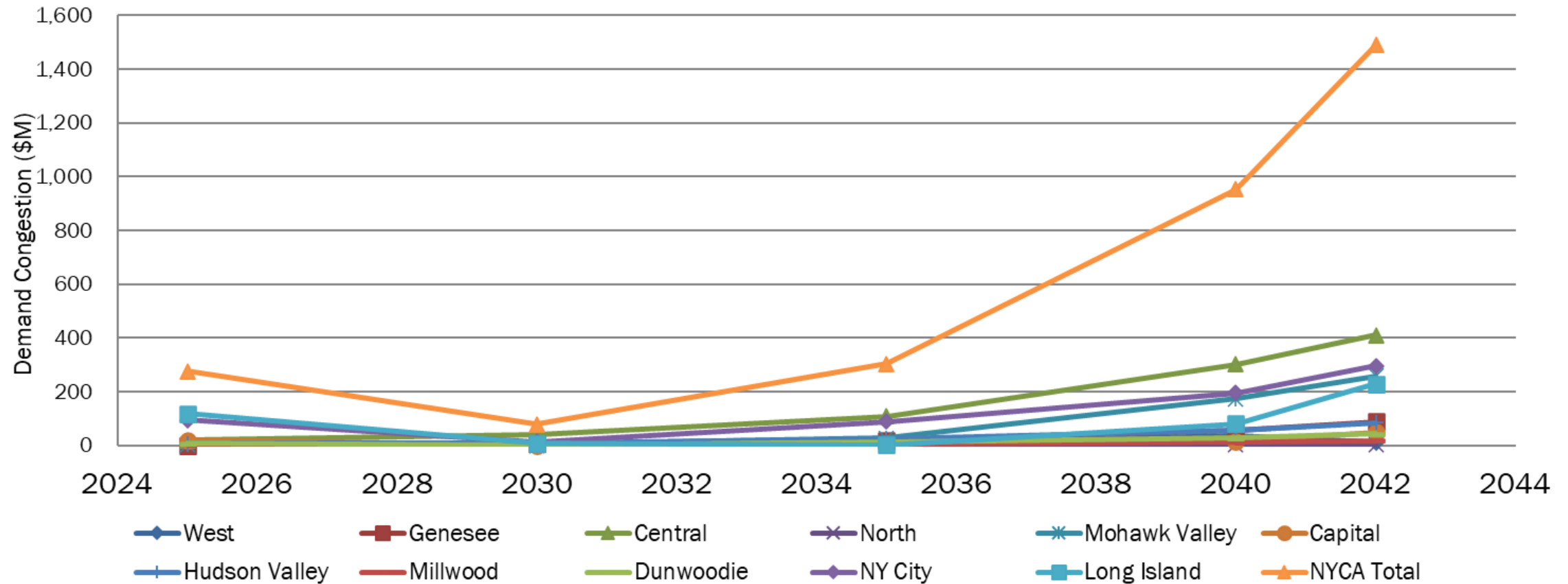
<https://www.nyserdera.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations>

<https://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={D06E618D-0000-C658-AB65-2C21446C29F6}>

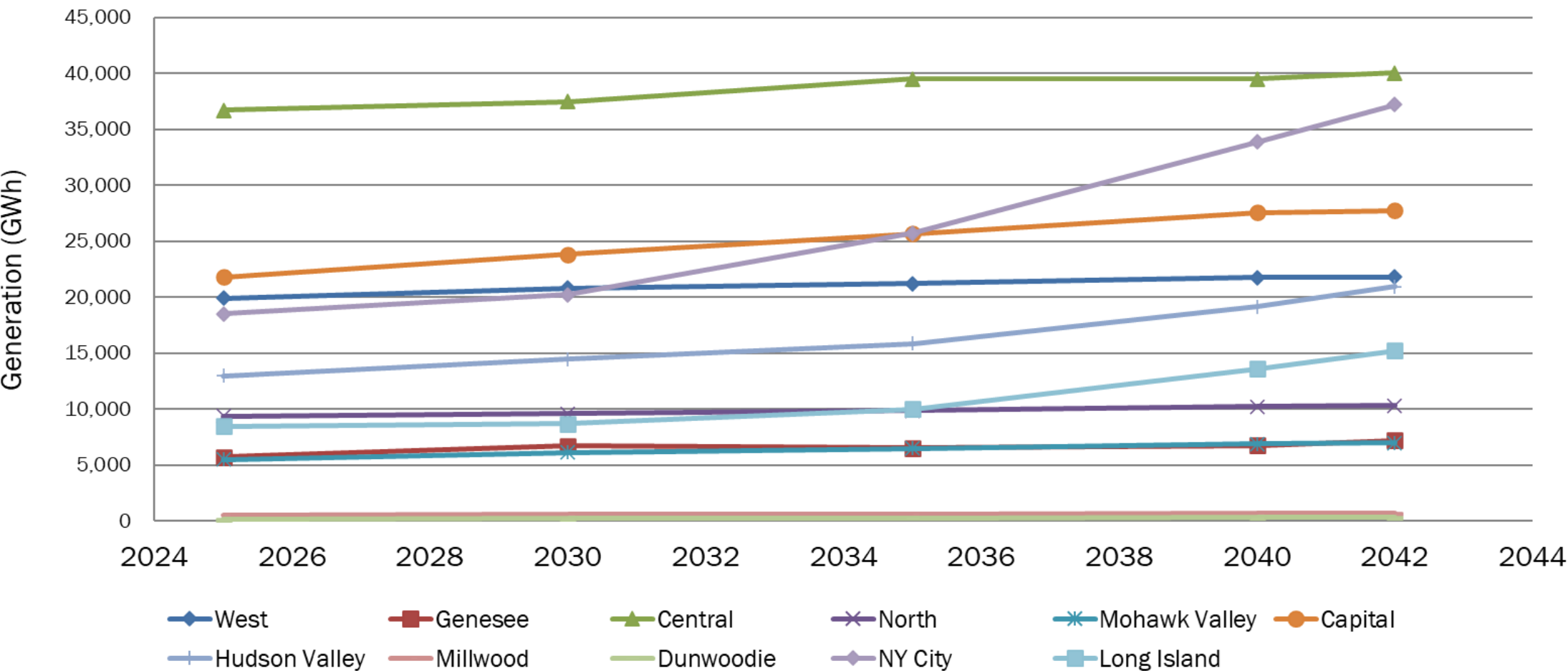


# Appendix: Final Base Case Results

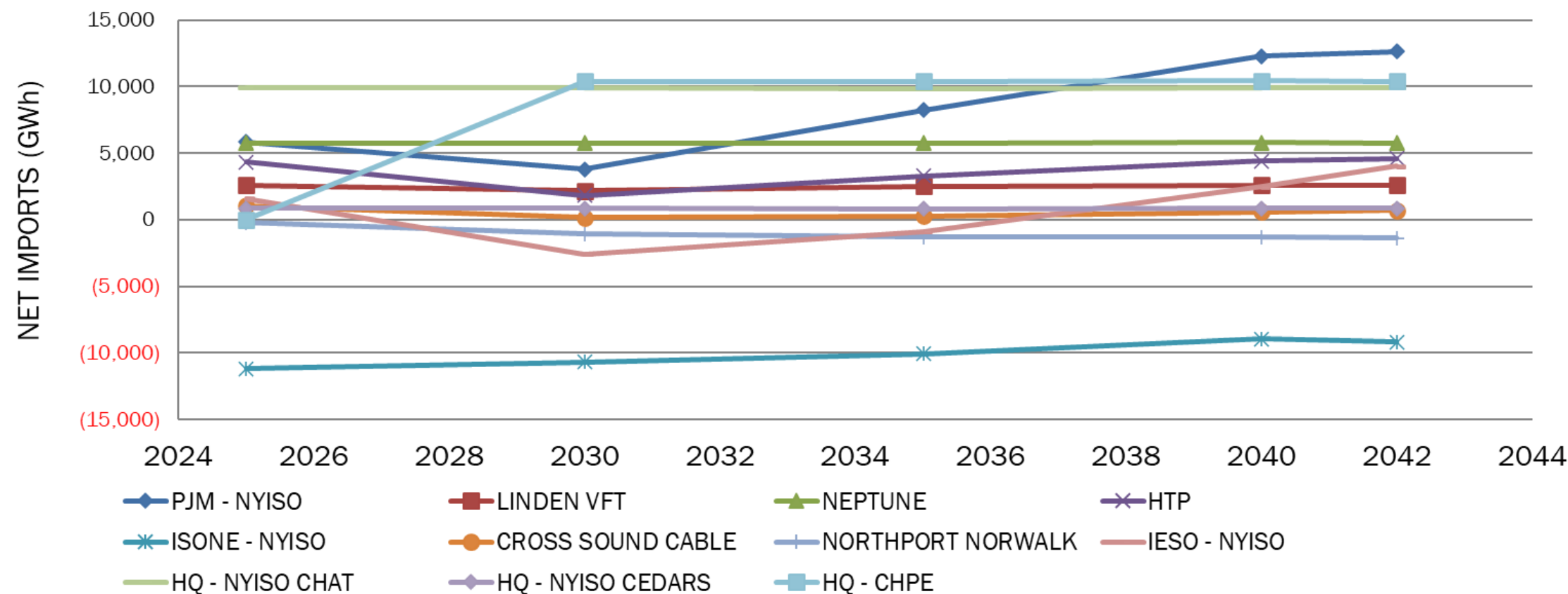
# Zonal Demand Congestion (nominal \$M)



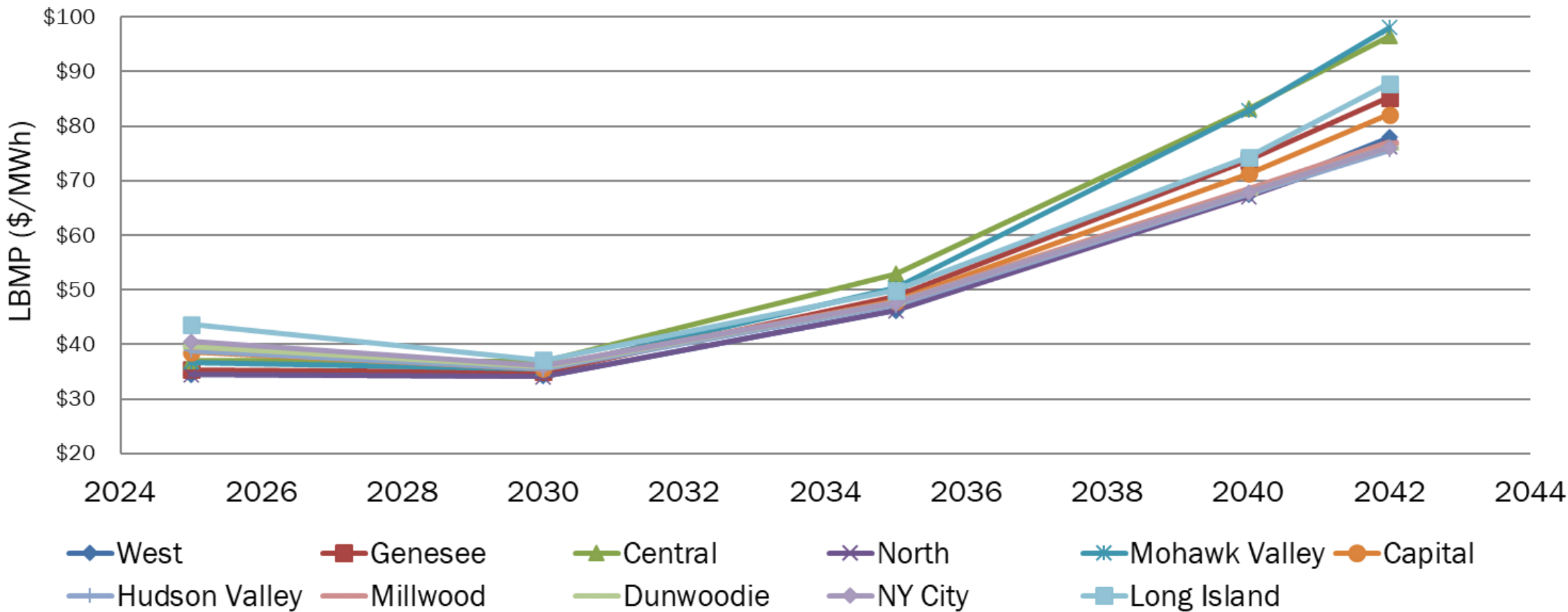
# Zonal NYCA Generation (GWh)



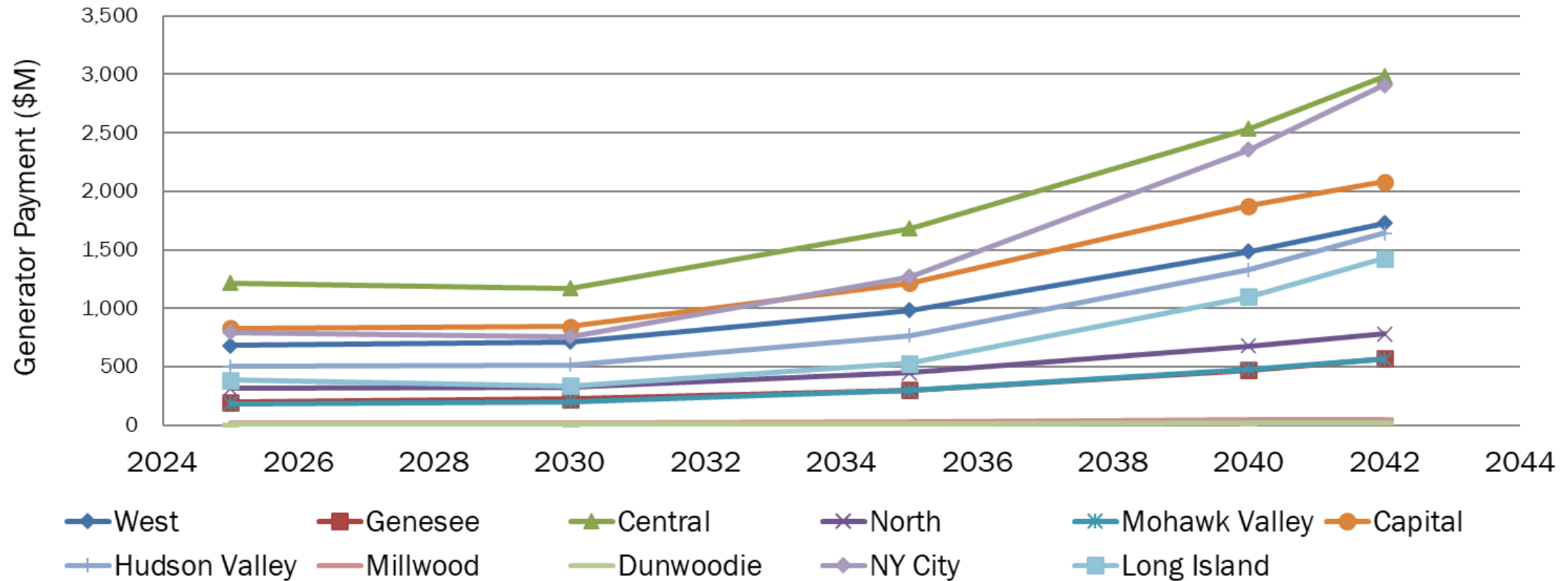
# Projected Net Imports (GWh)



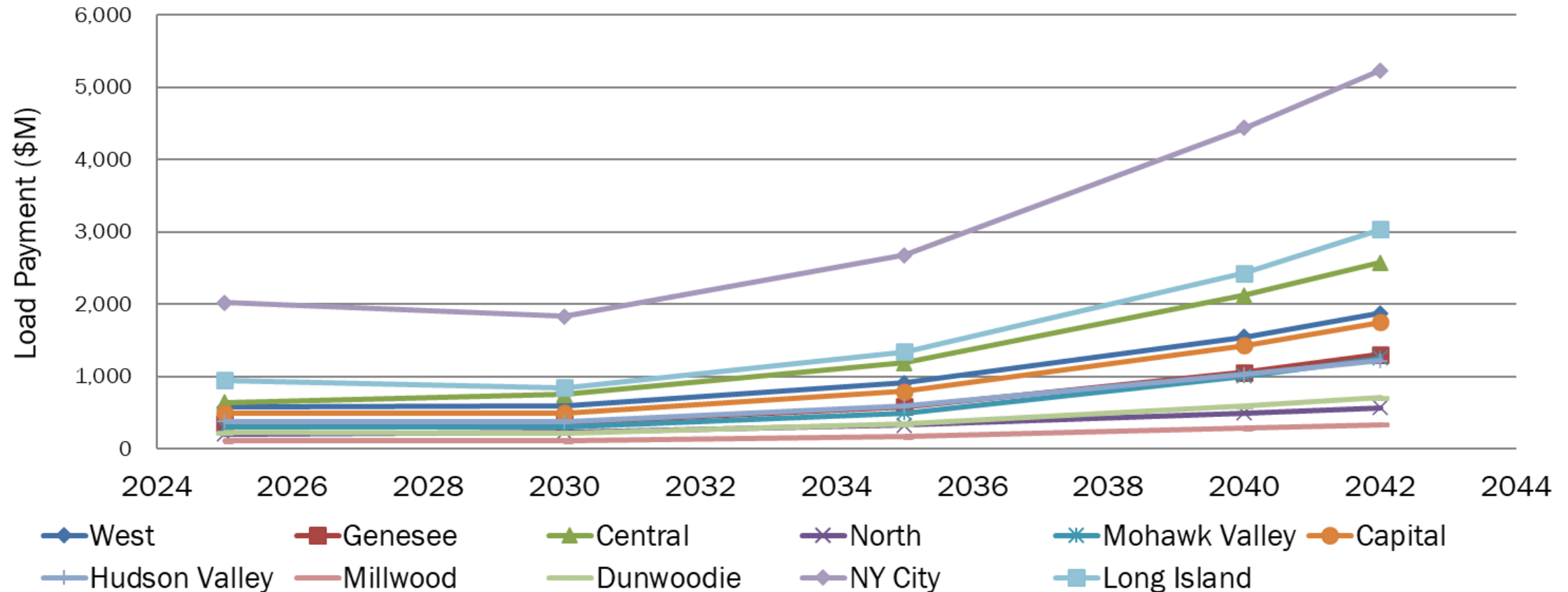
# Zonal NYCA LBMP (\$/MWh)



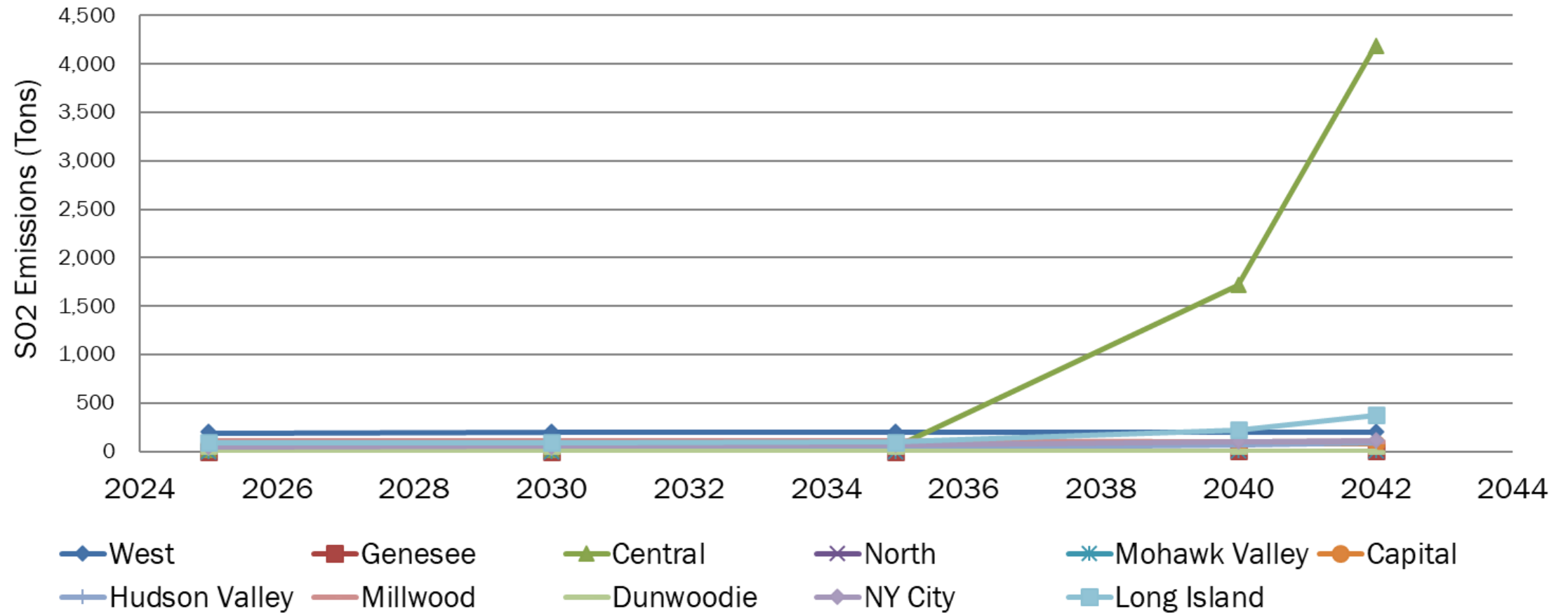
# Zonal Generator Payments (nominal \$M)



# Zonal Load Payments (nominal \$M)

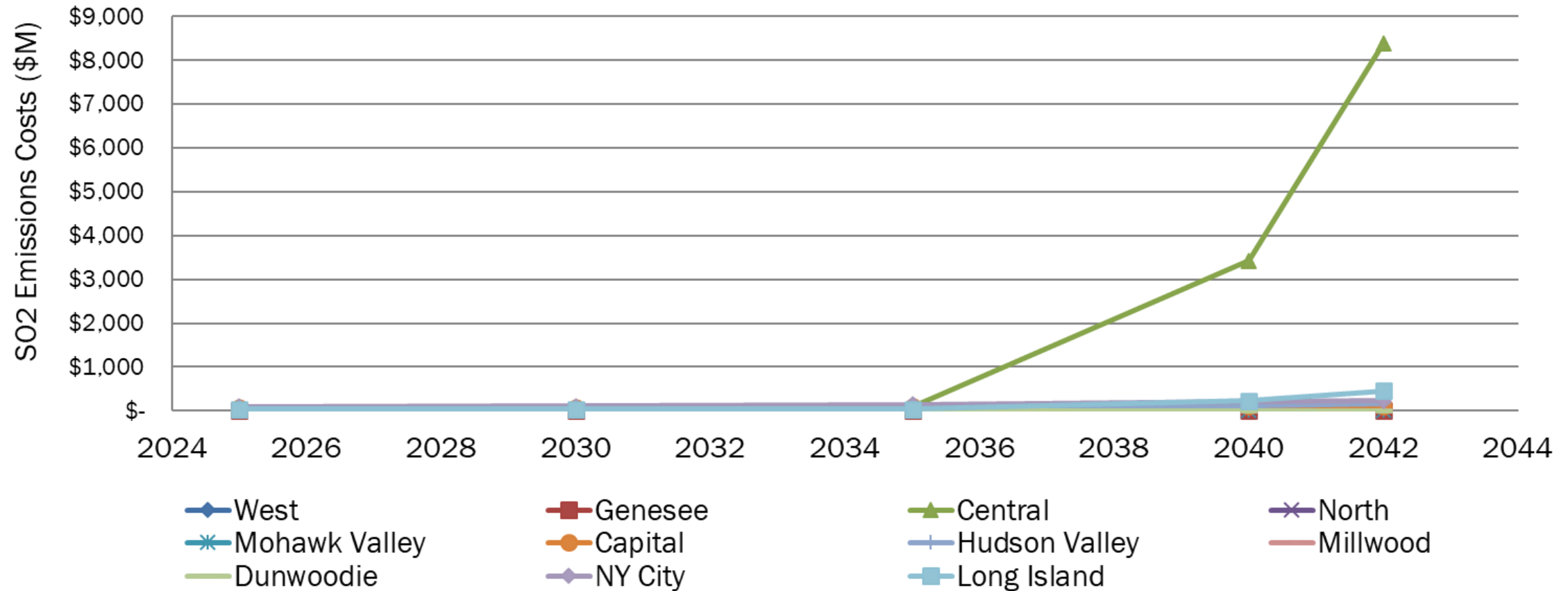


# Zonal SO<sub>2</sub> Emissions (Tons)

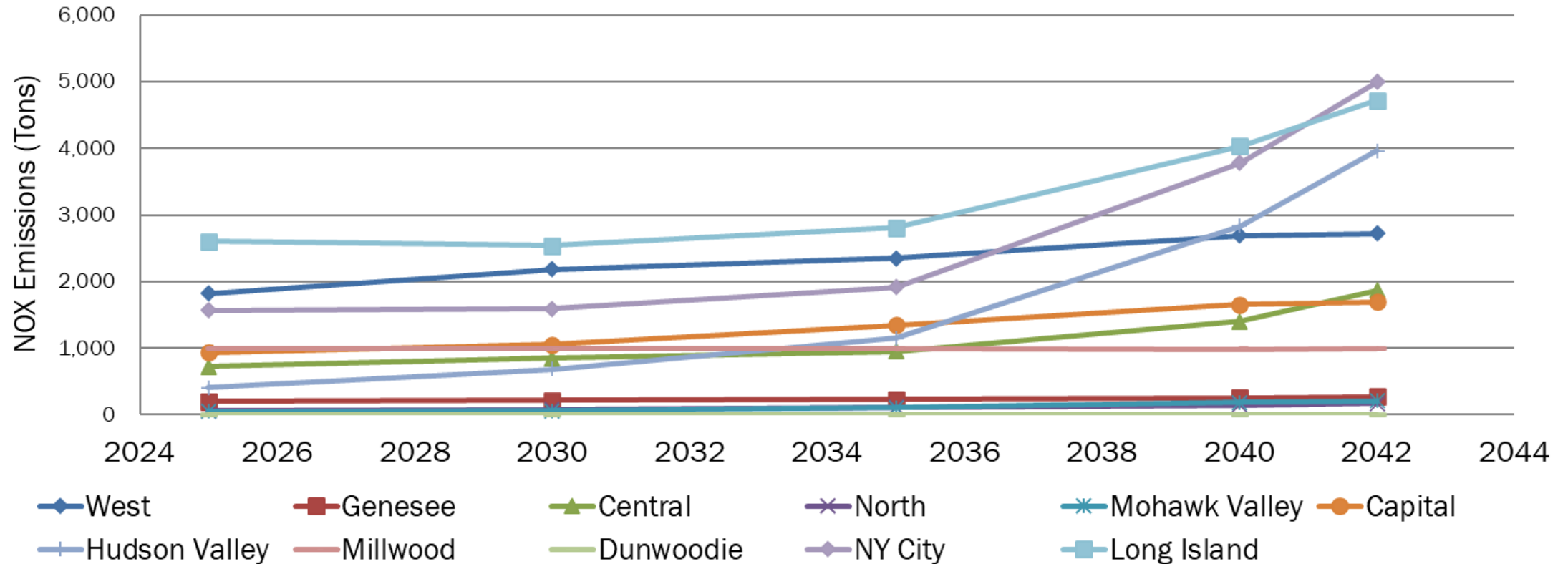




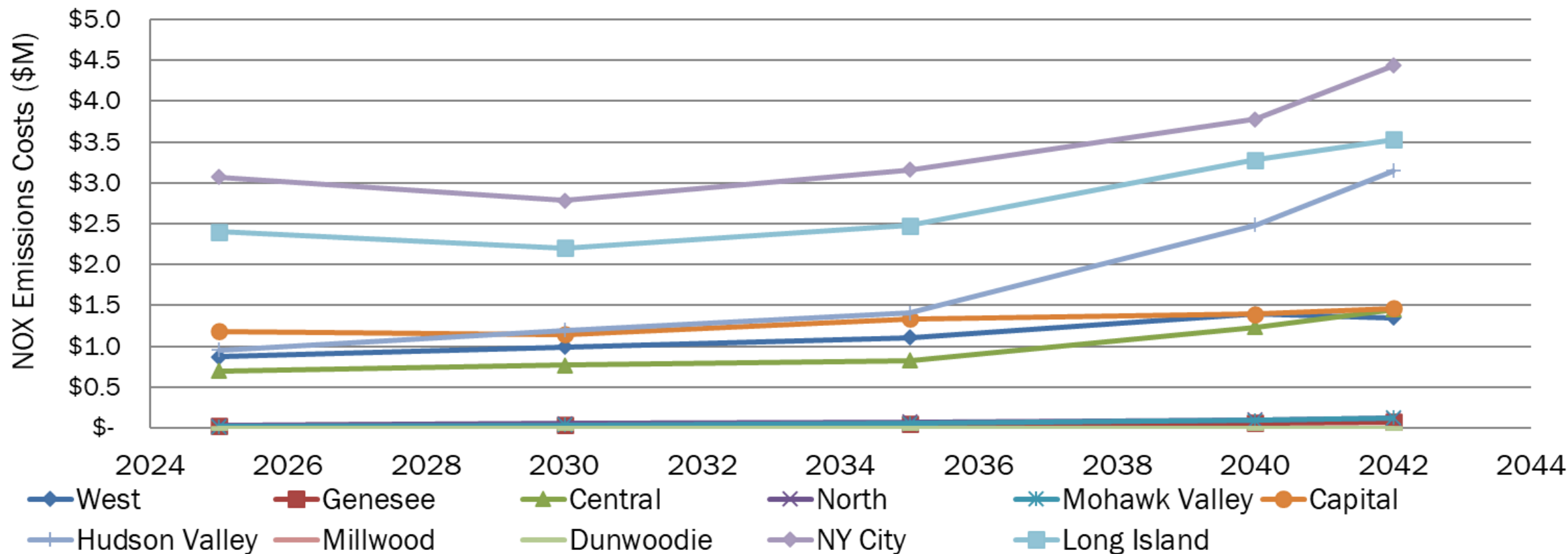
# Zonal SO<sub>2</sub> Emissions Costs (nominal \$)



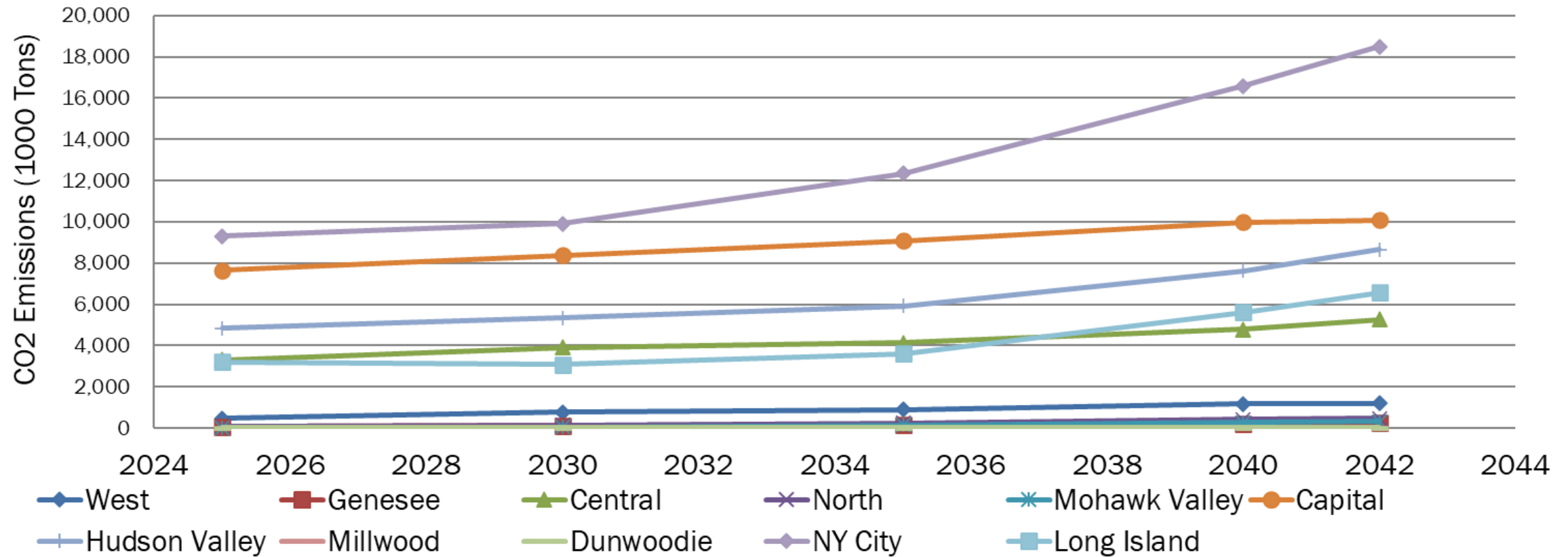
# Zonal NO<sub>x</sub> Emissions (Tons)



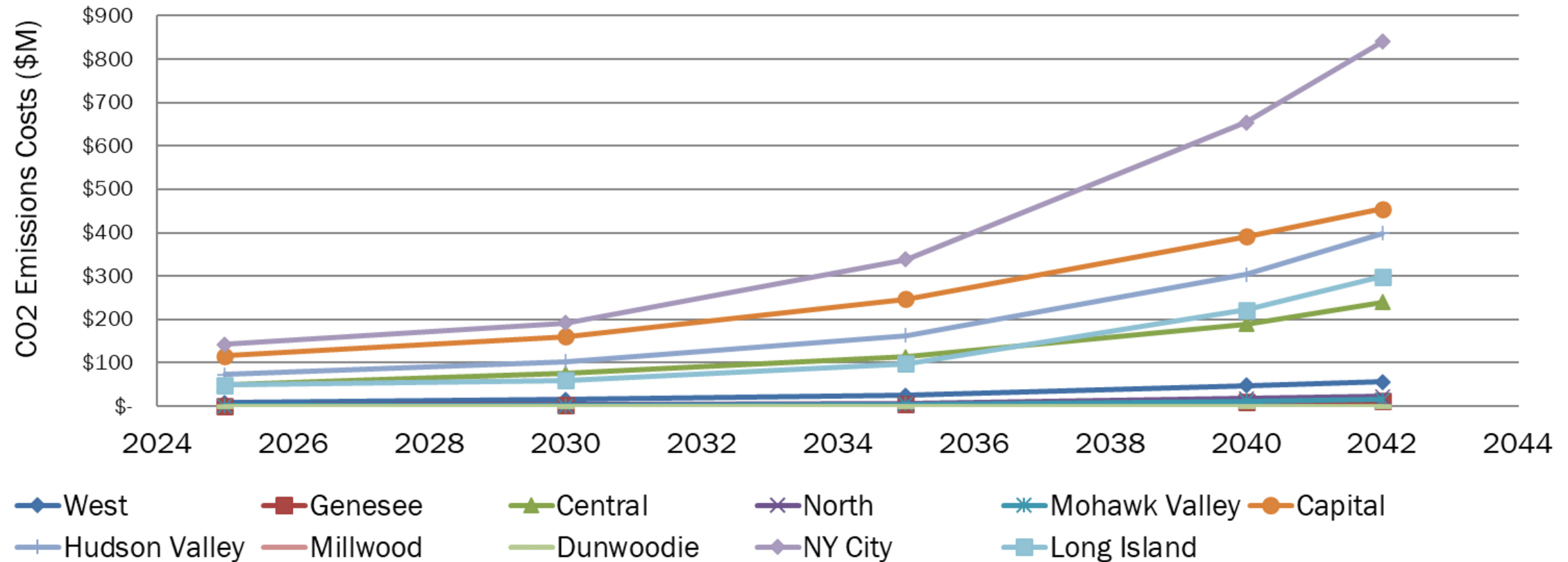
# Zonal NO<sub>x</sub> Emissions Costs (nominal \$M)



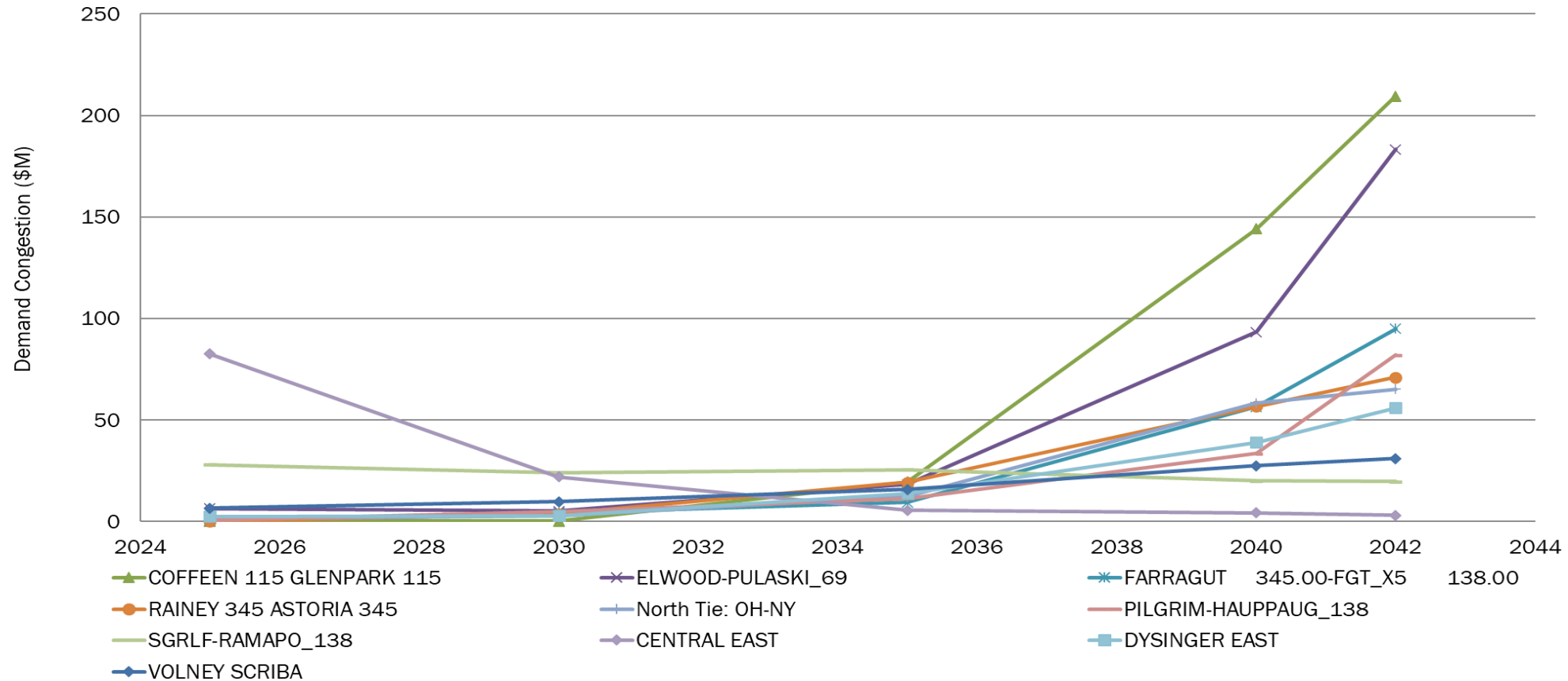
# Zonal CO<sub>2</sub> Emissions (1000 Tons)



# Zonal CO<sub>2</sub> Emissions Costs (nominal \$M)



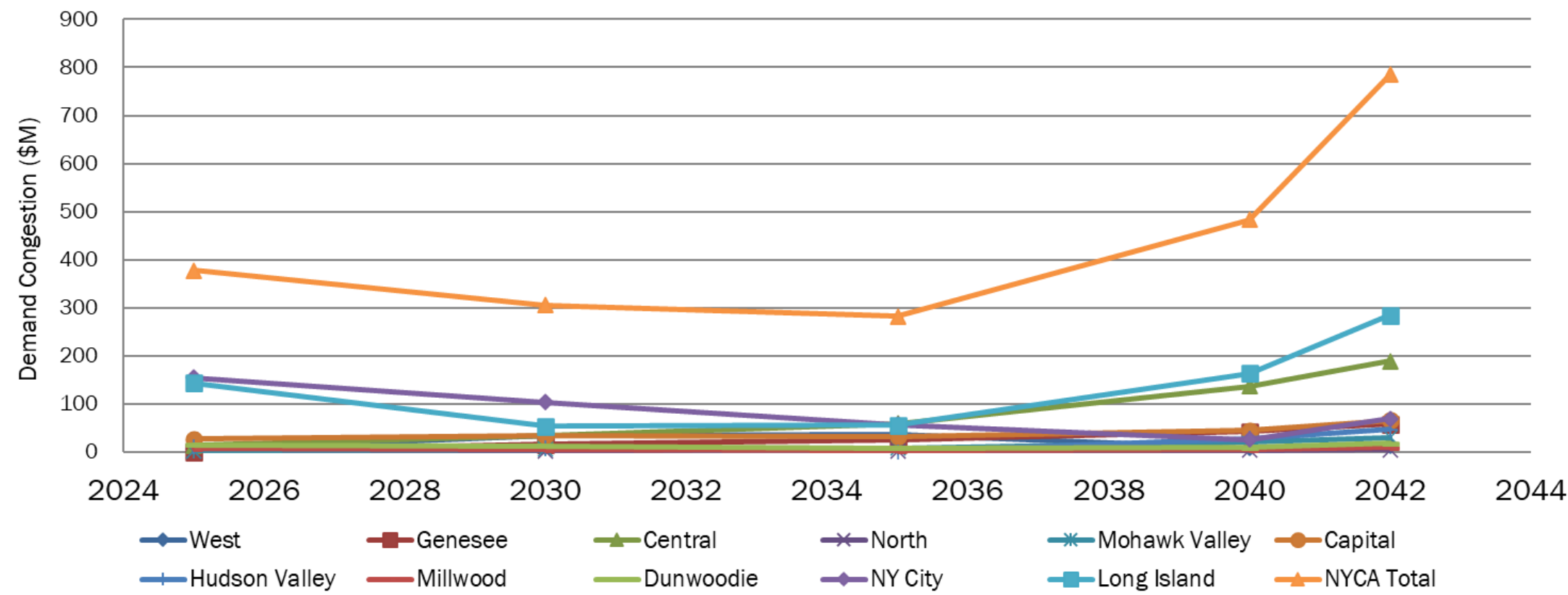
# Projected NYCA-Wide Demand Congestion by Constraint (nominal \$M)



\*Note - North Waverly - E. Sayre 115 kV and IESO-NY: North-Tie lines not shown on this chart as operations protocols would dictate the operation of the lines.

# Appendix: Final Contract Case Results

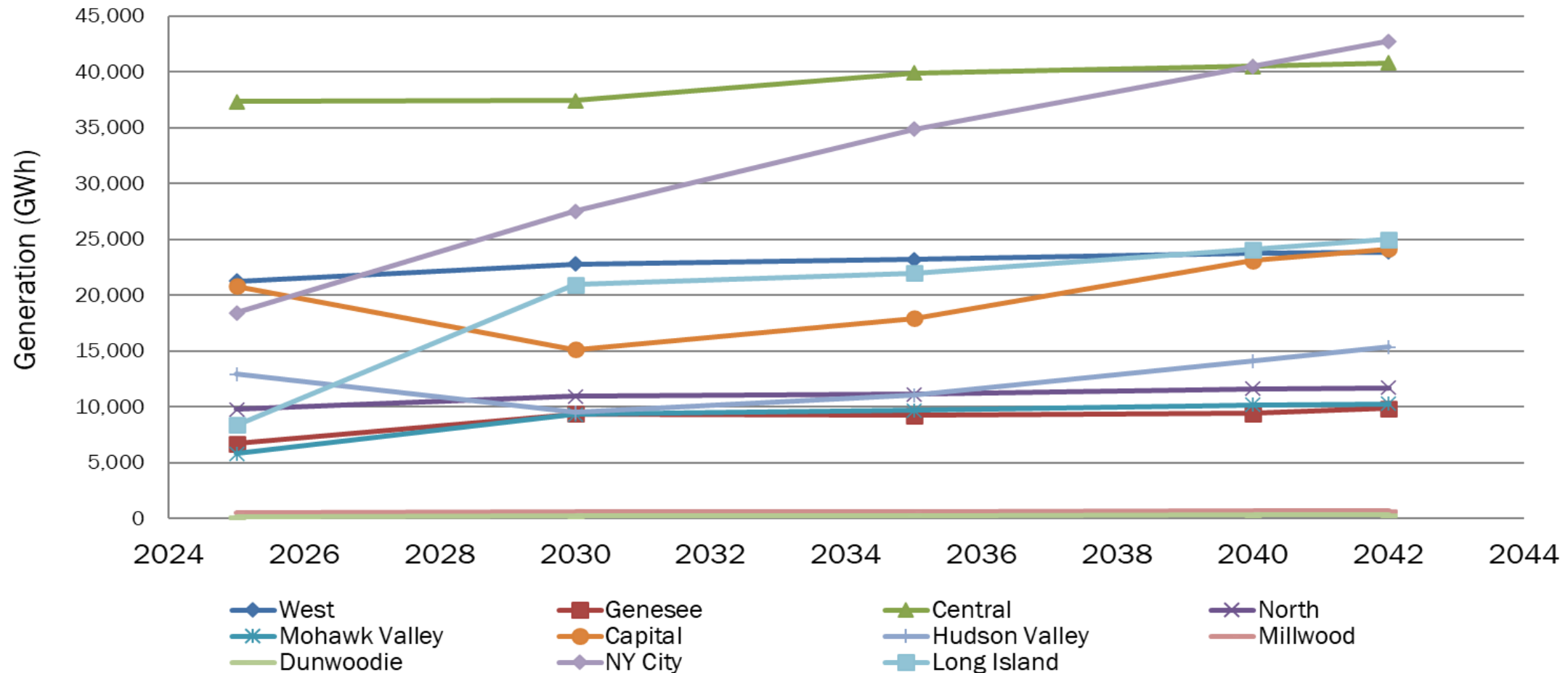
# Zonal Demand Congestion (nominal \$M)



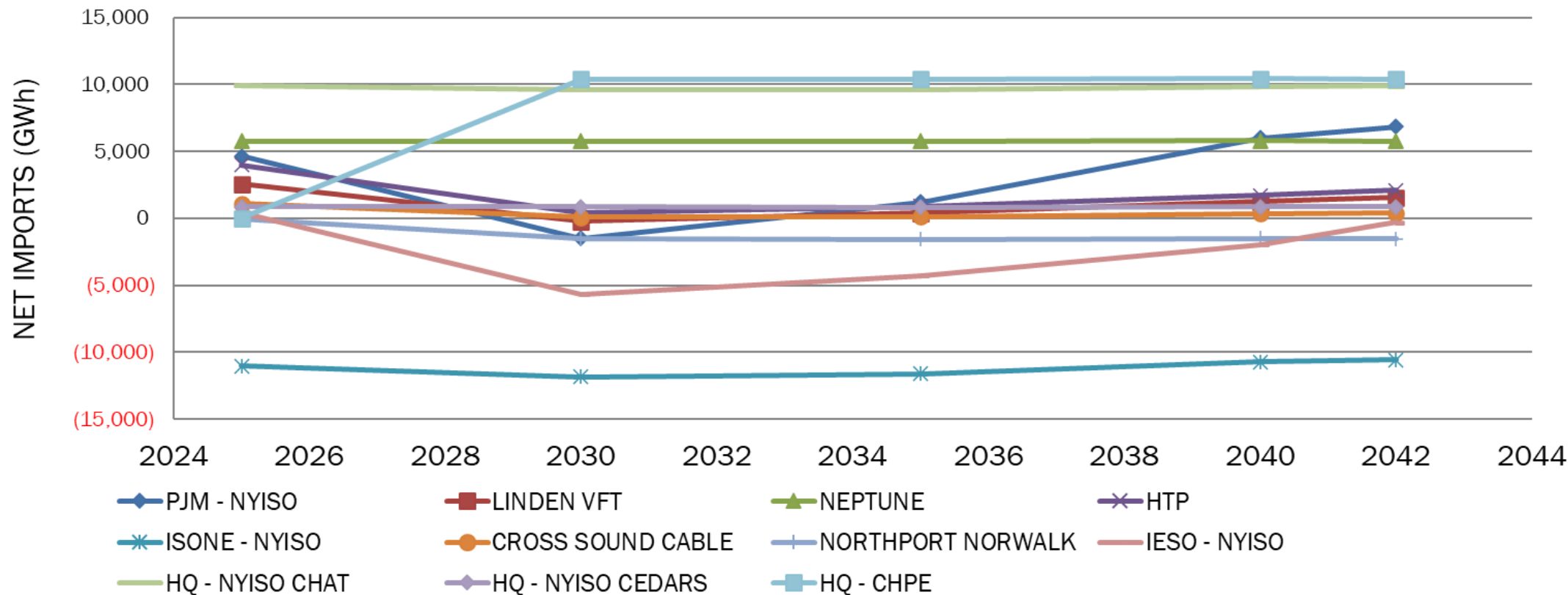
**Zonal Demand Congestion** =  $\sum_{hour\ 1}^{8760} [\sum_{constraint\ j}^n Shadow\ Price_j \times Zone\ GSF \times Zone\ Load]$



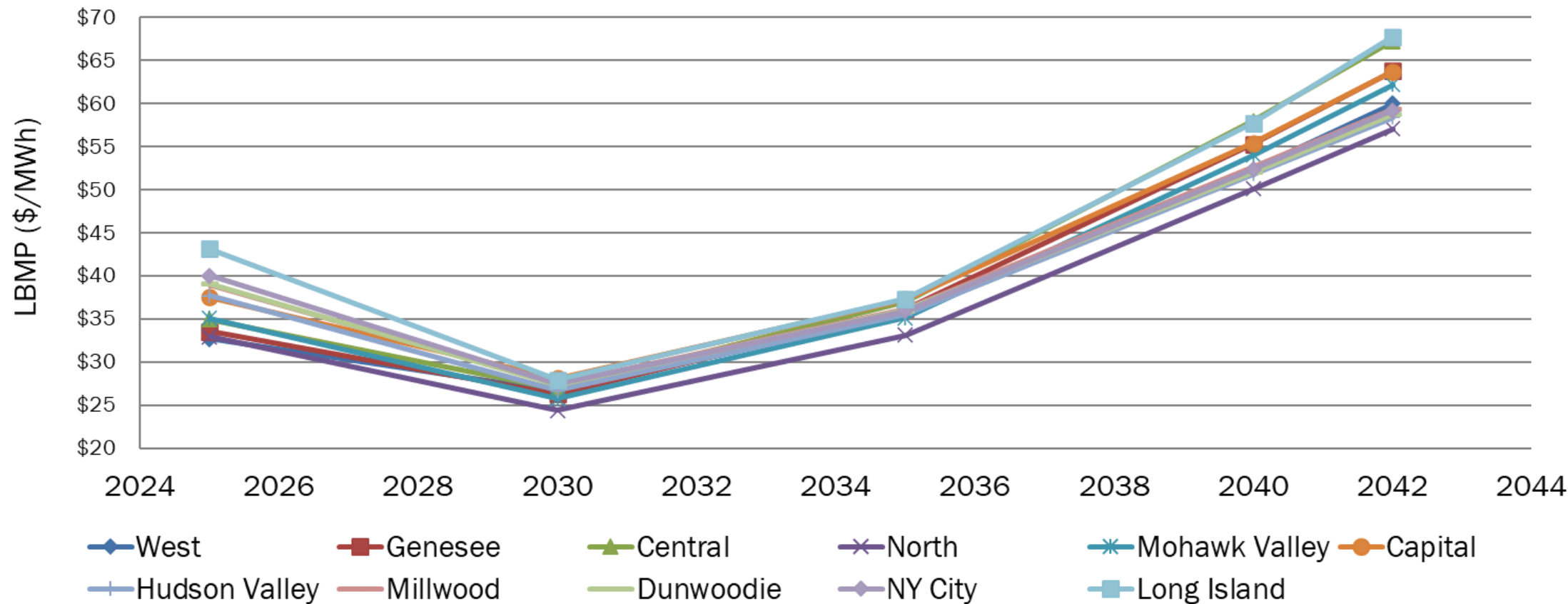
# Zonal NYCA Generation (GWh)



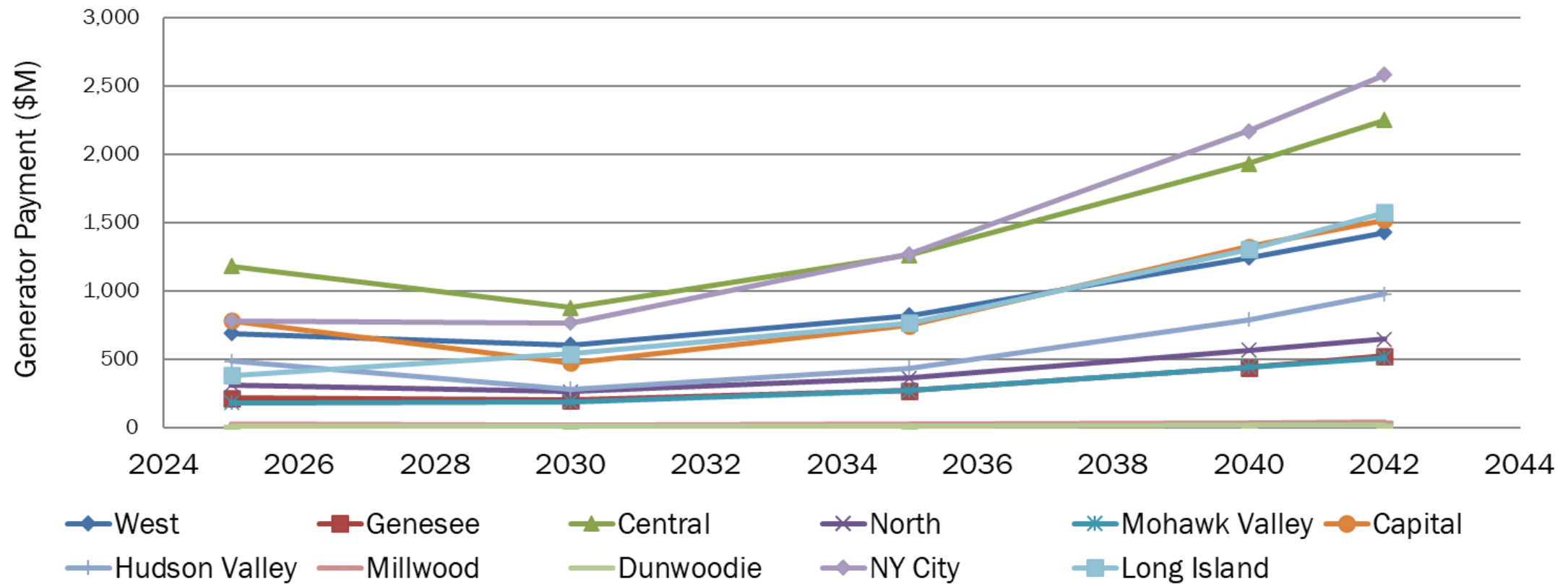
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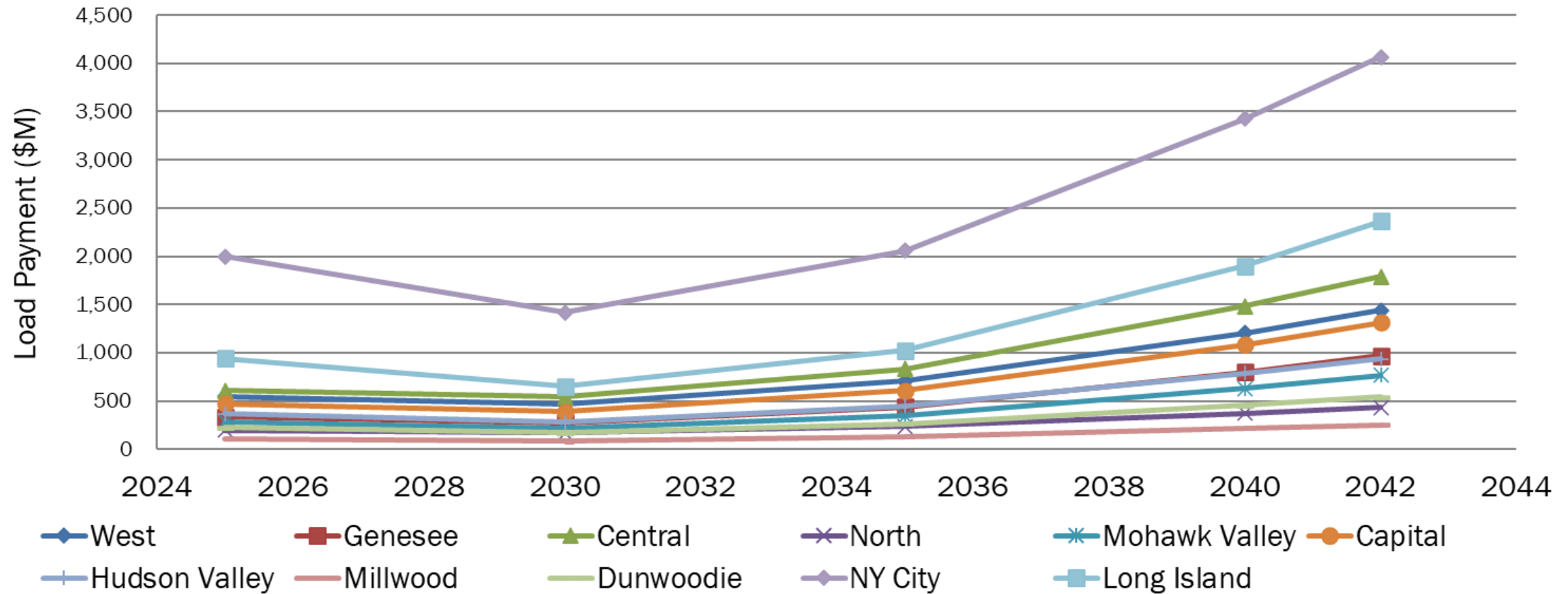
# Zonal NYCA LBMP (\$/MWh)



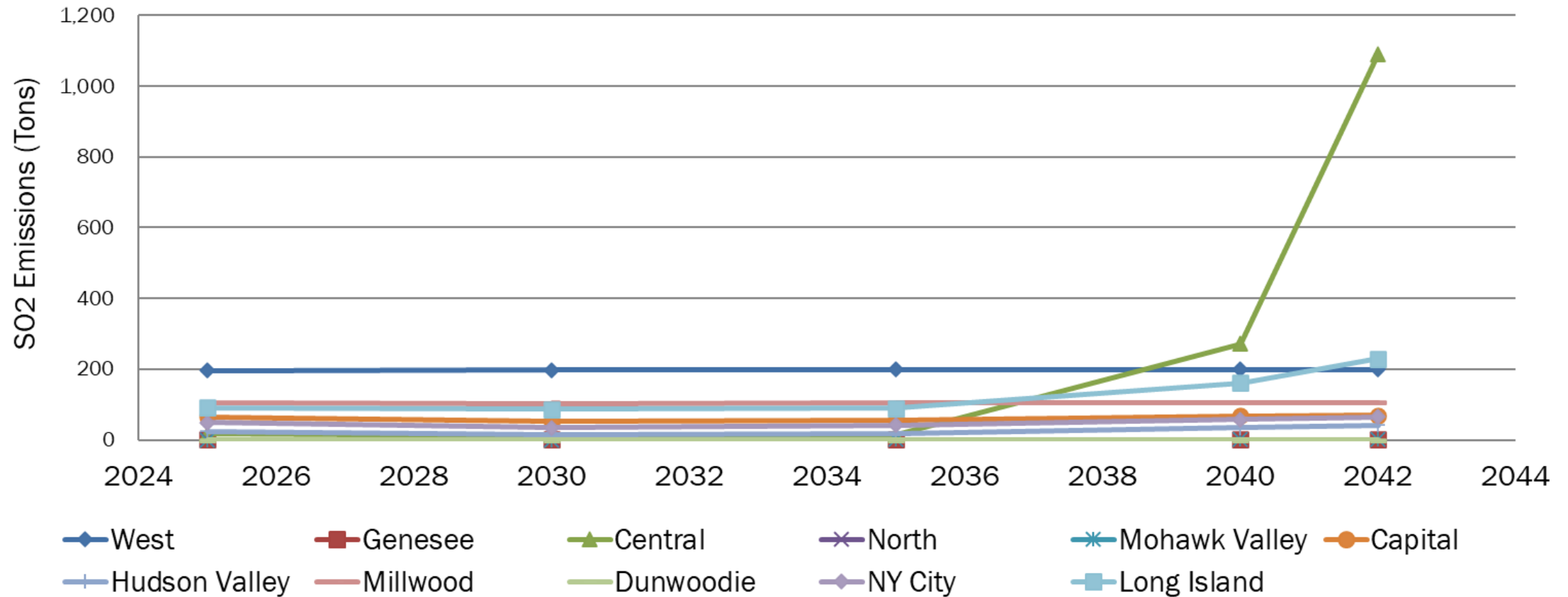
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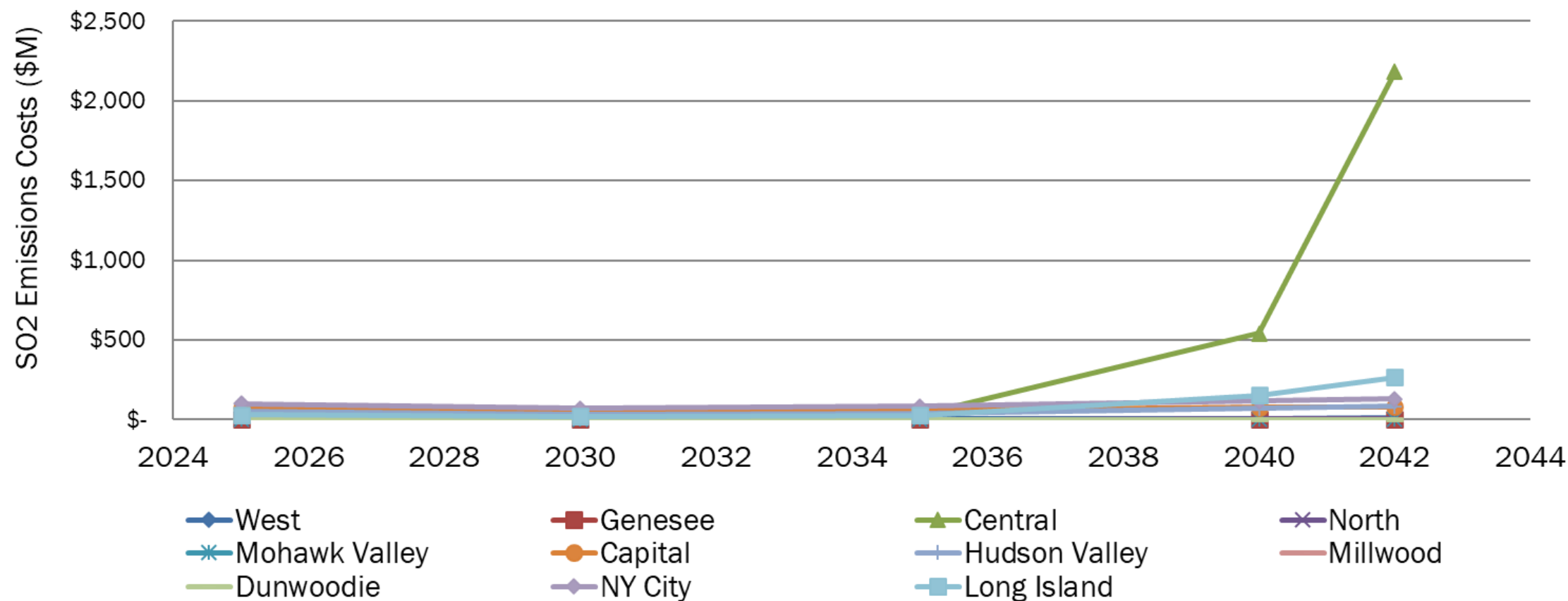
# Zonal Load Payments (nominal \$M)



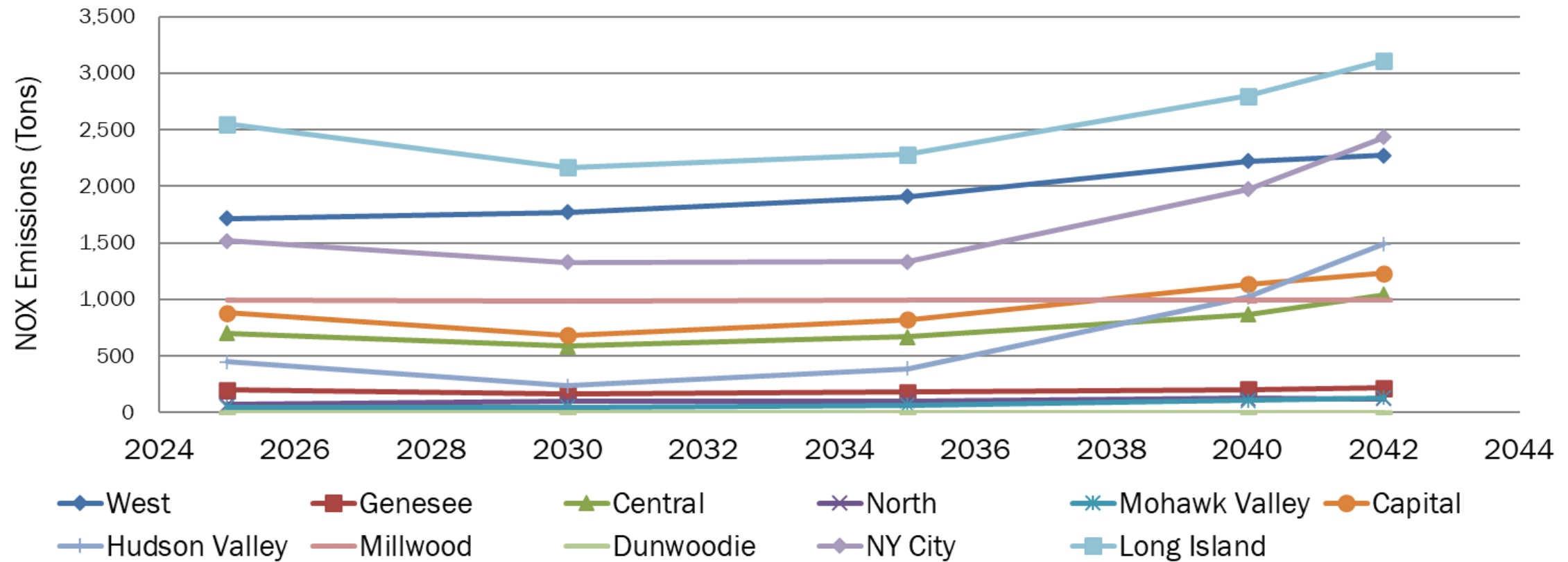
# Zonal SO2 Emissions (Tons)



# Zonal SO2 Emissions Costs (nominal \$)

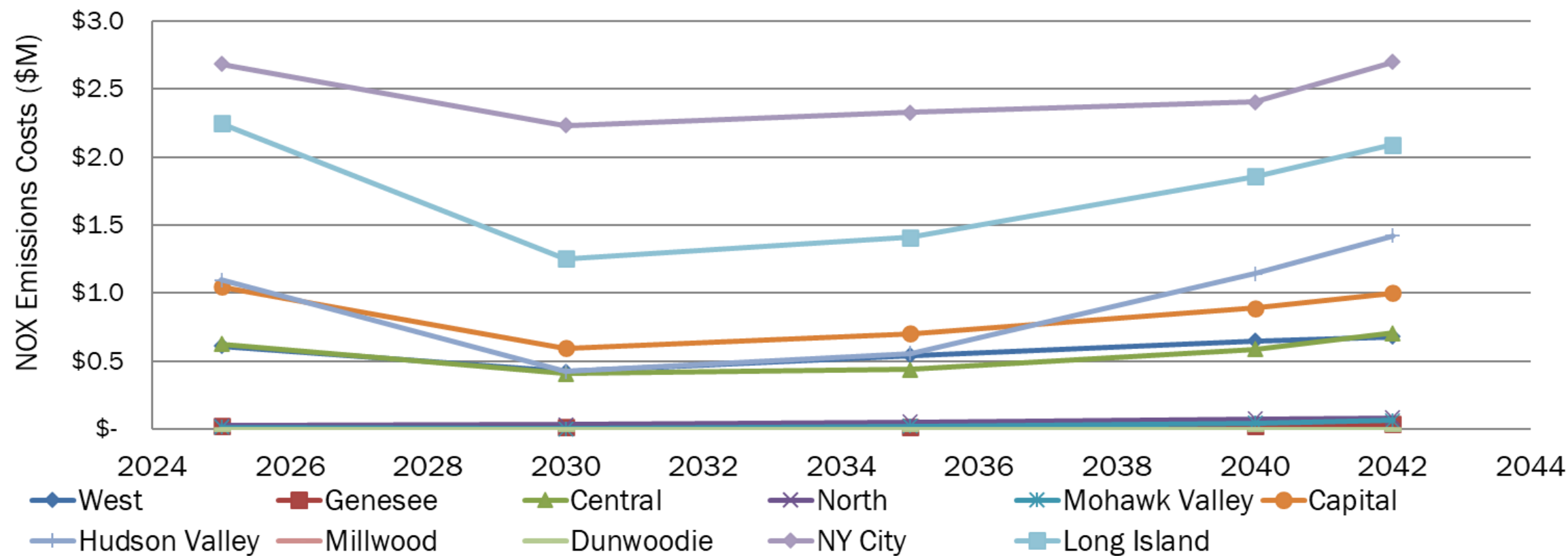


# Zonal NOX Emissions (Tons)

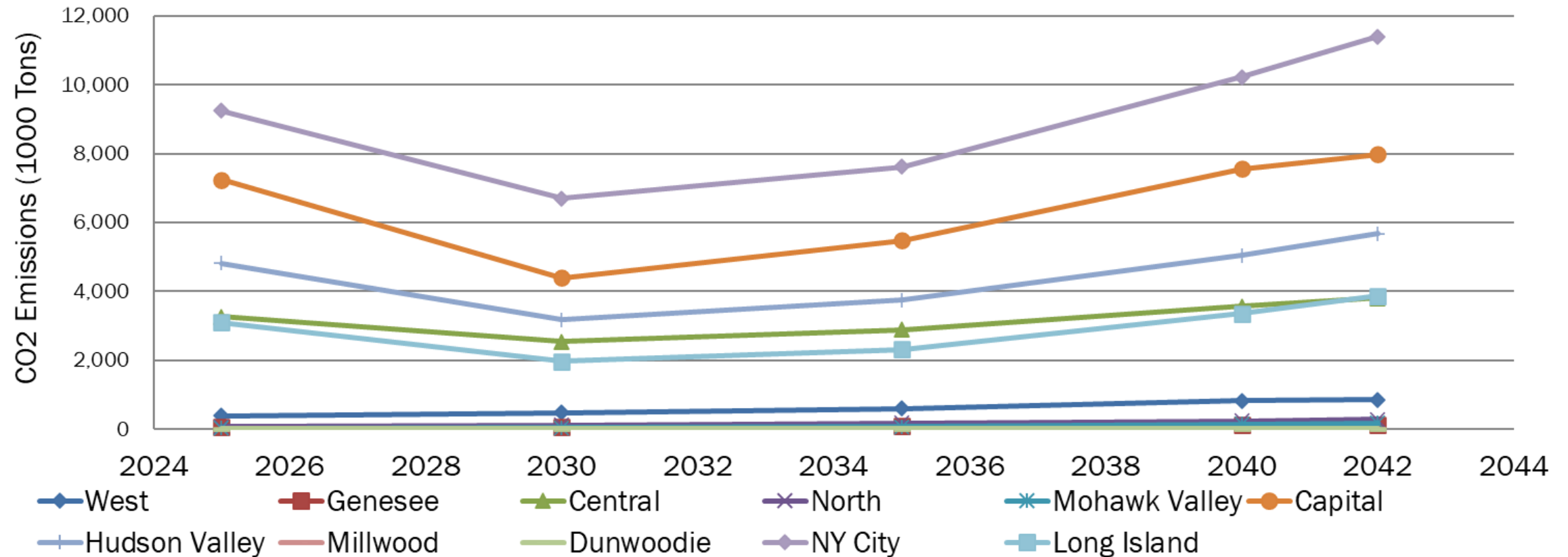




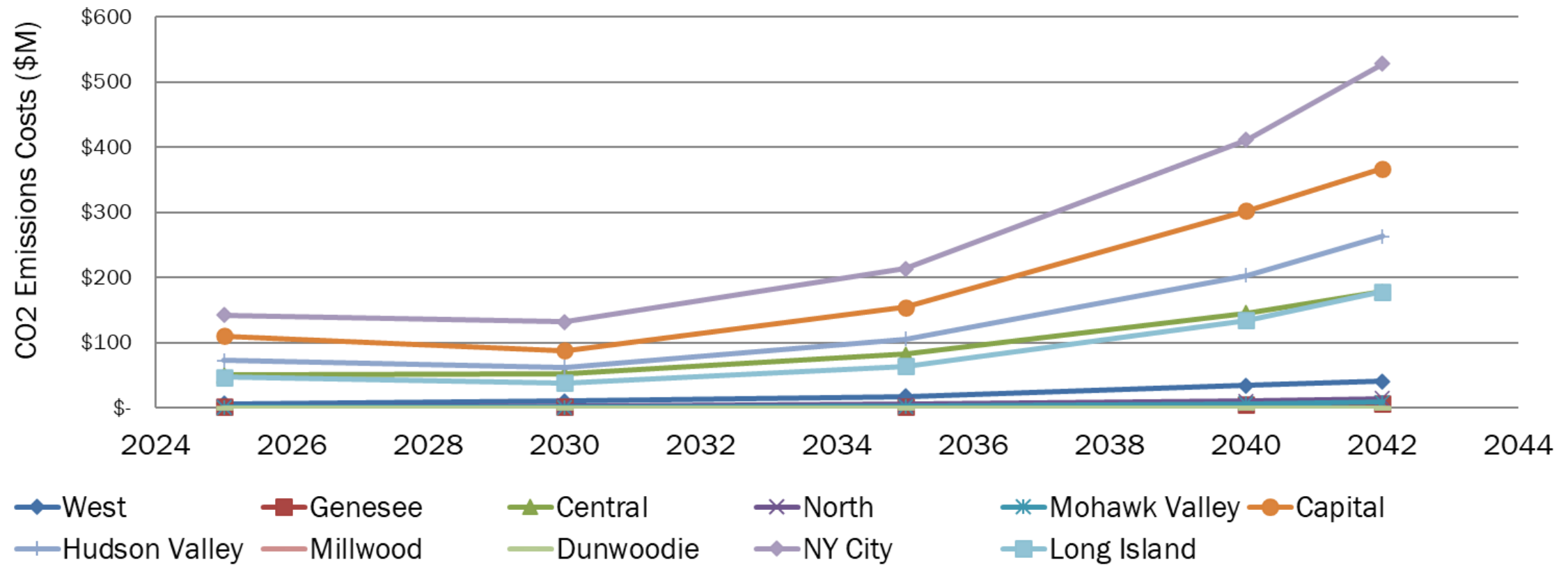
# Zonal NOX Emissions Costs (nominal \$M)



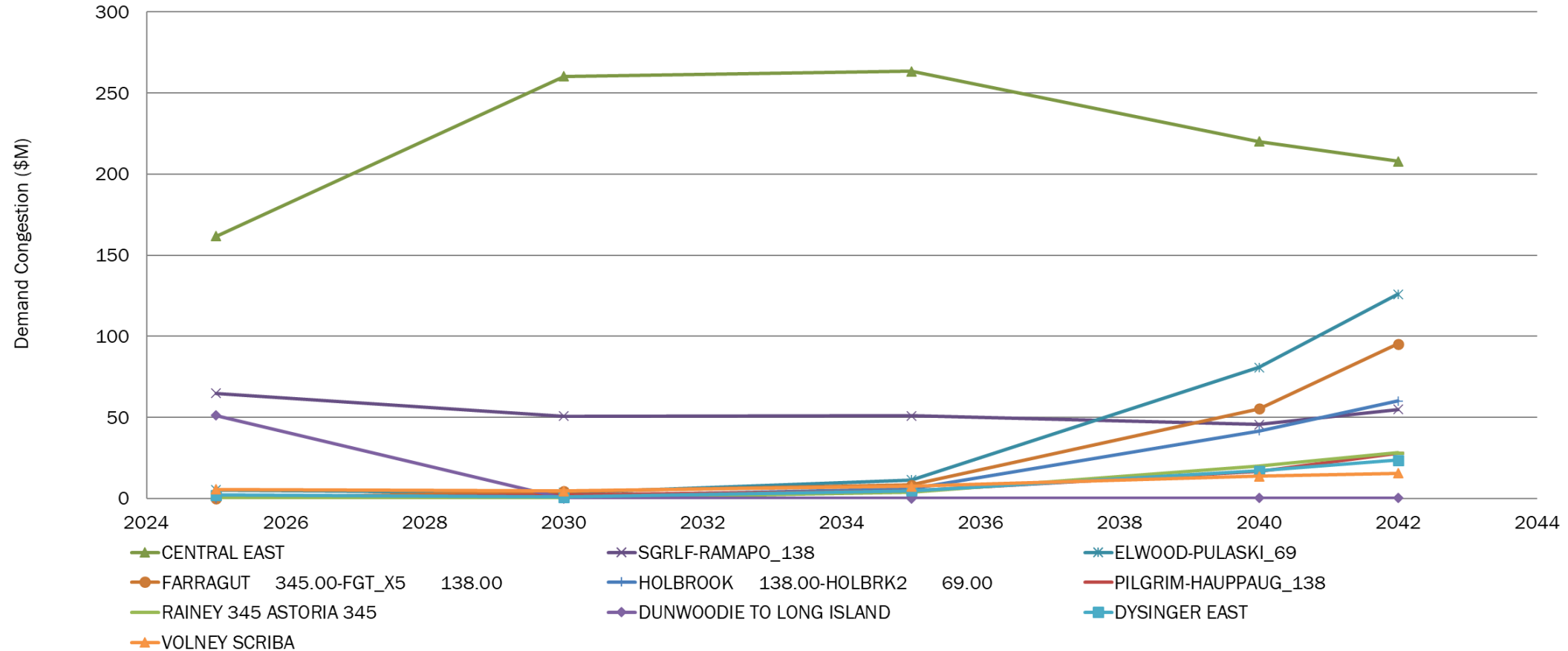
# Zonal CO2 Emissions (1000 Tons)



# Zonal CO2 Emissions Costs (nominal \$M)



# Projected NYCA-Wide Demand Congestion by Constraint (nominal \$M)



\*Note - North Waverly - E. Sayre 115 kV and IESO-NY: North-Tie lines not shown on this chart as operations protocols would dictate the operation of the lines.