New York ISO
Independent System Operator

Appendix J: Renewable Generation Pockets

2025-2044 System & Resource Outlook

A Report from the New York Independent System Operator

July 22, 2026

Appendix J: Renewable Generation Pockets

This appendix documents the renewable generation pockets analysis conducted for the Outlook. This analysis examines the effects of increased penetration of renewable resources connecting to the transmission network on specific nodes within the NYCA system. This analysis shows likely locations of new renewable resource additions, projected congestion on the transmission network, and possible curtailment of resources due to congestion, competition, and other factors. This analysis also highlights how increasing transmission capability by upgrading transmission paths may help to alleviate congestion and provide increased energy deliverability of resources from constrained pockets. Contingency pairs include monitored constraints and contingencies observed in historical market operation or identified in NYISO planning and operation studies and capture N-1 and N-0 conditions.

Two key metrics are considered for this analysis: (1) the number of congested hours for transmission constraints and (2) the deliverability of energy[1] from renewable resources within the defined renewable generation pockets. Renewable pocket analysis was conducted for the Contract Case and two Policy Case scenarios for the 2035 simulation year based on results from the NYISO's production cost analysis. Detailed results for the Policy Case scenarios 95x2044-Baseline and 100x2044-Higher are included in Appendix H: Capacity Expansion Model Results.

Renewable Generation Pocket Overview

Renewable generation pockets were first introduced by the NYISO in the 2019 CARIS Phase 1 report and have subsequently been evaluated in the NYISO's biennial System & Resource Outlook studies. For this Outlook, four renewable generation pockets within New York State are considered (Pockets W, X, Y, and Z). Each pocket includes corresponding sub-pockets (W1, X2, Y1, etc.) to depict a geographic grouping of renewable generation and the transmission constraints within a localized area. The bulk of installed non-offshore-wind renewable generator capacity (73% in 95x2044 – Baseline, 77% in 100x2044 – Higher) and renewable generator curtailment (75% in 95x2044 – Baseline, 81% in 100x2044 – Higher) are contained across all pockets. The pocket definitions are consistent between the Outlook scenarios.

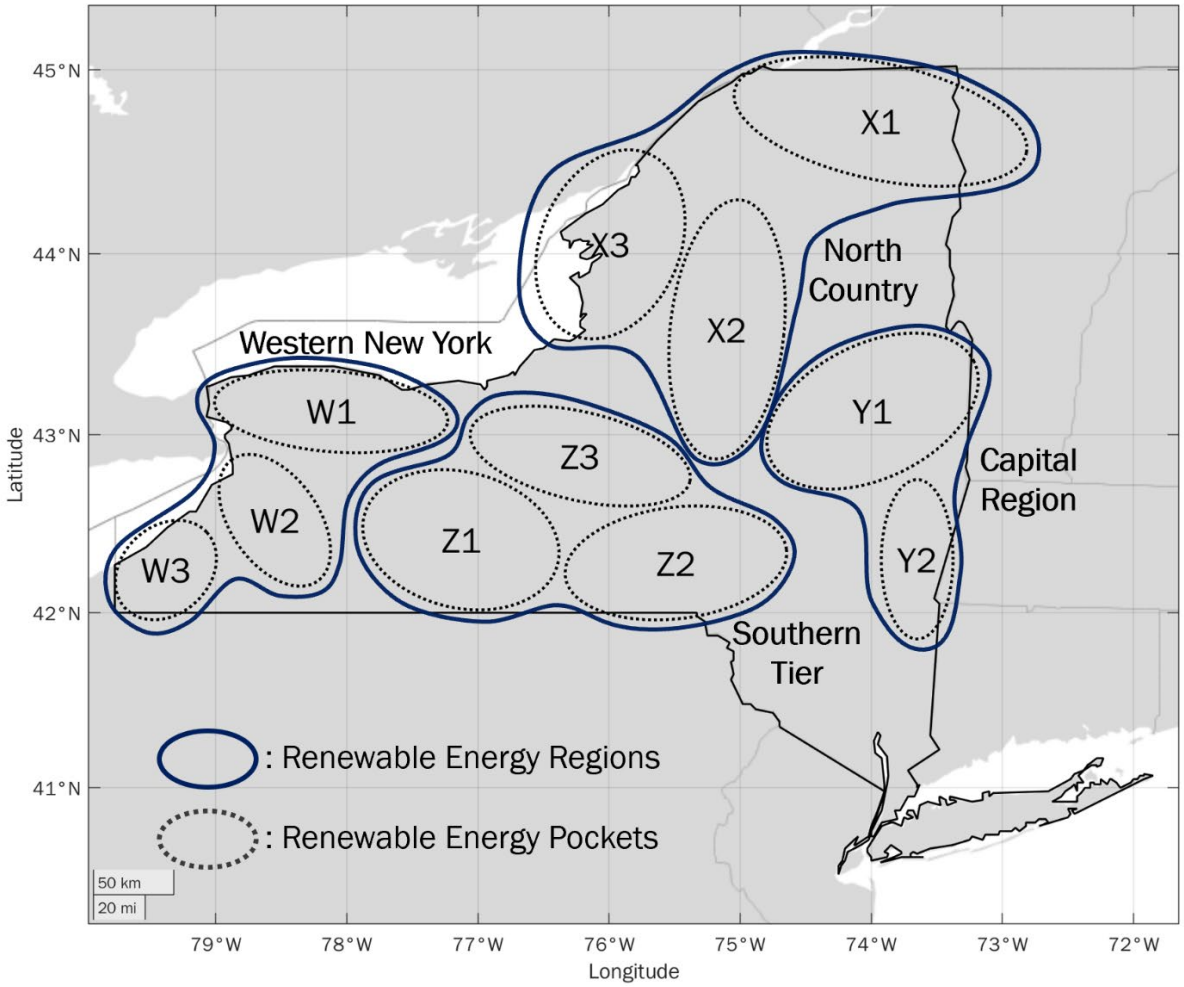
- **Western NY (Pocket W)**: Western New York constraints, mainly 115 kV in Buffalo and Rochester areas:
  1) **W1**: Orleans-Rochester Wind (115 kV)

[1] Energy deliverability is reported as a percentage and is calculated as follows: $Energy\ Deliverability = 1 - Curtailment$

2) **W2**: Buffalo Erie region Wind & Solar (115 kV)
3) **W3**: Chautauqua Wind & Solar (115 kV)

- **North Country (Pocket X)**: Northern New York constraints, including the 230 kV and 115 kV facilities in the North Country:
  1) **X1:** North Area Wind (mainly 230 kV in Clinton County)
  2) **X2**: Tug Hill Plateau Wind & Solar (mainly 115 kV in Lewis County)
  3) **X3**: Watertown Wind & Solar (115 kV in Jefferson & Oswego Counties)
- **Capital Region (Pocket Y)**: Eastern New York constraints, mainly the 115 kV facilities in the Capital Region:
  1) **Y1**: Capital Region Solar Generation (115 kV in Montgomery & Washington County)
  2) **Y2**: Hudson Valley Corridor (115 kV)
- **Southern Tier (Pocket Z)**: Southern Tier constraints, mainly the 115 kV constraints in the Finger Lakes area:
  1) **Z1**: Finger Lakes Region Wind & Solar (115 kV)
  2) **Z2**: Southern Tier Transmission Corridor (115 kV)
  3) **Z3**: Central and Mohawk Area Wind and Solar (115 kV)

Figure J-1: New York Renewable Generation Pockets Map



Renewable Generation Pocket Analysis (2035)

The Contract Case for this Outlook layers on additional contracted resources (in addition to those included in the Base Case under the inclusion rules) and retirement of aging fossil generators consistent with assumptions in the 2025-2034 Comprehensive Reliability Plan. The Contract Case also includes the remaining approved Phase 1 and Phase 2 transmission projects that do not meet the Base Case inclusion rules.[2] These transmission upgrades significantly increase the transmission capability of lines that the NYISO identified as congested in the pocket analysis studies in the 2021-2040 Outlook. While curtailment of resources is not eliminated, the upgraded transmission paths provide additional transmission capability for resources to be connected to the bulk transmission system. Apart from transmission constraints, generator-specific constraints, such as Must Run,

[2] Updated based on the 2025 Gold Book and consistent with the NYISO's 2025 most recent reliability study assumptions as of the Outlook lockdown date September 1, 2025.

Minimum Down Time, Minimum Run Time, Local Reliability Rules, that reduce flexibility in the operation of existing fossil resources to accommodate intermittent resources like wind and solar, can also cause curtailment.

Since the Contract Case in this Outlook considers fewer renewable resource additions compared to the prior Outlook, renewable energy deliverability across all pockets was largely unimpacted by transmission constraints.

With the addition of new resources in the Policy Case (as informed by capacity expansion simulations for the 95x2044-Baseline scenario and 100x2044-Higher scenario) significantly more renewable resources are added to the system in the Policy Case scenarios as compared to the Contract Case.[3]

As renewable capacity becomes more concentrated in the Policy Case scenarios, energy deliverability declines relative to the Contract Case due to greater competition among correlated resources in the same area. By study year 2035, land-based renewable capacity (e.g., UPV and LBW) increases by 13 GW in the 95x2044-Baseline Policy Case scenario and 35 GW in the 100x2044-Higher Case Policy Case scenario compared to the Contract Case. The 95x2044-Baseline scenario develops substantial land-based wind (LBW) capacity primarily in Pockets W, X, and Z, while utility-scale solar (UPV) additions are more concentrated in Pocket Y. In contrast, the 100x2044-Higher Policy Case scenario is characterized by significantly larger UPV additions with solar development occurring significantly in Pockets W, X, and Z.

The six figures below depict the renewable resource capacity (MW) and magnitude of renewable curtailment (GWh) for each of the three scenarios evaluated for renewable pocket analysis for model year 2035.

[3] Details on the methodology for resource placement in the production cost model are included in Appendix D: Modeling & Methodologies.

Figure J-2: Statewide Renewable Capacity and Curtailment for Contract Case 2035

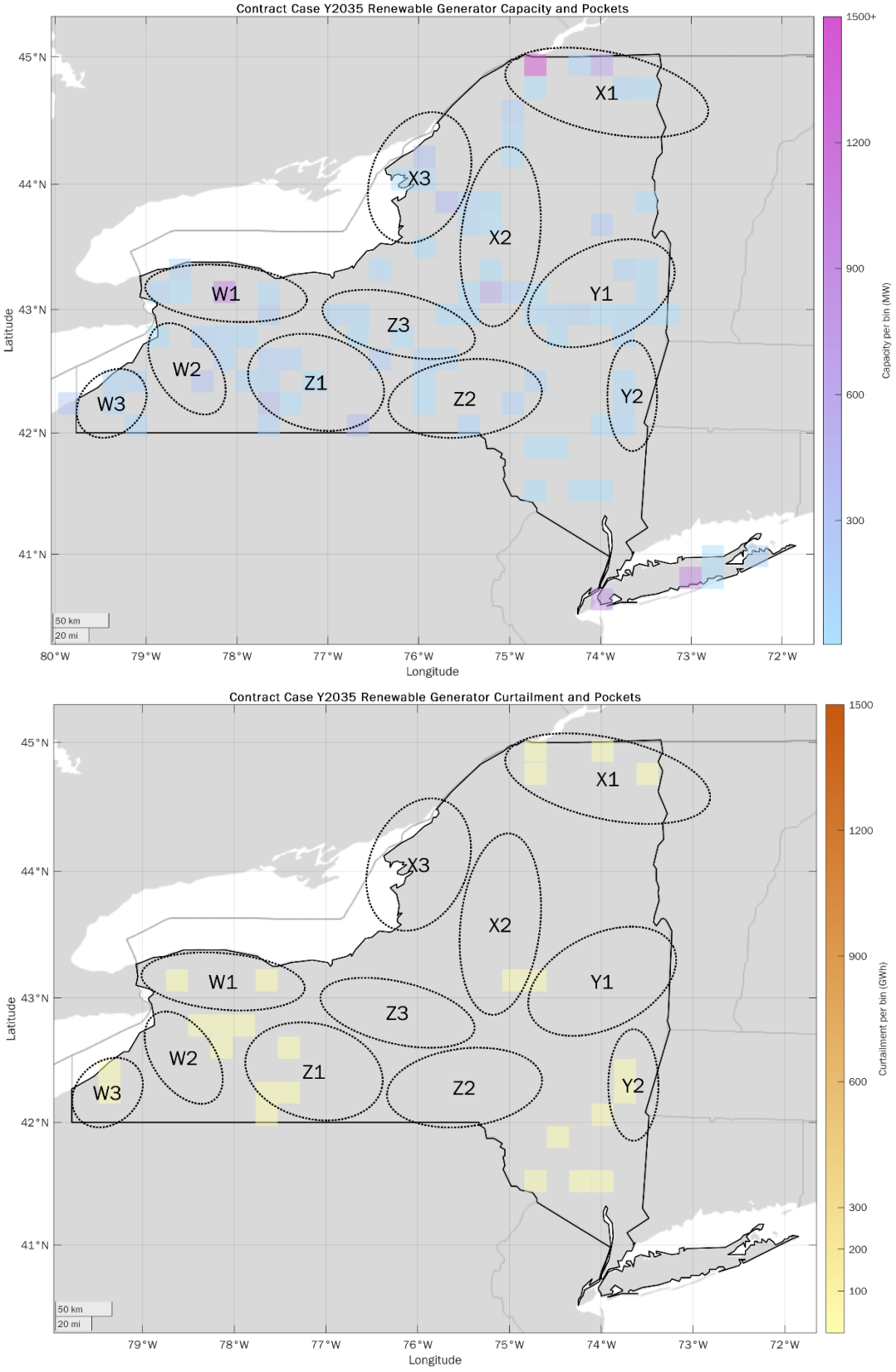


Figure J-3: Statewide Renewable Capacity and Curtailment for 95x2044-Baseline 2035

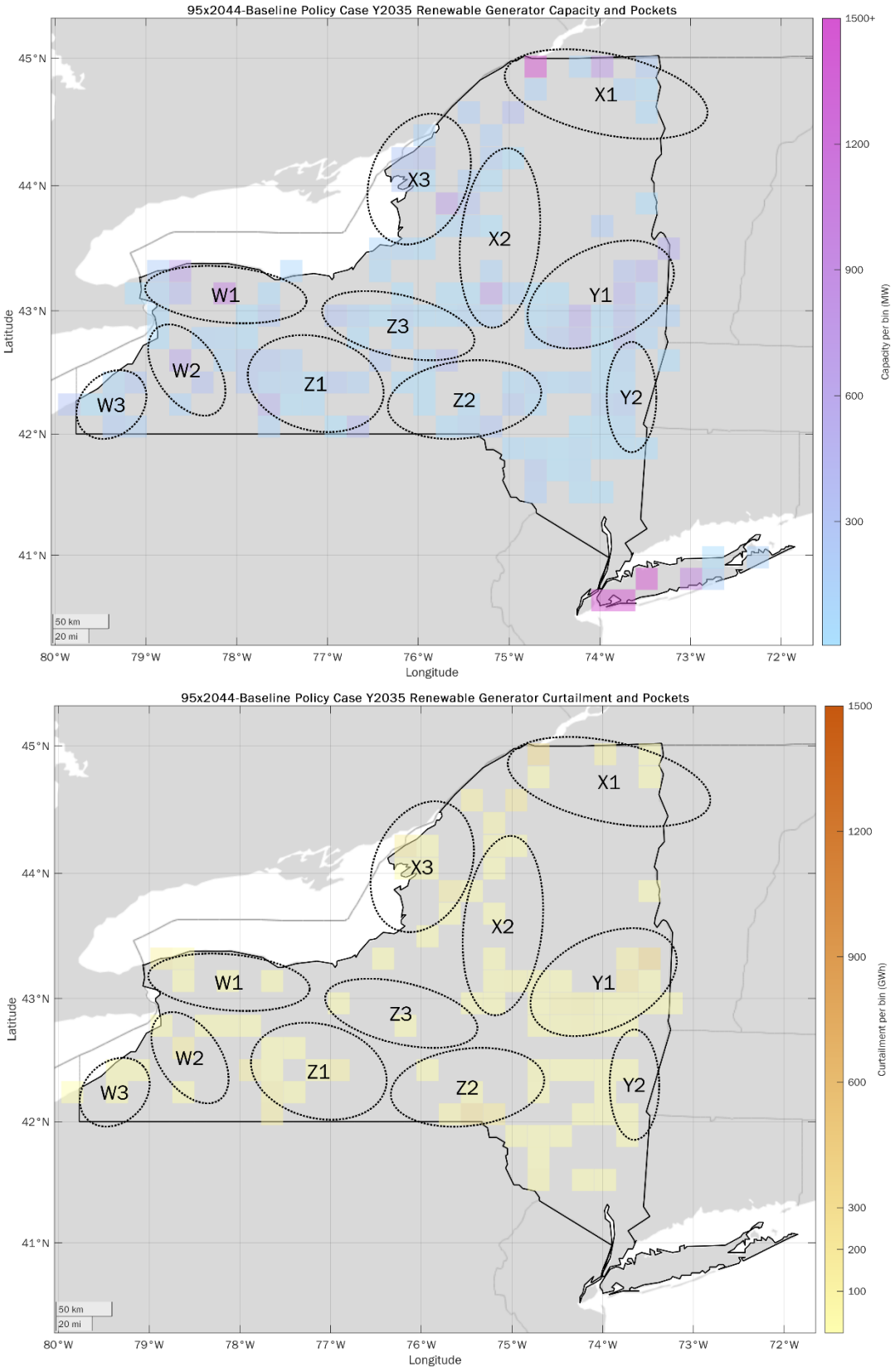
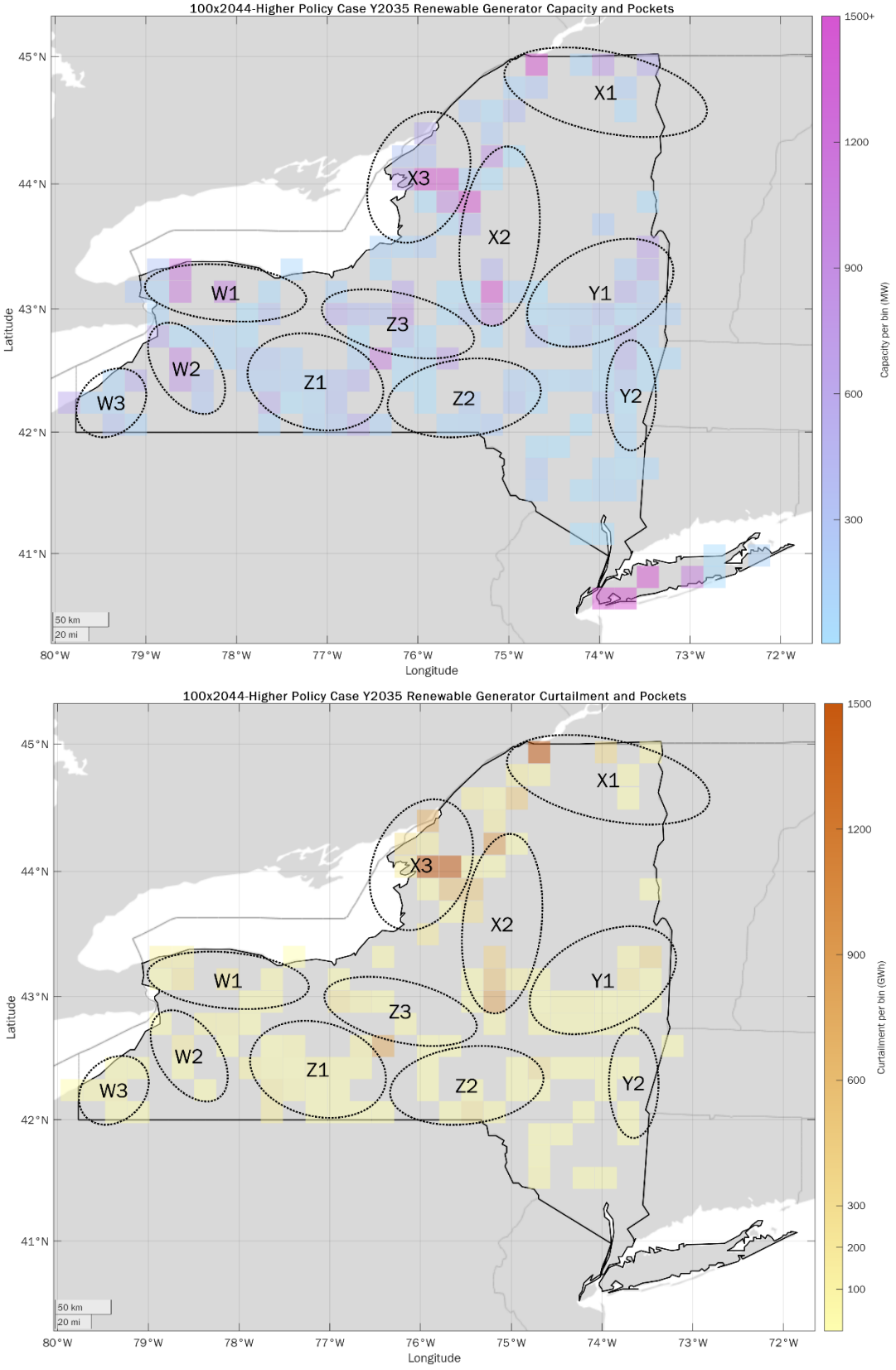


Figure J-4: Statewide Renewable Capacity and Curtailment for 100x2044-Higher 2035



Given the breadth of renewable generation pockets evaluated, this appendix focuses on a subset of pockets that exhibit the most significant and persistent transmission congestion and/or resource curtailment. **Pockets X3, Y1, and Z2** are highlighted based on reductions in renewable energy deliverability, indicating localized curtailment driven by transmission limitations and resource concentration. In contrast, **Pockets X1 and X2** are emphasized due to the persistence and severity of transmission congestion, including highly utilized 115 kV facilities that are frequently limited across scenarios. While other pockets may exhibit isolated congestion or minor changes in energy deliverability, these impacts are comparatively limited. Accordingly, the sections that follow concentrate on the most affected pockets to provide targeted insight into areas where transmission constraints and renewable integration challenges are the most pronounced.

Western New York (Pocket W)

The Western New York pocket contains large existing hydro resources, as well as a combination of new UPV and LBW resources in the Outlook scenarios. UPV resources from the Contract Case are located primarily in Pocket W1. The 95x2044-Baseline Policy Case scenario adds 1.8 GW of LBW in Pocket W and the 100x2044-Higher Policy Case scenario adds 5.7 GW of combined LBW and UPV. With the completed Western NY public policy upgrade and approved Phase 2 upgrades to transmission path in the region and ties to export renewable energy to PJM, this pocket shows less curtailment and congestion than observed in Pockets X, Y, or Z. On average, Pocket W exhibits the highest energy deliverability for renewables in 2035 for the Policy Case scenarios.

Northern New York (Pocket X)

The Northern New York pockets are located in Zone D (North) and Zone E (Mohawk Valley) and consist of existing large-scale LBW, hydro, and UPV resources with the addition of mostly LBW resources in the 95x2044-Baseline Policy Case scenario and UPV resources in the 100x2044-Higher Policy Case scenario. As part of the Northern New York Transmission Project (Smart Path Connect), transmission upgrades throughout this pocket greatly reduce congestion on previously constrained paths. This proves effective for the Contract Case; however, the magnitude of capacity additions within Pocket X in the Policy Case scenarios leads to increased congestion and a reduction in renewable energy deliverability.

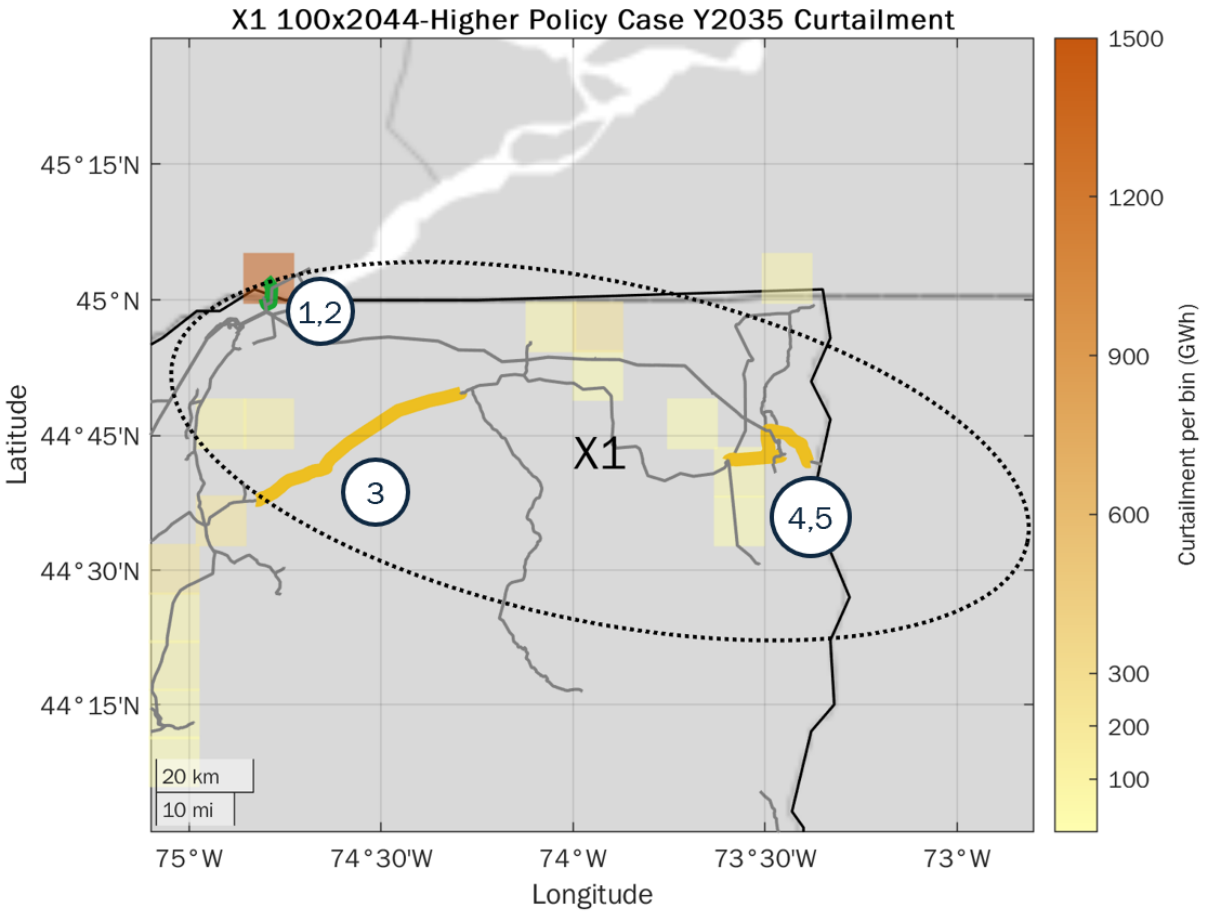
Pocket X1

Pocket X1 is located in Zone D along the 230 kV path from Moses to Plattsburgh. This region consists of St. Lawrence hydro, existing LBW resources, and additional UPV resources in the Contract Case. The 95x2044-Baseline Policy Case scenario adds 0.4 GW of LBW, while the

100x2044-Higher Policy Case scenario adds 0.5 GW of LBW and 0.1GW of UPV. Consistent across the Contract Case and Policy Case scenarios, a significant portion of the renewable capacity within Pocket X1 is hydro. Generally, hydro resources curtail before LBW and UPV as they are not eligible for Tier 1 RECs and therefore do not include negative bid costs in the production cost model. The hydro resources within Pocket X1 compete with substantial capacity additions in Pockets X2 and X3 in the 100x2044-Higher Policy Case scenario for shared transmission paths, contributing to reduced hydro energy deliverability in Pocket X1.

Transmission elements within Pocket X1 exhibit the second most congested hours among all renewable generation pockets. The Northern ties to Ontario are significantly congested in both the import and export directions. Malone to Nicholville and lines around Plattsburgh also exhibit significant congestion.

Figure J-5: Pocket X1 Congestion and Energy Deliverability Summary



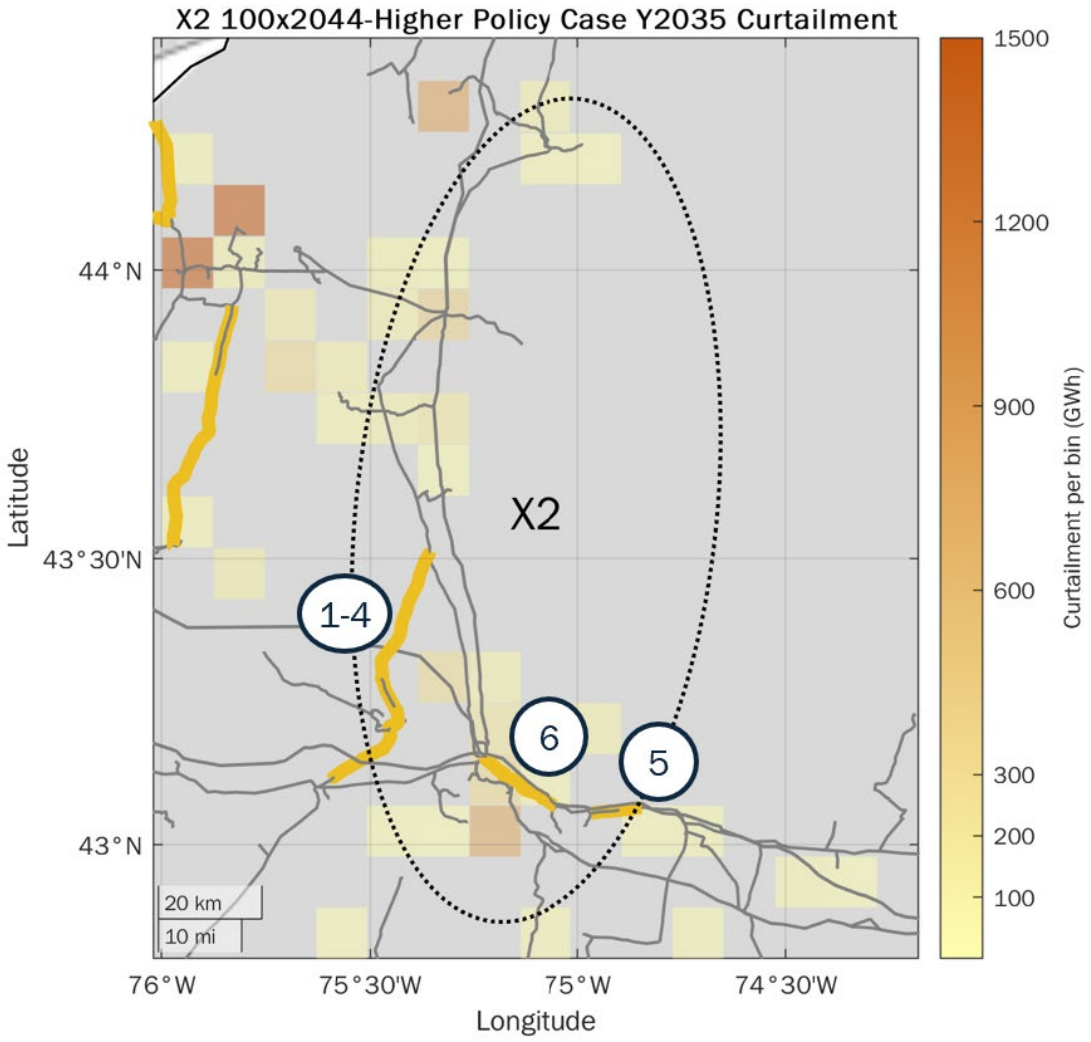
ID	Constraint	Number of Limiting Hours			
		Contract	95x2044 -Baseline	100x2044 -Higher	Average
1	MOSES E--ST_LAWR_L33P_230kV	4,938	3,961	4,026	4,308
2	MOSES E--ST_LAWR_L34P_230kV	2,325	3,193	3,457	2,992
3	MALONE--NICHOLVL_115kV	1,806	3,142	3,941	2,963
4	CUMBERLANDHD--PLAT 115_115kV	5,815	1,458	1,089	2,787
5	NOEND115--PLAT 115_115kV	3,041	1,855	919	1,938

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	95x2044 -Baseline	100x2044 -Higher	Contract	95x2044 -Baseline	100x2044 -Higher
Hydro	870	870	870	100%	96%	73%
Wind	678	1,054	1,153	100%	97%	87%
Solar	550	550	695	100%	100%	95%

Pocket X2

Pocket X2 is located in Zones D and E along the Moses–Adirondack–Porter path that connects upstream of the Central East interface. Renewable resource additions in this pocket are predominately UPV resources. Pocket X2 has the highest average number of congested hours across the Contract Case and Policy Case scenarios. The top congested element across all three scenarios is the Turning Stone-Rome 115 kV line flowing southwest outside of the pocket at an average of 7,710 limiting hours. The addition of LBW resources in the 95x2044-Baseline Policy Case scenario and UPV in the 100x2044-Higher Policy Case scenario reduces renewable energy deliverability for resources located near the Boonville area in the southern part of the X2 subpocket. Congestion at Inghams is correlated with congestion on Central East. However, congested hours decrease in the two Policy Case scenarios relative to the Contract Case as congestion at upstream elements limits flow before it reaches the more consolidated eastward path. Since this pocket is upstream of Central East, congestion on that interface limits some generation in this pocket that would have otherwise served load further downstate.

Figure J-6: Pocket X2 Congestion and Energy Deliverability Summary



ID	Constraint	Number of Limiting Hours			
		Contract	95x2044 -Baseline	100x2044 -Higher	Average
1	TRNG STN--ROME_115kV	8,266	7,824	7,039	7,710
2	AVA-USAF--BVPAR-3_115kV	3,238	6,775	6,305	5,439
3	AVA-USAF--TURIN_115kV	3,238	6,775	6,305	5,439
4	MADISON--ROME_115kV	5,148	1,651	790	2,530
5	INGMS-CD-INGHAM-E_115kV	4,420	978	534	1,977
6	PORTER 1--Q1047_POI_115kV	1,441	1,284	320	1,015

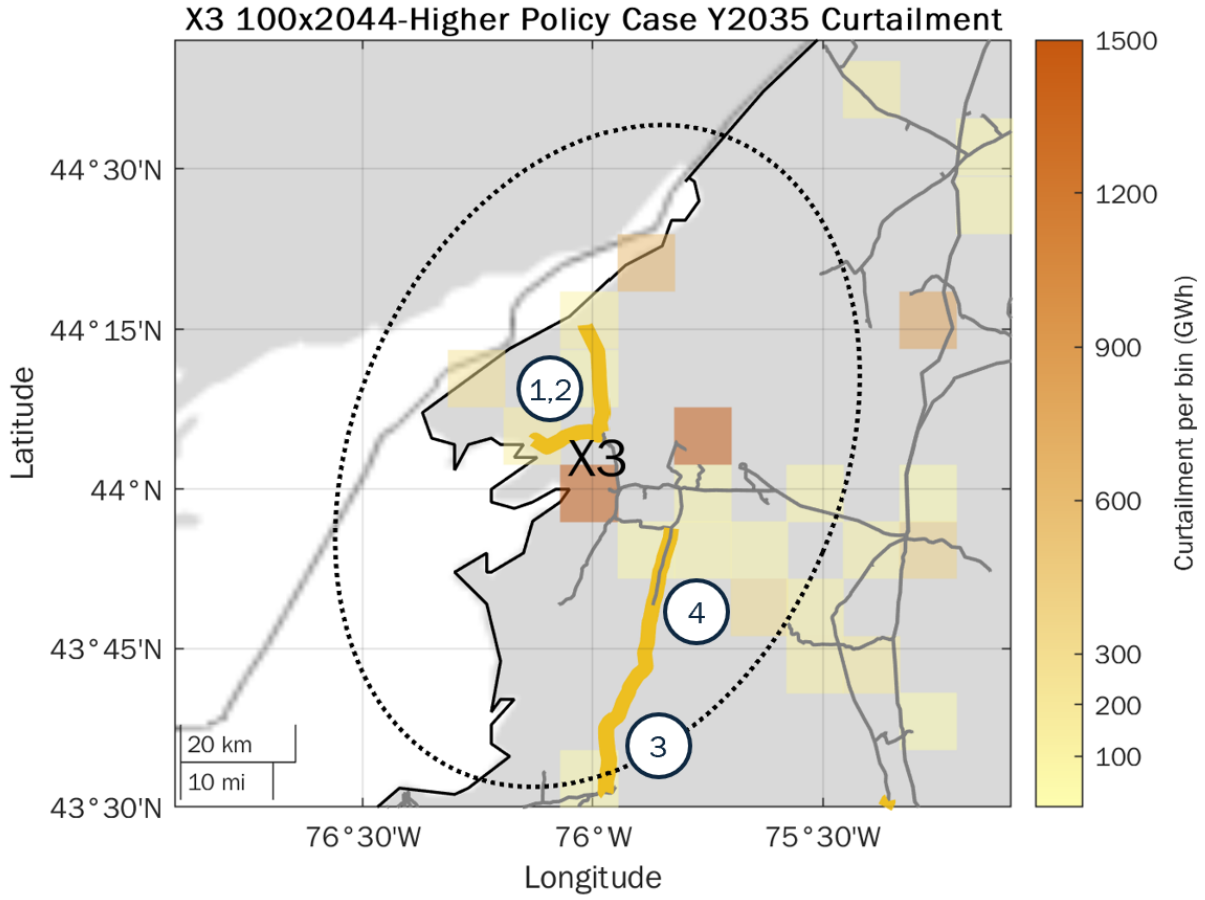
Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	95x2044 -Baseline	100x2044 -Higher	Contract	95x2044 -Baseline	100x2044 -Higher
Hydro	102	102	102	100%	91%	65%
Wind	74	644	644	100%	98%	88%
Solar	602	602	5,271	100%	99%	80%

Pocket X3

Pocket X3 encompasses the Jefferson and Oswego counties in Zone C (Central) and Zone E (Mohawk Valley). The pocket consists of a 115 kV system around Watertown with a 115 kV path from Watertown to the Lighthouse Hill 115 kV substation. This pocket primarily contains LBW and solar resources in the Contract Case, but the amount of LBW added in both Policy Case scenarios and the solar added in 100x2044-Higher Policy Case scenario exceeds the Contract Case capacity by a wide margin. When aggregating all renewables, Pocket X3 has the lowest renewable energy deliverability percentage among all pockets for the 100x2044-Higher Policy Case scenario.

The primary congested elements are Lyme and Thousand Islands connecting into Lyme Tap. The secondary congested elements are East Watertown flowing down to Light House Hill. These are driven by a large amount of candidate renewable additions being sited within Jefferson County with limited transmission to deliver renewable energy. Some of the observed curtailment could also be a result of this pocket feeding into Pocket X2 and eventually being limited by the congestion on the Central East interface.

Figure J-7: Pocket X3 Congestion and Energy Deliverability Summary



ID	Constraint	Number of Limiting Hours			
		Contract	95x2044 -Baseline	100x2044 -Higher	Average
1	LYMETP--LYME_115kV	0	2,043	4,365	2,136
2	THOU ISL--LYMETP_115kV	0	0	2,841	947
3	HTHSE HL--BABBITS_115kV	0	0	1,179	393
4	E WTRTWN--STAPLIN CRK_115kV	0	0	1,161	387

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	95x2044 -Baseline	100x2044 -Higher	Contract	95x2044 -Baseline	100x2044 -Higher
Hydro	70	70	70	100%	92%	65%
Wind	506	1,655	1,666	100%	94%	83%
Solar	319	319	5,640	100%	100%	41%

Capital Region (Pocket Y)

The Capital Region pockets are centered around the Albany metropolitan area and include areas in the Mohawk Valley and upper Hudson Valley regions. As an update from the prior Outlook, the Y1 pocket has been expanded northeast to contain the Glens Falls area split across Saratoga, Warren, and Washington counties. UPV resources in Pocket Y are primarily located along the 115 kV path flowing across Herkimer and Montgomery counties, as well as in the expanded northeast portion of the pocket. Bulk level transmission constraints in the area include Central East and New Scotland-Knickerbocker—both paths are historically congested throughout the year. The addition of UPV resources in the Policy Case scenarios causes high levels of congestion on local 115kV constraints within Pocket Y.

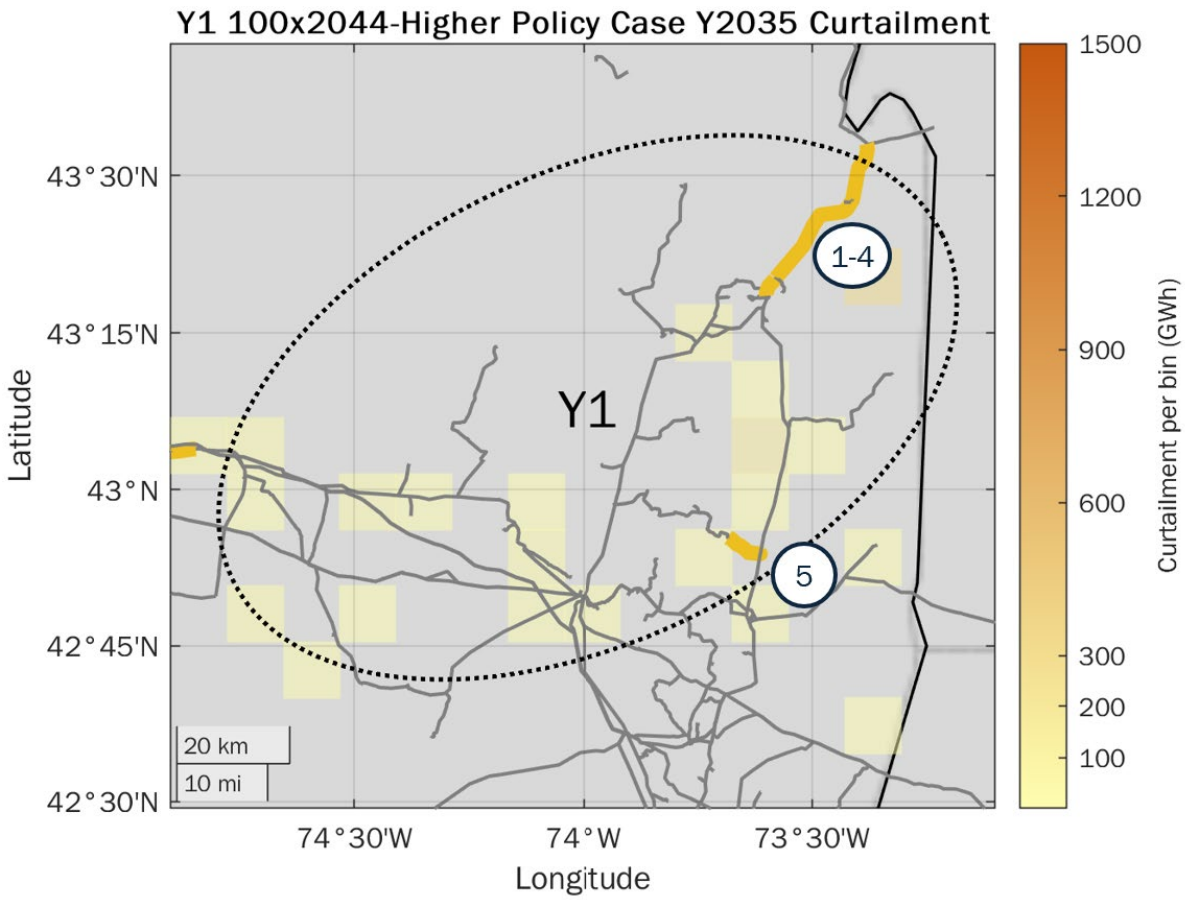
Pocket Y2 is located south of the Albany metro area in the upper Hudson Valley. This pocket consists mainly of higher level 345 kV lines carrying power from the Capital Region into Hudson Valley and down to load centers in New York City and Long Island. Pocket Y2 shows energy deliverability of 99% in the Contract Case and did not exhibit notable levels of curtailment or congestion in either of the Policy Case scenarios. In fact, the energy deliverability percentage improved compared to the Contract Case.

Pocket Y1

Pocket Y1 primarily contains solar and hydro resources in the Contract Case. The capacity additions in the Policy Case scenarios are predominantly UPV resources with 2.8GW added in the 95x2044-Baseline Policy Case and 2.2GW added in the 100x2044-Higher Policy Case. Many of the most constrained elements within Pocket Y1 are located on the 115kV system in Washington County. As renewable energy comes across Central East and is generated from resources around the Glens Falls area, the lines preceding the ISO-NE tie lines in Washington County begin to bind.

A majority of the Central East interface resides within Pocket Y1 as well. Central East is congested an average of 6,000 hours across the Contract Case and Policy Case scenarios. With the addition of awarded resources in the Contract Case and candidate resources in the Policy Case upstate, and the assumed age-based fossil retirements downstate, large amounts of energy are consistently being driven across Central East to serve downstate load. This congestion impacts the renewable energy deliverability for resources within Pocket Y1 located upstream of Central East and the congested elements shown in Pocket X2.

Figure J-8: Pocket Y1 Congestion and Energy Deliverability Summary



ID	Constraint	Number of Limiting Hours			
		Contract	95x2044 -Baseline	100x2044 -Higher	Average
1	COMSTOCK--WHITEHAL_115kV	440	2,557	2,963	1,987
2	COMSTOCK--MOHICAN_115kV	4,063	680	432	1,725
3	GRT MDWS--WHITEHAL_115kV	82	2,189	2,282	1,518
4	BURGOYNE--CEDAR_115kV	0	1,287	3,064	1,450
5	MULBR115--MLBRYTPS_115kV	0	1,860	1,903	1,254

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	95x2044 -Baseline	100x2044 -Higher	Contract	95x2044 -Baseline	100x2044 -Higher
Hydro	192	192	192	100%	87%	89%
Wind	0	0	186	N/A	N/A	100%
Solar	431	3,239	2,603	100%	88%	88%

Southern Tier (Pocket Z)

Pocket Z is located along the southern border of New York State in Zone C (Central) and Zone E (Mohawk Valley). This pocket consists of a combination of LBW and UPV resources. This pocket contains significant bulk level and lower kV transmission networks that connect resources in Western New York and the Finger Lakes to bulk transmission leading to major interfaces, such as Central East and Marcy-South, delivering power to the rest of the state.

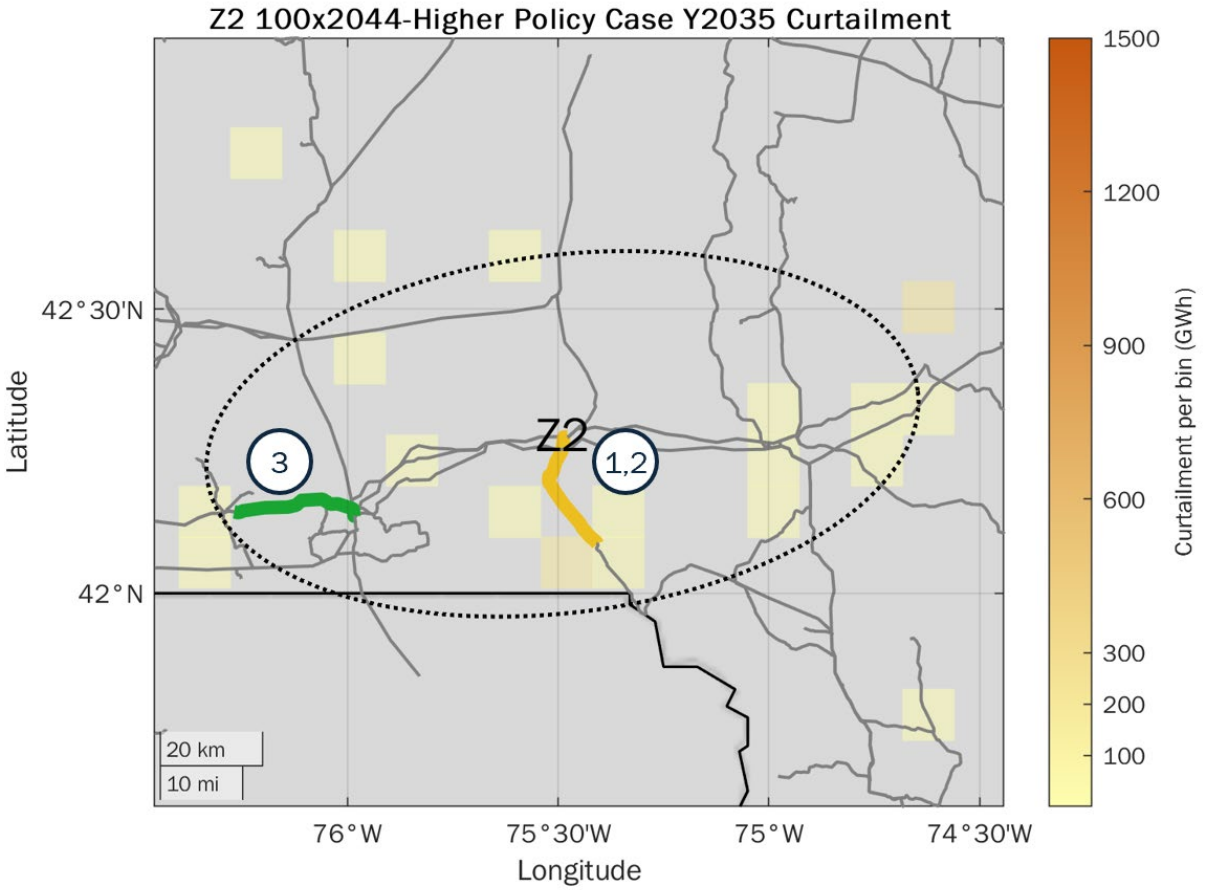
Pocket Z1 is located along the 230 kV path from South Perry to Hillside, the 115 kV circuits around Bennett substation, the 115 kV circuit from Hillside to North Waverly, and the Watercure 345 kV bus. This large pocket spans multiple counties and includes a variety of transmission paths for resources to interconnect. Despite Pocket Z1 having the fourth most renewable capacity across the Contract Case and Policy Case scenarios, energy deliverability was not significantly impacted by constrained transmission elements within, or around the Pocket.

Pocket Z3 is located along the 345/115 kV corridor from Lafayette-Clarks Corners substation and the 115 kV circuit from Clarks Corners to Oneida substation. Pocket Z3 has the fourth lowest renewable capacity across the Contract Case and Policy Case scenarios, and minimal curtailment is shown for the renewable resources in this pocket.

Pocket Z2

Pocket Z2 is located along the 345/115 kV corridor from Oakdale to the Fraser substation and contains the 115 kV section from East Norwich to Jennison. A few elements within Pocket Z2 exhibit notable congestion across the Contract Case and Policy Case scenarios. These are the 230 kV line from Watercure to Oakdale and the 115 kV line delivering power from Stilesville, Bluestone, and Afton north to Jennison. Both Policy Case scenarios add significant LBW capacity and 100x2044-Higher Policy Case scenario adds around 550 MW of UPV by 2035. The resource additions south of Jennison result in a constrained 115 kV transmission system and decreased energy deliverability. When aggregating all renewables, Pocket Z2 has the lowest renewable energy deliverability among all pockets for the 95x2044-Baseline Policy Case scenario.

Figure J-9: Pocket Z2 Congestion and Energy Deliverability Summary



ID	Constraint	Number of Limiting Hours			
		Contract	95x2044 -Baseline	100x2044 -Higher	Average
1	JENN 115--AFTON115_115kV	0	3,264	4,199	2,488
2	AFTON115--BLUEST_POI_115kV	0	2,559	3,549	2,036
3	OAKDL230--SHRED230_230kV	780	847	1,123	917

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	95x2044 -Baseline	100x2044 -Higher	Contract	95x2044 -Baseline	100x2044 -Higher
Hydro	0	0	0	N/A	N/A	N/A
Wind	213	1,083	1,052	100%	85%	92%
Solar	185	185	748	100%	100%	97%

Renewable Generation Pockets - Summary

Figures J-10 and J-11 show pocket metrics for the Contract Case and Policy Case scenarios for the year 2035.

Figure J-10: Renewable Capacity & Energy Deliverability By Pocket

Pocket	Capacity (MW)			Energy Delivered (GWh)			Energy Deliverability (%)		
	Contract Case	95x2044 -Baseline	100x2044 -Higher	Contract Case	95x2044 -Baseline	100x2044 -Higher	Contract Case	95x2044 -Baseline	100x2044 -Higher
W1	1,369	2,189	3,405	2,824	5,347	7,236	100%	100%	94%
W2	593	1,187	3,103	1,634	3,225	7,030	100%	96%	97%
W3	583	955	1,706	1,437	2,496	4,130	100%	99%	97%
X1	2,098	2,474	2,718	10,548	11,163	9,584	100%	96%	79%
X2	779	1,349	6,017	1,931	3,443	10,136	100%	97%	80%
X3	895	2,044	7,376	2,385	4,988	8,278	100%	95%	53%
Y1	622	3,430	2,980	1,501	6,130	5,481	100%	88%	89%
Y2	230	588	1,220	434	1,127	2,535	99%	100%	100%
Z1	1,391	2,100	3,553	2,864	4,701	7,498	100%	96%	94%
Z2	398	1,268	1,801	945	2,859	4,059	100%	86%	94%
Z3	302	785	2,467	691	1,994	5,520	100%	100%	95%

Figure J-11: Renewable Capacity & Energy Deliverability By Pocket and Resource Type

Pocket	Type	Capacity (MW)			Energy Delivered (GWh)			Energy Deliverability (%)		
		Contract Case	95x2044 -Baseline	100x2044 -Higher	Contract Case	95x2044 -Baseline	100x2044 -Higher	Contract Case	95x2044 -Baseline	100x2044 -Higher
W1	Hydro	69	69	69	140	126	100	99%	90%	71%
W1	Solar	1,100	1,100	2,250	2,110	2,108	3,932	100%	100%	91%
W1	Wind	200	1,020	1,087	574	3,112	3,205	100%	100%	99%
W2	Solar	0	0	1,552	N/A	N/A	2,876	N/A	N/A	98%
W2	Wind	593	1,187	1,551	1,634	3,225	4,154	100%	96%	96%
W3	Solar	270	270	1,021	493	491	1,835	100%	100%	97%
W3	Wind	313	685	685	944	2,006	2,295	100%	99%	96%
X1	Hydro	870	870	870	7,610	7,286	5,570	100%	96%	73%
X1	Solar	550	550	695	1,107	1,107	1,341	100%	100%	95%
X1	Wind	678	1,054	1,153	1,831	2,771	2,673	100%	97%	87%
X2	Hydro	102	102	102	557	505	360	100%	91%	65%
X2	Solar	602	602	5,271	1,173	1,157	8,186	100%	99%	80%
X2	Wind	74	644	644	201	1,781	1,590	100%	98%	88%
X3	Hydro	70	70	70	318	293	206	100%	92%	65%
X3	Solar	319	319	5,640	619	619	4,561	100%	100%	41%
X3	Wind	506	1,655	1,666	1,448	4,075	3,511	100%	94%	83%
Y1	Hydro	192	192	192	815	705	727	100%	87%	89%
Y1	Solar	431	3,239	2,603	686	5,425	4,285	100%	88%	88%
Y1	Wind	0	0	186	N/A	N/A	469	N/A	N/A	100%
Y2	Solar	230	583	1,012	434	1,109	1,863	99%	100%	99%
Y2	Wind	0	6	208	N/A	18	672	N/A	100%	100%
Z1	Hydro	38	38	38	159	156	134	100%	98%	84%
Z1	Solar	744	744	1,995	1,061	1,052	3,160	100%	99%	94%
Z1	Wind	608	1,318	1,520	1,644	3,494	4,204	100%	95%	95%
Z2	Solar	185	185	748	330	330	1,322	100%	100%	97%
Z2	Wind	213	1,083	1,052	615	2,529	2,737	100%	85%	92%
Z3	Solar	138	138	1,539	262	259	2,693	100%	99%	91%
Z3	Wind	164	647	928	429	1,734	2,828	100%	100%	99%