New York ISO
Independent System Operator

System & Resource Outlook Update

Economic Planning Department

Electric System Planning Working Group (ESPWG)

Thursday June 2nd, 2022 – WebEx Teleconference

Agenda

- **Outlook Study Status**
- **Renewable Pocket Detailed Analysis**
  - Contract Case
  - Policy Scenario 1 (S1)
  - Policy Scenario 2 (S2)
- **Next Steps**
- **Additional Material Posted To Todays Meeting**
  - Detailed Base, Contract, Policy S1, and Policy S2 Load Forecasts

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Outlook Study Status

- September – October 2021: Finalize reference case assumptions*
- November - December 2021: Conduct simulations and analysis*
- January, February, March, April, May, *June 2022:* Conduct Policy Case simulations and finalize analysis
- *June-July 2022:* Issue draft report, finalize draft report, seek input from Market Monitoring Unit, Business Issues Committee and Management Committee review and action
- August 2022: Seek Board of Directors review and approval
- Following issuance, the NYISO will conduct a public information session on the Outlook

*Collaborate with ESPWG and seek stakeholder input

Information in italics represents an update from the previous status or schedule

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Renewable Generation Pockets

Outlook Renewable Generation Pocket Process

- Pockets identified in 2019 CARIS Phase 1 70x30 scenario will serve as the starting point
- Pockets are identified for year 2030 for the following cases:
  - Contract Case
  - Policy Case Scenario 1
  - Policy Case Scenario 2
- A pocket definition is formed by both local transmission congestion and renewable generation
- Pocket definitions (lines & generators) will be published
- Pocket metrics (curtailment, energy deliverability, etc.) will be reported

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2019 CARIS Phase 1 "70x30" Scenario Renewable Generation Pockets

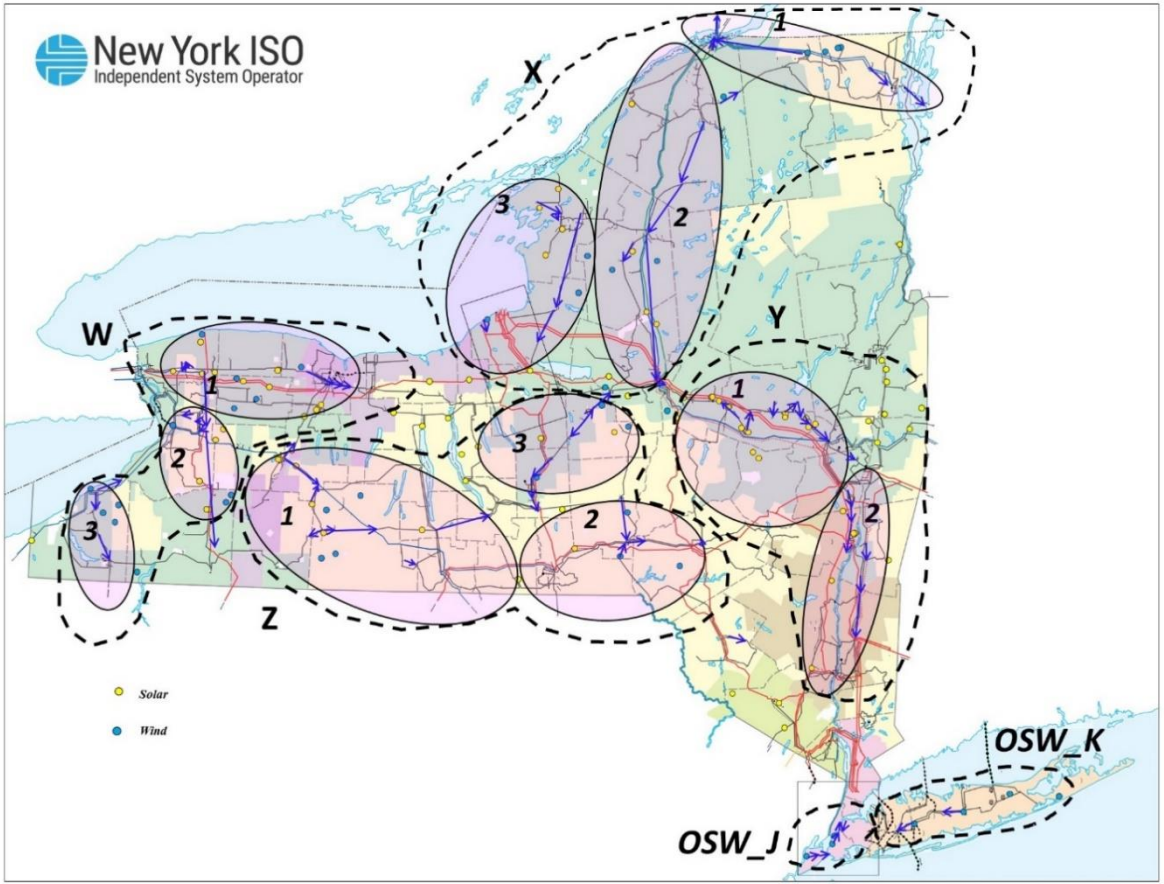

Figure 75 from 2019 CARIS Phase 1 Report

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Policy Case Assumptions: Generation Resources for year 2030

Resource Type	2019 CARIS 1 70x30 Scenario Load Case (MW)	2021 System and Resource Outlook Contract Case (MW)	2021 System and Resource Outlook Policy S1 Case (MW)	2021 System and Resource Outlook Policy S2 Case (MW)
HYDRO	4,467	4,489	4,402	4,423
UPV	10,831	4,804	4,804	4,804
OSW	6,098	4,316	5,036	7,436
LBW	6,476	3,670	9,610	6,415
Total*	**27,872**	**17,279**	**23,852**	**23,078**

* Total Installed Capacity

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Renewable Generation Pockets

- A threshold of 100 congested hours (~1%) per constraint in any case will be used to screen for pocket reporting
- In Contract Case only 1 pocket from 2019 pocket definitions does not appear (Z3) due to the lack of localized transmission congestion
- Policy Case S1 and S2 produced all 13 pockets identified in the CARIS 70x30 Scenario

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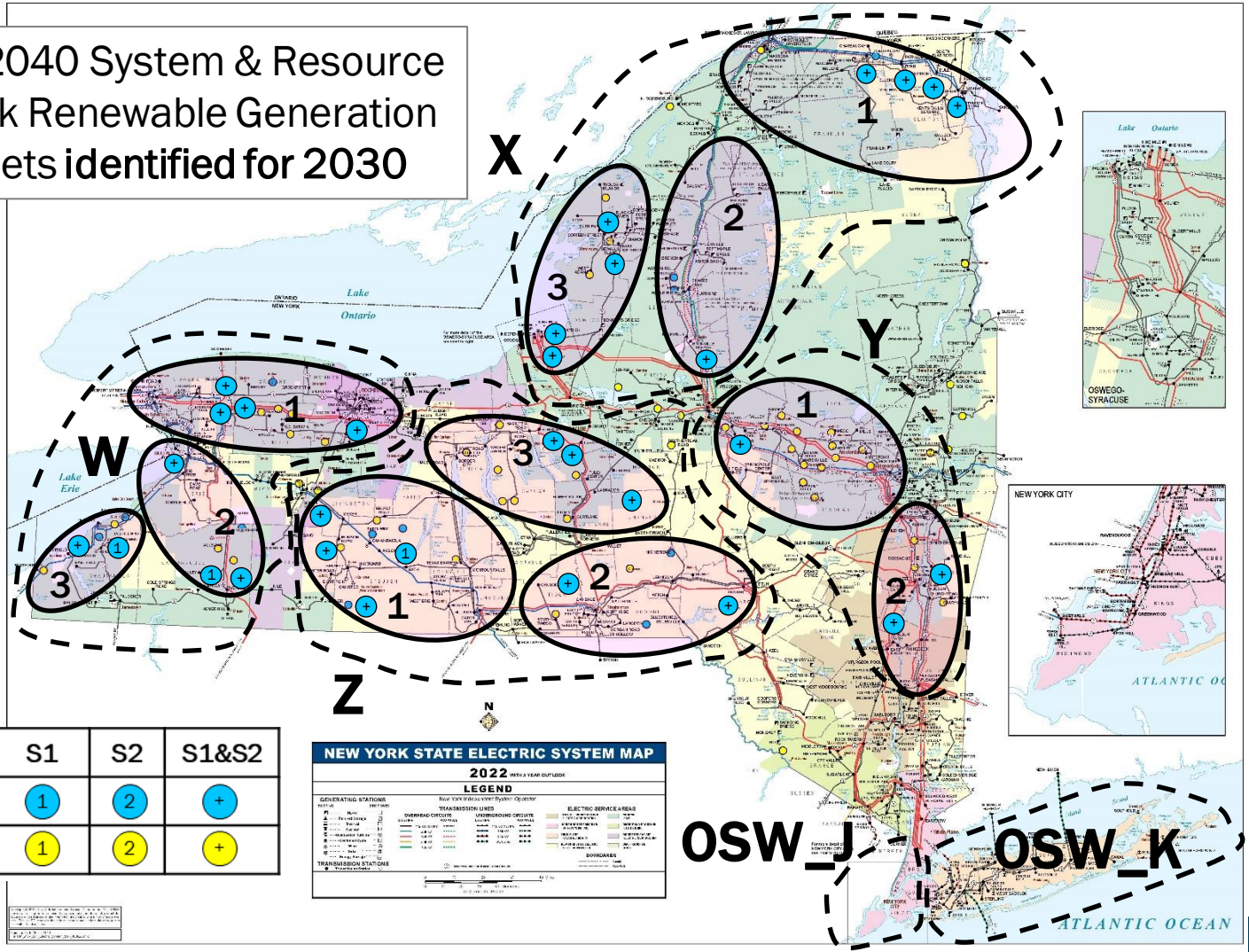
2021-2040 System & Resource Outlook Renewable Generation Pockets **identified for 2030**



Key	Cont.	S1	S2	S1&S2
Wind		1	2	+
Solar		1	2	+

Contract Case Pocket Metrics

Pocket	Type	Capacity (MW)	Scheduled Energy (GWh)	Dispatched Energy (GWh)	Curtailment (GWh)	Energy Deliverability (%)
W1	Wind	200	393	393	0	100%
	Solar	1,130	2,214	2,189	25	99%
W2	Wind	813	2,029	2,028	2	100%
	Solar	60	84	84	0	100%
W3	Wind	305	700	698	2	100%
	Solar	290	448	448	0	100%
X1	Hydro	1,049	7,929	7,929	0	100%
	Wind	678	1,441	1,441	0	100%
	Solar	180	367	367	0	100%
X2	Hydro	250	1,405	1,402	3	100%
	Wind	505	1,154	1,153	0	100%
	Solar	35	54	52	2	96%
X3	Hydro	155	771	760	11	99%
	Wind	80	179	179	0	100%
	Solar	369	609	541	69	90%
Y1	Hydro	30	114	114	0	100%
	Wind	74	179	174	5	97%
	Solar	961	1,801	1,735	66	96%
Y2	Wind	-	-	-	-	-
	Solar	250	421	421	0	100%
Z1	Wind	720	1,628	1,627	0	100%
	Solar	405	711	711	0	100%
Z2	Wind	213	696	689	7	99%
	Solar	60	97	97	0	100%
Z3	Wind	76	136	136	0	100%
	Solar	150	280	280	0	100%
OSW_J	Offshore Wind	2,046	8,366	8,364	2	100%
OSW_K	Offshore Wind	2,270	6,815	4,739	2,076	77%
	Solar	99	159	158	1	100%

- Dispatched Energy = Scheduled Energy – Curtailment
- Energy Deliverability (%) = Dispatched Energy / Scheduled Energy
- Hourly simulations underestimate real-time curtailments due to several factors including, but not limited to, not capturing transmission outages, forecast error, and real-time events
- Specific project interconnection configurations are not modeled as part of the Outlook

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Policy S1 Case Pocket Metrics

Pocket	Type	Capacity (MW)	Scheduled Energy (GWh)	Dispatched Energy (GWh)	Curtailment (GWh)	Energy Deliverability (%)
W1	Wind	1,543	4,890	4,890	0	100%
	Solar	1,130	2,239	2,203	36	98%
W2	Wind	1,491	4,263	4,012	251	94%
	Solar	60	84	74	10	89%
W3	Wind	916	2,713	2,534	179	93%
	Solar	290	448	420	29	94%
X1	Hydro	1,049	7,929	7,894	35	100%
	Wind	876	2,062	2,013	49	98%
	Solar	180	367	367	0	100%
X2	Hydro	250	1,407	1,336	71	95%
	Wind	598	1,441	1,425	17	99%
	Solar	35	56	47	9	84%
X3	Hydro	155	782	663	119	85%
	Wind	790	2,515	2,463	52	98%
	Solar	369	678	510	168	75%
Y1	Hydro	30	114	112	2	98%
	Wind	101	273	247	26	90%
	Solar	961	1,868	1,705	163	91%
Y2	Wind	255	857	857	0	100%
	Solar	250	422	419	3	99%
Z1	Wind	1,495	4,108	3,409	699	83%
	Solar	405	711	661	50	93%
Z2	Wind	803	2,620	2,400	220	92%
	Solar	60	97	76	22	78%
Z3	Wind	265	750	709	41	95%
	Solar	150	280	269	10	96%
OSW_J	Offshore Wind	2,046	8,368	8,368	0	100%
OSW_K	Offshore Wind	2,990	11,830	9,807	2,023	83%
	Solar	99	159	154	6	96%

- Dispatched Energy = Scheduled Energy – Curtailment
- Energy Deliverability (%) = Dispatched Energy / Scheduled Energy
- Hourly simulations underestimate real-time curtailments due to several factors including, but not limited to, not capturing transmission outages, forecast error, and real-time events
- Specific project interconnection configurations are not modeled as part of the Outlook

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Policy S2 Case Pocket Metrics

Pocket	Type	Capacity (MW)	Scheduled Energy (GWh)	Dispatched Energy (GWh)	Curtailment (GWh)	Energy Deliverability (%)
W1	Wind	735	2,180	2,180	0	100%
	Solar	1,130	2,239	2,207	32	99%
W2	Wind	1,074	2,891	2,852	39	99%
	Solar	60	84	81	3	96%
W3	Wind	576	1,594	1,584	10	99%
	Solar	290	448	448	1	100%
X1	Hydro	1,007	7,929	7,928	1	100%
	Wind	778	1,752	1,733	19	99%
	Solar	180	367	367	0	100%
X2	Hydro	240	1,407	1,389	18	99%
	Wind	552	1,298	1,290	8	99%
	Solar	35	56	51	5	91%
X3	Hydro	152	782	736	46	94%
	Wind	417	1,288	1,279	10	99%
	Solar	369	678	548	129	81%
Y1	Hydro	30	114	113	1	99%
	Wind	86	225	212	13	94%
	Solar	961	1,868	1,733	134	93%
Y2	Wind	123	413	413	0	100%
	Solar	250	422	418	4	99%
Z1	Wind	1,119	2,905	2,803	102	96%
	Solar	405	711	691	20	97%
Z2	Wind	512	1,673	1,629	44	97%
	Solar	60	97	88	9	91%
Z3	Wind	173	453	447	6	99%
	Solar	150	280	277	2	99%
OSW_J	Offshore Wind	5,166	19,997	19,994	3	100%
OSW_K	Offshore Wind	2,270	8,891	6,818	2,073	77%
	Solar	99	159	148	12	93%

- Dispatched Energy = Scheduled Energy – Curtailment
- Energy Deliverability (%) = Dispatched Energy / Scheduled Energy
- Hourly simulations underestimate real-time curtailments due to several factors including, but not limited to, not capturing transmission outages, forecast error, and real-time events
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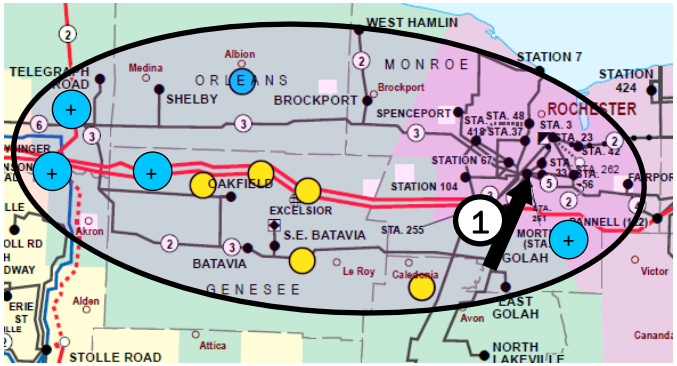
Pocket W1

Western NY: Niagara-Orleans-Rochester



Key	Cont.	S1	S2	S1&S2
Wind	●	1	2	+
Solar	●	1	2	+

Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	GOLAH115 115-MORTIMER 115	845	979	983

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	200	1,543	735	100%	100%	100%
Solar	1,130	1,130	1,130	99%	98%	99%

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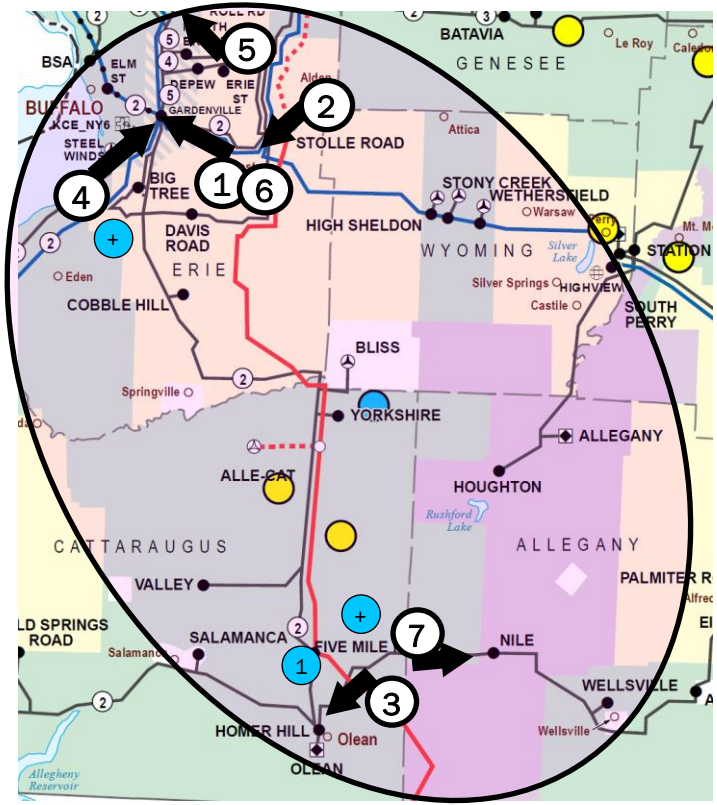
Pocket W2

Western NY: Buffalo-Erie



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	STOLE115 115-GIRD115 115	3,816	1,442	2,975
2	STOLE115 115-STOLE345 345	2,040	1,215	1,885
3	DUGN-157 115-HOMERHIL 115	8	2,833	722
4	BETH-149 115-GRDNVL1 115	0	827	0
5	CLSP-181 115-URBN-922 115	12	199	34
6	GARDV115 115-GIRD115 115	0	158	24
7	DUGN-157 115-NILE115 115	0	116	2

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	813	1,491	1,074	100%	94%	99%
Solar	60	60	60	100%	89%	96%

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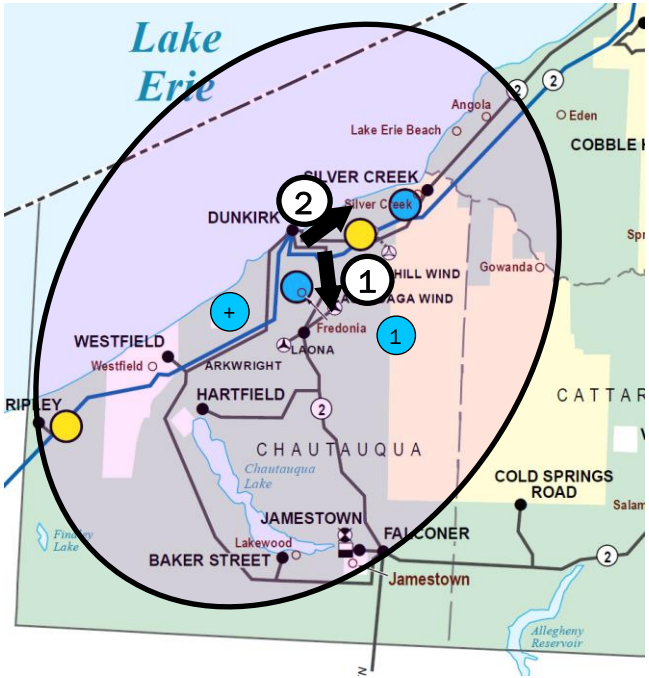
Pocket W3

Western NY: Chautauqua



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	EDNK-161 115-ARKWRIGH 115	297	106	139
2	SLVRC141 115-DUNKIRK1 115	13	2,270	387

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	305	916	576	100%	93%	99%
Solar	290	290	290	100%	94%	100%

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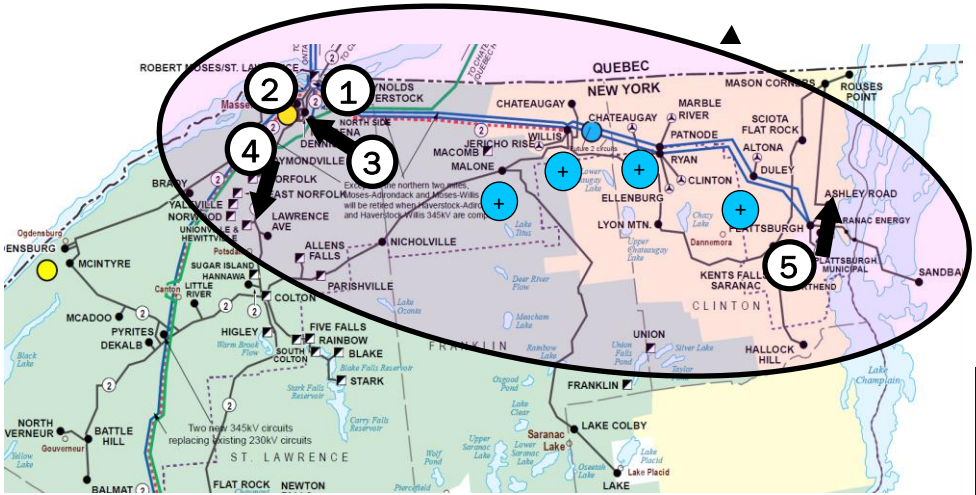
Pocket X1

North Country: Northern Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	North Tie: OH-NY	7,678	8,098	7,978
2	ALCOA-NM 115-ALCOA N 115	926	967	847
3	ALCOA-NM 115-DENNISON 115	782	859	805
4	LWRNCE-B 115-SANDST-5 115	0	146	158
5	NOEND115 115-PLAT 115 115	128	94	64

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Hydro	1,049	1,049	1,007	100%	100%	100%
Wind	678	876	778	100%	98%	99%
Solar	180	180	180	100%	100%	100%

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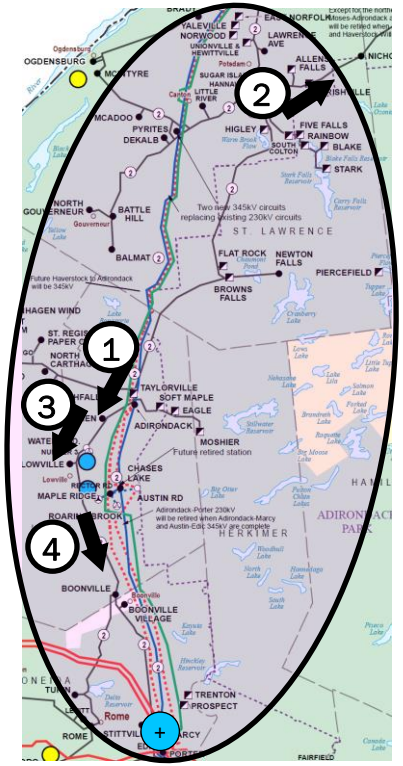
Pocket X2

Northern NY: Mohawk Valley Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	BREMEN 115-Q531_POI 115	182	2,018	1,269
2	NICHOLVL 115-PARISHVL 115	515	183	664
3	LOWVILLE 115-Q531_POI 115	434	132	92
4	BOONVL 115-LOWVILLE 115	96	0	0

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Hydro	250	250	240	100%	95%	99%
Wind	505	598	552	100%	99%	99%
Solar	35	35	35	96%	84%	91%

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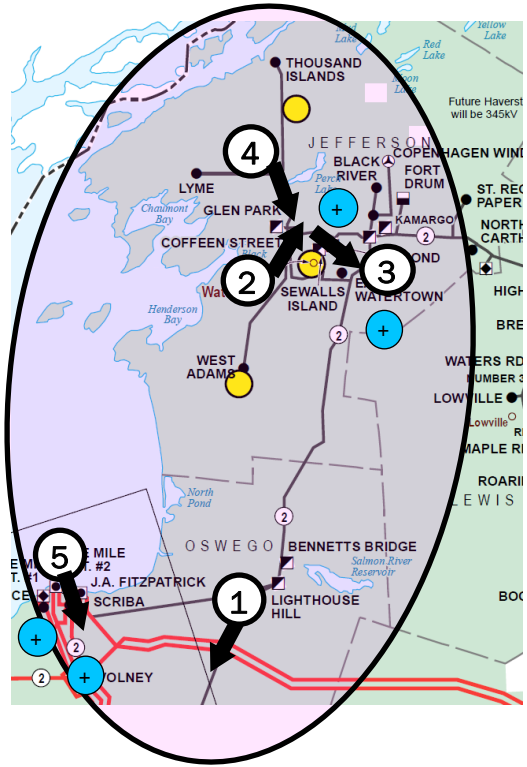
Pocket X3

Northern NY: Ontario Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	HTHSE HL 115-MALLORY 115	591	2,495	1,217
2	COFFEEN 115-GLEN PRK 115	1,119	1,152	1,168
3	COFFEEN 115-E WTRTWN 115	748	223	376
4	COFFEEN 115-LYMETP 115	0	117	115
5	HMMRMILL 115-WINE CRK 115	0	190	0

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Hydro	155	155	152	99%	85%	94%
Wind	80	790	417	100%	98%	99%
Solar	369	369	369	90%	75%	81%

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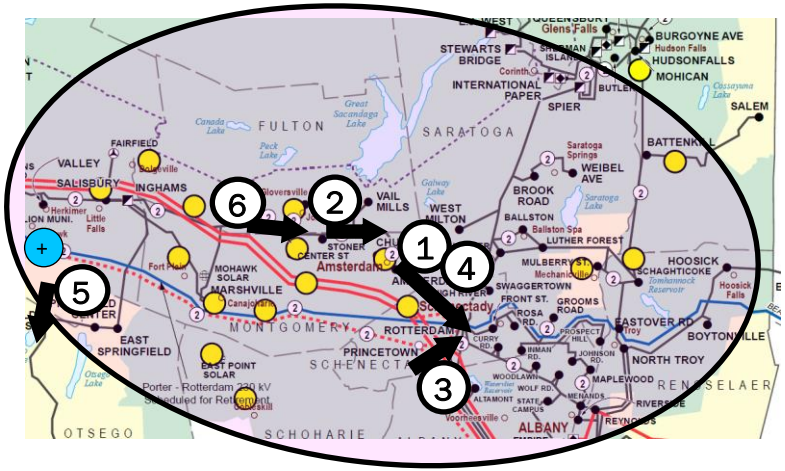
Pocket Y1

Capital Region: Mohawk Valley Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	RTRDM1 115-Q638POI 115	1,200	1,265	1,424
2	STONER 115-VAIL TAP 115	882	1,666	1,275
3	ROTTERDA 345-ROTRDM.2 230	61	1,299	967
4	AMST 115 115-Q638POI 115	302	604	730
5	COLER115 115-RICHF115 115	0	278	205
6	CENTER-N 115-MECO 115 115	0	210	0

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Hydro	30	30	30	100%	98%	99%
Wind	74	101	86	97%	90%	94%
Solar	961	961	961	96%	91%	93%

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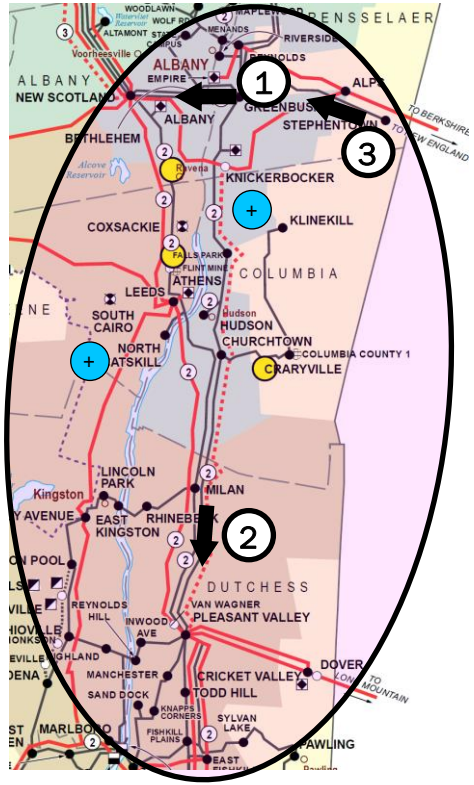
Pocket Y2

Capital Region: Hudson Valley Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	JMC2+9TP 115-OC W +MG 115	702	0	0
2	MILAN 115-BL STR E 115	11	119	15
3	STEPH115 115-GBSH+LGE 115	1	134	139

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind		255	123		100%	100%
Solar	250	250	250	100%	99%	99%

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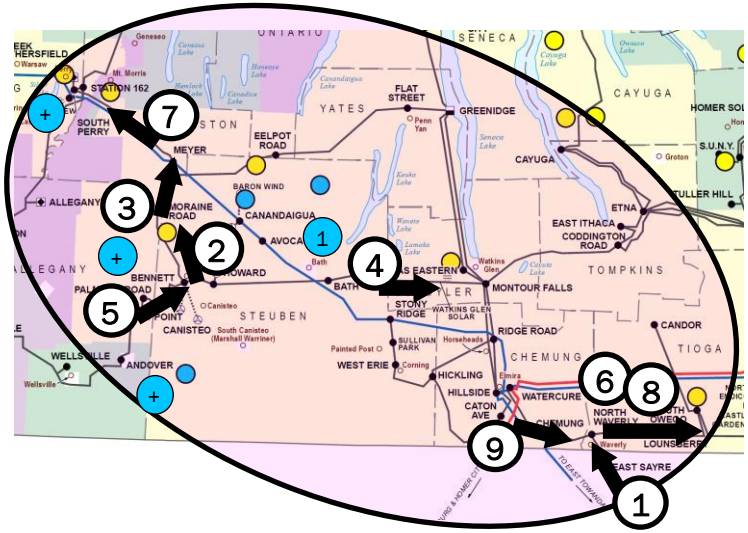
Pocket Z1

Southern Tier: Finger Lakes Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	N.WAV115 115-26E.SAYR 115	3,225	1,249	1,276
2	MORAI115 115-BENET115 115	0	2,246	925
3	MEYER115 115-MORAI115 115	0	1,825	1,045
4	BATH 115 115-MONTR115 115	5	1,986	572
5	BENET115 115-PALMT115 115	0	1,906	159
6	LOUNS115 115-STAGECOA 115	170	366	201
7	MEYER115 115-S.PER115 115	12	179	176
8	N.WAV115 115-LOUNS115 115	95	84	91
9	N.WAV115 115-CHEMU115 115	0	147	26

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	720	1,495	1,119	100%	83%	96%
Solar	405	405	405	100%	93%	97%

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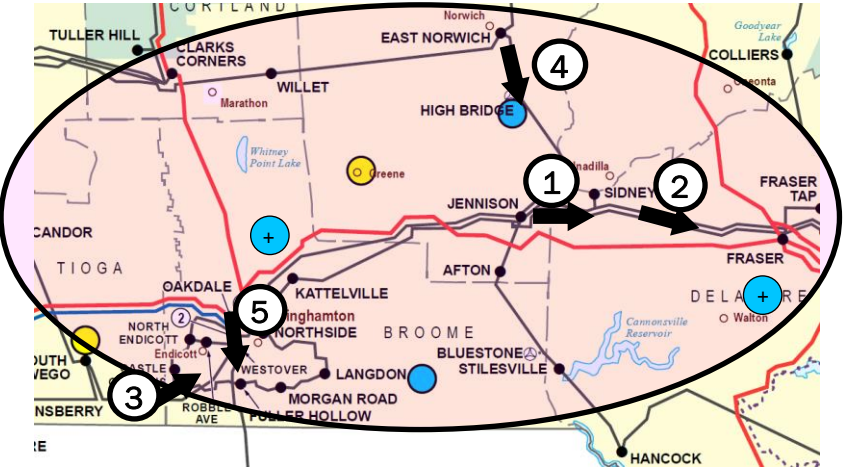
Pocket Z2

Southern Tier: Binghamton Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	JENN 115 115-SIDNT115 115	542	3,459	1,357
2	FRASR115 115-SIDNT115 115	0	242	155
3	S.OWE115 115-GOUDEY8- 115	0	167	169
4	E.NOR115 115-JENN 115 115	0	193	58
5	OAKDL230 230-OAKDL115 115	0	119	0

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	213	803	512	99%	92%	97%
Solar	60	60	60	100%	78%	91%

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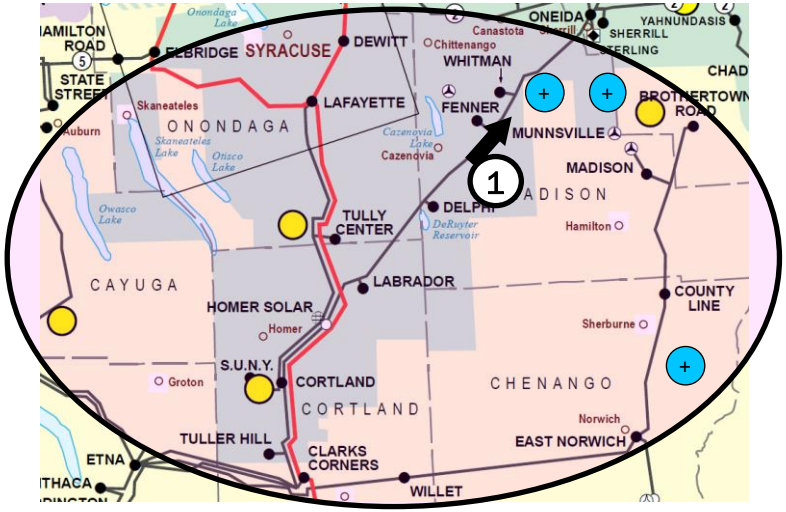
Pocket Z3

Southern Tier: Syracuse Area



Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	WHITMAN 115-FEN-WIND 115	0	128	7

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Wind	76	265	173	100%	95%	99%
Solar	150	150	150	100%	96%	99%

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Pocket OSW_J

New York City Offshore Wind & Tier 4 HVDC

Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	E179 ST 138-HG 4 138	4,726	5,519	5,775
2	ASTE-ERG 138-CORONA-S 138	1,327	1,888	1,418
3	ASTANNEX 345 E13ST 47 345 1	678	6,723	5,544
4	ASTANNEX 345 E13ST 48 345 1	559	3,234	2,339
5	FRESH KI 138-WILOWBK1 138	339	343	229
6	RAINEY8W 138-VERNON-W 138	299	3,044	4,202
7	HG 5 138-ASTORIA 138	210	222	2
8	GOWNUSR1 138-GRENWOOD 138	105	225	840
9	RAINEY8E 138-VERNON-E 138	16	661	610

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Offshore Wind	2,046	2,046	5,166	100%	100%	100%

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Pocket OSW_K

Long Island Offshore Wind

Hours Constrained (if > 100 Hours)

ID	Constraint	Contract	Policy S1	Policy S2
1	Cross Sound Cable	6,305	6,049	6,166
2	BARRETT2 138-VLY STRM 138	4,768	4,922	4,741
3	DUNWOODI 345-SHORE RD 345	3,991	4,362	5,347
4	REACBUS 345-DVNPT NK 345	3,278	2,909	3,559
5	HAUPAGUE 138-C.ISLIP 138	3,066	3,223	3,271
6	Neptune HVDC	2,472	3,125	3,655
7	NRTHPRT1 138-NRTHPRT2 138	1,776	2,114	1,839
8	HOLBROOK 138-RONKONK 138	681	248	754
9	CARLE PL 138-E.G.C. 138	477	680	245
10	NEWBRGE 138-RULND RD 138	436	630	802
11	E.G.C.-2 138-NEWBRGE 138	269	370	292
12	VLY STRM 138-E.G.C.-2 138	264	248	230
13	HAUPAGUE 138-PILGRM P 138	224	190	191
14	BUELL 69-EHAMP 69	158	186	160
15	L SUCS 138-SHORE RD 138	0	207	2

Type	Capacity (MW)			Energy Deliverability (%)		
	Contract	Policy S1	Policy S2	Contract	Policy S1	Policy S2
Offshore Wind	2,270	2,990	2,270	77%	83%	77%
Solar	99	99	99	100%	96%	93%

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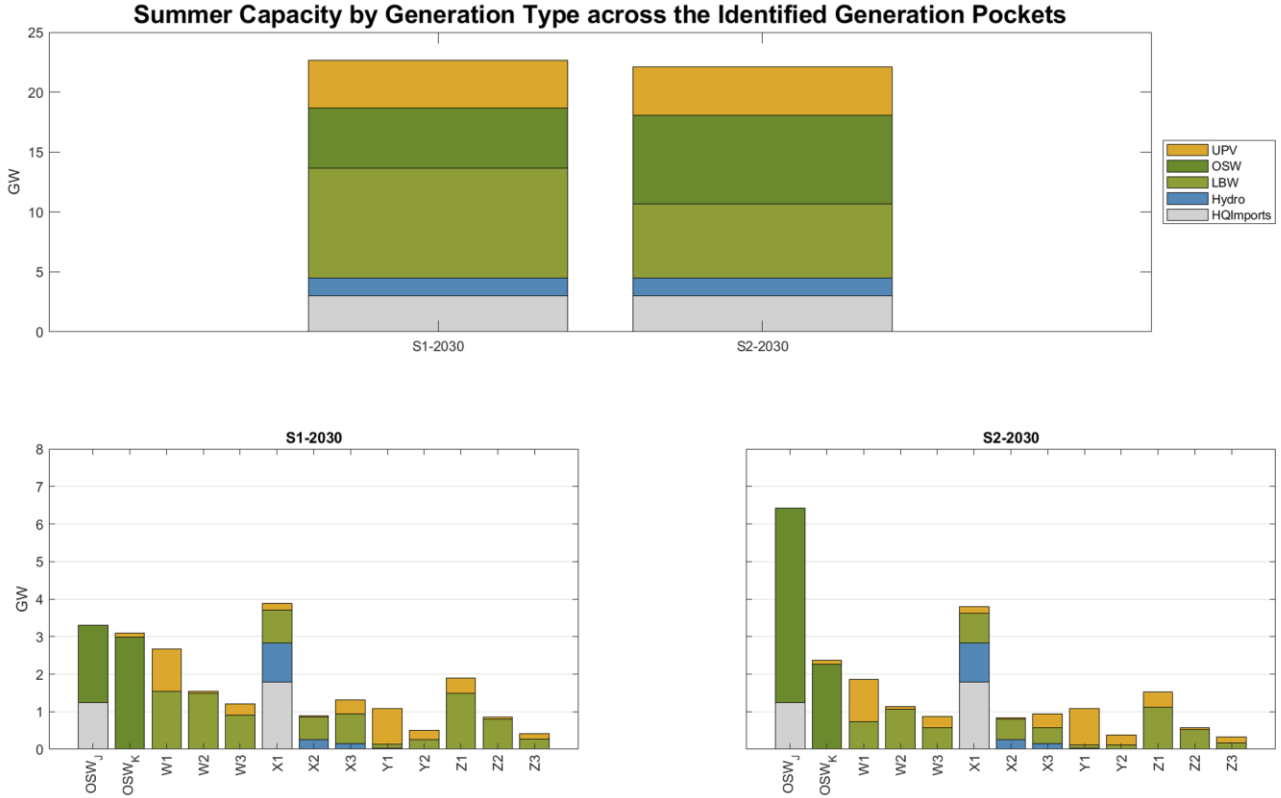
Policy Case Generation Capacity by Pocket



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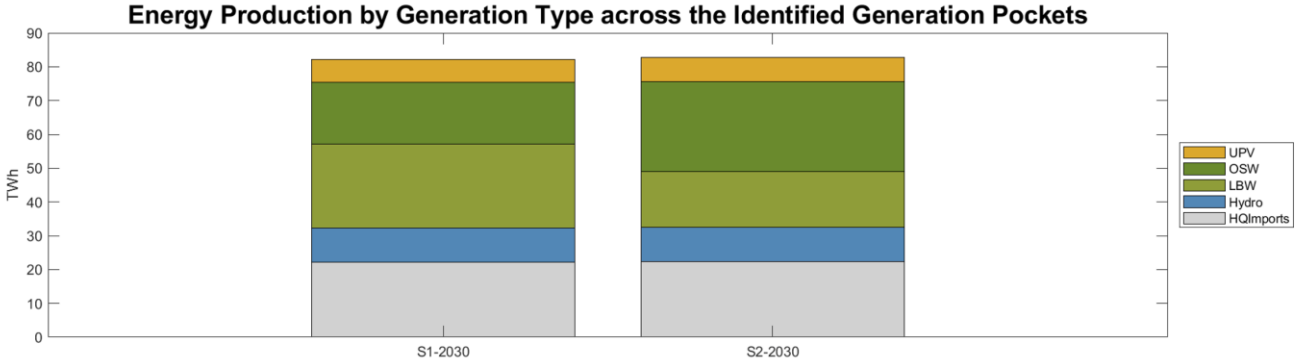
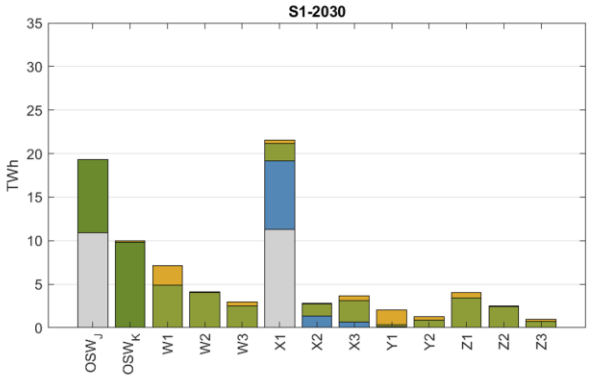
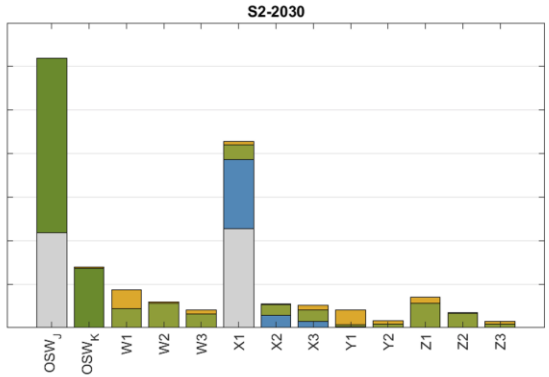
Policy Case Generation Energy by Pocket







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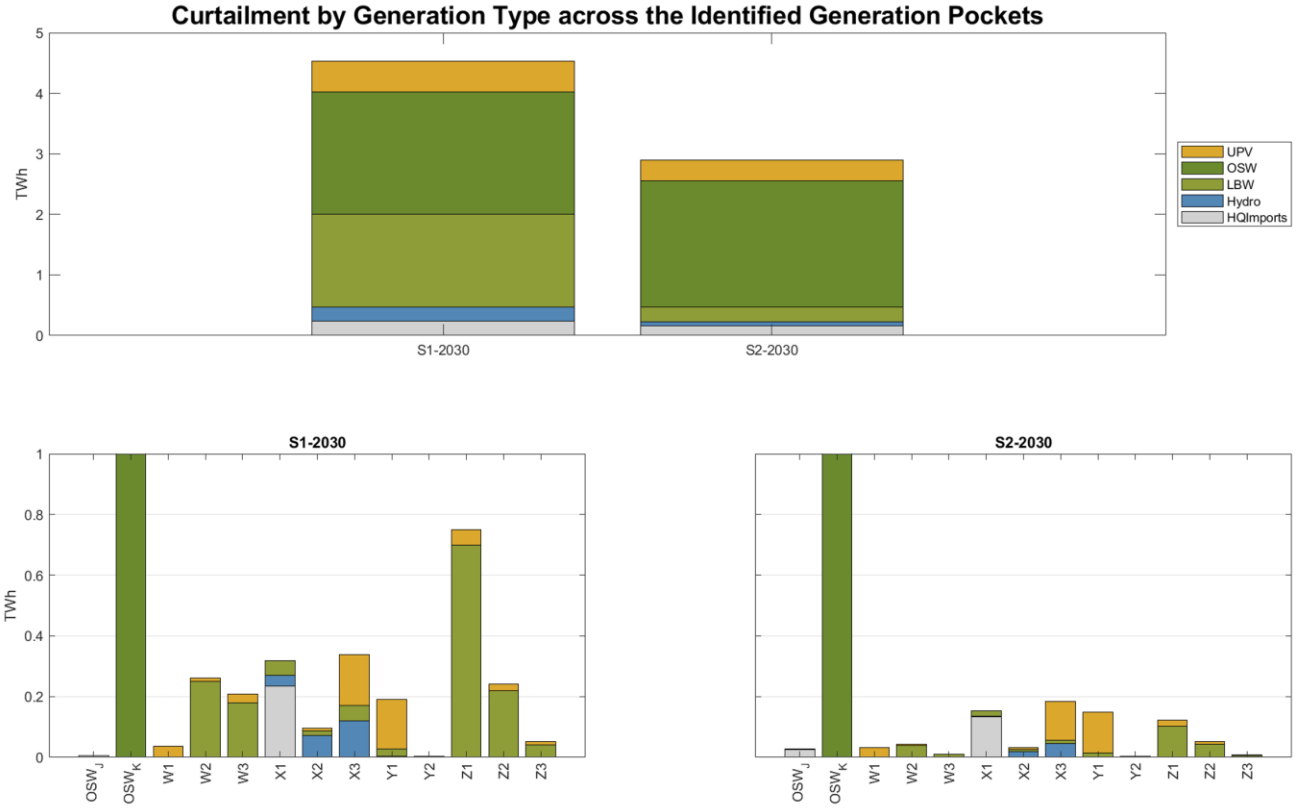
Policy Case Generation Curtailment by Pocket



Next Steps

Next Steps

- Policy S1 & S2 Detailed Results
- 2035 Renewable Generation Pockets
- Results Data Postings
- Draft Report Sections
- Upcoming Stakeholder Meetings for Outlook Updates
  - Wednesday June 8th Special ESPWG
  - Tuesday June 21st ESPWG
  - Friday July 1st ESPWG
  - Wednesday July 13th BIC
  - Wednesday July 27th MC

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Questions, Feedback, Comments?

- Email additional feedback to: JFrasier@nyiso.com

2021-2040 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

December 19, 2021
- System & Resource Outlook Update

January 25, 2022
- System & Resource Outlook Update

February 9, 2022
- System & Resource Outlook Update
- Base & Contract Case Results

February 25, 2022
- System & Resource Outlook Update

March 8, 2022
- System & Resource Outlook Update

March 24, 2022
- System & Resource Outlook Update
- Contract Case Congestion Analysis

April 1, 2022
- System & Resource Outlook Update

April 26, 2022
- System & Resource Outlook Update

May 23, 2022
- System & Resource Outlook Update

Final Reports

2022 Release

Data Posted to ESPWG

- Assumptions Matrix v1
- Capacity Expansion Assumptions Matrix v1
- Contract Case Renewable Projects
- Emissions Price Forecast
- Fuel Price Forecast
- Capacity Expansion Assumptions Matrix v2 (Redline)
- Capacity Expansion Assumptions Matrix v3 (Redline)
- Production Cost Assumptions Matrix v2 (Redline)
- Capacity Expansion Assumptions Matrix v4 (Redline)
- Capacity Expansion Assumptions Matrix v5 (Redline)
- Policy Case Hourly Load Forecasts
- Policy Case Zonal Capacity Expansion Preliminary Results
- Capacity Expansion Assumptions Matrix v6 (Redline)
- Capacity Expansion Assumptions Matrix v7 (Redline)

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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

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