CPV Valley Energy Center
50 Braintree Hill Office Park
Suite 300
Braintree, MA 02184

April 22, 2022

Transmitted via email to chris.hogan@dec.ny.gov

Mr. Christopher M. Hogan
Chief, Major Project Management Unit
Department of Environmental Conservation
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, NY 12233-1750

Re: CPV Valley, LLC – CPV Valley Energy Center
Title V and IV Permit Applications
DEC ID 3-3356-00136/000010 & 00009
Second Supplemental Response to November 29, 2020 Notice of Revocation of Complete Application and Notice of Incomplete Application

Dear Mr. Hogan:

As you know, CPV Valley, LLC ("Valley" or "Applicant") seeks permits under Title V and IV of the Clean Air Act and Article 19 of the New York Environmental Conservation Law ("ECL") (collectively, the "Application") for the Valley Energy Center ("Facility"). By letter dated March 8, 2021, Valley submitted a response to the New York State Department of Environmental Conservation's ("NYSDEC" or "Department") Notice of Revocation of Complete Application and Notice of Incomplete Application dated November 29, 2020 ("NOIA") regarding Valley's Application. By letter dated March 30, 2021, Valley submitted its First Supplemental Filing to the NYSDEC NOIA. Please find enclosed Valley's Second Supplemental Filing to the NYSDEC NOIA, which includes (i) an Additional Reliability Study prepared by the New York Independent System Operator ("NYISO") for Valley dated March 09, 2022 (the "Study"), and (ii) correspondence prepared by Hudson Energy Economics, LLC for NYSDEC on behalf of Valley, dated April 21, 2022, regarding the Study. The Second Supplemental Filing to the NYSDEC NOIA is being submitted to NYSDEC pursuant to the technical conference held between Valley and NYSDEC on November 22, 2021.

Thank you for your continuing attention Valley's Application.

Very truly yours,

Donald G. Atwood
Asset Manager Representative

R008 Additional Reliability Study: CPV Valley

A Report by the
New York Independent System Operator

March 9, 2022

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Background

The purpose of this Additional Reliability Study is for the New York Independent System Operator, Inc. ("NYISO") to conduct a reliability planning study to determine whether a hypothetical change, as specified by CPV Valley, LLC ("Requestor") below, may result in certain Reliability Needs arising on the New York Bulk Power Transmission System ("BPTF"), as defined pursuant to the scope of work.

This Study is being performed by the NYISO, at the request of CPV Valley, LLC, and in accordance with the NYISO Procedures. The Study will determine whether the hypothetical unavailability of the CPV Valley Generator as of January 1, 2023, may result in certain Reliability Needs as defined in Section 31.1 of the NYISO Open Access Transmission Tariff ("OATT") or a Generator Deactivation Reliability Need as defined in Section 38.1 of the OATT, in accordance with the applicable Reliability Criteria[1], and in accordance with applicable NYISO study guidelines, procedures, and practices.

Scope

A limited scope was defined in collaboration with the Requestor, as described below.

1. Resource adequacy: the NYISO, using the latest available resource adequacy planning models from the 2021 Q4 Short Term Assessment of Reliability ("STAR") extended through 2031, provides the impact of the unavailability of the CPV Valley Generator as of January 1, 2023, on the New York Control Area (NYCA) loss of load expectation ("LOLE") for the Study Period of 2023 through 2031.
2. Transmission security: the NYISO, using the "tipping points" tables from the 2021 Q4 STAR, extended through 2031, provides a "tipping point" evaluation, similar to those evaluations performed in the 2021 Q4 STAR, by removing the CPV Valley Generator as of January 1, 2023. This will be provided for the Study Period of 2023 through 2031.

1. Section 31.1 of the OATT defines "Reliability Criteria" as "The electric power system planning and operating policies, standards, criteria, guidelines, procedures, and rules promulgated by the North American Reliability Corporation ("NERC"), the Northeast Power Coordinating Council ("NPCC"), and the New York State Reliability Council ("NYSRC"), as they may be amended from time to time.

CPV Valley Description

CPV Valley is a 770 MW (nameplate) 2-unit combined cycle dual-fuel (natural gas and oil) plant with a summer capacity of 680 MW, located in NYISO Zone G in the Town of Wawayanda within the Lower Hudson Valley locality. The plant entered service in March 2018.

Resource Adequacy

Modeling Background

The NYISO conducts its resource adequacy analysis using the GE-MARS software package, which performs probabilistic simulations of outages of capacity and select transmission resources. The program employs a sequential Monte Carlo simulation method and calculates expected values of reliability indices such as loss of load expectation (LOLE in days/year) and includes load models, generation, and a simplified transmission representation. In determining the reliability of a system, several types of randomly occurring events are taken into consideration. Among these are the forced outages of generation and transmission, and deviations from the forecasted loads.

Generation Model

The NYISO models the generation system in GE-MARS using several types of units. Thermal unit considerations include random forced outages as determined by Generator Availability Data System (GADS), which is reflected in form of a calculated EFORd in the Monte Carlo draw, and scheduled and unplanned maintenance, and thermal derates. Renewable resource units (*i.e.,* solar PV, wind, run-of-river hydro, and landfill gas) are modeled using five years of historical production data. Co-generation units are also modeled using a capacity and load profile for each unit.

Load Model

The load model in the NYISO GE-MARS model consists of historical load shapes and load forecast uncertainty (LFU). The NYISO currently uses three historical load shapes in the GE-MARS model (2002, 2006 and 2007) in seven different load levels using a normal distribution. LFU is applied to every hour of these historical shapes and each of the seven load levels are run through the GE-MARS model.

External Areas Model

The NYISO models the four external Control Areas interconnected to the NYCA: (ISO-New England, PJM, Ontario, and Quebec). The transfer limits between the NYCA and the external areas are set in collaboration with the NPCC CP-8 Working Group. Additionally, the probabilistic model employs a number of methods aimed at preventing overreliance on support from the external systems. These include imposing a limit of 3,500 MW to the total emergency assistance from all neighbors, modeling simultaneous peak days, and modeling the long-term purchases and sales with neighboring control areas.

System Topology

The NYISO models the amount of power that could be transferred across the system in GE-MARS using interface transfer limits applied to the connections between the GE-MARS areas[2] ("bubble-and-pipe" model).

Under this type of probabilistic simulation, the NYCA loss of load expectation (LOLE in days/year) through the ten-year planning horizon is compared with the NYSRC and NPCC LOLE criterion to not exceed one event-day in 10 years, or LOLE < 0.1 event-days/year.

Resource Adequacy Results

The GE-MARS models from the 2021 Q4 STAR[3] were used as the "base case", from which CPV Valley was removed starting January 1, 2023, as defined in the scope. NYCA LOLE was then calculated for both models for impact comparison. The study years simulated were 2023 through 2031. The NYCA LOLE results are summarized in the **Figure 1** below.

Figure 1: NYCA LOLE with and without CPV Valley

	LOLE (days/year)		
Study Year	CPV On	CPV Off	Delta
2023	0.033	0.050	0.02
2024	0.041	0.059	0.02
2025	0.044	0.067	0.02
2026	0.046	0.069	0.02
2027	0.052	0.079	0.03
2028	0.044	0.085	0.04
2029	0.058	0.091	0.03
2030	0.059	0.098	0.04
2031	0.069	0.113	0.04

[2] No generation pockets in Zone J and Zone K are modeled in detail in MARS.

[3] https://www.nyiso.com/documents/20142/16004172/2021-Q4-STAR-Report-vFinal.pdf

Key resource adequacy observations:

1. If the 680 MW CPV Valley plant is unavailable, the loss of load expectation increases significantly and would exceed the resource adequacy criterion of 0.1 days/year starting in 2030 or 2031 based on the current load forecasts, system assumptions, and planning procedures. If the NYISO identified a LOLE greater than 0.1 in one of its reliability studies (e.g., Reliability Needs Assessment, Short-Term Assessment of Reliability) this would be considered a Reliability Need, as defined in Section 31.1. of the NYISO Open Access Transmission Tariff.
2. When the loss of load expectation is within the 0.1 days/year criterion, the already small system resource margin will significantly decrease without CPV Valley.

   As described in the 2021 Q4 STAR[4], and as an example focused on Zone G: the 2021-2030 Comprehensive Reliability Plan[5] (CRP) indicated that the zonal resource adequacy margin (ZRAM) as measured in "perfect capacity[6]" in Zone G was approximately 1,800 MW away from violating the NYCA LOLE criterion of 0.1 event-days/year under the study assumptions for study year 2024. Lower margins were identified in the outer study years in the CRP, e.g., 800 MW for study year 2030. If CPV Valley were "perfect capacity", the margin would further decrease to approximately 1,100 MW in 2024 (for a 1 to 1 impact assumption in Zone G), and would further decrease to 100 MW in 2030. The margin would become negative in 2031 when the LOLE is above its criterion.

[4] https://www.nyiso.com/documents/20142/16004172/2021-Q4-STAR-Report-vFinal.pdf

[5] https://www.nyiso.com/documents/20142/2248481/2021-2030-Comprehensive-Reliability-Plan.pdf

[6] "Perfect capacity" is capacity that is not derated (e.g., due to ambient temperature or unit unavailability), not subject to energy durations limitations (i.e., available at maximum capacity every hour of the study year), and not tested for transmission security or interface impacts.

Transmission Security Margins ("Tipping Points")

The purpose of this assessment is to identify plausible changes in conditions or assumptions that might adversely impact the reliability of the Bulk Power Transmission Facilities (BPTF) or "tip" the system into violation of a transmission security criterion. This assessment is performed using a deterministic approach through spreadsheet-based methods based on input from the 2021 Load and Capacity Data Report (Gold Book) and 2021 Quarter 4 STAR base case updates. For this assessment, "tipping points" are evaluated for the NYCA as well as the Lower Hudson Valley (G-J) locality. For this evaluation the system "tips" when the transmission security margin is negative (i.e., demand exceeds available resources and transmission capability).

New York Control Area (NYCA) Tipping Points

The tipping points for the NYCA are evaluated under summer peak conditions, which are expected to be the most stressed system conditions. A tipping point occurs when the transmission security margin is a negative value. The transmission security margin is the ability to meet load plus losses and system reserve (*i.e.,* total capacity requirement) against the NYCA generation, interchanges, and temperature-based generation de-rates (total resources). The NYCA generation (from line-item A) is comprised of the existing generation plus additions of future generation resources that meet the reliability planning process base case inclusion rules as well as the removals of deactivating generation and peaker units. Consistent with current transmission planning practices for transmission security, (1) wind generation is assumed at a 0 MW output, (2) run-of-river hydro is reduced consistent with its average capacity factor, and (3) solar is dispatched based on the ratio of its nameplate capacity and solar PV peak reductions stated in the 2021 Gold Book. Additionally, the NYCA generation includes the Oswego export limit for all lines in-service.

Figure 2 provides a summary of the statewide system margin with CPV in-service as well as with CPV out-of-service. Under current applicable reliability rules and procedures, the system would be unable to maintain operating reserves and meet forecasted demand when the transmission security margin is negative for the base case assumptions (e.g., baseline normal weather load forecast, no pre-contingency unscheduled forced outages, etc.). With CPV in-service the system has sufficient margin through 2031. However, with CPV out-of-service the system margin is insufficient starting in 2030. As shown in **Figure 2**, under baseline normal weather conditions the statewide system margin with CPV in-service (line-item H) ranges between 1,151 MW in 2023 to 508 MW in 2031. With CPV out-of-service the statewide system margin (line-item H) ranges from 489 MW in 2023 to -154 MW in 2031. The annual fluctuations are driven by the decreases in NYCA generation (line-item A) and in the load forecast (line-item E).

It is feasible for other combinations of events to tip the system over its margin, such as increased load or a combination of reductions in total resources and load. An additional evaluation shown in **Figure 2** is the impact of the historical forced outage rate of NYCA thermal generation (line-item I) on the transmission security margin. The statewide system margin with forced outages shows insufficient margins for all years with either CPV in-service or out-of-service (line-item J).

Figure 3 shows the statewide system margin for heatwave conditions (also known as 90/10 or 90th percentile load) under the assumption that the system is in an emergency condition, accounting for Special Case Resources (SCRs). Although the transmission security of the system is not currently designed for the 90th percentile forecast, **Figure 3** shows a risk to grid reliability with insufficient margin throughout the study period (Line-item I). When considering historical forced outage rates of thermal generation (line-item J), the system deficiency is amplified for all study years (line-item K).

Under transmission security for an extreme heatwave (1-in-100-year forecast), **Figure 4** shows that there is insufficient statewide system margin for all years (line-item I). This deficiency is exacerbated with the consideration of forced outages (line-item K). The adjusted statewide system margin is deficient beyond the point of meeting the total capability requirement without reserves.

Figure 5 provides a summary of the statewide system margins under the baseline normal weather conditions. **Figure 6** provides a summary of the statewide system margins under heatwave conditions. **Figure 7** provides a summary of the statewide system margins under the 1-in-100-year extreme heatwave conditions.

Figure 2: Statewide System Margin (Summer Peak - Baseline Normal Weather, Normal Transfer Criteria)

Line	Item	Summer Peak - Baseline Normal Weather, Normal Transfer Criteria with CPV In-Service								
		2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	NYCA Generation (1)	34,307	34,297	33,684	33,679	33,679	33,674	33,669	33,664	33,659
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0
D	**Total Resources (A+B+C) (3)**	36,151	36,141	35,528	35,523	35,523	35,518	35,513	35,508	35,503
E	Load Forecast	(32,380)	(32,211)	(32,140)	(32,076)	(32,088)	(32,094)	(32,158)	(32,263)	(32,375)
F	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
G	**Total Capability Requirement (E+F)**	(35,000)	(34,831)	(34,760)	(34,696)	(34,708)	(34,714)	(34,778)	(34,883)	(34,995)
H	**Statewide System Margin (D+G)**	1,151	1,310	768	827	815	804	735	625	508
I	Forced Outages (3)	(1,806)	(1,806)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)
J	**Statewide System Margin with Forced Outages (H+I)**	(655)	(496)	(976)	(917)	(929)	(940)	(1,009)	(1,119)	(1,236)

Line	Item	Summer Peak - Baseline Normal Weather, Normal Transfer Criteria with CPV Out-of-Service								
		2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	NYCA Generation (1)	33,645	33,635	33,022	33,017	33,017	33,012	33,007	33,002	32,997
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0
D	**Total Resources (A+B+C) (3)**	35,489	35,479	34,866	34,861	34,861	34,856	34,851	34,846	34,841
E	Load Forecast	(32,380)	(32,211)	(32,140)	(32,076)	(32,088)	(32,094)	(32,158)	(32,263)	(32,375)
F	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
G	**Total Capability Requirement (E+F)**	(35,000)	(34,831)	(34,760)	(34,696)	(34,708)	(34,714)	(34,778)	(34,883)	(34,995)
H	**Statewide System Margin (D+G)**	489	648	106	165	153	142	73	(37)	(154)
I	Forced Outages (3)	(1,781)	(1,781)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)
J	**Statewide System Margin with Forced Outages (H+I)**	(1,292)	(1,133)	(1,612)	(1,553)	(1,565)	(1,576)	(1,645)	(1,755)	(1,872)

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service.
2. Interchanges are based on ERAG MMWG values.
3. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)

Figure 3: Statewide System Margin (Summer Peak – Heatwave, Emergency Transfer Criteria)

Line	Item	Summer Peak - Heatwave, Emergency Transfer Criteria with CPV In-Service								
		2023	2024	2025	2026	2027	2028	2029	2030	2031
A	NYCA Generation (1)	34,307	34,297	33,684	33,679	33,679	33,674	33,669	33,664	33,659
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	SCRs (4), (5)	822	822	822	822	822	822	822	822	822
D	Temperature Based Generation Derates	(195)	(195)	(185)	(185)	(185)	(185)	(185)	(185)	(185)
E	**Total Resources (A+B+C+D)**	36,778	36,768	36,164	36,159	36,159	36,154	36,149	36,144	36,139
F	Load Forecast	(34,341)	(34,152)	(34,069)	(33,996)	(34,001)	(34,005)	(34,072)	(34,183)	(34,300)
G	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
H	**Total Capability Requirement (F+G)**	(36,961)	(36,772)	(36,689)	(36,616)	(36,621)	(36,625)	(36,692)	(36,803)	(36,920)
I	**Statewide System Margin (E+H)**	(183)	(4)	(525)	(457)	(462)	(471)	(543)	(659)	(781)
J	Forced Outages (3)	(1,806)	(1,806)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)
K	**Adjusted Statewide System Margin (I+J)**	(1,989)	(1,810)	(2,269)	(2,201)	(2,206)	(2,215)	(2,287)	(2,403)	(2,525)

Line	Item	Summer Peak - Heatwave, Emergency Transfer Criteria with CPV Out-of-Service								
		2023	2024	2025	2026	2027	2028	2029	2030	2031
A	NYCA Generation (1)	33,645	33,635	33,022	33,017	33,017	33,012	33,007	33,002	32,997
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	SCRs (4), (5)	822	822	822	822	822	822	822	822	822
D	Temperature Based Generation Derates	(195)	(195)	(185)	(185)	(185)	(185)	(185)	(185)	(185)
E	**Total Resources (A+B+C+D)**	36,116	36,107	35,503	35,498	35,498	35,493	35,488	35,483	35,478
F	Load Forecast	(34,341)	(34,152)	(34,069)	(33,996)	(34,001)	(34,005)	(34,072)	(34,183)	(34,300)
G	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
H	**Total Capability Requirement (F+G)**	(36,961)	(36,772)	(36,689)	(36,616)	(36,621)	(36,625)	(36,692)	(36,803)	(36,920)
I	**Statewide System Margin (E+H)**	(845)	(665)	(1,186)	(1,118)	(1,123)	(1,132)	(1,204)	(1,320)	(1,442)
J	Forced Outages (3)	(1,781)	(1,781)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)
K	**Adjusted Statewide System Margin (I+J)**	(2,626)	(2,446)	(2,904)	(2,836)	(2,841)	(2,850)	(2,922)	(3,038)	(3,160)

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service.
2. Interchanges are based on ERAG MMWG values.
3. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a de-rate of 373 MW for SCRs.

Figure 4: Statewide System Margin (Summer Peak – 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Line	Item	Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria with CPV In-Service								
		2023	2024	2025	2026	2027	2028	2029	2030	2031
A	NYCA Generation (1)	34,307	34,297	33,684	33,679	33,679	33,674	33,669	33,664	33,659
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	SCRs (4), (5)	822	822	822	822	822	822	822	822	822
D	Temperature Based Generation Derates	(410)	(410)	(390)	(390)	(390)	(390)	(390)	(390)	(390)
E	**Total Resources (A+B+C+D)**	36,563	36,553	35,959	35,954	35,954	35,949	35,944	35,939	35,934
F	Load Forecast	(36,039)	(35,834)	(35,743)	(35,659)	(35,662)	(35,666)	(35,734)	(35,849)	(35,974)
G	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
H	**Total Capability Requirement (F+G)**	(38,659)	(38,454)	(38,363)	(38,279)	(38,282)	(38,286)	(38,354)	(38,469)	(38,594)
I	**Statewide System Margin (E+H)**	(2,096)	(1,901)	(2,404)	(2,325)	(2,328)	(2,337)	(2,410)	(2,530)	(2,660)
J	Forced Outages (3)	(1,806)	(1,806)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)	(1,744)
K	**Adjusted Statewide System Margin (I+J)**	(3,902)	(3,707)	(4,148)	(4,069)	(4,072)	(4,081)	(4,154)	(4,274)	(4,404)

Line	Item	Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria with CPV Out-of-Service								
		2023	2024	2025	2026	2027	2028	2029	2030	2031
A	NYCA Generation (1)	33,645	33,635	33,022	33,017	33,017	33,012	33,007	33,002	32,997
B	External Area Interchanges (2)	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844	1,844
C	SCRs (4), (5)	822	822	822	822	822	822	822	822	822
D	Temperature Based Generation Derates	(410)	(410)	(390)	(390)	(390)	(390)	(390)	(390)	(390)
E	**Total Resources (A+B+C+D)**	35,901	35,891	35,297	35,292	35,292	35,287	35,282	35,278	35,273
F	Load Forecast	(36,039)	(35,834)	(35,743)	(35,659)	(35,662)	(35,666)	(35,734)	(35,849)	(35,974)
G	Operating Reserve Requirement	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)	(2,620)
H	**Total Capability Requirement (F+G)**	(38,659)	(38,454)	(38,363)	(38,279)	(38,282)	(38,286)	(38,354)	(38,469)	(38,594)
I	**Statewide System Margin (E+H)**	(2,758)	(2,563)	(3,066)	(2,987)	(2,990)	(2,999)	(3,072)	(3,191)	(3,321)
J	Forced Outages (3)	(1,781)	(1,781)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)	(1,718)
K	**Adjusted Statewide System Margin (I+J)**	(4,539)	(4,344)	(4,784)	(4,705)	(4,708)	(4,717)	(4,790)	(4,909)	(5,039)

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro are included as well as the Oswego Export limit for all lines in-service.
2. Interchanges are based on ERAG MMWG values.
3. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)
4. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
5. Includes a de-rate of 373 MW for SCRs.

Figure 5: Summary of Statewide System Margin - Baseline Normal Weather

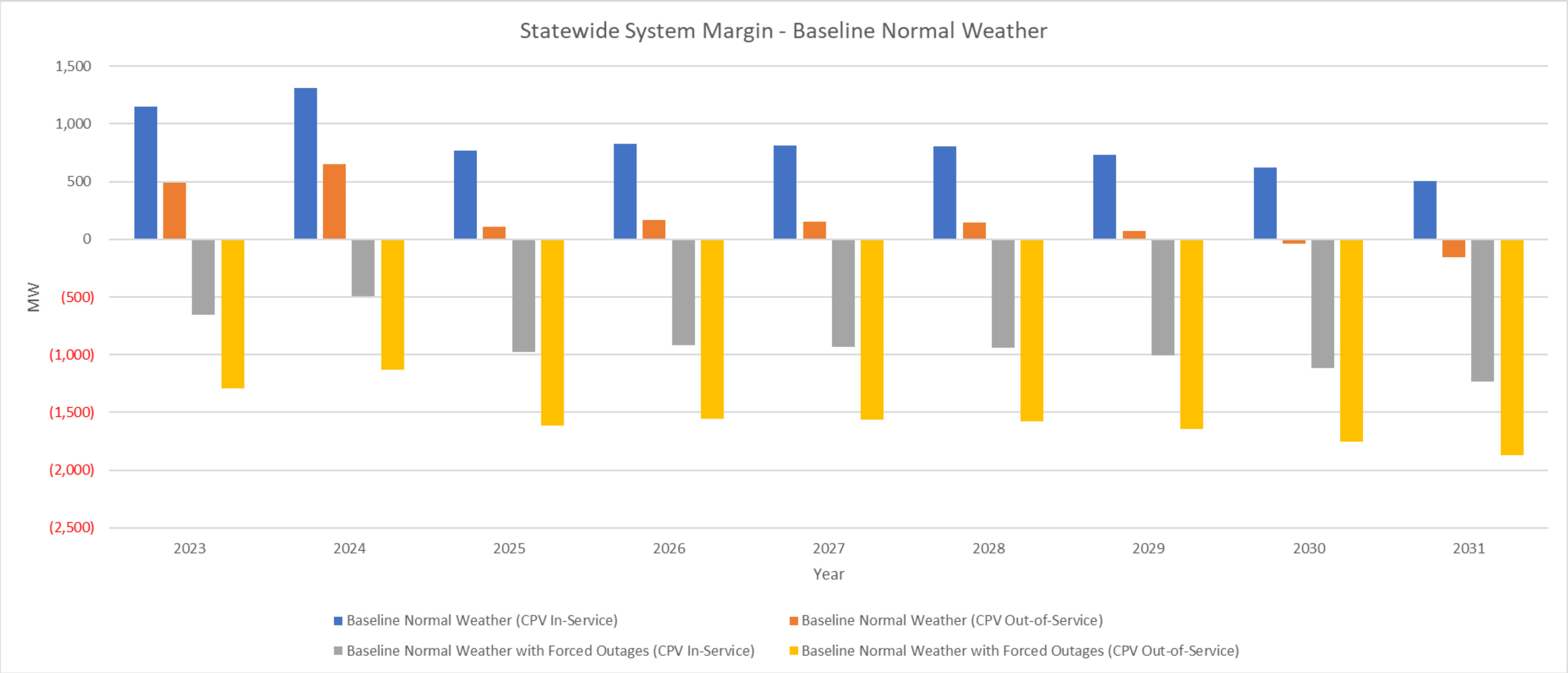


Figure 6: Summary of Statewide System Margin – Heatwave (90/10)

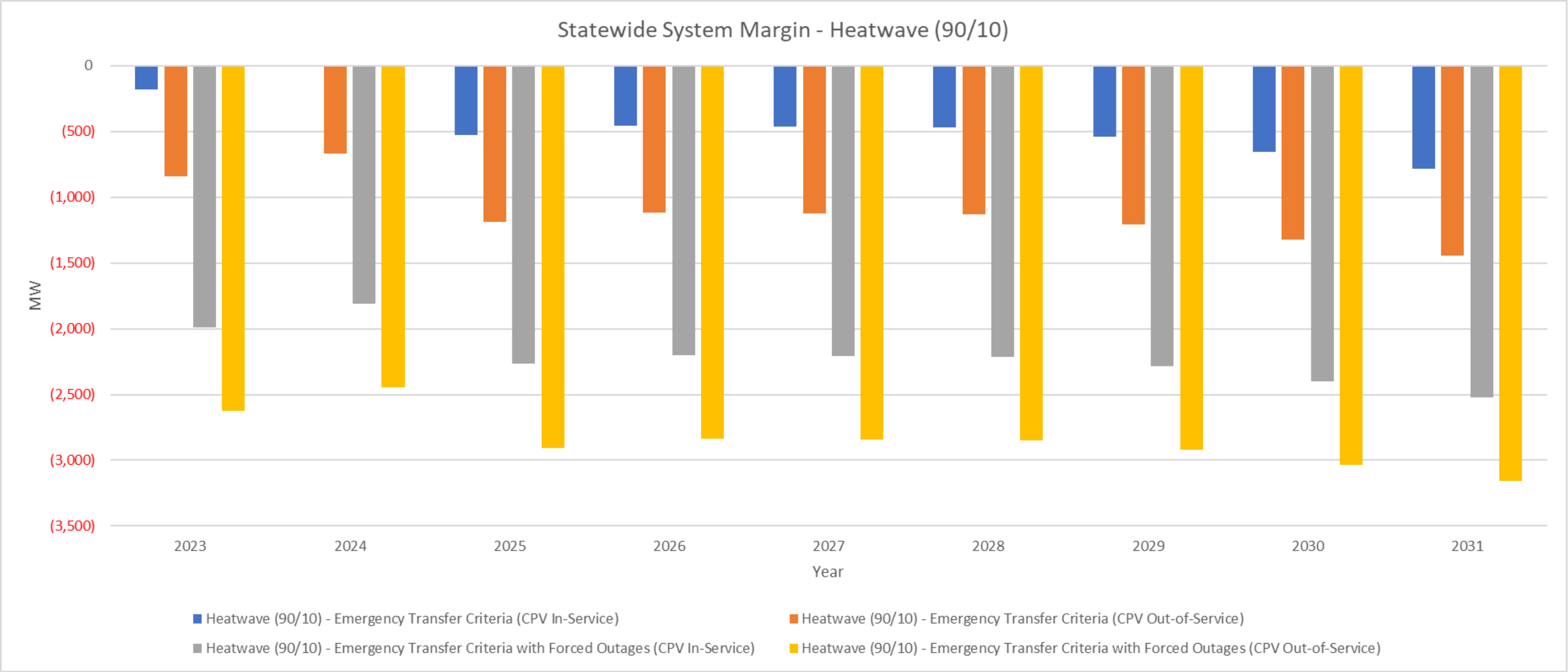
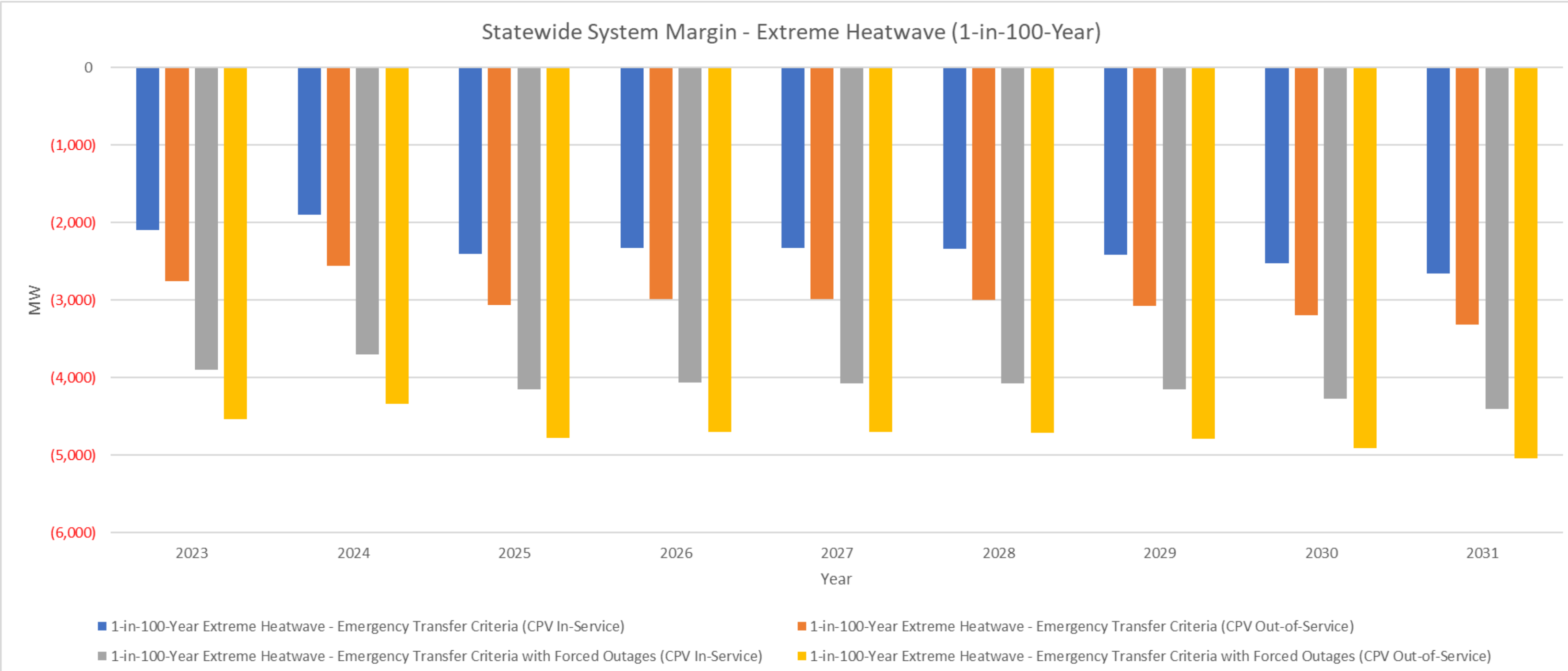


Figure 7: Summary of Statewide System Margin – 1-in-100-Year Extreme Heatwave



Lower Hudson Valley (Zones G-J) Tipping Points

The Lower Hudson Valley, or southeastern New York (SENY) region, is comprised of Zones G-J and includes the electrical connections to the Rockland Electric (RECO) load in PJM. To determine the tipping point for this area, the NYISO determined the combination of two non-simultaneous contingency events (N-1-1) that is most limiting to the transmission security margin. Design criteria N-1-1 combinations include various combinations of losses of generation and transmission. As the system changes, the limiting contingency combination may also change. Moreover, the UPNY-SENY limits included in this assessment are estimates of the transfer limits as they do not consider the impact of the CPV dispatch. The actual transfer limits may be different with CPV out-of-service.

Figure 8 shows how the transmissions security margin changes through time in consideration of the most limiting contingency combination for the year being evaluated. In years 2022 and 2023 (prior to the completion of the Segment B public policy project) the most limiting contingency combination to the transmission security margin under peak load conditions is the loss of Leeds-Pleasant Valley (92) 345 kV followed by the loss of Dolson — Rock Tavern (DART44) 345 kV and Coopers Corners – Rock Tavern (CCRT34). For the remainder of the years the contingency combination changes to the loss of Ravenswood 3 followed by the loss of Pleasant Valley-Wood St. 345 kV (F30/F31).

Figure 8: Lower Hudson Valley Transmission Security Margin (Summer Baseline Peak Forecast - Normal)

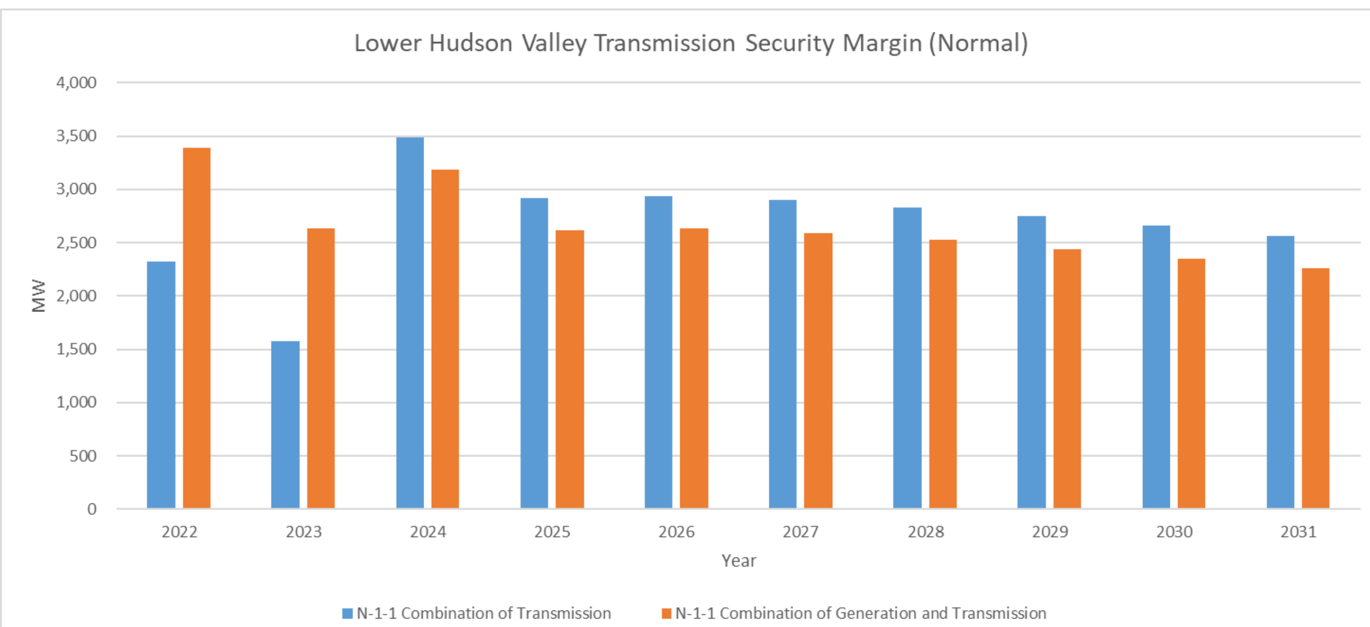


Figure 9 shows the calculation of the Lower Hudson Valley transmission security margin for summer baseline normal weather peak load conditions. Under current applicable reliability rules and procedures, a

violation would be identified when the transmission security margin is negative for the base case assumptions (e.g., baseline load forecast, no pre-contingency unscheduled forced outages, etc.). With CPV in-service under the baseline conditions applicable to the current reliability rules and procedures (line-item P), the transmission security margin ranges from 1,574 MW (2023) to 2,260 MW (2031) (line-item P). With CPV out-of-service the transmission security margin ranges from 912 MW (2023) to 1,598 MW (2031).

An additional evaluation shown in **Figure 9** is the impact of the historical forced outage rate of thermal generation on the transmission security margin (line-item R). This figure shows that generation outages consistent with the historical forced outage rates would result in a system deficiency upon the hypothetical CPV Valley unavailability in 2023. However, starting in 2024 there is a significant increase to the transmission security margin with the completion of the AC Transmission Segment B Public Policy Transmission Project such that no transmission security deficiencies are projected for normal weather through the study period.

Figure 10 and **Figure 11** show the transmission security margins for heatwave conditions (also known as 90/10 or 90th percentile load) and extreme heatwave conditions (1-in-100-year load), respectively, under the assumption that the system is in an emergency condition, and accounting for Special Case Resources (SCRs). An additional evaluation shown in each figure is the impact of the historical forced outage rate of thermal generation on the transmission security margin. Under heatwave conditions the adjusted transmission security margin (line-item S) shows that generation outages consistent with the historical forced outage rates would not result in "tipping" beyond transmission security limits. Under the extreme heatwave conditions shown in **Figure 11** with both CPV in-service and out-of-service, the system is deficient in 2023, and again in 2031.

Figure 12 provides a summary of the Lower Hudson Valley transmission security margins under the baseline load level. **Figure 13** provides a summary of the Lower Hudson Valley transmission security margins under the heatwave conditions. **Figure 14** provides a summary of the Lower Hudson Valley transmission security margins under the extreme heatwave conditions.

Key transmission security observations:

If the 680 MW CPV Valley plant is unavailable, transmission security could be at risk during heatwave conditions until the AC Transmission Segment B Public Policy Transmission Project is completed, scheduled for December 2023. Following completion of Segment B, Lower Hudson Valley transmission security margins would be positive for current forecasted system conditions.

Figure 9: Lower Hudson Valley Transmission Security Margin (Summer Peak – Baseline Normal Weather, Normal Transfer Criteria)

Summer Peak - Baseline Normal Weather, Normal Transfer Criteria with CPV In-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(15,231)	(15,163)	(15,120)	(15,100)	(15,142)	(15,210)	(15,294)	(15,381)	(15,474)
B	RECO Load	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)
C	**Total Load (A+B)**	(15,628)	(15,560)	(15,517)	(15,497)	(15,539)	(15,607)	(15,691)	(15,778)	(15,871)
D	UPNY-SENY Limit (3)	3,200	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	95	95	95	95	95	95	95	95	95
G	**Total SENY AC Import (D+E+F)**	3,284	5,809	5,809	5,809	5,809	5,809	5,809	5,809	5,809
H	Loss of Source Contingency	0	(980)	(980)	(980)	(980)	(980)	(980)	(980)	(980)
I	**Resource Need (C+G+H)**	(12,344)	(10,731)	(10,688)	(10,668)	(10,710)	(10,778)	(10,862)	(10,949)	(11,042)
J	*Resources needed after N-1-1 (C+G)*	(12,344)	(9,751)	(9,708)	(9,688)	(9,730)	(9,798)	(9,882)	(9,969)	(10,062)
K	G-J Generation (1)	13,603	13,602	12,988	12,988	12,988	12,988	12,988	12,987	12,987
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	**Total Resources Available (K+L+M)**	13,918	13,917	13,303	13,303	13,303	13,303	13,303	13,302	13,302
O	*Resources available after N-1-1 (H+N)*	13,918	12,937	12,323	12,323	12,323	12,323	12,323	12,322	12,322
P	**Transmission Security Margin (I+N)**	1,574	3,186	2,615	2,635	2,593	2,525	2,441	2,353	2,260
Q	Forced Outages (2)	(991)	(991)	(928)	(928)	(928)	(928)	(928)	(928)	(928)
R	**Transmission Security Margin with Forced Outages (P+Q)**	583	2,195	1,687	1,707	1,665	1,597	1,513	1,425	1,332

Summer Peak - Baseline Normal Weather, Normal Transfer Criteria with CPV Out-of-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(15,231)	(15,163)	(15,120)	(15,100)	(15,142)	(15,210)	(15,294)	(15,381)	(15,474)
B	RECO Load	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)
C	**Total Load (A+B)**	(15,628)	(15,560)	(15,517)	(15,497)	(15,539)	(15,607)	(15,691)	(15,778)	(15,871)
D	UPNY-SENY Limit (3)	3,200	5,725	5,725	5,725	5,725	5,725	5,725	5,725	5,725
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	95	95	95	95	95	95	95	95	95
G	**Total SENY AC Import (D+E+F)**	3,284	5,809	5,809	5,809	5,809	5,809	5,809	5,809	5,809
H	Loss of Source Contingency	0	(980)	(980)	(980)	(980)	(980)	(980)	(980)	(980)
I	**Resource Need (C+G+H)**	(12,344)	(10,731)	(10,688)	(10,668)	(10,710)	(10,778)	(10,862)	(10,949)	(11,042)
J	*Resources needed after N-1-1 (C+G)*	(12,344)	(9,751)	(9,708)	(9,688)	(9,730)	(9,798)	(9,882)	(9,969)	(10,062)
K	G-J Generation (1)	12,941	12,940	12,327	12,326	12,326	12,326	12,326	12,325	12,325
L	Temperature Based Generation Derates	0	0	0	0	0	0	0	0	0
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	**Total Resources Available (K+L+M)**	13,256	13,255	12,642	12,641	12,641	12,641	12,641	12,640	12,640
O	*Resources available after N-1-1 (H+N)*	13,256	12,275	11,662	11,661	11,661	11,661	11,661	11,660	11,660
P	**Transmission Security Margin (I+N)**	912	2,524	1,954	1,973	1,931	1,863	1,779	1,691	1,598
Q	Forced Outages (2)	(966)	(966)	(903)	(903)	(903)	(903)	(903)	(903)	(903)
R	**Transmission Security Margin with Forced Outages (P+Q)**	(54)	1,558	1,051	1,070	1,028	960	876	788	695

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro is included as well as the Oswego Export limit for all lines in-service.
2. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)
3. Limits in 2022 and 2023 are based on limits from the summer peak 2023 representations. Limits for 2024 through 2031 are based on the summer peak 2025 representations.

Figure 10: Lower Hudson Valley Transmission Security Margin (Summer Peak – Heatwave, Emergency Transfer Criteria)

Summer Peak - Heatwave, Emergency Transfer Criteria with CPV In-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(15,961)	(15,888)	(15,843)	(15,822)	(15,865)	(15,935)	(16,023)	(16,115)	(16,212)
B	RECO Load	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)
C	**Total Load (A+B)**	(16,358)	(16,285)	(16,240)	(16,219)	(16,262)	(16,332)	(16,420)	(16,512)	(16,609)
D	UPNY-SENY Limit (5)	3,925	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	4,069	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(12,289)	(10,691)	(10,646)	(10,625)	(10,668)	(10,738)	(10,826)	(10,918)	(11,015)
J	*Resources needed after N-1-1 (C+G)*	(12,289)	(10,691)	(10,646)	(10,625)	(10,668)	(10,738)	(10,826)	(10,918)	(11,015)
K	G-J Generation (1)	13,603	13,602	12,988	12,988	12,988	12,988	12,988	12,987	12,987
L	Temperature Based Generation Derates	(85)	(85)	(75)	(75)	(75)	(75)	(75)	(75)	(75)
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	288	288	288	288	288	288	288	288	288
O	**Total Resources Available (K+L+M+N)**	14,121	14,120	13,516	13,516	13,516	13,516	13,515	13,515	13,515
P	*Resources available after N-1-1 (H+O)*	14,121	14,120	12,225	12,225	12,225	12,224	12,224	12,224	12,224
Q	**Transmission Security Margin (I+O)**	1,832	3,429	2,870	2,891	2,848	2,778	2,689	2,597	2,500
R	Forced Outages (2)	(991)	(991)	(928)	(928)	(928)	(928)	(928)	(928)	(928)
S	**Adjusted Transmission Security Margin (Q+R)**	841	2,438	1,942	1,963	1,920	1,850	1,761	1,669	1,572

Summer Peak - Heatwave, Emergency Transfer Criteria with CPV Out-of-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(15,961)	(15,888)	(15,843)	(15,822)	(15,865)	(15,935)	(16,023)	(16,115)	(16,212)
B	RECO Load	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)	(397)
C	**Total Load (A+B)**	(16,358)	(16,285)	(16,240)	(16,219)	(16,262)	(16,332)	(16,420)	(16,512)	(16,609)
D	UPNY-SENY Limit (5)	3,925	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	4,069	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(12,289)	(10,691)	(10,646)	(10,625)	(10,668)	(10,738)	(10,826)	(10,918)	(11,015)
J	*Resources needed after N-1-1 (C+G)*	(12,289)	(10,691)	(10,646)	(10,625)	(10,668)	(10,738)	(10,826)	(10,918)	(11,015)
K	G-J Generation (1)	12,941	12,940	12,327	12,326	12,326	12,326	12,326	12,325	12,325
L	Temperature Based Generation Derates	(85)	(85)	(75)	(75)	(75)	(75)	(75)	(75)	(75)
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	288	288	288	288	288	288	288	288	288
O	**Total Resources Available (K+L+M+N)**	13,459	13,458	12,854	12,854	12,854	12,854	12,854	12,853	12,853
P	*Resources available after N-1-1 (H+O)*	13,459	13,458	12,225	12,225	12,225	12,224	12,224	12,224	12,224
Q	**Transmission Security Margin (I+O)**	1,170	2,767	2,208	2,229	2,186	2,116	2,028	1,935	1,838
R	Forced Outages (2)	(966)	(966)	(903)	(903)	(903)	(903)	(903)	(903)	(903)
S	**Adjusted Transmission Security Margin (Q+R)**	204	1,801	1,305	1,326	1,283	1,213	1,125	1,032	935

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro is included as well as the Oswego Export limit for all lines in-service.
2. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a de-rate of 242 MW for SCRs.
5. Limits in 2022 and 2023 are based on limits from the summer peak 2023 representations. Limits for 2024 through 2031 are based on the summer peak 2025 representations.

Figure 11: Lower Hudson Valley Transmission Security Margin (Summer Peak – 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria)

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria with CPV In-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(16,690)	(16,614)	(16,568)	(16,545)	(16,590)	(16,663)	(16,754)	(16,849)	(16,951)
B	RECO Load	(443)	(443)	(443)	(443)	(443)	(443)	(443)	(443)	(443)
C	**Total Load (A+B)**	(17,133)	(17,057)	(17,011)	(16,988)	(17,033)	(17,106)	(17,197)	(17,292)	(17,394)
D	UPNY-SENY Limit (5)	3,925	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	4,069	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(13,064)	(11,463)	(11,417)	(11,394)	(11,439)	(11,512)	(11,603)	(11,698)	(11,800)
J	*Resources needed after N-1-1 (C+G)*	(13,064)	(11,463)	(11,417)	(11,394)	(11,439)	(11,512)	(11,603)	(11,698)	(11,800)
K	G-J Generation (1)	13,603	13,602	12,988	12,988	12,988	12,988	12,988	12,987	12,987
L	Temperature Based Generation Derates	(179)	(179)	(159)	(159)	(159)	(159)	(159)	(159)	(159)
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	288	288	288	288	288	288	288	288	288
O	**Total Resources Available (K+L+M+N)**	14,027	14,026	13,432	13,432	13,432	13,432	13,431	13,431	13,431
P	*Resources available after N-1-1 (H+O)*	14,027	14,026	13,432	13,432	13,432	13,432	13,431	13,431	13,431
Q	**Transmission Security Margin (I+O)**	963	2,564	2,016	2,038	1,993	1,920	1,829	1,733	1,631
R	Forced Outages (2)	(991)	(991)	(928)	(928)	(928)	(928)	(928)	(928)	(928)
S	**Adjusted Transmission Security Margin (Q+R)**	(28)	1,573	1,088	1,110	1,065	992	901	805	703

Summer Peak - 1-in-100-Year Extreme Heatwave, Emergency Transfer Criteria with CPV Out-of-Service										
Line	**Item**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**
A	G-J Load Forecast	(16,690)	(16,614)	(16,568)	(16,545)	(16,590)	(16,663)	(16,754)	(16,849)	(16,951)
B	RECO Load	(443)	(443)	(443)	(443)	(443)	(443)	(443)	(443)	(443)
C	**Total Load (A+B)**	(17,133)	(17,057)	(17,011)	(16,988)	(17,033)	(17,106)	(17,197)	(17,292)	(17,394)
D	UPNY-SENY Limit (5)	3,925	5,450	5,450	5,450	5,450	5,450	5,450	5,450	5,450
E	ABC PARs to J	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)	(11)
F	K - SENY	155	155	155	155	155	155	155	155	155
G	**Total SENY AC Import (D+E+F)**	4,069	5,594	5,594	5,594	5,594	5,594	5,594	5,594	5,594
H	Loss of Source Contingency	0	0	0	0	0	0	0	0	0
I	**Resource Need (C+G+H)**	(13,064)	(11,463)	(11,417)	(11,394)	(11,439)	(11,512)	(11,603)	(11,698)	(11,800)
J	*Resources needed after N-1-1 (C+G)*	(13,064)	(11,463)	(11,417)	(11,394)	(11,439)	(11,512)	(11,603)	(11,698)	(11,800)
K	G-J Generation (1)	12,941	12,940	12,327	12,326	12,326	12,326	12,326	12,325	12,325
L	Temperature Based Generation Derates	(179)	(179)	(159)	(159)	(159)	(159)	(159)	(159)	(159)
M	Net ICAP External Imports	315	315	315	315	315	315	315	315	315
N	SCRs (3), (4)	288	288	288	288	288	288	288	288	288
O	**Total Resources Available (K+L+M+N)**	13,365	13,365	12,771	12,770	12,770	12,770	12,770	12,769	12,769
P	*Resources available after N-1-1 (H+O)*	13,365	13,365	12,771	12,770	12,770	12,770	12,770	12,769	12,769
Q	**Transmission Security Margin (I+O)**	302	1,902	1,354	1,377	1,332	1,258	1,167	1,072	969
R	Forced Outages (2)	(966)	(966)	(903)	(903)	(903)	(903)	(903)	(903)	(903)
S	**Adjusted Transmission Security Margin (Q+R)**	(664)	936	451	474	429	355	264	169	66

Notes:

1. Reflects the 2021 Gold Book existing summer capacity plus projected additions, deactivations, and de-rates. For this evaluation wind generation is assumed to have 0 MW output, solar generation is based on the ratio of solar PV nameplate capacity (2021 Gold Book Table I-9a) and solar PV peak reductions (2021 Gold Book Table I-9c). De-rates for run-of-river hydro is included as well as the Oswego Export limit for all lines in-service.
2. Includes de-rates for thermal resources based on NERC class average EFORd data (https://www.nerc.com/pa/RAPA/gads/Pages/Reports.aspx)
3. SCRs are not applied for transmission security analysis of normal operations, but are included for emergency operations.
4. Includes a de-rate of 242 MW for SCRs.
5. Limits in 2022 and 2023 are based on limits from the summer peak 2023 representations. Limits for 2024 through 2031 are based on the summer peak 2025 representations.

Figure 12: Summary of Lower Hudson Valley Summer Transmission Security Margin – Normal Weather

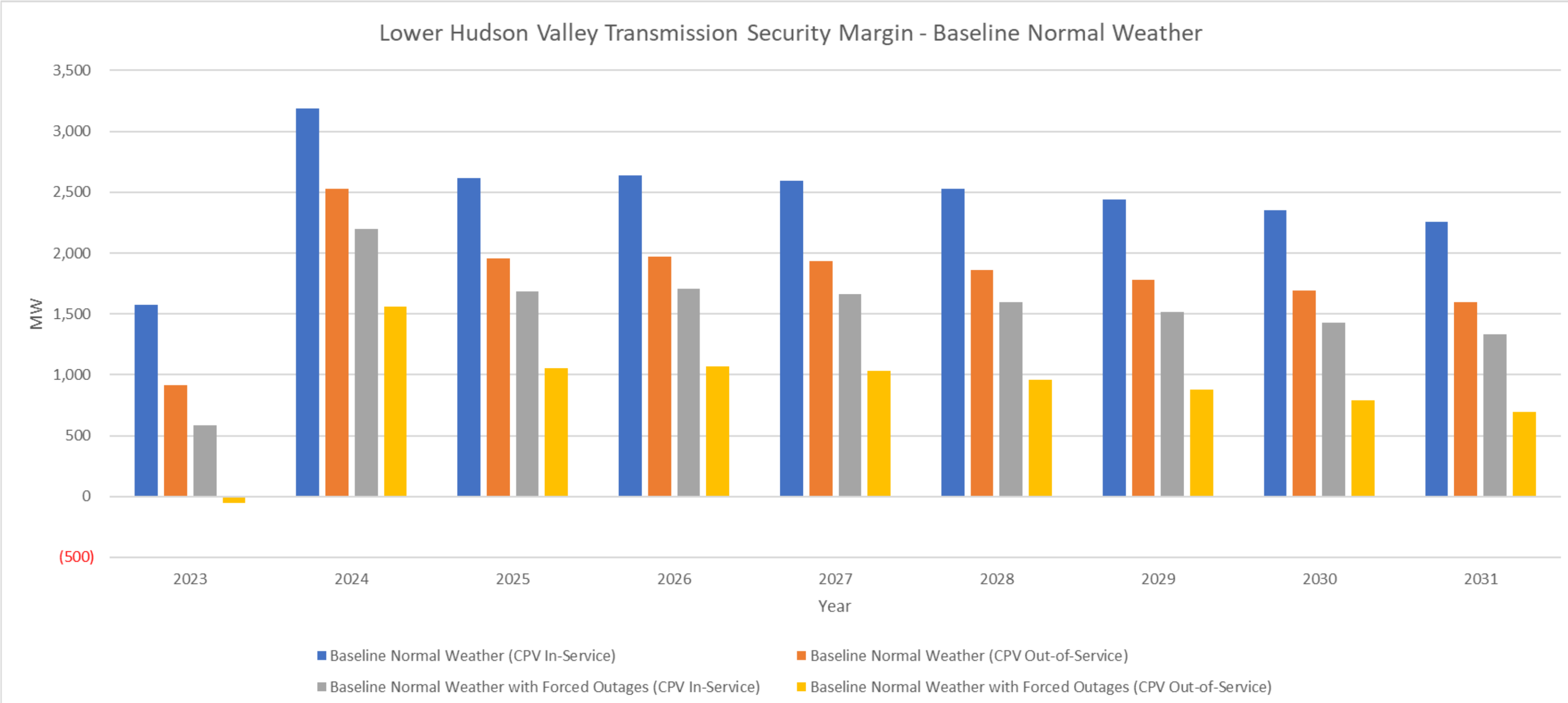


Figure 13: Summary of Lower Hudson Valley Summer Transmission Security Margin – Heatwave (90/10)

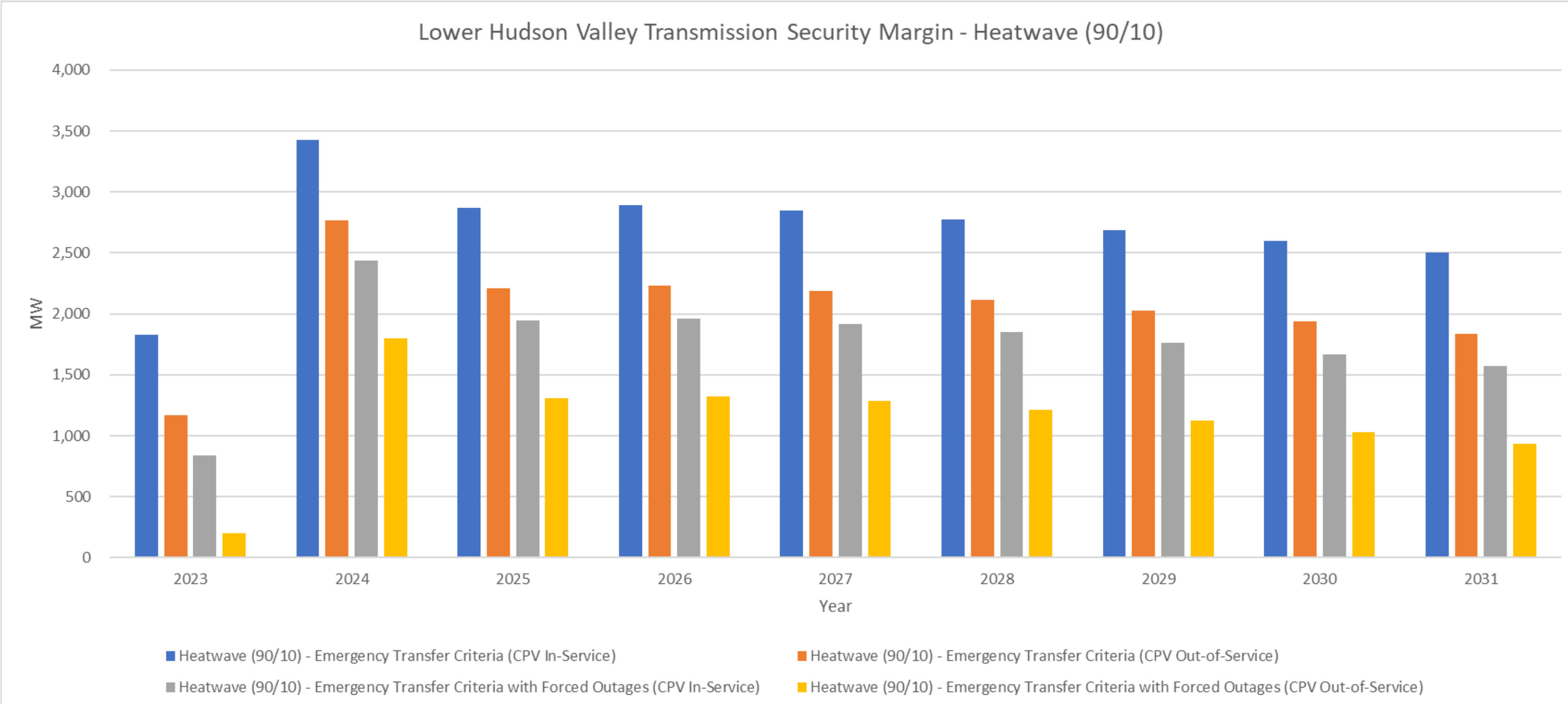
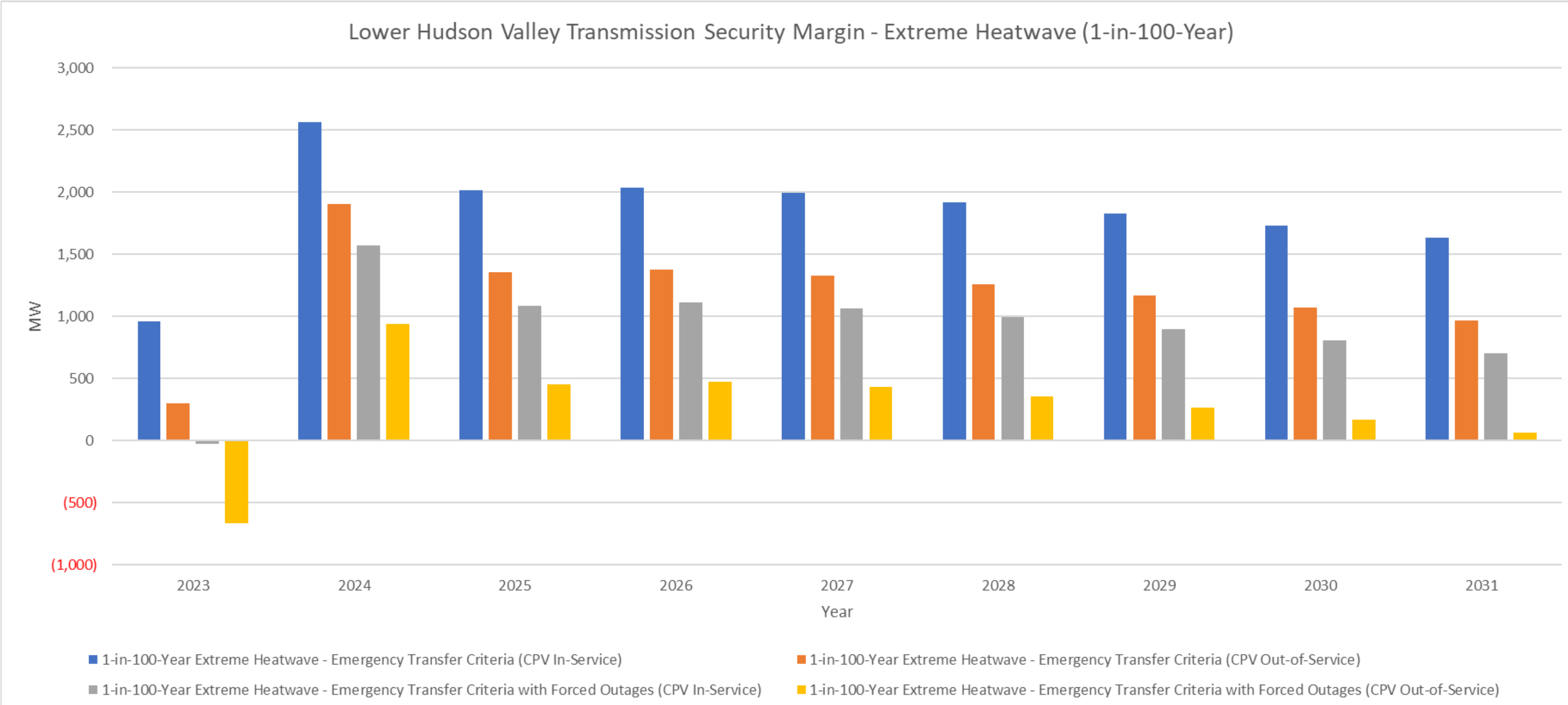


Figure 14: Summary of Lower Hudson Valley Summer Transmission Security Margin – Extreme Heatwave (1-in-100)



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April 21, 2022

VIA US AND ELECTRONIC MAIL: chris.hogan@dec.ny.gov

Mr. Christopher M. Hogan
Chief, Major Project Management Unit
Department of Environmental Conservation
Division of Environmental Permits
625 Broadway, 4th Floor
Albany, NY 12233-1750

RE: ***CPV Valley, LLC –Title V and Title IV Permit Applications***
DEC ID 3-3356-00136/000010 & 00009
CLCPA Project Justification - Grid Reliability

Dear Mr. Hogan,

CPV Valley, LLC ("Valley" or "Applicant") has retained Hudson Energy Economics, LLC as a consultant to review and analyze the reliability planning study the New York Independent System Operator, Inc. ("NYISO") performed regarding CPV Valley Energy Center ("CPV Valley" or "Facility").[1] As discussed below and detailed in the Study, without CPV Valley: (1) the loss of load expectation increases significantly and would exceed the resource adequacy criterion in 2031 and barely meet targets in 2030; (2) a Transmission Security Analysis assuming all no forced outages on generating units shows insufficient resources to meet the peak load plus operating reserve requirement in 2030. (3) recoginizing the risk of historic unit outage rates the NYISO will have insufficient resources to meet peak load plus reserves in every year from 2023 through 2031; (4) assuming no forced outages on units the system will be 845 MW short of meeting 90/10 heatwave peak plus reserves in 2023 and more than 1,400 MW short in 2031; and (5) assuming historic unit outage rates the system would have insufficient resources to meet the 90/10 peak load alone in almost beginning in 2025 and would fail to meet the peak load by 540 MW in 2031.

Qualifications

I am employed as President of Hudson Energy Economics, LLC, an energy consulting company specializing in electric market design and market operations with a focus on the NYISO controlled market. My entire professional career has been devoted

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1 New York Independent System Operator, *R008 Additional Reliability Study: CPV Valley* (March 9, 2022) ("Study").

to matters relating to electric generation and the development of competitive electricity markets. Since moving to New York in 1992 my consulting practice has focused on the operation of the New York Control Area. Since 1999, I have been an active participant in the stakeholder processes defining the NYISO initial market structure, subsequently identifying tariff revisions to correct, improve and enhance market design and developing the detailed rule changes, known as ISO Procedures in its tariffs, to implement tariff revisions, including all aspects of its energy, ancillary services, and installed capacity ("ICAP") markets. I have also participated in the NYISO's economic and reliability planning processes.

Finally, I have participated in the New York State Reliability Council ("NYSRC") Installed Capacity Subcommittee ("ICS") meetings since 2008. The NYSRC is responsible for setting the reliability rules for planning and running the New York Control Area ("NYCA"). The NYSRC ICS work focuses on the continuous improvement of modeling to most accurately capture the resource adequacy risks faced by the NYISO electric system and ultimately to ensure resource adequacy through the State's annually updated installed reserve margin ("IRM") requirements.

Since moving to New York in 1992 I have testified in numerous New York Public Service Commission ("NYPSC") Proceedings. Since the formation of the NYISO in the late 1990s, I have also testified in numerous Federal Energy Regulatory Commission ("FERC") proceedings relating to many aspects of the overall NYISO market design. My resume is attached herewith.

Resource Adequacy

Before a generating unit is allowed to retire from the NYCA, the NYISO performs a series of evaluations to determine whether the retirement would create reliability needs. Valley requested that the NYISO perform a retirement evaluation to determine whether CPV Valley's forced retirement[2] would result in reliability needs on the NYISO system over the next ten years.

The first evaluation that the NYISO performed was to determine whether there would be a resource adequacy violation on the NYISO system without CPV Valley. Resource adequacy is analyzed using a probabilistic model to determine the risk of having unserved load due to cumulative generator outages. The required target for the NYCA system is that the Loss of Load Expectation ("LOLE") be no greater than 0.1 days/year. The analysis that was performed by the NYISO for the Study is the same analysis they use for the Reliability Needs assessments and in setting the required Installed Reserve Margin.

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[2] For example, if the Facility were denied a Title V air permit by the New York State Department of Environmental Conservation (the "Department").

The Study shows that without CPV Valley the system exceeds the target LOLE standard in 2031 and barely meets the target in 2030. As the NYISO identified in its Study of CPV Valley retirement impacts: "If the NYISO identified a LOLE greater than 0.1 in one of its reliability studies (e.g., Reliability Needs Assessment, Short-Term Assessment of Reliability) this would be considered a Reliability Need, as defined in Section 31.1. of the NYISO Open Access Transmission Tariff."[3]

Transmission Security

The other evaluation the NYISO performed is referred to as a Transmission Security Margin study. The Transmission Security Margin looks at whether the NYCA has sufficient resources to meet projected peak loads plus operating reserve requirements.

The NYCA wide Transmission Security Margin study describes the Transmission Security study and their findings as follows:

> The tipping points for the NYCA are evaluated under summer peak conditions, which are expected to be the most stressed system conditions. A tipping point occurs when the transmission security margin is a negative value. The transmission security margin is the ability to meet load plus losses and system reserve (*i.e.,* total capacity requirement) against the NYCA generation, interchanges, and temperature-based generation de-rates (total resources).
> …
> Under current applicable reliability rules and procedures, the system would be unable to maintain operating reserves and meet forecasted demand when the transmission security margin is negative for the base case assumptions (e.g., baseline normal weather load forecast, no pre-contingency unscheduled forced outages, etc.). With CPV in-service the system has sufficient margin through 2031. However, with CPV out-of-service the system margin is insufficient starting in 2030.[4]

The Transmission Security Analysis that the NYISO presented above assumes that there are no outages on traditional generating facilities. This is highly unlikely since traditional units have a forced outage rate of approximately 5%.[5] To address the significance of assuming that the generating units would have no forced outages the NYISO looked at the margin assuming the system had average forced outages. They found that even with CPV Valley in service the NYISO had insufficient resources to meet peak load plus reserves in every year from 2023 through 2031. With CPV Valley removed the shortage became even more dire with it falling short of meeting peak plus

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[3] CPV Valley Reliability Study, p. 6.

[4] Ibid, p. 7

[5] Unit outage rates are generally higher on the older units that were previously owned by the Investor Owned Utilities. The NYISO system has more than 6,000 MW of steam boiler based units that are at least 50 years old.

operating reserve requirements by more than 1,600 MW in 2025 and the shortfall rising to almost 1,900 MW by 2031.[6]

The NYISO also looked at their margin in comparison to a peak that would be expected to occur in 10% of the years (referred to as a 90/10 peak). This type of peak is consistent with much hotter weather conditions. However, it could also be seen as a proxy, at least in the outer years, for the states beneficial electrification efforts accelerating faster than the NYISO's base case assumptions.

The 90/10 peak case also showed that with CPV Valley the system is unable to meet peak load plus reserve and that it gets much worse without CPV Valley. Without CPV Valley the system is 845 MW short of meeting 90/10 peak plus reserves in 2023 and more than 1,400 MW short in 2031. The preceding assume no unit outages. If 90/10 conditions were combined with historic outage rates then without CPV Valley the system would have insufficient resources to meet the peak load from 2025 onward and would fail to meet the peak load by 540 MW in 2031.[7]

There are other factors that the Department should consider in determining whether Valley should be granted its Title V air permit. CPV Valley is a state of the art generating unit with state-of-the-art pollution abatement equipment. Moreover, the unit is very flexible with a startup time of as little as 2 hours. This means that CPV Valley is ideally suited to compensate for the variability of wind and solar generation that New York is planning to rapidly add to the system to meet the requirements of the Climate Leadership and Community Protection Act ("CLCPA").

NYISO planning analysis shows that to achieve the CLCPA requirements and run the electric system reliably there will need to be substantial dispatchable resources. Until New York can determine a form of highly dispatchable emission free resources, this reliability service will be required to come from existing dispatchable resources such as CPV Valley.

The Facility's short start up time and low emission rates makes it an ideal source for this reliability service.

The NYISO's resource adequacy and transmission security evaluations show that if CPV Valley were to be retired then essentially no other significant sized generating units could be taken out of service without violating reliability requirements. This is readily shown in the results of the Transmission Security Margin study which showed that without CPV Valley the margin does not exceed 165 MW in any year after 2024.[8]

Consequently, failing to approve Valley's Title V air permit will mean that other, less flexible, less efficient, and higher emitting units would have to remain operating in the NYCA.

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6 CPV Valley Reliability Study, Figure 2, p. 11.
7 CPV Valley Reliability Study, Figure 3, p. 12.
8 CPV Valley Reliability Study, Figure 2, p. 11.

Sincerely,

Mark D. Younger
President
Hudson Energy Economics, LLC

cc: J. Afzali, Esq. (*via email*)