New York ISO
Independent System Operator

LFU Phase 3 Analysis: Upper Bin Weather Duration

Max Schuler

Demand Forecasting & Analysis

LFTF/ESPWG

April 25, 2023

Agenda

- Objective & Methodology
- Methodology
- Results & Graphs

New York ISO

Objective & Methodology

New York ISO

Objective – Upper Bin Weather Duration

- LFU multipliers are defined solely by peak load variability due to weather, and are applied to the entire load shape in MARS
- For example, the resulting Bin 1 MARS load shape takes the 2013 load shape (adjusted to reflect forecast targets), and scales it up by roughly 12% in each hour of the year
- There is no weather information directly underpinning this resultant Bin 1 hourly load shape in MARS, besides the 99.7th percentile weather defined for the seasonal peak load hours
- The purpose of this analysis is to estimate the assumed weather conditions underlying the entire summer Bin 1 load shape
- This assumed weather pattern can be compared with historical weather events or extreme weather scenarios
- This is pertinent as the impacts of climate change are enhancing focus on extreme weather assumptions and scenarios

New York ISO

Methodology – Upper Bin Weather Duration

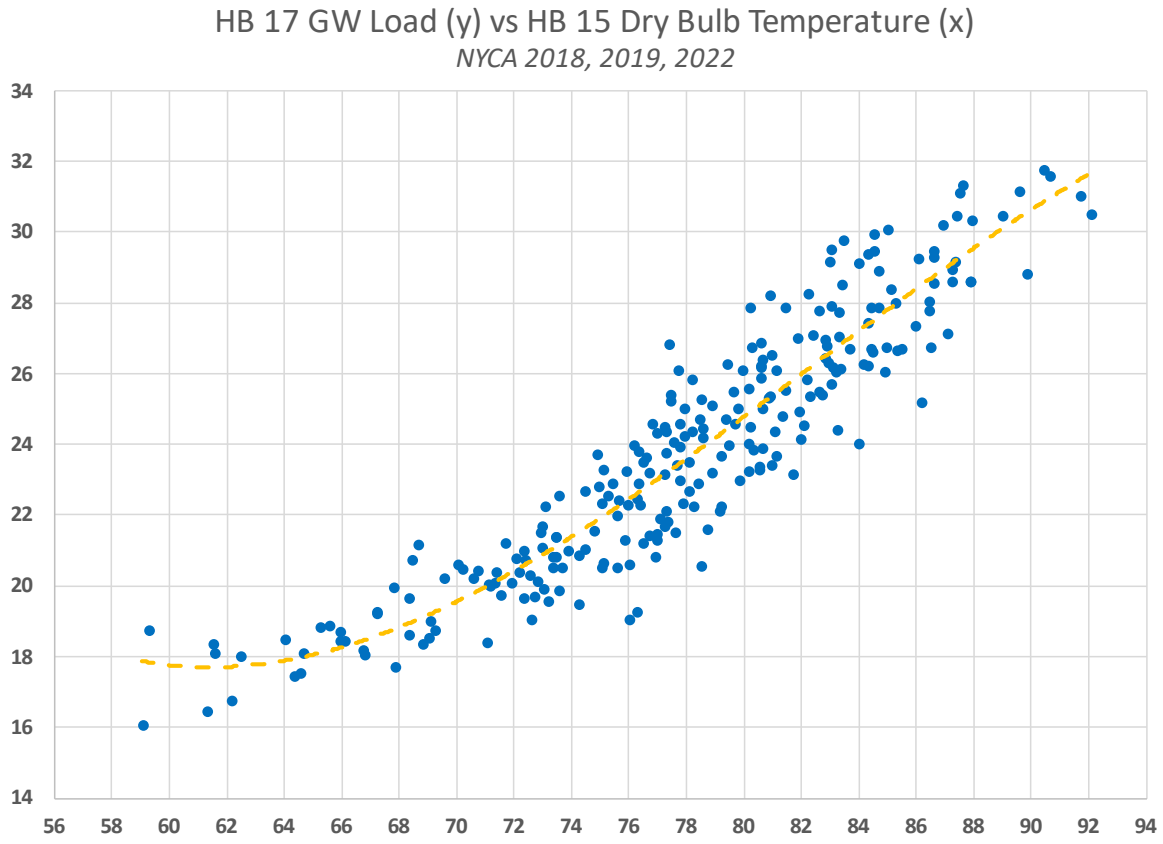
- **NYCA hour beginning 15 temperatures were regressed against hour beginning 17 GW load values**
  - Hour beginning 15 was selected as the hottest temperature hour on average
  - Hour beginning 17 was selected as the typical peak load hour
  - June through September weekday data was used for 2018, 2019, and 2022

- **This regression estimates the typical load and weather relationship observed during summer months in recent years**

- **Using this observed relationship, the Bin 1 load shape daily GW values were translated to estimated daily maximum temperature values**
  - Adjustments were made to correct for the difference in relative load values between weekdays and weekend days
  - Load deductions were made to reflect demand response reductions typically observed during 30 GW+ summer load days
  - Estimated temperature values reflect a statewide composite, and are rounded to the nearest integer

New York ISO

Regression Model



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.946
R Square	0.894
Adjusted R Square	0.892
Standard Error	2.153
Observations	253

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	5	9699.6	1939.9	418.4	0.0000
Residual	247	1145.2	4.6		
Total	252	10844.9			

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-133.1413	33.4181	-3.9841	0.0001
GW	21.7505	4.2617	5.1037	0.0000
GW2	-0.7741	0.1786	-4.3339	0.0000
GW3	0.0098	0.0025	3.9716	0.0001
June	0.9256	0.3444	2.6874	0.0077
Y22	1.8154	0.2889	6.2830	0.0000

Note that the x and y variables are flipped between the graph and regression model summary output. The graph shows the classical load (y) vs weather (x) relationship. The regression summary output shows weather (y) as a function of load (x) in order to derive estimated temperature values.

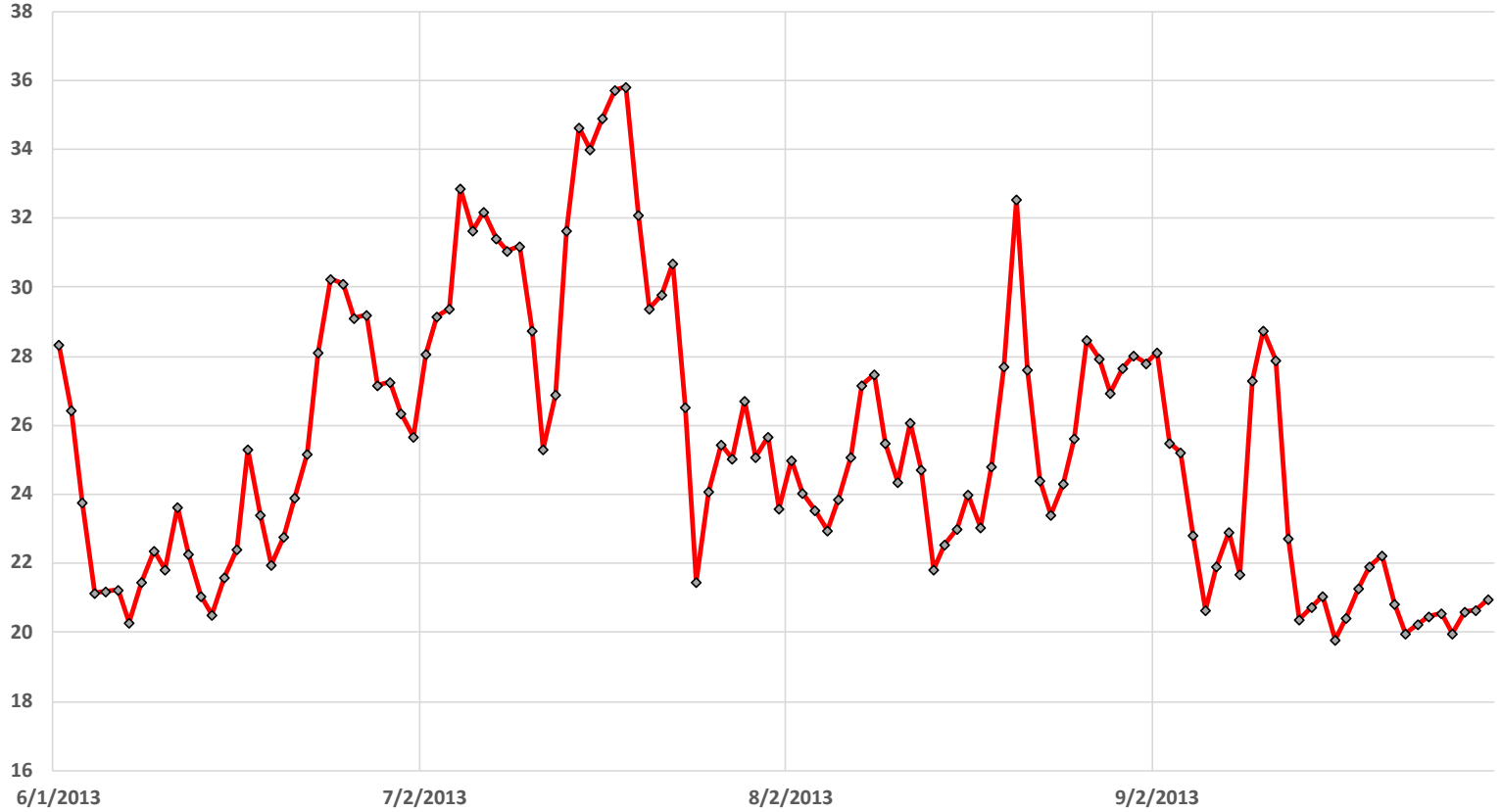
New York ISO

Results & Graphs

New York ISO

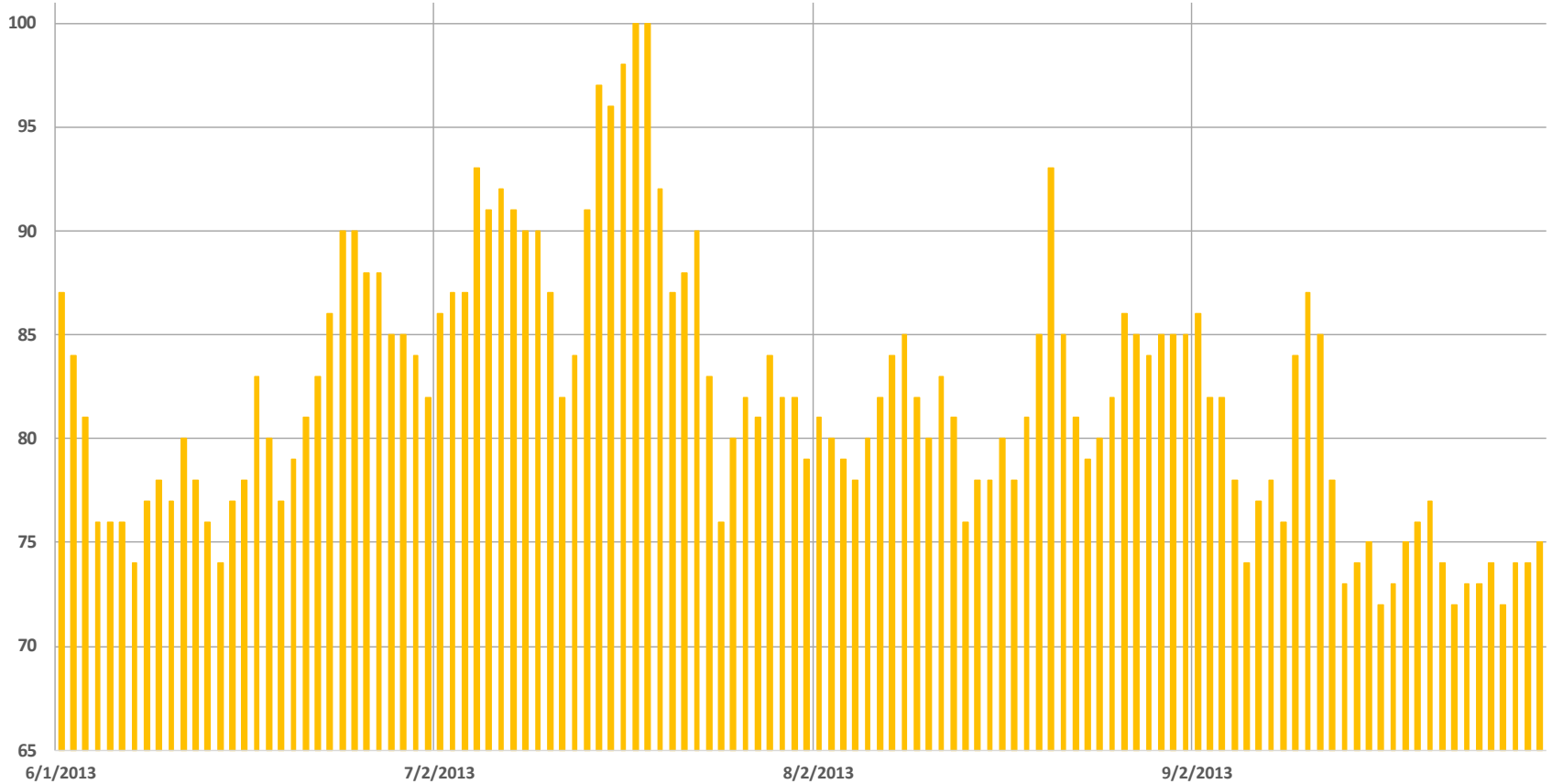
Summer 2013 Daily Bin 1 HB 17 Load (GW)

Without Demand Response Reductions



New York ISO

Bin 1 Estimated NYCA Dry Bulb Temperature (deg F)



Note: Statewide composite estimated temperature.
For reference, Zone J (NYC) temperature typically averages 3 degreesrees higher than the NYCA composite.

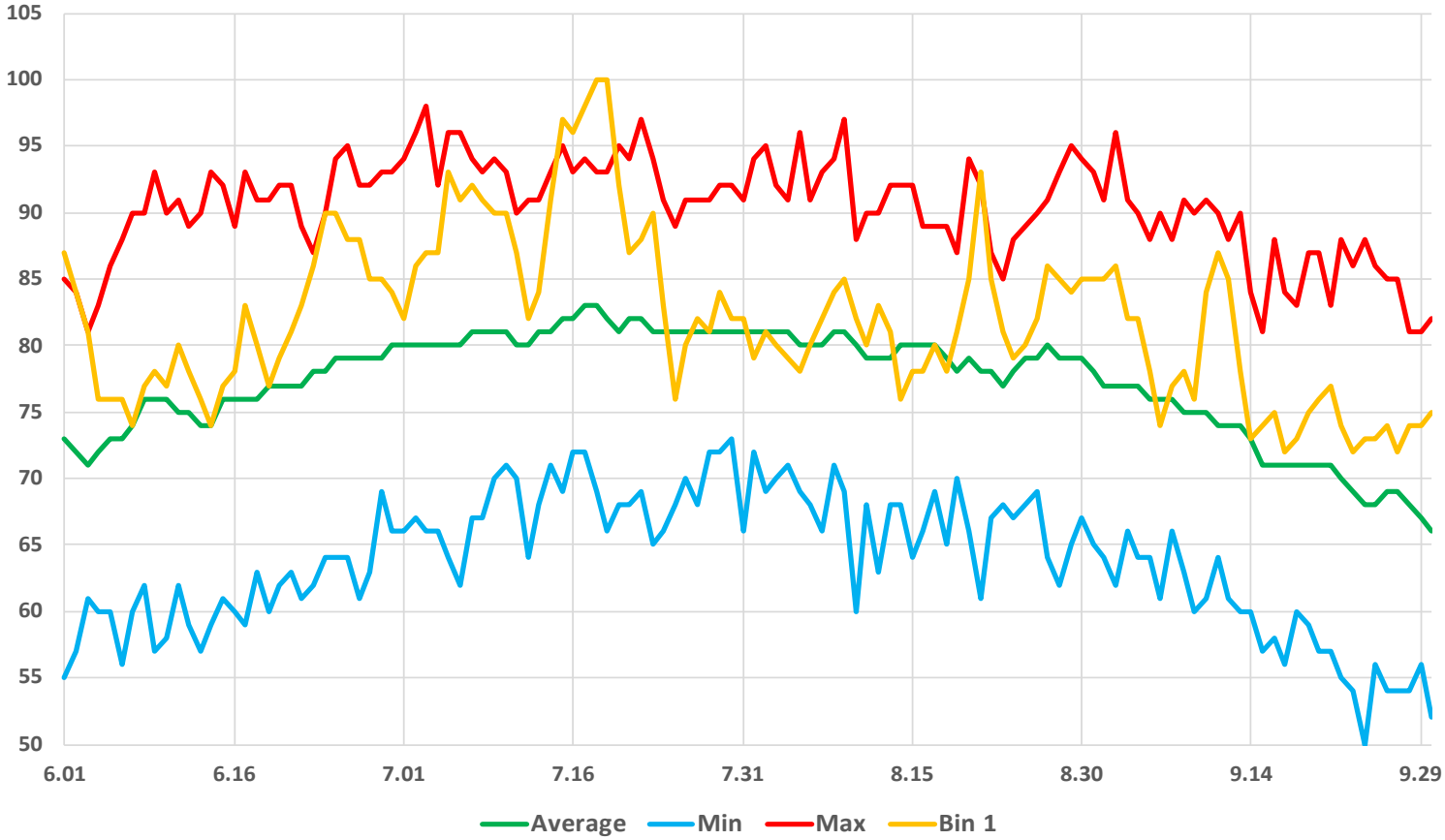
New York ISO

Results & Observations

- The 2013 Bin 1 input 5 PM loads (without demand response reductions) peak at nearly 36 GW, and exceed 30 GW on 17 days
- Estimated Bin 1 statewide composite temperatures were compared to historical 1950 through 2022 observations
- The Bin 1 maximum temperature of 100 degrees F exceeds the historical record of 98 degrees in 1966
- The Bin 1 summer average temperature (June through September) of 82 degrees exceeds the historical maximum of 80 degrees in 2005
- The bin 1 statewide composite temperature hits 90+ degrees on 17 days, including a stretch of 13 of 16 days in early July. Assuming an average temperature difference of 3 degrees, it is inferred that the New York City temperature hits 90+ degrees on 26 days.
- The bin 1 temperature reaches at least 95 degrees on 5 days. The statewide historical composite temperature has reached 95 degrees only 15 times over the last 73 years, with a maximum of 3 times in one summer in 1955.

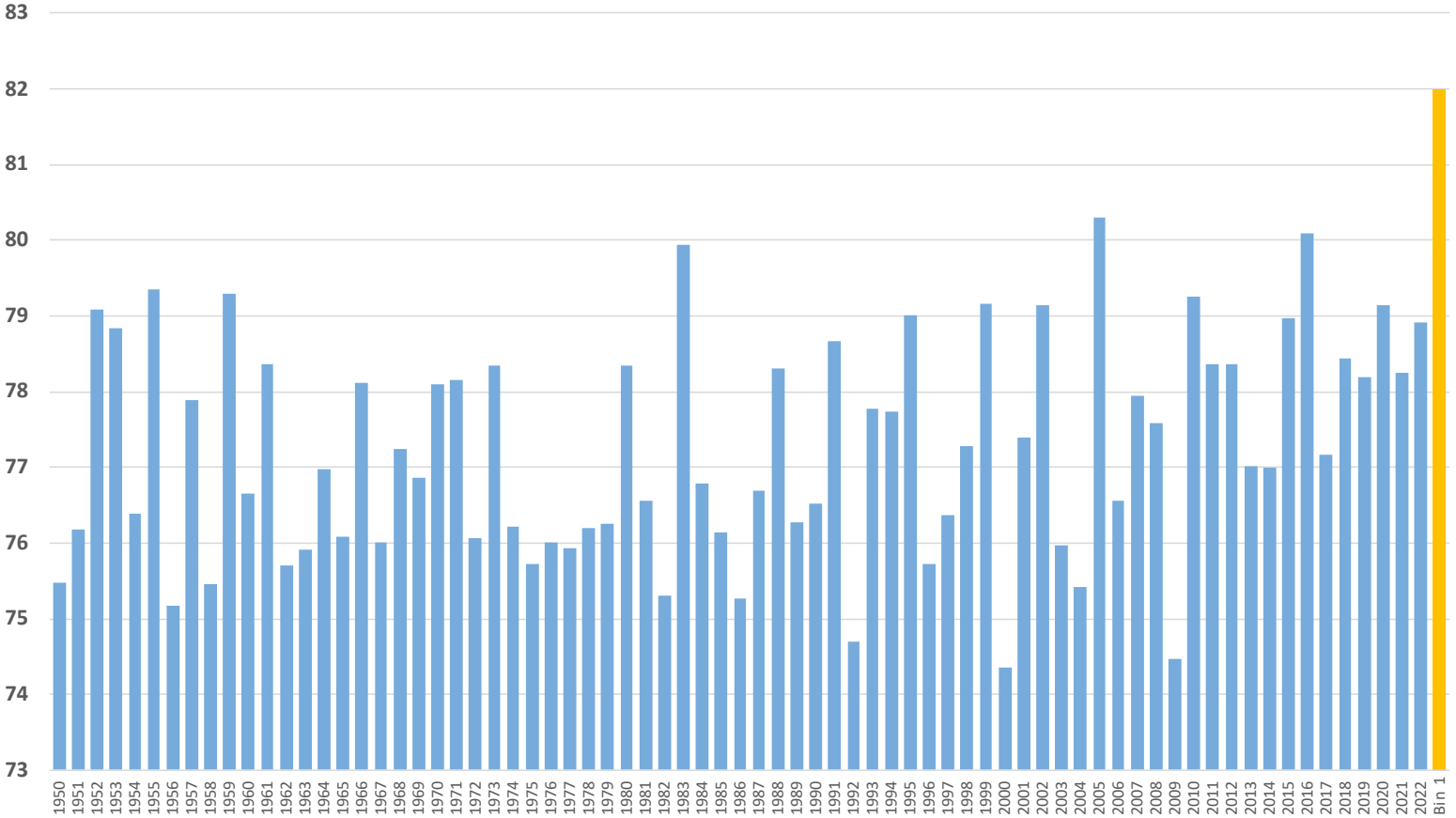
New York ISO

NYCA Composite Summer Daily Maximum Temperatures, 1950- 2022 and Bin 1



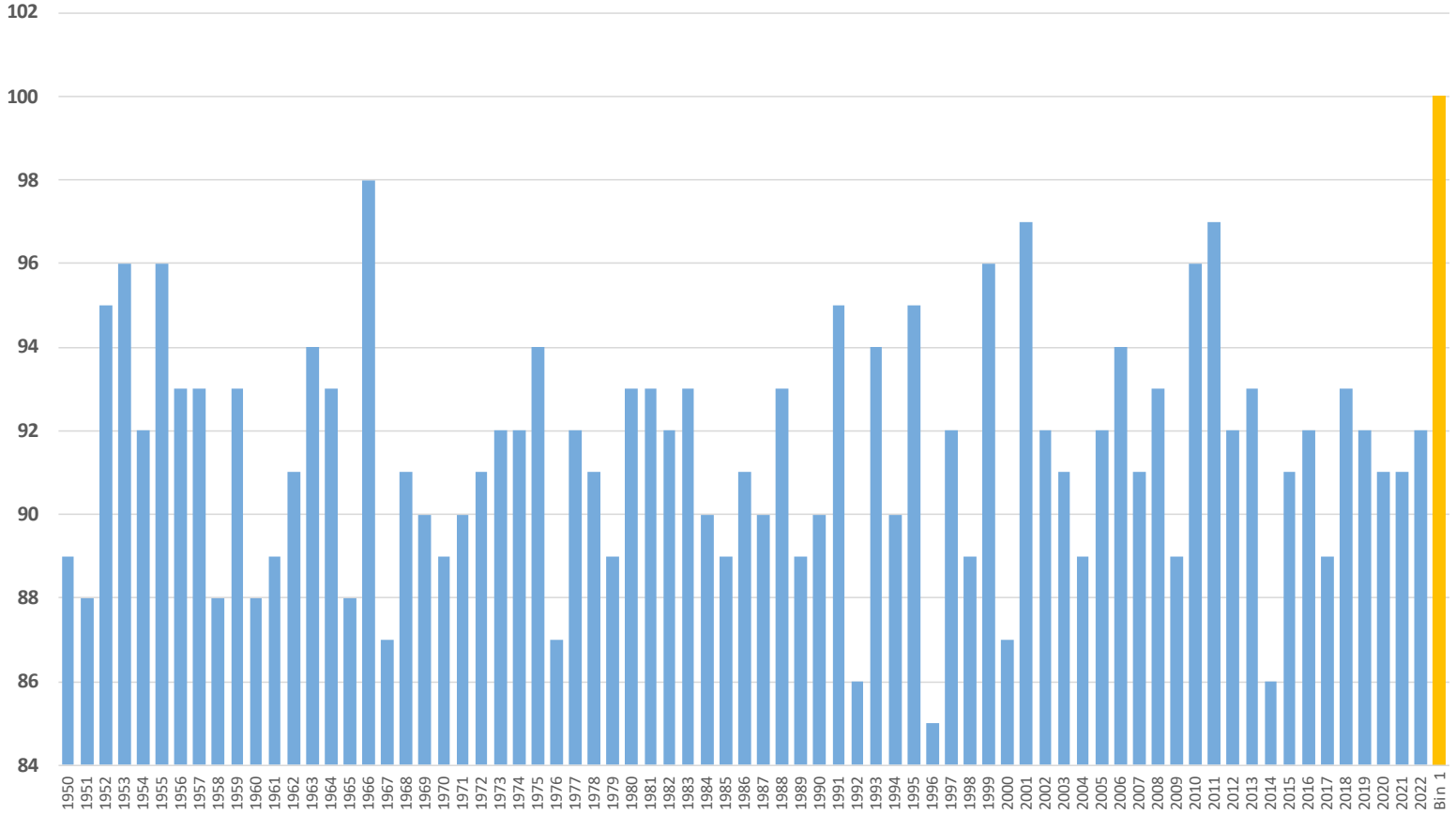
New York ISO

Summer Average Daily Maximum Temperature, 1950- 2022 and Bin 1



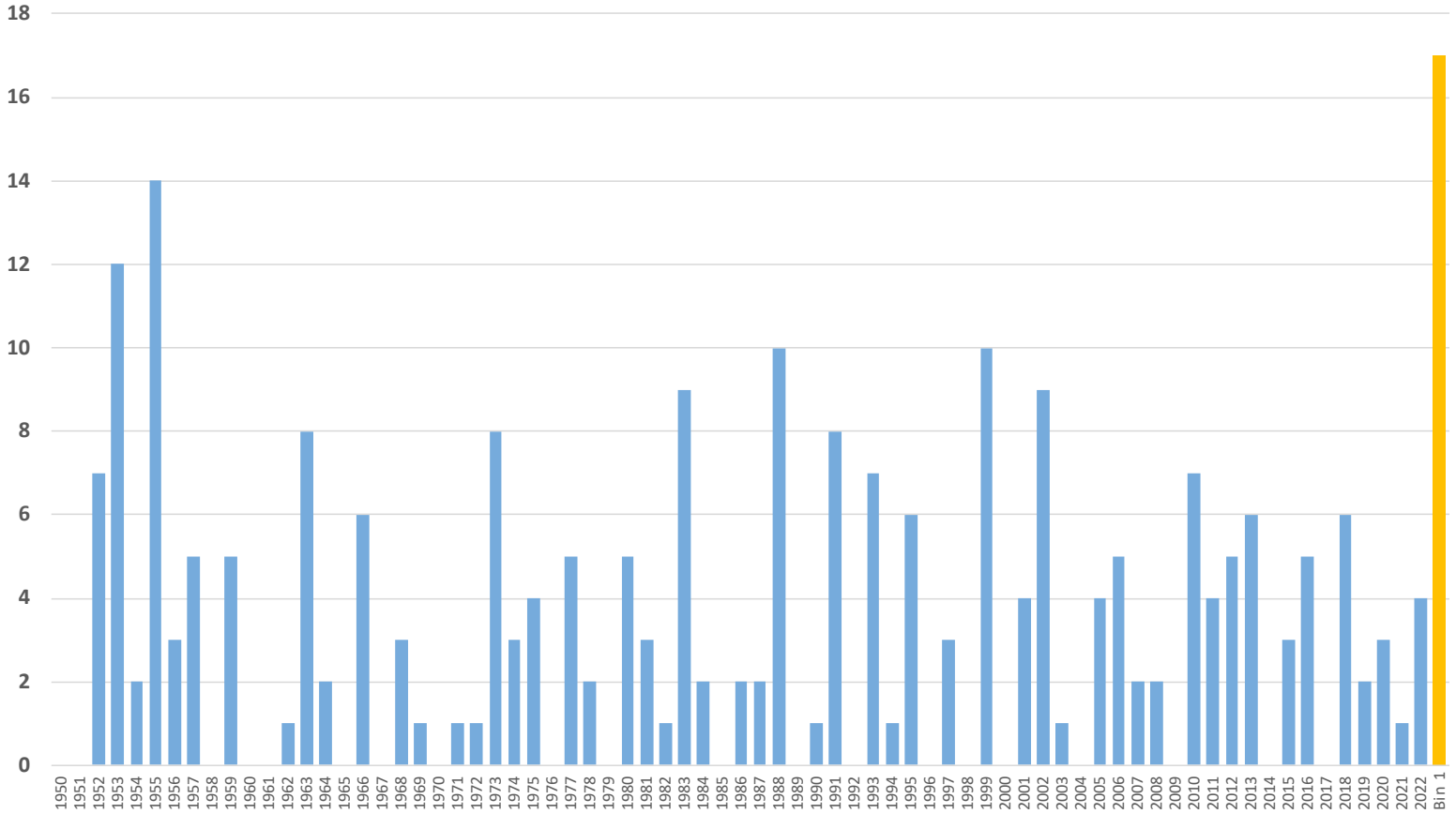
New York ISO

Summer Maximum Temperature, 1950- 2022 and Bin 1



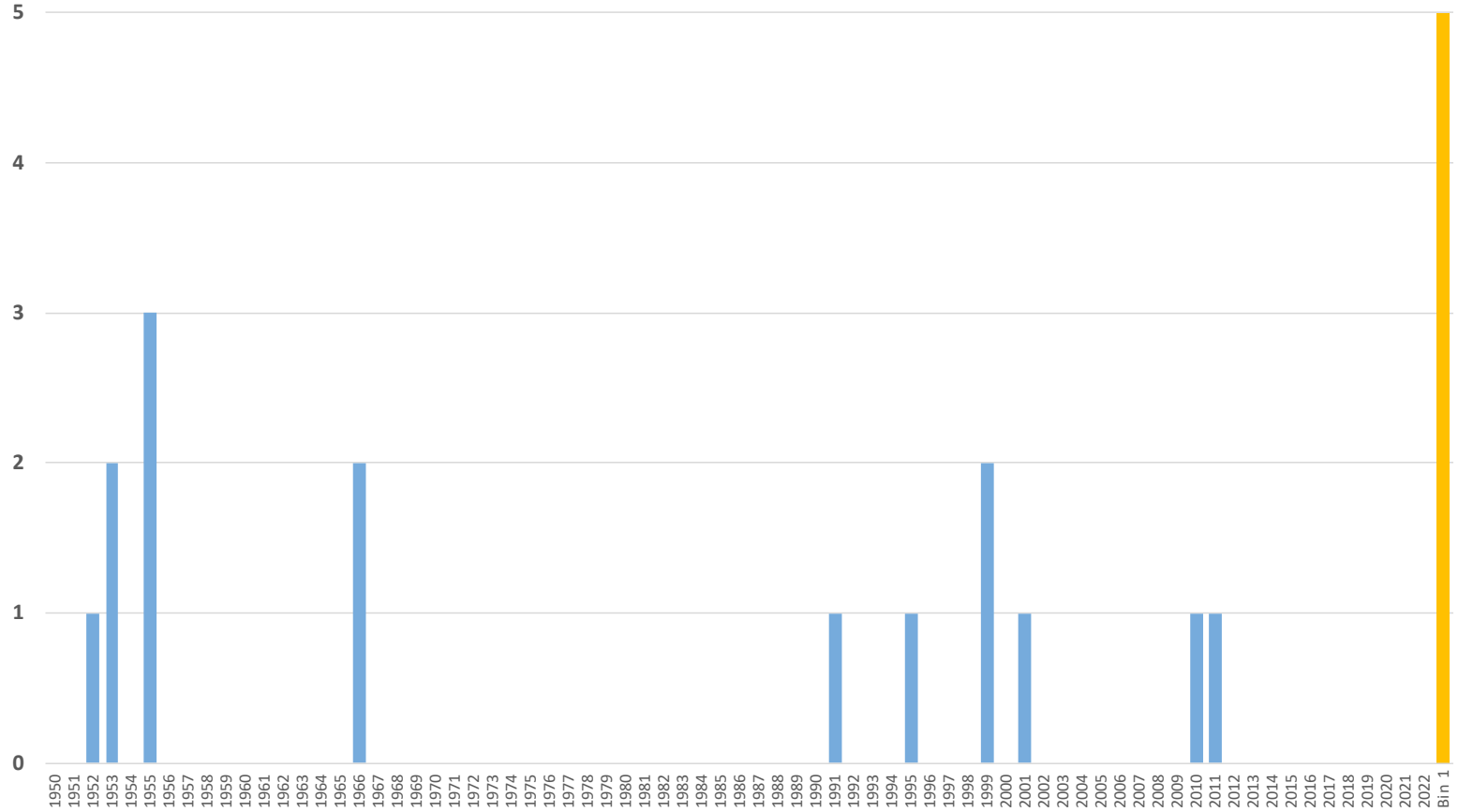
New York ISO

Count of 90+ Degree Days, 1950- 2022 and Bin 1



New York ISO

Count of 95+ Degree Days, 1950- 2022 and Bin 1



New York ISO

Questions?

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

New York ISO