New York ISO
Independent System Operator

NYSRC Fall Forecast Update –

Preliminary 2020 Weather Normalization

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Demand Forecasting & Analysis

Load Forecasting Task Force

September 16, 2020

Agenda

- Summary of 2020 Preliminary Weather Normalized Peaks
- Weather Normalization Models
- Update of Ratios of Non-Coincident Peaks to Coincident Peaks

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Summary of 2020 Preliminary Weather Normalized Peaks

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Actual and 20-Year Normal Peak-Producing CTHI Statistics – 2001-2020

NYCA Coincident Peak-Producing CTHI

Statistic	CE	CH	LI	N Grid	NYPA	NYSEG	OR	RGE	NYCA
Max	90.73	89.63	89.71	86.42	87.72	87.44	89.60	87.75	88.06
20 Yr Avg	85.71	85.65	85.03	82.57	82.30	82.78	84.85	83.21	84.02
Min	82.80	81.18	80.18	77.35	77.13	78.22	81.59	77.80	80.38
StDev	2.33	2.33	2.61	2.24	3.14	2.29	2.41	2.37	2.26
50th	85.71	85.65	85.03	82.57	82.30	82.78	84.85	83.21	84.02
57th	86.12	86.06	85.49	82.96	82.85	83.18	85.27	83.63	84.42
67th	86.72	86.66	86.16	83.54	83.66	83.77	85.89	84.23	85.00
90th	88.70	88.64	88.38	85.44	86.33	85.72	87.94	86.25	86.92
2020	84.59	85.21	85.02	82.11	84.19	83.02	83.96	81.35	83.56
Percentile	32%	43%	50%	42%	73%	54%	36%	22%	42%
z (2020)	-0.48	-0.19	0.00	-0.21	0.60	0.10	-0.37	-0.78	-0.20
CTHI Delta	-1.12	-0.44	-0.01	-0.46	1.89	0.24	-0.89	-1.86	-0.46

Notes: Cumulative Temperature & Humidity Index (CTHI) is a three-day weighted average of maximum temperature and humidity
The NYCA design condition of the 57th percentile is based upon a load-weighted average of the TD design conditions.
The 2020 NYCA peak occurred on July 27, Hour Beginning 17.

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Weather Normalization Models

- **Pooled Regression**
  - Pooled years 2016 through 2020 data
  - June through August weekdays (through 8/21/2020)
  - Regress daily Transmission District Peak MW against CTHI and other binary and trend variables

- **2020 Regression**
  - Uses only 2020 data
  - June through August weekdays (through 8/21/2020)
  - Regress daily Transmission District Peak MW against CTHI and other binary and trend variables

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Weather Normalization Method

- **Weather Response Method**

1. Calculate the derivative of the regression equation f'(CTHI) (*i.e.,* the slope of the regression line) at design conditions. The derivative represents the expected increase in MW per degree of additional CTHI.

2. Multiply the MW slope by the difference of (Design CTHI – Actual Coincident Peak CTHI).

3. Add this change in load to the actual Coincident Peak MW value to calculate the Weather Normalized Coincident Peak.

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Summary of 2020 Preliminary Weather Normalization

Weather Adjustment Method						
TD	Actual CP MW	Delta CTHI	Pooled Model Weather Adjustment	2020 Model Weather Adjustment	Average Weather Adjustment	2020 WN CP MW
Con Ed	11,273	2.13	616	705	660	11,933
Cen Hud	1,093	0.44	13	19	16	1,109
LIPA	5,344	0.01	1	2	2	5,346
Nat Grid	6,702	0.46	59	56	57	6,759
NYPA	405	-1.89	-1	-1	-1	404
NYSEG	3,178	-0.24	-15	-19	-17	3,161
O&R	1,038	1.93	46	57	52	1,090
RG&E	1,417	1.86	69	72	70	1,487
NYCA	**30,450**	**0.86**	**787**	**891**	**839**	**31,289**

Notes: Con-Edison & O&R are at 67th percentile design conditions.
Excludes DR impacts and municipal generation.

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2020 Peak Load Levels Relative to 2019

Approximate 2020 Peak Load Level Difference Relative to 2019			
TD	**2020 MW Difference Relative to 2019**	**2020 ICAP Forecast**	**Relative Percent Difference**
Con Ed	-771	13,034	-5.9%
Cen Hud	30	1,087	2.8%
LIPA	-29	5,115	-0.6%
Nat Grid	-38	6,920	-0.5%
NYPA	36	387	9.2%
NYSEG	7	3,173	0.2%
O&R	19	1,058	1.8%
RG&E	41	1,520	2.7%
NYCA	**-704**	**32,296**	**-2.2%**

Note: These differences represent the approximate change in 2020 peak load levels relative to 2019, and are estimated using the 2020 binary variable, 2020 daily trend variable, and applicable interaction variables from the pooled models. These differences primarily reflect virus and economic related impacts, but also include the impacts of changing weather sensitivity, general long-term growth trends, and other factors. These differences reflect average peak-producing conditions, and do not directly refer to the NYCA-coincident peak hour.

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Summary of 2020 Preliminary Transmission District Weather Normalization NYCA Coincident Peak

(1)	(2)	(3a)	(3b)	(4)	(5)	(6) = (3b)+(4)+(5)	(7)	(8) = (7)-(6)	(9) = (8)/(7)
Transmission District	2020 Actual MW, 7/27/2020 HB 17	Demand Response Estimate MW	2020 Actual MW, with DR Estimate	Estimated Muni Self-Gen	Weather Adjustment MW	2020 Weather Normalized MW	2020 ICAP Forecast, Without Loss Adjustment	TO Forecast, Over /Under MW	TO Forecast Delta, Percent Over /Under
Con Edison	11,273	177	11,450	0	660	12,110	13,034	924	7.1%
Cen Hudson	1,093	0	1,093	0	16	1,109	1,087	-22	-2.0%
LIPA	5,344	20	5,364	6	2	5,372	5,115	-257	-5.0%
Nat. Grid	6,702	186	6,888	48	57	6,993	6,921	-72	-1.0%
NYPA	405	0	405	0	-1	404	387	-17	-4.4%
NYSEG	3,178	54	3,232	0	-17	3,215	3,173	-42	-1.3%
O&R	1,038	11	1,049	0	52	1,101	1,059	-42	-4.0%
RG&E	1,417	8	1,425	0	70	1,495	1,520	25	1.6%
NYCA Total	30,450	456	30,906	54	839	31,799	32,296	497	1.5%

Notes: Peak load hours are defined by PI. Actual load data is from DSS.
The Demand Response impacts are estimates.

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Summary of 2020 Preliminary Transmission District Weather Normalization Locality Peaks

	2020 Locality Peak Information					2020 Locality Weather Normalization Calculation						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9) = (7)*(8)	(10) = (9)-(6)	(11)	(12)	(13)
Locality	Date and Time (Hr Beginning)	2020 Actual MW	Demand Response Estimate MW	Estimated Muni Self-Gen	2020 Actual Load including DR and Muni Self-Gen	2020 Weather Normalized Coincident Peak Demand	10-year NCP to CP Ratio	2020 Locality Weather Normalized MW	Locality Weather Adjustment MW	2020 ICAP Market Forecast MW	Forecast Over/Under MW	Forecast Percent Over/Under
Zone J - NYC	7/28/2020 HB 15	10,061	0	0	10,061	10,410	1.0183	10,601	540	11,477	876	8.3%
Zone K - LI	7/28/2020 HB 15	5,428	20	6	5,454	5,372	1.0249	5,506	52	5,228	-278	-5.0%
Zones G-to-J	7/28/2020 HB 14	14,057	0	0	14,057	14,707	1.0106	14,863	806	15,695	832	5.6%

Notes: Peak load hours are defined by PI. Actual load data is from DSS.
The Demand Response impacts are estimates.

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Weather Normalization Models

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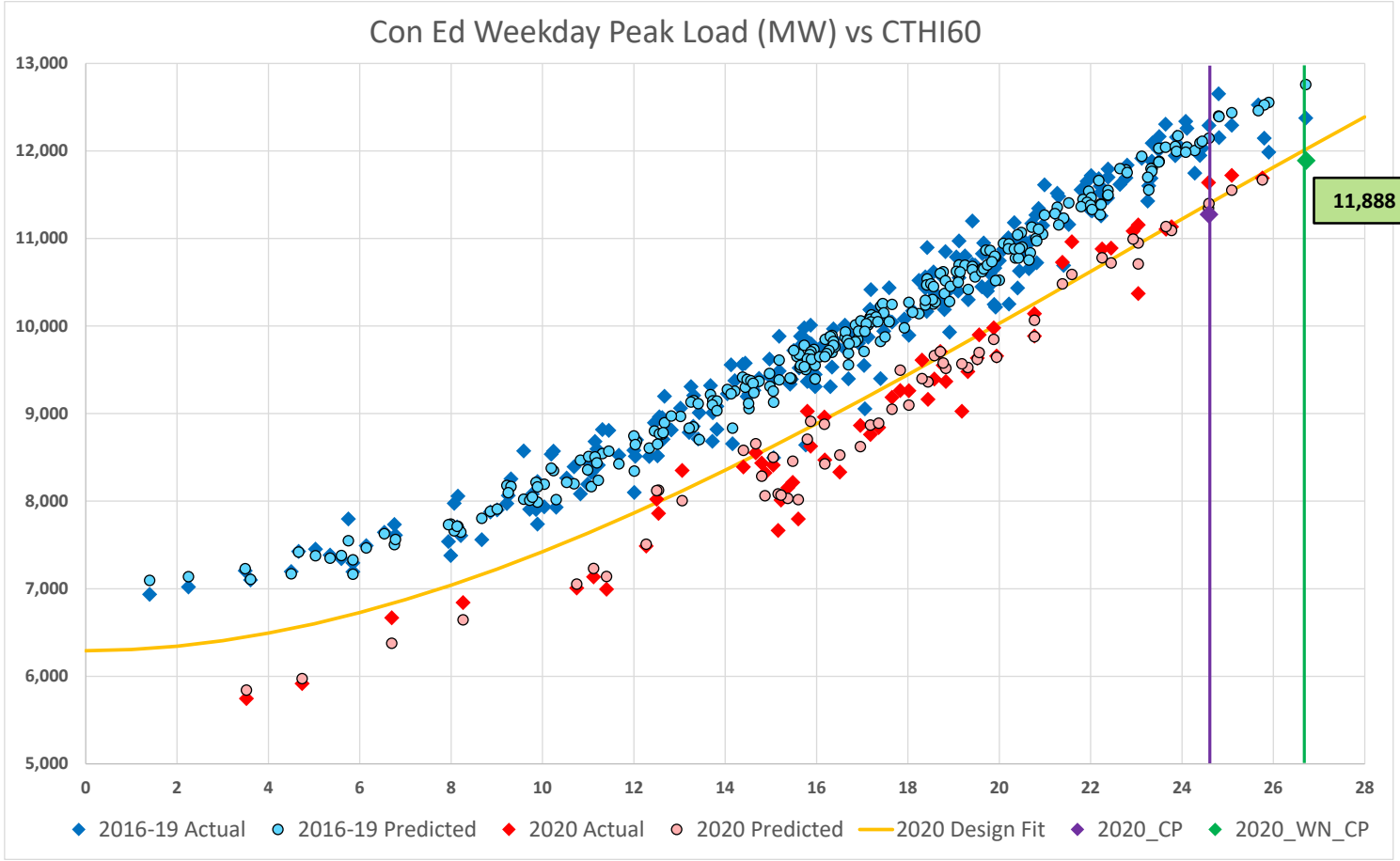
Con Ed Pooled Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	11,273
2020 CTHI60	24.59
Design CTHI60	26.72
Delta CTHI	2.13
MW/CTHI	289
Weather Adj	616
2020 WN CP	**11,888**

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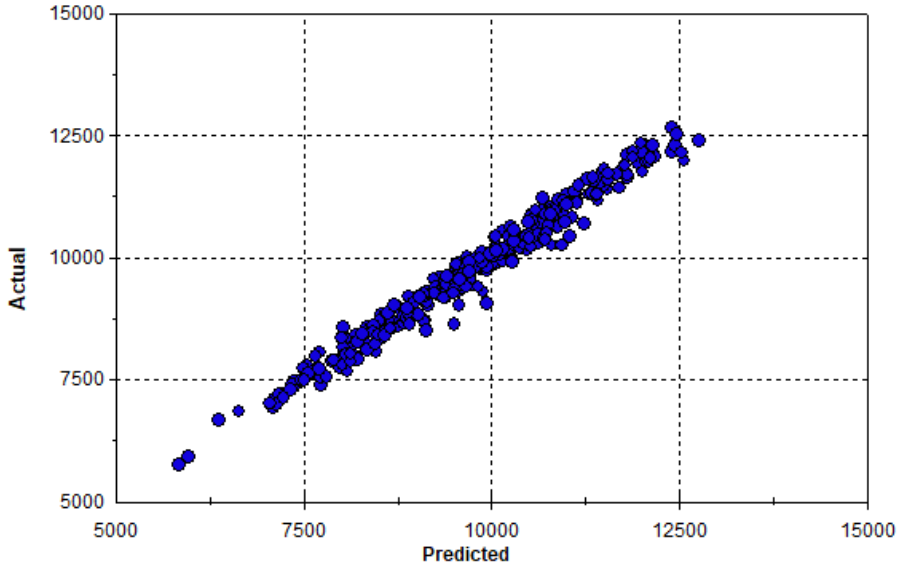
Con Ed Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	7197.453	58.254	123.552	0.00%
CE.Friday	-195.682	31.995	-6.116	0.00%
CE.Daily_Trend	2.767	1.132	2.445	1.50%
CE.Annual_Trend	-72.344	12.661	-5.714	0.00%
CE.Year_2020	-1160.686	71.13	-16.318	0.00%
CE.Year_2020_Daily_Trend	8.259	1.303	6.341	0.00%
CE.CTHI60Sq	13.263	0.56	23.665	0.00%
CE.CTHI60Cb	-0.196	0.02	-9.586	0.00%

Model Statistics	
Adjusted Observations	318
Deg. of Freedom for Error	310
R-Squared	0.975
Adjusted R-Squared	0.974
F-Statistic	1708.233
Prob (F-Statistic)	0
Std. Error of Regression	227.25
Mean Abs. Dev. (MAD)	175.04
Mean Abs. % Err. (MAPE)	1.82%



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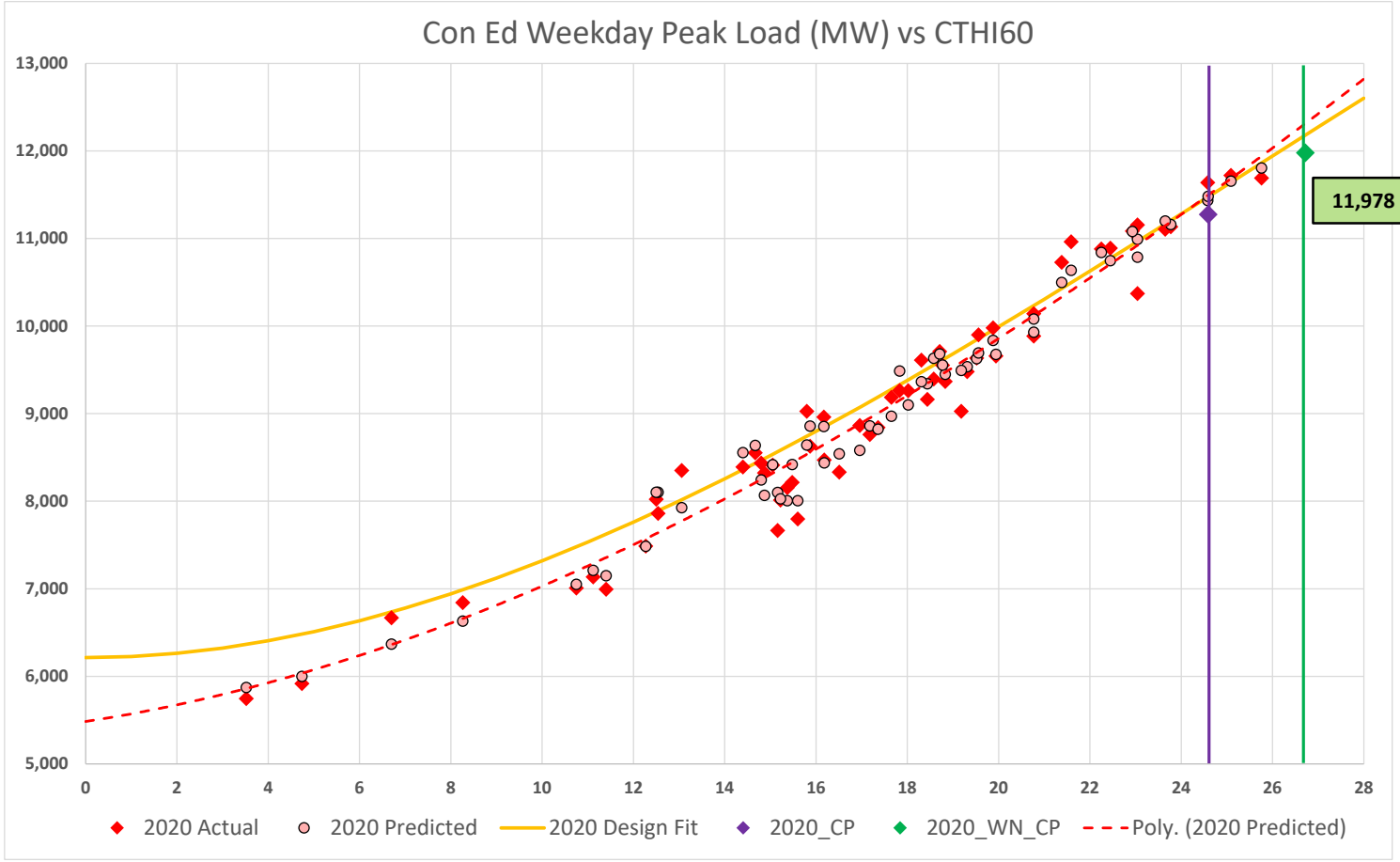
Con Ed 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

2020 CP	11,273
2020 CTHI60	24.59
Design CTHI60	26.72
Delta CTHI	2.13
MW/CTHI	331
Weather Adj	705
2020 WN CP	**11,978**

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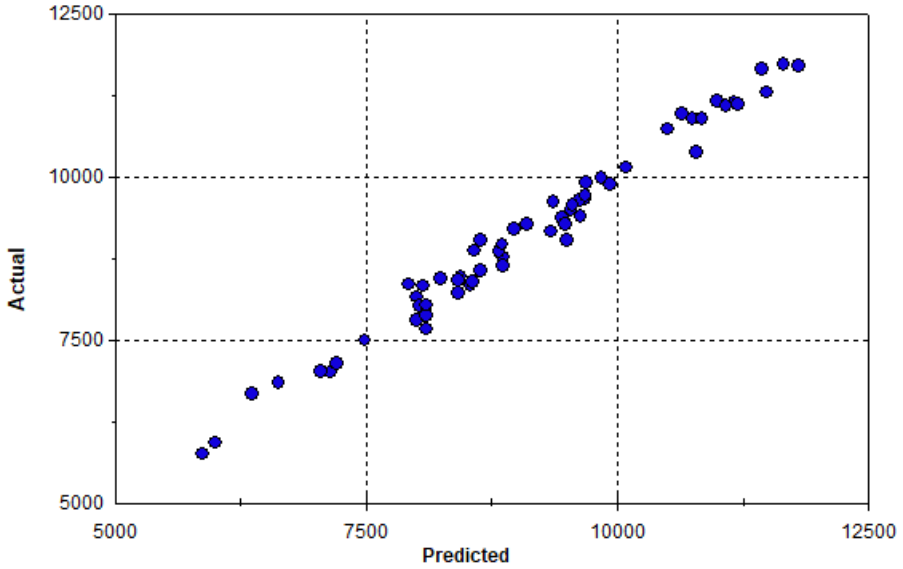
Con Ed 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	5713.622	114.942	49.709	0.00%
CE.Friday	-224.065	73.11	-3.065	0.34%
CE.Year_2020_Daily_Trend	8.918	1.24	7.194	0.00%
CE.CTHI60Sq	12.687	1.206	10.521	0.00%
CE.CTHI60Cb	-0.162	0.044	-3.681	0.05%



Model Statistics	
Adjusted Observations	59
Deg. of Freedom for Error	54
R-Squared	0.981
Adjusted R-Squared	0.98
F-Statistic	707.428
Prob (F-Statistic)	0
Std. Error of Regression	205.27
Mean Abs. Dev. (MAD)	156.35
Mean Abs. % Err. (MAPE)	1.78%

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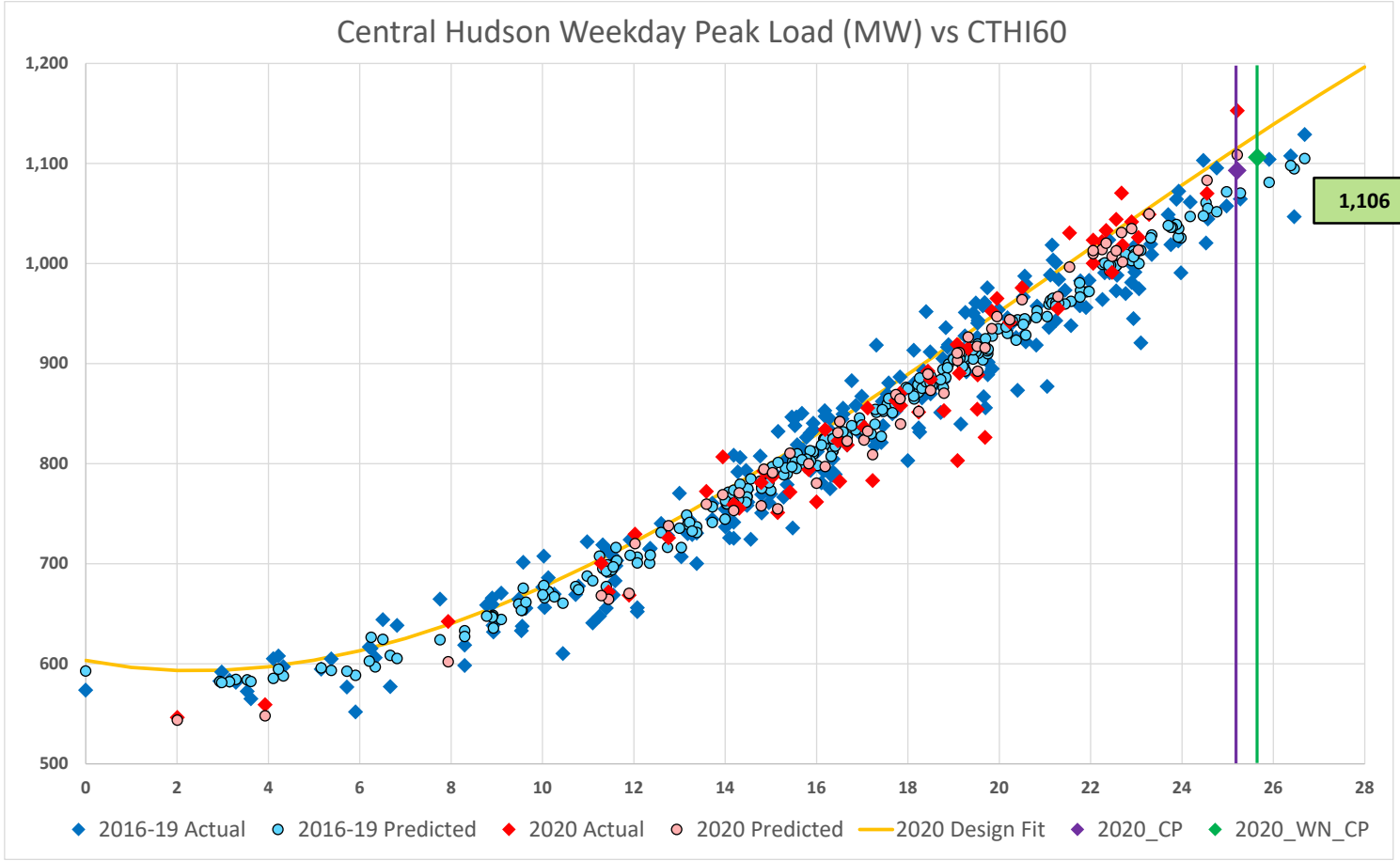
Central Hudson Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	1,093
2020 CTHI60	25.21
Design CTHI60	25.65
Delta CTHI	0.44
MW/CTHI	30
Weather Adj	13
2020 WN CP	**1,106**

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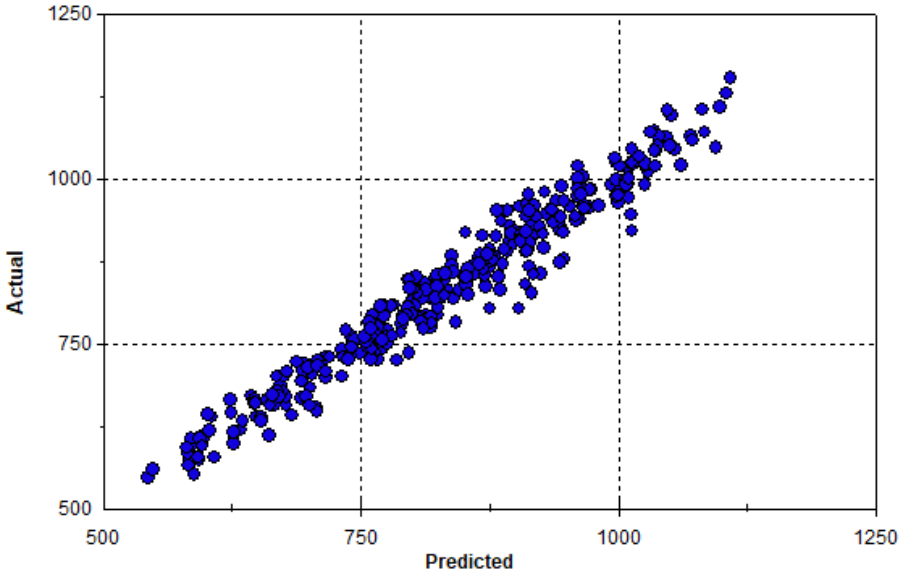
Central Hudson Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	589.854	15.51	38.029	0.00%
CH.Friday	-8.64	3.998	-2.161	3.15%
CH.Daily_Trend	0.487	0.137	3.566	0.04%
CH.Year_2020	-36.989	11.113	-3.328	0.10%
CH.Year_2020_Daily_Trend	0.414	0.17	2.437	1.54%
CH.CTHI60	-8.747	3.865	-2.263	2.43%
CH.CTHI60Sq	1.842	0.294	6.258	0.00%
CH.CTHI60Cb	-0.03	0.007	-4.487	0.00%
CH.CTHIS60q_Y2020	0.067	0.029	2.302	2.20%

Model Statistics	
Adjusted Observations	318
Deg. of Freedom for Error	309
R-Squared	0.956
Adjusted R-Squared	0.955
F-Statistic	845.455
Prob (F-Statistic)	0
Std. Error of Regression	28.43
Mean Abs. Dev. (MAD)	21.47
Mean Abs. % Err. (MAPE)	2.60%



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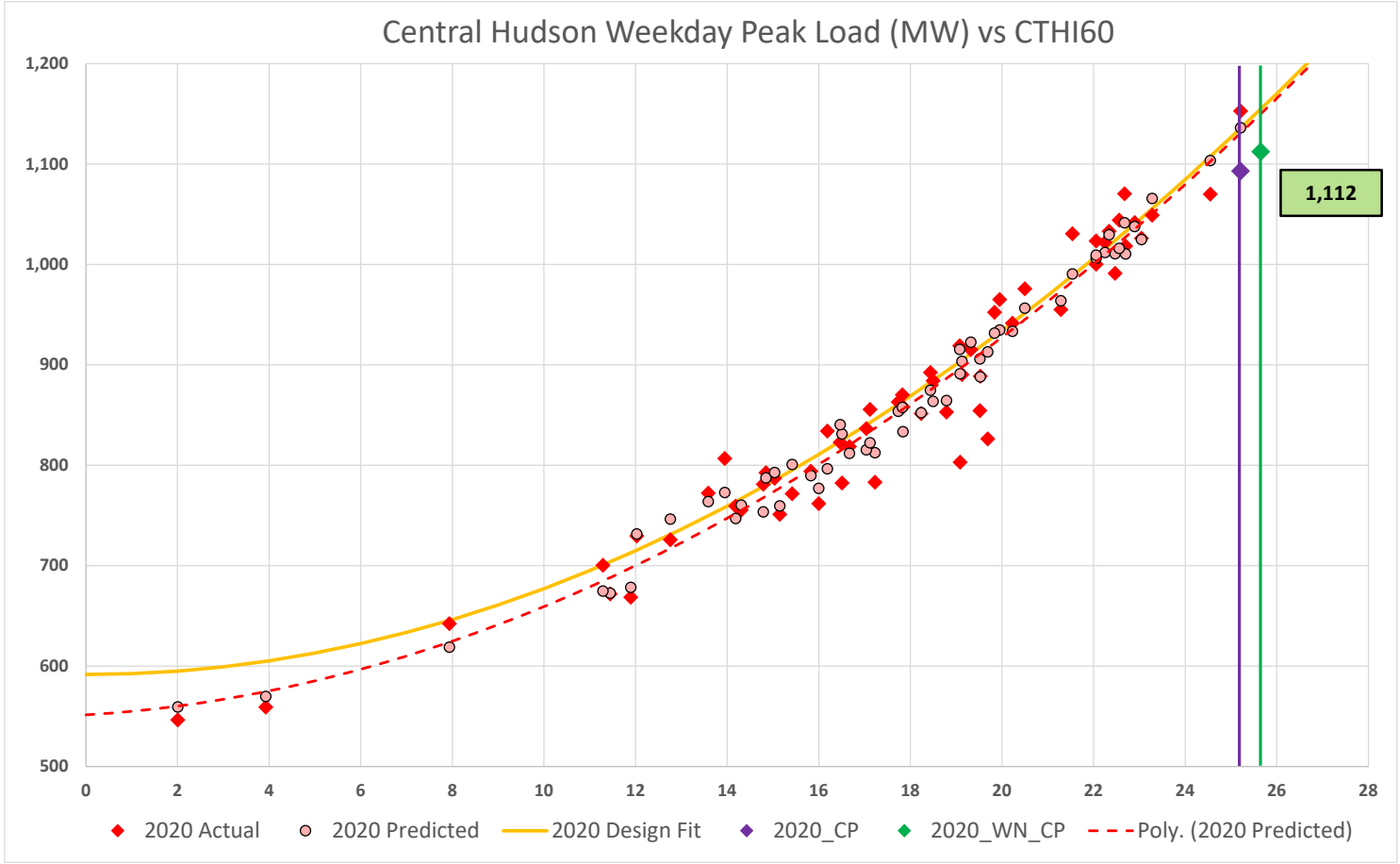
Central Hudson 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

2020 CP	1,093
2020 CTHI60	25.21
Design CTHI60	25.65
Delta CTHI	0.44
MW/CTHI	44
Weather Adj	19
2020 WN CP	**1,112**

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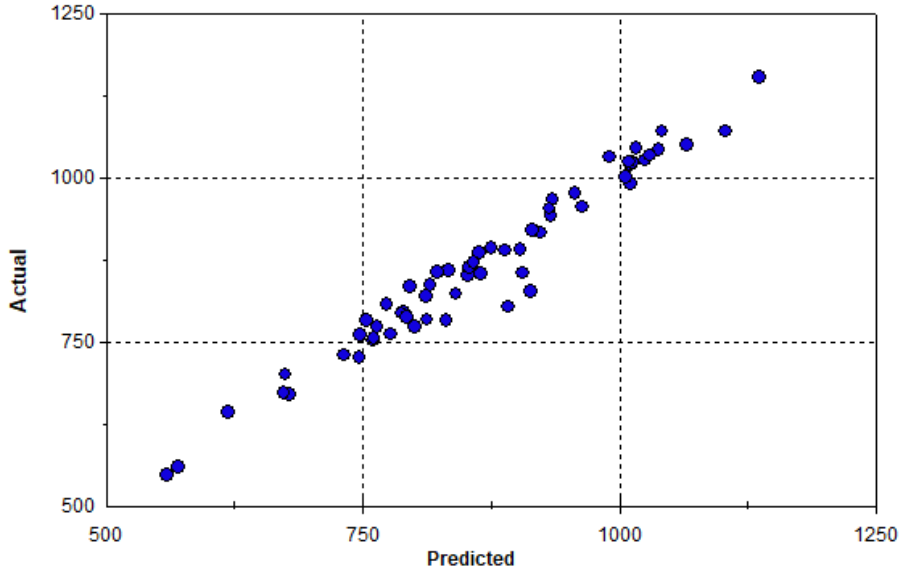
Central Hudson 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	555.25	9.464	58.672	0.00%
CH.Year_2020_Daily_Trend	0.648	0.148	4.367	0.01%
CH.CTHI60Sq	0.856	0.025	33.873	0.00%

Model Statistics	
Adjusted Observations	59
Deg. of Freedom for Error	56
R-Squared	0.961
Adjusted R-Squared	0.959
F-Statistic	685.71
Prob (F-Statistic)	0
Std. Error of Regression	26.55
Mean Abs. Dev. (MAD)	19.01
Mean Abs. % Err. (MAPE)	2.25%



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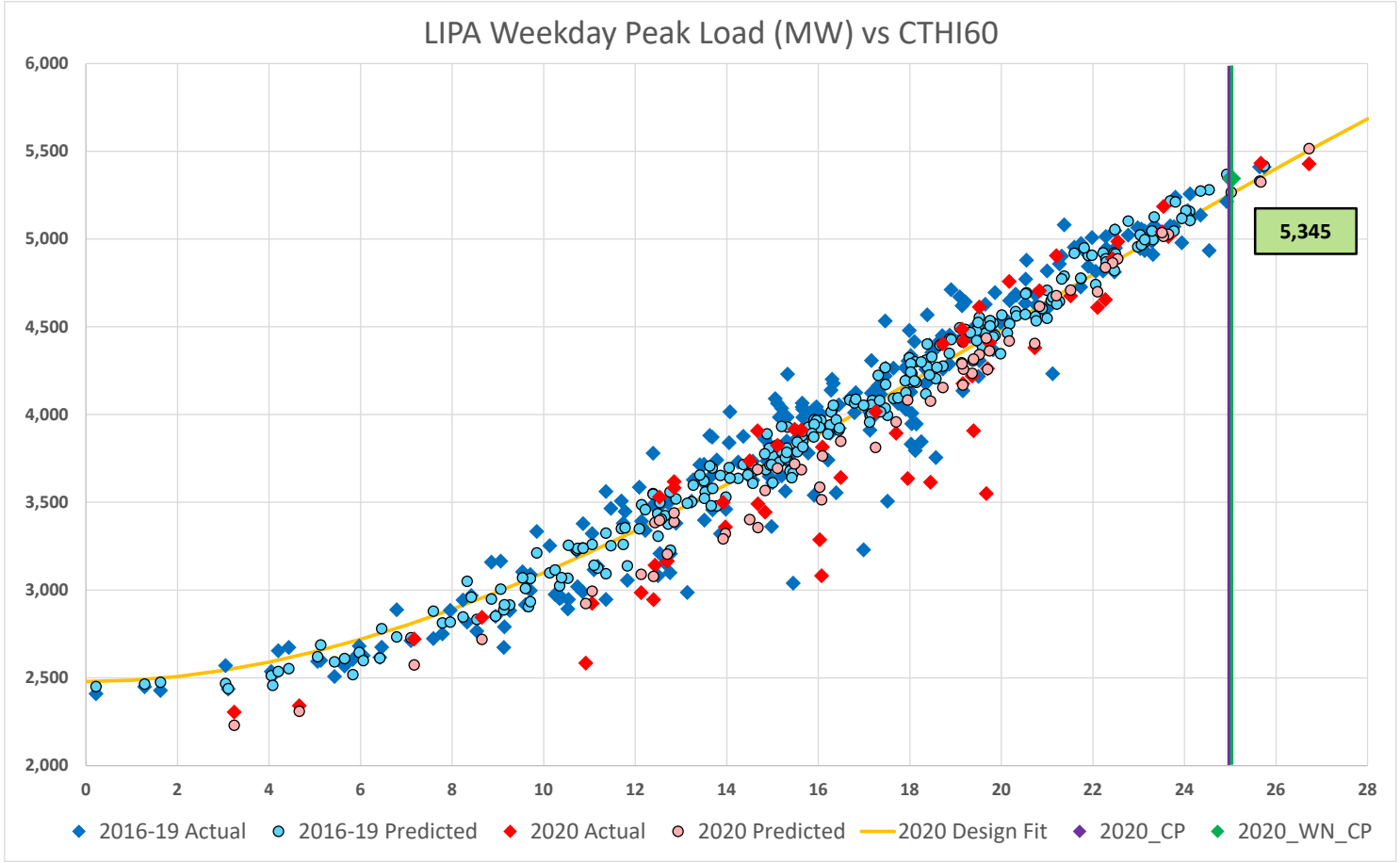
LIPA Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	5,344
2020 CTHI60	25.02
Design CTHI60	25.03
Delta CTHI	0.01
MW/CTHI	149
Weather Adj	1
2020 WN CP	**5,345**

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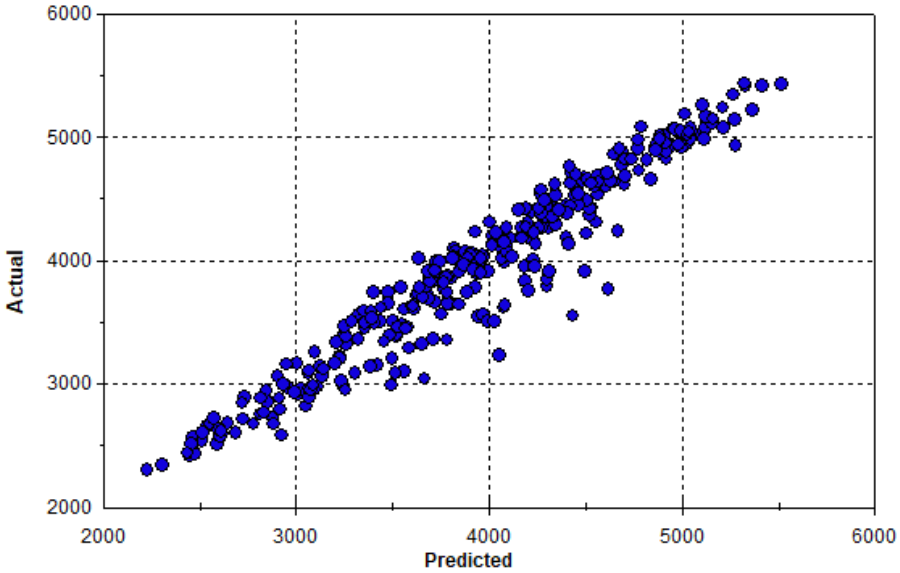
LIPA Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	2531.473	45.994	55.039	0.00%
LIPA.Friday	-82.989	26.62	-3.118	0.20%
LIPA.Daily_Trend	3.191	0.956	3.336	0.10%
LIPA.Annual_Trend	-50.459	10.467	-4.821	0.00%
LIPA.Year_2020	-129.224	59.165	-2.184	2.97%
LIPA.Year_2020_Daily_Trend	2.688	1.12	2.4	1.70%
LIPA.CTHI60Sq	7.365	0.465	15.824	0.00%
LIPA.CTHI60Cb	-0.117	0.017	-6.708	0.00%

Model Statistics	
Adjusted Observations	314
Deg. of Freedom for Error	306
R-Squared	0.94
Adjusted R-Squared	0.939
F-Statistic	689.091
Prob (F-Statistic)	0
Std. Error of Regression	187.99
Mean Abs. Dev. (MAD)	137.15
Mean Abs. % Err. (MAPE)	3.67%



Note: Some outlier data points included in the graph above have been excluded from the regression due to the impacts of the 2020 tropical storm.

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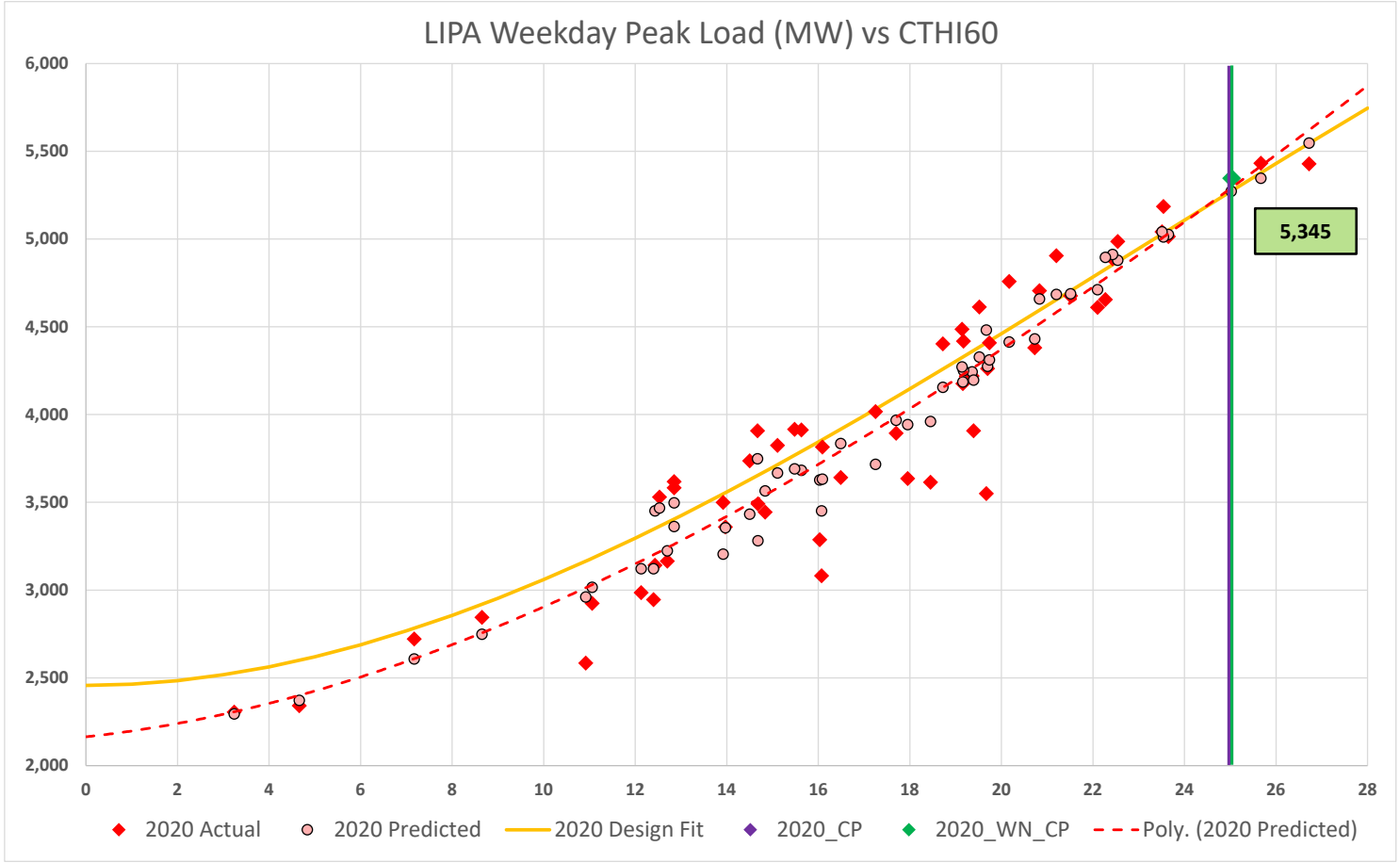
LIPA 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

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Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions .model fit throughout the summer.

2020 CP	5,344
2020 CTHI60	25.02
Design CTHI60	25.03
Delta CTHI	0.01
MW/CTHI	161
Weather Adj	2
2020 WN CP	**5,345**

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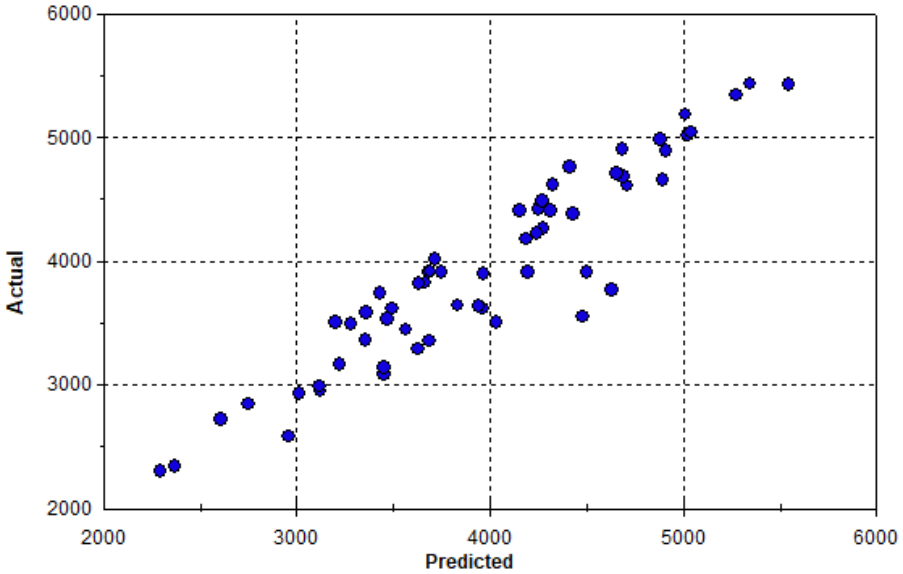
LIPA 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	2219.928	132.417	16.765	0.00%
LIPA.Friday	-185.793	89.116	-2.085	4.22%
LIPA.Year_2020_Daily_Trend	4.227	1.539	2.747	0.83%
LIPA.CTHI60Sq	7.051	1.384	5.096	0.00%
LIPA.CTHI60Cb	-0.102	0.05	-2.033	4.73%

Model Statistics	
Adjusted Observations	55
Deg. of Freedom for Error	50
R-Squared	0.917
Adjusted R-Squared	0.91
F-Statistic	137.506
Prob (F-Statistic)	0
Std. Error of Regression	240.97
Mean Abs. Dev. (MAD)	172.91
Mean Abs. % Err. (MAPE)	4.66%



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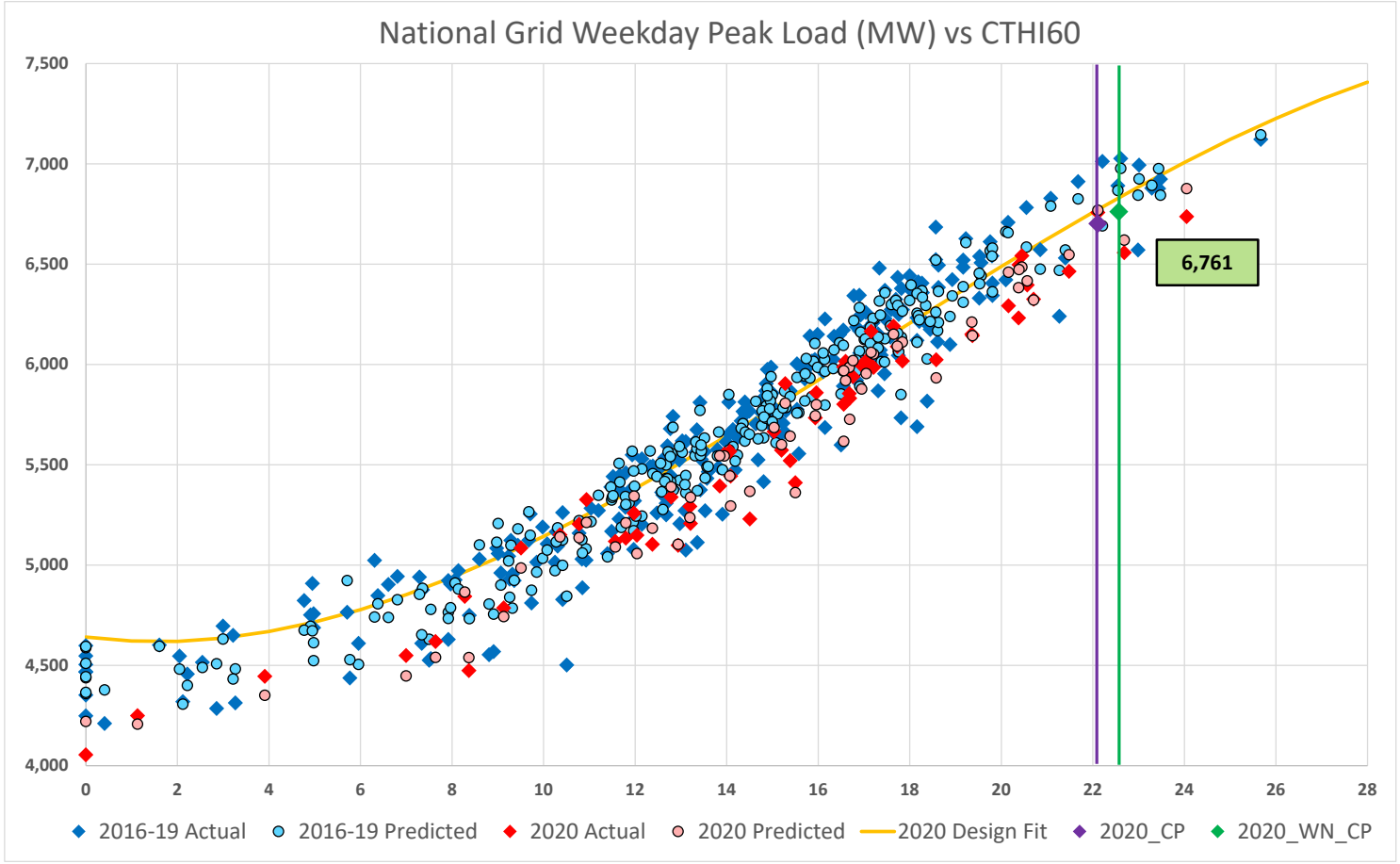
National Grid Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	6,702
2020 CTHI60	22.11
Design CTHI60	22.57
Delta CTHI	0.46
MW/CTHI	127
Weather Adj	59
2020 WN CP	**6,761**

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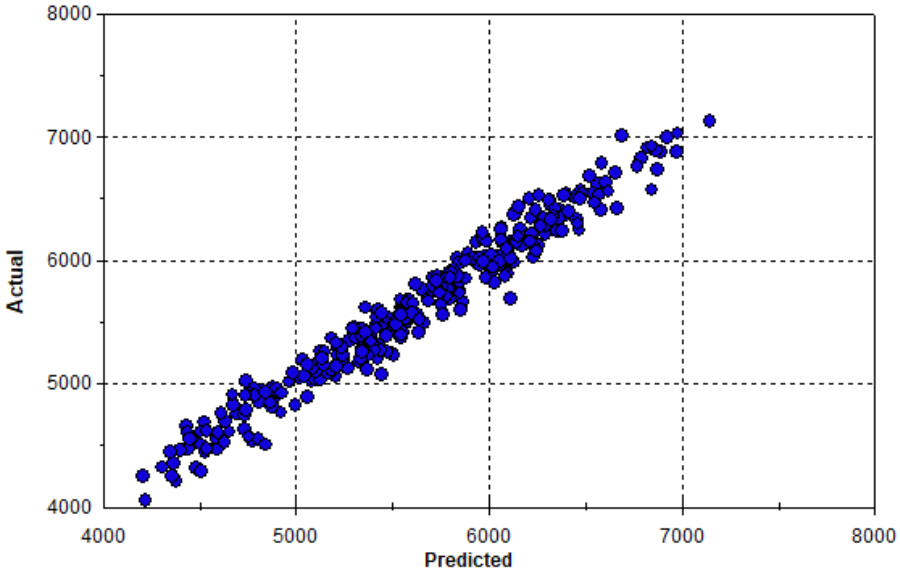
National Grid Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	4606.714	40	115.167	0.00%
NG.Friday	-98.297	17.699	-5.554	0.00%
NG.Daily_Trend	6.029	0.623	9.676	0.00%
NG.Annual_Trend	-66.358	7.031	-9.437	0.00%
NG.Year_2020	-62.063	39.869	-1.557	12.06%
NG.Year_2020_Daily_Trend	1.62	0.727	2.229	2.65%
NG.CTHI60	-29.697	11.188	-2.654	0.84%
NG.CTHI60Sq	9.881	1.06	9.323	0.00%
NG.CTHI60Cb	-0.189	0.029	-6.489	0.00%

Model Statistics	
Adjusted Observations	318
Deg. of Freedom for Error	309
R-Squared	0.964
Adjusted R-Squared	0.963
F-Statistic	1029.492
Prob (F-Statistic)	0
Std. Error of Regression	126.02
Mean Abs. Dev. (MAD)	98.53
Mean Abs. % Err. (MAPE)	1.78%



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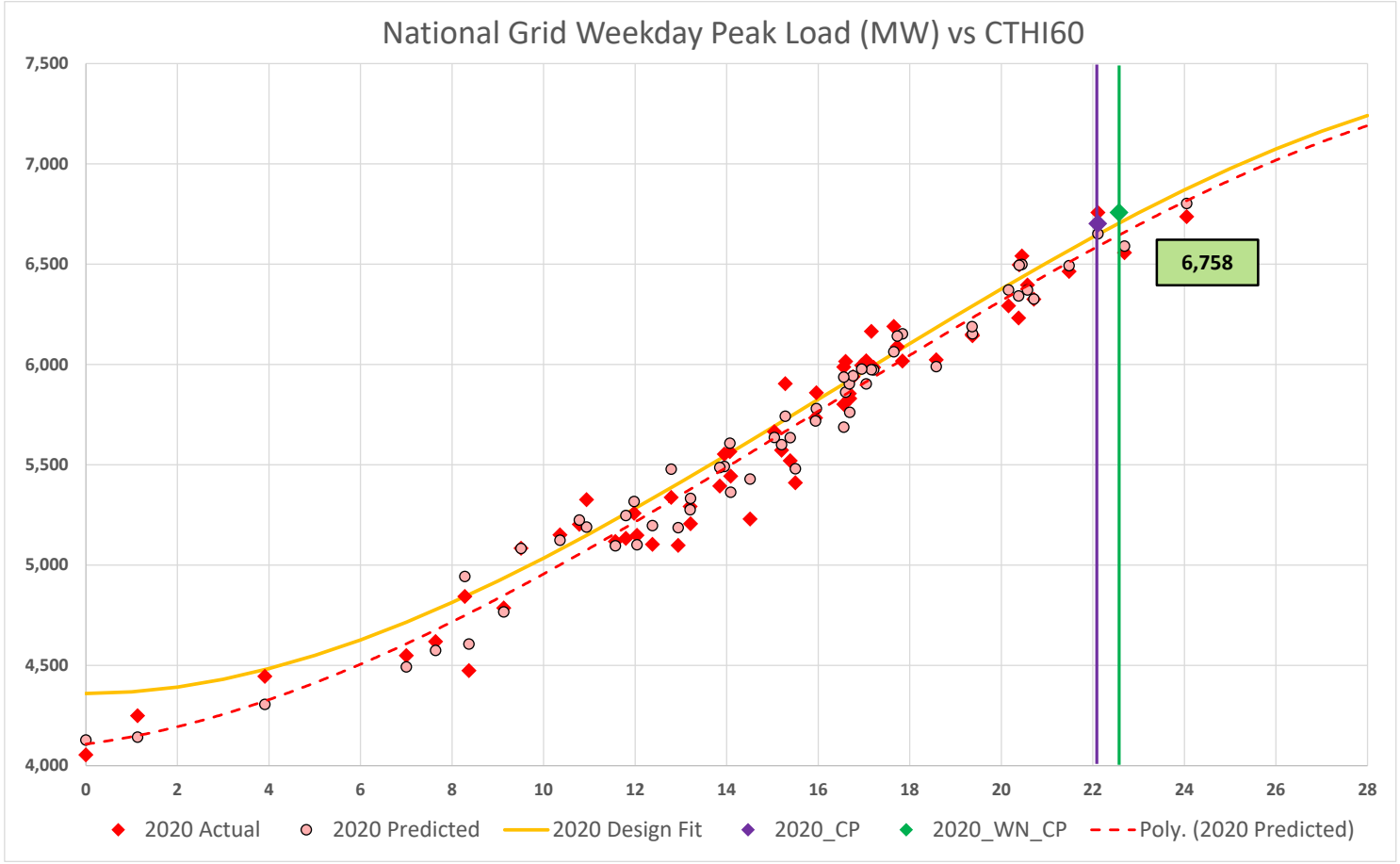
National Grid 2020 Model



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Red line represents the average model fit throughout the summer.

2020 CP	6,702
2020 CTHI60	22.11
Design CTHI60	22.57
Delta CTHI	0.46
MW/CTHI	121
Weather Adj	56
2020 WN CP	**6,758**

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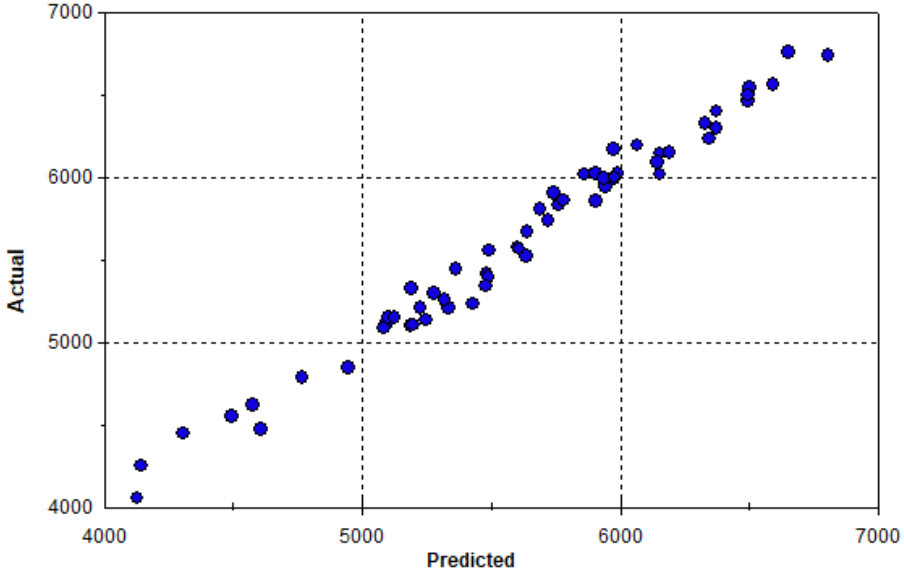
National Grid 2020 Model

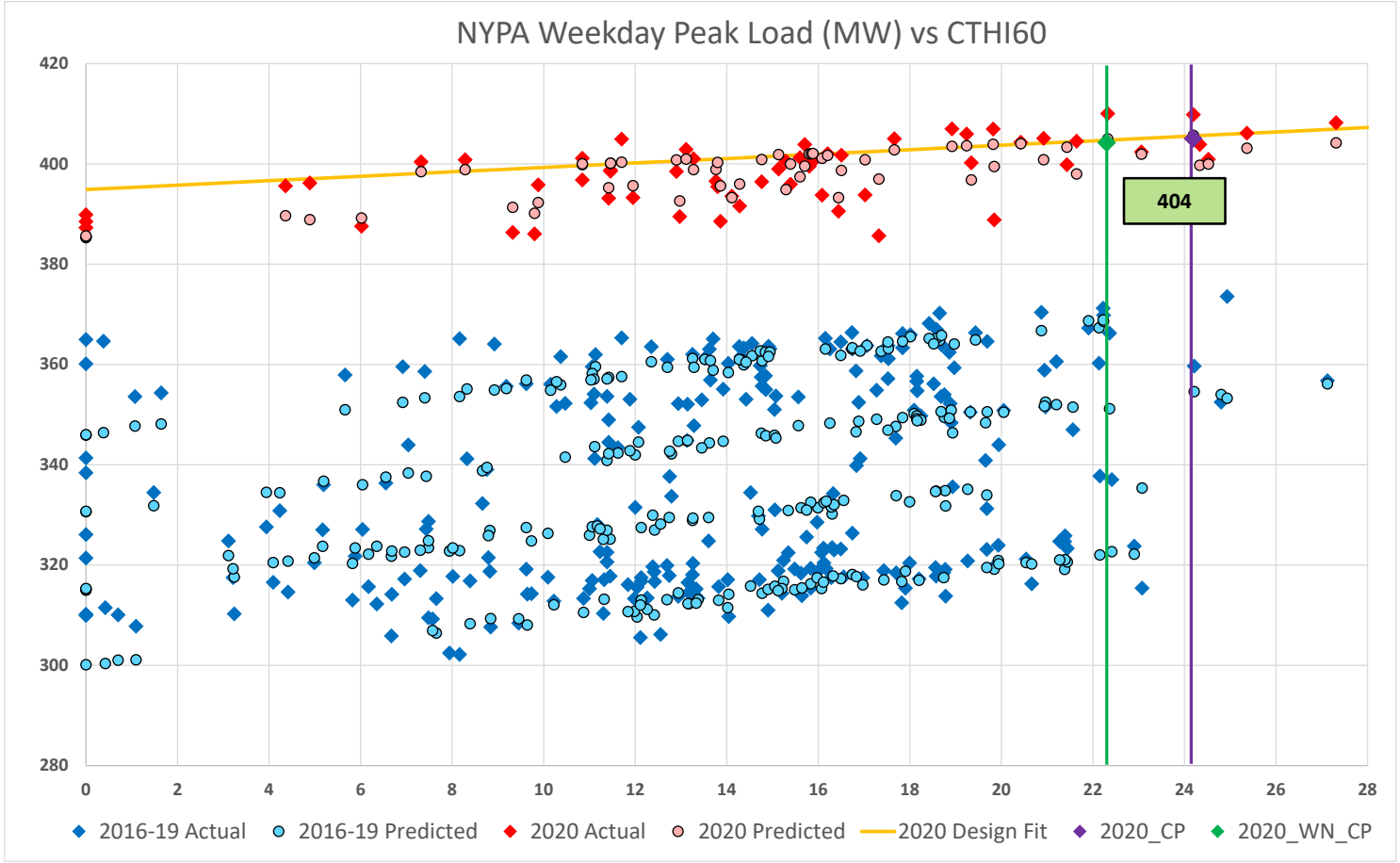
Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	4124.066	41.597	99.143	0.00%
NG.Friday	-60.207	30.744	-1.958	5.54%
NG.Year_2020_Daily_Trend	4.205	0.514	8.188	0.00%
NG.CTHI60Sq	8.463	0.551	15.368	0.00%
NG.CTHI60Cb	-0.171	0.023	-7.458	0.00%

Model Statistics	
Adjusted Observations	59
Deg. of Freedom for Error	54
R-Squared	0.981
Adjusted R-Squared	0.98
F-Statistic	703.444
Prob (F-Statistic)	0
Std. Error of Regression	91.06
Mean Abs. Dev. (MAD)	71.24
Mean Abs. % Err. (MAPE)	1.30%



New York ISO

NYPA Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

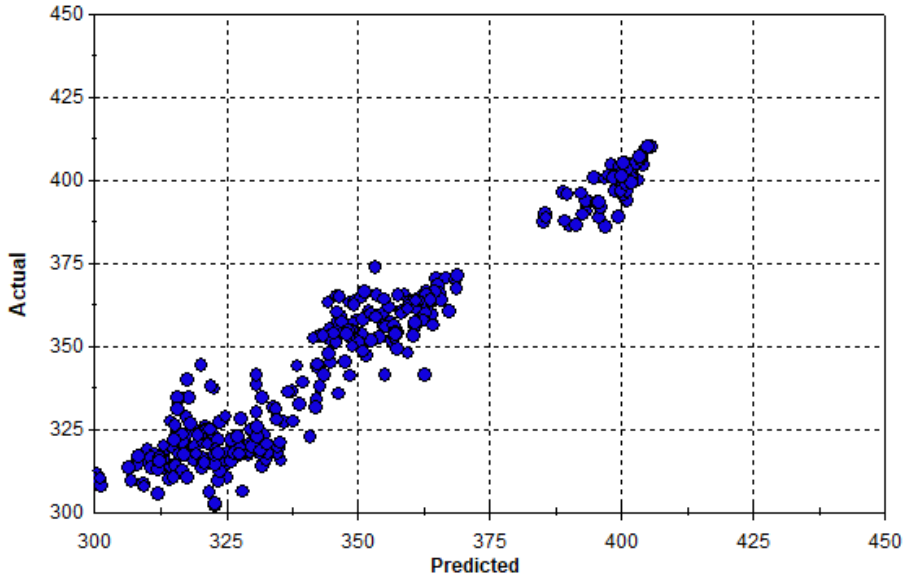
2020 CP	405
2020 CTHI60	24.19
Design CTHI60	22.30
Delta CTHI	-1.89
MW/CTHI	0.4
Weather Adj	-0.8
2020 WN CP	**404**

New York ISO

NYPA Pooled Model

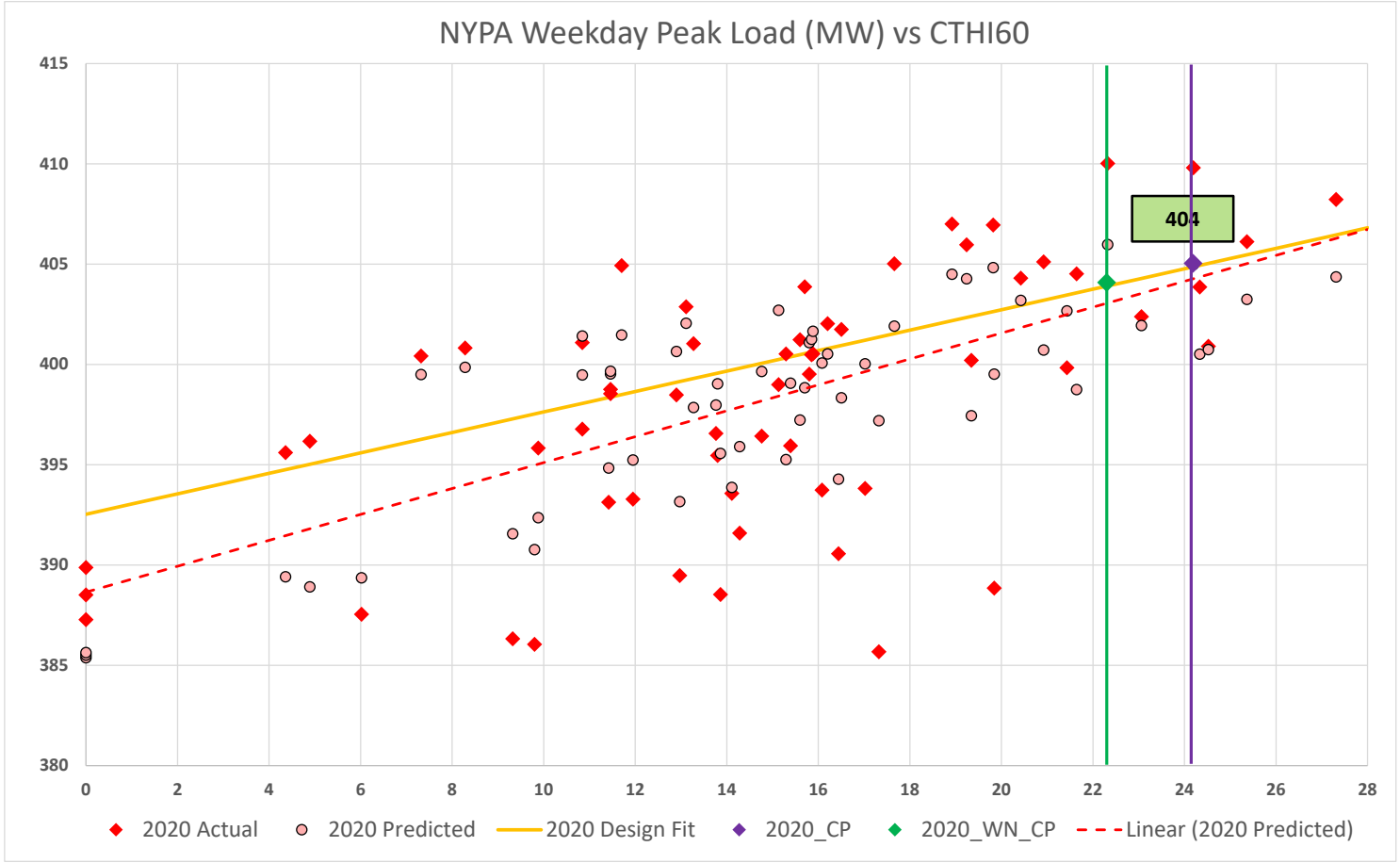
Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	283.927	1.76	161.32	0.00%
NYPA.Daily_Trend	0.082	0.038	2.176	3.03%
NYPA.Annual_Trend	15.437	0.449	34.379	0.00%
NYPA.Year_2020	24.013	3.477	6.907	0.00%
NYPA.Year_2020_Daily_Trend	0.092	0.048	1.915	5.64%
NYPA.CTHI60	0.848	0.102	8.296	0.00%
NYPA.CTHI60_Y2020	-0.406	0.2	-2.027	4.35%

Model Statistics	
Adjusted Observations	318
Deg. of Freedom for Error	311
R-Squared	0.93
Adjusted R-Squared	0.929
F-Statistic	691.637
Prob (F-Statistic)	0
Std. Error of Regression	8.07
Mean Abs. Dev. (MAD)	6.15
Mean Abs. % Err. (MAPE)	1.82%



New York ISO

NYPA 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

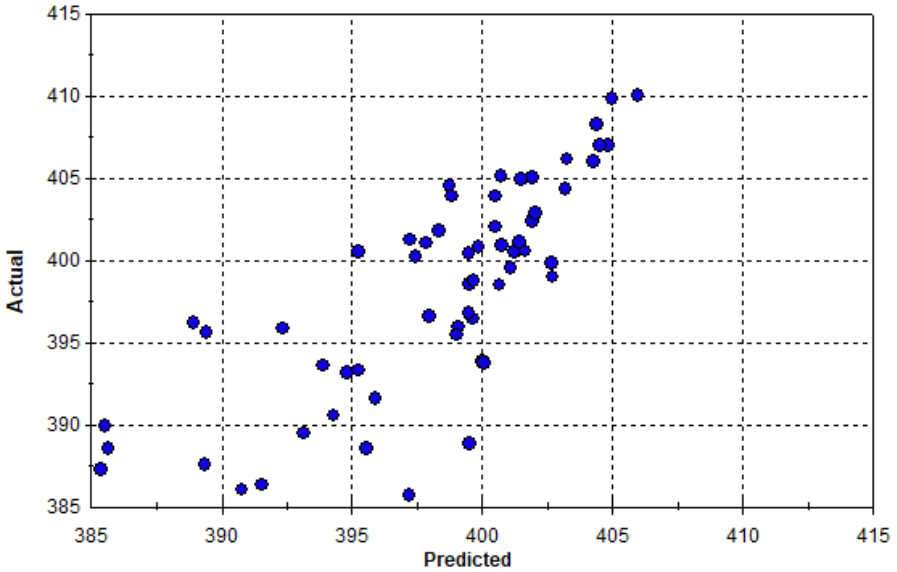
2020 CP	405
2020 CTHI60	24.19
Design CTHI60	22.30
Delta CTHI	-1.89
MW/CTHI	0.5
Weather Adj	-1.0
2020 WN CP	**404**

New York ISO

NYPA 2020 Model

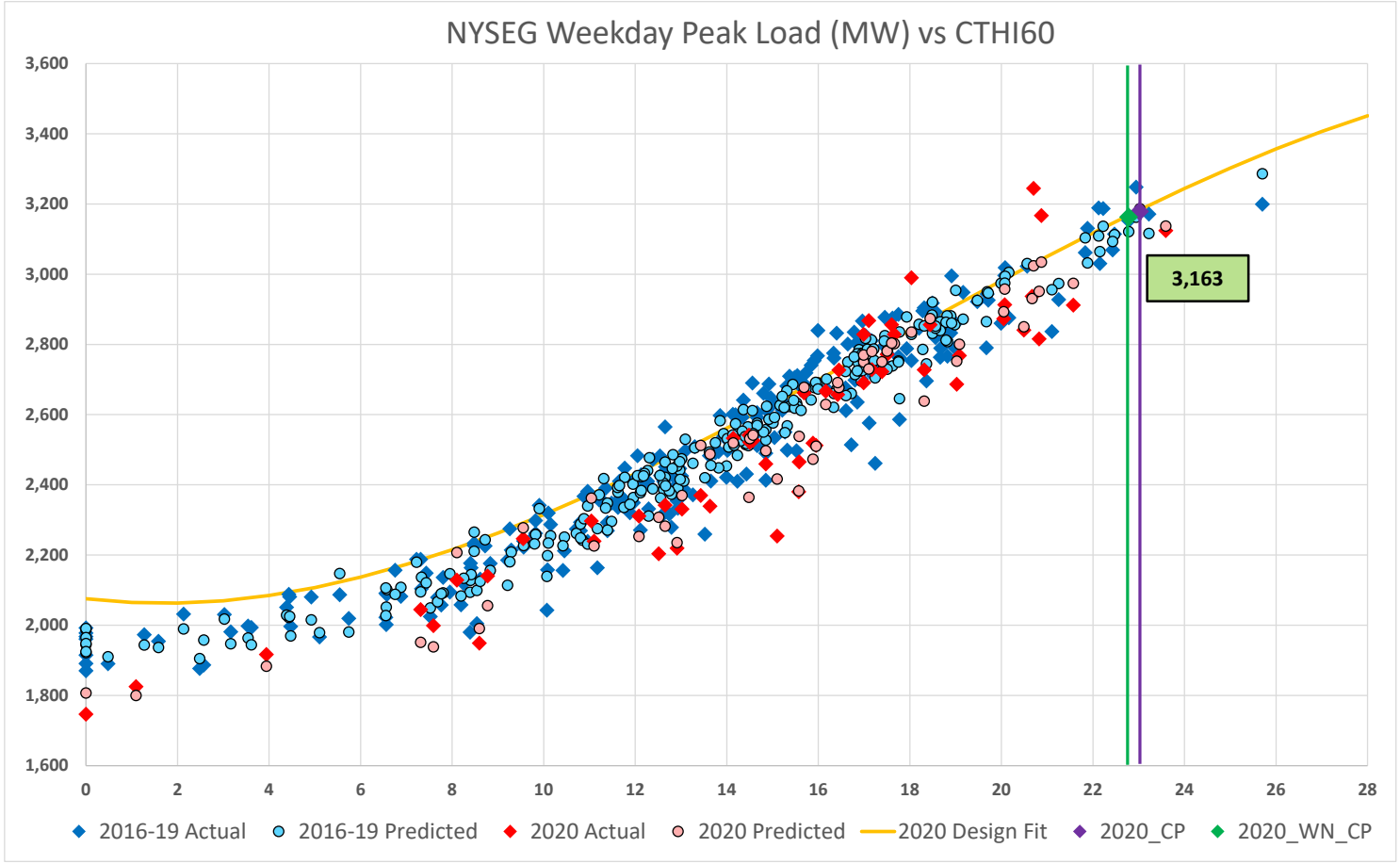
Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	385.248	1.532	251.422	0.00%
NYPA.Year_2020_Daily_Trend	0.13	0.023	5.679	0.00%
NYPA.CTHI60	0.51	0.092	5.571	0.00%

Model Statistics	
Adjusted Observations	59
Deg. of Freedom for Error	56
R-Squared	0.605
Adjusted R-Squared	0.591
F-Statistic	42.852
Prob (F-Statistic)	0
Std. Error of Regression	4.13
Mean Abs. Dev. (MAD)	3.31
Mean Abs. % Err. (MAPE)	0.83%



New York ISO

NYSEG Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

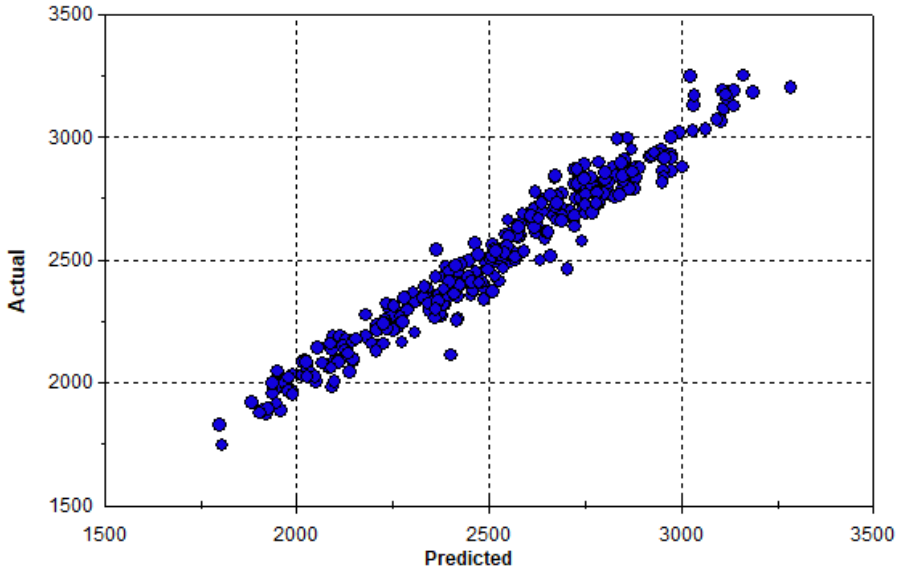
2020 CP	3,178
2020 CTHI60	23.02
Design CTHI60	22.78
Delta CTHI	-0.24
MW/CTHI	64
Weather Adj	-15
2020 WN CP	**3,163**

New York ISO

NYSEG Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	1983.082	20.864	95.047	0.00%
NYSEG.Friday	-37.324	9.321	-4.004	0.01%
NYSEG.Daily_Trend	2.766	0.327	8.447	0.00%
NYSEG.Annual_Trend	-17.32	3.675	-4.713	0.00%
NYSEG.Year_2020	-94.5	20.896	-4.522	0.00%
NYSEG.Year_2020_Daily_Trend	2.12	0.391	5.422	0.00%
NYSEG.CTHI60	-15.825	5.871	-2.695	0.74%
NYSEG.CTHI60Sq	4.896	0.56	8.741	0.00%
NYSEG.CTHI60Cb	-0.092	0.016	-5.905	0.00%

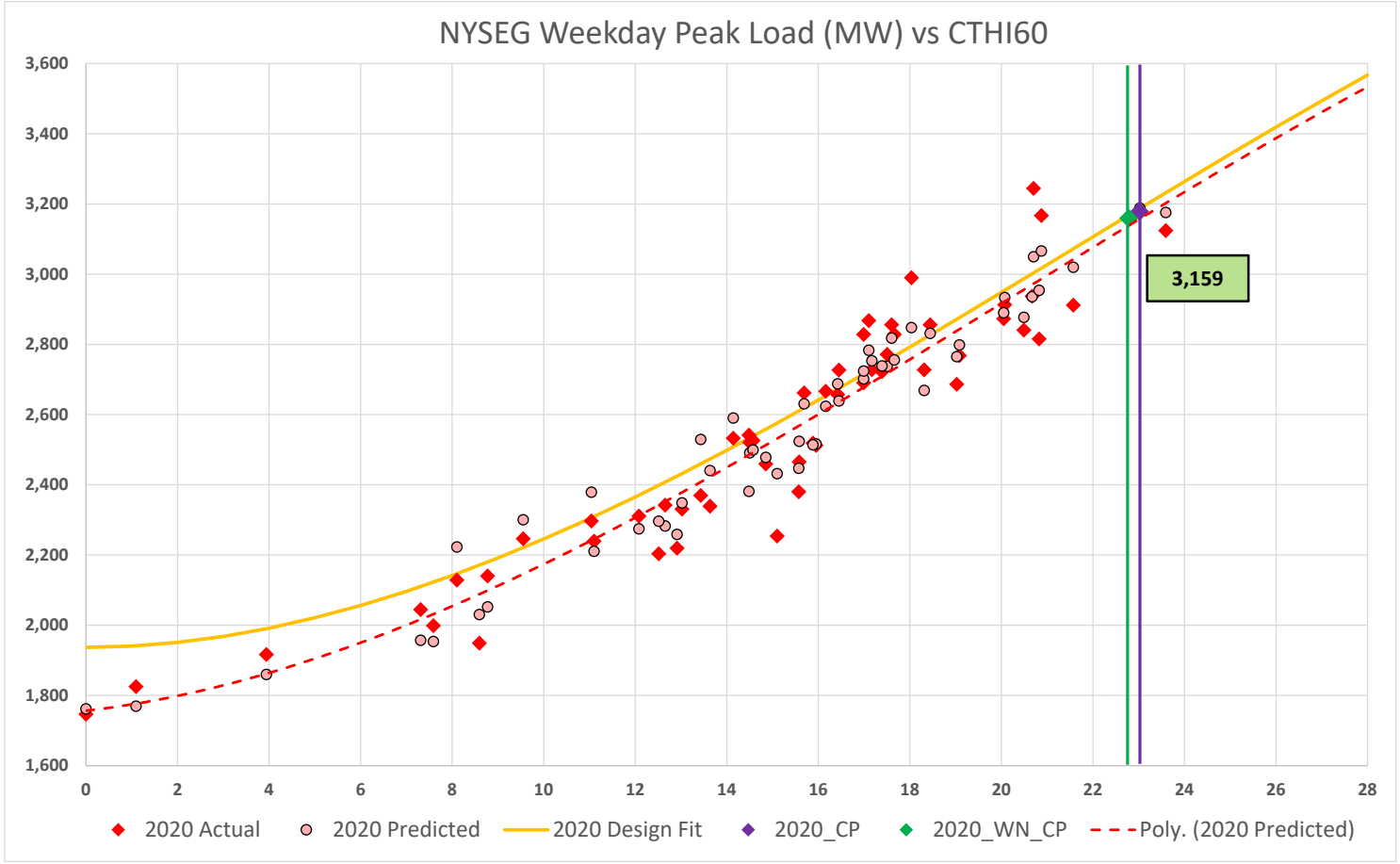
Model Statistics	
Adjusted Observations	314
Deg. of Freedom for Error	305
R-Squared	0.96
Adjusted R-Squared	0.959
F-Statistic	922.839
Prob (F-Statistic)	0
Std. Error of Regression	65.81
Mean Abs. Dev. (MAD)	50
Mean Abs. % Err. (MAPE)	2.00%



Note: Some outlier data points included in the graph above have been excluded from the regression due to the impacts of the 2020 tropical storm.

New York ISO

NYSEG 2020 Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

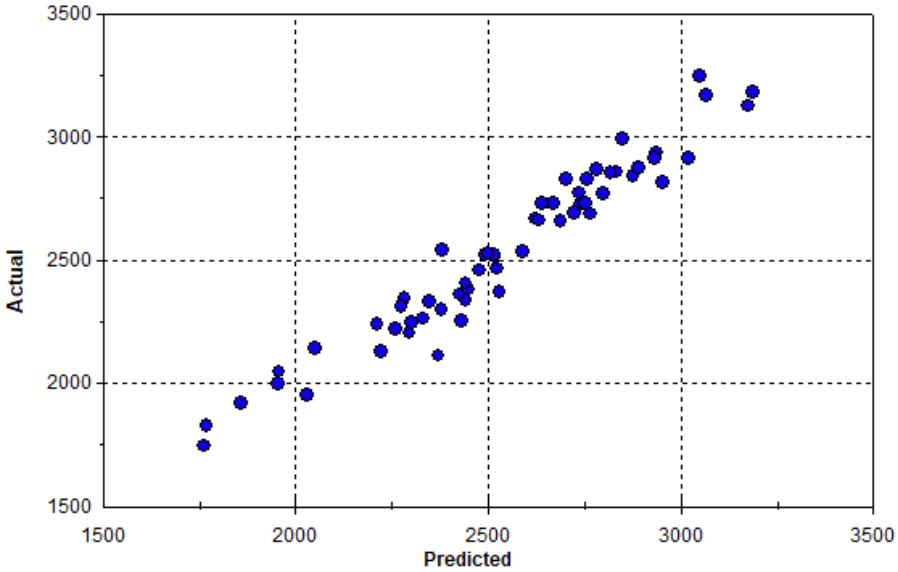
2020 CP	3,178
2020 CTHI60	23.02
Design CTHI60	22.78
Delta CTHI	-0.24
MW/CTHI	79
Weather Adj	-19
2020 WN CP	**3,159**

New York ISO

NYSEG 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	1758.631	37.344	47.093	0.00%
NYSEG.Year_2020_Daily_Trend	3.185	0.485	6.571	0.00%
NYSEG.CTHI60Sq	3.648	0.495	7.372	0.00%
NYSEG.CTHI60Cb	-0.056	0.021	-2.714	0.90%

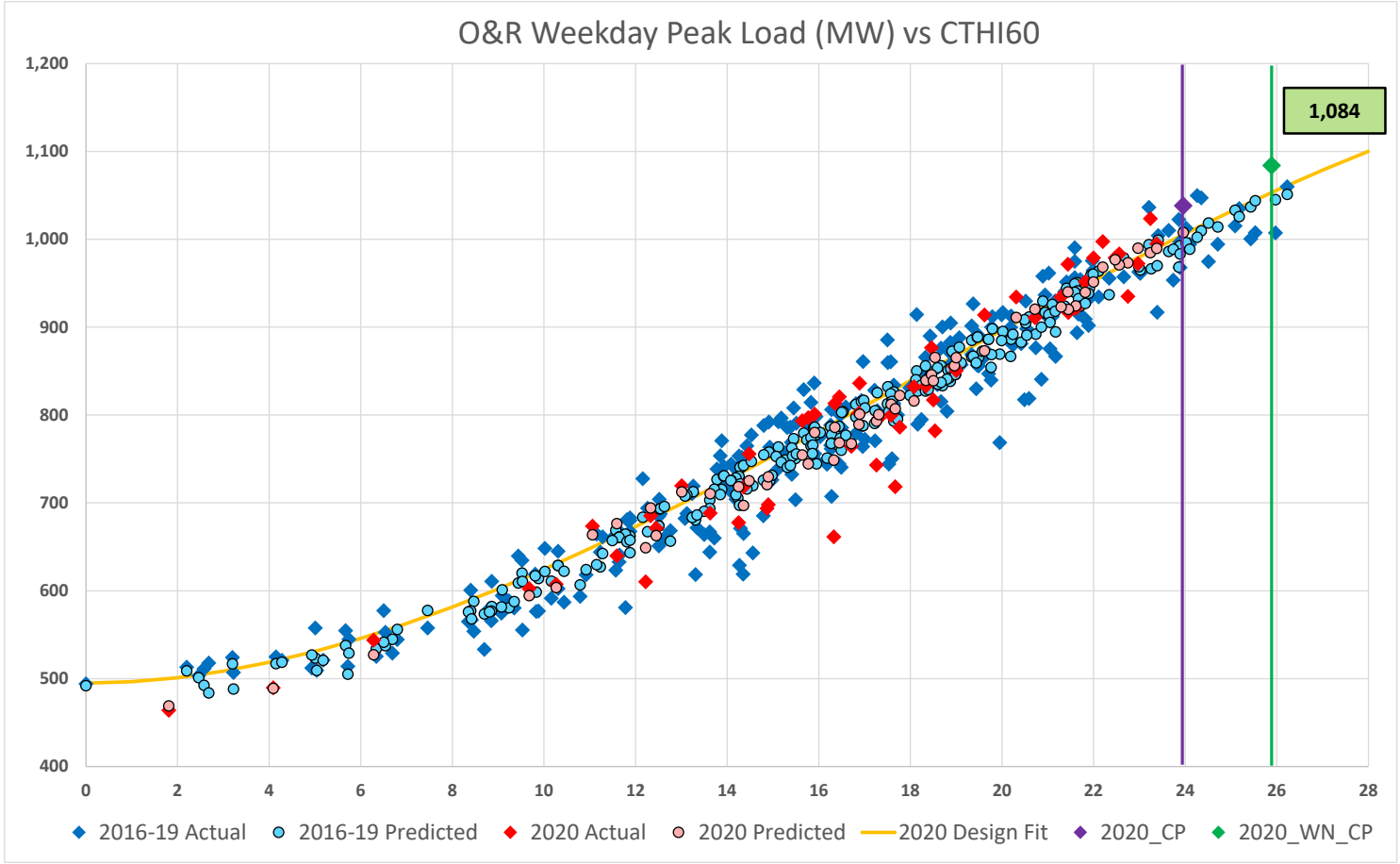
Model Statistics	
Adjusted Observations	55
Deg. of Freedom for Error	51
R-Squared	0.952
Adjusted R-Squared	0.949
F-Statistic	336.011
Prob (F-Statistic)	0
Std. Error of Regression	80.57
Mean Abs. Dev. (MAD)	62.45
Mean Abs. % Err. (MAPE)	2.49%



Note: Some outlier data points included in the graph above have been excluded from the regression due to the impacts of the 2020 tropical storm.

New York ISO

O&R Pooled Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	1,038
2020 CTHI60	23.96
Design CTHI60	25.89
Delta CTHI	1.93
MW/CTHI	24
Weather Adj	46
2020 WN CP	**1,084**

New York ISO

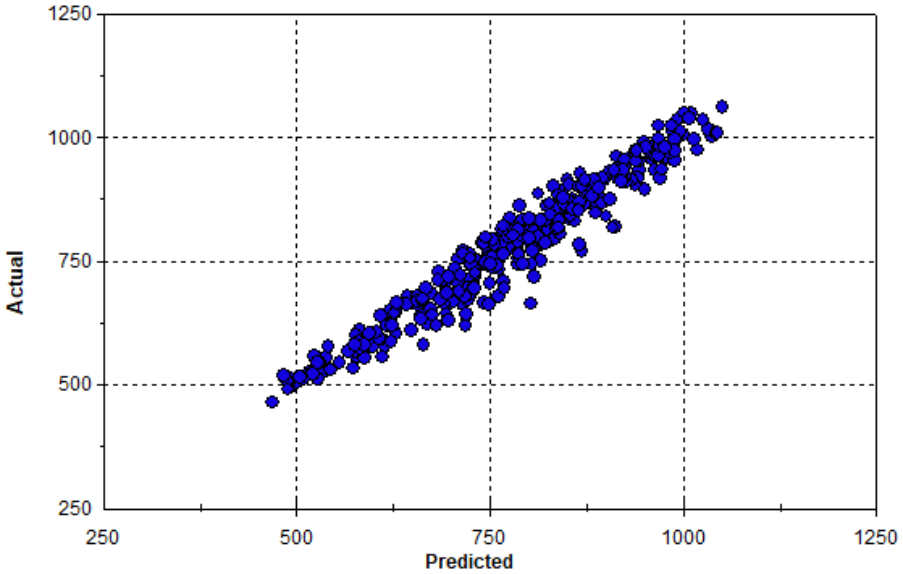
O&R Pooled Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	511.044	7.709	66.289	0.00%
O_R.Friday	-14.203	4.604	-3.085	0.22%
O_R.Annual_Trend	-9.552	1.606	-5.95	0.00%
O_R.Year_2020_Daily_Trend	0.566	0.124	4.575	0.00%
O_R.CTHI60Sq	1.584	0.072	22.043	0.00%
O_R.CTHI60Cb	-0.029	0.003	-10.34	0.00%

Not Included:

O_R.Year_2020	-3.24	9.839	-0.329	74.22%

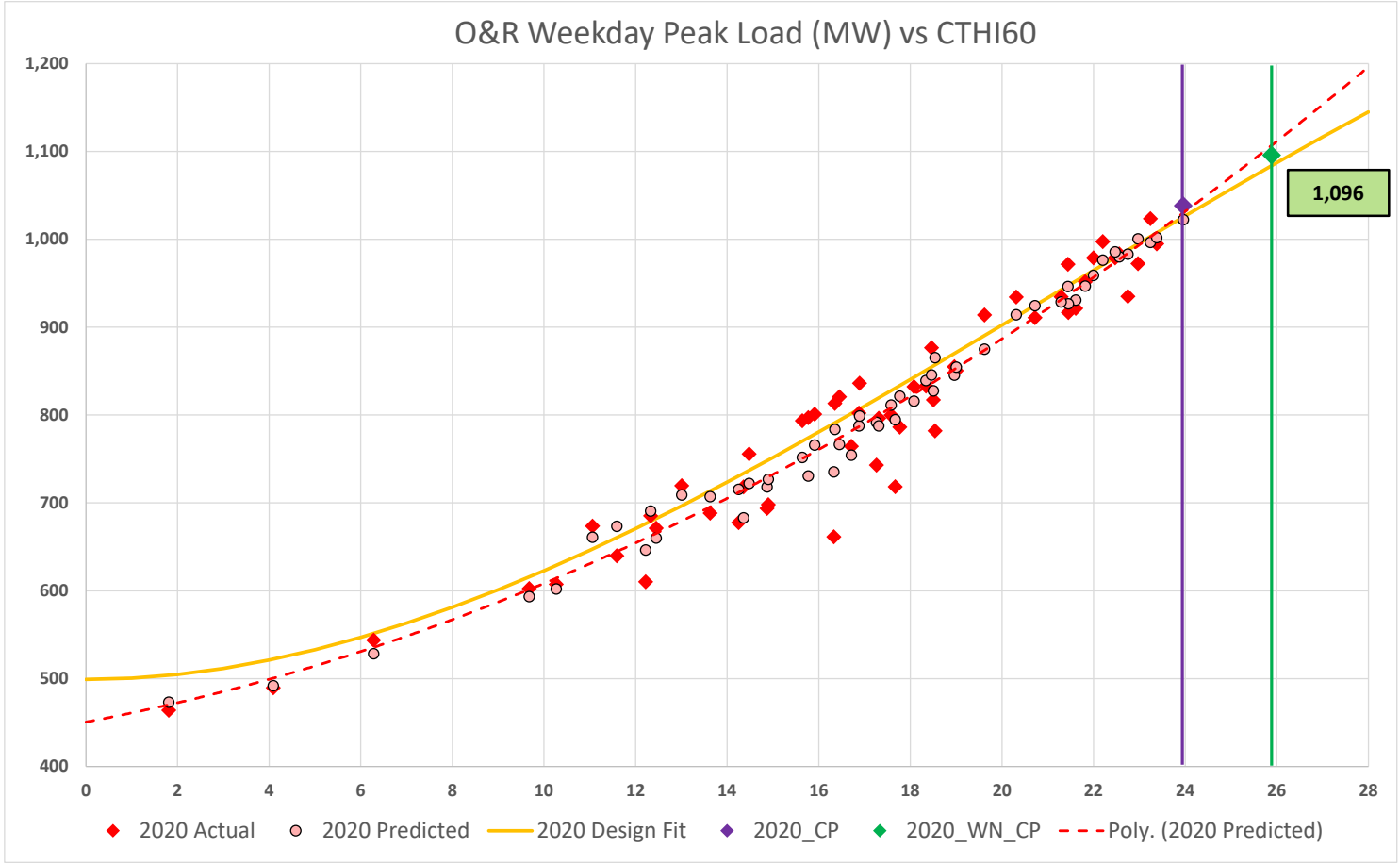
Model Statistics	
Adjusted Observations	314
Deg. of Freedom for Error	308
R-Squared	0.948
Adjusted R-Squared	0.947
F-Statistic	1120.567
Prob (F-Statistic)	0
Std. Error of Regression	32.53
Mean Abs. Dev. (MAD)	25.32
Mean Abs. % Err. (MAPE)	3.32%



Note: Some outlier data points included in the graph above have been excluded from the regression due to the impacts of the 2020 tropical storm.

New York ISO

O&R 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

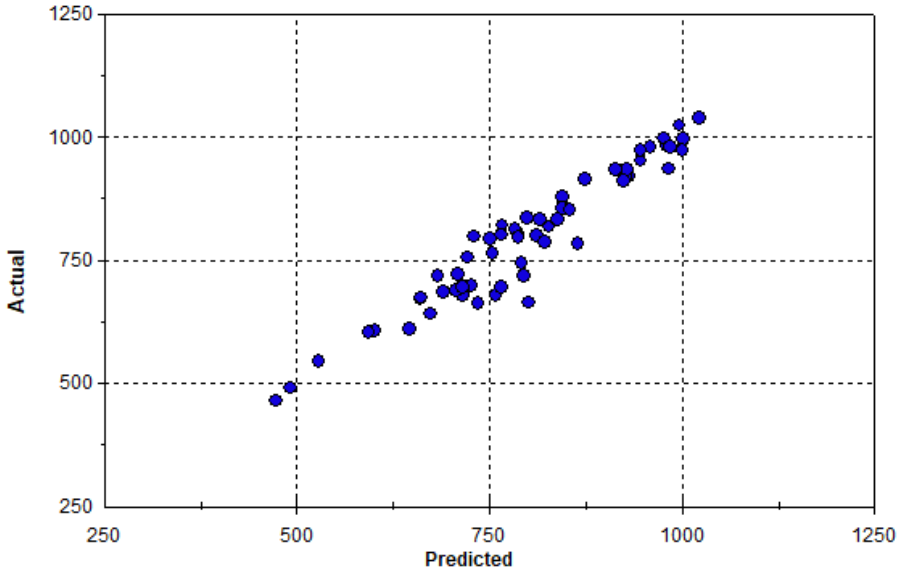
Method 2	
2020 CP	1,038
2020 CTHI60	23.96
Design CTHI60	25.89
Delta CTHI	1.93
MW/CTHI	30
Weather Adj	57
2020 WN CP	**1,096**

New York ISO

O&R 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	467.891	19.267	24.285	0.00%
O_R.Friday	-25.451	12.279	-2.073	4.34%
O_R.Year_2020_Daily_Trend	0.556	0.199	2.793	0.74%
O_R.CTHI60Sq	1.468	0.218	6.738	0.00%
O_R.CTHI60Cb	-0.023	0.008	-2.743	0.84%

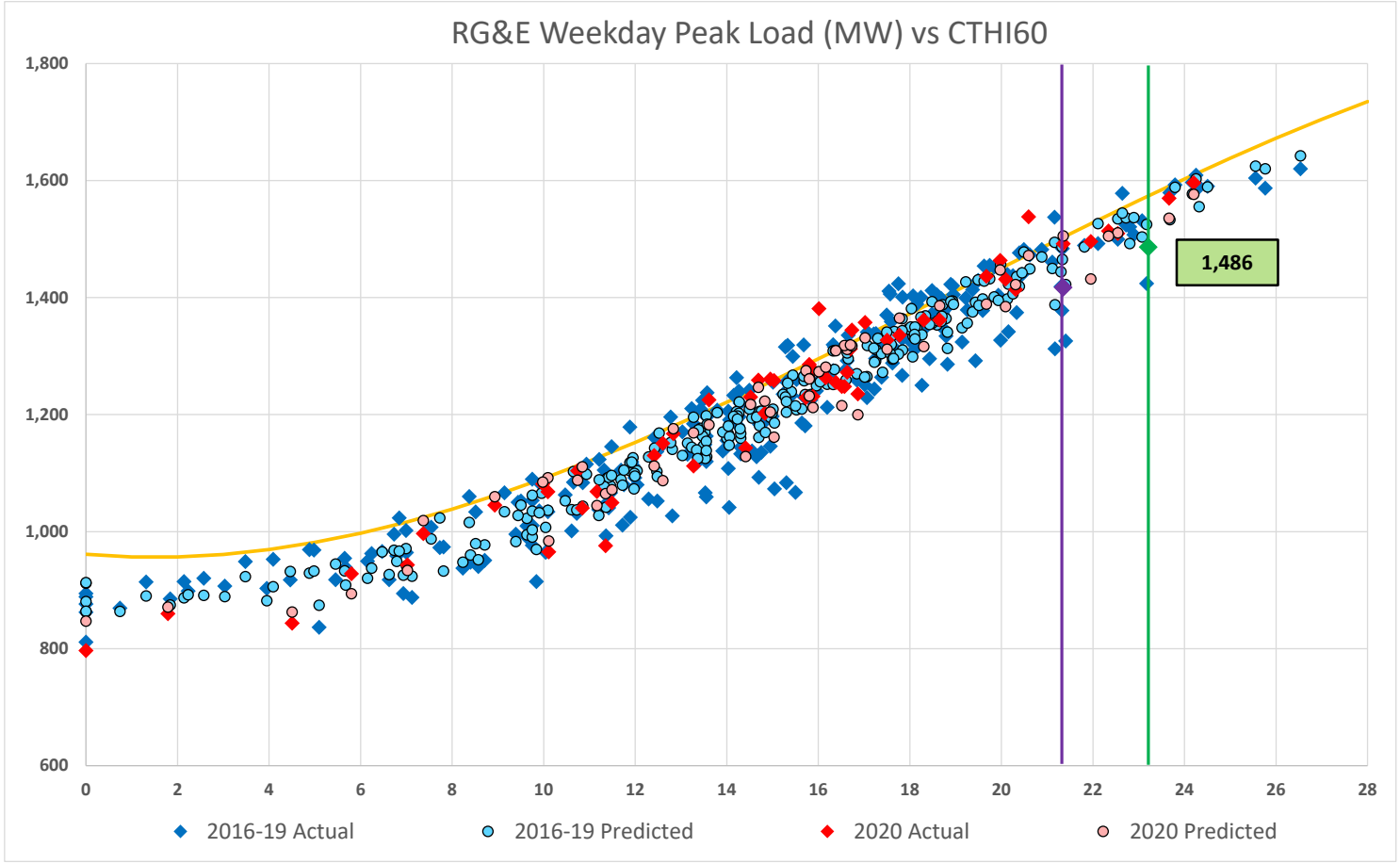
Model Statistics	
Adjusted Observations	55
Deg. of Freedom for Error	50
R-Squared	0.949
Adjusted R-Squared	0.945
F-Statistic	231.687
Prob (F-Statistic)	0.00
Std. Error of Regression	32.64
Mean Abs. Dev. (MAD)	24.34
Mean Abs. % Err. (MAPE)	3.14%



Note: Some outlier data points included in the graph above have been excluded from the regression due to the impacts of the 2020 tropical storm.

New York ISO

RG&E Pooled Model



Design condition is 50th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

2020 CP	1,417
2020 CTHI60	21.35
Design CTHI60	23.21
Delta CTHI	1.86
MW/CTHI	37
Weather Adj	69
2020 WN CP	**1,486**

New York ISO

RG&E Pooled Model

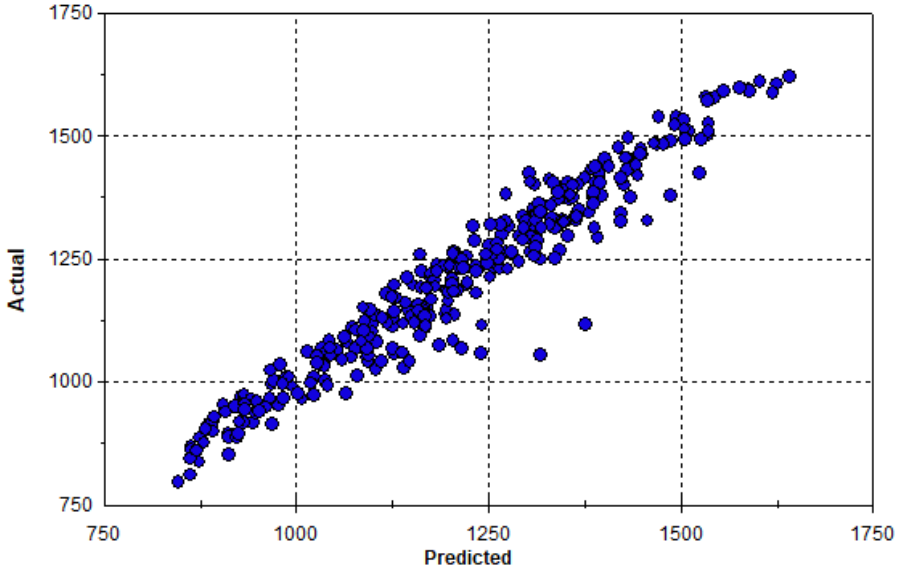
Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	916.783	14.612	62.741	0.00%
RGE.Friday	-23.019	6.076	-3.788	0.02%
RGE.Daily_Trend	1.176	0.204	5.758	0.00%
RGE.Annual_Trend	-14.398	2.154	-6.683	0.00%
RGE.Year_2020_Daily_Trend	0.905	0.16	5.65	0.00%
RGE.CTHI60	-6.97	3.857	-1.807	7.18%
RGE.CTHI60Sq	2.412	0.335	7.196	0.00%
RGE.CTHI60Cb	-0.042	0.009	-4.853	0.00%

Not Included:

RGE.Year_2020	5.129	16.126	0.318	75.07%

Model Statistics	
Adjusted Observations	314
Deg. of Freedom for Error	306
R-Squared	0.95
Adjusted R-Squared	0.949
F-Statistic	838.073
Prob (F-Statistic)	0
Std. Error of Regression	43.01
Mean Abs. Dev. (MAD)	33.54
Mean Abs. % Err. (MAPE)	2.83%

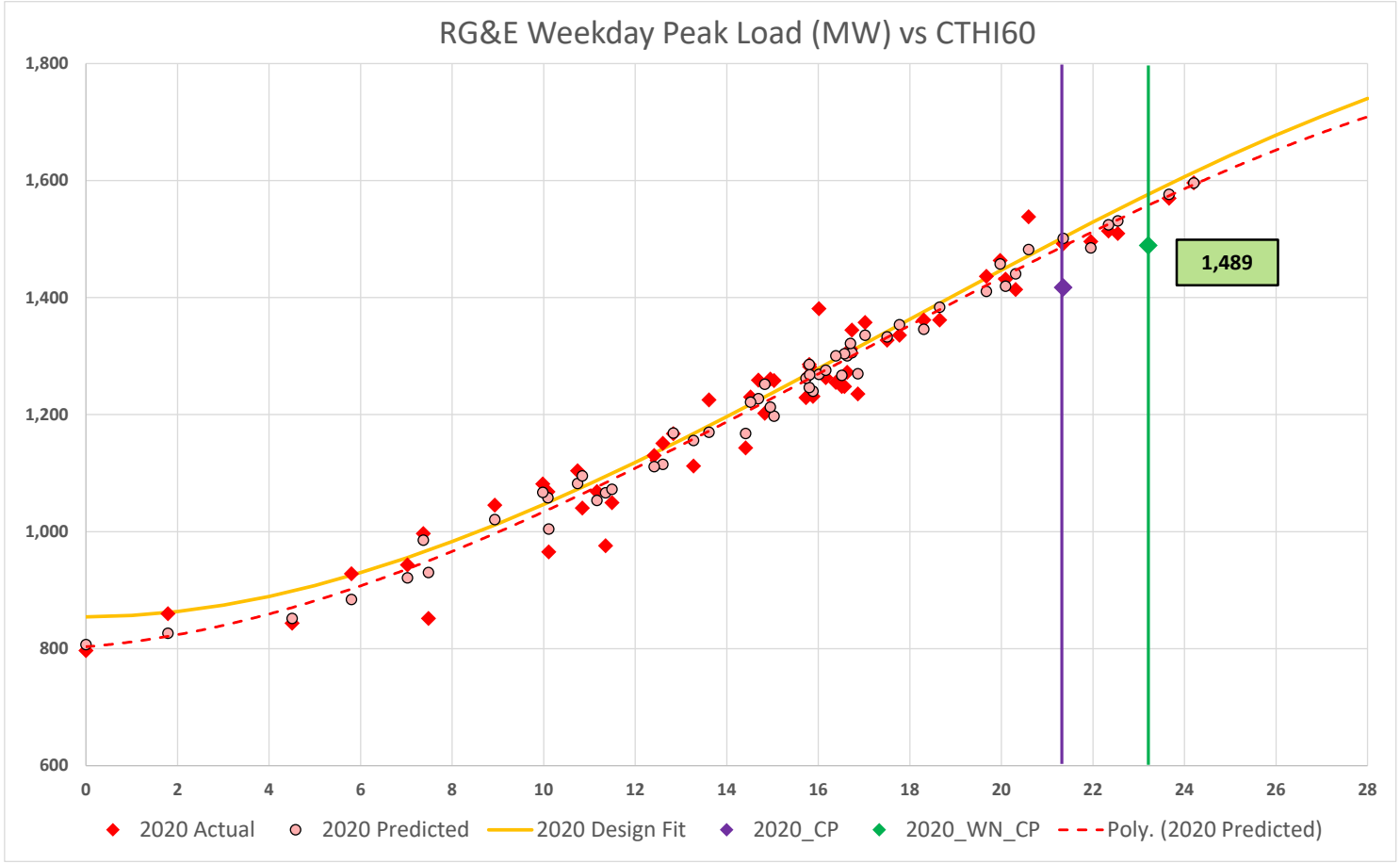
Note: On the date of the NYCA peak, a cool front and rain showers in the RG&E area caused a drop in load levels during the late afternoon and through the hour of the NYCA peak. Additional adjustments may be made to account for this impact in the final IRM weather normalization and forecast.



Note: Some outlier data points included in the graph above have been excluded from the regression. These include those impacted by the 2020 tropical storm and others.

New York ISO

RG&E 2020 Model



Design condition is 67th percentile. CTHI60 is CTHI relative to 60 degrees.

Purple dot shows 2020 coincident peak.

Green dot shows 2020 weather normalized coincident peak.

Yellow line shows model fit during 2020 late July design conditions.

Red line represents the average model fit throughout the summer.

2020 CP	1,417
2020 CTHI60	21.35
Design CTHI60	23.21
Delta CTHI	1.86
MW/CTHI	39
Weather Adj	72
2020 WN CP	**1,489**

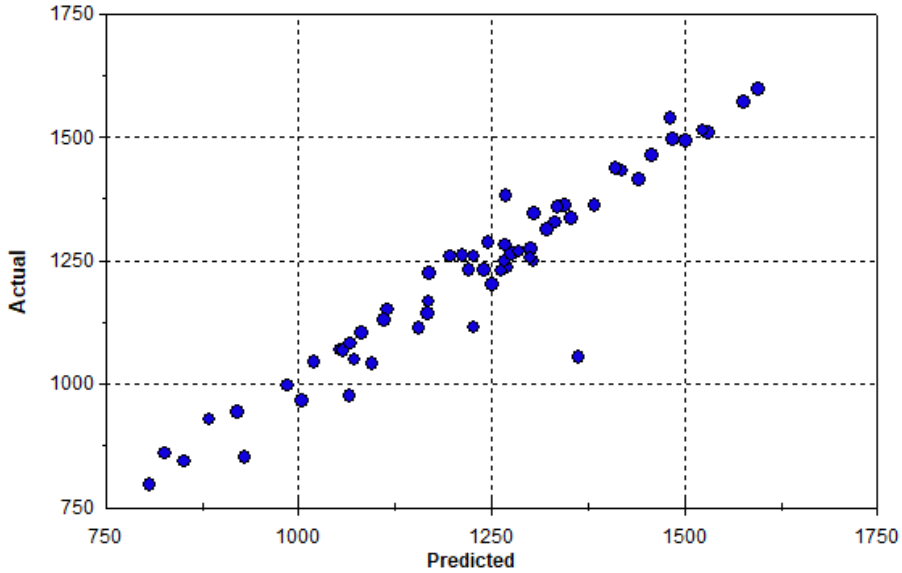
New York ISO

RG&E 2020 Model

Variable	Coefficient	StdErr	T-Stat	P-Value
CONST	806.198	16.351	49.306	0.00%
RGE.Year_2020_Daily_Trend	0.859	0.215	3.991	0.02%
RGE.CTHI60Sq	2.362	0.21	11.222	0.00%
RGE.CTHI60Cb	-0.044	0.009	-5.123	0.00%

Model Statistics	
Adjusted Observations	57
Deg. of Freedom for Error	53
R-Squared	0.966
Adjusted R-Squared	0.964
F-Statistic	498.175
Prob (F-Statistic)	0
Std. Error of Regression	37.33
Mean Abs. Dev. (MAD)	28.37
Mean Abs. % Err. (MAPE)	2.43%

Note: On the date of the NYCA peak, a cool front and rain showers in the RG&E area caused a drop in load levels during the late afternoon and through the hour of the NYCA peak. Additional adjustments may be made to account for this impact in the final IRM weather normalization and forecast.



Note: Some outlier data points included in the graph above have been excluded from the regression. These include those impacted by the 2020 tropical storm and others.

New York ISO

Ratios of Non-Coincident to Coincident Peaks

New York ISO

Update of Ten-Year Rolling Average of Coincident and Locality Peaks To Obtain NCP/CP Ratios for 2021

NYCA Coincident Peak Dates & Times & Zonal MW

Year	NYCA Date	Hr Beg	Zone G	Zones H+I	Zone J	NYCA CP
2011	7/22/2011	16	2,482	2,239	11,826	16,546
2012	7/17/2012	14	2,282	2,082	11,405	15,769
2013	7/19/2013	17	2,384	2,253	11,736	16,373
2014	9/2/2014	16	2,036	1,917	10,567	14,520
2015	7/29/2015	16	2,070	1,930	10,455	14,455
2016	8/11/2016	16	2,069	1,993	11,006	15,068
2017	7/19/2017	17	2,011	1,898	10,249	14,158
2018	8/29/2018	16	2,189	1,966	11,037	15,192
2019	7/20/2019	16	2,199	1,935	9,999	14,133
2020	7/27/2020	17	2,177	1,947	9,661	13,785
Average			**2,190**	**2,016**	**10,794**	**15,000**

G-to-J Locality Peak Dates & Times & Zonal MW

Year	G-to-J Date	Hr Beg	Zone G	Zones H+I	Zone J	G-J NCP
2011	7/22/2011	16	2,482	2,239	11,826	16,546
2012	7/18/2012	13	2,288	2,071	11,424	15,783
2013	7/19/2013	17	2,384	2,253	11,736	16,373
2014	9/2/2014	17	2,046	1,933	10,572	14,551
2015	7/20/2015	16	2,059	1,996	10,675	14,730
2016	8/11/2016	16	2,069	1,993	11,006	15,068
2017	7/20/2017	16	2,046	1,936	10,722	14,704
2018	8/29/2018	16	2,189	1,966	11,037	15,192
2019	7/17/2019	17	1,942	1,874	10,769	14,585
2020	7/28/2020	14	2,024	1,947	10,086	14,057
Average			**2,153**	**2,021**	**10,985**	**15,159**

Note: DSS loads peaked during these hours. PI loads may have peaked on different hours.
The NCP to CP ratios are calculated using DSS Data.

New York ISO

Update of Ten-Year Rolling Average of Coincident and Locality Peaks To Obtain NCP/CP Ratios for 2021

Zone J Locality Peak Dates & Times & Zonal MW

Year	Zone J Date	Hr Beg	Zone G	Zones H+I	Zone J	G-J NCP
2011	7/22/2011	12	2,375	2,107	11,876	16,358
2012	7/18/2012	15	2,115	2,002	11,438	15,554
2013	7/19/2013	17	2,384	2,253	11,736	16,373
2014	9/2/2014	17	2,046	1,933	10,572	14,551
2015	7/20/2015	16	2,059	1,996	10,675	14,730
2016	8/11/2016	16	2,069	1,993	11,006	15,068
2017	7/20/2017	17	2,046	1,936	10,722	14,704
2018	8/29/2018	16	2,189	1,966	11,037	15,192
2019	7/17/2019	17	1,942	1,874	10,769	14,585
2020	7/28/2020	14	2,024	1,947	10,086	14,057
Average			**2,125**	**2,001**	**10,992**	**15,117**

Zone K Locality Peak Dates & Times & Zonal MW

Year	Zone K Date	Hr Beg	CP	NCP	NCP/CP Ratio	Difference
2011	7/22/2011	15	5,896	5,914	1.0030	18
2012	6/21/2012	16	5,079	5,510	1.0848	431
2013	7/18/2013	16	5,589	5,764	1.0314	175
2014	9/2/2014	16	5,054	5,054	1.0000	-
2015	7/20/2015	16	5,136	5,247	1.0216	111
2016	8/12/2016	16	5,190	5,411	1.0426	221
2017	7/20/2017	16	4,989	5,137	1.0297	148
2018	8/29/2018	16	5,412	5,412	1.0000	-
2019	7/21/2019	17	5,323	5,452	1.0242	129
2020	7/20/2020	17	5,344	5,433	1.0167	89
Average			**5,301**	**5,433**	**1.0249**	**132**

Note: DSS loads peaked during these hours. PI loads may have peaked on different hours.
The NCP to CP ratios are calculated using DSS Data.

New York ISO

Calculation of G-to-J Locality NCP/CP Ratio

Coincident Peaks

Period	Zone G	Zone H+I	Zone J	G-to-J CP
3 Yr Avg	2,188	1,949	10,232	14,370
5 Yr Avg	2,129	1,948	10,390	14,467
10 Yr Avg	2,190	2,016	10,794	15,000

15,159/15,000 = 1.0106

G-to-J Locality Peak Statistics - 2011 to 2020

Period	Zone G	Zone H+I	Zone J	G-to-J NCP
3 Yr Avg	2,052	1,929	10,631	14,611
5 Yr Avg	2,054	1,943	10,724	14,721
10 Yr Avg	2,153	2,021	10,985	15,159

Period	Zone G	Zone H+I	Zone J	G-to-J NCP
3 Yr Avg	(137)	(20)	398	241
5 Yr Avg	(75)	(5)	334	254
10 Yr Avg	(37)	5	191	159

Period	Zone G	Zone H+I	Zone J	G-to-J NCP
3 Yr Avg	0.9375	0.9896	1.0389	1.0168
5 Yr Avg	0.9648	0.9976	1.0321	1.0176
10 Yr Avg	0.9831	1.0024	1.0177	1.0106

New York ISO

Calculation of Zone J NCP/CP Ratio

Coincident Peaks

Period	Zone G	Zone H+I	Zone J	G-to-J CP
3 Yr Avg	2,188	1,949	10,232	14,370
5 Yr Avg	2,129	1,948	10,390	14,467
10 Yr Avg	2,190	2,016	10,794	15,000

10,992/10,794 = 1.0183

Zone J Locality Peak Statistics - 2011 to 2020

Period	Zone G	Zone H+I	Zone J	G-to-J NCP
3 Yr Avg	2,052	1,929	10,631	14,611
5 Yr Avg	2,054	1,943	10,724	14,721
10 Yr Avg	2,125	2,001	10,992	15,117

Period	Zone G	Zone H+I	Zone J	G-to-J NCP
3 Yr Avg	(137)	(20)	398	241
5 Yr Avg	(75)	(5)	334	254
10 Yr Avg	(65)	(15)	198	117

Period	Zone J
3 Yr Avg	1.0389
5 Yr Avg	1.0321
10 Yr Avg	1.0183

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Calculation of Zone K NCP/CP Ratio

Zone K Peak Statistics - 2011 to 2020			
Period	**K CP**	**K NCP**	**Ratio**
3 Yr Avg	5,360	5,432	1.0136
5 Yr Avg	5,252	5,369	1.0224
10 Yr Avg	**5,301**	**5,433**	**1.0249**

Period			**Diff.**
3 Yr Avg			73
5 Yr Avg			117
10 Yr Avg			132

5,433/5,301 = 1.0249

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Questions?

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

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