

Estimated Impacts of COVID-19 on NYISO Load

Information current as of 5/16/2020

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Demand Forecasting & Analysis

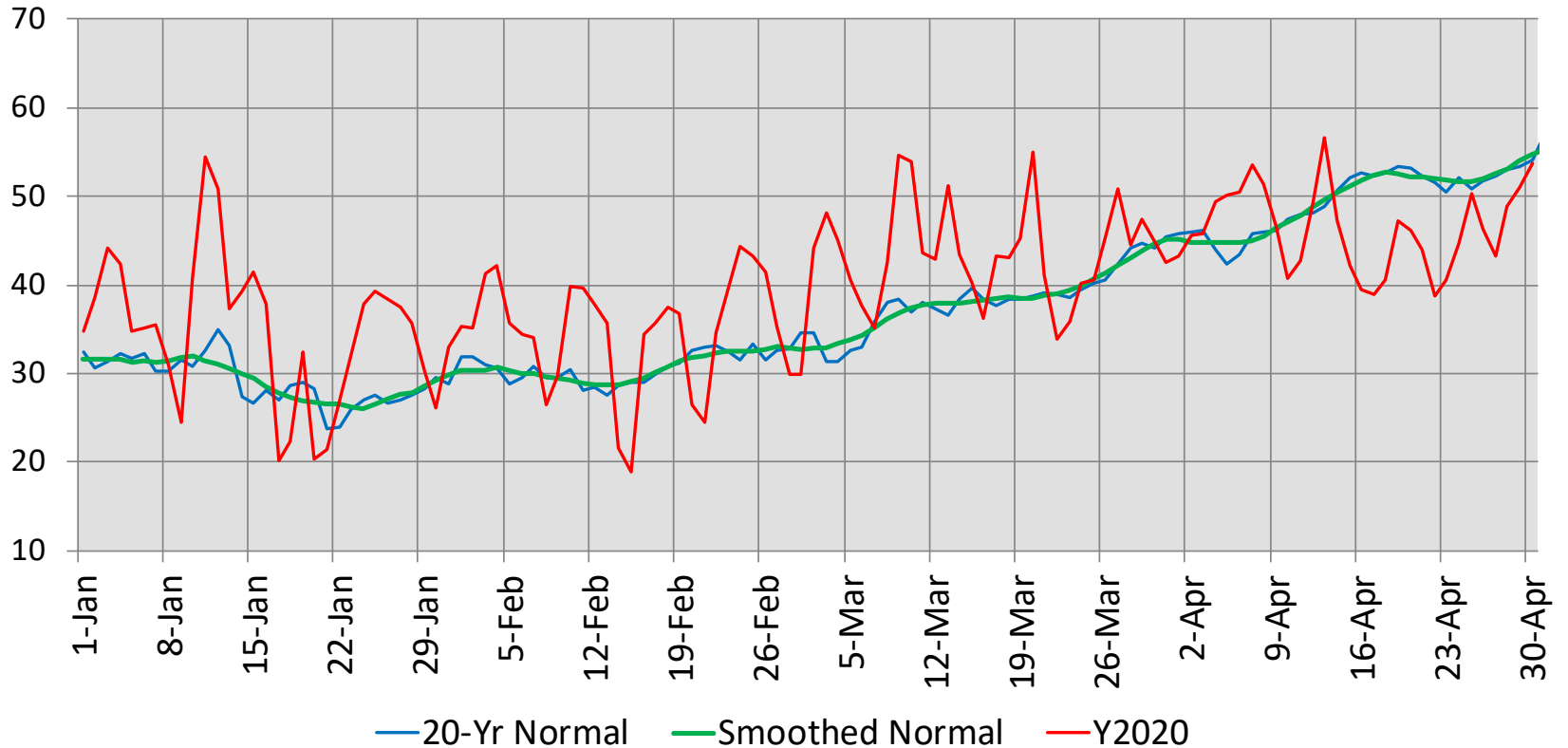
Load Forecasting Task Force

May 21, 2020, Teleconference

Recent Impacts on NYISO Load

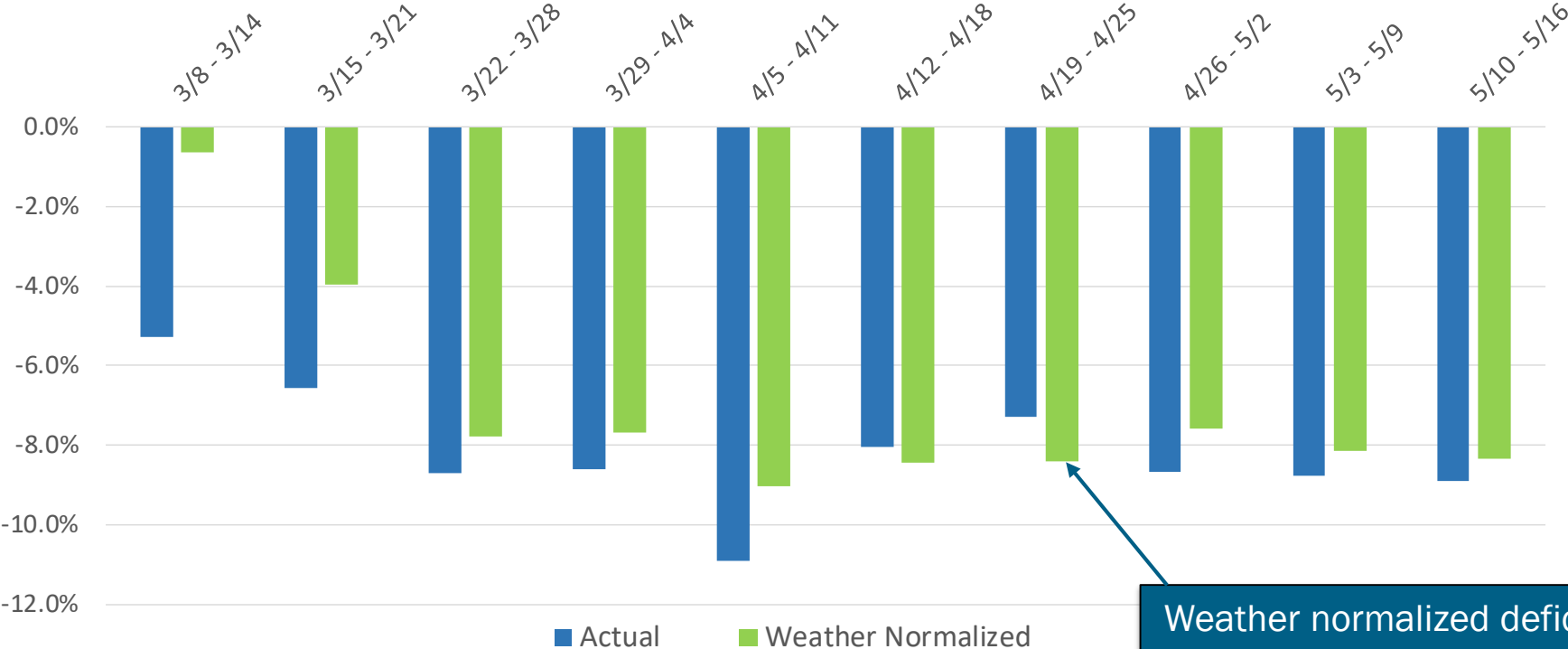
NYCA Recent Temperature Trends

NYCA Daily Average Temperature



Recent Impacts on Daily Energy by Week

Weekly Energy Use - % Versus Expected (NYCA)

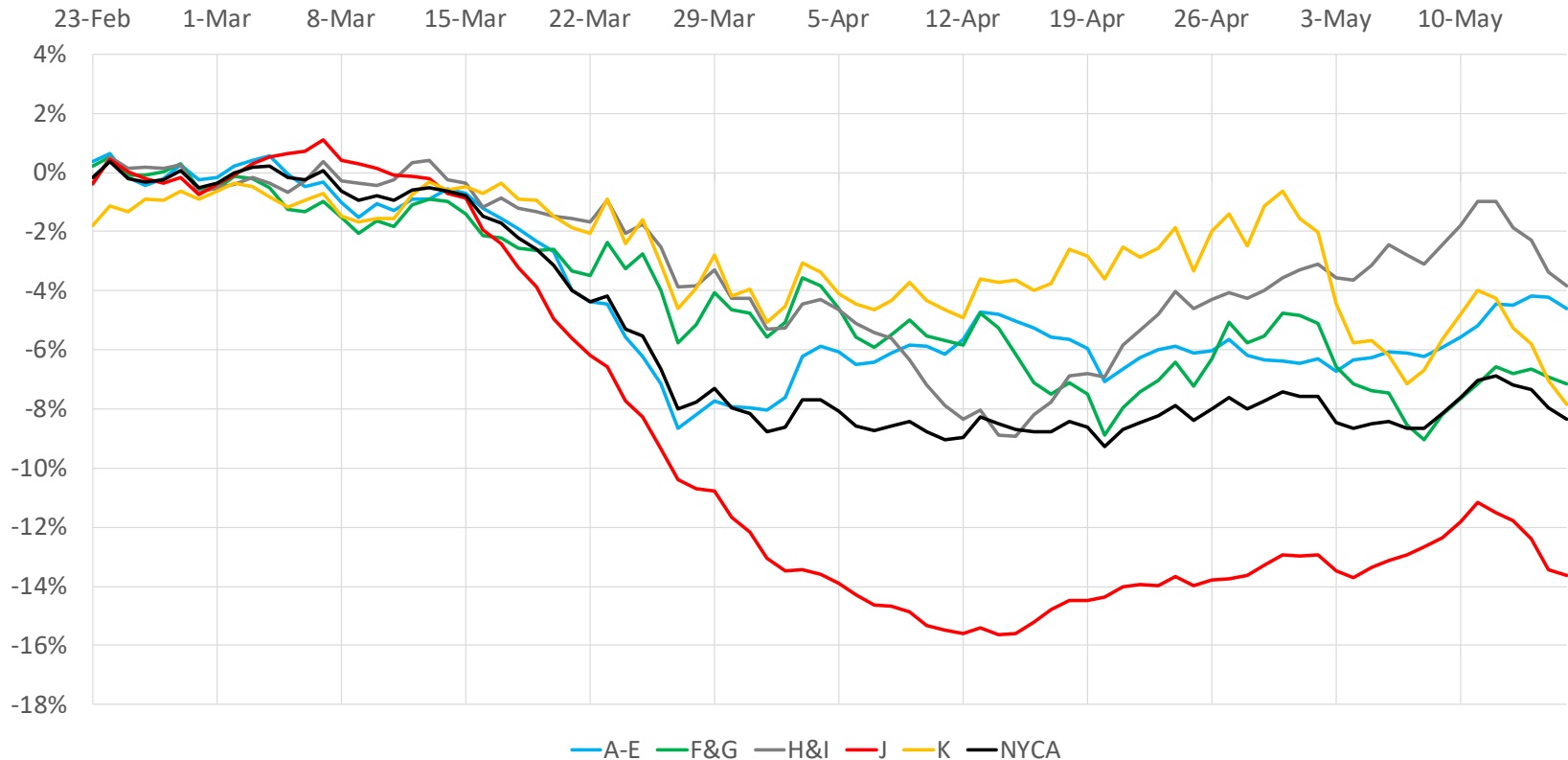


Includes Weekend Days

Weather normalized deficits show effects of COVID-19 shutdowns

Regional Impacts on Daily Energy Patterns

2020 Weather Normalized Load Relative to Expected Load, 7-Day Moving Average (Daily Energy)

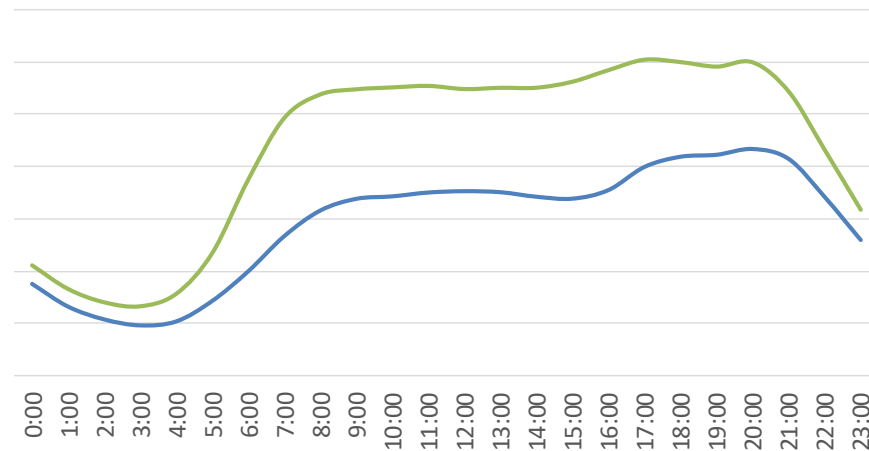
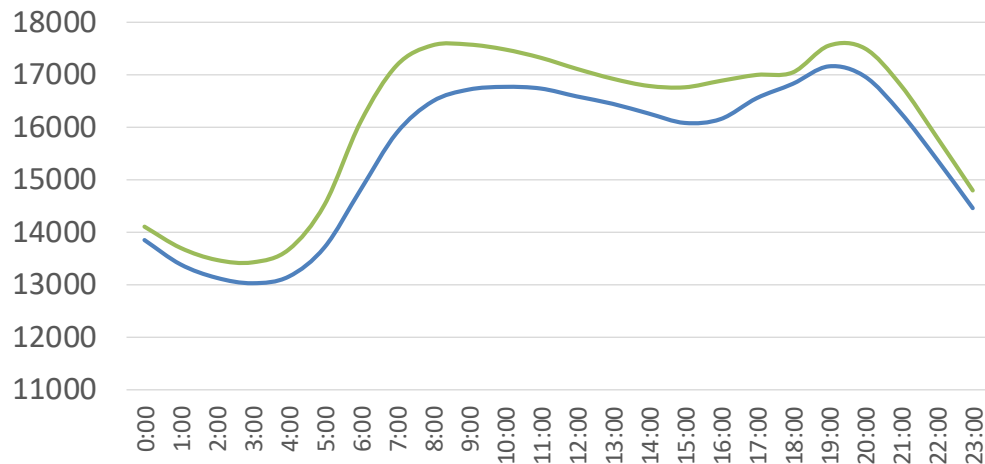


Recent Impacts on Hourly Load Patterns

— Actual — Simulated

March 16-20 (MW)

May 11 - May 15 (MW)

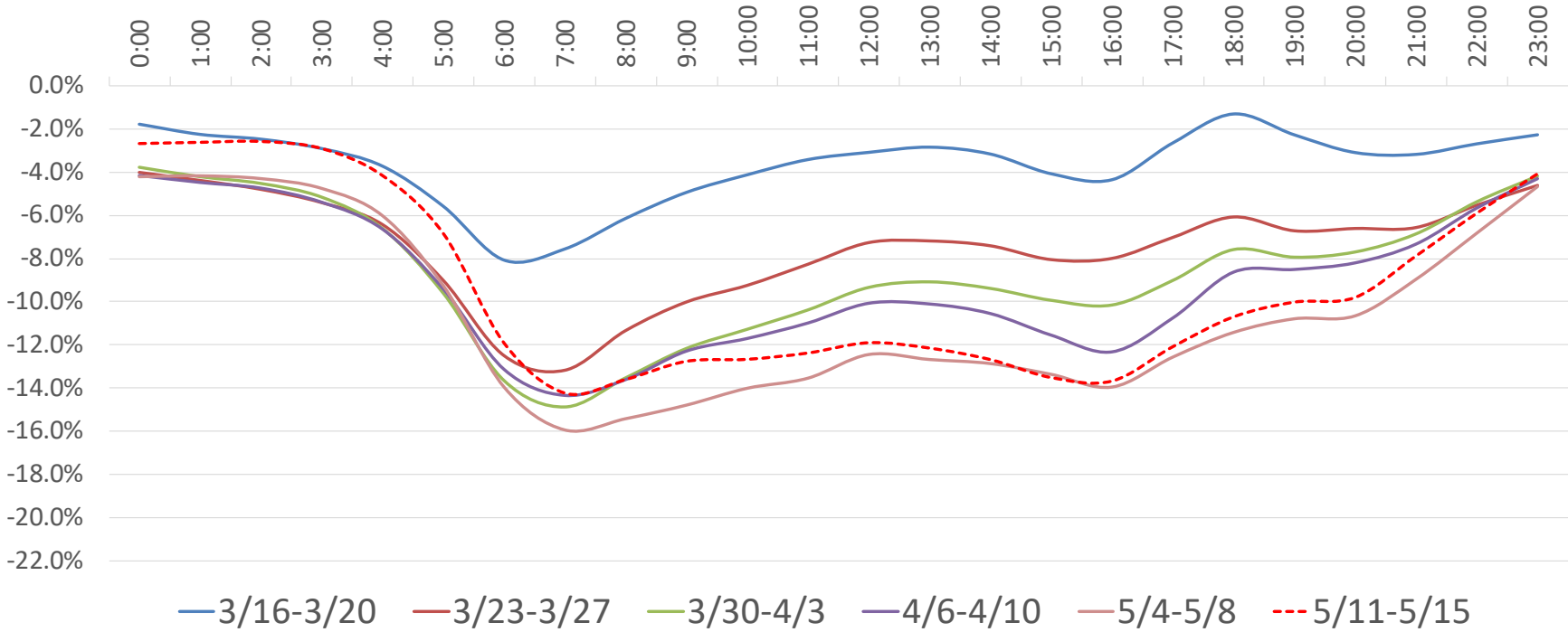


Week 1 of COVID-19 Shutdowns

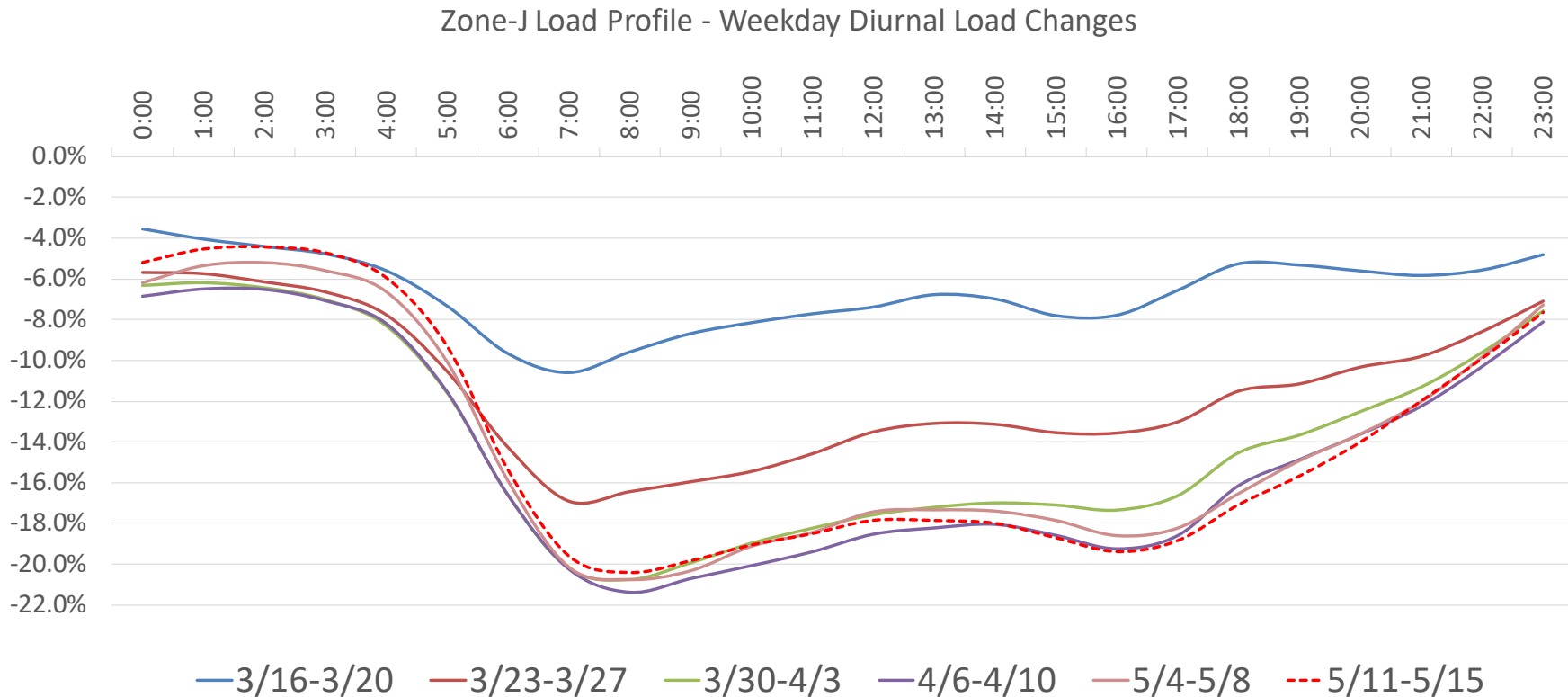
Week 9

Impacts on Hourly Load Patterns

NYCA Load Profile - Weekday Diurnal Load Changes

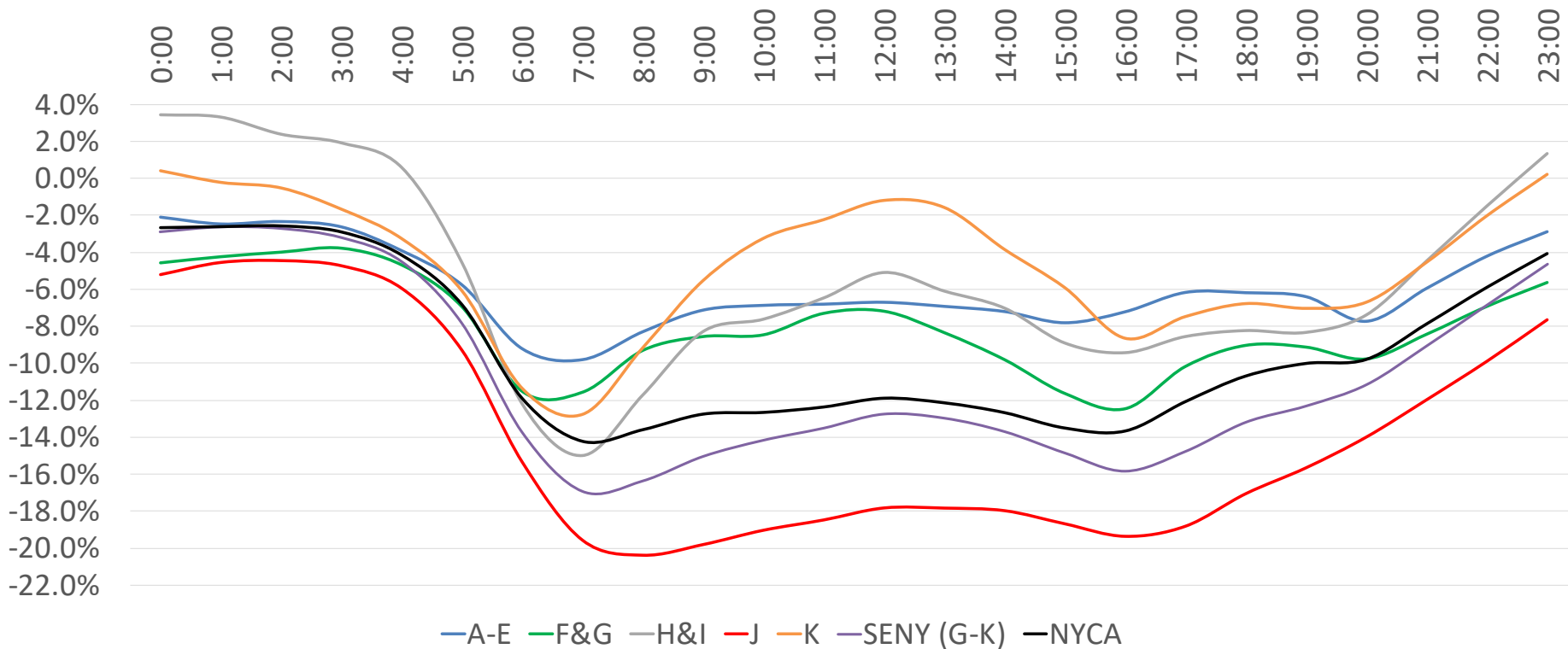


Impacts on Hourly Load Patterns



Impacts on Hourly Load Patterns (Area)

Average Hourly Deficit by Area - Week of 5/11 - 5/15 (Weekdays)



Impacts on Hourly Load Patterns (Area)

Hour	A-E	F&G	H&I	J	K	SENY (G-K)	NYCA
0:00	-2.1%	-4.6%	3.4%	-5.2%	0.4%	-2.9%	-2.7%
1:00	-2.5%	-4.3%	3.3%	-4.6%	-0.2%	-2.6%	-2.6%
2:00	-2.4%	-4.0%	2.4%	-4.5%	-0.5%	-2.7%	-2.6%
3:00	-2.6%	-3.8%	1.9%	-4.7%	-1.7%	-3.2%	-2.9%
4:00	-3.9%	-4.7%	0.6%	-6.0%	-3.3%	-4.5%	-4.2%
5:00	-5.8%	-7.0%	-4.6%	-9.3%	-6.1%	-7.8%	-6.8%
6:00	-9.2%	-11.5%	-12.2%	-15.4%	-11.4%	-13.7%	-11.9%
7:00	-9.8%	-11.6%	-15.0%	-19.6%	-12.8%	-16.9%	-14.2%
8:00	-8.3%	-9.3%	-11.7%	-20.4%	-9.2%	-16.4%	-13.6%
9:00	-7.1%	-8.6%	-8.3%	-19.8%	-5.5%	-15.0%	-12.8%
10:00	-6.9%	-8.5%	-7.6%	-19.0%	-3.3%	-14.2%	-12.7%
11:00	-6.8%	-7.3%	-6.5%	-18.5%	-2.2%	-13.5%	-12.4%
12:00	-6.7%	-7.2%	-5.1%	-17.8%	-1.2%	-12.7%	-11.9%
13:00	-6.9%	-8.4%	-6.1%	-17.8%	-1.6%	-13.0%	-12.2%
14:00	-7.2%	-9.8%	-7.0%	-18.0%	-3.9%	-13.7%	-12.7%
15:00	-7.8%	-11.6%	-8.9%	-18.7%	-5.9%	-14.8%	-13.5%
16:00	-7.2%	-12.5%	-9.4%	-19.4%	-8.7%	-15.8%	-13.7%
17:00	-6.2%	-10.2%	-8.6%	-18.8%	-7.5%	-14.8%	-12.1%
18:00	-6.2%	-9.1%	-8.2%	-17.1%	-6.8%	-13.2%	-10.7%
19:00	-6.4%	-9.1%	-8.3%	-15.7%	-7.0%	-12.3%	-10.0%
20:00	-7.7%	-9.8%	-7.4%	-14.0%	-6.7%	-11.1%	-9.8%
21:00	-6.0%	-8.5%	-4.5%	-12.0%	-4.5%	-9.1%	-7.9%
22:00	-4.2%	-6.9%	-1.5%	-9.9%	-2.0%	-6.8%	-5.9%
23:00	-2.9%	-5.7%	1.3%	-7.7%	0.2%	-4.6%	-4.1%

Average Hourly
Load Deficit
By Area
Week of
5/11 - 5/15

Impacts on Hourly Load Patterns (Zone)

Hour	A	B	C	D	E	F	G	H	I	J	K
0:00	-6%	-2%	-1%	-4%	7%	-6%	-2%	6%	2%	-5%	0%
1:00	-6%	-2%	-2%	-6%	7%	-6%	-2%	5%	3%	-5%	0%
2:00	-6%	-2%	-2%	-6%	9%	-5%	-2%	4%	2%	-4%	-1%
3:00	-6%	-3%	-2%	-6%	7%	-5%	-3%	4%	1%	-5%	-2%
4:00	-7%	-4%	-3%	-8%	6%	-5%	-4%	3%	-1%	-6%	-3%
5:00	-8%	-7%	-5%	-8%	3%	-7%	-7%	-3%	-5%	-9%	-6%
6:00	-11%	-10%	-9%	-10%	-4%	-12%	-11%	-11%	-13%	-15%	-11%
7:00	-12%	-11%	-9%	-13%	-4%	-11%	-12%	-11%	-17%	-20%	-13%
8:00	-11%	-9%	-8%	-11%	0%	-8%	-11%	-8%	-14%	-20%	-9%
9:00	-10%	-8%	-7%	-9%	2%	-7%	-11%	-3%	-11%	-20%	-6%
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12:00	-9%	-7%	-8%	-5%	3%	-5%	-10%	-2%	-7%	-18%	-1%
13:00	-9%	-7%	-9%	-6%	1%	-7%	-11%	-3%	-7%	-18%	-2%
14:00	-9%	-8%	-9%	-6%	0%	-8%	-12%	-5%	-8%	-18%	-4%
15:00	-9%	-7%	-9%	-7%	-1%	-10%	-14%	-8%	-10%	-19%	-6%
16:00	-8%	-7%	-8%	-8%	-2%	-11%	-15%	-6%	-11%	-19%	-9%
17:00	-8%	-6%	-7%	-8%	1%	-9%	-12%	-5%	-10%	-19%	-7%
18:00	-9%	-6%	-6%	-6%	1%	-9%	-10%	-6%	-10%	-17%	-7%
19:00	-10%	-7%	-6%	-7%	2%	-9%	-9%	-7%	-9%	-16%	-7%
20:00	-11%	-8%	-8%	-9%	0%	-10%	-9%	-6%	-8%	-14%	-7%
21:00	-9%	-6%	-6%	-6%	2%	-9%	-7%	-3%	-5%	-12%	-5%
22:00	-7%	-4%	-5%	-4%	4%	-8%	-5%	0%	-2%	-10%	-2%
23:00	-5%	-3%	-3%	-3%	5%	-7%	-3%	4%	0%	-8%	0%

Average Hourly Load Deficit by Zone - Week of 5/11 - 5/15

Economic Scenarios and 2020 Forecast

NYCA Load: Structure & Sensitivities

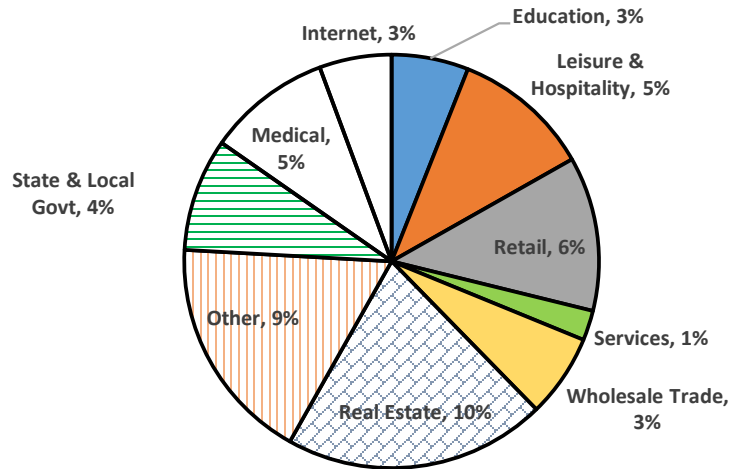
	Share of GWh
Upstate	47%
Con Ed	38%
LIPA	14%

	Residential	Commercial	Industrial
Upstate	41%	40%	19%
Con Ed	26%	67%	6%
LIPA	48%	45%	4%
NYCA	35%	51%	14%

- Majority of NYCA load is non-Residential
- Business cycles/Recessions have the bulk of impact on Commercial & Industrial energy usage
- NYS Manufacturing has been in decline for a few months and according to NYS Dept. of Labor, we have been experiencing contractionary conditions since Fall 2019
- Certain elements of Commercial load are at higher risk than others

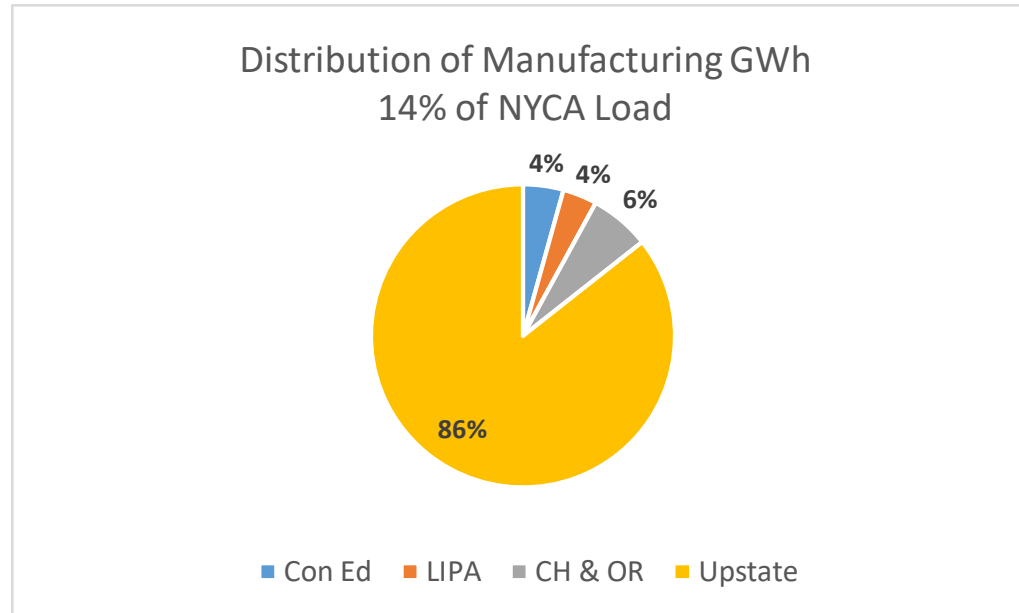
NYCA Commercial Load: Structure

Commercial shares of NYCA Load



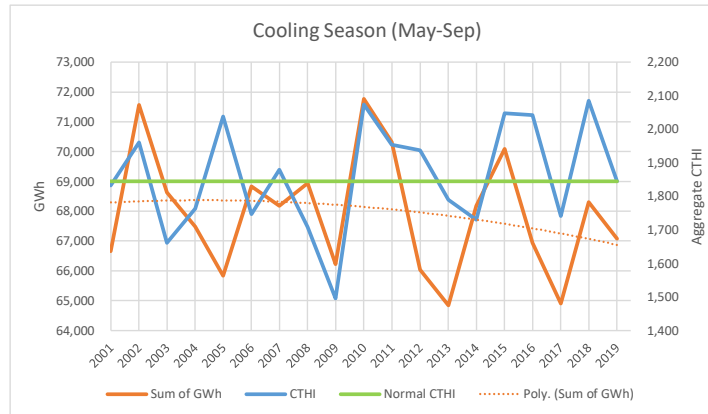
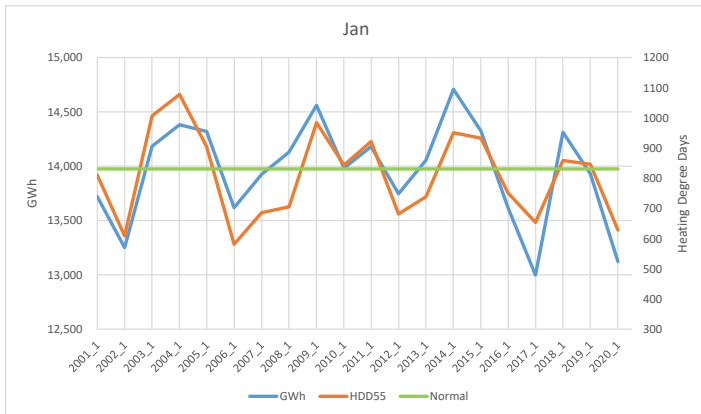
- 19% (solid colors) are at highest risk due to lockdown and social distancing
- 23% (hatched) could show diminished load due to attendance, bankruptcies, vacancies etc. (2007-09 recession saw over 20% commercial vacancies in NYC)
- Downstate is most vulnerable by being center of Commercial activity with the majority share of Trade, Leisure & Hospitality & Real Estate

NYCA Manufacturing Load: Distribution

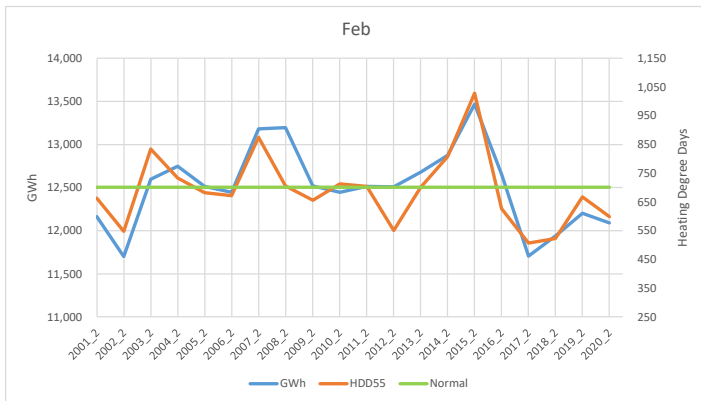


- NYS Manufacturing was already in decline in late 2019, due, in part, to supply-chain disruptions with respect to overseas sources and, in part, lower foreign demand
- Clearly, the bulk of the impact of lower industrial activity will be Upstate
- Industrial load consists of Manufacturing and Construction energy usage

Impact of Weather on NYCA Load



Despite trends in Summer GWh (-) and CTHI (+), Cooling load has a strong positive correlation with CTHI – except 2005 & 2012.

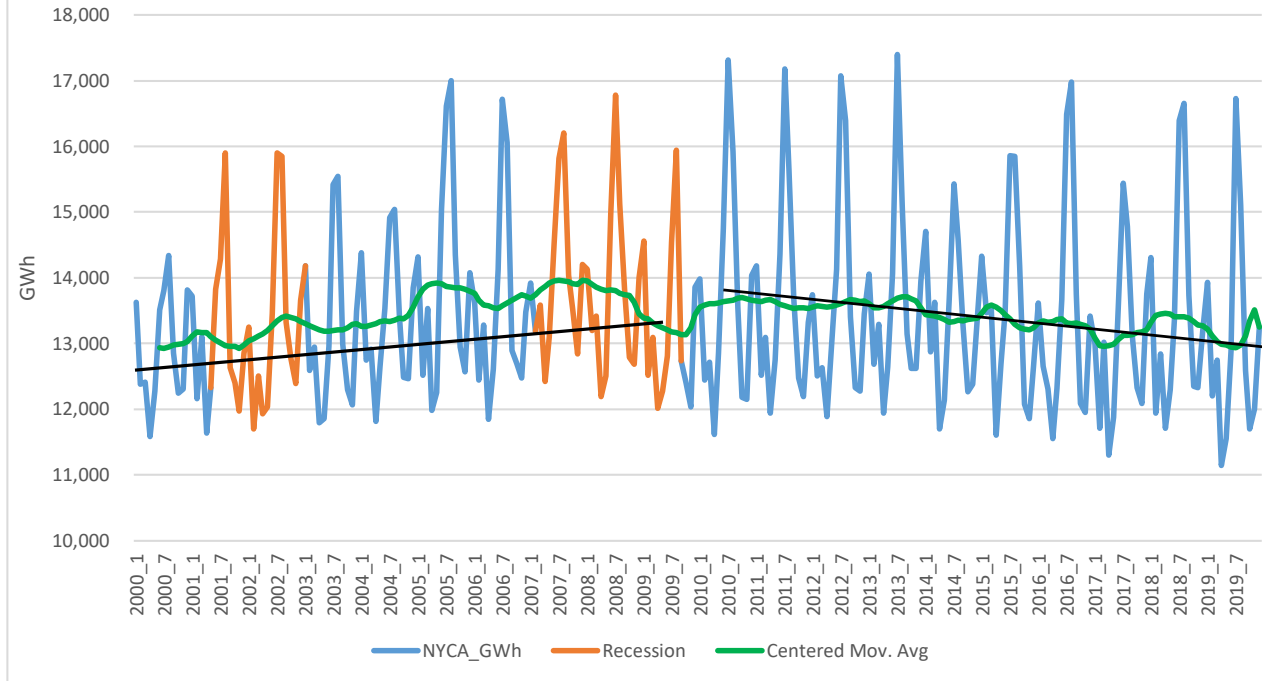


- Temperature is the *prime* mover of NYCA load
- Q1 2020 was among the warmest recorded, with Jan., Feb. & Mar. heating degree days (HDD), on average, being 75% of 20-year normals
- Cooling Season: May - Sep:
 - 2009 had the coolest season in 20 years
 - 2020 is expected to have above normal cumulative temperature and heat index (CTHI)

Impact of Recessions on NYCA Load

- Diminished Commercial and Industrial activity, i.e. a recession, is reflected in a decline in NYS GDP
- A recession's impact is the lower energy usage not only during the months of declining GDP but also during the recovery period as it returns to a normal growth path
- The magnitude and extent of the impact of depends on both the depth or intensity of a recession as well as the length of recovery
- The unprecedented monetary and fiscal measures being implemented by the Federal Reserve and the Federal Government may ameliorate the detrimental impacts and spur a faster recovery
- During the past 20 years there were two recessions, in 2001-03 and 2007-09. However, since then the nature and trend of load has altered with energy efficiency (EE) and behind-the-meter (BTM) solar and other resources influencing grid energy needs. This change altered the historical positive relationship between GDP and annual GWh

20-year History of NYCA Monthly Energy (GWh)



- **2000-2010: Load had rising trend but dipped lower during recessions**
- **2010-19: Load has declining trend due mainly to the growing impact of EE and BTM**
- **While 2002 saw an above-normal Summer, 2009 had the coolest Summer in two decades**

Quantifying Impact of Recessions

- 1. Estimate an Econometric model that estimates monthly GWh as a function of weather – Heating Degree Days (HDD) and Combined Temperature-Humidity Indicator (CTHI) – and GDP**
- 2. Simulate implied monthly GWh by assuming a counterfactual projection of GDP if it had maintained its pre-recession trajectory. In case of a projected recession, the simulation is based on GDP trajectories based on assumed recession scenarios**
- 3. The relationship of energy usage and GDP has evolved and the correlation between them is a lot weaker in 2010-19 as compared to 2000-09. This provides an upper and lower bound of the impact of GDP change on load**

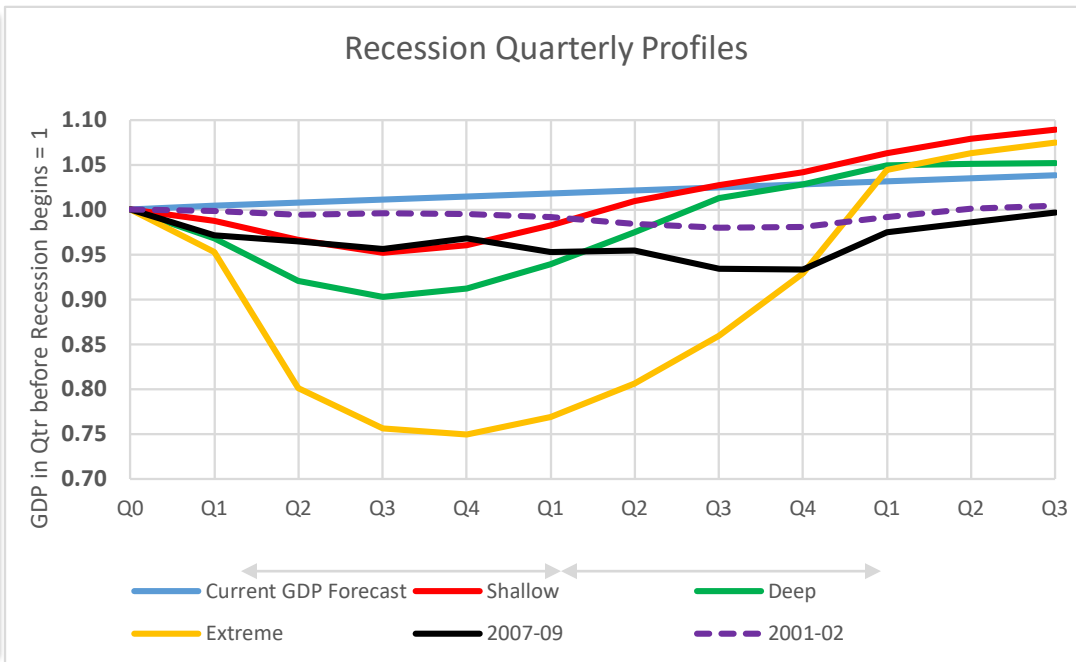
Load in Recent Recessions

	Estimated GWh Change			
	Recession (a)	Winter Abnormality (b)	Summer Abnormality (c)	Weather Abnormality (b) + (c)
2001 Q3 to 2003 Q1				
2001	(185)	(427)	(8)	(435)
2002	(720)	(566)	2,151	1,585
2003	(1,188)	738	(992)	(254)
Total	(2,092)	(255)	1,151	897
2007 Q2 to 2009 Q1				
2007	(1,270)	415	(107)	307
2008	(3,108)	24	(944)	(920)
2009	(2,412)	215	(3,474)	(3,260)
Total	(6,790)	653	(4,526)	(3,872)

- Recession impact refers to lost GWh due to GDP being below potential/pre-recession trend
- Winter/summer abnormality means that the season was warmer/cooler than normal
- A negative weather impact implies that the heating/cooling load was less than expected
- 2008 & 2009
 - Large GWh losses due to both below-normal cooling load and a poor economy
 - Both years also saw drops in residential loads across all utilities

Forecast Recession Scenarios

- Shallow: shock = -1.4% plus a two-quarter recession with -2% declines per quarter
- Deep: shock = -3.2% plus a two-quarter recession with -5% and -2% drops in each quarter
- Extreme: shock = -4.8% plus a three-quarter recession with -16.0%, -5.5%, -0.9% drops in each quarter



- *Note: All GDP changes are relative to the preceding quarter*

Range of NYCA Net Energy Outcomes

		Shallow Recession + Low Impact	Shallow Recession + High Impact	Deep Recession + Low Impact	Deep Recession + High Impact	Extreme Recession + Low Impact	Extreme Recession + High Impact
2020	Normal Summer	148,100	147,000	146,000	144,000	139,900	134,800
	Above-normal Summer	149,400	148,400	147,300	145,300	141,200	136,100
2021		151,000	150,800	149,500	148,600	140,900	135,600

- The impact of GDP on net energy consumption is projected to range from a Low Impact of 44 GWh/\$billion to a High Impact of 66 GWh/\$billion per year
- 145,000 GWh is the forecast for 2020 at this time, assuming a “deep” recession with medium impact to energy consumption under normal weather conditions; 6% lower than original energy budget forecast of 154,300 GWh

NYISO Energy Forecast: Original vs. Covid-19 Impact

	NYCA GWh		
2020	Budget	Actual/Projected	Difference
January	13,540	12,941	-599
February	12,470	11,970	-500
March	12,570	11,516	-1,054
April	11,170	10,320	-850
May	11,820	11,072	-748
June	13,050	12,288	-762
July	15,410	14,617	-793
August	14,800	13,991	-809
September	12,970	12,155	-815
October	11,820	10,979	-841
November	11,750	10,955	-795
December	12,930	12,196	-734
Total	154,300	145,000	-9,300

Quantifying Impact: An Alternative Sectoral Approach

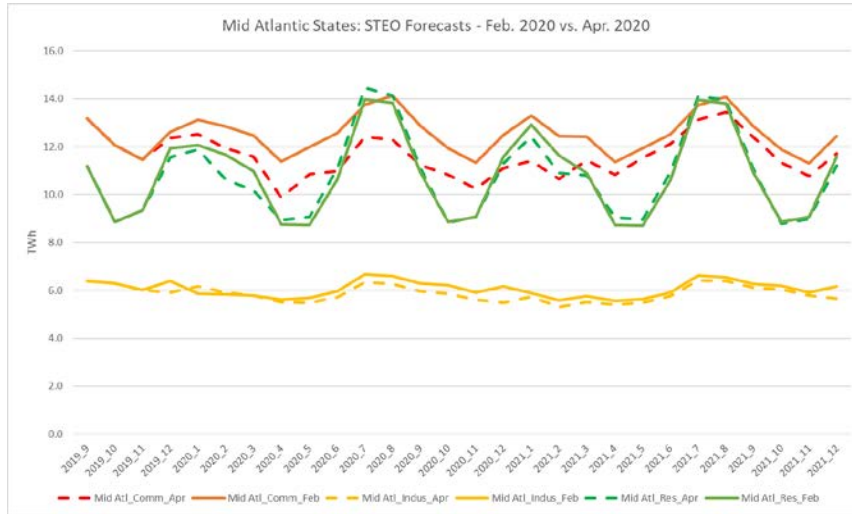
Assumptions based, in part, on history and, in part, on news

Sector/Subsector	Share of NYCA Load	Assumed Impact of Recession
Residential	35.1%	10%
Commercial Sectors		
Education	3.0%	-7.0%
Lesiure & Hospitality	5.5%	-30.0%
Retail	6.1%	-15.0%
Services	1.2%	-20.0%
Real Estate	10.4%	-5.0%
Wholesale Trade	3.3%	-17.5%
Other	9.0%	-10.0%
State & Local Government	4.5%	-10.0%
Medical	4.8%	7.0%
Internet	2.8%	15.0%
Industrial	14.3%	-20.0%
NYCA Weighted Average		-4%

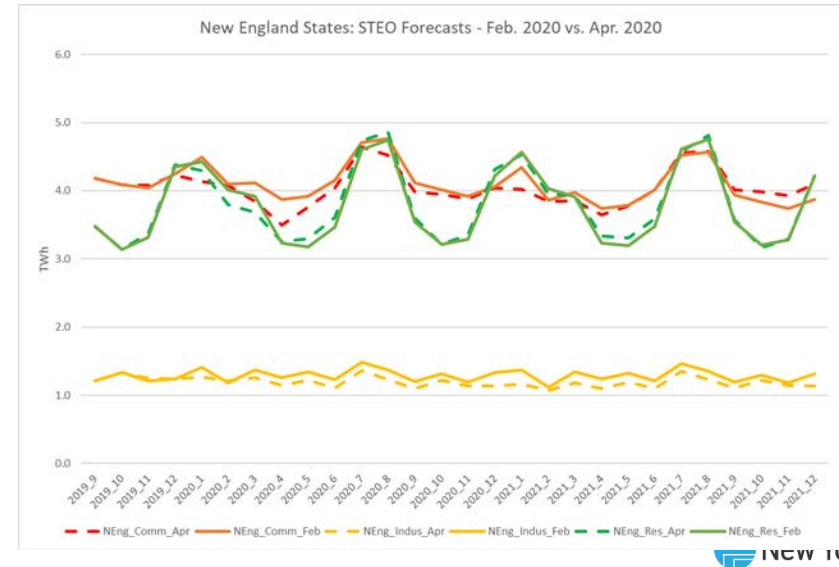
4% of 150,280
adjusted for Jan-Apr history

2020 Net Energy Forecast (Vintage 2019)	150,700
2020 Long Term Forecast Revision (Trends)	(420)
Jan - April Net Energy Shortfall	(2,665)
Projected 8-Month Recession Impact based on assumptions on left	(4,834)
Total Projected 2020 Energy Shortfall	(7,919)
Exports & Wheets included in Budget	3,600
Jan - April Shortfall	(455)
Projected 8-Month Shortfall	(900)
Projected 2020 NYCA Net GWh	145,026

U.S. EIA - Short Term Energy Outlook: Electricity Consumption



New England: Residential load drops in Q1-20 but recovers by Q2; both Commercial (-3.7%) & Industrial (-8.2%) drop in 2020 but recover in 2021.



Mid-Atlantic: Residential load drops in Q1-20, but recovers by Q2; both Commercial (-10%) & Industrial (-3.4%) drop in in 2020 but recover in 2021

Next Steps

- **NYISO Operations and Demand Forecasting Team continue to monitor and assess the impacts of the COVID-19 shutdowns**
 - Track economic forecasts and consult with Transmission Owners on sector impacts
- **Mid-Year Forecast Update:**
 - Update Baseline Energy Forecast with Peak Considerations (June & July)
- **Forecasting system updates for Day-Ahead and Real Time (in-day) forecasts**

Questions and Discussion

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

