

Historic Electric Usage Trends in New York: 2000 to 2011

Arthur Maniaci

*Supervisor, Load Forecasting & Energy Efficiency
New York Independent System Operator*

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Overview

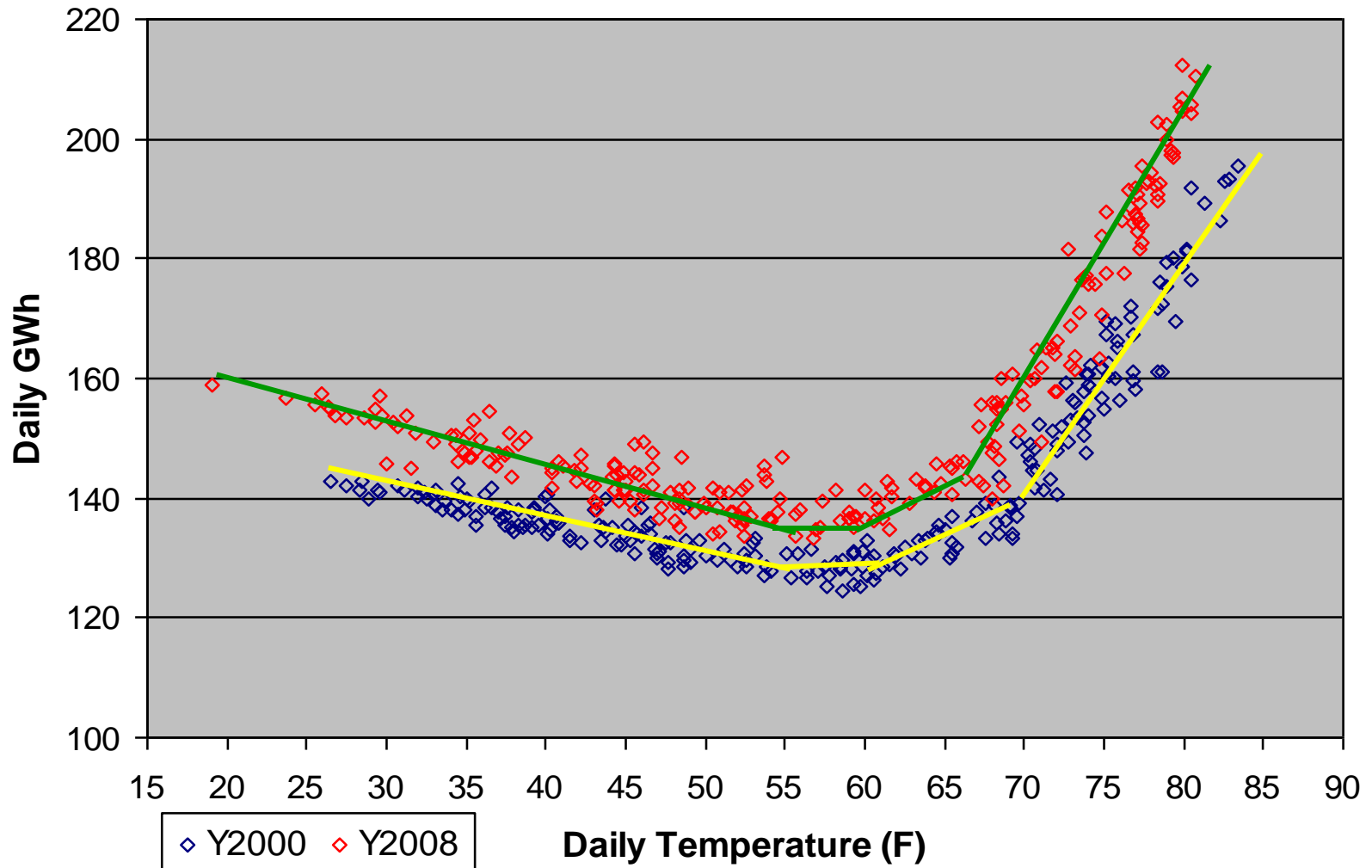
Analysis of seasonal energy growth over time reveals how energy usage trends are affected by the economy, weather, technology, energy efficiency programs, and consumer behavior.

Preliminary results indicate this analysis may also be used to estimate the impact of energy efficiency programs on the entire power system. Additional work could reveal more detailed results across all seasons and regions of the state.

From a system planning perspective, this methodology is embodied in the Statistically Adjusted End-Use (SAE) approach – a hybrid of econometric and end-use forecasting techniques.

Information from the planned EAG Market Baseline study can be used to provide up-to-date information for future SAE models and forecasts.

Daily Weekday Energy versus Temperature 2000 & 2008



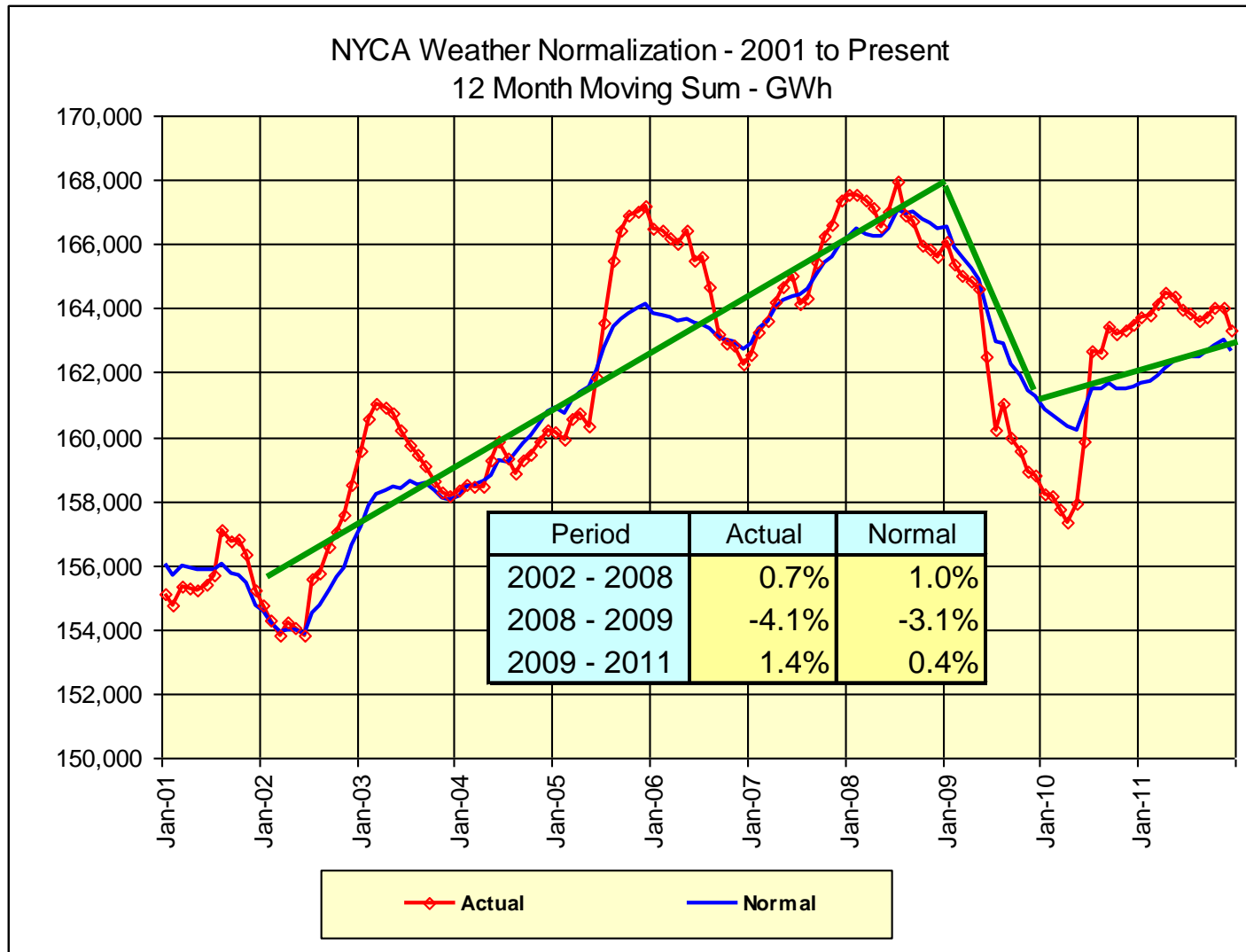
Modeling Framework

Plots of daily energy versus temperature for different years illustrates several points about trends in energy usage.

1. Winter seasonal usage occurs below 55 F. Summer seasonal usage occurs above 60 F. Usage between 55 and 60 is non-weather-sensitive, or base usage.
2. In winter, usage increases as temperature decreases. In summer, usage increases as temperature increases. Summer air conditioning usage is greater than winter space heat usage.
3. Overall increase from 2000 to 2008 is driven primarily by economic growth. From 2008 onward, major factors are the recession & EEPS.
4. Increase over time in the slopes of weather-sensitive load in summer and winter is due to higher appliance saturation and larger sizes of equipment.
5. Increased energy efficiency of non-weather-sensitive appliances (stoves, dryers, refrigerators) decreases base usage, all else equal.
6. Increased energy efficiency of weather-sensitive appliances decreases the slope of weather-sensitive usage, all else equal.

Statewide Energy Usage, Pre & Post-Recession

Actual & Weather-Normalized



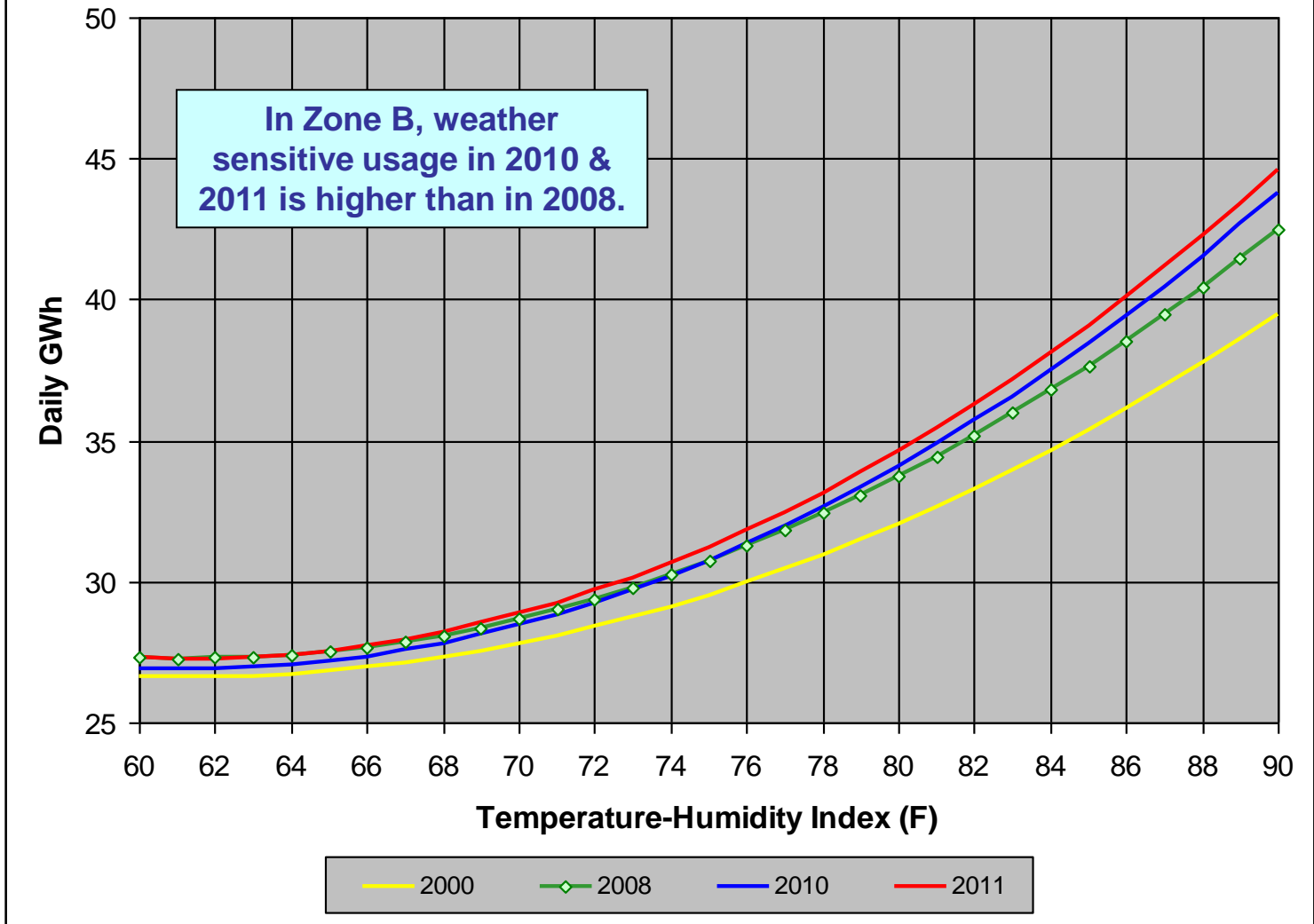
Summary of Analysis

- ◆ Reviewed weather-sensitive energy usage for 11 years, 2000 to 2011, by region across the state.
- ◆ Built models of daily energy for each zone to determine weather-sensitive usage & for weather normalization.
 - *Winter usage, summer usage & base or non-weather sensitive usage*
- ◆ Examined trends in base and summer energy usage.
 - *2001 to 2008: base & summer energy usage values increase*
 - *2009 to 2011:*
 - Base usage trend shows impact of recession & recovery
 - Summer usage trend shows recovery & then a decrease in 2011
 - Possible evidence of energy conservation impact at statewide level
(Results regarding energy efficiency impacts are still preliminary, pending further review & analysis)

Weather Normalization Models

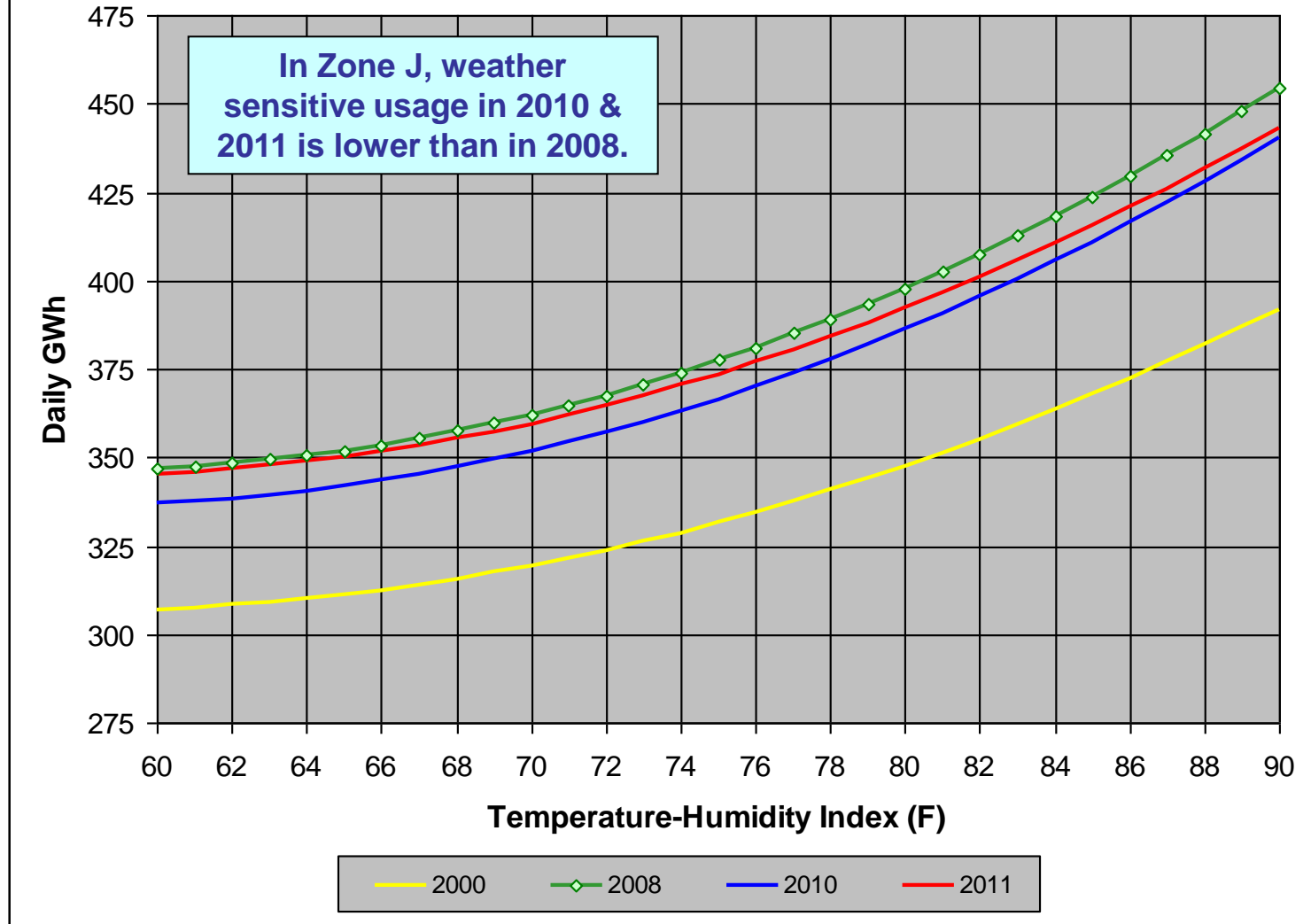
- ◆ Daily GWh = $f(\text{Econ, weather data, calendar data})$ at daily frequencies for each of several NY regions.
 - *Estimated over a multi-year period to capture impact of the economy.*
 - *Estimated using daily usage data to capture response to heating and cooling weather indexes.*
 - *Designed to provide information on usage trends.*
- ◆ Model specification is used to derive a weather adjustment, based on actual daily weather versus 20-year normal weather on a daily basis.
 - *Models estimated for total usage in a region. Could also be estimated if daily or monthly data is available by sector. (i.e., residential, commercial, & industrial).*
 - *Also applicable to SAE forecast modeling technique, which allows explicit incorporation of efficiency trends.*

Weather Response Function: Daily Energy (GWh) vs THI Rochester Area (Zone B)



All results are preliminary, subject to further review & confirmation.

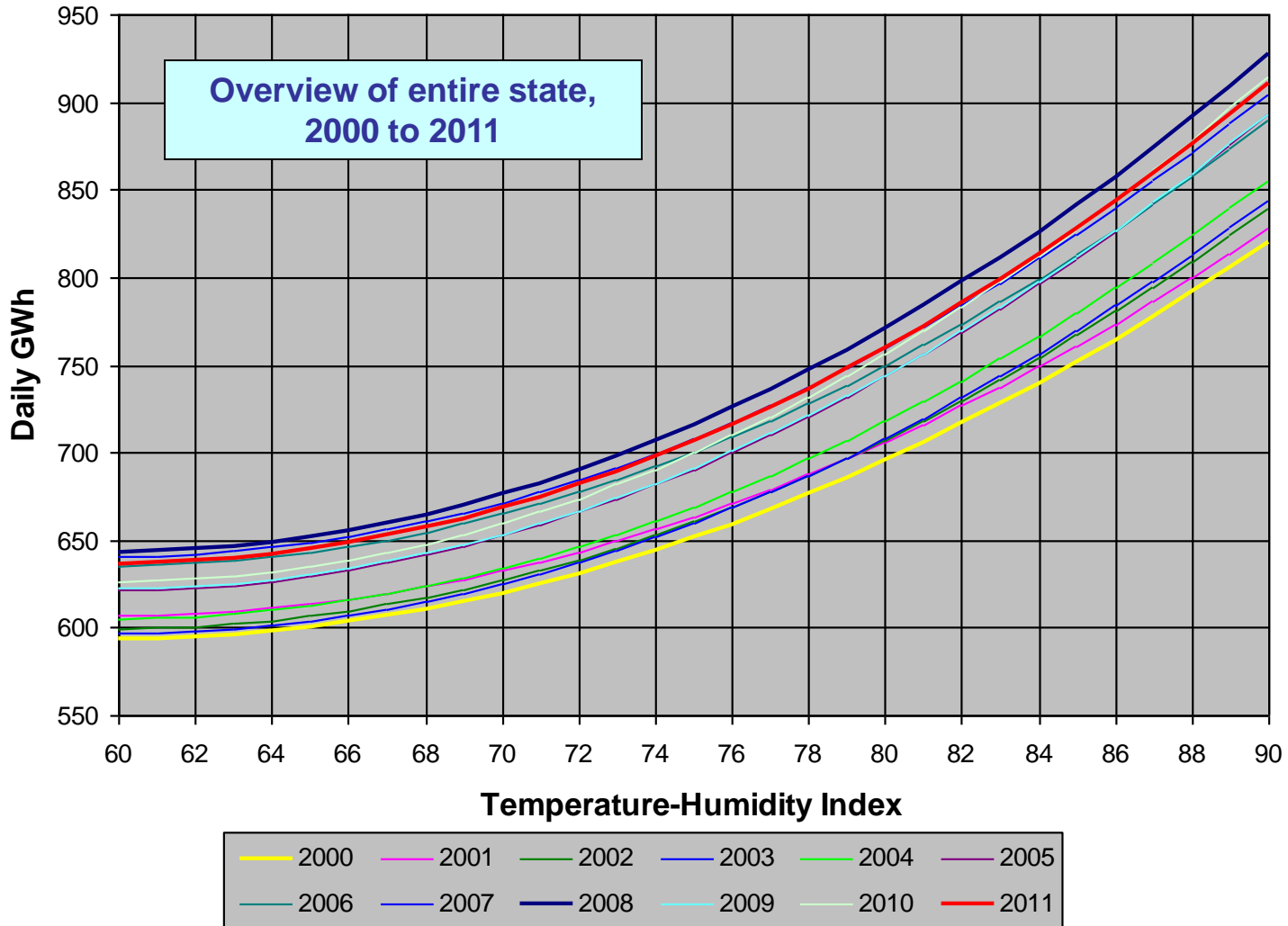
Weather Response Function: Daily Energy (GWh) vs THI New York City Area (Zone J)



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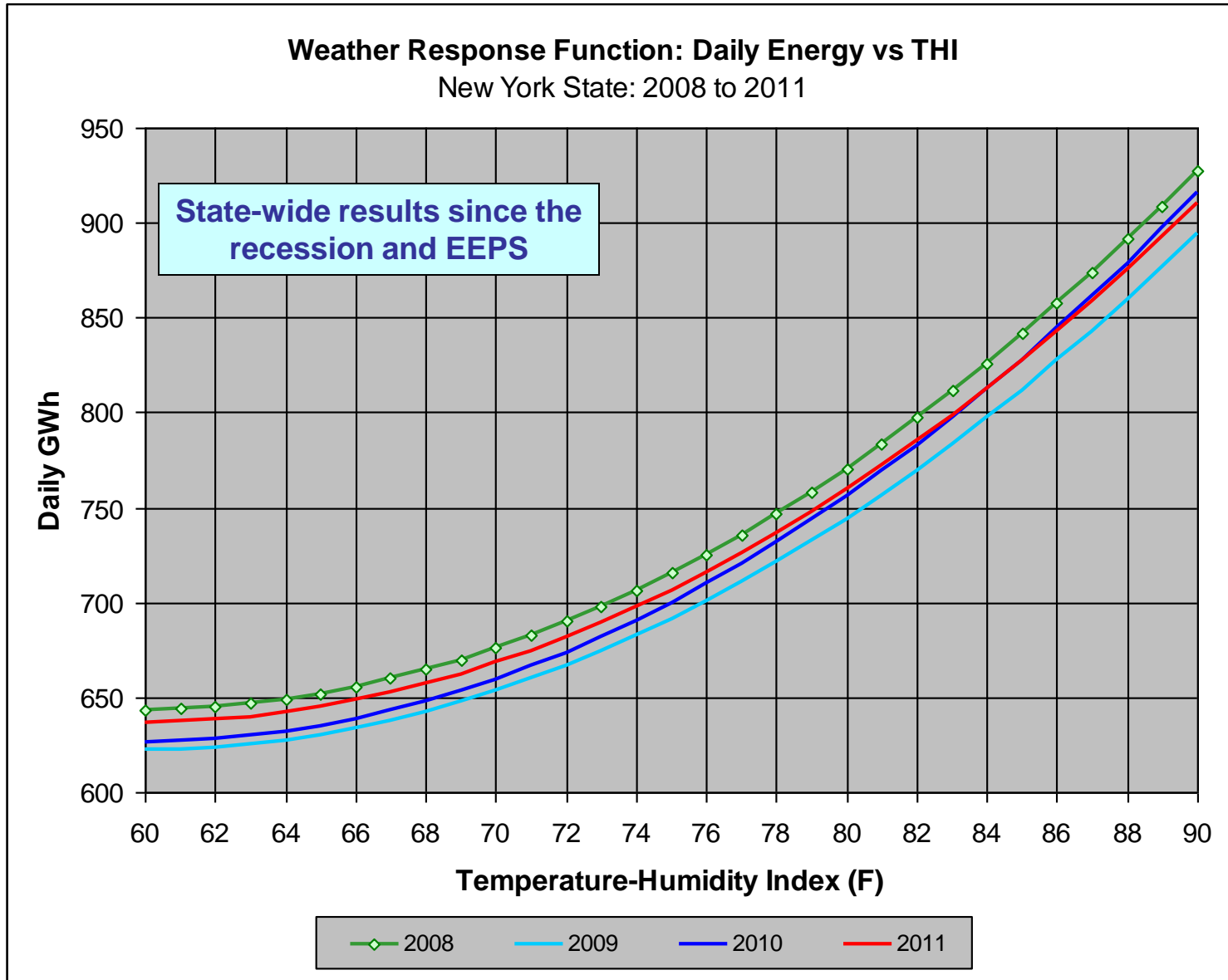
Weather Response Function: Daily Energy vs THI

New York State: 2000 to 2011



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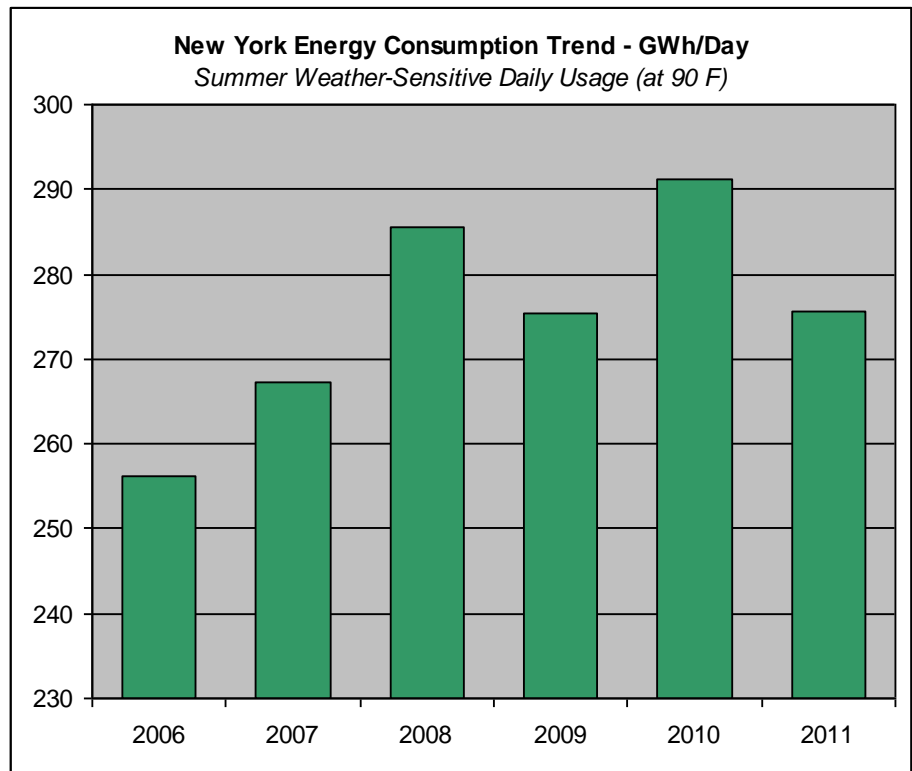
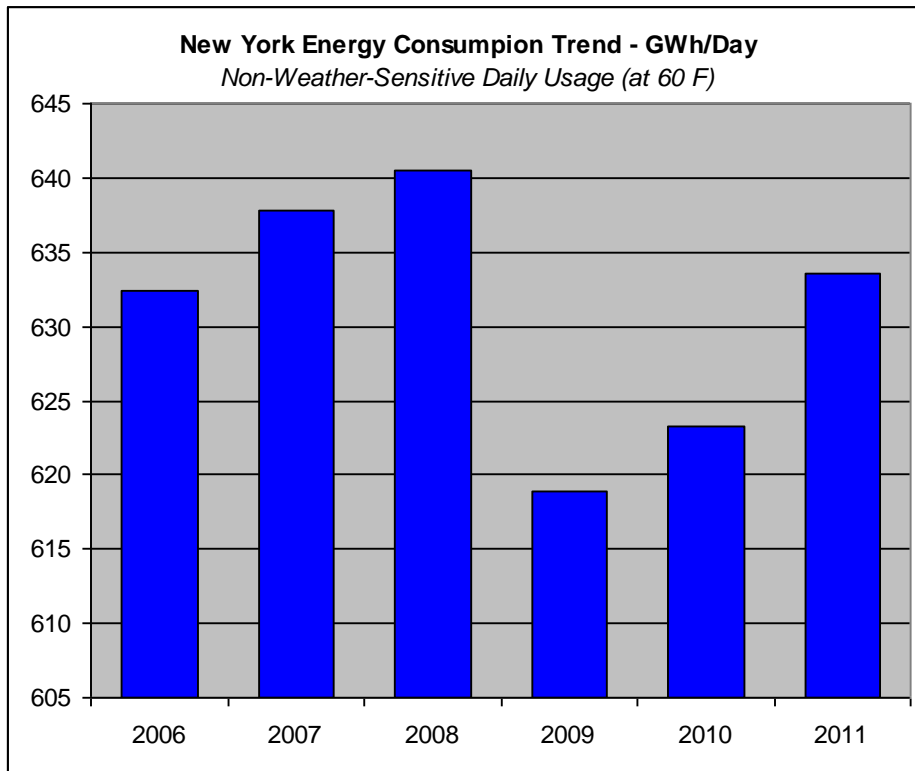
Weather Response Function: Daily Energy vs THI New York State: 2008 to 2011



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Statewide Trends in Base Usage & Summer Weather-Sensitive Usage

Weather-Sensitive Usage in 2011 was less than in 2010

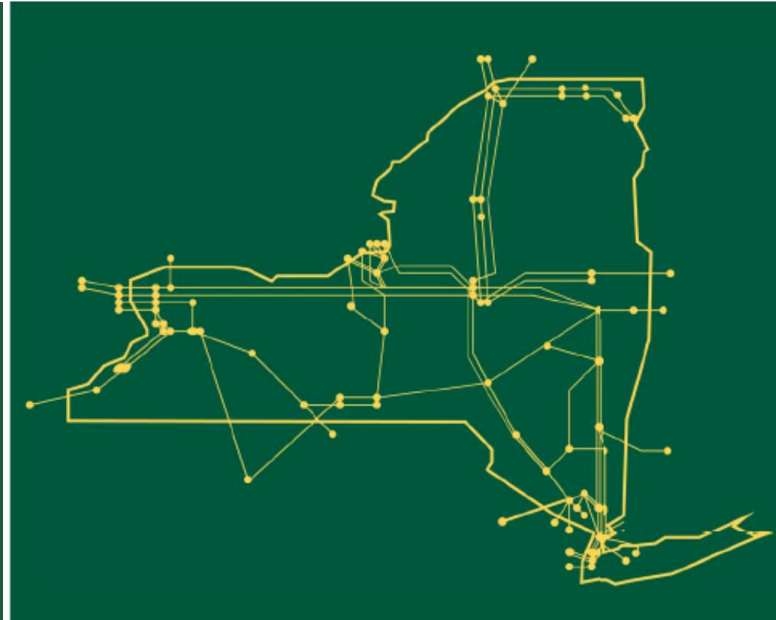


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Additional Work Required

- ◆ Review results at zonal level
- ◆ Compare with EE energy impacts at zonal level
 - *Estimate weather normalized annual consumption for 2010 & 2011*
 - *Account for impact of economic growth in 2011 vs 2010*
 - *Then take difference of 2010 & 2011 usage*
- ◆ Examine correlation of difference with estimated impacts of EE
- ◆ Discuss method & results with other NYISO & EAG stakeholders

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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