

The Itron logo is a red square with the word "Itron" in white, lowercase letters. A yellow lightning bolt is positioned above the letter 'o'.

Itron

Electricity Forecasting in a Dynamic Market

Organization of MISO States
Forecast Workshop & Spring Seminar
March 21 - 23, 2018

Eric Fox
Director, Forecast Solutions
Itron, Inc.

ITRON FORECASTING WHAT WE DO

OPERATIONAL FORECASTING



SHORT-TERM

(5 MIN TO 10 DAYS)

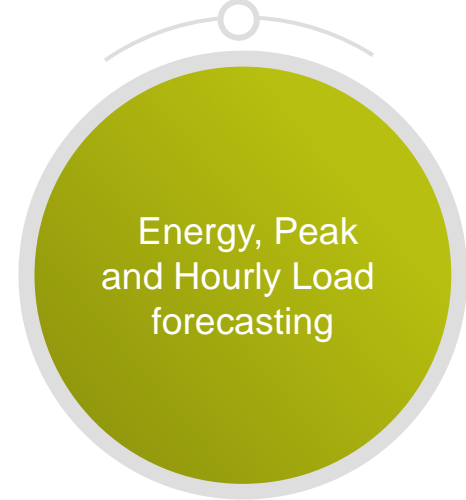
FINANCIAL FORECASTING



MEDIUM-TERM

(1 TO 3 YEARS)

CAPACITY PLANNING

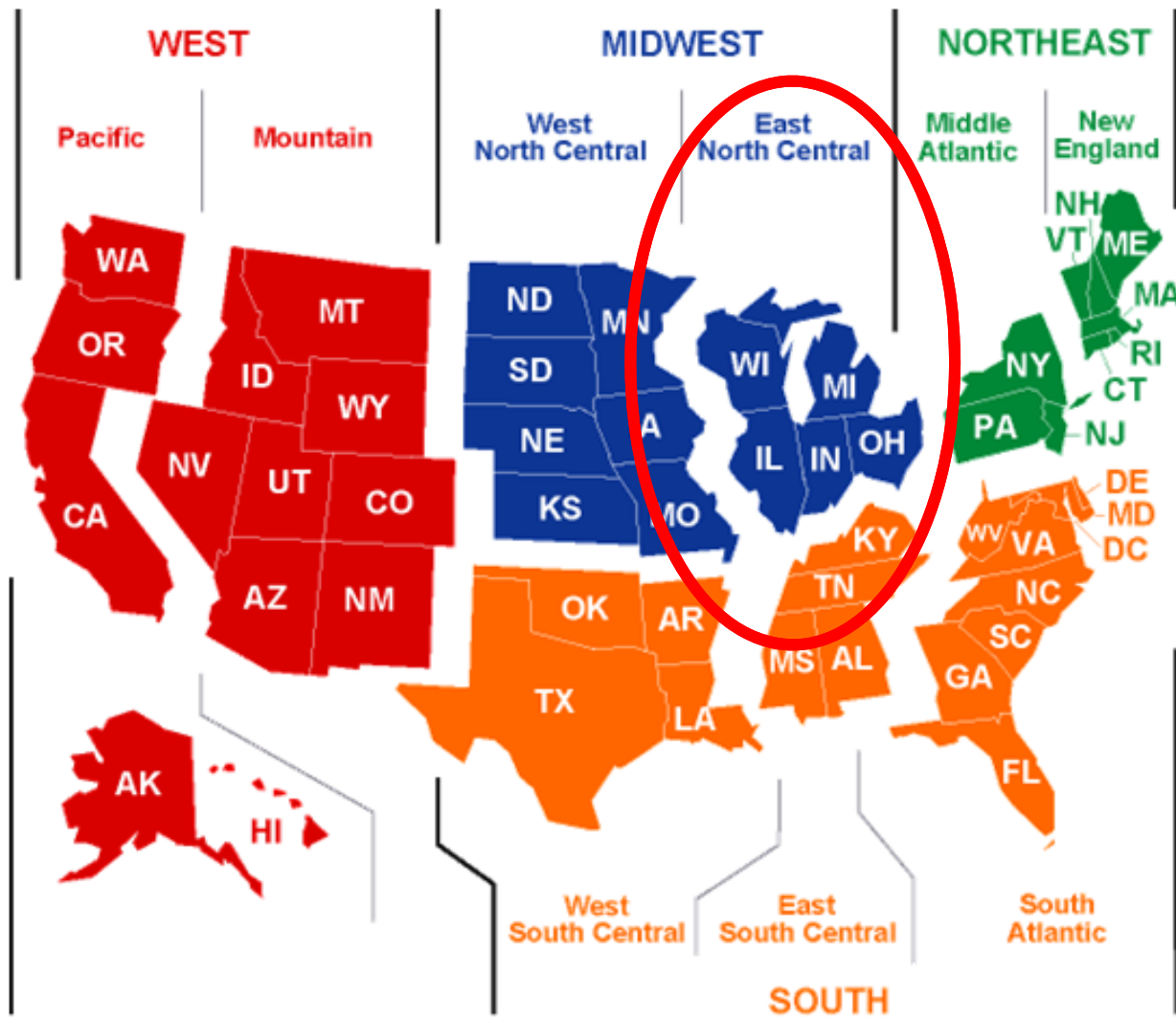


LONG-TERM

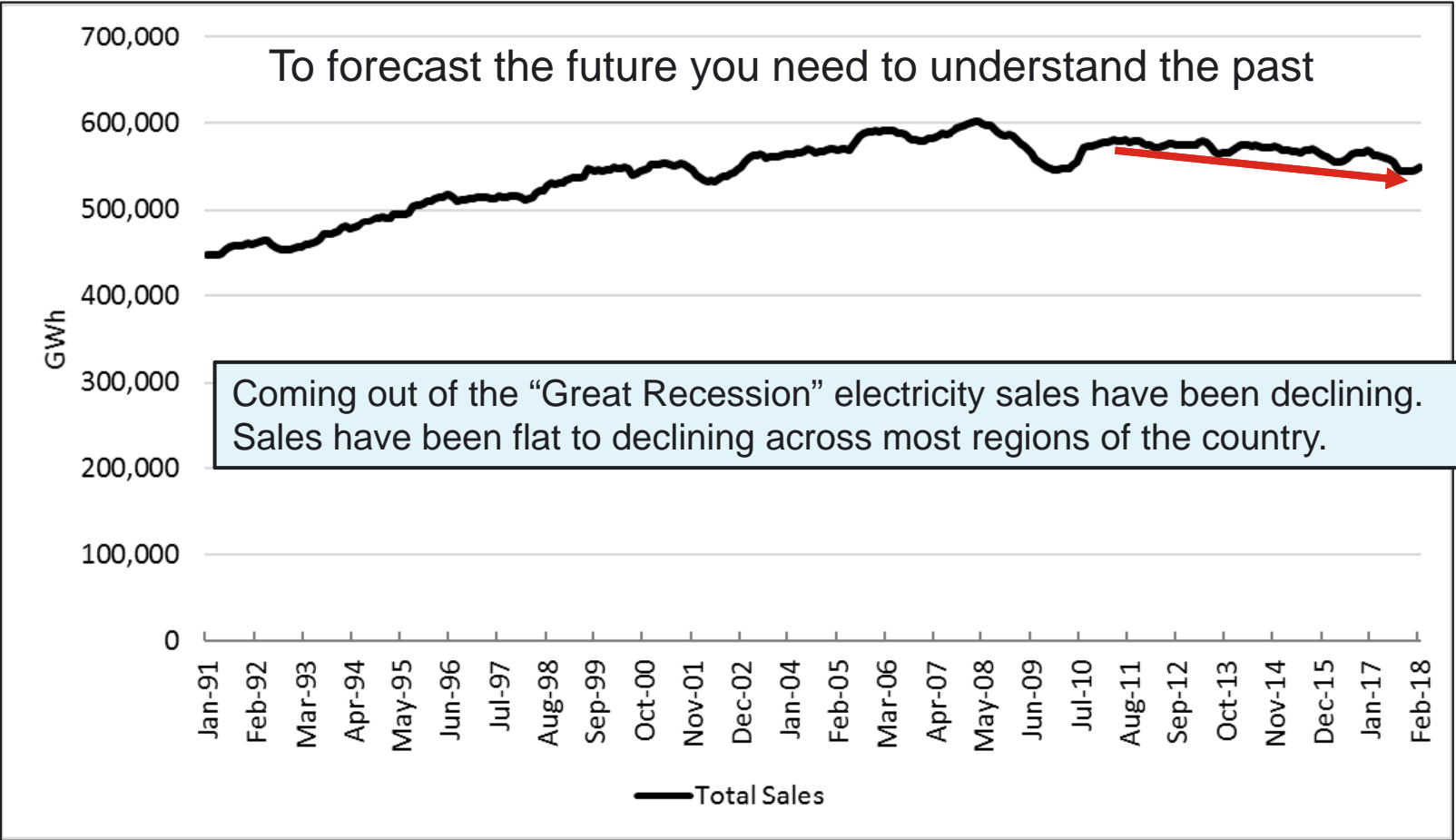
(5 TO 20 YEARS)

ENERGY TRENDS

FOCUS ON EAST NORTH CENTRAL

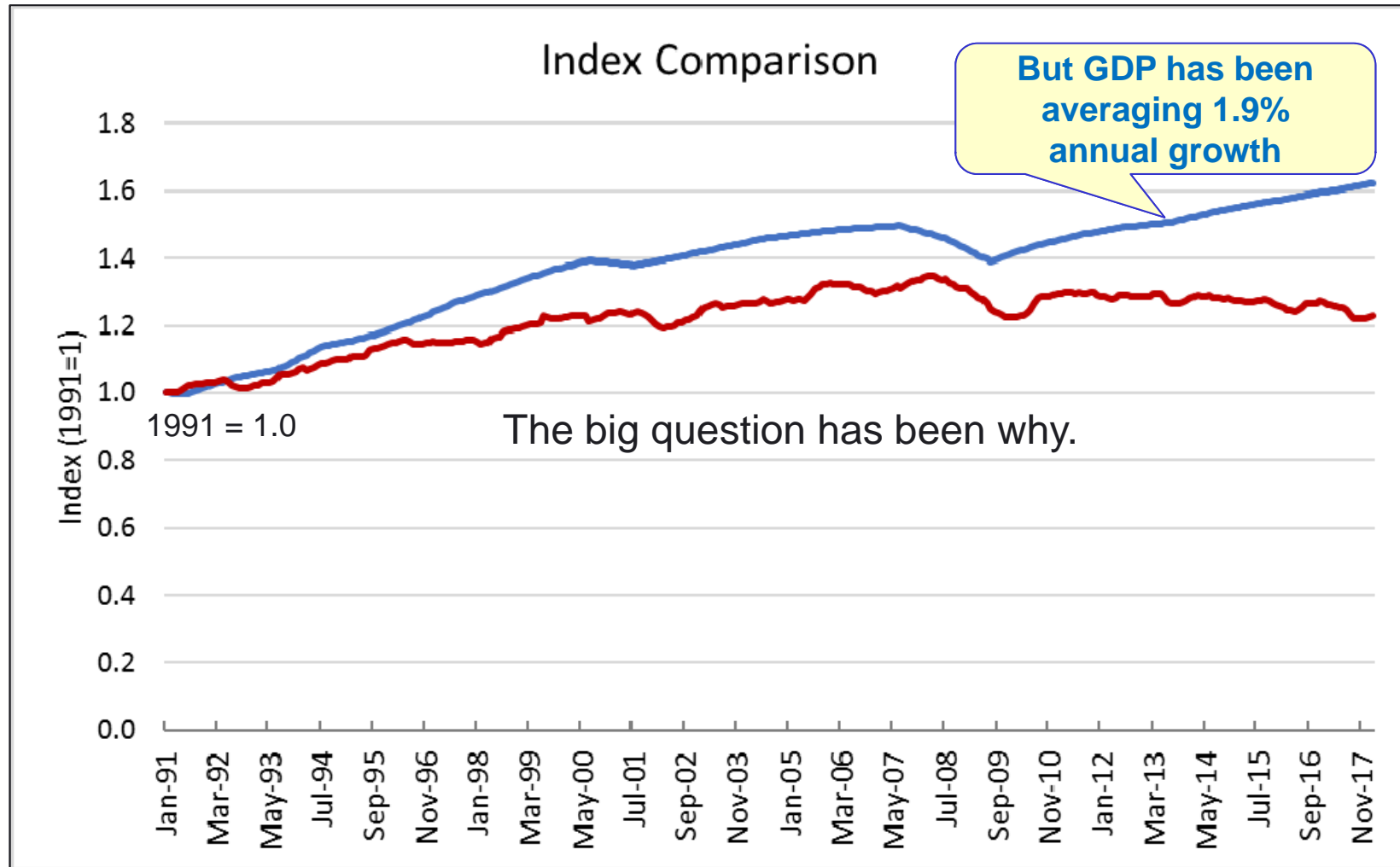


EAST NORTH CENTRAL (ENC) CENSUS REGION ELECTRIC SALES

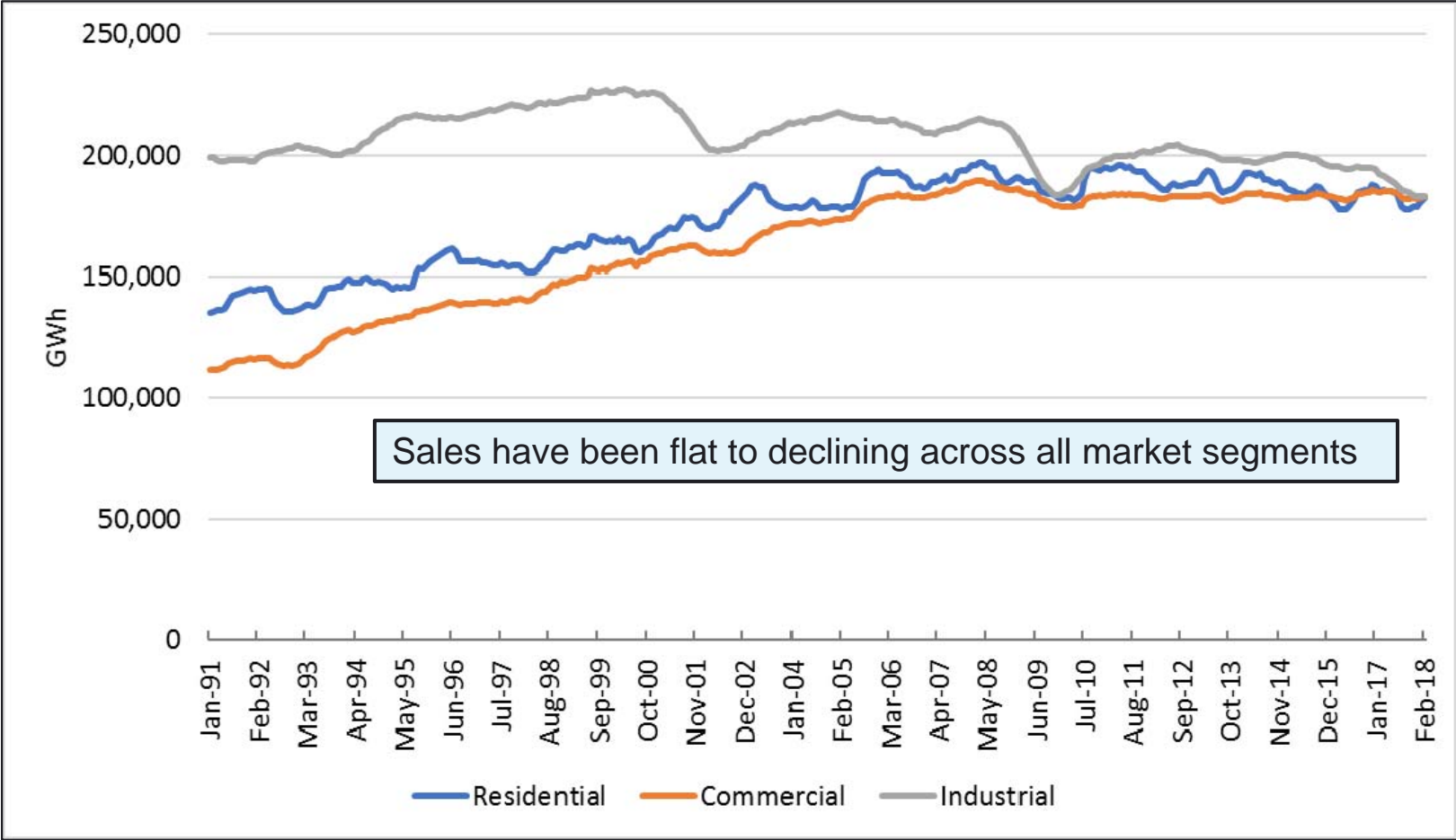


» EIA reported state level class sales, 12-month rolling sum.

GROWING DISCONNECT BETWEEN ECONOMIC GROWTH AND ELECTRICITY USE

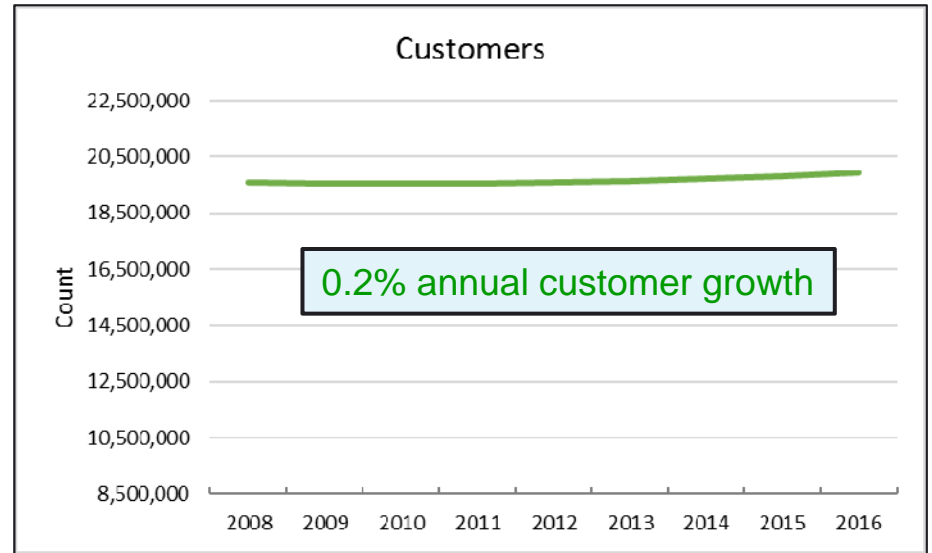
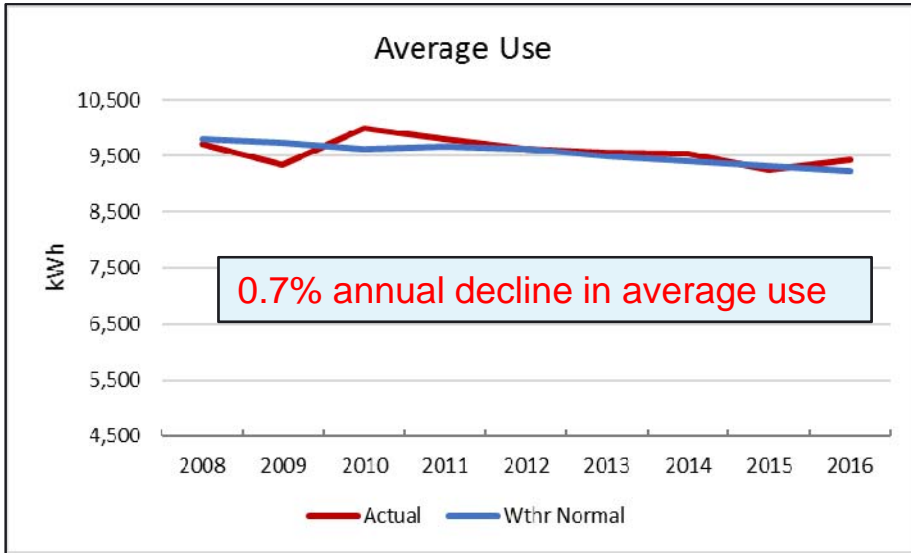


ENC MARKET SEGMENT ELECTRICITY SALES

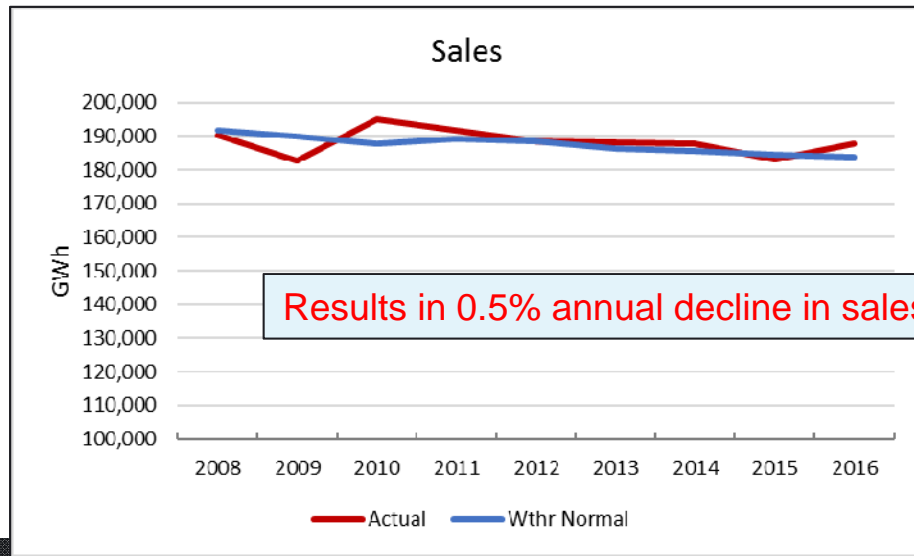


» EIA reported state level class sales, 12-month rolling sum.

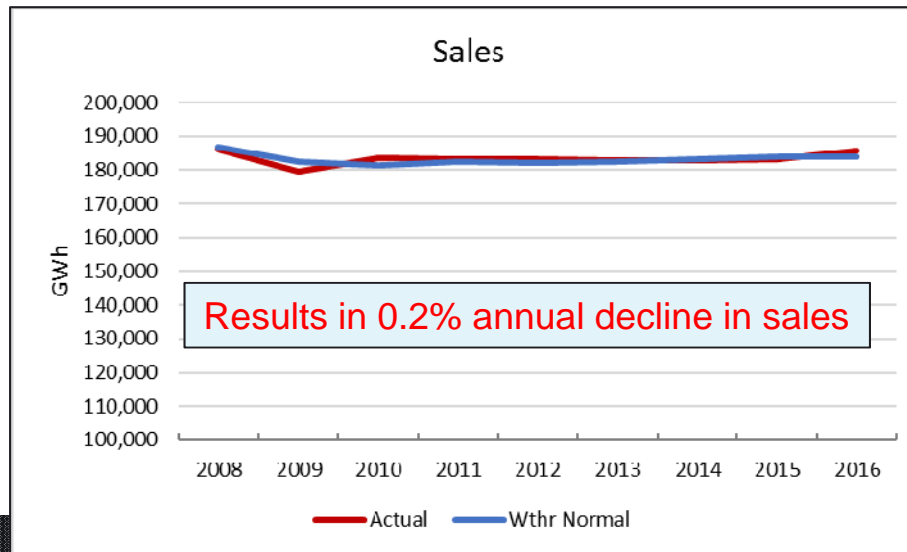
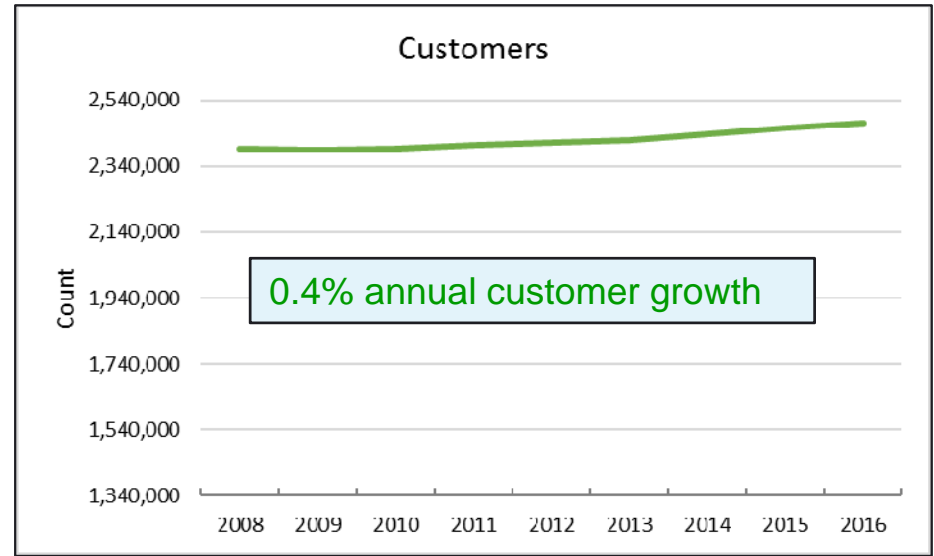
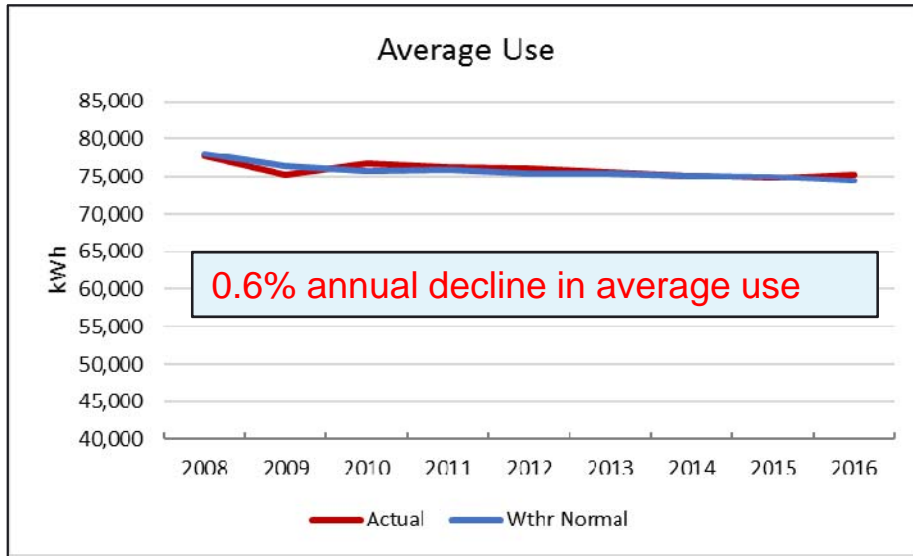
ENC RESIDENTIAL SALES TRENDS



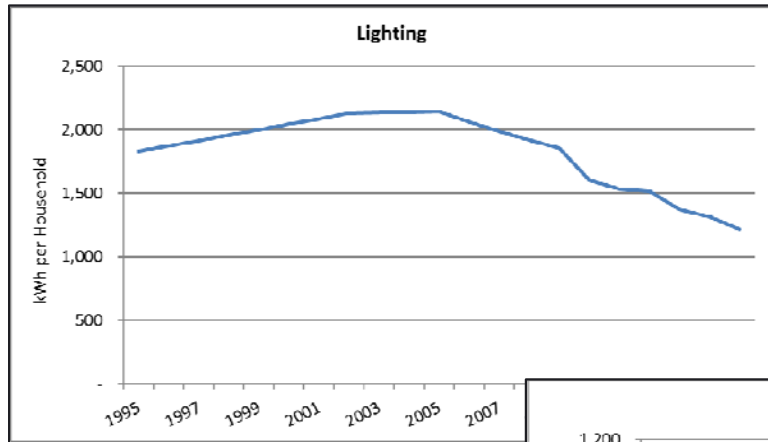
Strong efficiency gains coupled with slow population growth



ENC COMMERCIAL SALES TRENDS

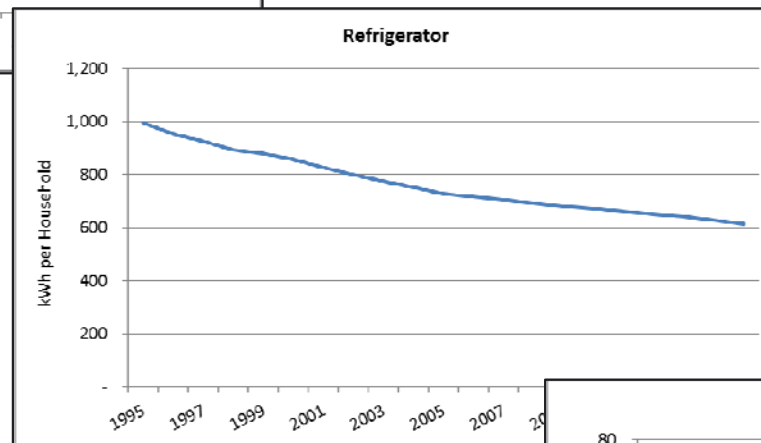


WHY IS ELECTRICITY PER CUSTOMER USE DECLINING

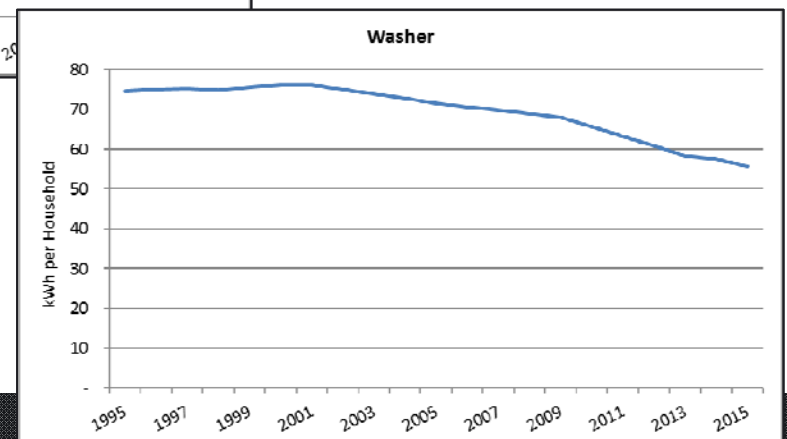


» The largest impact on sales over the last 10-years can be attributed to residential and commercial end-use efficiency improvements

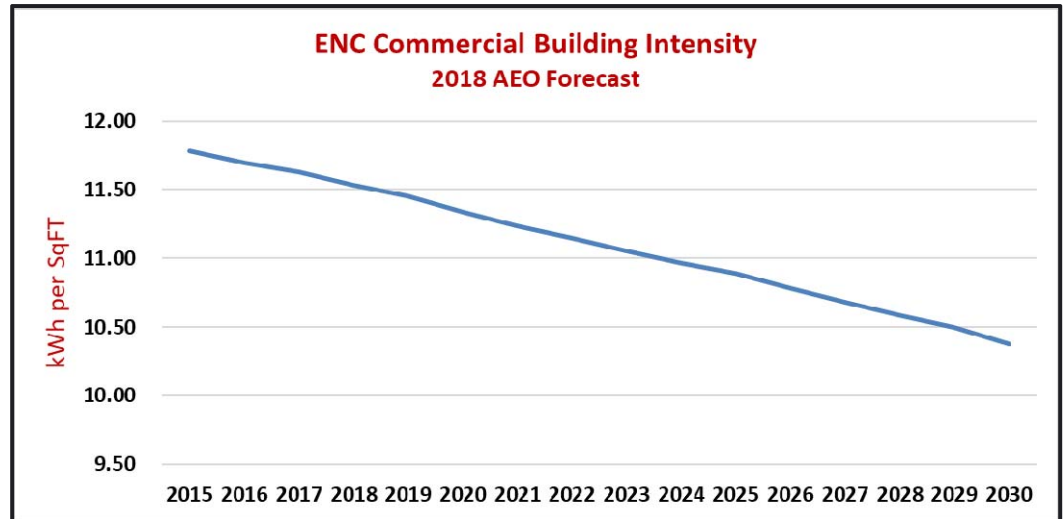
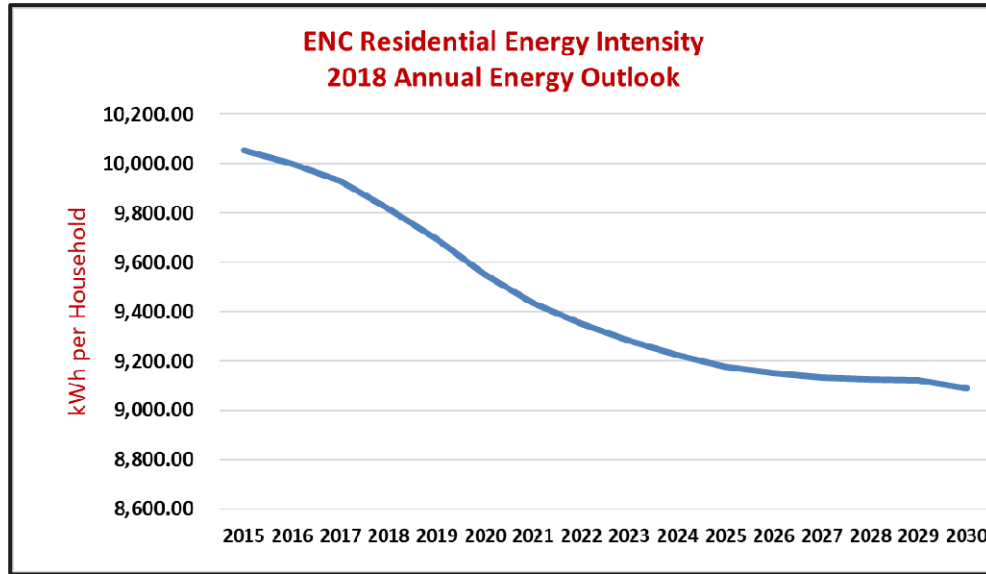
- New Standards
- Energy Efficiency Programs



» Everything you buy uses less electricity than what you are replacing



EFFICIENCY GAINS WILL CONTINUE TO DRIVE ENERGY USE



WHY THE BREAKDOWN BETWEEN ECONOMIC GROWTH AND ELECTRICITY INPUT?

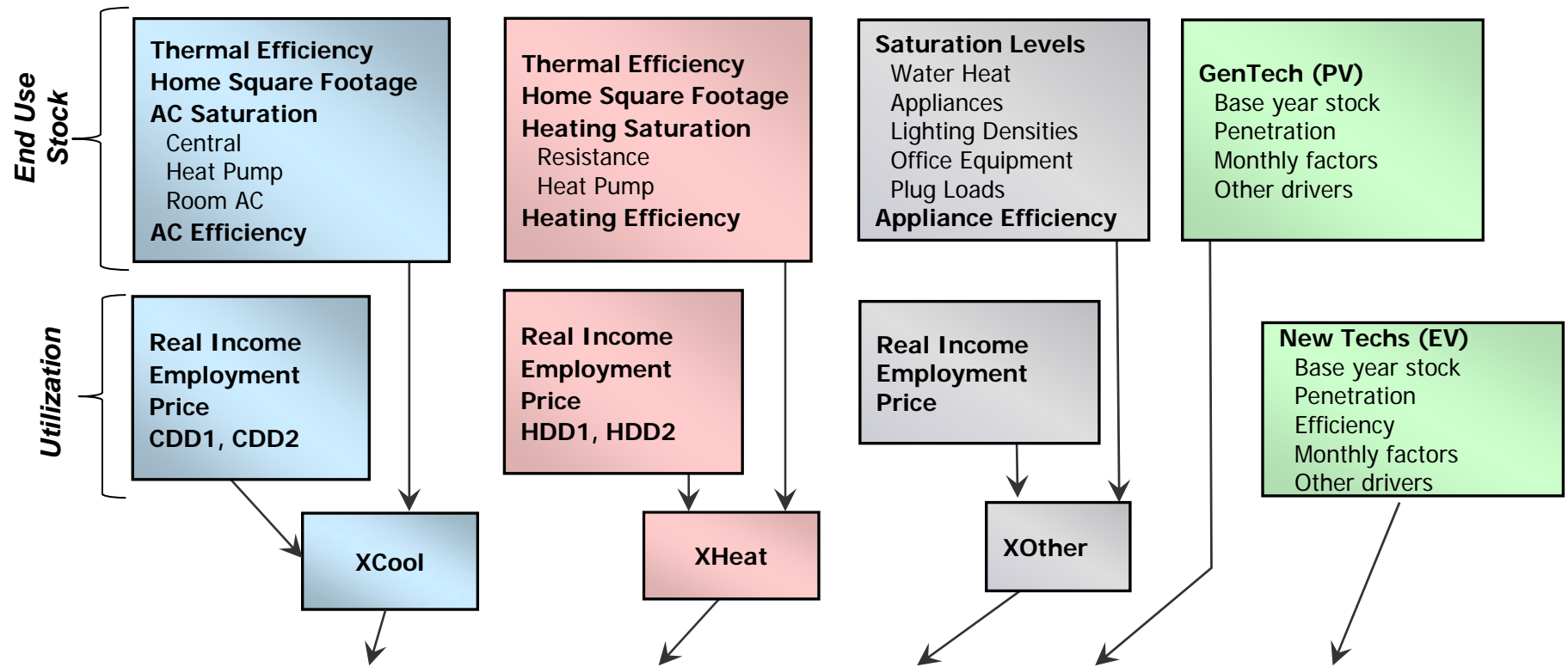
- » Changing composition of GSP – change in business mix
 - Shift to less energy intensive “knowledge-based” economy

- » Lower energy input as a result of end-use efficiency improvements
 - New standards
 - Government and utility sponsored energy efficiency programs

- » New technologies are reshaping demand in some regions
 - Heat Pump Water Heaters
 - Cold Climate Heat Pumps
 - Data Centers
 - Solar
 - Electric Vehicles

Two parts to the equation
(1) economic growth and (2) structural change (changes in energy intensity)

NEED MODELING STRUCTURE THAT CAPTURES BOTH ECONOMIC AND STRUCTURAL CHANGE



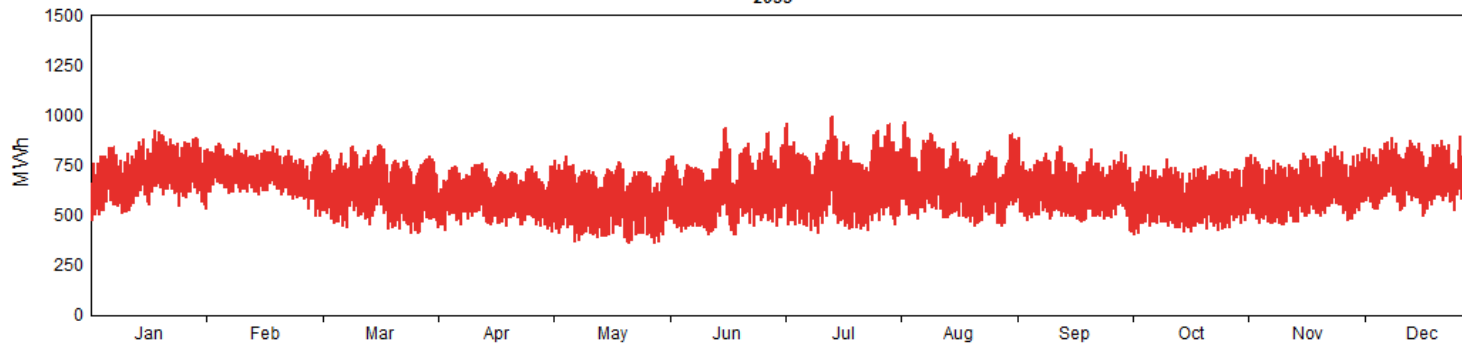
$$KWh_m = a + b_c \times XCool_m + b_h \times XHeat_m + b_o \times XOther_m - GenTech_m + NewTech_m + e_m$$

Combine traditional linear regression model – with structured model variables

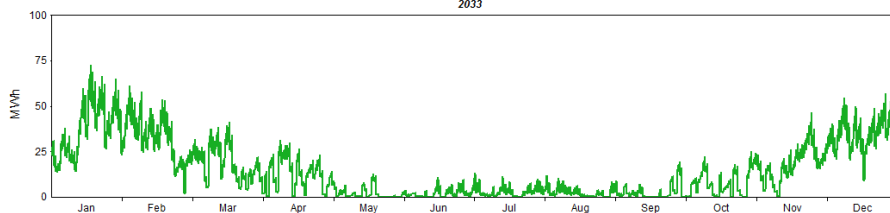
FORECASTING LONG-TERM DEMAND

- » In the long-term shapes matter
- » New technologies are changing system shape and in turn the timing and level of peak demand

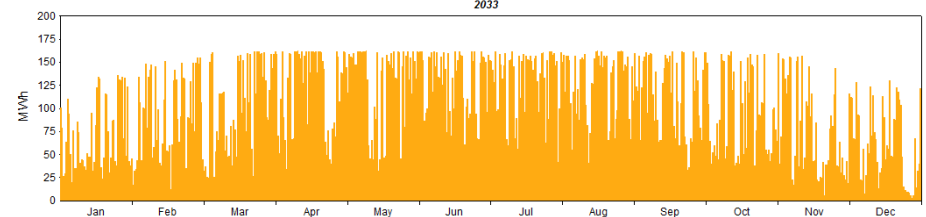
System
2033



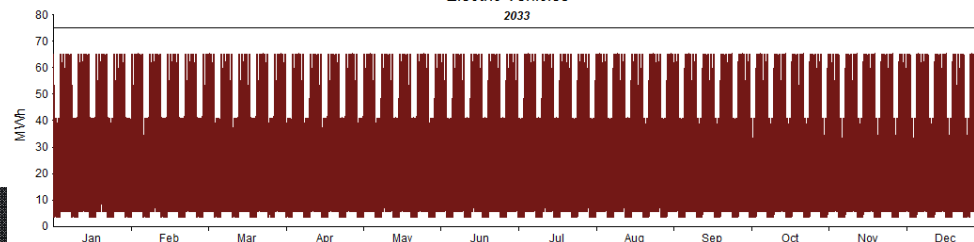
Heat Pump Program
2033



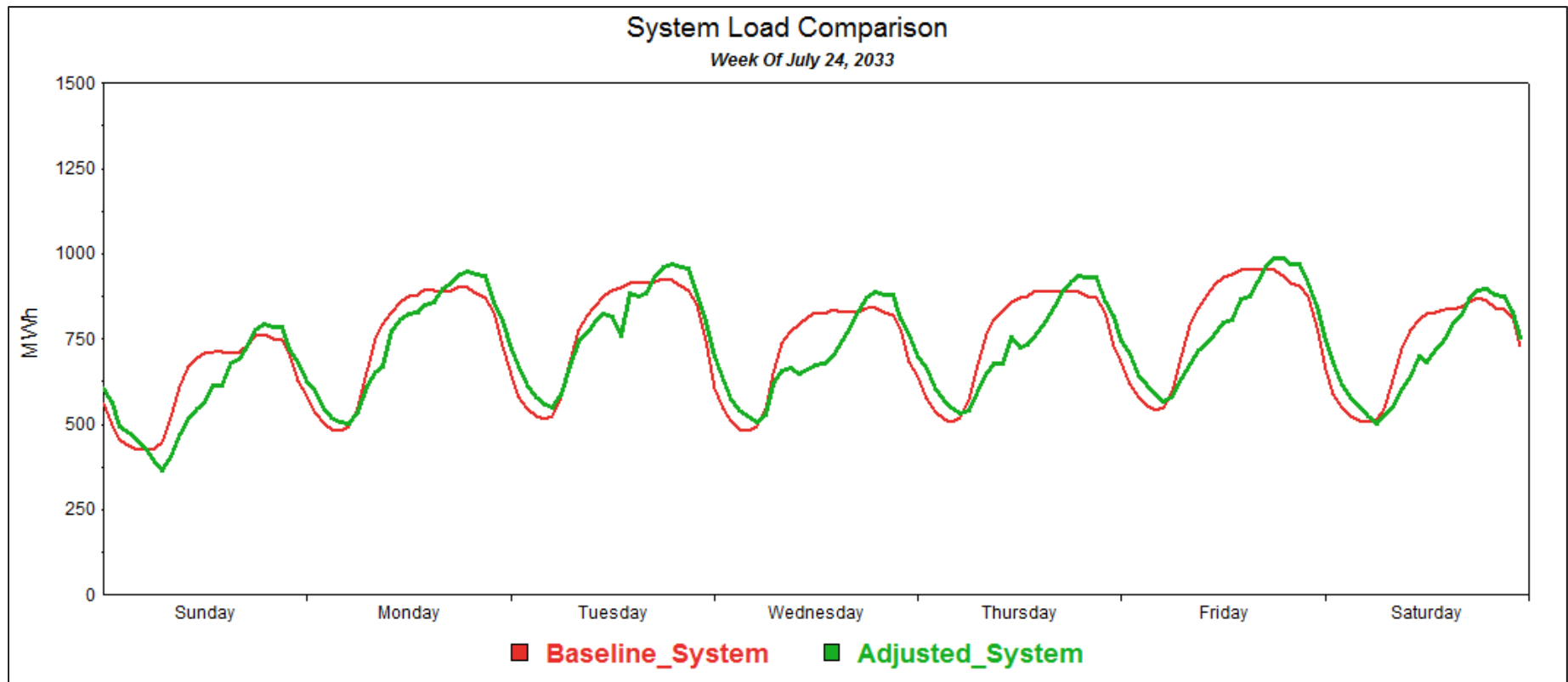
Solar
2033



Electric Vehicles
2033



SYSTEM LOAD IMPACT



- » You don't know the demand impact until you add up all the pieces. Difficult to capture in an econometric or regression model.
- » An old approach is new again.