ENERGY TRENDS AND FORECAST NEW YORK AND UTILITY SURVEY RESULTS

Eric Fox, Itron, Inc

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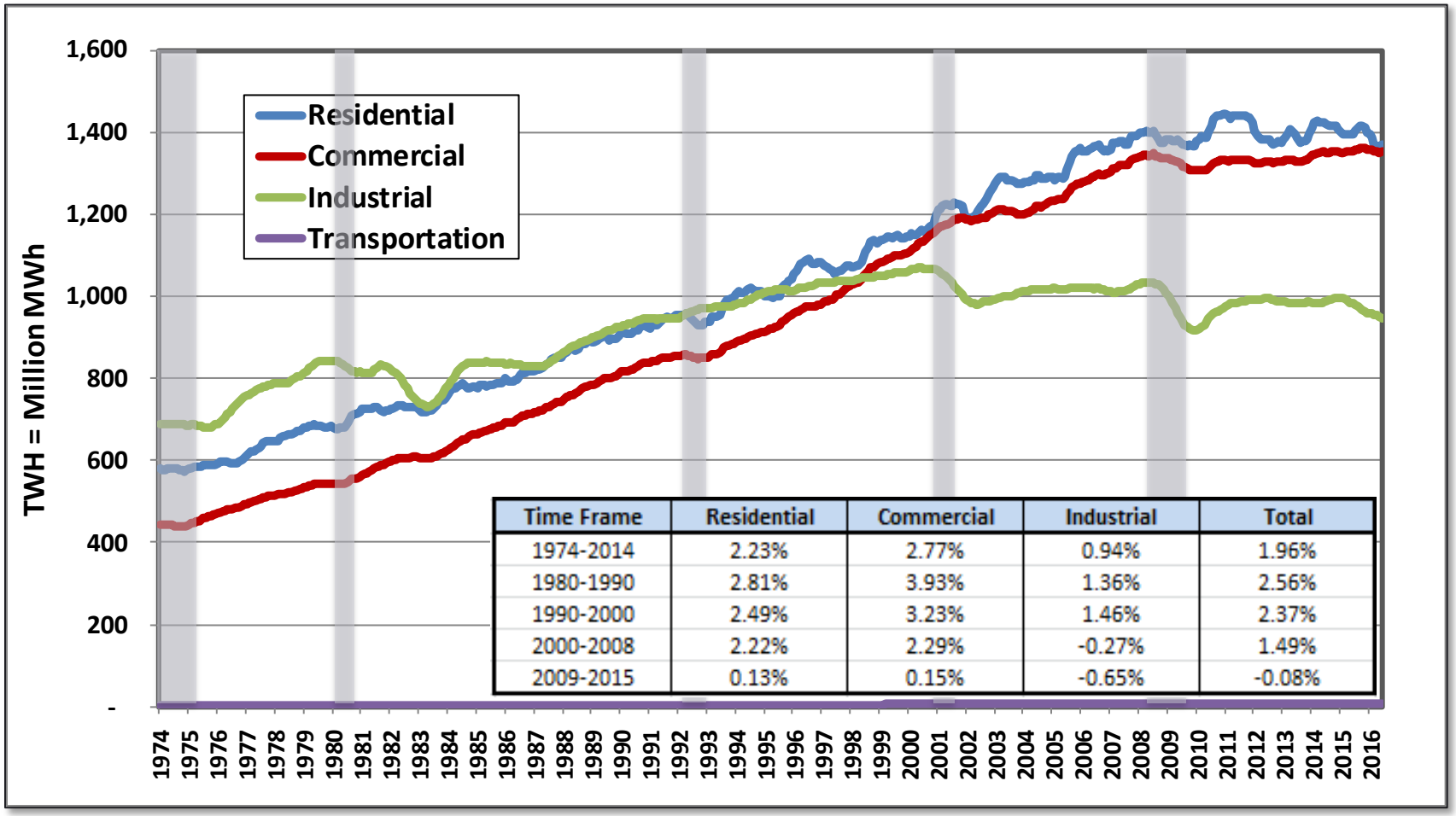
OUTLINE

- Itron 2016 Utility Forecast Survey – Expectations for the Future
- New York Energy and Sales Trends
- State Forecast Model – Implication for Future Energy Requirements
- Capturing EE Program Impacts
- Summary

WHAT OTHER UTILITIES ARE FORECASTING – 2016 FORECAST SURVEY

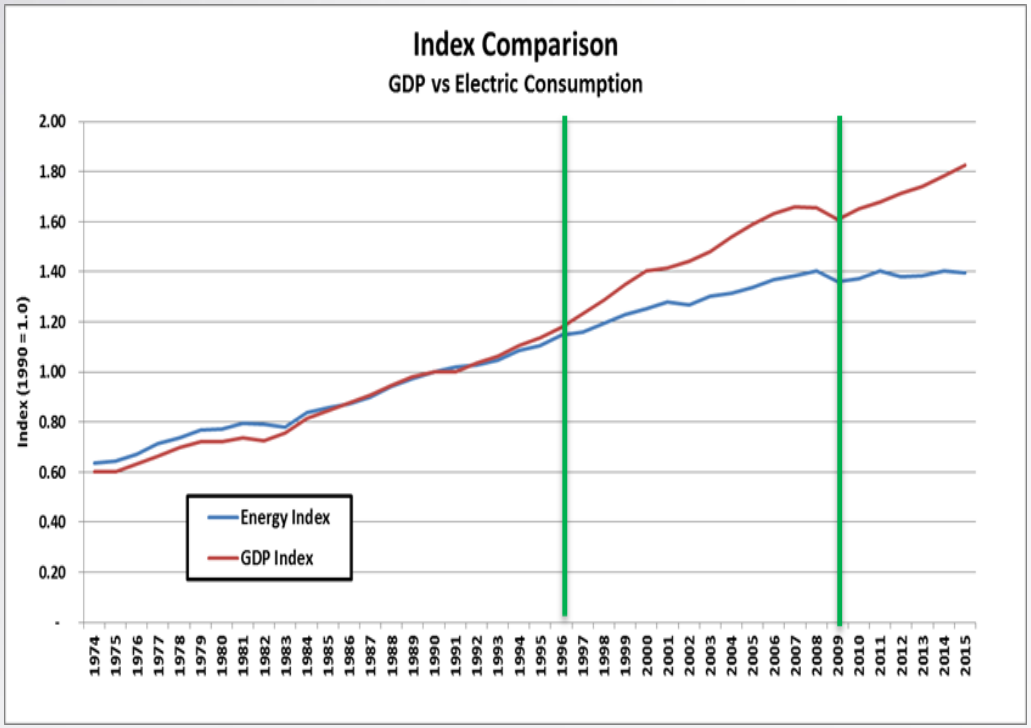
U.S. Electricity Sales (Twh)

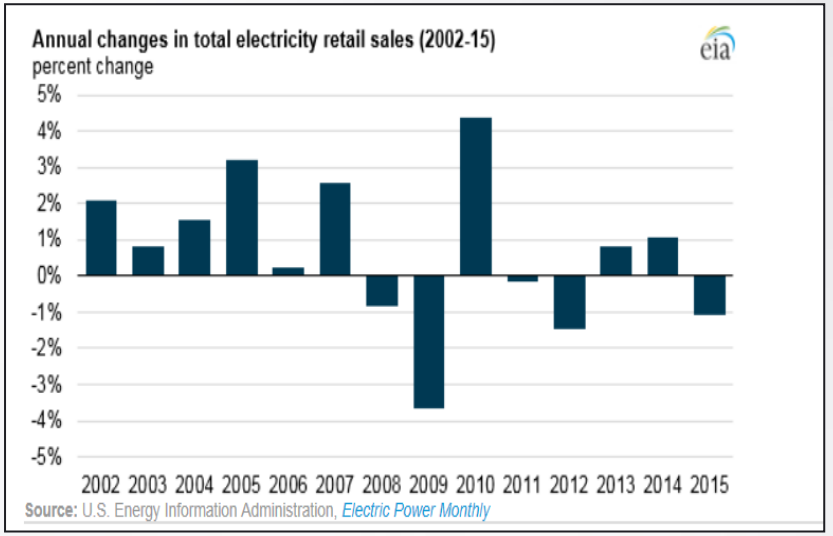


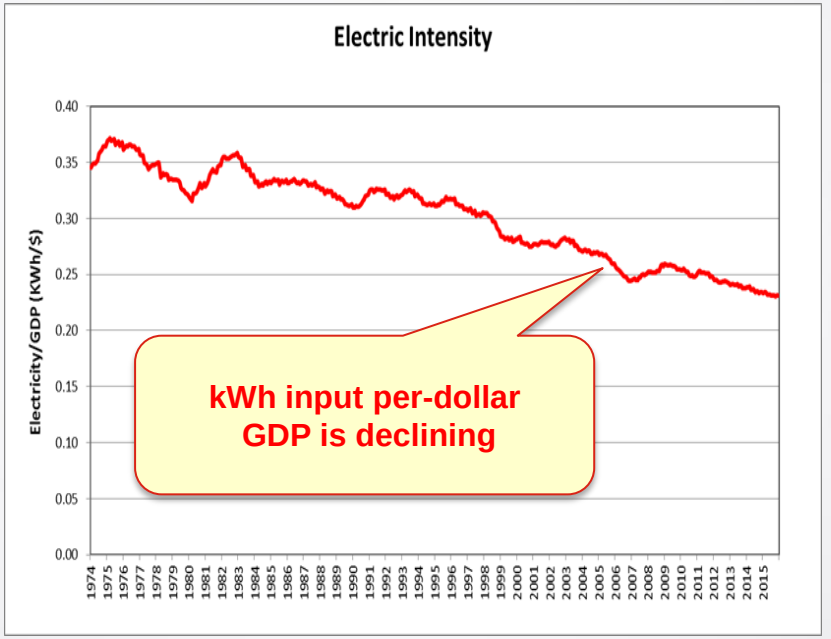
Time Frame	Residential	Commercial	Industrial	Total
1974-2014	2.23%	2.77%	0.94%	1.96%
1980-1990	2.81%	3.93%	1.36%	2.56%
1990-2000	2.49%	3.23%	1.46%	2.37%
2000-2008	2.22%	2.29%	-0.27%	1.49%
2009-2015	0.13%	0.15%	-0.65%	-0.08%

Computed as 12-month moving-sum of monthly class sales
Data updated through June 2016

ELECTRIC SALES AND ECONOMIC GROWTH







Historically, GDP has been strongly correlated with electric sales. This correlation has been weakening over time. Since 2010 GDP has averaged 2.0% annual growth while electric sales have been flat.

Regional Sales Trend

- Since 2012, we have been surveying utilities on current and projected energy growth. This year, 62 utilities representing 50% of electric sales in North America participated.

- Itron normalized sales estimates are based on reported monthly class sales data from EIA's Form 826.

Reported Annual Electricity Sales Growth (Percent)

Region	2012	2013	2014	2015	Average
Canada	0.44	0.71	0.09	-1.41	-0.04
MidWest	-0.68	-0.01	0.54	-0.34	-0.12
Northeast	-0.36	-0.34	0.32	-1.59	-0.49
South	1.05	0.89	1.60	1.54	1.27
West	0.4	-0.4	0.71	-1.18	-0.12
All	0.22	0.23	0.87	-0.12	0.30
Itron Weather Normal	0.05	0.28	0.95	-1.12	0.04

Customer growth

Strongest customer growth is in the South and West

Residential Customer Count Growth (%)

Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	0.81	1.11	1.35	0.16	0.81	1.02	1.01
Midwest	0.08	0.13	0.34	0.48	0.55	0.60	0.45
Northeast	0.03	1.18	(0.20)	0.32	0.27	0.34	0.24
South	0.62	0.81	1.05	1.24	1.30	0.92	1.27
West	0.60	0.88	1.03	1.17	1.05	0.95	1.29
Total	0.47	0.66	0.72	0.80	0.87	0.78	0.87
Natural Gas			1.08	1.14	0.96	0.74	0.85

Residential 2015 Forecast

Elect: 0.98
NG: 1.11

Commercial Customer Count Growth (%)

Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	0.44	0.74	1.70	0.31	0.68	1.17	0.84
Midwest	0.26	0.42	0.72	0.68	0.83	0.51	0.45
Northeast	0.10	0.40	0.39	0.33	0.51	0.80	0.54
South	0.75	1.04	0.97	1.10	1.19	0.81	1.11
West	0.62	0.65	0.88	(0.30)	1.02	0.83	1.09
Total	0.51	0.69	0.88	0.67	0.89	0.76	0.77
Natural Gas			0.65	1.17	0.64	0.58	0.41

Commercial 2015 Forecast

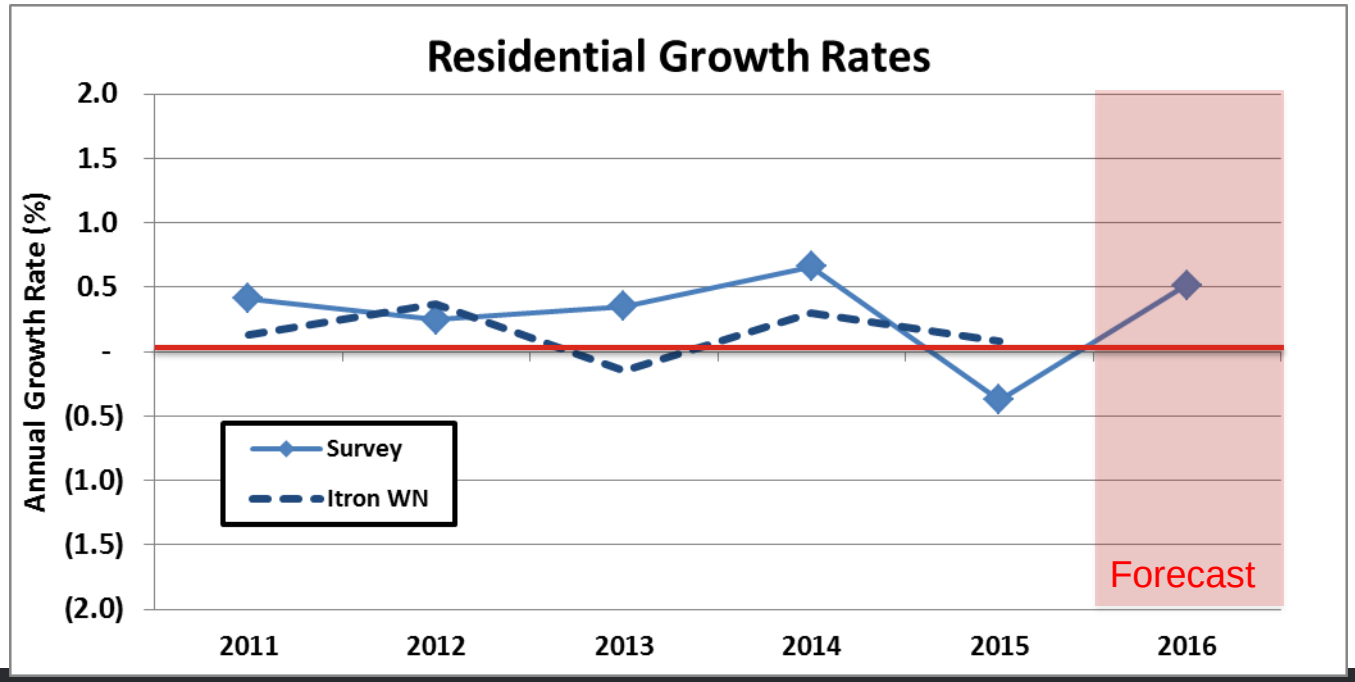
Elect: 0.89
NG: 1.17

Residential sales (%)

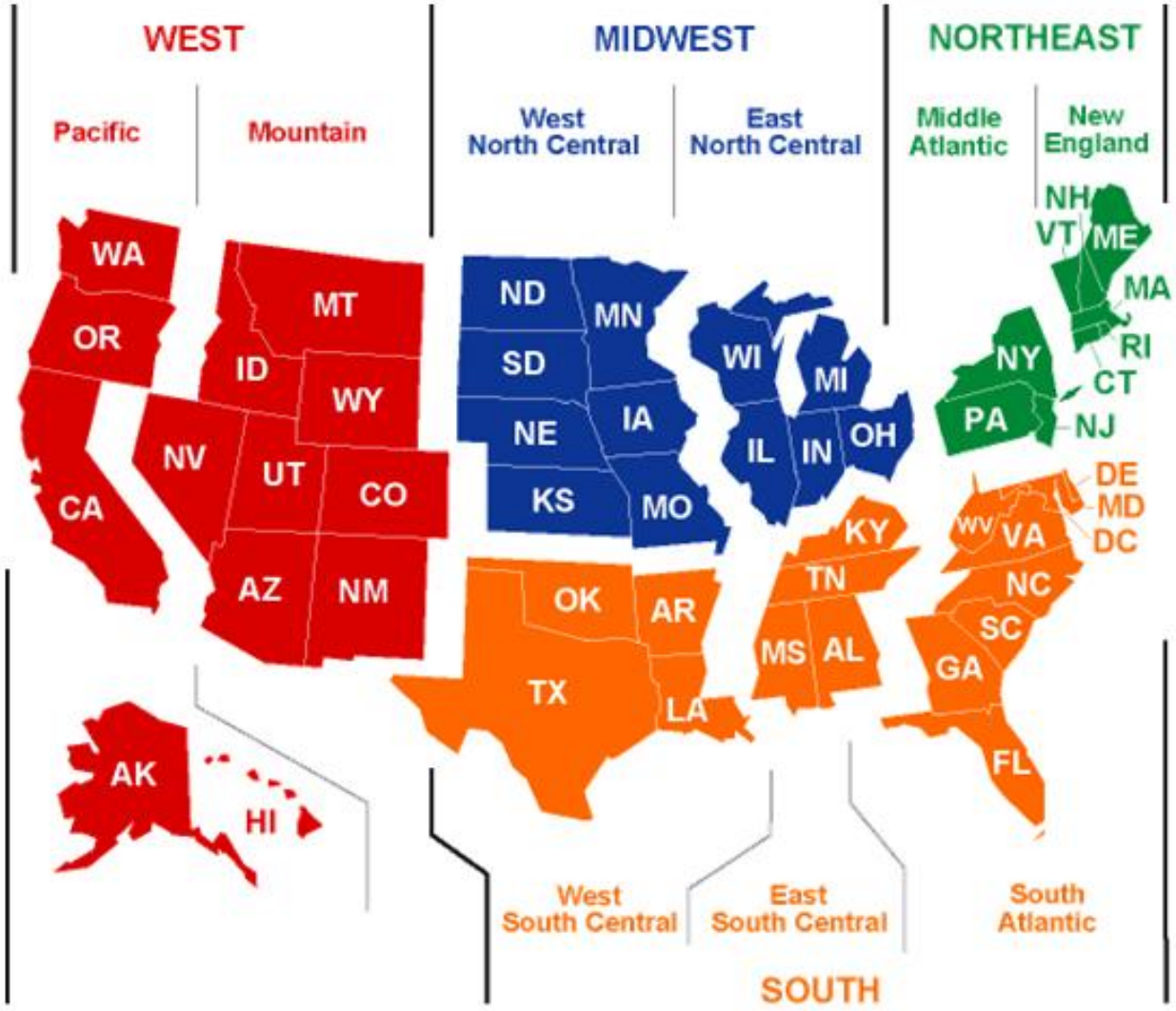
All regions but the South saw a drop in 2015 sales

Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	(0.08)	0.35	2.22	0.85	(0.97)	1.87	0.97
Midwest	(0.04)	(0.93)	0.19	0.09	(1.24)	(0.51)	0.06
Northeast	1.15	0.44	0.85	(0.42)	(1.25)	(1.22)	(0.72)
South	0.78	1.26	0.13	1.17	1.27	1.20	1.04
West	0.38	0.34	(0.35)	0.24	(1.11)	1.14	0.66
Electric Total	0.41	0.25	0.35	0.66	(0.38)	0.52	0.53
Itron WN	0.13	0.37	(0.15)	0.30	0.08		
Natural Gas Total			3.13	0.63	(0.72)	0.81	0.51

2015 Forecast
Elect: 0.80
NG: 0.59



Regions


WEST
MIDWEST
NORTHEAST
Pacific
Mountain
West North Central
East North Central
Middle Atlantic
New England
WA
OR
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WY
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AZ
CO
NM
ND
SD
NE
KS
MN
IA
MO
WI
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IL
IN
OH
NY
PA
NH
VT
ME
MA
RI
CT
NJ
DE
MD
DC
WV
VA
NC
SC
GA
FL
KY
TN
MS
AL
OK
AR
TX
LA
AK
HI
West South Central
East South Central
South Atlantic
SOUTH

Non-Residential sales (%)

Other than the South, 2015 non-residential sales growth were also weak.

Commercial Sales

Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	0.82	0.07	0.75	0.74	0.51	0.73	0.72
Midwest	0.02	(0.02)	0.64	0.45	(0.48)	0.20	0.26
Northeast	(0.52)	(0.57)	0.12	0.77	(0.58)	(0.21)	(0.62)
South	0.32	0.65	0.60	1.05	1.07	0.86	1.05
West	(0.07)	0.40	0.43	0.74	0.43	1.32	0.94
Electric Total	0.15	0.24	0.51	0.80	0.28	0.56	0.60
Itron WN*	0.80	(0.14)	0.54	1.34	(1.84)		
Natural Gas Total			4.38	2.25	(0.58)	0.32	0.42

*Itron WN is "non-residential" which combines commercial and industrial sectors

Commercial 2015 Forecast
Elect: 0.83
NG: -0.42

Industrial Sales

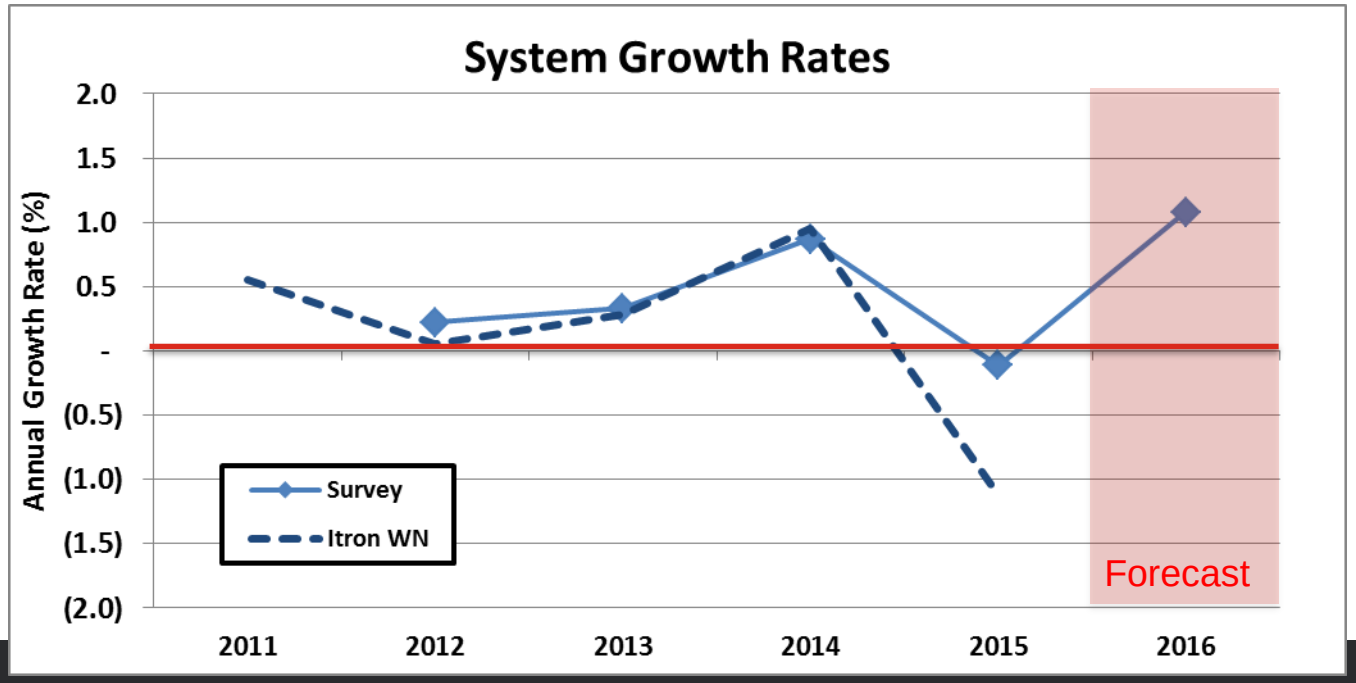
Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	(0.26)	(0.67)	1.80	(1.00)	(1.57)	(0.16)	0.83
Midwest	2.06	(0.37)	(0.09)	1.97	(0.71)	2.06	0.82
Northeast	0.51	(1.32)	1.56	0.19	(3.44)	2.52	(0.21)
South	2.48	2.22	1.53	2.66	1.75	2.36	1.95
West	0.68	2.70	(1.03)	0.08	(1.47)	3.29	1.43
Electric Total	1.78	0.73	0.32	1.30	(0.33)	1.93	1.19
Natural Gas Total			4.47	(0.43)	(0.13)	9.07	1.12

Industrial 2015 Forecast
Elect: 2.21
NG: 1.71

Total (System) sales (%)

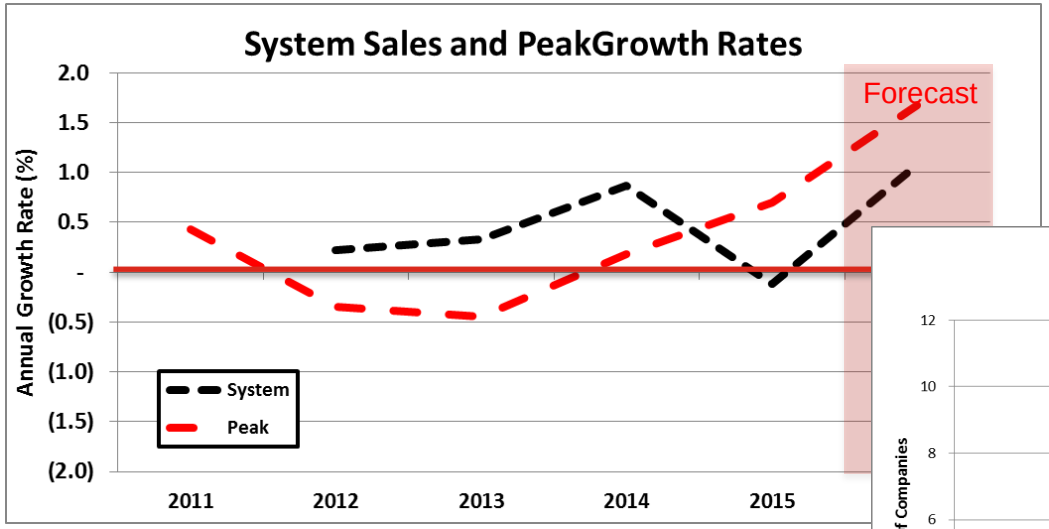
Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada		0.44	0.71	0.09	(1.41)	0.84	2.49
Midwest		(0.68)	(0.01)	0.54	(0.34)	0.73	0.32
Northeast		(0.36)	(0.34)	0.32	(1.59)	0.46	0.44
South		1.05	0.89	1.60	1.54	1.60	1.34
West		0.40	(0.40)	0.71	(1.18)	1.62	0.84
Electric Total		0.22	0.33	0.87	(0.12)	1.08	1.10
Itron WN	0.55	0.05	0.28	0.95	(1.12)		
Natural Gas Total			2.97	1.13	1.50	0.85	1.05

2015 Forecast
Elect: 0.99
NG: 0.50

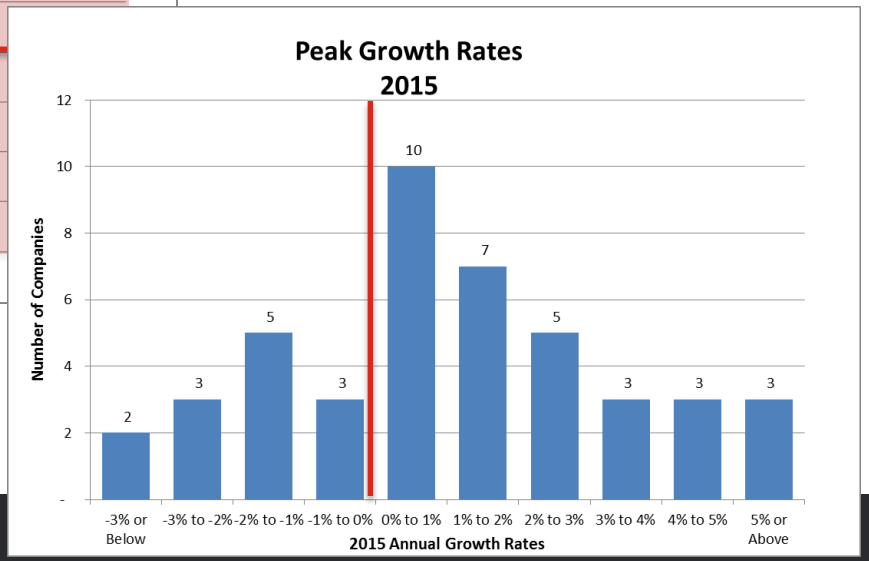


Peak Forecasts (%)

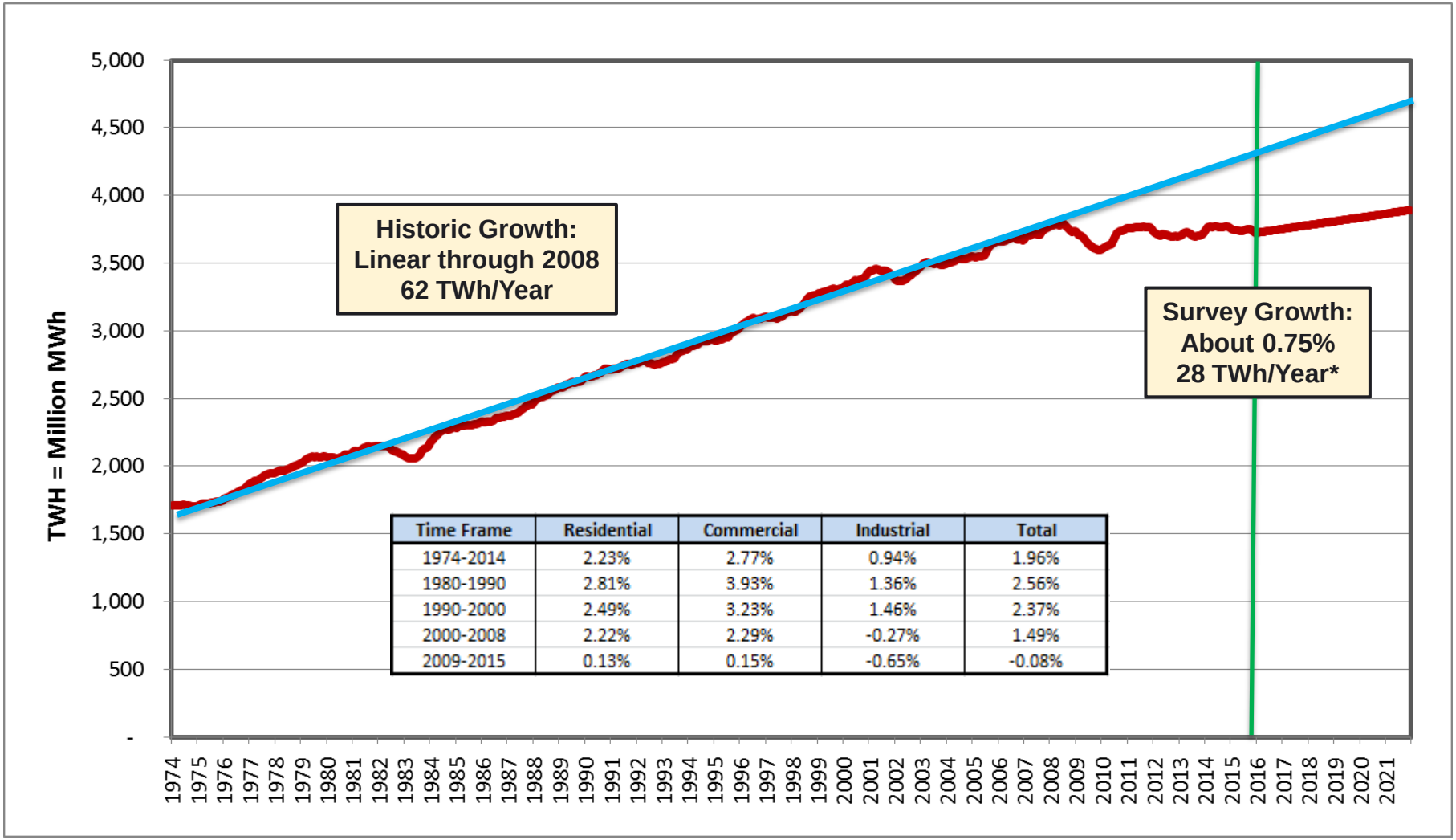
Region	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Actual 2015	Forecast 2016	Forecast 2016-2026
Canada	0.76	0.99	-	(0.53)	(0.87)	2.88	2.72
Midwest	(0.25)	(0.90)	(1.55)	(0.88)	0.25	1.19	0.28
Northeast	(0.35)	1.76	(0.71)	(1.28)	0.90	1.86	0.44
South	0.08	(1.00)	(1.09)	2.22	3.24	1.38	1.43
West	2.28	(0.47)	3.95	(1.02)	0.89	0.66	0.79
Electric Total	0.43	(0.35)	(0.45)	0.18	0.70	1.67	1.22



2015 Forecast
Elect: 1.48



2016 U.S. Electric System Forecast



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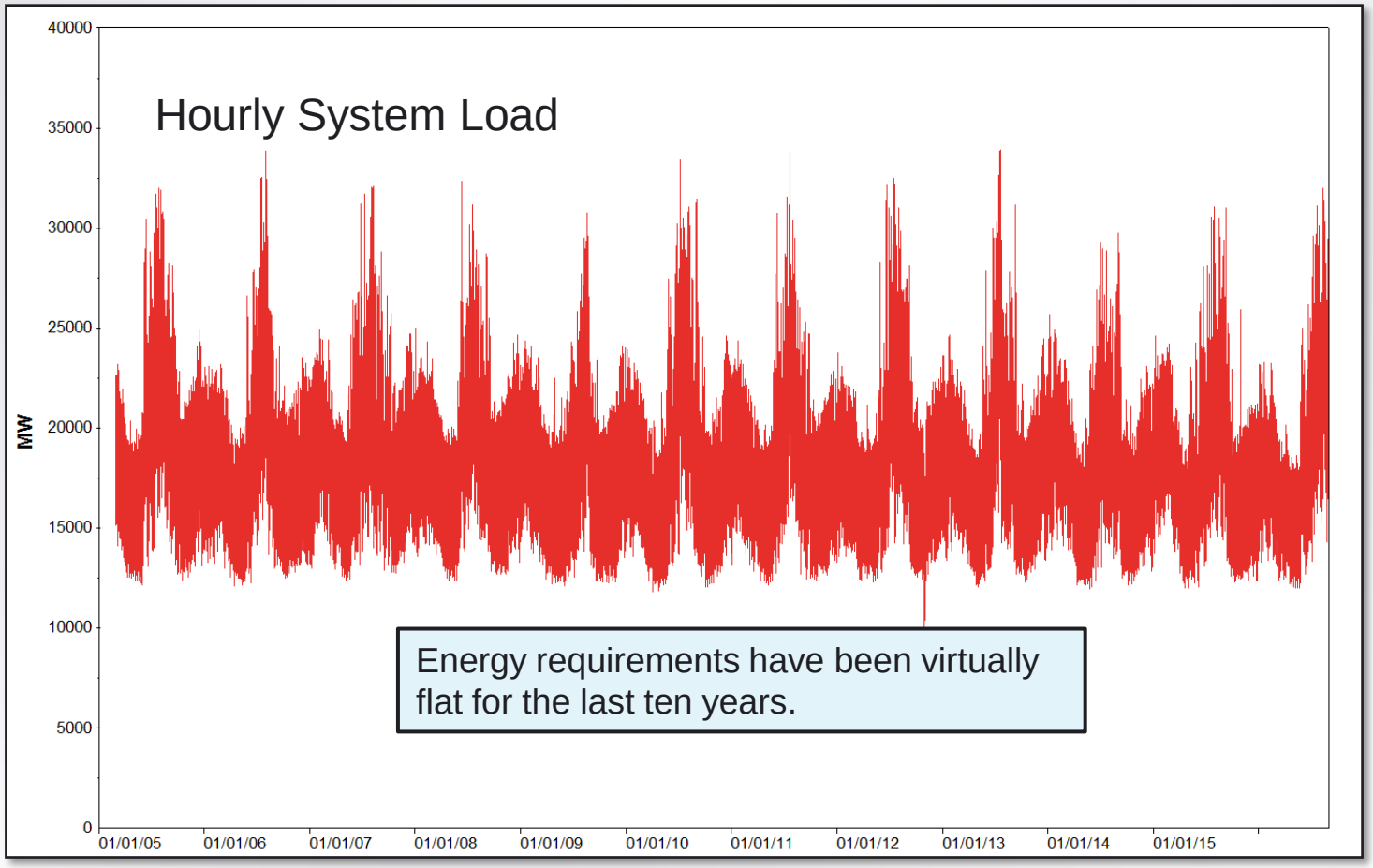
2000-2008	2.22%	2.29%	-0.27%	1.49%
2009-2015	0.13%	0.15%	-0.65%	-0.08%

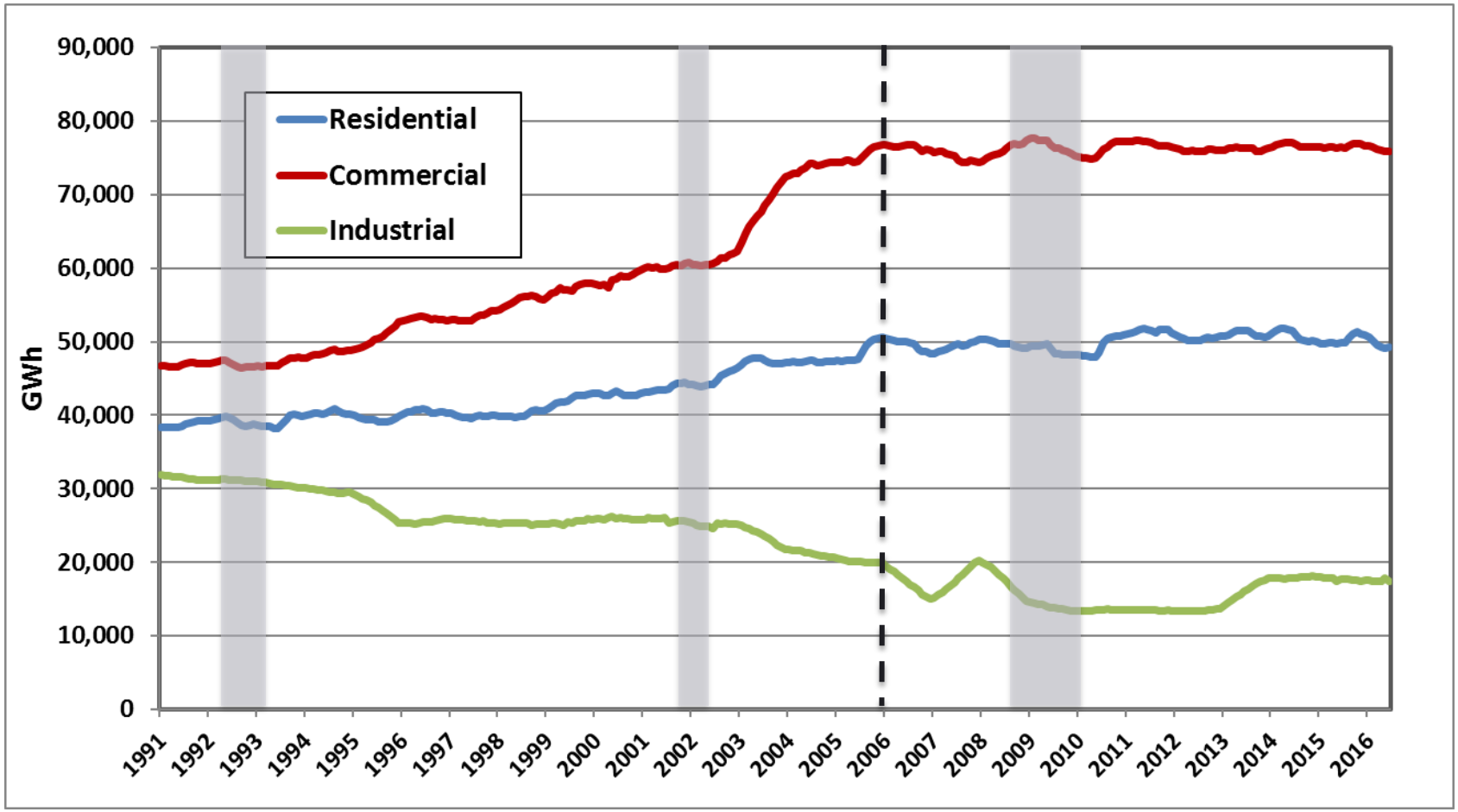
Forecast is the sum of Residential, Commercial, and Industrial sales

NEW YORK ENERGY AND SALES TRENDS

NEW YORK ELECTRIC LOAD (2005 – 2016)

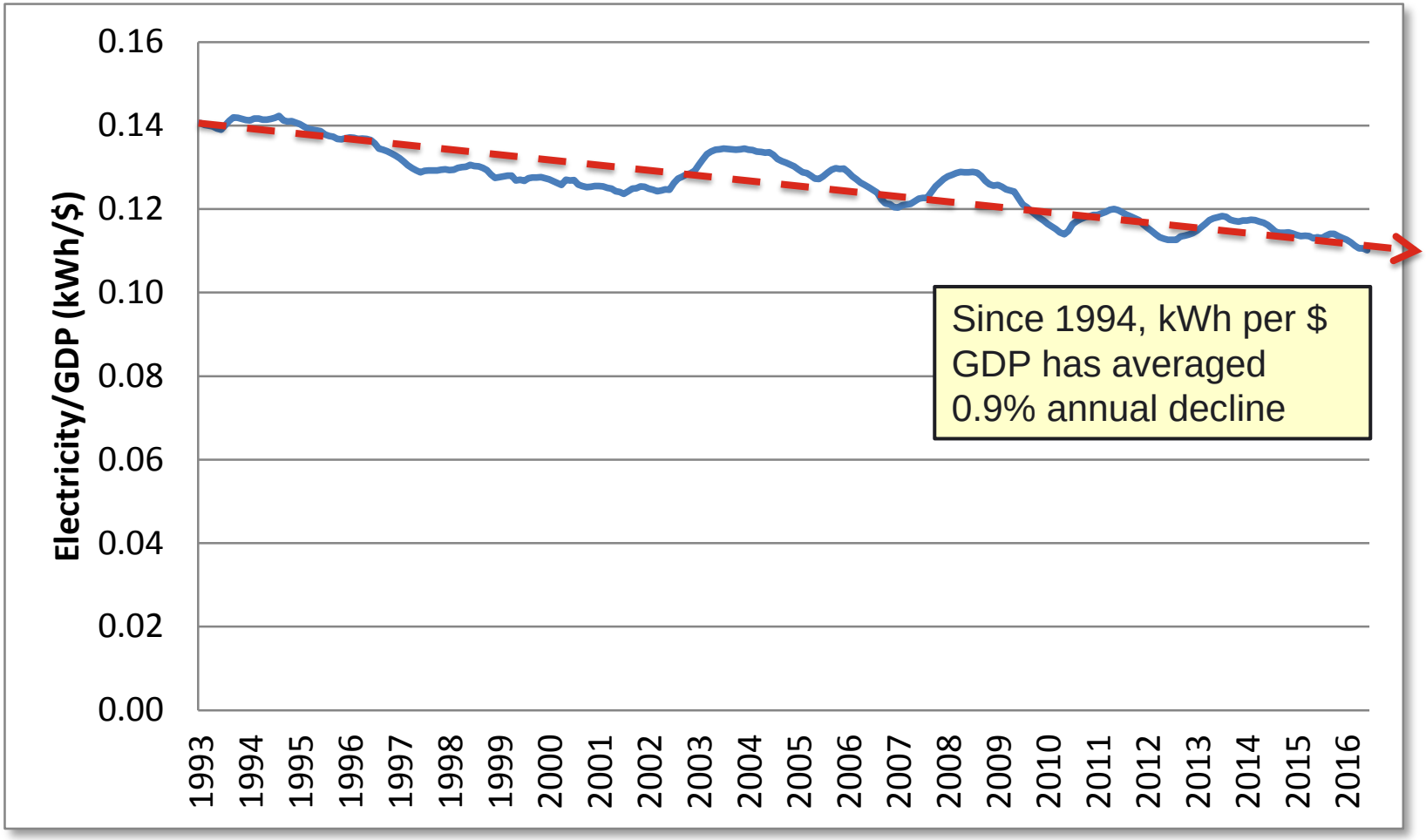


New York Customer Class Sales (GWh)

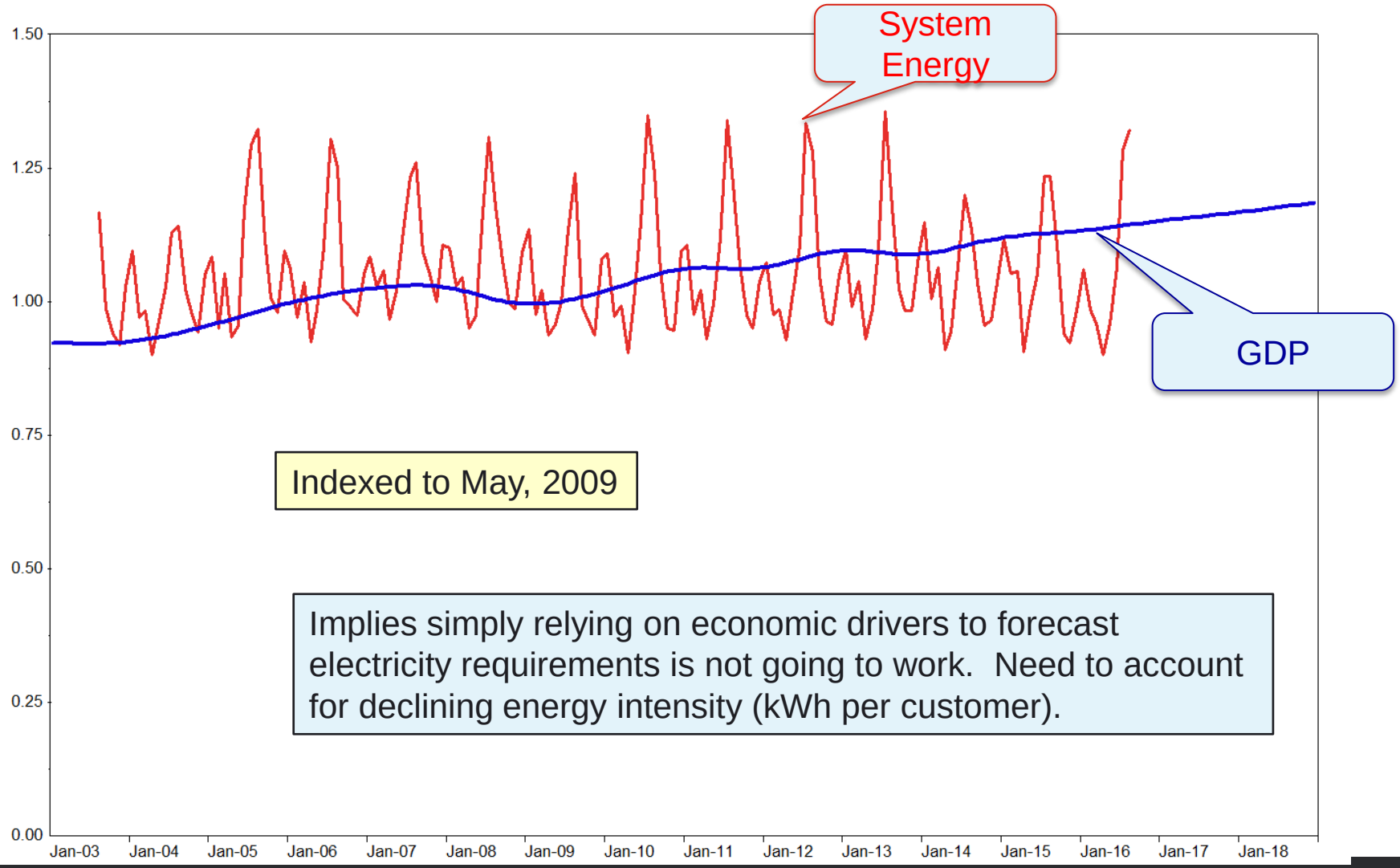


Computed as 12-month moving-sum of monthly class sales
Data updated through June 2016

Energy Intensity (kWh per $ GDP)



Changing Energy and Economic Relationship
Energy Requirements vs. GDP

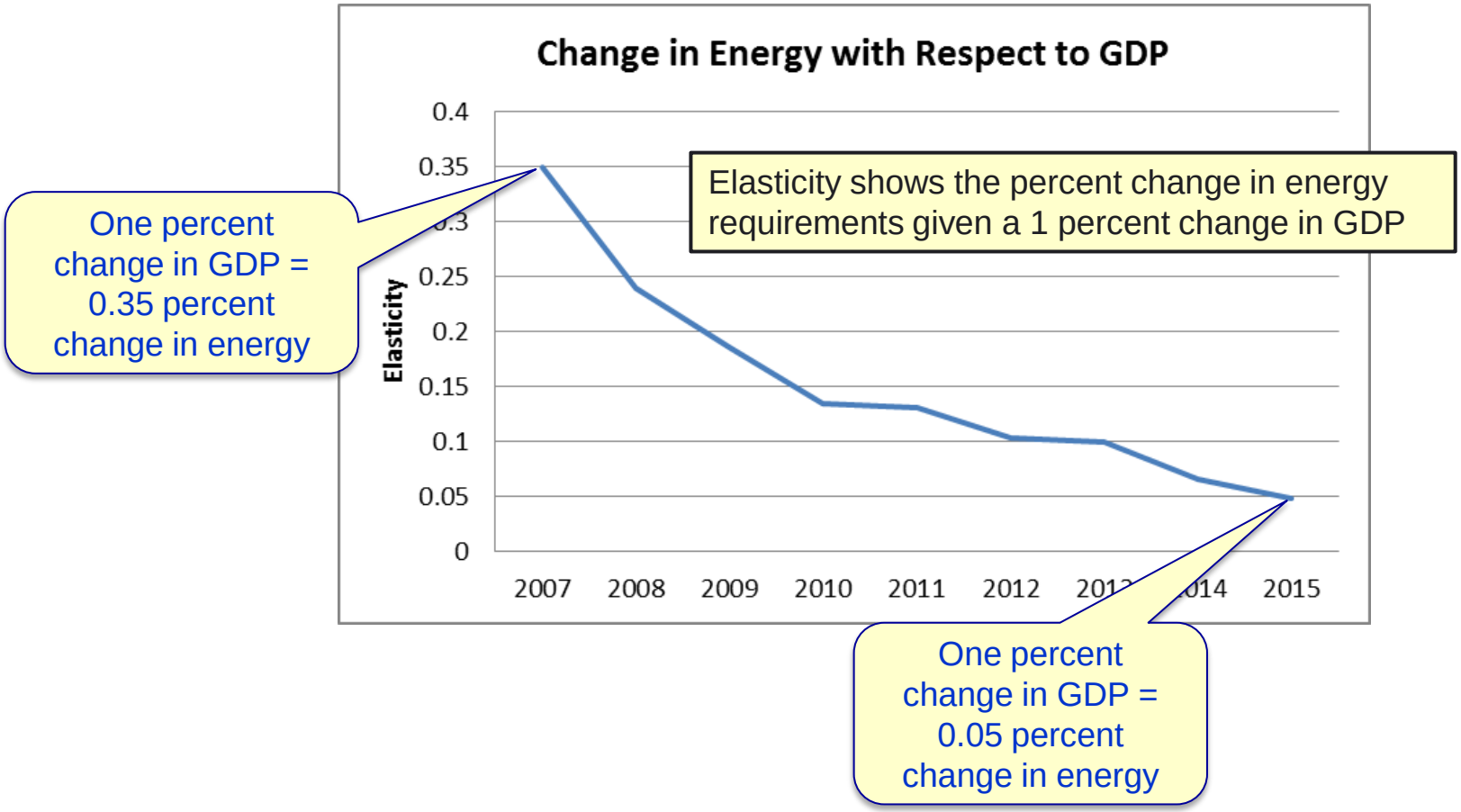


Indexed to May, 2009

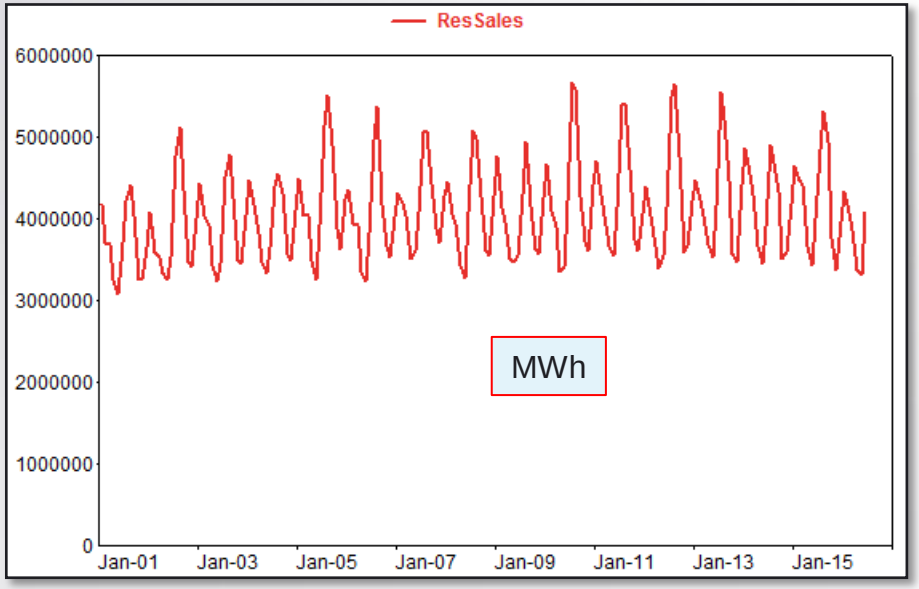
Implies simply relying on economic drivers to forecast electricity requirements is not going to work. Need to account for declining energy intensity (kWh per customer).

Energy and GDP – The Power of the Past

Simple regression model that relates historical energy to GDP, HDD, and CDD. Estimated starting in 2003.

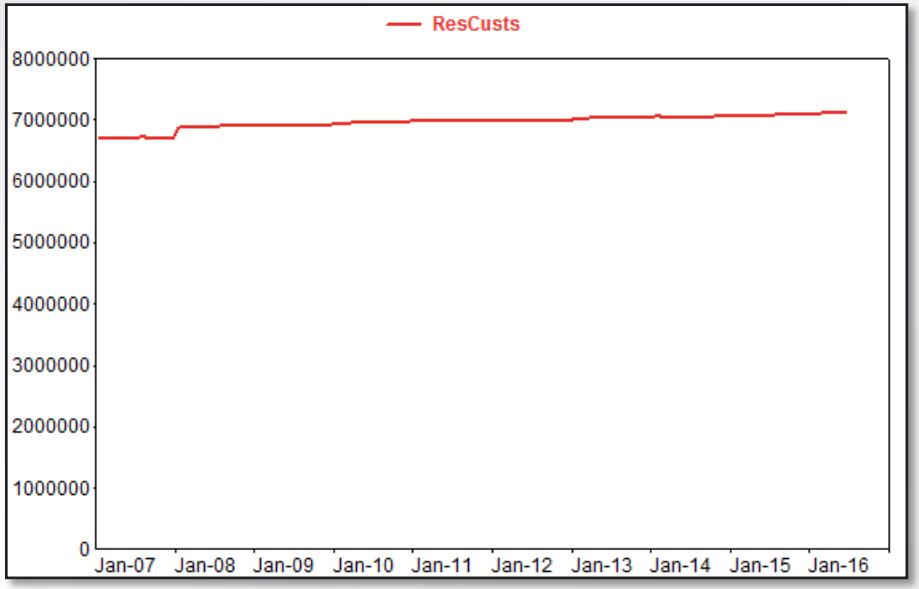


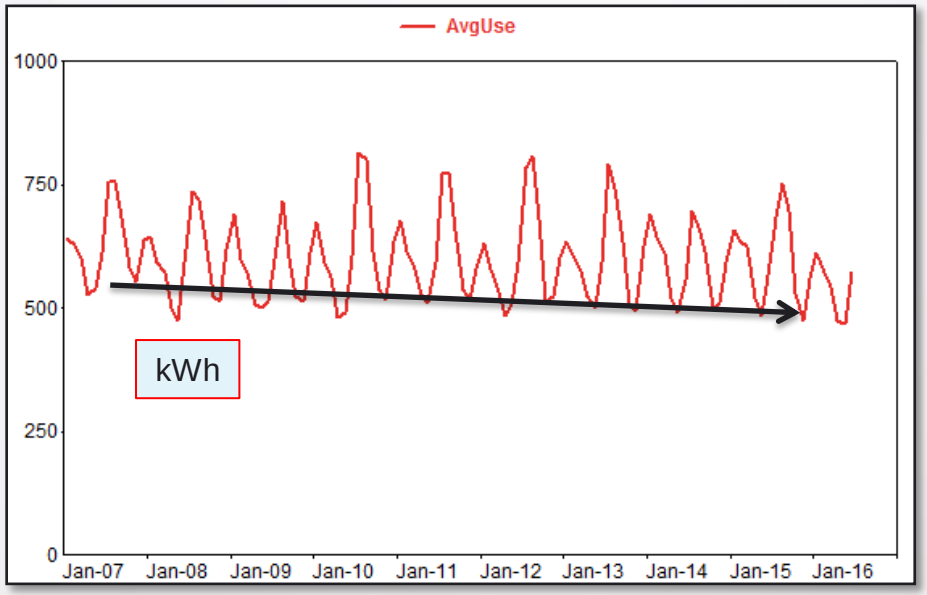
NEW YORK RESIDENTIAL SALES TRENDS



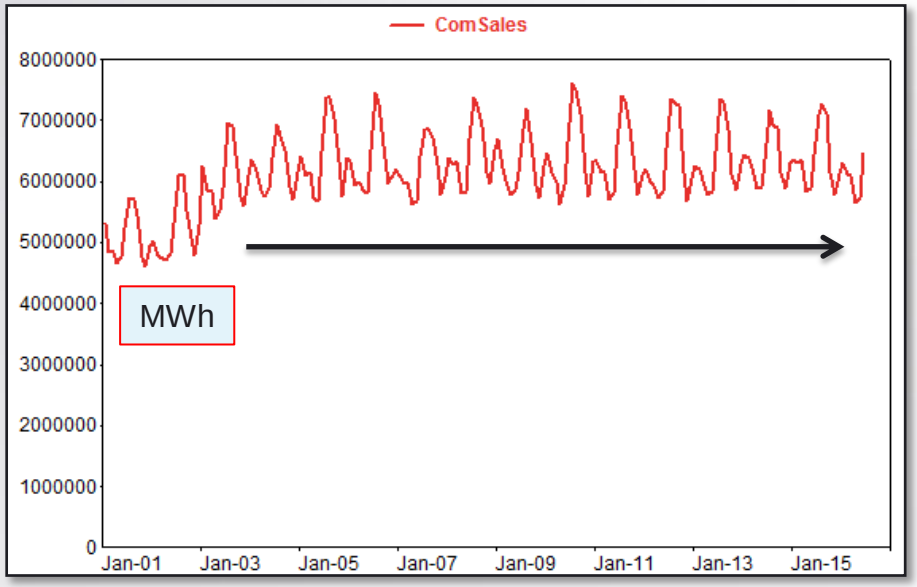
Increasing population and decreasing usage per customer combine to produce residential sales that have been largely flat over the last ten years.

	Sales	Custs	AvgUse
07-15	0.2%	0.7%	-0.5%



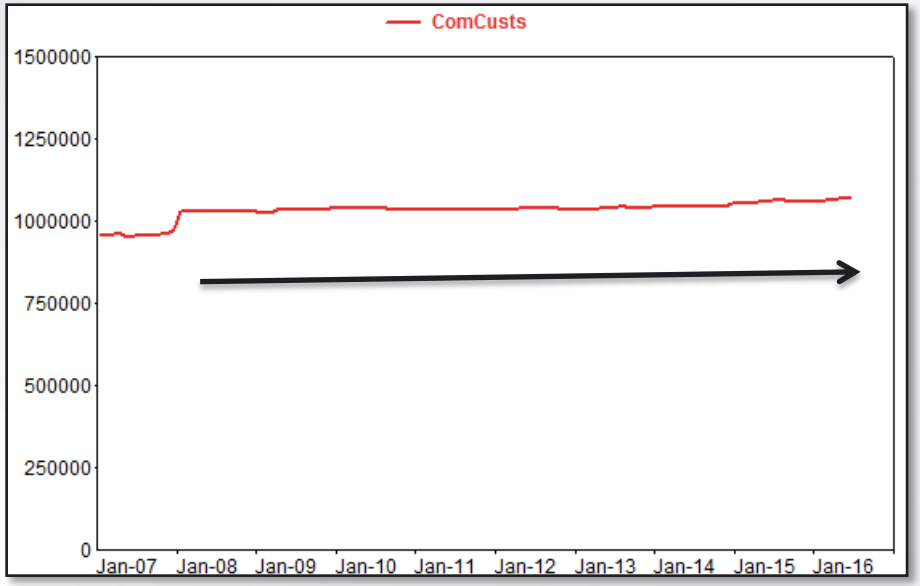


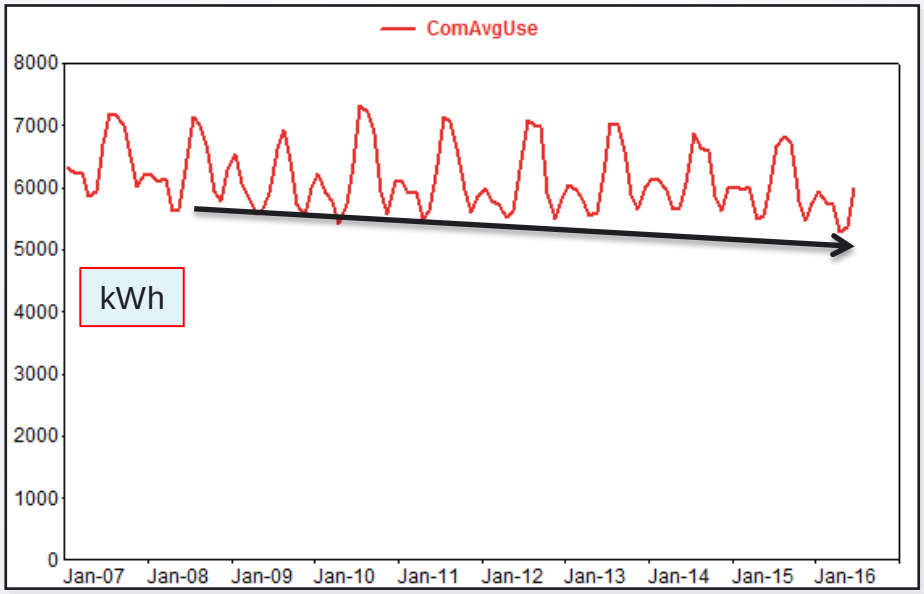
NEW YORK COMMERCIAL SALES TRENDS



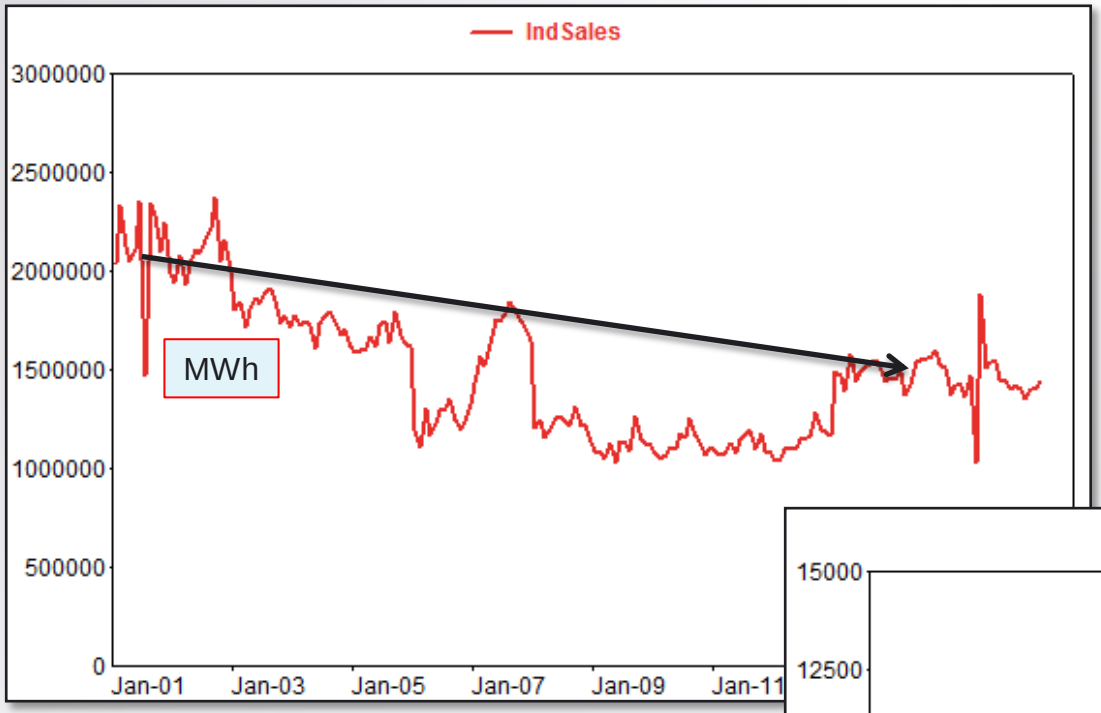
It's the same story in the commercial sector. Since 2008 average use decline has been stronger than customer growth.

	Sales	Custs	AvgUse
08-15	-0.1%	0.4%	-0.5%

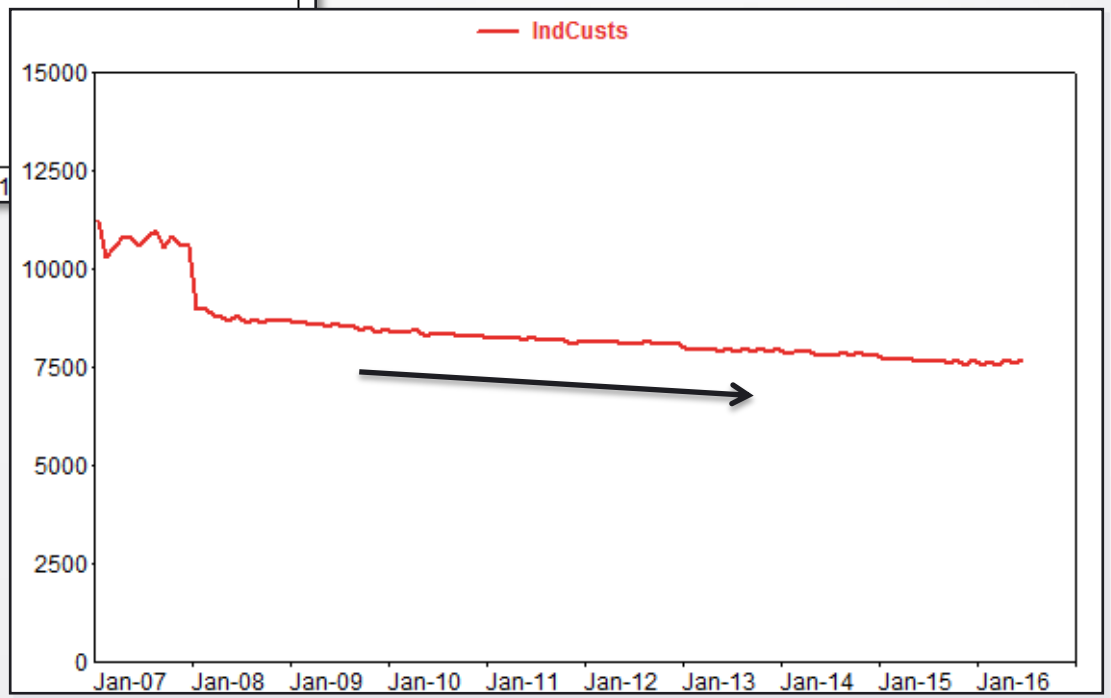




NEW YORK INDUSTRIAL SALES TRENDS



Industrial sales have been on a long-term decline. Industrial sales increased coming out of the recession and have since flattened out.

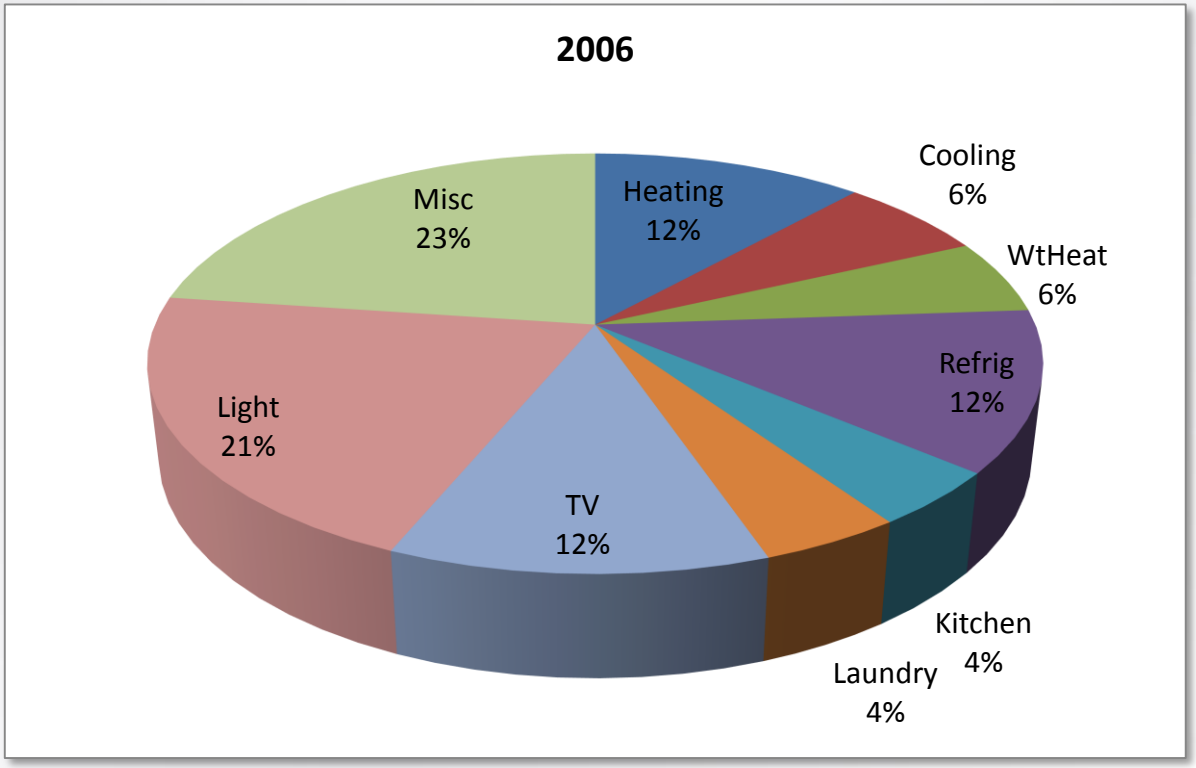


Factors pressuring energy sales

- The Big Factors
  - New appliance and business equipment efficiency standards
  - Utility and state-sponsored energy efficiency (DSM) programs

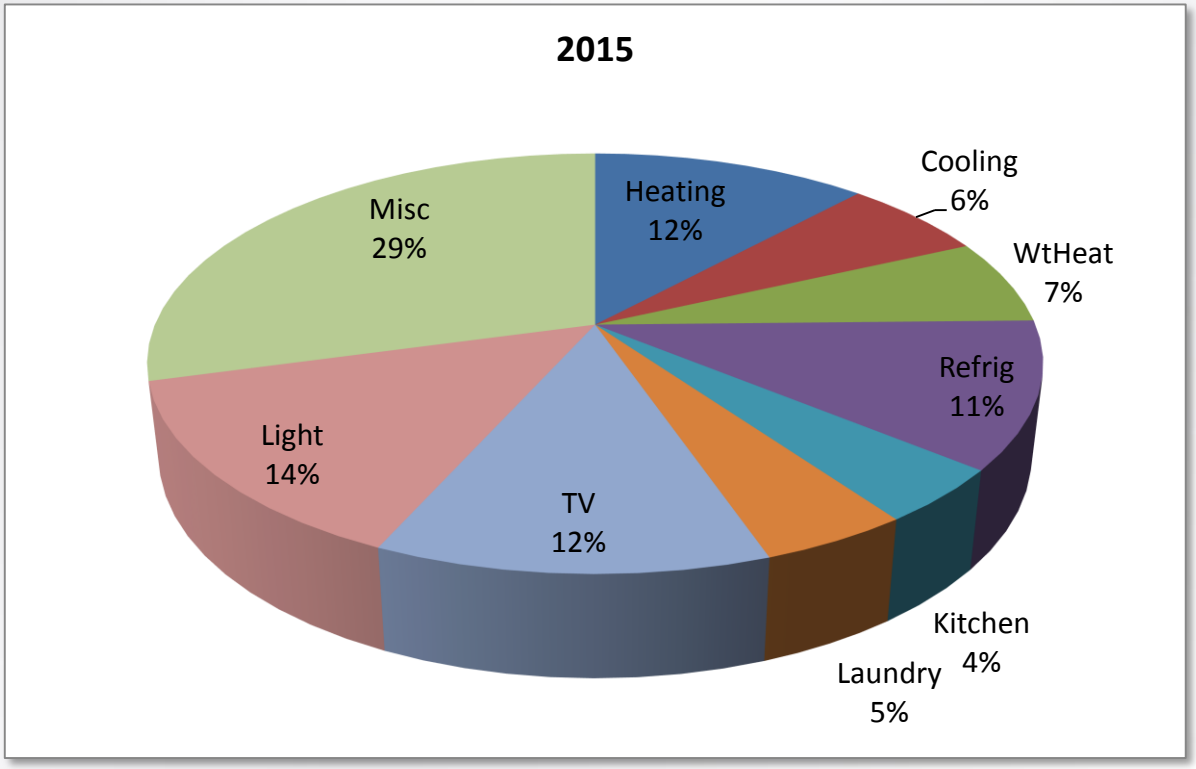
- Other Contributing Factors - The World is Changing
  - Increasing share of less energy-intensive industries (decline in industrial production, increase in personal services)
  - Declining square footage resulting from increase in multi-family home share
  - Slower economic and household income growth
  - Solar load penetrations (in some states)
  - Changing demographics – slower household formation, smaller household size, aging population

Residential Usage - NY



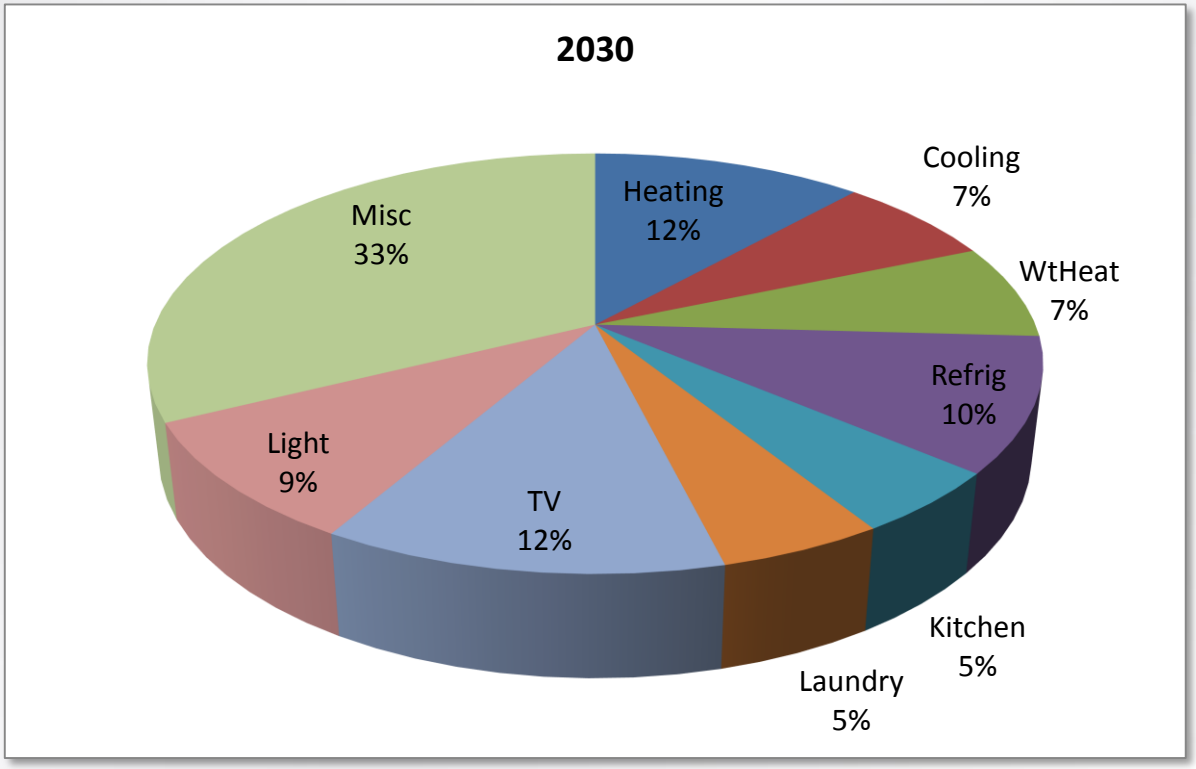
Normalized average use = 7,234 kWh

Residential Usage - NY



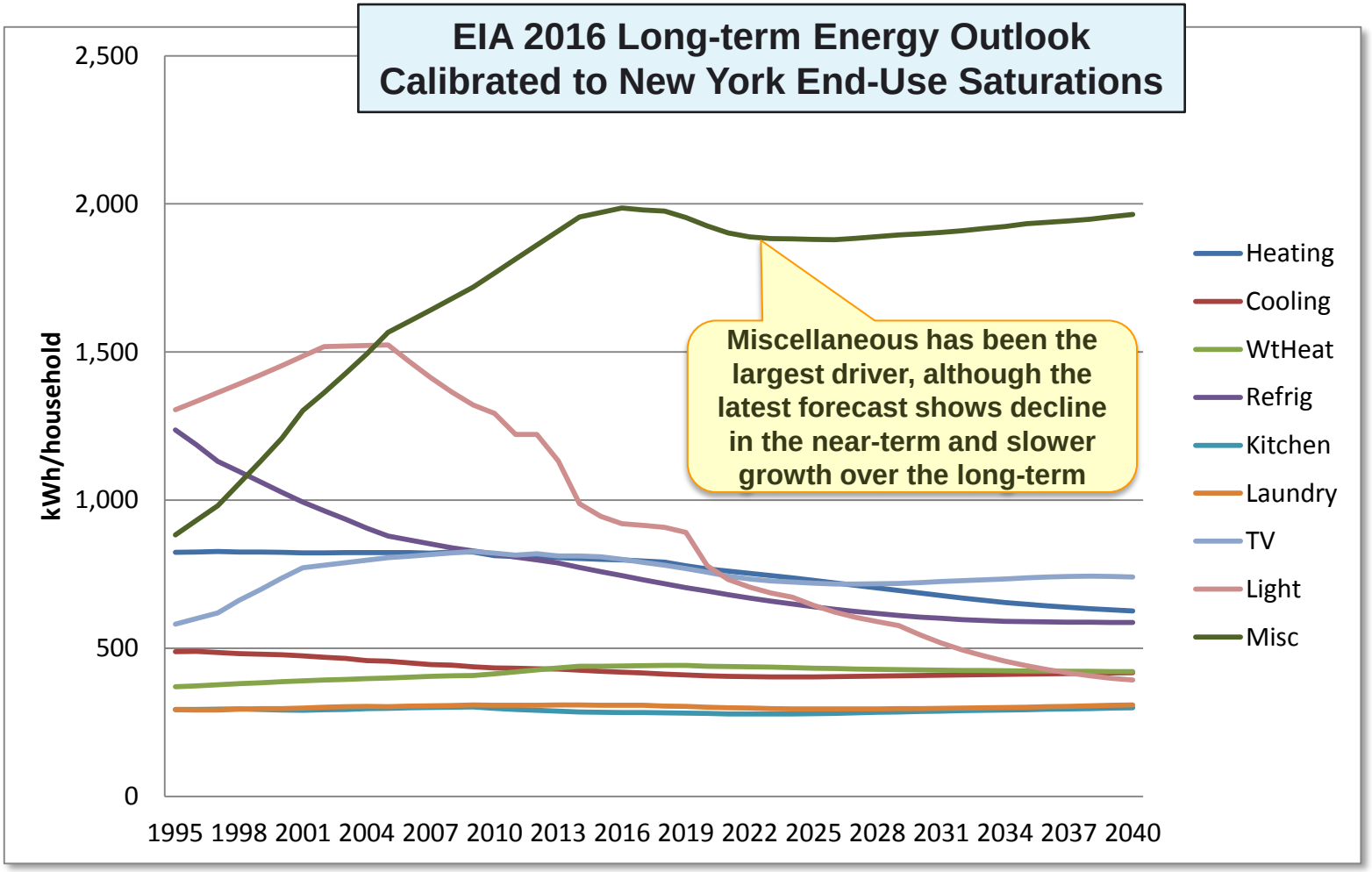
Normalized average use = 7,060 kWh

Residential Usage - NY



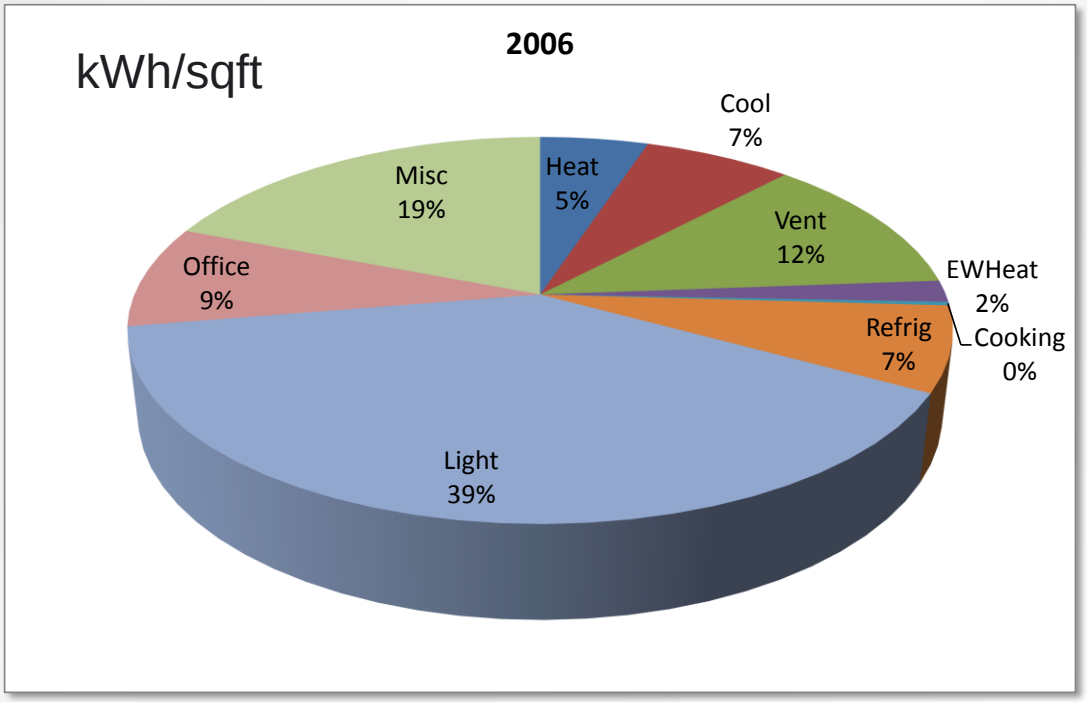
Normalized average use = 6,350 kWh

Residential End-Use Energy Intensities



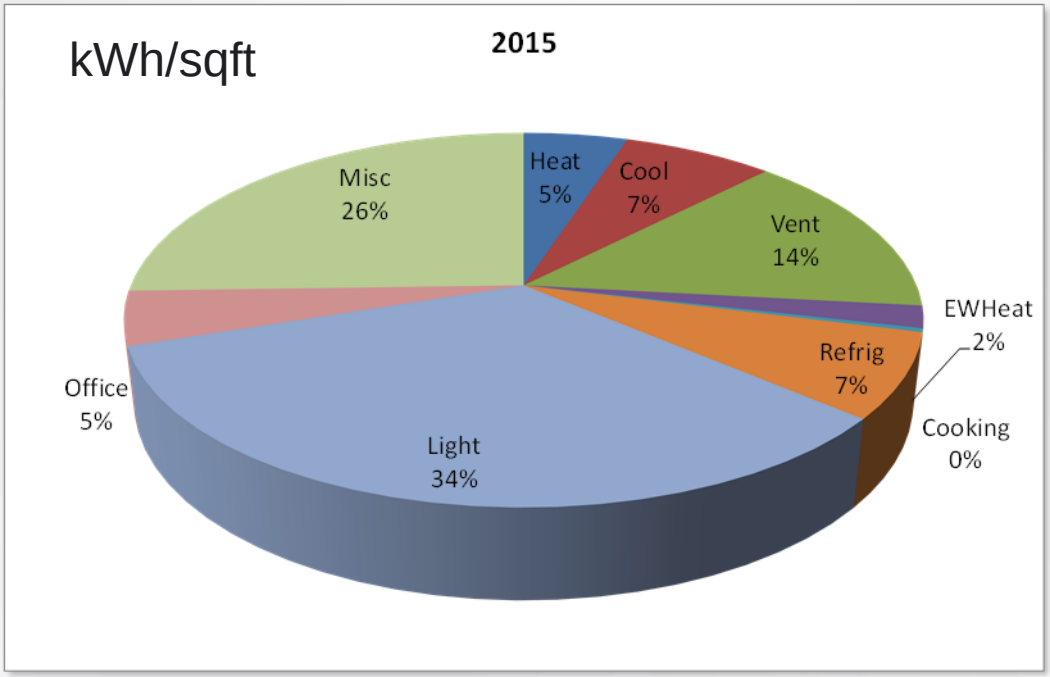
Total residential energy intensity is projected to decline 1.1% annually over the next 10 years as efficiency gains outweigh saturation growth.

Commercial Usage - NY



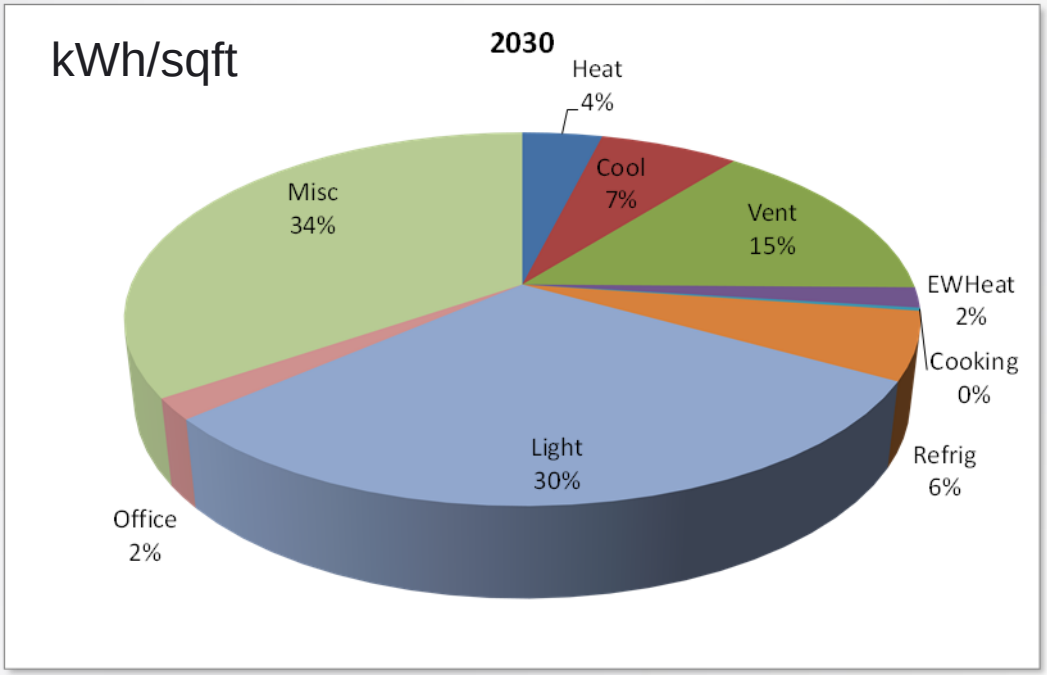
Normalized average use = 73,651kWh

Commercial Usage - NY



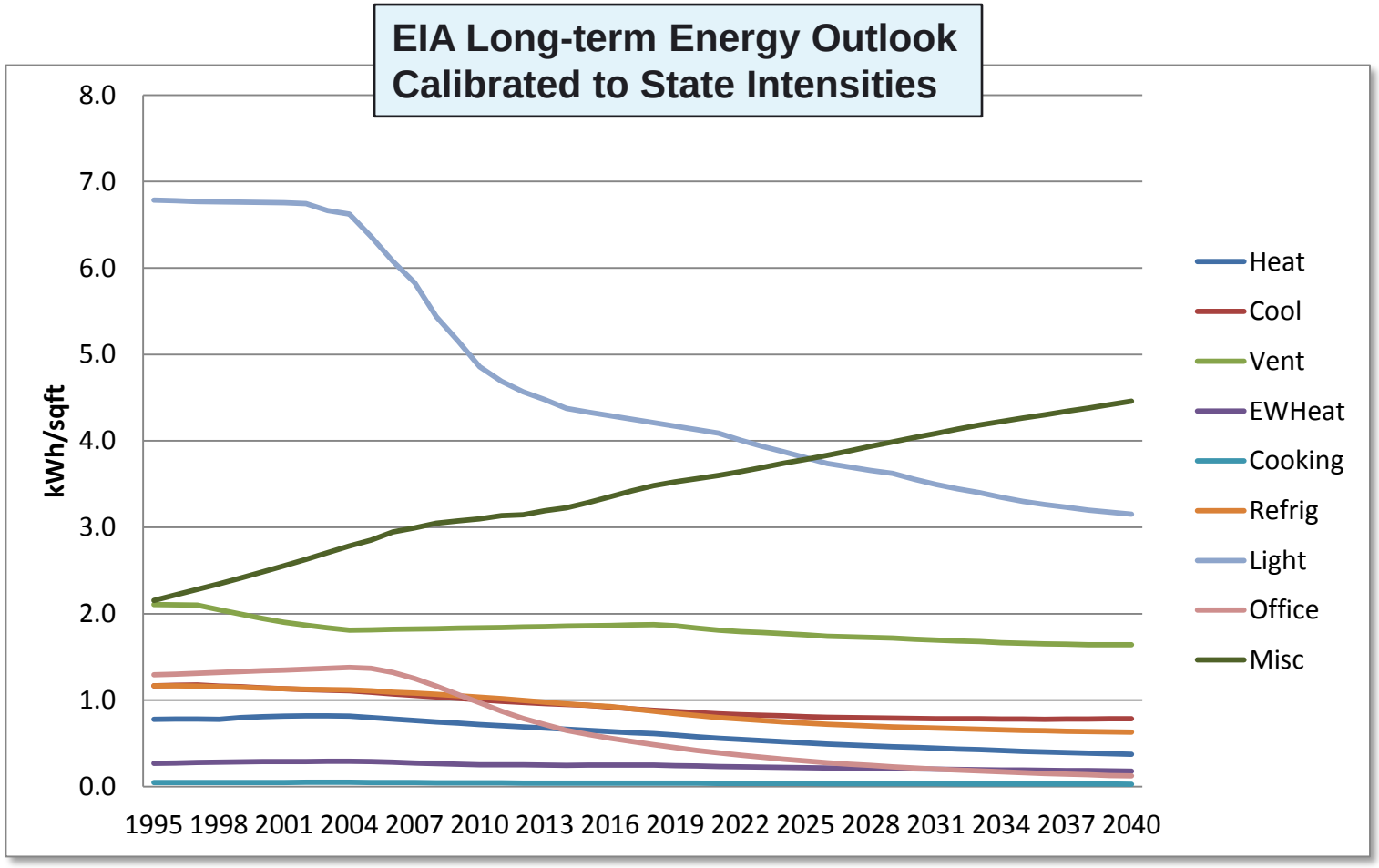
Normalized average use = 71,138 kWh

Commercial Usage - NY



Normalized average use = 69,012 kWh

Commercial End-Use Intensities



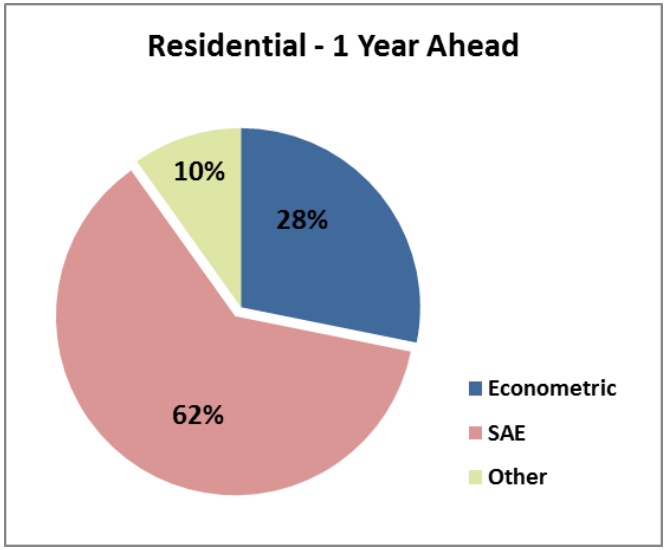
Total commercial intensity averages 0.8% decline over the next 10 years.

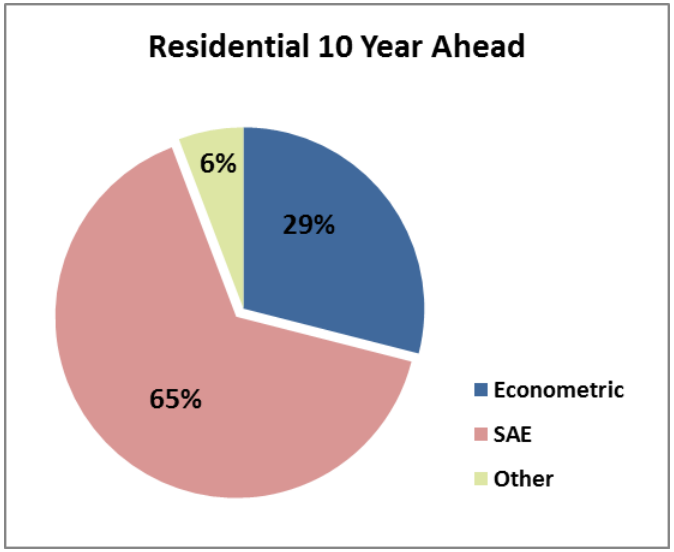
FORECAST MODEL IMPLICATIONS FOR THE FUTURE

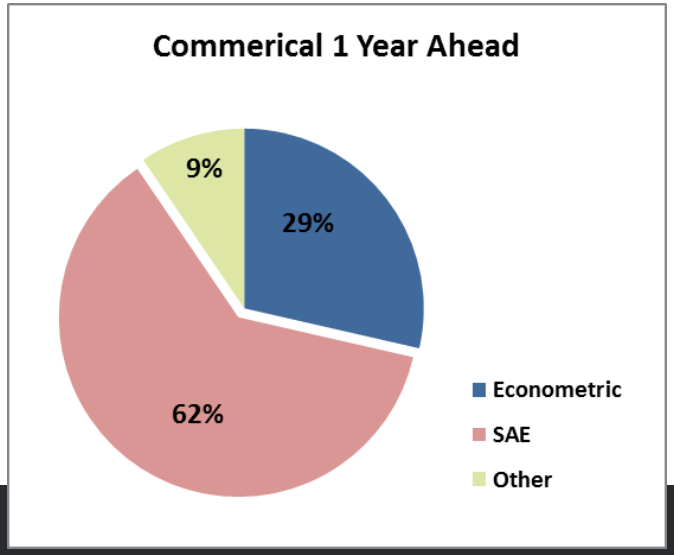
Forecast Drivers

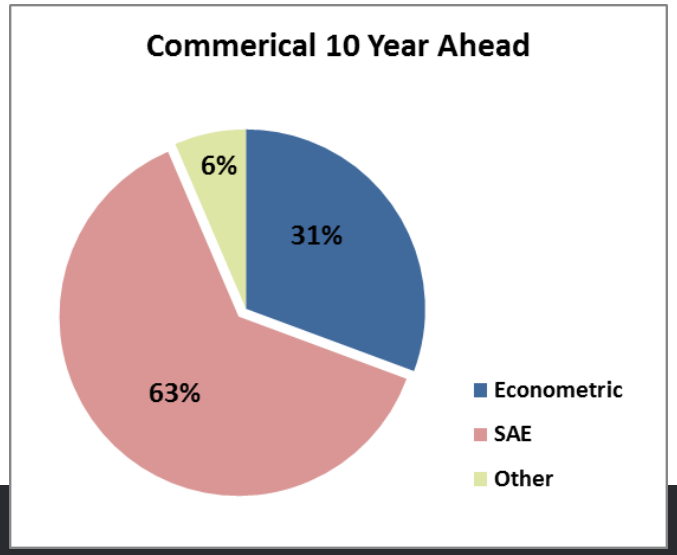
- State-level historical and forecasted economic drivers:
  - Number of Households
  - GDP
  - Total employment
  - Manufacturing employment
- Monthly zonal-level weighted HDD and CDD
  - 30-year normal forecast
- Historical and projected end-use saturation, efficiency, and intensities calibrated to New York. Projections based on EIA 2016 Annual Energy Outlook
- Forecast based on Statistical Adjusted End-Use (SAE) model specifications estimated with reported monthly billed sales and customer data

Energy forecast methods



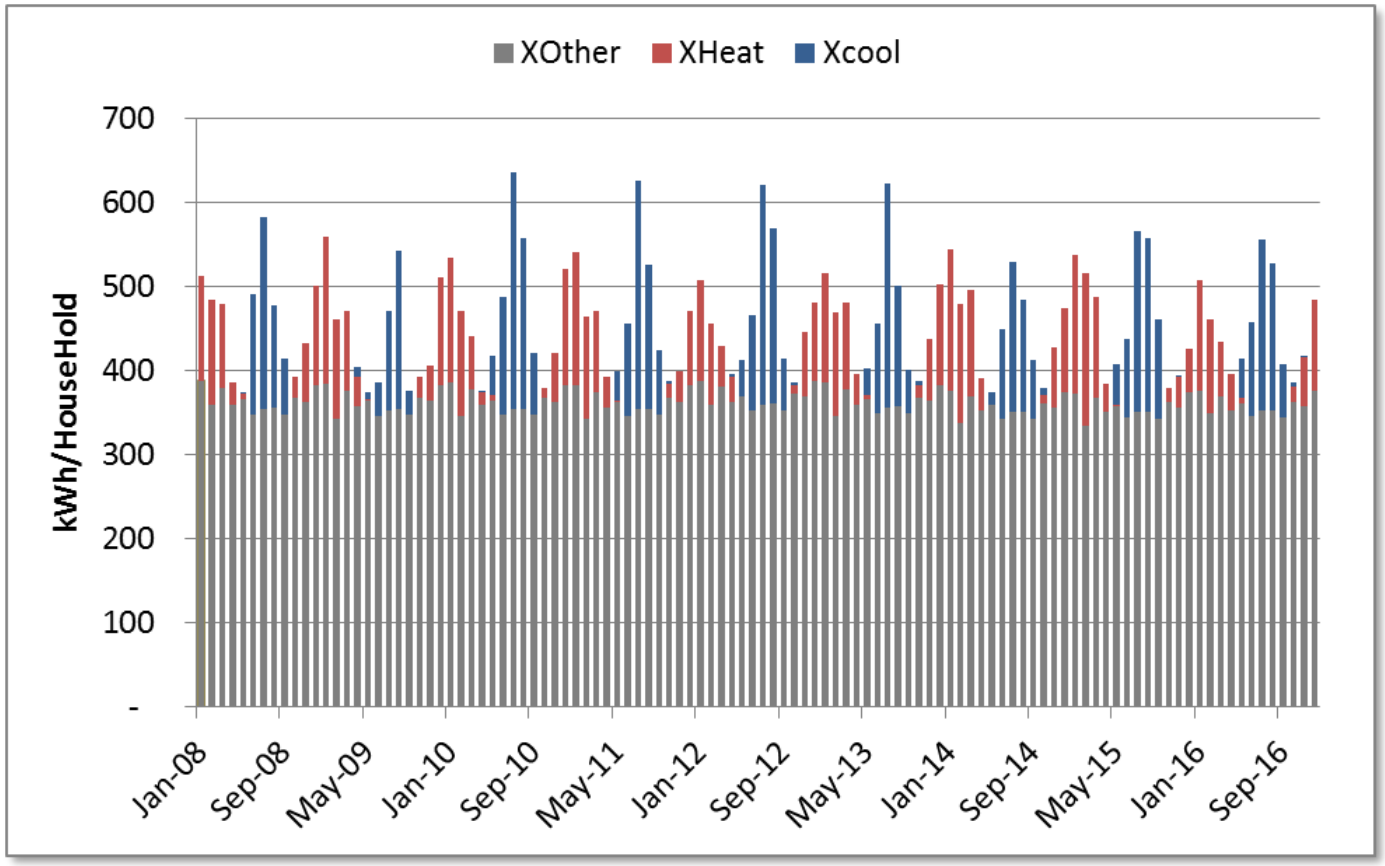






Residential Average Use Model Variables

Economic, price, and end-use intensities are combined to generate estimates of average monthly heating, cooling, and base-use energy requirements.

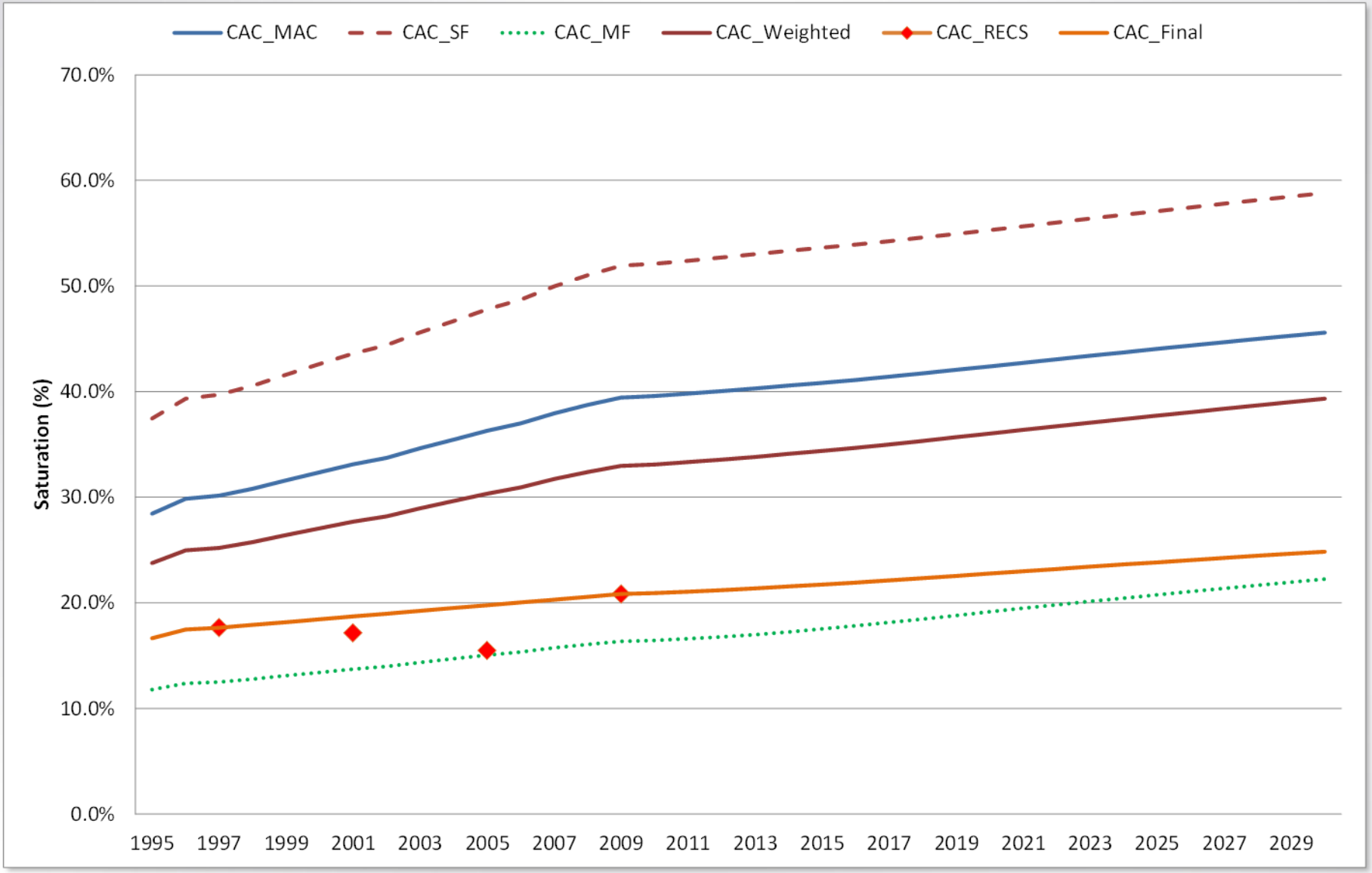


$$AvgUse_m = a + b_c \times XCool_m + b_h \times XHeat_m + b_o \times XOther_m + e_m$$

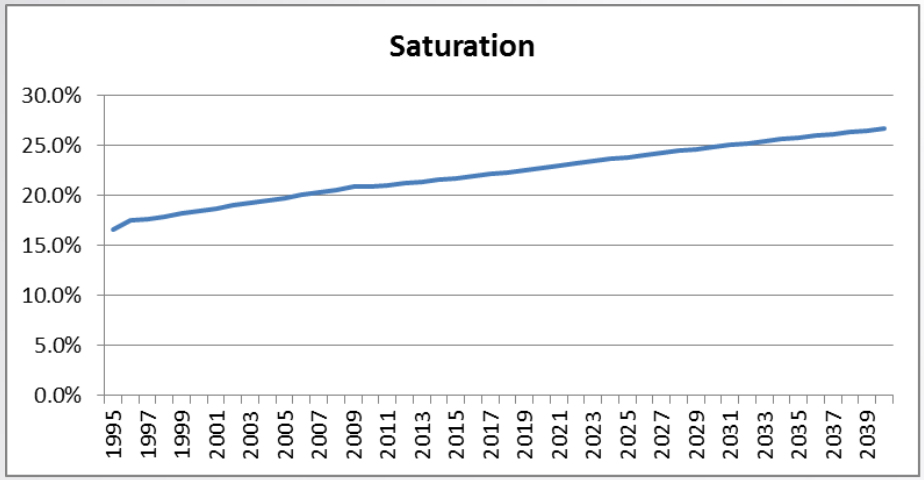
Calibrated End-Use Intensities - Data Sources

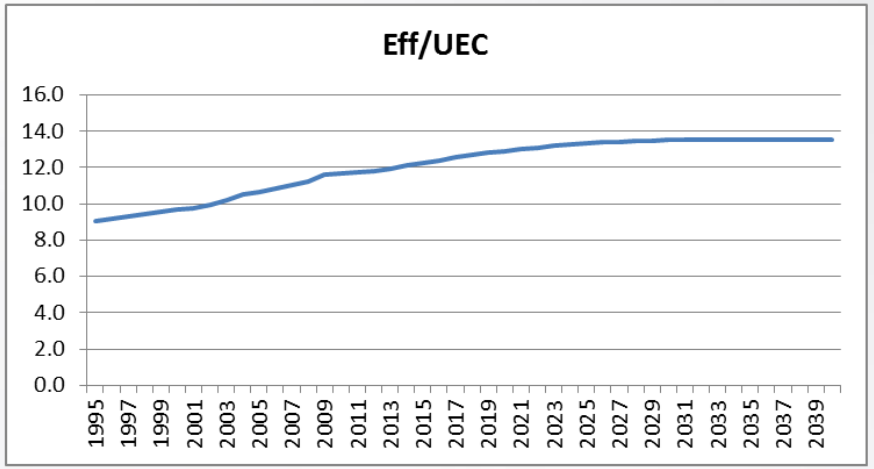
- 2016 EIA Annual Energy Outlook – Mid-Atlantic Census Division
- Residential Energy Consumption Survey (RECS) 1997, 2001, 2005 and 2009
- Commercial Building Energy Consumption Survey (CBECS) 2003 and 2012
- 2010 Energy Efficiency Potential Study for Consolidated Edison Company of New York, Inc. (Global Energy Partners)
- 2016 PSEG Long Island Energy Efficiency Potential Study (Applied Energy Group)
- US Census Bureau

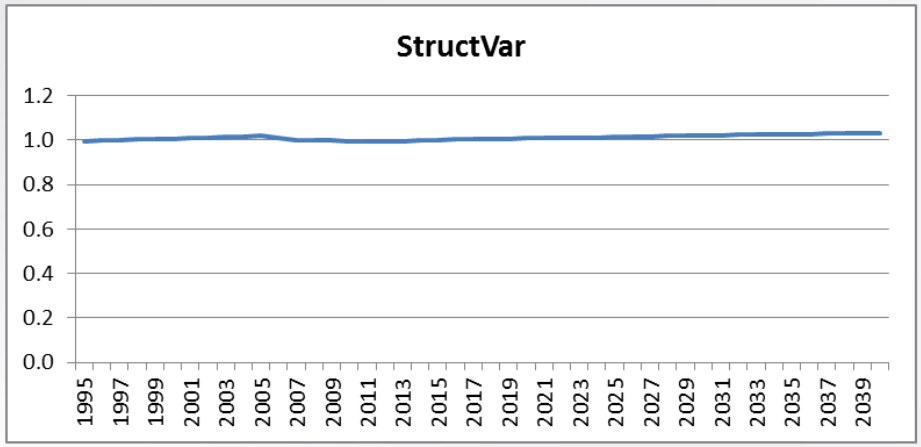
Residential Cooling – Central Air Conditioning

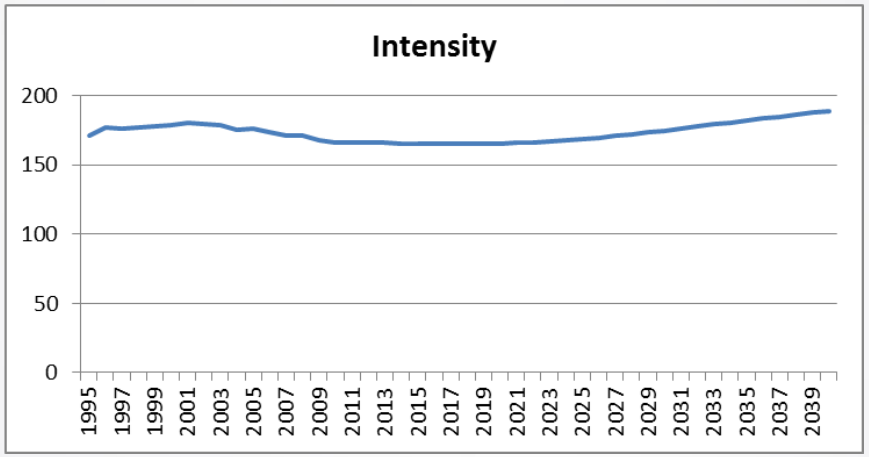


Residential Central Air Conditioning

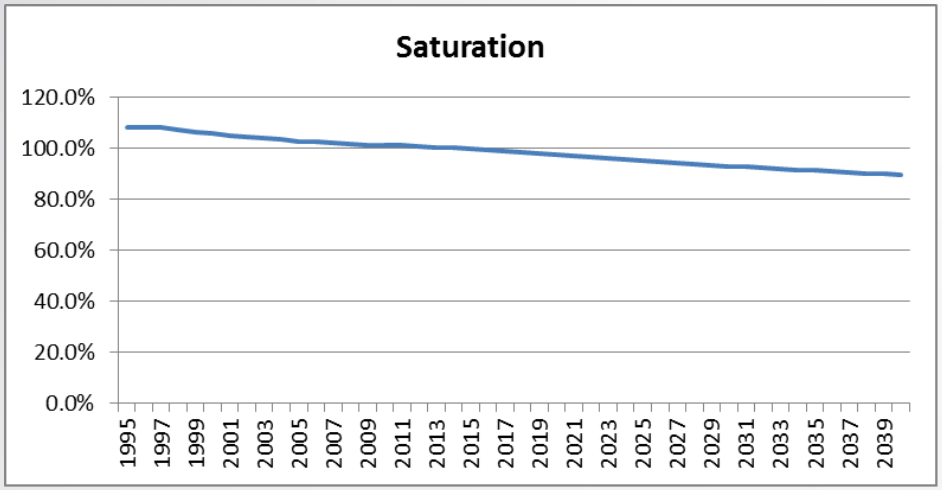


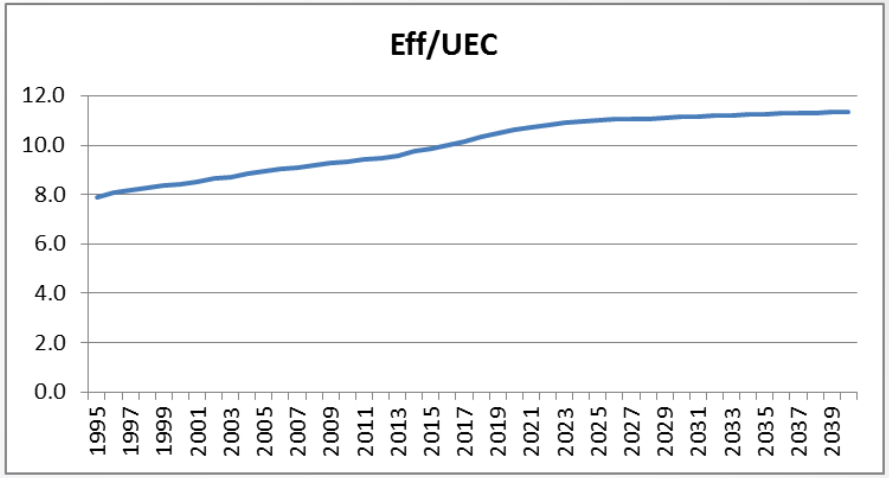


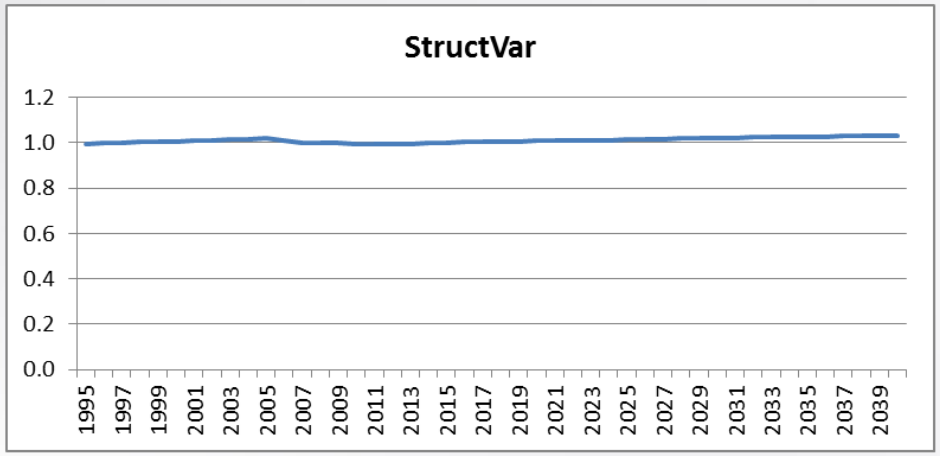


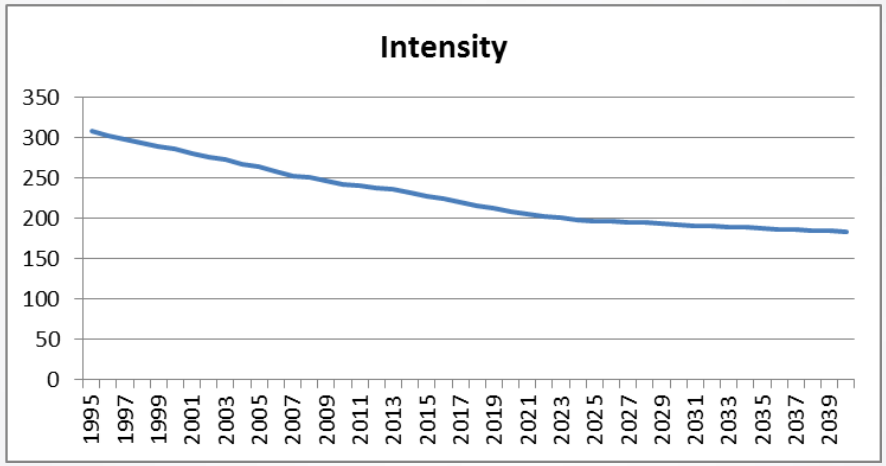


Residential Room Air Conditioning

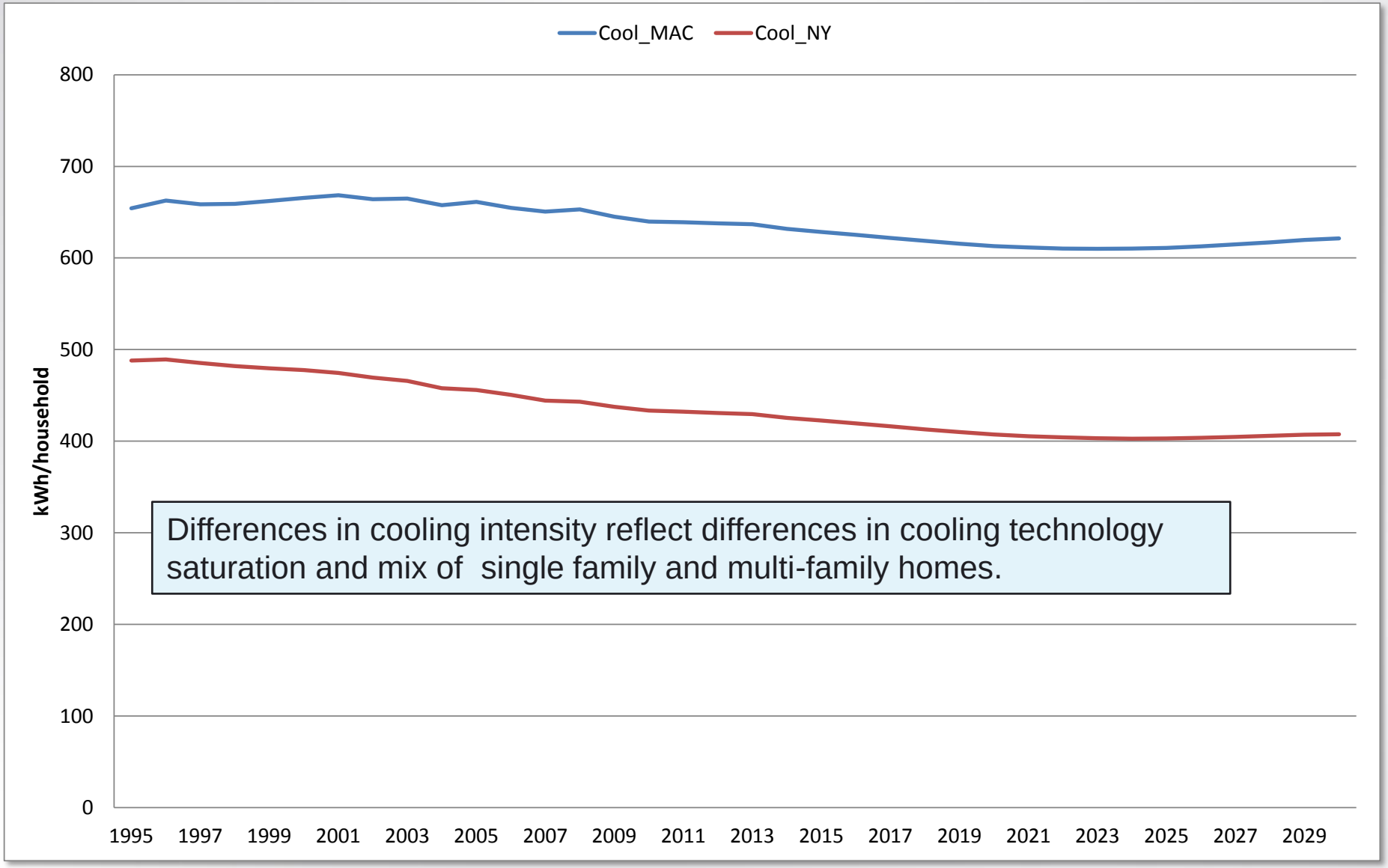




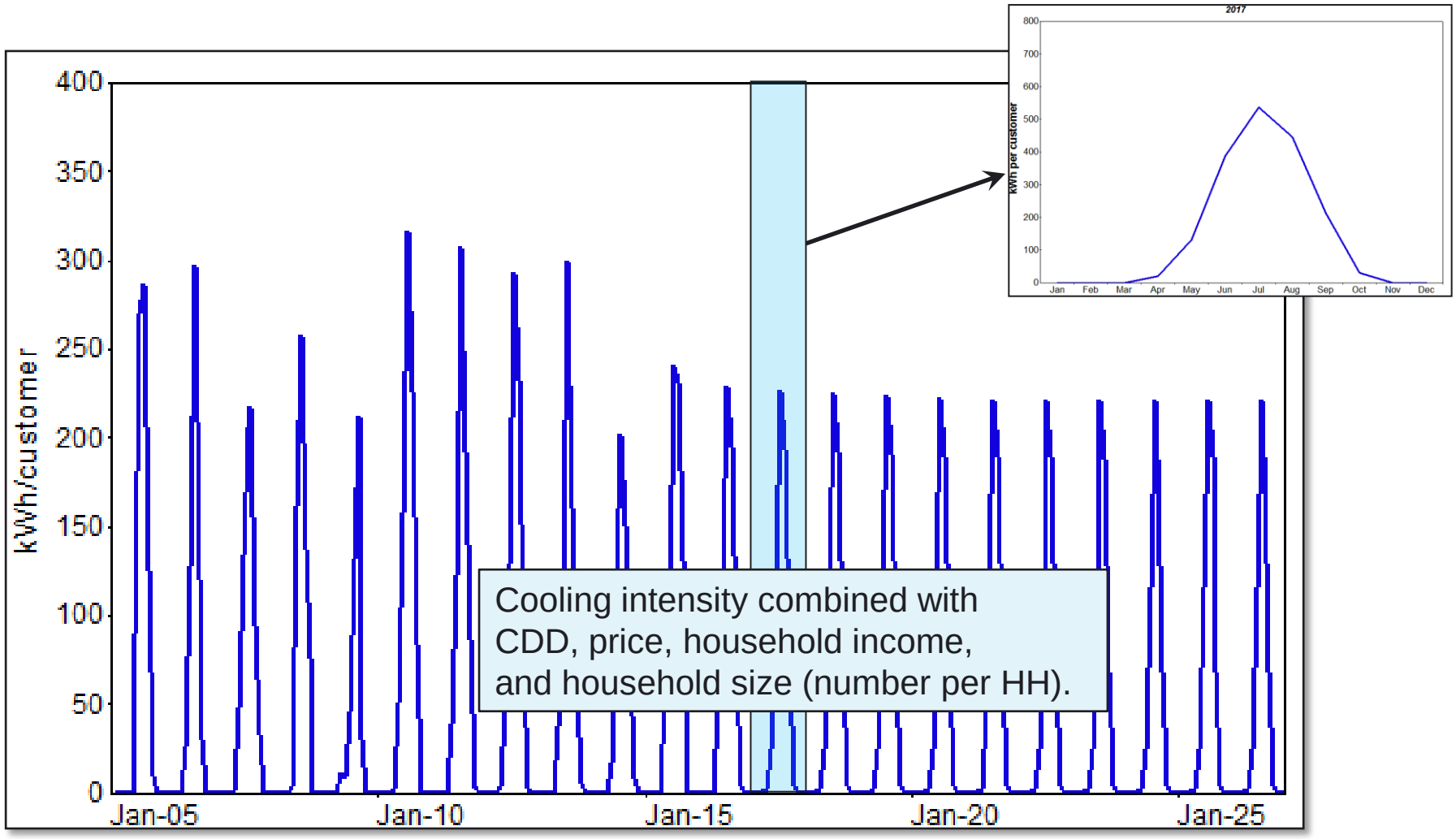




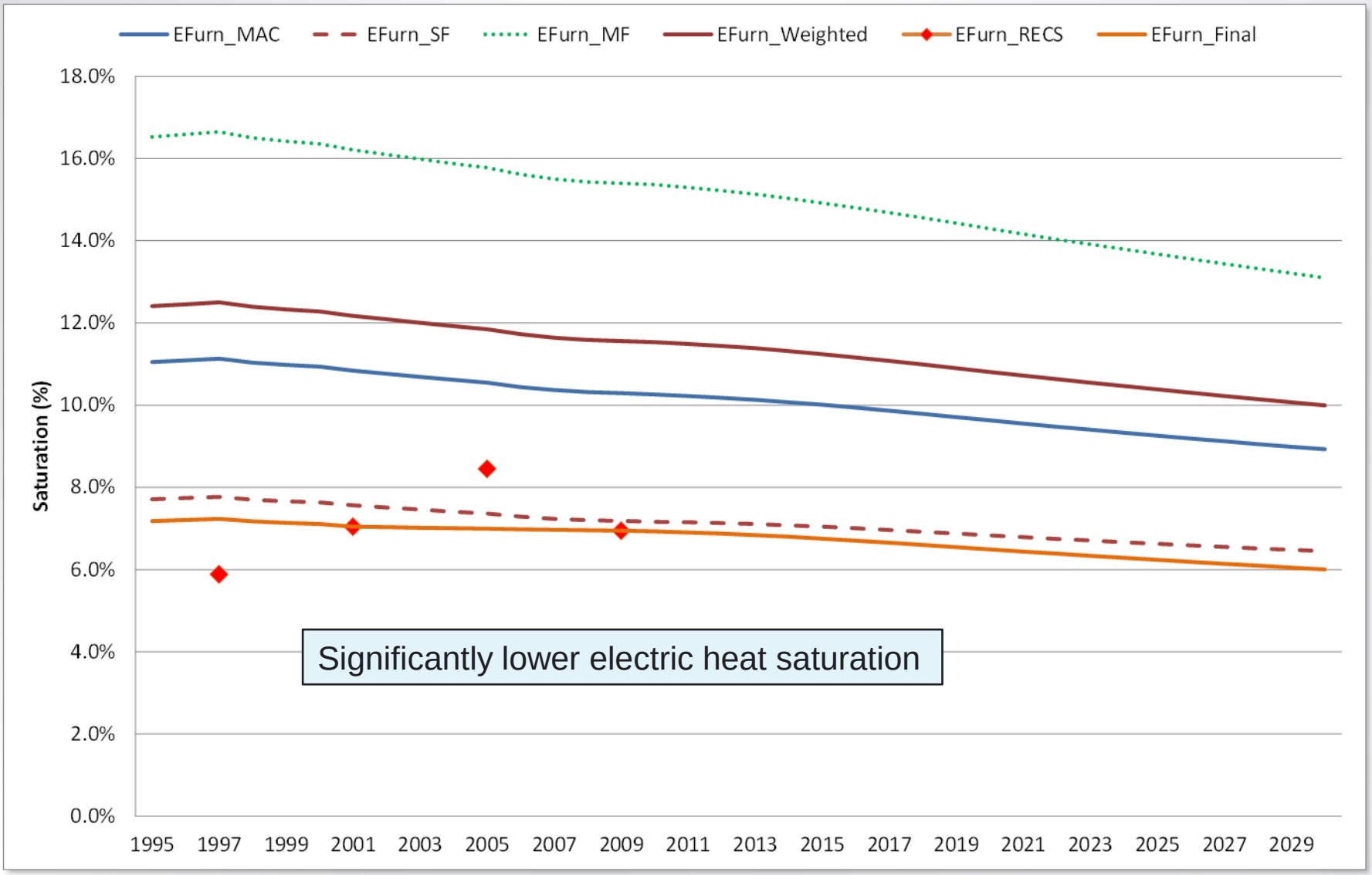
Residential Cooling Intensity



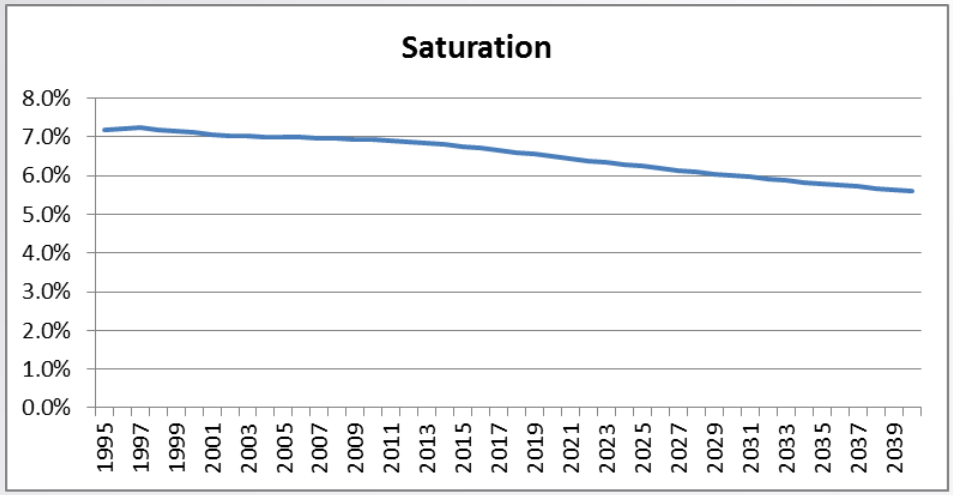
Residential XCool Variable

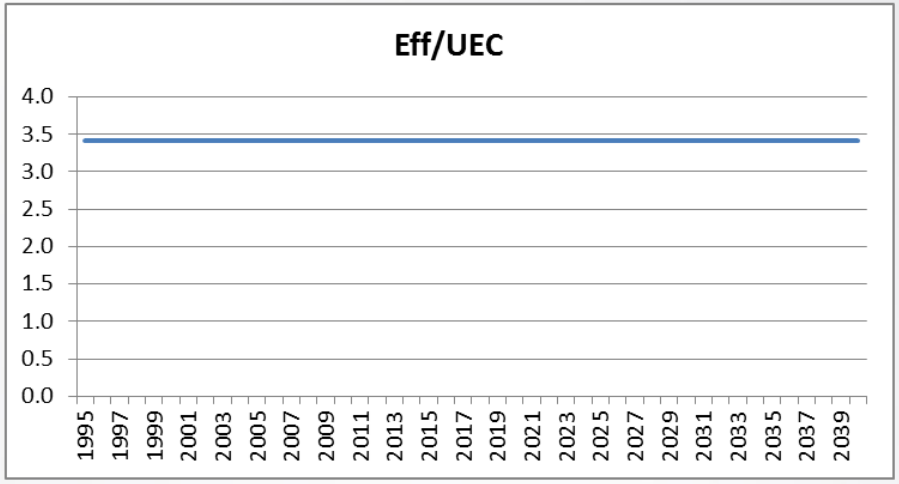


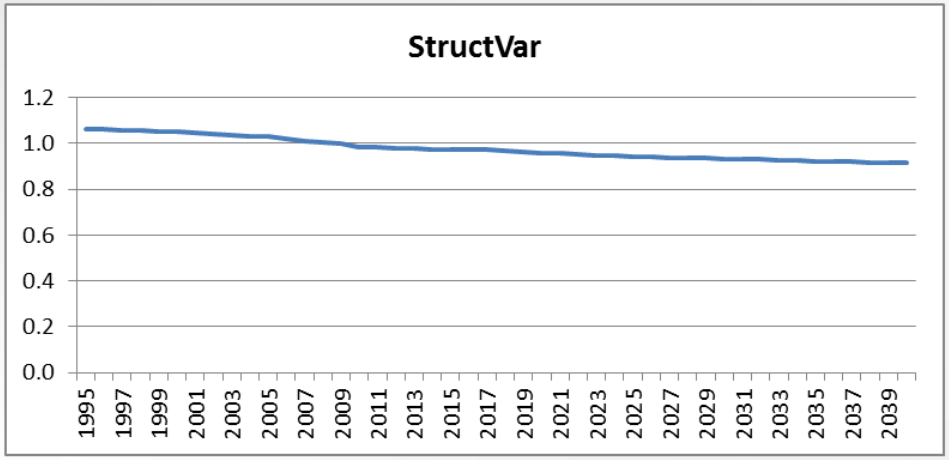
Resistance Heat Saturation

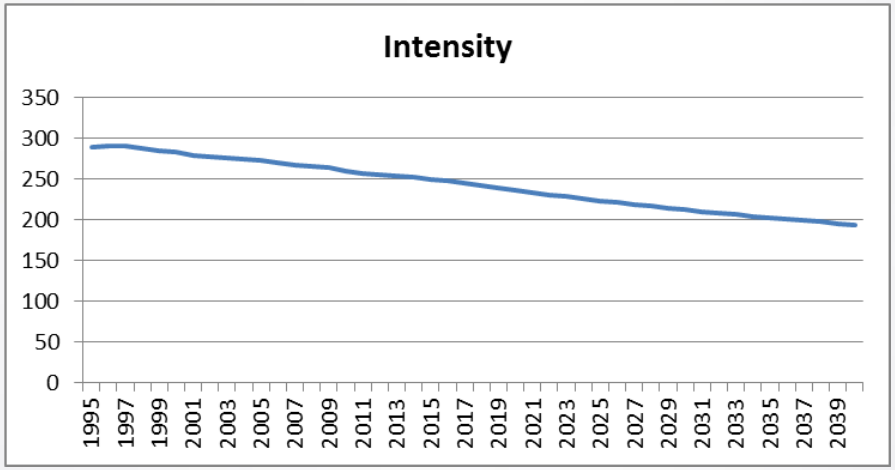


Resistant Electric Heat

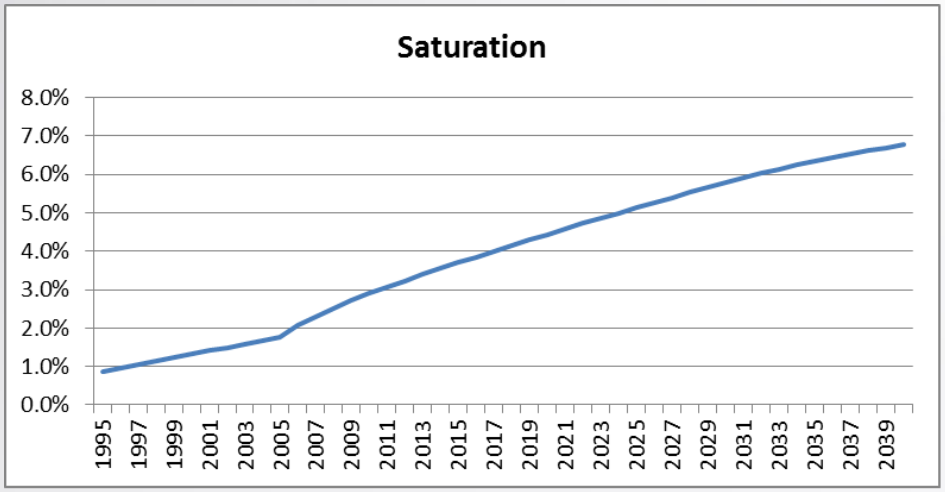


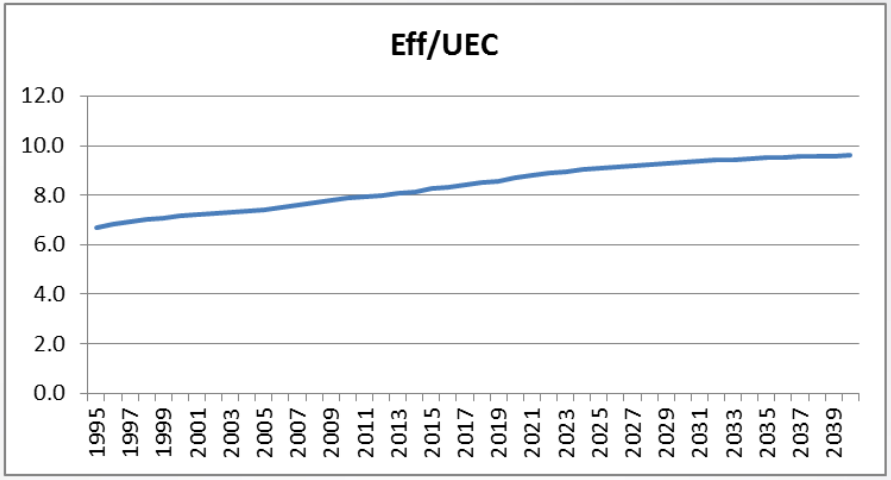


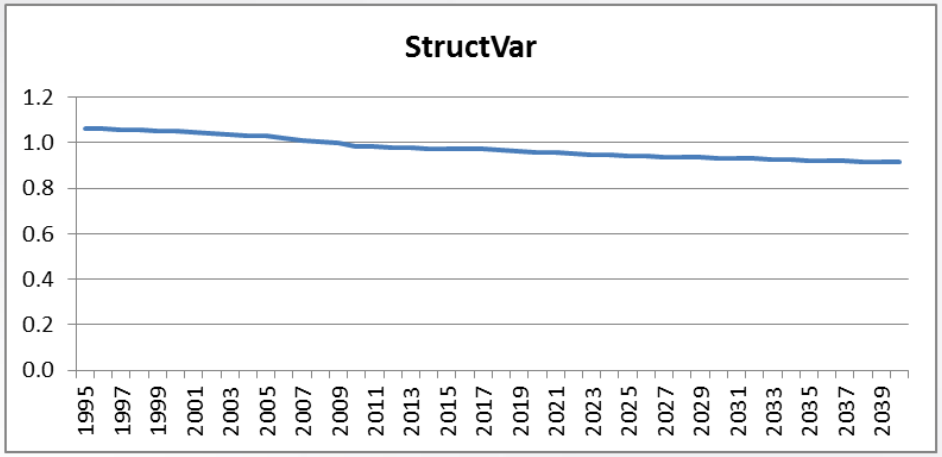


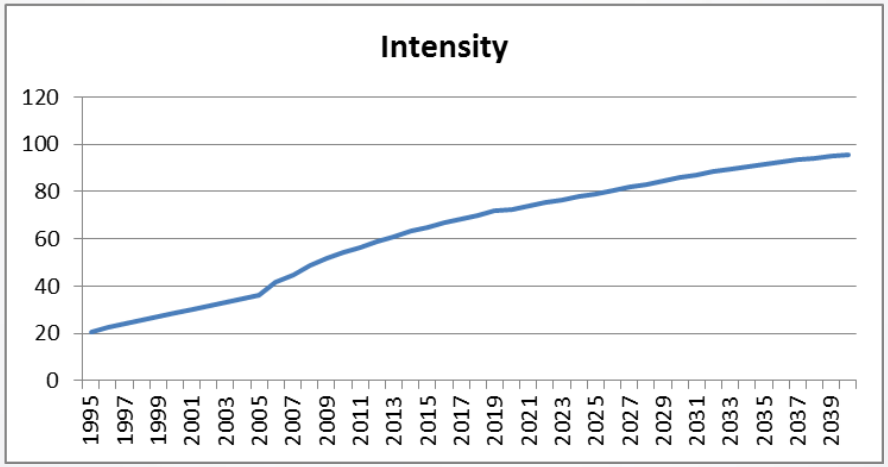


Heat Pump (Heating)

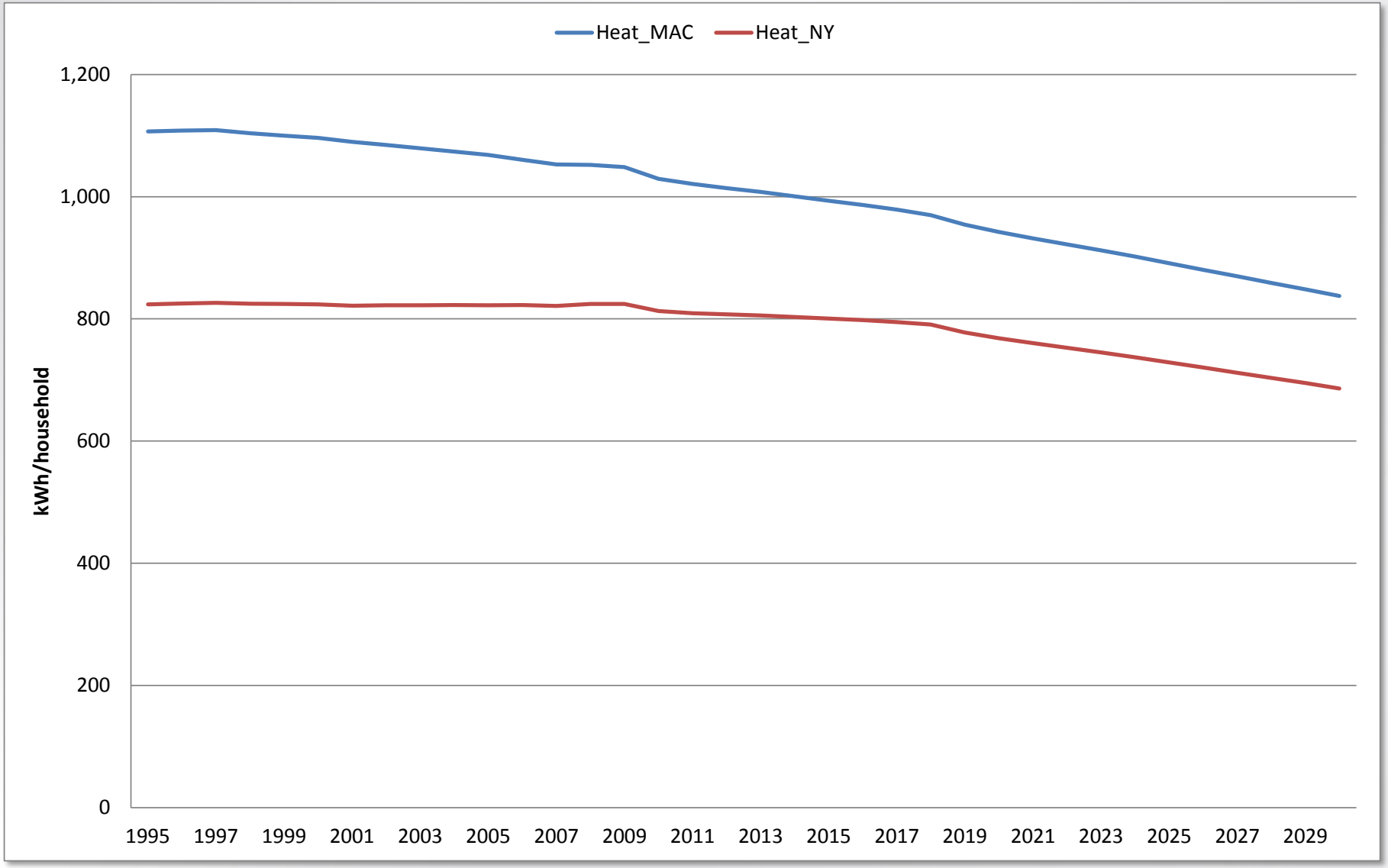




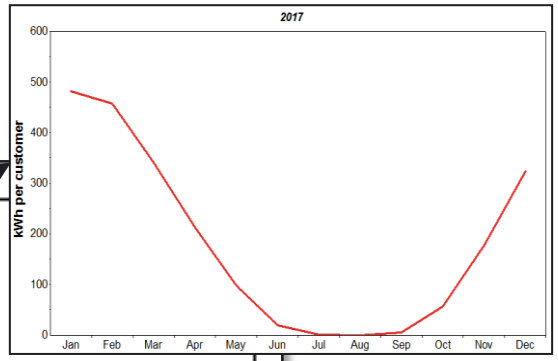


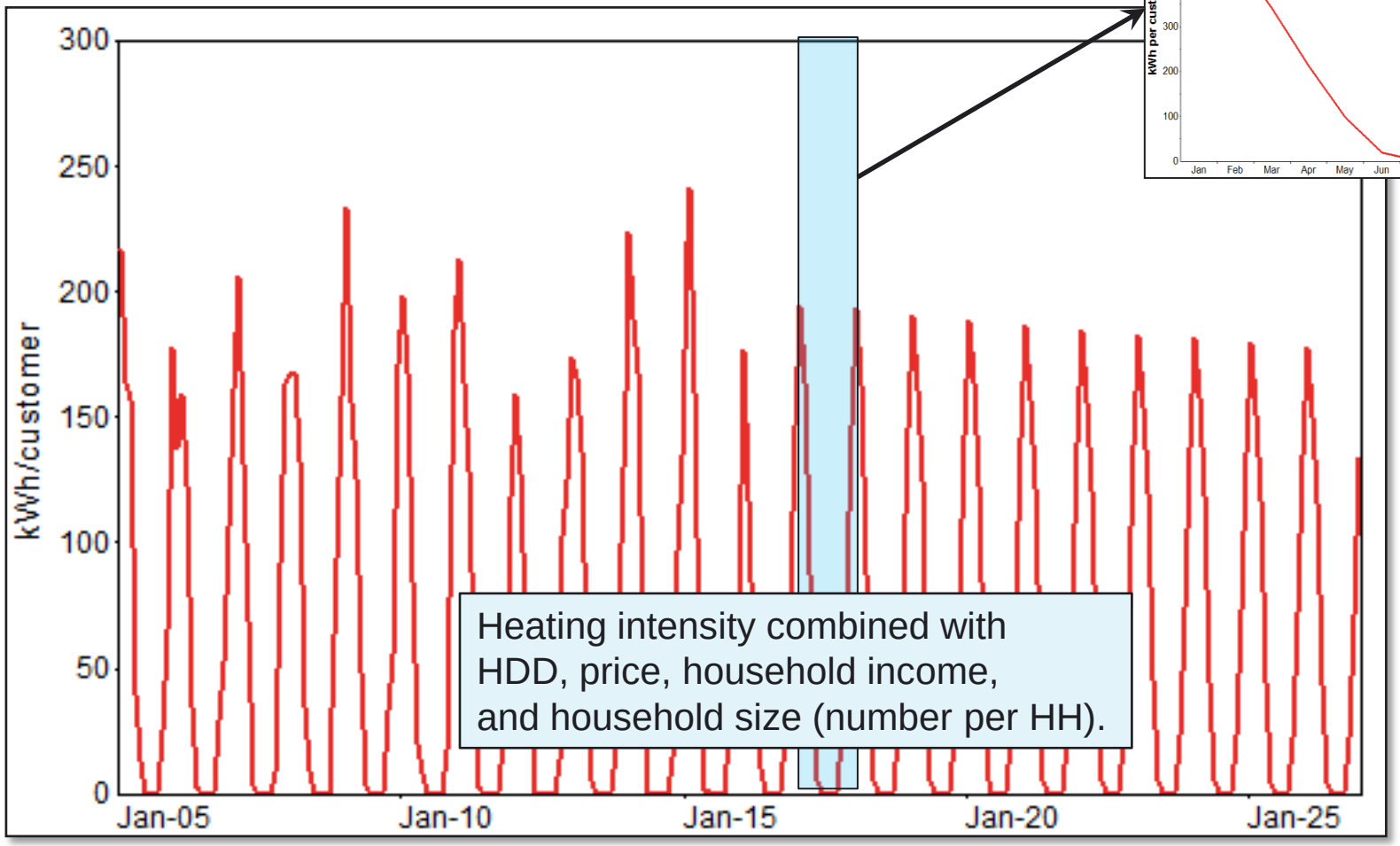


Residential Heating Intensity

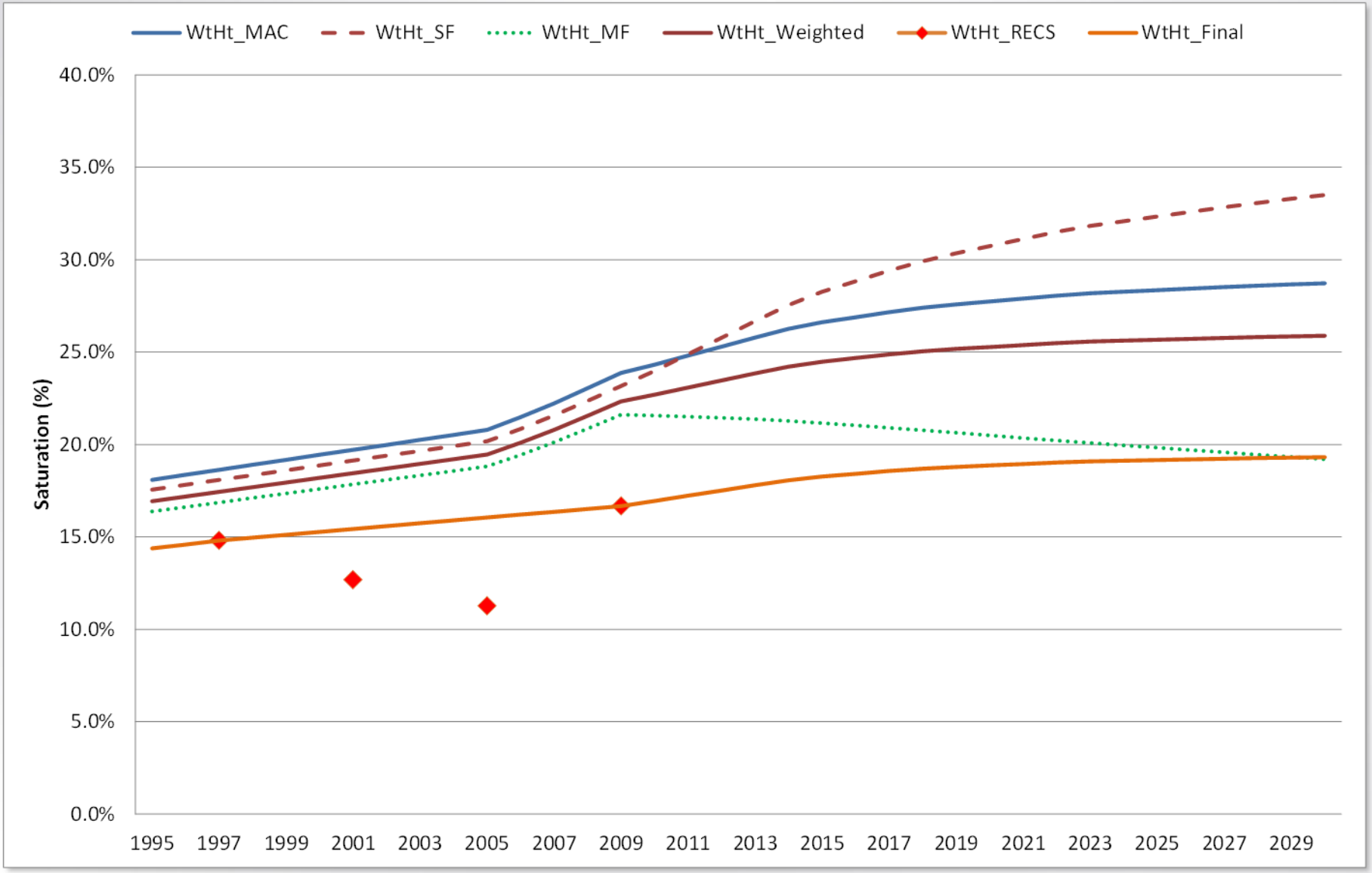


Residential XHeat Variable

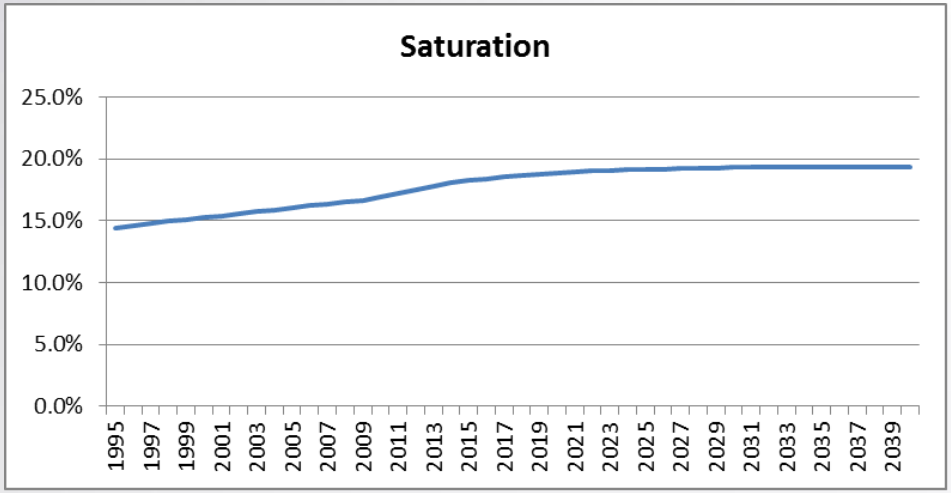


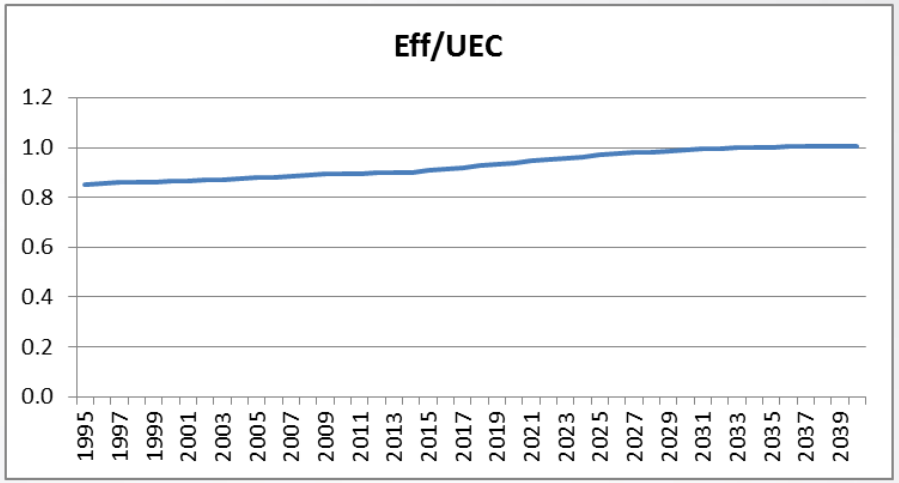


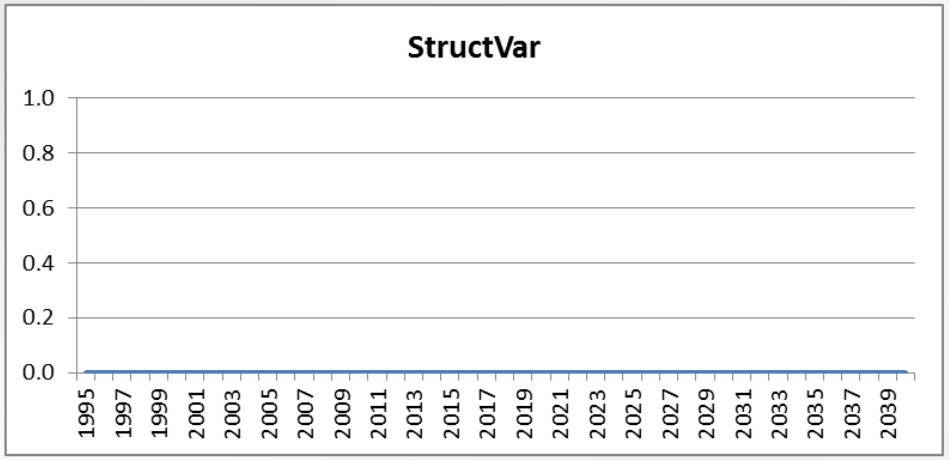
Residential Base Use – Water Heating

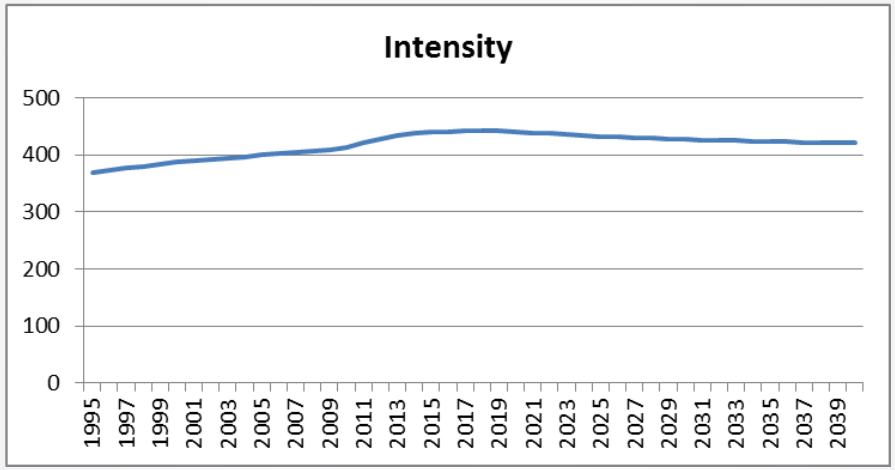


Electric Water Heating

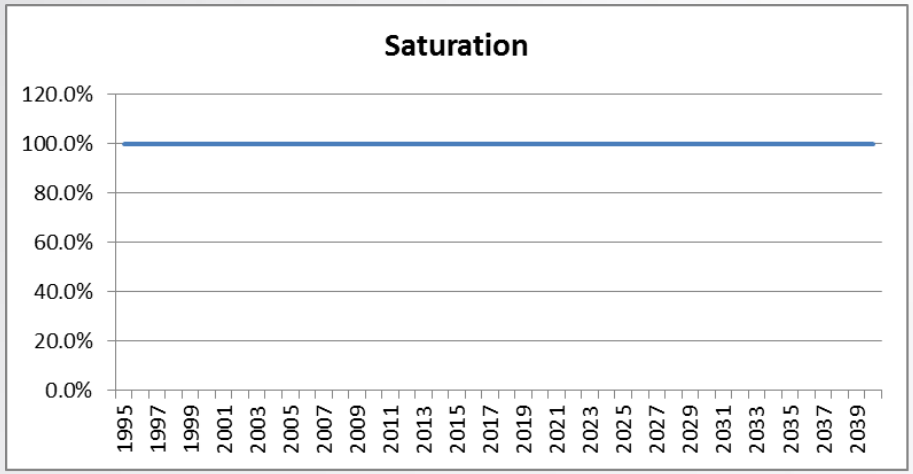








Lighting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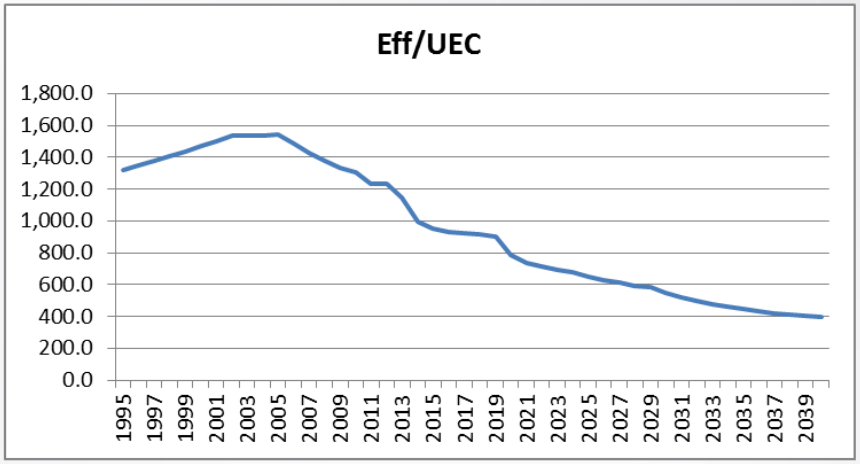
80.0%
60.0%
40.0%
20.0%
0.0%
1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019 2021 2023 2025 2027 2029 2031 2033 2035 2037 2039


Eff/UEC
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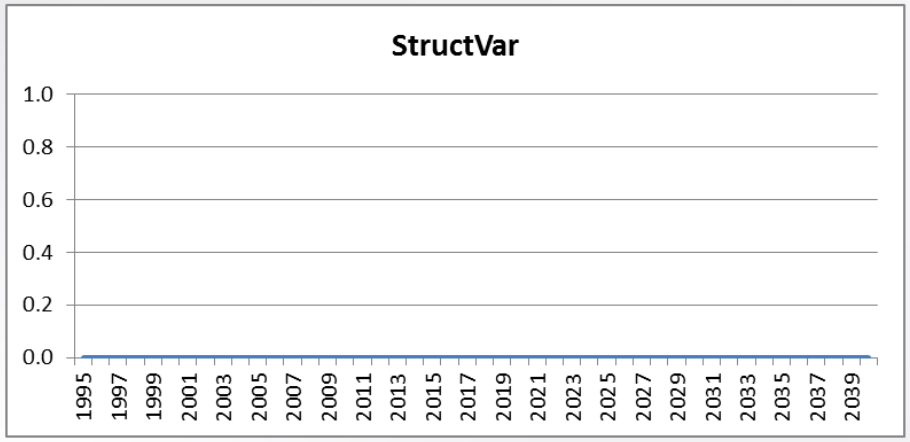
1,600.0
1,400.0
1,200.0
1,000.0
800.0
600.0
400.0
200.0
0.0
1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019 2021 2023 2025 2027 2029 2031 2033 2035 2037 2039


StructVar
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0.6
0.4
0.2
0.0
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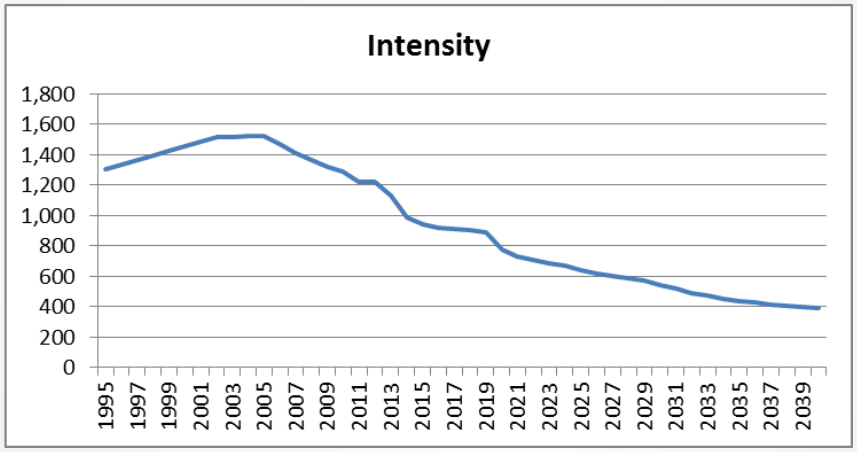
Intensity
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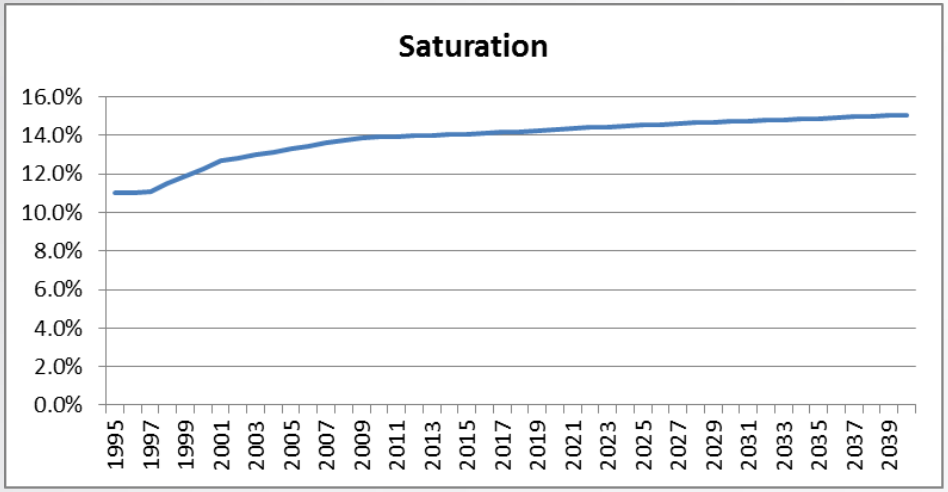
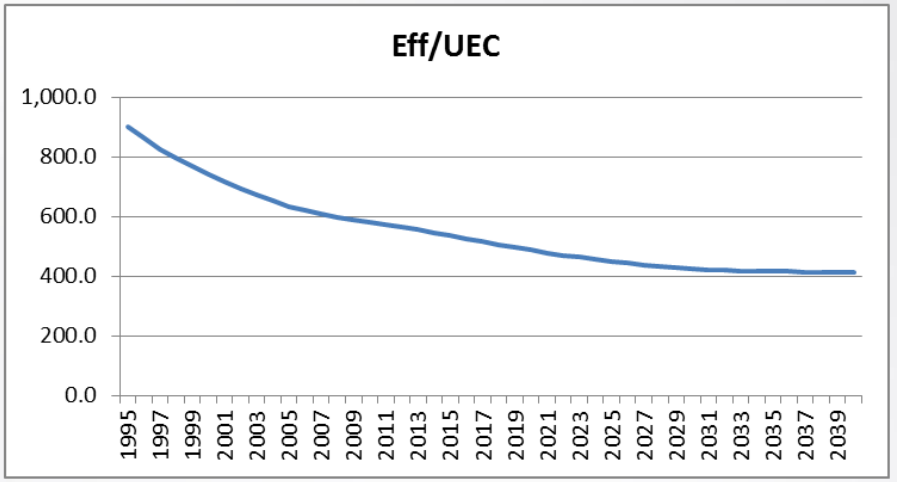
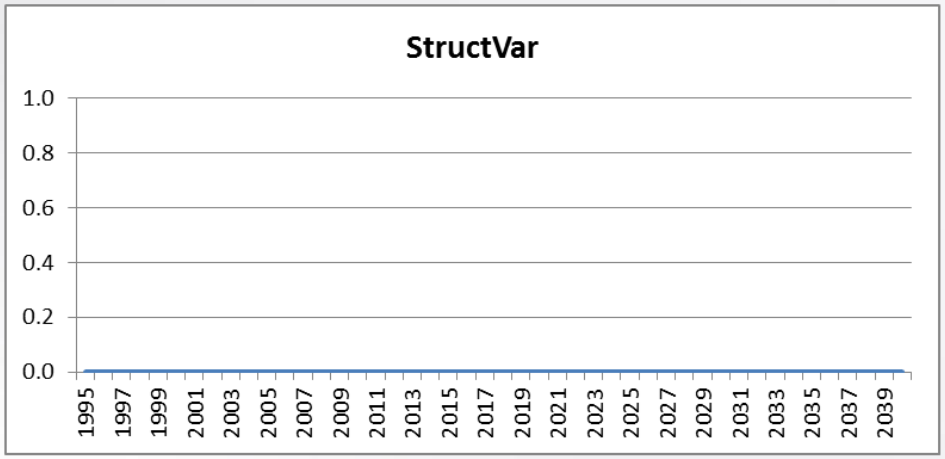
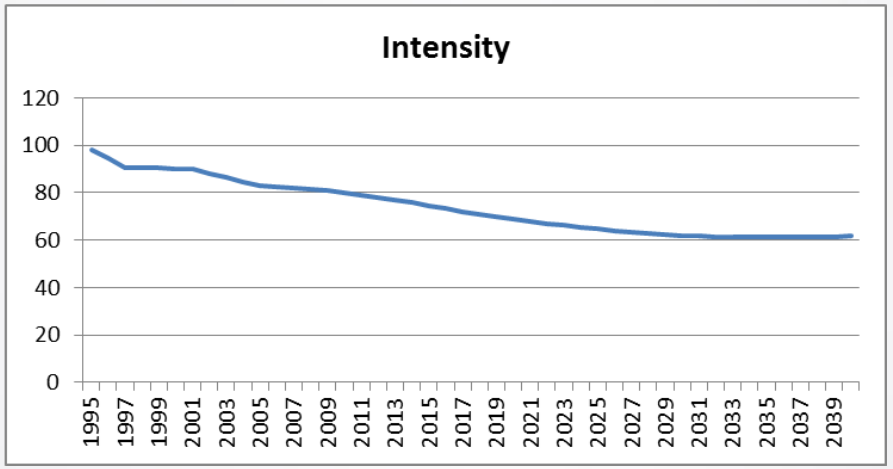
1,600
1,400
1,200
1,000
800
600
400
200
0
1995 1997 1999 2001 2003 2005 2007 2009 2011 2013 2015 2017 2019 2021 2023 2025 2027 2029 2031 2033 2035 2037 2039

Second Refrigerator

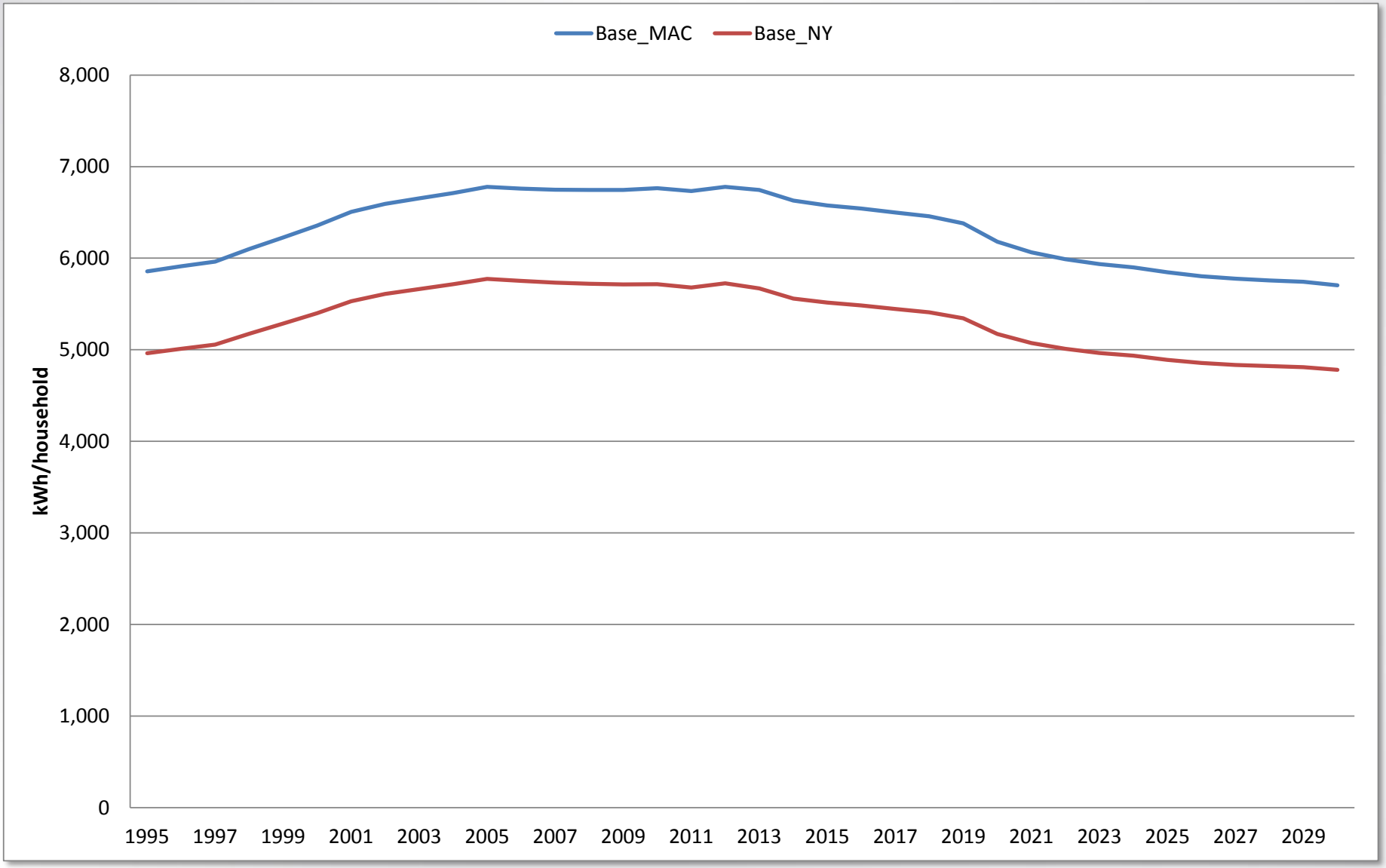




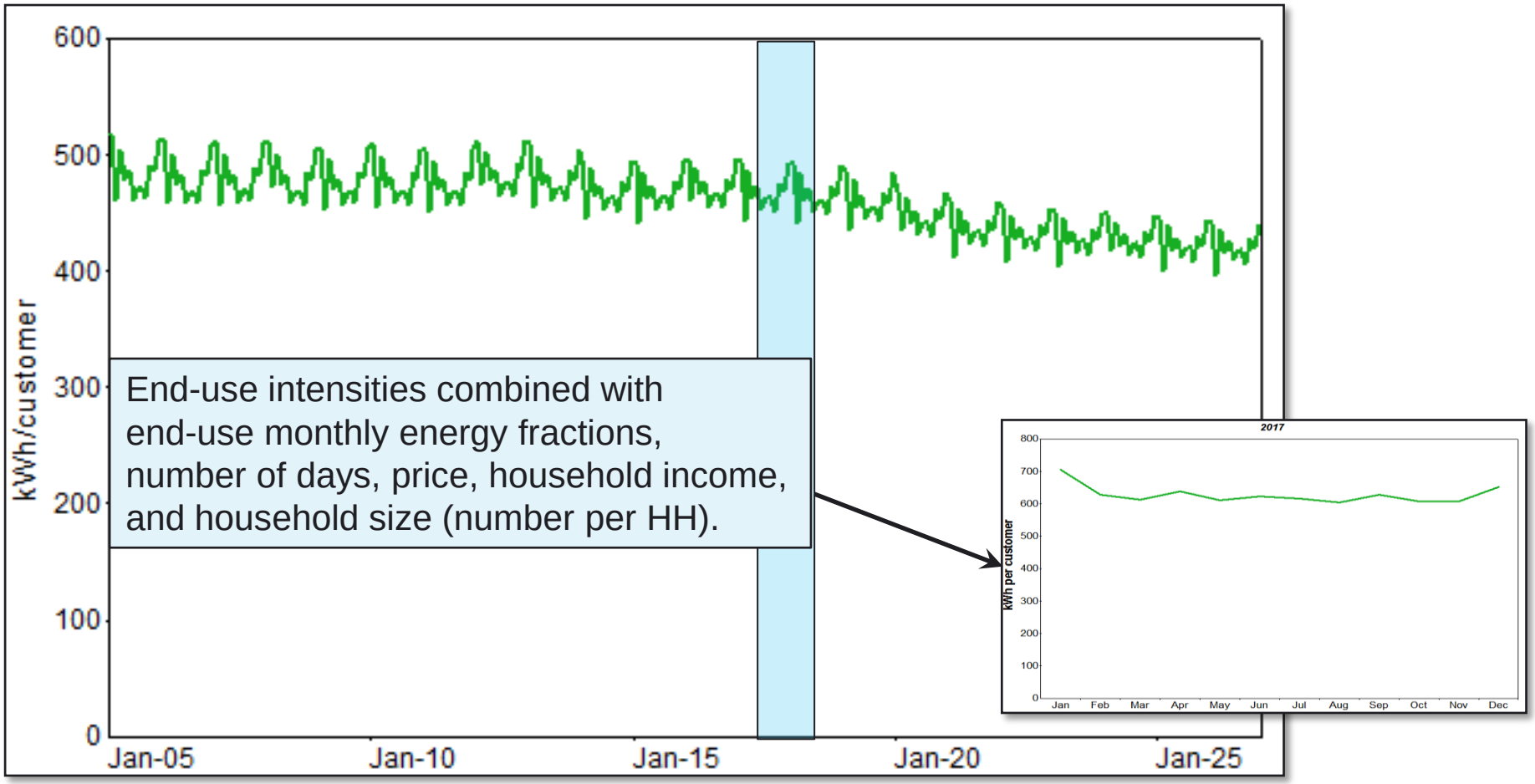




Residential Base Use Intensity



Residential XOther Variable



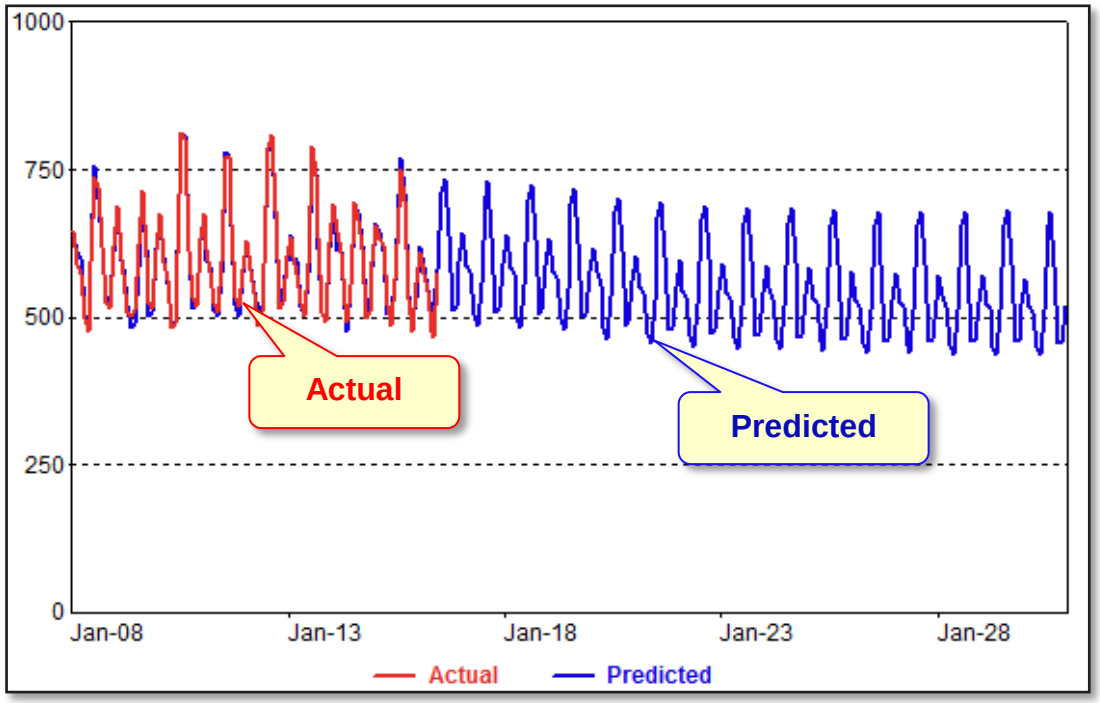
Residential Average Use Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mStructRes.XHeat	0.749	0.037	20.361	0.00%
mStructRes.Lag_XHeat	0.142	0.038	3.768	0.03%
mStructRes.XCool	0.89	0.028	31.336	0.00%
mStructRes.Lag_XCool	0.491	0.031	16.049	0.00%
mStructRes.XOther	0.759	0.068	11.088	0.00%
mStructRes.Lag_XOther	0.203	0.07	2.913	0.45%
mBin.Sep	41.062	7.463	5.502	0.00%
mBin.May10	-26.305	15.729	-1.672	9.78%
mBin.Sep10	-55.569	16.566	-3.354	0.12%
mBin.Nov13	-49.627	15.915	-3.118	0.24%

By incorporating end-use intensity trends, we can construct theoretically strong models that explain historical sales trends well.

	AvgUse
07-15	-0.5%
16-26	-0.9%

Model Statistics	
Iterations	1
Adjusted Observations	102
Deg. of Freedom for Error	92
R-Squared	0.971
Adjusted R-Squared	0.968
AIC	5.57
BIC	5.827
Log-Likelihood	-418.8
Model Sum of Squares	744,116.36
Sum of Squared Errors	22,003.25
Mean Squared Error	239.17
Std. Error of Regression	15.46
Mean Abs. Dev. (MAD)	11.31
Mean Abs. % Err. (MAPE)	1.97%
Durbin-Watson Statistic	1.646

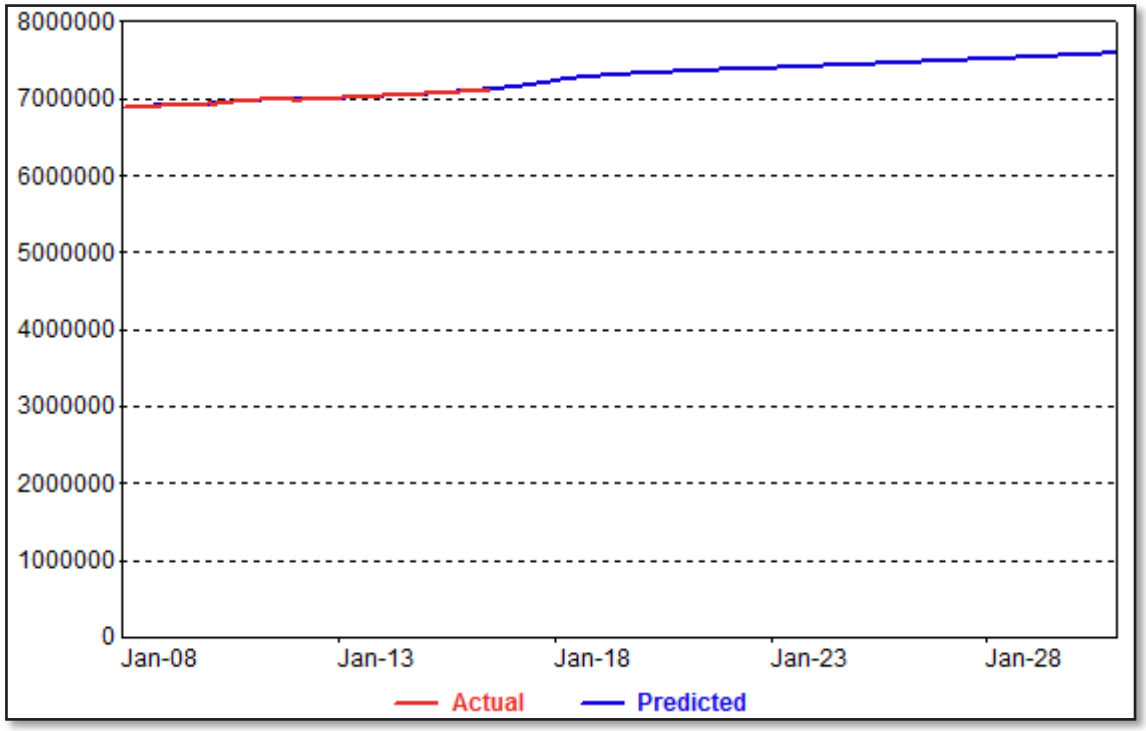


Residential Customer Forecast Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mEcon.HHs	964.828	15.482	62.319	0.00%
AR(1)	0.989	0.013	78.67	0.00%

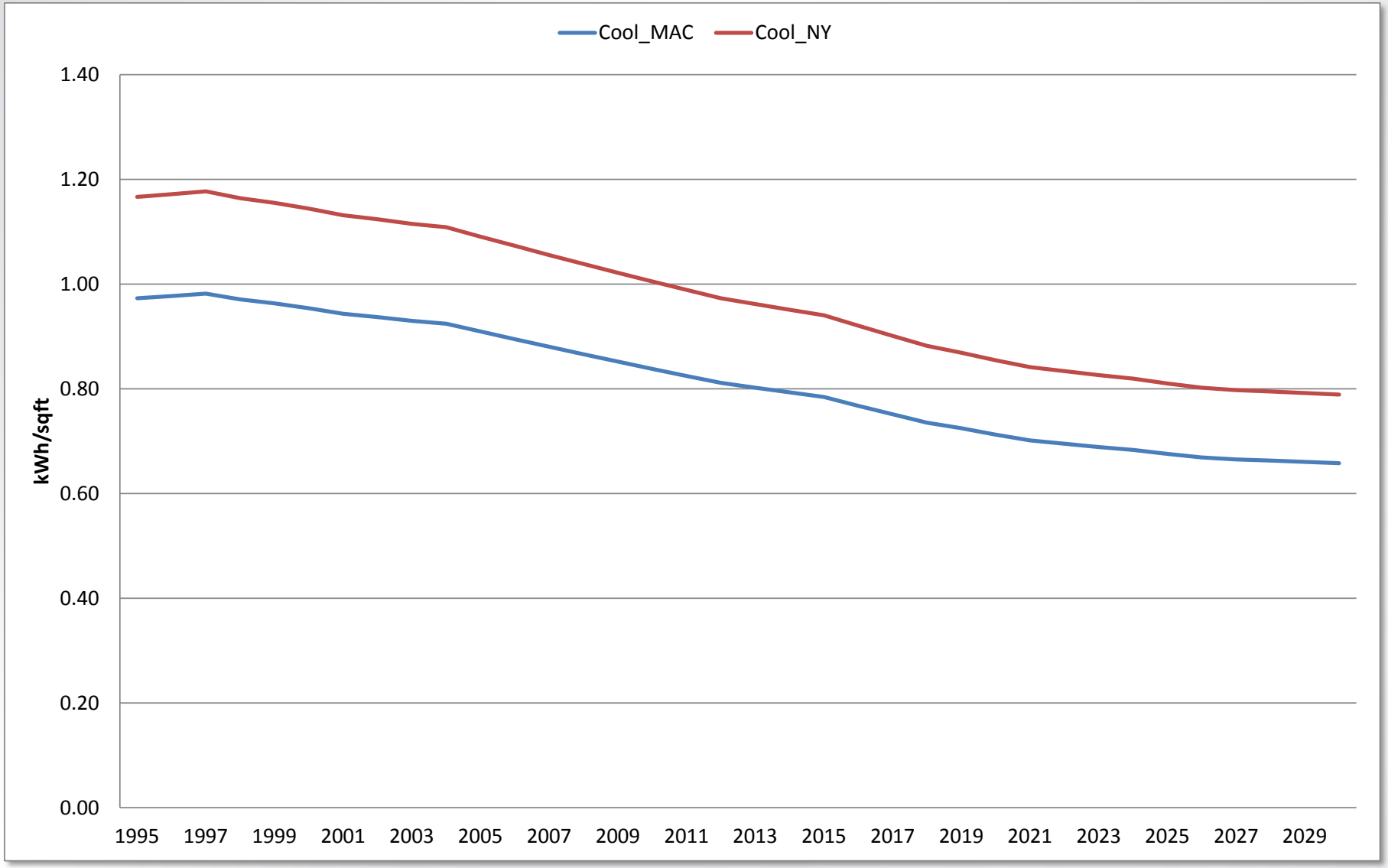
Model Statistics	
Iterations	9
Adjusted Observations	101
Deg. of Freedom for Error	99
R-Squared	0.989
Adjusted R-Squared	0.989
AIC	17.661
BIC	17.713
Log-Likelihood	-1,033.21
Model Sum of Squares	400,225,504,441.72
Sum of Squared Errors	4,542,773,996.88
Mean Squared Error	45,886,606.03
Std. Error of Regression	6,773.97
Mean Abs. Dev. (MAD)	4,556.46
Mean Abs. % Err. (MAPE)	0.07%
Durbin-Watson Statistic	2.361

	Custs
07-15	0.7%
16-26	0.5%

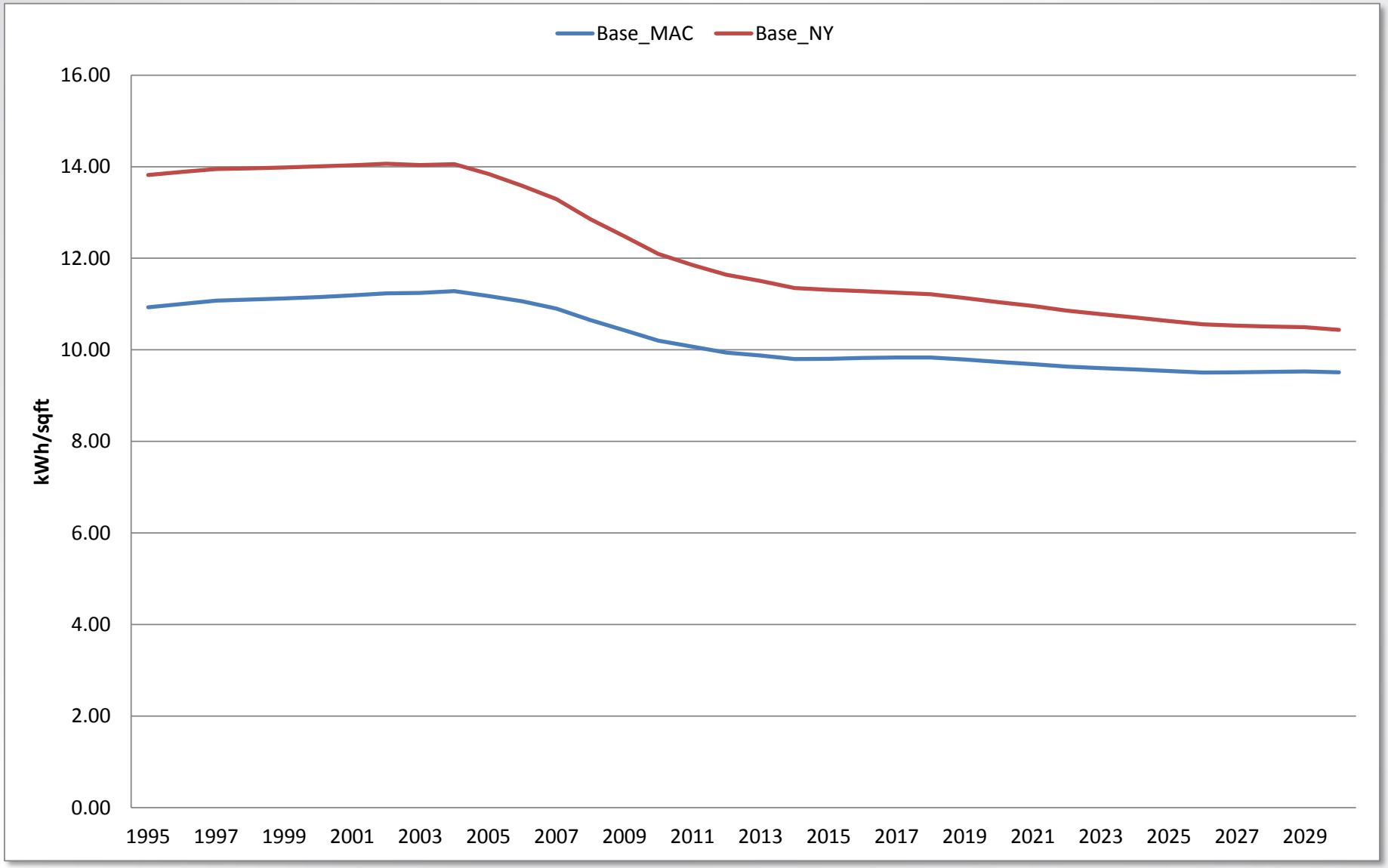


0.5% annual customer growth combined with -0.9% change in average use translates into -0.4% annual sales growth.

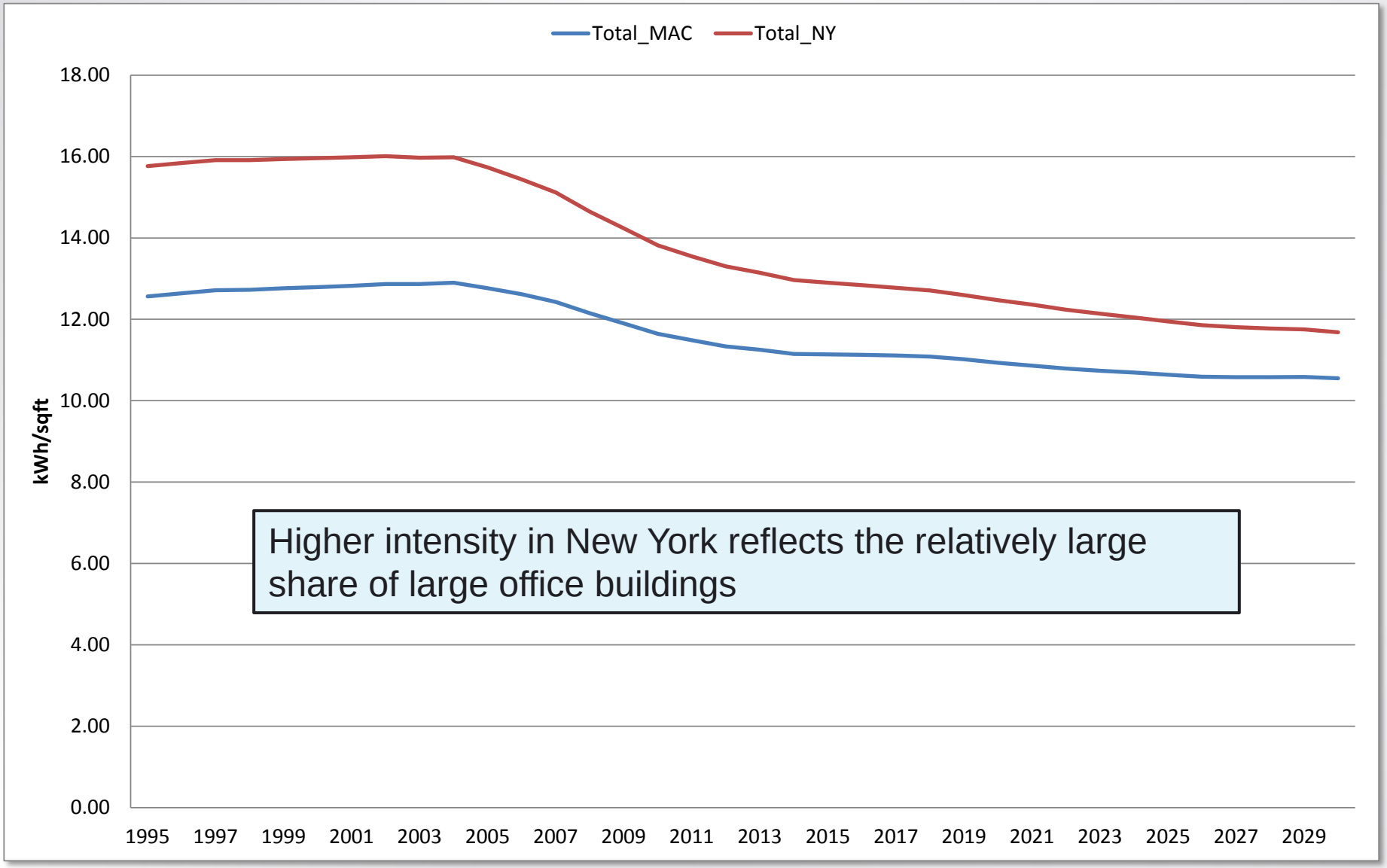
Commercial Cooling Intensity



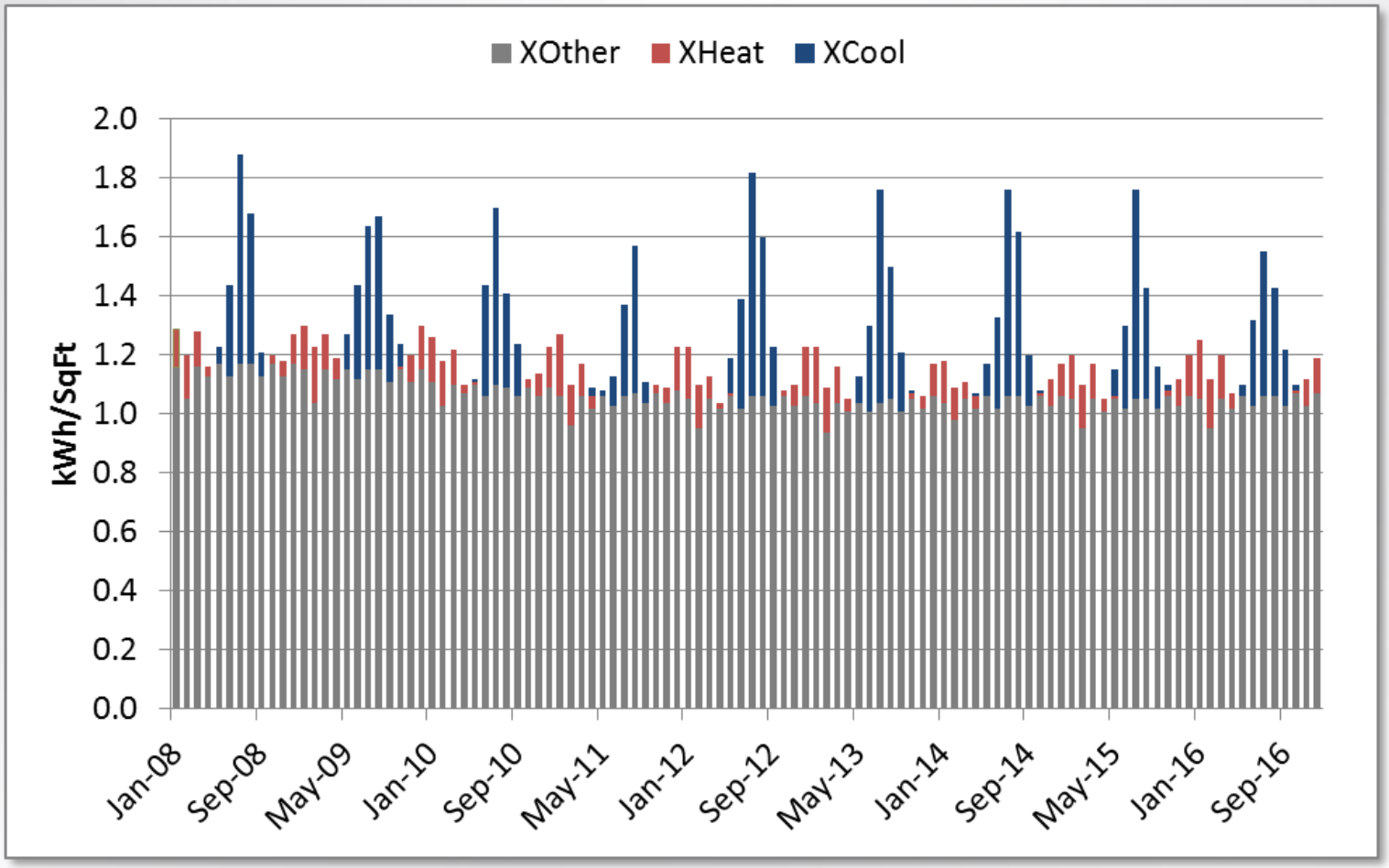
Commercial Base Use Intensity



Commercial Total Building Intensity



Commercial Model Variables



$$Sales_m = a + b_c \times XCool_m + b_h \times XHeat_m + b_o \times XOther_m + e_m$$

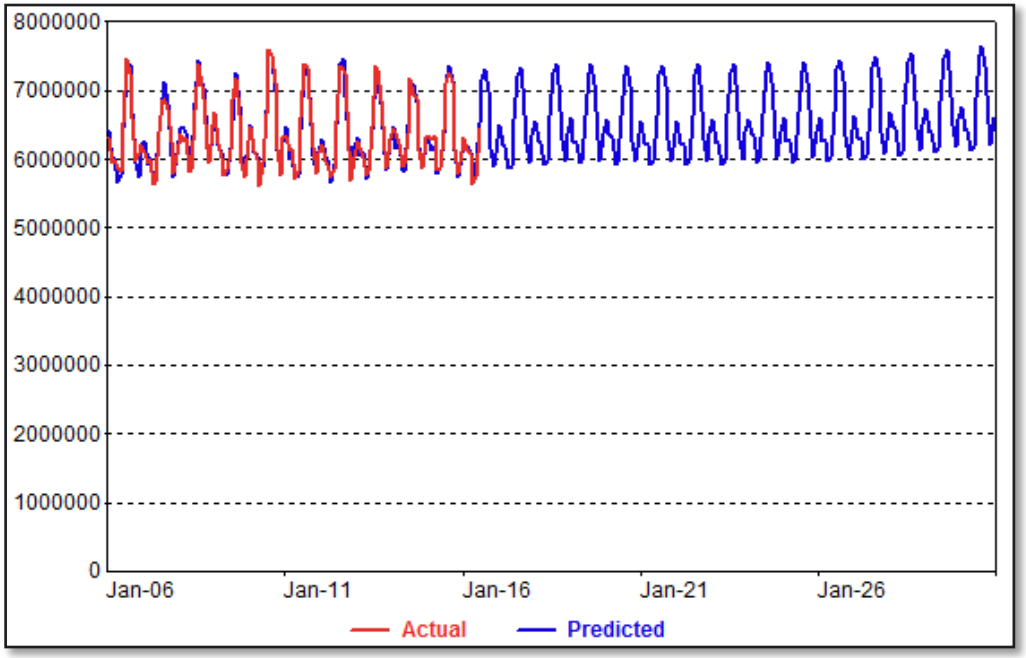
Commercial model variables incorporate HDD, CDD, price, economic drivers, and end-use intensities

NY Commercial Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mStructCom.XOther	255579.731	17069.989	14.972	0.00%
mStructCom.LagXOther	218821.01	17618.976	12.42	0.00%
mStructCom.XHeat	1162026.644	382407.415	3.039	0.30%
mStructCom.LagXHeat	1485267.027	342338.516	4.339	0.00%
mStructCom.XCool	1758388.394	84356.186	20.845	0.00%
mStructCom.LagXCool	658833.101	89437.796	7.366	0.00%
mStructCom.Apr_XOther	-28023.739	3866.004	-7.249	0.00%
mStructCom.May_XOther	-22428.828	3288.122	-6.821	0.00%
mStructCom.Sep_XOther	29137.33	3118.707	9.343	0.00%
mStructCom.Nov_XOther	-18370.595	3108.361	-5.91	0.00%
mBin.Bef08	-674570.466	35862.89	-18.81	0.00%
mBin.Yr2015Plus	-172546.408	39257.353	-4.395	0.00%
mBin.Jan08	-368982.335	108453.802	-3.402	0.09%
MA(1)	0.349	0.094	3.713	0.03%

Model Statistics	
Iterations	15
Adjusted Observations	126
Deg. of Freedom for Error	112
R-Squared	0.956
Adjusted R-Squared	0.951
AIC	23.383
BIC	23.698
Log-Likelihood	-1,637.94
Model Sum of Squares	31,447,793,466,470.40
Sum of Squared Errors	1,442,467,155,484.44
Mean Squared Error	12,879,171,031.11
Std. Error of Regression	113,486.44
Mean Abs. Dev. (MAD)	81,234.46
Mean Abs. % Err. (MAPE)	1.27%
Durbin-Watson Statistic	1.973

	Sales
07-15	0.4%
16-26	0.2%



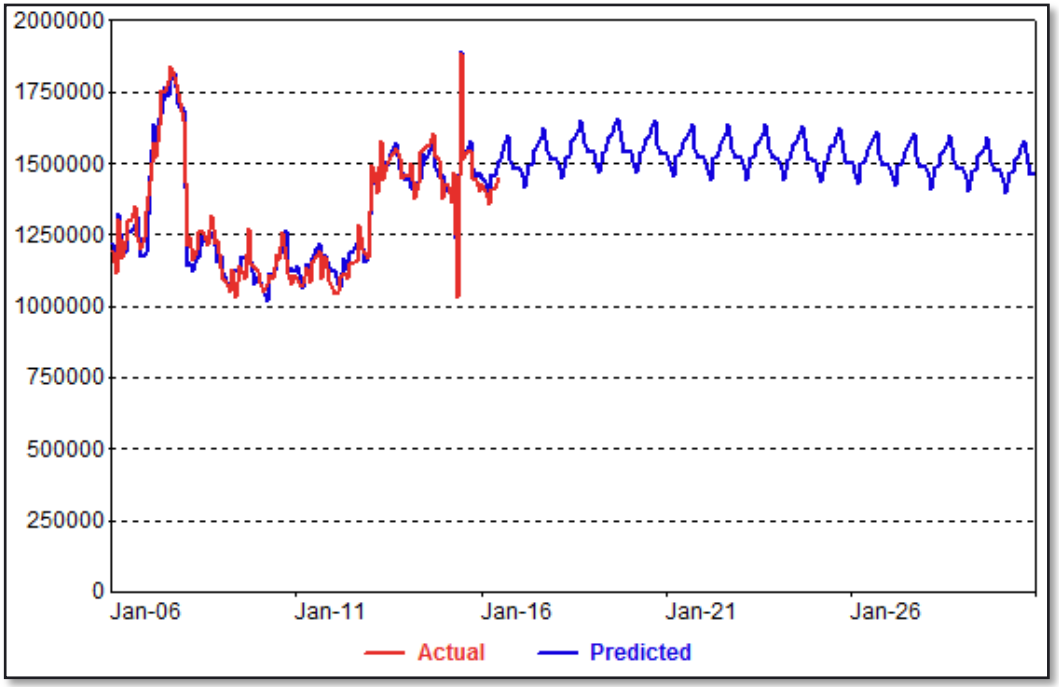
NY Industrial Sales Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mStructInd.XVar	21579.566	193.188	111.702	0.00%
mStructInd.XVar_2013Plus	5971.607	258.405	23.11	0.00%
mBin.Yr07	522466.716	22074.559	23.668	0.00%
mBin.Feb	-34313.368	16333.199	-2.101	3.79%
mBin.Mar	-73332.474	16893.094	-4.341	0.00%
mBin.Jun	49310.832	16920.277	2.914	0.43%
mBin.Jul	61968.367	19082.512	3.247	0.16%
mBin.Aug	86339.509	19175.296	4.503	0.00%
mBin.Sep	116801.273	19754.971	5.913	0.00%
mBin.Oct	34845.937	16874.321	2.065	4.13%
mBin.Mar06	212503.629	47630.319	4.462	0.00%
mBin.Jan07	-285071.163	49402.481	-5.77	0.00%
mBin.May15	-432152.054	50497.3	-8.558	0.00%
mBin.Jun15	386855.848	52175.764	7.414	0.00%
mBin.Sep11	-155867.34	47629.72	-3.272	0.14%
MA(1)	0.419	0.09	4.639	0.00%

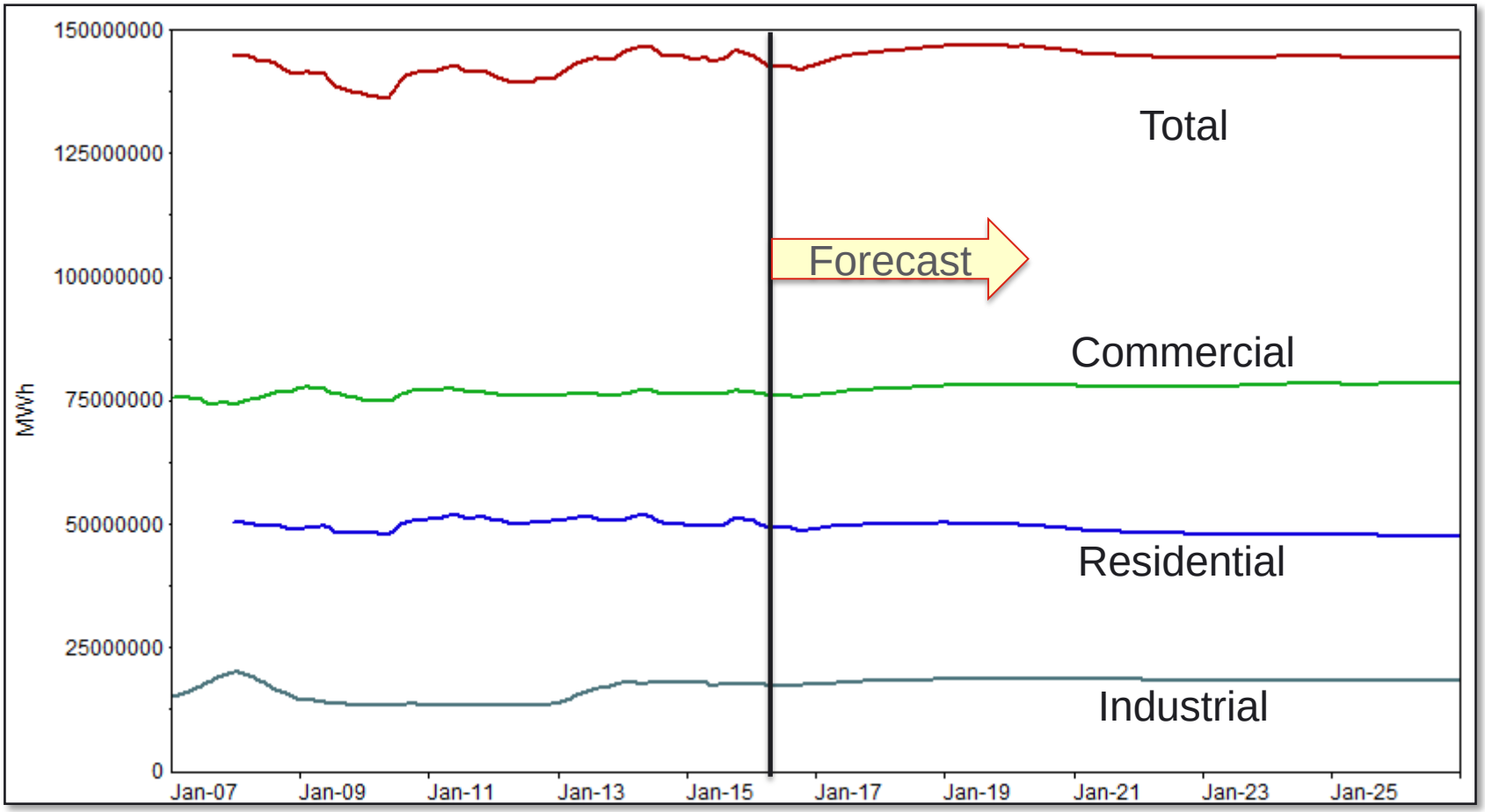
Model Statistics	
Iterations	11
Adjusted Observations	126
Deg. of Freedom for Error	110
R-Squared	0.951
Adjusted R-Squared	0.944
AIC	21.745
BIC	22.105
Log-Likelihood	-1,532.74
Model Sum of Squares	5,235,159,122,680.84
Sum of Squared Errors	271,600,011,351.34
Mean Squared Error	2,469,091,012.28
Std. Error of Regression	49,689.95
Mean Abs. Dev. (MAD)	37,045.88
Mean Abs. % Err. (MAPE)	2.87%
Durbin-Watson Statistic	1.845

U.S. Industrial intensities (kWh /employee) combined with state manufacturing employment projections)

	Sales
07-15	-0.7%
16-26	0.2%



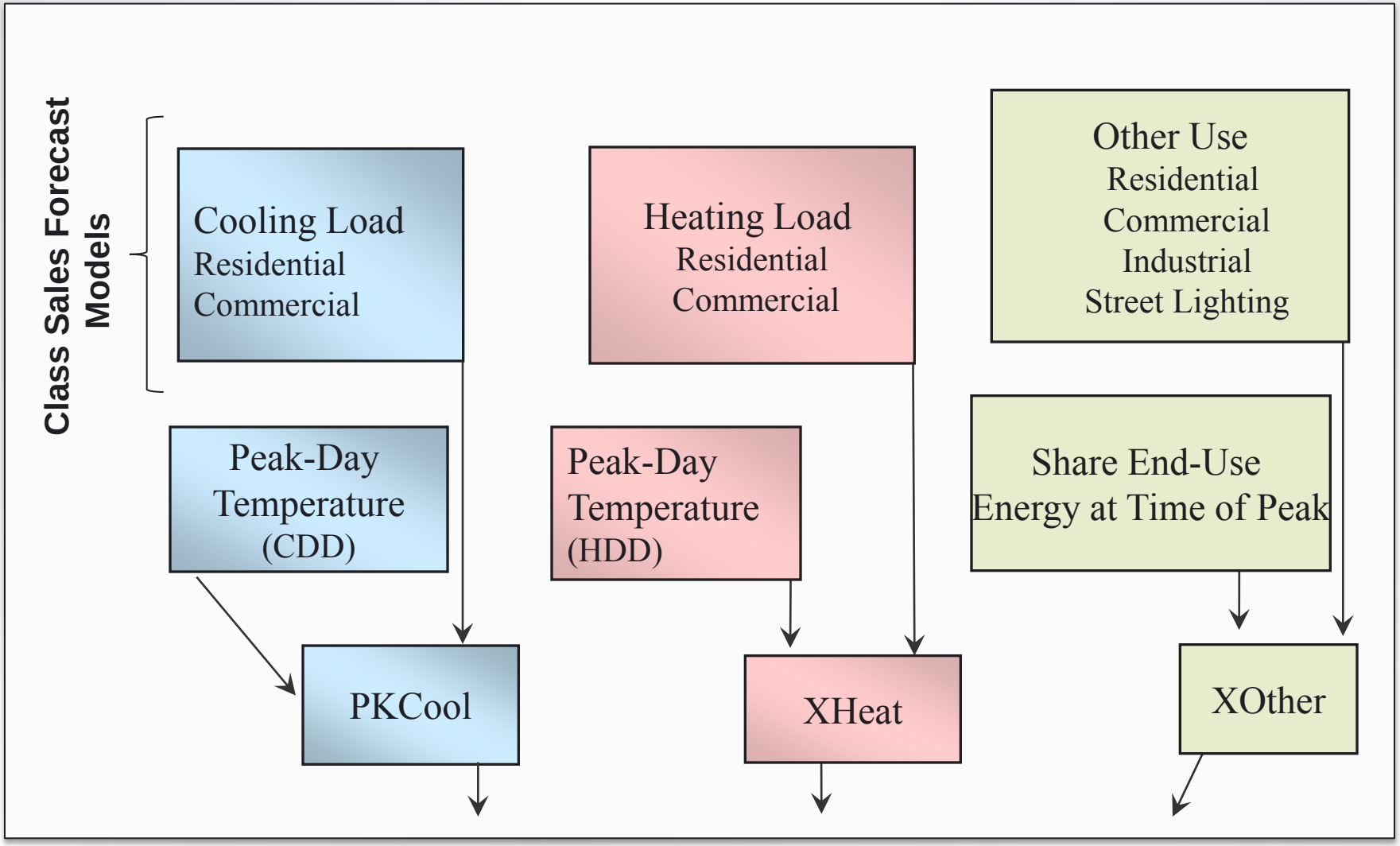
12-month moving sum



Average Annual Growth

	Res	Com	Ind	Total
07-15	0.2%	0.4%	-0.7%	0.0%
16-26	-0.4%	0.3%	0.2%	0.0%

Peak Model



$$Peak_m = a + b_c \times PkCool_m + b_h \times PkHeat_m + b_o \times PKOther_m + e_m$$

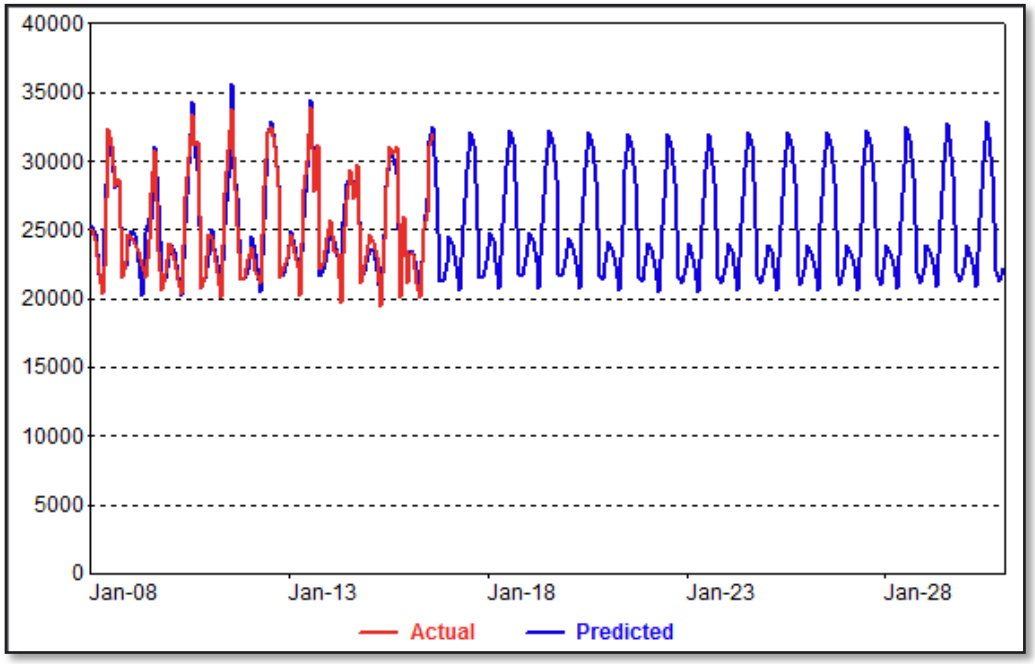
Peak Model

Variable	Coefficient	StdErr	T-Stat	P-Value
mPeakVars.BaseVar	1.711	0.024	72.597	0.00%
mPeakVars.CoolVar	4.618	0.201	23.011	0.00%
mPeakVars.HeatVar	1.864	0.302	6.177	0.00%
mBin.Mar	2323.787	411.941	5.641	0.00%
mBin.Apr	1640.416	449.456	3.65	0.04%
mBin.May	3304.881	467.403	7.071	0.00%
mBin.Jun	1971.949	459.194	4.294	0.00%
mBin.Jul	-3138.65	653.696	-4.801	0.00%
mBin.Sep	4187.82	469.258	8.924	0.00%
mBin.Aft13	-641.863	278.63	-2.304	2.35%
mBin.Nov15	5594.684	1206.544	4.637	0.00%
mBin.Yr2015Plus	-681.258	352.687	-1.932	5.65%

Model Statistics	
Iterations	1
Adjusted Observations	104
Deg. of Freedom for Error	92
R-Squared	0.924
Adjusted R-Squared	0.915
AIC	14.189
BIC	14.494
Log-Likelihood	-873.38
Model Sum of Squares	1,467,316,455.03
Sum of Squared Errors	119,925,054.22
Mean Squared Error	1,303,533.20
Std. Error of Regression	1,141.72
Mean Abs. Dev. (MAD)	783.43
Mean Abs. % Err. (MAPE)	3.13%
Durbin-Watson Statistic	1.903

Peak demand increases slightly faster than energy requirements as cooling load increases somewhat faster than base load

	Peaks
07-15	0.2%
16-26	0.2%



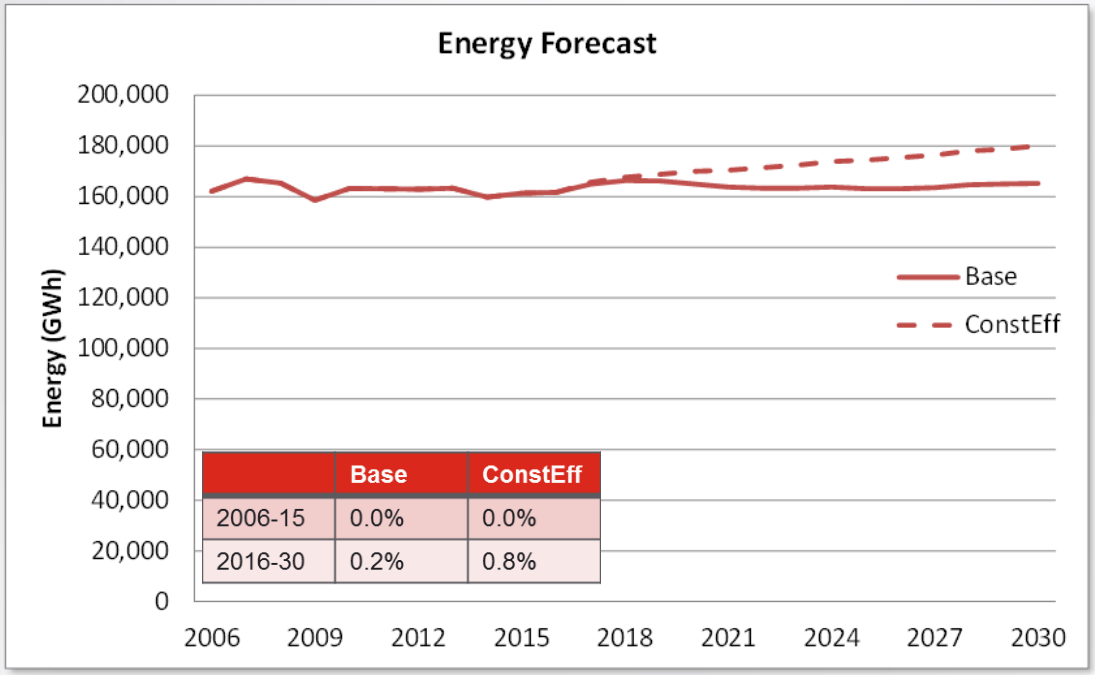
CAPTURING EE PROGRAM IMPACTS

Capturing EE Impacts

- Significant efficiency gains captured in the SAE model specification
  - Improvements in end-use efficiency as a result of new standards and state EE programs

- EE programs impact the model-based forecast in two ways:
  - Estimated regression model coefficients reflect declining customer usage that are in part the result of EE programs.
  - EE program incentives encourage adoption of more efficient end-uses and along with standards are incorporated in the forecast model variables (XOther, XCool, and XHeat).
    - (e.g., higher saturation of energy star appliances, higher share of CFLs and LED lighting)
  - The forecast implicitly assumes that some level of EE program activity will continue through the forecast period

Constant Efficiency Scenario



- Efficiency gains results in annual average load reduction of 1,286 GWh per year (through 2026)

- In comparison NYISO projects EE program savings of 988 GWh per year and standards impact are 365 GWh per year (total impact 1,353 GWh)

Incorporating EE Savings as a Model Variable

Variable	Coefficient	StdErr	T-Stat	P-Value
XOther	0.984	0.007	141.5	0.00%
XHeat	0.999	0.066	15.2	0.00%
XCool	1.138	0.029	39.0	0.00%
EE_MWh	-0.432	0.148	-2.9	0.43%
MA(1)	0.577	0.08	7.2	0.00%

Model Statistics	
Iterations	17
Adjusted Observations	116
Deg. of Freedom for Error	111
R-Squared	0.963
Adjusted R-Squared	0.962
Std. Error of Regression	275,304
Mean Abs. Dev. (MAD)	208,751
Mean Abs. % Err. (MAPE)	1.54%
Durbin-Watson Statistic	1.794

- Adding EE to the right-hand side of the model is mathematically equivalent to “reconstituting” sales by adding past EE savings to historical sales data.
- Implies 57% of EE savings are captured by the model variables

With EE as an explicit model variable, average annual system energy declines 0.2% and system peak demand growth is flat.

SUMMARY

Summary

- Electricity sales have been slowing across all regions of the country
  - End-use efficiency improvements have been the largest contributor to declining customer usage trends
  - Utilities expect these trends to continue
  - SAE models allows us to directly incorporate end-use efficiency improvements into the energy and demand forecasts
- New York energy requirements are likely to decline over the next ten-years as customer average use declines faster than customer growth
  - Expected impact of future standards and utility EE programs will translate into lower customer average use
- Forecasting is getting more complicated as new end-use technologies and behind-the-meter generation technologies penetrate the market
  - PVs, EVs, Fuel Cells, Battery Storage, Cold Climate Heat Pumps, Heat-Pump Water Heaters, ?