



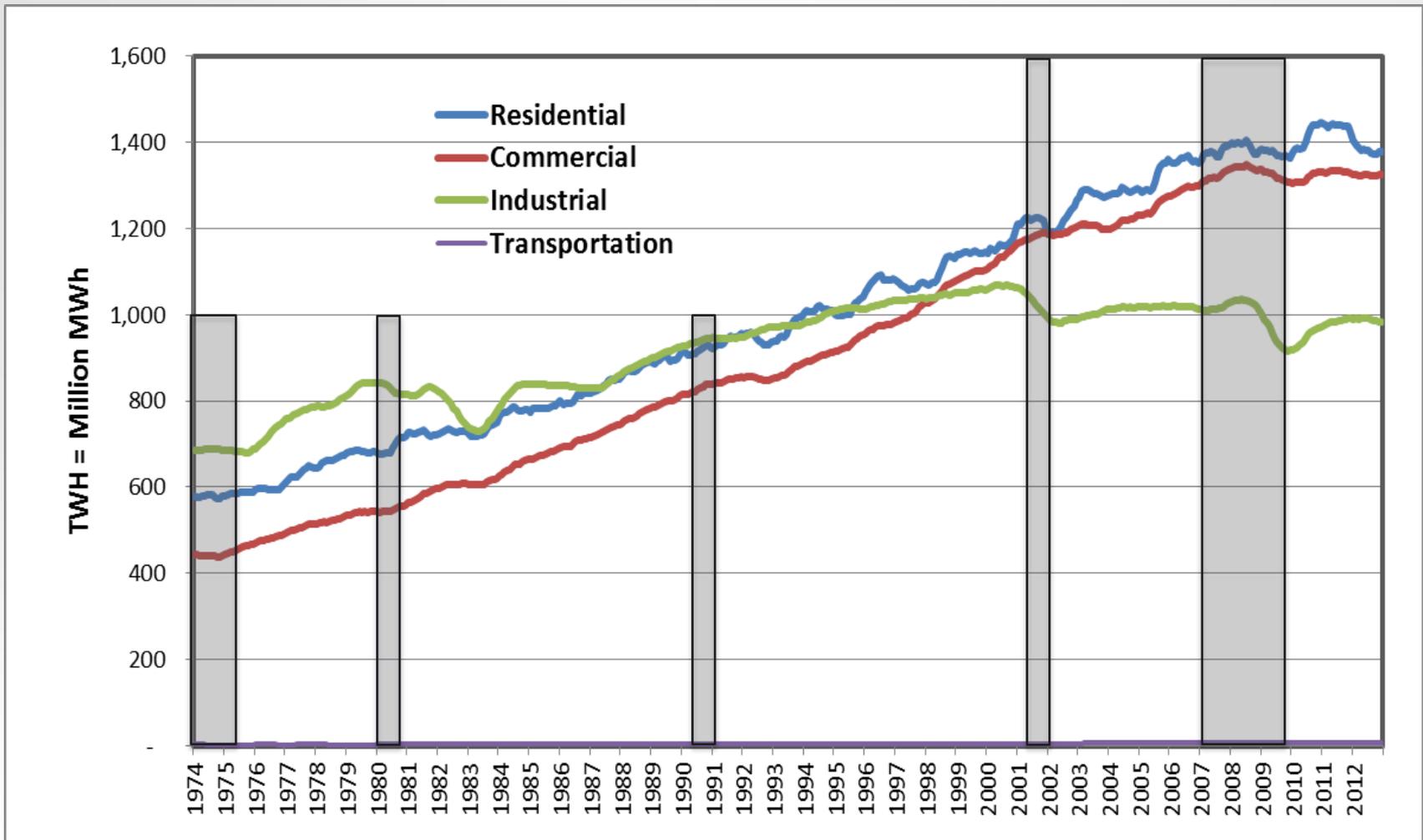
ENERGY FORECASTING TRENDS AND BENCHMARK ACCURACY SURVEY RESULTS

Mark Quan
Western Load Research Association
March 27-29, 2013

AGENDA

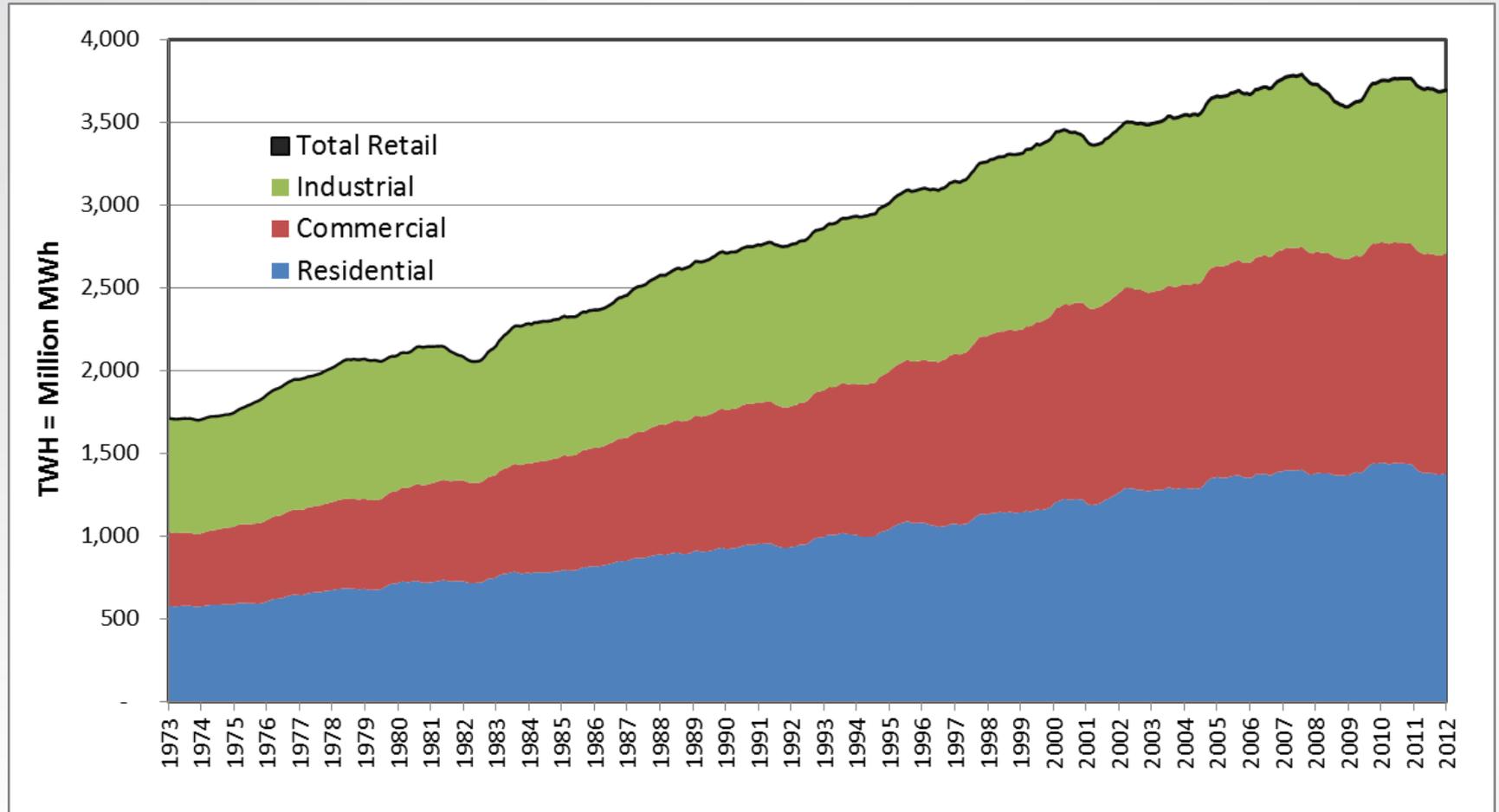
- » **State of the Market**
- » 2012 Survey Results
- » Survey Implications on Forecasting

U.S. Electricity Sales (TWh)



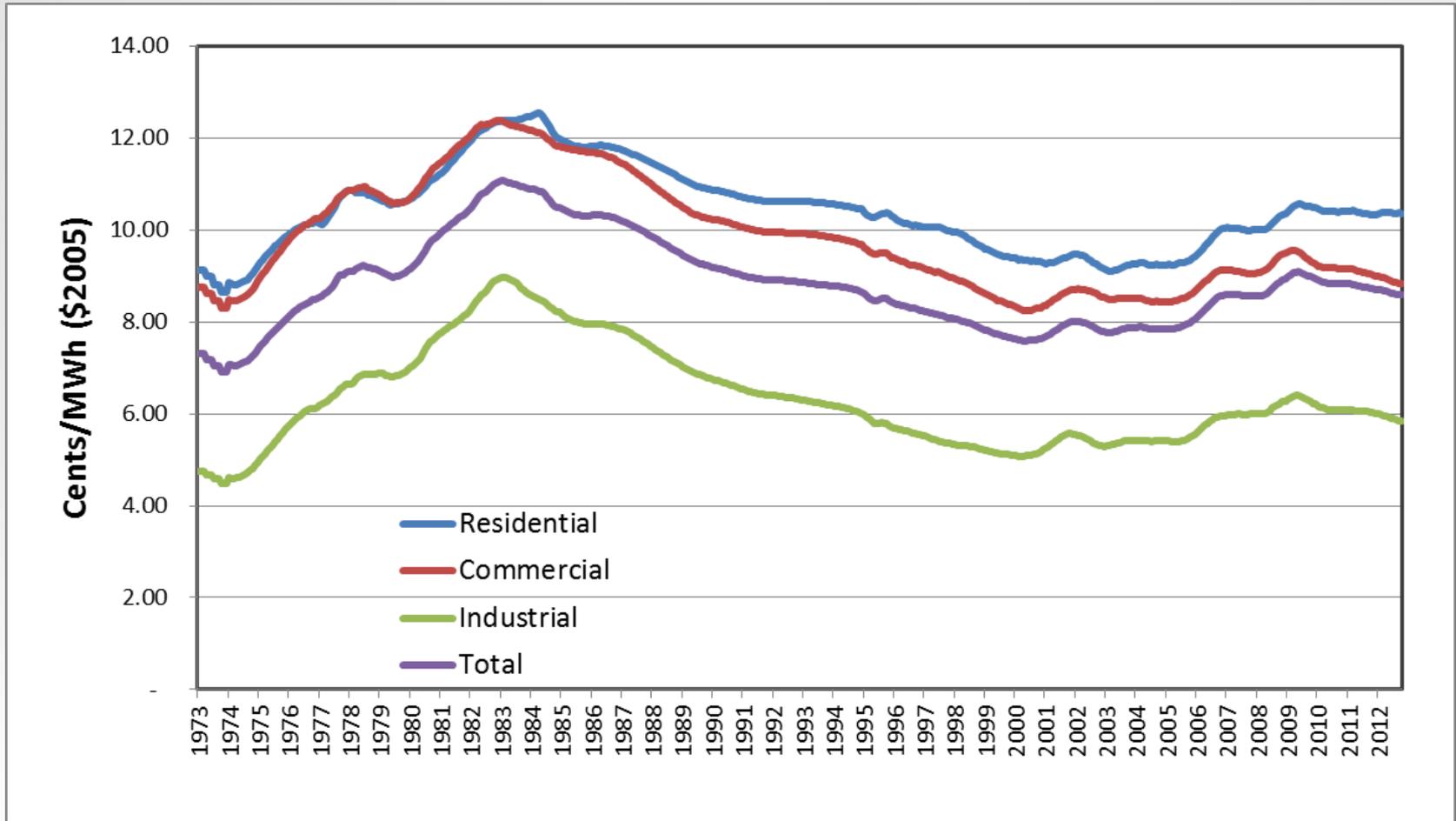
Computed as 12 month moving sum of monthly class sales
Data through November 2012

Annual Electricity Sales (TWh)



Computed as 12 month moving sum of monthly class sales
Data through November 2012

Real Electricity Prices (\$2005/MWh)



Computed as 12 month moving average of monthly \$/MWh by class

AGENDA

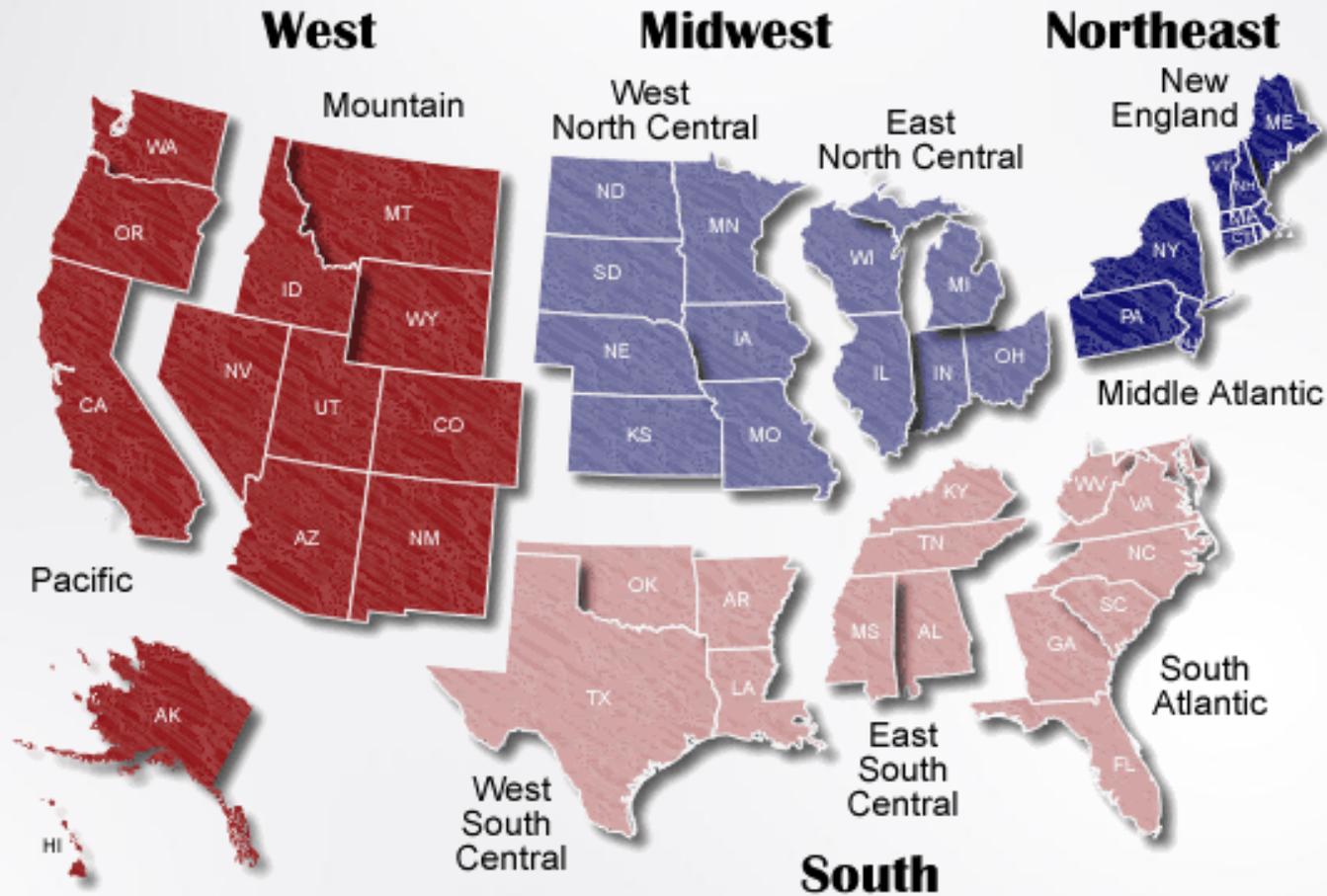
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2012 Forecasting Benchmark Survey

- » In April 2012, Itron surveyed energy forecasters in North America. The goal was to get a benchmark for growth and forecast accuracy
- » A total of 77 utilities responded:
 - Midwest – 18
 - Northeast – 10
 - South – 25
 - West – 15
 - Canada – 9
- » Respondents represent about 2,000 Billion KWh (about 45% of total North America sales)

REGIONS

U.S. Census Regions



Map by the Indiana Business Research Center,
Kelley School of Business, Indiana University

Customer Growth from 2010 to 2011 (%)

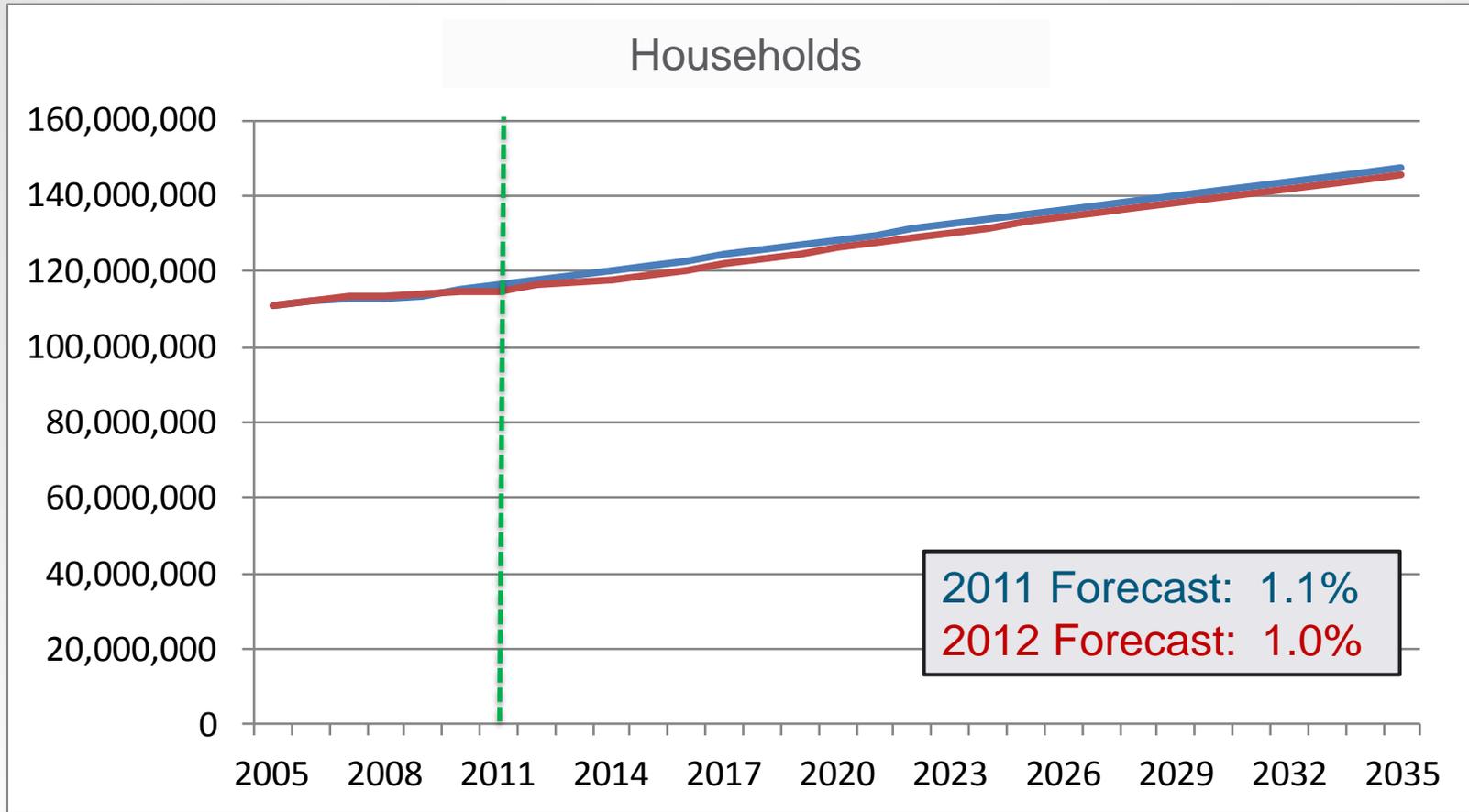
Region	Residential		Commercial	
	Simple	Weighted	Simple	Weighted
Canada	1.46	0.81	0.68	0.44
Midwest	0.20	0.08	0.34	0.26
Northeast	0.02	0.03	0.26	0.10
South	0.66	0.62	0.83	0.75
West	0.80	0.60	0.50	0.62
Total	0.57	0.47	0.56	0.51

Region	Population Change 2000-2010
Canada*	11.6
Midwest**	3.9
Northeast**	3.2
South**	14.3
West**	13.8
Total U.S.**	9.7

* Statistics Canada (2001-2011)

** U.S. Census, <http://www.census.gov/prod/cen2010/briefs/c2010br-01.pdf>

U.S. HOUSEHOLD PROJECTIONS

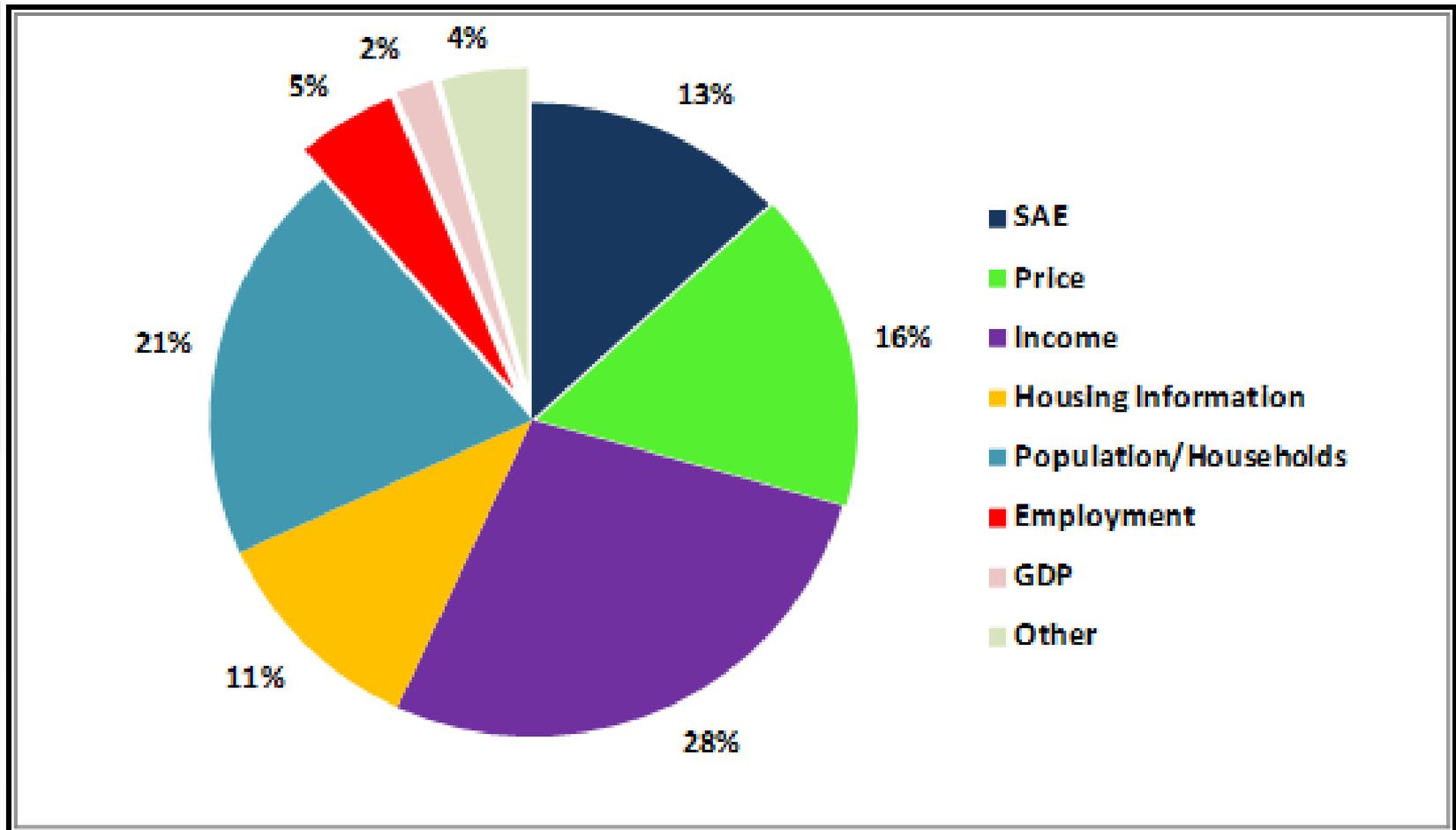


Weather Normalized Annual Sales Growth (%) for 2011

Region	Residential		Commercial		Industrial		Peak	
	Simple	Weighted	Simple	Weighted	Simple	Weighted	Simple	Weighted
Canada	0.97	-0.08	0.77	0.82	0.28	-0.26	1.30	0.76
Midwest	-0.15	-0.04	0.23	0.02	2.13	2.06	-0.40	-0.25
Northeast	1.09	1.15	-0.50	-0.52	1.22	0.51	-0.23	-0.35
South	0.66	0.78	0.36	0.32	3.58	2.48	1.01	0.08
West	2.50	0.38	0.80	-0.07	4.30	0.68	1.40	2.28
Total	0.57	0.41	0.22	0.15	2.14	1.78	0.43	0.43

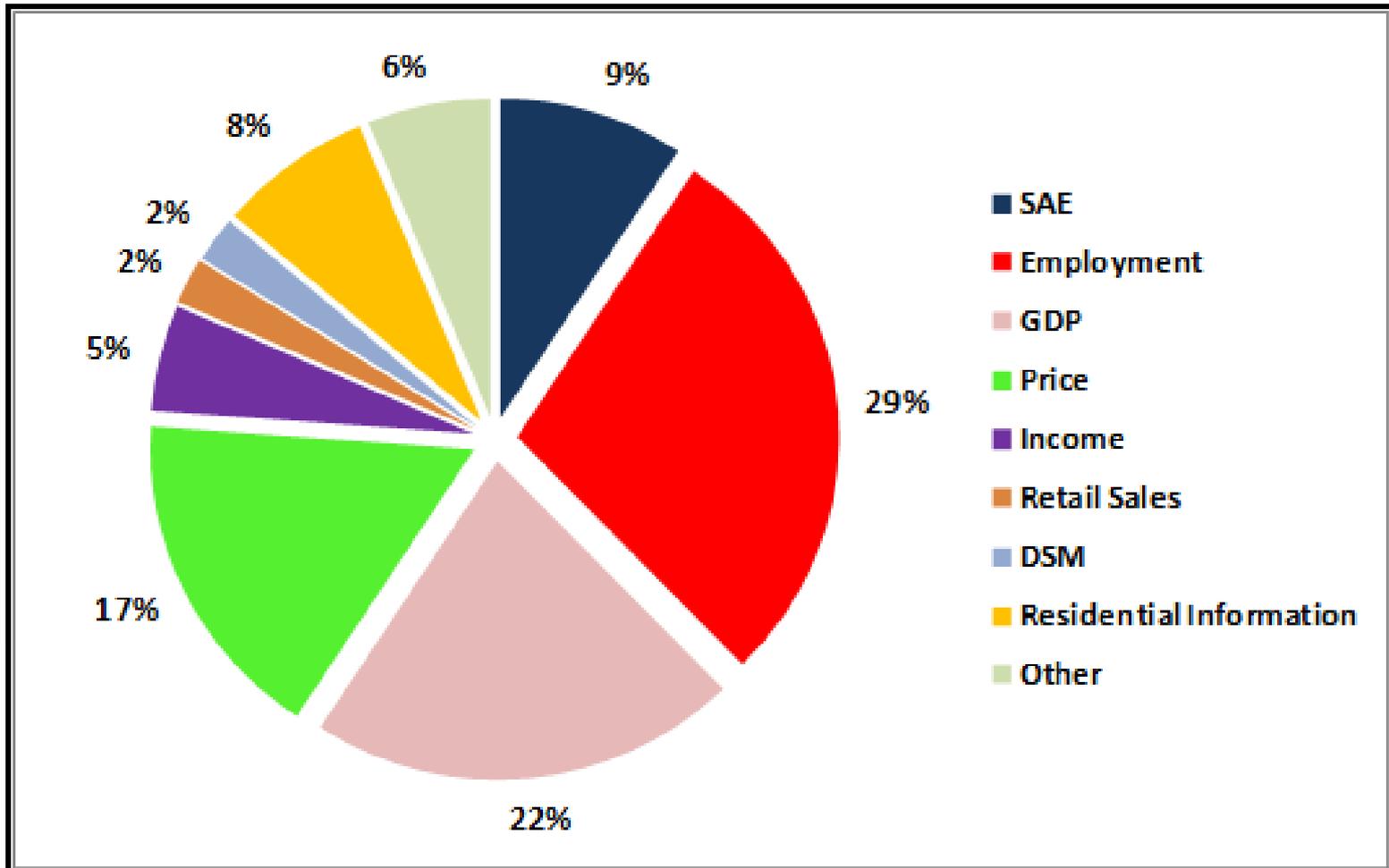
Residential Sales Model Variables

What are the primary economic drivers used in your residential sales model?
169 Drivers listed from 77 Respondents



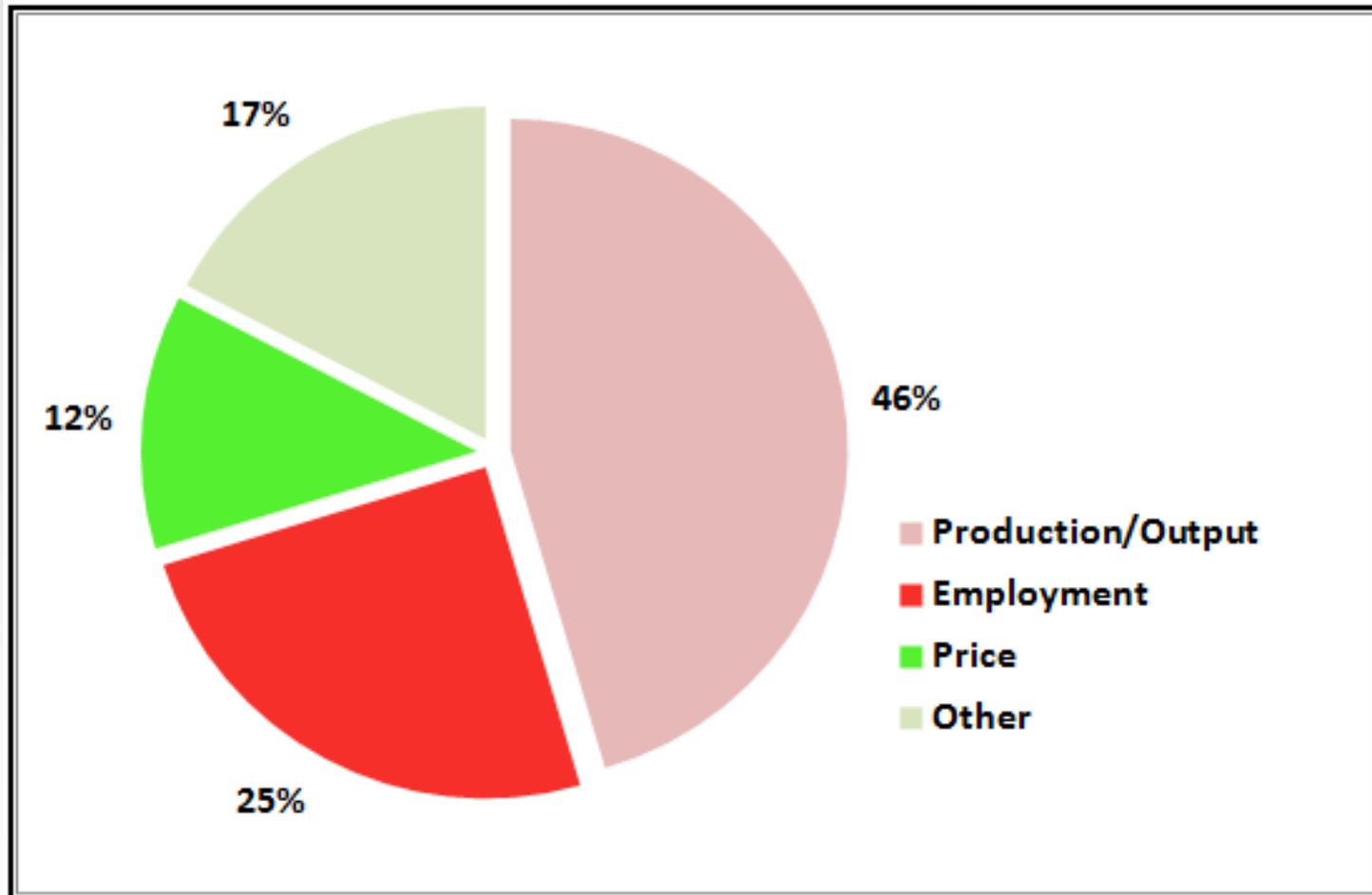
Commercial Sales Model Variables

What are the primary economic drivers used in your commercial sales model?
130 Drivers listed from 77 Respondents



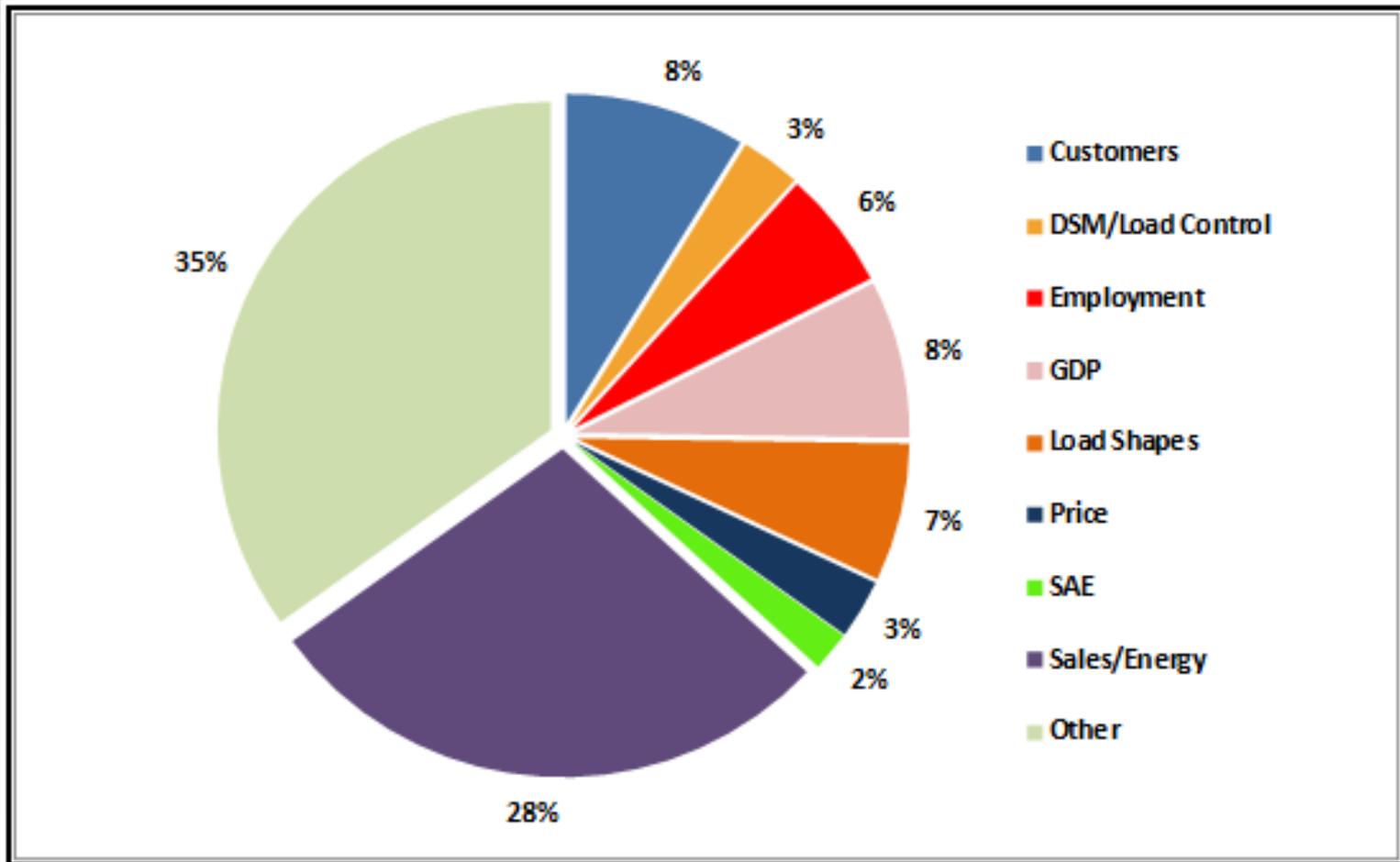
Industrial Sales Model Variables

What are the primary economic drivers used in your industrial sales model?
121 Drivers listed from 77 Respondents



Peak Model Variables

What are the primary economic drivers used in your industrial sales model?
103 Drivers listed from 77 Respondents



Were 2011 Sales (Adjusted for Weather) Above or Below the Forecasted Level?

Simple Average

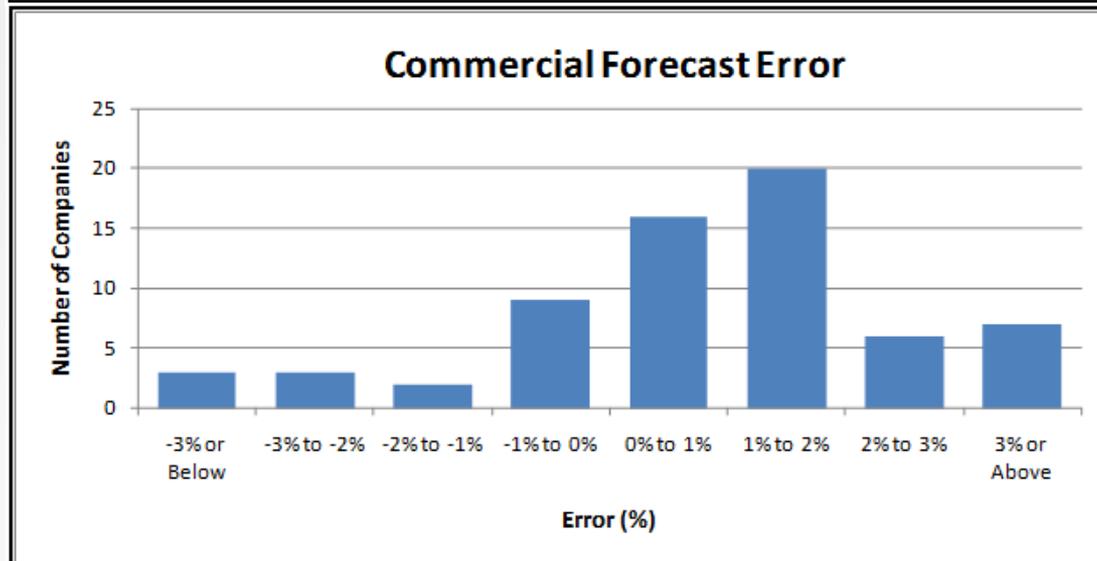
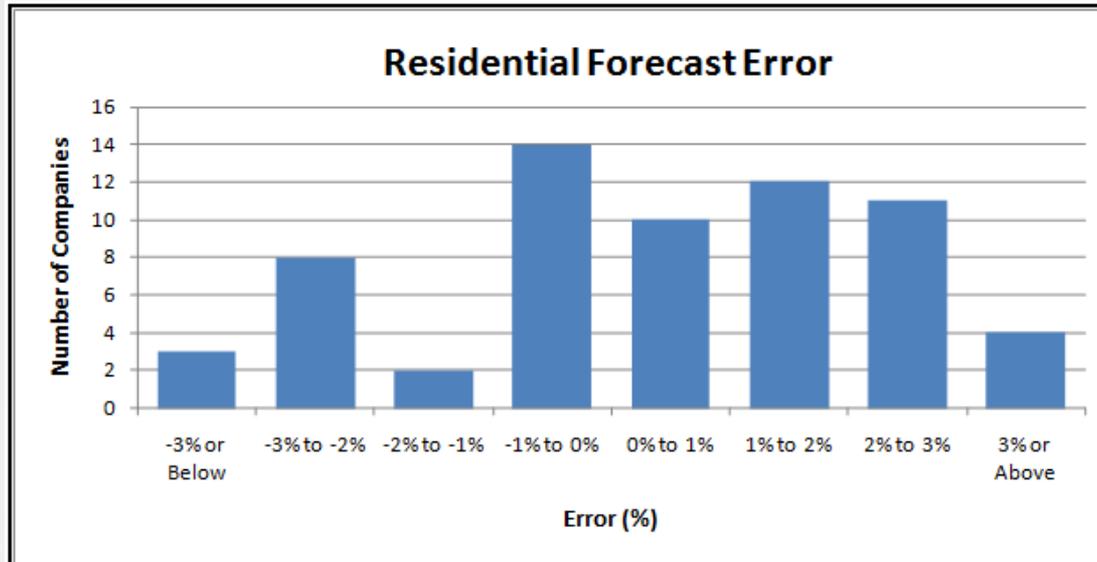
	Res	Com	Ind	Peak
Canada	0.72	0.68	3.22	2.14
Midwest	0.52	0.21	0.15	0.37
Northeast	-0.07	0.82	0.53	0.76
South	0.92	1.57	-1.24	-0.77
West	0.47	0.45	-0.95	0.00
Total	0.54	0.81	-0.09	0.41

Weighted Average

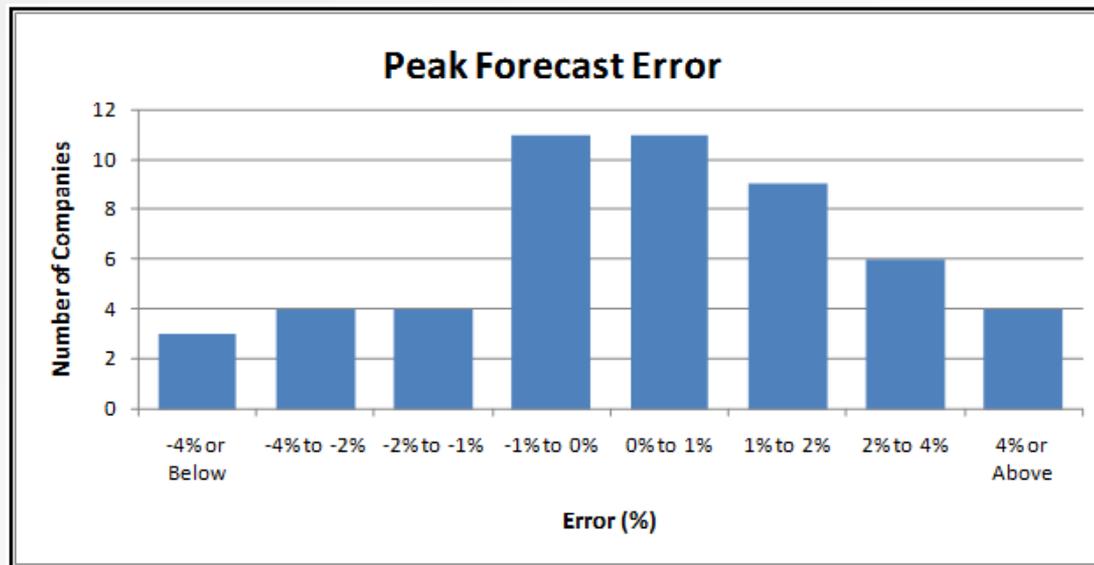
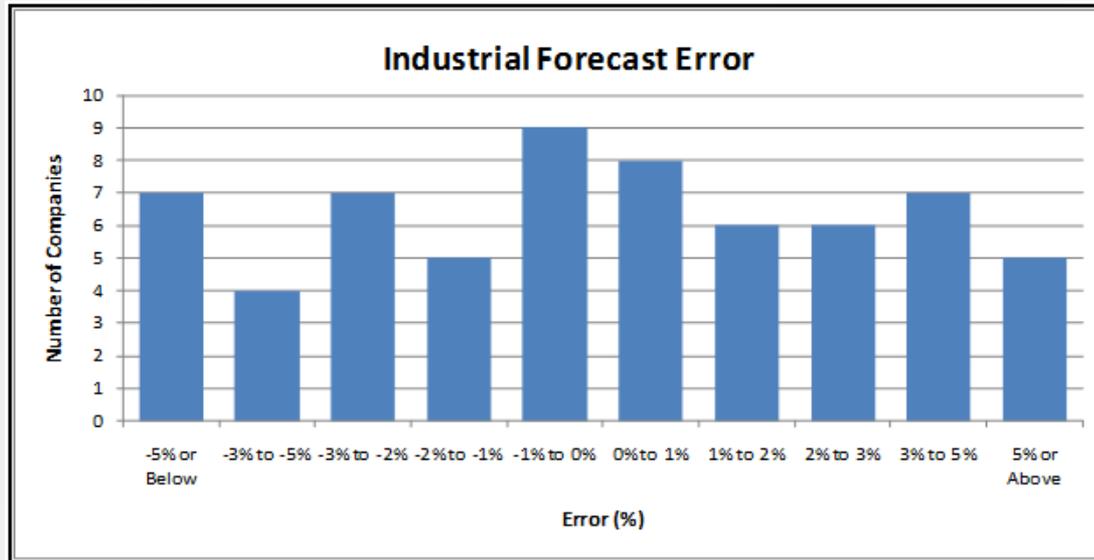
	Res	Com	Ind	Peak
Canada	1.03	1.47	2.55	1.40
Midwest	0.36	-0.16	1.08	0.51
Northeast	-0.82	0.48	1.84	-0.16
South	0.96	0.96	-0.83	-0.73
West	0.38	1.23	-1.73	-0.06
Total	0.60	0.72	0.21	0.15

Negative numbers means that the forecast was under (below) the normalized value

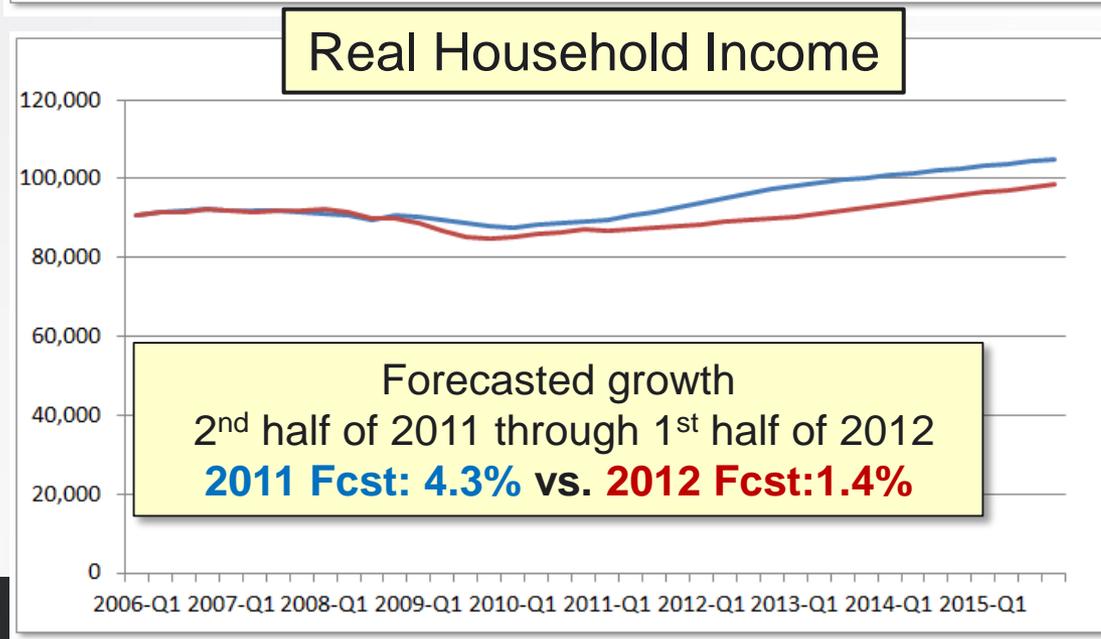
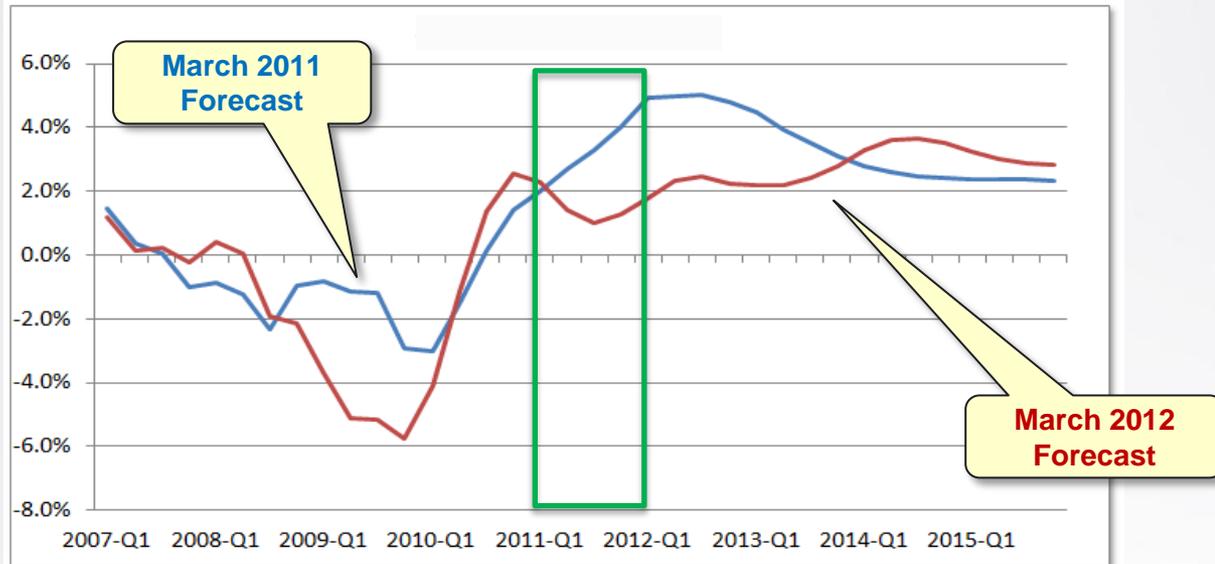
Forecast Error Distribution



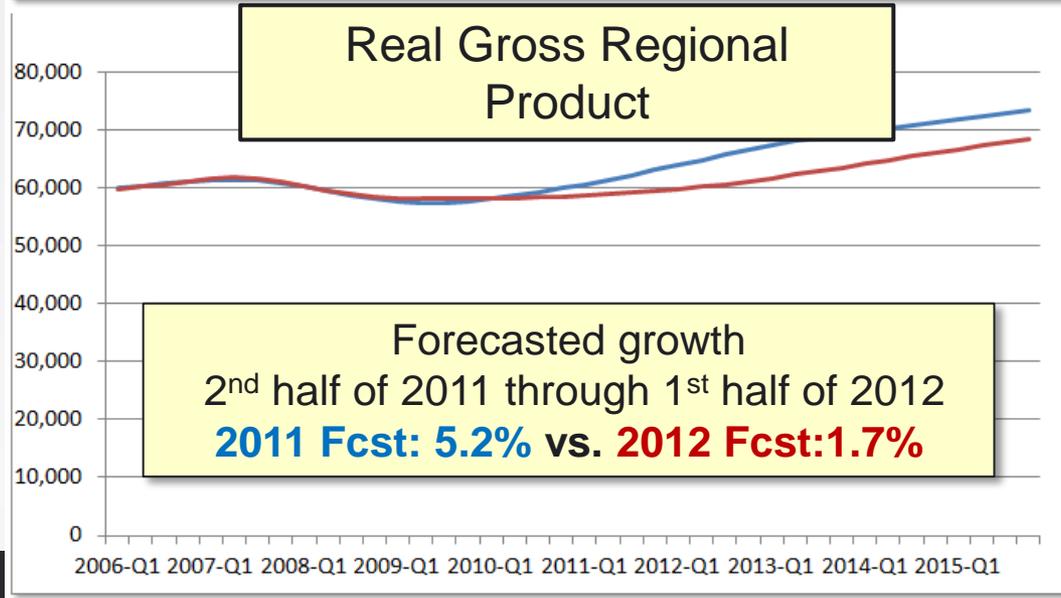
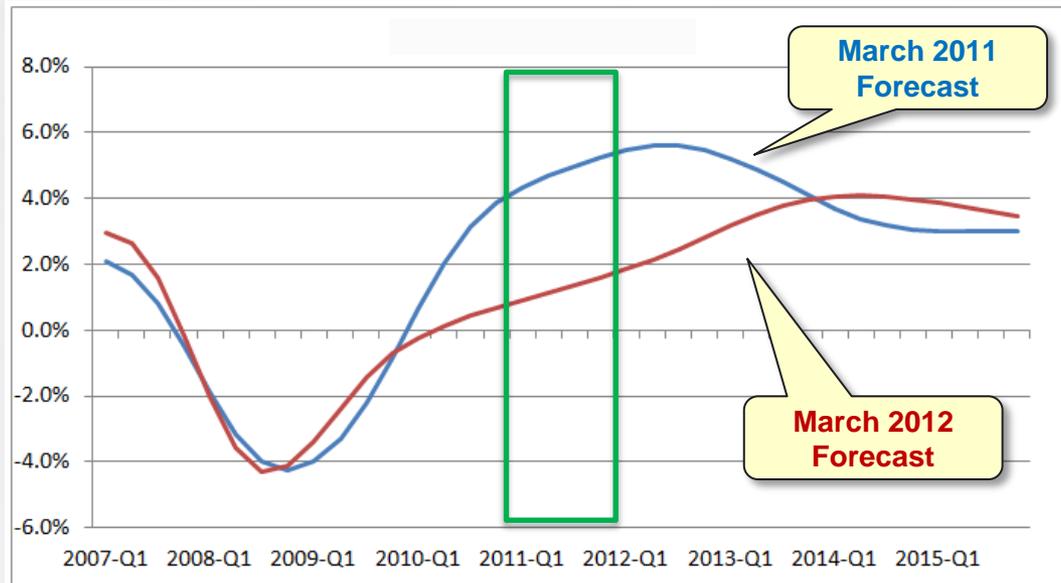
Forecast Error Distribution



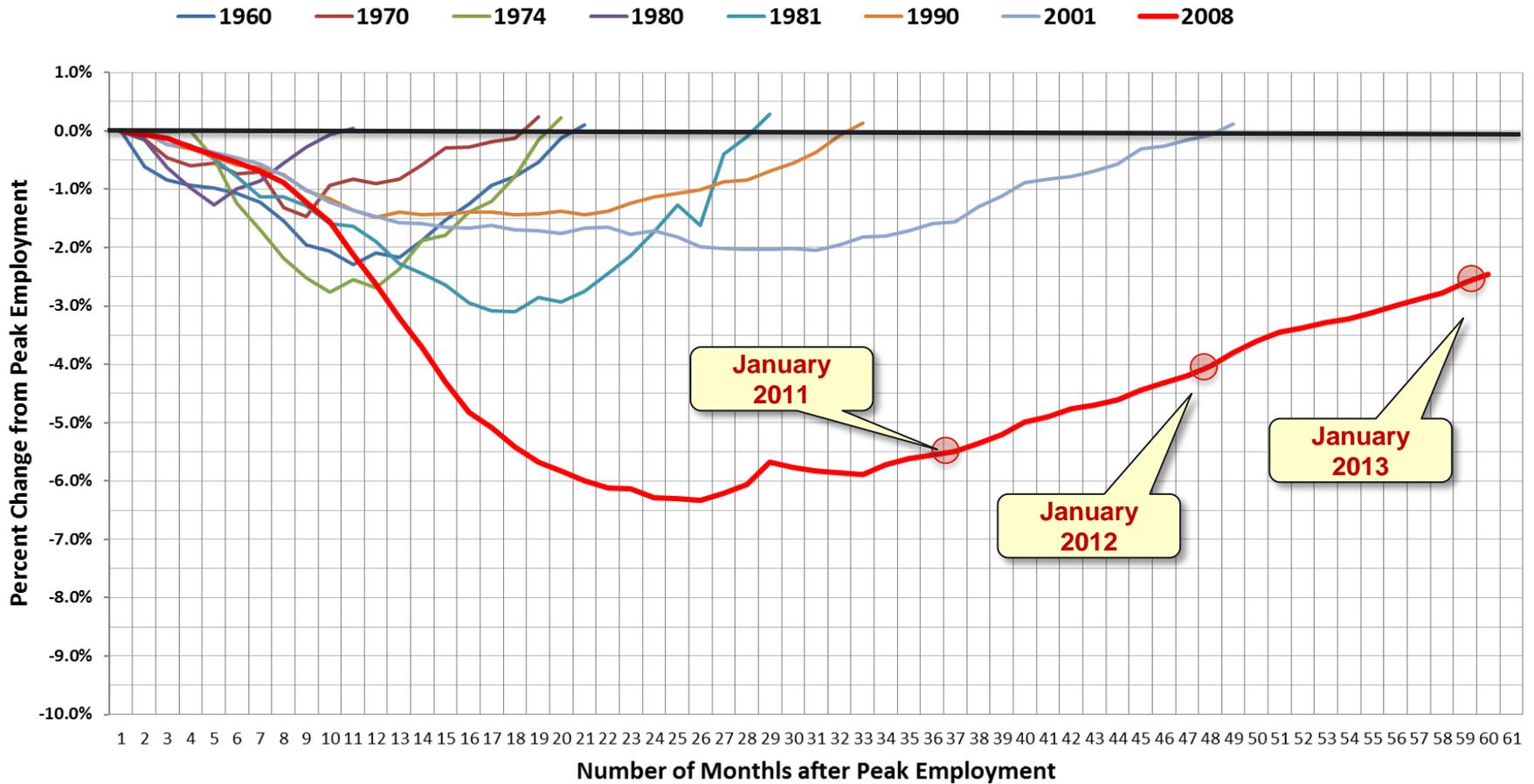
Economic Forecast Missed Reality Big Time



Economic Forecast Missed Reality Big Time



SPEED OF RECOVERY IS THE ISSUE



Source: U.S. Bureau of Labor Statistics

Sales Growth Forecast for 2012 Relative to 2011

Simple Average

	Res	Com	Ind	Peak
Canada	-0.19	0.18	-3.83	0.02
Midwest	0.08	0.47	1.58	0.23
Northeast	-0.38	0.75	1.05	0.20
South	1.16	1.22	1.49	1.81
West	0.89	1.12	-1.47	0.76
Total	0.50	0.84	0.32	0.71

Weighted Average

	Res	Com	Ind	Peak
Canada	-0.05	-0.02	-0.95	0.38
Midwest	-0.21	0.49	1.94	0.34
Northeast	-1.30	0.90	0.01	-1.24
South	0.31	1.29	1.23	0.54
West	0.54	1.79	0.21	-0.59
Total	0.04	0.92	0.93	0.19

Forecast Sales Growth for 2012-2021 Period

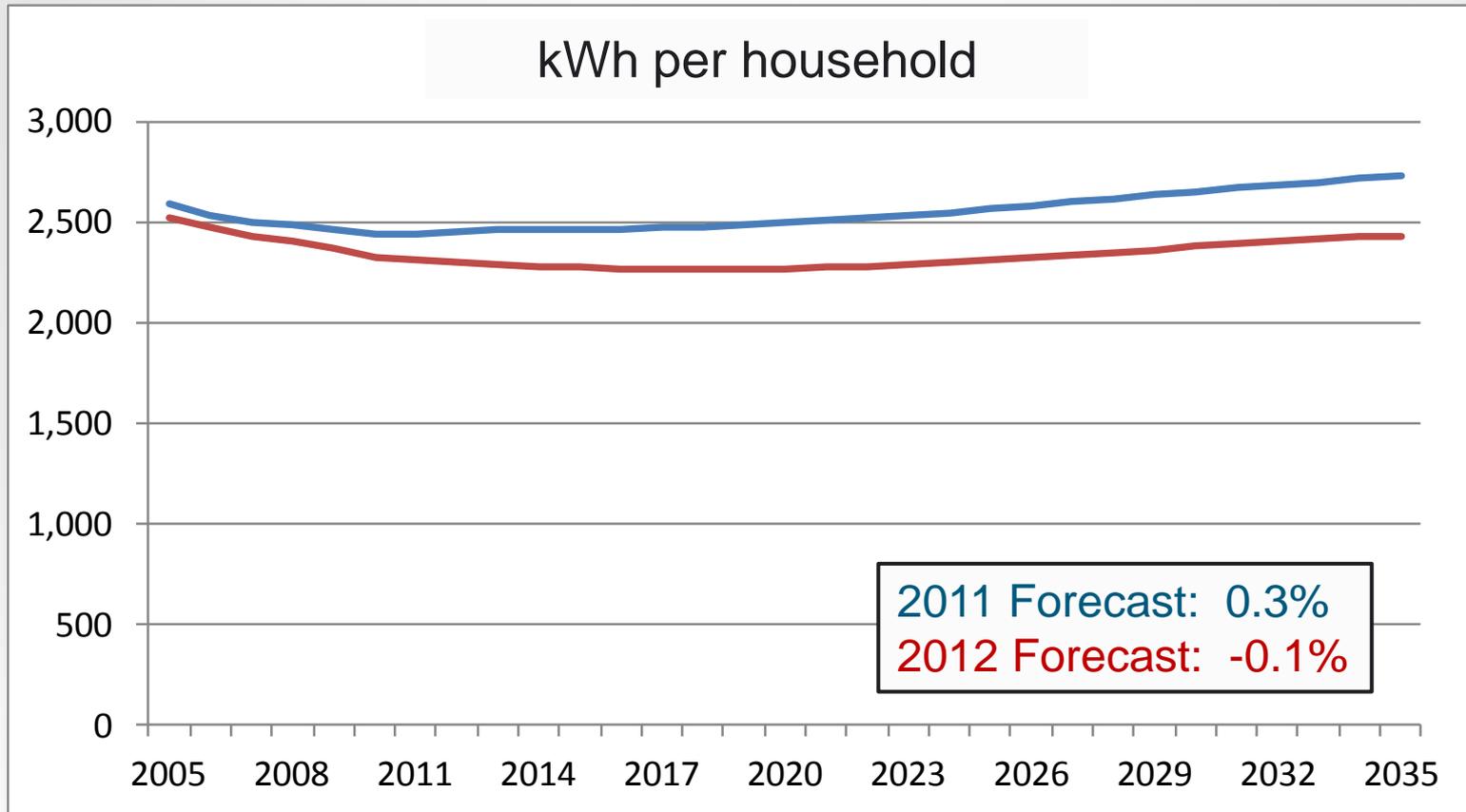
Simple Average

	Res	Com	Ind	Peak
Canada	0.74	0.99	0.82	0.45
Midwest	0.72	0.97	0.97	0.99
Northeast	2.78	2.24	1.81	4.23
South	1.13	1.98	0.77	1.04
West	1.40	1.20	-1.40	0.70
Total	1.21	1.49	1.01	1.39

Weighted Average

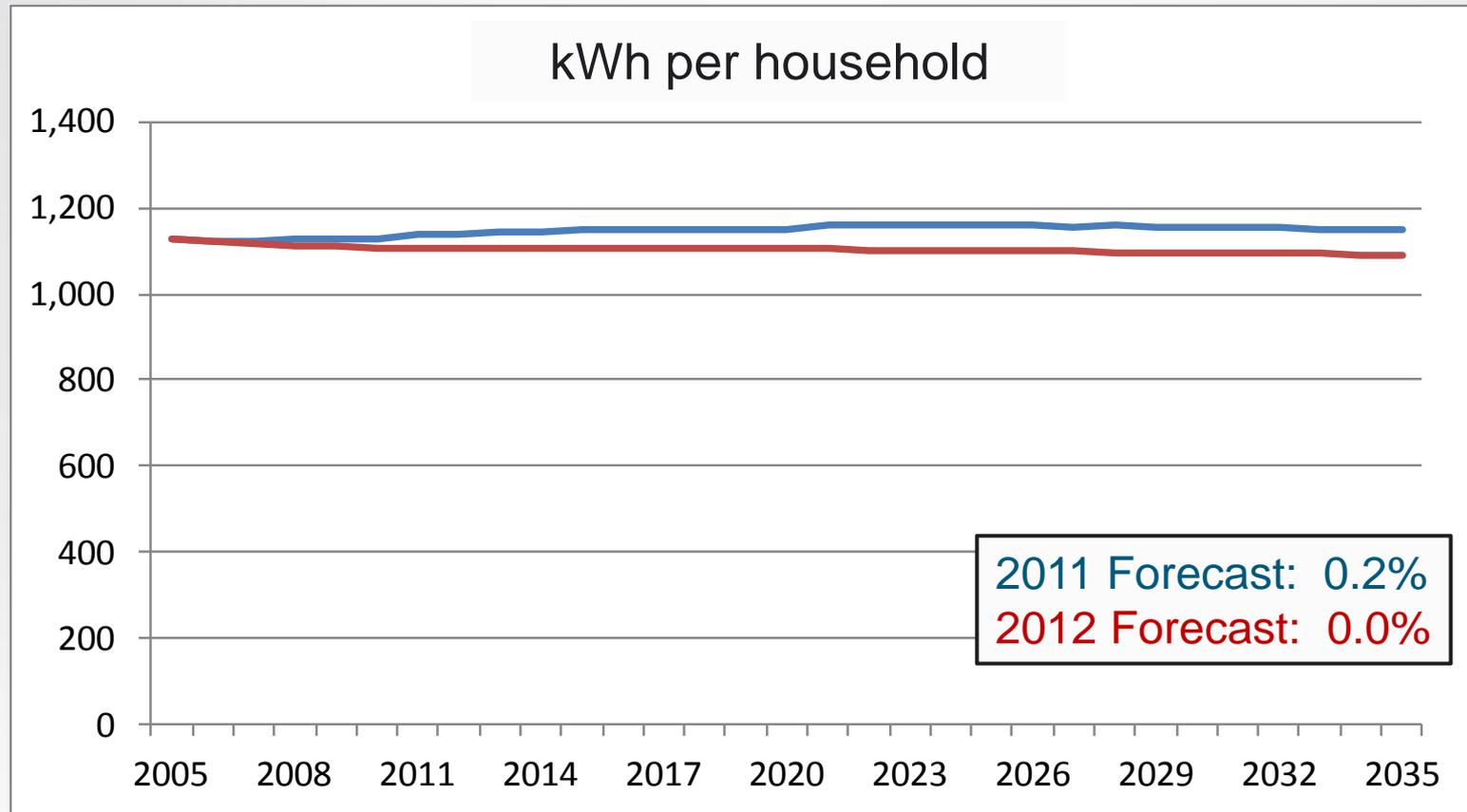
	Res	Com	Ind	Peak
Canada	0.70	1.85	1.54	0.60
Midwest	0.37	0.71	0.93	0.69
Northeast	2.70	1.17	1.53	4.89
South	1.03	1.21	0.52	0.88
West	1.37	1.47	0.57	1.18
Total	0.95	1.20	0.84	0.99

COOLING INTENSITY



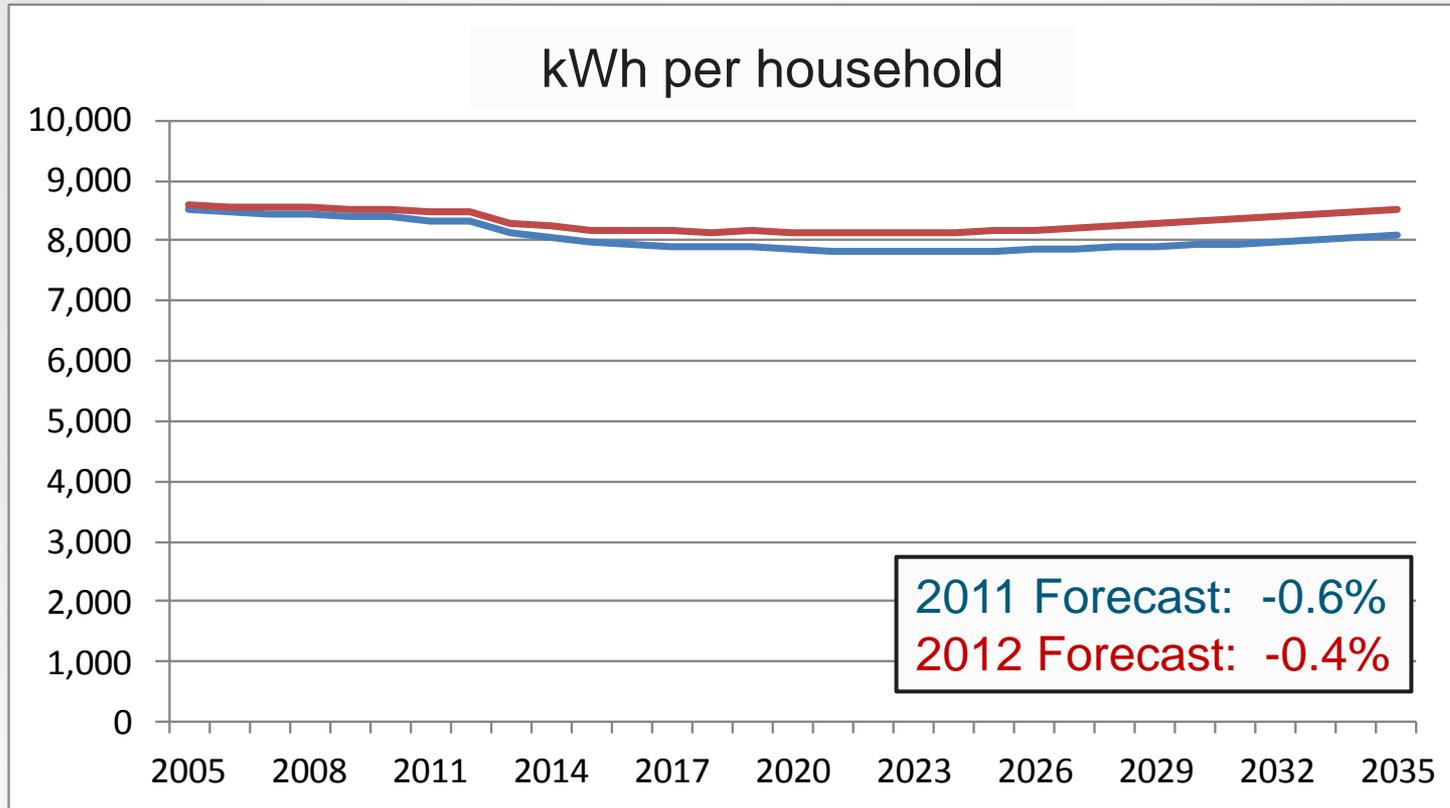
- Lower cooling intensity due to downward revision in floor space projections (smaller homes) and more efficient cooling equipment.

HEATING INTENSITY



- Lower heating intensity due to downward revision in floor space projections (smaller homes) and lower furnace fan intensity.

BASE USE INTENSITY



- Higher base use sales as a result of new technology options and stronger miscellaneous load growth.

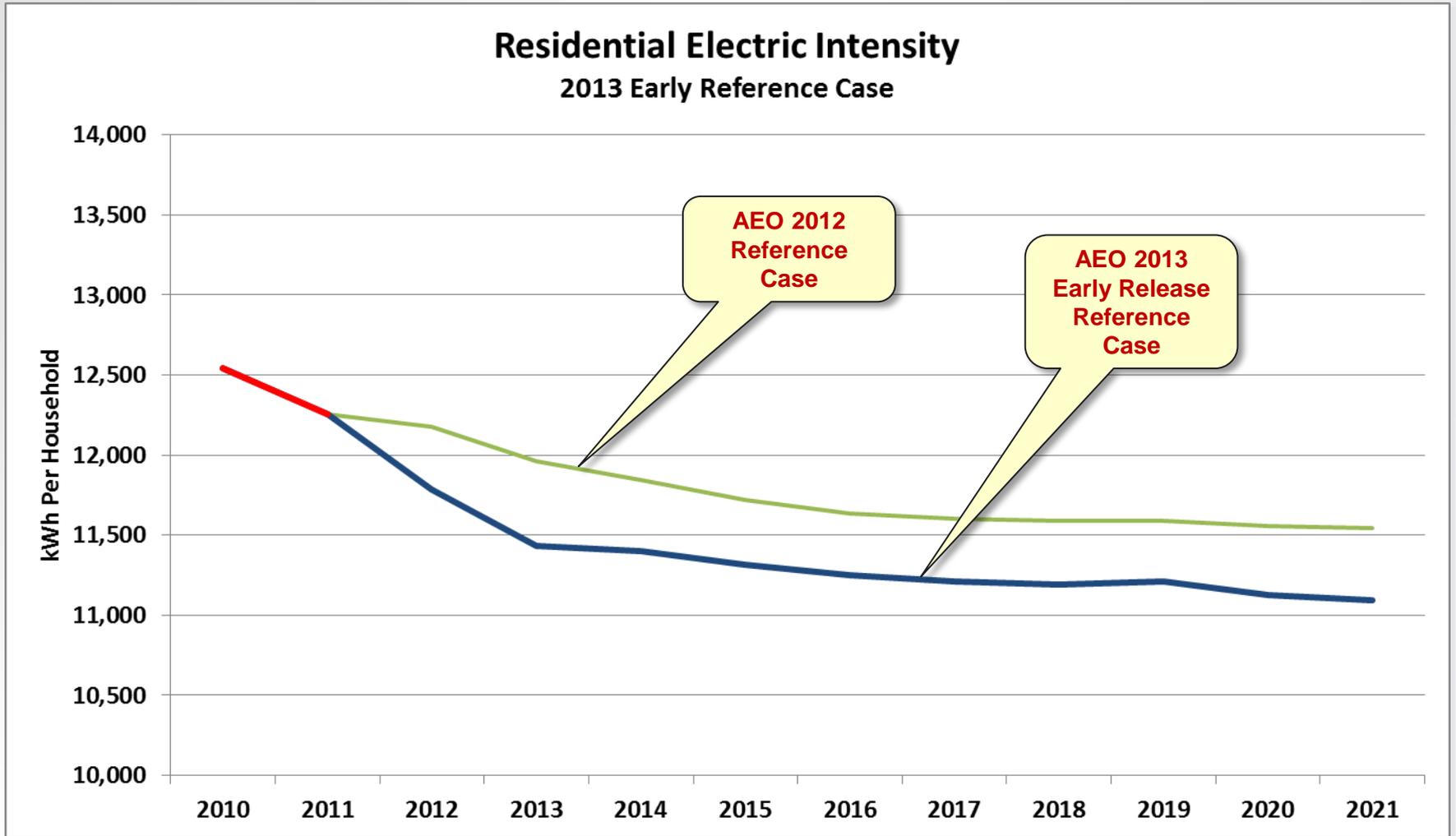
ELECTRONICS DOMINATE ELECTRICITY GROWTH

residential electricity consumption
average annual percent change 2010-2035



Source: EIA, Annual Energy Outlook 2012 Early Release Reference case

RESIDENTIAL ELECTRIC INTENSITY



FACTORS DRIVING INTENSITIES DOWNWARDS

» New Standards

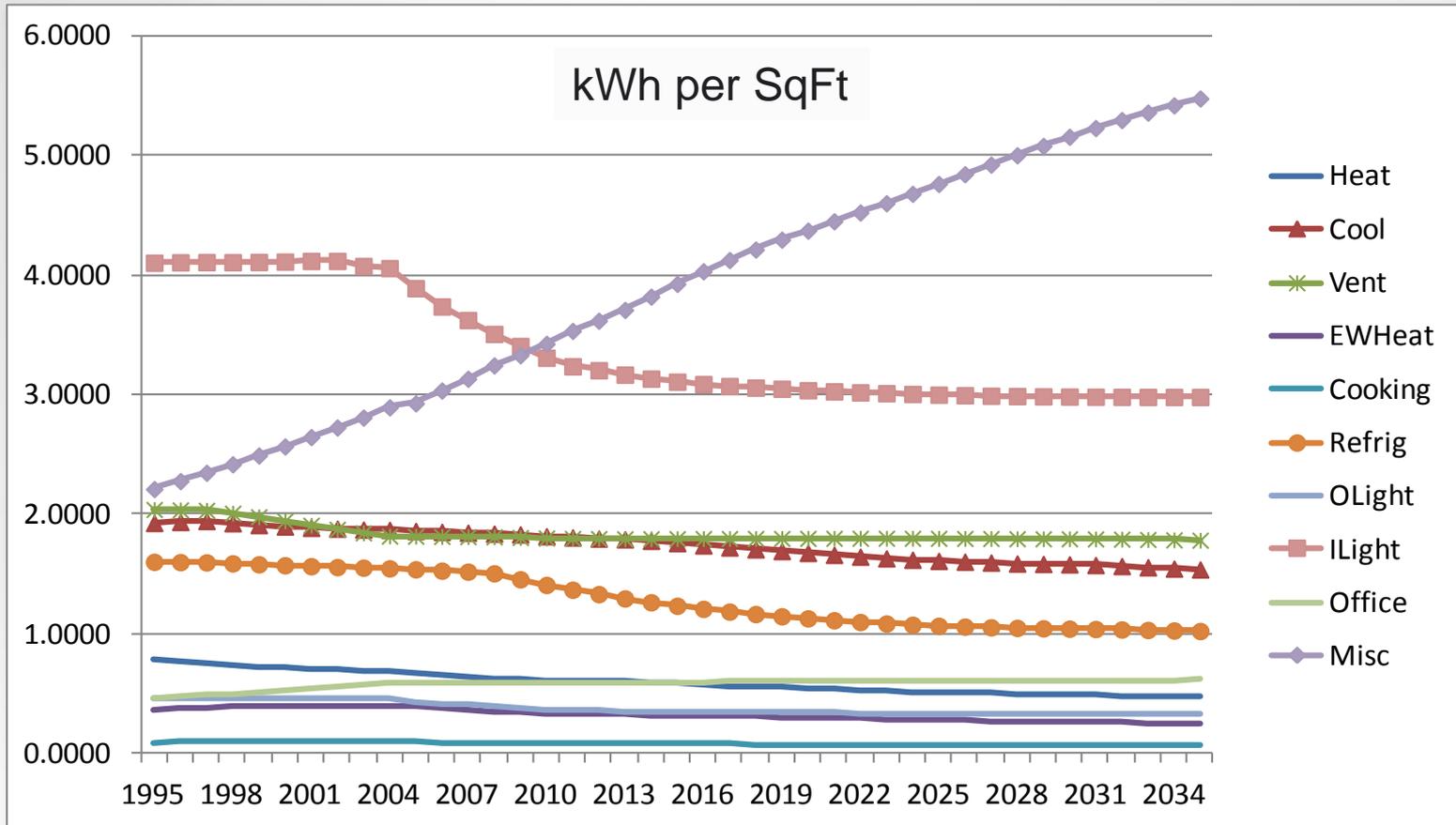
- 2012 forecast reflects the most recent Federal efficiency standards enacted under EISA 2007, ARRA 2009 and standards issued by the Department of Energy.
 - Refrigeration
 - Lighting
 - Water Heating

» Calibration to new product shipment data

» Modeling Assumptions

- EIA also continuously updates model parameters such as building retirement and hurdle rates as well as technology options menu.

COMMERCIAL END-USE INTENSITY PROJECTIONS

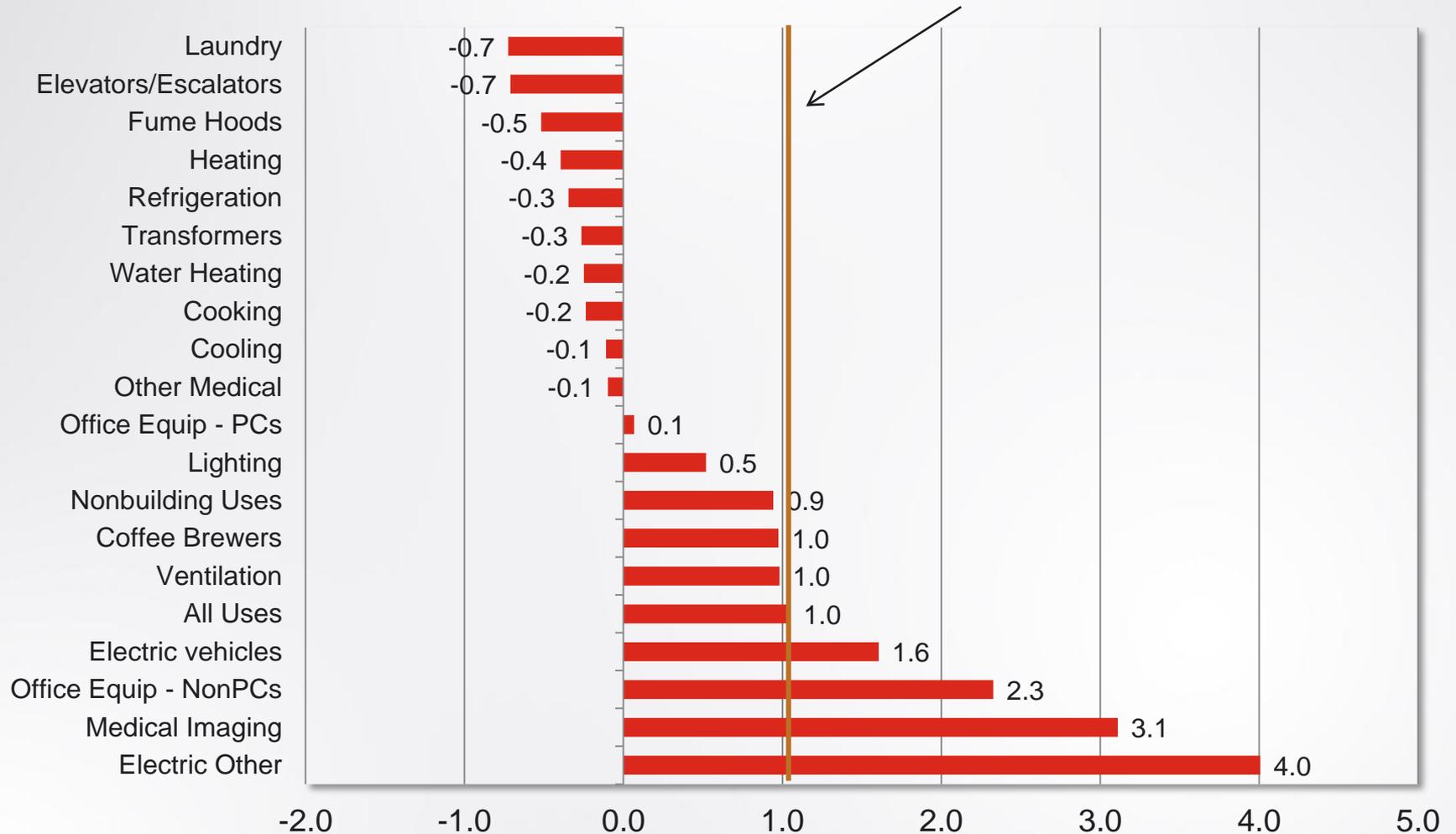


- » Miscellaneous sector includes the following high-growth categories:
 - Non-PC office equipment (servers, mainframe computers)
 - Other equipment (elevators, medical imaging equipment, etc.)

COMMERCIAL ELECTRICITY CONSUMPTION

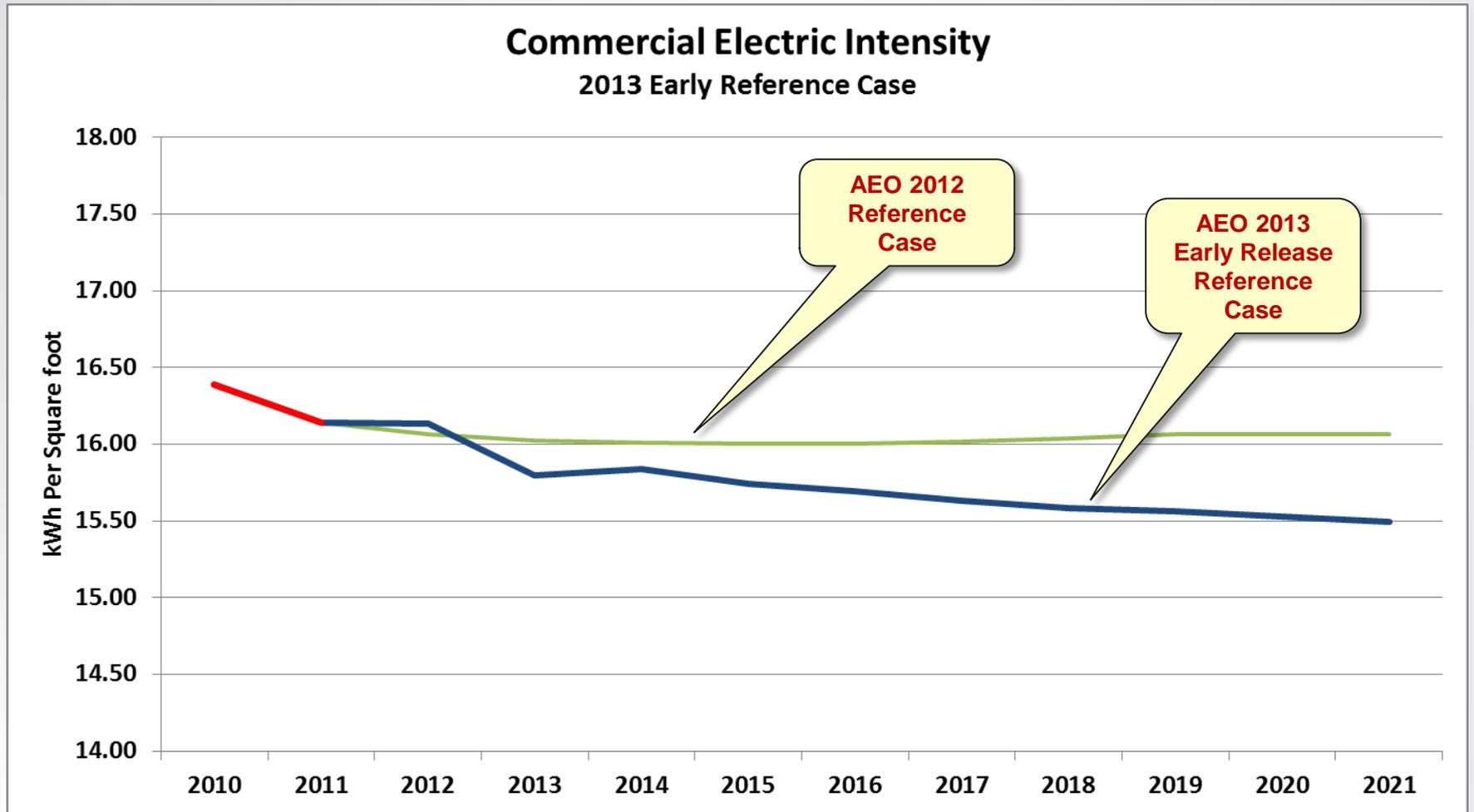
average annual percent change 2010-2035

commercial floorspace (1.0 percent per year)



Source: EIA, Annual Energy Outlook 2012 Early Release Reference case

COMMERCIAL ELECTRIC INTENSITY



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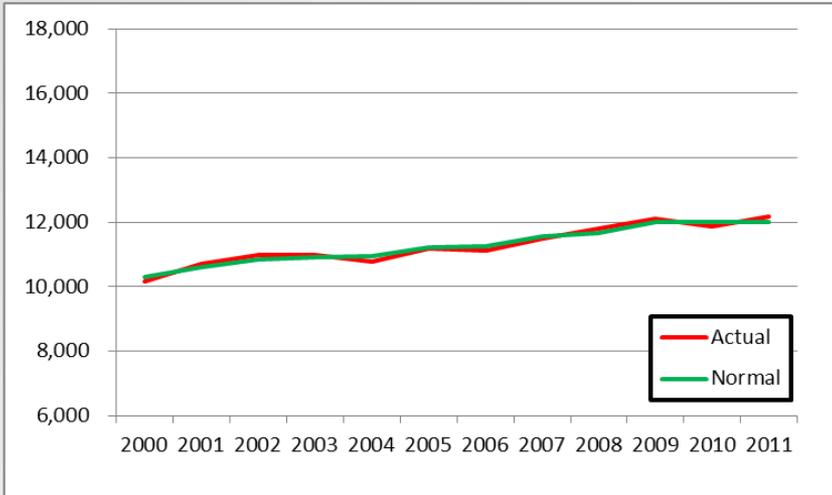
LONG-TERM ENERGY TRENDS

- » Over the last few years there has been a significant downward trend in long-term residential and commercial energy sales projections
 - Flat to declining residential and commercial average use as a result of strong end-use efficiency gains coupled with minimal increase in end-use saturation growth other than miscellaneous
 - New standards
 - Utility and state efficiency programs
 - Slower customer growth
 - Lower household projections and lower square footage growth
 - Lower commercial square footage growth

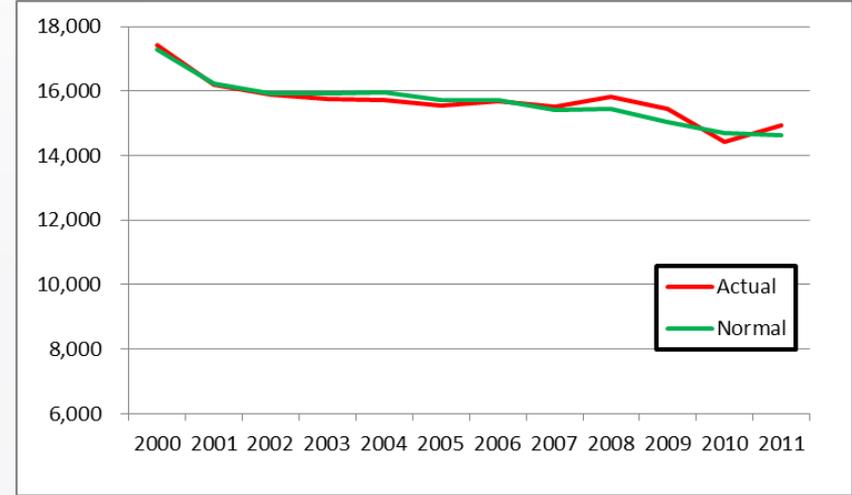
- » All the pieces seem to support a 1.0% electric sales growth world

WHERE ARE WE SEEING THIS TREND?

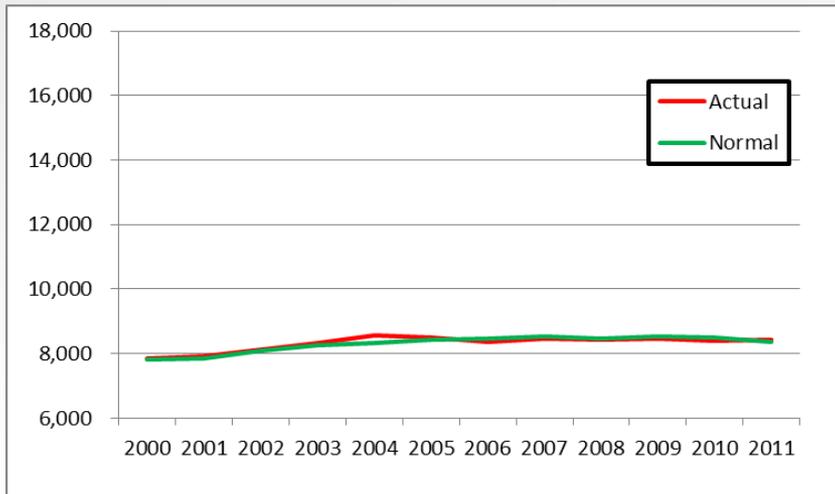
North Central



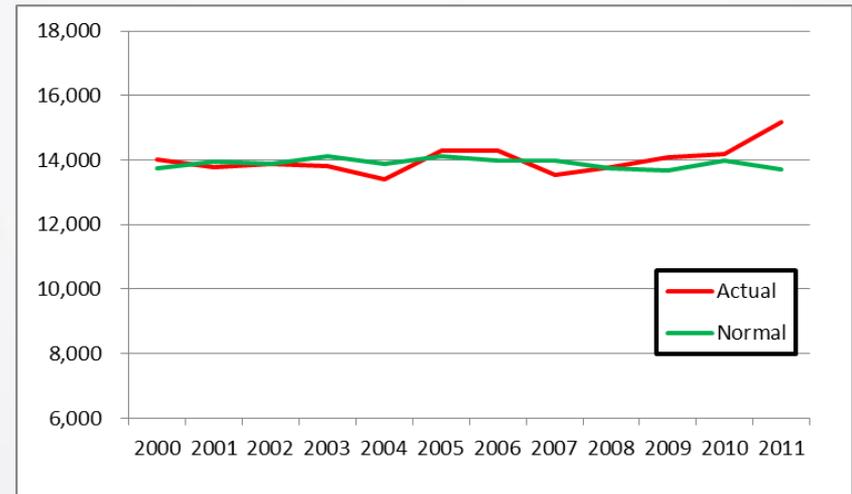
Northwest



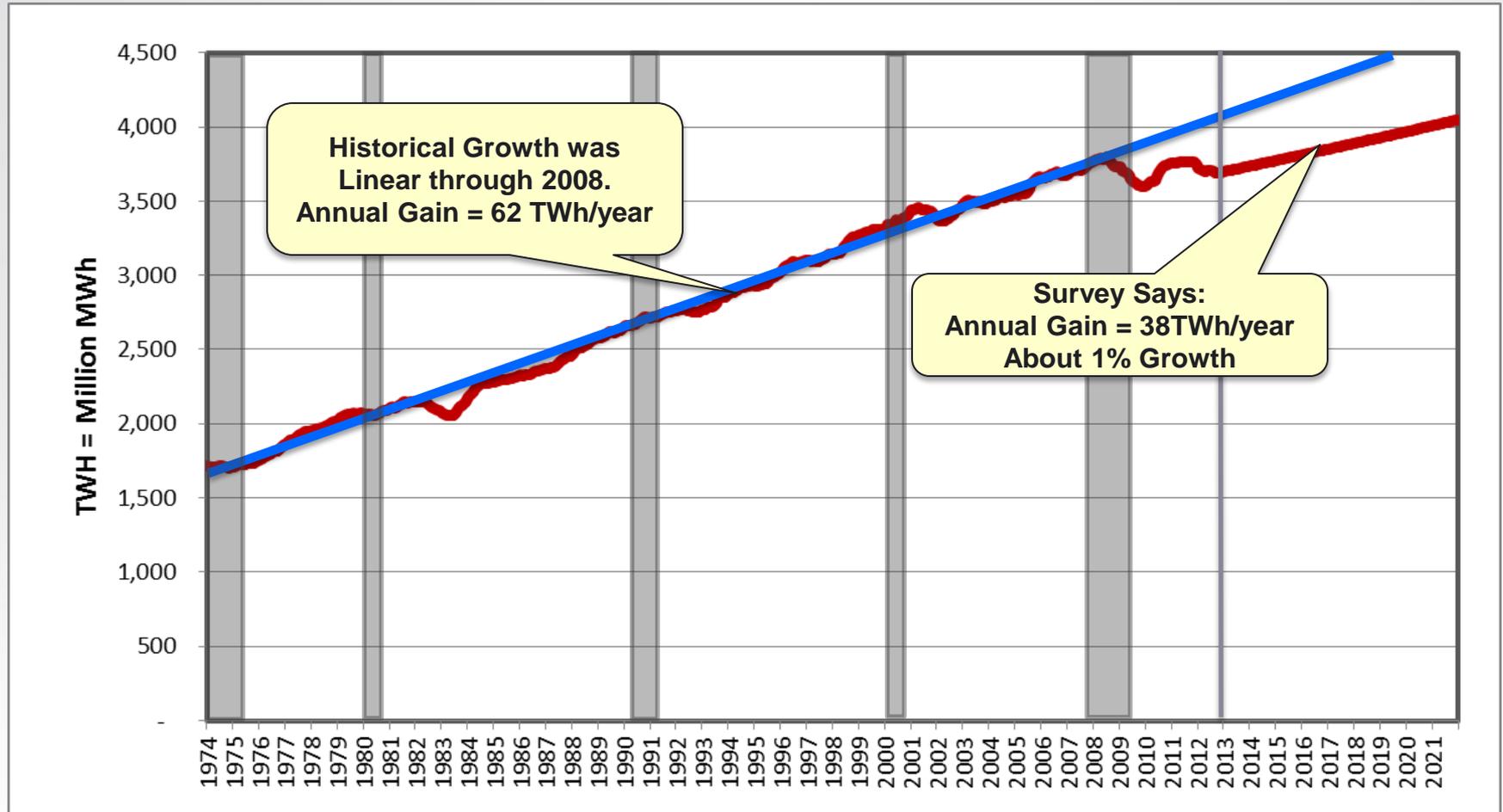
West



South



Living in a 1% World



THANK YOU

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