

What's new?

- **Forecasts will now be based on many model simulations instead of being based on a single linear model.**
 - Neural Network models were developed with 33% of the historical data being withheld from model development.
 - The data being withheld was determined randomly.
 - Randomly withholding data mitigates over-fitting of the data.
 - The model's accuracy was determined based on how well it predicted the sample holdout data.
 - Process was repeated hundreds of times (model convergence).
- **Benefits**
 - In statistics, repeated sampling gives a more accurate estimate than a single sample.
 - The result is a more robust forecast.

What's new?

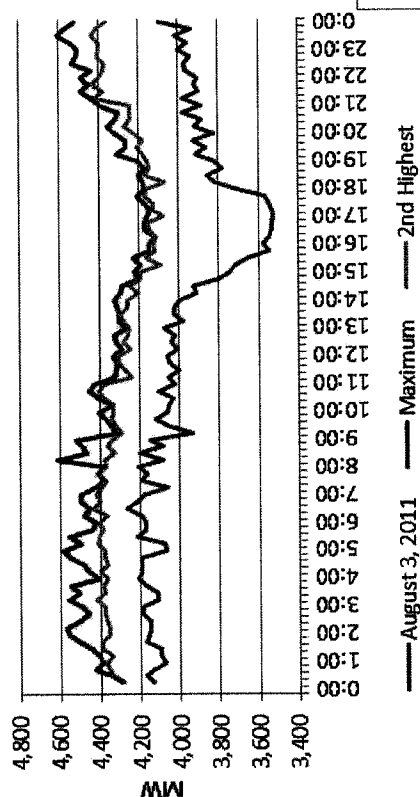
- **Historical energy relationships will now be based on premise counts by customer class (residential, commercial and industrial).**
 - Historical energy relationships will no longer be based on non-farm employment values.
- **Benefits**
 - Historical premise accounts will be very stable and will not be subject to the significant changes exhibited by non-farm employment revisions.
 - “Historical values are actually historical.”

What's new?

- **The determination of 15-year normal forecast will now be based on model output using the most recent 15 years of historical weather data.**
 - Will no longer create a synthetic weather file for use in the model
 - Will no longer time align weather conditions for time of peak
- **Benefits**
 - More accurately reflects historical weather patterns
 - More accurately reflects load diversity at time of peak

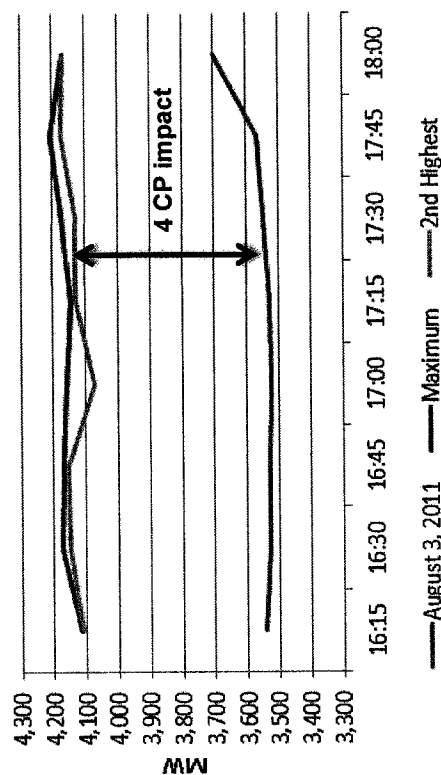
2011 Summer Peak – Impact of 4 CP load reduction

Transmission Connected Premises



- 4 CP impact shown is based on aggregated transmission load values for ~430 premises.
- Estimate is not based on an analysis of individual premises.

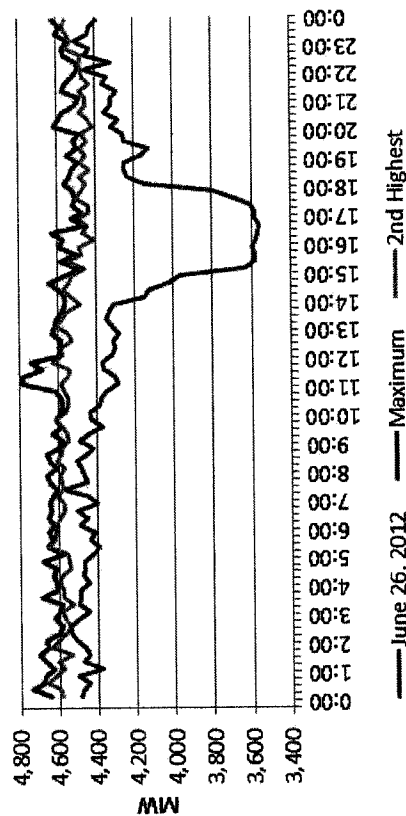
Transmission Connected Premises



- Difference represents the 4 CP impact of ~600 MW on an aggregated basis.
- 4 CP impact would likely be greater if analysis were performed on individual premises.

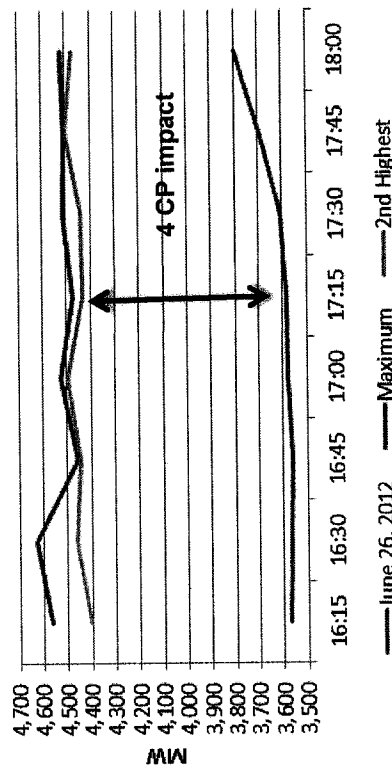
2012 Summer Peak – 4CP Impact

Transmission Connected Premises



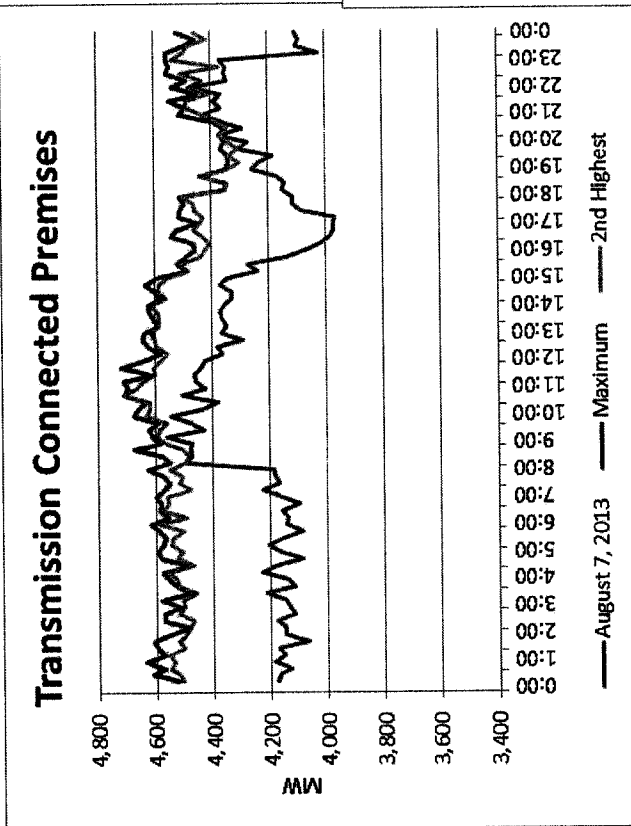
- 4 CP impact shown is based on aggregated transmission load values for ~430 premises.
- Estimate is not based on an analysis of individual premises.

Transmission Connected Premises

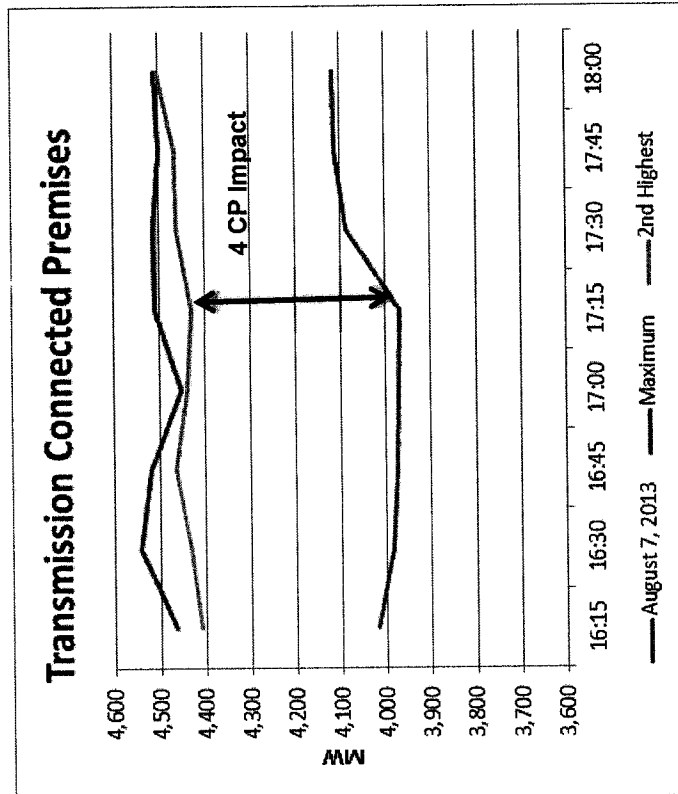


- Difference represents the 4 CP impact of ~900 MW on an aggregated basis.
- 4 CP impact would likely be greater if analysis were performed on individual premises.

2013 Summer Peak - 4CP Impact

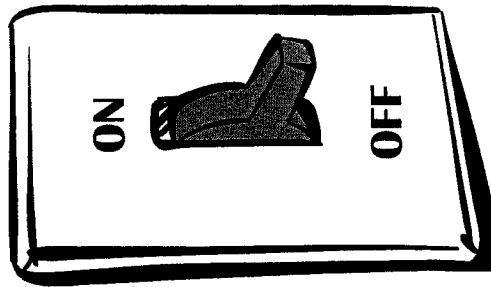


- 4 CP impact shown is based on aggregated transmission load values for ~440 premises.
- Estimate is not based on an analysis of individual premises.



- Difference represents the 4 CP impact of ~500 MW on an aggregated basis.
- 4 CP impact would likely be greater if analysis were performed on individual premises.

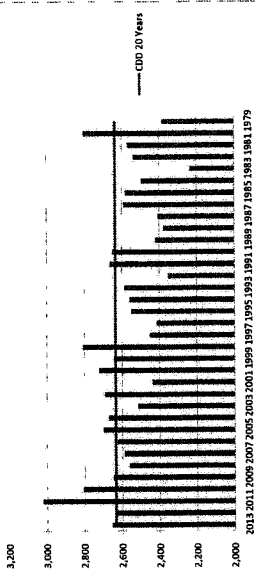
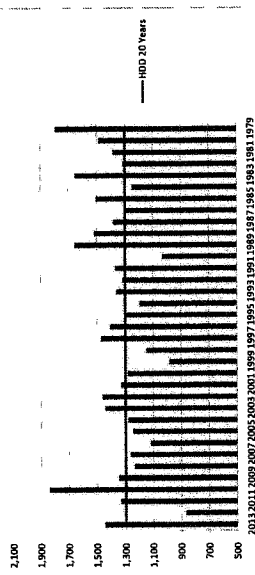
Questions



ERCOT PUBLIC
10/7/2013



Cooling Season CDD (Beaumont)



Heating Season = November to March

Cooling Season = April to October

HDD	1,447	67%	2013
% Change			
CDD	2,654	0.8%	
% Change			

	2013	2012	2011	2010	2009	2008	2007	2006	2005
HDD	1,447	868	1,335	1,841	1,348	1,233	1,266	1,118	1,244
% Change	67%	-35%	-27%	36%	9%	-3%	13%	-10%	-11%
CDD	2,654	2,632	3,021	2,807	2,647	2,562	2,589	2,626	2,697
% Change	0.8%	-12.9%	7.8%	6.1%	3.3%	-1.1%	-1.6%	-2.8%	1.0%

	CDO	CAGR	% Change
2013	2,635	0.4%	0.1%
2012	2,631	0.5%	0.5%
2011	2,617	0.5%	0.7%
2010	2,599	0.4%	0.3%
2009	2,591	0.4%	0.4%
2008	2,580		
Average	2,609		

	CDD	CAGR	Change
2013	2,594	0.3%	0.5%
2012	2,580	0.3%	0.1%
2011	2,577	0.3%	0.6%
2010	2,562	0.2%	0.0%
2009	2,562	0.3%	0.3%
2008	2,553		
Average	2,571		

HDD	CAGR	% Change
1,322	-0.4%	-0.5%
1,329	-0.4%	-1.1%
1,343	-0.1%	-0.1%
1,345	-0.1%	0.9%
1,333	-1.1%	-1.1%
1,348		
1,337		

	CAGR		CAGR	% Change		CAGR	% Change	
	2013	2012		2013	2012		2013	2012
2013	2,690	2,676	0.6%	0.5%	1,298	0.1%	0.1%	
2012	2,676	2,683	0.6%	-0.2%	1,297	0.7%	-4.4%	
2011	2,682	2,678	0.8%	0.2%	1,356	2.4%	0.0%	
2010	2,674	2,674	0.2%	0.3%	1,356	4.3%	4.3%	
2009	2,616	2,616	0.0%	0.0%	1,300	2.5%	2.9%	
2008	2,615	2,615			1,284			
Average	2,651	2,651			1,312			

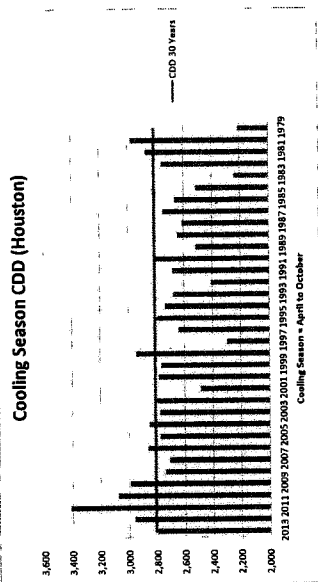
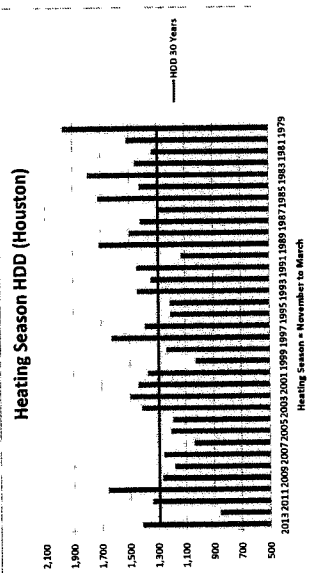
Trend Lines

Trend Lines
HDD 20 Yr 1,299

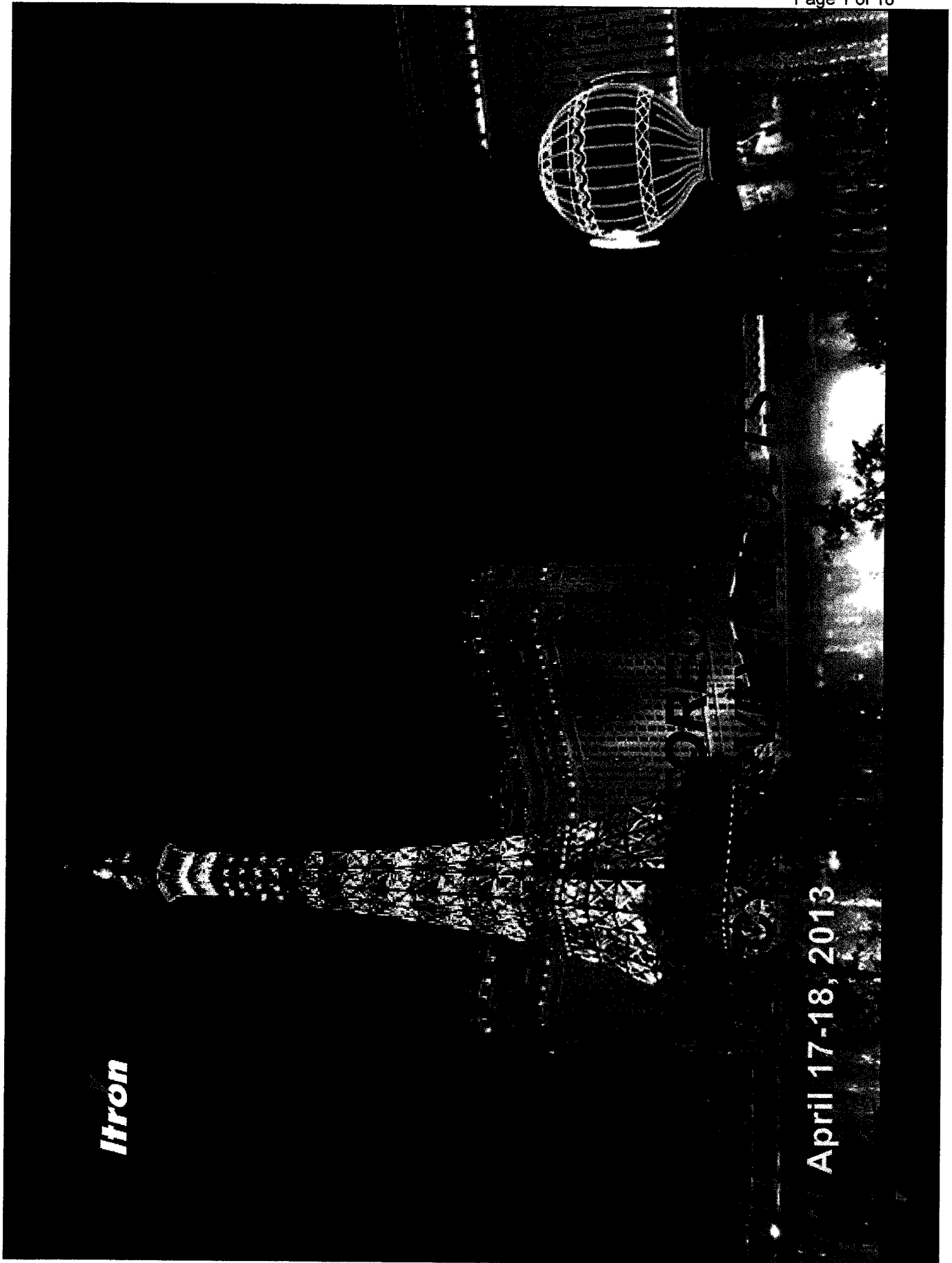
Trend Lines

[illegible][illegible]

Houston

[illegible][illegible]

59



Itron

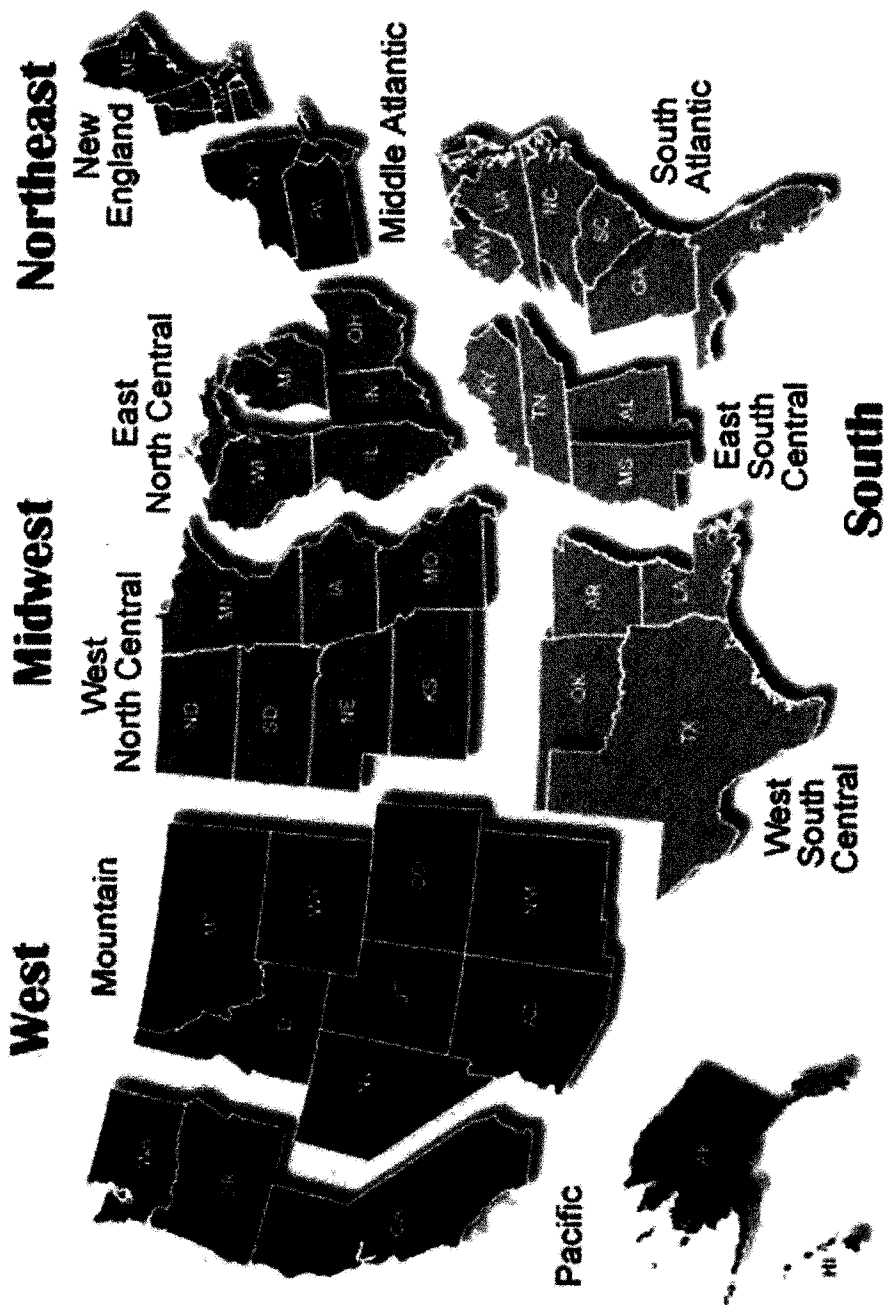
April 17-18, 2013

2013 Forecasting Benchmark Survey

- » In April 2013, Itron surveyed energy forecasters in North America. The goal was to get a benchmark for growth and forecast accuracy
- » A total of 54 (77 in 2012) utilities responded:
 - Midwest – 19 (18)
 - Northeast – 7 (10)
 - South – 12 (25)
 - West – 8 (15)
 - Canada – 8 (9)
- » Respondents represent about 1,700 (2,000) Billion kWh

REGIONS

U.S. Census Regions

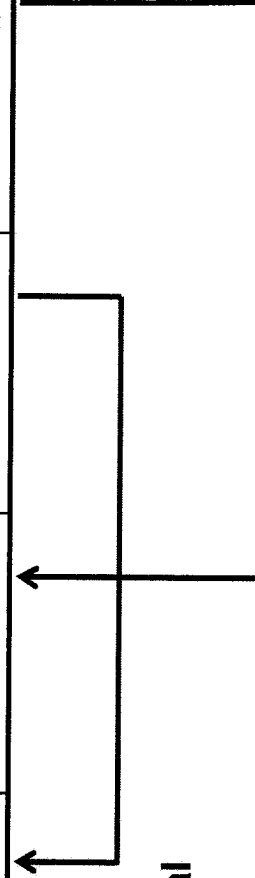


Map by the Indiana Business Research Center,
Kelley School of Business, Indiana University

Customer Growth from 2011 to 2012 (%)

What was your average customer growth from 2011 to 2012 for the Residential and Commercial classes?

Region	2011 - 2012		2010 - 2011	
	Residential	Commercial	Residential	Commercial
Canada	0.94	1.07	0.81	0.44
Midwest	0.09	0.39	0.08	0.26
Northeast	1.18	0.40	0.03	0.10
South	0.83	1.22	0.62	0.75
West	0.88	0.53	0.60	0.62
Total	0.73	0.93	0.47	0.51



Residential and Commercial
increasing slightly

US Non-Farm Employment Growth

2010-2011 1.22%

2011-2012 1.70%

Weather Normalized Annual Sales Growth (%) for 2012

2013 Survey Result

Region	Residential	Commercial	Industrial	System	Peak
Canada	(0.73)	(0.37)	(0.71)	0.59	1.11
Midwest	(0.92)	(0.17)	(0.37)	(0.56)	(1.51)
Northeast	0.44	(0.57)	(1.32)	(0.36)	1.76
South	0.97	0.27	3.30	1.44	(1.33)
West	0.55	1.13	2.76	0.71	0.95
Total	(0.09)	0.03	1.49	0.44	(0.87)

* Half of the Canadian responses reported all sectors as well as system and peak growth

- Flat Residential and Commercial Sales
- Industrial sector showing recovery

2012 Growth Rates

2012 Survey Result Sales Growth (%) for 2011

Region	Residential	Commercial	Industrial	System	Peak
Canada	(0.08)	0.82	(0.26)	NA	0.76
Midwest	(0.04)	0.02	2.06	NA	(0.25)
Northeast	1.15	(0.52)	0.51	NA	(0.35)
South	0.78	0.32	2.48	NA	0.08
West	0.38	(0.07)	0.68	NA	2.28
Total	0.41	0.15	1.78	NA	0.43

2011 Growth Rates

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

2013 Survey Result MAPEs for 2012

Region	Residential	Commercial	Industrial	System	Peak
Canada	1.07	1.81	4.32	1.22	1.72
Midwest	0.89	2.18	2.47	1.83	2.33
Northeast	0.99	2.38	1.42	0.78	3.21
South	0.74	2.13	3.45	0.89	1.85
West	0.87	1.29	3.87	0.56	1.43
Total	1.28	3.12	3.74	1.86	2.95

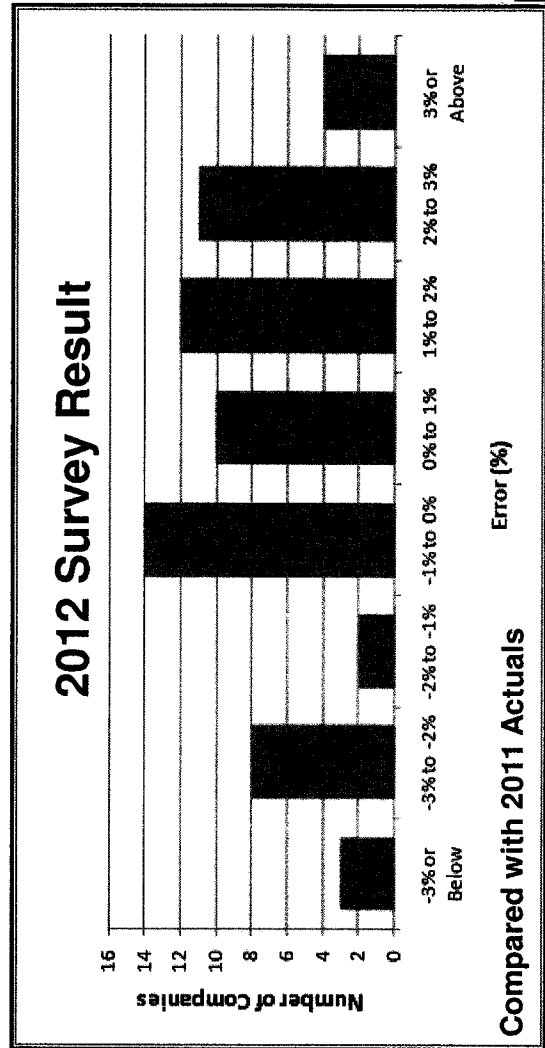
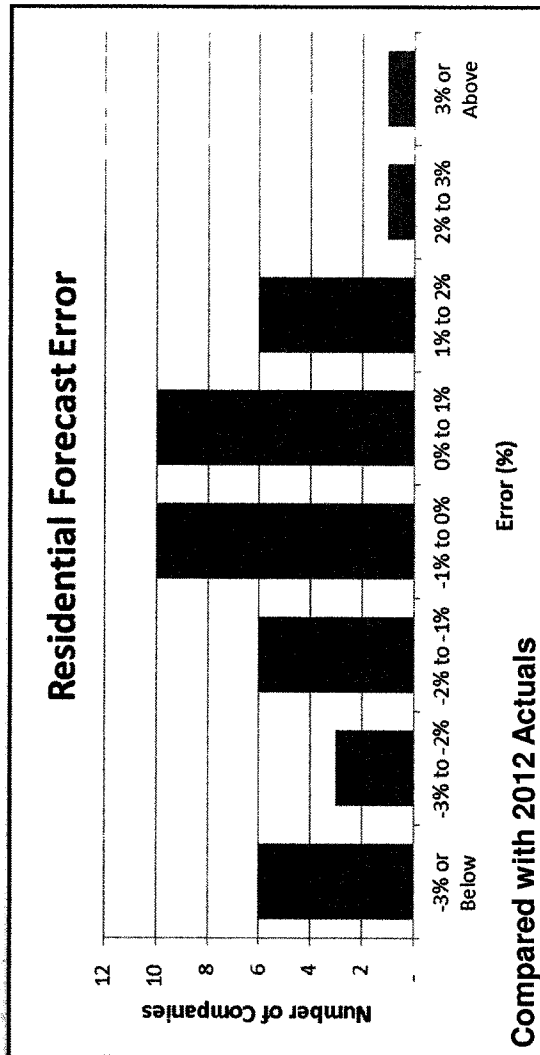
2012 Survey Result MAPEs for 2011

Region	Residential	Commercial	Industrial	System	Peak
Canada	1.27	1.72	4.16	NA	1.40
Midwest	1.96	2.32	2.90	NA	0.62
Northeast	1.52	0.76	2.98	NA	3.52
South	1.50	1.64	3.50	NA	1.01
West	1.52	1.49	2.64	NA	1.18
Total	1.60	1.79	3.27	NA	1.08

* Results are weighted based on company annual energy

Residential Forecast Error Distribution

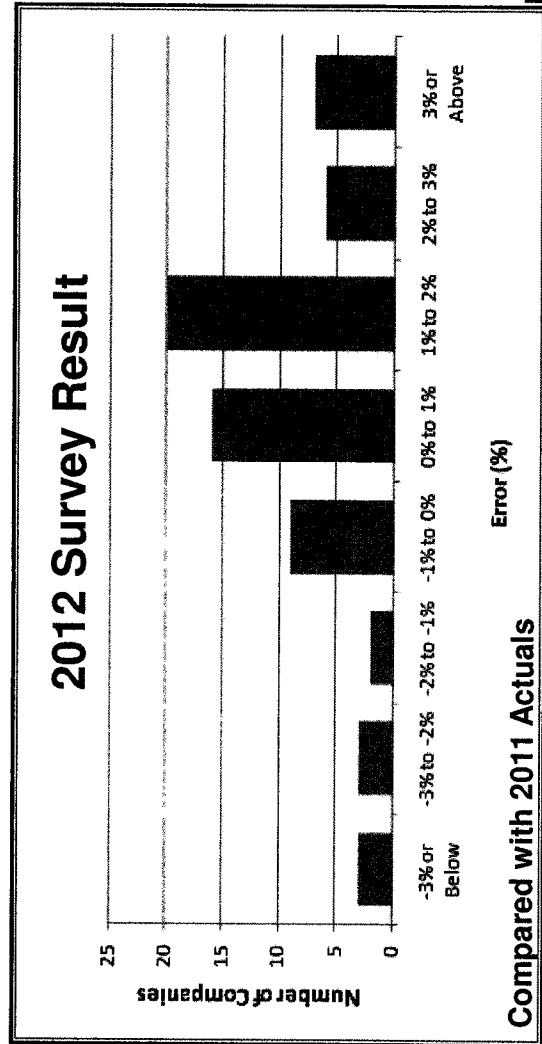
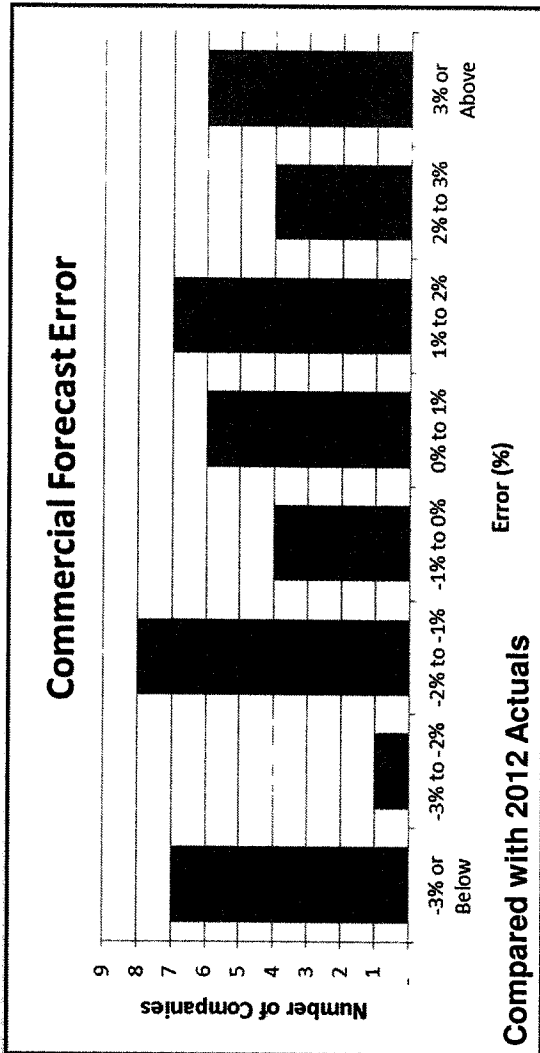
- Very slight tendency to under forecast 2012 actuals.
- 75% of utilities forecasts were within 2% of actual values.



Negative values mean that the forecast is lower than the normalized actual value (i.e. "under-forecast")

Commercial Forecast Error Distribution

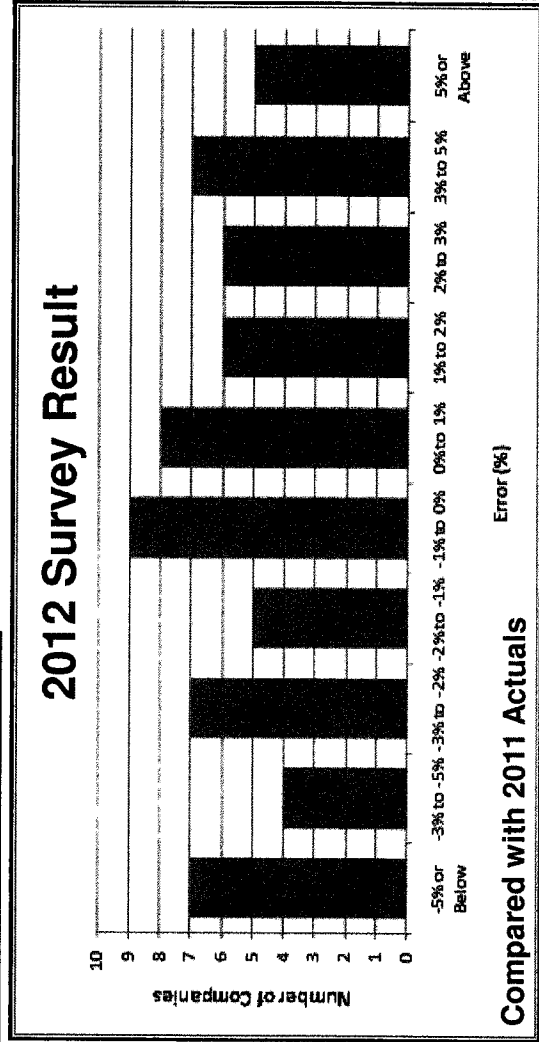
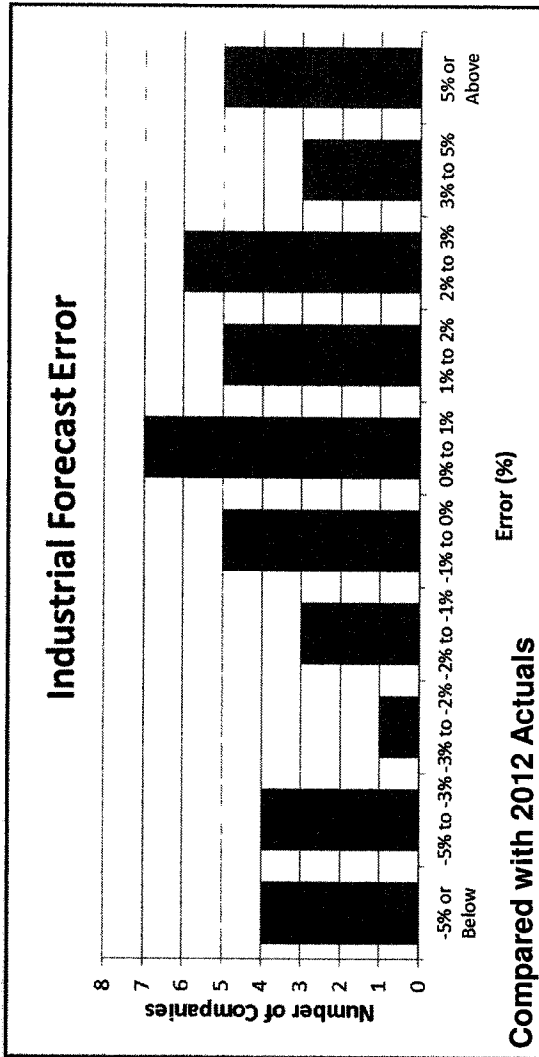
- Slight tendency to over forecast 2012 actuals.
- 54% of utilities forecasts were within 2% of actual values.



Negative values mean that the forecast is lower than the normalized actual value (i.e. "under-forecast")

Industrial Forecast Error Distribution

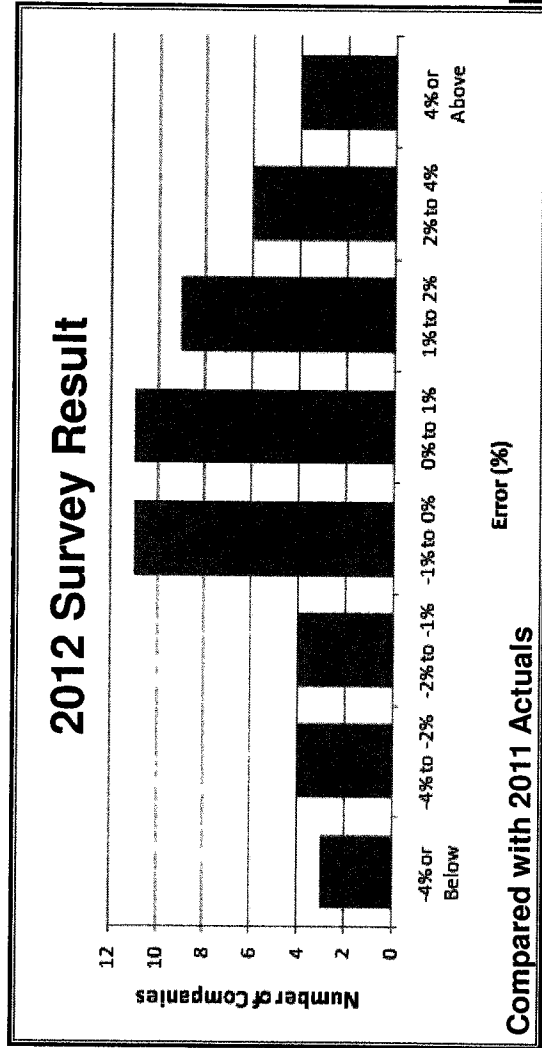
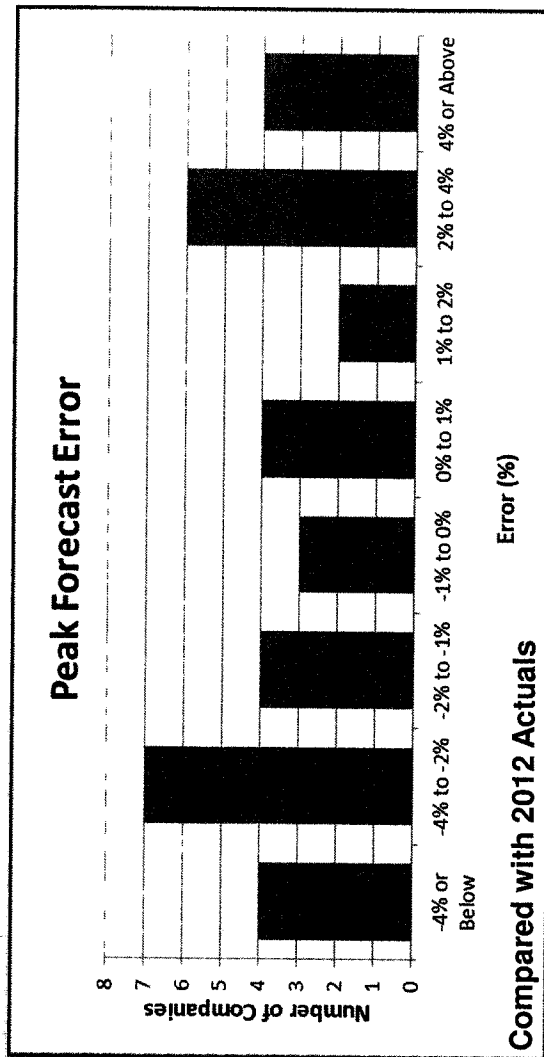
- Slight tendency to over forecast 2012 actuals.
- 46% of utilities forecasts were within 2% of actual values.



Negative values mean that the forecast is lower than the normalized actual value (i.e. "under-forecast")

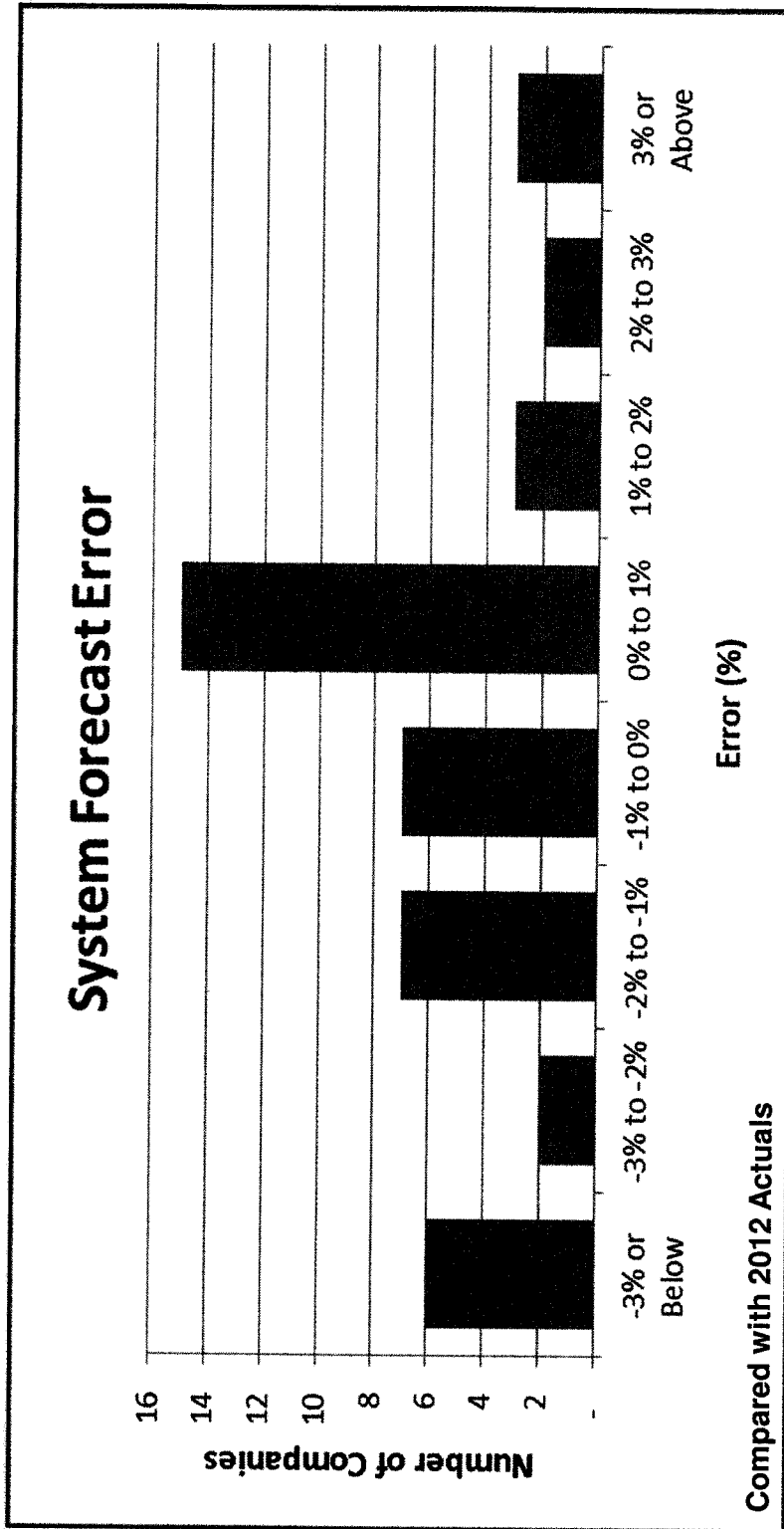
Peak Forecast Error Distribution

- 38% of utilities forecasts were within 2% of actual values.



Negative values mean that the forecast is lower than the normalized actual value (i.e. "under-forecast")

Total System Forecast Error Distribution



➤ 71% of utilities forecasts were within 2% of actual values.

Negative values mean that the forecast is lower than the normalized actual value (i.e. "under-forecast")

Sales Growth Forecast – One Year Ahead

2013 Survey Result 2013 Growth (%) relative to 2012

Region	Residential	Commercial	Industrial	System	Peak
Canada	0.66	1.61	2.45	0.81	2.35
Midwest	(0.76)	0.77	1.65	0.47	0.12
Northeast	0.15	1.31	(1.11)	0.15	1.66
South	1.98	1.32	1.15	1.70	1.01
West	(0.32)	0.56	3.65	0.55	0.49
Total	→ 0.26	1.38	2.06	0.96	1.09

2013 Forecast

2013 Survey Result Weather Normalized Sales Growth (%) for 2012

Region	Residential	Commercial	Industrial	System	Peak
Total	→ (0.09)	0.03	1.49	0.44	(0.87)

2012 Actual

Over-forecast commercial and peaks.
Under-forecast industrial.
Nailed residential.

2012 Survey Result 2012 Growth (%) relative to 2011

Region	Residential	Commercial	Industrial	System	Peak
Canada	(0.05)	(0.02)	(0.95)	NA	0.38
Midwest	(0.21)	0.49	1.94	NA	0.34
Northeast	(1.30)	0.90	0.01	NA	(1.24)
South	0.31	1.29	1.23	NA	0.54
West	0.54	1.79	0.21	NA	(0.59)
Total	0.04	0.92	0.93	NA	0.19

2012 Forecast

Sales Growth Forecast – Next Ten Years

2013 Survey Result
2013-2023 Growth (%)

Region	Residential	Commercial	Industrial	System	Peak
Canada	0.79	1.34	1.33	0.92	0.57
Midwest	0.47	0.51	0.98	0.68	0.70
Northeast	0.38	0.54	(1.64)	0.41	0.66
South	1.19	1.12	1.26	1.03	0.80
West	0.71	1.08	1.62	1.25	1.17
Total	1.11	1.30	1.34	1.22	1.03

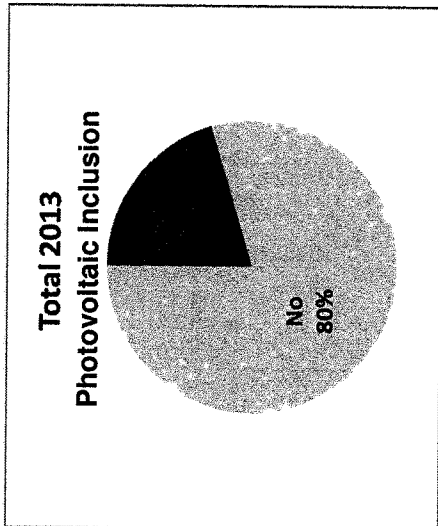
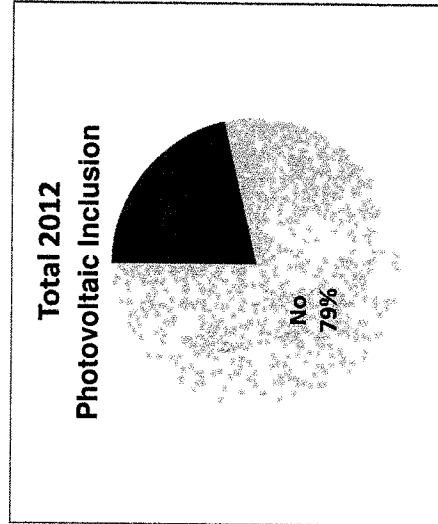
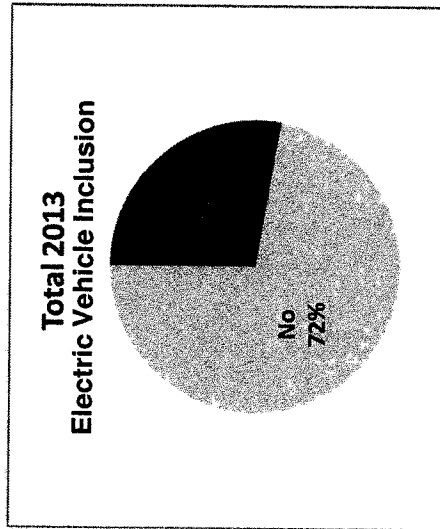
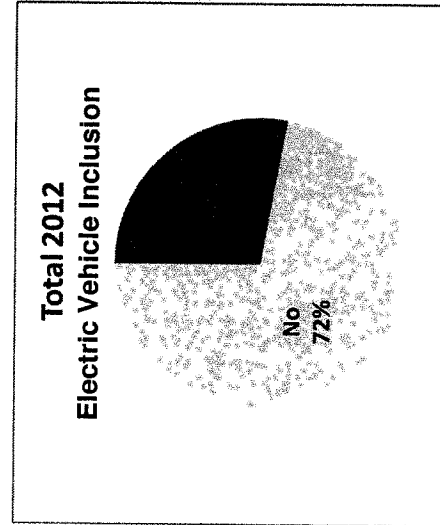
Consistent 1%
growth range

2012 Survey Result
2012-2022 Growth (%)

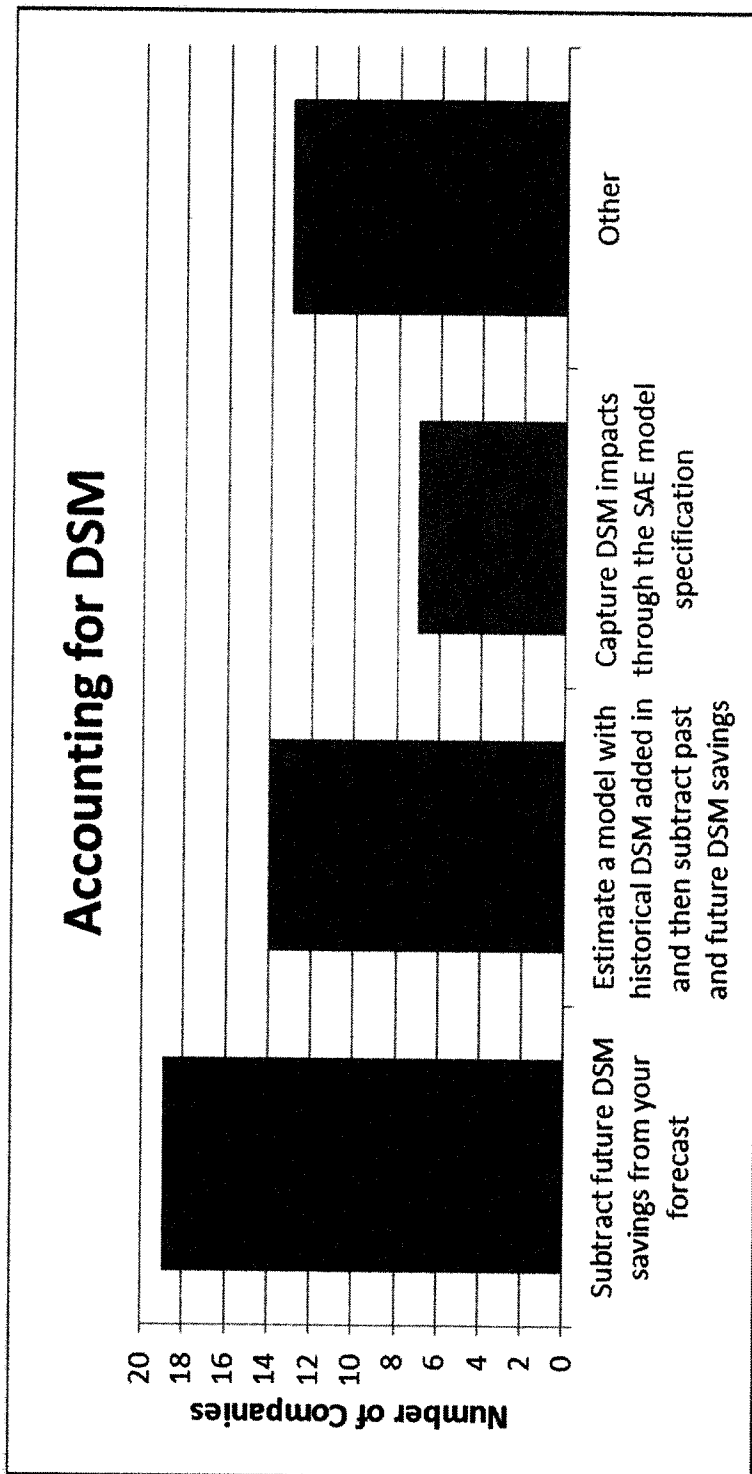
Region	Residential	Commercial	Industrial	System	Peak
Canada	0.70	1.85	1.54	NA	0.60
Midwest	0.37	0.71	0.93	NA	0.69
Northeast	2.70	1.17	1.53	NA	4.89
South	1.03	1.21	0.52	NA	0.88
West	1.37	1.47	0.57	NA	1.18
Total	0.95	1.20	0.84	NA	0.99

Electric Vehicles/Photovoltaic Systems

Are you explicitly including electric vehicles or photovoltaic systems in your forecast?

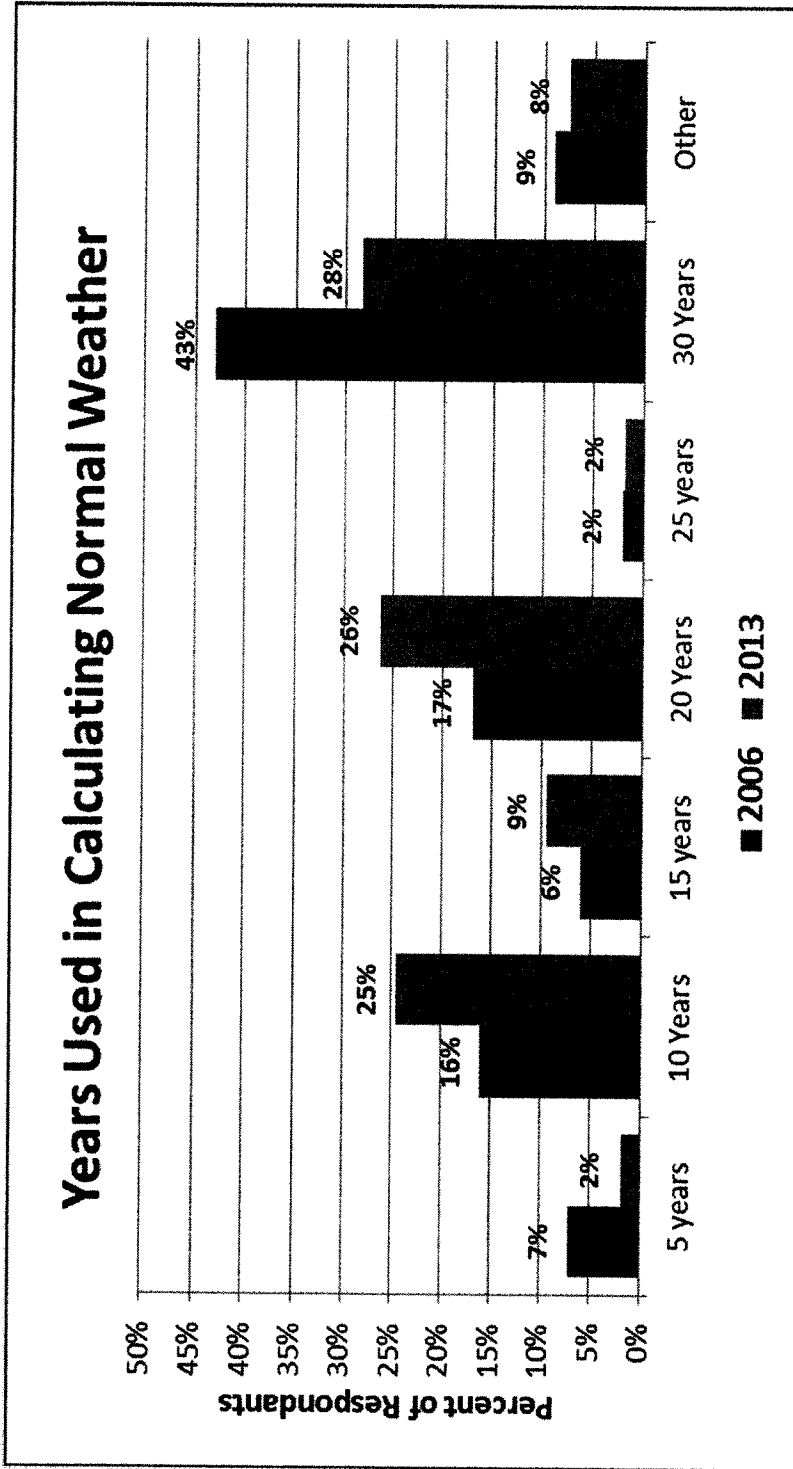


Accounting for DSM



- At least 75% of respondents are attempting to deal with DSM impacts in their model.

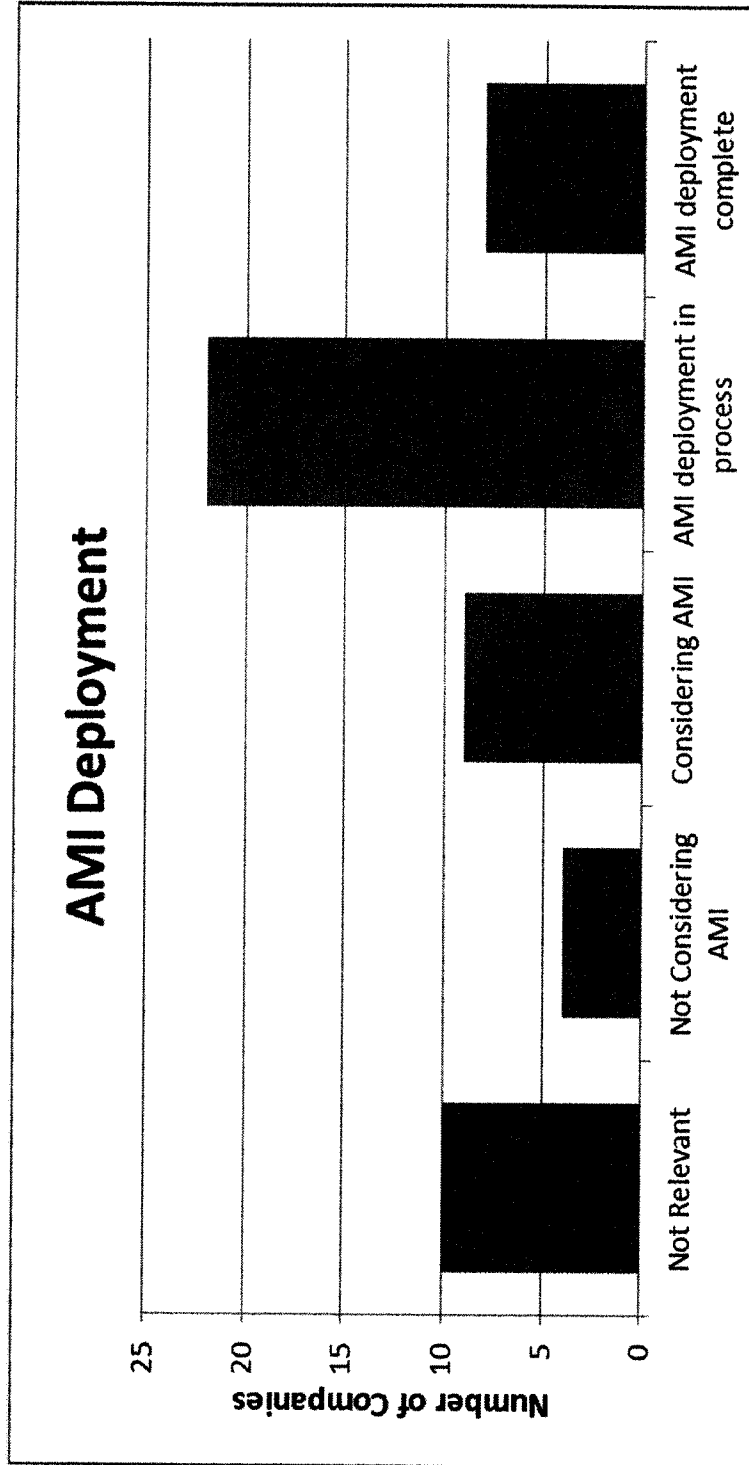
Years Used in Normal Weather Calculation



➤ Between 2006 and 2013 there is a general shift to use fewer years when calculating normal weather

- 2006 Survey included 172 Respondents
- 2013 Survey included 53 Respondents

AMI Deployment



- 57% of respondents will have AMI data in the near future.
- How will AMI data impact the forecasting process?

THANK YOU
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