Grid Operations and Planning Report

ERCOT Board of Directors
February 17, 2009

Kent Saathoff

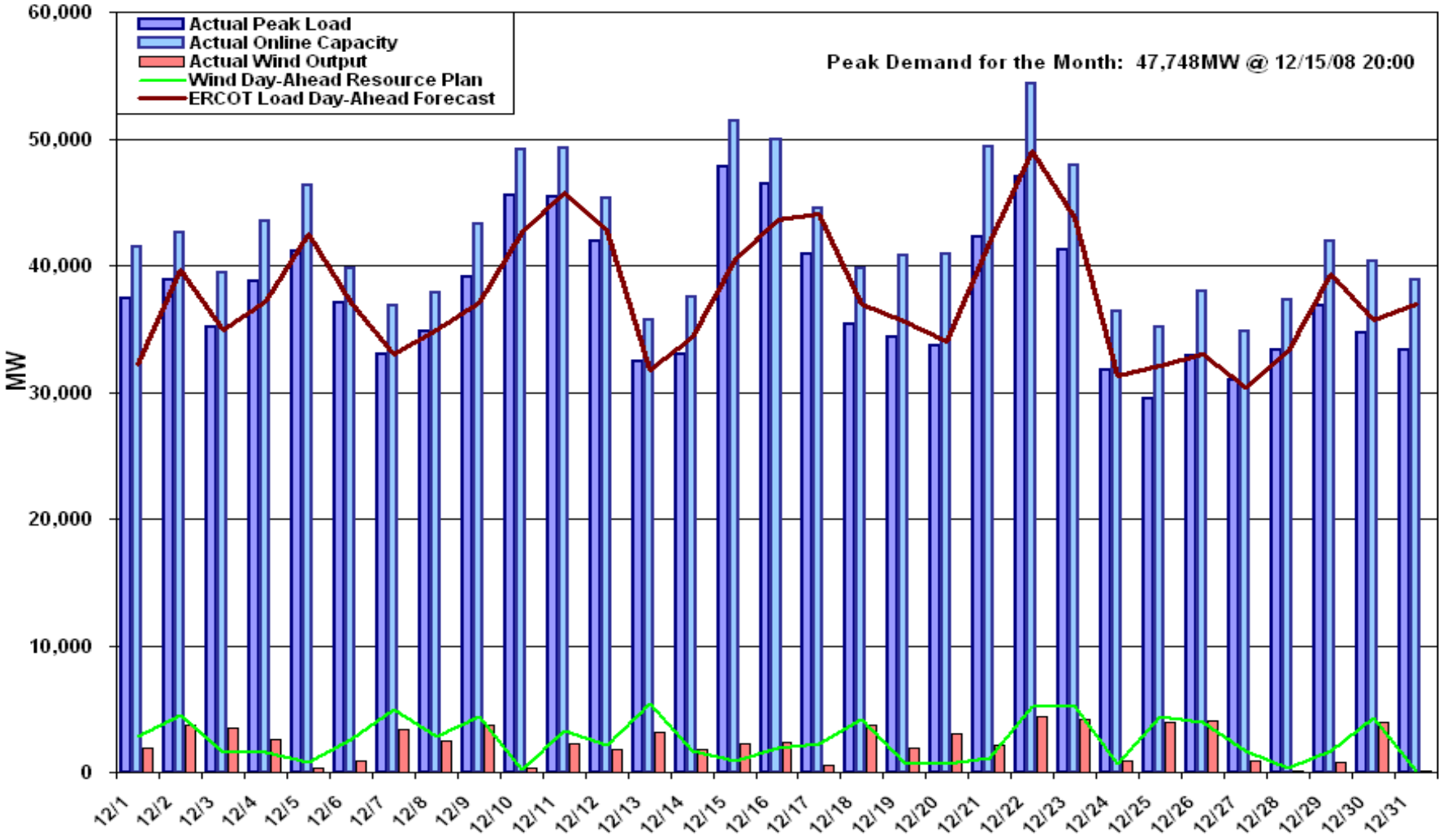
Content

- **Summary**
- **December, 2008 Operations**
  - Peak Demand: Actual vs. Forecast
    On-line Resources: Total at Peak and Wind
  - Day-Ahead Load Forecast Performance
  - Out of Merit Capacity Order (OOMC) & Replacement Reserve Service (RPRS) Purchases
  - Zonal Congestion
  - Significant System Incidents
  - Advisories, Alerts and EECPs
  - Other Items
- **Cost update for Ancillary Service Methodology Change**
- **Planning Activities**
- **Wind Capacity**
- **Notices of Suspension of Operation**

Summary

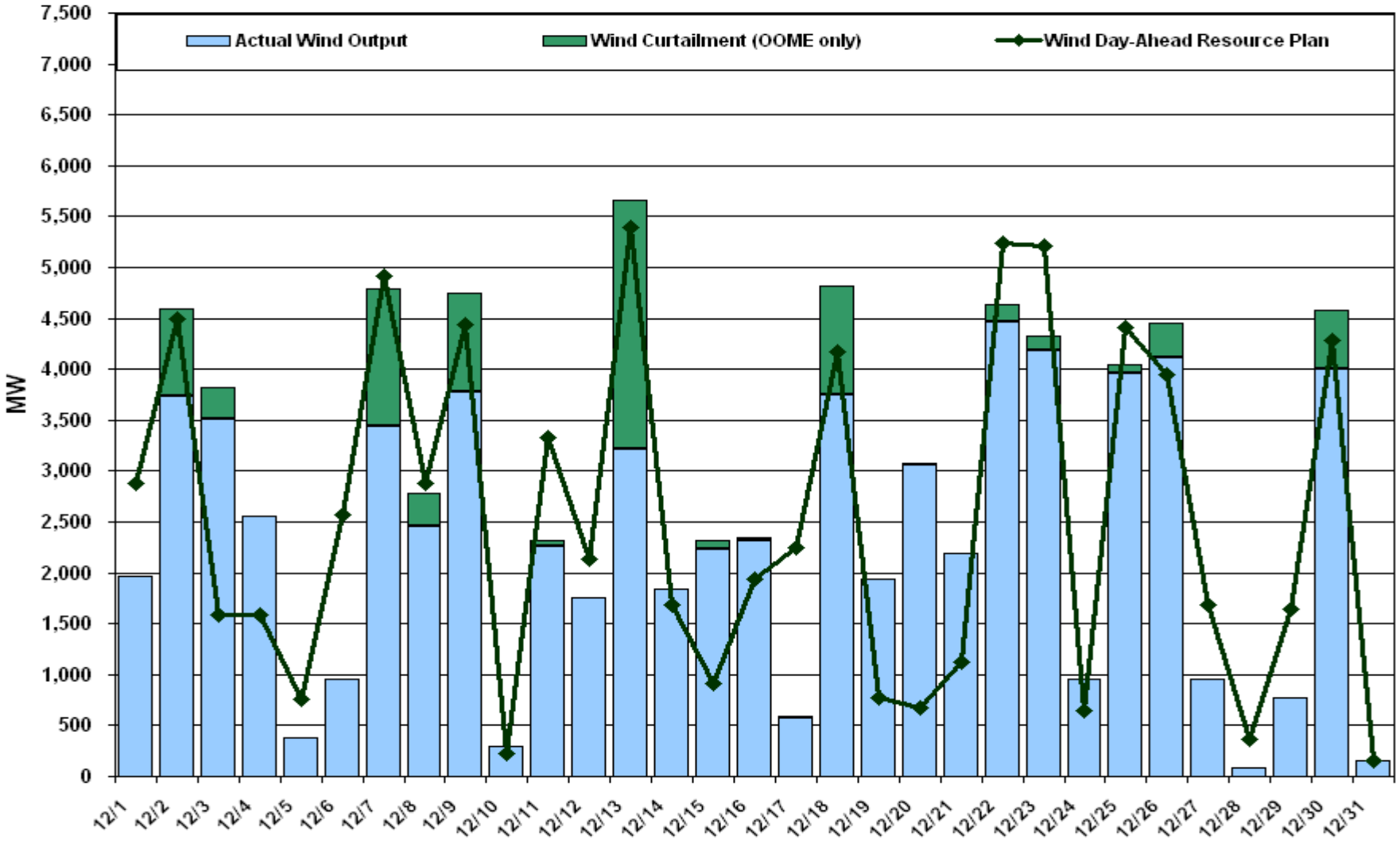
- **December 2008 Operations**
  - The peak demand of 47,748 MW on December 15th was less than the forecast of 49,014 MW for December.
  - Day-ahead load forecast error for December was 4.54%. Higher than normal due to numerous weather fronts and high forecast temperature error
  - The only zonal transmission congestion was West-North
  - Two Alerts for Adjusted Responsive Reserve below 2500 MW. Two transmission alerts. No EECP events
- **The cost of Non-Spinning Reserve has decreased significantly since Ancillary Service methodology change in November**
- **256 active generation interconnect requests totaling over 106,000 MW.**
- **8,065 MW wind capacity on line January 31, 2009**
- **Received Notice of Suspension of Operation on 2/5/09 for 15 generating units totaling 3,902 MW. RMR studies under way.**

Daily Peak Demand: Hourly Average Actual vs Forecast, Resource Plan & On-line Capacity at Peak

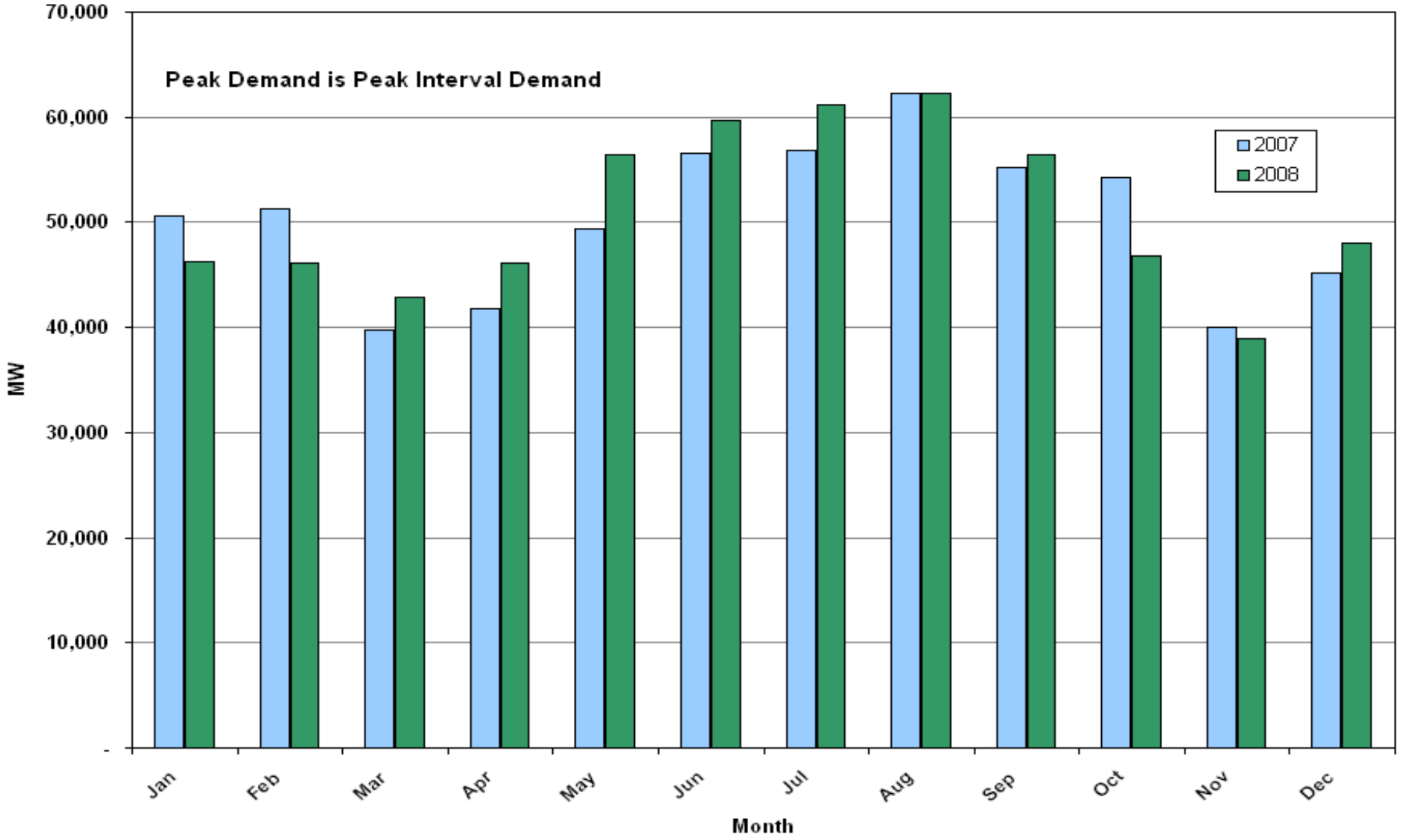


Note: All data are hourly averages during the peak load hour obtained from Resource Plans, and EMMS.

Actual Wind Output w/ Curtailment Added Back Vs Wind Day-Ahead Resource Plan Based on AWS Forecast at Peak Load Hour



Monthly Peak Demand: Actual

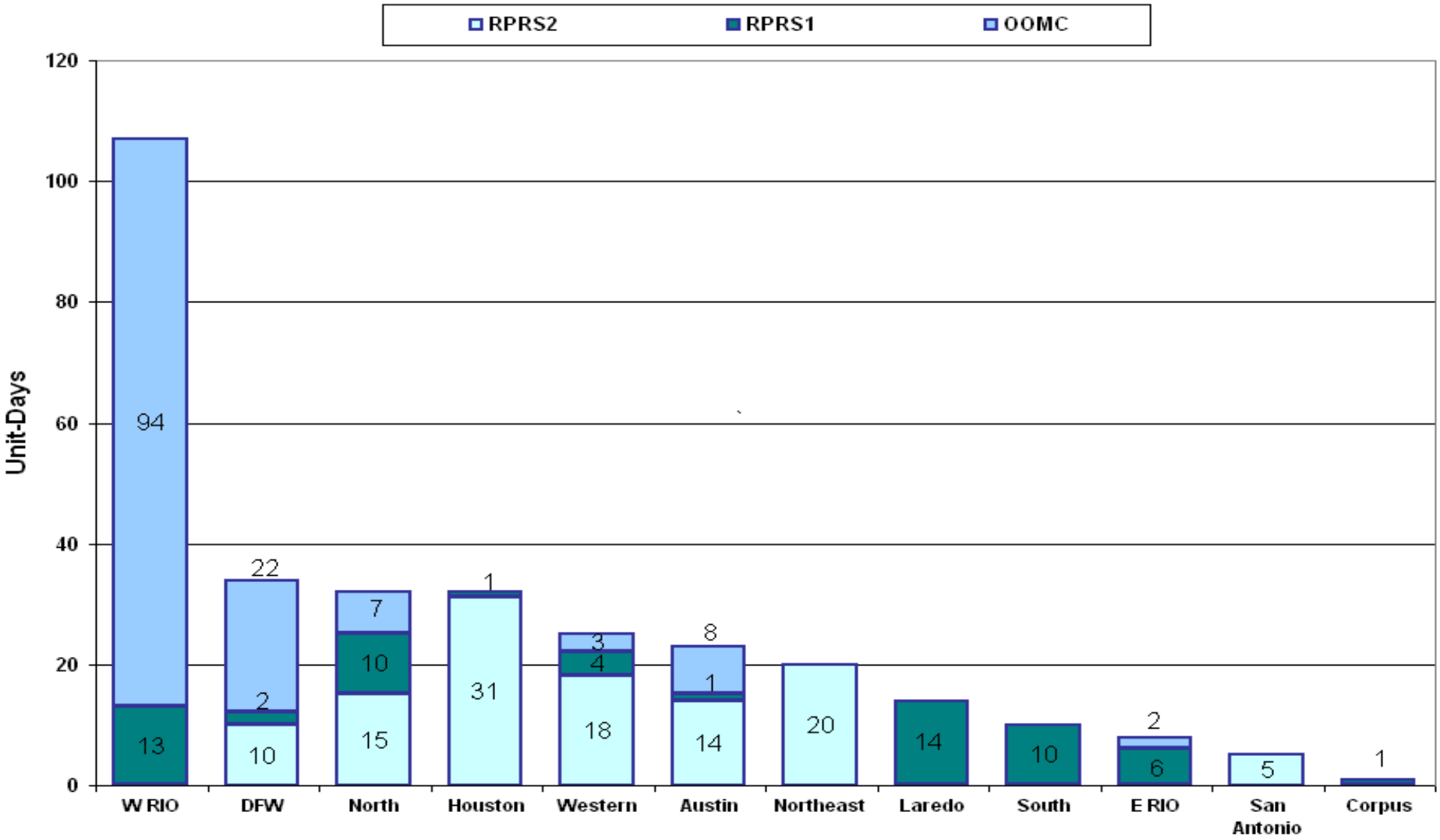


Day-Ahead Load Forecast Performance in December 2008

	Mean Absolute Percent Error (MAPE) for ERCOT Mid-Term Load Forecast (MTLF) Run at 16:00 Day Ahead				
	2005 MAPE	**2006 MAPE**	**2007 MAPE**	**2008 MAPE (YTD)**	**December 2008 MAPE**
Average Annual MAPE	4.53	3.28	2.95	3.30	4.54

December 2008 MAPE was high due to numerous weather fronts and high forecast temperature errors

Capacity Purchases of RMR, OOMC & RPRS to Manage Local Congestion in December 2008



Zonal Congestion

CSC	Dec 07 Days	Oct 08 Days	Nov 08 Days	**December 08 Days**	**Last 12 Months Total Days** (Dec 07 – Dec 08)
North – Houston	0	15	1	**0**	71
North – West	10	0	1	**0**	45
West – North	7	13	17	**22** Dec – 1-3, 7-10, 12-15, 18, 21-27, 29-31	189
South – North	0	0	0	**0**	36
North - South	N/A	0	0	**0**	110

Significant System Incidents in December 2008

- **December 1st at 23:20**
  - Loss of one 138 kV bus due to switch failure and three units for a total of 456 MW generation.
- **December 16th at 15:45 – See next page**
- **December 19th at 16:00**
  - Loss of Temple Switch 345KV Bus, the 345/138 KV transformer and the Temple Switch – Sandow Switch 345 KV line. ERCOT determined the protective relay for Temple Switch 345kV bus operated as intended due to a breaker failure.

December 16th Event

- **December 16th at 15:45**
  - Two units tripped a total of 1,575 MW generation as a result of an insulator flashover which caused the loss of one 345 kV transmission line and one unit. Second unit tripped on generator step-up transformer relay operation
  - 1,276 MW of Generation Responsive Reserve was deployed.
  - 360 MW of LaaR were tripped by high speed under-frequency relays. Remaining LaaR deployed by operator instruction.
  - System Frequency dropped to 59.705 Hz immediately after the trip and recovered to 60Hz in 4 minutes and 32 seconds.
  - This was a NERC reportable event (greater than 80% of the most severe single contingency). ERCOT recovered 100 percent within the NERC disturbance timeframe of 15 minutes.
  - This event is reportable but excluded from Disturbance Compliance Standard compliance evaluation in accordance with NERC Reliability Standards BAL-002 since it was due to multiple contingencies.

Advisories and Alerts in December 2008

- **Advisories issued for Adjusted Responsive Reserve (ARR) below 3000 MW.**
  - Issued 12 Days.
- **Alerts issued December 15 and 28 for ARR below 2500 MW**
- **Transmission Alerts (operation above single contingency limit):**
  - 12/05 11:00 Transmission Alert issued for Northwest Texas Cheyenne – No Trees Switch 138 kV due to forced outage. Alert ended at 11:50.
  - 12/09 14:07 Transmission Alert issued for the Turkey and Turkey Lighthouse areas due to a forced transmission outage. Block Load Transfer (BLT) was implemented with 2 MW of ERCOT load picked up by Southwest Power Pool (SPP).
- **No EECPs in December 2008**

Other Items

- **December 2nd**
  - Held interval ending 06:45 balancing energy deployments to keep below West to North stability limit.

- **December 8th**
  - 15:10 - Held the deployments for IE 15:15 due to data base load taking longer than usual. Resumed with the deployments for IE 15:45.

Cost Update of Ancillary Service Methodology Change

Summary of November Ancillary Service Changes

- **Purchase NSRS based on the accuracy of the wind and load forecasts**
  - Procurements are no longer based on largest unit in ERCOT
  - Procure NSRS for On-Peak and Off-Peak hours
- **Incorporate the impact of increasing wind generation on Regulation.**
  - Utilizes GE study results to determine amount of Regulation Reserve required to cover increasing wind installations
- **Increase Regulation Procurement if the average CPS1 score dropped below 100 in the previous 30 days**

Cost of NSRS over the past three months

- **Total Dollars Spent under old Methodology**
  - November 07 - $3,760,396
  - December 07 - $4,176,373
  - January 08 - $2,614,980
- **Total Dollars Spent under new Methodology**
  - November 08 - $1,144,547
  - December 08 - $961,654
  - January 09 - $1,269,259
- **Total Difference between Nov. 07, Dec. 07, Jan. 08 & Nov. 08, Dec. 08, Jan. 09**
  - $7,176,289

Summary of Cost Comparison

Dollars Spent (Day-Ahead Price * Procured MW)

Month	During All Hours	During On-Peak Hours	During Off-Peak Hours
January '09	$1,269,258.67	$174,000.87	$1,095,257.80
January '08	$2,614,980.20	$2,272,865.02	$342,115.18
December '08	$961,654.23	$233,297.73	$728,356.50
December '07	$4,176,372.38	$3,292,575.96	$883,796.42
November '08	$1,144,547.81	$703,179.33	$441,368.48
November '07	$3,760,396.18	$3,057,358.76	$703,037.42
October '08	$3,221,463.88	$3,173,843.70	$47,620.18

Average Day-Ahead Clearing Price During Hours of NSRS Procurement

Month	During All Hours	During On-Peak Hours	During Off-Peak Hours
January '09	$1.00	$0.29	$2.43
January '08	$6.44	$6.26	$7.90
December '08	$0.91	$0.41	$1.92
December '07	$6.40	$6.16	$7.50
November '08	$1.52	$1.41	$1.73
November '07	$5.38	$5.20	$6.33
October '08	$6.55	$6.62	$3.91

Summary of Cost Comparison cont.

Cost Analysis and Heat Rate

Month	Monthly Average MCPE Across all Zones - $/MWh	Monthly Average Fuel Index Price (FIP) - $/mmbtu	Average Monthly Heat Rate – mmbtu/MWh
January '09	29.49	4.53	6.51
January '08	56.72	7.69	7.38
December '08	37.35	5.29	7.06
December '07	50.15	6.63	7.56
November '08	37.83	6.15	6.15
November '07	46.81	6.21	7.54
October '08	44.81	6.35	7.06

Observations

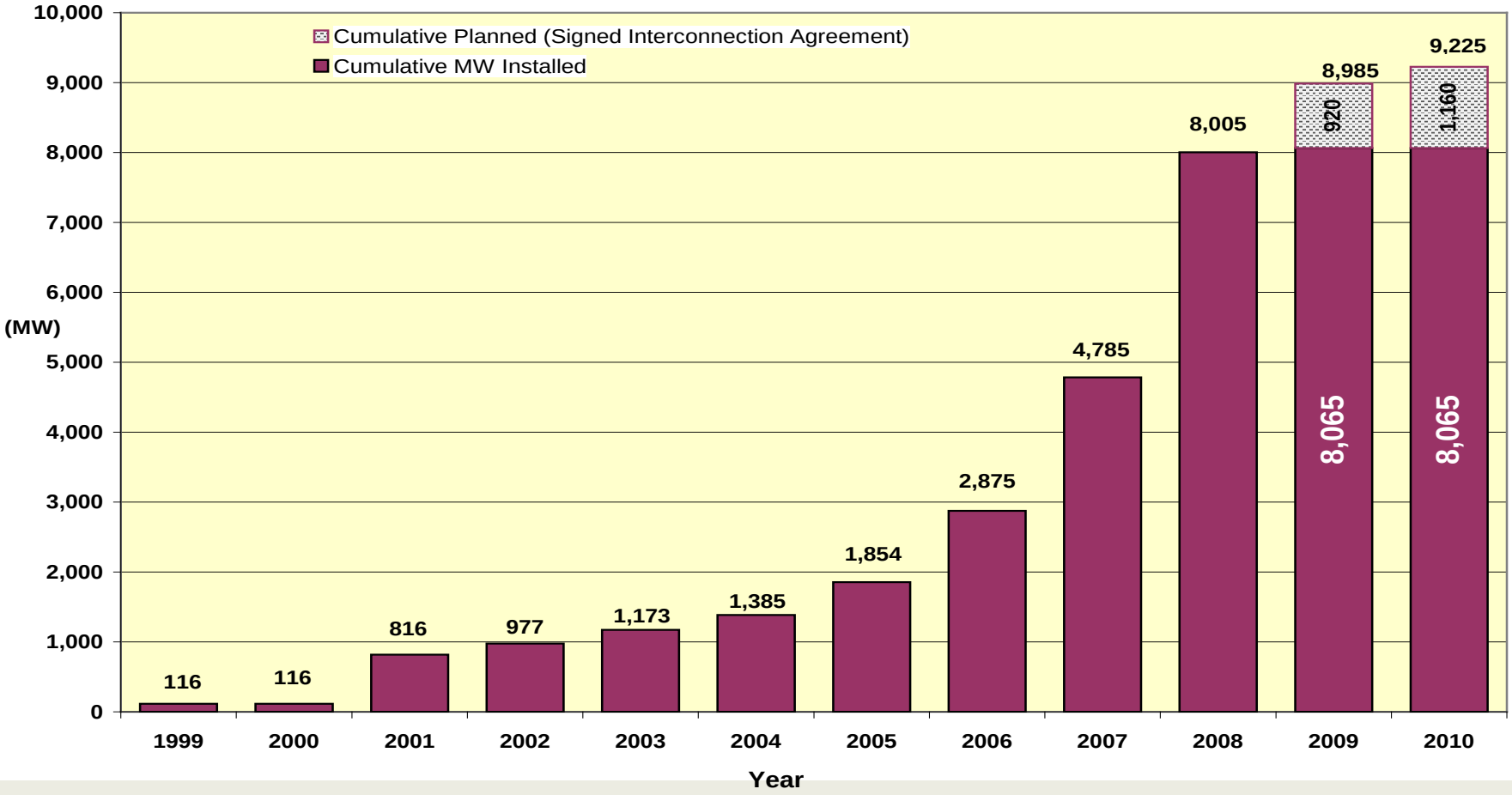
- **Cost of NSRS has been considerably lower during the past three months**
- **Average FIP price for the past three months was $5.32/mmbtu as compared to $6.84/mmbtu in the same months last year**
- **Possible reasons for lower NSRS cost**
  - More certainty in NSRS procurement
    - NSRS obligations are decided before the start of the month instead of on a day ahead basis
  - Slightly lower heat rate average in the balancing energy market affecting the NSRS offers

System Planning Report

Planning Activities - Summary

- **ERCOT is currently tracking 256 active generation interconnect requests totaling over 106,000 MW. This includes almost 52,000 MW of wind generation**
- **60 MW of new generation began commercial operation in January, bringing the currently installed total of wind power capacity to 8,065 MW.**
- **Pursuant to PRR 779, a listing of projects undergoing Full Interconnection Studies has been made public in Secion 1.5**
- **Regional Planning is reviewing proposed transmission improvements with a total estimated cost of $770 million**
- **All projects (in engineering, routing, licensing and construction) total $4.1 billion**
- **Transmission Projects approved in 2008 totaled $255 million**
- **Transmission projects completed in 2008 totaled $453 million**

ERCOT Wind Capacity by Year



Notices of Suspension of Operations

- **Received Notice of Suspension of Operations for 15 generating units totaling 3,902 MW on February 5, 2009**
- **2,251 MW scheduled to be retired May 2009 and 1,651 MW September 2009**
- **ERCOT will do RMR studies to determine which units are needed for transmission security and pursue RMR contracts accordingly**