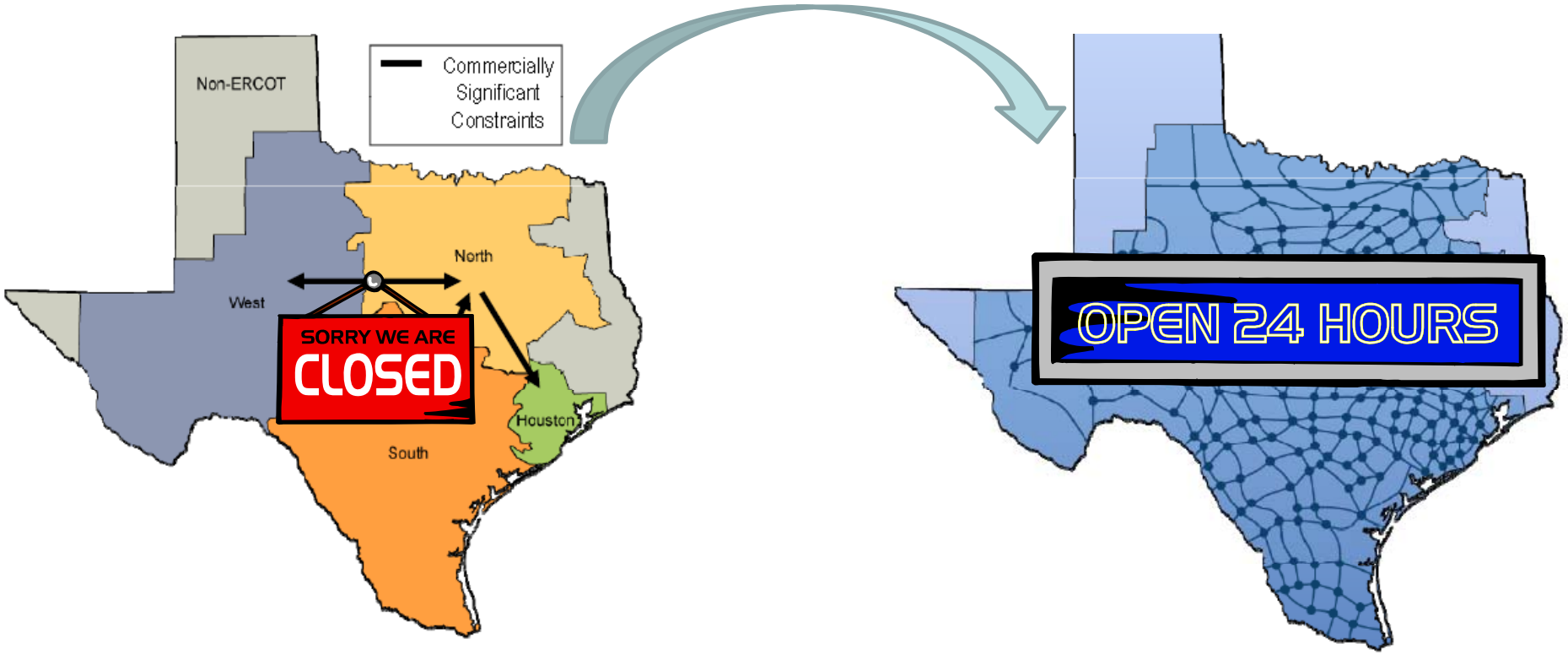
ERCOT: Post-Nodal and Beyond

Texas Energy Professionals Association
November 3, 2011

Trip Doggett
President & CEO
ERCOT

NODAL MARKET OPERATIONS EFFECTIVE DECEMBER 1, 2010

Zonal Market **_Dec 1, 2010_** Nodal Market



OPERATIONAL BENEFITS

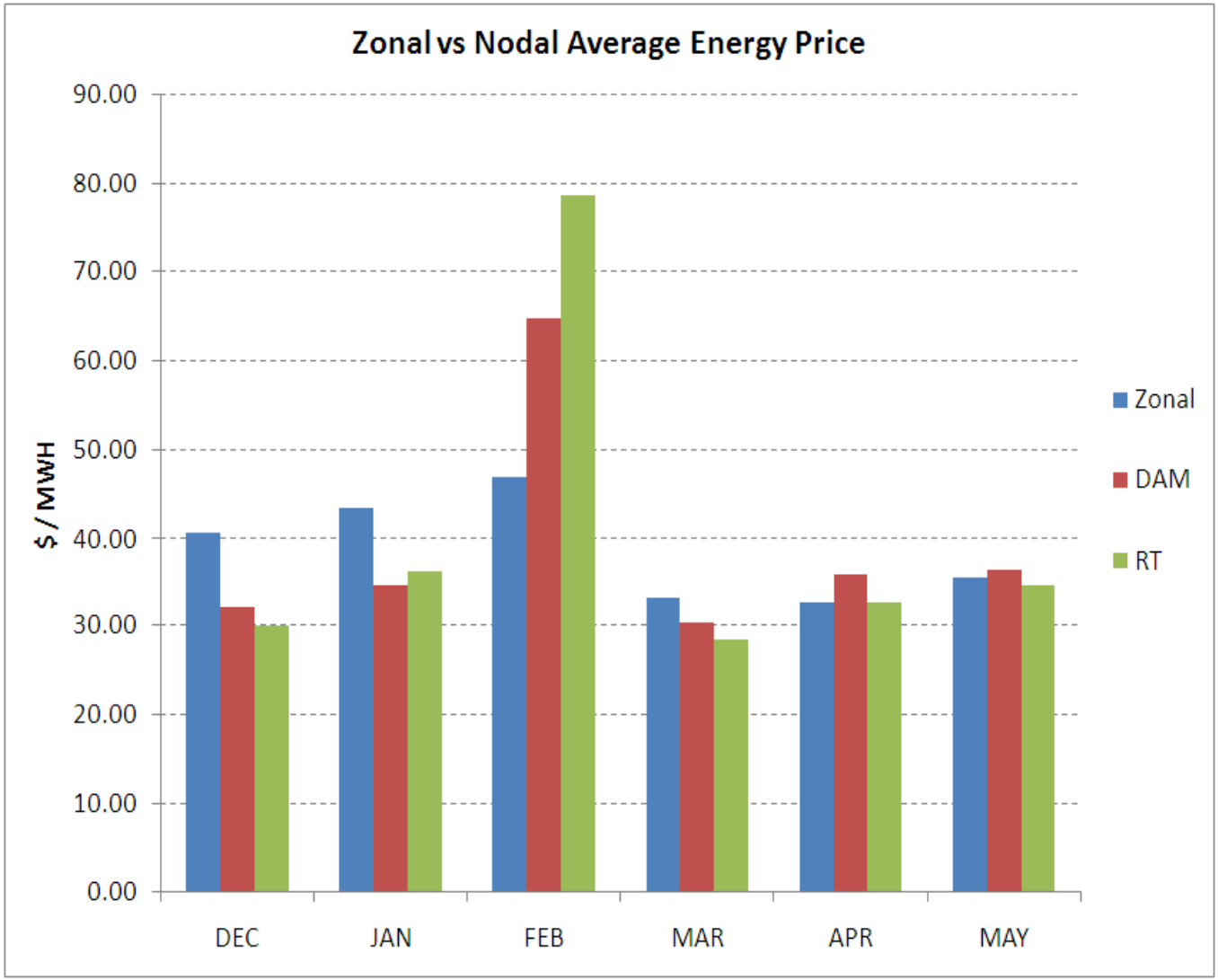
- Improved Ancillary Service Monitoring
  - Transparency of units providing services
- Unit Specific management of congestion
- Quicker response to volatility
  - Managing the West to North Interface
  - 5 minute dispatch allows better management of up/down changes in load and wind output

Ancillary Services Cost Comparison Zonal to Nodal

- Regulation Up and Down
  - Lower Quantity
  - Higher $/MW
  - Lower Overall Cost for AS
- Responsive Reserve
  - Same Quantity
  - Higher $/MW
  - Higher Overall Cost for AS
- Non-Spinning Reserve
  - Similar Quantities
  - Higher $/MW
  - Higher Overall Cost for AS

ENERGY COST COMPARISON SUMMARY

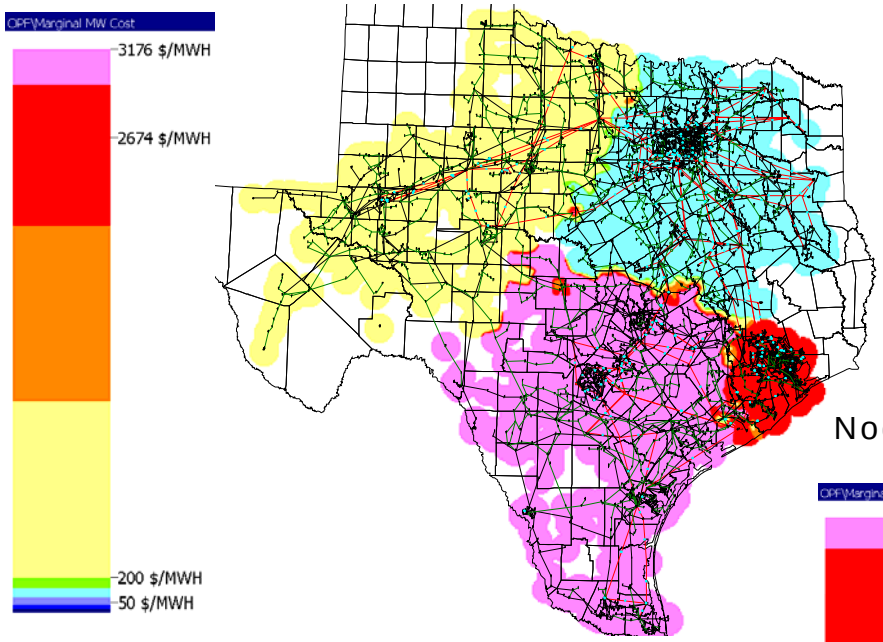
- Resource specific offers and dispatch are more efficient in serving demand and managing congestion
- Co-Optimization of Ancillary Services and energy result in a reduction of overall system cost



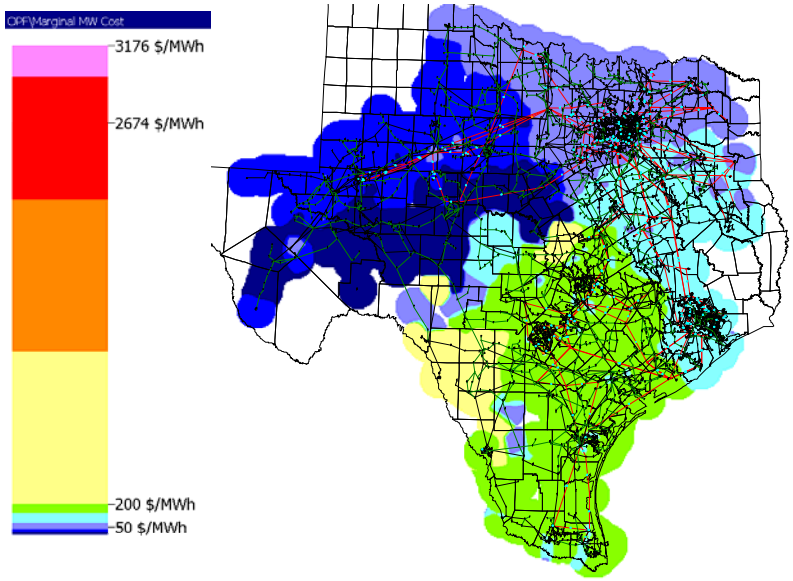
* Graph revised July 5, 2011

PRICE COMPARISON ZONAL VS NODAL LMPS (WITH SAME FIP) FROM MAY 20 2008

Zonal MCPEs May 2008



Nodal LMPs with offers based on May 2008 FIP



New Peak Demand Records This Year

New Peak Demand Record

- **68,379 MW on Aug. 3, 2011**
- 67,929 MW on Aug. 2, 2011
- 66,867 MW on Aug. 1, 2011

❖ Prior to this year, all time peak demand record was 65,776 MW on Aug. 23, 2010.

ERCOT Demand Monthly Records

	2011		2010
May:	57,356 MW	May:	56,344 MW
June:	63,102 MW	June:	62,278 MW
July:	65,195 MW	July:	63,400 MW

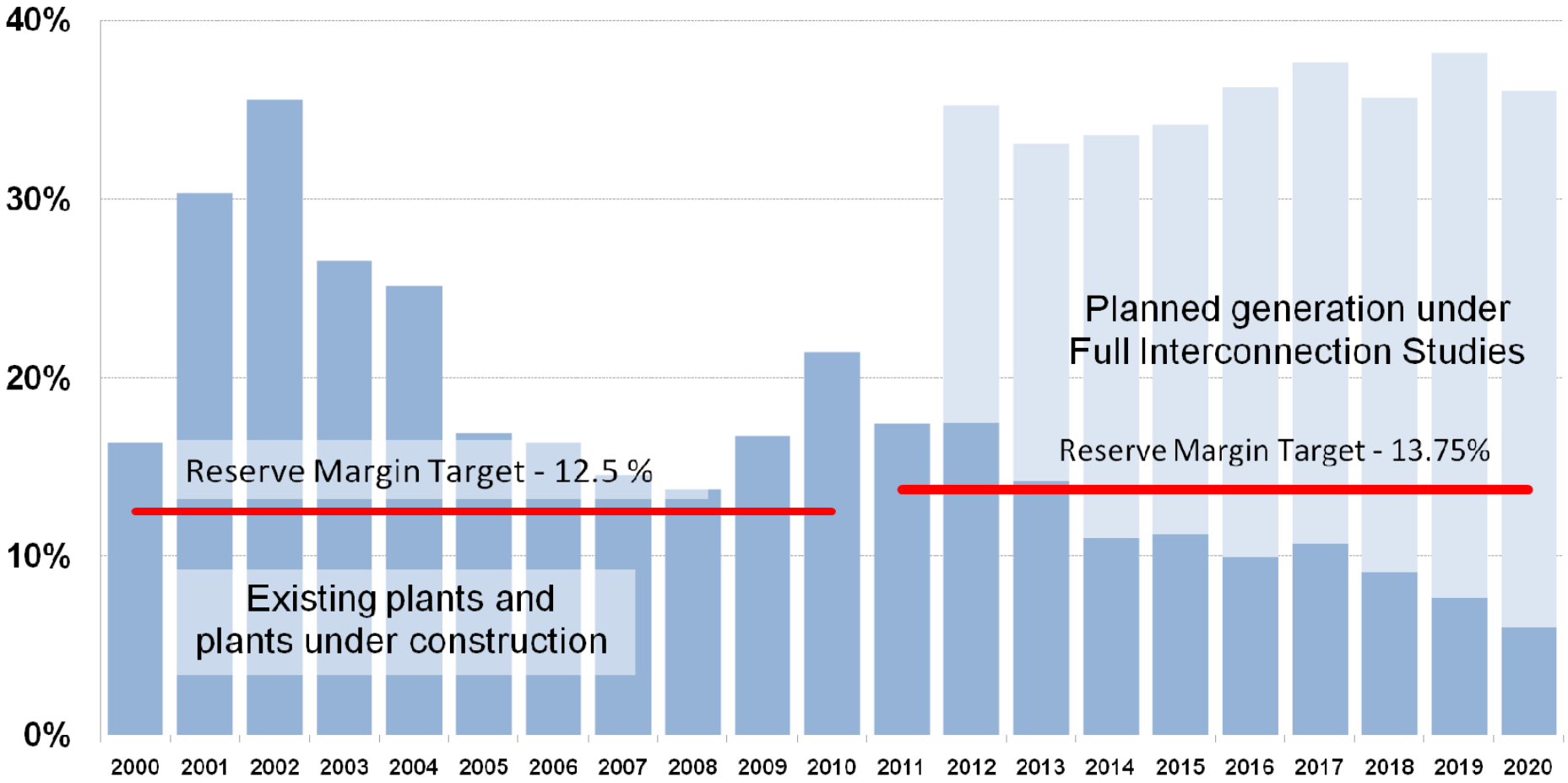
Note: The August 3 preliminary record of 68,294 MW was adjusted to 68,379 MW, following initial settlement.

ERCOT Peak Demand History, 2000-2010

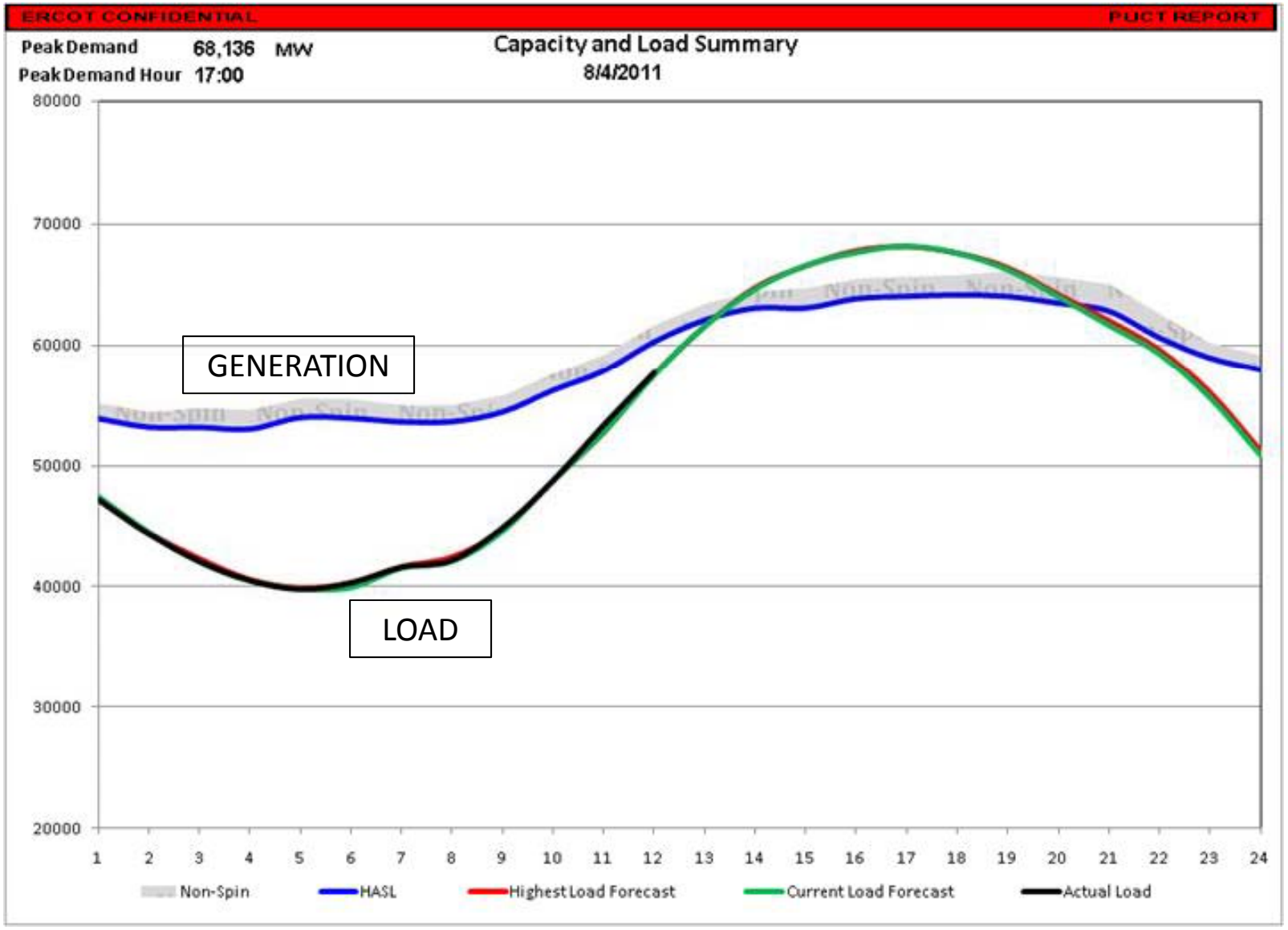
2000	57,606 MW	August 31
2001	54,729 MW	August 15
2002	56,086 MW	August 26
2003	60,037 MW	August 7
2004	58,506 MW	August 3
2005	60,214 MW	August 23
2006	62,339 MW	August 17
2007	62,130 MW	August 13
2008	62,171 MW	August 4
2009	63,400 MW	July 13
2010	65,776 MW	August 23
YTD 2011	**68,379 MW**	**August 3**

Note: The August 3 preliminary record of 68,294 MW was adjusted to 68,379 MW, following initial settlement.

ERCOT Reserve Margins – 2000-2020



HOW DOES THAT 17.5% BECOME <5%?



OPERATING RESERVE MARGIN

TIME: 08/03/2011 16:13 Load: 68,392 MW

2011 Report on the Capacity, Demand, and Reserves in the ERCOT Region

Summer Summary

Load Forecast:	**REAL TIME**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Total Summer Peak Demand, MW	68392	63,898	65,665	67,757	70,540	72,591	74,198	75,365	76,654	77,866	79,274
less LAARs Serving as Responsive Reserve, MW	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0	0	0	0	0	0
less Emergency Interruptible Load Service	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB1125)	128	128	259	395	536	681	829	980	1133	1289	1448
Firm Load Forecast, MW	**66,781**	**62,286**	**63,880**	**65,790**	**68,381**	**70,231**	**71,628**	**72,576**	**73,638**	**74,612**	**75,771**
Resources:	**REAL TIME**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Installed Capacity, MW	59,367	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859
Capacity from Private Networks, MW	4,176	5,023	5,071	5,074	5,074	5,074	5,074	5,074	5,074	5,074	5,074
Effective Load-Carrying Capability (ELCC) of Wind Generation, MW	1,895	822	822	822	822	822	822	822	822	822	822
RMR Units to be under Contract, MW	0	0	0	0	0	0	0	0	0	0	0
Operational Generation, MW	**65,438**	**69,704**	**69,752**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**
50% of Non-Synchronous Ties, MW	733	553	553	553	553	553	553	553	553	553	553
Switchable Units, MW	2,841	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962
Available Mothballed Generation , MW	0	0	110	146	164	181	198	198	198	198	198
Planned Units (not wind) with Signed IA and Air Permit, MW	619	260	1,940	1,940	2,720	4,880	5,500	6,780	6,780	6,780	6,780
ELCC of Planned Wind Units with Signed IA, MW	0	13	65	113	131	131	131	131	131	131	131
Total Resources, MW	**69,631**	**73,492**	**75,382**	**75,469**	**76,284**	**78,461**	**79,099**	**80,379**	**80,379**	**80,379**	**80,379**
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	0	0
less Retiring Units, MW	0	0	0	0	0	0	0	0	0	0	0
Resources, MW	**69,314**	**73,175**	**75,065**	**75,152**	**75,967**	**78,144**	**78,782**	**80,379**	**80,379**	**80,379**	**80,379**
Reserve Margin	**3.8%**	**17.5%**	**17.5%**	**14.2%**	**11.1%**	**11.3%**	**10.0%**	**10.8%**	**9.2%**	**7.7%**	**6.1%**
(Resources - Firm Load Forecast)/Firm Load Forecast											

OPERATING RESERVE MARGIN

TIME: 08/03/2011 16:13 Load: 68,392 MW

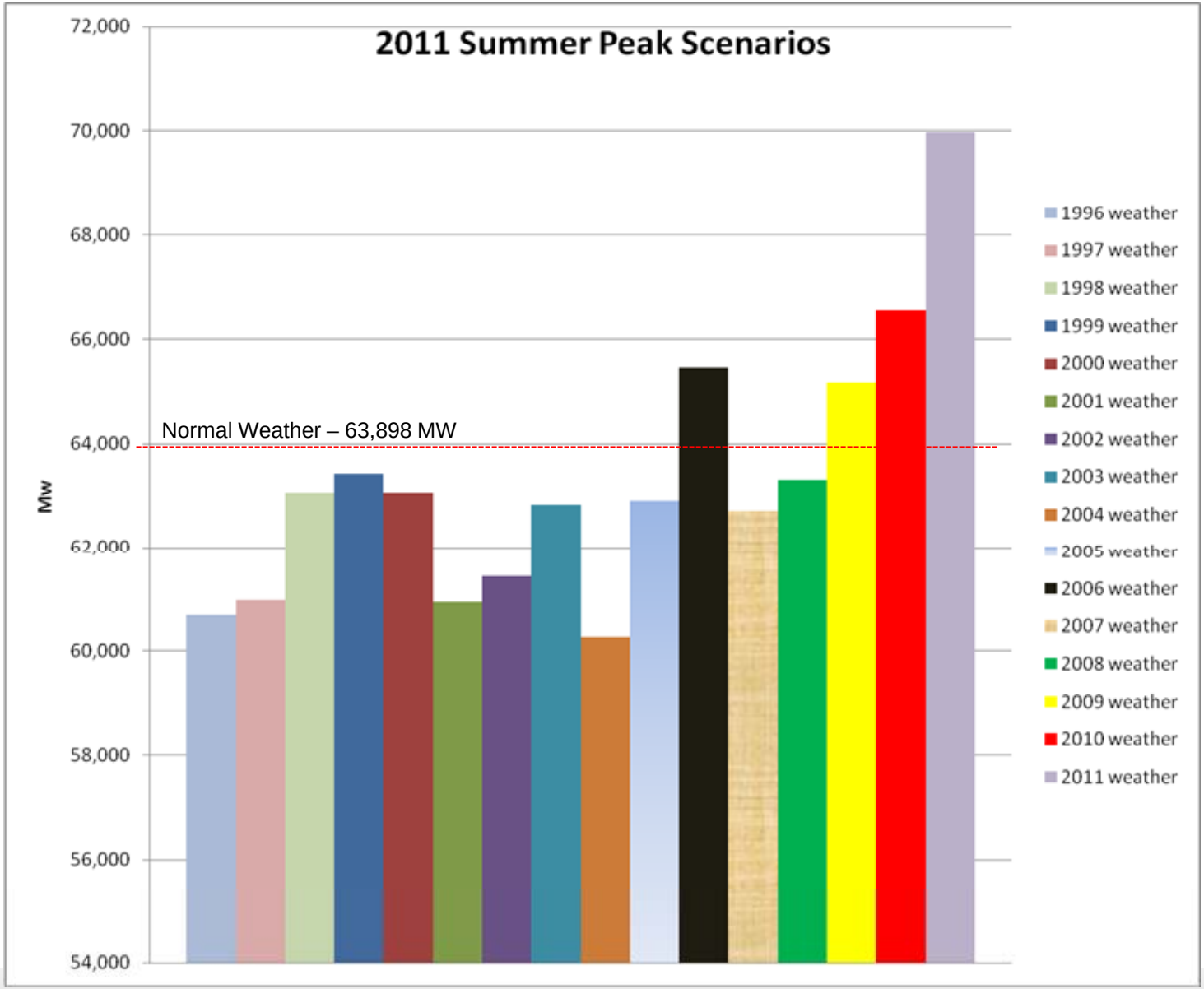
2011 Report on the Capacity, Demand, and Reserves in the ERCOT Region

Summer Summary

Total Summer Peak Demand **68,392** **63,898**

Load Forecast:											
								2017	**2018**	**2019**	**2020**
Total Summer Peak Demand, MW								75,365	76,654	77,866	79,274
less LAARs Serving as Responsive Reserve, MW								1,063	1,063	1,063	1,063
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0	0	0	0	0	0
less Emergency Interruptible Load Service	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB1125)	128	128	259	395	536	681	829	980	1133	1289	1448
Firm Load Forecast, MW	**66,781**	**62,286**	**63,880**	**65,790**	**68,381**	**70,231**	**71,628**	**72,576**	**73,638**	**74,612**	**75,771**
Resources:	**REAL TIME**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Installed Capacity, MW	59,367	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859
Capacity from Private Networks, MW	4,176	5,023	5,071	5,074	5,074	5,074	5,074	5,074	5,074	5,074	5,074
Effective Load-Carrying Capability (ELCC) of Wind Generation, MW	1,895	822	822	822	822	822	822	822	822	822	822
RMR Units to be under Contract, MW	0	0	0	0	0	0	0	0	0	0	0
Operational Generation, MW	**65,438**	**69,704**	**69,752**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**
50% of Non-Synchronous Ties, MW	733	553	553	553	553	553	553	553	553	553	553
Switchable Units, MW	2,841	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962
Available Mothballed Generation , MW	0	0	110	146	164	181	198	198	198	198	198
Planned Units (not wind) with Signed IA and Air Permit, MW	619	260	1,940	1,940	2,720	4,880	5,500	6,780	6,780	6,780	6,780
ELCC of Planned Wind Units with Signed IA, MW	0	13	65	113	131	131	131	131	131	131	131
Total Resources, MW	**69,631**	**73,492**	**75,382**	**75,469**	**76,284**	**78,461**	**79,099**	**80,379**	**80,379**	**80,379**	**80,379**
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	0	0
less Retiring Units, MW	0	0	0	0	0	0	0	0	0	0	0
Resources, MW	**69,314**	**73,175**	**75,065**	**75,152**	**75,967**	**78,144**	**78,782**	**80,379**	**80,379**	**80,379**	**80,379**
Reserve Margin	**3.8%**	**17.5%**	**17.5%**	**14.2%**	**11.1%**	**11.3%**	**10.0%**	**10.8%**	**9.2%**	**7.7%**	**6.1%**
(Resources - Firm Load Forecast)/Firm Load Forecast											

SUMMER PEAK SCENARIOS



OPERATING RESERVE MARGIN

TIME: 08/03/2011 16:13 Load: 68,392 MW

2011 Report on the Capacity, Demand, and Reserves in the ERCOT Region

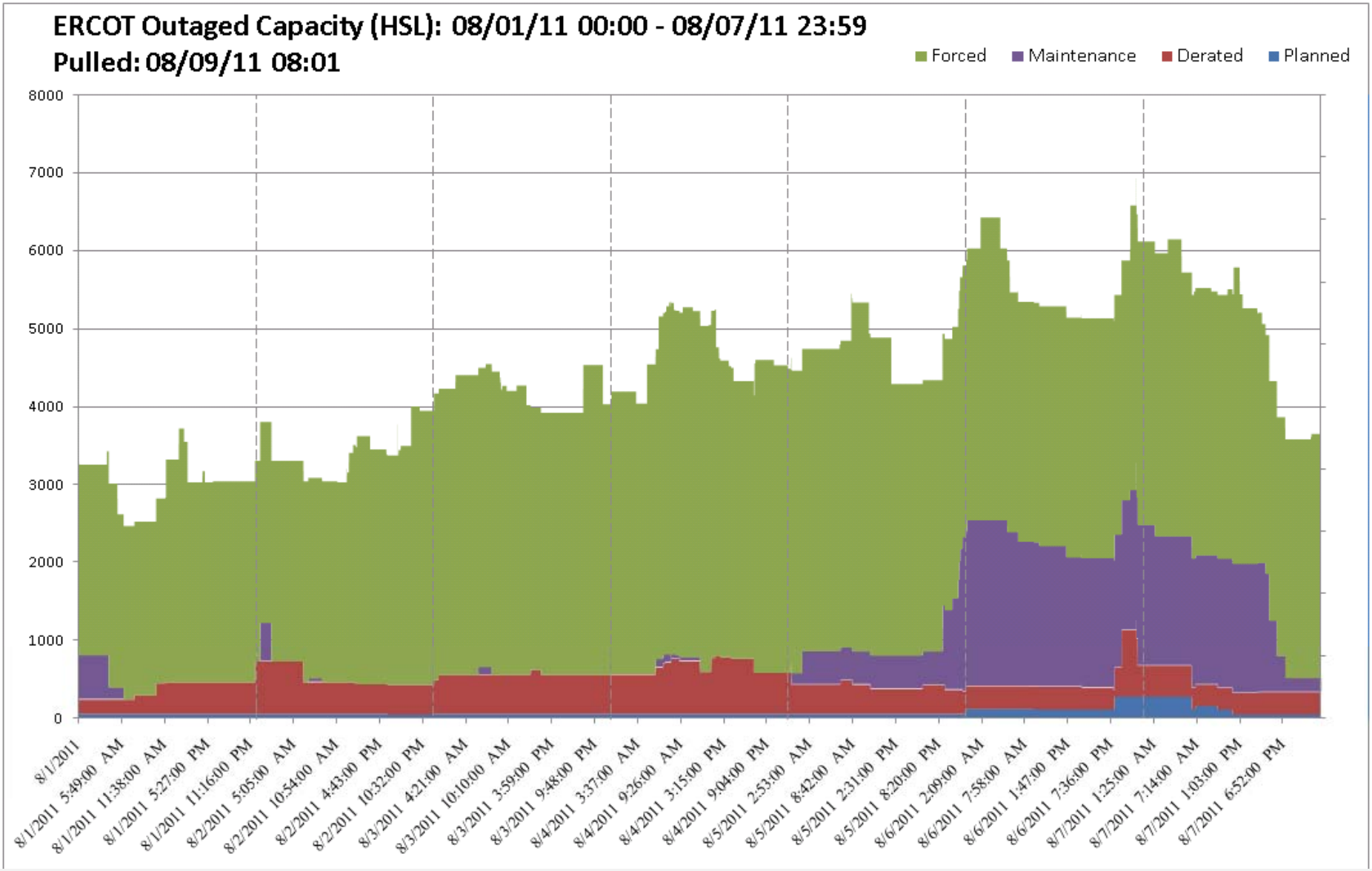
Summer Summary

Load Forecast:	REAL-TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Summer Peak Demand, MW	68392	63,898	65,665	67,757	70,540	72,591	74,198	75,365	76,654	77,866	79,274
less LAARs Serving as Responsive Reserve, MW	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0	0	0	0	0	0
less Emergency Interruptible Load Service	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB1125)	128	128	259	395	536	681	829	980	1133	1289	1448
Firm Load Forecast, MW	**66,781**	**62,286**	**63,880**	**65,790**	**68,381**	**70,231**	**71,628**	**72,576**	**73,638**	**74,612**	**75,771**

Installed Capacity 59,367 63,859

Resources:								2017	2018	2019	2020
Installed Capacity, MW								63,859	63,859	63,859	63,859
Capacity from Private Networks, MW								5,074	5,074	5,074	5,074
Effective Load-Carrying Capability (ELCC) of Wind Generation, MW	1,895	822	822	822	822	822	822	822	822	822	822
RMR Units to be under Contract, MW	0	0	0	0	0	0	0	0	0	0	0
Operational Generation, MW	**65,438**	**69,704**	**69,752**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**
50% of Non-Synchronous Ties, MW	733	553	553	553	553	553	553	553	553	553	553
Switchable Units, MW	2,841	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962
Available Mothballed Generation , MW	0	0	110	146	164	181	198	198	198	198	198
Planned Units (not wind) with Signed IA and Air Permit, MW	619	260	1,940	1,940	2,720	4,880	5,500	6,780	6,780	6,780	6,780
ELCC of Planned Wind Units with Signed IA, MW	0	13	65	113	131	131	131	131	131	131	131
Total Resources, MW	**69,631**	**73,492**	**75,382**	**75,469**	**76,284**	**78,461**	**79,099**	**80,379**	**80,379**	**80,379**	**80,379**
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	0	0
less Retiring Units, MW	0	0	0	0	0	0	0	0	0	0	0
Resources, MW	**69,314**	**73,175**	**75,065**	**75,152**	**75,967**	**78,144**	**78,782**	**80,379**	**80,379**	**80,379**	**80,379**
Reserve Margin	**3.8%**	**17.5%**	**17.5%**	**14.2%**	**11.1%**	**11.3%**	**10.0%**	**10.8%**	**9.2%**	**7.7%**	**6.1%**
(Resources - Firm Load Forecast)/Firm Load Forecast											

GENERATION OUTAGES: 08/01 – 08/07



OPERATING RESERVE MARGIN

TIME: 08/03/2011 16:13 Load: 68,392 MW

2011 Report on the Capacity, Demand, and Reserves in the ERCOT Region

Summer Summary

Load Forecast:	REAL TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Summer Peak Demand, MW	68392	63,898	65,665	67,757	70,540	72,591	74,198	75,365	76,654	77,866	79,274
less LAARs Serving as Responsive Reserve, MW	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0	0	0	0	0	0
less Emergency Interruptible Load Service	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB1125)	128	128	259	395	536	681	829	980	1133	1289	1448
Firm Load Forecast, MW	**66,781**	**62,286**	**63,880**	**65,790**	**68,381**	**70,231**	**71,628**	**72,576**	**73,638**	**74,612**	**75,771**

Resources:	REAL TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Installed Capacity, MW								63,859	63,859	63,859	63,859
Capacity from Private Networks, M								5,074	5,074	5,074	5,074
Effective Load-Carrying Capability								822	822	822	822
RMR Units to be under Contract, MW	0	0	0	0	0	0	0	0	0	0	0
Operational Generation, MW	**65,438**	**69,704**	**69,752**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**	**69,755**
50% of Non-Synchronous Ties, MW	733	553	553	553	553	553	553	553	553	553	553
Switchable Units, MW	2,841	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962
Available Mothballed Generation , MW	0	0	110	146	164	181	198	198	198	198	198
Planned Units (not wind) with Signed IA and Air Permit, MW	619	260	1,940	1,940	2,720	4,880	5,500	6,780	6,780	6,780	6,780
ELCC of Planned Wind Units with Signed IA, MW	0	13	65	113	131	131	131	131	131	131	131
Total Resources, MW	**69,631**	**73,492**	**75,382**	**75,469**	**76,284**	**78,461**	**79,099**	**80,379**	**80,379**	**80,379**	**80,379**
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	0	0
less Retiring Units, MW	0	0	0	0	0	0	0	0	0	0	0
Resources, MW	**69,314**	**73,175**	**75,065**	**75,152**	**75,967**	**78,144**	**78,782**	**80,379**	**80,379**	**80,379**	**80,379**
Reserve Margin	**3.8%**	**17.5%**	**17.5%**	**14.2%**	**11.1%**	**11.3%**	**10.0%**	**10.8%**	**9.2%**	**7.7%**	**6.1%**
(Resources - Firm Load Forecast)/Firm Load Forecast											

Capacity from Private Networks 4,176 5,023

OPERATING RESERVE MARGIN

TIME: 08/03/2011 16:13 Load: 68,392 MW

2011 Report on the Capacity, Demand, and Reserves in the ERCOT Region

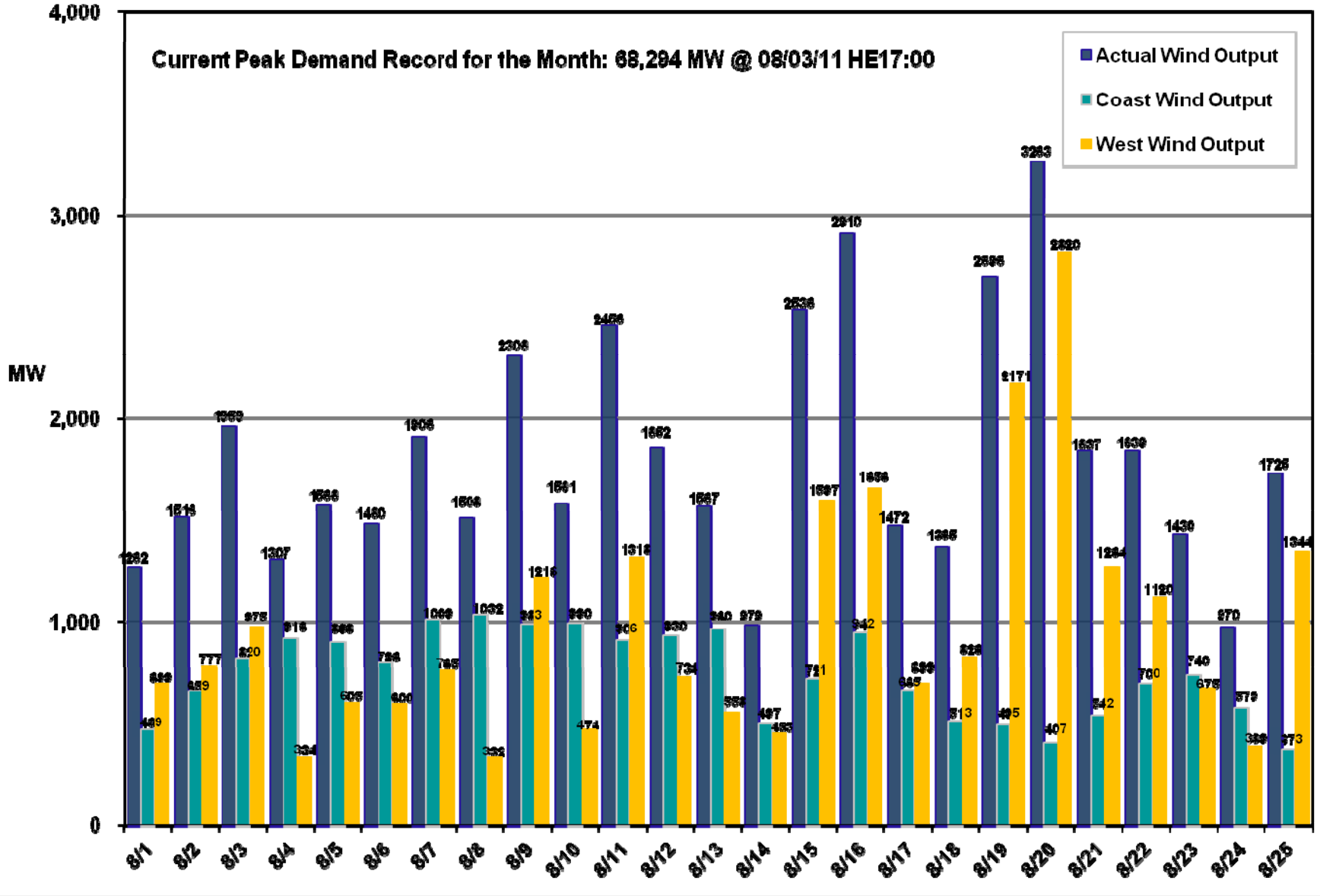
Summer Summary

Load Forecast:	REAL TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total Summer Peak Demand, MW	68392	63,898	65,665	67,757	70,540	72,591	74,198	75,365	76,654	77,866	79,274
less LAARs Serving as Responsive Reserve, MW	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063	1,063
less LAARs Serving as Non-Spinning Reserve, MW	0	0	0	0	0	0	0	0	0	0	0
less Emergency Interruptible Load Service	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB1125)	128	128	259	395	536	681	829	980	1133	1289	1448
Firm Load Forecast, MW	**66,781**	**62,286**	**63,880**	**65,790**	**68,381**	**70,231**	**71,628**	**72,576**	**73,638**	**74,612**	**75,771**

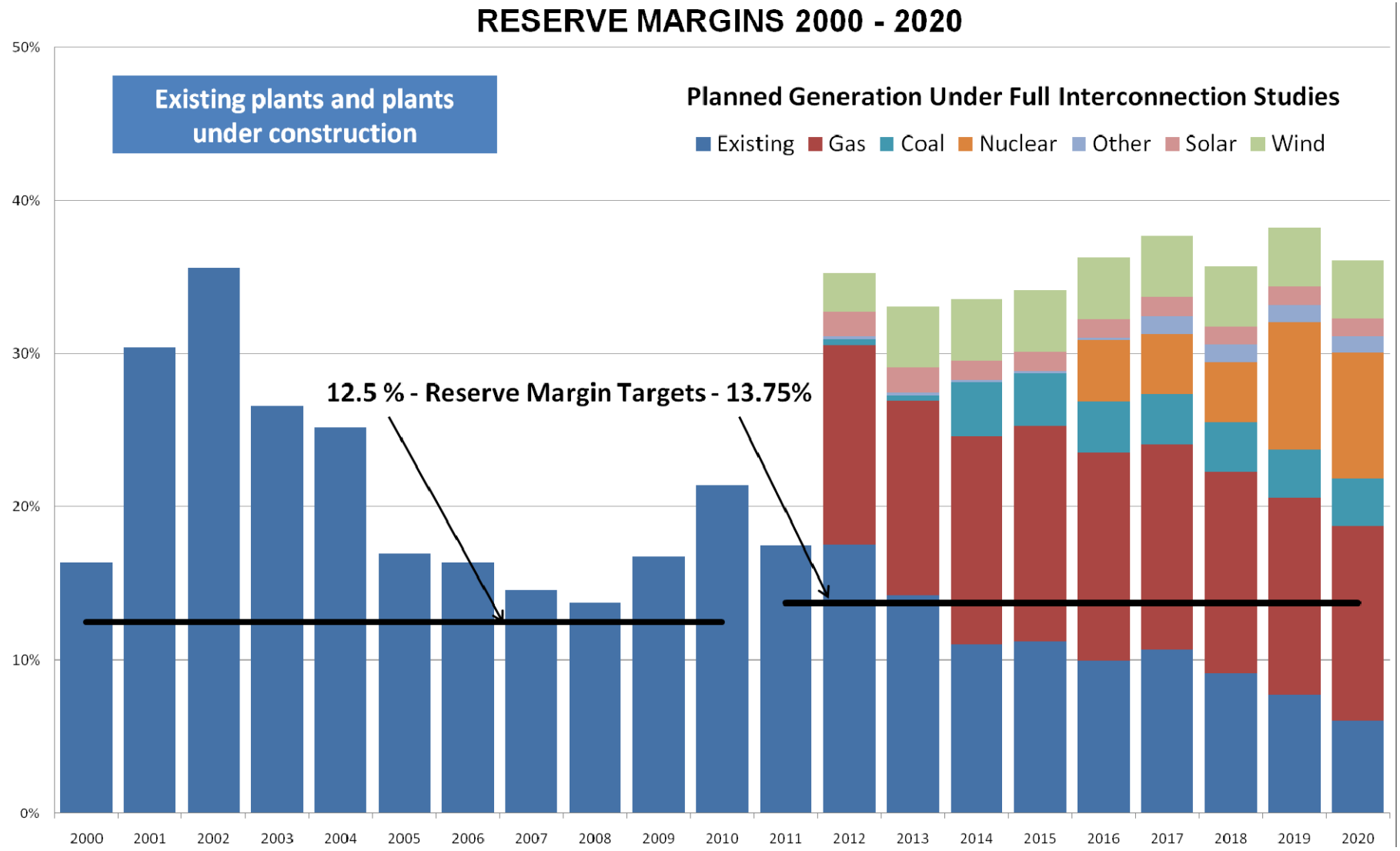
Resources:	REAL TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Installed Capacity, MW	59,367	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859	63,859
Capacity from Private Networks, MW	4,176	5,023	5,071	5,074	5,074	5,074	5,074	5,074	5,074	5,074	5,074
Effective Load-Carrying Capability (ELCC								822	822	822	822
RMR Units to be under Contract, MW								0	0	0	0
Operational Generation, MW								**69,755**	**69,755**	**69,755**	**69,755**
50% of Non-Synchronous Ties, MW	733	553	553	553	553	553	553	553	553	553	553
Switchable Units, MW	2,841	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962	2,962
Available Mothballed Generation , MW	0	0	110	146	164	181	198	198	198	198	198
Planned Units (not wind) with Signed IA and Air Permit, MW	619	260	1,940	1,940	2,720	4,880	5,500	6,780	6,780	6,780	6,780
ELCC of Planned Wind Units with Signed IA, MW	0	13	65	113	131	131	131	131	131	131	131
Total Resources, MW	**69,631**	**73,492**	**75,382**	**75,469**	**76,284**	**78,461**	**79,099**	**80,379**	**80,379**	**80,379**	**80,379**
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	0	0
less Retiring Units, MW	0	0	0	0	0	0	0	0	0	0	0
Resources, MW	**69,314**	**73,175**	**75,065**	**75,152**	**75,967**	**78,144**	**78,782**	**80,379**	**80,379**	**80,379**	**80,379**
Reserve Margin	**3.8%**	**17.5%**	**17.5%**	**14.2%**	**11.1%**	**11.3%**	**10.0%**	**10.8%**	**9.2%**	**7.7%**	**6.1%**
(Resources - Firm Load Forecast)/Firm Load Forecast											

ELCC of Wind Generation **1,895** **822**

DAILY WIND GRAPH AT PEAK



ERCOT RESERVE MARGINS – 2000-2020



FUTURE GENERATION STATUS UPDATE

- **For planned units with signed interconnection agreements and air permits, which count toward reserve margin:**
  - ERCOT has surveyed developers on their estimated probability of in-service for each future year
  - The capacity from these generators will be discounted in the CDR in each year by the survey probabilities
- **For future units still in the generation interconnection process, which do not count toward the reserve margin:**
  - ERCOT has attempted to contact the developers of each future unit to ascertain the current status
  - The Transmission Owners have been asked to provide a status of each future unit whose interconnection study they are performing
  - Future units which are “on-hold” will be removed from reporting
- **These changes will be reflected in a CDR update for the December Board meeting**
- **The Generation Interconnection Procedures will be modified to resolve the “on-hold” status**

DROUGHT EFFECT ON GENERATION

- **ERCOT has been periodically surveying generators during and since the summer to monitor the effect of drought on generation availability**
- **Based on most recent survey:**
  - Current unavailability due to drought is only 24 MW
  - If East Texas receives half of it's normal winter/spring rainfall, unavailability could go up to 434 MW by May
  - If no significant rainfall received, unavailability is estimated to be as much as 3,044 MW by May
  - Approximately 9,000 MW is dependent on water rights from sources at historically low levels
- **Mitigation actions being taken:**
  - Building of pipelines to remote water sources
  - Procuring additional water rights
  - Adding pumping capability
- **ERCOT will continue to monitor the situation as long as the drought exists**

THE FUTURE

Key strategic issues for ERCOT:

- Impacts to Reserve Margins
  - EPA Rules
  - Drought
  - Outage rates
- Reliability & Markets
  - Right mix of Ancillary Services
  - New technologies
  - ERCOT's role in Market Evolution – Business Integration
- Maintain flat Admin. Fee for 2012
- Risk Analysis
- Retention of Quality Employees

QUESTIONS?