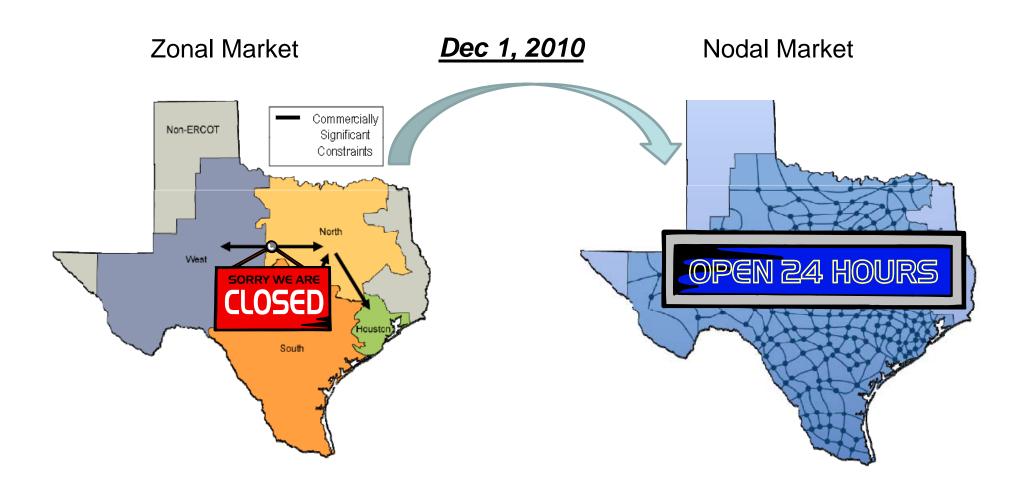


# **ERCOT: POST-NODAL AND BEYOND**

TEXAS ENERGY PROFESSIONALS ASSOCIATION NOVEMBER 3, 2011

Trip Doggett
President & CEO
ERCOT

# NODAL MARKET OPERATIONS EFFECTIVE DECEMBER 1, 2010



### **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

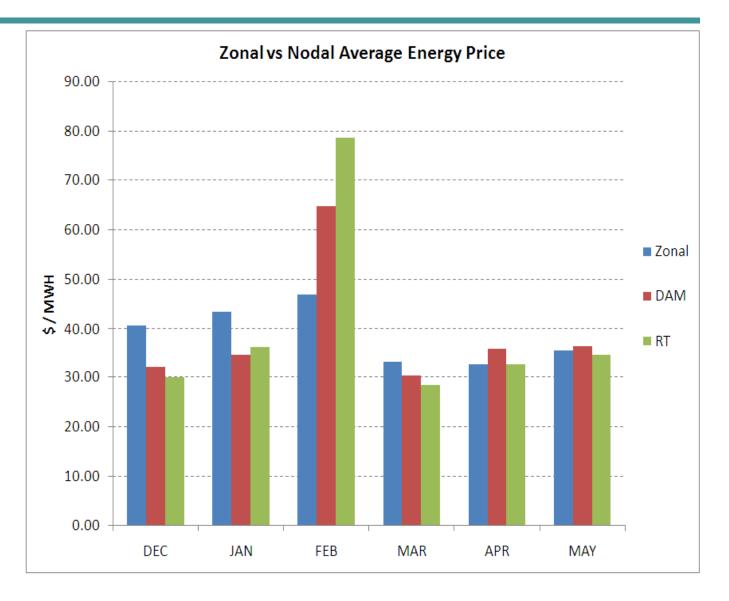
## Non-Spinning Reserve

- 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

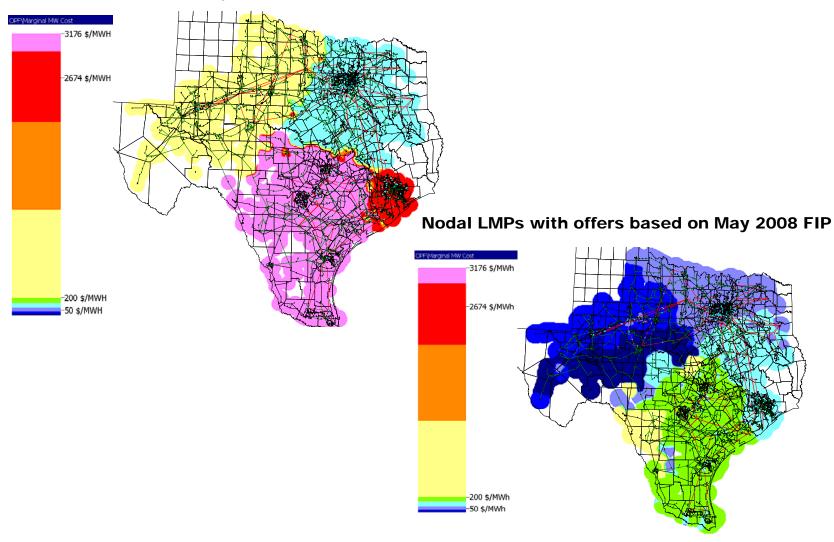


<sup>\*</sup> Graph revised July 5, 2011



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

#### **Zonal MCPEs May 2008**



### **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**

	<u>2011</u>		<u>2010</u>
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**

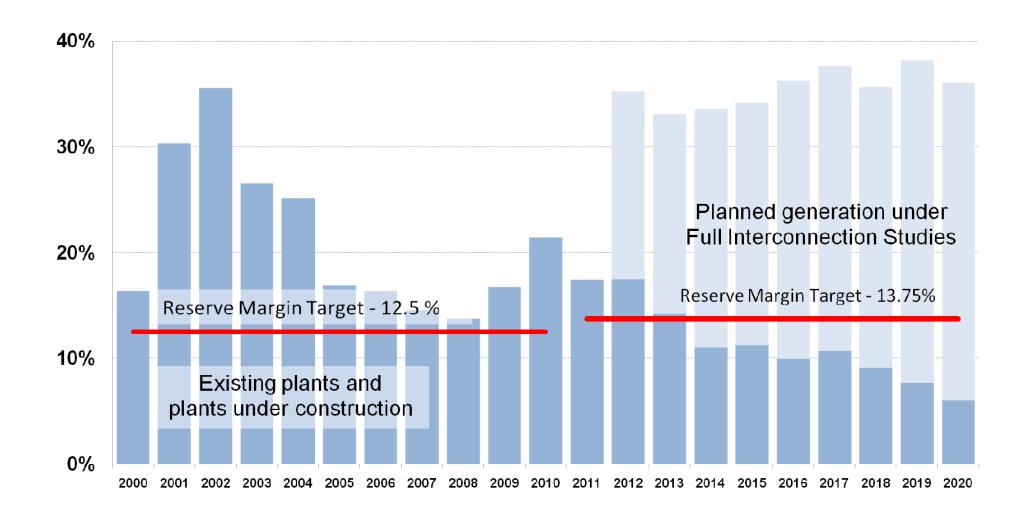
2000	57,606 MW	August 31
2001	54,729 MW	August 15
2002	56,086 MW	August 26
2003	60,037 MW	August 7
2004	58,506 MW	August 3
2005	60,214 MW	August 23
2006	62,339 MW	August 17
2007	62,130 MW	August 13
2008	62,171 MW	August 4
2009	63,400 MW	July 13
2010	65,776 MW	August 23

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.

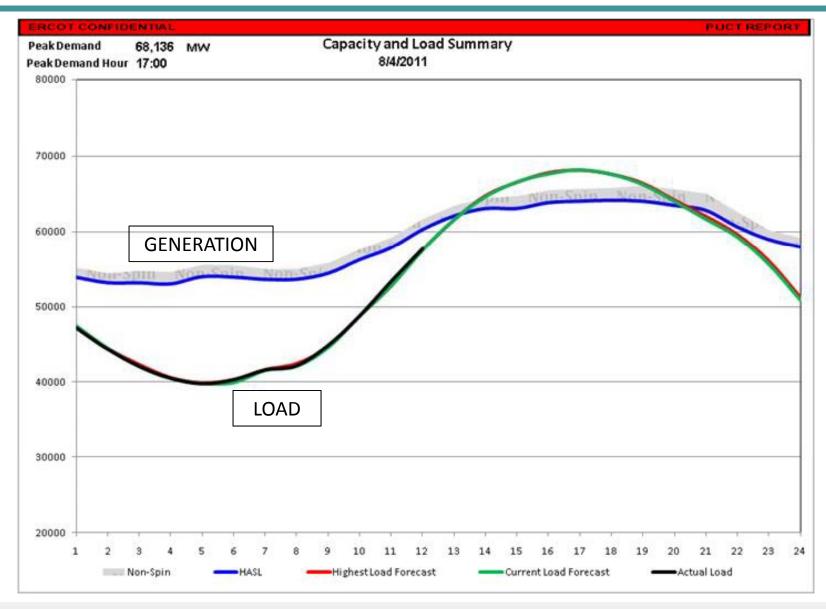


### **ERCOT RESERVE MARGINS – 2000-2020**





### How does that 17.5% become <5%?





TIME: 08/03/2011 16:13

Load: 68,392 MW

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

Load Forecast: Total Summer Peak Demand, MW less LAARs Serving as Responsive Reserve, MW less LAARs Serving as Non-Spinning Reserve, MW less Emergency Interruptible Load Service less Energy Efficiency Programs (per SB1125) Firm Load Forecast, MW	REAL TIME 68392 1,063 0 421 128 66,781	2011 63,898 1,063 0 421 128 62,286	2012 65,665 1,063 0 463 259 63,880	2013 67,757 1,063 0 509 395 <b>65,790</b>	2014 70,540 1,063 0 560 536 <b>68,381</b>	2015 72,591 1,063 0 616 681 70,231	2016 74,198 1,063 0 678 829 71,628	2017 75,365 1,063 0 745 980 72,576	2018 76,654 1,063 0 820 1133 73,638	2019 77,866 1,063 0 902 1289 74,612	2020 79,274 1,063 0 992 1448 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	U	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 Switchable Units, MW Available Mothballed Generation , MW Planned Units (not wind) with Signed IA and Air Permit, MW ELCC of Planned Wind Units with Signed IA, MW Total Resources, MW	733 2,841 0 619 0 <b>69,631</b>	553 2,962 0 260 13 <b>73,492</b>	553 2,962 110 1,940 65 <b>75,382</b>	553 2,962 146 1,940 113 <b>75,469</b>	553 2,962 164 2,720 131 <b>76,284</b>	553 2,962 181 4,880 131 <b>78,461</b>	553 2,962 198 5,500 131 <b>79,099</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>
less Switchable Units Unavailable to ERCOT, MW	317	317	317	317	317	317	317	0	0	Π	Π
less Retiring Units, MW	0	0	0	0	0	0	0	Ö	Ö	Ö	Ö
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 (Resources - Firm Load Forecast)/Firm Load Forecast	3.8%	17.5%	17.5%	14.2%	11.1%	11.3%	10.0%	10.8%	9.2%	7.7%	6.1%



TIME: 08/03/2011 16:13

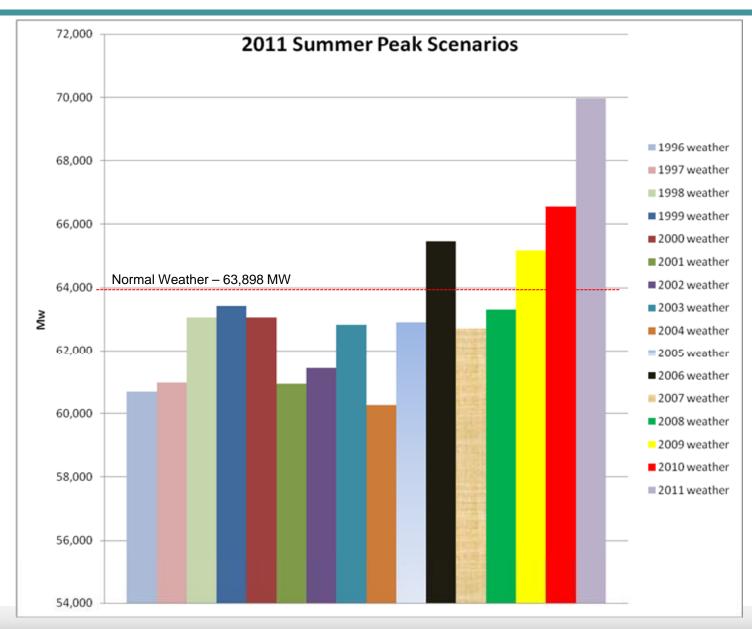
Load: 68,392 MW

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

Load Forecast: Total Summer Peak Demand, MW less LAARs Serving as Responsive Reserve,		ner Peak Demand			68,392		63,898		<b>2017</b> 75,365 1,063	<b>2018</b> 76,654 1,063	<b>2019</b> 77,866 1,063	<b>2020</b> 79,274 1,063
less LAARs Serving as Non-Spinning Reserving		. ,555 O	. ,555	.,555	. , <del>000</del> O		<del>,555</del>		1,000	1,000	1,003 N	1,003 N
less Emergency Interruptible Load Service	0,	421	421	463	509	560	616	678	745	820	902	992
less Energy Efficiency Programs (per SB112	5)	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:	REA	AL TIME	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Installed Capacity, MVV		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 V	Wind Generation, MW	1,895	822	822	822	822	822	822	822	822	822	822
RMR Units to be under Contract, MW	_	U	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 A		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, I	MVV	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
Land Carachable Halas Harristonia de EDOOT	k.45.07	247	247	247	247	317	247	247				0
less Switchable Units Unavailable to ERCOT,	MAA	317	317	317	317		317	317	0 N	0	U	U
less Retiring Units, MW		CD 244	72 475	0 75.005	0 75 452	0 75.007	70.444	70.702	_	00.270	00 270	00.270
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 (Resources - Firm Load Forecast)/Firm Load I	Forecast	3.8%	17.5%	17.5%	14.2%	11.1%	11.3%	10.0%	10.8%	9.2%	7.7%	6.1%



### SUMMER PEAK SCENARIOS





TIME: 08/03/2011 16:13

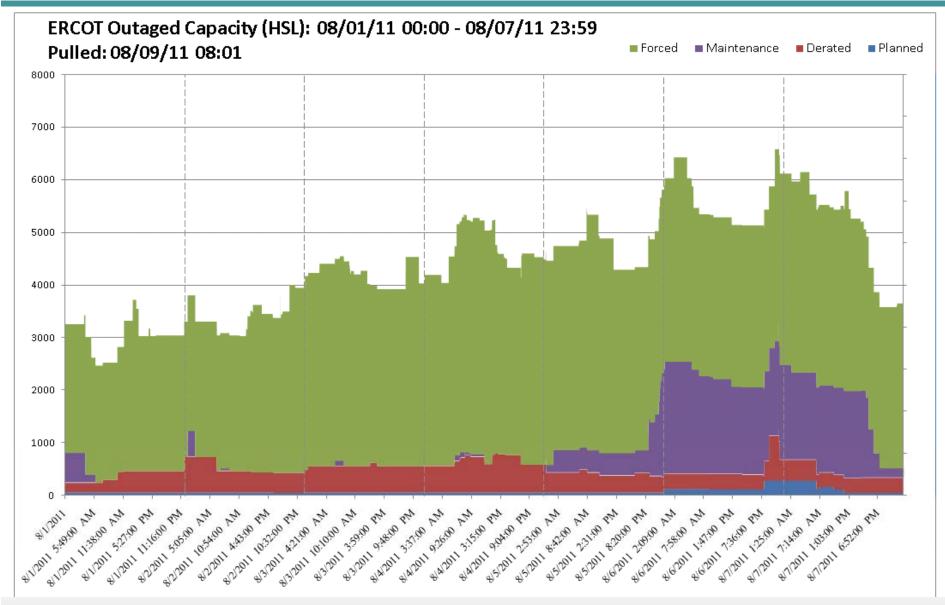
Load: 68,392 MW

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

Load Forecast: Total Summer Peak Demand, MW less LAARs Serving as Responsive Reserve, MW less LAARs Serving as Non-Spinning Reserve, MW less Emergency Interruptible Load Service less Energy Efficiency Programs (per SB1125) Firm Load Forecast, MW	REAL TIME 68392 1,063 0 421 128 66,781	2011 63,898 1,063 0 421 128 62,286	2012 65,665 1,063 0 463 259 63,880	2013 67,757 1,063 0 509 395 <b>65,790</b>	2014 70,540 1,063 0 560 536 <b>68,381</b>	2015 72,591 1,063 0 616 681 70,231	2016 74,198 1,063 0 678 829 71,628	2017 75,365 1,063 0 745 980 72,576	2018 76,654 1,063 0 820 1133 73,638	2019 77,866 1,063 0 902 1289 74,612	<b>2020</b> 79,274 1,063 0 992 1448 <b>75,771</b>
Resources: Installed Capacity, MW Capacity from Private Networks, MW Effective Load-Carrying Capability (ELCC) of Wind Generation, MW RMR Units to be under Contract, MW Operational Generation, MW	1,895 0 65,438	822 0 <b>69,704</b>	822 0 <b>69,752</b>	822 0 <b>69,755</b>	,367 822 0 69,755	63,8 822 0 69,755	822 69,755	2017 63,859 5,074 822 0 69,755	2018 63,859 5,074 822 0 69,755	2019 63,859 5,074 822 0 69,755	2020 63,859 5,074 822 0 69,755
50% of Non-Synchronous Ties, MW Switchable Units, MW Available Mothballed Generation , MW Planned Units (not wind) with Signed IA and Air Permit, MW ELCC of Planned Wind Units with Signed IA, MW Total Resources, MW	733 2,841 0 619 0 <b>69,631</b>	553 2,962 0 260 13 <b>73,492</b>	553 2,962 110 1,940 65 <b>75,382</b>	553 2,962 146 1,940 113 <b>75,469</b>	553 2,962 164 2,720 131 <b>76,284</b>	553 2,962 181 4,880 131 <b>78,461</b>	553 2,962 198 5,500 131 <b>79,099</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>	553 2,962 198 6,780 131 <b>80,379</b>
less Switchable Units Unavailable to ERCOT, MW less Retiring Units, MW Resources, MW  Reserve Margin (Resources - Firm Load Forecast)/Firm Load Forecast	317 0 <b>69,314</b> 3.8%	317 73,175 17.5%	317 0 <b>75,065</b> 17.5%	317 0 <b>75,152</b> 14.2%	317 0 <b>75,967</b> 11.1%	317 0 <b>78,144</b> <b>11.3</b> %	317 0 <b>78,782</b> <b>10.0</b> %	0 0 <b>80,379</b> <b>10.8</b> %	0 0 <b>80,379</b> <b>9.2</b> %	0 0 <b>80,379</b> 7.7%	0 80,379 6.1%



### **GENERATION OUTAGES: 08/01 – 08/07**





TIME: 08/03/2011 16:13

Load: 68,392 MW

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

Load Forecast: Total Summer Peak Demand, MW less LAARs Serving as Responsive Reserve, MW less LAARs Serving as Non-Spinning Reserve, MW less Emergency Interruptible Load Service less Energy Efficiency Programs (per SB1125) Firm Load Forecast, MW	REAL TIME 68392 1,063 0 421 128 66,781	2011 63,898 1,063 0 421 128 62,286	2012 65,665 1,063 0 463 259 63,880	2013 67,757 1,063 0 509 395 <b>65,790</b>	2014 70,540 1,063 0 560 536 <b>68,381</b>	2015 72,591 1,063 0 616 681 70,231	2016 74,198 1,063 0 678 829 71,628	2017 75,365 1,063 0 745 980 72,576	2018 76,654 1,063 0 820 1133 73,638	2019 77,866 1,063 0 902 1289 74,612	2020 79,274 1,063 0 992 1448 75,771
	R <u>eal time</u>	_ 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Installed Capacity, MW Capacity from Private Networks, N Effective Load-Carrying Capability  Capacity from P	Private	Netwo	orks	4,1	L76	5,02	23	63,859 5,074 822	63,859 5,074 822	63,859 5,074 822	63,859 5,074 822
RMR Units to be under Contract, MW	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 Switchable Units, MW Available Mothballed Generation , MW	733 2,841	553 2,962 0	553 2,962 110	553 2,962 146	553 2,962 164	553 2,962 181	553 2,962 198	553 2,962 198	553 2,962 198	553 2,962 198	553 2,962 198
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 less Retiring Units, MW <b>Resources, MW</b>	317 0 <b>69,31</b> 4	317 0 <b>73,175</b>	317 0 <b>75,065</b>	317 0 <b>75,152</b>	317 0 <b>75,967</b>	317 0 <b>78,144</b>	317 0 <b>78,782</b>	0 0 <b>80,379</b>	0 0 <b>80,379</b>	0 0 <b>80,379</b>	0 0 <b>80,379</b>
Reserve Margin (Resources - Firm Load Forecast)/Firm Load Forecast	3.8%	17.5%	17.5%	14.2%	11.1%	11.3%	10.0%	10.8%	9.2%	7.7%	6.1%



TIME: 08/03/2011 16:13

Load: 68,392 MW

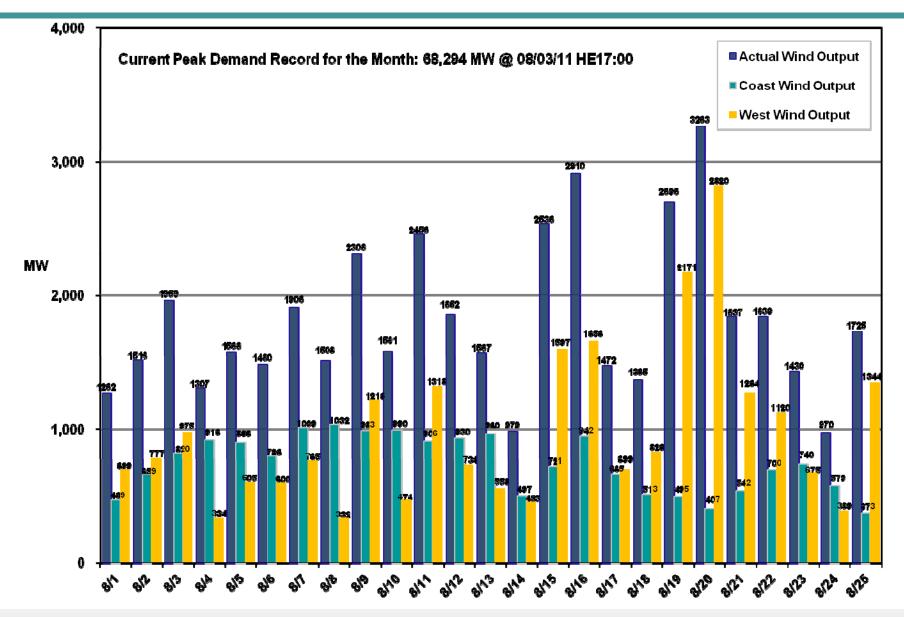
**TEPA** 

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

Load Forecast:	RE <u>AL TIME</u>	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	Ō	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	<b>5</b> .023	5.071	5.074	5.074	5.074	5.074	5,074	5,074	5,074	5,074
Effective Load-Carrying Capability (ELCC	Attend Com	<b></b>		1 4 4	205	000	2	822	822	822	822
RMR Units to be under Contract, MW <b>ELCC OT</b>	wina Gene	eneration			<b>395</b>	822	)	0	0	0	0
Operational Generation, MW	00,400	02,004	00,102	02,133	00,100	00,100	<del>ئد،,ده</del>	69,755	69,755	69,755	69,755
50% of Non-Synchronous Ties, MVV	733		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 , MVV	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											

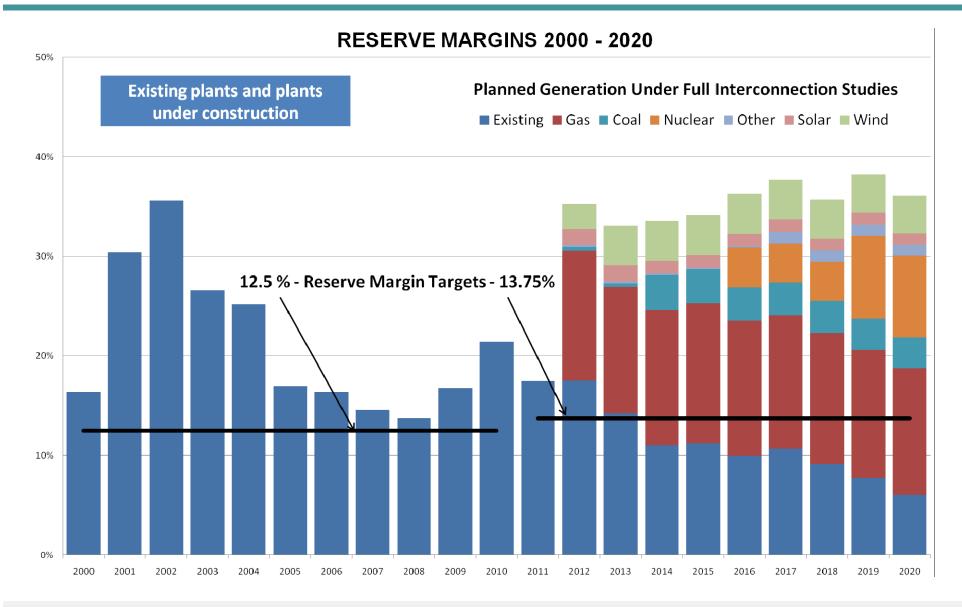


### DAILY WIND GRAPH AT PEAK





### **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 inservice 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?**