ERCOT's Challenges & Opportunities

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AGENDA

- **New Records at ERCOT**
- **2012 Summer**
- **Resource Adequacy**
- **Wind Growth**
- **Demand Response**

New Records at ERCOT

New Peak Demand Record: 68,379 megawatts

- 68,379 megawatts (MW), Aug. 3, 2011
- The 2010 peak demand – 65,776 MW, Aug. 23, 2010 – was broken 3 consecutive days:
  - Aug. 1, 2011 66,867 MW
  - Aug. 2, 2011 67,929 MW
  - Aug. 3, 2011 68,379 MW

New Weekend Record

- 65,159 MW, Sunday, Aug. 28
  - 5 percent increase over 2010 previous record – 62,320 MW

Winter Peak Record

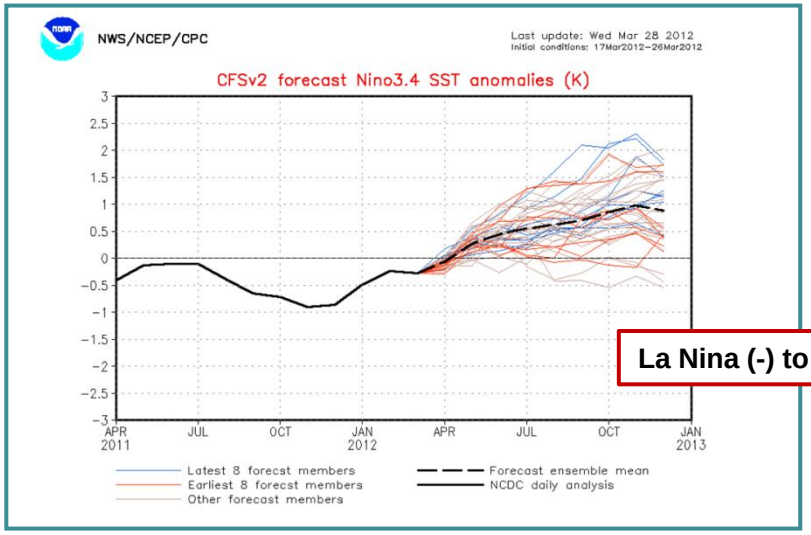
- 57,315 MW (February 10, 2011)
  - 3 percent increase over 2010 previous record - 55,878 MW

Wind Record

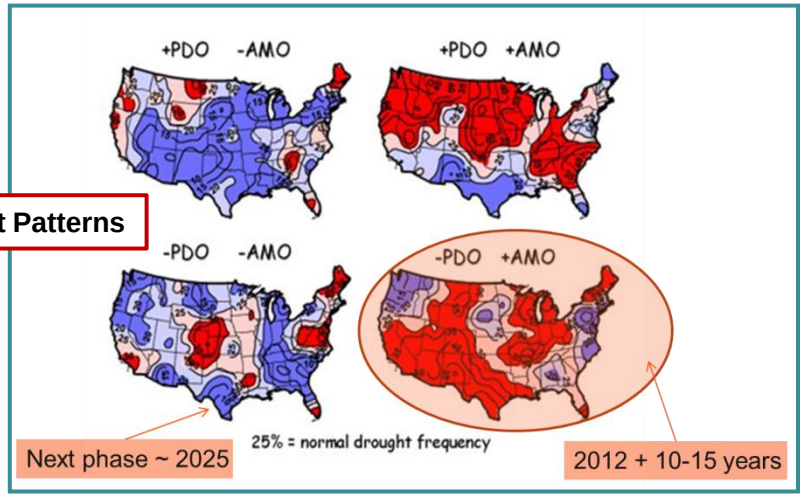
- A new wind record of 8,368 MW occurred on June 19, 2012 at 19:25
  - Non-Coastal Wind = 7,381 MW (86.0% of installed capacity)
  - Coastal Wind = 987 MW (69.5% of installed capacity)
  - Wind was supplying 17.64% of the 47,452 MW load

2012 SUMMER

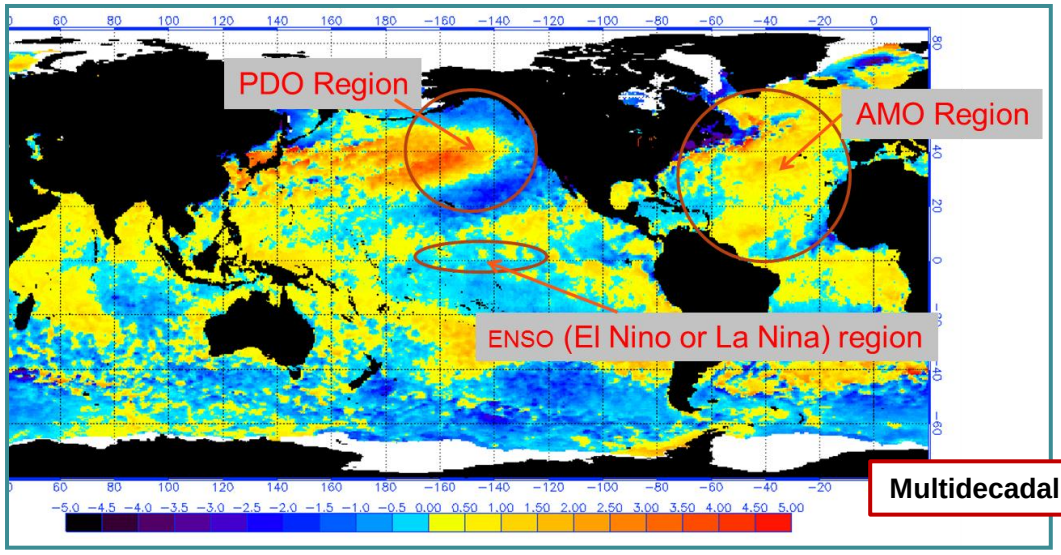
SUMMER 2012 WEATHER DEVELOPMENTS



La Nina (-) to El Nino (+)



Drought Patterns



Multidecadal Influences

Long Term Forecast – Contributing Factors

- **Variations in SST (Sea Surface Temps)**
  - El Niño (+) & La Niña (-)
  - Pacific Decadal Oscillation (PDO)
  - Atlantic Multidecadal Oscillation (AMO)
- Certain shorter term phenomena (e.g. North Atlantic Ocean Blocking) can only be forecasted 10-14 days out – such effects are not included in longer term forecasts

SUMMER 2012 WEATHER OUTLOOK

ERCOT Summer Weather Issues

- Drought
- Flooding
- Heat
- Tropical Weather

Summer Weather Outlook

- 2011 an outlier for heat and drought
- El Niño expected this summer
- Past years (1951, 1963, 1976, 2006 & 2009), La Niña transitioned to El Niño during summer:
  - Warmer than normal temperatures
  - Lower than normal rainfall
- Climate models suggest:
  - Warmer spring followed by normal temperatures for summer
  - More variable rainfall from spring through summer
- Texas in more drought-prone period that could persist for next decade

2012 Storm Threat

- Early season storms expected in Gulf of Mexico due to above-normal water temperatures
- Lower seasonal threat
- El Niño-related wind shear increases later in the season to hinder storm development

What To Expect this Summer

- **Tight reserves = significant chance for multiple Energy Emergency Alerts**
  - Not likely to result in the need for rotating outages
- **If higher-than-normal number of forced generation outages during peak or record-breaking weather conditions similar to last summer, ERCOT system likely to have insufficient resources available**
  - Would result in the need for rotating outages to maintain grid stability
- **Improved drought conditions in many river basins**
  - Reservoir levels not expected to affect power plant operations this summer
  - Potential risks to generation capacity continue while Texas remains under drought conditions

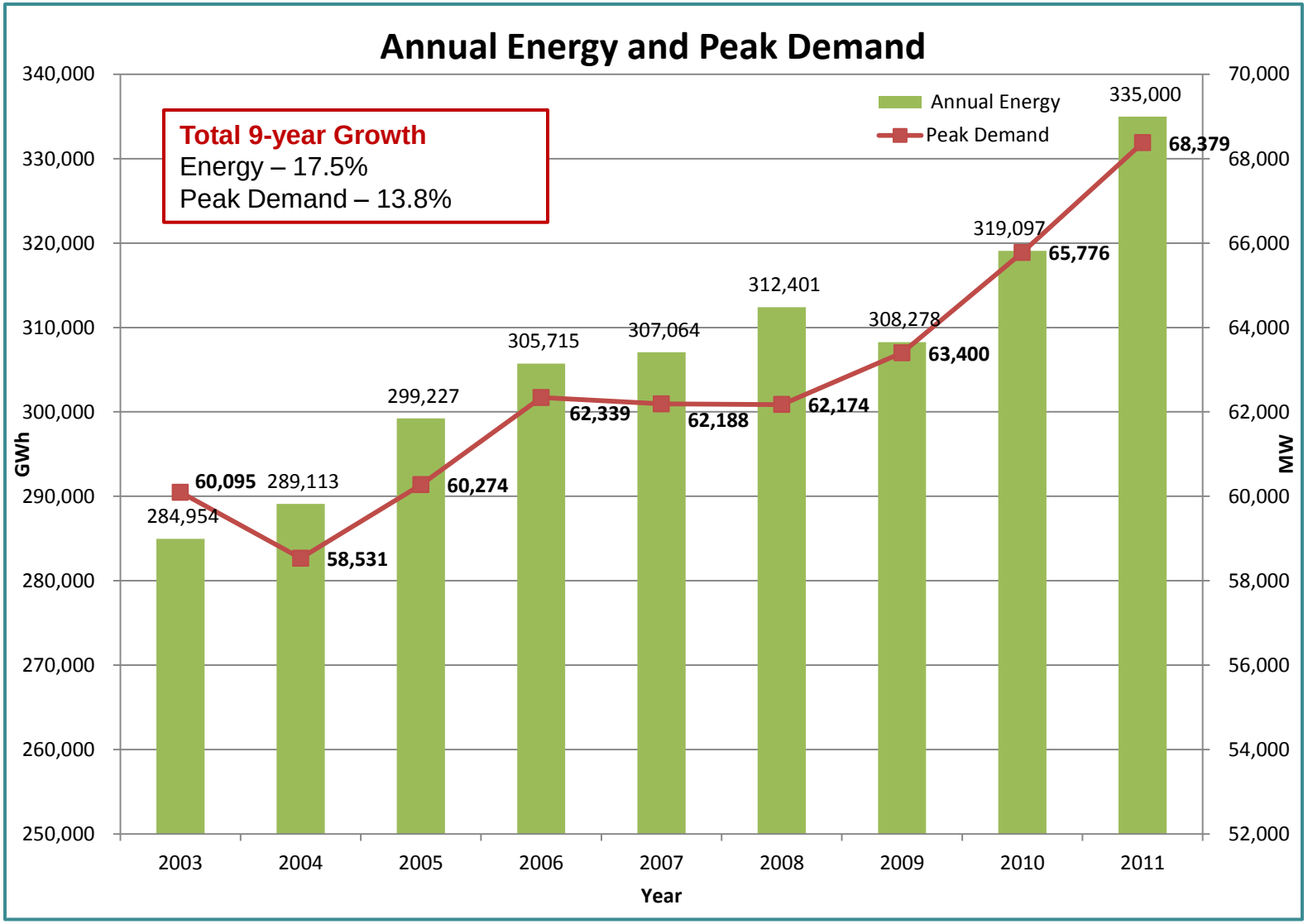
SARA Summer 2012 Final Report

Item	Summer 2012	Base Case	Extreme Load & Typical Gen Outages	Extreme Load & Extreme Gen Outages
1	Total Resources	73,853		
2	Base Case Peak Demand	67,492		
3	Uses of Reserve Capacity	3,790	7,371	9,438
4	Capacity Available for Operating Reserves* (1-2-3)	2,571	-1,010	-3,077
5	Demand Adjustment during Scarcity**	750		
6	Adjusted Capacity Available for Operating Reserves (4+5)	3,321	-260	-2,327

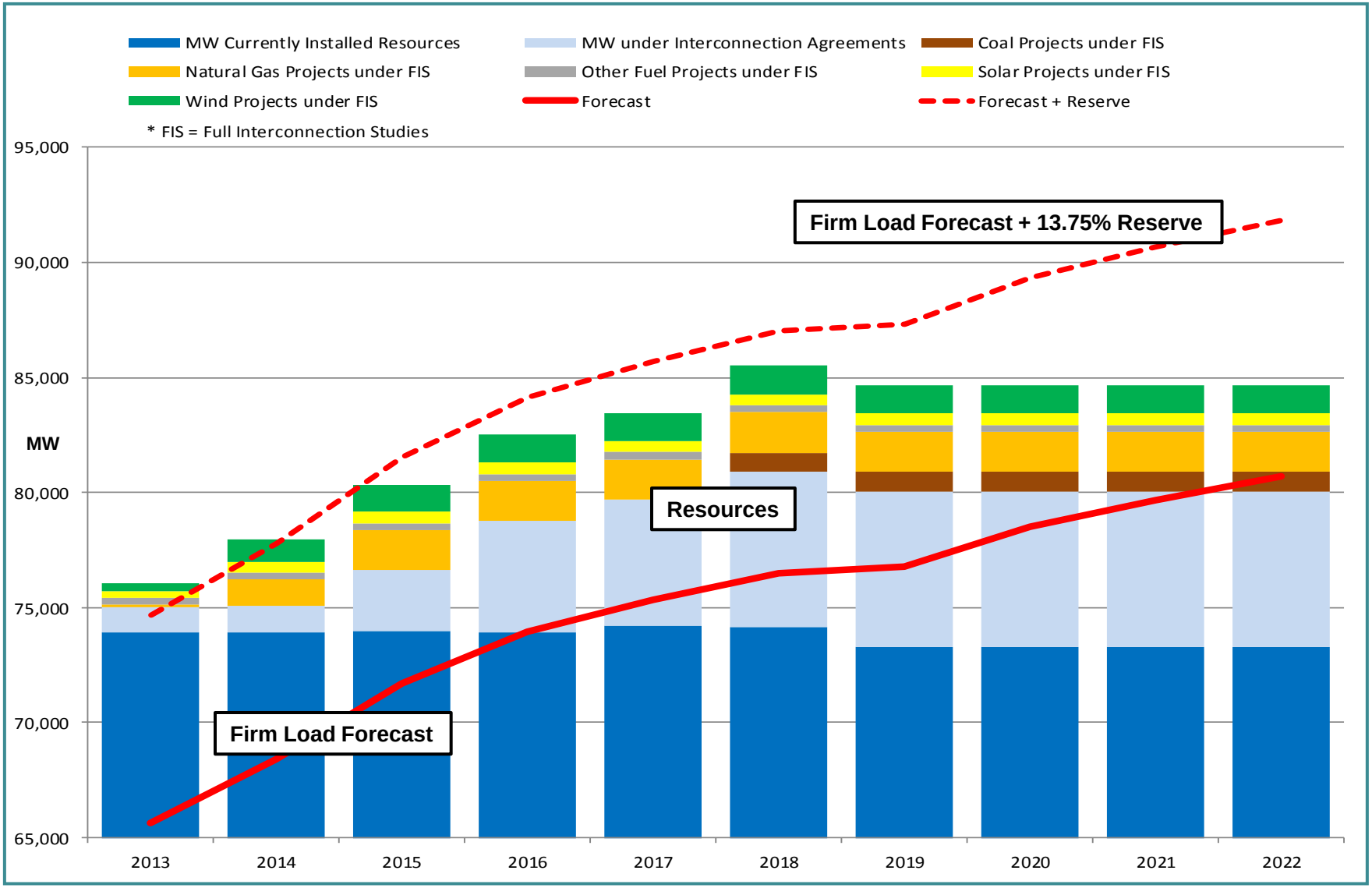
*Less than 2300MW indicates risk of EEA1
**Represents effects of price responsive demand, conservation appeals, demand programs, etc.
based on summer 2011 experience; does not include Load Resource or Emergency Response Service (ERS) activation

Resource Adequacy

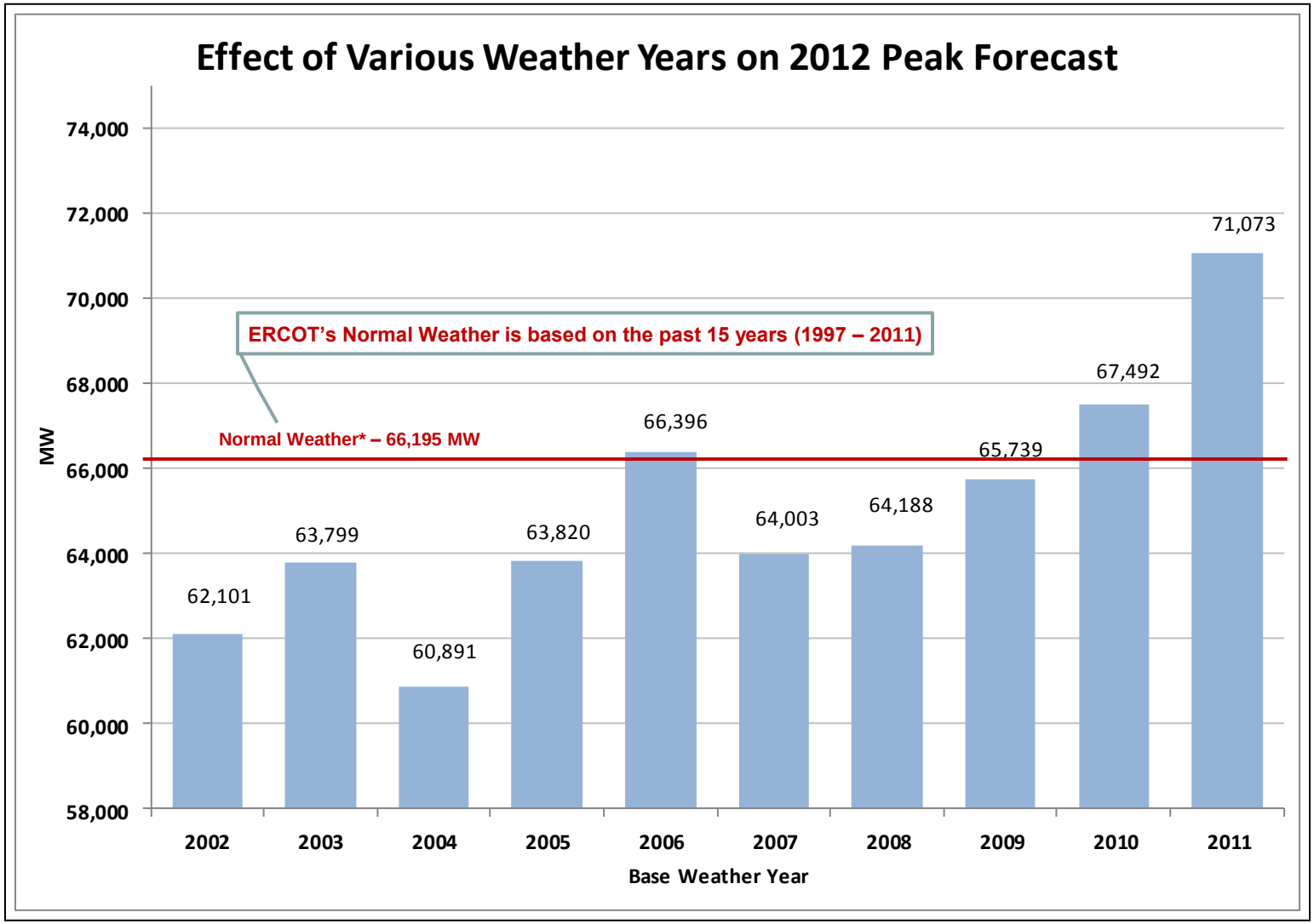
ANNUAL ENERGY & PEAK DEMAND (2003-2011)



MAY 2012 CAPACITY, DEMAND AND RESERVES REPORT (CDR)



2012 Peak Load Forecast – Sensitivity to Weather



Brattle Study Scope

ERCOT commissioned *The Brattle Group* to address three questions:

1. Investors and their Investment Criteria

- Identify, describe, and rank the relevant factors that influence investment decisions made by the development and financial community related to new capacity additions, capacity retirements, and repowering projects in ERCOT.

2. Market Outlook for Investment and Resource Adequacy

- Evaluate the current drivers from both a wholesale and retail perspective that influence resource investment decisions in the ERCOT market.

3. Evaluation of Policy Options

- Provide suggestions for ways to enhance favorable investment outcomes for long-term resource adequacy in ERCOT.

BRATTLE STUDY FINDINGS & RECOMMENDATIONS

Final Report released on June 1, 2012

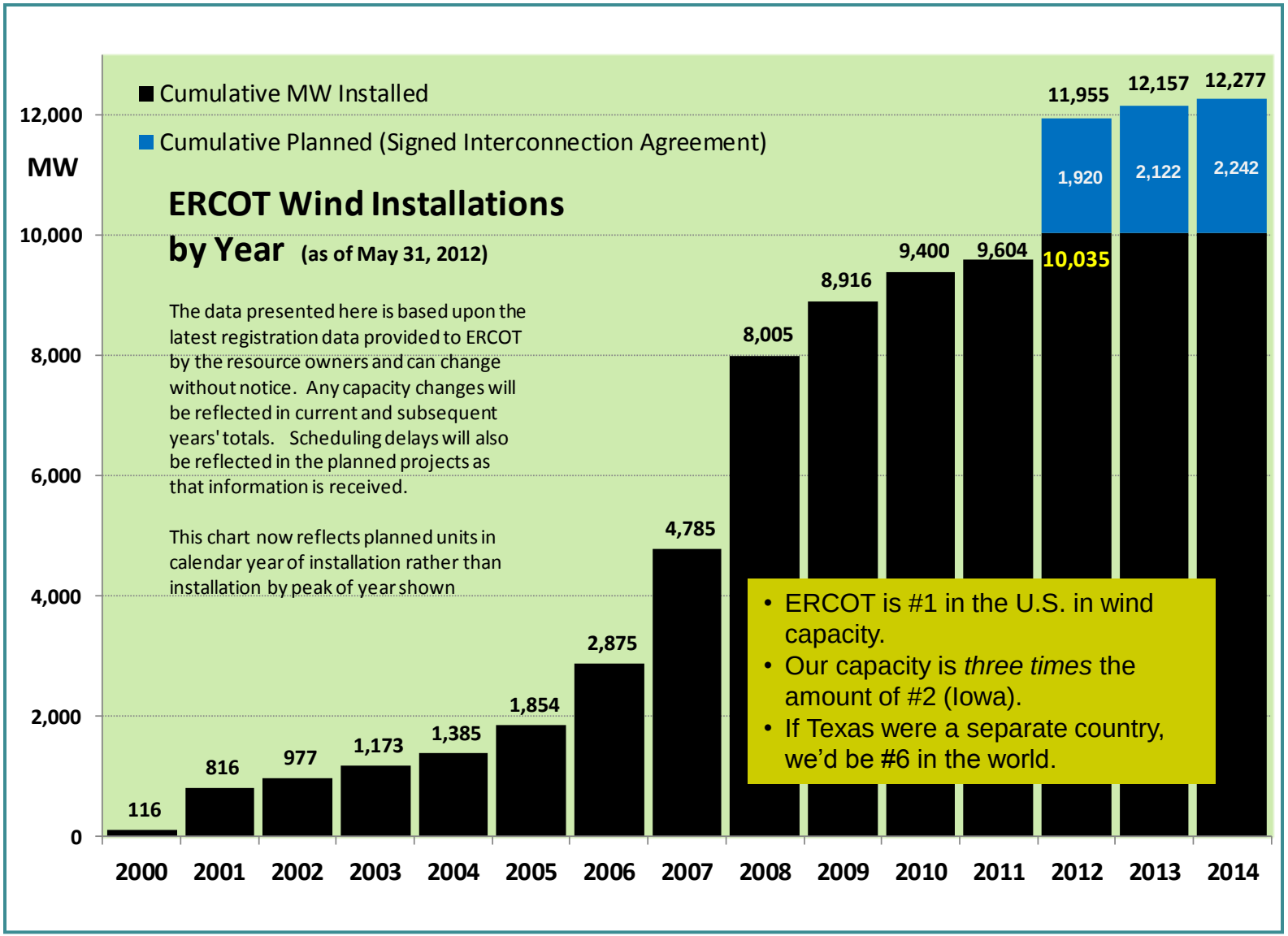
- New investment in ERCOT is impeded by low wholesale prices, low natural gas prices, and an efficient existing generation fleet
- ERCOT's current energy-only market is not likely to support sufficient investment to meet the resource adequacy target
- Reliability targets could be achieved with a significant increase in price-responsive demand – would likely take several years before a sufficient level of demand response could be achieved
- Based on large and uncertain gaps, either the market design needs to be adjusted or the reliability objectives revised
- Four policy options for attracting greater investment to support a higher reserve margins
  - Energy-only market with price adders
  - Energy-only market with backstop procurement
  - Resource adequacy requirements on load serving entities
  - Resource adequacy supported by a centralized forward capacity market
- Miscellaneous market design enhancements to better enable demand-side resources to participate, and to achieve efficient pricing during scarcity and non-scarcity conditions

2012 Resource Adequacy Actions Completed

- Online Non-Spin standing deployment & offer floor
- Offline Non-Spin offer floor
- Responsive Reserve & Regulation Up offer floor
- Institutionalized the process to recall mothball units for capacity
- Pricing of energy for Reliability Unit Commitment (RUC) units deployed for capacity at System Wide Offer Cap
- Expansion of Responsive Reserve with a corresponding reduction in Non-Spin
- Coordination of Load Management initiatives
- EILS service expanded to Emergency Response Service (ERS)
- Brattle Group Study
- Posting non-binding near real-time forward prices
- ERS 30-min Demand Response pilot
- System Wide Offer Cap raised to $4500 (effective Aug 1, 2012)

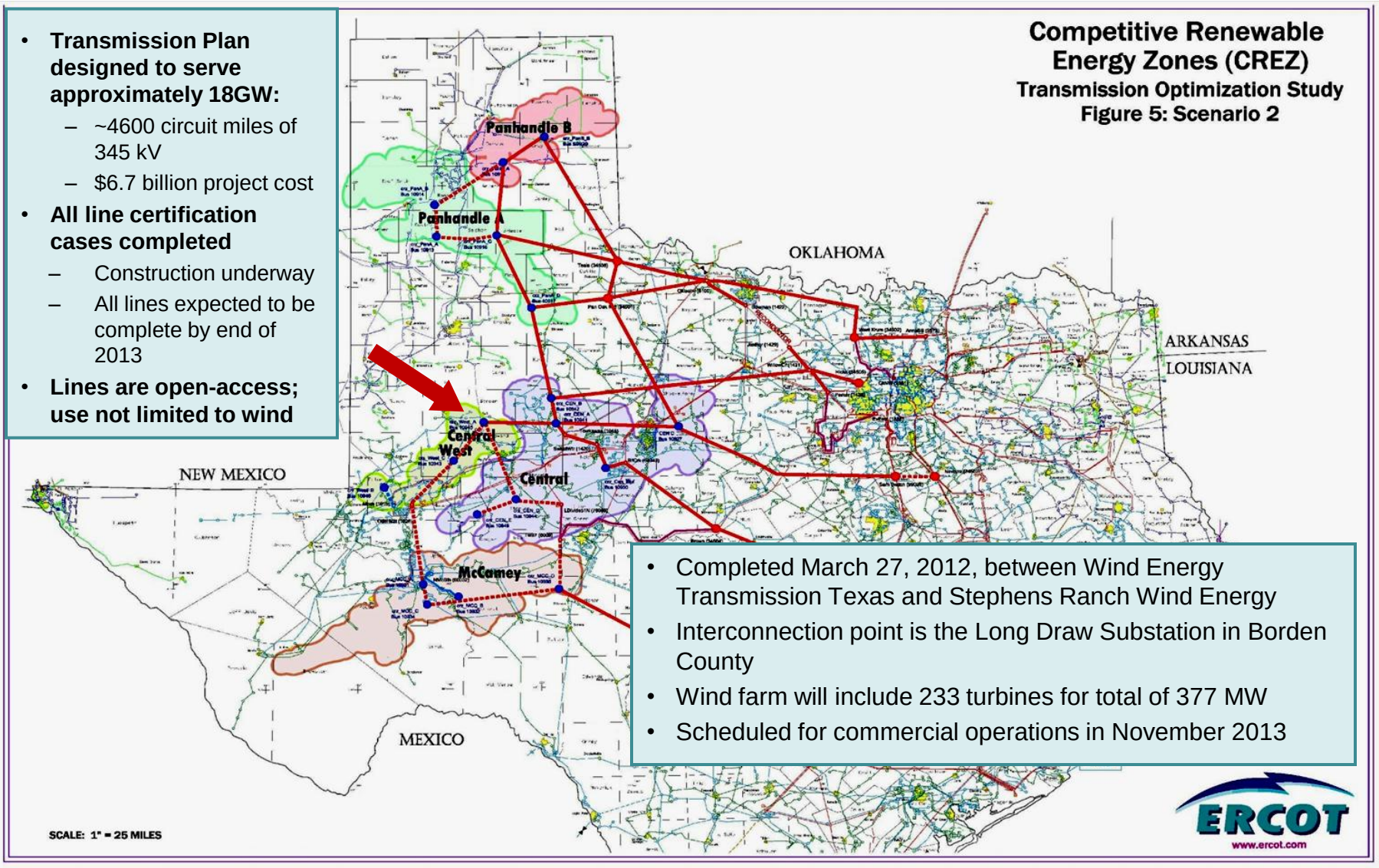
Wind Growth

WIND GENERATION – MAY 2012



First Interconnection Agreement for a CREZ Substation

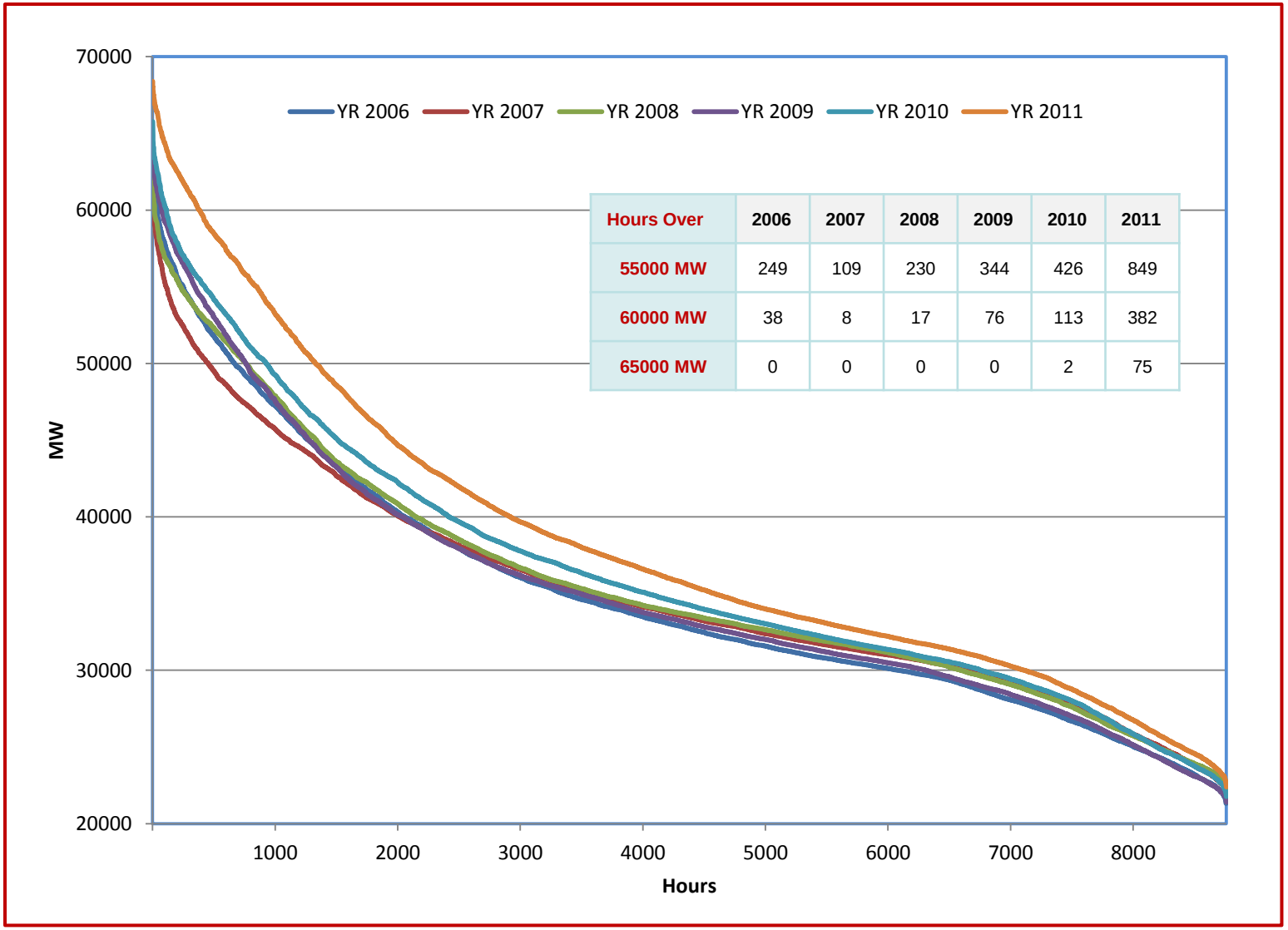
- **Transmission Plan designed to serve approximately 18GW:**
  - ~4600 circuit miles of 345 kV
  - $6.7 billion project cost
- **All line certification cases completed**
  - Construction underway
  - All lines expected to be complete by end of 2013
- **Lines are open-access; use not limited to wind**



- Completed March 27, 2012, between Wind Energy Transmission Texas and Stephens Ranch Wind Energy
- Interconnection point is the Long Draw Substation in Borden County
- Wind farm will include 233 turbines for total of 377 MW
- Scheduled for commercial operations in November 2013

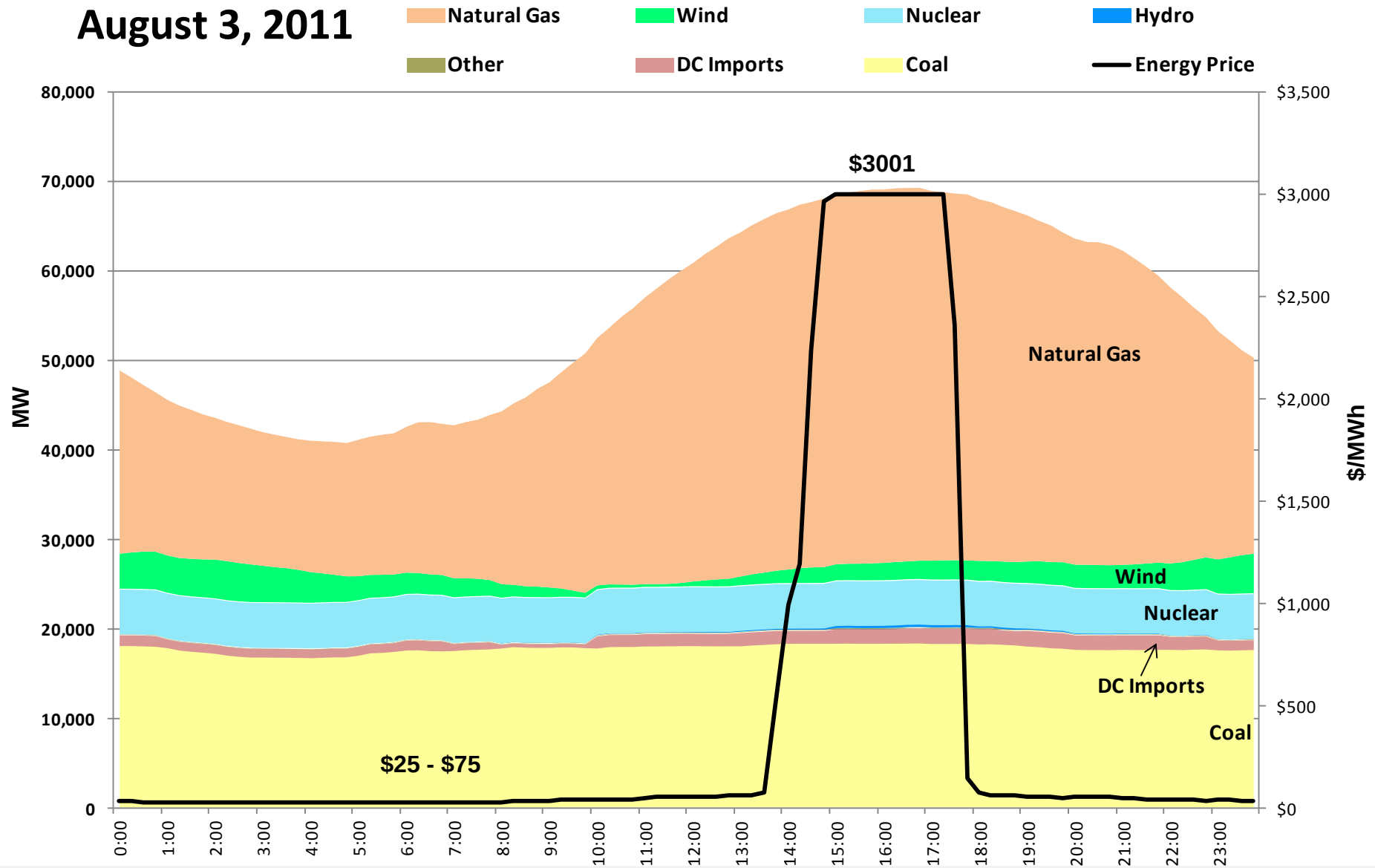
Demand Response

LOAD DURATION CURVES – 2006 TO 2011

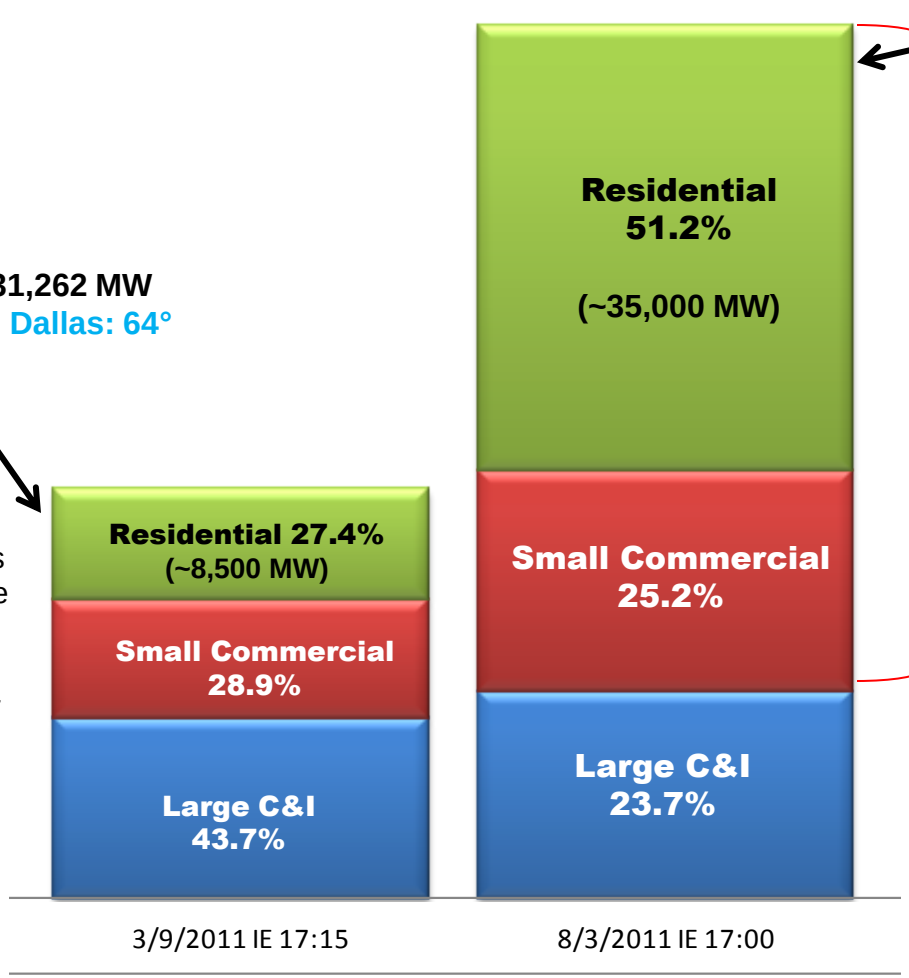


Hours Over	2006	2007	2008	2009	2010	2011
55000 MW	249	109	230	344	426	849
60000 MW	38	8	17	76	113	382
65000 MW	0	0	0	0	2	75

SUMMER PEAK DAY LOAD SHAPE WITH FUEL MIX



On-peak DR Potential by Customer Type



Wednesday
March 9, 2011
5:15 PM
ERCOT Load: 31,262 MW
Temperature in Dallas: 64°

- Based on customer class breakdown in competitive choice areas and extrapolated to ERCOT
- Large C&I are IDR Meter Required (>700kW)

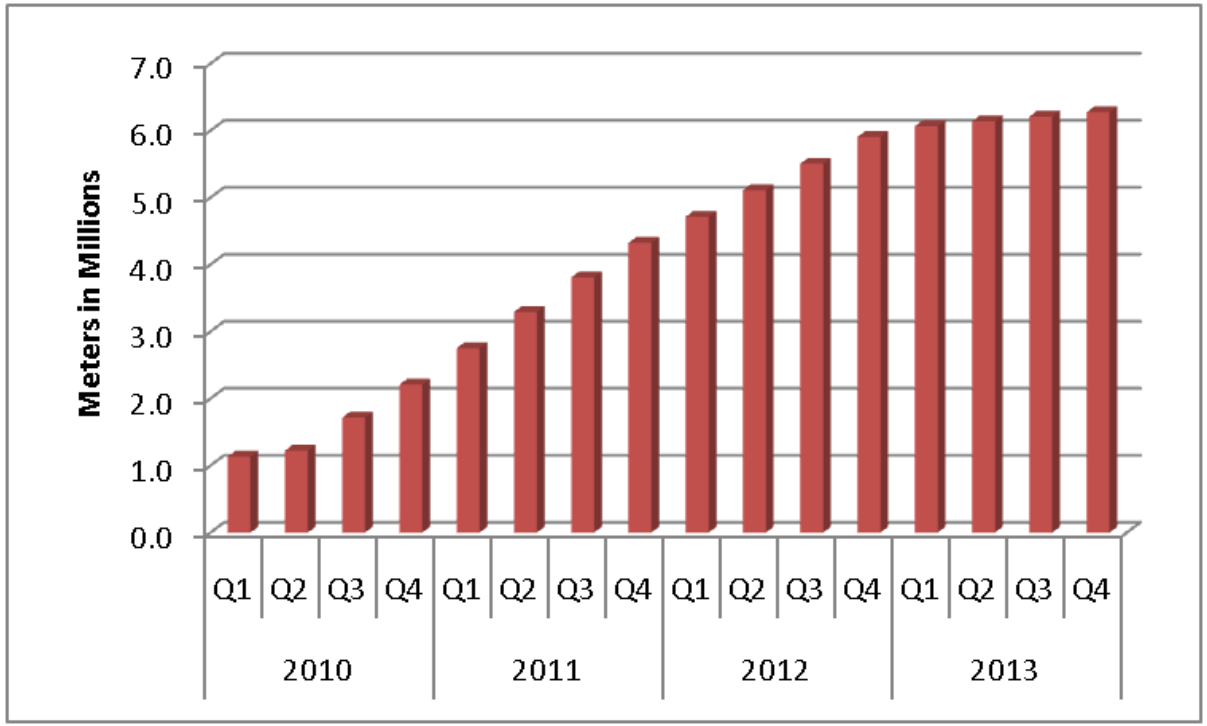
Wed., Aug. 3, 2011
5:00 PM
ERCOT Load: 68,416 MW
Temperature in Dallas: 109°

Currently cannot qualify as Load Resources

- ERCOT staff is working on ALR enablement with market participants in both NOIE and competitive choice areas

TODAY WE'RE SETTLING OVER 5.3 MILLION ADVANCED METERS

Advanced Meter Deployment Plan



June 2012
83.2% of the ERCOT Competitive Load settled with 15-min interval data (AMS and IDR)

Advanced meters give customers the data they need to make educated decisions about their electricity usage

Potential for ALR (Aggregated Load Resource)

ALR

A collection of devices and/or premises capable of delivering demand response based on ERCOT market rules

Load Management/ Measurement Devices

C&I:

- HVAC
- Lighting
- Refrigerators
- Pumps
- Other…

Residential:

- Thermostats
- Pool pumps
- Water heaters
- PEVs
- Etc.…

Premises:

C&I:

- Pumping stations
- Retail chains
- Warehouses
- Office buildings
- Light industrials
- Other….

Residential:

- Homes
- Apartment buildings
- Etc.

QSE

- Financial counterparty with ERCOT
- Maintains telemetry from ALR to ERCOT
- Receives dispatch instructions and sends to ALR to provide demand response

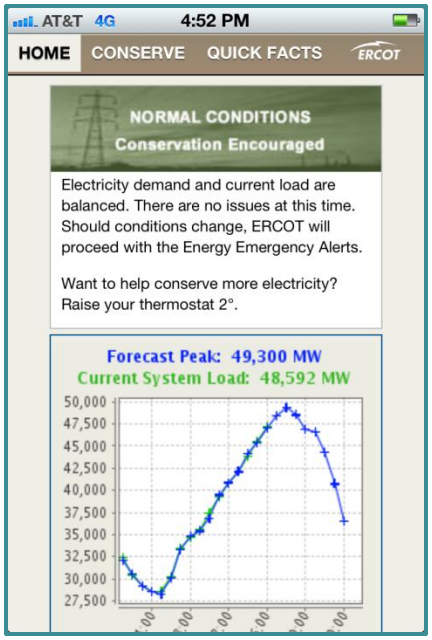
ISO

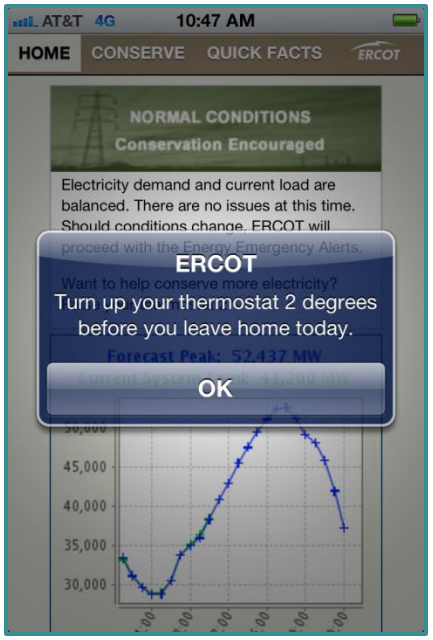
- Procures Ancillary Services in the Day-Ahead Market
- Monitors grid conditions in real time
- Dispatches Ancillary Services according to needs
- Measures and verifies performance of DR resources

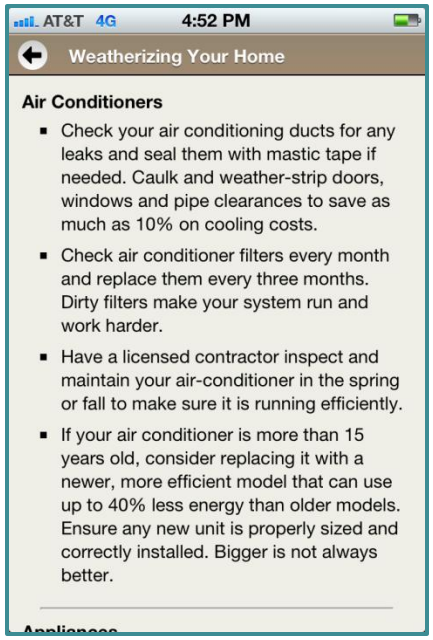
Small Customer ALR Hurdles

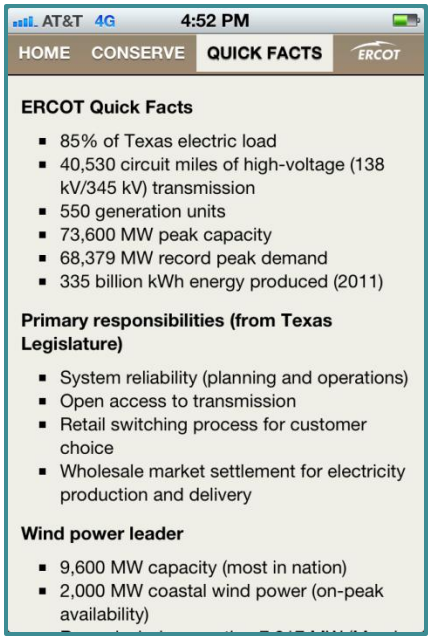
- **Network modeling**
  - LRs currently must tie to a single point on the system
  - Challenge for aggregations, especially with multiple REPs
- **Telemetry**
  - Full-time telemetry from each member of the aggregation is cost-prohibitive
- **Registration (managing population churn)**
- **Measurement & Verification**
  - Real-time M&V from telemetry data should be validated against after-the-fact 15-minute settlement data
- **Automated response & primary frequency response**
  - To qualify as a Controllable Load Resource (CLR), an ALR must provide the equivalent of governor response and must auto-respond to electronic signals from ERCOT

OUTREACH: ERCOT MOBILE APP GIVES REAL TIME GRID UPDATES









ERCOT Mobile App

- iPhone and Android Phone users
- Pop up notifications
- Applications for first release
  - Conservation Spotlight
  - Load Forecast versus Actual graph
  - ERCOT Conservation Tips
  - ERCOT Quick Facts
- Over 7900 downloads