ERCOT OVERVIEW

TEXAS WATER CONSERVATION ASSOCIATION
MARCH 9, 2012

Trip Doggett
President & CEO
ERCOT

CONTENTS

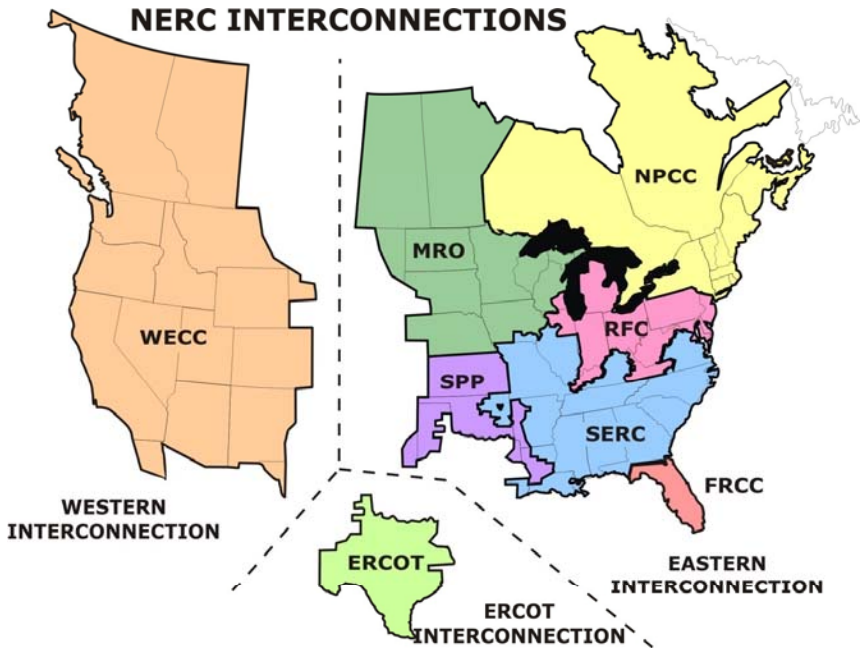
- **What is ERCOT?**
  - ERCOT as a North American Electric Reliability Corporation (NERC) interconnect
  - ERCOT as an Independent System Operator
- **Challenges**
  - Demand Growth
  - Resource Adequacy
  - Drought
- **Options**

ERCOT

The ERCOT Region:

The interconnected electrical system serving most of Texas, with limited external connections

- 75% of Texas land; 85% of Texas load
- More than 40,000 miles of transmission lines
- 550+ generation units
- 68,294 MW peak demand (set August 3, 2011)



ERCOT Inc.:

A non-profit corporation designated the "Independent Organization" under state law and assigned these responsibilities [Texas Public Utility Regulatory Act (PURA) 39.151]:

- Maintaining System Reliability
- Ensuring Open Access to Transmission
- Facilitating the Competitive Wholesale Market
- Facilitating the Competitive Retail Market

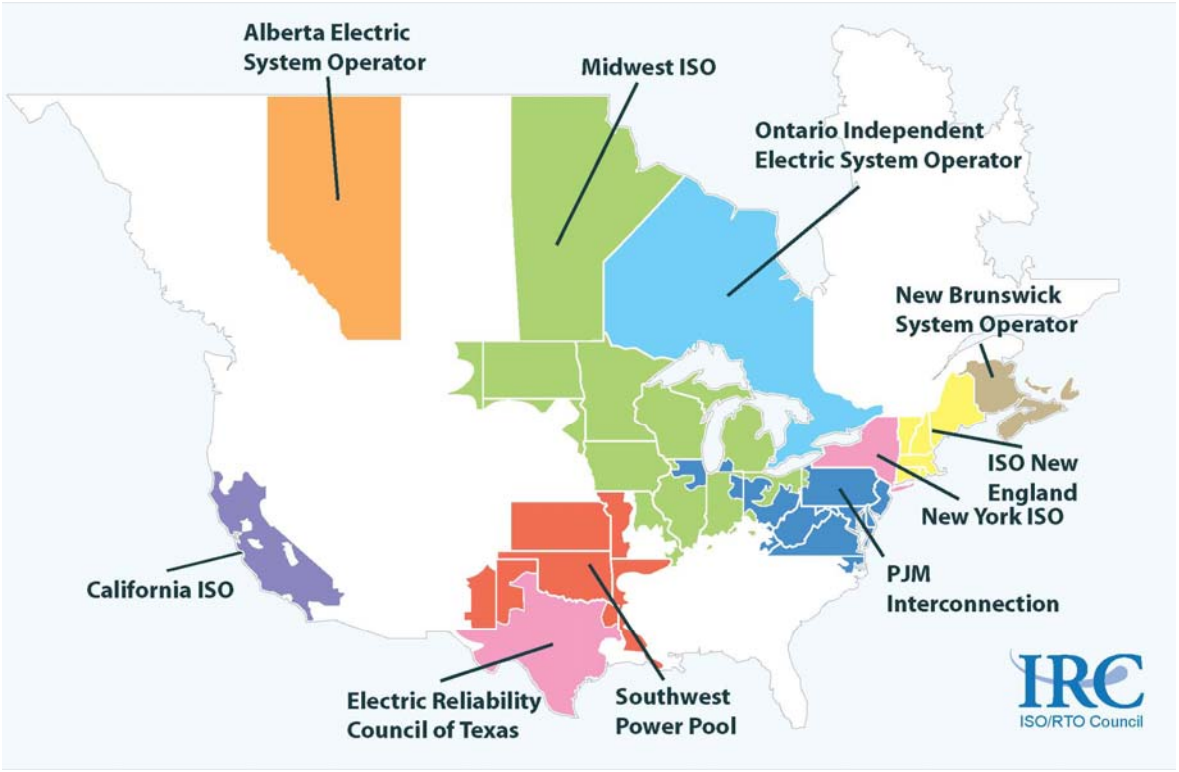
Regulatory Characteristics:

- ERCOT is regulated by the Texas Public Utility Commission with oversight by the Texas Legislature
- ERCOT is not a market participant and does not own generation or transmission/distribution wires

ERCOT AS INDEPENDENT SYSTEM OPERATOR

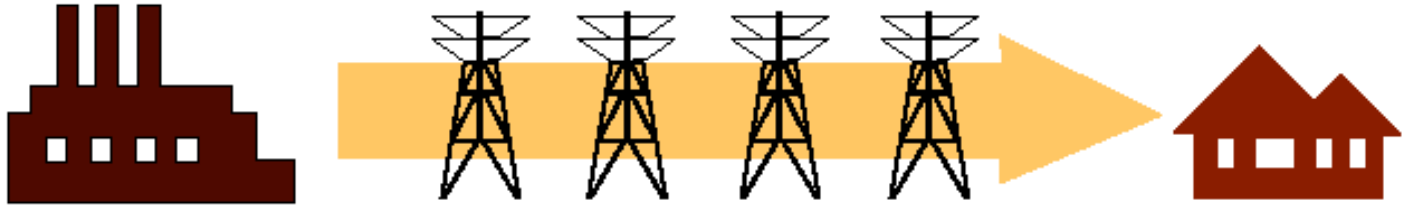
❖ ERCOT IS ONE OF 10 NORTH AMERICAN ISOs/RTOs

- **ISOs/RTOs serve 67% of U.S. population**
- **Goal: Reliability, Efficiency, Transparency & Impartiality**



PRE-2002

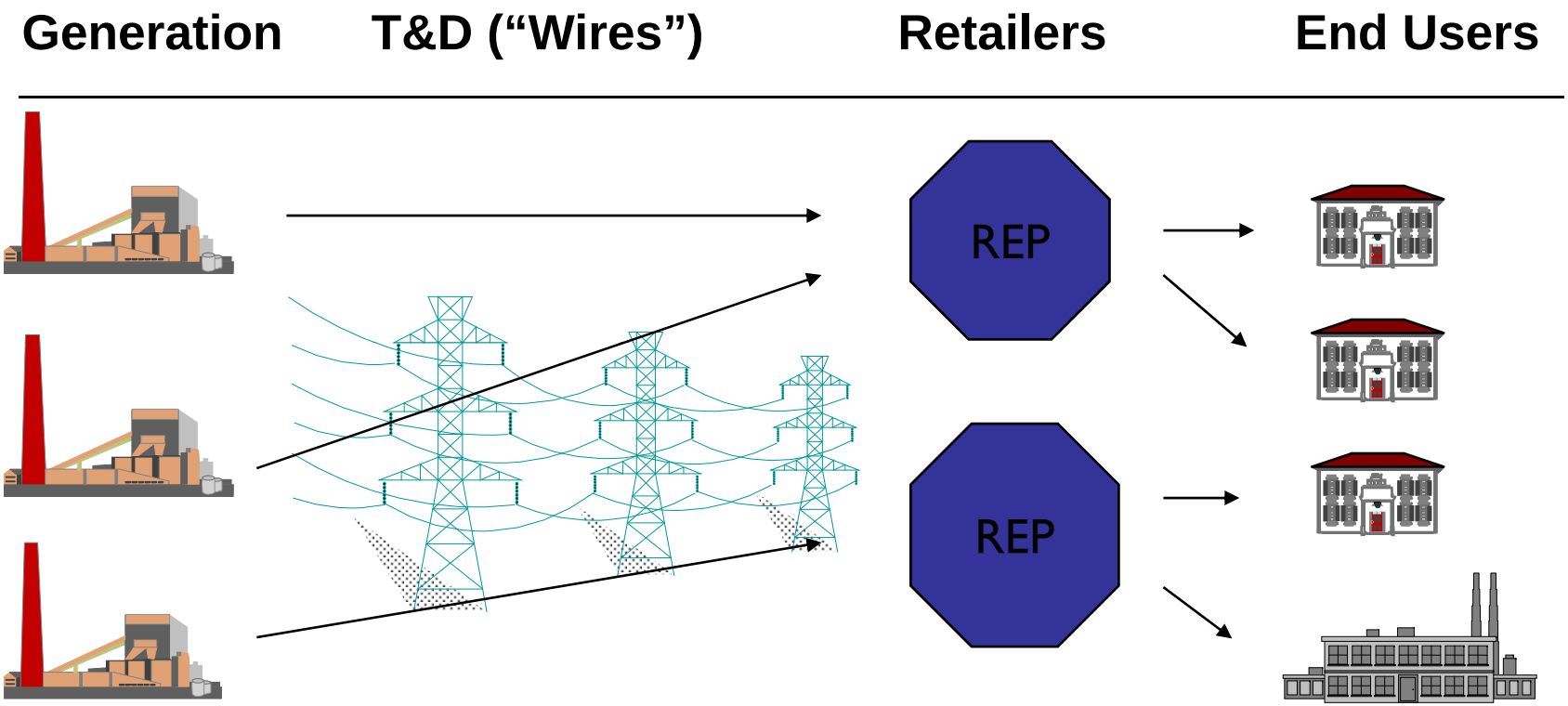
Every utility was vertically integrated, from generation to customer service.



Integrated electric utility

Customer

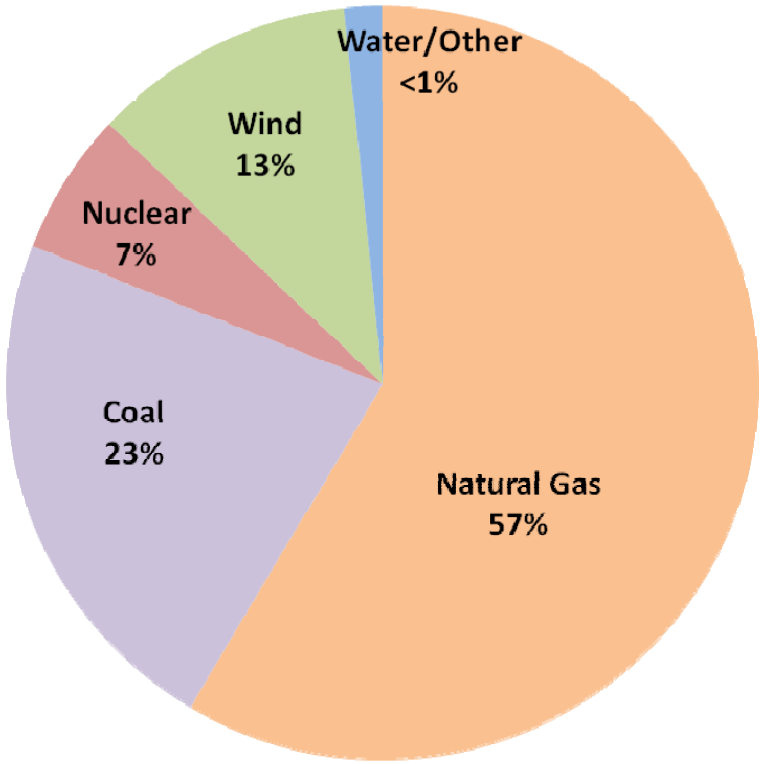
TEXAS COMPETITIVE MODEL



ELECTRIC GRID OPERATIONS

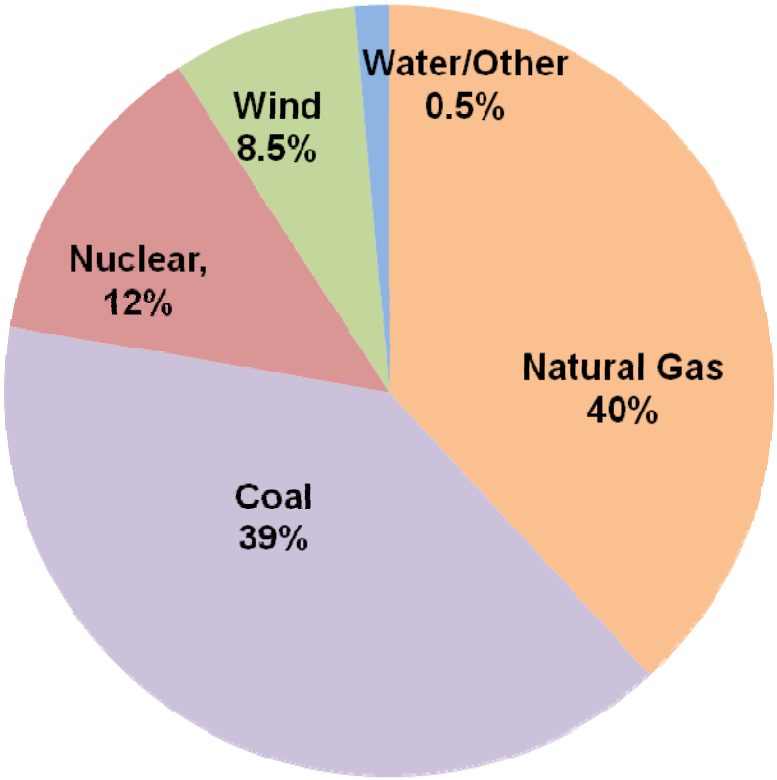
- **ERCOT 'directs traffic' on the grid to maintain reliability and ensure supply of electricity:**
  - Coordinates scheduling of power by market participants
  - Analyzes grid conditions continuously in real-time
  - Dispatches generation to ensure power production matches load at all times
  - Secures available generation capacity to meet reliability requirements including contingencies
  - Coordinates planned outages of generators and transmission lines
  - Relieves transmission system congestion
  - Coordinates emergency actions & recovery
  - Operates markets to meet regional energy & capacity requirements not met through bilateral arrangements

ERCOT Capacity and Energy by Fuel Type



Installed Capacity, January 2012

~ 80,000 MW



Energy Produced, 2011

335 billion kilowatt-hours

CHALLENGES

NEW RECORDS IN USAGE

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

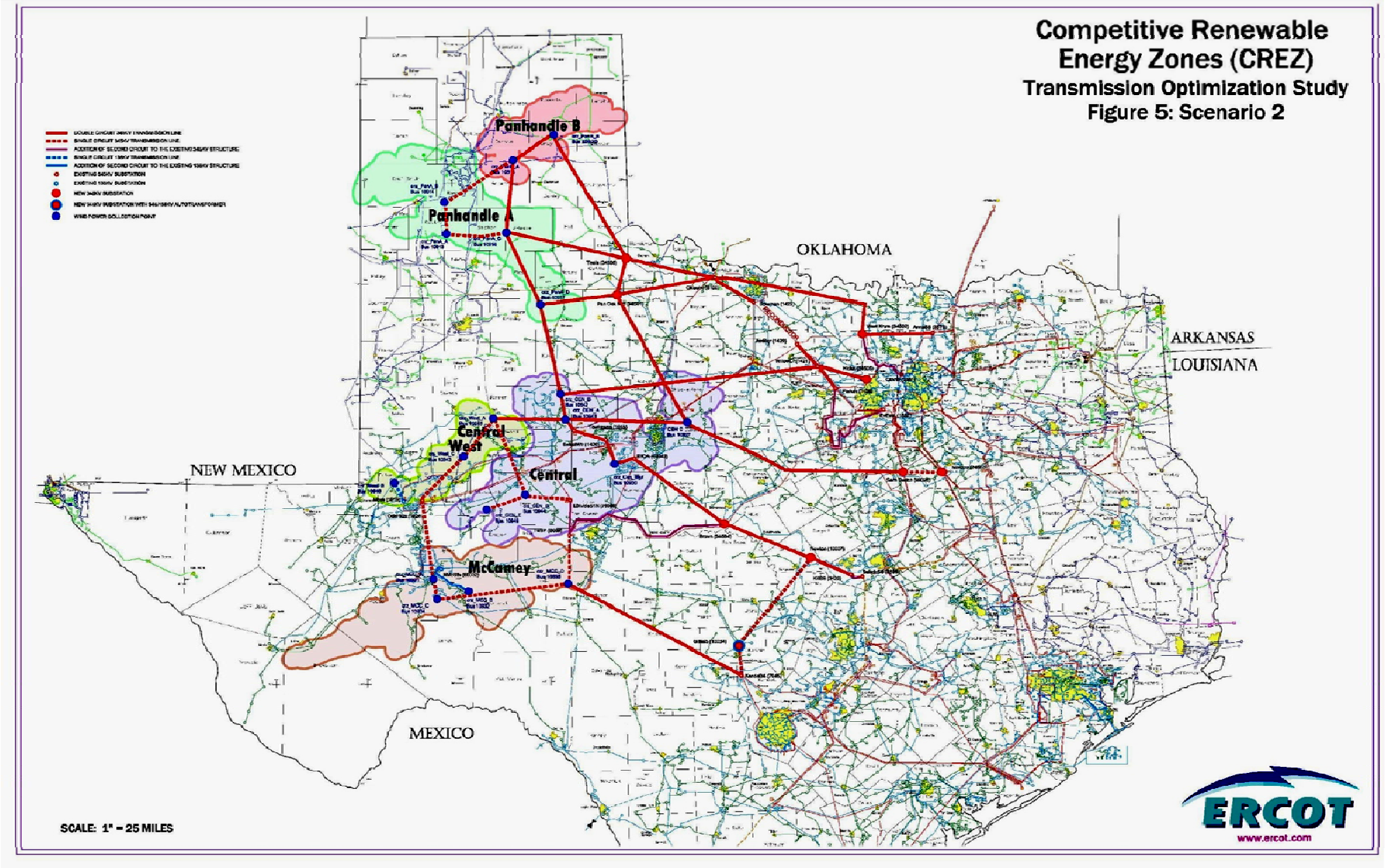
Winter Peak Record

- 57,282 MW (February 10, 2011)
  - 3 percent increase over 2010 previous record - 55,878 MW

Wind Record

- A new instantaneous wind record of 7,599 MW occurred on March 7 at 20:41.

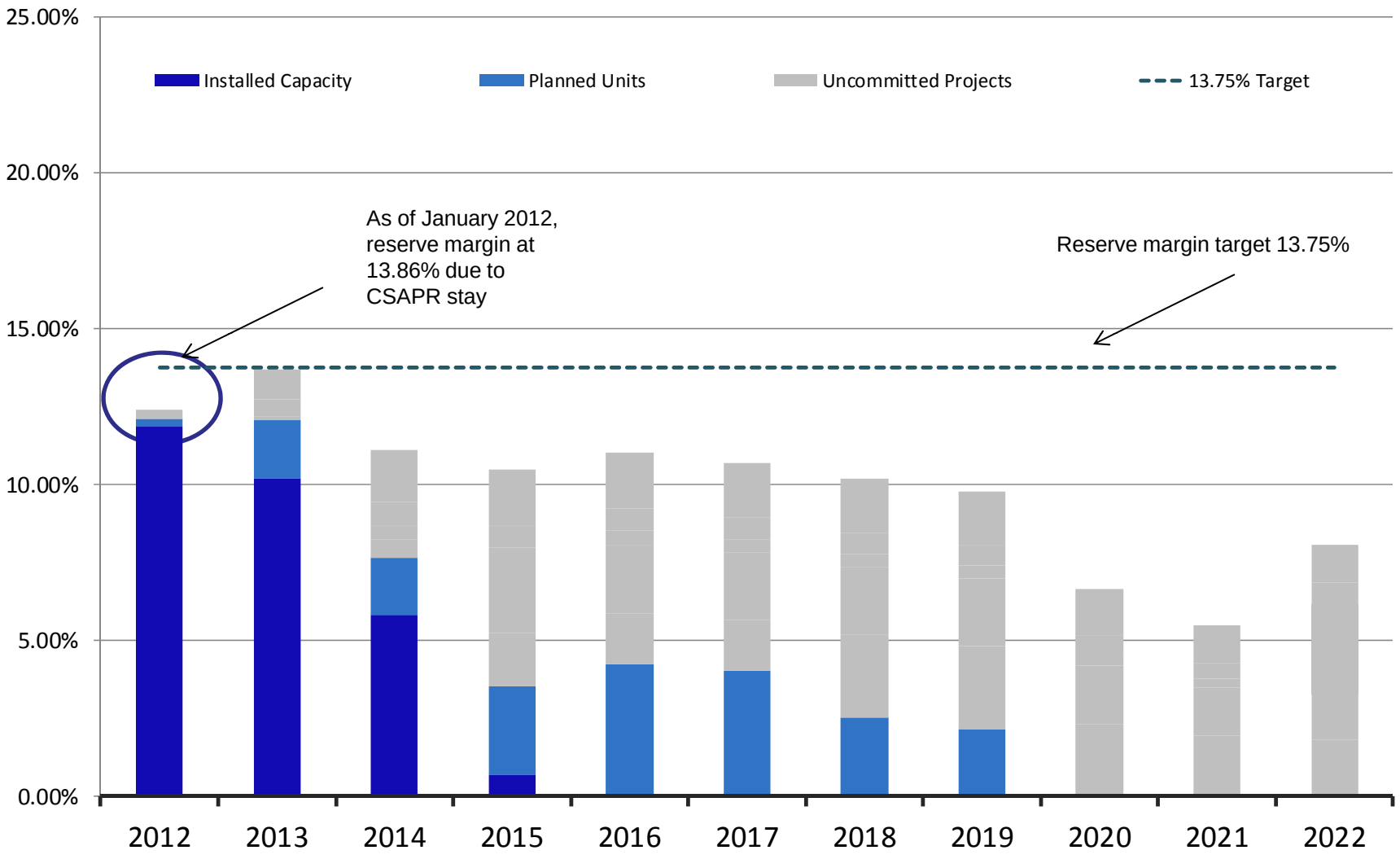
CREZ


Competitive Renewable Energy Zones (CREZ)
Transmission Optimization Study
Figure 5: Scenario 2
Panhandle B
Panhandle A
OKLAHOMA
ARKANSAS
LOUISIANA
Central West
Central
McCamey
NEW MEXICO
MEXICO
SCALE: 1" = 25 MILES
ERCOT
www.ercot.com

RESERVE MARGINS: PROJECTING ADEQUACY OF SUPPLY

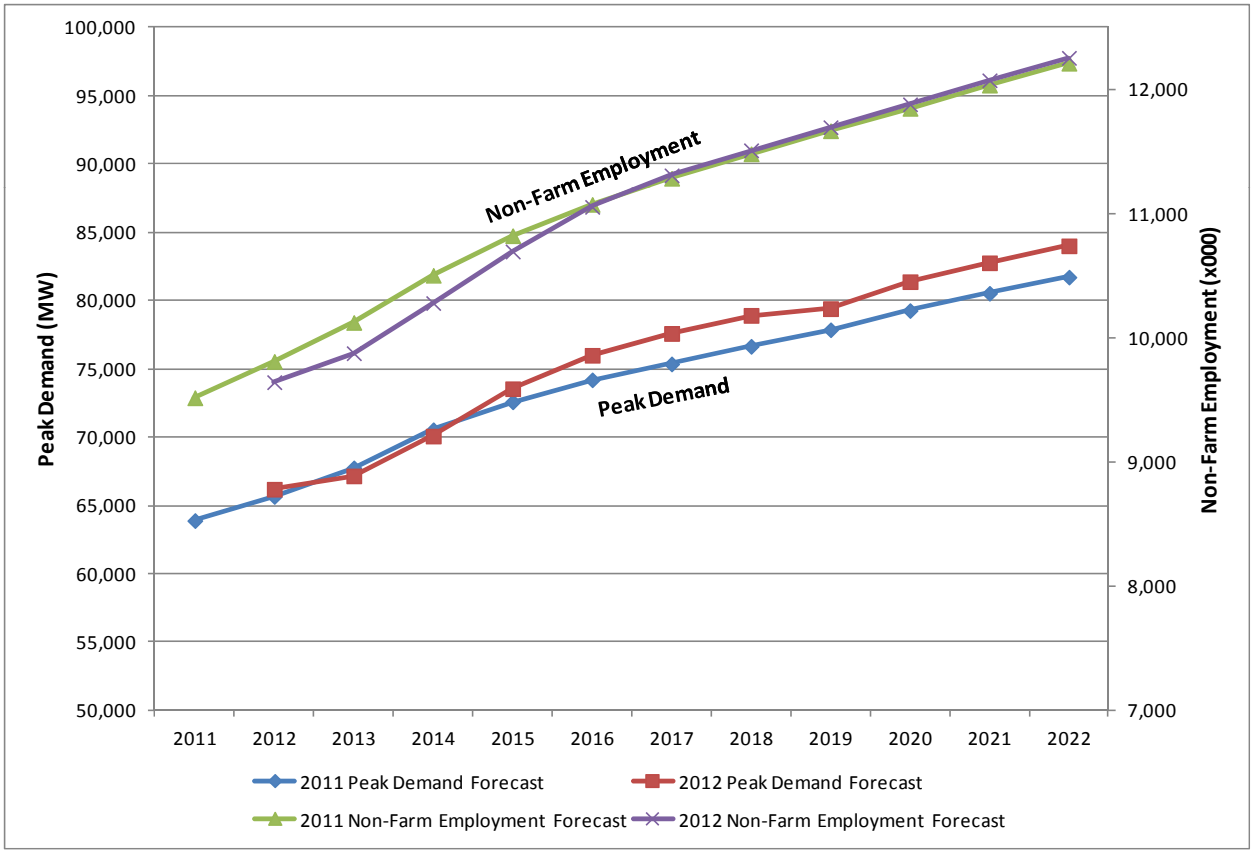
- **Target reserve margin for the ERCOT Region is 13.75%**
- **Defined as:**
  - Percentage difference between available generating capacity and forecasted peak system load
- **Ensures (but does not guarantee) adequate electric supply will be available in case of contingency need**
  - Unexpected weather extremes or loss of major generation units
- **Available capacity includes:**
  - Gas, coal and nuclear fuel units accounted at their season operating limit level (unless scheduled to retire or mothball)
  - Hydro plants and wind farms at their "high confidence summer peak" level
  - Planned units (with signed transmission interconnection agreements and required permits)
  - Loads Acting as Resources - Large customers registered and bidding to provide capacity services in market-based load participation programs
  - DC Ties - capacity that can be imported through DC links from neighboring grids

DECEMBER 2011 CAPACITY, DEMAND AND RESERVES (CDR) REPORT

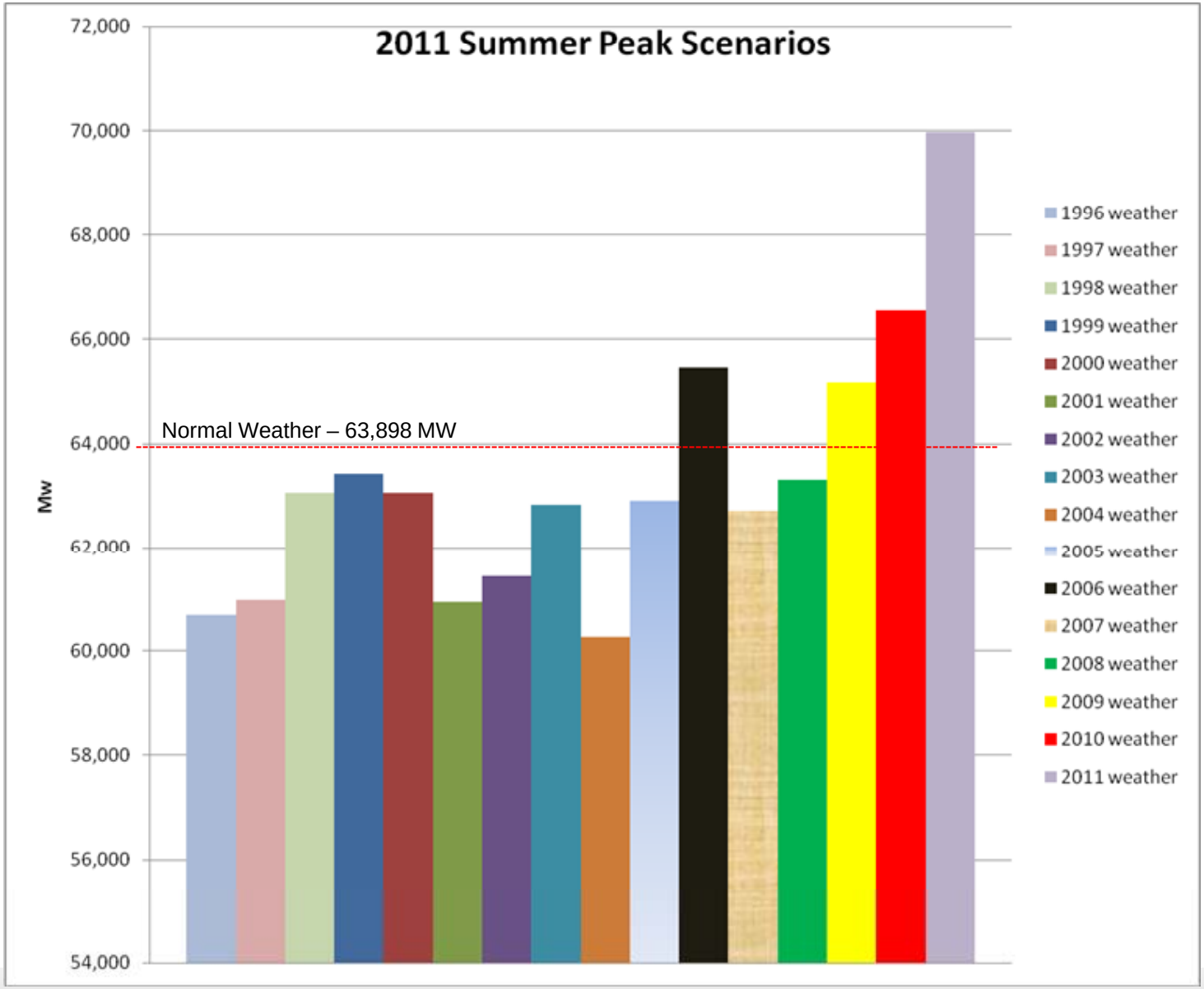


2012 CDR – LOAD FORECAST

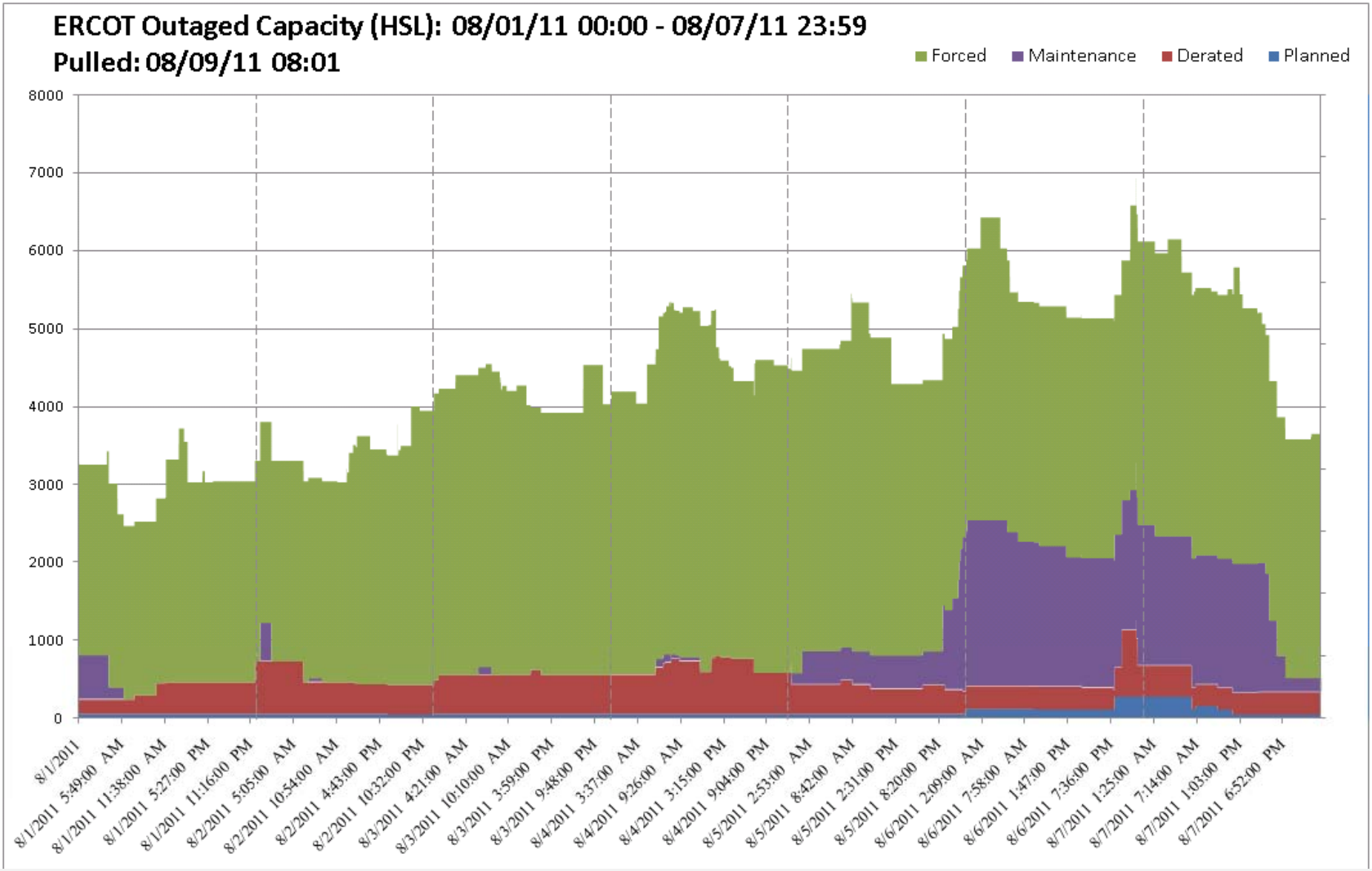
- **Updated economic forecast from Moody's**
  - Slower growth in near-term
- **Updated assessment of normal weather profile**



SUMMER PEAK SCENARIOS



GENERATION OUTAGES: 08/01 – 08/07



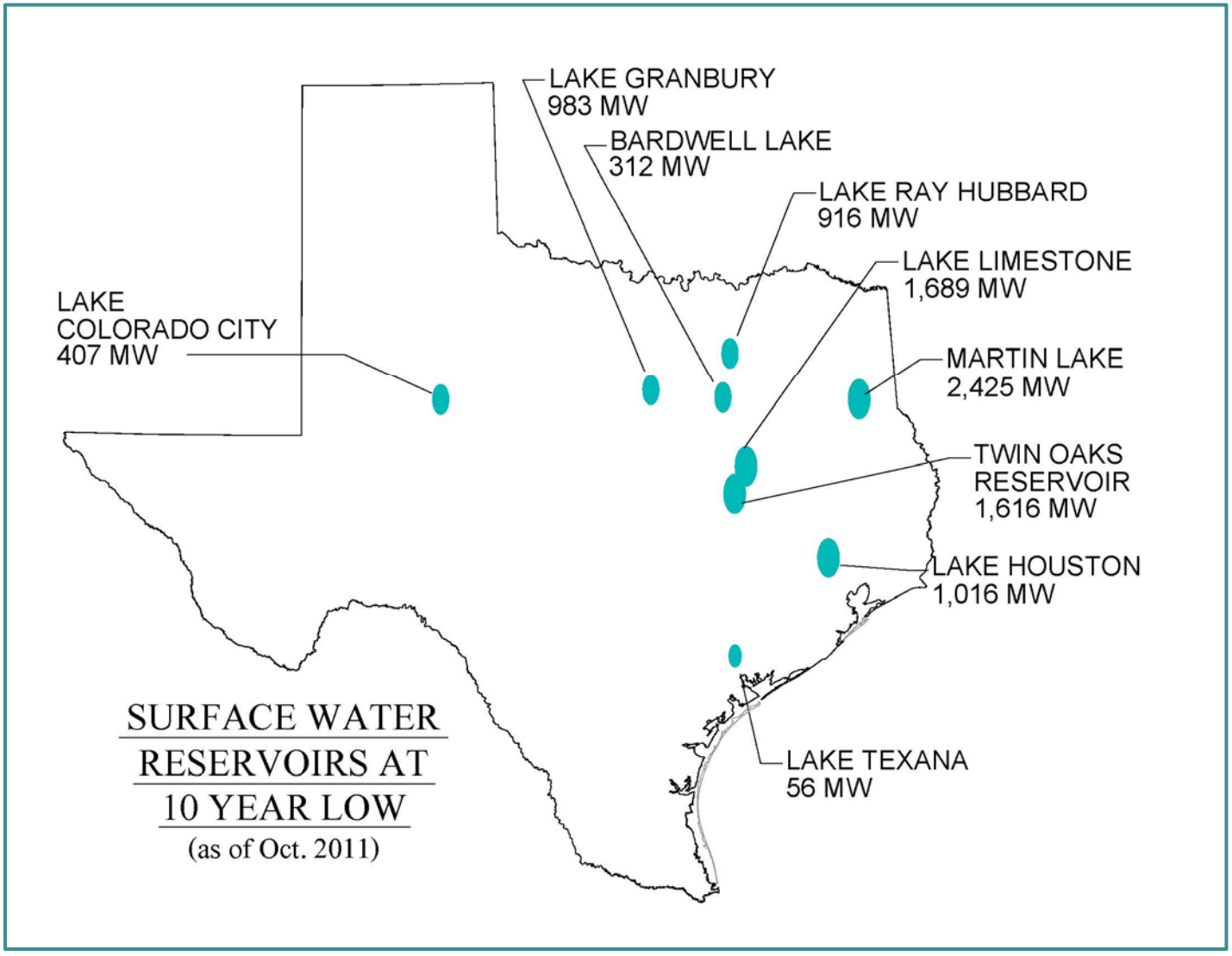
Drought

THE 2011 TEXAS DROUGHT

Excerpts from Oct 2011 Report by Office of State Climatologist:

- Large portion of Texas will likely endure a second summer of drought.
- 2011-12 La Niña is forecasted to be less intense than 2010-11.
- It is impossible to determine at this point whether the drought will last beyond a second year.
  - On rare occasions in the past, La Niña conditions were observed for 3 consecutive years.
- Texas precipitation is also influenced by Pacific Decadal Oscillation & Atlantic Multidecadal Oscillation.
  - During the past decade, both patterns have been in an unfavorable state.
- Global patterns tend to reverse themselves over time, possibly leading to an extended period of wetter weather for Texas, though this may not happen for another 3-15 years.

SURFACE WATER SUPPLIES AT 10 YEAR LOWS (OCT 2011)



ERCOT Actions to Manage Drought Impact

- Surveyed generation entities in the state and reviewed drought concerns and possible mitigations
- Identified surface water most impacted and projected impacts to generation for 2012
- Reviewed public sources regarding state and regional water plans
- Met with TCEQ staff and drought response teams
- Facilitated a workshop with generation and transmission entities to share best practices relevant to drought conditions

MANAGING DROUGHT IMPACT – GENERATION SECTOR ACTIONS INCLUDE …

- Generators are designed to
  - Conserve – minimize water usage
  - Reuse – Reuse water from one process for another
  - Recycle – Return clean water to the source after usage
- Generators regularly account for all water withdrawn to regulatory authorities
- Many generators utilize salt water or effluent, where practical
- Generators regularly maintain equipment to avoid water leakage/wastage
- A couple of generators have installed pipelines to access accumulated (from rain & seepage) water at mine sites
- Some generator resources are re-engineering their water intake structures to allow for deeper intake level conditions

MANAGING DROUGHT IMPACT – TRANSMISSION SECTOR CONCERNS INCLUDE …

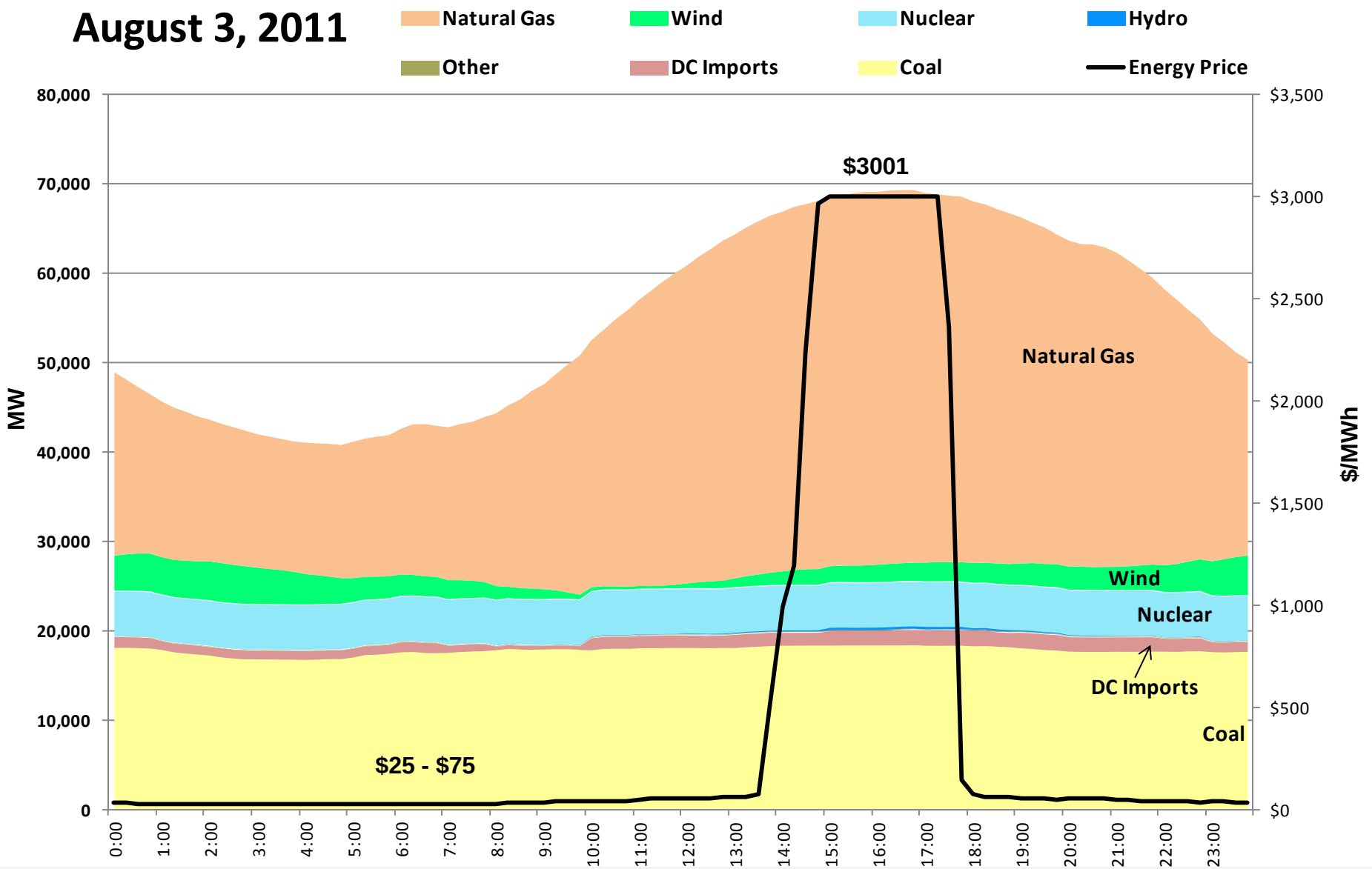
- Increased insulator contamination incidents (salt, smoke, bird excrement, etc.)
- Fires, smoke implications, vegetation management, and risks to wooden h-frame infrastructure
- Potential issues associated with transmission system planning if there are significant generator de-rations
- Coordination with the local authorities (police, fire, etc.) requesting de-energizing of transmission facilities for safety to allow for aerial firefighting.

DROUGHT CONCLUSIONS

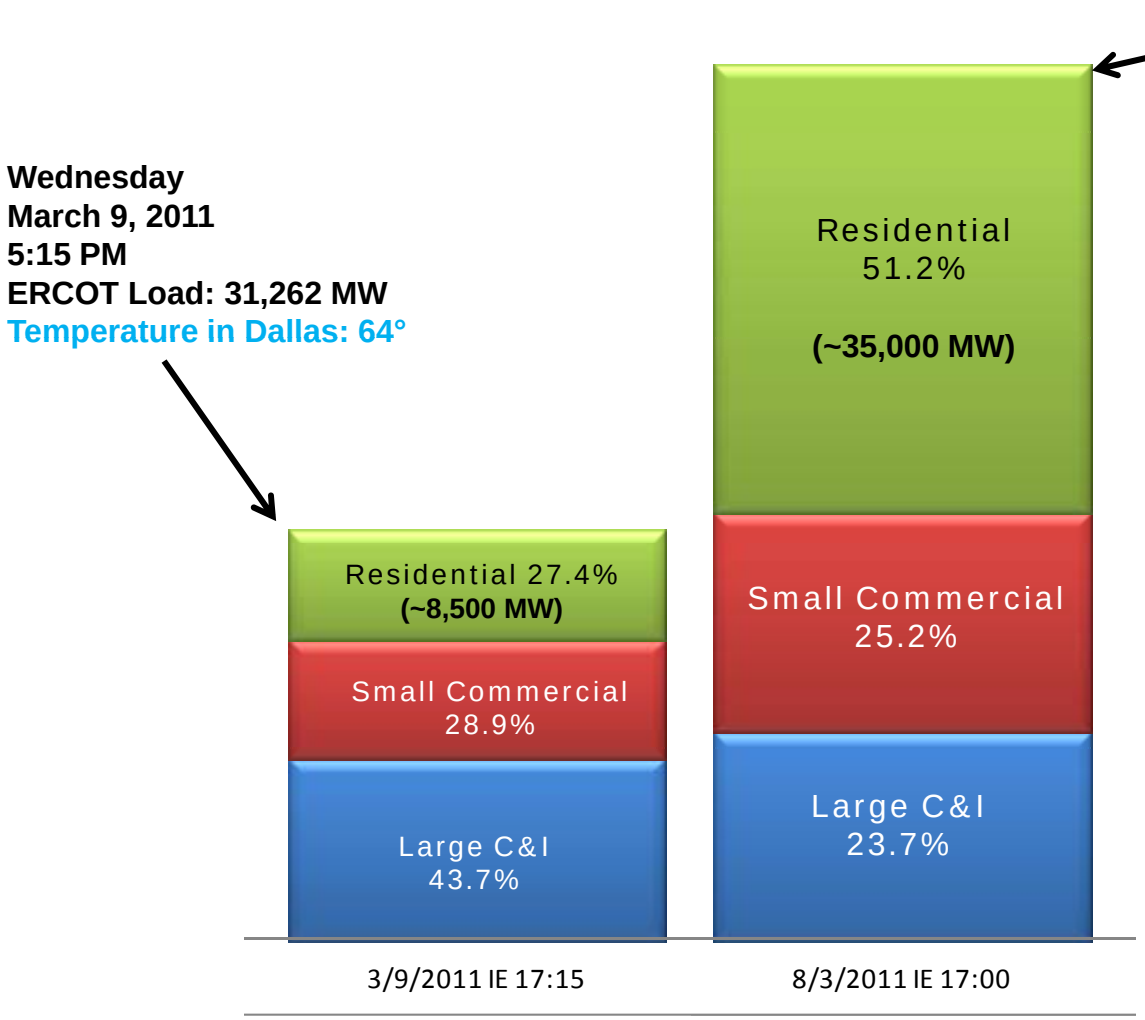
- Persistent drought conditions are impacting electric generation resources, but are unlikely to cause significant generation shortfalls in 2012
- If the drought continues into 2013, consequences to electric generation availability are likely to become more severe
- ERCOT will continue to analyze survey results and will continue to keep regulatory authorities well-informed

Options for Handing these Challenges

SUMMER PEAK DAY LOAD SHAPE WITH FUEL MIX



OFF-PEAK VS. ON-PEAK LOAD BY CUSTOMER TYPE



- Customer class breakdown is for competitive choice areas; percentages are extrapolated for munis and co-ops to achieve region-wide estimate
- Large C&I are IDR Meter Required (>700kW)

EMERGENCY RESPONSE SERVICE

- **Emergency Interruptible Load Service is transitioning to ERS**
  - PUC Rule and ERCOT Protocol revisions in process
  - June 1 effective date for new provisions
- **Service provided by electricity customers willing to reduce load or unregistered generators willing to supply energy during grid emergencies in exchange for payment**
- **An additional tool for ERCOT Operations to manage grid reliability, deployed only in declared emergencies (EEA)**
  - Designed to help avoid rotating blackouts
- **ERS Resources may be individual or aggregated loads or unregistered generators**
- **Procured 24/7/365**
  - Not just a peak reduction program
  - Offers may vary by Time Period (different business & non-business hour blocks)

EMERGENCY RESPONSE SERVICE

- **Qualifications/requirements:**
  - Relationship with QSE that can receive Verbal Dispatch Instruction over the ERCOT Hotline
  - 15-minute interval metering
  - Capability reducing load or providing generation – minimum obligation of 100 kW -- within 10 minutes of ERCOT dispatch
- **Payment to EILS Resources is subject to contractual agreement between the QSE and the EILS resource owner**
- **Participants are paid as-bid if procured**
- **Historically, reservation payments have ranged from approximately $6 to $11 per MW per Hour**
- **430 MW under contract during 2011 summer peak hours**
  - For 2012, estimating between 560 and 630 MW for peak

FOLLOW ERCOT

Facebook:
Electric Reliability Council of Texas

Twitter:
http://twitter.com/ercot_iso