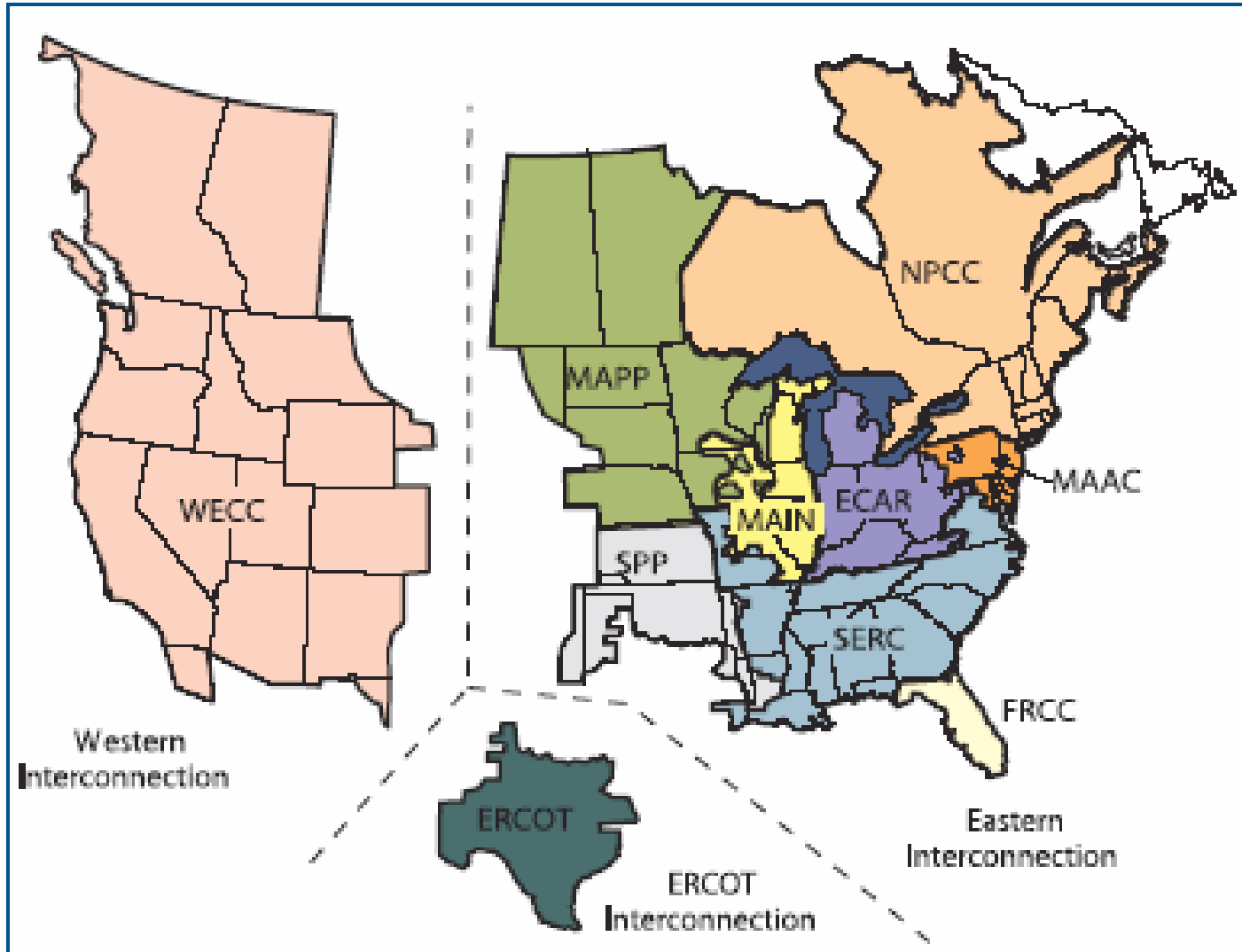


ERCOT Capacity Issues

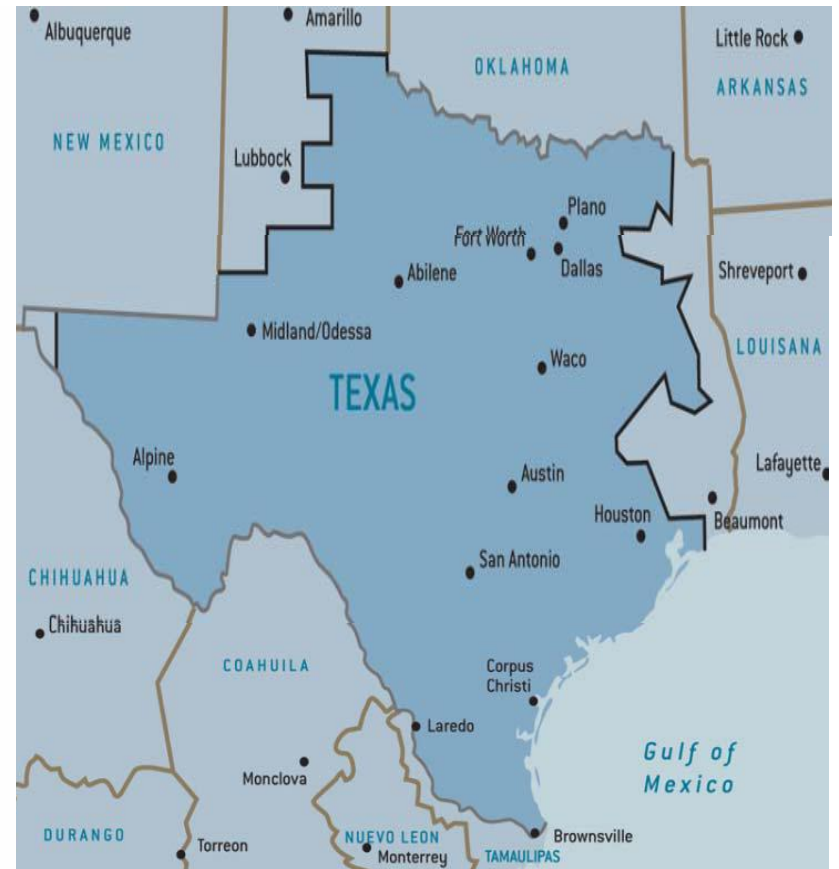
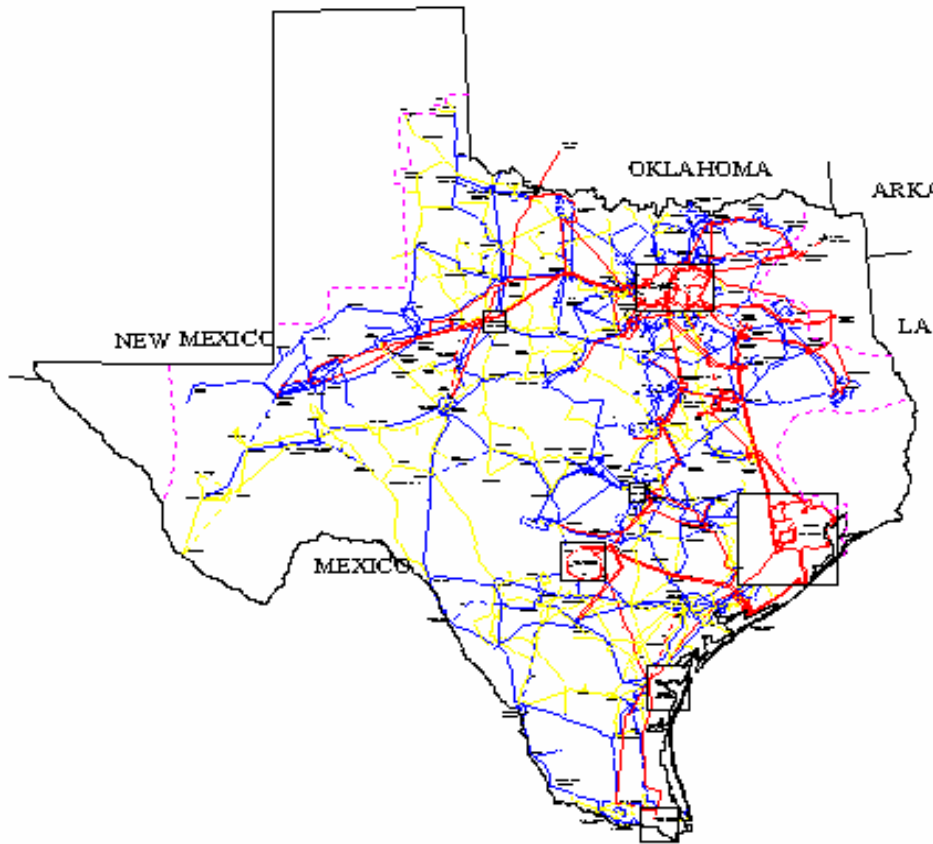
**North Texas Renewable Energy Group
July 14, 2012**

**Ron Seidel
RBS Energy Consulting**

North American Grid



ERCOT System



Facts & Figures

- **200,000 Square Miles**
- **40,500 miles of Transmission (2010)**
- **73,492 MW Peak Capacity**
- **10,035 MW of wind generation**
- **68,294 MW Peak Load (2011)**
- **13.75% Target Reserve Margin**
- **2011 Peak Reserve Margin 7.6%**
- **4 DC Ties, 1100 MW (to Mexico and SPP)**
- **Stand alone system about the size of the UK**

Transition to a Competitive Market

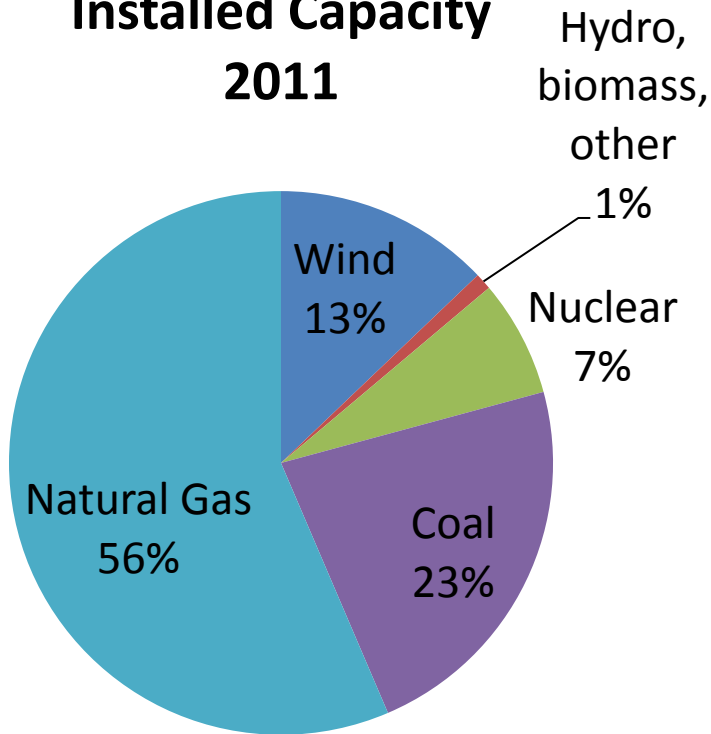
- **Wholesale competition / open access in 1995**
- **Retail competition began in 2002 after approval by the legislature in 1999**
- **Energy only market with no price caps – at least initially**
- **Generation and retail sales deregulated**
- **Transmission and distribution regulated by the PUCT**

ERCOT Responsibilities

- **Responsible to the Public Utilities Commission**
- **Ensure reliability**
- **Ensure open access to transmission and distribution systems**
- **Manage the competitive market**
- **Ensure timely conveyance of information needed to support customer choice –retail switching**
- **Ensure accurate accounting for electricity production and delivery**

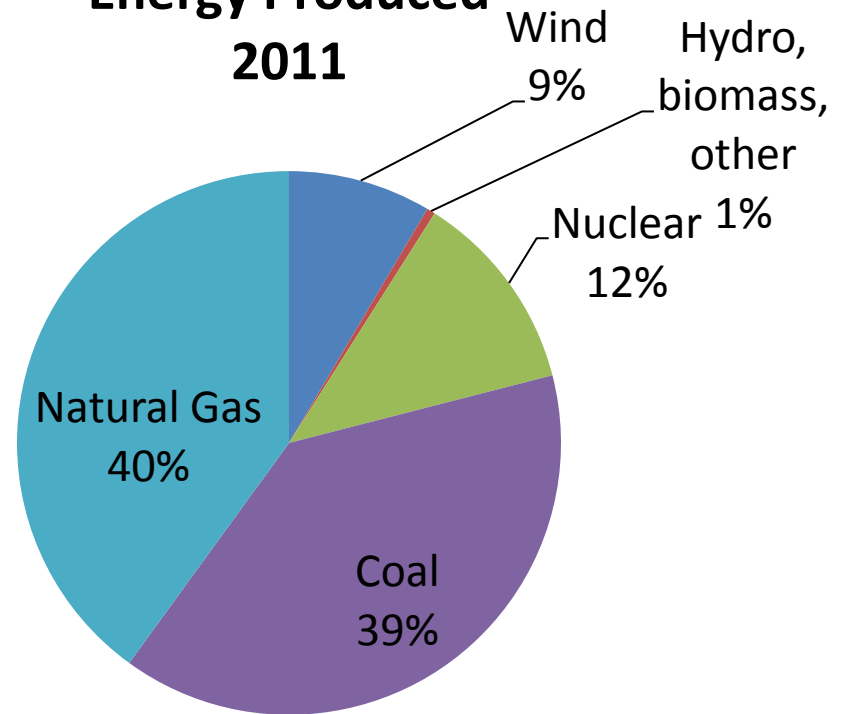
ERCOT Capacity and Energy

**Installed Capacity
2011**



68,251 Megawatts

**Energy Produced
2011**



335,000 Megawatt-hours

Resource Mix

by Capacity - 2010 / 2011

	<u>2010</u>	<u>2011</u>
• Natural gas	57%	56%
– Combined cycle	30%	
• Coal	23%	23%
• Nuclear	6%	7%
• Wind	13%	12%
• Hydro / Other	1%	1%

Note: Wind is assigned a reliability capacity value of 8.7% of rated capacity.

Resource Mix by Energy - 2010 / 2011

	<u>2010</u>	<u>2011</u>
• Natural gas	38%	40%
• Coal	40%	39%
• Nuclear	13%	12%
• Wind	8%	8%
• Hydro / Other	1%	1%

ERCOT Forecast

June 2011

Actual

	<u>2011</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	
Load Forecast (MW)	62286	68294	63880	65790	68381	70231	71628	72576	73638	74612	75771	
Load Growth (MW)			1594	1910	2591	1850	1397	948	1062	974	1159	
Load Growth Rate (%)			2.6%	3.0%	3.9%	2.7%	2.0%	1.3%	1.5%	1.3%	1.6%	2.2%
Resources (MW)	73175	73175	75065	75152	75967	78144	78782	80379	80379	80379	80379	
Resource Growth (MW)			1890	87	815	2177	638	1597	0	0	0	
Reserve Margin (%)	17.5%	7.1%	17.5%	14.2%	11.1%	11.3%	10.0%	10.8%	9.2%	7.7%	6.1%	

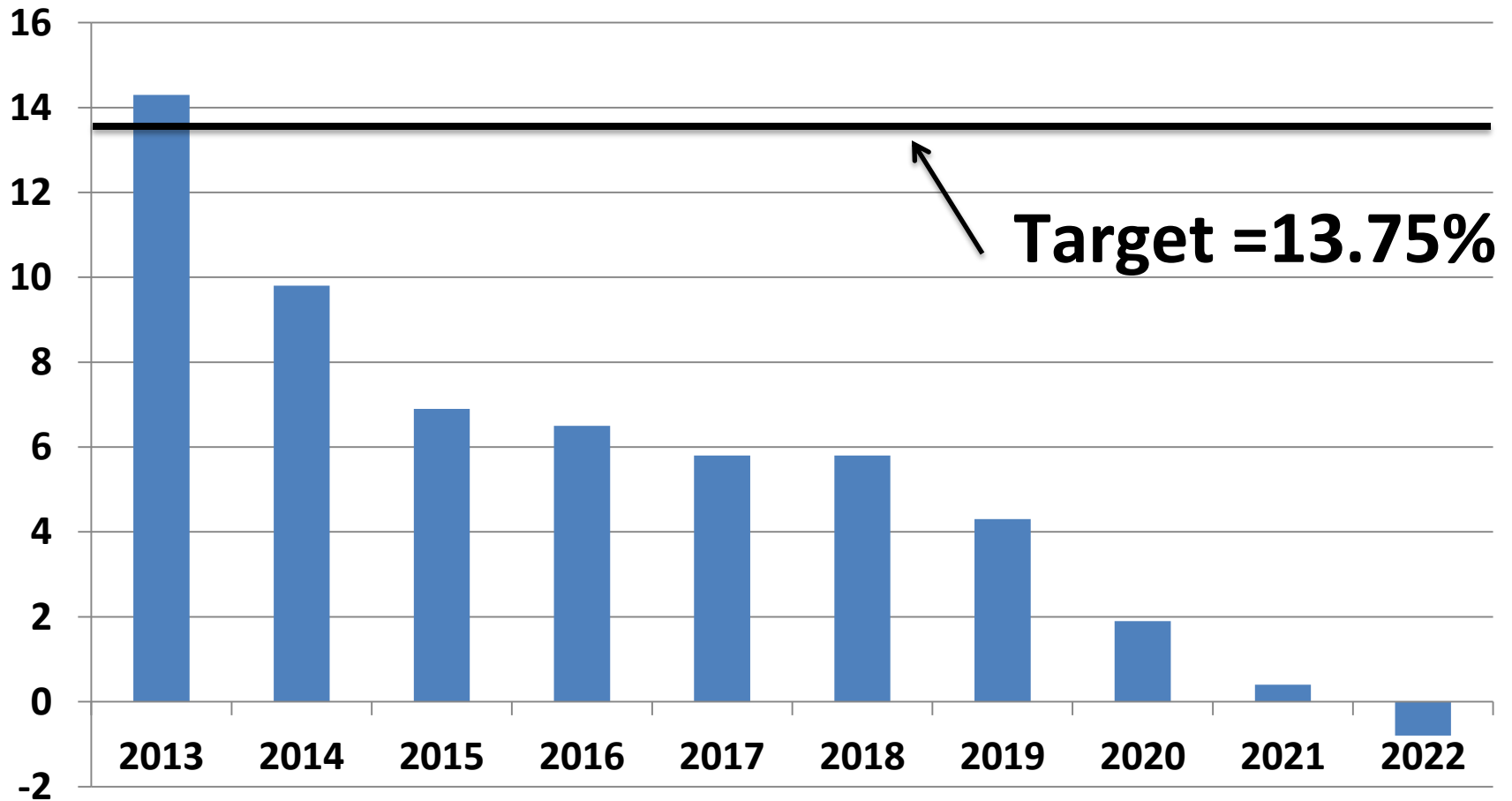
Notes:

1. Total Resources include 8.7% of installed wind capacity
2. New resources during this period include 1845 MW coal, 3505 MW natural gas and 145 MW biomass
3. Does not include potential new wind resources or retirements (old gas)

ERCOT Reserve Margins

May 2012 Report

Percent by year



ERCOT Energy Only Market

Key Features

- **System Wide Offer Cap**

- \$3000/MWh limit per PUCT rule
- Price of energy set at \$3000/MWh when ERCOT is out of competitive energy offers (scarcity)
- Offer Cap reduced to \$500/MWh if Peaker Net Margin reaches an accumulation \$175,000 in a year (has not occurred thus far)

- **Ancillary Services**

- Regulation Reserve (reserves deployed to maintain frequency)
- Responsive Reserve (10 minute reserves)
 - 2300 MW now going to 2800 MW in April
 - Contingency reserves supplied by generation & up to 50% from load resources
- Non-spinning reserves (30 minute reserves)

- **Emergency Interruptible Load Service**

Common Misconceptions About the ERCOT Market

- **The Balancing Energy price is representative of the price for energy**
- **There is no capacity market to incent the building of new capacity**
- **Natural gas is the predominant fuel for producing electricity**

Recent Design Changes

- **Energy**

- Increase System Wide Offer Cap to \$4500 / MWh August 1

- **Ancillary Services**

- Move 500 MW of Non- Spinning Reserve Service to Responsive Reserves

- **Offer floors for Non-Spinning Reserve Resources**

- No less than \$120 for Online Resources available for dispatch
- No less than \$180 for Offline Resources when deployed

- **Offer floors for Responsive Reserve & Reliability Unit Commitment Resources**

- Offer placed at the system wide offer Cap of \$3000

- **Evaluating methods to allow increased load participation**

- Demand response pilot – 150 MW

Additional Measures to Address Resource Adequacy

- **Near Term**

- Bring mothballed generation back into service on a temporary basis (10 units - 1984 MW)
- PUCT Workshops

- **Longer Term**

- PUCT/ERCOT Engaged the Brattle Group to study to recommend long term solutions
- “A capacity market is not an option”

The Brattle Group Report – PUCT Options

- **Energy only with market-based reserve margin**
- **Energy only with adders to support a target reserve margin**
- **Energy only with backstop procurement at minimum acceptable reliability**
- **Mandatory resource adequacy requirement for load serving entities**
- **Resource adequacy requirement with a centralized forward capacity market**

The Brattle Group Report for The Solar Energy Industries Association (SEIA)

Electricity Cost and Emissions Savings with the addition of various amounts of solar PV in 2011

Solar PV	CO2 Avoided	Energy Cost Benefit
<u>MW</u>	<u>(tons)</u>	<u>(\$)</u>
1000	323,000	167,900,000
2500	811,000	348,400,000
5000	1,612,000	520,300,000

Where Do We Go From Here?

- **PUCT Workshops / Deliberations / Rulemakings**
- **No real issue until 2014 with mothballed units in service and with normal summers**
- **2013 Legislature likely to address the resource adequacy issue**
- **My opinion: A capacity market in some form is inevitable – an energy market will require patience**