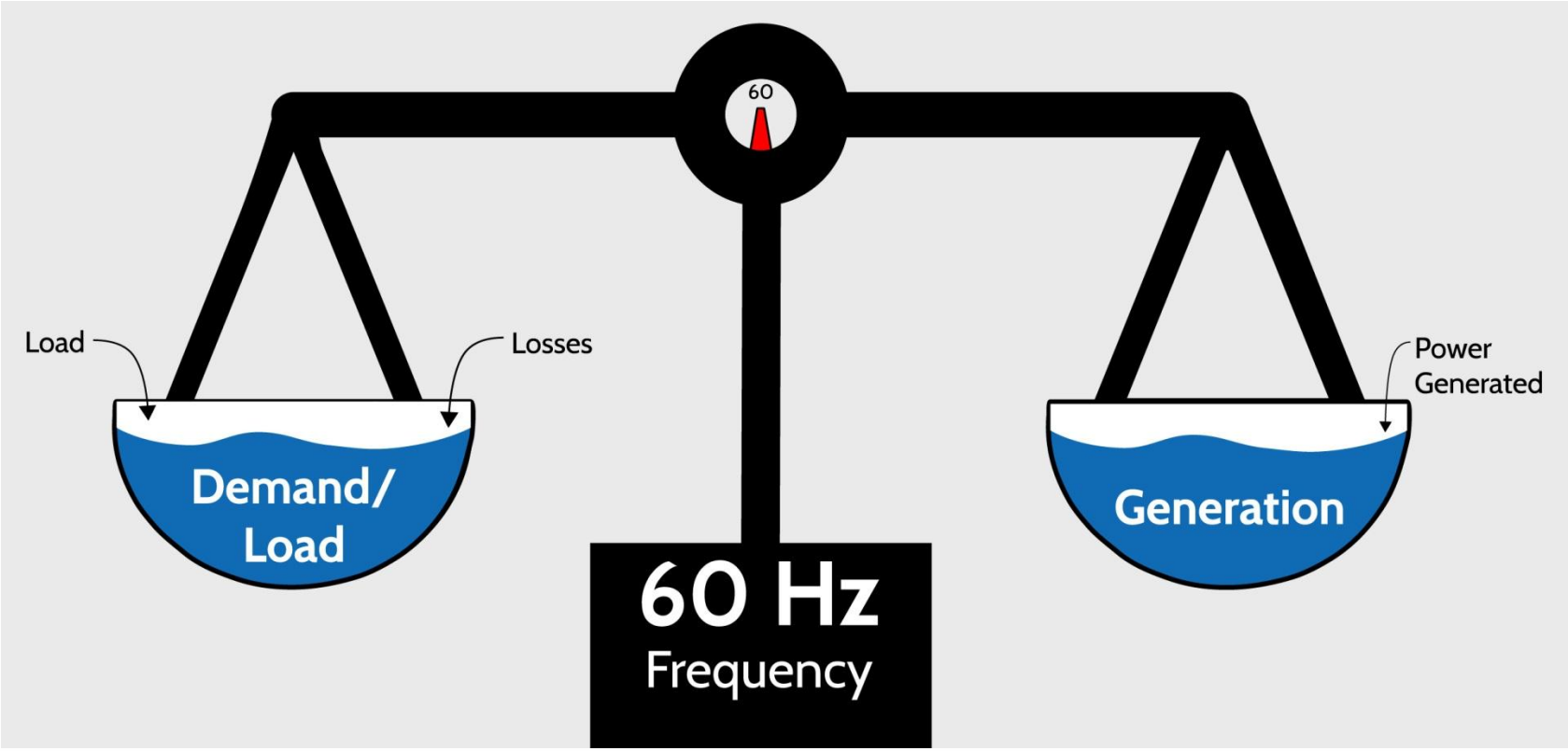
Project 42636 - Panel 1

Dan Woodfin
Director, System Operations

August 15, 2014

Power Generation must match Load Demand



Economic Dispatch

- Every five minutes, ERCOT sends a signal to each online generator that is participating in the ERCOT market (through the generator's Qualified Scheduling Entity (QSE)) telling each generator how much power to produce
- In general, this set of generator output levels is the lowest cost way to meet the system load for that five minute interval
- The optimization uses the offer curves submitted for each generator
- If the lowest-cost set of generator output levels would result in an overload of one or more transmission constraints on the system, the economic dispatch optimization will select a different, higher-cost set of output levels that is the lowest cost set that does not overload any transmission constraints
- This process is called a security-constrained economic dispatch (SCED)

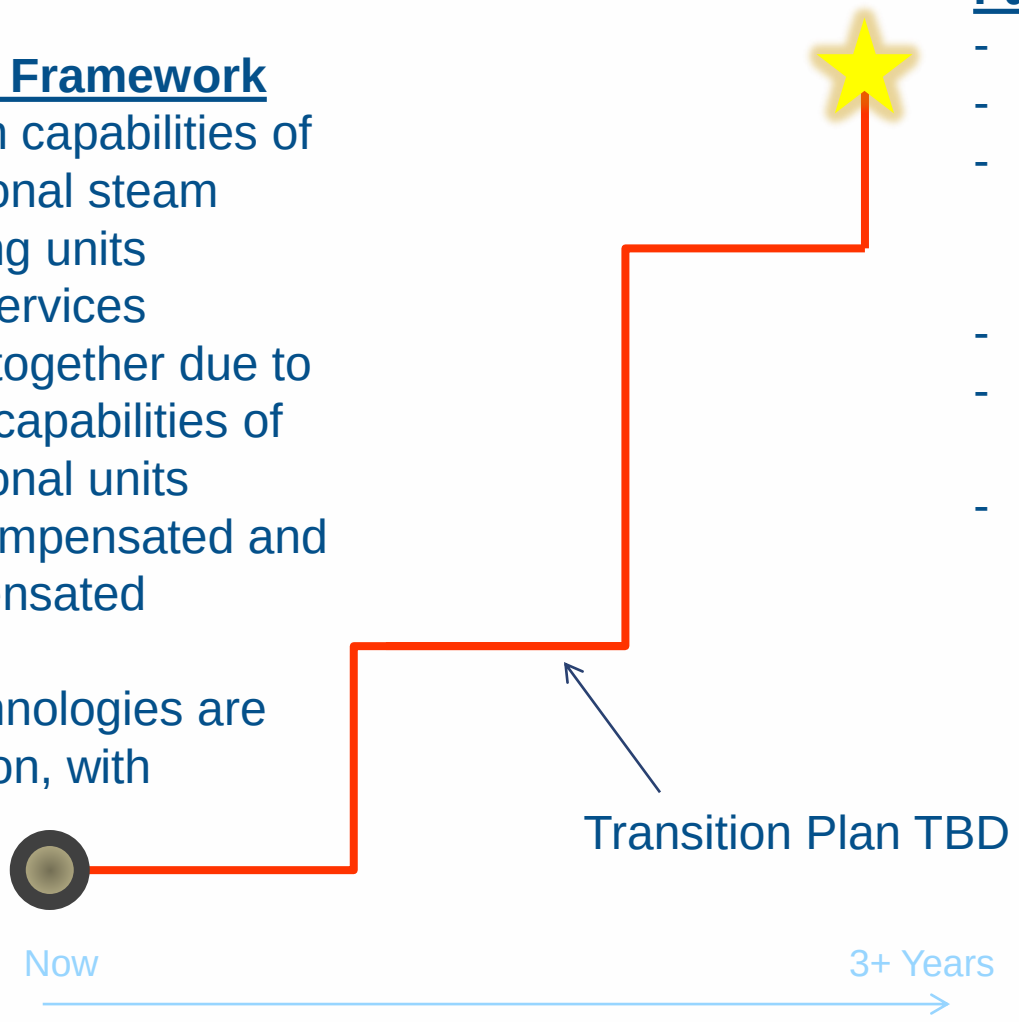
What are Ancillary Services?

- In general, Ancillary Services (AS) are services that are supplemental to the energy market which are needed to maintain system reliability
  - The five-minute generation dispatch alone does not ensure that appropriate resources are available to acceptably balance generation with load
- Ancillary Services are procured to ensure that sufficient resources with the appropriate characteristics are available to balance any additional variability and maintain the system frequency through a variety of potential conditions

Proposed Change in Ancillary Services Framework

Current AS Framework

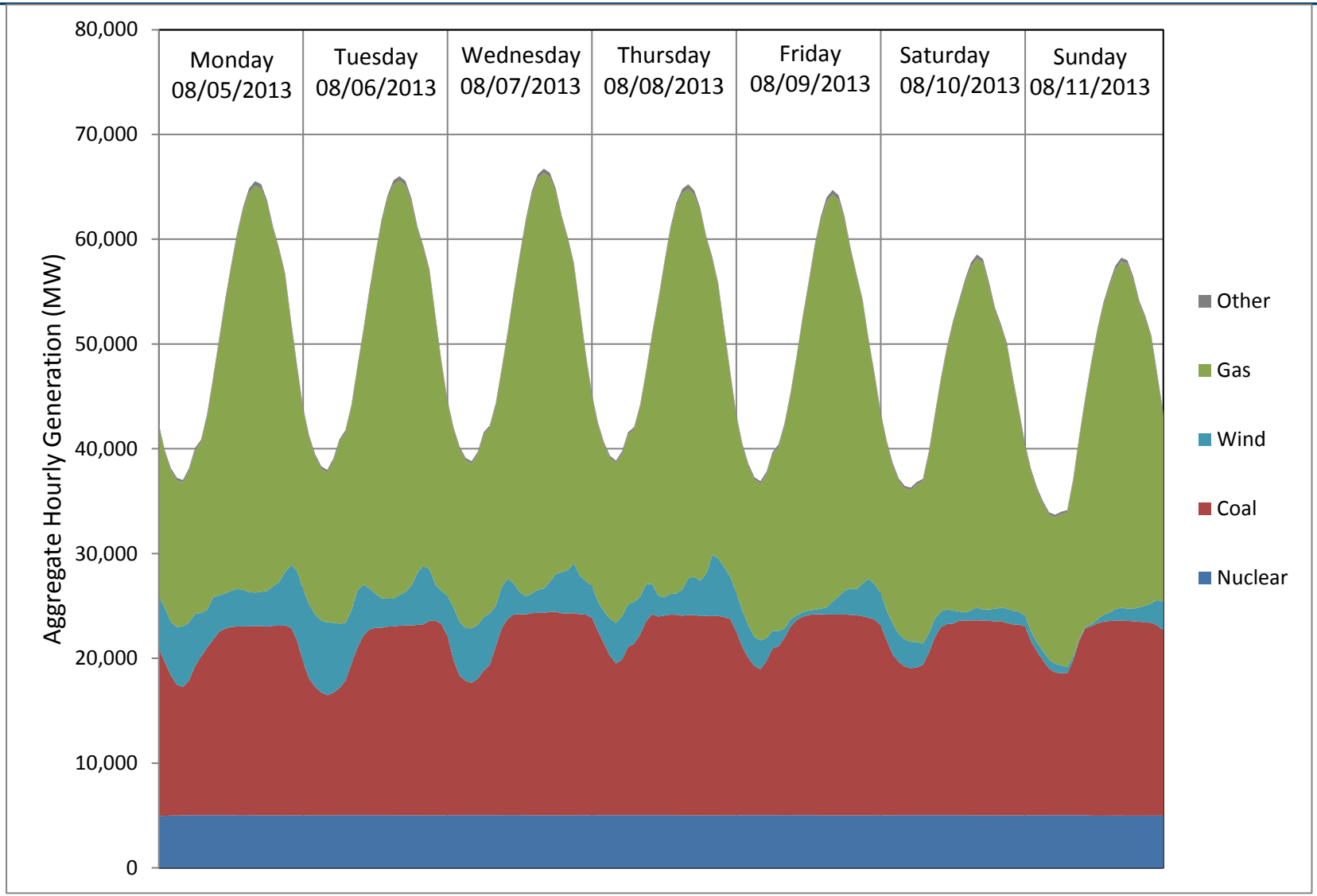
- Based on capabilities of conventional steam generating units
- Unique services bundled together due to inherent capabilities of conventional units
- Mix of compensated and uncompensated services
- New technologies are cobbled on, with difficulty



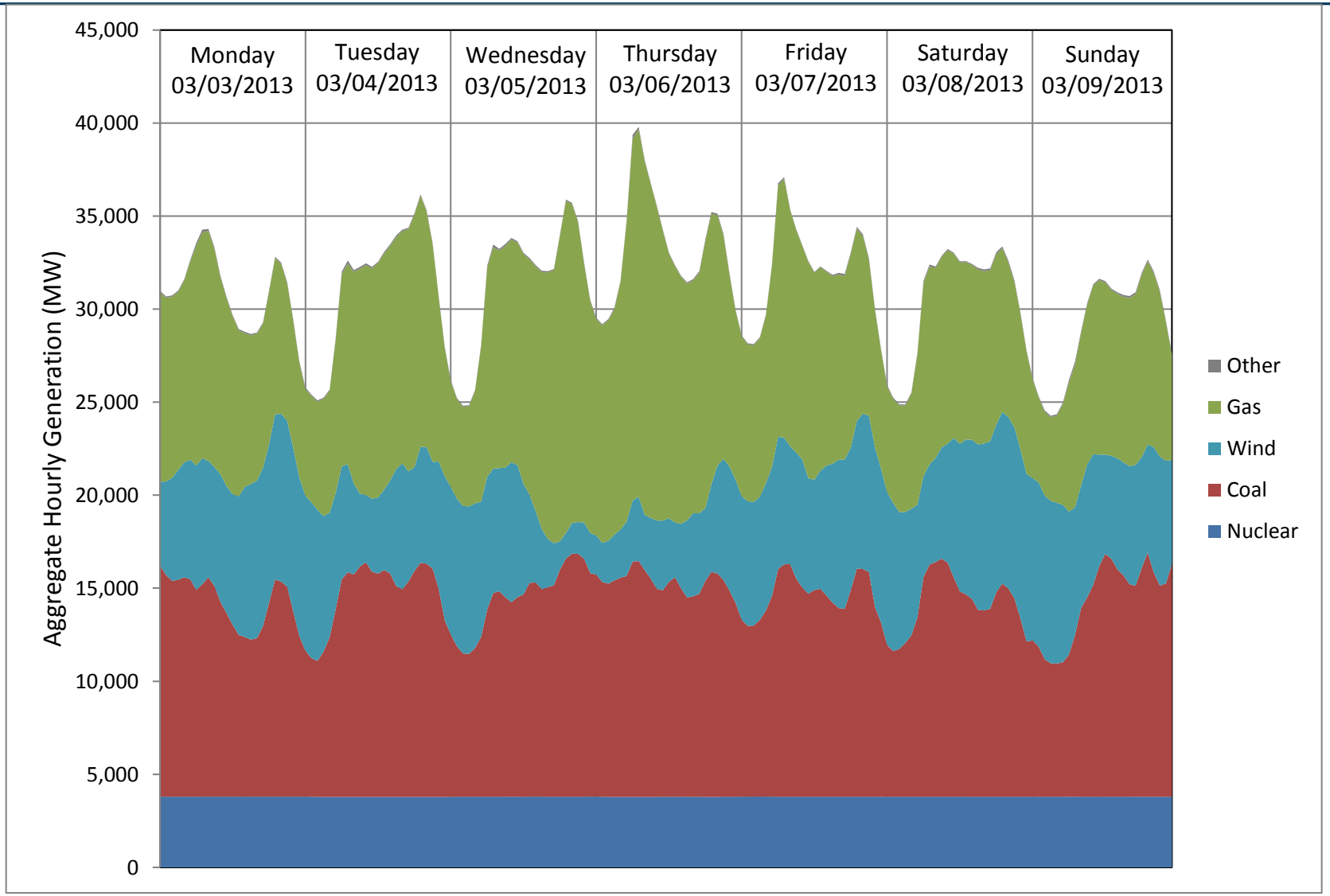
Future AS Framework

- Technology neutral
- Market-based
- Based on fundamental needs of the system, not resource characteristics
- Unbundled services
- Flexible for new technologies
- Pay for performance, where practical

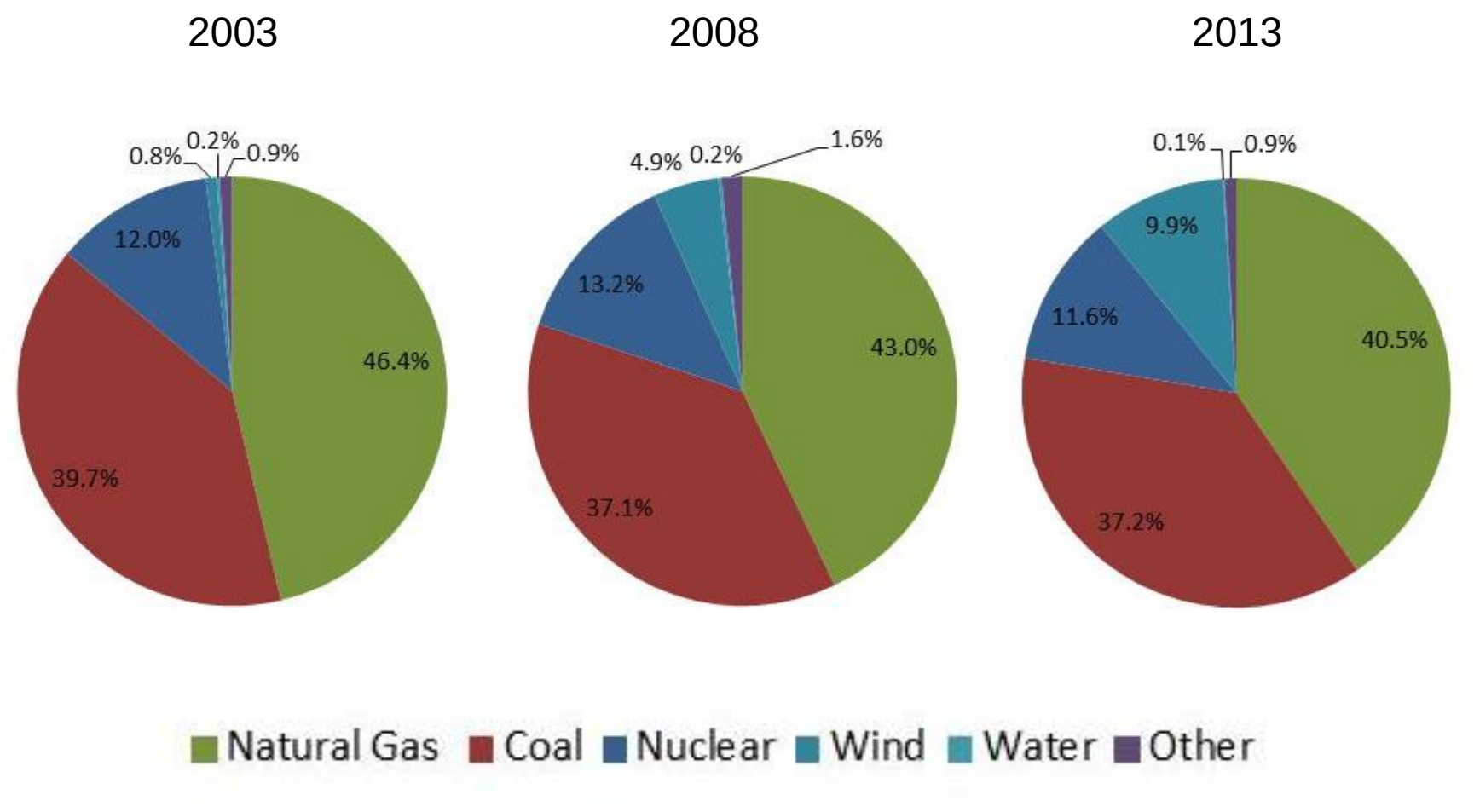
Typical August Generation Output



Typical March Generation Output



Energy by Fuel Type

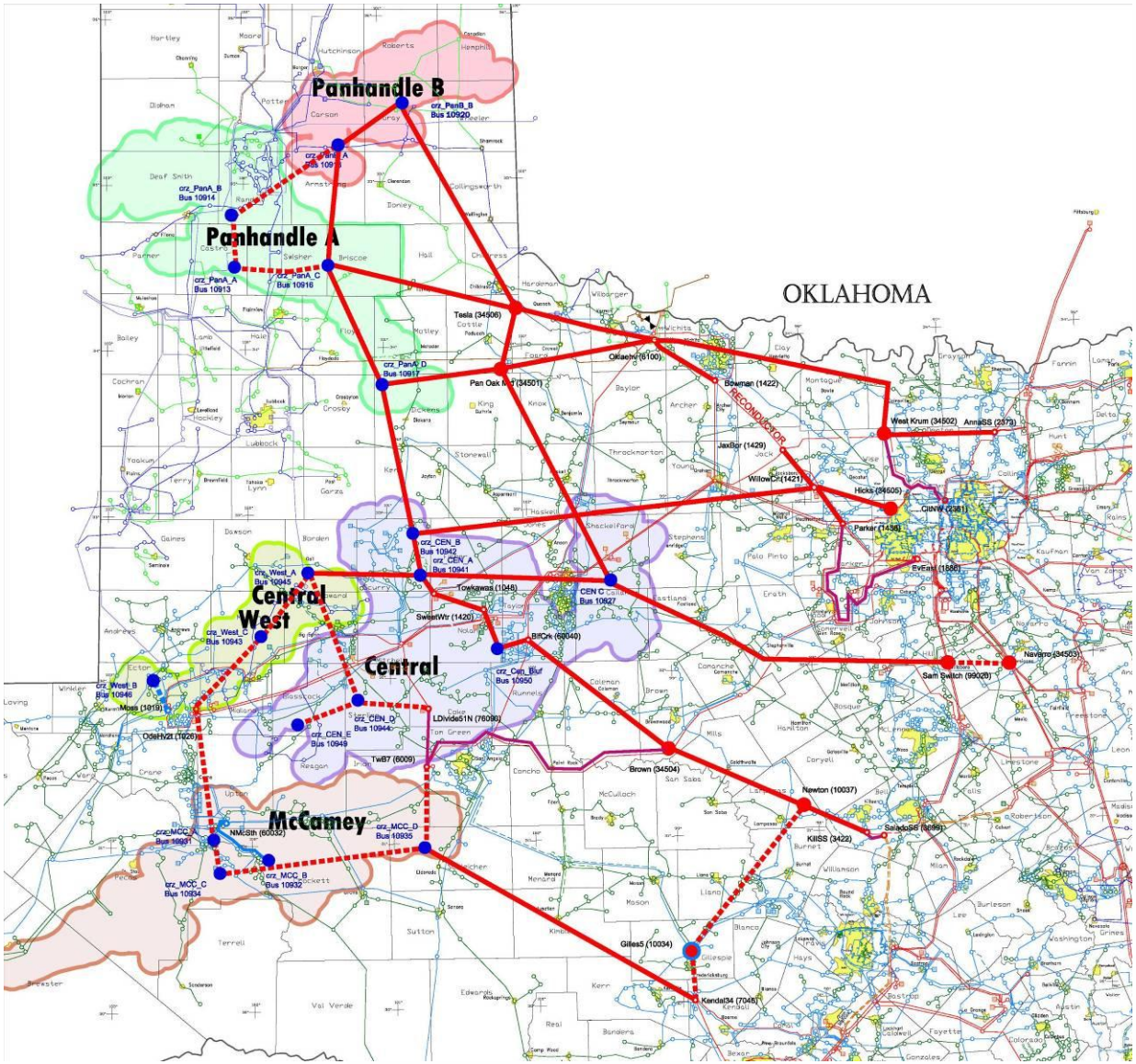


Project 42636 - Panel 2

Warren Lasher
Director, System Planning

August 15, 2014

As Filed – The CREZ Transmission Plan



Red lines are new 345-kV double circuit ROW

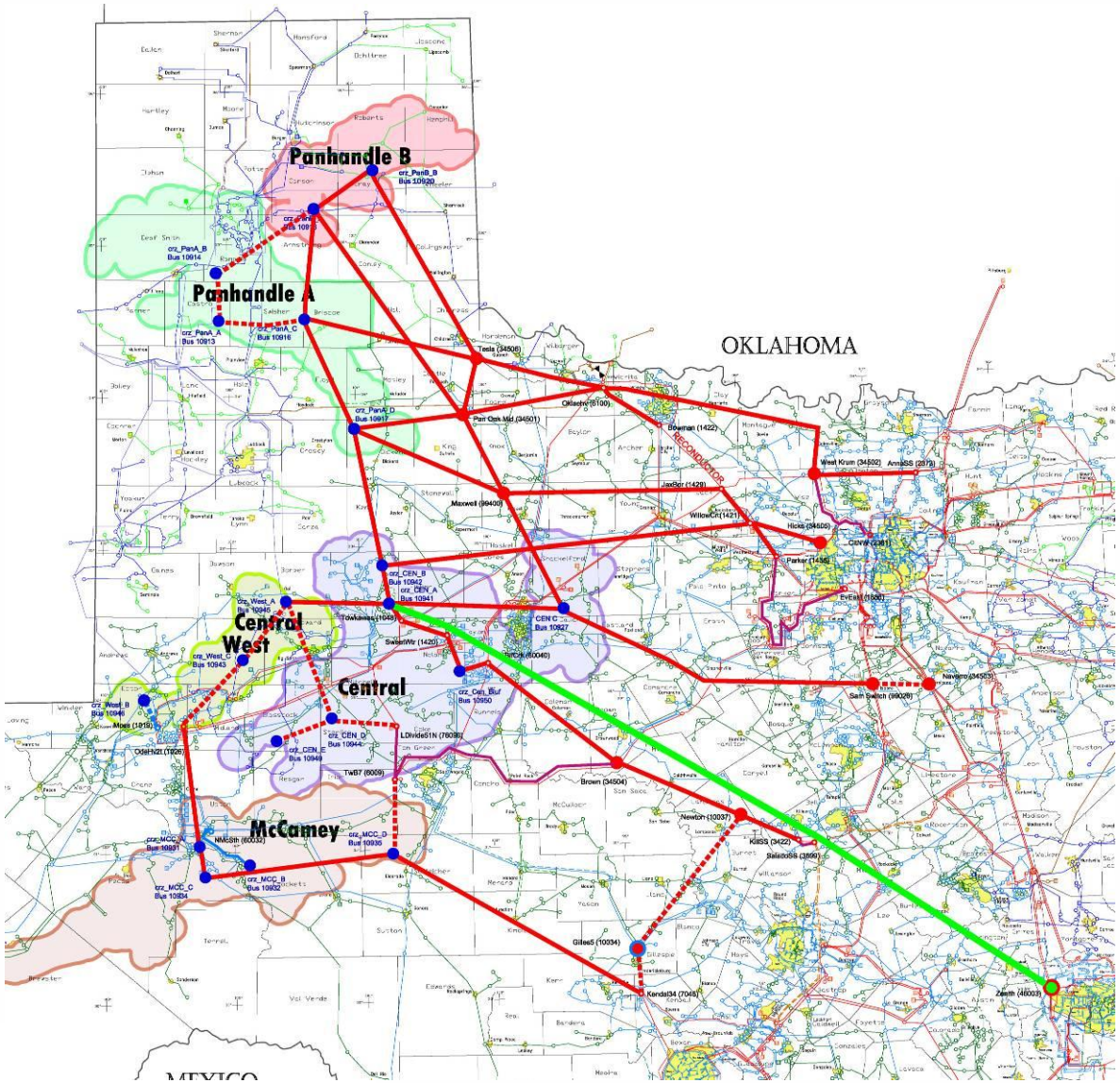
Dotted red lines are new 345-kV single circuit ROW

Final Cost: ~$6.9 B

Designed to Accommodate ~18,500 MW of wind generation (~11,500 MW of incremental wind generation)

Completed on-time by the end of 2013

Additional Higher Wind CREZ Scenario



This plan was developed to accommodate Scenario 3 with an additional ~6,400 MW of wind generation (~24,800 MW of total wind generation in West Texas)

Red lines are new 345-kV double circuit ROW

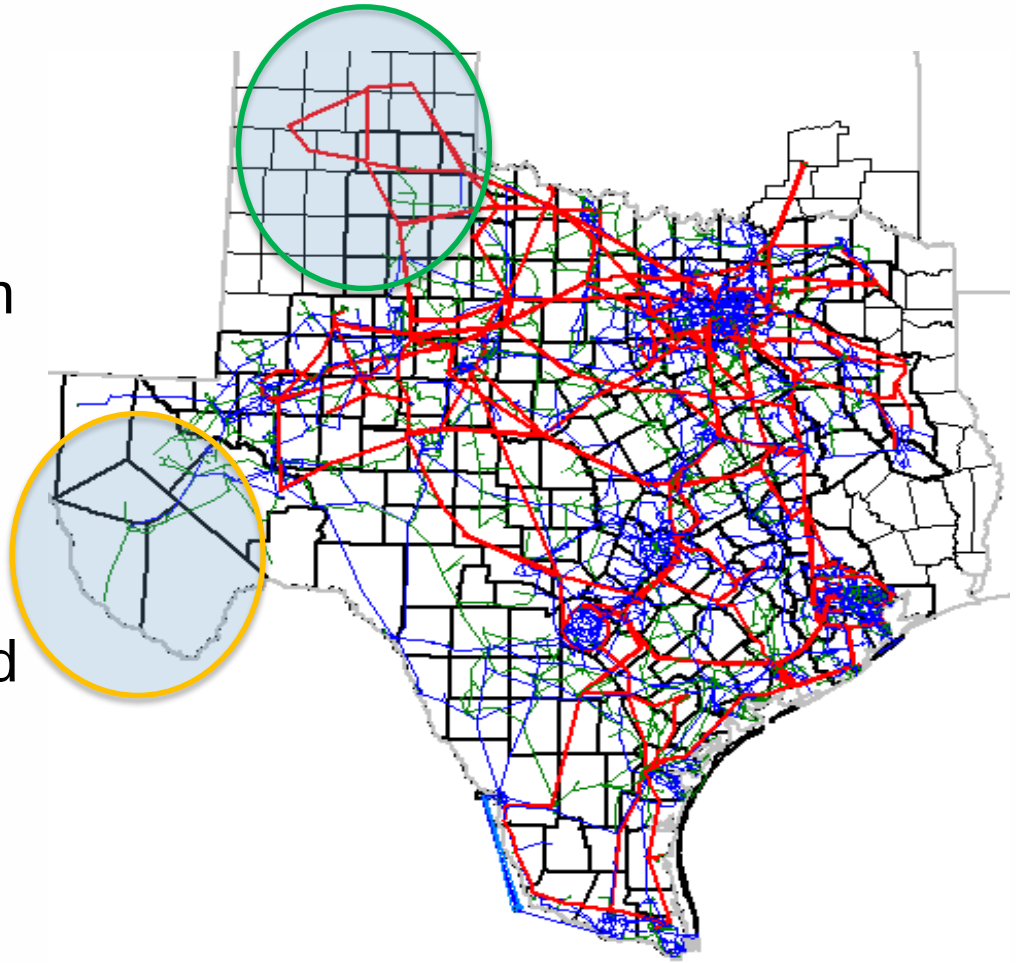
Dotted red lines are new 345-kV single circuit ROW

Green line is a 2000-MW HVDC ROW

Estimated Cost ~$2 B

The Challenges Continue

- Panhandle wind development
  - Minimal nearby synchronous generation and no local load
  - With high levels of wind penetration, these conditions lead to voltage stability and grid strength challenges
- Solar developer interest in far Southwest Texas
  - Limited nearby high-voltage transmission



Project 42636 - Panel 3

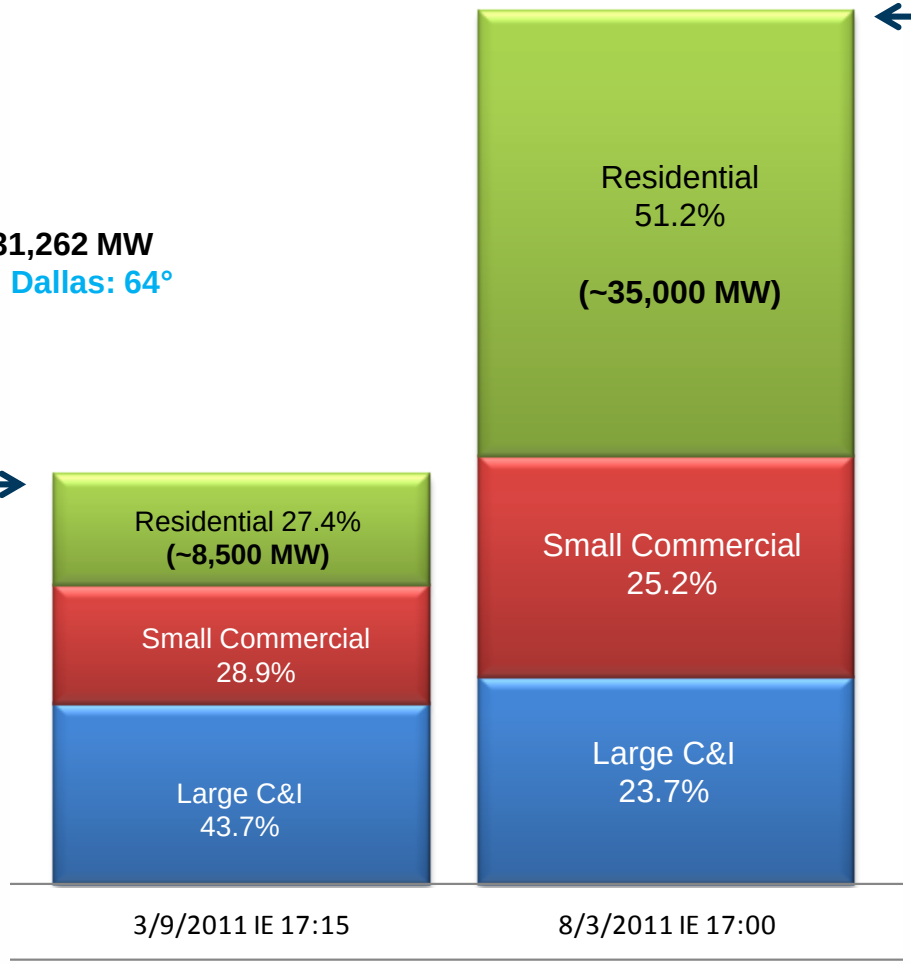
Paul Wattles
Senior Analyst, Market Design and Development

August 15, 2014

Weather impacts on load by customer type

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

Wed., Aug. 3, 2011
(ERCOT's peak day)
5:00 PM
ERCOT Load: 68,416 MW
Temperature in Dallas: 109°



37,000 MW of weather-sensitive load -- 54% of peak

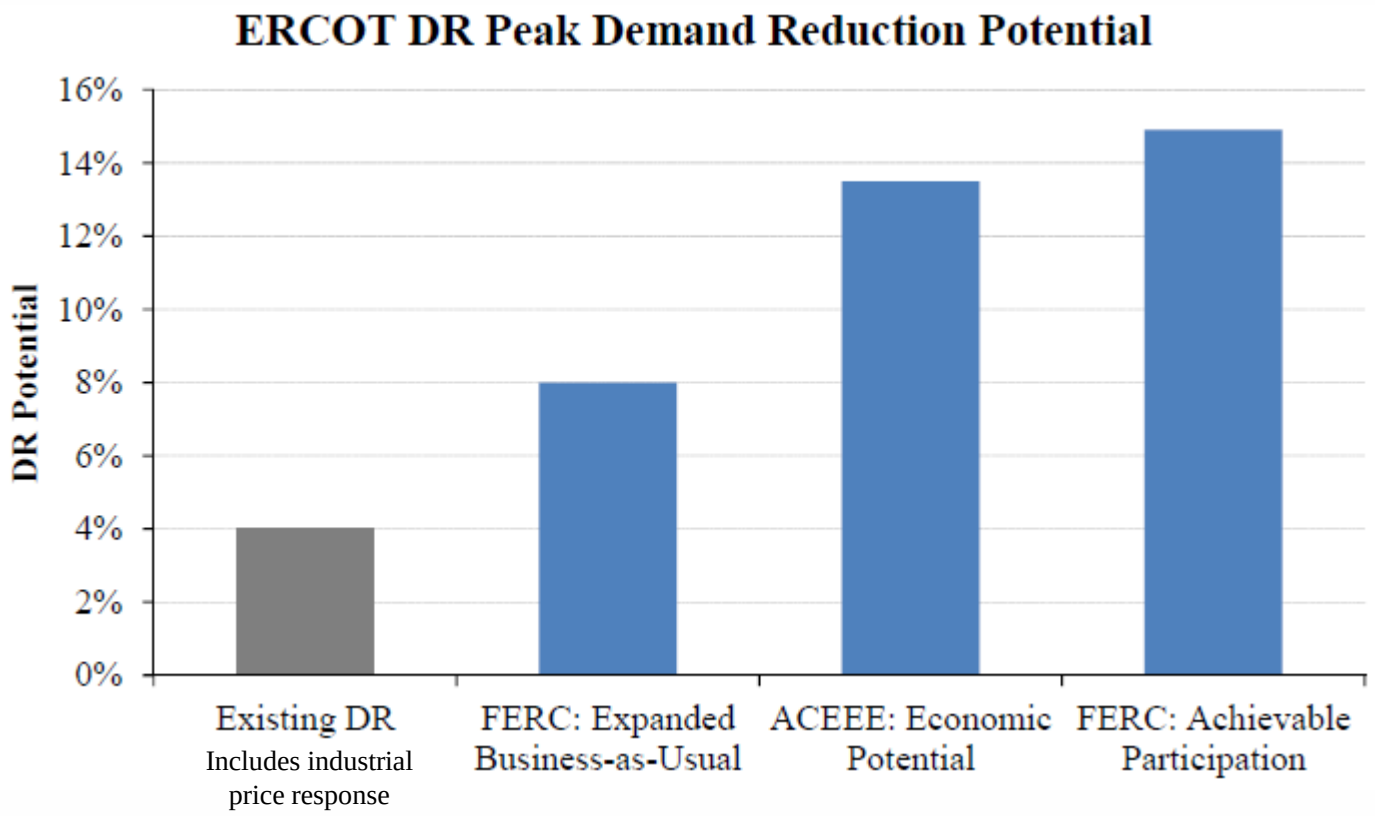
- Customer class breakdown is for competitive choice areas; percentages are extrapolated for munis and co-ops to achieve region-wide estimate
- Large C&I are IDR Meter Required (>700kW)
- 15-minute settlement interval demand values

DR available for ERCOT dispatch (summer peaks 2014)

Service	MWs	Notes
Load Resources providing Responsive Reserves	1400	Capped at 1400 MW (half of total hourly Responsive procurement of 2800 MW)
Emergency Response Service	725	Includes 10-minute and 30-minute ERS; and ERS Generation (primarily distributed diesel) Significant % of ERS demand response is assisted by backup generation
TDSP Load Management Programs	220	Summer peak hours only Dispatched concurrently with ERS through agreements between ERCOT and TDSPs Unknown % backed up by generation

2,300 MW of dispatchable DR = 3.4% of ERCOT summer peak

Estimates of DR Potential in ERCOT



Sources: "ERCOT Investment Incentives and Resource Adequacy, Brattle Group, June 2012
"National Assessment of Demand Response Potential," FERC/Brattle Group, 2009
"Potential for Energy Efficiency, Demand Response and Onsite Renewable Energy to Meet Texas's Growing Electricity Needs," American Council for an Energy Efficient Economy (ACEEE), 2007