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# Grid Expansion and the Incorporation of Renewable Energy



**Wednesday, July 9, 2014**

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# Overview

- Adequacy of resources process
- Regulatory mechanisms to finance the expansion of the transmission
- Promotion mechanisms to encourage renewable energy
- Grid expansion process
- Renewable energy credits
- Rules for connecting renewable energy sources to the transmission network



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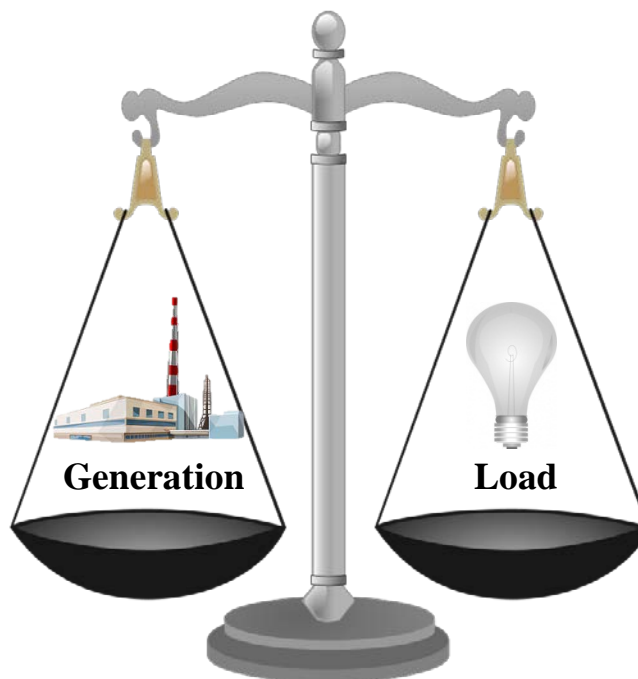
# Resource Adequacy – Target Reserve Margin

- The target reserve margin is the amount of generation capacity in excess of peak demand that will result in a need for forced outage no more often than once in 10 years
- Target reserve margin has recently been set at 13.75%
- Projection of demand growth, new generation commitment suggests that the target will not be achieved in the near future
- Increasing amount of wind generation creates pressure to increase target reserve margin

# On the Texas Electric Grid, Supply (Generation) and Demand (Load) Must be Exactly in Balance at All Times

*To increase generation*, the PUCT and ERCOT have:

- Stimulated wind generation through CREZ
- Encouraged utilities to bring mothballed units back into service
- Created incentives for new generation:
  - By increasing the System Wide Offer Cap
  - By setting market rules to ensure that energy prices reflect scarcity conditions



*To reduce peak demand*, the PUCT and ERCOT have:

- Adopted new energy efficiency rules
- Developed new programs that pay loads to curtail demand during grid emergencies (Emergency Response Service)

**When Generation Doesn't Keep Up With Demand,  
Blackouts Result**

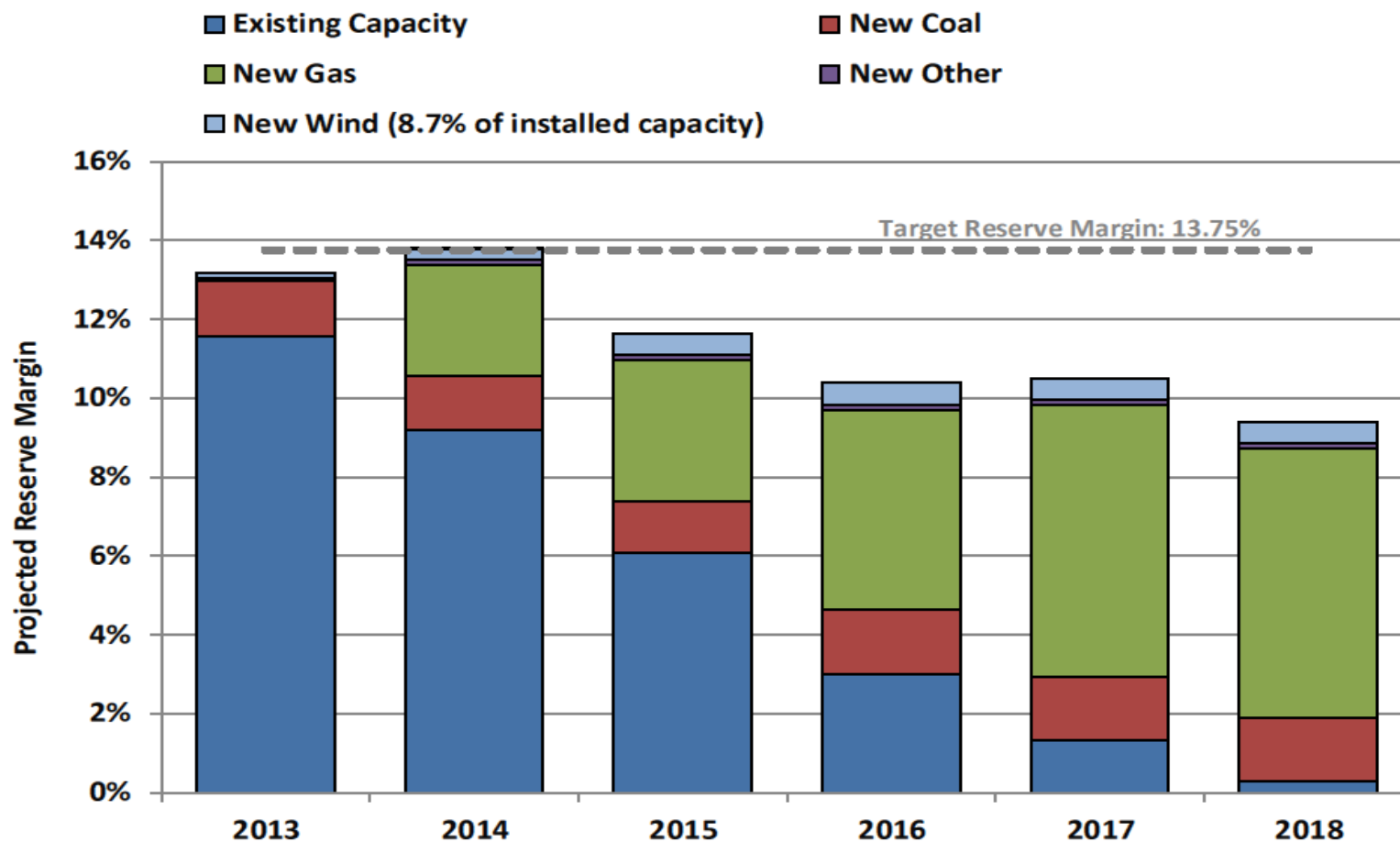


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# Projected Reserve Margins



Source: ERCOT Capacity Demand Reserve Reports / 2013 data from Winter 2012, 2014 - 2018 from May 2013



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# Energy-Only vs. Capacity Markets

- ERCOT is an energy-only market
  - Generation resources are paid *only* for energy that is injected into the grid
  - With few exceptions, payments are not made for making capacity available
- Most other energy markets in the U.S. operate a forward capacity market(s)
  - Generators participate in an auction to determine lowest price for making available a specific amount of generation capacity in the future
  - Payments are made to generators for capacity whether or not the capacity is called upon to supply energy



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# Resource Adequacy in an Energy-Only Market

- In an energy-only market, new generation is encouraged when capacity shortages lead to high energy prices during periods of peak demand
- Put another way, the net revenue (revenue less operating costs) must be sufficient to recover capital investment and provide a return on investment





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# Open Question

- Will enhancements to the energy-only market be sufficient to ensure that the target reserve margin is met?
- Will it be necessary to incur the inefficiencies inherent in a capacity market to ensure resource adequacy?





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# Regulatory mechanisms to finance the expansion of transmission

- Postage Stamp Transmission Policy
- ERCOT oversight – open and transparent process
- Commission authority over citing and cost recovery
- Rate Mechanisms:
  - TCOS
  - Interim TCRF



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# Renewable Energy

- Goal of 10,000 MW by January 1, 2025
- Currently exceed 2025 target (>11,000 MW)
- Renewable Portfolio Standard program provides incentives:
  - Requires REPs to purchase Renewable Energy Credits



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# Goal for Renewable Energy (§25.173)

(a) Purpose. The purposes of this section are:

- (1) to ensure that the cumulative installed generating capacity from renewable energy technologies in this state totals 2,280 megawatts (MW) by January 1, 2007, 3,272 MW by January 1, 2009, 4,264 MW by January 1, 2011, 5,256 MW by January 1, 2013, and 5,880 MW by January 1, 2015, with a target of at least 500 MW of the total installed renewable capacity after September 1, 2005, coming from a renewable energy technology other than a source using wind energy, and that the means exist for the state to achieve a target of 10,000 MW of installed renewable capacity by January 1, 2025;
- (2) to provide for a renewable energy credits trading program by which the renewable energy requirements established by the Public Utility Regulatory Act (PURA) §39.904(a) may be achieved in the most efficient and economical manner;



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# Goal for Renewable Energy (§25.173)

(a) Purpose. The purposes of this section are (*cont*)

- (3) to ensure that the cumulative installed generating capacity from renewable energy resources at those sites in this state that have the greatest economic potential for capture and development of this state's environmentally beneficial resources;
- (4) to protect and enhance the quality of the environment in Texas through increased use of renewable resources; and
- (5) to ensure that all customers have access to providers of energy generated by renewable energy resources pursuant to PURA §39.101(b)(3).



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# Renewable Energy Credits

- Established by the Commission by rulemaking
  - allows customers to have access to providers of energy generated by renewable energy resources.
- ERCOT ISO - REC program administrator
- ERCOT monitors and audits REC generators. Provides an annual report to PUC. If a REP isn't purchasing required RECs, leads to enforcement action.
- PUCT handles registration portion of the program and certifies facilities so they can participate
  - Participation is voluntary. There are generators producing renewables who aren't certified to be a REC generator

<https://www.texasrenewables.com/>



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# Renewable Energy Credits

- To earn RECs, a generator must be a new facility or a small producer that meets the requirements in PUCT Substantive Rule §25.173(c).
- A facility is eligible to earn RECs if it relies exclusively on an energy source that is naturally regenerated such as solar, wind, geothermal, hydroelectric, wave/tidal, biomass or biomass-based waste products. *The energy source can not be derived from fossil fuels, waste products from fossil fuels or waste products from inorganic sources.*
- Texas has more renewables than what is required by the REC program
  - 2014 – 5000 MW for RECs



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# Competitive Renewable Energy Zones

- Stalemate arose between transmission and generation over construction of long transmission lines from West Texas
  - Transmission providers wanted financial commitment from generators
  - Developers concerned about cost and risk of financial commitment
- 2005 Legislation
  - Designated zones for renewable energy development
  - Directed to develop transmission plan
  - Consider level of financial commitment in designating zones and granting CCNs





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# Early Development Out West

- By 2002, 1,005 MW of wind generation had been added to the West Region of ERCOT.
- 755 MW concentrated near the town of McCamey.
- Local transmission system could not deliver the full output of the wind in the McCamey area.
- RESULT: severe operating limits to protect the system and wind developers started looking elsewhere.



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# Regional Planning Group (RPG)

- As the result of the wind constraints, the West Texas Regional Planning Group held its first meeting in January 2003.
- This meeting marked the beginning of the more open ERCOT transmission planning process by soliciting input and comment from generation developers and retail electric providers.





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# Solution

- Senate Bill 20 enacted in 2005
- Expectation of legislation
  - Sufficient transmission to meet State's renewable goal
  - Improve coordination between transmission & wind
  - Need for transmission determined before CCN
- Rule adopted December 2006 – Subs. R. 25.174



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“.... we must continue our commitment to conservation, energy efficiency and customer demand response. We are going to need every resource to meet the growing electricity needs of Texas.”

*Barry Smitherman, Commissioner/Chairman  
2007- 2011*



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# Healthy Resource Mix:

$$G_T(X) = X_1 G_{GAS} + X_2 G_{COAL} + X_3 G_{NUC} + X_4 G_{renew} + X_5 G_{DR}$$

## Objective:

**A final mix of  $X_1 + X_2 + X_3...$  which will maximize efficiencies  
and minimize costs while providing sufficient resources  
for new facilities**



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# Current PUC Review

- Two new major projects are being opened up at the request of the Chairman.
- Purpose of the projects are to look at ERCOT's prospective upgrades, ancillary services, and the transmission planning process related to renewables, and problems that have arisen as part of the CREZ build out.



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# Unintended Consequences of Wind

1. **Project No. 42631:** Study series compensation that has the potential to cause sub-synchronous oscillation (SSO), if the series capacitors that have been installed are taken out of bypass mode.





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# Review policies at ERCOT

## 1. ERCOT Planning & System Costs Associated with Renewable Resources:

- Panhandle Renewable Energy Zones (PREZ) – are they part of CREZ?
- Southern Cross project and DC ties
- Explore the costs of system upgrades, and the costs to maintain and operate current system, and the allocation of those costs specifically related to renewable resources
- ERCOT Board instructed ERCOT to review its transmission planning process
  - Look at the current production cost savings test used for analyzing the benefits of transmission projects



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# PUCT Workshop

## Sub-Synchronous Oscillation (SSO)

July 28<sup>th</sup>

[www.texasadmin.com](http://www.texasadmin.com)



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# Interconnection Rules

- § **25.191** Transmission Service Requirements. 06/20/01
- § 25.192 Transmission Service Rates. 04/18/12
- § 25.193 Distribution Service Provider Transmission Cost Recovery Factors (TCRF). 10/25/10
- § 25.195 Terms and Conditions for Transmission Service. 06/20/01
- § **25.196** Standards of Conduct. 06/20/01
- § **25.198** Initiating Transmission Service. 06/20/01
- § 25.199 Transmission Planning, Licensing and Cost-Recovery for Utilities within the Electric Reliability Council of Texas. 04/13/05
- § 25.203 Alternative Dispute Resolution (ADR). 06/20/01

*See Additional Resources for links to rules*



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# Standard Generation Interconnection Agreement

## Commission Order:

“Strict adherence to a standard agreement would facilitate expeditious, non-discriminatory interconnection of new power projects with the transmission network.”

“Approval ...will minimize delays in achieving interconnection, promote competition, ensure an orderly process...ensure that an electric utility or transmission and distribution utility provides nondiscriminatory access to wholesale transmission service.”



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# Standard Generation Interconnection Agreement

## Commission Order:

“... motions for reconsideration point out that power projects may have special needs that warrant deviations from the standard agreement. The parties to an interconnection agreement should be able to modify the standard agreement in individual cases to meet the special needs of a project, but this ability must not frustrate the goal of expeditious, non-discriminatory interconnection.”



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# Standard Generation Interconnection Agreement

- Adopted in Docket No. 22052
  - May 2000 order on rehearing
  - Pursuant to P.U.C. SUBST. R. 25.195(a)
  - January 2000 – ERCOT filed a petition for approval of standard generation interconnection agreement
  - Developed through the stakeholder process
- Docket No. 35077 - interconnection agreements are filed by TSPs (since 2007)



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# Additional Resources

- **PUC Rules** [www.puc.state.tx.us/rules/subrules/electric/index.cfm](http://www.puc.state.tx.us/rules/subrules/electric/index.cfm)
  - Transmission Service Rates, 25.192
  - Goal for Renewable Energy, 25.173
  - Competitive Renewable Energy Zones, 25.174
  - Selection of Transmission Service Providers, 25.216
- **PUC Proceedings** <http://interchange.puc.state.tx.us>
  - CREZ Proceeding, Docket No. 33672
  - Selection of CREZ Transmission Service Providers, Docket No. 35665
  - Priority Dispatch, Project No. 34577