300MW Green Pastures Wind Farm

35MW Webberville Solar Project

1,516MW Temple I & II CC Gas Plant

Texas' Transforming Energy Market: Big Changes Underway

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PIONEER GREEN ENERGY

Developer of wind and solar projects across select US markets

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Projects

Name	Size	ISO	Owner
Wind			
Miami Wind I	289MW	ERCOT	Invenergy
Green Pastures I & II	300MW	ERCOT	Capital Dynamics
Logan's Gap Wind	200MW	ERCOT	Pattern Energy
San Roman Wind	93MW	ERCOT	Acciona
Solar			
Pumpjack Solar	20MW	CAISO	Duke
Wildwood Solar I	20MW	CAISO	Duke
Wildwood Solar II	15MW	CAISO	SunPower
Rio Bravo Solar I	20MW	CAISO	SunPower
Rio Bravo Solar II	20MW	CAISO	SunPower
Great Bay Solar I	75MW	PJM	Algonquin
Total	***1051MW***		

Major forces reshaping Texas' electricity markets

1. "Disruptive Challenges" to Texas utilities

   The way electricity is generated, sold and provided to customers in ERCOT is changing and is poised to change even more dramatically. Texas' retail energy provider (REP) space is ripe for disruption, particularly the major incumbents.

2. The paradox of cheap natural gas

   All forecasts call for substantial new gas generation to be built, and in fact ERCOT planners are relying on this new generation to maintain reliability. But persistently cheap natural gas has, counterintuitively, complicated new gas financings, and it is far from clear that ERCOT wholesale electricity prices will rise enough to support the forecast gas build.

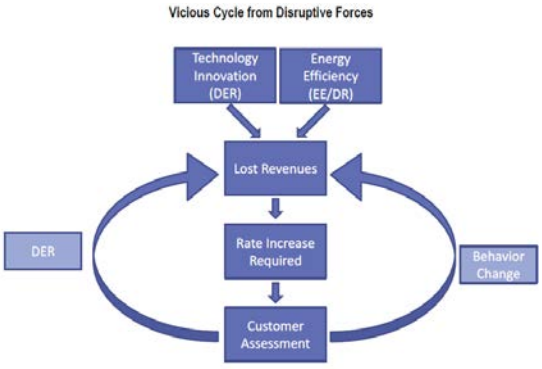
3. 2010s Brawl: Wind vs. Solar

   An epic intra-renewables clash has been brewing for a decade – wind has been the unquestioned champ of renewables in Texas, but solar is coming on strong. Dueling analyses forecast one or the other dominating. The one thing that is certain is that ERCOT will have front row seats to the fight.

4. Takeaways

#1: "Disruptive Challenges" to Utilities

- Utility term: "Disruptive challenges" – also known as: "Utility death spiral"
- Core concept: Utilities have fixed costs, own assets with substantial liabilities, many of which lean out-of-market, and their revenues are under attack from several directions.
  - Disruptive change comparable to airline, telecommunications industries after deregulation
- Drivers:
  - Cheap natural gas: reduces profits from energy sales; drives coal plants into 'stranded' status
  - Low load growth, caused by energy efficiency improvements and demand response, compounded by economic downturn
  - Biggest factor: Loss of customers to renewables (called "Distributed Energy Resources/DERs")



Renewables and the "Spiral"

Ever-cheaper renewables drive many "Spiral" problems:

- Wind, solar have become an optimal economic, not just environmental and PR/sustainability, choices.
- "Behind the fence"/ "Rooftop" distributed solar generation by commercial & industrial (C&I) and residential customers is growing quickly, likely to accelerate
- Increasing number of PPAs between large C&I customers and wind/solar projects (Wal-Mart, Apple, Amazon, Mars, Microsoft, Yahoo, US GSA, etc.)
  - Utilities accounted for 75% of wind PPAs in 2012 and 2013, but only 40% in 2014
- Other corporates are buying wind/solar outright (IKEA, Anheuser Busch, etc.)
- SolarCity's unique business model is starting to target C&I customers
- Many C&I customers also seeking renewables as a way to hedge the ballooning natural gas exposure of the electricity business

In Germany, "Utility Death Spiral" ground zero, large C&I customers are increasingly abandoning the grid by self-generating (16% of German companies self-generating in 2014, up from 10% 2013) as a way of avoiding high rates and grid charges

Isn't the term "Death Spiral" a little extreme?

Not really…

Edison Electric Institute (EEI), 1/2013

- "As the cost curve for [renewable] technologies improves, they could directly threaten the centralized utility model."
- "While the threat of disruptive forces on the utility industry has been limited to date, economic fundamentals and public policies in place are likely to encourage significant future disruption to the utility business model."
- "While we would expect customers to remain on the grid until a fully viable and economic distributed non-variable resource is available, one can imagine a day when battery storage technology or micro turbines could allow customers to be electric grid independent. To put this into perspective, who would have believed 10 years ago that traditional wire line telephone customers could economically "cut the cord?""

Source: "Disruptive Challenges: Financial Implications and Strategic Response to a Changing Retail Energy Business" EEI, 2013

David Crane, former CEO of NRG, 1/2016:

Transforming NRG from "brown to green, and from centralized to distributed" is "essential to its long-term viability."

Source: David Crane, "If I was right, why was I fired?" Greenbiz January 12, 2016

Paul Keglevic, CFO of EFH, 11/2015:

EFH "needs to transform itself. It needs to get geographic diversity. It needs to get fuel diversity. It probably needs to retire its old coal assets."

Source: "Tied up in bankruptcy, EFH frets over future" DMN November 30, 2015

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Also available as part of the eCourse
Texas Renewable Energy Market

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