The Brattle Group

Summary of Brattle's Study on "ERCOT Investment Incentives and Resource Adequacy"

Prepared for:

The Public Utility Commission of Texas

Workshop on Project No. 40480, Commission Proceeding Regarding the Recommendations Included in the Brattle Group Report.

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Agenda

Study Motivation

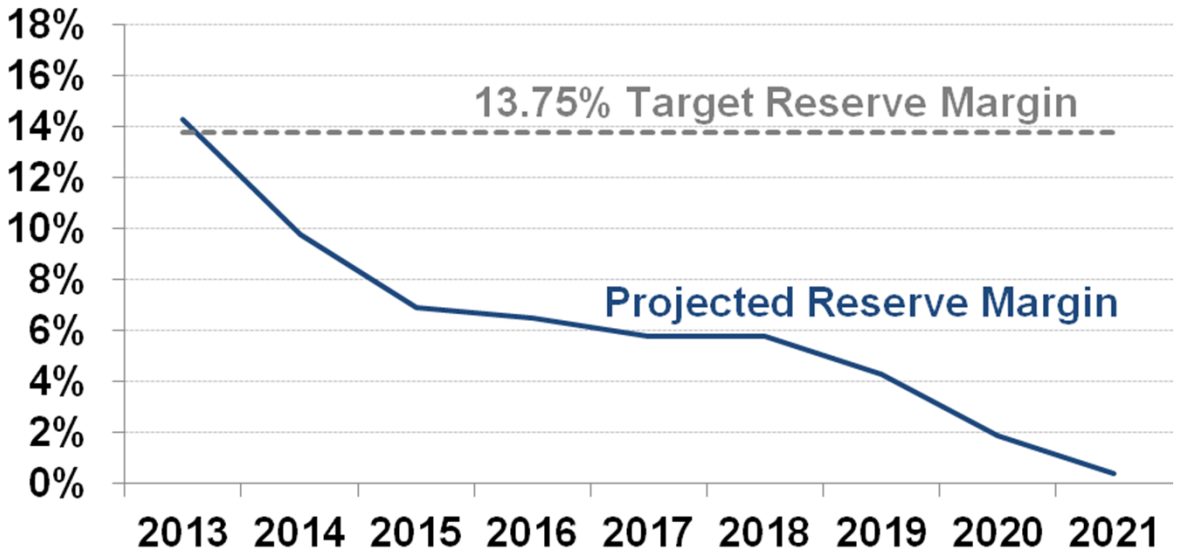
Primary Findings

Recommendations

Study Motivation

Investment stalled, and reserve margins are declining below target

Reserve Margin Outlook



Source: May 2012 CDR

- Challenging fundamentals with low gas prices and low market heat rates
- Little visible investment in the face of high load growth
- Concern that prices may not attract enough investment to meet the target reserve margin

Findings

Key Investment Factors

- Investors are cautious after a history of losses
- Slightly higher cost of capital for generation investment in ERCOT
  - Lack of long-term PPAs in a retail choice environment
  - Volatile energy-only spot prices (but less volatile forwards)
- Needs vary by type of player:

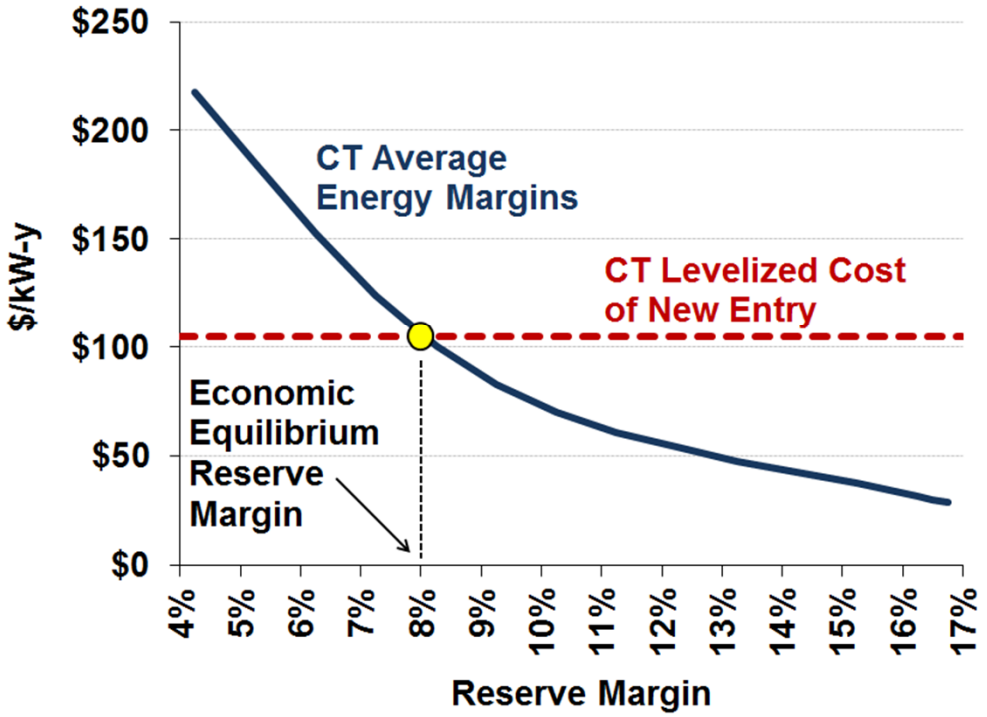
Lenders	Larger, more diversified borrowers	Small, undiversified borrowers
Must be confident that the borrower will have stable net revenues covering the total amount borrowed	Can diversify some of the project-specific volatility and borrow efficiently against larger balance sheet	Rely primarily on project-specific non-recourse debt financing with little equity, which is difficult absent a long-term contract

Findings

This market will not support enough investment to meet the target reserve margin

- Scarcity pricing is needed to support investment, but scarcity is rare (except in extreme weather) at the target reserve margin
- Under current market conditions and rules, the reserve margin would have to fall to 8% for prices to be high enough often enough to support investment
- Substantial uncertainties about market conditions, weather, and regulatory risk result in uncertain reserve margins

Energy Margins Decrease at Higher Reserve Margins



Note: Margins shown based on 'Mid' price cap scenario, with a $4,500 HCAP, $262,500 PNM threshold, and $2,000 LCAP. The assumed PNM threshold and LCAP are higher than current levels.

Recommendations

Determine objectives, then design a market to meet those objectives

STEP 1

Resolve the Threshold Question:

Should the markets or regulators determine the reserve margin?

Markets

Regulators

STEP 2

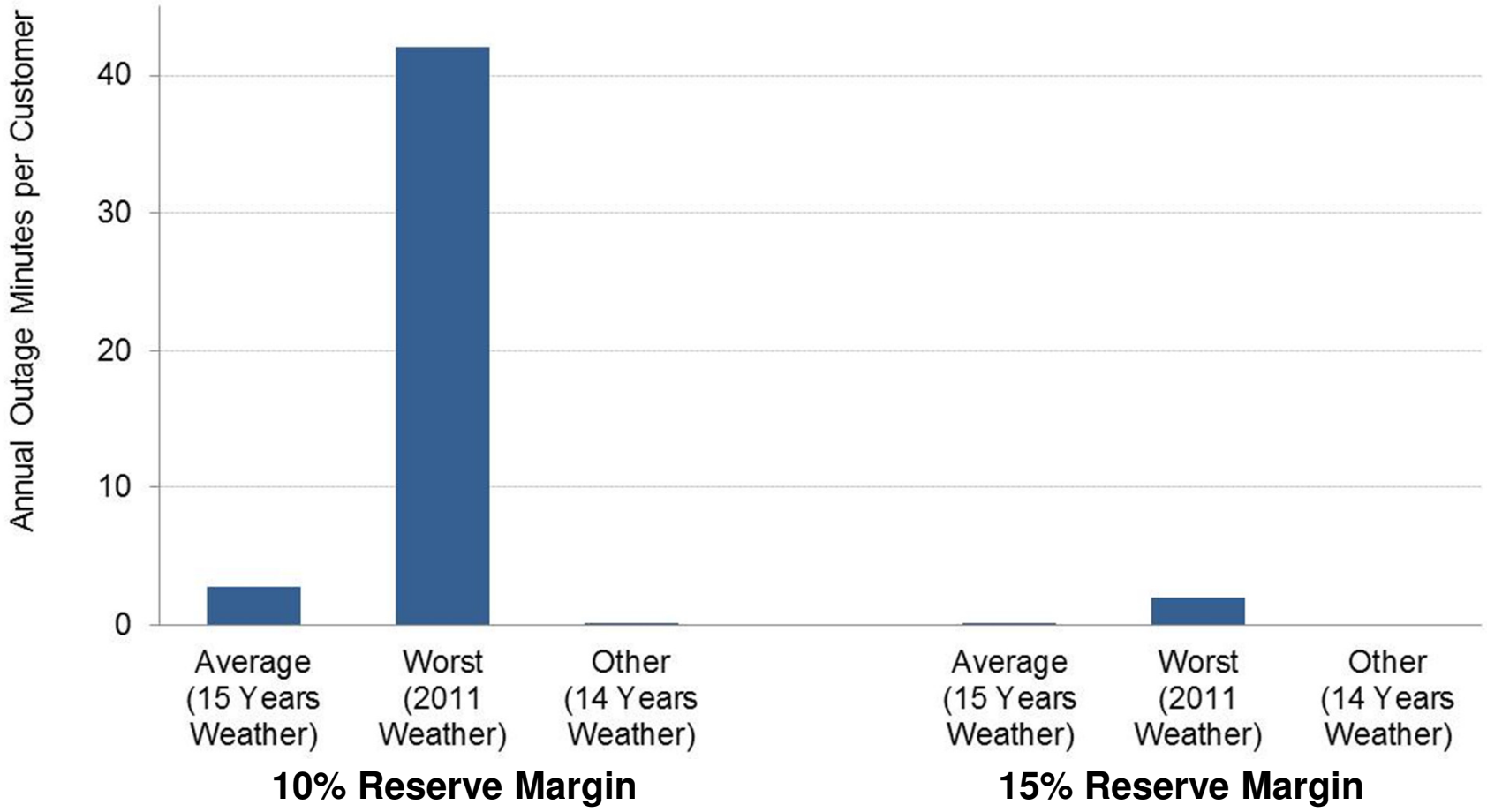
- Reliability implications?
- Ways to further safeguard critical loads?
- Optimal & minimum reserve margin?
- Best market construct?

The decision depends on the trade-offs among reliability, economic efficiency, and complexity.

Recommendations

Reliability implications are greatest in extreme weather

Estimated Customer Outage Minutes Due to Resource Adequacy

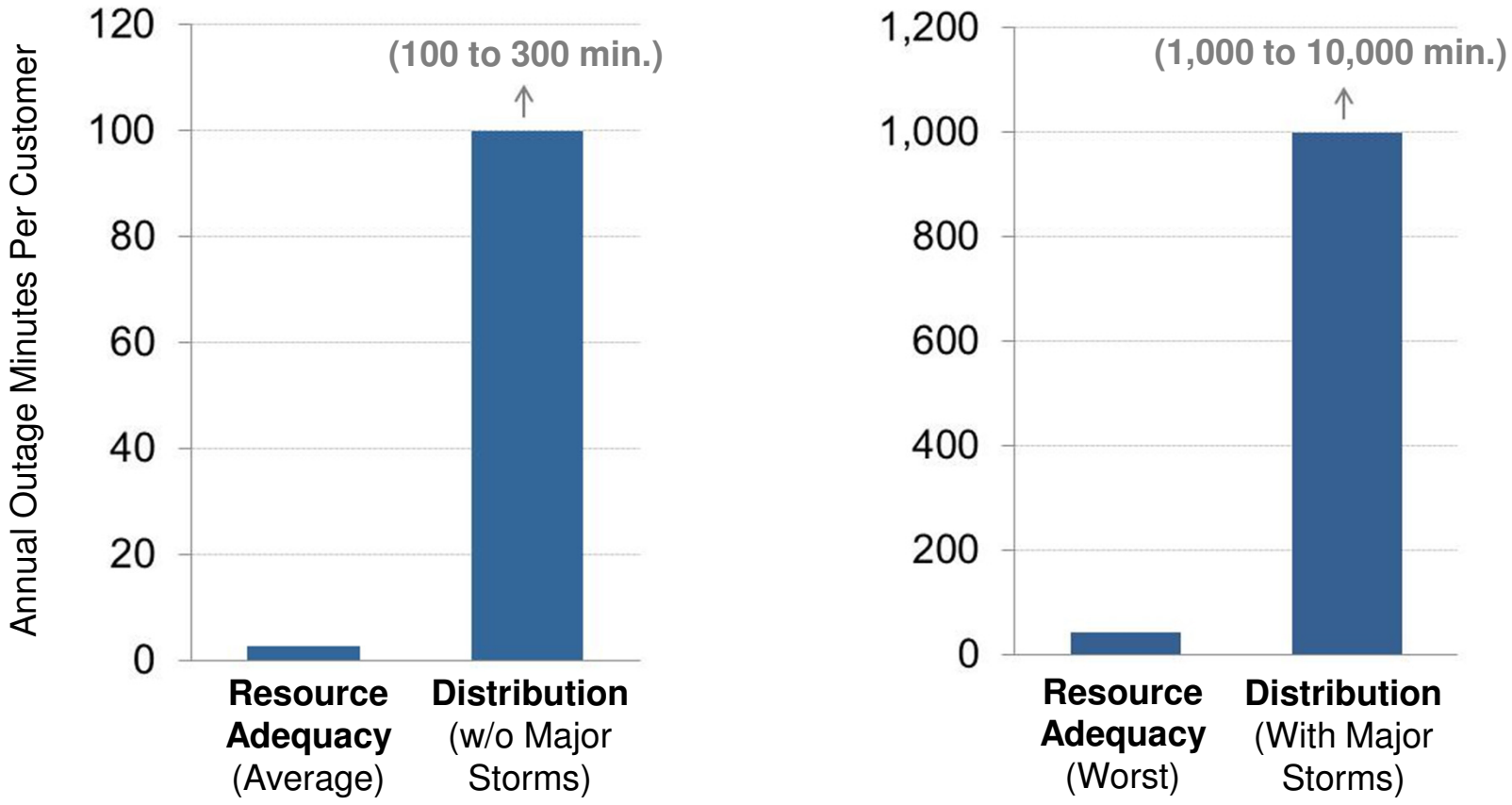


Note: Average minutes per customer based on Expected Unserved Energy from ERCOT's LOLE model, divided by a 65,000 MW system size.

Recommendations

But resource adequacy outages are a fraction of distribution outages

Resource Adequacy (at 10% RM) vs. Distribution-Level Outages



Notes: Distribution outage SAIDI data aggregated by ERCOT from utilities' Annual Service Quality Reports, 2008-2011.
Distribution outages "with major storms" refers to 2008.

Recommendations

Pros and Cons of Various Policy Options

Alternative Market Constructs	Market or Regulator-Determined Target	Market or Regulator-Directed Meeting of Target	Risk of Partial Involuntary Curtailment	Risks to Investors (affects cost of capital)	Economic Efficiency	Changes in Market Design	Comments
1. Pure Energy-Only with Market-Based Reserve Margin	Market	Market	Relatively High in short-run; Lower in long-run	High	May be highest in long-run	Easy	• Viability depends on lots of demand-response helping to set prices at willingness-to-pay; ERCOT market is not there yet
2. Energy-Only with Adders to Support Target Reserve Margin	Regulator	Market	Medium	High	Medium	Easy	• Not a reliable way to meet target after "low-hanging fruit" exhausted; adders are administrative
3. Energy-Only with Backstop Procurement at Minimum Level	Regulator	Regulator	Low	High	Lower	Easy	• Attractive as an infrequent last resort, but long-term reliance is inefficient, non-market-based, slippery slope
4. Mandatory Resource Adequacy Requirements for LSEs	Regulator	Market	Low if sufficient penalty for non-compliance	Med-high	Medium due to regulator determinations	Significant	• Well-defined system/local requirements and resource qualification support bilateral trading of fungible credits, competition • Can't be a forward requirement. • Flexibility: DR is like opting out non-firm load; and for controllable customers' "firm" load, LSEs could offer differentiated levels of reserves
5. Resource Adequacy Requirement with Centralized Forward Capacity Market	Regulator	Market	Low	Med-high (slightly less than #4)	Medium due to regulator determinations	Major	• Working well in PJM • Forward construct can efficiently respond to potential retirements and meet needs w/sufficient lead time • Transparency valuable to market participants and market monitor • Many administrative determinations

Other Recommendations

Regardless of the long-term policy path, we recommend:

- More fully enable and support DR
  - Allow high prices to occur, but at a variety of levels with a more gradual scarcity pricing function, e.g., from $500 initially to VOLL when actually shedding load
  - Implement indicative price forecasts (done)
  - Implement “Load in SCED” so some load can set prices
  - Account for price-responsive demand in load forecasts

- Continue to refine energy pricing provisions
  - Increase SWOC, LCAP, and the Peaker Net Margin threshold
  - Ensure locational scarcity pricing signals when appropriate
  - Avoid mechanisms that trigger scarcity prices during non-scarcity conditions
  - Address pricing inefficiencies related to unit commitment

Other Recommendations (cont.)

Regardless of the long-term policy path, we recommend:

- Revisit provisions to ensure that retail electric providers (REPs) can cover their positions as reserve margins tighten and price caps increase

- Continue to demonstrate regulatory stability
  - Develop and articulate a complete roadmap
  - Continue to demonstrate tolerance for high-priced events