

# Evolving Away from an Energy-Only Market, or Evolving the Energy-Only Market?

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Critical thinking at the critical time™

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# Topics

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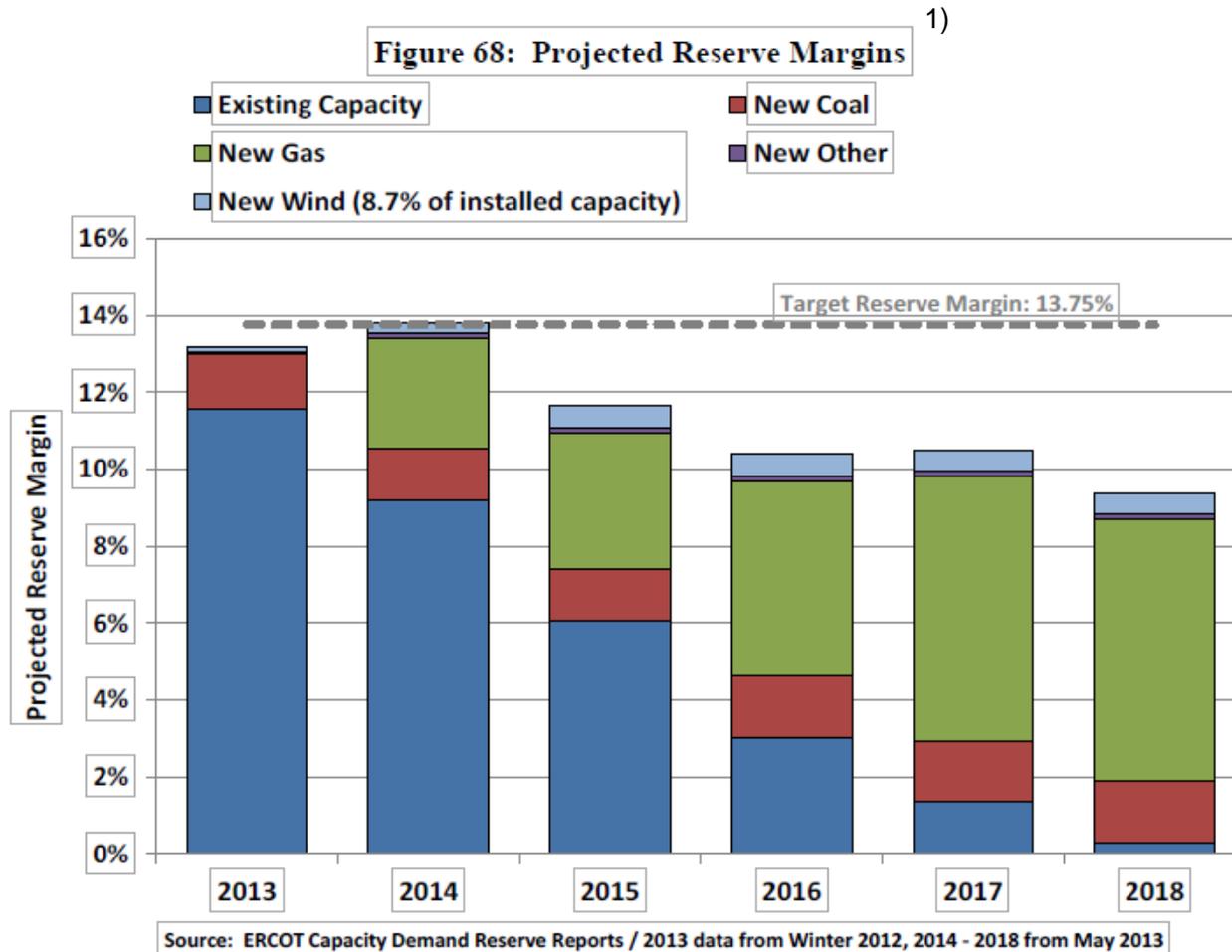
- Resource Requirements and Market Design
- Capacity Market Resource Adequacy Designs
- Shortage Pricing Mechanisms
- Reserve Shortage Pricing and Resource Adequacy

# Resource Requirements and Market Design

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Did the ERCOT energy-only market fail to elicit needed investment in new capacity or were people not listening to the message the energy-only market was sending?

# Resource Requirements and Market Design



Corrected Margin <sup>2)</sup>      16.7      16.7      17.2      17.9      16.4

1) Potomac Economics Ltd, 2012 State of the Market Report for the ERCOT Wholesale Electricity Markets, June 2013 p. 90

2) Kenneth W. Anderson Jr, Memo, February 5, 2014 re Project 40000

# Resource Requirements and Market Design

Overly optimistic load forecasts are not limited to ERCOT. In capacity market systems, planners' load forecasts determine capacity requirements. In energy only markets, market load forecasts determine capacity.

	PJM Projected Peak Load	Weather Adjusted Peak Load*
2010-2011	144,592	135,080
2011-2012	145,208	134,325
2012-2013	144,857	136,595
2013-2014	147,270	

\*Adjusted for changes in RTO configuration  
Source: RPM Base Residual Auction Parameters

# Resource Requirements and Market Design

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The frequency of reserve shortage hours depends on the design of an energy-only market or of a capacity market, not whether it is an energy-only market or a capacity market.

- There is some level of reserve shortage prices that will incent the resource mix needed to produce the desired level of reliability;
- Market expectations regarding resource needs are of course not always correct.
- Planner expectations regarding resource needs are also not always correct.

# Resource Requirements and Market Design

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The level of reliability is not determined simply by the nominal reserve margins, it also depends on the characteristics of the resources providing capacity (such as intermittency, start-time, forced outage rate, ramp rate, energy limits) and their performance.

- A given nominal level of capacity will likely not provide the same level of reliability in a capacity market system as in an energy-only market design.

# Capacity Market Resource Adequacy Designs

The process of determining capacity requirements is just one of the many intractable problems in implementing capacity market designs in the real world.

- What counts as capacity must be defined by rules rather than outcomes, e.g. what is the “capacity” value of a megawatt of coastal wind, inland wind, solar, bio mass, summer only demand response, gas fired generation subject to gas LDC curtailment,...
- Supplier performance incentives must be provided through capacity market rules rather than by spot energy prices.
- Locational requirements and incentives must be provided through capacity market rules rather than by spot energy prices.

# Capacity Market Resource Adequacy Designs

- Identifying the exercise of buyer or seller market power is at least much more complex than in an energy market, if not simply impossible.
- Power consumer conservation incentives must be provided through capacity market rules (demand response) rather than through consumer response to high energy prices.
- Accurately assigning capacity market obligations to consumers is conceptually and administratively complex, particularly in a retail access electricity market.
- Resource requirements to meet power demand are determined based on planning forecasts rather than market based evaluations.

# Shortage Pricing Mechanism

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There has been, however, a fundamental weakness in ERCOT's current resource adequacy design – the shortage pricing mechanism.

- Hockey stick bids and "small fish swim free" cannot provide a reliable shortage pricing signal to support resource adequacy.
- Hockey stick bids cannot be counted on to set high prices during shortage conditions.
- "Small fish swim free" bidding will at times lead to high prices when there is not a shortage.

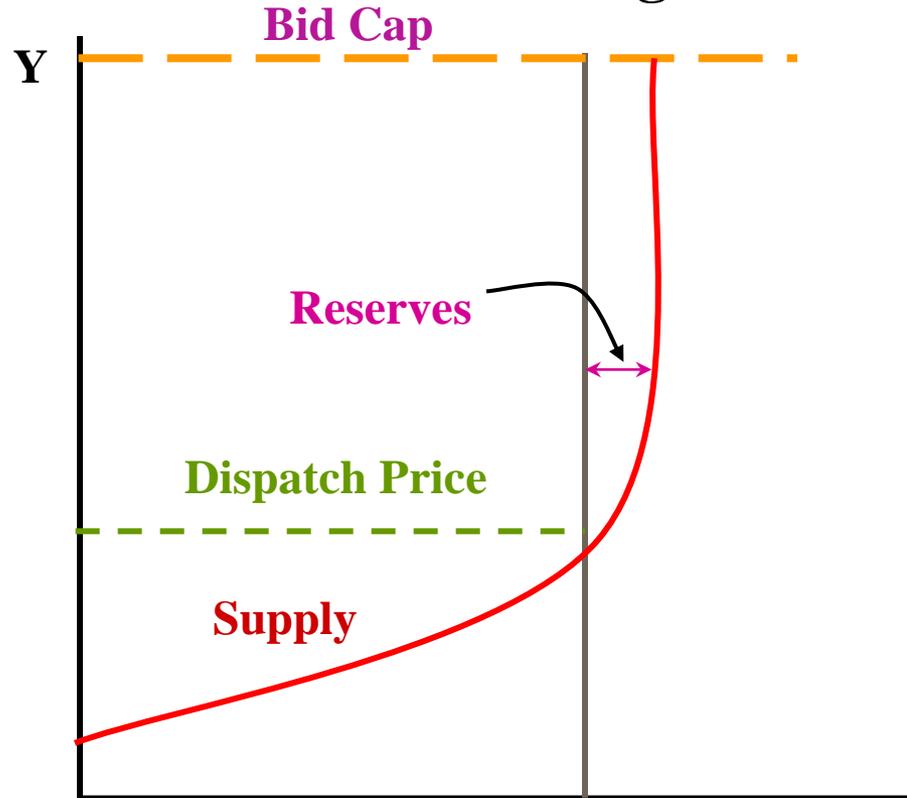
# Shortage Pricing Mechanism

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The kludges needed to make hockey stick bids send even an erratic price signal for resource adequacy will hinder or prevent ERCOT from addressing other operational needs.

# Shortage Pricing Mechanism

## Hockey Stick Bidding with Reserves in a Shortage



# Shortage Pricing Mechanism

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If the system operator shifts reserves across units in real time to minimize costs, hockey stick bids on a few megawatts of output will not impact energy prices, even during shortage conditions.

- Capacity with a high offer price will provide reserves, and energy prices will not reflect shortage conditions.
- If the system operator releases reserves as needed to meet load, hockey stick bids cannot possibly provide an efficient signal for shortage conditions.

# Shortage Pricing Mechanism

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These issues are not hypothetical:

"During the first year of nodal market operation when non-spinning reserves were deployed (converted to energy), prices rarely reflected the marginal cost of the auction being taken....Real-time energy price formation has been improved, but the current mechanism is sub-optimal from a reliability and efficiency perspective."

# Shortage Pricing Mechanism

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“During times when there are shortages of supply offers available for dispatch and Responsive Reserves are deployed...the value of the foregone reserves ..should be reflected in energy prices to achieve efficient economic signals governing investment in generation, demand response and transmission. Unfortunately, ERCOT’s dispatch software does not recognize that load has been curtailed, and computes prices based on supplying only the remaining load.”

# Reserve Shortage Pricing

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The ability of an energy-only market to incent the construction of the resources needed to reliably meet load depends critically on the price signal provided by energy and ancillary service prices during scarcity conditions.

- This price signal is best provided by appropriate values of ISO/regulator determined shortage prices rather than by offer prices and offer price caps.

# Reserve Shortage Pricing

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The Operating Reserve Demand Curve concept embodied in "Interim Solution B+" would implement a more complete form of real-time shortage pricing in ERCOT.

- Energy and reserve prices would be set in part based on the level of reserves available in real-time relative to the reliability target.
- More of the pricing anomalies that have plagued ERCOT under high load conditions would be eliminated or reduced.
- Seller market power concerns would be addressed because settlement prices would reflect shortage conditions without the need for high offer prices.

# Reserve Shortage Pricing

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Interim Solution B + is just the first step:

- ERCOT needs to go all the way, to implement real-time reserve shortage pricing with co-optimization of energy and ancillary services in real-time like the designs employed by the New York ISO and MISO.

# Reserve Shortage Pricing

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A longer term benefit from implementing real-time reserve shortage pricing and co-optimization of energy and reserves in real-time is that this would provide ERCOT with a more flexible core market design that would support further market enhancements, such as:

- Increased demand side participation in ancillary service markets.
- More flexibility in the real-time dispatch to better accommodate the variability of intermittent resources.
- Ramp capability dispatch and pricing.

# Reserve Shortage Pricing

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ERCOT needs better real-time reserve shortage pricing in the long-run, whether or not it implements a capacity market.

- Capacity markets provide the "missing money" but they also create missing incentives," unless supported by effective and efficient real-time shortage pricing;
- These missing incentives are becoming more, not less of an issue, as the peak output of intermittent resources increases, and resource adequacy needs shift from "capacity" to "flexible capacity."

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