



Whitepaper

ERCOT'S RMR Decision Jeopardizes Market

Authors: Judah Rose, Aditi Moorthy, Pat Milligan, Dinesh Madan, ICF

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- The recent ERCOT decision to adopt a Reliability Must Run (RMR) contract without adjusting the market structure more broadly fails to protect the market's efficiency and price signals.
- RMR adoption threatens to create excessive swings between excess reliability and under-reliability.
- Buyers and sellers need to avoid being lulled into over-complacency and underestimating the remaining albeit suppressed risks of low scarcity prices, especially during normal or subnormal wind conditions.

Executive Summary

RMR contracts, as currently implemented by ERCOT, distort proper market signals and ultimately may undermine rather than enhance reliability. As ERCOT considers further RMR contracts, and in the context of multiple consecutive years of both low energy and scarcity pricing already putting pressure on existing plants, the issue will only grow in importance.

The Electric Reliability Council of Texas (ERCOT) awarded a Reliability Must Run (RMR) contract on June 1, 2016 to NRG's Greens Bayou unit 5, its first since 2011, and was considering awarding another one to Calpine's Clear Lake plant¹. RMR contracts require generators to stay on line and not retire in exchange for cost of service regulation.

The rule structure surrounding RMR units in ERCOT has been under increased scrutiny since ERCOT implemented the Operating Reserve Demand Curve (ORDC) market construct in 2014. The announcement of the RMR contract for Greens Bayou brought renewed criticism, even from NRG itself. Stakeholders such as the Independent Market Monitor argued that the way that RMR capacity is dispatched unfairly depresses real-time pricing for other generators. While ERCOT considered a proposal that purported to help fix the problem with energy pricing, it was ultimately rejected².

How RMR Distorts Price Formation

RMR units are committed to the Reliability Unit Commitment (RUC) process, which addresses incremental needs for capacity from transmission and reliability issues beyond what is produced in an economically optimal outcome. RUC-committed units are required to be online for the given time period in case they are needed to relieve transmission constraints. In the case of slow-start units such as Greens Bayou and Clear Lake, this level of availability requires that the plants ramp up to a minimal level of output, called Low Sustainable Limit (LSL). In this situation, the MW operating, plus all MW which the plant is capable of ramping up to within 30 minutes, are counted as online reserves for calculation of the ORDC price adder. The ORDC price adder, an administratively determined adder, is a function of system operating reserves (supply-demand). When the curve price gets high enough, it is capped at the System Wide Offer Cap or SWOC (see Figure 1).

An RMR contract artificially adds capacity in the system's total potential operating reserves. ERCOT's pricing construct takes into account both the scarcity ORDC price adder and the marginal cost of energy.

ERCOT runs an electrical energy market and all buy- and sell-side entities are required to participate via bids and asks. There is a market-clearing algorithm that sets the price and also adjusts for the price for scarcity. ERCOT seeks to retain a minimum level of reserves to control the system in the event of additional contingencies. That is, even if rolling blackouts are needed to decrease the load, ERCOT needs some supply to ensure it can be done in an orderly manner.

¹ ERCOT reviewed Calpine's notice to suspend its 400-MW, gas-fired Clear Lake Power Plant and preliminarily determined it was needed to support transmission system reliability. On October 12, 2016, ERCOT reversed the preliminary decision, and under the new nodal protocols will not enter into an RMR with Clear Lake. Additionally, on September 16, 2016, the P.U.C opened a new rulemaking (Project. 46369) relating to RMR services.

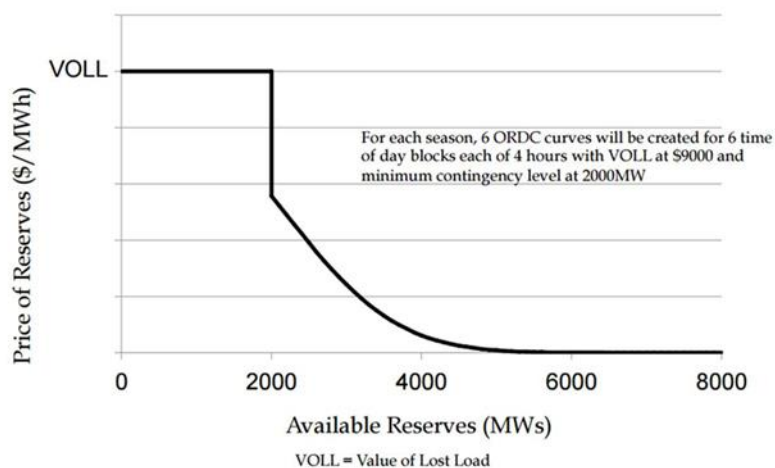
² NRG submitted a nodal protocol revision request NPRR784 to allow SCED dispatch RMR units last in the stack for relieving transmission congestion, thus at higher mitigated offer cap than with prevailing procedures. ERCOT rejected the NPRR784.

In the case when an RMR unit is needed for the purposes of ERCOT-wide system reliability, capacity would be offered at the SWOC. An RMR unit will be dispatched only after all other units in the reserves have been deployed and this dispatch will have no effect on the market.

However, in the case when an RMR unit is dispatched for local reliability and transmission congestion mitigation purposes, its energy offer curves are capped at very low prices, resulting in non-economic dispatch of the unit. Because the available reserves include uneconomical online RMR MW, the ORDC price adder ends up being lower than what it would have been had ERCOT excluded those MW.

An additional problem of the current RMR structure is that since mitigated energy offer curves for RMR units are very low, they also suppress real time energy prices³. Had the unit retired and not been available to mitigate the constraint, by necessity, the energy price would have been higher, and other units would have received compensation to solve the issue.

FIGURE 1: ERCOT ORDC CURVE – SCARCITY PRICING



Source: ERCOT

the span of just approximately 2 GW (see Figure 1). This means that even a small unit like Greens Bayou at 370 MW can have a large effect. However, the energy price component highlights the fact that not only do RMR contracts affect system-wide compensation, they are

The energy price component is likely a much smaller problem than the scarcity price problem, given that slope of the energy offer curve will likely be much smaller and more gradual compared to the ORDC curve, and problems with ORDC affect the entire market not just the load pocket. The ORDC transitions from minimal pricing to \$9,000/MWh over

³ NRG has indicated that its mitigated offer cap for Greens Bayou is in the range of \$50-70/MWh. This was disclosed in its appeal to the Board of Directors for higher mitigated offer caps.

additionally disruptive for local price formation, something ERCOT avoids fixing with the current structure of pricing.

The Locational Argument is Incorrect

Opponents of the considered rule which would have raised the mitigated offer curve stated that since Greens Bayou was contracted specifically to address local reliability issues that would be resolved with the Houston Import Project coming online in 2018, any pricing signals sent due higher offer curve caps would not incentivize new generation, as a transmission solution is already underway. Additionally, the argument was made that subjecting all customers to high prices due to issues in one load pocket was inappropriate.

Claiming that scarcity pricing is unnecessary when it does not result in more capacity misconstrues the role of scarcity pricing in the market. This extra compensation is intended to incentivize construction keep existing units on line, encourage demand-side load reduction and supply-side response like improved generator readiness, and provide resources a fair opportunity to earn a return such that the deregulation does not constitute a taking.

Even if ERCOT had a locational scarcity market with its own ORDC curve, it would not change the need to mitigate the impacts of the RMR via changes to the local ORDC curve and the scarcity pricing algorithm. Until the transmission solution is in place, the generators there are providing for reliability locally, and their compensation should reflect that and provide entry/exit incentives accordingly. Because the Greens Bayou can act as a precedent, one must ask how many other similar locational problems exist that will also trigger price suppression. Most importantly, as long as ERCOT's scarcity pricing mechanisms are not local but system-wide, the price response needs to be system-wide.

Fixing the Market

As others have stated, an RMR unit should be treated economically as if it's not there. This would require two corrections to current market structures⁴.

First, ERCOT should concurrently adjust the scarcity pricing triggers MW-by-MW or ignore the RMR capacity in its estimates of online reserves – either way treats the RMR unit economically as if it had actually retired. This can be visualized as increasing the level of remaining system

⁴ Luminant, in comments filed October 2013 regarding Emergency Response Services (ERS), has argued for exclusion of ERS, RUC and RMR capacity in the ORDC's calculation of operating reserves, stating that inclusion of such capacity would result in price suppressing effects.

capacity (or resources⁵) triggering the administratively-set SWOC by exactly the amount of RMR capacity (370 MW, in the case of Greens Bayou). Using the latter approach, the entire ORDC should shift outward temporarily by 370 MW⁶. However, this is more complicated than simply excluding online RMR capacity from the calculation in the first place. ERCOT has stated that this issue is being discussed currently in stakeholder proceedings.

Second, reliability-based deployment of the RMR unit (which currently occurs at the mitigated offer cap) should be economically corrected for. Once RMR contracting without adjustment is considered likely, market participants are more likely to make the wrong judgments about market entry and exit. The RMR could exacerbate rather than improve ERCOT-wide reliability problems. This is a worrisome development because scarcity has a large impact on whether existing plants should retire or new units should be built, and this decentralized market process is a critical determinant of ERCOT reliability.

Lack of Recent Summer Pricing Due to Wind & Oversupply, not RMR

Scarcity pricing in ERCOT was very low in 2015 and again in 2016 year-to-date, but this was not a function of RMR treatment. In 2016, as we demonstrate in Figure 2, the lack of price spikes was due to record high wind.

During the 2016 peak demand period, the resources available to ERCOT operators were more than 7 GW. This level is much higher compared to the scarcity triggers of approximately 2-4 GW, consequently the scarcity price adder was zero (first column). Even without Green Bayou, the level of resources is so high compared to demand, that the scarcity price adder was zero (second column). Thus, the RMR had no major effect on scarcity pricing.

This was happenstance, however, as wind available at the extremely variable peak broke through previous records⁷. If in 2016, wind blew at levels during the annual peak commensurate with the least wind energy per MW of nameplate capacity⁸, the price adder would have been significantly affected by the RMR (column 3 versus column 4). Therefore, Green Bayou could have had a significant price suppressive effect during the 2016 peak if it was not so windy.

⁵ ERCOT includes interruptible load as a resource similar to supply.

⁶ Structuring the RMR as a contract for differences would permit the bid, while still ensuring that the earning so the plant is at cost of service levels. The key is to minimize market distortion.

⁷ The amount of ERCOT experience with wind performance at the system peak is limited, and hence, this makes surprises more likely. Thus far, August peak demand wind level is uncorrelated with demand so that it can vary from close to zero up to the levels experienced in August 2016's peak (or perhaps more).

⁸ On average, wind capacity contributes 16% of its total nameplate capacity to resources available at the moment of annual system peak typically during the August. The lowest is close to 3% and the highest, experienced in 2016 is 30%. The previous highest contribution was 21%. See ICF's whitepaper "Texan Roulette: Increasing Wind Capacity Raises the Stakes in ERCOT" for more insights on wind development and price spikes in ERCOT.

**FIGURE 2: ERCOT SUPPLY & DEMAND CONDITIONS AT 2016 SUMMER PEAK
(APPROXIMATE GW)**

Parameter	Peak 2016 – Actual Conditions (1)	Peak 2016 – Without Green Bayou RMR (2)	Peak 2016 - Without Green Bayou RMR and Historical Low Wind Levels ⁹ (3)	Peak 2016 - Historical Low Wind Levels with Green Bayou (4)
Non Wind Supply	71	70.4	70.4	71
Wind	4.8	4.8	0.3	0.3
Demand Resource	2.5	2.5	2.5	2.5
Total Resources	78.3	77.7	73.2	73.8
Demand	71.1	71.1	71.1	71.1
Resources-Demand	7.2	6.6	2.1	2.7
ORDC Trigger	4	4	4	4
SWOC Trigger	2	2	2	2
Scarcity Price	None	None	Very High	Moderately High

Source: ICF, ERCOT

ERCOT Must Act to Preserve its Market

While the RMR capacity wasn't a major factor to scarcity pricing this summer due to record high wind output, with less favorable wind conditions the RMR capacity could have depressed ORDC driven prices, seriously undermining confidence in the market. We make this clarification in part because there is a special need for clear information about the ERCOT market. The ORDC by nature will produce high volatility in prices – this was anticipated from the outset and participants should have as clear an understanding as possible given the consequences of inadequate preparation e.g. inadequate hedging.

⁹ Due to low wind levels not change in the nameplate capacity levels.

In sum, ICF believes RMR capacity as currently implemented will suppress prices, but want to guard against the impression that 2015¹⁰ and 2016 scarcity prices were low due to RMR contracts – the effects of this decision have yet to directly and significantly manifest in market scarcity prices. Additionally, although the current RMR scarcity treatment suppresses prices, there is still potential for price spikes. Market participants should avoid thinking that as long as the RMR situation is not fixed, there is no chance of high scarcity. ERCOT should act quickly in this matter, and generically reform the market.

About the Authors



Judah L. Rose joined ICF in 1982 and currently serves as a Managing Director of ICF International. He co-chairs its Energy Advisory and Solution line of business. Mr. Rose has approximately 35 years of experience in the energy industry including in electricity generation, fuels, environmental compliance, planning, finance, forecasting, and transmission. His clients include electric utilities, financial institutions, law firms, government agencies, fuel companies, and Independent Power Producers. Mr. Rose is one of ICF's Distinguished Consultants, an honorary title given to three of ICF's 5,000 employees, and has served on the Board of Directors of ICF International as the Management Shareholder Representative.



Aditi Moorthy is an Associate in ICF's Energy Advisory & Solutions line of business. She has experience analyzing U.S. electricity markets, with strong expertise in California and ERCOT markets. Ms. Moorthy has been involved in numerous projects involving power market valuations, cash-flow forecasts, and energy market forward price curves for a range of clients, including independent power producers (IPP); investment banks; private equity firms and utilities.



Patrick Milligan, is an associate with ICF's Energy Advisory & Solutions line of business with experience modeling supply and demand in wholesale power, generator asset valuation and financial projections in a variety of markets in the United States, particularly the ERCOT market, Mexico and Canada.

¹⁰ RMR was not in place in 2015, and record high wind suppressed prices in 2016 regardless of RMR as discussed.



Dinesh Madan is a Technical Director in ICF's Energy Advisory and Solutions line of business. He joined ICF in 2005 and has been extensively involved in the areas of energy market modeling, wholesale power market assessment, asset valuation and financial modeling, restructuring and litigation support including contract evaluation and risk assessment. Mr. Madan is an expert in US electricity markets, with a special focus on ERCOT and CAISO and with a strong understanding of market design and issues affecting wholesale and retail power markets.

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For more information, contact:

Shanthi Muthiah

shanthi.muthiah@icf.com +1.703.934.3881



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