

ELECTRICITY MARKET DESIGN AND GREEN ENERGY

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Wholesale Market Re-Design in a Fully Decarbonized New England Grid
New England Electricity Restructuring Roundtable

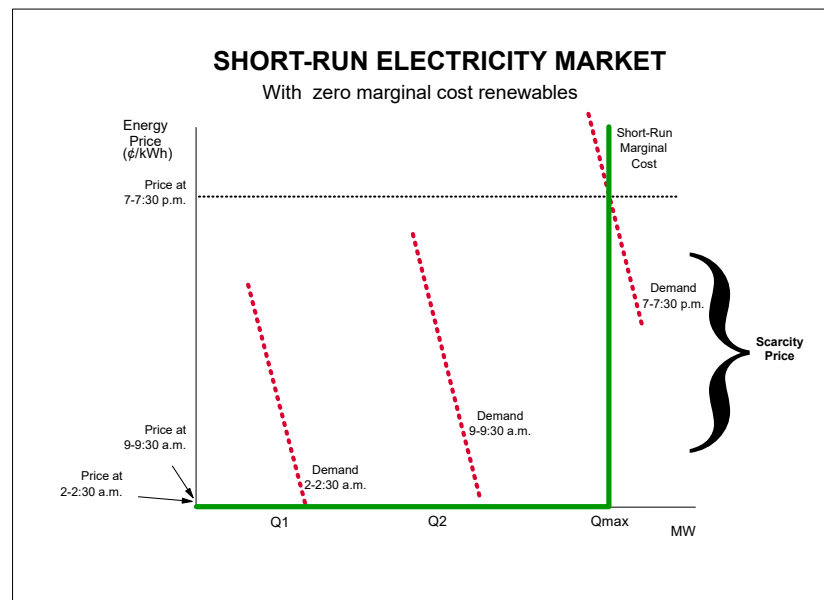
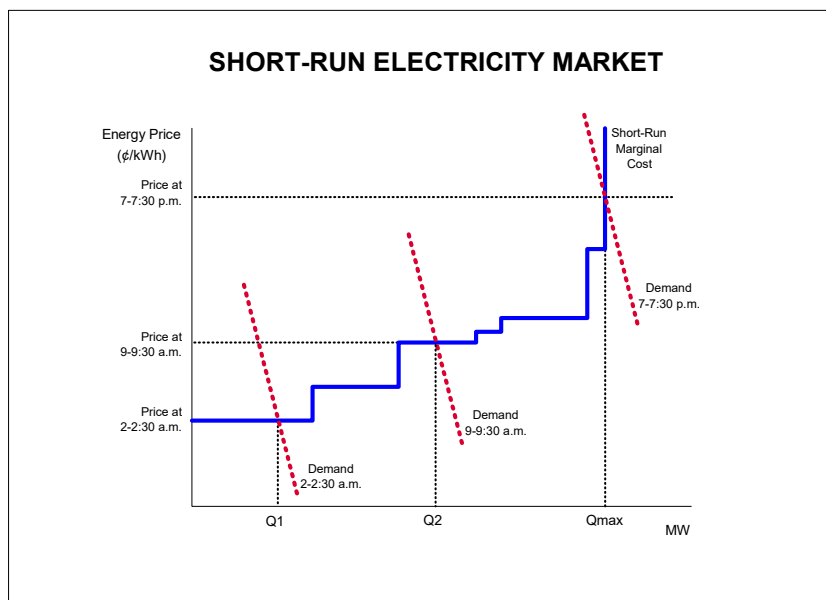
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ELECTRICITY MARKET

Pool Dispatch

An efficient short-run electricity market determines a market clearing price based on conditions of supply and demand balanced in an economic dispatch. Everyone pays or is paid the same price. The thought experiment of a no-carbon/zero-variable-cost, green energy supply reveals that the basic efficiency principles still apply. The same principles apply in an electric network. (Schweppe, Caramanis, Tabors, & Bohn, 1988)

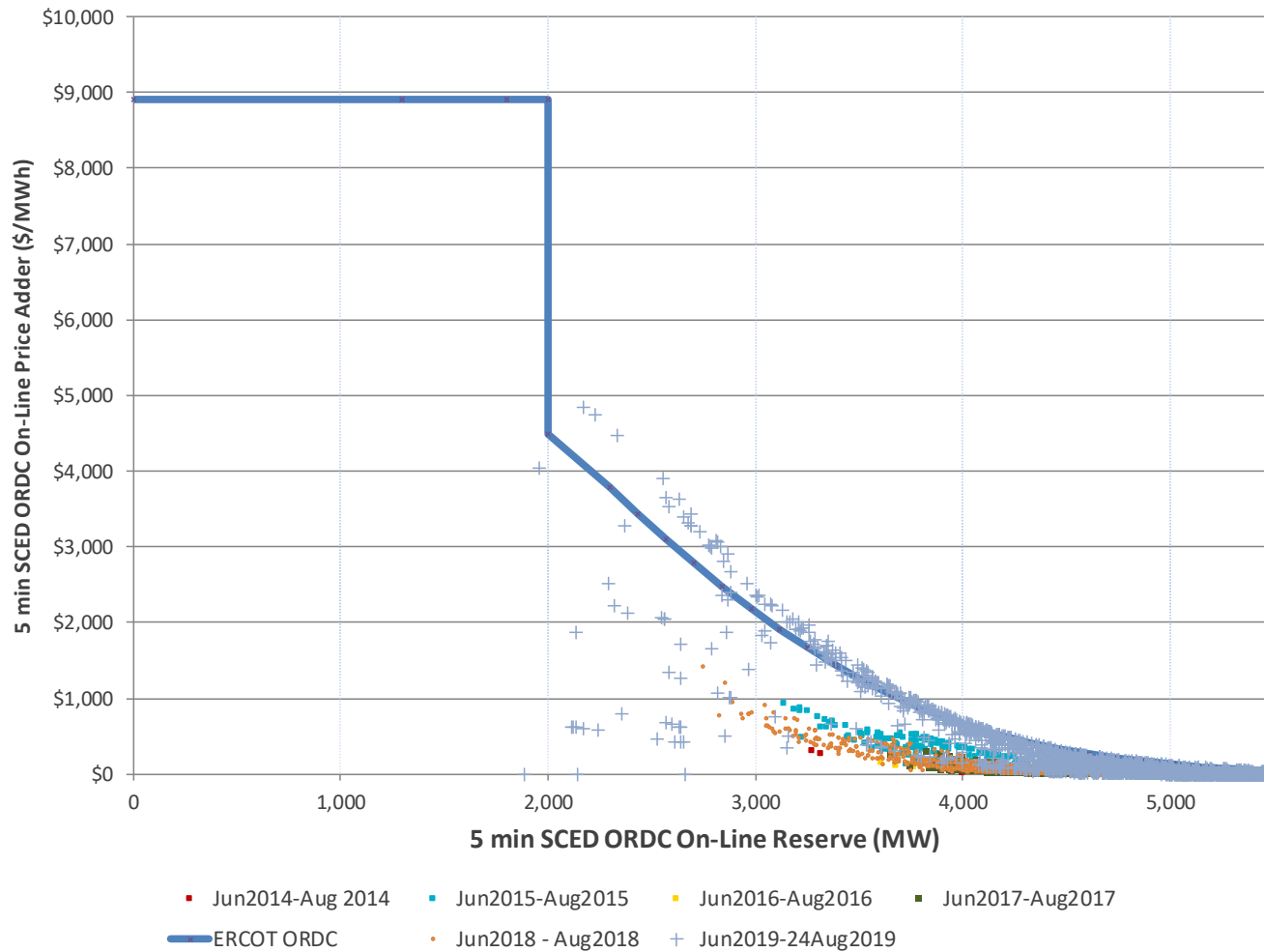


A key feature would be to increase the importance of scarcity pricing. ERCOT adopted an Operating Reserve Demand Curve in 2014. (Hogan, 2013) PJM has proposed a series of reforms for energy price formation, motivated in part by the impact of increased penetration of intermittent renewable resources. (PJM Interconnection, 2017) (PJM Interconnection, 2019)

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ERCOT Scarcity Pricing

In ERCOT the summer peak is the most important period. The first five years of results show recent scarcity of reserves and higher reserve prices.



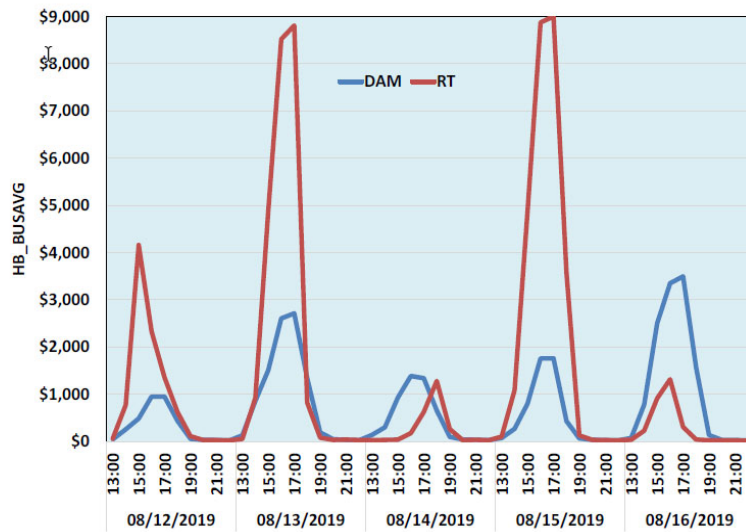
Source: Resmi Surendran, ERCOT, EUCI Presentation, Updated 8/31/2019. The ORDC is illustrative. See also (Hogan & Pope, 2017)

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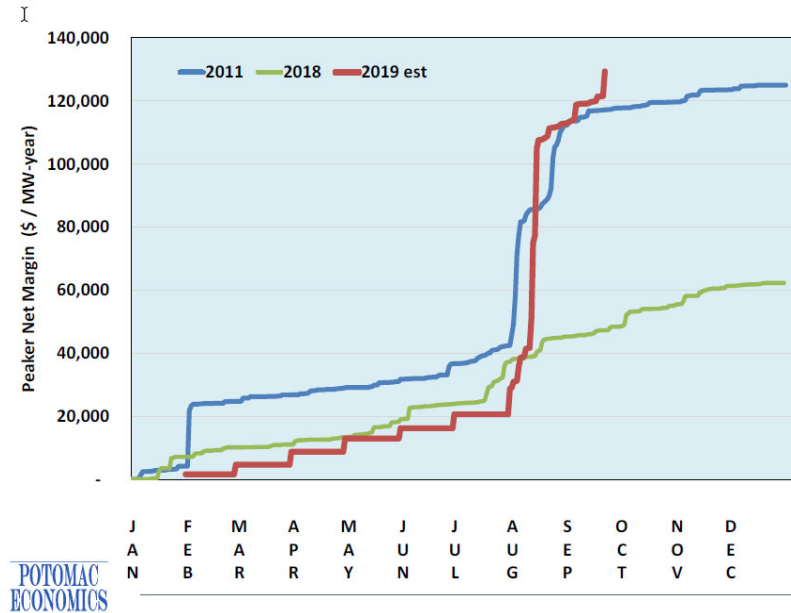
ERCOT Scarcity Pricing

After introduction of the ORDC scarcity prices and the contribution to Peaker Net Margin were low for several years, but this changed in 2019.¹ The PNM target level is \$80,000-\$95,000/MW-Yr. (Potomac Economics, 2019, p. 112)

Day Ahead vs Real-Time Prices



Peaker net margin in 2019 is the highest ever



¹ Beth Garza, "Independent Market Monitor Report," Potomac Economics, ERCOT Board of Directors Meeting Presentation, October 8, 2019.

An ERCOT review of the Summer of 2019 underscored that scarcity pricing was consistent with performance of the system.²

Key Observations for Summer 2019

- Early summer was mild, and August was very hot (September was also above normal).
- There were many days with tight conditions, and an Energy Emergency Alert (EEA) Level 1 was declared twice.
 - Emergency Response Service (ERS) deployments prevented the need for EEA2.
- Peak demand day saw higher Intermittent Renewable Resource (IRR) production.
 - As a result, it was not one of the highest-priced days, and there was no EEA.
- Tightest conditions frequently occurred earlier than time of peak demand.
- Resource performance continues to outpace historical patterns.
- Overall, the market outcomes supported reliability needs.
- Even with significant pricing events, there were no mass transitions.

Notably, high prices occurred at the right time, and were not socialized through capacity market charges spread over all load.

² Dan Woodfin and Carrie Bivens, “Summer 2019 Operational Review”, ERCOT Board of Directors Meeting Presentation, October 8, 2019.

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