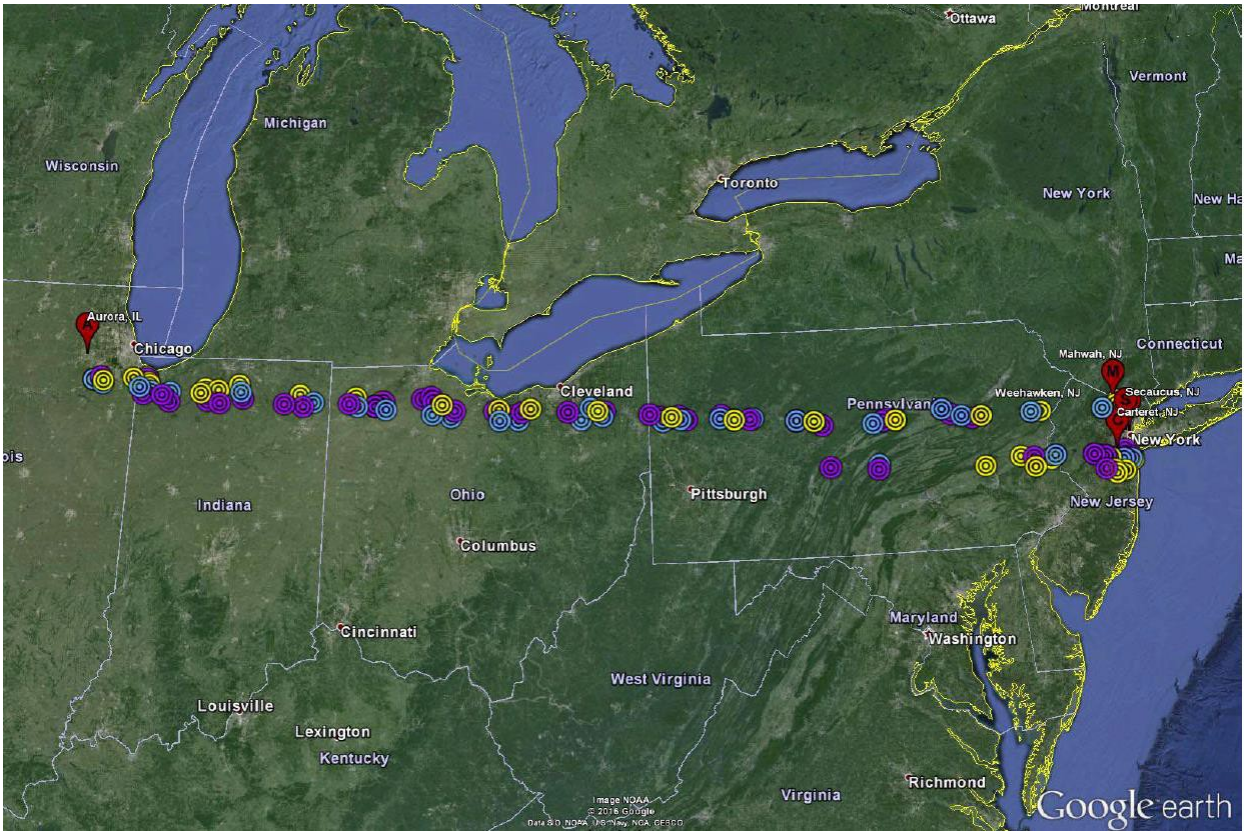


Figure 1. Microwave network paths

The figure maps tower locations of three microwave networks (blue, yellow and purple icons) obtained from the Federal Communications Commission. There are more than three microwave networks between Chicago and New York during our sample period; however, we plot only three to avoid clutter. The remaining networks follow very similar paths. The red markers indicate locations of the CME's data center in Aurora, IL (marker A); the NYSE data center in Mahwah, NJ (marker M); Nasdaq data center in Carteret, NJ (marker C); BATS data center in Weehawken, NJ (marker W); and Direct Edge data center in Secaucus, NJ (marker S).

Source: Shkililko and Sokolov, "Every Cloud has a Silver Lining: Fast Trading, Microwave Connectivity and Trading Costs"

Figure 3. A typical weather front
As a weather front moves over the microwave paths, it disrupts data transmission forcing trading firms to fall back on the fiber-optic cable.

Source: Shkililko and Sokolov, "Every Cloud has a Silver Lining: Fast Trading, Microwave Connectivity and Trading Costs"

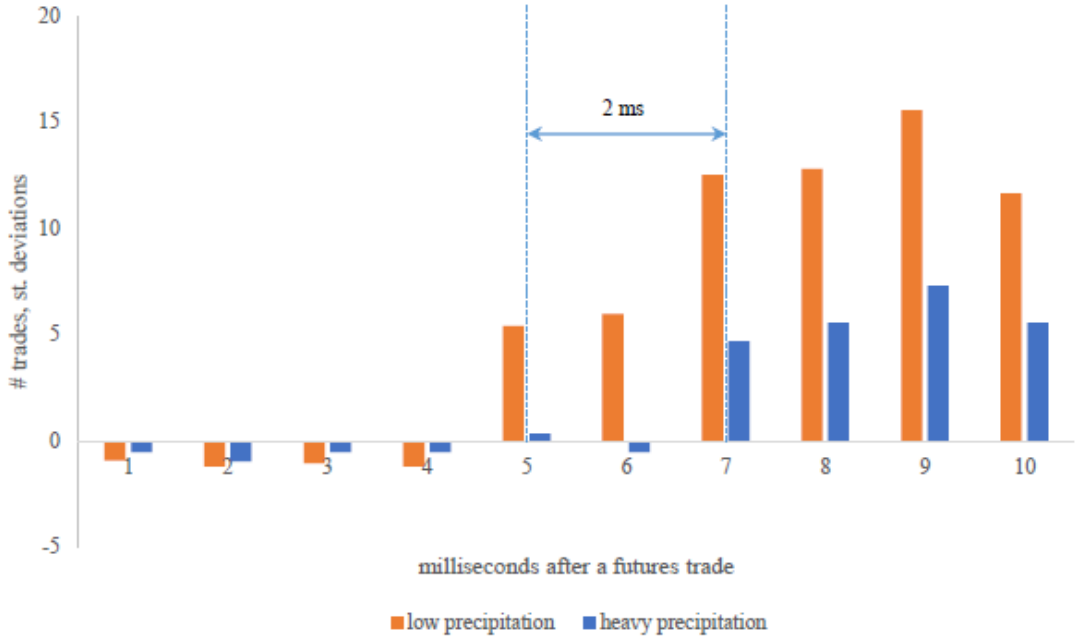
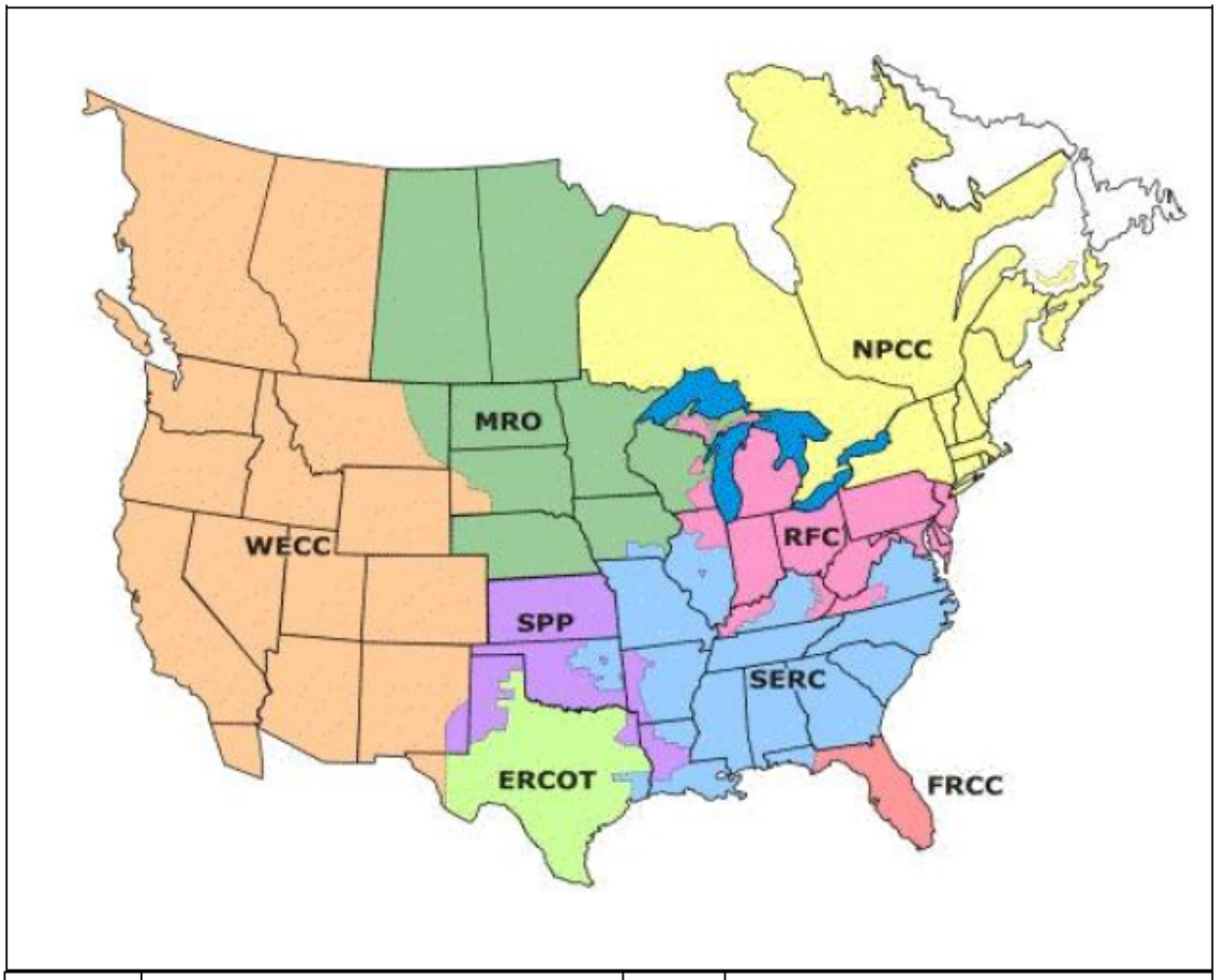


Figure 4. Equity trades after a futures trade during low and heavy precipitation episodes
The figure reports a timeline of equity trades that follow a futures trade. Orange bars represent periods of zero or very low precipitation ($PRECIP2<0$), and blue bars represent periods of heavy precipitation ($PRECIP2>1$) when the microwave networks are disrupted. The number of trades is standardized on an asset by asset basis to allow for cross-sectional comparability. We focus on the standalone futures trades ($t = 0$), those not preceded by another futures or equity trade in the previous 100 milliseconds. Note: light covers the distance from Chicago to New York in 4 milliseconds (ms), the microwave signal covers this distance in about 4.5 ms, and the same signal takes 6.5 ms to cover the distance through fiber. During our sample period, the CME clock lags DTAQ by about one millisecond, and we adjust for this lag. The 2-ms advantage of the fastest traders is evident even without the adjustment.

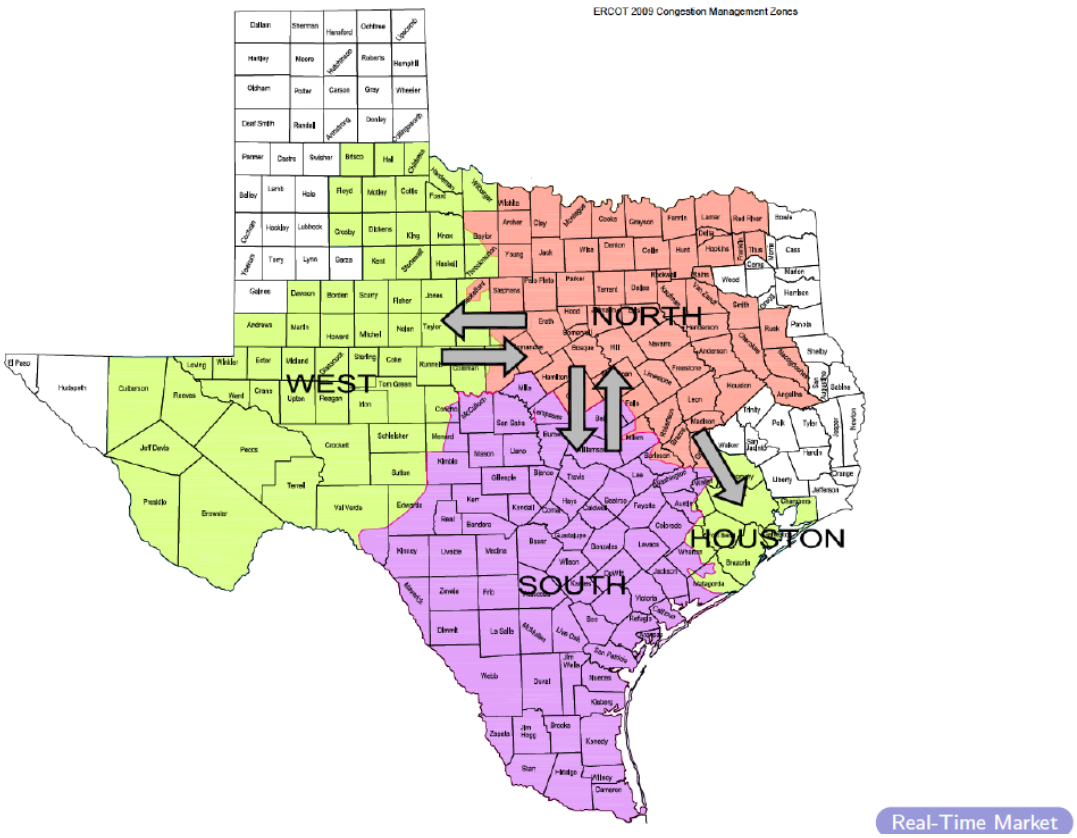
Source: Shkililko and Sokolov, "Every Cloud has a Silver Lining: Fast Trading, Microwave Connectivity and Trading Costs"



ERCOT	Electric Reliability Council of Texas	**RFC**	Reliability*First* Corporation
FRCC	Florida Reliability Coordinating Council	**SERC**	Southeastern Electric Reliability Council
MRO	Midwest Reliability Organization	**SPP**	Southwest Power Pool
NPCC	Northeast Power Coordinating Council	**WECC**	Western Electricity Coordinating Council

Source: U.S. Dept. of Energy, Energy Information Administration

Source: Cain and Lesser (2007), "A Common Sense Guide to Wholesale Electric Markets," *Bates White Report*



Source: Cristian Hernandez

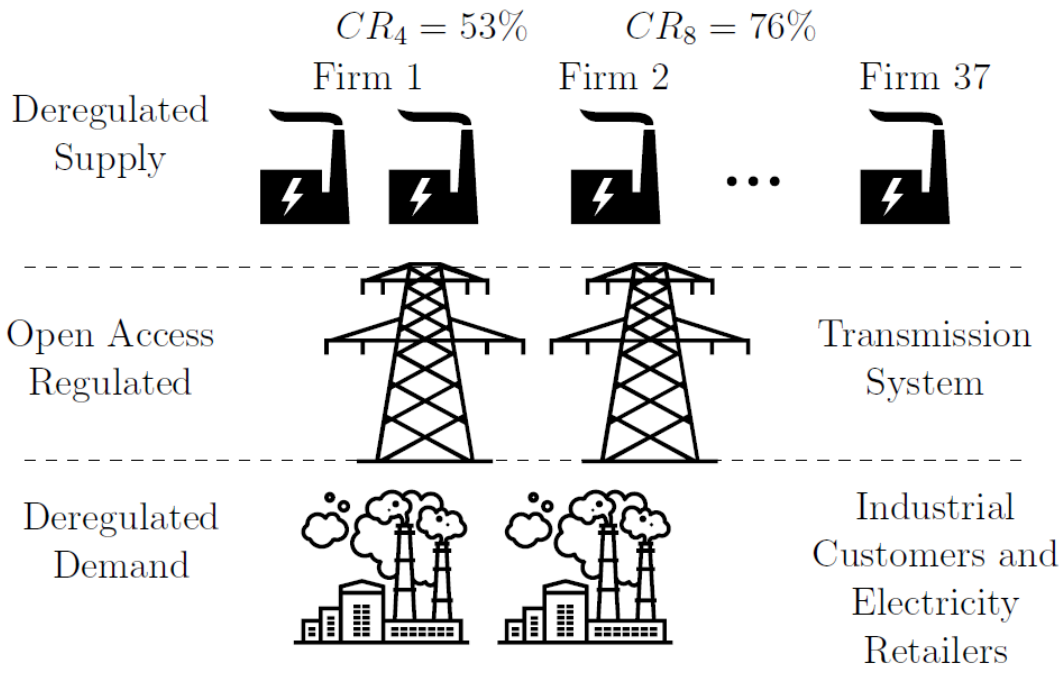
Coal and Gas Plants Produced 82% of Electricity in 2009

Plant Type	Number of Plants	Capacity (MW)	Output (GWh)	Output Share
Natural Gas	116	63,922	162,804	0.483
Coal	16	20,993	112,387	0.333
Nuclear	2	5,139	41,498	0.123
Wind	56	8,606	17,968	0.053
Oil	6	281	1,251	0.004
Hydro	19	468	519	0.002
Biomass	13	107	409	0.001
Total	228	99,516	336,836	1.000

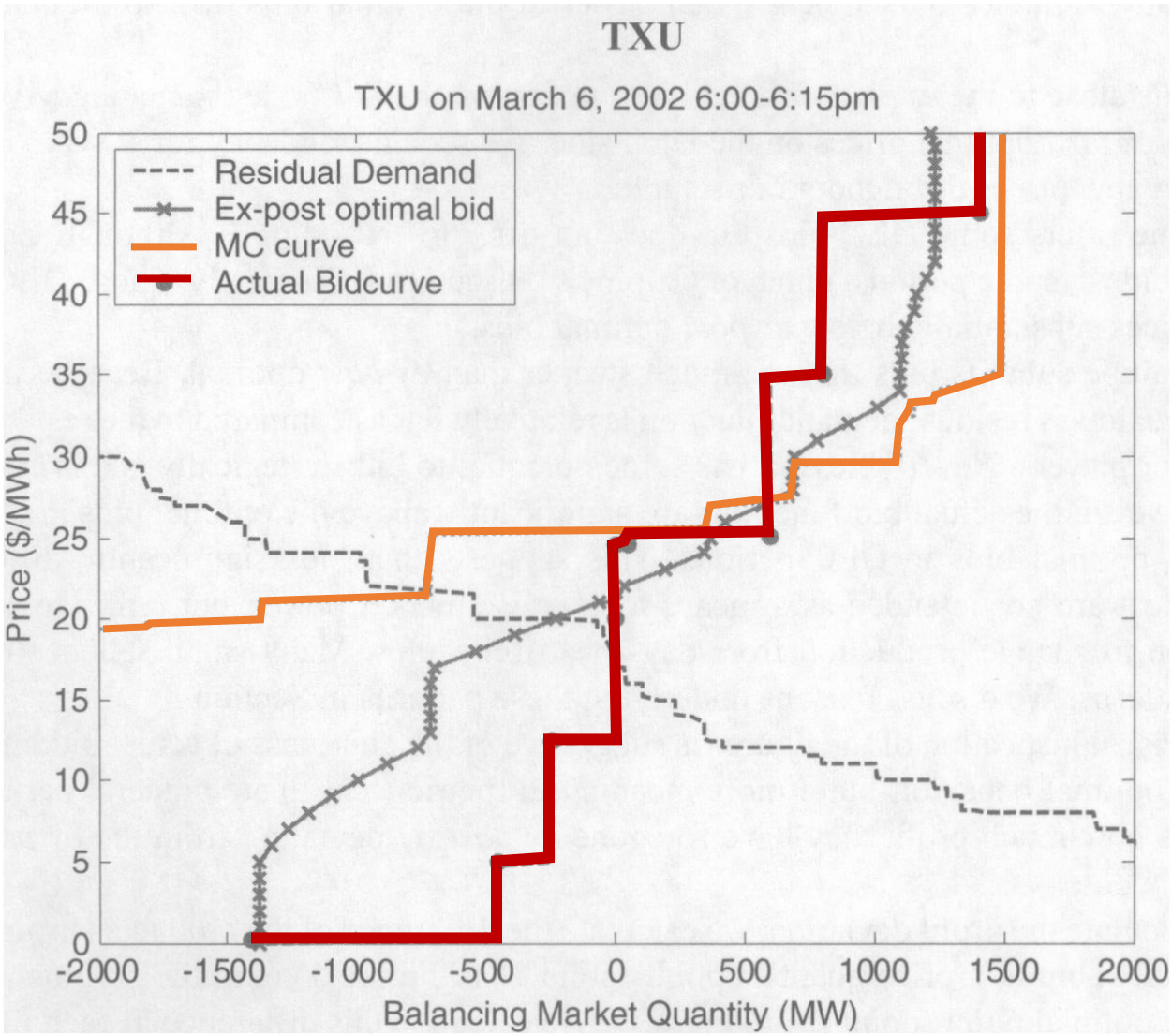
Source: Environmental Protection Agency eGRID

Source: Cristian Hernandez

Texas' Wholesale Electricity Market: ERCOT

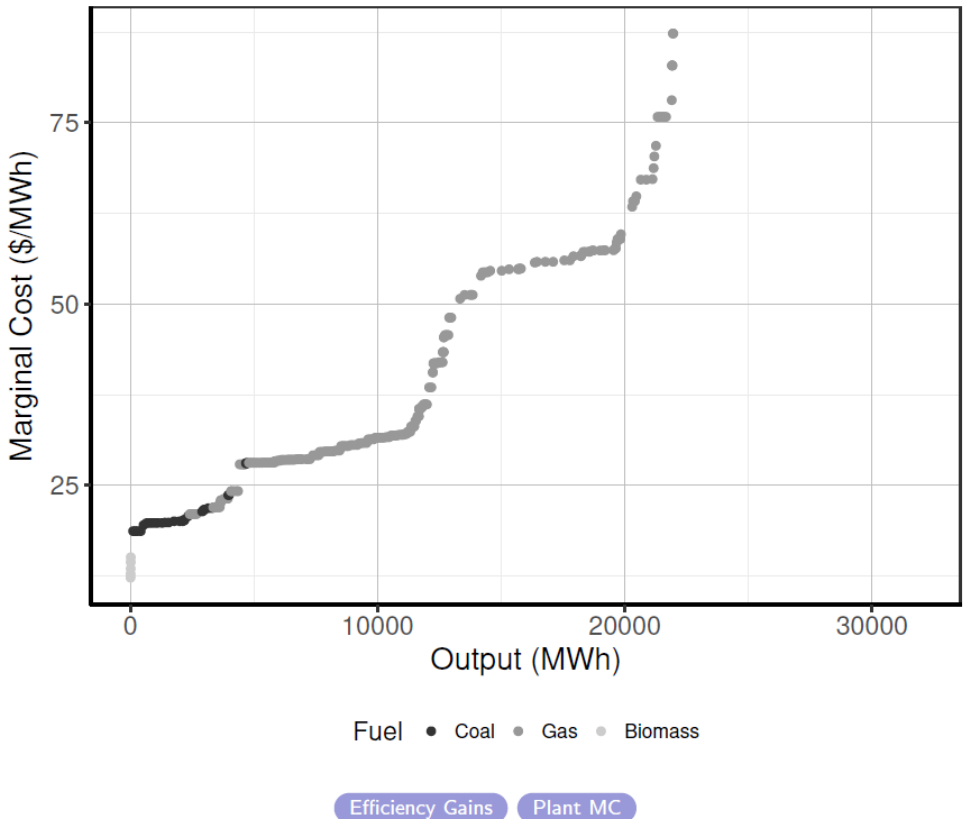


Source: Cristian Hernandez



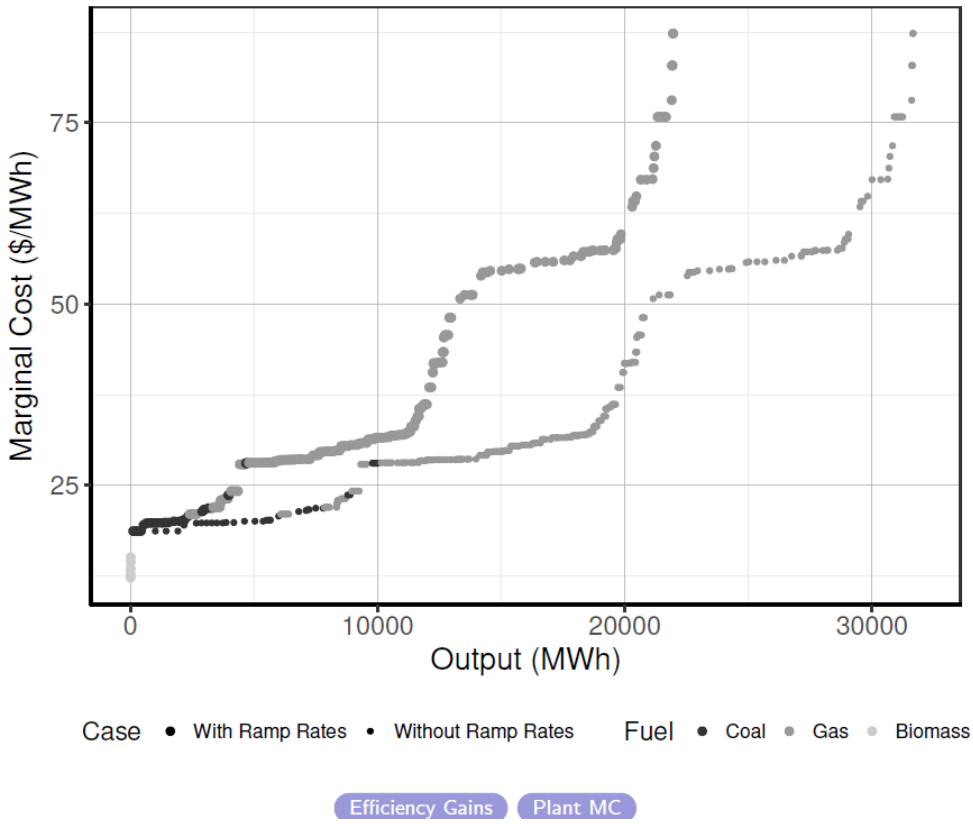
Source: Hortacsu and Puller (2008), "Understanding Strategic Bidding in Multi-Unit Auctions: A Case Study of the Texas Electricity Spot Market," *RAND Journal of Economics* 39.1. Color added for emphasis.

ERCOT Marginal Cost at 6pm on August 8th, 2009



Source: Cristian Hernandez

Ramping Constraints Affect Low Marginal Cost Plants



Source: Cristian Hernandez