

GETTING THE PRICES RIGHT IN PJM
A Summary: April 1998 through June 1999

July 17, 1999
William W. Hogan¹

The connection between prices and operating decisions often receives cursory treatment in the electricity restructuring process. Market participants want flexibility and choice, but object to consistent pricing as too complex. This is a mistake, and produces only an illusion of simplicity. If customers have flexibility in the choice of generation, spot purchases, bilateral transactions, and so on--then prices matter and competitive prices should reflect marginal costs. In large part, control of operating decisions is moving from engineers motivated by principles of technical efficiency, to market participants motivated by prices and profits. This is a major purpose of electricity restructuring--to change the locus of such key decisions. If we want the market to be guided by prices, and we expect and intend for people to take these prices seriously, it becomes important to follow the usual advice to "get the prices right." The experience developing in the first system in the United States with a consistent market pricing system underscores the point and provides empirical heat to help dispel the fog of confusion covering one of the central problems in electricity markets: pricing to allocate use of scarce transmission capacity.

SUMMARY

This graphical summary supplements the more discursive analysis of the pricing experience in the Pennsylvania-New Jersey-Maryland Interconnection (PJM), as found in:

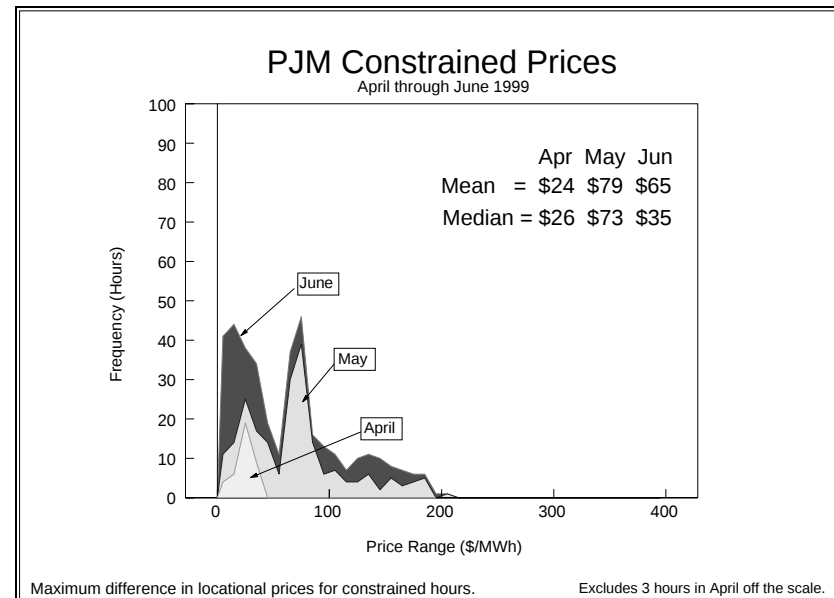
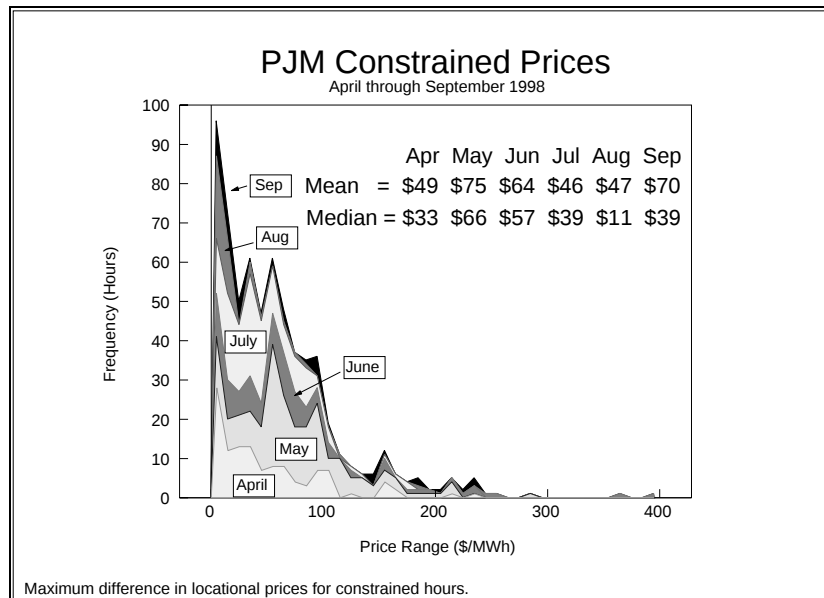
William W. Hogan, "GETTING THE PRICES RIGHT IN PJM. Analysis and Summary: April 1998 through March 1999, The First Anniversary of Full Locational Pricing," April 2, 1999, available through the author's web page; and the earlier discussion in the Electricity Journal, September 1998.

¹ Lucius N. Littauer Professor of Public Policy and Administration, John F. Kennedy School of Government, Harvard University and Director of the Law and Economics Consulting Group. This paper draws on work for the Harvard Electricity Policy Group and the Harvard-Japan Project on Energy and the Environment. The author is or has been a consultant on electric market reform and transmission issues for American National Power, British National Grid Company, GPU Inc. (and the Supporting Companies of PJM), GPU PowerNet Pty Ltd, Duquesne Light Company, Electricity Corporation of New Zealand, National Independent Energy Producers, New York Power Pool, New York Utilities Collaborative, New England Power Company, New England ISO, Niagara Mohawk Corporation, PJM Office of Interconnection, Putnam, Hayes & Bartlett, Inc., San Diego Gas & Electric Corporation, Transenergie, Transpower of New Zealand, Westbrook Power, Williams Energy Group, and Wisconsin Electric Power Company. The views presented here are not necessarily attributable to any of those mentioned, and any remaining errors are solely the responsibility of the author. (<http://ksgwww.harvard.edu/people/whogan>).

April through June, 1999

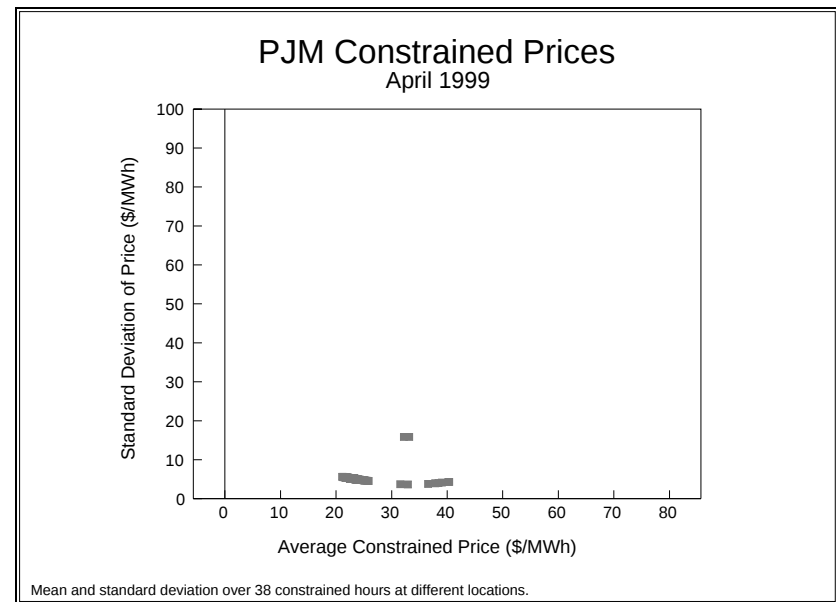
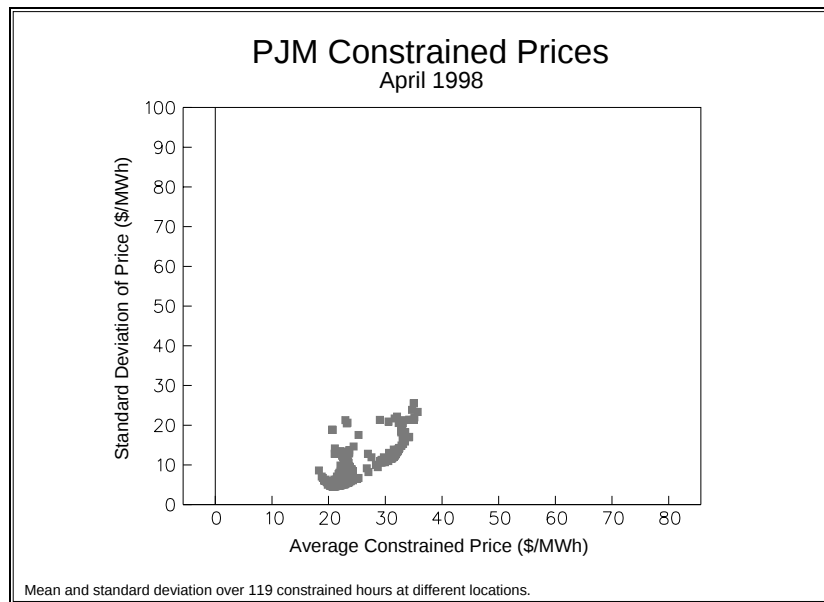
The PJM system uses a bid-based, security-constrained, economic dispatch for the balancing market. When the system confronts transmission constraints, prices can differ at every location. The prices reported by PJM cover approximately two thousand locations. The data for the constrained hours reveal the sometimes substantial effects of transmission congestion. The focus here is on this transmission congestion and locational differences. However, even without congestion, prices have been volatile; but that is another story.

The data for April through June, 1999, reinforce the information from the first year. Although prices and their distribution were not identical with those of the corresponding months in the previous year, they were similar. April was less constrained than a year ago; May and June were about the same as before.

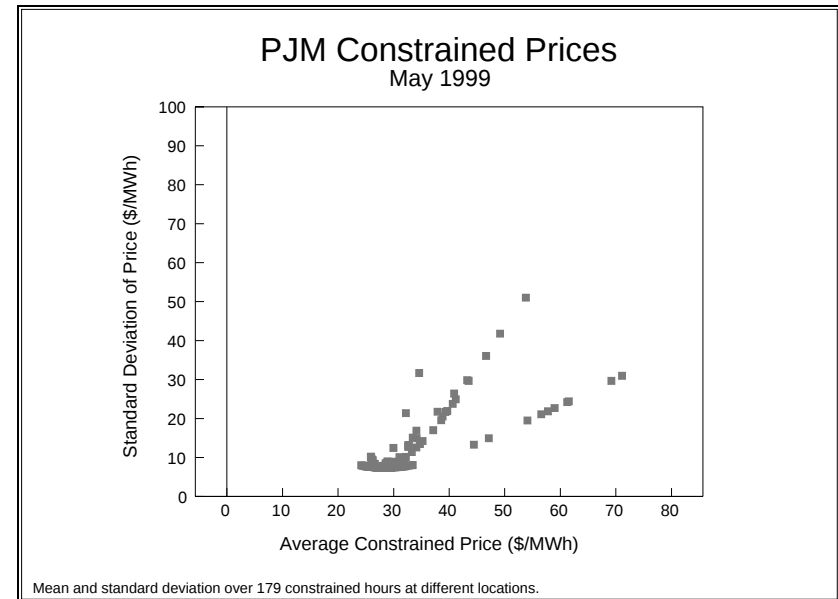
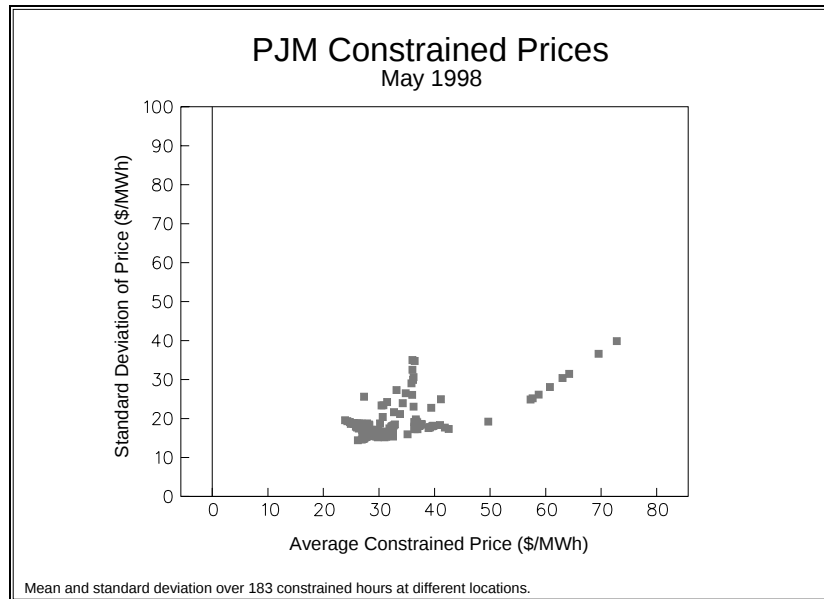


The prices were broadly dispersed. Notably, as of April 1999, generators within PJM were eligible to remove themselves from bid caps, but this did not appear to have much impact on average locational price differences. One simple way to summarize the data is to examine both the average and the variation of prices at different locations during constrained hours. If two locations always have the same prices, then the two averages of prices over the period would be the same and the two standard deviations of the prices would be the same. These conditions would be necessary, but not sufficient, for the prices to be the same at the two locations. Hence, this straightforward calculation gives a lower bound on the number of different locations with sometimes unique prices.

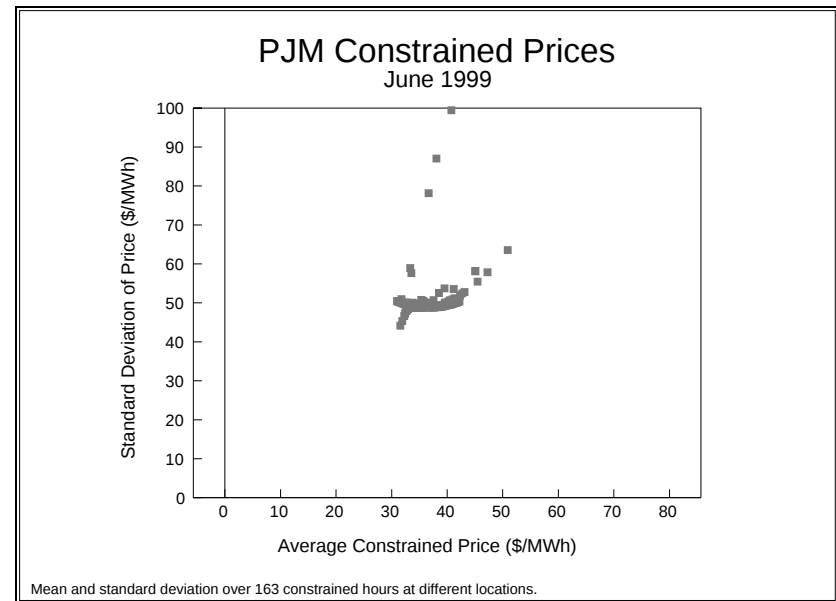
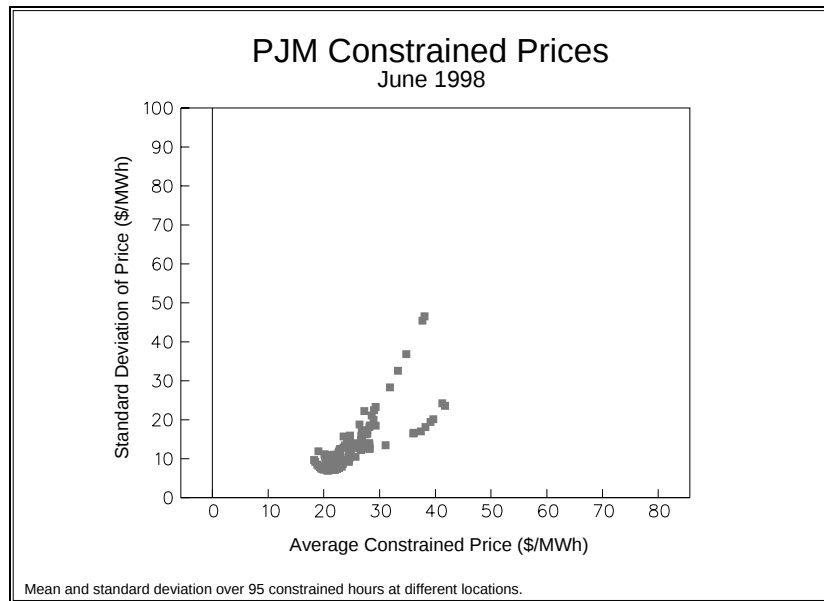
April of 1999 found only 38 constrained hours, with less dispersion in prices than the previous year.



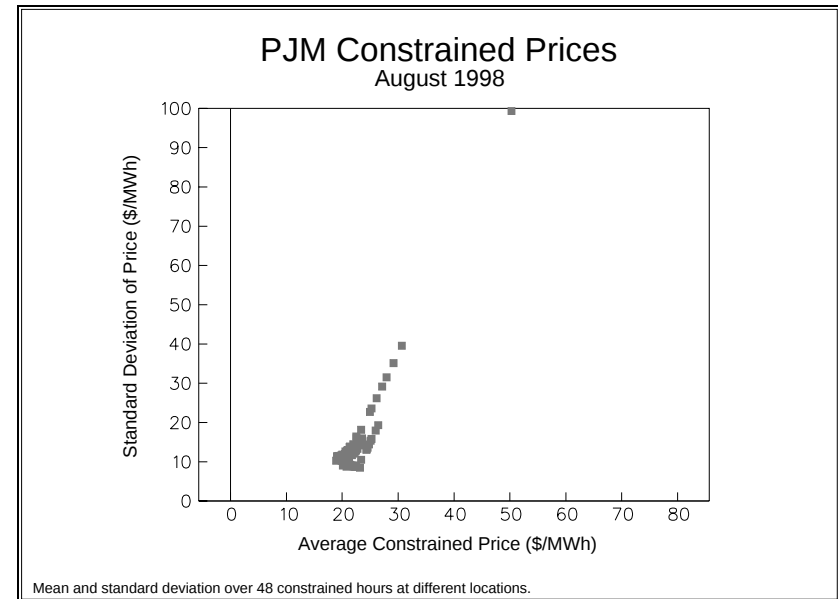
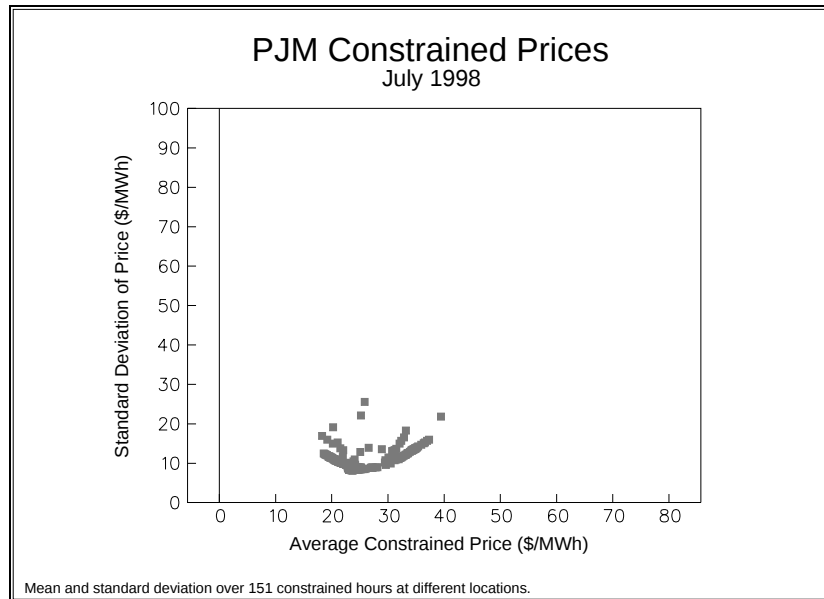
May of 1999 found 179 constrained hours with price dispersion similar to the previous year.

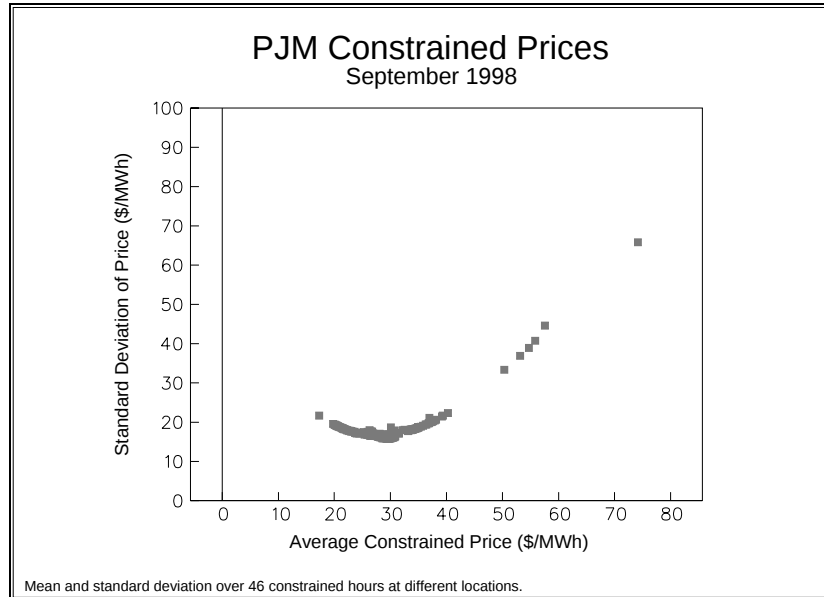


June of 1999 found 163 constrained hours compared to 95 hours the year before. Average constrained prices were higher, and the much higher standard deviation of prices in 1999 indicates greater volatility. The relative dispersion of prices across locations is roughly similar to the previous year.



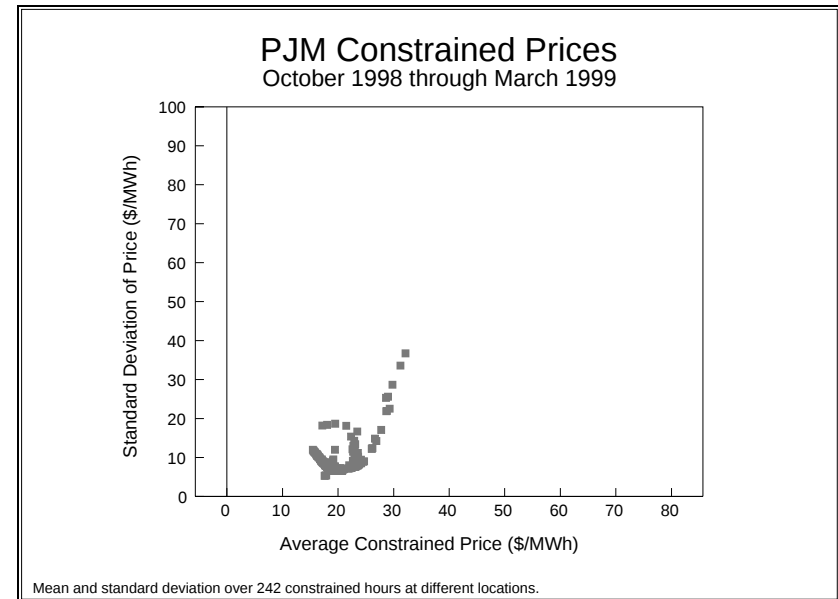
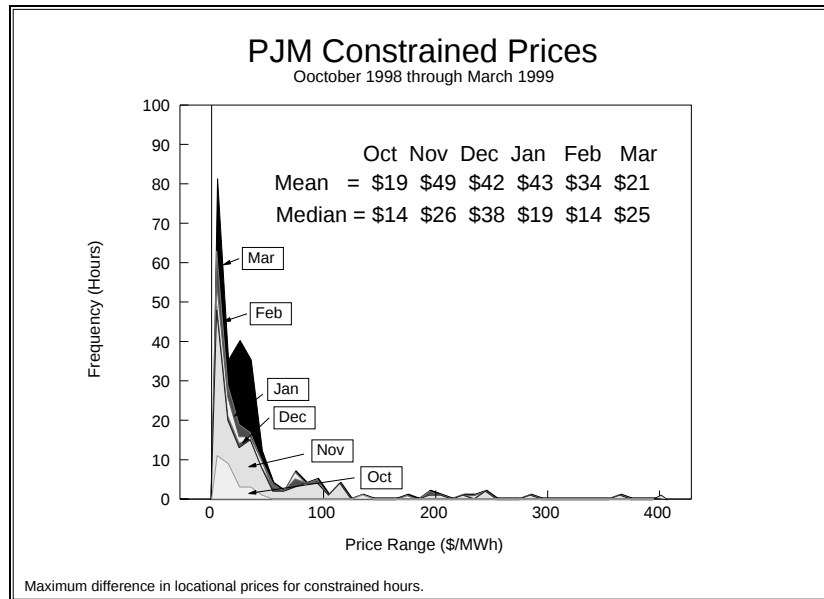
For future reference, we include the corresponding data for the other months of July 1998 through March 1999.





The degree of dispersion gives some indication of the number of "zones" that would be required to capture the real differences in prices. Defining the standard for "close enough" and drawing the boundaries would be contentious, but the controversy may be moot. Using a threshold of \$1 per MWh over the month for the maximum deviation of prices across a zone, the required zones would be as indicated in the following table. Note that the zones would not be the same in each month; hence, to have stable zones over an extended period would require more than one hundred separate zones. This provides no simplification, as has been recognized in PJM. Using the prices for the actual nodes is the simple solution that allows for choice, reinforces market incentives, and provides the opportunity for many other innovations such as financial transmission rights auctioned for the full capacity of the system.

Required Zones in PJM							
	Apr	May	Jun	Jul	Aug	Sept	Oct-Mar
1998-1999	94	83	75	57	52	64	61
1999-2000	22	63	60				



--end--