A CRITIQUE OF FERC'S NEW MERGER GUIDELINES: Implications for Analyzing Market Power, Mergers, and Deregulation

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Introduction

Market power due to utility mergers has historically been of concern to players in, and regulators of, wholesale electricity markets. However, with the promise of deregulated *retail* electricity markets in many states throughout the country and the ensuing merger frenzy, the concern over market power is even greater and is shared by many more stakeholders. The exercise of market power in retail markets is a very important issue that must be given serious consideration both in current utility merger proposals and, more generally, in plans to restructure the generation industry into fully competitive bilateral contract markets and spot markets. In merger-related market power analyses, it will be necessary to distinguish a utility's increase in market power due to merging with another utility from a utility's increase in market power due purely to the introduction of retail competition. It will also be necessary to learn more about the exact conditions that allow for the exercise of market power.

Given the trend to consolidate the ownership of generation facilities and the pending introduction of deregulated electricity prices, the exercise of both *vertical* and *horizontal* market power is a strong possibility. Firms with moderate to high levels of concentration in generation markets and/or with ownership in transmission and distribution facilities may have the ability to increase generation prices above truly competitive levels. In short, the potential ability of firms to exercise market power should be evaluated in light of known or likely changes in corporate structures (e.g., utility merger, utility divestiture of generation assets) and market structures (e.g., retail competition, bilateral contract markets, poolco-type spot markets), as well as in light of the factors which the Federal Energy Regulatory Commission ("FERC") has identified in its new merger guidelines.

FERC's Analytic Screen for Market Power

Overview

In December 1996, FERC put forth an updated Policy Statement that is applicable to proposed mergers between an electric (or an electric-gas) utility with another electric, gas, or electric-gas utility. In our opinion, these new guidelines are a great improvement over FERC's old merger guidelines, which had been in place since 1966 when they were established in the Commonwealth Edison Company Case. Since that time, the changes in technology and public policy in the electric and natural gas industries have been dramatic and necessitate very careful market power analyses. FERC says in its Policy Statement that "we recognize that even in an open access environment, markets may not work perfectly or even well. This is particularly the case during the transition from a monopoly cost-of-service market structure to a competitive market-based industry."[1] The new guidelines provide an up-to-date context in which market power analyses for electric utility mergers should be performed, and follow closely the 1992 Horizontal Merger Guidelines of the Department of Justice (DOJ) and the Federal Trade Commission (FTC) that are applied to mergers in all industries.

FERC's new guidelines also identify some of the complexities of performing a sound market power analysis as part of a merger evaluation. For example, FERC stated that its "guidelines are just that – guidelines. They provide analytical guidance but do not provide a specific recipe to follow. Indeed, applying the guidelines to the electric power industry is one of our biggest analytic challenges, both because the industry is evolving very rapidly and because the industry has some unique features."[2] With regard to the first part of this quote, FERC's message appears to be that the nature of merger filings must change relative to historical submissions to FERC. We agree that any sort of "cookie-cutter approach" would be inadequate in the face of retail competition. With regard to the second part of this quote, we agree completely and think that the analysis of market power in electric and electric-gas mergers is even more complex than FERC indicated in its guidelines.

It is due to these complexities that we believe FERC's latest merger guidelines still have several weaknesses, some more serious than others. Many of these relate to the specific steps of FERC's analytic screen, as we discuss herein. However, one weakness is worth mentioning here in our discussion of the general context in which market power analyses should be performed, rather than in our discussion of the specific steps of FERC's screen. In its guidelines, FERC did not make clear that one must consider the market power that each utility may possess under both wholesale and *retail* competition before the proposed merger occurs, and then consider whether a merger between the two utilities is likely to enhance any existing market power or create market power under both types of competition. This is a significant issue for the market power analyses of utility mergers

[1] Federal Register, Vol. 61, No. 251, page 68603, *2. Discussion*.
[2] Federal Register, Vol. 61, No. 251, page 68600, *C. Use of Guidelines.*

because, as we have mentioned, it emphasizes the importance of distinguishing a utility's increase in market power due to the introduction of retail competition from a utility's increase in market power due to merging with another utility. With the simultaneous flurry of both restructuring and merger activity in this country, it is important to separately determine the relative increase in market power that each factor may cause. For certain utilities, it may be the case that gaining entrance into competitive retail markets would increase their market power much more than merging with another utility would under either wholesale or retail competition. In short, FERC's new analytical framework can easily be applied to evaluating a utility's market power both before and after the introduction of retail competition - its application should not be limited to evaluating mergers. Thus, we believe that FERC's explicit recognition of this fact would be a significant improvement to its guidelines.

FERC's Analytic Screen[3]

In its new guidelines, FERC identified three key factors that should be considered when evaluating a proposed merger: 1) the potential effect on competition, 2) the potential effect on rates[4], and 3) the potential effect on state[5] and federal regulation. It is the potential effect on competition, both wholesale and retail, that is the focus of our attention in this article.

In order to try to identify proposed mergers that could negatively affect competition, FERC adopted the Horizontal Merger Guidelines of the DOJ and the FTC as the basic framework for its guidelines. The Commission's "analytic screen" for detecting potential market power focuses on:

1. identifying relevant product markets;
2. identifying relevant geographic markets;
3. measuring supplier concentration in the identified markets; and
4. evaluating the implications of any changes in concentration.

Regarding the role of FERC's analytic screen, the Commission explicitly stated: "We intend to apply the analytic screen to mergers between firms that are not solely engaged in electricity markets, e.g., electric-gas mergers."[6] However, it is very important to recognize that FERC did not provide any details about the methodological changes that are appropriate and necessary for applying this screen to electric-gas mergers. Thus, this is one of the areas in which FERC's analytic screen could, and should, be improved.

[3] FERC's "Competitive Analysis Screen" is discussed in detail in Appendix A of FERC's Policy Statement.
[4] It is important to note that after the deregulation of generation, rate protection will only apply to the rates for transmission and distribution.
[5] FERC relies on state regulatory commissions to exercise their authority to protect state interests by detecting and mitigating market power. FERC will only step in if state commissions do not have such authority.
[6] Federal Register, Vol. 61, No. 251, page 68610, *D. Other Considerations.*

Below, where we address the four components of FERC's screen, we suggest how each one might be interpreted to analyze an electric-gas merger.

Relevant Product Markets

The first step in FERC's analytic screen is to identify relevant product markets. In general, each product sold by the utilities proposing to merge should be grouped along with those products which, from a buyer's perspective, are good substitutes for each product in order to form a single product market.

Recall the quote we cited earlier in which FERC noted that the electricity industry has some unique features. Indeed, electric product markets differ from other product markets in a number of fundamental ways. In most parts of the country, electricity cannot be stored in significant quantities, it does not have any substitutes for certain end-uses, it does not have many readily available substitutes (at least in the short term) for certain other end-uses, and it can only be transported along existing transmission and distribution lines, which cannot easily be expanded. In addition to these distinct characteristics, electric generating systems typically consist of baseload, cycling, and peaking units. These different units are designed to operate economically over different time intervals and at different capacity factors in order to provide a least-cost mix of different electricity products, which vary widely in terms of price. As we will discuss later, in competitive bilateral contract markets these different generating technologies will likely form the basis for different electric product markets which can be further subdivided into short-, medium-, and long-term submarkets.

In past utility mergers, FERC has differentiated electricity into just three wholesale product markets: non-firm energy, short-term capacity and energy, and long-term capacity and energy. FERC stated in its recent merger guidelines that "these remain reasonable products under the prevailing institutional arrangements..., [although] We would expect to see greater precision in product differentiation as market institutions develop."[7] Regarding the first part of this quote, we would argue that the way in which FERC differentiated wholesale electricity products in the past is no longer reasonable, especially for competitive retail markets. In our opinion, FERC grouped "good" substitutes with "bad" substitutes. For example, FERC did not break down long-term capacity into the three subcategories mentioned above, namely baseload, cycling, and peaking, a break down which we believe is necessary even under "prevailing institutional arrangements."

We believe that the specific structure of competitive markets will help determine how to differentiate different product markets. For those products and services sold in bilateral contract markets, it seems that the three broad product categories would be baseload, cycling, and peaking power. Contracts for these products would be further differentiated into short-, medium-, and long-term contracts, and product delivery would be either firm or interruptible. However, for those services sold in a poolco-type spot market, where

[7] Federal Register, Vol. 61, No. 251, page 68607, *B.1 Identify the Relevant Products.*

there is a single market clearing price in each hour for *all* generation, it seems that the three broad product categories would be peak, shoulder, and off-peak generation on both a daily and seasonal basis.[8] FERC unfortunately appears to have overlooked the critical, yet simple, point that the characteristics of a competitive market structure will help determine how to differentiate product markets from one another. Hence, its guidelines could be improved by including this observation and by illustrating its implications.

It is important to remember that different products may still be grouped in the same product market if they are good substitutes for one another. For example, two successive 10-year contracts for baseload power are probably a good substitute for a one 20-year contract for baseload power, even though the products are differentiated by contract duration. In order to identify good substitutes from the perspective of a buyer in the electricity market, we emphasize that one must consider three factors. First, one must consider end-use services such as space heating / cooling, water heating, cooking, industrial applications, and electric generation. Secondly, one must consider substitute fuels at the end-use. Competition may exist among fuels including electricity, gas, propane, oil, coal, and renewables. Finally, one must consider the characteristics of the end-use customer. For example, different customer groups have different demand elasticities in the short-, medium-, and long-run. In the short-run, a residential customer with electric space heating is unlikely to be able to switch immediately to an alternative fuel if electricity prices spike, whereas an industrial customer may be able to quickly switch to an alternative fuel to operate some pieces of equipment. Since price elasticities of demand are the lowest in the short-run, especially for small consumers, suppliers can exercise price discrimination across customer groups.

Furthermore, the life-cycle economics of end-use equipment may influence the potential market power of an electric supplier. Let's return again to the case of a residential customer with electric space heating equipment who is facing high electricity prices. Since this customer has already paid for the heating equipment, s/he must weigh the total cost of electricity (i.e., the unit price of electricity times the units consumed by the equipment) against, for example, the total cost of natural gas (i.e., the unit price of gas times the units consumed by the equipment) *plus* the cost of the new gas equipment. Whether or not the customer decides to switch to gas will depend, in part, on how old her/his electric space heating equipment is. In general, though, switching from electricity to natural gas will only be cost-effective for this customer when the total cost of electricity, which is driven by the unit price of electricity, becomes high enough to justify the capital investment in new gas equipment. Thus, electricity suppliers may be able to increase their prices that they charge residential space heating customers above competitive levels while still keeping their prices below the "break even point" where customers will switch fuels.[9]

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[8] FERC explicitly cites the possible legitimacy of using time differentiated products, but does not connect this basis for differentiation to the types of market structures. (Federal Register, Vol. 61, No. 251, page 68607, *B.1. Identify the Relevant Products*.)

[9] This scenario assumes that the customer is "rational," in the economic sense of the term.

The above discussion about identifying relevant product markets has important implications for evaluating the market power of either an electric-electric utility merger or an electric-gas utility merger. Clearly, consideration should be given not only to "supply-side" electric product markets but also to contested end-use markets. FERC does not mention this key point in its Policy Statement. Nor does it mention that the life-cycle economics of electric end-use equipment may help determine the pricing power of unregulated suppliers in the short, medium, and long term. Finally, FERC does not mention that in electric-gas utility mergers, the electric generation division may be a gas consumer as well as an electricity producer through its ownership of gas-fired generating units, thereby potentially providing more ways for the entities in an electric-gas merger to exercise market power.

Relevant Geographic Markets

The second step in FERC's analytic screen is to identify the relevant geographic market for each product sold by the merging utilities. This involves identifying the potential suppliers that could compete in each product market. A relevant geographic market in an open access transmission environment should be determined by competitive suppliers' abilities to reach the market both *economically* and *physically*. Making this determination requires a detailed analysis of generation and transmission costs, physical transmission constraints, and the generating capacity at different locations that would actually be available to compete.

FERC explained in its Policy Statement that determining the economic capability of a competitive supplier to reach a market should be accomplished using a "delivered price test," which accounts for the supplier's generation costs and the price of transmission service, including ancillary services and losses.[10] We note that if a gas supplier is being considered, its delivered price may also include the price of storage. According to FERC (and DOJ), potential suppliers should be included in a geographic market if they could deliver the product or acceptable substitutes to a customer at a cost no greater than 5 percent above the competitive price to that customer.[11] However, we believe that a 5 percent price increase is too small to be the appropriate criterion for determining the geographic parameters of most electric product markets. One reason is that within a properly defined electric product market (i.e., a product and its substitutes), the price spread is likely to be significantly greater than 5 percent. A second reason is that a 5 percent price increase is comparable to, or even smaller than, each additional transmission tariff that might have to be paid by a competitive supplier from outside the service territory of the merging utilities. Thus, a 5 percent increase in a product's price might not be big enough to allow competitors outside of the service territory to economically reach the relevant product market. These two reasons, which are expanded upon below, also hold true for defining geographic markets for gas products. The implication of these considerations is that there is a strong interactive linkage between properly defining both product and geographic markets for electricity and gas.

[10] Federal Register, Vol. 61, No. 251, page 68607, *B.3.a Delivered Price Test.*
[11] Federal Register, Vol. 61, No. 251, page 68607, *B.3.a Delivered Price Test.*

Using changes in the delivered price to measure the geographic scope of possible competition within a product market is itself much too simplistic for industries as complex as those for electricity and gas. In the case of the electric industry, a simple price differential test cannot account for the complicated interactions between different generation sources and the system dispatch that together allow different products to substitute for one another in subtle and complex ways. Even just changing the contract duration of an electric or gas product might change the average price by more than 5 percent, and yet the two products might be excellent substitutes for each other. Applying a delivered price test of 5 percent to the electric industry for the purpose of defining geographic markets might make sense if FERC's three traditionally defined wholesale product markets (i.e., non-firm energy, short-term capacity and energy, and long-term capacity and energy) were appropriate for a fully competitive electric industry. For example, if the price of electricity were averaged over the entire load to be served by long-term energy and capacity within a given service territory, then 5 percent might be a large enough price differential to define the geographical boundaries of the relevant product market. However, as we discussed earlier, FERC's three traditionally defined product markets are not appropriate for fully competitive electric bilateral contract markets or spot markets. Thus, price differentials of 5 percent will not be large enough to identify all of the good product substitutes, and the geographical location of their suppliers, that could economically compete in the relevant product market. This point is illustrated in the examples presented below.

In a bilateral contract market for baseload power with load factors between 80-100 percent, a 5 percent price increase would certainly define too small of a range within the full range of prices for this product. For example, if an existing generating unit could offer baseload power at 20 mills per kWh at high load factors, a 5 percent price differential would imply looking only at competing generating units with delivered prices between 20 and 21 mills per kWh.[12] This would probably limit the geographic market to those baseload generators located *within* the merged utility's own service territory because transmission costs would prevent all generators located *outside* of the utility's own service territory from economically competing.[13] (And there may not even be any other units located in the utility's own service territory with a price in this narrow range!) Adding the cost of just one additional transmission tariff would almost certainly add more than 1 mill per kWh to the delivered price of the product, since transmission tariffs average about 5 mills per kWh nationally. Unless a generating unit in a neighboring service territory had a competitive price of less than about 16 mills per kWh for the relevant product, it would not likely be able to compete with a 20 mill per kWh unit in the neighboring service territory. In addition, there may be very few, if any, units actually available that could bid such a low price as 16 mills per kWh. For *all* electric products, where the marginal costs might vary from 10 mills per kWh to 160 mills per kWh, a price

[12] Ibid., FERC uses a very similar example on page 68608, *B.3.a Delivered Price Test.*

[13] Ibid., this would conflict with FERC's assumption that geographical markets would include at least those utilities "directly interconnected to either of the merging parties." (page 68607, *B.2. Geographic Markets: Identify Customers Who May Be Affected by the Merger*.)

differential of only 5 percent would sub-divide the general product market into 56 price brackets. Therefore, if a 5 percent delivered price differential were used, the market power analysis would not only be too complex, but it would also be inaccurate because the relevant geographic market for each electric product would be incorrectly defined much too narrowly. Delivered price differentials as large as 30 - 50 percent may be needed to properly define electricity markets. For example, a delivered price differential of 50 percent would sub-divide the aggregate electricity market into seven price brackets, each representing an electric product market. This may be a large enough number of markets to analyze for signs of market power.

Regarding an electric supplier's *physical* access to customers and markets, we recommend that careful consideration be given to how physical transmission constraints that form load pockets could create or maintain barriers to entry into the generation market and enhance the potential abuse of market power by unregulated generation companies. When evaluating the market power of an electric utility in a contested end-use market, consideration should be given to constraints in both the electric and gas transmission/transportation and distribution systems. For example, a local distribution system for gas may not reach all customers, or control of gas supplies in an electric load pocket might exacerbate utility market power in both fuel industries.

Even if a product from a nearby region could compete economically and physically with a locally supplied electric or gas product, it would only be a viable competitive alternative if it were *available*.[14] For example, if electric generation from a given facility were already under contract, if the facility were down, or if the product could be sold more profitably elsewhere, then it would not be available to compete. All of these considerations imply that the sizes of geographic markets are likely to be different for each different electric and gas product, and they will change over time due to changes in costs (i.e., generation, transmission, ancillary services, losses), physical constraints, and plant availability. Thus, a relevant geographic market may not be nearly so extensive as many electricity analysts (including FERC) assumed in most previous market power studies once all these factors have been taken into account.

This point can be illustrated by FERC's conclusion in the Baltimore Gas and Electric Company (BG&E) / Potomac Electric Power Company (PEPCO) merger case, namely that all of PJM is the relevant market for capacity. While this may be true for low cost baseload units that are dispatched early in the merit order before any transmission congestion might occur, this may not be true for peaking capacity. Since peaking capacity is always dispatched last in the dispatch order, many transmission constraints may already have developed, and peaking units in central Pennsylvania may not be able to physically serve load in northern New Jersey. In addition, the fixed costs of transmission that must be spread over the relatively few hours of operation of a peaking unit may prevent some peaking units from economically competing with other peaking units, even if only one additional transmission tariff must be paid.

[14] Ibid., FERC supports this additional test on page 68608, *B.3.a Delivered Price Test.*

Another analytical weakness of the second step in FERC's analytic screen is that the Commission does not sufficiently stress the need to analyze relevant geographical markets based on major load centers as a focal point. In our view, the potential competition between substitutable supply-side products cannot just be considered in the abstract as FERC has typically done, such as all capacity within PJM. The analysis needs to proceed from the perspective of products competing in different end-use markets of different sizes that are located in different load centers.[15] Seen from this perspective, the geographical boundaries of each product market serving each load center will overlap in very complex patterns, and the ability of generation owners or gas producers to exercise market power in any given load center must be determined *simultaneously* with their ability to exercise market power in all other load centers in which they can compete on an economic, physical, and availability basis. Thus, we believe that in the past, FERC and DOJ have not focused sufficiently on linking electricity supplies to electricity demand in the complex ways indicated above to properly define markets. These complexities are the reason why the methodologies described in DOJ's merger guidelines cannot be used in the electric and gas industries without being revised. As we will discuss below, the only way these complex linkages can be analyzed adequately is via joint simulation modeling of electric and gas systems.

Analyzing Market Concentration

Based on FERC's new guidelines, the Commission will continue to screen mergers for market power using the Herfindahl-Hirschman Index (HHI), presumed to be an indicator of the potential for market power. The HHI is the sum of the squares of the market shares of all of the suppliers in a given market. As examples, a market in which there are five firms with equal market concentrations has an HHI of 2,000, and ten such firms means an HHI of 1,000. The DOJ and the FTC consider a market "unconcentrated" if its HHI falls below 1,000, "moderately concentrated" if its HHI lies between 1,000 and 1,800, and "highly concentrated" if its HHI is in excess of 1,800. These generic breakpoints in the full range of HHI values, called "safe harbors," have been adopted by FERC. It is important to understand that FERC is simply assuming that these safe harbors, which have in the past been applied to other industries, are valid for the electric industry. We believe that this assumption is a major weakness of FERC's new merger guidelines.

FERC correctly points out that "supply and demand conditions in electricity markets vary substantially over time, and the market [power] analysis must take these varying conditions into account. Applicants should present *separate analyses* [emphasis added] for each of the major periods when supply and demand conditions are similar."[16]

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[15] Ibid., FERC's only discussion of the need to focus on load occurs on page 68607 when it states that "applicants are expected to provide product-specific delivered price estimates for each destination market or customer."

[16] Federal Register, Vol. 61, No. 251, page 68607, *B.3. Geographic Markets: Identify Potential Suppliers to Each Identified Customer.*

Because a separate market power analysis must be done for each product market identified, FERC explicitly states that "concentration statistics should be calculated using the capacity measures discussed above for each relevant market identified."[17] FERC also explicitly states that this means that the HHI and single firm market shares must be presented for each product, for each geographical market, for each key time period, etc. If taken literally, this implies the need for dozens, if not hundreds, of HHI calculations. Then, the pre- and post-merger results need to be compared.

It is important to note that FERC's requirement for HHI values for *each* electric market is a significant change relative to the way market power studies have been done in the past. However, this new approach was not taken by Baltimore Gas and Electric Company (BG&E) and Potomac Electric Power Company (PEPCO) in their analysis of market power in wholesale power markets impacted by their merger, even though this was the first merger approved by FERC since its new guidelines were issued. FERC's new requirement is also significant because it raises a very important conceptual problem that FERC seems to have ignored, namely the problem of how it will interpret the results of potentially dozens of HHI values for different products impacted by a single merger. In other words, how should an analyst weigh the results of how each HHI value compares to the generic safe harbors (which may not even be appropriate for the electric industry) in order to reach a "bottom-line" conclusion as to whether a merger will increase market power by too great an extent. Some of the changes in HHI values for a given product may pass the generic safe harbors, and some may not. What then?[18] If the index were tailored properly to each particular type of market structure, then from the definition of the index one would know how the results for each sub-market should be combined to produce a valid index of market power for the entire market. In short, there is a major omission in FERC's new market power guidelines, namely a "recipe" for how to reach an overall conclusion. Without such a recipe, one could argue that FERC's analytic screen is incomplete. However, as we discuss later, there is a solution, namely simulation modeling.

We believe that the reason why this serious conceptual problem arises in the first place is because the HHI is far too simplistic an index to measure market power in an industry as complex as the electric industry. While the HHI may or may not be a useful tool to assess the potential for market power in other industries, we do not believe that it is an appropriate measure for analyzing market power in the electric industry. This is true from both an empirical and a theoretical perspective. Thus, as we will describe below, we see no need for use of the HHI, but rather a need for a very different overall approach to analyzing market power.

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[17] Federal Register, Vol. 61, No. 251, page 68608, *B.4. Analyze Concentration.*

[18] FERC suggests that if some products do not pass the HHI test and some do, "remedial conditions would be explored at this stage" for the products that do not pass. (Federal Register, Vol. 61, No. 251, page 68607, *A. Consistency With DOJ Guidelines.*) We would argue that one should not do a separate mitigation analysis for each for each product market differentiated by time period and region, as FERC suggests. Mitigation strategies for each product market must be coordinated.

First of all, there is nothing fundamental in economic theory that would lead to the conclusion that each firm's market concentration should be squared in order to weight it, and then simply added to the squares of the market shares of each of the other firms in the relevant market, as the HHI does. There is no theoretical basis for *squaring* each firm's market share, as opposed to, say, *cubing* the market share of each firm. It may be the case that for the electric industry, in contrast to some other industry, cubing each firm's market concentration might provide a more accurate index of market power abuse. Similarly, there is no reason to believe that the squares of each firm's market concentration should just be added together. Different firms with the same level of market concentration may be able to exercise more or less market power depending on factors such as transmission constraints, their cost structures, etc. In fact, DOJ cautioned FERC about this point by saying "not all market shares are equal."[19]

In fact, it is very likely that the same values of the HHI calculated for different electricity markets should have different interpretations, particularly if the structure, size or type of one market is very different from that of another. For example, an HHI value of 1800 may imply no significant impact on prices in one sub-market (e.g., a 20,000 MW long-run baseload market), but a serious problem in another sub-market (e.g., a 5,000 MW short-term cycling market). One cannot tell until the relevant studies for electric sub-markets are completed. In fact, in discussing its analytic screen, FERC made a similar point when it stated that it "has insufficient experience to adopt at this time specific thresholds for the various possible combinations of HHI and length of time at which the [transmission] constrained periods would be problematic."[20]

Finally, the HHI is probably not a useful measure of potential market power abuse in the electric industry, even when applied to correctly defined product and geographic markets, because the structure of the electricity generation market is *fundamentally different* from most other commodity markets to which the HHI has been applied previously. The HHI does not and cannot take transmission constraints into account, except to the extent that these constraints are used to define the relevant geographic region. It does not factor in transmission pricing constraints between generating units and consumers, it does not address the degree of substitutability of other products for electricity, and it does not address the degree of ease of entry of new generation into each sub-market.

The most important point is that a simple index like the HHI does not, and cannot, take the unique features of the electric industry structure in each region into account. For example, it does not take into account the differences between bilateral contract markets and a poolco.[21] Furthermore, in the electric industry, sub-markets do not operate in

[19] Federal Register, Vol. 61, No. 251, page 68615, *II.B.1. Market Shares*.
[20] Federal Register, Vol. 61, No. 251, page 68609, *B.4. Analyze Concentration*.
[21] For example, an HHI of ~350 or lower is needed to avoid a 5 percent price effect in a pure poolco without contracts for differences. (Aleksandr Rudkevich, Max Duckworth, and Richard Rosen, *Modeling Electricity Pricing in a Deregulated Generation Industry: The Potential for Oligopoly Pricing in a Poolco*. Tellus Institute, 2/12/97.)

isolation from each other, and yet the HHI for one sub-market cannot take into account how that sub-market interacts with and affects other sub-markets.[22] Finally, the HHI does not take the shape of the generation supply cost curve into account which is likely to determine the relative importance of each sub-market in leading to market power within the overall market structure.

In short, the HHI is mathematically incapable of taking into account existing unique characteristics of the electric industry or potential future changes in its structure. In addition, there is no way of knowing whether an HHI of 1800, 1000, or some other value should be interpreted as the starting point for potential market power under wholesale or retail competition because, to the best of our knowledge, no adequate empirical studies of the electric utility industry have ever been done to validate that assumption, even for wholesale markets.[23] Furthermore, it is certainly true that no adequate empirical studies have ever been done for retail competition because it has never existed. Thus, there is not any solid analytical basis specific to the electric utility industry that would allow one to conclude that an HHI result of 1,000 or lower in an electric sub-market indicates that there is little or no danger of market power abuse.[24] Even former assistant attorney general William Baxter, the originator of the Guidelines, wrote that setting a safe-harbor HHI of 1,000 was "as much a political anchorage ... as because anyone thought that nicely round number was right."[25] Thus, until more detailed market power studies using the HHI have been done for relevant sub-markets in the electric industry, there is not even a valid way to interpret particular values of the HHI in terms of their potential implications for the abuse of market power, even if one believed that the mathematical structure of the HHI was appropriate.

The Need for Simulation Modeling

Based our criticisms of the HHI, we strongly oppose FERC's reliance on this index to screen for the potential exercise of market power due to mergers or its potential application to the present or future structure of the electric industry. Instead, we support relying on simulation modeling of the relevant electricity market structure.[26] Simulation

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[22] Put mathematically, the index has no "cross-terms" to account for these effects. A cross-term is a term like the square of a single company's market concentration for one product, whereby the market concentration of the company in one sub-market is multiplied by its market concentration in another sub-market.

[23] While FERC does warn against strict interpretation of HHI results, it does not acknowledge that the HHI values may not have a theoretical or empirical basis for the electric industry. (Federal Register, Vol. 61, No. 251, page 68609, *B.4. Analyze Concentration.*)

[24] Refer to the comments made by EEI and others to FERC, quoted on page 68615, *II.B.2. Measuring Market Concentration*.

[25] William F. Baxter, "Antitrust Policy," in Martin Feldstein (Ed.), American Economic Policy in the 1990s (University of Chicago Press, 1994), p. 610.

[26] By simulation modeling we simply mean any computer-based approach to simulating the behavior of an electricity market structure, including dispatch rules and transmission system behavior, as load varies over time.

modeling will allow one to *directly* compute the impact of any particular pattern of concentration of resource ownership on overall market prices. Thus, the use of simulation modeling means that an index of market power is not needed. However, one will still need to identify how much of a price impact would represent unacceptable market power.

We find that recently there are a growing number of electric utility analysts who realize that simulation modeling is the only adequate approach to assessing market power.[27] Furthermore, the use of simulation modeling to analyze the degree of market power abuse that may be due to a merger is entirely consistent with FERC's new methodology. Realistically, we believe that the only way to carry out the market power assessment described by FERC is to create a simulation model, especially since FERC correctly requires separate analyses for all significantly different time periods.[28]

The market power analysis for any given product or end-use service will need to be performed simultaneously for the region / load center of interest and neighboring regions / load centers. Simulation modeling will be necessary to identify the myriad potential combinations of supply resources that could be used to meet different consumers' demands in different time periods under different assumptions about product substitutability (for both supply and end-use products), cost, transmission and distribution constraints, and resource availability. Such a model must present a sufficiently realistic analysis of the regional energy markets, including resource dispatch, fuel-switching, conservation alternatives, price elasticities of demand, and transmission/transportation system operations. The fact that aggregators and individual consumers will attempt to meet their load on a least-cost basis will provide an overall constraint on the demand for different electric products given the price differentials among them. Since relevant product markets in the electric industry will not have rigid boundaries - physical, economic, or otherwise - multi-regional models will be required. The models will also need the flexibility to accommodate different structural rules.[29] It would appear that FERC did not realize how complex its prescribed methodology would be in practice.

Conclusion

[27] These analysts include Mark W. Frankena (Prepared Testimony Before the Public Service Commission of Nevada, Docket No. 95-9022), and Lewis J. Perl ("Measuring Market Power in Electric Generation") *Antitrust Law Journal*, Vol. 64, Winter 1996: pages 311-320.

[28] FERC hints at the need for simulation models when it states that its screen analysis will have to evolve with industry restructuring, and that "flow based network models that include constraints on transmission networks are likely to be needed for the screen analysis" (Federal Register, Vol. 61, No. 251, page 68610, *D. Other Considerations*). Flow based network models are one aspect of simulation modeling. Since industry restructuring is well underway at the federal level in the form of power pools proposing to become spot markets, FERC should not wait any longer to adopt simulation modeling.

[29] One simulation model that the authors recently reviewed assumed that all load centers were served by pure poolcos. This is not a very good assumption.

FERC's new merger guidelines, particularly its analytic screen, provide much more detail about how to analyze market power in the electric utility industry than any previous set of merger guidelines. Thus, they represent a significant step forward. In addition, FERC's new guidelines are equally applicable for analyzing the potential market power of electric and gas utilities under restructuring scenarios, not just under merger proposals. Therefore, we believe that FERC should use its new guidelines to analyze the potential for market power in recently filed power pool proposals to establish poolco-type spot markets. Similarly, state public utility commissions should use FERC's guidelines for analyzing market power in deregulated generation markets.

Though the guidelines represent a significant step forward, they still require improvement in many ways, and they still contain the rudimentary element of reliance on HHI safe harbors. We have shown why continuing to rely on the HHI is both inappropriate and impractical. In our view, this element of FERC's guidelines should be eliminated in favor of simulation modeling, which appears to be the only way of accomplishing the type of analyses that FERC now requires. Perhaps some day, when many market power analyses have been performed for a completely deregulated electric generation industry, analysts will be able to identify some simple rules of thumb or simple safe harbor guidelines that can be used to detect market power. However, that day will not come until the hard work of analyzing the potential for market power in many regions of the country has been done at a highly proficient level in a way that only simulation modeling will accomplish.