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Title: Competition Policy and the Transition to a Low-Carbon, Efficient Electricity Industry

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Abstract:

U.S. industries are facing intense pressures to become more energy efficient, driven by the need to lower the carbon footprints of energy-intensive sectors and to achieve energy security. A successful transition to a new era of efficient, low-carbon electricity production and usage will require fundamental changes in the way we plan for, produce, deliver, and price a critically important commodity. The purpose of this article is to explore the importance of competition policy in a transitioning electricity industry. It starts by setting out the important precondition of the new era: market participants have fundamentally different objectives than in the old regime, and these changed objectives need to be recognized in order to fashion appropriate policy. Next, the paper presents some of the major competitive issues that are likely to arise in the new era, including: access and demand response technologies, the design of markets for CO_2 emissions allowances, and transmission planning. The paper concludes with a number of recommendations for how competition policy can best promote a successful transition.

JEL Classifications:

D4 – Market Structure and Pricing
K2 – Regulation and Business Law
L1 – Market Structure, Firm Strategy, and Market Performance
L2 – Firm Objectives, Organization, and Behavior
L4 – Antitrust Issues and Policies
L5 - Regulation and Industrial Policy
L9 - Industry Studies: Transportation and Utilities

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Competition Policy and the Transition to a Low-Carbon, Efficient Electricity Industry

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I. Introduction

U.S. industries are facing intense pressures to become more energy efficient. Two concerns are driving this transition. One is the need to lower the carbon footprints of energy-intensive sectors such as electricity, transportation, and building and industrials.[2] This will require an unprecedented reduction in dependence on fossil fuels for electricity production and a fundamental shift to conservation in energy-using industries. A second concern is the need to achieve energy security by reducing this country's reliance on foreign sources of energy supplies such as crude oil. Security will be achieved when crude oil imports from unreliable sources fall to the point that their interruption would not produce intolerable effects.

A successful transition to a new era of efficient, low-carbon electricity production and usage will require fundamental changes in the way we plan for, produce, deliver, and price a critically important commodity. Some of these changes are well understood to be necessary. For example, the traditional utility regulatory model must be modified from one that promotes the sale of megawatts to one that provides incentives for utilities to also sell efficiency and conservation.[3] Similarly, consumers will have to overcome their traditional

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[2] Electric power production accounted for 41 percent of carbon dioxide emissions in 2008, followed by the transportation sector (33 percent), and building and industrials (26 percent). "Annual Energy Outlook 2010 Early Release Overview," U.S. Energy Information Administration (December 14, 2009), Figure 9. Retrieved from http://www.eia.doe.gov/oiaf/aeo/overview.html#consumption.

[3] For a detailed discussion of this issue see, e.g., Peter Fox-Penner, SMART POWER: CLIMATE CHANGE, THE SMART GRID, AND THE FUTURE OF ELECTRIC UTILITIES, Island Press (2009).

reluctance to adjust demand as prices change, a reluctance that has been an impediment to virtually every initiative to improve efficiency in the electricity industry. Flat rate retail pricing schemes effectively subsidize consumption when costs are high and choke off consumption when costs are low, while inviting generators to exercise market power. Likewise, the failure to design most auction markets in the U.S. to include demand-side bidding defeats the important role of demand elasticity in determining prices.[4]

Other changes that are necessary to lead the transition to a low carbon, efficient electricity industry are perhaps less obvious because they are not specific to energy-related sectors. Paramount among these is the role of competition policy, which creates the necessary preconditions for the new era and ensures that its objectives are not undermined by other forces. In electricity markets, competition policy must focus on traditional issues such as generation concentration and vertical integration. But policy must also include a heightened awareness of and attention to novel issues that will be created by the emergence of new markets that are complementary to electricity. These markets will include everything from grid hardware to financial instruments—all of which will become more important in the new era.

The purpose of this article is to explore the importance of competition policy in a transitioning electricity industry. This discussion starts by setting out the important precondition of the new era: market participants have fundamentally different objectives than in the old regime, and these changed objectives need to be recognized in order to fashion appropriate policy. The second section discusses this "re-optimization" problem in

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[4] There is some progress in this area. See, for example, F. Stuart Bresler III, "Description of Market Integration of PJM DSM & Energy Efficiency Programs," Panel on DSM, Energy Efficiency and Smart Grid-Smart Components of a Carbon Constrained Energy Environment, American Bar Association Section of Environment, Energy and Resources, 17th Section Fall Meeting (September 24, 2009).

detail. The third section presents some of the major competitive issues that are likely to arise in an era of low-carbon, efficient production and usage of energy. The fourth section sets forth a number of recommendations for how competition policy can best promote a successful transition and the fifth section concludes.

II. The New Industry Paradigm

A. Electricity, Then and in the Future

The transition to a low-carbon, efficient electricity industry will be nothing short of a revolution. To understand the magnitude of this challenge, we need only to recall that over much of the last century, the electric power industry in the U.S. was premised on the view that it should produce and sell as much power as possible. That objective was made possible by a number of favorable factors such as low energy costs, cheap capital, and consumers' appetite for all things electrical. Private investment, public power, and rural coops all pitched in and made it happen.

The industry that arose from this premise had a number of key characteristics. It was dominated by very large-scale production, with vertically integrated utilities, limited transmission capabilities, franchised monopoly distribution, and simple customer rates. This system was remarkably successful in achieving its objectives. Any inefficiencies of this system paled in comparison to the achievement of reliable, ubiquitous power supply, and rates that declined in real terms for decades. Over time industry and regulators refined and optimized this system. A set of well-developed and well-understood institutions and procedures arose and the major players agreed on broad objectives and the terms of the debate.

It is against this backdrop that the challenges posed by low-carbon, efficient production and usage become dramatically clear. The new objectives are profoundly at odds with the old objectives and the industry that has arisen around the old paradigm. The new era will force every part of the present industry to "re-optimize" its most basic decisions. What do we mean by re-optimization? Economics teaches that consumers, investors, utilities, and regulators all operate in a fundamentally similar way, namely to maximize a particular objective (e.g., satisfaction, returns, profits, or the public interest), subject to binding constraints. This model is a powerful device for predicting behavior. It tells us how consumers will respond to price changes, how investors will respond to alternative opportunities, how firms will respond to price signals, and how regulation will impact all of the above.

The model of optimization does a good job of predicting the behavior of agents, and changes in their behavior in response to policy changes. Achieving low-carbon, efficient production and usage will require that consumers, investors, utilities, and regulators all re-pose their maximization problem, since objectives have changed, and then re-solve it subject to new and likely tighter constraints. Objectives will be different: no more maximizing production and consumption, no more isolated geographic markets, no more entitlement to simple rates. Constraints will be different as well: limited use of fossil fuels, plug-in hybrid vehicles, repriced appliances for energy efficiency, greater uncertainty for investors, and complex rate structures to be determined by regulators and understood by consumers.

B. Challenges of Re-Optimization

The re-optimization process will face many challenges. Ironically, some of the most difficult obstacles in the new era will consist of factors that were optimized and hence considered advantages under the old model. For example, existing capital is extremely long-lived, with high replacement costs and long payback periods. This feature, which has usefully driven investment for decades, is mismatched with the necessity of new investments in carbon-friendly technologies. Moreover, much of the low-carbon renewable technology is high fixed cost in nature-- perhaps even higher than conventional fossil-fuel technologies. High fixed costs are responsible for price volatility and problems of cost recovery in energy markets, issues that already pose challenges for the present system, but which will become considerably more pronounced in the new era.

Re-optimization must also grapple with the impact on transmission and distribution grids. Grids were designed for predictable, consistent, manageable movements of power. At the distribution level, many utilities have little experience with the technologies and customer interface requirements for demand response. Assuming that Advanced Metering Infrastructure (AMI) will become ubiquitous, ensuring the full benefit of time-varying price and other demand responses will require rethinking the traditional distribution utility function.

At the transmission level, new technologies involve intermittent production with high degrees of variability (e.g., tidal) and unpredictability (e.g., wind and solar). Integrating them into the system creates significant technology and control issues. Similarly, we can expect smaller-scale power sources with varying degrees of "connectedness" with the grid. Incumbent transmission networks may be faced with private networks, which in turn will raise controversies over access and interconnection not unlike those that dominated telecommunications policy for more than a decade. Moreover, unlike most generation technologies, production points for much wind and solar are distant from the locations of major transmission lines. This simple fact has already raised thorny financing and jurisdictional siting issues.

Finally, re-optimization will affect consumers in fundamental ways. Those who have long been accustomed to cheap and reliable power at uniform (and probably declining) rates will be confronted with extensive time-of-use and critical time pricing. They will need to learn how to process information about rates, how to adapt their own usage, and how to program their home appliances in response to price signals. The potential gains here, by most indications, are considerable but will require customers to re-optimize subject to new constraints.

III. Emerging Competitive Issues

Competition policy will also need to be re-oriented for the issues raised by the new era. The need for re-orientation stems from two basic observations. First, the electricity industry exhibits conditions conducive to a number of anticompetitive practices, some familiar, others found less often in other sectors. Strategic withholding and price spikes arise with particular frequency and magnitude here. We can expect this to continue in the new era. Moreover, entry of large- and small-scale technologies raises new and potentially difficult questions about "access." Apart from that, issues of mergers and market concentration have already arisen in electricity, and can be expected to persist. Thus, competition policy in the new era will thus have to address an array of questions about the ability and incentive for firms to exercise market power.

A second reason to focus on competition policy is the emergence of important markets that are complementary to electricity. These include emissions allowances under a cap-and-trade system for CO_2, smart grid technologies, renewable generation and advanced transmission technologies, and even financial instruments such as derivatives. These new markets will raise many novel competitive issues. This section focuses on three of the major areas in which competition policy is likely to be particularly important: access and demand response technologies, the design of markets for CO_2 emissions allowances, and transmission planning.

A. Demand Response

Technologies such as demand-response, energy efficiency, and distributed storage can play a potentially large role in electricity markets.[5] These technologies have significant potential to lower costs, thwart the exercise of market power, and shrink the industry's carbon footprint. Demand response, in particular, can play a potentially significant role in electricity markets by increased price responsiveness, reducing capacity requirements, and avoiding energy payments during high price periods.[6]

For demand response to be successful, however, it will have to be implemented on a scale sufficient to have a substantial impact. Demand resources must be deployed in large quantities and at a diffuse customer level in order to be effective—something that state regulators will have difficulty implementing. But it will also be difficult to manage some demand-response technologies at a granular level. Enhancing efficiency through demand response will depend critically on developing the AMI, information transfer, and grid coordination necessary to get demand-response technologies into the hands of all consumers.

The need for demand response protocols creates opportunities for anticompetitive behavior. A critical policy challenge will therefore be to ensure that demand-response receives non-discriminatory access. This is especially a concern where the traditional vertically-integrated utility model still obtains (as it does for major portions of the U.S.). There, firms still have incentives both to favor their own generation at the expense of rivals

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[5] Federal Trade Commission, "Comment of the Federal Trade Commission on Wholesale Competition in Regions with Organized Electricity Markets," FERC Docket No. RM-07-19 (April 17, 2008). Retrieved from http://www.ftc.gov/be/v070014b.pdf.

[6] Paul Centolella and Andrew Ott, "The Integration of Price Responsive Demand into PJM Wholesale Power Markets and System Operations," Panel on DSM, Energy Efficiency and Smart Grid-Smart Components of a Carbon Constrained Energy Environment, American Bar Association Section of Environment, Energy and Resources, 17th Section Fall Meeting (September 24, 2009), at p. 2,

and to sell as much power as possible. Incumbents might discourage demand response through a number of mechanisms, including imposing standby charges, denying information to third party providers, raising pre-textual reliability concerns, or adopting anticompetitive equipment standards.[7] All of these strategies would have the effect of driving up demand response costs, creating barriers to entry, and hampering the transition to a low-carbon, efficient industry. Whereas generator interconnection and information on transmission availability are key bulwarks of access on the supply-side, interoperability is likely to be the "access" equivalent on the demand-side.

Second, interoperability will revolve around the smart grid technologies that are deployed to integrate, monitor, and optimize various resources on the grid.[8] The process of standard-setting for the smart grid is therefore crucial but at the same time it creates opportunities for anticompetitive behavior. Participants in standard-setting processes could hold patents on key technologies or have other interests in ensuring that certain technologies are central to the standard. It is therefore important to ensure that interoperability standards reflect a competitive underlying process.[9] This will minimize the potential risk of undue influence by any particular participant or multiple participants with common interests in

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[7] See "10th Annual American Antitrust Institute Energy Roundtable: Summary of Proceedings," American Antitrust Institute (April 27, 2010), at p. 5. Retrieved from http://www.antitrustinstitute.org/archives/files/Summary%202010_042720101343.pdf.

[8] See Federal Energy Regulatory Commission, *Smart Grid Policy*, 128 FERC ¶ 61,060 (July 16, 2009).

[9] A major initiative, coordinated by the National Institute for Standards and Technology, is presently underway to define interoperability standards. There are numerous Priority Action Plans that cover standards in various areas, including, for example, distribution grid management and wind plant communications. The standards setting organizations are numerous and contain a wide variety of participants. See, e.g., http://collaborate.nist.gov/twiki-sggrid/bin/view/SmartGrid/PriorityActionPlans#Standard_Setting_Organizations_S.

promoting a particular outcome.[10] Without this assurance, standards could introduce competitive distortions that would spill over to electricity markets.

Third, the structures of demand-response and smart grid technology markets are also important. Competition in those markets will ensure that consumers have access to a diverse set of products and services at competitive prices, and benefit from rivalry-induced innovation. However, restrictive agreements between technology vendors and utilities can have the effect of excluding rivals from the market. Likewise, utility acquisitions of demand-response and smart grid technology assets in highly concentrated markets may create the ability and/or incentive to foreclose rival utilities or technology vendors.

Given current practice in other areas, another likely outcome will be more patent infringement litigation associated with smart grid technologies and disputes over licensing involving vendors, utilities, and third-party providers.[11] The emergence of dominant players in the markets for smart grid technologies raises natural antitrust questions, particularly if such firms price at supracompetitive levels or drive out competitors. In any of the foregoing scenarios, competition and/or consumers are harmed and the full benefits of a transition to a low-carbon, efficient industry will go unrealized. Competition policy should be attuned to the potential developments.

B. Markets for CO_2 Emission Allowances

The design and implementation of cap and trade system will raise a series of competition and regulatory issues involving antitrust, regulatory, and environmental agencies

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[10] For a discussion of antitrust issues involved in standard-setting, see, e.g., Rambus Inc. v. FTC, 522 F.3d 456 (D.C. Cir.), cert denied, 129 S. Ct. 1318 (2008). For more information see also, e.g., U.S. Department of Justice and Federal Trade Commission, "Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition" (April 2007). Retrieved from http://www.ftc.gov/reports/innovation/P040101PromotingInnovationandCompetitionrpt0704.pdf.

[11] See, e.g., SIPCO LLC. v. Florida Power & Light Company and FPL Group Inc., *Complaint for Patent Infringement* (Case No. 09-22209) (S. D. Fla.) (July 27, 2009).

at both the state and federal levels. Numerous questions arise in designing an emissions allowance trading system. These include, among others: trading rules, information disclosure, spatial and sector coverage of the trading system, initial allocation of permits, whether allowances can be banked or borrowed, and the monitoring, enforcement, and compliance system.[12]

These design issues are important since market outcomes (e.g., allowance prices and quantities) are a major determinant of compliance costs under cap-and-trade. Compliance costs in turn feed into the carbon-control strategy and technology choices made by generators and utilities, and those ultimately have a direct effect on the prices of electricity. Moreover, auction design inevitably involves tradeoffs between economic efficiency, generation of revenues from sales of allowances, and other policy goals. For this reason, too, the initial sale and subsequent trading of allowances should ensure that firm responses to price signals are made competitively so as to minimize total compliance costs, achieve other intended objectives, and avoid windfall gains to any agents.

There are at least three competitive issues associated with minimizing compliance costs in a cap-and-trade system. The first is to ensure that auction design promotes economic efficiency so that allowances are obtained by those who place the highest value on them. Free distribution to present sources of emissions, for example, may minimize the immediate financial impact on those firms and thereby reduce both disruption and resistance by industry to the program. But this approach can create entry barriers because new entrants into the industry must purchase allowances from incumbent firms that already own them. In addition, it fails to ensure that ultimate prices fully reflect social costs, and because of the

[12] Catherine Boemare and Philippe Quirion, *Implementing Greenhouse Gas Trading in Europe: Lessons from Economic Literature and International Experiences* 43 ECOLOGICAL ECON. 213, 213 (2002).

patchwork of electricity market systems—some with cost of service regulation, others subject to incentive regulation, and many deregulated—it would create a mosaic of prices and windfall gains. The alternative of auctioning off allowances is understood in principle to have superior efficiency properties, and in addition, the resulting revenues can be used to accomplish a number of goals, including reducing taxes.[13] The sheer cost of this approach to established firms has caused it to lose favor.

A second consideration in designing a cap-and-trade system is ensuring low market concentration in order to avoid unilateral or collusive strategic behavior. Multiple-round (as opposed to single-round) auction formats can provide bidders with opportunities for signaling and detecting deviations from a collusive agreement. On the other hand, auctions that are open to all firms that financially qualify promote competition and limit opportunities for collusion. And rules that prohibit any one firm from purchasing more than a specified percentage of allowances prevent attempts to corner the market. Monitoring allowance markets for anticompetitive conduct should receive careful attention as part of designing well-structured emissions allowance markets.

A third feature of well-designed auctions is good information, specifically, clear and reliable price signals (i.e., transparency), and low transactions costs for bidders. Certain design features can promote these objectives and thereby enhance incentives for more efficient investment. For example, a more frequent uniform-price format is relatively simple, transparent, and promotes price discovery. Treating all allowances equally keeps transactions

[13] See, e.g., *RECOMMENDATIONS FOR DESIGNING A GREENHOUSE GAS CAP-AND-TRADE SYSTEM FOR CALIFORNIA*, RECOMMENDATIONS OF THE MARKET ADVISORY COMMITTEE TO THE CALIFORNIA AIR RESOURCES BOARD iii (2007), at p. 58. Retrieved from http://www.climatechange.ca.gov/publications/market_advisory_committee/2007-06-29_MAC_FINAL_REPORT.PDF.

costs low. Finally, making future allowances available for auction in advance aids electric utilities in planning investments in new generation.

C. Transmission Planning

The Federal Energy Regulatory Commission (FERC or the Commission) has over the past several years devoted much effort to redefining its transmission planning criteria. This is particularly important since, while the Commission reaffirmed functional unbundling in Order No. 890, a considerable part of the industry remains vertically integrated. The new processes should help in handling the myriad of transmission issues that the new era is likely to bring, most especially the incentive of integrated transmission providers to frustrate access not only with respect to use of existing transmission capacity, but also by slowing the pace of investment in new capacity, or even declining to invest at all.[14] A good deal of attention will therefore need to be devoted to minimizing the risk that vertically-integrated transmission owners will foreclose existing and potential rivals from the market through their control over the grid.

In the new era, the risks of foreclosure remain not only for conventional generation and transmission technologies, but also for new transmission projects using innovative (e.g., superconductor) technologies, renewable sources of generation, and small-scale demand response technologies. To counter these risks, competition policy will need to pursue varied approaches. For example, market-centric approaches should be encouraged in the planning process for proposed transmission expansions. This could be fostered by relying on system

[14] Preventing Undue Discrimination and Preference in Transmission Service, Order No. 890, 72 FR 12,266 (March 15, 2007), FERC Stats. & Regs. ¶ 31,241 (2007), at P. 57.

congestion studies that evaluate expansions of generation and transmission based on their benefit to large numbers of users, as opposed to single user benefit.[15]

A second competitive implication of transmission planning concerns the process itself. FERC has encouraged an open planning process under Order 890 that involves a relatively high degree of coordination and information exchange among market participants. [16] These participants include transmission providers, generators, buyers, and vendors and adopters of smart grid technologies and interfaces such as digital broadband networks. The importance of technical coordination among market participants in promoting beneficial outcomes such as market entry, compatibility, and system-wide optimization is not in dispute, but there are also possible detrimental effects from too much sharing of competitively sensitive information.

For example, transparency and exchange of information about rivals' prices, costs, loads, and siting and sizing decisions can facilitate tacit or express collusion between market players.[17] This concern is heightened in some centralized wholesale electricity markets where there are already high levels of concentration and a history of anticompetitive conduct. Moreover, wholesale market participants are already in close and frequent contact in multiple markets such as real-time, day-ahead, and capacity auctions. This can also facilitate anticompetitive coordination. In light of this, adding another point of contact—i.e., transmission planning—should be undertaken with care.

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[15] FERC has recognized the importance of this approach. See, e.g., s*upra* note 14, at P. 549.

[16] Preventing Undue Discrimination and Preference in Transmission Service, order on reh'g, Order No. 890-A, 73 FR 2984 (Jan. 16, 2008), FERC Stats. & Regs. ¶ 31,261 (2007), at P. 4.

[17] For a concise discussion of factors that facilitate collusion, see, e.g., Robert H. Porter and J. Douglas Zona, "Bidding, Bid Rigging, and School Milk Prices: *Ohio v. Trauth* (1994)," 329 THE ANTITRUST REVOLUTION (2008), J. Kwoka and L. White, eds. (5th ed.), at pp. 334-335.

Third, RTO-based rules for approving transmission expansions and receiving cost-recovery may create anticompetitive incentives and barriers to entry. Consider voting rules that give incumbent vertically-integrated transmission owners undue influence over the approval of proposed projects.[18] In some cases, incumbents may have incentives to collect high electricity prices because of regional or nodal electricity price differentials. Under such circumstances, they could oppose projects that relieve transmission constraints by bringing in remote sources of low-cost generation, frustrating the transition to low-carbon, efficient production and usage.[19]

IV. Policy Recommendations

How exactly will the transition to low-carbon, efficient electricity come about, and how can competition policy help? The answer to the first part of this question will involve a system that must be re-optimized--both more tightly controlled than at present but at the same time flexible enough to accommodate more heterogeneity in production and usage. To achieve this balance, regulators will need to address several tasks. These include transmission adequacy and access, dynamic pricing and demand response techniques, incentive regulation reforms, assurance of adequate generation to local distribution utilities, integration of intermittent generation into control areas, and the rationalization of physical and financial markets.

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[18] See, e.g., Federal Energy Regulatory Commission, *Motion of the American Antitrust Institute, American Public Power Association and National Rural Electric Cooperative Association for Leave to Intervene out of Time and Request for Rehearing*, in New York Independent System Operator, Inc., Docket No. OA08-52-005 (April 19, 2009). See also Federal Energy Regulatory Commission, *Order on Rehearing and Motion*, in New York Independent System Operator, Inc., Docket No. OA08-52-005 (October 15, 2009).

[19] For general discussion, see, e.g., Jonathan A. Lesser, "The Failures of Transmission Planning and Policy," presentation to the Harvard Economic Policy Group Fifty-Eighth Plenary Session (February 25, 2010). Retrieved from http://www.hks.harvard.edu/hepg/papers/2010/lesser_jonathan_hepg_feb2010.pdf.

At the federal level, the necessary ingredients and resources may be in place, or at least within grasp. But for many states, it is clear from their struggles with restructuring issues to date that their capabilities may not extend to dealing with all that will be required. Moreover, jurisdictional tussles have already emerged between the FERC and the states and between the FERC and other sector regulators such as the Commodity Futures Trading Commission. Unless a myriad of regulatory agencies enhance their capabilities and engage in unprecedented levels of cooperation, there will be the risk of inconsistent policy, bad policy, or no policy at all.

With respect to competition policy, FERC, the U.S. Department of Justice (DOJ), and the Federal Trade Commission (FTC) should anticipate a number of emerging issues. For example, some of the markets integral to the electricity supply chain will remain regulated, but more and more will undergo deregulation. Unregulated markets should be subject to ordinary antitrust standards, rather than those more specific to the industry. When that occurs, the appropriate locus for competition policy shifts from sector regulation (i.e., FERC) to the DOJ and FTC. While this shift has not always been welcomed by the affected industry, it ensures the application of the same standard across all industries.

From a substantive point of view, neither antitrust nor regulation has thus far proven itself especially capable of detecting and correcting certain anticompetitive practices such as strategic withholding in electricity. Policy would benefit from more creative thinking about how to fashion an effective approach to these practices. Indeed, the same can be said for the range of possible competition problems likely to arise in new markets.

Another impending competition issue is the merger wave that is likely to accompany the transition to low-carbon production and efficiency. One wave has already occurred as a result of restructuring in the 1990s and early 2000s but further changes in the industry will likely trigger more consolidation. At present the principle roles of the antitrust agencies in electricity mergers is their shared responsibility for review with FERC. The problem of "too many cooks in the merger kitchen" is well known and further rationalization of the multi-agency review process will be necessary as the revolution unfolds and more markets are integrated into the electricity supply chain.[20]

This issue takes on particular importance since electricity mergers pose questions that are in some ways different from most other industries. Standard approaches to defining markets and measuring concentration, for example, do not fully capture the risks to competition from mergers. In addition, market definition needs to account for new sources of intermittent generation and also demand response. Then, too, there may also be more mergers that combine generation and transmission assets with other unregulated, complementary market assets, such as smart grid technology vendors. Such mergers may require more involvement by antitrust agencies, since FERC may have limited jurisdiction to review them. And the new Horizontal Merger Guidelines being issued by the Department of Justice and Federal Trade Commission will need to be examined for their implications for merger review in the energy sector.[21] While the agencies are well aware of these matters, more should be done prospectively to systematize the methodology tailored to this sector.

And finally but no less important is the fact that the antitrust agencies and regulators should be making every effort to lower barriers to entry by new competitors. Ease of entry has the attractive property that it can at least partly compensate for rising concentration from mergers and blunt the impact of anticompetitive practices. It can also ensure that new technologies have the opportunity to establish themselves in a market dominated by more

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[20] See, e.g., Diana L. Moss. *Antitrust Versus Regulatory Merger Review: The Case of Electricity*, 32 REVIEW OF INDUSTRIAL ORGANIZATION 241 (May 2008).

[21] See http://www.ftc.gov/opa/2010/04/hmg.shtm.

traditional competitors. Barriers of various sorts–from siting requirements to regulatory inconsistency--should therefore be identified and reduced or dismantled wherever possible.

V. Conclusions

As this discussion hopefully has made clear, the revolution that is overtaking the electricity industry will present both familiar and novel challenges. Competitive issues already affecting the industry can be expected to persist through the transition to a low carbon, energy efficient future. But novel problems also seem certain to emerge as the number of complementary markets grows, as incentives for anticompetitive conduct apply to new settings, and as competitive concerns not yet anticipated make their appearance. As with other industries that have undergone transition, competition policy must play a central role in ensuring the benefits of the transition in the electric power sector for consumers and companies alike.