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ELECTRICITY DEREGULATION PUTS PRESSURE ON THE TRANSMISSION NETWORK AND INCREASES ITS COST

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TIME FOR POLICYMAKERS TO DO THE MATH ON DEREGULATION

In wake of the massive blackout in the Northeast, government officials and industry experts are calling for a massive upgrade of the transmission system that would cost between \$50 billion and \$100 billion.¹ The annual carrying costs for such a capital outlay are certain to be in the range of \$10 billion to \$25 billion, depending on how much is spent and who builds the system.²

Many experts are beginning to admit that a substantial part of the upgrade costs are caused by the need to support the increased strain on the system that occurs in the deregulated electricity markets that policymakers have been struggling to create in the past decade.³ Yet, earlier this year the Department of Energy conducted a study that projected less than \$1 billion of efficiency gains from the implementation of the Standard Market Design,⁴ which the Federal Energy Regulatory Commission (FERC) is proposing to push deregulation to the next level.⁵

A consumer does not need a degree in electrical engineering to see that these numbers do not add up.⁶ If the costs outweigh the benefits, why should we bother?⁷ At a minimum, policymakers should inquire into what it would cost to run a reliable system without the added costs of supporting deregulated markets.

The advocates of deregulation frequently claim that it is too late to go back to public interest regulation, but two-thirds of the states never left. In fact, the two-thirds of the states that have not gone down the road to deregulation in their intrastate market have been steadfastly resisting the effort of the FERC to force them into deregulated interstate markets.⁸ Given the massive costs of deregulated markets that are now coming into view and the meager gains that such markets appear to promise, not to mention a track record of market manipulation, price volatility and lack of consumer choice,⁹ it may be a lot cheaper for the handful of states who have deregulated to go back than to force the majority of states down the problem-riddled road to deregulation.¹⁰

When Congress returns in September, it is going to be under immense pressure to do something, but these numbers make it clear that just anything won't do. If Congress pushes ahead with its deregulatory agenda, it could cost consumers billions more in transmission upgrades than it should, costs that will never be offset by benefits. Congress should take action to prevent the real problem--more blackouts, rather than use the blackout as an excuse to push its deregulatory agenda. Based upon almost two decades of analysis of the faltering effort to deregulate electricity markets, this paper outlines the reasons why Congress should pass a reliability-only electricity bill and put its deregulation agenda on hold.

ELECTRICITY IS A UNIQUE AND VITAL SERVICE, NOT AN ORDINARY COMMODITY

For almost two decades the Consumer Federation of America and Consumers Union have argued that the fundamental characteristics of the electric utility industry require policymakers to treat it differently than other industries.¹¹ The unique characteristics of the electricity system were on display in the recent Northeast blackout and its aftermath:

- The electricity network is a remarkably demanding system that must be kept in perfect balance in real time. In only a remarkably short period of time, the blackout spread over vast distances, but bringing power back up took days or even weeks.

- The electricity industry requires huge capital investments in long-lived facilities that are sunk in place, with no alternative uses. That critical characteristic of the industry is displayed in the thousands of miles of transmission lines and massive power plants that were affected by the events of August 14.
- Electricity cannot be treated as any other commodity. It has no substitutes, it is not storable, and it is essential to health, safety and the economy. Just look at the photos of people sleeping in the streets of New York. The complete disruption of routine activities for tens of millions of consumers and businesses underscores this key characteristic of electricity.
- Strong seasonal and daily shifts in demand create severe peaks that strain resources. Hot summer afternoons place the greatest strain on the grid.

Historically, the uniquely American approach to delivering this vital service under such difficult conditions was to allow private companies to own both transmission and generation and provide service in exclusive territories, subject to public interest obligations.¹² The integration of generation and production fostered coordination and effective management of the network.¹³ Exclusive territories lowered the risk and costs associated with long-term inflexible assets. Public interest obligations, such as the obligation to serve all customers at just and reasonable rates, protected the public from the abuse of monopoly power while preserving the companies' incentive to invest in the network.

This pragmatic approach was certainly not perfect, but it achieved a critical balance between public and private interests. In the past decade, policymakers lost sight of these fundamentals and deregulation upset that balance, particularly for the transmission system. De-integration quickly turned into disintegration.

DEREGULATION INCREASES THE DEMANDS ON THE TRANSMISSION NETWORK AND DECREASES THE CAPACITY OF THE GRID

CFA/CU prepared a series of reports and detailed studies on electricity system operation prior to deregulation in the 1990s,¹⁴ as well as repeated problems that arose as markets were restructured. The specific episodes we have studied include the price spikes of 1998,¹⁵ the outages of 1999,¹⁶ the California meltdown of 2000-2001,¹⁷ and continuing troubles of deregulated electricity markets.¹⁸ These studies identified numerous economic and operational mechanisms through which electricity restructuring and deregulation increased pressures on the nation's electricity transmission network:

- A dramatic increase in the number and complexity of transactions, which the system was not designed to support.
- Difficulties in coordinating and planning as competition and contracts replace vertically integrated operational and administrative decisions.
- Disincentives to invest in transmission because the private interests of facility owners conflict with the shared, public nature of the transmission grid.
- Disincentives to spend on maintenance because of profit pressures and the perceived competitive disadvantage associated with spending on a system shared with potential competitors.

- Increasing needs for excess capacity to cope with the market manipulation problems that plague electricity markets and to dampen price spikes that result from trying to treat electricity like a commodity.
- Failure to account for the social and environmental constraints on increasing transmission capacity and provide a framework for comprehensive planning that integrates alternative approaches, like energy efficiency and local (distributed) generation (such as co-generation, etc.)

Our studies identified most of the problems that deregulation imposed as permanent challenges, not transitional issues associated with the movement from a regulated to a deregulated industry. However, even those problems that seemed at first to be transitional are beginning to look like they are long-term challenges. A decade of structural neglect makes it less likely that consumers will ever end up better off as a result of deregulation.

Given the characteristics of electricity, we have long doubted the benefits of deregulation; these doubts apply with special force to transmission. Investment in these facilities is constrained by social concerns. There is no prospect of competition in transmission and the physics of electron flows leave little room for market transactions to improve on engineering decisions. That is why two major government studies in the past couple of years and one by the South Eastern Regulatory Utility Conference¹⁹ have all reached the same conclusion: there are few efficiency gains to be made by creating regional transmission organizations.

DEREGULATION AND STRESS ON THE TRANSMISSION GRID

Perhaps in the final analysis we will find that no individual outage-related event will be attributed directly to deregulation. Yet it is clear deregulation contributes to stress on the system, making accidents more likely, more severe and more difficult to respond to. Table 1, from our April 2000 analysis, summarizes the studies that provided the basis for identifying the problems of restructuring, with those that affect the transmission system underlined in bold. It was irresponsible to push deregulation under those circumstances and it would be even more irresponsible to charge ahead given recent events.

Accidents have always played a special role in the electric utility network. Because of the demanding physical nature of the network, accidents are prone to happen, and due to the volatile nature of the commodity, accidents tend to be severe. The integrated nature of the network, the inability to store electricity and demanding real-time performance means that accidents are often highly disruptive and difficult to fix.²⁰ To keep things in balance, the system needs either: plentiful reserves close at hand; ample amounts of transmission capacity readily available to move abundant supplies from far away; or a great deal of load that can be quickly shed.²¹ Most electricity markets do not have those luxuries today, or any chance of acquiring them any time soon.

**TABLE 1:
CAUSES OF ELECTRIC UTILITY INDUSTRY MARKET FAILURE DEMONSTRATED BY THE
FIRST THREE YEARS OF U.S. DEREGULATION**

BASIC CONDITIONS: SUPPLY

Technology	<u>Long lead times 5(7) 6(1), Delayed replacement 6(16) 11(2)</u> Inability to store electricity 5
Product durability	Generation Outages 1(2-11, 4-6) 3(15) 5(40) 10(1-2), <u>Transmission shutdowns 1(4-10),</u> <u>Failures take time to repair 6(9)</u> <u>Summer impairment of performance 6(7, 18, 22)</u>

BASIC CONDITIONS: DEMAND

Price elasticity	Extremely low short run 2(24) 5(39) 11(2) Limited conservation 6(2,19, 23)
Substitutes	Lack of substitutes, Restriction on self-supply 8
Cyclical/seasonal	Weather-related demand 1(4-6) 2(37) 10(1-2), <u>Inadequate reliability criteria 6(21)</u>
Purchase method	Obligation to serve 1 (4-1) 2(25), Lack of incentive to cut back 1(4-4) 4(46)6(2, 19)

MARKET STRUCTURE

Number of sellers	Few sellers 2(ii) 3(21) 4(49-56) 5(6,7) 7
Number of buyers	Constrained demand by utilities 1(4-1) 2(25) 5(30,31), Constrained distribution 6(30) Limited end-user choice 5(42,57)
Barriers to entry	<u>Transmission constraints 1(2-15,5-7)5 (11,12)</u> <u>Load pockets, inadequate system 6(10,32)</u> Self-supply blocked 8()Emergencies 1(2-15), Substation inflexible 6(31)
Cost structures	High fixed
Vertical integration	Affiliate relations distort market 2(38) 6(38), Integration restricts entry 11(3)
Diversification	Utilities Add Brokerage 2(24,28) <u>Inadequate Planning/Spending for maintenance 6(29,34 - 37)</u>
Inadequate Market Information	<u>Lack of timely, objective 1(5-3) 2(ii), Load projections 6(8),</u> <u>Unit ratings 6(11)</u> <u>Planning tools 6(13), Cable condition, incipient failure 6(5,14)</u> <u>Refusal to share best practices 6(15), Forecasting 6(17, 28)</u> <u>Inadequate notice 6(20) Dispatch software 6(27)</u>
Inadequate Coordination	<u>Breakdown of coordination 1(2-37, 3-3), ISO lacks authority 6(4),</u> <u>Lack of data 6(6)</u>

CONDUCT

Pricing behavior	<u>Hoarding, gouging 4(65) 5(3,38)</u> Above cost 10(1-4) 11(17) <u>Reliance on nonfirm power 6(24) 10(2-1) 11(3)</u>
Legal tactics	<u>Defaults, abrogation of contracts,</u> daisy chains, two-way deals1 (4-10, 5-2) 2(4) <u>Refusal to provide market monitoring information 5(4)</u> <u>Inefficient short term sales 6(25), Records not preserved 6(33)</u>
Regulation	<u>Transmission rules create problems 1(4-40) 2(20) 11(3)</u> <u>Market rules not developed 6(3)</u>

SOURCES: Originally Published in Cooper, Mark, *Behind The Headlines Of Electricity Restructuring: A Story Of Greed, Irresponsibility And Mismanagement Of A Vital Service In A Vulnerable Market* (And you thought this was about irrational tree huggers who wouldn't allow power plants or transmission lines to be built, but still want to run their air conditioners without paying a fair price for electricity, March, 20, 2001

The analytic categories are from Scherer, F. M. and David Ross, *Industrial Market Structure and Economic Performance* (Boston, Houghton Mifflin: 1990).

The substantive references are as follows:

1 = Federal Energy Regulatory Commission, *Staff Report to the Federal Energy Regulatory Commission on the Causes of the Pricing Abnormalities in the Midwest During June 1998* (Washington, D.C.; 1998)

2 = Public Utilities Commission of Ohio Report, *Ohio's Electric Market: June 22-26, 1998, What Happened and Why: A Report to the Ohio General Assembly* (Columbus, Oh; 1998)

3 = Bohn, Roger E., Alvin K. Klevorick and Charles G. Stalon, Market Monitoring Committee of the California Power Exchange, *Report on Market Issues in the California Power Exchange Energy Markets* (August 17, 1998)

4 = Bohn, Roger E., Alvin K. Klevorick and Charles G. Stalon, Market Monitoring Committee of the California Power Exchange, *Second Report on Market Issues in the California Power Exchange Energy Markets* (March 9, 1999)

5 = Klein, Michael and Loretta Lynch, *California's Electricity Options and Challenges* (August, 2000)

6= Department of Energy, *Interim Report of the U.S. Department of Energy's Power Outage Supply Study Team*, January 1999; *Horizontal Market Power in Restructured Electricity Markets*, March 2000

7 = Department of Energy, *Horizontal Market Power in Restructured Electricity Markets*, March 2000

8= Alderfer, R. Brent, et al., *Making Connections: Case Studies of Interconnection Barriers and their Impact on Distributed Power Projects* (National Renewable Energy Laboratory, May 2000)

9 = Energy Information Administration, *The Changing Structure of the Electric Power Industry 1999: Mergers and Other Corporate Combinations*, December 1999

10 = Staff Report on the Federal Energy Regulatory Commission on Western Markets and the Causes of the Summer 2000 Price Abnormalities (November 1, 2000)

11= Wolak, Frank A., et al., "An Analysis of the June 2000 Price Spike in California ISO's Energy and Ancillary Service Market," *Market Surveillance Committee of the California Independent System Operator* (September 6, 2000)

A DRAMATIC INCREASE IN THE NUMBER AND COMPLEXITY OF TRANSACTIONS

Because of the nature of the industry, the cooperation of all participating entities is critical to its smooth operation. The competitive ethic that pervades markets frustrates the necessary cooperation, increases costs and weakens the base for coordination and integration of supply and demand.²² Empirical studies show that strong economies are achieved by coordinating electricity supply and demand.²³ Before restructuring, the electricity industry was a reasonably well-run, complex, integrated network that was under some stress.²⁴

Creation of markets for electricity services leads to a huge growth in the number of transactions conducted every day and creates heavy administrative requirements.²⁵ An entity that once maintained real-time balance as an insulated operation that could oversee its own supply, demand and delivery, must now achieve real-time balance simultaneously in five, six or seven different markets over broad geographic areas. This has proven to be a daunting task²⁶ that consumes substantial resources.²⁷

Over the past decade, the number of traders increased over 50-fold; the quantity of electricity traded increased several hundred times.²⁸ There were also complications of financial and ownership relationships between entities which made managing those transactions a difficult and costly task.²⁹ A system operator requires significant resources raising the total cost of operating the system, as those costs are included in the cost of each transaction. The complexity of scheduling power delivery for multiple generators and retailers also adds costs to the system.³⁰

The transmission system was not designed to support either the quantity or type of transactions occurring now. In addition to the administrative transaction costs and managerial functions are facilities' costs. Demands on network facilities increase as a result of the wide range of transactions taking place. An increase in the number of transactions requires costly improvements to the transmission system in order to ensure reliability.

Reliance on financial relationships, rather than physical relationships, adds another problem.³¹ Market participants have discovered that they cannot count on firm financial transactions and that they are subject to what they perceive to be arbitrary declarations of emergencies, or extremely disconcerting actions by merchants and utilities, that nonetheless comport with legitimate contracts.³²

INCREASING DIFFICULTY OF COORDINATION

The critical coordination and integration functions performed by vertically integrated, non-competitive firms that are essential to the operation of the electricity grid become more difficult as utility service is de-integrated and competitive transactions expand.³³ These functions are further undermined by breaking the industry into competing component parts.

One of the central activities of electric utility monopolies is to balance load -- to aggregate customers who use electricity at different times of the day or year. By bringing together customers with dissimilar load patterns, utilities are able to use their facilities more fully -- to balance periods when some customers are off-line with other customers who are on-line. Market participants do not have an incentive to cooperate to balance load. Under deregulation, sellers and buyers seek the best deal for themselves and will not necessarily consider the

needs of balancing and coordination.³⁴ They may withhold capacity and misreport information.³⁵ The failure of the Federal Energy Regulatory Commission to investigate the price spikes of 1998,³⁶ its belated recognition of the massive abuses in California,³⁷ and its inability to come to grips with the problem,³⁸ not to mention the ongoing scandal in natural gas pricing, demonstrate the folly of relying on after-the-fact investigations of abusive market transactions.³⁹

Moreover, the rules for allocating scarce transmission resources during times of stress have not been worked out. In a competitive market, some entities gain by hoarding transmission capacity--in other words, reserving more transmission capacity than is actually needed to move that firm's power to end use customers. As a result, transmission markets may appear more constrained to buyers than they are in real physical terms.⁴⁰ This type of market-driven behavior, interacting with real, physical transmission constraints, makes it difficult to determine the true physical condition of the transmission system.

Thus, we have a new market in which a multitude of complex transactions are being made. One of the most important requirements for coping with this new market situation would be good information. Unfortunately, such information is not available. There is simply no centralized, reliable source of information. Information is much more difficult to gather for system aggregators.⁴¹ What is more, the information available may be unreliable. Brokers and facility owners, who seek to maximize profits and are the sources of information, may well have interests that would be served by skewing information in one direction or another.⁴² After a decade of deregulation, the Federal Energy Regulatory Commission has yet to create an information system for assessing the status of the grid or even the actual price of electricity and natural gas being sold in the market.

DISINCENTIVES TO INVEST

Policymakers compounded all of these problems by rushing ahead with deregulation where transmission facilities were inadequate and not designed to support the transactions that policymakers were stimulating. The problem of inadequate capacity was immediately reflected in both the inability to move power between regions of the country and the existence of load pockets within regions.⁴³ The inadequacy of transmission is pervasive and widespread. Policymakers were irresponsible to push deregulation ahead without first ensuring there was adequate capacity.

It is true that the problem became worse during the transition to deregulated markets as a number of factors interacted to create a disincentive to expand and maintain transmission assets.⁴⁴ Incumbent utilities, which were being stripped of their franchise territories, were reluctant to invest in transmission facilities while the rules were uncertain. Yet the under-incentive problem is not simply a transitional issue. Since expanding transmission capacity would facilitate competition with electric utility merchants' own generation assets, it is not in their best, private interest, to do so. Merchants in the electric utility industry do not have an interest in building excess capacity and they bear none of the disruption costs if supply is interrupted. Worse still, markets are sufficiently concentrated that gaming repeated auctions is a chronic problem.⁴⁵ Merchant generators make more money when markets are tight and as they have shown in California, left on their own they do not maintain sufficient facilities to ensure the lights don't go out.

INADEQUATE INCENTIVE TO MAINTAIN FACILITIES

Facing greater pressure on their earnings, an easy way for formerly regulated entities to maintain profits was to cut back on maintenance. The tendency to scrimp on maintenance is not solely a function of the transition, however. Whenever competition is introduced into utility industries, a lowest common denominator mentality takes over. Investments in public obligations, like system-wide maintenance, are seen as imposing a competitive disadvantage so such activities go begging.⁴⁶

In theory, in a competitive market, poor service would induce customers to switch to different suppliers. In practice, there has been little switching in electricity generation markets, where competition was supposed to be the most intense. It is very unlikely that there will ever be competition in the transmission and distribution facilities over which competitively generated electricity was supposed to flow. The notion that multiple sets of electricity wires will compete for customers or business is fanciful at best. The burden of inadequate service and poor quality falls on the public, who as consumers have no choice.

INCREASING NEEDS FOR INCREASINGLY EXPENSIVE EXCESS CAPACITY

Reserve margins and excess capacity emerge as such critically important factors for maintaining system reliability and for disciplining market power that they deserve to be singled out for particular attention by policymakers. In a restructured industry, keeping the lights on involves two problems, not one. Not only must the electrons be available, but the consumer must also be able to afford to flip the switch on.

Provision for reserve margins is uncertain in a competitive market because the cost of provision of reserves is unattractive to business interests, unless peak prices are extremely high. Merchant generators also demand higher rates of return and shorter payback periods, further increasing costs.⁴⁷ Consequently, electricity markets free of reserve planning and coordination may be chronically tight or subject to extreme price instability.

Based on restructured market performance, reserve margins need to be well above traditional levels of 15 to 20 percent and perhaps as much as 30 percent to prevent the abuse of market power.⁴⁸ In addition to the normal operating reserve that the industry has required, there must also be a competitive, or economic, reserve whose primary function is to restrain pricing abuse and instability.

SOCIAL AND ENVIRONMENTAL CONSTRAINTS ON TRANSMISSION CAPACITY

A fundamental problem with investment in new transmission is resistance to the building of additional transmission lines for environmental, health and safety reasons.⁴⁹ The social cost of transmission facilities is far greater than their economic costs. For this reason, scarcity of transmission in the economic sense is likely to be a permanent part of the industry landscape.

Moreover, the benefits of these shared transmission facilities that support the overall network are difficult to align with costs. The problem is both geographic, determining which benefits accrue to which areas, and intergenerational, recognizing that different parts of the system may benefit differently from the same investment across time. Today's investment to serve a long distance transaction may be a core part of tomorrow's system serving native (local)

load. The shared nature of the facilities makes it more difficult for private investors to recover their costs and to overcome the social resistance to the siting of facilities. The shared nature of the facilities across jurisdictions makes it more difficult to reconcile competing interests.

Such public investment is best carried out within the framework of a comprehensive plan. Yet, integrated resource planning is harder to implement in the deregulated model, if it is not abandoned altogether.

FEDERAL POLICYMAKERS ARE HEADED IN THE WRONG DIRECTION: THEY MUST PUT THE PUBLIC INTEREST FIRST

SLOWING DOWN AND CHANGING DIRECTIONS

Policymakers frequently pay lip service to the unique characteristics of electricity, but the focus on restructuring and creation of electricity markets in the past decade led them to underestimate the extremely demanding conditions that must be met to deliver electricity reliably to the public. The wild gyrations of the California electricity markets two years ago, which were caused in part by the fundamental characteristics of electricity, sent policymakers scrambling to build in greater protections against market manipulation. The massive black out in the Northeast once again has policymakers scrambling to assess the state of the transmission system.

Last year, as policymakers were wrestling with an electricity bill in Washington, we offered some advice.

Rather than rushing ahead with restructuring and deregulation, Congress and FERC need to step back and fully understand the implications of the abuses, operational disruptions, and the financial crisis that has occurred in the electricity industry. Congress must restore simplicity and transparency to the industry. The first goal must be to reinforce consumer and investor protections. A comprehensive review of the national transmission system should be conducted. Effective mechanisms for planning and expanding the grid should be demonstrated in reality. Institutions for managing the grid and overseeing trading should be transfigured before moving forward.⁵⁰

This was sound advice when we offered it to the Federal Energy Regulatory Commission (FERC) and the Congress exactly one year ago and it is even better advice now. Transmission facilities are critical infrastructure of a modern society and digital economy that must be dedicated to promoting the public interest. They are part of a shared system in which the fate of each user and producer is tied to the behavior of others. Deregulation has led to private profit maximization that has resulted in under-investment in capacity and inadequate maintenance, causing a breakdown of cooperation and transparency in a network that demands the utmost coordination.

We take the primary lesson of the decade of deregulation to be that we need to restore the balance of public and private interests in the electricity sector. Society cannot rely on private actors to ensure adequate investments are made in vital public goods, such as the electric transmission grid. The transmission system is a highway, not a market, and should be developed under a public interest model in which the primary purpose of all participants is to

ensure reliability and protect the public. The obligation to serve that transmission utilities properly bear must be matched with a duty to build. Bribing merchants to provide these vital public goods, such as through "incentive" payments, unbridled expansion into non-utility businesses, and the auctioning of transmission capacity to the higher bidder, will be particularly expensive.

Unfortunately, neither the Federal Energy Regulatory Commission nor the Congress has taken this point of view. Federal authorities continue to plow ahead with their deregulatory agenda without having adequately studied or addressed any of the fundamental problems that afflict the transmission grid.

Congress and the FERC have been consumed with creating deregulated markets that undervalue the importance of the transmission grid. The FERC is trying to impose a complex "Standard Market Design" on the nation that would allocate transmission resources to the highest bidder, with no assurances that additional transmission capacity would be built or adequately maintained. FERC wants to force all electricity providers into regional transmission organizations (RTOs) that are dominated by the industry, lack consumer representation and push state regulators to the side in an advisory committee.

Congress is proposing to allow utilities to diversify into non-utility businesses and form huge multi-state holding companies by repealing the Public Utility Holding Company Act. This would subject the utility industry to less oversight, by allowing utilities to play a shell game with their assets and transferring a vast increase in responsibility to the FERC, which has been completely unable to deal with the manipulation of markets in the West and the misreporting of energy prices. Foreign corporations could become the owners of this vital infrastructure. For reliability, it wants to move from voluntary industry *self-regulation* to mandatory *self-regulation*.

RECOMMENDATIONS

Policymakers could have eased the transition to competitive generation markets by recognizing the physical and institutional infrastructure that would be needed to support greater competition, but they did not. Perhaps they realized that presenting a true picture of the difficulty of electricity deregulation would have made it impossible to sell it to the public. Whatever the reason behind the underestimation of the difficulties of deregulation, the build-up of problems now makes the implementation of competition a much riskier proposition.⁵¹ Not only has the inadequacy of institutions and facilities grown, but also public confidence in the process has been eroded.

The nation is now deeply divided between approximately one-third of the states – primarily in the Midwest, Northeast and mid-Atlantic – that have deregulated and restructured their electric utility sectors, and two-thirds that have not. Although there are a host of complex reasons behind this division, one cannot help but observe that, on average, those areas of the nation that remain fully regulated have substantially lower prices and more reliable service. Moreover, the tight power pools that resisted the blackout existed long before deregulation. Effective management of the grid does not require deregulation of either generation or transmission; on the contrary it is made more difficult by deregulation.

For the past decade, policymakers and regulators in Washington, D.C., and the Northeast have spent a lot of time trying to make the new electricity markets work. At the same

time, they have neglected to upgrade and maintain a reliable electricity transport system. Congress and the FERC should devote all of their energy to studying, strengthening and managing the interstate transmission system – to promoting the public interest, not the profits of merchant generators and transmission owners.

Congress and FERC are headed in the wrong direction. CFA and CU recommend that:

- Congress not repeal the Public Utility Holding Company Act.
- Congress pare back the Electricity Title of the Energy Bill to a reliability-only title. Both the physical and institutional infrastructure of the industry needs careful study and consideration.
- Congress require a comprehensive survey of the national grid, since such a survey has not been conducted in forty years. It should identify the upgrades that are necessary for reliability and those whose primary purpose is to expand transactions.
- Congress study the question of how best to establish standards and regulatory oversight over privately owned transmission lines. Voluntary self-regulation has been uneven and inadequate. Mandatory self-regulation is little better. More public oversight is necessary.
- Congress examine new institutions that can reconcile the interests of the states and include representation of consumer interests. FERC's proposal for regional, quasi-voluntary institutions of nebulous authority and ill-defined rights and responsibilities is not a solution.
- Congress require a framework for comprehensive planning that considers all alternatives. It should get serious about energy efficiency, like mandating higher minimum standards for air conditioners, which would reduce the demands on the grid at its most vulnerable times, hot summer days. It could also give a boost to local (distributed) generation, which has the double benefit of adding generation resources to the system while not using the long distance transmission lines, whose failure triggered the recent black out.
- FERC abandon its Standard Market Design.

ENDNOTES

¹ Barbaro, Michael, "Consumers Must Demand a (Pricey) New Power Grid," *Washington Post*, August 24, 2003, gives this range.

² Annual cost recovery factors include return of capital (depreciation), return on capital (income) and taxes. Utilities that face lower risk because of franchise service territories, receive lower rates of return, use longer depreciation periods and can have greater reliance on lower cost debt in their financing. Their cost recovery factors can be in the high teen (e.g. 18 percent of invested capital). Merchants require higher rates of return, shorter payback periods and must have greater reliance on higher cost equity (or more expensive "junk" debt) demand much larger cost recovery factors, in the mid- to high twenties. The high cost of merchant plants is readily ascertainable by examining the cost of building plants under different financial assumptions, see Staff Report, *Market Clearing Prices Under Alternative Resource Scenarios: 2000–2010* (California Energy Commission, February 2000). U.S. Department of Energy, Office of Economic, Electricity and Natural Gas Analysis, *The Impact of Wholesale Electricity Price Controls on California Summer Reliability* (June 2001); Watts, Price C., "Heresy? The Case Against Deregulation of Electricity Generation," *The Electricity Journal*, 2001 (March 3).

³ Banerjee, Neela, and David Firestone, "New Kind of Electricity Market Strains Old Wires Beyond Limits: Reliability Suffered in Deregulation, Experts Say," *New York Times*, August 24, 2003.

⁴ U.S. Department of Energy, *Report to Congress: Impacts of the Federal Energy Regulatory Commission's proposal for Standard Market Design* (Washington, D.C.: April 30, 2003). Even this small number was criticized, see Alliance of State Leaders Protecting Electricity Consumers, *Commentary on DOE's Study of Standard Market Design* (Olympia, WA: June 2003).

⁵ A FERC commissioned study of its proposed Regional Transmission Organizations (RTOs) projected slightly higher savings (ICF Consulting, *Economic Assessment of RTO Policy*, Prepared for the Federal Energy Regulatory Commission, February 26, 2002, Tables ES-1, ES-2), but some question even this estimate, see "Comments on the RTO Cost Benefit Analysis Report by the New Mexico and Rhode Island Offices of Attorney General, The Rhode Island Division of Public Utilities and Carriers, the Public Advocate for the State of Maine and the Colorado Office of Consumer Counsel," before the Federal Energy Regulatory Commission, Electricity Market Design Structure, Docket Nos. RM01-12-000, etc., May 3, 2002.. Casazza, John, A., "Electricity Choice: Pick Your Poison: A. Errant Economics? B. Lousy Law? C. Market Manipulation? D. All Three?," *Public Utilities Fortnightly*, 2001 (March 1), identifies efficiency gains in generation of 3 percent

⁶ Cooper, Mark, "Recognizing the Limits of Markets, Rediscovering Public Interest in Utilities," in Robert E. Willett (ed), *Natural Gas and Electricity Power Industry Analysis* (Houston: Financial Communications Company, 2003) (hereafter, Cooper, Recognizing), pp. 416-419, recounts the history of "The Incredible Shrinking Benefits of Restructuring and Deregulation."

⁷ Cooper, Mark, *All Pain, No Gain: Restructuring and Deregulation in the Interstate Electricity Market* (Washington, D.C.: Consumer Federation of America, September 2002), (hereafter, All Pain);

⁸ Cooper, Mark, "An Economic Explanation of Why the West and the South Want to Avoid being Afflicted by the FERC's SMD and Why Market Monitoring is Not an Effective Cure for the Disease," *SMD Market Metrics Conference*, October 2, 200.

⁹ Cooper, Mark, *A Discouraging Word (or Two or Three or Four) about Electricity Restructuring in Texas, Pennsylvania, New England and Elsewhere* (Washington, D.C.: Consumer Federation of America and Consumers Union, March 2003) (hereafter, Discouraging),

¹⁰ Cooper, Mark, "Economics of Power: Heading for the Exits, Deregulated Electricity Markets Not Working Well," *Natural Gas*, 19:5, December 2002, "Let's Go Back: Utilities Cannot Meet Their Obligations Under a One-Size-Fits-None Deregulation Scheme," *Public Power*, December 2002, "Regulators Should Regain Control to Prevent Abuses During Scarcity," *Natural Gas*, August 2003 (hereafter, Regain Control).

¹¹ Studies that make direct comparisons to other industries over this period include Cooper, Mark, *Industrial Organization and Market Performance in the Transportation and Communications Industries: A Review of Current Theories and Empirical Applications to the Railroad, Electric Utility, Airline, Telecommunications and Oil Pipeline Industries with Hypotheses about Natural Gas Pipelines* (Washington, D.C.: January 1986) (hereafter, Cooper, Organization), "Theory vs. Reality," *Consumer Federation of America Utilities Conference*, April 6, 1987. "Protecting the Public Interest in the Transition to Competition in New York Industries," *The Electric Utility Industry in Transition* (Public Utilities Reports, Inc. & the New York State Energy Research and Development Authority, 1994), *Residential Consumer Economics of Electric Utility Restructuring* (Consumer Federation of America and Consumers Union, July 1998) (hereafter, Cooper, Economics).

¹² Cooper, Mark, "Restoring the Balance of Public Values and Private Incentives in American Capitalism," *Too Much Deregulation or Too Little*, Washington D.C.: Cato Institute, November 1, 2002, *U.S. Capitalism and the Public*

Interest: Restoring The Balance in Electricity and Telecommunications (Washington, D. C.: Consumer Federation of America, August, 2002).

¹³ Cooper, Mark, *Back To Basics In Analyzing The Failure Of Electricity Restructuring: Accepting The Limits Of Markets*, Energy Markets in Turmoil, Institute for Regulatory Policy Studies Illinois State University, May 17, 2001 (hereafter, Back),

¹⁴ In addition to the studies cited in note 1, concerns have also been expressed at the state level, see for example, "Electric Industry Restructuring: Who Wins? Who Loses? Who Cares?" Hearing on Electric Utility Deregulation, National Association of Attorneys General, November 18, 1997, "Direct Testimony of Dr. Mark N. Cooper in Response to the Petition of Enron Energy Services Power, Inc., for Approval of an Electric Competition and Customer Choice Plan and for Authority Pursuant to Section 2801 (E)(3) of the Public Utility Code to Service as the Provider of Last Resort in the Service Territory of PECO Energy Company on Behalf of the American Association of Retired Persons," Pennsylvania Public Utility Commission v. PECO, Docket No. R-00973953, November 7, 1997. "Policies to Promote Universal Service and Consumer Protection in the Transition to Competition in the Electric Utility Industry," Regulatory Flexibility Committee, Indiana General Assembly, September 9, 1997, "Testimony of Dr. Mark N. Cooper on Behalf of the American Association of Retired Persons," Application of PECO Company for Approval of its Restructuring Plan Under Section 2806 of the Public Utility Code, Pennsylvania Public Utility Commission, June 20, 1997. "Direct Testimony of Dr. Mark N. Cooper Submitted on behalf of The American Association of Retired Persons, before the Public Service Commission, State of New York, In the Matter of Competitive Opportunities Case 94-E-0952 New York State Electric and Gas Co. 96-E-0891; Rochester Gas and Electric Corp. 96-E-0898 Consolidated Edison Company of New York, Inc. 96-E-0897.

¹⁵ Cooper, Mark, *Electricity Restructuring and the Price Spikes of 1998* (Consumer Federation of America and Consumers Union, June 1999) (hereafter, Cooper, *Spike*).

¹⁶ Cooper, Mark, *Reconsidering Electricity Restructuring* (Consumer Federation and Consumers Union, November 2000) (hereafter, Cooper, *Reconsidering*). These concerns have been expressed in presentations to state policymakers on behalf of CFA and its member groups including, the Arizona Public Service Commission, April 17, 2000), the Wisconsin Public Power Association (June 28, 2000) Nevada Energy Policy Committee, November 30, 2000, Florida Public Utility Commission (January 13, 2001) and the Consumer Affairs Committee of the National Association of Regulatory Utility Commissioners (February 25, 2001), as well as testimony in state restructuring cases, including "Prefiled Testimony Of Dr. Mark N. Cooper On Behalf Of The Virginia Citizen Consumers Council," In The Matter Of Application Of Virginia Electric And Power Company For Approval Of A Functional Separation Plan, Virginia State Corporation Commission, Case No. Pue000584, August 24, 2001; "Direct Testimony Of Dr. Mark N. Cooper On Behalf Of The Attorney General Of Oklahoma, Before The Oklahoma Corporation Commission Application Of Ernest G. Johnson, Director Of The Public Utility Division, Oklahoma Corporation Commission, To Require Public Service Company of Oklahoma To Inform The Commission Regarding Planning Of Energy Procurement Practices And Risk Management Strategies And For A Determination As To Appropriate Methods To Lessen The Impact Of Energy Price Volatility Upon Consumers, Cause No. Pud 2001-00096, May 18, 2001.

¹⁷ Cooper, Mark, *Behind The Headlines Of Electricity Restructuring: A Story Of Greed, Irresponsibility And Mismanagement Of A Vital Service In A Vulnerable Market (And you thought this was about irrational tree huggers who wouldn't allow power plants or transmission lines to be built, but still want to run their air conditioners without paying a fair price for electricity*, (Washington, D.C.: Consumer Federation of America, March, 20, 2001), *Electricity Deregulation and Consumers: Lessons From a Hot Spring and A Cool Summer* (Washington, D.C.: Consumer Federation of America, August 30, 2001).

¹⁸ Cooper, Discouraging, Regain Control.

¹⁹ Southeastern Association of Regulatory Utility Commissioners, *The Benefits and Costs of Regional Transmission Organizations and Standard Market Design in the Southeast*, November 6, 2002.

²⁰ Electricity cannot be stored economically. Since stockpiles are uneconomic, excess capacity is necessary. Pirrong, Stephen Craig, *The Economics, Law and Public Policy of Market Power Manipulation* (Boston: Kluwer, 1996), pp. 10, 24, 59, 70, identifies storage and transportation costs, as well as low elasticities of demand as critical factors making market manipulation more likely. Phillipovic, Dragana, *Energy Risk: Valuing and Managing Energy Derivates* (New York: McGraw-Hill, 1998), p. 3, cites a number of factors that distinguish energy from other commodities, but makes it quite evident that the need to physically consume the product on a real-time basis is the central factor.

²¹ The elasticity of demand is very low, so load shedding must be administered. Reviews of dozens of studies can be found in Bohi, Douglas, *Analyzing Demand Behavior: A Study of Energy Elasticities* (Baltimore: Resources for the Future/Johns Hopkins, 1981) and Pindyck, Robert, S., *The Structure of World Energy Demand* (Cambridge: MIT Press, 1979). Joskow, Paul and Richard Schmalensee, *Markets For Power: An Analysis of Electric Utility Deregulation* (Cambridge: MIT Press, 1984). Rose, Kenneth, *Electric Restructuring Issue for Residential and Small Business Customers* (Columbus, OH: National Regulatory Research Institute, June 2000); Branch, E. Ralph, "Short Run Income Elasticity of Residential Electricity Using Consumer Expenditure Survey Data," *Energy Journal*, 14:4,

1993), Hyman, Leonard, S. *America Electric Utilities: Past, Present and Future* (Arlington, VA; Public Utilities Reports, 1988); Hirst, Eric, and Brendan Kirby, *Retail-Load Participation in Competitive Wholesale Electricity Markets* (prepared for the Edison Electric Institute and the Project for Sustainable FERC Energy Policy, December 2000; Braithwaite, S., "Customer Response to Market Prices – How Much Can You Get When You Need it Most?" *EPRI International Energy Conference*, Washington, D. C., July 2000), and Schwarz, et al., *Industrial Response to Real-Time Prices for Electricity: Short-Run and Long-Run* (University of North Carolina, December 2000).

²² Department of Energy, *Interim Report of the U.S. Department of Energy's Power Outage Supply Study Team*, January 1999; *Horizontal Market Power in Restructured Electricity Markets*, March 2000 (hereafter, Outage Report), raises the problem of transaction pressures in a number of ways. An unwillingness to share best practices is a generic problem (Finding 15). Inadequate notice of problems (Finding 20) and business factors (finding 38) also fall into this category. Even more fundamental is the lack of authority of the ISO to respond to problems (Finding 4) and an absence of rules (Finding 3).

²³ Bohn, Roger E., Alvin K. Klevorick and Charles G. Stalon, Market Monitoring Committee of the California Power Exchange, *Report on Market Issues in the California Power Exchange Energy Markets* (August 17, 1998) (Hereafter Cal, Report); Gegaux, Douglas and Kenneth Nowotny, "Competition and the Electric Utility Industry," *Yale Journal on Regulation*, 10:63, 1997; Gilsdorf, Keith, "Testing for Subadditivity of Vertically-Integrated Electric Utilities," *Southern Economic Journal*, 18:12, 1995; Henderson, J. Stephen, "Cost Estimation for Vertically Integrated Firms: the Cost of Electricity," M. A. Crew (Ed.), *Analyzing the Impact of Regulatory Change in Public Utilities* (Lexington, MA: Lexington Books, 1985); Hirst, Erick and Brenda Kirby, "Dynamic Scheduling: The Forgotten Issue," *Public Utilities Fortnightly*, April 15, 1997; Kaserman, David L. and John W. Mayo, "The Measurement of Vertical Economies and the Efficient Structure of the Electric Utility Industry," *Journal of Industrial Economics*, 29:5, 1991; Kwoka, John E. Jr., *Power Structure: Ownership, Integration, and Competition in the U.S. Electricity Industry* (Boston: Dordrecht, 1996); Roberts, Mark J., "Economies of Density and Size in the Production and Delivery of Electric Power," *Land Economics*, 62:4, 1986.

²⁴ Mistr, Alfred E. Jr., "Incremental-Cost Pricing: What Efficiency Requires," *Public Utilities Fortnightly*, January 1, 1996; Oren, Shmuel, S., "Economic Inefficiency of Passive Transmission Rights in Congested Electricity Systems with Competitive Generation," *The Energy Journal*, 18:1, 1997, "Passive Transmission Rights Will Not Do the Job," *The Electricity Journal*, 10:5, 1997; Ostroski, Gerald B., "Embedded-Cost Pricing: What Fairness Demands," *Public Utilities Fortnightly*, January 1, 1996; Radford, Bruce W., "Electric Transmission: An Overview," *Public Utilities Fortnightly*, January 1, 1996; Volpe, Mark J., "Let's Not Socialize Transmission Rates," *Public Utility Fortnightly*, February 15, 1997. Bohi, Douglas and Karen Palmer; "The Efficiency of Wholesale vs. Retail Competition in Electricity," *The Electricity Journal*, October 1996; Gegaux, Douglas and Kenneth Nowotny, "Competition and the Electric Utility Industry," *Yale Journal on Regulation*, 10:63, 1997, Cornelli, Steve, "Will Customer Choice Always Lower Costs?," *The Electricity Journal*, October, 1996.

²⁵ Outage Report, although not strictly a problem of "manipulation," the outage report identifies incentive and behavioral problems that can be classified in this category. The complaint about inefficient short-term transactions is essentially a complaint about the market transaction mechanism (Finding 25). The new market also elicited a reliance on nonfirm sales, which simply could not be sustained in a stressed market (Finding 24).

²⁶ Earle, Robert L, Phillip Q. Hanser, Weldon C. Johnson and James D. Reitzes, "Lessons from the First Year of Competition in the California Electricity Market," *The Electricity Journal* (October 1999), describe the process in a context that finds the potential for market power and inefficiency.

²⁷ Federal Energy Regulatory Commission, Staff Report to the Federal Energy Regulatory Commission on the Causes of the Pricing Abnormalities in the Midwest during June 1998 (Washington, D.C.; 1998) (hereafter, FERC, Staff Report), p. 3-2; Ohio Report, pp. 20-21; Kiah, E., *Thoughts on Wild Prices*, July 1998, DOE, Outages.

²⁸ FERC, Staff Report), pp. 3-1, 3-2.

²⁹ Public Utilities Commission of Ohio Report, Ohio's Electric Market: June 22-26, 1998, *What Happened and Why: A Report to the Ohio General Assembly* (Columbus, Oh; 1998) (Hereafter, Ohio Report), p. 28.

³⁰ Bohn, Roger E., Alvin K. Klevorick and Charles G. Stalon, Market Monitoring Committee of the California Power Exchange, *Second Report on Market Issues in the California Power Exchange Energy Markets* (March 9, 1999) (Hereafter Cal, Second Report). p. 66.

³¹ FERC Staff Report, pp. 4-1, 4-16; American Public Power Association, *Electricity Prices and Volatility in Transition to Competitive Market* (Washington, D.C, May 1998). FERC, Staff Report, p. 4-9.

³² Ohio Report, p. 25.

³³ Rosen, Richard, Freyr Sverrisson and John Stutz, *Can Electric Utility Restructuring Meet the Challenges It Has Created*, (Tellus Institute, November 2000). raise questions about the ability of any set of institutions to run the industry based primarily on external market transactions. On the problems in the electric utility industry, see, Cooper, *Industrial Organization*, which identified basic economic conditions in the electricity and telecommunications industries that raise doubts about the prospects for deregulation as the debate was beginning. .

³⁴ Letter from Rederick H. Ritts, Attorney for Steel Dynamics Inc., a large industrial consumer of electricity to Alan Richardson of the American Public Power Association and Roy Thilly of Wisconsin Public Power, Inc., dated August 19, 1998; FERC Staff Report, pp. 5-6, 5-7.

³⁵ Outage report, identifies numerous problem with information including a general lack of data (finding 6), poor load projections and forecasts (findings 8, 17, 28), unit ratings (finding 11), cable conditions and incipient failure (finding 5, 14), inadequate notice (finding 20) and failure to preserve records (finding 33).

³⁶ Cooper, Spike, p. 21.

³⁷ "Motion To Intervene And Request For Rehearing Of The Consumer Federation Of America," before the Federal Energy Regulatory Commission, *San Diego Gas & Electric Company, Complaint, v. All Sellers of Energy and Ancillary Services Into Markets Operated by the California Independent System Operator and the California Power Exchange*, Docket Nos. EL00-95-000 et al., "Reply Comments of the Consumer Federation Of America," before the Federal Energy Regulatory Commission, *San Diego Gas & Electric Company, Complaint, v. All Sellers of Energy and Ancillary Services Into Markets Operated by the California Independent System Operator and the California Power Exchange*, Docket Nos. EL00-95-000 et al.

³⁸ Initial Comments Of The Consumer Federation Of America," *Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity Market Design*, Federal Energy Regulatory Commission, Docket No. RM01-12-000.

³⁹ "Initial Comments of the Consumer Federation of America," *Remedying Undue Discrimination through Open Access Transmission Service and Standard Electricity market Design*, Federal Energy Regulatory Commission, Docket No. RM-01-12-000, October 15, 2002, West and South.

⁴⁰ FERC Staff Report, p. 3-20.

⁴¹ The information problem received the most attention in the Outage Report. A number of information and management weaknesses are noted including inadequate forecasting tools (Finding 8, 13, 17, 18 20), a lack of monitoring instruments (Findings 5, 11, 14), and little real time information to respond to problems (Findings 6, 27).

⁴² FERC Staff Report, pp. 3-2, 4-3, 4-4, 4-16.

⁴³ Cambridge Energy Research Associates (CERA), *Electric Power Trends: 2001 (2000)*; *High Tension: The Future of Power Transmission in North America* (August 2000) (hereafter, CERA, *High Tension*); Stipp, David, "The Real Threat to America's Power," *Fortune*, March 5, 2001; Harris, Kiah, E., *Thoughts on Wild Prices*, July 1998, p. 1.

⁴⁴ *Id.*

⁴⁵ Klemperer, Paul, *The Economic Theory of Auction* (Nuffield College, July 2000); McDiarmid, Robert C., Lisa G. Dowden, and Daniel I. Davidson, "A Modest Proposal: Revoke the Nobel Prize? Recognize the Limitations of Theory? Or Grant a License to Steal?," *Electricity Journal*, January/February 2001; Newberry, David M., "Competition, Contracts, and Entry in the Electricity Spot Market," *Rand Journal of Economics*, 29:4, 1998, citing in particular Wolfram, Catherine, D. "Strategic Bidding in a Multi-unit Auction: An Empirical Analysis of Bids to Supply Electricity in England and Wales," *Rand Journal of Economics*, 29, 1998. Newberry cites von der Fehr, N-H.M. and D. Harbrord, "Spot Market Competition in the UK electricity Industry," *Economic Journal*, 103 1993, as the origin of the auction theory approach. Brunekreeft, Gert, "A Multiple-unit, Multiple-period Auction in the British Electricity Spot Market," *Energy Economics*, 23, 2001, reviews this debate from the auction side. Kahn, Alfred, et al., *Pricing in the California Power Exchange Electricity Market: Should California Switch from Uniform Pricing to Pay-as-Bid Pricing* (California Power Exchange, January 23, 2001) Klemperer, Paul, *What Really Matters in Auction Design* (Nuffield College, February 2001. Bolle, Friedel, "Supply Function Equilibria and the Danger of Tacit Collusion: The Case of Spot Markets for Electricity," *Energy Economics*, April 1992; see also "Necessary Conditions for Efficient Multiple-bid Auctions, in R. Nau, E. Gronn, M. Machina and O. Bergland, *Economic and Environmental Risk and Uncertainty: New Models and Methods* (Kluwer, 1997).

⁴⁶ A classic example is utility resistance to conservation investments and distributed generation as systems become physically constrained (see for example, Alderfer, R. Brent, M. Monika Eldridge, and Thomas J. Starrs, *Making Connections: Case Studies of Interconnection Barriers and their Impact on Distributed Power Projects* (National Renewable Energy Laboratory, May 2000), Kahn, Michael and Loretta Lynch, *California's Electricity Options and Challenges: Report to Governor Gray Davis*, (hereafter, *Options*); Marcus, William and Jan Hamrin, *How We Got into the California Energy Crisis*, JBS Energy (2000).

⁴⁷ Staff Report, *Market Clearing Prices Under Alternative Resource Scenarios: 2000 -2010* (California Energy Commission, February 2000). U.S. Department of Energy, Office of Economic, Electricity an Natural Gas Analysis, *The Impact of Wholesale Electricity Price Controls on California Summer Reliability* (June 2001); Watts, Price C., "Heresy? The Case Against Deregulation of Electricity Generation," *The Electricity Journal*, 2001 (March 3).

⁴⁸ Rudkevich, Alesandr, Max Duckworth, and Richard Rosen, "Modelling Electricity Pricing in a Deregulated Generation Industry: The Potential for Oligopoly Pricing in a Poolco," *The Energy Journal*, 1998 (19). The Cal-ISO has argued for a dependable reserve of 14 to 19 percent, which translates into a nameplate reserve in the range of 20 to 25 percent. Borenstein, Severin and James Bushnell, "An Empirical Analysis of the Potential for Market Power in California's Electricity Industry," *Journal of Industrial Economics*, 47:3, September 1999; Bushnell, James, Christopher Knittel and Frank Wolak, *Estimating the Opportunities for Market Power in Deregulated Wisconsin*

Electricity Market (Consumers First, ND). Sweetser, Al, *An Empirical Analysis of a Cominnat Dominant? Firm's Market Power in a Restructured Electricity Market: A Case Study of Colorado* (April 1, 1998);

⁴⁹ Brendan, Kirby and Eric Hirst, "Maintaining Transmission Adequacy in the Future," *Electricity Journal* (1999), acknowledge the primary importance of noneconomic factors.

⁵⁰ Cooper, All Pain, p. iii.

⁵¹ Casazza, J.A., "Small Consumers – What Has Hurt them and What Can be Done About it," Presentation to the National Association of Regulatory Utility Commissioners, November 13, 2001; in Cooper, *Economics*; and Coyle, Eugene, *Price Discrimination, Electronic Redlining, and Price Fixing in Deregulated Electric Power* (American Public Power Association, January 2000).