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BEFORE THE ARIZONA CORPORATION COMMISSION

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3 **MIKE GLEASON**
4 **Chairman**
5 **WILLIAM A. MUNDELL**
6 **Commissioner**
7 **JEFF HATCH-MILLER**
8 **Commissioner**
9 **KRISTIN K. MAYES**
10 **Commissioner**
11 **GARY PIERCE**
12 **Commissioner**

Arizona Corporation Commission
DOCKETED
AUG 31 2007

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13 IN THE MATTER OF THE APPLICATION OF
14 SEMPRA ENERGY SOLUTIONS FOR A
15 CERTIFICATE OF CONVENIENCE AND
16 NECESSITY FOR COMPETITIVE RETAIL
17 ELECTRIC SERVICE.

DOCKET NO. E-03964A-06-0168

NOTICE OF FILING

18 NOTICE IS HEREBY GIVEN that pursuant to the Procedural Order dated July 5,
19 2007, New West Energy Corporation is filing the direct testimony of Peter Fox-Penner in
20 this case.

RESPECTFULLY SUBMITTED this 31st day of August, 2007.

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BEFORE THE ARIZONA CORPORATION COMMISSION

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DOCKET NO. E-03964A-06-0168

**DIRECT TESTIMONY
OF PETER FOX-PENNER
ON BEHALF OF
NEW WEST ENERGY CORPORATION**

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I. INTRODUCTION, SUMMARY AND CONCLUSION

Q. Please state your name and position.

A. My name is Peter Fox-Penner. I am a Principal and Co-Chairman of *The Brattle Group*, an economic and management consulting firm with offices in Cambridge, MA, Washington, D.C., San Francisco, CA, London, England, and Brussels, Belgium. My business address is 1850 M Street, NW, Suite 1200, Washington, DC 20036.

Q. Please state your qualifications and experience.

A. I received a Ph.D. in Economics from the Graduate School of Business, University of Chicago, as well as an M.S. in Mechanical Engineering and a B.S. in Electrical Engineering from the University of Illinois. I am an economist and manager with two decades of experience in government and consulting, primarily in the area of regulated utilities. My statement of qualifications, including testimony I have given over the past four years, is attached as Exhibit A.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of New West Energy.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a broad overview of the successes and failures of retail and wholesale electric markets in the U.S. during the last fifteen years. My discussion draws on a number of books and publications I have contributed to over this period that are listed in my vita.

Q. What is your overall conclusion with regard to electric competition in the United States?

A. Among the restructured network industries, electricity has broken the mold. Whereas other deregulated network industries have experienced price reductions of 35 to 60 percent, there is no empirical evidence that U.S. electric competition has reduced retail prices relative to traditional regulation.

Q. Why have the results of electricity deregulation in the U.S. been disappointing?

A. There are two schools of thought on this. The first is that competition was never a very sound idea for this industry for economic and equity reasons. The second school of thought argues that restructuring's poor performance is due to "government failure," *i.e.*, that politicians have placed certain controls on markets that have prevented them from functioning properly. An example of these controls is found in the enactment of rules that limit wholesale spot price increases as well as retail rate increases even when such increases are due to market fundamentals (*e.g.*, increasing fuel costs).

Both reasons are true to a degree. There are very deep flaws in how we implemented electric competition in the United States, in both wholesale and retail markets. With respect to wholesale, the FERC only received a substantive legislative mandate in 2005, and even then it came with a stern directive to keep prices and market power under control. The tests allowing market rates and mergers were originally vastly underspecified, allowing the California meltdown and also stopping some otherwise sound transactions. Also, there is no substitute for adequate grid capacity and effective open transmission access, as vertical divestiture was apparently never a likely option in parts of the U.S. Finally, neither wholesale nor retail markets can work well without significant demand response – something the industry is only now getting around to implementing. Beyond these fundamental considerations, the litigious regulatory environment and the exaggerated benefits of competition have led to a backlash against deregulation among policymakers and the public.

These are the primary factors that help explain why competition has not worked well in the United States. It was rushed into existence with vastly oversold expectations, inadequate legal and regulatory authority, and inadequate infrastructure. In addition, both retail and wholesale markets were poorly designed, including provisions for last-resort service that made competition unworkable regardless of other challenges to the markets.

Q. Has electric deregulation yielded any benefits?

A. This depends on what we mean by "benefits." There is good evidence that wholesale competition has modestly reduced the costs of generating power. However, the evidence

indicates that deregulation has not reduced the retail price of electricity. While retail electricity rates have been increasing in both restructured and non-restructured states over the last several years, proponents of deregulation created an expectation that competition would lead to vastly reduced retail prices, much like deregulation did for airlines or telecommunications. These exaggerated expectations have not been realized. In addition, deregulation also has delivered greater price uncertainty and other side effects with decidedly mixed results.

II. STATUS OF STATE RESTRUCTURING

Q. When did states begin to open their retail electric industry to competition?

A. The movement to deregulate the electricity industry gathered significant momentum in the mid-1990s. In May 1994, the California Public Utility Commission issued a "blue book" report proposing and setting forth a framework for retail electric competition in that state. Later, in September 1996, California enacted a bill (AB 1890) that opened its retail electric market to competition as of March 31, 1998. The first state to restructure its electric market was Rhode Island, which permitted retail choice as of July 1997. From 1997-2001, a total of approximately 20 states implemented retail choice. Exhibit B shows the states that permit full or partial retail electric competition, along with dates in which these changes were adopted. Exhibit B also contains current information on customer shopping statistics in each state.

Q. Why did only a subset of states decide to pursue retail electric choice?

A. Each state has jurisdiction with respect to the structure of its retail electric market. While several bills were introduced in Congress in the mid- and late-1990s that would have required states to implement retail choice by a date certain, none of these bills were passed. Thus, each state had to decide whether it was in the public interest to pursue retail electric choice.

There is no question that the desire to lower retail electric rates was the primary motivation underlying retail choice. Most of the states that decided to implement retail choice had above-average electric rates.

Q. What is Arizona's history with respect to retail electric competition?

A. The Arizona Commission first began to consider retail electric competition in May 1994, when Commission Staff initiated a generic investigation. After a lengthy public hearing process, the first set of Retail Electric Competition Rules was adopted in late 1996 in Decision No. 59943 (December 26, 1996). Under these rules, retail direct access was to be phased-in starting in 1999.

In September 1999 (Decision No. 61969), a new set of Retail Electric Competition Rules was proposed and adopted. These revised rules included a mandatory divestiture provision and the separation of competitive and non-competitive services. Retail access was made available to all customers by January 2001. Approximately twenty entities eventually received CC&N's to provide competitive electric service. Although there was limited retail electric competition in Arizona from 1999 to 2001, all of the retail competitors that had served Arizona customers eventually stopped serving these customers for various reasons. Moreover, the California power crises of 2000-2001 caused Arizona policymakers to reconsider the state's commitment to retail competition.

Q. Were the Commission's Retail Electric Competition Rules appealed?

A. Yes, these rules were appealed and partially overturned by the Arizona Court of Appeals, in Phelps Dodge Corporation, et al., v. Arizona Electric Power Cooperative, Inc., et al., 207 Ariz. 95, 83 P. 3d 573 (2004) ("Phelps Dodge Decision"). This decision upheld a superior court's invalidation of CC&N's that had been granted by the Commission, on the grounds that the Rule under which the CC&N's were granted established a method of setting rates that did not consider the "fair value" of property owned by ESP's in Arizona. This Decision left Arizona without any certified competitive retail providers.

Q. Did some states that had implemented retail choice subsequently decide to "re-regulate" the provision of retail electricity?

A. Yes. Several states, such as California, Nevada, and Montana, have all decided to restrict retail access to "grandfathered" customers and/or to large customers. Virginia decided to fully re-regulate its electric market. Other states, such as Maryland, Delaware, and Maine are considering whether their utilities should get back into the business of building

generating plants to “self-provide” at least a portion of their power supply requirements (and therefore reduce their reliance on wholesale power markets).

Q. What does the current shopping data tell about the state of retail competition?

A. Referring to Exhibit B, it is clear that in states with retail choice, residential customers, for the most part, continue to purchase power from their local utility. In many states, the percentage of residential load buying from a competitive supplier is below 5 percent. The one major exception is Texas, which has adopted an aggressive policy to move all retail customers, including residential customers, off of utility service. The Texas “provider of last resort” policy is addressed in the testimony of my colleague Frank Graves. Ohio is the only other state with over 10 percent of its residential load being served by non-utility suppliers, but most of these customers are being served through a municipal aggregation program established by that state’s restructuring law.

The market for large commercial and industrial has tended to be much more active, as one would expect, given that they are the more attractive customers for competitive retail providers. However, even the market for these customers is not currently active in some retail choice states, such as Connecticut and Michigan.

III. EVALUATING THE IMPACTS OF ELECTRIC COMPETITION

Q. When evaluating the impact of competition, is it easy to isolate the changes caused by various regulatory initiatives?

A. No, it is possible but certainly not easy to do this. For example, when evaluating the impact of wholesale competition, it is difficult to isolate the impact of regional transmission access (and rate “depancaking”) from the impact of centralized power markets.

Q. How do you unbundle the key attributes of alternative electric industry structures for the purpose of evaluating them from a broad perspective?

- A. It is important to unbundle the concept of electric deregulation into a more specific set of attributes in order to arrive at an accurate view of its current state. A brief explanation of these issues is as follows:

Long-term vs. Short-term Effects: The temptation in most analyses of competition in power systems is to gravitate toward quantification of short-term effects because there are a number of very good quantitative models that do this. Moreover, such analyses require relatively few controversial assumptions. Long-term effects are generally more important, but to look at the long-term effects, it is necessary to project the type of system changes that will occur (*i.e.*, new investment), how the new system will operate, and how much the additions will cost. This is especially difficult for power systems because of the high degree of production interdependence.

Retail vs. Wholesale Competition: In deregulation, a key dimension is whether there is retail choice or wholesale competition only. U.S. wholesale competition is, in fact, a bundle that includes wholesale open access, an ISO/RTO or some other kind of independent transmission operator, and some degree of generation pricing flexibility. Retail competition is not necessarily a part of this bundle, but it cannot work well until wholesale competition is working well.

Specific Market Design Features vs. the Concept of Competition: there are several different ways to implement competition in the electric power industry. It is important to distinguish between the generalized concept of wholesale competition, which has existed to a limited degree for thirty years or more, and specific market models such as LMP. The latter features a centralized spot market administered by the ISO or RTO, with energy prices set on an hourly basis at numerous locations within the bulk power grid. At the other end of the spectrum, wholesale markets can feature bilateral physical trading, with the transmission operator playing little or no role in the setting of energy prices. Numerous hybrid models between these two polar opposites (*e.g.*, a centralized spot market with region-wide rather than locational pricing) also can be established.

Full vertical separation vs. open access: The most critical structural feature of electric markets is the degree of vertical separation. Purely separated markets are those where

generation is 100% separated from transmission. If vertical integration is not implemented, there is a hybrid structure and an open access regime is needed to ensure that grid operators do not favor their own generators. There are tradeoffs between vertical and separated structures. Separation is easier to regulate and build incentives into, and vertical integration carries intrinsic economic efficiencies. There is no clear winner for all cases.

Equity and Other non-price attributes: There is a big difference between efficiency effects, where costs and prices drop on average, and equity effects, where, money is redistributed well or poorly.

Notably, the short-term price of electric energy is often the only variable that is measured, but is far from the only factor that matters. Electric consumers and their representatives care just as much about short and long-term price uncertainty, reliability, security of supply, rate fairness and the absence of market power, choice of products, and the environmental attributes of power. The oversight of these issues is common in assessments of the impact of competition on the industry. All these dimensions play a role in the present controversy over electric restructuring.

Q. A number of cost-benefit studies have been performed regarding electric competition. What is your general view of these studies?

A. Most of these studies, explicitly or implicitly, seek to answer the following question: "Would ratepayers in market x be better off today had retail choice not been adopted?" That is not an easy question to answer. The difficulty does not lie in accurately modeling electric markets, but in creating a "but for" scenario that properly compares regulated and non-regulated cases for the same market.

There are numerous factors aside from restructuring that influence prices, such as fuel costs, that are endogenous; these are difficult enough to factor into a model, though possible. The political issues – how markets have been structured, rules adopted and rates set – continue to be made based on considerations other than pure efficiency and are quite more complicated. Thus, a "but for" scenario can only be recreated by guessing what the regulatory process would have done when confronted with the ongoing

outcomes of the alternative industry structure. We know the political decisions that helped shape the structure we adopted, but not the decisions that would have shaped the structure we didn't employ.

Another reason why cost-benefit analyses are so difficult is that the first ten years of deregulation have been marked by extraordinary turmoil. Observed cost and price signals do not constitute reliable long-term measures of the productive or allocative efficiencies of the market participants. The same is true of the demand side – demand-side pricing and efficiency programs are still so underutilized that we have only small indications of the potential benefits of these measures in widespread national use.

Finally, there are important differences between studies that focus on changes in costs and those that focus on changes in price. If the cost of manufacturing a product is greatly reduced and there are no offsetting increases in the cost of selling or delivering the good, and competition is reasonably strong, then the manufacturing cost reductions should be passed on in the form of lower retail prices. If production costs are declining and retail prices are not, there are many possible explanations. Further examination of these cases requires an examination of generation costs.

Q. Please summarize the broad evidence regarding competition's effect on generating plant costs and efficiencies?

A. Electric restructuring, at least in the U.S., has meant deregulating the generation and retail supply segments of the industry (since transmission and distribution are widely viewed as natural monopolies). Given this, it should be possible to measure the effects of the pressure to reduce costs on the generation sector directly before we have to contend with all of the factors that affect retail electricity prices (transmission, distribution, retail rate freezes, etc.).

Again, it is much easier to measure production efficiency in the short run than the long run. For power plants, the stock does not change much and the efficiency of these generators over time can be measured, controlling for changes in the price of fuel, for example, so that shifts in generator efficiency following restructuring can be isolated well.

Several researchers have done these short-run studies, including several Brattle Group colleagues. The studies of "market states" show that utility-owned plants reduced their non-fuel operating expenses, as well as their employees per MW (an indication of increased workplace efficiency). Plants divested by utilities were found to have increased their heat rates. Though there are caveats with each study, the findings are in line with predictions and industry experience.

There is no analogous way, however, to examine the long-term impacts of wholesale competition on power costs because of the limited existing time frame, among other issues.

IV. COMPETITION'S IMPACT ON RETAIL PRICES

Q. If the evidence shows that the costs of generating power have been reduced as a result of wholesale competition, then why don't customers in those markets perceive that retail prices are lower?

A. There are several reasons why but the most obvious reason is that, despite improvements in generator efficiency, wholesale power prices have increased, not decreased, over the past several years. This increase has been caused primarily by an increase in the price of fossil fuels, particularly natural gas. Labor costs have also increased in both restructured and non-restructured states. These increases have overwhelmed the relatively modest cost-savings improvements in generator efficiency spurred by wholesale competition.

Both wholesale costs and retail rates have increased significantly over the last ten years in both structured and non-restructured states. While the evidence shows that rates in restructured states are 35 percent higher than those in non-restructured states, the same discrepancy existed before restructuring. That said, over the last several years, rates have been going up somewhat faster in restructured states, due primarily to the expiration of transitional, restructuring-related rate freezes. A "rate-shock" occurred in a few restructured states because their rate freezes came off at a time when wholesale prices were high, contributing to the perception that restructuring had failed.

Q. Assume that fuel prices and other input costs had not increased. In that event, would wholesale power prices have declined as a result of competition?

A. Not necessarily. One could argue that today's wholesale generation prices are lower than they would have been in a "but for" world without wholesale competition. That may be true, but there are many reasons why a decrease in the cost of power may not be reflected in lower wholesale and retail prices. First, organized markets tend to sell a higher fraction of energy at the marginal spot price, which is at least as high as the most expensive unit operating in any hour. Before deregulation, energy was primarily sold at the average or embedded cost of the supplying utility, which meant that the generation component of retail prices was based on the average total cost (*i.e.*, including both fixed and variable costs) of the utility's generation fleet and power supply contracts.

In most electricity systems, the marginal cost of the most expensive unit on the system tends to be much more expensive than the marginal cost of the average generator. Moreover, the marginal cost of the most expensive unit tends to be greater than the embedded cost of a utility's generation fleet. While the most expensive unit is dispatched infrequently, generators with relatively high marginal costs (*e.g.*, gas-fired units) typically are dispatched during peak hours and set the price in a competitive market.

Organized markets tend to sell a higher fraction of energy at the marginal spot price, which is at least as high as the most expensive unit operating in any hour. Before deregulation, energy was normally sold at the average total cost of the supplying generator, which means that the generation component of retail prices was based on the average cost of generators. In most electricity systems, there is a 100-200 percent difference between the marginal cost of the average generator and the most expensive plant on the system.

Deregulation has had the intended effect of moving retail prices away from pure average-cost pricing towards pricing at marginal costs. This is more economically efficient, but is likely to result in higher prices if all other factors are held the same. Going back to elevated expectations, many policymakers were told that huge reductions in the costs of production would more than offset marginal cost pricing.

Q. Apart from pricing power at marginal cost, is there another reason why lower wholesale costs will not necessarily translate into lower wholesale prices?

A. Yes. If there is market power present in the deregulated spot market, spot prices will be even higher than marginal costs. Under perfect competition, the wholesale market price will equal the marginal cost of the most expensive generator operating at any given time. However, few if any generation markets (as well as most other product markets for that matter) are perfectly competitive. Generation markets, even if competitive, are characterized by workable competition, not perfect competition. Under workable competition, prices sometimes will exceed the marginal cost of the most expensive generator.

In addition, when system-wide demand for power exceeds the available supply, generation prices, like prices in other markets, will rise to reflect the "scarcity" value of generation; *i.e.*, generation is "rationed" to those willing to pay the most for it. One of the worst political features of electric deregulation is that it has put regulators in the unenviable position of having to sort between price increases consistent with economic efficiency, such as scarcity-related price increases, and increases that are pure transfers of wealth from buyers to sellers due to abuses of market power. This has been the core of my consulting business for the last five years and it is still quite an unsettled exercise.

V. COMPETITION'S IMPACT ON OTHER ASPECTS OF RETAIL ELECTRIC SERVICE

Q. Having reviewed the comparative pricing outcomes in restructured versus non-restructured states, can you briefly summarize your views on the non-price attributes of electric retail industry structures?

A. Yes. It is undisputed that restructuring has led to much greater uncertainty and price volatility. It has also led to large transactions costs, including costs that evidently convince many households and small businesses to forego shopping for power, and to greater financial instability for utilities and power providers in restructured states. These comments apply to both the retail and wholesale markets, though not equally to every

market design. LMP markets are the most volatile of all working markets, and wholesale markets are much more volatile than retail markets.¹

The evidence on several other attributes is mixed. Restructuring strongly set back U.S. efforts to achieve greater energy efficiency, as attempts to transfer these programs over to the market were not very successful. The record on fuel diversity is unclear, given that both competitive, merchant generators and regulated utilities primarily built gas-fired power plants following the onset of choice.

Additionally, there is some evidence that restructuring, often in tandem with renewable power mandates (*i.e.*, requirements that load-serving entities acquire a specified percentage of their power supply from renewable resources), provided customers with an expanded opportunity for “green” product mixes. Now, many integrated utilities are following suit.

Finally, I am not aware of differences in technical power quality or reliability in restructured versus non-restructured states. Although several large recent blackouts have been attributed to wholesale competition, I believe the industry is well on its way to adopting working mandatory reliability standards that will work in all types of structures.

Q. Could you please summarize your thoughts?

A. In the United States, electric competition was rushed into existence with vastly oversold expectations, inadequate legal and regulatory authority, and inadequate infrastructure. Electricity markets require certain physical and institutional preconditions to work effectively. Without these, competition works well in certain parts of the industry, but not at the widespread level at which it has been introduced.

Recent improvements in the design and regulation of wholesale power markets are likely to ensure that they will provide net benefits to the nation. At the same time, such markets will clearly exist as a complement to vertically integrated utilities, including franchise IOUs and customer- and government-owned systems. In other words, wholesale markets

¹ Long-term volatility, more commonly referred to as “boom and bust cycles” are also in my opinion more pronounced in restructured states – but this is very much tied to state retail as well as federal market design policies that originally emphasized single-price markets. See Joskow 2006.

are unlikely to replace integrated providers, especially for long term supplies, but will certainly supplement them beneficially.

The additional benefits of retail choice on top of the benefits provided by wholesale competition are mixed and somewhat situation-specific. It is imperative, however, that whether a state adopts choice or remains under rate regulation, it be extremely careful to create policies that are consistent with enabling success with the structure it creates. For retail choice states, this includes ensuring a competitive structure at both the wholesale and retail level, which in turns means adequate transmission capacity and access, among other things; adequate demand response; appropriate last-resort pricing and customer supplier shift policies; and careful formulation of policies to meet other critical state energy goals, including renewable energy, fuel diversity, and energy efficiency. The state needs the resources to police its competitive framework as well.

If a state chooses to remain with rate regulation there are important items to attend to as well. Good regulation in this day and age compels a state to maintain a high quality, economically sophisticated, and politically balanced regulatory commission. To provide benefits comparable to retail choice, regulators must monitor industry best practices and benchmark their utilities against them continuously. Regulated, government- and customer-owned utilities should provide product variety, including green power options and time-differentiated prices, among other things.

Q. Thank you. I have no further questions.

EXHIBIT A

Peter Fox-Penner is an economist with an engineering education and more than 30 years of experience in regulated industries, energy policy, and environmental issues. In a career that has spanned consulting, senior government service, and academia, he has assisted numerous public and private clients in settings that include expert testimony, publications and speeches, and advice to senior management and boards. He is the author of numerous publications and books and a frequent speaker at conferences and meetings.

Dr. Fox-Penner's longest area of specialization has been electricity market policies and regulation. In this area he has advised most major U.S. energy companies and grid operators, and government agencies, as well as a number of international clients, on electric policy issues. He is the author of the *Electric Utility Restructuring: A Guide to The Competitive Era*, a best-selling 1997 work on the subject, and many other publications in electric and energy policy. He served as the lead expert in the prosecution of market manipulation during the California energy crisis of 2000-2001. His work in this subject area has been cited by the Supreme Court and other authorities.

Recently, Dr. Fox-Penner returned to his earlier focus on energy security, oil markets, and climate change. He is co-leading *Brattle's* expanding work in energy security policies. He is also returning to his early work in the area of utility resource planning and energy efficiency programs.

Outside of his duties as a *Brattle* Group principal, Dr. Fox-Penner previously served as board member of the Global Energy Group. He is a Managing Member of ENpartners, a small green technology investment firm that is in the process of merging with a solar and lighting focused ESCO. He has served on the board of Environment 2004 and the Environmental Alliance and as an advisor to the Progressive Policy Institute and several Presidential Campaigns.

As co-chairman of the firm, Dr. Fox-Penner directs the firm's external strategy formulation and execution. Since assuming this role in 2001, he has led the firm through six consecutive years of growth and acquisitions.

Dr. Fox-Penner received his B.S. in Electrical Engineering (1976) and his M.S. in Mechanical Engineering (Energy Policy, 1978) from the University of Illinois, and his Ph.D. in Economics from the Graduate School of Business, University of Chicago (1989).

REPRESENTATIVE EXPERIENCE

Regulated Industries and Electric Restructuring

- Electric utility restructuring
- Antitrust, market power, and merger-related issues in regulated industries

- Network and transmission pricing, access rules, and governance
- Economic and policy issues in public interest utility programs
- Load and sales forecasting, pricing, and new product analysis

Energy, Environmental, and Technology Policy

- Global climate change policies
- Energy security policies and transportation energy use
- Technology and Market Evaluations
- Public Policies Towards New Technologies and R& D
- Energy efficiency—economics and policy
- Oil market economic policy questions

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- 2007 Principal and Co-Chairman, *The Brattle Group*, Washington, DC
- 2001-2007: Principal and Chairman, *The Brattle Group*, Washington, DC
- 1996-2001 Principal and Director, *The Brattle Group*, Washington, DC
- 1993-1996: Principal Deputy Assistant Secretary for Energy Efficiency and Renewable Energy, United States Department of Energy
- Senior Advisor for Technology Policy, Office of Science and Technology Policy, Executive Office of the President
- Assistant to the Deputy Secretary of Energy
- 1989-1993: Vice President, Charles River Associates, Boston, MA
- 1991-1993: Professorial Lecturer, Center for Energy and Environmental Studies, Boston University
- 1987-1989: Senior Associate, Charles River Associates
- 1980-1983: Research Engineer and Chief Research Engineer, Illinois Governor's Office of Consumer Service, Chicago, IL
- 1977-1980: Research Assistant and Research Engineer, Office of Vice Chancellor for Energy Research, University of Illinois, Urbana, IL

TESTIMONIAL EXPERIENCE

NEW YORK PUBLIC SERVICE COMMISSION CASE NO. 06-M-0878, MARCH 7, 2007

Subject: Rebuttal Testimony on Impacts of the Transaction on competition in the Joint Petition of National Grid PLC and KeySpan Corporation for Approval of Stock Acquisition and other Regulatory Authorizations
Sponsor: National Grid

NEW YORK PUBLIC SERVICE COMMISSION CASE NO. 06-6-0878, OCTOBER 27, 2006

Subject: Direct Testimony on Impacts of the Transaction on competition in the Joint Petition of National Grid PLC and KeySpan Corporation for Approval of Stock Acquisition and other Regulatory Authorizations
Sponsor: National Grid

U.S. FEDERAL ENERGY REGULATORY COMMISSION DOCKET NO. EC06-427-003, SEPTEMBER 25, 2006

Subject: Supplemental Testimony examining the nature and degree of regulatory control applied to Mystic units 8 and 9 from their conception.
Sponsor: Mystic Development, LLC

U.S. FEDERAL ENERGY REGULATORY COMMISSION DOCKET NO. EC06-427-003, AUGUST 18, 2006

Subject: Direct Testimony examining the nature and degree of regulatory control applied to Mystic units 8 and 9 from their conception.
Sponsor: Mystic Development, LLC

U.S. FEDERAL ENERGY REGULATORY COMMISSION DOCKET NO. RM04-7-000, AUGUST 7, 2006

Subject: NOPR Comments on Filing to the FERC on Market-Base Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services

AMERICAN ARBITRATION ASSOCIATION CASE NO. 72198&0065604VSS, JUNE 27, 2006

Subject: Rebuttal Report - Arbitration between Oakley and New West Energy regarding termination of agreement
Sponsor: New West Energy

AMERICAN ARBITRATION ASSOCIATION CASE NO. 72198Y0065604VSS, JUNE 9, 2006

Subject: Arbitration between Sony Pictures Entertainment and New West Energy regarding termination of agreement
Sponsor: New West Energy

U.S. FEDERAL ENERGY REGULATORY COMMISSION DOCKET NO. EC06-___-000, MAY 23, 2006

Subject: Affidavit Impact of the merger of National Grid and KeySpan Corporation on competition in wholesale electricity and gas markets

Sponsor: National Grid

AMERICAN ARBITRATION ASSOCIATION CASE NO. 73 198 Y 00019 05 MAVI, APRIL 3, 2006

Subject: Arbitration between Oakley and New West Energy regarding termination of agreement

Sponsor: New West Energy

U.S. FEDERAL ENERGY REGULATORY COMMISSION DOCKET NO. EC06-___-000, MARCH 8, 2006

Subject: Affidavit Impact of SCE's Acquisition on Anaheim's share of SONGS

Sponsor: Southern California Edison Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER96-1551-015, ER01-615-011, JANUARY 31, 2005

Subject: Affidavit in response to PSNM Notice of Possible Change Status

Sponsor: El Paso Electric Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER01-1529-009, OCTOBER 28, 2005

Subject: Change in Status Market Based Rate

Sponsor: Sierra Pacific Power and Nevada Power Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EL05- -000, OCTOBER 11, 2005

Subject: Affidavit re: Complaint against Mirant Americas Energy Marketing termination payment

Sponsor: City of Vernon

CALIFORNIA PUBLIC UTILITIES COMMISSION, R.04-04-025 AND R.04-04-003, AUGUST 31, 2005

Subject: Assessment of PG&E's SRAC Proposal

Sponsor: Pacific Gas & Electric Corporation

CALIFORNIA PUBLIC UTILITIES COMMISSION, R.04-04-003 AND R.04-04-025, AUGUST 31, 2005

Subject: Assessment of SCE's Wholesale Energy Competition at the SP15 Market Location

Sponsor: Southern California Edison Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EC05-___-000, AUGUST 31, 2005

Subject: Section 203 Filing

Sponsor: Nevada Power Company and GenWest LLC

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER02-2263-005, AUGUST 29, 2005

Subject: Triennial Market-based Rate Filing
Sponsor: Southern California Edison Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER96-1551-014 ET AL., AUGUST 12, 2005

Subject: Generation Market Power Compliance Filing
Sponsor: El Paso Electric Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER02-1336- ET AL., JULY 15, 2005

Subject: Triennial Market-based Rate Filing
Sponsor: Vandolah Power Company, L.L.C, Front Range Power Company, LLC, Dartmouth Power Associates Limited Partnership

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER01-1527-004, ET AL, ER01-1529-004 ET AL, JUNE 22, 2005

Subject: Compliance filing for Market Based Rate Tariff Three-Year Update Filing
Sponsor: Sierra Pacific Power and Nevada Power Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EC05-43-000, MAY 27, 2005

Subject: Supplemental Protest Merger of Exelon Corporation and Public Service Enterprise Group (Peter Fox-Penner and Johannes Pfeifenberger)
Sponsor: Ameren Services Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EC05-43-000, APRIL 11, 2005

Subject: Motion to Intervene and Protest Merger of Exelon Corporation and Public Service Enterprise Group (Peter Fox-Penner and Johannes Pfeifenberger)
Sponsor: Ameren Services Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER96-1511-011 ET AL, MARCH 9, 2005

Subject: Response Affidavit to PSNM's Revised Generation Market Power Screens
Sponsor: El Paso Electric Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NOS. ER05- -000 AND ER-96-140-, FEBRUARY 17, 2005

Subject: Market Power Analysis Application for Market-Based Rate Authorization
Sponsors: Dartmouth PPA Holdings, L.L.C.

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NOS. EL03-180-000 ET AL,
JANUARY 31, 2005**

Subject: Prepared Supplemental Testimony – Detailed Analysis of Widespread Use
of Fat Boy Transactions
Sponsors: California Parties

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER03-563-030, JANUARY
10, 2005**

Subject: Cross Answering Testimony and Exhibits - ISO-NE's Locational Installed
Capacity (LICAP)
Sponsor: Dominion Resources *et al*

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER99-2416-001,
NOVEMBER 17, 2004**

Subject: Supplemental Affidavit on Revised Market-Based Rate Tariff Three-Year
Update Filing
Sponsor: El Paso Electric Company

**AMERICAN ARBITRATION ASSOCIATION, CASE NO. 72 Y 198 00236 04 VSS, NOVEMBER 15,
2004**

Subject: Arbitration between California Portland Cement Company and New West
Energy regarding termination of agreement
Sponsor: New West Energy

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER00-3693- , ET AL.,
NOVEMBER 9, 2004**

Subject: Revised Market Based Rate Tariff Three-Year Update Filing
Sponsor: Edison Mission Energy and Edison Mission Marketing & Trading, Inc.

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER03-563-030, NOVEMBER
4, 2004**

Subject: ISO-NE's Locational Installed Capacity (LICAP)
Sponsor: Dominion Resources *et al*

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER01-1527- AND DOCKET
NO. ER01-1529- , OCTOBER 25, 2004**

Subject: Revised Market Based Rate Tariff Three-Year Update Filing
Sponsor: Sierra Pacific Power and Nevada Power Company

**U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. ER99-2416-001, AUGUST
11, 2004**

Subject: Revised Market-Based Rate Tariff Three-Year Update Filing
Sponsor: El Paso Electric Company

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NOS. ER04-539-002, MAY 25, 2004

Subject: PJM Market Mitigation in NICA
Sponsor: Edison Mission Energy, Midwest Generation and Edison Mission Marketing & Trading, Inc.

U.S. DISTRICT COURT, EASTERN DISTRICT OF PENNSYLVANIA, CIVIL ACTION NO. 02-CV-2733, APRIL 2004

Subject: Expert Report Estimating Damages arising from alleged breaches of agreement between Powerweb and NewEnergy
Sponsor: Powerweb, Inc.

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EL03-153-000, FEBRUARY 9, 2004

Subject: Declaration Opposing Settlement Regarding Market Manipulation by Dynegy
Sponsor: Southern California Edison

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EL03-152-000, JANUARY 20, 2004

Subject: Declaration Opposing Settlement Regarding Market Manipulation by Duke
Sponsor: Southern California Edison

U.S. FEDERAL ENERGY REGULATORY COMMISSION, DOCKET NO. EL03-158-000, JANUARY 8, 2004

Subject: Declaration Opposing Settlement Regarding Market Manipulation by Mirant
Sponsor: Southern California Edison

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With Gregory N. Basheda, Darrell B. Chodorow, Jason A. Hicks, Eric Hirst, James K. Mitchell, Dean M. Murphy and Joseph B. Wharton. "The FERC, Stranded Cost Recovery, and Municipalization." *Energy Law Journal* 19 (1998): 351-386

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- With Franklin M. Fisher, Joen Greenwood, William G. Moss, and Almarin Phillips. "Due Diligence and the Demand for Electricity: A Cautionary Tale." *Journal of Industrial Organization*, 1992.
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- With Bruce M. Hannon and Robert Herendeen. "An Energy Conservation Tax: Impacts and Policy Implications." *Energy Systems and Policy* 5, no. 2 (1981).
- With R.S. Chambers, R.A. Herendeen, and J.J. Joyce. "Gasohol: Does It or Doesn't It . . . Produce Positive Net Energy?" *Science* 206, no. 4420 (November 1979): 789-795.
- "Considerations of Energy Cost and Versatility in Choosing Optimal Stockpile Forms." *Resources Policy* 5, no. 2 (June 1979): 414-448.
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- With Clark Bullard and David Pilati. "Energy Analysis: Handbook for Combining Process and Input-Output Analysis." *Resources and Energy* (June 1979). Also published by the Energy Research and Development Administration, Washington, DC, ERDA 77-61).
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Electric Utility Restructuring: A Guide to the Competitive Era. Vienna, VA: Public Utility Reports, 1997

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With Romkaew Broehm. "Price-Responsive Electric Demand: A National Necessity, Not an Option, chapter 10 in "Electricity Pricing in Transition", ed. Ahmad Faruqui and B. Kelly Eakin," Kluwer Academic Publishers, 2002.

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"What Role Should the Federal Government Play in Energy Efficiency?" in *Policy Evolution: Energy Conservation to Energy Efficiency.* Douglas A. Decker and Alan Berolzheimer, eds. Liburn, GA: The Fairmount Press, 1997.

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With Joe Romm. "Plugging Into the Grid." Progressive Policy Institute (PPI), March 2007.

With Gregory Basheda, Marc Chupka, Johannes P. Pfeifenberger, Adam Schumacher. "Why Are Electricity Prices Increasing?" The Edison Foundation, June 2006.

- “Heard Around Town: Focus on Energy Policy and the Energy Efficiency Market.” The NAESCO Newsletter, November 2005.
- “A Welcome Truce in the Electricity Wars.” *Public Utilities Fortnightly*, October 2005.
- “Rethinking the Grid – Avoiding More Blackouts and Modernizing the Power Grid Will Be Harder than You Think.” *Electricity Journal*, March 2005.
- “U.S. Needs a Plan to Keep the Lights On.” *The Plain Dealer*, August 26, 2004.
- “A Year Later, Lessons from the Blackout.” *The New York Times*, August 15, 2004.
- With Romkaew Broehm. “Deregulated Electricity Pricing in the U.S.: Dramatic New Rules From the FERC,” *The Brattle Group*, April 25, 2004.
- “Will Federal Legislation Fix the Grid?” Progressive Policy Institute, October 7, 2003.
- With Greg Basheda. “State Involvement in the Regional Transmission Planning Process,” The Edison Electric Institute, October 2003.
- With William G. Moss. “Geographic Market Definition in Electric Power Markets.” *The Brattle Group*, August 30, 2000, Revised & Submitted January 2002.
- “Easing Gridlock on the Grid: Electric Planning and Siting Compacts.” *The Electricity Journal*, November 2001.
- “Clean Growth: A Balanced Energy Policy for the 21st Century.” Progressive Policy Institute’s Policy Report, October 2001.
- With Greg Basheda. “A Short Honeymoon for Utility Deregulation.” *Issues in Science and Technology*, Spring 2001.
- “What not to learn from the California Crisis.” (Op-ed) *The Providence Journal*, March 3, 2001.
- “Epitaph for Electric Deregulation.” Prepared for the National Council on Competition and the Electric Industry, December 2000 meeting, October 2000.
- With Frank Graves. “Monopoly Power After Reform? A Time for Soul-Searching.” *Public Utilities Fortnightly*, May 2000.
- “Federal Restructuring Legislation: Any Chance in This Congressional Session?” *Energy Efficiency Journal*, March 2000.
- “Electric Power Deregulation: Blessings and Blemishes, A Non-Technical Review of the Issues

Associated with Competition in Today's Electric Power Industry." Prepared for the National Council on Competition and the Electric Industry, March 14, 2000.

With Johannes P. Pfeifenberger. "Transmission Access, Episode II: FERC's Journey." *Public Utilities Fortnightly*, August 1999.

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"Critical Trends in State Utility Regulation." *Natural Resources and Environment* 8 (Winter 1994): 17-20.

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“The Dollar, Energy and Labor Impact of 1971 Regular Route Intercity Bus Transportation.” Center for Advanced Computation Technical Memo 31, July 1974.

“Energy Intensity of Motorcycle Travel.” Center for Advanced Computation Technical Memo 30, July 1974.

SELECTED CONFERENCE/WORKSHOP PARTICIPATION

“Electric Rate ‘Decoupling’ and Energy Efficiency Programs.” EEI’s 2007 Spring Legal Conference, Charleston, SC, April 16, 2007.

“Overview of Demand-Side Climate-Friendly Technologies.” Presented at The Edison Foundation Climate Change Technologies in the Power Sector Workshop, December 7, 2006.

“Why Are Electricity Prices Increasing? An Industry Wide Perspective.” Presented at the Foundation for American Communications’ Seminar (FACS), November 2, 2006.

“Why Are Electricity Prices Increasing?” Presented at Edison Electric Institute’s Annual Conference, June 20, 2006.

“Renewable Energy and the Oil/Gas Price Shock.” Presented at ACORE’s Renewable Energy in America: Policies for Phase II, Washington, DC, October 17, 2005.

“The Global Power Industry: Is it Really Back to the Future?” Presented at The Discover Showcase, Toronto, Canada, October 25, 2004.

“Natural Gas - Electric Issues in New England.” By Peter Fox-Penner and Greg Basheda. Presented at Edison Electric Institute’s New England CEO Dialogue, Manchester, New Hampshire, April 27, 2004.

“Efficient Grid Expansion and Participant Funding.” By Peter Fox-Penner. Presented at the Harvard Electric Policy Group meeting, December 11, 2003.

“The Role of an Expert Witness in Testimony and Litigation Support: What We Teach Our Own.” By Peter Fox-Penner and Lynda Borucki. Presented at the Energy Bar Association’s Mid Year Meeting, December 5, 2003.

“The Role of Alternative Energy in the US Supply.” By Peter Fox-Penner and Adam Schumacher. Presented to the 54th Annual Program on Oil and Gas Law, Houston, Texas, February 20-21, 2003.

“Market Measurement and The Delivered Price Test Under Standard Market Design.” By Peter Fox-Penner, Gary Taylor, Romkaew Broehm and Metin Celebi. Presented to the Staff of the Federal Energy Regulatory Commission, November 15, 2002.

“Enron and Electricity Deregulation.” Presented at Le Centre Francais sure les Etats-Unis (CFE), May 15, 2002.

“At the Crossroads or on the Brink? U.S. Electric Industry Trends in Early 2002.” Presented at Cooperative Finance Corporation’s CEO Conference, April 10, 2002.

“Revenues, Regulations and ITC Business Models,” Presented at the Executive Transmission Forum, January 29, 2002.

- “A ‘Securities’ Versus ‘Antitrust’ of the Competitive Power Industry and its Implication for RTO Market Monitoring.” Remarks before the American Antitrust Institute Conference on Electricity Market Monitoring, December 11, 2001.
- “What Does the California Experience Tell Us About Fixing the Rest of America’s Power Markets?” By Peter Fox-Penner and Joseph B. Wharton. Presented at the National Association Business Economics Regional/Utility Roundtable, April 24, 2001.
- “Taming the Lions in America’s Electric Markets: Five Major Challenge.” Presented at National Governors’ Association Center for Best Practices, Executive Policy Forum on Energy, “*Is Electricity Restructuring in Jeopardy?*” Washington, DC, April 5, 2001.
- “The Challenge to Co-operatives in the Electric Power Industry of the 21st Century.” NRECA’s 30th Annual CEO Leadership Conference. Keystone, CO, August 2, 2000.
- “Price-Responsive Electric Demand: A National Priority.” The Electric Power Research Institute’s International Energy Pricing Conference. Washington, DC, July 26, 2000.
- “Incentives, Regulation and Transmission Companies: One Practitioner’s View.” Presented to The Federal Energy Regulatory Commission’s RTO Staff. Washington, DC, July 16, 1999.
- “ISOs, Transcos, Gridcos, and Long-Run Power Industry Efficiency.” Federal Energy Bar Association’s Mid-Year Meeting. Washington, DC, December 4, 1998.
- “Market Power Issues in Restructured Electric Power Markets.” American Bar Association’s Satellite Seminar, “Critical Federal and State Practice Issues in Electricity Deregulation.” Washington, DC, December 3, 1998
- “SAVIOR OR BUREAUCRAT? ISOs, Competition, and Independent Transmission Companies.” Winning with Retail Competition, 2nd Annual PUR Conference, Arlington, VA, June 22, 1998.
- “The Evolution of the Energy Services Industry.” *Have it Your Way: Buying and Saving Energy in the Age of Customer Choice*, Annual Meeting of Energy Management Consortium and the Northeast Energy Efficiency Council, Boston, MA, September 18, 1997.
- “Volatility and Stability in the Deregulated Generation Marketplace.” Restructuring and Convergence, Successful Strategies in the Energy Services Marketplace, Arlington, VA, May 22, 1997.
- “Progress and Promise: The Clinton Administration’s Efforts in Fostering Sustainable Development.” Global Accords for Sustainable Development: Enabling Technologies and Links to Finance and Legal Institutions Conference, M.I.T., Cambridge, MA, September 5, 1996.

- Invited Speaker, Fourth Biennial Conference of the International Society for Ecological Economics, Boston, MA, August 7, 1996.
- “Linking Energy, Environment, and Technology to the Economy.” Globalcon Energy and Environment Exposition, April 3, 1996.
- 21st Annual Illinois Energy Conference, November 1996.
- Civil Engineering Research Foundation, Washington meeting, October 12, 1995.
- “Technology and Economic Growth: The Government's Role.” M.I.T. Club of Washington, DC, October 10, 1995.
- “The Impact of Government Budget Changes and Restructuring on Engineering.” ASME and the Public Lecture Series, Washington, DC, September 21, 1995.
- “Energy - Environment - Technology: Two Visions, Two Directions.” *Proceedings of the 1995 International Energy and Environment Congress*. Association of Energy Engineers, Richmond, VA, 1995.
- “The Federal Role in Energy Efficiency.” Eighth Biannual DSM Evaluation Conference, Chicago, IL, August 24, 1995.
- Invited Speaker, Seventh National DOE/EPRI Demand-Side Management Conference, Dallas, TX, June 28, 1995.
- “Utility Restructuring and Regulatory Reform.” Invited Presentation, National Association of Regulatory Utility Commissioners Attorneys' Conference, Tucson, AZ, May 18, 1995.
- Invited Speaker, Conservation Committee, Semi-Annual Meetings of the National Association of Regulatory Utility Commissioners, 1994 and 1995.
- Invited Panelist, OECD Seminar on Sustainable Production and Consumption, Massachusetts Institute of Technology, December 19, 1994.
- “Electric Utilities and the Environment: Restructuring Need Not Mean Retreat.” Invited Presentation, “Brave New World - Managing Externalities in a Competitive Electric Utility Industry.” University of Illinois Center for Regulatory Studies, Chicago, IL, November 17, 1994.
- Invited Speaker, International Ground Source Heat Pump Association, Hershey, PA, October 17, 1994.
- Invited Speaker, “Washington: Business and Public Policy,” Brookings Institution Seminar, October 18, 1994.

“Federal Climate Change Management Programs and Climate-Wise,” Businesses for Social Responsibility 1994 Environment Conference, Boston, MA, October 13, 1994.

Invited Speaker, National Association of State Energy Officials, Asheville, NC, August 31, 1984.

Invited Speaker, Annual Meeting of the California Institute for Energy Efficiency, Berkeley, CA, July 25, 1994.

“Voluntary Greenhouse Gas Reporting Under the Energy Policy Act of 1992.” Invited Presentation, International Conference on Global Climate Change, Center for Environmental Information, Washington, DC, February 1993.

Panel Moderator, Natural Gas Procurement Strategies, Association of Energy Engineers Annual Conference, Boston, MA, June 1992.

Panel Moderator, Alternative Fuel Vehicles Conference, the Management Exchange, Washington, DC, April 1992.

Invited Presenter, American Water Works Association. Conservation Committee Workshop, Austin, TX, January 1992.

“The Future History of DSM.” Plenary presentation, 5th National Demand-Side Management Conference, Boston, MA, August 1, 1991.

“Visibility of the Buy Strategy — Bulk Power Transfers: Solution or Fatal Attraction?” The Management Exchange “The Buy vs. Build Decision” Conference, Washington, DC, March 22, 1991.

BOARDS AND OTHER PROFESSIONAL ACTIVITIES

Chairman, Environmental Alliance, 2005-2006

Managing Member, ENpartners.LLC, 2005-present

Lecturer in Management, University of Chicago Graduate School of Business, Winter Quarter 2006

Vice Chairman, Environment2004, 2002-2004

Member of the Board, Global Energy Group, 2002 - 2003

Co-Founder and Steering Committee Chair, Patriot’s Energy Pledge 2001 -

Advisor, Progressive Policy Institute, Washington, DC, 2000 - Present

Advisor Center for National Policy, Washington, DC, 1993-present

Advisory Board, Massachusetts Institute of Technology Energy Laboratory, 1993-1996

Nominator, Heniz Foundation Awards, 1995-1996

Member, Illinois Solar Energy Advisory Board, 1980

HONORS AND AWARDS

Who's Who in the East (1991, 1992)

Fellow, Center for the Study of Economy and the State, University of Chicago, 1986

NSF Travel Fellow, Dec. 1981

MIT Institute Fellowship, 1978

Earle C. Anthony Fellowship, 1978

Union Carbide Fellow, 1977-78

Michigan Annual Giving Scholarship, 1976

Illinois State Scholar, 1976

National Merit Scholar, 1976

Sigma Tau Beta

Phi Kappa Phi

Eta Kappa Nu

EXHIBIT B

Exhibit B: Restructuring by State

State	Date Adopted	Phased In	Diversify	Transition Period	% Load (%)			Legislative/Regulatory Changes
					Residential	Commercial	Industrial	
Arizona	December 1, 1998	Residential: January 1, 1999 w/ gradual % increases until October 1, 1999	Yes	Varied by utility	0%	0%	0%	Sempra Energy has petitioned to sell at retail.
California	September 23, 1996	March 31, 1998	AB 1890 required IOUs to divest 50% of generation	April 1, 1998 - March 31, 2002	N/A	N/A	N/A	Following the crisis of 2000, restructuring suspended and re-regulation implemented in January, 2001
Connecticut	April 29, 1998	July, 2000	Yes	July, 2000 - July 1, 2004	2.90%	0.60%	0.60%	Two bills currently under discussion: Fomans (re-introduction of vertical integration) & Fontana (increase retail competition)
Delaware	March 31, 1999	October 1, 2000 - April 1, 2001	Yes	Originally ended on April 30, 2006 but rate increases were phased in as a result of legislation passed in the Spring of 2006	1.65%	99.61%	99.61%	April 6, 2006: "Electric Utility Retail Customer Supply Act" - allows for a phase in of a determined 5% increase in res. Rates. Utility is required to enter into long-term supply contracts while residential customers are allowed to switch
Maine	May 29, 1997	March 1, 2000	Yes, except nuclear and QFs	No transition period	0.60%	33.40%	77.50%	Commission to review issues involving transmission and distribution utilities re-entering energy supply business
Maryland	April 8, 1999	March 1, 2000	Not required: PEPCO did so voluntarily	July, 2000 - July, 2004 for most customers	1.90%	41.40%	41.40%	Customers have a choice of a 15% rate increase for the first two years after the rate cap ends, followed by an increase of the remaining amount
Massachusetts	November 25, 1997	March 1, 1998	Yes	March, 1998 - March, 2005	5.99%	69.36%	69.36%	90% available to customers who stayed in same location
Michigan	February 6, 2000	January, 2002	Not required	January 1, 2002 - December 31, 2005	N/A	8.10%	8.10%	Plan to facilitate IEP and utility investment in base load generation. In 2006, issued 40 orders to further establish electric customer choice
Montana	May 2, 1997	July 1, 2004	Not required	N/A	almost 0%	almost 0%	almost 100%	Although industrial customers will remain in choice, House Bill 25 will eliminate choice for others on October 1, 2007; Montana is essentially re-integrating
Nevada	July 17, 2001	April - June, 2002	Not required	N/A	N/A	-	-	
New Hampshire	September 8, 2000	July 1, 1998 - May 1, 2001	PNH has not yet divested; smaller utility (Unitil & Granite State) have	Most customers (PSNH-territory) still on traditional cost-of-service rates (Unitil and Granite State follow Massachusetts-style competitive procurement)	-	-	-	
New Jersey	July 7, 1999	November 14, 1999	Yes	1999 - 2003	12.80%	44.40%	72.00%	Instituted a declining block auction a year before the end of the transition period (auction costs not covered)
New York	May 20, 1996	July 1, 2001	Not required; used by utility to reduce stranded costs	1998 (verna) - July, 2001	9.10%	20.40%	20.40%	NYPSC has pursued restructuring without supporting legislation
Ohio	July 6, 1999	January 1, 2001	Not required; utility adopted a "structural separation plan" for retail end distribution services	Originally slated to end at the end of 2003, but effectively extended through 2006 or 2009 by individual utility Rate Stabilization Plans	11.60%	13.90%	13.90%	Allows for municipal aggregation; programs account for majority of retail switching
Oregon	June 21, 2001	March 1, 2002	Not required	N/A	N/A	5%	5%	
Pennsylvania	December 3, 1996	January, 2000	Not required	2000 - 2010 (varies by utility)	3.10%	11.50%	11.50%	
Rhode Island	August 7, 1996	July 1, 1997 - January 1, 1998	Yes	Jan 1998 - June 2000 for Last Resort Services, but \$25 is not currently competitively procured	0.20%	13.90%	13.90%	
Texas	May 25, 1999	July 31, 2001 - January 1, 2002	Not required, but unbundling required using separate or affiliate companies	January, 2002 - January, 2007	37.80%	85.8%	85.8%	
Virginia	March, 1999	January 1, 2002 - January 1, 2004, depending on region and utility	Not required (see "Regulatory Changes")	1999 - December 31, 2010 (originally, prior to re-regulation bill)	N/A	N/A	N/A (0% as of 08/2006)	Re-regulation of the retail market, 2006
Washington, D.C.	September 18, 2000	January 1, 2001	N/A	January, 2001 - February, 2005	1.10%	77.10%	77.10%	Adopted MD RFP style

(1): Primary sources for transition period are The Brattle Group Research of state commission sites and "Keeping Up with Retail Access? Developments in U.S. Restructuring and Resource Procurement for Regulated Retail Service," by Johannes P. Pfeifferberger, Adam C. Schumacher, and Joseph B. Wharren, The Electricity Journal, December 2004.

(2): Primary source for shopping data is Kenneth Rose's 2006 Performance Review of Electric Power Markets.