

Docket No: A.15-02-009

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Witness: Charles J. Cicchetti

**Prepared Testimony of Charles J. Cicchetti on behalf of ChargePoint, Inc.
Regarding Application of Pacific Gas & Electric Company
for Approval of its Electric Vehicle Infrastructure and Education Program**

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1 **1. Introduction and Background**

2 Q. Please state your name and address.

3 A. My name is Charles J. Cicchetti. I am a co-founder of Pacific Economics Group, Inc.,
4 located at 1341 Hillcrest Ave., Pasadena, California 91106.

5 Q. Please describe your background, experience, and expertise.

6 A. I am an economist with 46 years of experience in matters related to electricity, energy,
7 and environmental matters. I have studied and provided expert testimony before
8 regulatory commissions and courts on matters related to determining the marginal cost,
9 pricing, regulation, financing, valuation, and more for electricity.

10 I graduated from Colorado College in 1965 with a degree in Economics. I
11 completed my Ph.D. in economics in 1969 at Rutgers University. From 1969 to 1972, I
12 engaged in post-doctoral research at Resources for the Future in Washington D.C. I held
13 several academic positions, including becoming a tenured Full Professor of Economics
14 and Environmental Studies at the University of Wisconsin, Madison, serving as Deputy
15 Director of the Energy and Environmental Policy Center at the JFK School at Harvard
16 University, and holding the Jeffrey and Paula Miller Chair in Government, Business and
17 the Economy at the University of Southern California (USC). I have resigned from full-
18 time teaching and currently teach part of an online course on marginal cost, electricity
19 economics, and regulation in the Electrical Engineering Department at USC.

20 Q. Please describe your non-academic career and relevant experience.

21 A. In the 1970s, I researched the theory and importance of marginal electricity costs, utility
22 pricing, and regulation. I benefited from grants from the Ford Foundation, the National
23 Science Foundation, and the Environmental Defense Fund (EDF). I have co-authored

1 and published three books and various research papers on electricity economics. These
2 include *Perspective on Power*, which dealt with electricity tariffs and regulation; *Studies*
3 *in Electric Utility Regulation*, which I also co-edited and wrote much of the chapters;
4 and, *The Marginal Cost and Pricing of Electricity*, which used utility case studies to
5 demonstrate the importance of and methods for determining marginal cost.

6 After spending five years testifying on these matters for environmental and
7 consumer interveners and governmental agencies, I became Chair of the Public Service
8 Commission of Wisconsin in 1977, and served on the Commission until 1980. During
9 this period, I was also on the Executive Committee of the National Association of
10 Regulated Utility Commissioners (NARUC) and chaired its Committee for implementing
11 the National Energy Act of 1978, which included the Public Utility Regulatory Policies
12 Act (PURPA) and involved electricity pricing matters.

13 In the 1980s and 1990s, I testified on various matters related to estimating the
14 cost, valuation, pricing, and regulation of electricity in many states and nations. I wrote a
15 book, *Restructuring Electricity Markets*, in which I updated my previous work on
16 marginal cost and utility pricing as applied to my work on electricity matters for the
17 World Bank.

18 In the new century, I continued this work and added various analyses of mergers
19 and acquisitions of electricity assets. I provided opinions on value and costs to Boards of
20 Directors and regulators. I prepared a report for the California legislature on the causes
21 of the electricity crisis in 2000 and 2001. This led to a book that I co-authored, *The*
22 *California Electricity Crisis: What, Why and What's Next*, which dealt with the causes of
23 the western states' electricity crisis, and provided some views on changing the roles and

1 regulation of electric utilities. I also testified in a number of civil and regulatory
2 proceedings on these matters.

3 In the past ten years, I have returned to matters related to adding energy efficiency
4 and distributed generation to the services that state regulators recognize and graft onto
5 regulated utilities in an economically efficient fashion. I wrote a book, *Going Green and*
6 *Regulation Right*, which analyzes how states are encouraging energy efficiency and
7 establishing regulatory best practices and sensible goals. More recently, I have been
8 investigating demand side bidding and distributed generation policies and pricing.

9 During my career, some examples of testimony I gave before the California
10 Public Utilities Commission (CPUC) were rate design matters for EDF and The Utility
11 Reform Network (TURN) in the 1970s. I have also testified on matters related to
12 marginal cost and rate design for Pacific Gas & Electric (PG&E) in the 1980s. More
13 recently, I have testified on matters related to the sale of Pacific Bell, attaching cable
14 television lines to Southern California Edison's (SCE) poles, Independent Power
15 Producer matters, Community Choice Aggregation, and matters related to shuttering the
16 Mohave Generating Station on behalf of the Navajo Nation.

17 I attach my current resume as Attachment A to this testimony.

18 Q. What is the purpose of your testimony in this proceeding?

19 A. I am responding to Pacific Gas and Electric Company (PG&E) Application 15-02-009.
20 My testimony specifically addresses PG&E's proposal to enter the electric vehicle (EV)
21 charging station and network service markets as a regulated monopoly, which would own
22 and operate EV charging stations. I discuss the nature of PG&E's proposed program and
23 its elements, the degree to which the markets for EV charging equipment and network

1 services are competitive, the concentration of these markets, and the significant
2 unmitigated anticompetitive impacts of PG&E's proposal.

3 Q. Do you present a conclusion regarding whether PG&E has satisfied the Commission's
4 "balancing test" as established in Decisions 11-07-029 and 14-12-079?

5 A. Yes, I do. I will discuss this in some detail below. I conclude that PG&E has failed to
6 address adequately or reasonably each of the four elements of the balancing test in its
7 testimony. I further conclude that PG&E has not identified any unique benefits of utility
8 ownership. Put simply PG&E has not made any case, let alone a compelling one, for
9 why regulated utilities should own EV charging stations financed with ratepayer money.
10 I conclude the purported benefits of PG&E's proposal do not outweigh its significant
11 anticompetitive impacts.

12 As a general proposition, a proposal to add regulated utilities to competitive
13 markets raises a great many questions and issues. These include: what, why, and how?

- 14 • What is the need that PG&E's ownership and operation of EV charging
15 stations would purportedly fill?
- 16 • What does PG&E add beyond the EV charging station connection and grid
17 integration?
- 18 • Why does PG&E propose to enter the competitive market of companies
19 providing EV charging stations with free rate based products and services that
20 non-utilities cannot offer?
- 21 • Is PG&E ownership of equipment and control of EV networks needed to
22 provide various benefits such as implementing Time of Use (TOU) rates for
23 hosts and EV charging?

- 1 • How does PG&E justify treating its competitive EV charging station business
2 as a regulated service?
- 3 • Why should this new service not be offered through a competitive affiliate if
4 there is a perceived market need that is not being met?
- 5 • What evidence is there that the competitive market is failing or will fail to
6 deliver the necessary EV charging stations and services to meet the needs of
7 the Northern California suburban workplace, commercial, and public locations
8 PG&E primarily intends to target?
- 9 • Why does PG&E need to do anything beyond assisting with utility-side
10 infrastructure to encourage expanded consumer investment to meet the state’s
11 goals?

12 Q. How is the rest of your testimony organized?

13 A. I will expand the discussion and address the various concerns enumerated above. Section
14 2 summarizes PG&E’s proposal and its effects on competitors and EV drivers. Section 3
15 reviews the policy concerns and defects in PG&E’s approach. Section 4 reviews the
16 Commission’s Balancing Test. Section 5 reviews the Joint Assigned Commissioner and
17 Administrative Law Judge’s Scoping Memo. Section 6 discusses competition and market
18 power. Section 7 discusses benefits, costs, and alternatives. Section 8 summarizes my
19 conclusions.

1 **2. Summary of PG&E’s Application**

2 Q. What does PG&E propose to do in the EV charging station market?

3 A. PG&E initially proposed to procure, own, and operate 25,000 Level 2 and 100 DC fast
4 charge EV charging stations and to secure what it claims would be about 25% of the
5 market by 2020.¹

6 Under this proposal, PG&E would provide EV charging stations, maintenance,
7 and network services (specified and selected by PG&E) to host properties free of charge.
8 Ratepayers would shield PG&E’s shareholders from any business or operating risks and
9 pay higher utility rates that allow PG&E to “sell” EV charging station equipment for
10 “free.”

11 In response to instruction from the CPUC, PG&E submitted supplemental
12 testimony on October 12, 2015 that scaled back the size of this proposal to either a 2,510
13 station “compliant” Phase 1 program, or a 7,530 station “enhanced” Phase 1 program.²
14 However, the supplemental testimony made no changes in PG&E’s program design. As
15 a result, the CPUC is presented with PG&E’s request for the authority to procure, own,
16 and operate a network of thousands of EV charging stations, at ratepayer expense, and in
17 competition with more than 15 non-utility companies (by PG&E’s calculation) that
18 currently make up the market.³ PG&E proposes to focus its program primarily on prime
19 workplace, retail, and public locations, with a smaller portion of the program devoted to
20 multi-unit dwellings (MUDs) and locations in disadvantaged areas.

¹ Pacific Gas & Electric Company’s (U 39 E) Electric Vehicle Infrastructure and Education Program Application, (February 9, 2015) page 1-3.

² Pacific Gas & Electric Company’s (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Order (October 12, 2015), Supplemental Testimony, page 1, lines 23-28.

³ Ibid, page 22, lines 16-19.

1 Q. What is the current market for EV charging station installations?

2 A. By all accounts, PG&E seeks to enter what appears to be the most robust and successful
3 EV charging market in the country. Many “hosts” like shopping malls, entertainment and
4 sports facilities, government buildings, parking facilities, private office and commercial
5 buildings, and multi-unit residential buildings can and continue to make investments to
6 add charging stations. Numerous companies provide EV charging stations and network
7 services that are successfully competing with each other and offering a diversity of
8 options for consumers.

9 Q. What do you conclude regarding PG&E’s proposal?

10 A. PG&E has proposed a business model in which it would invest money from its
11 comprehensively regulated utility operations to enter an already existing competitive
12 market. PG&E proposes to recover its investment in a network of utility-owned EV
13 charging stations -- both its allocated expenses and a regulated return. PG&E’s
14 shareholders effectively assume no risks related to what would be regulated monopoly
15 investments and ownership. PG&E also proposes what it describes as “partnerships”
16 with entities that it would effectively control.⁴

17 Based on my review of PG&E’s application, I conclude that PG&E over-reaches,
18 seeks unfair and anticompetitive advantages, and would undermine the functioning and
19 benefits of the competitive markets for EV equipment and services. PG&E claims that it
20 wants to make more charging stations available to its customers as quickly as possible,
21 but instead of choosing a simple and easy to implement program, PG&E is proposing to

⁴ Pacific Gas & Electric Company’s (U 39 E) Electric Vehicle Infrastructure and Education Program Prepared Testimony, (February 9, 2015) page 1-3.

- 1 create a cumbersome and controversial new business model and move into a role it has
- 2 never occupied before. I discuss these problems in more detail below.

1 **3. Principal Policy Concerns With PG&E’s Application**

2 Q. What are your principal concerns with PG&E’s application?

3 A. My concerns fall into two broad categories: (1) regulatory and anticompetitive concerns;
4 (2) concerns about unintended consequences if PG&E’s proposal is accepted.

5 Q. What are your regulatory and anticompetitive concerns?

6 A. In summary, my concerns regarding the regulatory flaws and anticompetitive impacts of
7 PG&E’s proposal are:

- 8 • PG&E would not charge hosts, such as private building owners, government
9 entities, and parking structures, to install EV charging stations.
- 10 • PG&E would eschew regulatory principles, particularly cost causality and
11 beneficiary or user pays, without an adequate regulatory or policy
12 justification.
- 13 • PG&E would enter an existing competitive market offering a product and
14 services that others in the market are already selling, at a zero price
15 alternative. This “zero” price can be considered a negative price when hosts
16 are also freely provided other improvements that are not offered on an equal
17 basis to competitors.
- 18 • PG&E would NOT compete on a level playing field. Instead, as a regulated
19 utility receiving guaranteed cost recovery plus a return on equity, PG&E
20 would provide a regulated alternative, one that is not intended to recover
21 direct or indirect costs.
- 22 • The PG&E proposal would make it impossible for non-utility firms to
23 compete in the geographical and product markets PG&E has entered. PG&E

1 would likely push successful firms out of the market and cause others not to
2 enter the market.

- 3 • PG&E would use ratepayer funding to pay for a marketing program focused
4 on competing with the market to obtain host sites (in addition to exploiting its
5 existing utility customer relationships).
- 6 • PG&E provides no logic or evidence supporting the notion that EV charging
7 station ownership and operation is a natural monopoly or a candidate for cost
8 of service regulation as a franchise monopoly service.
- 9 • PG&E's approach would effectively monopolize EV charging stations under
10 CPUC regulation and create bad precedent for other technologies. This would
11 be comparable to granting PG&E the exclusive right to monopolize efficient
12 light bulbs, water heaters, furnaces, distributed energy resources (DER) such
13 as photo-voltaic (PV) solar and wind, battery storage, etc.
- 14 • Allowing a regulated electric utility to use its unique privileges and customer
15 relationships to move into and exert monopoly power in otherwise
16 competitive markets is contrary to fundamental principles of utility regulation
17 and economics.

18 Q. Is there a role for utilities to play in supporting the deployment of EV charging stations?

19 A. Yes. Electric utilities should insure safety and reliability on their distribution grid. In
20 addition, there are external benefits for society when electric powered vehicles replace
21 gasoline and diesel powered vehicles and, potentially, when this new load is balanced
22 with renewable energy generation on the grid. Utilities can take actions consistent with
23 their regulatory mandates and functions to support and promote the adoption and use of

1 EVs. Utilities also have a public education role that includes providing useful
2 information to their customers.

3 Q. Explain what you would view as appropriate actions within the areas described above.

4 A. There is a utility role to support customers that are considering EV choices and/or
5 purchasing EV charging stations in franchise monopoly markets. However, there are
6 limits to when and how regulated utilities should be permitted to take actions using
7 ratepayers' dollars that affect competition in markets that are currently working.
8 Regulated utilities should help to integrate and encourage the formation of competitive
9 markets that provide economically and socially beneficial customer choices. Regulated
10 utilities should NOT monopolize these markets using ratepayers' funds, while accepting
11 no business or utilization risks.

12 For example, utilities can develop and adopt tariffs that encourage and reward
13 utility customers that invest their own money in a product, such as an efficient
14 thermostat, or a service, such as installing insulation. But it would not be necessary or
15 appropriate for the utility to itself offer these goods and services, assuming they are
16 available from non-utility competitors.

17 Regulated utilities should make the necessary regulated utility investments and
18 upgrades required to keep people safe and the grid reliable. Since the grid of the future
19 will need to serve increasing numbers of EVs, the utility's role could include providing
20 "make ready" facilities on a non-discriminatory basis at hosts' sites, and possibly the
21 distribution of rebates to hosts if they are cost justified and necessary to pay for EV
22 chargers. Finally, utilities should incorporate EV load into their distributed energy
23 resource plans and use feeder-level information to inform future capacity needs.

1 Q. Can you identify and explain what you mean by “unintended consequences” that could
2 result if the Commission adopts PG&E’s proposal?

3 A. Yes. The unintended consequences I am concerned with include the following:

- 4 • PG&E could adopt a one-size-fits-all approach to EV charging stations.

5 However, PG&E has no particular expertise as a regulated monopoly with
6 procuring EV charging stations or services, competitive marketing, branding,
7 sizing, and location. In competitive markets, suppliers experiment and earn
8 rewards when they are successful and lose money when they make mistakes.

9 There are dozens of different types of charging stations and associated
10 services available out in the market today. These different choices appeal to
11 different sites. PG&E could pick one approach and flood the market with that
12 model. PG&E’s proposal allows it to avoid the risks competitive suppliers
13 would face, and so there is a greater risk of poor procurement decisions.

- 14 • PG&E’s EV Services Partners (the industry participants forced by PG&E into
15 the role of supplier to the monopoly utility instead of the customer) would
16 also not likely innovate or experiment. PG&E’s Services Partners would
17 tailor their products to PG&E’s RFP specifications, and resell electricity under
18 terms that PG&E specifies. This restricts choices that would otherwise be
19 offered in the competitive market, where each seller of EV equipment and
20 services seeks to meet the customer’s expectations and desires, and where
21 each host is free to make pricing and access choices that result in various
22 service offerings to EV drivers. For example, the EV charging station market
23 has introduced networking options and functionality, which provides

1 information related to EV charging station locations and current real time
2 availability, as well as other services designed for particular customer sectors.
3 EV drivers are also able to join networks and take advantage of various
4 payment options as members. The elimination of choice, and the resulting
5 impact on innovation is a particularly harmful consequence in markets for
6 advanced technologies and new services.

- 7 • PG&E would also likely be conflicted. PG&E proposes to simultaneously
8 own and operate its EV program as a regulated electricity business. PG&E
9 would constrain its EV Services Partners with program limitations that would
10 further PG&E's self-interest in expanding its own utility-owned equipment
11 and utility-provided electricity. In contrast, competitive EV charging station
12 networks and hosts marketing to customers (rather than to PG&E) would be
13 free to experiment and determine what EV drivers want, which could be very
14 different than what PG&E thinks would be best. PG&E's ownership and
15 control would create a natural incentive for PG&E to limit how hosts integrate
16 other technologies, such as distributed generation, batteries, etc., on the hosts'
17 side of the meter, and with community choice aggregation and direct access
18 providers. Similarly, PG&E would have an incentive to undermine the
19 emerging competitive market offerings in network and information services.
- 20 • Pricing and cost recovery is another area in which there could be unintended
21 consequences. Competition would likely encourage, accelerate, and
22 accommodate non-utility owned investments, and integrate them into an
23 economically efficient supply chain. The competitive market would take risks

1 and innovate. As a utility, PG&E operates with restrictions that do not
2 encourage experimentation related to the products offered and their pricing.
3 These restrictions often cause regulated utilities to offer products the utility
4 thinks the customer wants and needs, based solely on the engineering
5 consequences of what the utility builds, or other utility-specific objectives,
6 rather than customer preferences and needs, and at a non-competitive price.

- 7 • A regulated monopoly that has little or no operating or business risks would
8 supplant an important role of competitive markets in terms of finding winners
9 and dismissing losers. By externally controlling the product specifications
10 and conditions of customer use and functioning as a monopoly provider of
11 charging stations and services, PG&E (rather than the market) will determine
12 which companies win and lose. This artificial construct deprives consumers
13 of the benefits of normal market functions. A company that might otherwise
14 have been a “loser” in a competitive market may become a “winner” in
15 PG&E’s RFP, and *vice versa*.

16 Q. Can you illustrate these concepts and concerns using examples of other regulated and
17 competitive products?

18 A. Yes. I can easily do this, because this Commission has provided good models for using
19 its regulatory authority over the utilities to help advance new markets and new
20 technologies. The Commission has successfully combined economic incentives and
21 competition to facilitate deployment of new products in California that benefit customers
22 and serve public policy goals. The balanced mix of incentives that support rather than
23 supplant private investment and policies supportive of competition encourages innovation

1 and lets consumer preferences emerge in the market. Competitive markets are more
2 efficient in sorting out what works and what consumers want than a large utility's
3 planners. The same opportunities for a combination of regulatory encouragement, utility
4 financial support, and competition are available in the EV charging station market.

5 The Commission has taken important steps to encourage very successful
6 expansions in distributed electricity generation. For example, solar PV rooftop
7 investments have expanded beyond virtually everyone's previous expectations. This
8 happened, in large part, through the Commission's providing regulated utility financial
9 support to the competitive market under the California Solar Initiative (CSI). Customers
10 received incentives to pay for part (but not all) of the cost of a rooftop solar system. PV
11 manufacturers and installers competed on price and service. The Commission established
12 certain rules such as warranty requirements to ensure that the ratepayers' investment in
13 the incentives was protected.

14 This approach accommodated and unleashed competition, which added marketing
15 and product innovation in the competitive rooftop solar market. The Commission
16 adopted a similar mix of utility support to the competitive market to expand distributed
17 generation in its Self-Generation Incentive Program (SGIP).

18 Telecommunications is another good example of how protecting and enabling
19 competing businesses within a larger regulatory scheme can pay off for consumers and
20 ratepayers. Through wise regulatory choices, the nation's telephone industry was
21 transformed from plain old telephone service (POTS), which was a vertically regulated
22 monopoly, to a digitized competitive market that has transformed how the world
23 conducts business, collects and disseminates information, and socializes. The innovative

1 technology we take for granted today would not have been as completely introduced if
2 regulated monopoly landline integrated telephone companies had been granted protection
3 and control.

4 Regulated monopolies' investments can become stranded with new technical
5 innovations, especially if selecting new products is left to the utility rather than the
6 consumer. This can reduce innovation, and slow or delay technical and other
7 advancement. New technology means new products. Competition works because
8 suppliers must gauge a reasonable degree of supplier risk taking. Opportunity drives
9 competitive entry based on new technology and new customer choices. Even the timing
10 and nature of the technological changes depend on feedback in the competitive market
11 because consumers and their choices play a central role. When regulation gives a
12 monopoly service provider unusual opportunities to control technical and product
13 innovation, the workings of the competitive market will fail to sort out what consumers
14 want and are willing to pay to achieve.

15 Under regulated monopoly control, I suspect solar rooftops would still be
16 relegated to utility-owned demonstration projects. Rather than the success that California
17 and other regions have achieved, we would still be listening to brave talk of the homes of
18 the future. Likewise, if monopoly telephone companies had controlled the entry and rate
19 of innovation in the cellular telephone industry, consumers would still probably be
20 carrying mobile cell phones the size of bricks. And no one would call these phones
21 "smart."

22 Q. How do these various economic and regulatory principles relate to the PG&E
23 application?

1 A. The California Legislature and this Commission have considered much of what I have
2 been discussing above. The California Legislature established a statutory requirement
3 that the Commission must not allow the utilities to unfairly compete with non-utility
4 enterprises. The Commission recently determined that utilities in California could have a
5 role in helping expand EV infrastructure. But the Commission also determined it would
6 apply a balancing test to any utility proposal to own EV infrastructure. This balancing
7 test includes a comparison of the benefits and costs, as well as the potential for
8 anticompetitive effects and any unfair utility advantages. Much of my general discussion
9 above is provided in order to frame the application of this balancing test. I turn to the
10 specifics below.

1 **4. The Balancing Test and Considerations Applicable to Proposals by**
2 **Regulated Utilities for Ownership and Operation of EV Charging**
3 **Stations**

4 Q. What is your understanding of CPUC Decision 14-12-079?

5 A. The CPUC has previously determined that EV charging is a service and providers of
6 charging for electric vehicles will not be considered regulated public utilities.⁵ In D.14-
7 12-079, the Commission set aside the previous requirement that a regulated utility, such
8 as PG&E, must present evidence to demonstrate either a “market failure” or “underserved
9 market” as part of any request to own PEV charging infrastructure.⁶

10 The CPUC opined that its decision to remove a “broad prohibition” did not
11 remove a case-by-case review to “ensure that the utilities do not unfairly compete with
12 nonutility enterprises.”⁷ And, “the requirement to protect against unfair competition must
13 be considered, along with the demonstrated costs and benefits of any utility PEV
14 proposal.”⁸ The CPUC’s final general conclusion was that “it may be that certain
15 programs are not appropriate for either ratepayer funding or ratepayer funding without
16 shareholder contribution.”⁹

17 Q. What will the Commission review in considering a utility’s application to install EV
18 charging stations?

19 A. The CPUC articulated four specific elements it would review in each utility application:

⁵ Decision 10-07-044. This CPUC decision was codified into law as well in Public Utilities Code section 216(i).

⁶ Decision 14-12-079, page 2.

⁷ Ibid. page 8.

⁸ Ibid. page 8.

⁹ Ibid. page 8.

- 1 1) “The nature of the proposed utility program and its elements; for example,
- 2 whether the utility proposes to own or provide charging infrastructure, billing
- 3 services, metering, or customer information and education.
- 4 2) Examination of the degree to which the market into which the utility program
- 5 would enter is competitive, and in what level of concentration.
- 6 3) Identification of potential unfair utility advantages, if any.
- 7 4) If the potential for the utility to unfairly compete is identified, the commission
- 8 will determine if rules, conditions or regulatory protections are needed to
- 9 effectively mitigate the anticompetitive impacts or unfair advantages held by
- 10 the utility.”¹⁰

11 The CPUC agreed with various commenters “that both the ratepayer benefit
12 analysis (which necessarily includes a quantification of costs) and the impact on
13 competition will require compliance with [Public Utility Code] Sections 740.3, 740.8 and
14 451.”¹¹ The CPUC did not adopt a restricted inventory of elements to be deemed relevant
15 to applying the balancing test to investor-owned utility (IOU) electric vehicle service
16 equipment (EVSE) ownership. Instead, it described broad areas of inquiry, and planned
17 to anticipate further refinements that might emerge.¹²

18 Q. What is Section 740.3?

19 A. This section sets the basis for the Commission’s balancing of ratepayer interests, cost
20 recovery, and potential anticompetitive concerns. California Public Utilities Code
21 Section 740.3(a) directs the Commission to “evaluate and implement policies to promote
22 the development of equipment and infrastructure needed to facilitate the use of electric

¹⁰ Ibid. pages 8-9.

¹¹ Ibid. page 10.

¹² Ibid. page 10.

1 power and natural gas to fuel low-emission vehicles.” Section 740.3(c) sets forth the
2 requirement that any policy adopted by the Commission to develop equipment or
3 infrastructure for EVs “shall ensure that the costs and expenses of those programs are not
4 passed through to electric or gas ratepayers unless the commission finds and determines
5 that those programs are in the ratepayers’ interests. The commission’s policies shall also
6 ensure that utilities do not unfairly compete with nonutility enterprises.”

7 Q. What is Section 740.8?

8 A. California Public Utilities Code Section 740.8 defines the term “interests,” which I
9 interpret to be the ratepayer benefits and costs in Section 740.3. Section 740.8 states:
10 “As used in Section 740.3 , ‘interests’ of ratepayers, short- or long-term, mean direct
11 benefits that are specific to ratepayers in the form of safer, more reliable, or less costly
12 gas or electrical service, consistent with Section 451, and activities that benefit ratepayers
13 and that promote energy efficiency, reduction of health and environmental impacts from
14 air pollution, and greenhouse gas emissions related to electricity and natural gas
15 production and use, and increased use of alternative fuels.”¹³

16 I interpret the concept of benefits to mean “net” of any ratepayer costs.

17 Q. What is Section 451?

18 A. California Public Utilities Code Section 451 requires that any utility charges be just and
19 reasonable. This section states, “all charges demanded or received by any public
20 utility...for any product or commodity furnished or to be furnished or any service
21 rendered or to be rendered shall be just and reasonable.”

¹³ SB 350 will result in wording changes to this section, which do not affect the analysis in my testimony.

1 This is consistent with my conclusion that the Commission will consider net
2 benefits, or benefits minus costs, for purposes of the ratepayer benefit analysis required
3 by Decision 14-12-079.

4 Q. How are these code sections relevant to this proceeding?

5 A. I discuss this below after reviewing other relevant Commission actions.

6

1 **5. The Joint Assigned Commissioner and Administrative Law Judge’s**
2 **Scoping Memo and Ruling**

3 Q. Please discuss your understanding of the September 9, 2015 Joint Assigned
4 Commissioner and Administrative Law Judge’s Scoping Memo and Ruling (Scoping
5 Memo and Ruling)?

6 A. The Scoping Memo and Ruling did two things that are relevant to the PG&E application.
7 First, it reiterated and reinforced the Commission’s prior Decision 14-12-079
8 requirements in the context of PG&E’s application, and ordered PG&E to provide
9 supplementary testimony addressing the “balancing test” as well as testimony on other
10 questions not adequately covered in PG&E’s opening testimony:

11 (1) Does the PG&E proposal meet the four issues “balancing test” that the
12 Commission enumerated in D14-12-079?

13 (2) What benefits does PG&E installation of Direct Current Fast Chargers
14 (DCFC) offer that others do not already offer, do the benefits merit the
15 incremental cost of DCFC, and what is the state of DCFC competition in the
16 market?;

17 (3) What data and analysis should be collected to determine the merit of a second
18 phase, and who should perform the analysis? And,

19 (4) What transition should be used between the initial and potential second stage
20 to provide time for regulatory review and minimize market uncertainty and
21 discontinuity?¹⁴

¹⁴ In the Matter of the Application of Pacific Gas and Electric Company for Approval of its Electric Vehicle Infrastructure and Education Program (U39E), Application 15-02-009, Joint Assigned

1 Second, the Scoping Memo and Ruling directed PG&E to: (1) reduce the scale of
2 its EV charging service deployment to 2,510 charging stations deployed over 24 months;
3 (2) provide for an 18-month transition plan for a possible second phase; and, (3) be
4 responsive to the four questions discussed above.¹⁵

5 Q. How do Decision 14-12-079 and the Scoping Memo and Ruling relate to the preliminary
6 conceptual concerns and questions that you have identified above?

7 A. The Commission’s actions permit PG&E to *propose* a program (of the size allowed in the
8 Ruling) that involves some element of utility ownership of EV infrastructure. Neither the
9 Scoping Memo and Ruling nor the Decision provided a blanket approval or invitation to
10 test whatever PG&E proposes without requiring application of the balancing test to
11 ensure that the current market participants are not subject to unfair competition with the
12 utility, and that other ratepayers are not harmed or forced to pay undue subsidies.
13 Accordingly, while the scale of EV charging stations will be reduced to about ten percent
14 under the Scoping Memo and Ruling, PG&E still must satisfy the Commission’s
15 requirements, as set forth in Decision 14-12-079, and pass the balancing test.

16 As I explain below, PG&E has not done so.

17 Q. How has PG&E failed to satisfy these threshold requirements?

18 A. PG&E has failed to acknowledge the potential unfair advantages its proposal confers
19 upon the utility or to suggest “what rules, conditions or regulatory protections are needed
20 to mitigate the anticompetitive impacts or unfair advantages held by the utility.”¹⁶

21 PG&E’s entire analysis of elements 3 and 4 of the balancing test consists of two

Commissioner and Administrative Law Judges’ Scoping Memo and Ruling (September 4, 2015), pages 8-9).

¹⁵ Ibid, page 15.

¹⁶ See Joint Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Ruling in Application 15-02-009 (September 4, 2015), page 8.

1 paragraphs on page 26 of PG&E’s Supplemental Testimony. In these two paragraphs,
2 PG&E simply cites its obligation to avoid discrimination in its treatment of customers,
3 and the fact that it will use an open procurement process to “procure” equipment and
4 services.

5 PG&E has not quantified any benefits related to its possible entry into the
6 competitive market by supplying, owning, and operating EV charging service equipment
7 at no cost to host facility owners. Nor has PG&E quantified any benefits related to its
8 plan to own and operate that equipment as a utility. PG&E has only offered general
9 benefits of deploying more EV charging stations. These benefits do not directly proceed
10 from PG&E’s entering the market and competing as a utility against non-utility market
11 participants and so are not relevant to the necessary analysis.

12 The provision of EV charging equipment and services is an existing market, and
13 no other market participant could compete against a utility that gives away for free the
14 equipment and services that others would require the host to pay for. PG&E’s failure to
15 acknowledge, analyze, or demonstrate any benefits outweighing this anticompetitive
16 effect does not change the fact that the adverse impact exists.

17 Q. Why do you say that PG&E has failed to acknowledge the existence of unfair utility
18 advantage?

19 A. PG&E dismisses all question of anticompetitive impact by saying it will follow utility
20 rules.¹⁷ PG&E also says that its entry into the competitive market “simply represents
21 another model” that is comparable to that of any of the other 15 plus participants in the

¹⁷ Pacific Gas and Electric Company’s (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Ruling (October 12, 2015), Supplemental Testimony, page 26.

1 market.¹⁸ This is a misstatement of fact. PG&E is a regulated utility seeking permission
2 to compete with non-utilities in a competitive market. PG&E’s proposal does not
3 “simply represent another model.”

4 Q. Please explain.

5 A. This is a matter of basic economics. In competitive markets, suppliers design products,
6 which they hope buyers will purchase. They use marketing and packaging tools to make
7 the products they seek to sell attractive to potential buyers. The competitive suppliers
8 also set the price they require to complete a sale. If customers like the offering, they will
9 complete the sale and the supplier will use the money received to pay its expenses and
10 recover a return on its investments. Suppliers are at some considerable risk that potential
11 buyers will reject the offer because they think the price may be too high or someone else
12 is offering what they consider to be a superior offering.

13 Under regulation, electric utilities do not typically face risks related to a superior
14 offering from a competitive supplier. Customers mostly have no choices in what is most
15 often a “take it or leave it” regulated electric service offering. Under regulation, an
16 electric utility would be reasonably certain it would recover all its prudent costs,
17 including a return “on” and “of” its investments, with little likelihood of losses, combined
18 with limitations on exceptional gains.

19 PG&E proposes to take the same regulated approach for the EV charging
20 equipment products and services it proposes to sell in its service territory, with one very
21 significant additional change. PG&E would eschew risks and expect to fully recover its
22 investments and earn a regulated return for its proposed entry into the competitive EV
23 charging station market. PG&E would also add the most unusual, even for a regulated

¹⁸ Ibid, page 22, line 20.

1 business, “zero” price for the EV charging stations and services it would “sell” to hosts.
2 In exchange, the same property-owning hosts would be forced to forfeit the ability to
3 choose equipment and services, to control the pricing and terms of the electricity used to
4 charge EVs, and all other choices they would otherwise have with respect to the EV
5 charger and services provided to drivers.

6 Companies like ChargePoint (and the 15 plus other companies that PG&E refers
7 to in the California market) currently compete freely with each other on price, product,
8 etc. They cannot sell the charging stations for nothing and remain in business. In
9 contrast, PG&E proposes to recover its costs and income from the fees that its other retail
10 electricity customers pay. Competitive firms have different business models that provide
11 network services as well as product and services options to attract customers. Hosts can
12 innovate and use charging stations to complement their business interests. PG&E has no
13 need or incentive to do any of these types of things.

14 I have provided this brief “primer” on the regulated utility versus competitive
15 market models because it is at the foundation of understanding why PG&E would have
16 anticompetitive advantages if it becomes an EV charging station supplier. This does not
17 mean there are no opportunities for PG&E to support the expansion of EV charging
18 stations in its service territory. All PG&E customers, including EV charging stations,
19 have a reasonable expectation that PG&E will provide reliable service. Indeed, PG&E
20 has a responsibility to maintain a reliable distribution system. Further, PG&E could
21 provide “make ready” infrastructure as a regulated extension of its utility system to
22 facilitate and accommodate competitively supplied EV charging stations and services.

1 This would have the additional benefit of lowering the cost of EV adoption to satisfy
2 California's ZEV goals.

3 Q. Are there other deficiencies in PG&E's proposal?

4 A. Yes. PG&E has not addressed the threshold issue of unfairly competing, which I refer to
5 as the "level playing field" issue. PG&E incorrectly concludes that, since it will sell
6 electricity to one or more EV Services Partners at regulated rates and not sell electricity
7 directly, it will not compete unfairly.¹⁹ PG&E also incorrectly concludes that because it
8 will be procuring EV charging products and services from market participants means
9 there is no anticompetitive impact.²⁰ This reasoning is flawed because it does not address
10 PG&E's selection of and supplying EV charging station equipment and services to hosts
11 for nothing, and ignores the anticompetitive effects this would have on other competitive
12 equipment suppliers in this market.

13 PG&E would not require the site host to pay anything to recover PG&E's capital
14 costs or a return on the same, or to contribute fees to cover operating expenses. Instead,
15 PG&E proposes to recover the capital costs, including a return, and operating expenses
16 from its retail customers.

17 PG&E proposes to use a "new balancing account" through 2019 and then a
18 General Rate Case (GRC) in 2020 or when it becomes effective to recover its EV
19 charging station costs in its regulated revenue requirements.²¹ PG&E proposes to use
20 various tax benefits, such as normalized federal tax treatment and accelerated

¹⁹ Pacific Gas and Electric Company's (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge's Scoping Memo and Ruling (October 12, 2015), Supplemental Testimony, page 23, lines 17-22.

²⁰ Ibid, lines 14-17.

²¹ Pacific Gas & Electric Company's (U 39 E) Electric Vehicle Infrastructure and Education Program Prepared Testimony, (February 9, 2015) page 6-1.

1 depreciation.²² With no revenue coming directly from the installed EV charging stations
2 it would provide, this means other PG&E ratepayers would be paying for the EV
3 charging station installation and maintenance.

4 Q. Would PG&E shareholders bear any risk related to PG&E's ownership and operation of
5 EV charging facilities?

6 A. No. In fact, the PG&E Application does not address the question raised in Decision 14-
7 12-079 of whether PG&E's proposal falls into the category of "certain programs" that are
8 "not appropriate for either ratepayer funding or ratepayer funding without shareholder
9 contribution." This is a relevant consideration, since PG&E's shareholders are not
10 investing in a new competitive business. In fact, the intricacies of PG&E's proposals
11 make it very clear that PG&E would recover all costs, including a possible cost over-run
12 contingency if the costs are less than the agreed upon capped amount. With no
13 shareholder risk, and no prudence or used and useful reviews, I conclude there would be
14 no shareholder contributions to the EV charging station installations. Since this proposal
15 involves PG&E providing goods and services that are not part of its utility function, it is
16 reasonable to question whether this is "not appropriate for either ratepayer funding or
17 ratepayer funding without shareholder contribution." I would conclude this is the case.

²² Ibid, pages 6-10 through 6-11.

1 **6. Competition and Market Power Considerations**

2 Q. Do you find that PG&E has provided or made a reasonable assessment of competition
3 and market concentration, which the Commission requires?

4 A. No, I do not come to such a conclusion. In fact, I reach an opposite conclusion. PG&E’s
5 witness on market concentration erroneously avers that the relevant geographic market is
6 “at least national and probably global.”²³ PG&E also erroneously claims that its relevant
7 product market is to “sell the electricity under regulated utility rates and tariffs to the
8 retail charging service providers who, in turn, will resell to EV drivers. Thus, PG&E
9 asserts that it will not be competing in the retail EV charging services market, but will be
10 enabling others to enter and compete in that market.”²⁴

11 Q. Why do you disagree with PG&E’s definition of the market as global or national?

12 A. PG&E proposes to enter the competitive market for EV equipment sales and services in a
13 narrow geographic market in northern California, where it has franchise electricity rights.
14 This very specific geographic market in northern California is the relevant market. This
15 market is neither national nor global in scope.

16 Q. What would be PG&E’s market share in the relevant geographic market?

17 A Pursuant to the Scoping Memo and Ruling, in Phase 1 PG&E would supply 2,510
18 charging stations to an existing market, which PG&E estimates has 3,075 charging
19 stations in 2015.²⁵ Assume no other suppliers can compete against PG&E’s free or
20 negative price alternative, which seems more than likely. With no new entry, PG&E
21 would have a market share of 44.94% (2,510/5,585). Its individual company HHI

²³ Pacific Gas and Electric Company’s (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Ruling (October 12, 2015), Supplemental Testimony, page 23, lines 25-26.

²⁴ Ibid, page 23, lines 18-22.

²⁵ Ibid, page 25, Table 7, line 1.

1 component would exceed 2,020.²⁶ Under its enhanced supplemental proposal, PG&E
2 proposes to add 7,530 EV charging stations in 2020²⁷, which under the same assumptions
3 would be a market share of 71.0% (7,530/10,605), with an individual HHI component
4 that equals 5,041.

5 PG&E does not assume its zero cost option will reduce other competitive entry
6 into the relevant EV charging station market. This leads PG&E to assume that by 2020
7 there would be a rather startling 92,470 non-PG&E EV charging stations, or a 30 fold
8 increase from the current estimate of 3,075.²⁸ I do not think this type of increase in non-
9 PG&E EV charging stations could occur, with PG&E offering free installation for hosts
10 while competitors charge the full installation costs. Accordingly, PG&E's estimated
11 market share of 7.5% in 2020 seems to be widely underestimated.

12 Q. Do you agree with PG&E's definition of the relevant product market?

13 A. No, I do not. The product that PG&E, as a regulated utility, would provide is the
14 equipment used for EV charging, and the network services. Other competitors provide
15 the same types of equipment and services and, typically, hosts pay for any necessary site
16 preparation. PG&E initially proposed to add 25,000 Level 2 (L2) charging stations and
17 100 DCFC stations. The Scoping Memo scaled back this proposal to 2,510 charging
18 stations. PG&E proposed in its Supplemental Filing to modify its original proposal and

²⁶ A company's individual HHI is its market share squared. Thus, a market share of 44.94% equals an HHI of 44.94 times 44.94, or 2020.

²⁷ Pacific Gas and Electric Company's (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge's Scoping Memo and Ruling (October 12, 2015), Supplemental Testimony, page 25, Table 7, line 2.

²⁸ Ibid, line 1.

1 install 2,460 L2 stations and 50 DCFC stations; or, under the “enhanced” proposal PG&E
2 would install 7,430 L2 stations and 100 DCFC stations.²⁹

3 PG&E testifies that it will not be “directly operating” EV charging stations or
4 networking facilities.³⁰ As I explained above, operating the EV charging stations through
5 affiliated Services Partners is not the relevant market for the analysis of market power or
6 anticompetitive market actions required under Decision 14-12-079. The relevant product
7 market is also not the manufacturing of the EV charging station equipment.³¹

8 The relevant product market is the sale of this equipment, which competitors
9 market and charge hosts to install, and the sale of network services, which are likewise
10 provided through competitive markets. PG&E proposes to provide the equipment and
11 EV charging services (other than the cost of electricity) to the host for free. The EV
12 Services Partner would operate the equipment that PG&E would own and maintain, and
13 “resell” the electricity to EV drivers under terms dictated by PG&E.

14 Q. Why do you identify the sale of EV charging stations and services as the relevant product
15 market?

16 A. I recognize that gasoline or conventional vehicles are substitutes for PEVs and ZEVs. I
17 also recognize that some PEV drivers who occupy single family or similar homes often
18 charge their vehicles at home. Regardless, the analysis of potential anticompetitive
19 impacts should be focused on the market for EV charging stations and services at multi-
20 unit dwellings (MUD), private and public works, and parking facilities. The specific

²⁹ Pacific Gas and Electric Company’s (U 39 E) Supplement to Application Pursuant to Joint Assigned Commissioner and Administrative Law Judge’s Scoping Memo and Ruling (October 12, 2015), Supplemental Testimony, page 1.

³⁰ Ibid, page 23, lines 10-11.

³¹ Ibid, line 10.

1 primary product market is the sale of the EV charging station equipment and services to
2 customers within these customer sectors.

3 As I discussed above, there is a lack of any meaningful discussion in PG&E's
4 Initial and Supplemental Applications with respect to the distinction between the "free"
5 goods and services PG&E would provide and the same goods and services others are
6 competing to sell in the same geographic and product market. Competitors trying to sell
7 the same or similar equipment would be simply unable to match or fairly compete with
8 PG&E and its zero price offer.

9 PG&E claims that its proposal will result in public benefits, such as enabling
10 communication of TOU prices and facilitating grid integration benefits that improve
11 reliability and, other things equal, reduce costs for all customers.³² However, such
12 benefits are irrelevant for purposes of balancing net benefits against unmitigated
13 competitive harm, since competitively supplied EV charging equipment has the same
14 built-in capabilities and the public's benefit from such capabilities is the same as it would
15 be under PG&E's proposal. Of course, PG&E would need to develop terms, regulations,
16 and pricing of electricity and other services. This is its primary "day-job", but it is not
17 dependent on PG&E owning and operating EV service charging stations under COS
18 regulation.

19 Q. What is the starting point in examining the impacts of PG&E's proposal to enter into
20 competitive markets for EV charging equipment and services?

21 A. There are both specific antitrust or unfair competition concerns and regulatory matters
22 that are relevant in applying the Commission's balancing test. The CPUC identified two

³² Pacific Gas & Electric Company's (U 39 E) Electric Vehicle Infrastructure and Education Program Application, page 5. See also Pacific Gas & Electric Company's Electric Vehicle Infrastructure and Education Program Prepared Testimony (February 9, 2015) page 4-7, lines 23-27.

1 aspects that would be included in determining whether it would approve utility ownership
2 of EV charging stations. These are “ratepayer benefit analysis” and the “impact on
3 competition.”³³ The effects on competition require an examination of the existence of
4 any unfair advantages that would provide the utility with the “potential...to unfairly
5 compete.”³⁴

6 Q. What regulatory principles does PG&E’s proposal violate?

7 A. Regulation and regulated tariffs have similar potential to protect against unfair
8 competition, if and when tariffs reflect cost causality, beneficiary or user pays, and
9 contain no undue subsidies. These are important regulatory principles and
10 considerations, particularly when utilities sell or provide regulated services that: (1)
11 compete directly with competitively-supplied services, such as EV charging services,
12 solar roof top distributed generation, etc., and (2) compete indirectly in the form of
13 substitutes related to not using utility services, such as conservation, energy efficiency,
14 etc. PG&E’s proposal violates these regulatory principles because it ignores cost
15 causality, beneficiary pays, and represents an undue subsidy from ratepayers who do not
16 use EV charging stations.

17 Under PG&E’s proposal, site hosts receive the benefit of a “free” EV charging
18 station. However, this “free” charging station is not free at all, because it is paid for by
19 ratepayers in the rates they pay to PG&E, rates that are higher than they would otherwise
20 be, to recover the return “on” and “of” PG&E’s rate based investment in EV charging
21 stations. Moreover, PG&E’s proposal would create a permanent and self-sustaining
22 change in the market because its anticompetitive entry will push others out of the market.

³³ Phase 1 Decision Establishing Policy to Expand the Utilities’ Role in Development of Electric Vehicle Infrastructure, Decision 14-12-079, December 22, 2014, page 10.

³⁴ Ibid page 9.

1 If the CPUC allows PG&E to take over and monopolize a large sector of the market, the
2 competition will fail – not because of any flaw in their products or services, but because
3 they can't compete with “free” regulated utility offerings. This failure, of course, would
4 provide PG&E additional justification for expanding its monopoly utility business model
5 to take over the failed competitors' prior place in what will have become a monopolized
6 market, and to revert to the scale in its initial application, and beyond.

7 Q. Does that mean that PG&E's entire proposal is contrary to regulatory principles?

8 A. No. Some aspects of PG&E's proposal are consistent with regulatory principles. For
9 example, the reasonable costs of program administration or the recovery of costs related
10 to make ready infrastructure likely involve just and reasonable costs to all ratepayers.
11 Such cost recoveries are tied to utility functions and, in the case of the make ready
12 infrastructure, leads to private investment that serves public purposes.

13 Q. In what way does PG&E's proposal violate competitive principles?

14 A. PG&E proposes to provide host facilities, such as Multi-Unit Dwellings (MUD), parking
15 facilities, and public and private enterprises, with installed EV charging stations and
16 services at no charge to the host. PG&E would take no utilization or other business risk
17 for the EV charging stations it would supply for free in its service territory. PG&E
18 eschews any up- or down-side returns based on the use of the EV charging stations it
19 locates on its system.

20 PG&E's proposal is an extreme form of predatory pricing and anti-competitive
21 behavior. PG&E would eliminate new entry and monopolize the market because it would
22 not charge hosts for the EV charging stations it supplies. PG&E would assume no cost

1 recovery risk and have no incentive to innovate and experiment with network service
2 options.

3 Host facilities would not be making any investment, other than some lost parking,
4 in the free PG&E EV charging stations located on or near their premises, or the related
5 network services. PG&E's Services Partners would not be allowed to offer new terms
6 and innovative services outside of PG&E specifications. These would combine to bring
7 PG&E into the customers' domain on the so-called "other side of the meter," which, at a
8 minimum, raises regulatory concerns.

9 Q. Why is this potentially anticompetitive?

10 A. As I noted above, utility involvement beyond complementary steps to facilitate the entry
11 of others in competitive markets can undermine competition and have unintended
12 consequences. An EV charging station service market strongly oriented to PG&E's
13 interests will not utilize the important market signaling aspects of a competitive market.
14 New products would be delayed or not arrive, and alternative packaging and alternative
15 pricing will be suppressed. In addition, PG&E will likely be encouraged to make
16 decisions based on non-market considerations, which will be less efficient than relying on
17 market forces to determine sensible terms of use.

18 Barriers to entry will form within the relevant geographical and product markets
19 because no competitive business could enter and compete against PG&E's zero priced
20 EV charging stations, which come with subsidized or freely provided "make ready"
21 facilities at hosts' sites. This would create an unfair and anticompetitive advantage
22 because, under PG&E's proposal, only hosts that accept free PG&E-owned EV charging
23 stations would be entitled to receive the "make ready" investments for free. Other hosts

1 would be obliged to pay for these installation costs and purchase or lease competitively
2 supplied EV charging station equipment. Since PG&E will have displaced other market
3 participants, hosts will effectively be taken out of the equation and have no say related to
4 terms of use and pricing alternatives.

5 Competition would likely cease within PG&E's target geographical and target
6 product markets, and competitive firms with marketing and technological expertise and
7 an appetite to innovate and compete would be pushed aside or simply not enter PG&E's
8 exclusive market area. The impact on competition would be extremely negative, and the
9 effect on entry and innovation most chilling. PG&E would have unfair advantages, and
10 competition would be adversely affected.

11 Q. Can you point to any proceeding in which regulators have addressed the effect of
12 regulated utility entry into workably competitive markets?

13 A. Yes. It is important to recognize that regulators routinely rely on regulatory principles
14 such as used and useful, cost causation, user pays, and no unfair subsidies or
15 discrimination. In situations where a regulated utility proposes to enter a competitive
16 market, scrutiny over these regulatory principles is heightened. In such situations,
17 regulators typically seek to ensure that the utility does not attempt to compete by offering
18 a zero price option and that the utility assumes operating risk.

19 For example, I recently testified in two proceedings³⁵ before the National Energy
20 Board in Canada with respect to a regulated pipeline's (NOVA Gas Transmission Ltd.)
21 proposals to enter into workably competitive markets with a tariff proposal that would

³⁵ National Energy Board Report in the Matter of NOVA Gas Transmission Ltd., Application Dated 14 October 2011 for the Northwest Mainline Komie North Extension, GH-001-2012 (January 2013); National Energy Board Report in the Matter of NOVA Gas Transmission Ltd., Application Dated 8 November 2013 for the North Montney Mainline Project, GH-001-2014 (April 2015).

1 have effectively provided shippers with a zero price option. The first, the Komie North
2 Proceeding, is the more relevant to the proceedings here.

3 In the Komie North Proceeding, an important issue before the Board was whether
4 the entry of the regulated pipeline into the workably competitive market in northeast BC
5 offered a product that was a close substitute to the product offered in the competitive
6 market. The Board stated that it "...finds persuasive the expert opinion of Dr. Cicchetti
7 on behalf of Westcoast that the Komie North Section is a close substitute for other
8 facilities in northeast BC. The Board is satisfied that the evidence on this topic
9 established that the Project facilities would be part of competition in northeast BC."³⁶

10 The Board next considered the effect that entry into the workably competitive
11 market by an entrant offering what was in essence a zero-priced option (similar in nature
12 to the zero price option PG&E proposes to offer) would have on that market. The Board
13 observed, "Dr. Cicchetti's evidence was that negotiated, competitive and market-based
14 pipeline development in northeast BC has historically provided economic transportation
15 services on a timely basis. Dr. Cicchetti concluded that if NGTL is permitted to
16 introduce its regulated utility pricing model into the HRB, then existing natural gas
17 infrastructure serving that region will likely be underutilized or even become unused and
18 stranded."³⁷

19 In denying NGTL's application to enter the competitive market with a zero price
20 toll, the Board stated that it had "regard for the evidence from parties such as Westcoast"
21 and denied NGTL's zero price tariff application. The Board stated that it found "...the

³⁶ National Energy Board Report in the Matter of NOVA Gas Transmission Ltd., Application Dated 14 October 2011 for the Northwest Mainline Komie North Extension, GH-001-2012 (January 2013), page 19.

³⁷ Ibid. page 43.

1 construction and operation of the Komie North Section on the basis proposed by NGTL
2 would entice volumes away from Westcoast by offering an alternative path to market
3 with service priced well below costs. Issuance of a certificate would negatively affect
4 Westcoast transmission...and gathering and processing facilities...The Board typically
5 favours competitive outcomes. In the Board's view, healthy competition in northeast BC
6 would be promoted by pricing consistent with user-pay, economic efficiency, and proper
7 price signals to the market."³⁸

8 This is just one example from a different industry. The regulatory and economic
9 principles are applicable generally and should be considered in this case.

³⁸ Ibid. page 45.

1 **7. Net Benefits and Related Policy**

2 Q. Has PG&E identified sufficient net benefits to offset the unmitigated negative effect of its
3 proposal on competition and the competitive EV charging station market?

4 A. No. PG&E cannot demonstrate net benefits because PG&E has not identified *any*
5 benefits that are uniquely linked to its unfair competitive entry into the market. PG&E
6 claims that its proposal to enter the market will benefit competitive companies (and thus
7 create new entrants and expand the market) by giving them a chance to become suppliers
8 to PG&E's monopoly utility program. But there is no evidence that converting market
9 players into contract suppliers to a utility benefits them or the market.

10 PG&E also provides no evidence supporting its theory that the competitively-
11 supplied EV charging station market will not continue to expand on its own, particularly
12 if the Commission approves limited PG&E expenditures to support utility site preparation
13 and service connection facilities.

14 To understand the net benefit question presented by this factual situation, assume
15 that PG&E replaces competitively-supplied EV charging stations with utility-owned and
16 financed ones within the relevant markets. Also, suppose the number and use of EV and
17 ZEV units do not change as a result of PG&E ownership of EV charging stations. Other
18 things equal, the benefits to society would not be affected. Nevertheless, utility retail
19 electricity customers would pay more for electricity because the full costs of EV charging
20 station ownership would be rolled into the price of electricity, while a competitively
21 supplied market would require hosts to pay for the costs of EV charging stations and
22 services. The unavoidable conclusion from this straightforward comparison is that there
23 is a net negative benefit equal to the unnecessary ratepayer cost. However, it is important

1 not to stop at this conclusion, because it does not take into account additional undesirable
2 consequences and aspects of utility ownership that affect the net benefits for society and
3 specific outcomes.

4 Q. What are the additional undesirable consequences?

5 A. I see at least two areas of additional undesirable consequences to consider. These are: (1)
6 there will be different winners and losers under PG&E ownership of EV charging
7 stations; (2) economic inefficiencies would result if hosts pay a zero cost for EV charging
8 stations and PG&E restricts and limits host discretion and charger management.

9 Q. Describe how PG&E ownership and competitive markets would produce different
10 winners and losers.

11 A. As I discussed above, it is reasonable to start with the assumption that both PG&E's
12 ratepayer-financed EV charging station proposal and a program that does not involve
13 ratepayer investment in utility-owned and operated charging stations would produce the
14 same level, mix, and location of expanded EV charging stations. In this case, the benefits
15 in terms of meeting EV and ZEV needs would be identical. The primary difference in
16 this case is who pays the cost to install EV charging stations. PG&E would spread the
17 costs across all electricity customers, while competitors would charge hosts that locate
18 EV charging stations on their premises, both with and without taxpayer assistance. In
19 this circumstance, utility ratepayers would experience the same external benefits and pay
20 less for electricity under the competitive model than under the PG&E proposal because
21 they would not bear the additional PG&E costs to acquire, maintain, and operate the
22 necessary number of EV charging stations.

1 Q. Do PG&E's shareholders benefit more under PG&E's proposal?

2 A. Yes, they do. Shareholders benefit because the utility earns a return "on" and "of" its
3 investment in the EV charging stations **and** enjoy the increased revenue generated by the
4 EV charging stations. Assuming that the competitive market would achieve similar EV
5 charging station penetration within PG&E's service territory as it would without PG&E's
6 proposal, the utility would achieve the same bump in revenue from increased sales to
7 providers of electricity used at competitive market-supplied EV charging stations.

8 Under PG&E's proposal, the benefits enjoyed by PG&E's shareholders as a direct
9 result of utility ownership come at the expense of all its ratepayers. This is a form of
10 undue subsidy unless PG&E can demonstrate that all its customers are better off as a
11 result of this aspect of its proposal. PG&E has not produced any analysis to demonstrate
12 that this is the case.

13 Q. How would PG&E ownership affect the cost of service for electricity?

14 A. Utility ownership and the Rate Base cost recovery for EV charging stations and related
15 services would require retail customers to finance PG&E's investment and require the
16 recovery of the cost of EV charging station equipment in the form of the return "on" and
17 "of" PG&E's EV charging station equipment. Over the life of the utility investment,
18 utility ratepayers would pay much more than the cost of the original investment. This
19 would shift additional costs from hosts to PG&E ratepayers.

20 There are other utility costs that likely would be the same or similar under either
21 approach. These are costs for customers' education and information, and site "make
22 ready" expenses. Regardless of whether or not PG&E owns the EV charging stations,

1 any of these utility costs could be capitalized or expensed under either approach. The
2 primary differences are related to who pays for the EV charging equipment.

3 Under the competitive model, hosts pay for the EV charging station equipment, or
4 in the case of disadvantaged communities, a rebate may be expensed. Under the PG&E
5 model, PG&E's other retail customers pay for the EV charging station equipment and
6 PG&E's return on its investments.

7 Q. What is relevance of the amount electricity ratepayers would contribute?

8 A. In addition to the obvious economic and regulatory concerns related to the amount of any
9 subsidy used to internalize and capture external benefits, there is a cost effectiveness
10 matter to consider. The PG&E approach is particularly costly because the utility would
11 pay all the cost of, including the investment and return on, EV charging station
12 equipment.

13 It appears there is no disagreement between PG&E and most other parties
14 regarding the overall benefits of EV and ZEV expansion in California. However, the
15 mostly third-party ratepayers that pay to encourage the conversion to EV and ZEV are
16 entitled to a cost-effective solution. For example, utility customers would pay less and
17 accomplish more for each dollar paid to support public interest programs if the
18 Commission adopts a utility program of partial financial support, rather than allowing the
19 utility to ignore opportunities for participant contribution.

20 Programs based on utility-financed make-ready programs, targeted rebates (e.g.
21 for disadvantaged customers), and distribution system upgrades would get more done for
22 less cost. Utility ownership coupled with rate base cost recovery is likely the most costly
23 approach to increase deployment of EV charging stations, especially in areas where there

1 is a demonstrable willingness of site hosts to pay part of program costs. Markets that
2 support hosts' ownership and financial contribution encourage innovation, alternative
3 terms and pricing, and efficient risk-taking. Thus, a more cost-effective program will
4 also avoid the potential utility market power and anti-competitive concerns.

5 Q. What would you suggest for low income and any other areas where it is difficult or
6 expensive to install EV charging stations?

7 A. PG&E's application proposes to help install 10% of EV charging stations in places where
8 the market might be too slow or otherwise under served.³⁹ In order to ensure that
9 participation in these areas is enabled, the Commission can consider additional financial
10 inducements such as rebates and incentives to accomplish the program's objectives in an
11 inclusive manner.

12 Q. Please explain your second concern?

13 A. My second concern relates to the net cost of inefficiencies created by PG&E's program.
14 As I have discussed generally above, a competitive market in which sellers and buyers
15 interact freely and transact without artificial constraints produces efficiency in the
16 market. PG&E's program interferes with these normal interactions in ways that are likely
17 to disadvantage ratepayers, and also leads to the less than optimal utilization of EV
18 charging stations and services that are the focus of this proceeding.

19 Q. Can you provide an example?

20 A. Assume that a site host would normally make the decision about how many charging
21 stations to install based on his or her best estimate of current and future usage, perhaps
22 with advice from the experienced vendors seeking to sell the product to the buyer. The

³⁹ Pacific Gas & Electric Company's Electric Vehicle Infrastructure and Education Program Prepared Testimony (February 9, 2015) page 1-5, lines 12-15.

1 fact that the buyer will be spending money on the charging stations (regardless of what
2 benefits the owner expects to achieve as a result) means that the owner will have an
3 economic incentive to size the installation to meet the best estimate of the needs of the
4 site. Any other action would not be rational.

5 Contrast the situation under the PG&E program, in which the site host will
6 receive all of the charging infrastructure and related services at no cost. All things equal,
7 it is likely that inefficient choices will be made, since the ratepayers, rather than the site
8 host, will pay the cost of overbuilding. PG&E also has an inherent incentive (since its
9 shareholders benefit from each utility-owned station) to install more rather than less.

10 As another example, assume that a commercial site host purchases a charging
11 station and network services today from a seller in the competitive market. That site host
12 has a strong incentive to recover the investment in that on-site infrastructure by
13 optimizing its usage. A site host responding to this incentive in a rational way will want
14 to encourage more, rather than less, employee or customer usage, and use the EV
15 charging network technology or other means to achieve this.

16 Contrast what is likely to happen if PG&E owns the charging station and has
17 hired an off-site EV Service Partner to set pricing at all of the thousands of charging
18 stations on the PG&E utility network at what PG&E has determined to be a “reasonable”
19 price. The opportunity for site-specific efficiencies will be lost, since the site host has no
20 control and a “reasonable” charging price determined by PG&E for a diverse fleet of EV
21 chargers may reflect TOU signals, but would not capture distinctions in the value of
22 charging to a diverse population of drivers at a diversity of sites who are charging their
23 cars at different times and for different purposes.

1 Q. Does PG&E admit its EV charging station proposal would be a ratepayer program?

2 A. Yes. On page 1-8 of its initial Application PG&E states “PG&E will leverage its existing
3 distribution network, electric infrastructure expertise, and access to capital to install EV
4 infrastructure and charging equipment at the scale needed to accelerate the EV market.”
5 PG&E also describes its revenue recovery mechanism in some detail in its application.
6 This makes it clear that PG&E will not be subjected to any prudence or used and useful
7 regulatory review, if it keeps costs below the authorized cap. PG&E also proposes a new
8 balancing account to book and recover EV charging station and related costs until a likely
9 GRC filing in about 2020, in which the unrecovered costs would be added to its regulated
10 revenue requirements.

11 Q. Who benefits and who pays to finance PG&E’s entry into the EV charging station
12 market?

13 A. PG&E shareholders benefit as a general proposition from capital expenditures recovered
14 in rate base, when the costs of capital are less than the authorized rate of return, including
15 the benefits of cash flow related to depreciation and tax treatments.

16 Utility ratepayers benefit from the provision of utility services when they pay less
17 than they are willing to pay to purchase such utility services. Externalities can and do
18 have a role to play.

19 Utility ratepayers are better off if the utility is held accountable to least cost
20 principles. This is a crucial regulatory concept because utilities have exclusive franchise
21 monopolies. If the Commission concludes that utilities are an integral and important
22 component for the achievement of the public interest, ratepayers who are required to

1 finance the achievement of such external benefits would be better off if the utility
2 accomplishes any such assignment at least cost.

3 Q. How does this affect the Commission’s consideration of PG&E’s proposal to own and
4 operate EV charging stations?

5 A. Assume my observations and explicit concerns related to potential anticompetitive and
6 unfair utility advantages are correct. Also assume that the Commission agrees with
7 PG&E’s assertion that the existing market cannot keep up with the requirements to
8 provide EV charging stations to meet state goals for the expanded purchase and use of
9 PEV and ZEV vehicles by California drivers. Utility ratepayers would benefit from a
10 “least cost” solution that also minimizes the potential adverse anticompetitive market
11 consequences.

12 The Commission has a clear path to this end. PG&E should not own and operate
13 EV charging stations. Instead, PG&E’s role should be more traditional. This could
14 include utility investments to strengthen the distribution grid, site-specific “make ready”
15 investments and, if needed, targeted rebates for sites in disadvantaged communities.
16 These would maximize benefits, avoid adverse market effects, and minimize the bill
17 impacts for PG&E’s retail customers.

18 Q. Assuming that there is a common objective of avoiding delay in implementing an EV
19 charging program, is PG&E’s utility ownership model the best approach?

20 A. No. In my opinion it is not. PG&E’s application states that a “dramatic acceleration” in
21 the pace of EV charging station deployment is needed to meet California climate goals.⁴⁰

⁴⁰ Pacific Gas & Electric Company’s (U 39 E) Electric Vehicle Infrastructure and Education Program Application, page 3. See also Pacific Gas & Electric Company’s Electric Vehicle Infrastructure and Education Program Prepared Testimony (February 9, 2015) page 1-2, lines 20-21.

1 If we accept the assumption that speed in program implementation is a priority objective,
2 PG&E's proposed approach is not the best choice.

3 Q. Why?

4 A. First, the proposal adds administrative and transactional complexity as compared to
5 alternatives. Second, I do not think competitive EV charging stations can compete
6 against PG&E's zero-price alternative. Rather than adding EV stations to what
7 competitive suppliers would add, PG&E will very likely cause competitive EV charging
8 businesses to exit the market. The chilling anti-competitive effect of PG&E's zero-price
9 option will very likely significantly slow or at least greatly reduce the efforts of
10 competitors in PG&E's market. I think there is too much that can go wrong if PG&E is
11 authorized to offer EV charging stations at no cost to hosts, and to use rate payer funds
12 while accepting no operating risks.

13 Competition is working. Innovation and choice are important. PG&E has not
14 made any case that requires it to go beyond preparing the market for more make ready
15 sites, which competitors and hosts could use to expand more rapidly. The CPUC can also
16 direct PG&E to expand the number and modify the scale of make ready sites or direct
17 PG&E to add rebates if uptake is lagging in certain customer groups. Regardless of any
18 next steps, the Commission should not simply accept PG&E's costly plan to create a new
19 vertically integrated utility program for a product and market in which regulated utilities,
20 such as PG&E, have never been involved. Such steps would be complex and time
21 consuming to implement, add much uncertainty related to the rate of expansion, and
22 introduce anticompetitive problems and the potential abuse of market power.

23

1 Q. In light of the above, what is your conclusion upon applying the Commission’s balancing
2 test for PG&E’s proposals?

3 A. PG&E’s application fails the balancing test because there are significant anticompetitive
4 aspects with PG&E’s proposal. PG&E proposes to select, own, and operate EV charging
5 equipment at no cost to the site host. No one can compete against PG&E’s “free”
6 product. Innovation and experimentation would decline. Network services would suffer.
7 PG&E has not identified any potential benefits specific to PG&E’s ownership scheme.
8 Even if hypothetical benefits such as accelerating deployment were assumed, such
9 benefits do not outweigh the potential losses in economic efficiency and unfairness that
10 would result from the anticompetitive impacts of PG&E’s proposals and the longer term
11 risk of harm to a very successful competitive market. Under any realistic set of facts or
12 circumstances, PG&E’s proposals are not necessary and would harm the market it
13 proposes to help. This conclusion applies to both the “compliant” and “enhanced”
14 proposals because both employ the same program design.

15 Q. In light of the above, what is your conclusion upon applying the Commission’s balancing
16 test for PG&E’s proposals?

17 A. PG&E’s application fails the balancing test because there are significant anticompetitive
18 aspects with PG&E’s proposal. PG&E proposes to select, own, and operate EV charging
19 equipment at no cost to the site host. No one can compete against PG&E’s “free”
20 product. Innovation and experimentation would decline. Network services would suffer.
21 PG&E has not identified any potential benefits specific to PG&E’s ownership scheme,
22 and even if hypothetical benefits such as accelerating deployment were assumed, such
23 benefits do not outweigh the potential losses in economic efficiency and unfairness that

1 would result from the anticompetitive impacts of PG&E's proposals, and longer term risk
2 of harm to a very successful competitive market. Under any realistic set of facts or
3 circumstances, PG&E's proposals are not necessary and would harm the market it
4 proposes to help. This conclusion applies to both the "compliant" and "enhanced"
5 proposals because both employ the same program design.

6 Q. What is your recommendation?

7 A. The Commission should reject PG&E's proposal, or as discussed above, it could modify
8 the proposal to ensure that it meets the balancing test and conforms to basic "least cost"
9 principles. The modified proposal would include grid enhancement investments, "make
10 ready" site investments, and other host rebates if cost justified and demonstrably
11 necessary.

1 **8. Conclusion**

2 Q. What do you conclude?

3 A. The State of California, as well as others, will benefit from expanded PEV and ZEV on
4 the roads. Electric utilities have an important and essential role in this transition. Their
5 primary goal is to supply electricity to charge vehicles in homes, workplaces, parking
6 facilities, etc. They have access to finance and they have an important role in
7 maintaining and expanding the distribution grid so that it can accommodate electric
8 vehicles.

9 There currently are numerous competitive firms that sell EV charging station
10 equipment and network services. There is no case that supports treating all such stations
11 and related services as an integrated part of the utility system. There is also no case that
12 supports treating EV charging stations as a natural monopoly or even a regulated utility
13 service. Finally, PG&E has not provided any information or data that supports a
14 conclusion that the existing competitive market is failing to satisfy the requirements of
15 PEV or ZEV drivers, or that it will not respond positively to utility initiatives that make it
16 less costly and complicated to install the utility side facilities needed to connect new EV
17 charging facilities on site.

18 Taking all of the above into consideration, it is my opinion that PG&E has failed
19 to justify its proposal under the Commission’s balancing test or any other applicable
20 regulatory principles. It is my further opinion that a modified program limiting utility
21 involvement to support in the form of free make ready facilities and/or limited rebates
22 would be cost justified as a means of encouraging private investment in expansion of EV
23 infrastructure.

ATTACHMENT A:
Resume of Charles J. Chicchetti

September 2015
CHARLES J. CICHETTI, Ph.D.

PROFESSIONAL EXPERIENCE

2008-present Senior Advisor to Navigant Consulting, Inc.;

1996-present Co-Founder, Pacific Economics Group, a California LLC;

1998-2006 Jeffrey J. Miller Professor in Government, Business, and the Economy, University of Southern California;

1992-1996 Managing Director, Arthur Andersen Economic Consulting;

1991-2008 Adjunct Professor, University of Southern California

1991-1992 Co-Chairman, Putnam, Hayes & Bartlett, Inc.;

1988-1991 Managing Director, Putnam, Hayes & Bartlett, Inc.;

1987-1990 Deputy Director, Energy and Environmental Policy Center, John F. Kennedy School of Government, Harvard University;

1984-1987 Senior Vice President, National Economic Research Associates;

1980-1984 Co-Founder and Partner, Madison Consulting Group;

1979-1986 Professor of Economics and Environmental Studies, University of Wisconsin-Madison;

1977-1979 Chairman, Public Service Commission of Wisconsin, Appointed by Governor Patrick J. Lucey (member until 1980);

1975-1976 Director, Wisconsin Energy Office and Special Energy Counselor for Governor Patrick J. Lucey, State of Wisconsin;

1974-1979 Associate Professor, Economics and Environmental Studies, University of Wisconsin-Madison;

1972-1974 Visiting Associate Professor, Economics and Environmental Studies, University of Wisconsin-Madison;

1972 Associate Lecturer, School of Natural Resources of the University of Michigan;

1969-1972 Resources for the Future, Washington, D.C.;

1969 Post-Doctoral Research: Ph.D., Economics, Rutgers University;

1968-1969 Instructor, Rutgers University;

1965 B.A., Economics, Colorado College;

1961-1964 Attended United States Air Force Academy.

ADVISORY BOARDS

Faculty Advisor to Campus Republicans at USC, 2002 to 2005

Alliance for Energy Security; Former Member;

Association of Environmental and Resource Economics, Former Executive Committee, Former Member;

California ISO Market Advisory Group –Former Member appointed by Governor Gray Davis;

Center for Public Policy Advisory Committee, Former Member;

Department of Energy, Fuel Oil Marketing Advisory Committee, Former Member;

Graduate School of Public Policy at the University of California, Berkeley; Former Board Member;

National Association of Regulatory Utility Commissioners, Executive Committee and Chairman of the Ad Hoc Committee on the National Energy Act, Former Member;

Public Interest Economics Center, Board of Directors, Former Member;

Rutgers University, Energy Research Advisory Board;
U.S. Chamber of Commerce Energy and Natural Resources Committee, Former Member.

EDITORIAL BOARDS

Journal of Environmental Economics and Management, Former Member
Energy Systems and Policy, Former Member;
Land Economics, Former Editor.

PUBLICATIONS

Books and Monographs

“Why EPA’s Mercury and Air Toxics Rule is Good for the Economy and America’s Workforce”, July 2011.

The Results in Context: A Peer Review of EEI’s “Potential Impacts of Environmental Regulation in the U.S. Generation Fleet.": May 11, 2011.

Expensive Neighbors: The Hidden Cost of Harmful Pollution to Downwind Employers and Businesses; by Charles J. Cicchetti, Ph.D., prepared for Exelon in response to EPA’s proposed Transport Rule under the Clean Air Act; January 2011.

“The True Cost of Harmful Pollution to Downwind Families and Business”, written by Charles J. Cicchetti, Ph.D., prepared for Exelon in response to EPA’s proposed Transport Rule under the Clean Air Act, November, 2010.

“Economic Regulation and the Development of Integrated Energy Systems”, with Mike Cleland and Sean Conway, ICES Literary Series, v.1 September 2012.

Going Green and Getting Regulation Right: “A Primer for Energy Efficiency”, PUR Publishers, March 2009.

Natural Gas: the Other California Energy Crisis, Pacific Economics Group Working Paper with Colin M. Long, February 2007.

The California Electricity Crisis: What, Why, and What’s Next, with Jeffrey A. Dubin and Colin M. Long, Kluwer Academic Publishers, July 2004.

A Tarnished Golden State: Why California Needs a Public/Private Partnership for its Electricity Supply System, with Colin M. Long, August 2003.

Restructuring Electricity Markets: A World Perspective Post-California and Enron, with Colin M. Long and Kristina M. Sepetys, May 2003.

Energy Deregulation: The Benefits of Competition Were Undermined by Structural Flaws in the Market, Unsuccessful Oversight and Uncontrollable Competitive Forces, with Jeffrey A. Dubin, Jon Hockenyos, Colin M. Long and J.A. Wright. California State Auditor, Bureau of State Audits, Sacramento, California, March 2001.

Restructuring Electricity Markets: A World Perspective, with Kristina M. Sepetys, January 1996.

The Economic Consequence of Independent Film Making, Prepared for the American Film Marketing Association, with W.E. Peale, Stefan Boedeker, Jeffrey Dubin, Jeff Truitt, January 1995.

The Application of U.S. Regulatory Techniques to Spain's Electric Power Industry, with Irwin M. Stelzer, prepared for Unidad Electrica, S.A., Cambridge: Energy and Environmental Policy Center, Harvard University, March 1988.

The Economic Theory of Enhanced Natural Gas Service to the Industrial Sector: An Applied Approach, Vol. II with L.D. Kirsch, for the Gas Research Institute, Contract No. 5080-380-0349, February 1982.

The Economic Theory of Enhanced Natural Gas Service to the Industrial Sector: An Applied Approach, Vol. I with L.D. Kirsch and R. Shaughnessy, for the Gas Research Institute, Contract No. 5080-380-0349, May, 1981.

The Economic Effects of Deregulating Natural Gas, with R.H. Haveman, M. Lowry, M. Post and R. Schmidt, prepared for the Northeast Coalition for Energy Equity, Madison: MCG Monograph, 1981.

The Marginal Cost and Pricing of Electricity: An Applied Approach, with W. Gillen and P. Smolensky, Cambridge: Ballinger Publishing Company, 1977.

The Costs of Congestion: An Econometric Analysis of Wilderness Recreation, with V.K. Smith, Cambridge: Ballinger Publishing Company, 1976.

Energy System Forecasting, Planning and Pricing, ed. with W. Foell for the National Science Foundation, Madison: University of Wisconsin Monograph, 1975.

Studies in Electric Utility Regulation, ed. with J. Jurewitz for the Ford Foundation Energy Policy Project, Cambridge: Ballinger Publishing Company, 1975.

Perspective on Power: A Study of the Regulation and Pricing of Electric Power, with E. Berlin and W. Gillen for the Ford Foundation Energy Policy Project, Cambridge: Ballinger Publishing Company, 1974.

A Primer for Environmental Preservation: The Economics of Wild Rivers and Other Natural Wonders, New York: MSS Modular Publication, 1973.

Forecasting Recreation in the United States: An Economic Review of Methods and Applications to Plan for the Required Environmental Resources, Lexington: Lexington Books, June 1973.

Alaskan Oil: Alternative Routes and Markets, for Resources for the Future, Baltimore: Johns Hopkins University Press, December 1972.

The Demand and Supply of Outdoor Recreation: An Econometric Analysis, Ph.D. Thesis: Rutgers University, 1969. Also, with J.J. Seneca and P. Davidson, Washington, D.C.: U.S. Department of Interior, Bureau of Outdoor Recreation, Contract No. 7-14-07-4, 1969.

A Neo Keynesian Equilibrium Analysis For an Open Economy, A.B. Thesis, Colorado College, Colorado, Springs, Colorado, May, 1965.

PUBLICATIONS

Journal Articles

“Inflated Numbers; Erroneous Conclusions: The Navigant Wind Jobs Report”, American Energy Alliance, The National Center for Public Policy Research, March 2013.

“Technology for the Masses: The Consumer-centric Smart Grid and its Challenge for Regulators” with Philip Mause, Public Utilities Fortnightly, October 2011.

“Duke’s Fifth Fuel”, Public Utilities Fortnightly, January 2008.

“Public Service Commission of Wisconsin, 1977-1980” Charles J. Cicchetti, The NRRI Journal of Applied Regulation, Volume 4, December 2006

“A Brief History of Rate Base: Necessary Foundation of Regulatory Misfit” with Charles J. Cicchetti, Public Utilities Fortnightly, July 2006.

“ISOs and Transcos: What’s at Stake?” with Gary D. Bachman and Colin M. Long, The Electricity Journal, December 2000.

“Politics as Usual: A Roadmap to Backlash, Backtracking and Re-regulation,” with Colin M. Long, Public Utilities Fortnightly, Vol. 138, No. 18. October 1, 2000.

“Transmission Products and Pricing: Hidden Agendas in the ISO/Transco Debate,” with Colin M. Long, Public Utilities Fortnightly, Vol. 137, No. 12. June 15, 1999

“Mergers and the Convergence of the Electric and Natural Gas Industries,” Natural Gas, March 1997.

“Been There, Done That: Sunk Costs, Access Charges and the Transmission Pricing Debate,” Energy, Vol. XXI, No. 4. September, 1996.

“Regulating Competition: Transition or Travesty?” with Kristina M. Sepetys, The Electricity Journal, May 1996.

“California Model Sets the Standard for Other States,” with Kristina M. Sepetys, World Power Yearbook 1996.

“Measuring the Effects of Natural Resource Damage and Environmental Stigma on Property Value,” Environmental Law, September/October, 1995.

- "The Route Not Taken: The Decision to Build the Trans-Alaska Pipeline and the Aftermath," The American Enterprise, Volume 4, Number 5, September/ October 1993.
- "A Micro-Econometric Analysis of Risk-Aversion and the Decision to Self-Insure," with Jeffrey Dubin, in Journal of Political Economy, Revised, July 1993. (Volume 102, No. 1, February 1994.)
- "Energy Utilities, Conservation, Efficiency," with Vinayak Bhattacharjee and William Rankin, Contemporary Policy Issues, Volume XI, Number 1, January 1993.
- "Uniqueness, Irreversibility, and the Theory of Nonuse Values," with Louis L. Wilde, American Agricultural Economics Association, December 1992.
- "Utility Energy Services," with Ellen K. Moran, Regulatory Incentives for Demand-Side Management, Chapter 9, American Council for an Energy-Efficient Economy, December 1992.
- "A Micro-Econometric Analysis of Risk Aversion and the Decision to Self-Insure," California Institute of Technology, with Jeffrey A. Dubin, January 1992.
- "The Use and Misuse of Surveys in Economic Analysis: Natural Resource Damage Assessment Under CERCLA," California Institute of Technology, with Jeffrey Dubin and Louis Wilde, July 1991.
- "The Federal Energy Regulatory Commission's Proposed Policy Statement on Gas Inventory Charges (PL-89-1-1000), Energy and Environmental Policy Center, Harvard University, Discussion Paper E-89-11, July 1989.
- "Incentive Regulation: Some Conceptual and Policy Thoughts," Energy and Environmental Policy Center, Harvard University, Discussion Paper E-89-09, June 1989.
- "Including Unbundled Demand-Side Options in Electricity Utility Bidding Programs," with William Hogan, Public Utilities Fortnightly, June 8, 1989. (Also a Discussion Paper E-88-07).
- "Assessing Natural Resource Damages Under Superfund: The Case Against the Use of Contingent Value Survey Methods," with Neil Peck, Natural Resources & Environment, Vol. 4, No. 1, Spring 1989.
- "Pareto Optimality Through Non-Collusive Bilateral Monopoly with Cost-of-Service Regulation (or: Economic Efficiency in Strange Places)," with Jeff D. Makhholm, Energy and Environmental Policy Center, Harvard University, Working Paper, 1988.
- "The FERC's Discounted Cash Flow: A Compromise in the Wrong Direction," with Jeff Makhholm, Public Utilities Fortnightly, July 9, 1987.
- "Conservation Subsidies: The Economist's Perspective," with Suellen Curkendall, Electric Potential, Vol. 2, No. 3, May/June 1986.

- "Our Nation's Gas and Electric Utilities: Time to Decide," with R. Shaughnessy, Public Utilities Fortnightly, December 3, 1981.
- "Is There a Free Lunch in the Northwest? (Utility-Sponsored Energy Conservation Programs)," with R. Shaughnessy, Public Utilities Fortnightly, December 18, 1980.
- "Opportunities for Canadian Energy Policy," with M. Reinbergs, Journal of Business Administration, Vol. 10, Fall 1978/Spring 1979.
- "Energy Regulation: When Federal and State Regulatory Commissions Meet," with J. Williams, American University Law Review, 1978.
- "The End-User Pricing of Natural Gas," with Don Wiener, Public Utilities Fortnightly, March 16, 1978.
- "An Econometric Evaluation of a Generalized Consumer Surplus Measure: The Mineral King Controversy," with V.K. Smith and A.C. Fisher, Econometrica, Vol. 44, No. 6, 1976.
- "Alternative Price Measures and the Residential Demand for Electricity: A Specification Analysis," with V.K. Smith, Regional Science and Urban Economics, 1975.
- "An Economic Analysis of Water Resource Investments and Regional Economic Growth," with V.K. Smith and J. Carston, Water Resources Research, Vol. 12, No. 1, 1975.
- "A Note on Fitting Log Linear Regressions with Some Zero Observations for the Regressand," with V.K. Smith, Metroeconomica, Vol. 26, 1975.
- "The Design of Electricity Tariffs," Public Utilities Fortnightly, August 28, 1975.
- "The Economics of Environmental Preservations: Further Discussion," with A.C. Fisher and J.V. Krutilla, American Economic Review, Vol. 64, No. 6, December 1974.
- "Electricity Price Regulation: Critical Crossroads or New Group Participation Sport," Public Utilities Fortnightly, August 29, 1974.
- "Interdependent Consumer Decisions: A Production Function Approach," with V.K. Smith, Australian Economic Papers, December 1973.
- "Economic Models and Planning Outdoor Recreation," with A.C. Fisher and V.K. Smith, Operations Research, Vol. 21, No. 5, September/October 1973.
- "Evaluating Federal Water Projects: A Critique of Proposed Standards," with R.K. Davis, S.H. Hanke and R.H. Haveman, Science, Vol. 181, August 1973.
- "The Mandatory Oil Import Quota Program: A Consideration of Economic Efficiency and Equity," with W. Gillen, Natural Resources Journal, Vol. 13, No. 3, July 1973.

- "Congestion, Quality Deterioration and Optimal Use: Wilderness Recreation in the Spanish Peaks Primitive Area," with V.K. Smith, Social Sciences Research, Vol. 2, 1, March 1973 (reprinted July 1973).
- "The Economics of Environmental Preservation: A Theoretical and Empirical Analysis," with A.C. Fisher and J.V. Krutilla, American Economic Review, Vol. 62, No. 4, September 1972.
- "Recreation Benefit Estimation and Forecasting: Implications of the Identification Problem," with V.K. Smith, J.L. Knetsch and R. Patton, Water Resources Research, Vol. 8, No. 4, August 1972.
- "Evaluating Benefits of Environmental Resources with Special Application to the Hells Canyon," with J.V. Krutilla, Natural Resources Journal, Vol. 12, No. 1, January 1972. (Also published in Benefit-Cost and Policy Analysis, 1972.)
- "On the Economics of Mass Demonstrations: A Case Study of the November 1969 March on Washington," with A.M. Freeman, R.H. Haveman and J.L. Knetsch, American Economic Review, Vol. 61, No. 4, September 1971.
- "Option Demand and Consumer Surplus: Further Comment," with A.M. Freeman III, Quarterly Journal of Economics, Vol. 85, August 1971.
- "Some Economic Issues Involved in Planning Urban Recreation Facilities," Land Economics, February 1971.
- "A Note on Jointly Supplied Mixed Goods," with V.K. Smith, Quarterly Review of Economics and Business, Vol. 10, No. 3, Autumn 1970.
- "A Gravity Model Analysis of the Demand for Public Communication," with J.J. Seneca, Journal of Regional Science, Vol. 9, No. 3, Winter 1969.

Articles Appearing in Other Volumes

- "Including Unbundled Demand-Side Options in Electric Utility Bidding Programs," in *Competition in Electricity: New Markets & New Structures*, with William Hogan and edited by James L. Plummer and Susan Troppmann, (Public Utilities Reports and QED Research Inc: Arlington, Virginia) March 1990.
- "Meeting the Nation's Future Electricity Needs: Cogeneration, Competition and Conservation," in 1989 Electricity Yearbook, New York: Executive Enterprises, 1989.
- "Environmental Litigation and Economic Efficiency: Two Case Studies," with R. Haveman in Environmental Resources and Applied Welfare Economics: Essays in Honor of John F. Krutilla, V.K. Smith ed., Washington, DC: Resources for the Future, 1988.
- "Electricity and Natural Gas Rate Issues," with M. Reinbergs, in The Annual Energy Review, Palo Alto: Annual Reviews Inc., Vol. 4, 1979.

- "Die Erhaltung der Natürlichen Umwelt: Eine Theoretische und Empirische Untersuchung" with A. Fisher and John Krutilla. Sonderdruck aus Umwelt und Wirtschaftliche Entwicklung, Sieten 249-279. 1979.
- "The Measurement of Individual Congestion Costs: An Econometric Application to Wilderness Recreation," with V.K. Smith, in Theory and Measurement of Economic Externalities, ed. S.A. Lin, New York: Academic Press, 1976.
- "Implementing Diurnal Electricity Pricing in the U.S.: A Pragmatic Approach," in Energy System Forecasting, Planning and Pricing, ed. C.J. Cicchetti and W. Foell, Madison: University of Wisconsin Press, February 1975.
- "Measuring the Price Elasticity of Demand for Electricity: The U.S. Experience," with V.K. Smith, in Energy System Forecasting, Planning and Pricing, ed. C.J. Cicchetti and W. Foell, Madison: University of Wisconsin Press, 1975.
- "Public Utility Pricing: A Synthesis of Marginal Cost, Regulatory Constraints, Averch-Johnson Bias, Peak Load and Block Pricing," with J. Jurewitz, in Studies in Electric Utility Regulation, ed. C.J. Cicchetti and J. Jurewitz, Cambridge: Ballinger Publishing Company, 1975.
- "Congestion, Optimal Use and Benefit Estimation: A Case Study of Wilderness Recreation," with V.K. Smith, in Social Experiments and Social Program Evaluation, ed. J.G. Albert and M. Kamrass, Cambridge: Ballinger Publishing Company, 1974.
- "Electricity Growth: Economic Incentives and Environmental Quality," with W. Gillen, in Energy: Demand, Conservation and Institutional Problems, ed. M. Macrakis, Cambridge: MIT Press, 1974.
- "Some Institutional and Conceptual Thoughts on the Measurement of Indirect and Intangible Benefits and Costs," with John Bishop, in Cost-Benefit Analysis and Water Pollution Policy, ed. H. Peskin and E. Seskin, Washington, D.C.: Urban Institute, 1974.
- "The Trans-Alaska Pipeline: An Economic Analysis of Alternatives," with A.M. Freeman III, in Pollution, Resources and the Environment, ed. A.C. Enthoven and A.M. Freeman III, New York: W.W. Norton and Co., 1973.
- "Alternative Uses of Natural Environments: The Economics of Environmental Modification," with A.C. Fisher and J.V. Krutilla, in Natural Environments: Studies in Theoretical and Applied Analysis, ed. J.V. Krutilla, Baltimore: Johns Hopkins University Press, 1972.
- "A Multivariate Statistical Analysis of Wilderness Users in the United States," in Natural Environments: Studies in Theoretical and Applied Analysis, ed. J.V. Krutilla, Baltimore: Johns Hopkins University press, 1972.
- "Benefits or Costs? An Assessment of the Water Resources Council's Proposed Principles in Standards," with R.K. Davis, S.H. Hanke, R.H. Haveman and L.

Knetsch, in Benefit-Cost and Policy Analysis, ed. W. Nishkanen, *et al*, Chicago: Aldine Publishing Company, 1972.

"Observations on the Economics of Irreplaceable Assets: Theory and Method in the Social Sciences," with J.V. Krutilla, A.M. Freeman III and C. Russell, in Environmental Quality Analysis, ed. A Kneese and B.T. Bower, Baltimore: Johns Hopkins University Press, 1972.

"Outdoor Recreation and Congestion in the United States," in Population, Resources and the Environment, ed. R. Ridker, Washington, D.C.: U.S. Government Printing Office, 1972.

"Benefit-Cost Analysis and Technologically Induced Relative Price Changes: The Case of Environmental Irreversibilities," with J.V. Krutilla, Natural Resources Journal, 1972.

Less Technical Articles

"Still the Wrong Route," Environment, Vol. 19, No. 1, January/February, 1977.

"National Energy Policy Plans: A Critique," Transportation Journal, Winter 1976.

"The Mandatory Oil Import Program: A Consideration of Economic Efficiency and Equity," with W. Gillen, Joint Economic Committee of the U.S. Congress, 1974.

"The Political Economy of the Energy Crisis," with R. Haveman in Carroll Business Review, Winter 1974.

"The Wrong Route," Environment, Volume 15, No. 5, June 1973.

"A Review of the Empirical Analyses that Have Been Based Upon the National Recreation Surveys," Journal of Leisure Research, Vol. 4, Spring 1972.

"How the War in Indochina is Being Paid for by the American Public: An Economic Comparison of the Periods Before and After Escalation," Public Forum, July 1970, (reprinted in the Congressional Record, August 13, 1970).

"User Response in Outdoor Recreation: A Reply," with J.J. Seneca, Journal of Leisure Research, Vol. 2, No. 2, Spring 1970.

"User Response in Outdoor Recreation: A Production Analysis," with J.J. Seneca, Journal of Leisure Research, Vol. 1, No. 3, Summer 1969.

Miscellaneous Articles

"We Must Increase Access to Alaska's Resources," Op-Ed in the Washington Examiner, August 4, 2015.

"Competitive Battlefield: A View from the Trenches," Northeast Utilities 1987 Annual Report, Competition: A Matter of Choices, 1987.

SPEECHES AND PAPERS PRESENTATED

Speeches and Papers Presented Since 1971

"California: Going Green and Getting Regulation Right", Law Seminars International 11th Annual Conference on Energy in California, San Francisco, California, September 15, 2009.

"The Business Case For Energy Efficiency", CS Week Conference, Washington, D.C., May 21, 2009.

"Back to The Future: Energy Planning and Lessons for the 1970's", Third Annual Nelson Institute Earth Day Conference, Madison, Wisconsin, April 22, 2009.

"Energy Efficiency and Regulatory Incentives," EUEC 11th Annual Energy and Environment Conference, Tucson, Arizona, January 27-30th, 2008.

"Conservation Reconsidered: A First Row Seat," Reconsidering "Conservation Reconsidered": A 40-Year Legacy, Resources for the Future, October 3, 2007.

"Market Issues: Power Procurement & Contracts," Law Seminars International, San Francisco, California, September 17-18th, 2007.

"Economists as Appraisers, Threats or Compliments?" Appraisal Institute Seminar, Los Angeles, California, March 26, 2007.

"The Economic Health of California's Energy Markets", An Economist's Perspective on the Electronic Health of CA Energy Markets, San Francisco, California, September 26, 2006.

"California's Electricity Supply and Demand: Reality Check 2006", Electricity Policy Roundtable, San Francisco, California, February 17, 2004.

"Solving California's energy Problems: A Pragmatic Approach" University of Southern California, Los Angeles, California, September 12, 2003.

"Lessons From California to Russia," Edison Electric Institute's US/Russia Electricity Markets Conference, Washington, District of Columbia, February 25, 2003.

"Measuring the Effects of Natural Resource Damage and Environmental Stigma on Property Value and Health" April 30, 2002.

"State Regulation Is Here to Stay: Financing the Future, NARUC 113th Annual Convention, Philadelphia, Pennsylvania, November, 2001.

- “Deregulation Revisited: The Power Crisis in California,” New York University’s Energy Forum, New York, New York, 26 February 2001.
- “The Changing Face of Utilities,” Author Anderson’s 21st Annual Energy Symposium, Houston, Texas, 28 November 2000.
- “Lessons for Bangladesh: Thinking Globally While Acting Locally,” The World Bank’s Bangladesh Power Sector Reforms Workshop, Dhaka, Bangladesh, 1 October 2000.
- “Some Global Insights on Power Sector Reform in Bangladesh.” The World Bank’s Bangladesh Power Sector Reforms Workshop, Dhaka, Bangladesh, 1 October 2000.
- “Diversification and Shareholder Value,” The Energy Daily’s 27th Annual Conference: Lighting the World, Williamsburg, Virginia, 2 December 1999.
- “Challenges for Government-Owned Utilities,” The Bond Buyer Public Power Conference, Santa Monica, California, 7 October 1999.
- “Restructuring America’s Electricity Industry and Public Power or Customer Owned Utilities,” APPA’s CEO Roundtable, Scottsdale, Arizona, 3 March 1998.
- “Electricity Restructuring: The Future Role of Regulation (Woulda, Shoulda, Coulda)’ American Bar Association’s Annual Electricity Conference, Denver, Colorado, 13 February 1998.
- “Mergers in the Utility Industry,” Arthur Anderson’s 18th Annual Energy Symposium, Houston, Texas, 9 December 1997.
- “Convergence, Competition, Mergers and Marketing: Are You Getting Ready for the Millennium?” California Foundation on the Environment and the Economy, Santa Cruz, California, 4 December 1997.
- “Electric Utility Strategy: Regulation, Restructuring and Competition,” The Fourth Annual Power Industry Forum: “A View Toward the New Energy Corporation,” San Diego, California, 7 March 1997.
- “Restructuring Energy Markets: A World Perspective,” The Energy Daily’s 22nd Annual Conference: The One-Stop Energy Stop, Williamsburg, Virginia, 12 December 1996.
- “Mergers in the Utility Industry,” Arthur Anderson’s Energy Symposium, Houston, Texas, 10 December 1996.
- “Political, Economic, and Regulatory Challenges when Transforming Privately-Owned Utilities to Competitive Enterprises,” Presentation at the Economist Conferences, Bilbao, Spain, 12 November 1996.
- “Transmission, Divestiture, and the Future,” Panelist at the EEI Strategic Planning Conference, Seattle, Washington, 14 October 1996.
- “Merger Mania.” Utilities AIS Conference. St. Charles, Illinois. October 1-2, 1996.

- “Cost-of-Service Regulation: The Old Dog Won’t Hunt, and Recently, It Wasn’t Very Good,” Presentation to the Board of Wisconsin Electric Power Company,” Belize, Central America, 3 April 1996.
- “Primary Mergers: An Insider’s Guide.” Electric Utility Week Conference. March 15, 1996.
- “Merger Policy Issues—When is a Proposed Electric Utility Merger in the Public Interest?” Panelist at the 3rd Annual DOE-NARUC National Electricity Forum, 5 December 1995.
- “Measuring the Effects of Natural Resources Damage and Environmental Stigma on Property Value,” Presented to Morgan, Lewis & Bockius, 29 November 1995.
- “Strategy for a Natural Gas Distributor: Competition, Consolidation, Cost Cutting,” for Washington Gas Light, 23 October 1995.
- “Strategic Issues Facing the Electric Utility Industry,” AIS Symposium, St. Charles, IL, 9 October 1995.
- “Worldwide Electricity Restructuring: Regulation, Competition or Both?” presented at the 4th World Economic Development Congress, Washington, DC, 6 October 1995.
- “Competition, Consolidation, Restructuring: A Program for Expanding Utility Consulting,” Western Region Utility Presentation, 28 September 1995.
- “North/South Estimated Savings Compared to Recent Merger Claimed Savings,” for PSCo information only, July 28, 1995.
- “California PUC Plans for Restructuring the Electric Industry,” Utilities Overheads, 3 July 1995.
- “Public Utility Holding Company Act (PUHCA) Current Issues,” Utilities Overheads, 3 July 1995.
- “Power Industry Restructuring: Competition and Deregulation are Not Synonyms,” Utilities Overheads, 3 July 1995.
- “The FERC’s Role in Electric Utility Industry Restructuring,” Utilities Overheads 3 July 1995.
- “Whereto Regulation? Slice and Dice Supplants Command and Control,” HARC Presentation, 8 August 1995/
- “Strategic Issues Facing the Electric Utility Industry,” US West Presentation, 1 August 1995.
- “Proposal to Provide Consulting Services to Assist with An Alternative Ratemaking Proposal,” Boston Gas Presentation, 27 July 1995.

- “Strategic Issues Facing the Electric Utility Industry,” ConEd Presentation, 26 July 1995.
(Also “Power Thinking”)
- “Strategic Issues Facing the Electric Utility Industry,” NU Board of Trustee Presentation,
25 July 1995.
- “Public Utility Holding Company Act (PUHCA)” Presentation to Southwest Gas
Corporation, 19 June 1995.
- “FERC Activity-Gas Industry Update,” Presentation to Southwest Gas Corporation, 19
June 1995.
- “Electric Industry Restructuring Recent FERC and CPUC Developments,” Presentation
to Southwest Gas Corporation, 19 June 1995.
- “Power Marketing and Bulk Power Markets: Power Marketing and its Impact on the
Electric Power Industry,” Infocast’s Power Marketing and Bulk Power Markets, 8
June 1995.
- “Energy Industry in Transition,” Yankee Energy Systems presentation, 23 May 1995.
- “State Regulation in an Era of Regulated Competition,” American Enterprise Energy
Policy Forum, 16 May 1995.
- “Natural Resource Damages Latest Developments and Future Focus,” The CVM
Controversy. Executive Enterprises NRDA Conference, 5 May 1995, San Francisco.
- “Restructuring the Electric Industry,” Prepared for Georgia Power Company, 28 March
1995.
- “Electric, Gas and Telephone Industry Insights and Outlooks,” Prepared for Peoples
Energy Corporation Officers’ Planning Retreat, 12 March 1995.
- “The Driving Forces Reshaping the Electric Power Industry,” Presentation to Northeast
Utilities Management, 27 February 1995.
- “Electricity Markets: Yesterday, Today, and Tomorrow,” and “The Driving Forces
Reshaping the Electric Power Industry,” Presentation to General Electric, 13
February 1995.
- “Power Marketing and Its Role in the Competitive Energy Industry: Projecting Future and
International Power Needs,” EEI Conference, 27 January 1995.
- “Evolution or Revolution: Whoever Gets the Customers Wins!” Energy Daily
Conference, 1 December 1994.
- “Natural Resource Damages Latest Developments and Trends: CVM Controversy,”
Executive Enterprise’s NRDA Conference, 15 November 1994.
- “The Current Natural Gas Transportation Issues that Affect the North American Market,”
IGUA/ACIG Natural Gas Conference, 15 November 1994.

- “Power Marketing and Its Role in the Competitive Energy Industry: Projecting Future and International Power Needs,” Infocast-New York, 28 October 1994.
- “FERC and State Regulatory Incentives: Restructuring the Electric Utility Industry,” Arthur Andersen’s Financial Symposium, 27 September 1994.
- “Restructuring the Electric Utility Industry,” Arthur Andersen’s Financial Symposium, 27 September 1994.
- “What Do We Want to Get Out of the CPUC Restructuring Process,” Aspen Institute Presentation Materials, 6 July 1994.
- “The Debate over Retail Competition in California: A Prescriptive Suggestion,” Aspen Institute Presentation Materials, 6 July 1994.
- “A Review and Critique of Internal Revenue Service Economist Report Regarding Electricity Conservation Program Expenditures and Related Tax Deductions,” EEI Taxation Committee Meeting, 14 June 1994.
- “Environmental Law, Liability & Litigation.” Director’s Roundtable, 18 May 1994.
- “Arthur Andersen Group Presentation to The Gas Company: Customer Values Initiative.” Los Angeles, California, 1994.
- “NRDA and Property Valuation Analysis,” presented to Fennemore Craig, P.C., 28 February 1994.
- “Commentary on the Future of Regulation: Pro or Kahn?” (To Regulate or Not to Regulate: That is the Question,” NARUC/DOE presentation, 15 February 1994.
- “Latin America Assertion of Membership in Pacific Basin,” Aspen Institute, Pac Rim Workshop, 31 January 1994.
- “Utility Rate Regulation in the 1990s and Beyond,” 1993 Utilities Financial Symposium, 14 September 1993.
- “Natural Resource Damages: An Economic Critique,” Presented to Beveridge & Diamond (w/J. Dubin), 8 September 1993.
- “Understanding Economic Damage Valuations Under NRDA,” Presented to Occidental USA, (with L. Wilde), 17 August 1993.
- “Allocating Costs in Superfund Cases,” Presented to Waste Management, July 1993.
- “Understanding Economic Damage Valuations Under NRDA,” Presented to Sidley & Austin, 29 June 1993.
- “Allocating Cost in Superfund Cases,” Presented to Keck, Mahin & Cate, 23 June 1993.

“Draft RCRA Corrective Action Regulatory Impact Analysis (RIA),” Presented to Beveridge & Diamond, 18 June 1993.

Chicago Energy Economic Association Speech, (CJC used notes/speech from UC Berkeley/RFF speech of 10 May 1993), 10 June 1993.

“Understanding Economic Damage Valuations Under NRDA,” AAEC Corporate Counsel Symposium Series (Dallas & Houston), May 18-19, 1993.

“The Regulatory Triad for the 90s: Integrated Resource Planning, Incentive, Regulation and Social Costing,” UC Berkeley/RFF Briefing, 10 May 1993

“Understanding Economic Damage Valuation Under NRDA,” AA/Perkins Coie Presentation, 4 May 1993.

“DSM & Shareholder Incentive,” 1993 Rate Symposium, April 25-27, 1993.

“Twenty Years Since Earth-Day I: What Have We Learned?” USC Economic Honor Society Omicron, Delta Epsilon, 15 April 1993.

“The Clinton Economic Plan,” USC Panel Discussion, 26 February 1993.

“Incorporating Externalities in Utility Least-Cost Planning,” Edison Electric Institute, 10 February 1993.

“Incorporating Externalities in Utility Least-Cost Planning,” A Presentation to the ABA Mid-Year Meeting, 7 February 1993.

“Understanding Economic Damage Valuations Under NRDA,” Presented at “OPA-On the Gulf Coast,” Seminar, sponsored by Haight, Gardner, Poor & Havens, 27 January 1993.

“DSM and Shareholders Incentives,” Prepared for Southern California Edison, January 1993.

“DSM and Shareholders Incentives,” Prepared for the Allied Social Science Association 1993 Annual Meetings, 5 January 1993.

“Social Cost of Electricity,” Panel Discussant, Anaheim, California, January 5 & 6, 1993.

“Environmental Externalities: Are There Any Left?” American Bar Association’s Winter Meeting. Boston, Massachusetts. February 7, 1993.

“Incorporating Externalities in Utility Least-Cost Planning,” Edison Electric Institute Energy and Environmental Committee, San Francisco, California, February 10, 1993.

“Environmental Policy: The Good, The Bad, The Ugly,” University of Southern California, Los Angeles, February 25, 1993.

- “Incorporating Environmental Strategies into Your Corporation’s Overall Strategy to Improve the Bottom Line,” moderator, Arthur Anderson & Co.’s Energy 1993 Expo, Pittsburgh, Pennsylvania, March 2-3, 1993.
- “Resource Planning, Incentives, and Pricing for Electric, Natural Gas, and Telecommunications Services: New Products and Regulations,” University of Missouri’s 1993 Rate Symposium, Kansas City, Missouri, April 26, 1993.
- “An Economist’s View of Demand Side Management,” Chicago Energy Economists Association, Chicago, Illinois, June 10, 1993.
- “Presentation to the Board of Southwest Gas,” Las Vegas, Nevada, June 14, 1993.
- “Draft RCRA Corrective Action Regulatory Impact Analysis (RIA),” Beveridge & Diamond, June 18, 1993.
- “Where Do We Go From Here: Bush or Clinton?” Presented at the Corporate Recovery Conference sponsored by Arthur Andersen & Co., Scottsdale, Arizona, September 17, 1992.
- “The Economic Effect of the Clean Air Act on the U.S. Economy: Tradable Emissions Allowances,” National Clean Air Conference, Houston, Texas, May 20, 1992.
- “Electric Utility Industry Through 2000.” Fluor Daniel Power Sector Meeting, San Diego, California. January 28, 1992.
- “Valuation of Natural Resource Damages: Evolution of a Process,” Executive Enterprises, Inc. Conference Natural Resource Damages Claims and Litigation “Problems in Valuation.” November 7, 1991.
- “The Evolution of the Electric Utility Sponsored Conservation Movement in North America: Remembrance of Things Past,” Demand Side Management: A Current and Future Resource Conference Sponsored by the Commission of the European Communities and the International Energy Agency; Copenhagen, Denmark, October 23, 1991.
- “Are There Any Economic Efficiency Arguments for Embracing Utility-Sponsored Conservation Programs?” WEA International Conference, Seattle, Washington, June 29, 1991.
- “National Resource Damages: What Does the Proposed Final DOI Rule Mean?” Presented at the Workshop on Natural Resource Damages, Washington, DC, May 30, 1991.
- When Green Turns Mean: Pollution as a Crime.” Emerging Environmental Policies and Business Conference, University of North Carolina State University, April 18, 1991.
- “When Green Turns Mean: Pollution as a Crime”, Presented at the Third Annual Law and Economics Seminar of Putnam, Hayes & Bartlett, Inc., The Arizona Biltmore Hotel, Phoenix, Arizona, November 7-11, 1990.

- "The Legal and Economic Consequences of 1992." Presented at the Second Workshop on Post Keynesian Economics, Knoxville, Tennessee, July 3, 1990.
- "Environment: A Green Gimmick or a New Game Plan?", Presented at Pacific Gas & Electric Company's Managers Meeting, San Francisco, California, May 31, 1990.
- "Energy Firms and Global Environmental Policy", 1990 PacRim Workshop, Seoul, Korea, May 16, 1990.
- "Can the Gas Business Fulfill Its New Promise?" Presented at "Inside F.E.R.C.", San Francisco, California, April 20, 1990.
- "Energy Firms and Global Environmental Policy." Presented at Pacific Gas & Electric's Management Committee Retreat, Santa Cruz, California, March 17-26, 1990.
- "Can Economic Efficiency and Demand Side Bidding Co-Exist?" Bidding for Electricity Conference, Davis, California, March 15, 1990.
- "Electric Utility Mergers and Reorganization: Antitrust Meets Regulation." Presented at the Third Annual Conference on Electric Law and Regulation, Denver, Colorado, March 9, 1990.
- "Infrastructure, Regulatory, Risk/Reward Issues." Presented at the Portland General Symposium, Portland, Oregon, November 6, 1989.
- "Belated and Expensive: How Utilities Have Reacted to New Economic Imperatives in the Last Two Decades," Conference Sponsored by the Energy Daily, The Watergate Hotel, Washington, D.C., November 3, 1989.
- "Competitive Bidding: Price, Time, Location and Uncertainties." Presented at the Coopers & Lybrand Annual Electric & Gas Conference, Crystal Gateway Marriot, Arlington, VA, November 2, 1989.
- "Electric Utilities: New Markets, New Challenges," Speech before the Interstate Natural Gas Association of America Seminar, The Greenbrier, White Sulphur Springs, West Virginia, October 17, 1989.
- "Sweetening the Pot: Plaintiff Devices to Maximize Claims" (Contingent Value Surveys Hedonic Price Measures), Second Annual Law and Economics Seminar a Putnam, Hayes & Bartlett, Inc, The Arizona Biltmore Hotel, Phoenix, Arizona, October 11-14, 1989.
- "Incentive Regulation and Conservation Policy," Presented at the New England Conference of Public Utility Commissioners, Kennebunkport, Maine, September 2, 1989.
- "Incentive Regulation and Conservation Policy," Presented at the New England Conference of Public Utility Commissioners (NARUC) Least-Cost Planning Conference, Charleston, South Carolina, September 11, 1989.

- “Twenty Years Since Earth Day I: What Have We Learned”, 7th International Oil and Gas Conference, Cambridge, Massachusetts, June 1-2, 1989.
- “The Resurgence of Political Economy in Regulated Industries”, Law and Economics Seminar, London, England, May 18, 1989.
- “Back to the Future in Gas and Electric Industries”, Annual Meeting of the federal Bar Association, Washington, D.C., May 5, 1989.
- “The Role of Rate Reform: The Bundling of Services,” International Association of Energy Economists, North American Gas Supply and Markets Conference, The Hyatt Regency, Denver, Colorado, September 7, 1989.
- “Incentive Regulation: What Works and What Doesn’t.” Presented at the Great Lakes Conference of Public Utility Commissioners, The Greenbrier, White Sulphur Springs, West Virginia, July 11, 1989.
- “New Proposals for Incentive Regulation in the Electric Utility Industry,” Chief Executives’ Forum, Key Largo, Florida, Sponsored by the First Boston Corporation and Putnam, Hayes & Bartlett, Inc., February 9-12, 1989.
- “Current Trends in Regulation and Some New Proposals to Alter Incentives in the Electric Utility Industry,” Harvard Utility Forum Meeting, Cambridge, MA, February 2, 1989.
- “Some New Proposals to Introduce Incentive Tariffs in the Electric and Natural Gas Industries,” Utility Discussion Group, Held by Putnam, Hayes & Bartlett, Inc., Capital Hilton, Washington, D.C., January 5, 1989.
- “Privatization in Developing Countries: Case Studies of Electricity in Turkey and Pakistan,” EESIG Brown-Bag Lunch, December 14, 1988.
- “Some New Proposals to Introduce Incentive Tariffs in the Electric and Natural Gas Industries,” Harvard Utility Forum – Harvard Gas Forum Demand-Side Bidding/Alternatives to Rate Base Regulation Workshop, Cambridge, MA, December 13, 1988.
- “The March Towards a Competitive Gas Industry: Obligation to Serve, Incentive Regulation, and Risk Allocation,” The Interstate Natural Gas Association of America Seminar, Washington, D.C., December 2, 1988.
- “Pricing and Contracting Issues and Experience.” Presented at the AIT/ASEAN Senior Executive Seminar, Hua Hin, Thailand, November 9-11, 1988.
- “Some Thoughts on Why and How to Initiate Private Power in Pakistan”, ASEA/AIT/USAID Senior Executive Seminar in Co-Generation and Private Power, Hua Hin, Thailand, November 1988.
- “Meeting the Nation’s Future Electricity Needs: Cogeneration, Competition and Conservation.” Presented at the 100th Annual Convention and Regulatory

Symposium of the National Association of Regulatory Utility Commissioners, San Francisco, California, November 2, 1988.

Speech before the New Dimensions in Pricing Electricity Conference of Niagara Mohawk Power Corporation and the Electric Power Research Institute, "Cogeneration and Competition", Syracuse, New York, September 30, 1988.

Speech before the Second Annual Conference of the American Cogeneration Association, "Cogeneration and Competition," Chicago, Illinois, September 26, 1988.

"Valuing Damages to Natural Resources in Environmental Litigation", Presentation before the American Bar Association Annual Meeting, Toronto, Ontario, Canada, August 8, 1988.

"Decision Making and Environmental Risks: Economic and Political Issues An Executive Summary," The Robert M. La Follette Institute of Public Affairs, The University of Wisconsin-Madison, June 1988.

Comments Before the American Bar Association First Annual Conference on Electricity Law and Regulation, Denver, Colorado, April 7-8, 1988.

"After the Chaos: Gas Strategies for the Long Term." Inside F.E.R.C.'s Eight Annual Conference, New Orleans, Louisiana, March 21-22, 1988.

"Wholesale Electricity, Old Scar-Tissue: New Wounds Versus New Solutions," before the National Governors' Association, Washington, D.C., December 10, 1987.

"Recent Changes in Natural Gas Transportation and Marketing: What, if Anything, Can They Tell Us About Electricity Reform?" Seventh Annual Electricity and Gas Executives Conference, First National Bank of Chicago, September 21, 1987.

"U.S. Economic Regulation of Electricity," with Miles Bidwell, NERA Seminar, London, England, June 26, 1987.

"Pricing and Energy Policy in Wisconsin and the United States," Workshop on Energy, The Economy, and the Environment, IIASA, Laxenburg, Austria, June 23-25, 1987.

"State Regulation in the Natural Gas Revolution," presented at Proceeding of Gas Mart '87, The First National Trade Fair for Natural Gas, sponsored by Natural Gas Intelligence, Washington, D.C., May 3-5, 1987.

"Can Natural Gas Deregulation be a Model for the Electric Industry?" Speech given at the First Rutgers/New Jersey Department of Commerce Annual Conference on Energy Policy in the Middle Atlantic States, February 20, 1987 (also published in Energy Deregulation and Economic Growth).

"Are Energy Efficiency Programs Worth It?" with Suellen M. Curkendall, IAEE Conference, MIT, Cambridge, Massachusetts, November 19-21, 1986.

- "Marketing Strategies for Natural Gas Distributors in the 1900s," before the Gas Utility Managers Conference Sponsored by the New England Gas Association, September 7-9, 1986.
- "Conservation and Cogeneration: The Utilities' Friends or Foes?" with M. Berkman, S. Curkendall and H. Parmesano, before the NERA Electric Utility Conference, Scottsdale, Arizona, February 12-15, 1986.
- "The Future Competitive Environment for Utilities," remarks prepared for Dayton Power & Light Company 1985 Interdivisional Meeting, December 9, 1985.
- "The Final Rule for Natural Gas Carriage." Presentation before the Ohio Electric Association, Cincinnati, Ohio, October 23, 1985.
- "The FERC's Recent Interest in Wheeling and Carriage," co-authored by Robert D. Obeiter, before the Ninth Annual News Media Seminar, Columbus, Ohio, and the Third NARUC Electric Research and Development Seminar, St. Charles, Illinois, October 22, 1985.
- "The Regulatory World of Natural Gas: Are We Quitting the Game or Changing the Rules?" before the Natural Gas Supply Association 1985 Annual Meeting, Miami, Florida, October 10, 1985.
- "Marginal Cost and Competition: Unbundling Natural Gas Carriage," before the Advanced Seminar in Gas Pricing Policies, Sponsored by the American Gas Association, College Park, Maryland, October 8, 1985.
- "Commingling Competition with Regulation: Closing the Circle or Quitting the Game," before the Iowa Investor-Owned Utilities Management Conference, Waterloo, Iowa, October 7, 1985.
- "The State Regulator in a Free Gas Market," Comments Presented at a Conference Sponsored by The Gas Daily, Chicago, Illinois, August 1985.
- "Grafting Competition Onto Regulation: The Problems and The Promise," before the Iowa State Regulatory Conference, Ames, Iowa, May 1985.
- "Comments Before The Workshop on Current Antitrust Issues in Public Utility Industries, sponsored by the American Bar Association, Washington, D.C., March 1985.
- "Yesterday, Today and Tomorrow," Comments before the IEEE Winter Power Meeting, New York, New York, February 5, 1985.
- "Natural Gas: The Eggs Have Been Scrambled, Now What?" Before the National Association for Regulatory Utility Commissioners Annual Meeting, Los Angeles, California, November 1984.
- "The Performance of the Regulation of Public Utilities in the U.S., "A NERA Seminar: Is American-Style Regulation Appropriate to the UK?," London, England, October 1984.

“A Strategy for Implementing Electricity Tariff Reform and Load Management in Korea.”
Seoul, Korea, 1982.

“The National Energy Act and State Utility Regulation.” NARUC Convention, Las Vegas,
Nevada, November 1982.

“Time of the Electricity Pricing: Correcting Some Continuing Confusion,” NARUC Annual
Convention, New Orleans, Louisiana, November 16, 1977.

“Our Energy Crisis and Education: A Critical Assessment,” Council for Educational
Development and Research Conference on Education Confronts Energy
Conference, Washington, D.C., June 22, 1977.

“Alaskan Oil and Gas: The Wrong Route Revisited.” American Association for the
Advancement of Science, Denver, Colorado February 22, 1977.

The At Rann II Symposium, Prepared Summary of NSF Study to Provide a Practical
Guide for the Analysis of the Marginal Cost Structure of Electric Utilities for the
Purpose of Designing Electricity Tariffs, Washington, D.C., November, 1976.

Prepared Remarks “Cost/Benefit Aspects of Non-Waste Technology and Production,”
presented at the NWT Seminar, Seminar on the Principles and Creation of Non-
Waste Technology, Paris, France, November, 1976

The Advest Seminar comments entitled “Meeting Experiments,” at New York, New York,
October, 1976.

The Annual Meeting of American Economics Association,” Nixon-Ford National Policy
Plans: A Critique.” Atlantic City, New Jersey, September, 1976.

The NARUC annual Regulatory Studies Program, Prepared Remarks “Excerpt from the
Marginal Cost and Pricing of Electricity: An applied Approach,” East Lansing,
Michigan, August, 1976.

Prepared Remarks before the 1976 Symposium on Rate Design Problems of Regulated
Industries, “The Marginal Cost of Electricity and Continuing Rate Controversies, “
Kansas City, Missouri, February, 1976.

Prepared Remarks before the Wisconsin Manufacturing Association in Stevens Point,
Wisconsin, September, 1975.

“Public Utility Pricing, Conservation and Ecology.” NARUC Annual Regulatory Studies
Program, Michigan State University, East Lansing, Michigan. August 1975.

“Energy Pricing: The Growing Consumer Burden.” Third National Seminar for Consumer
Representatives in State and Local Government. Milwaukee, Wisconsin. July 1975.

“New Approaches to Public Utility Rate Setting.” Third National Seminar for Consumer
Representatives in State and Local Government. Milwaukee, Wisconsin. July 1975.

"The Design of Electricity Tariffs." Upper Great Lakes Utilities Commission. Greenbriar, West Virginia. July 1975.

"Time of Day Pricing: WHY and HOW." Joint Conference by the Federal Energy Administration, the American Public Power Association, the Edison Electric Institute, the National Association of Regulatory Utility Commissioners, and the National Electric Cooperatives Association. Washington, D.C. June 1975.

Prepared Remarks before the Institute of Public Utilities, Michigan State University, East Lansing, Michigan. May 1975.

"The Energy Game: Who are the Players?" 49th Annual Convention of the Wisconsin Petroleum Association, April 2, 1975.

"Implementing Time-of-Day Pricing of Electricity: Promises and Pitfalls." Atlanta, Georgia. March 1975.

Prepared remarks "The Time has Come to Speak Out On Our Energy and Economic Crisis," Madison, Wisconsin, March, 1975.

Prepared Remarks before The American Association for the Advancement of Science at the Minnesota Energy Agency Conference, 1975. "Energy Pricing in the United States: A Critique," 1975.

"Benefit Cost Analysis and the National Environmental Policy Act." Proceedings of the American Bar Association. 1975.

"Electricity Price Regulation: Critical Crossroads or New Group Participation Sport." Ames Public Utility Conference and the Midwest Association of Regulated Utilities Conference, both 1974.

"Implementing Diurnal Pricing: A Pragmatic Approach." At the Regulatory Information Systems Conference. St. Louis, Missouri. 1974.

"An Economist Views the National Environmental Policy Act and the Environmental Impact Statement." Public Choice Meetings, American Bar Association Annual Meeting, College Park, Maryland. March 1973.

"Electricity Growth: Economic Incentive and Environmental Quality." With W. Gillen. Conference on Energy: Demand and Institutional Problems. February 1973.

"Some Economic Implications of the NEPA." Public Choice Meetings, American Bar Association Annual Meeting, Washington, D.C. 1973.

"Regression Analysis with Dichotomous Dependent Variables." With V. Kerry Smith. Toronto, Canada, December 1972.

"Optimality in Producing and Distributing Public Outputs", The American Economic Association, December 1971.

“Preservation Versus Development: Some Economic Issues.” With J.V. Krutilla.
Econometric Society Meetings. December 1970.

CIVIL PROCEEDINGS AND RELATED LEGISLATIVE TESTIMONY

Supplemental Expert Report in the matter of Arkansas River Power Authority (ARPA) v. Babcock & Wilcox Power Generation, in re ARPA’s Conversion of the Lamar Power Plant to Coal from Natural Gas, July 27, 2015.

Before the United States Supreme Court, Amicus Curiae Brief of Charles J. Cicchetti (sole author) on behalf of Petitioners in Federal Energy Regulatory Commission v. Electric Power Supply Association, et. al, Nos. 14-480 & 14-841, July 2015.

Expert Report of in the matter of Arkansas River Power Authority (ARPA) v. Babcock Wilcox Power Generation, in re: ARPA’s Conversion of the Lamar Power Plant to Coal from Natural Gas, April 6, 2015.

In the matter of New Jersey Department of Environmental Protection, et al. v. Occidental Chemical Corporation, et al. Superior Court of New Jersey Law Division – Essex County, Docket No. ESX-L-9868-05), Expert Report Estimating Economic Damages Related to Dioxin at Lister Avenue and the Passaic River, March 13, 2014.

Before the Superior Court of New Jersey Law Division: Union County, Union County Docket No.: UNN-L-2601-11, Lionetti Associates, LLC t/a Lorco Petroleum Services, v. City of Elizabeth, City Council of the City of Elizabeth and Liberty Water Company, v. Joint Meeting of Essex and Union Counties Deposition Transcript, November 1, 2013.

Before the Superior Court of New Jersey Law Division: Union County, Civil Action Docket No.: UNN-L-0556-10, Papetti’s Hygrade Egg Products, Inc., v. City of Elizabeth, City Council of the City of Elizabeth and Liberty Water Company, Expert Report, April 1, 2013.

Before the United States District Court for the District of Colorado, Civil Action No. 1:12-cv-01275-JLK, Diné Citizens Against Ruining our Environment v. Kenneth Salazar, Declaration August 2012.

Before the Supreme Court of the United States, Metropolitan Edison Company and Pennsylvania Electric Company v. Pennsylvania Public Utility Commission, On Petition for a Writ of Certiorari to the Commonwealth Court of Pennsylvania, Motion for Leave to File Brief as Amici Curiae in Support of Petitioners and Brief of Electrical Engineers, Scientists and Economists as Amici Curiae in Support of Petitioners, August 1, 2012.

Before the United States Court of Appeals for the Tenth Circuit, Nos. 11-9552, 11-9557 & 11-9567, On Petitions for Review of Final Action of the United States Environmental Protection Agency, Declaration in Support of the Navajo Nation’s Amicus Brief, May 18, 2012.

Before the State Assessment Review Board, Prepared Supplemental Testimony on behalf of Anadarko Petroleum, Case No. P-08-9, May 9, 2012.

Expert Rebuttal Report In the Matter of Arbitration Proceedings Concerning Disputes with Respect to Units 1& 2 at Sundance Generating Station among TransAlta Generation Partnership, TransCanada Energy LTD. and Balancing Pool, March 27, 2012.

Expert Report in the Matter of Arbitration Proceedings Concerning Disputes with Respect to Units 1& 2 at Sundance Generating Station among TransAlta Generation Partnership, TransCanada Energy LTD. and Balancing Pool, February 3, 2012.

Before the United States District Court for the District of Colorado, Civil Action No. 1:11-cv-002243-REB-CBS, Center for Biological Diversity, et al v. Joseph Pizarchik, Affidavit on behalf of the Navajo Nation, in Support of Limited Motion to Intervene and Motion to Dismiss; June 13, 2011.

Before the Superior Court for the State of Alaska, Third Judicial District of Anchorage, in BP Pipelines (Alaska), et al. v. Alaska Department of Revenue et al., Videotaped Deposition Transcript, June 8, 2011.

Before the Superior Court for the State of Alaska, Third Judicial District of Anchorage, in BP Pipelines (Alaska), et al. v. Alaska Department of Revenue et al., Rebuttal Expert Report, May 11, 2011.

Before the Circuit Court of the State of Oregon, County of Lin; Trial Testimony on behalf of PacifiCorp in the matter of Wah Chang v. PacifiCorp, Case No. 002578, April 24, 2011.

Before the Superior Court for the State of Alaska, Third Judicial District of Anchorage, in BP Pipelines (Alaska), et al. v. Alaska Department of Revenue et al., Expert Report, March 3, 2011.

Before the Superior Court of New Jersey Law Division – Essex County, New Jersey Department of Environmental Protection et al. v. Occidental Chemical Corporation, et al. Docket No. ESX-L-9868-05, Expert Report on Damages Related to Lister Avenue, December 2010.

Before the Superior Court for the State of California, County of San Diego, City of Oceanside v. Dow Chemical, Docket No. 05-439807, Expert Report on behalf of the City of Oceanside, July 2010.

Before the U.S. Bankruptcy Court for the District of Delaware, In re Semcrude, Case No. 08-11525 BLS, on behalf of the Unsecured Creditors of Semcrude L.P. Expert Analysis of Trading Data, February 2010.

Before the District Court of Chambers County, Texas, Oral Videotaped Deposition In re: David Jenkins, et al. vs. Entergy Jenkins Corporation, et.al. Cause No. 20666, December 15, 2009.

Before the District Court of Chambers County, Texas, Expert Report on Behalf of Defendants, In re: David Jenkins, George W. Strong, Francis N. Gans and Gary M. Gans vs. Entergy Corporation, Entergy Services, Inc., Entergy Power, Inc., Entergy

Power Marketing Corporation, Entergy Arkansas, Inc., and Entergy Gulf States, Inc., Cause No. 20666, October 16, 2009.

Before the Superior Court for the State of Alaska, Third Judicial District at Anchorage, Affidavit In re: Tesoro Alaska Company v. Union Oil Company of California, Unocal Pipeline Company, Unocal Corporation, Case No. 3AN-05-5877 Civ, September 9, 2009.

Before the Supreme Court of the United States, NRG Power Marketing, LLC, et al., Petitioners, v Main Public Utilities Commission, et.al, Respondents, On Writ of Certiorari to the United States Court of Appeals for the District of Columbia Circuit, Brief as *Amici Curiae* in Support of Petitioners, July 14, 2009.

Before the Superior Court of New Jersey Law Division – Essex County, New Jersey Department of Environmental Protection et al. v. Occidental Chemical Corporation, et al. Docket No. ESX-L-9868-05, Expert Report on a Comparison of Damage Theories, June 15, 2009.

Before the Superior Court for the State of Alaska, Third Judicial District at Anchorage, Rebuttal Report In re: BP Pipelines (Alaska) Inc., Exxon Mobil Pipeline Company, Unocal Pipeline Company, Conoco Phillips Transportation Alaska, Inc. and Koch Alaska Pipeline Company, Owners, and Alyeska Pipeline Service Company, as Agent for the Owners, Fairbanks North Star Borough and City of Valdez v. State of Alaska Department of Revenue, State Assessment Review Board, and North Slope Borough, Case No. 3AN-06-08446 CI, May 15, 2009. Deposition taken on May 28, 2009.

Before the United States District Court Southern District of Mississippi Jackson Division, Declaration In re: The State of Mississippi, ex rel. Jim Hood, Attorney General for the State of Mississippi, v. Entergy Mississippi, Inc., et al. No 3:08cv780-HTW-LRA, May 4, 2009.

Before the United States District Court Southern District of Mississippi Jackson Division, Supplemental Declaration In re: The State of Mississippi, ex rel. Jim Hood, Attorney General for the State of Mississippi, v. Entergy Mississippi, Inc., et al. No 3:08cv780-HTW-LRA, May 15, 2009.

Before the United States District Court for the District of Nevada, Reply Declaration In re: Western States Wholesale Natural Gas Antitrust Litigation (McGraw Hill), MDL Docket No. 1566, Base Case No. 2:03-cv-01431-PMP-PAL, April 28, 2009.

Before the Superior Court for the State of Alaska, Third Judicial District at Anchorage, Expert Report In re: BP Pipelines (Alaska) Inc., Exxon Mobil Pipeline Company, Unocal Pipeline Company, Conoco Phillips Transportation Alaska, Inc. and Koch Alaska Pipeline Company, Owners, and Alyeska Pipeline Service Company, as Agent for the Owners, Fairbanks North Star Borough and City of Valdez v. State of Alaska Department of Revenue, State Assessment Review Board, and North Slope Borough, Case No. 3AN-06-08446 CI, April 8, 2009.

Before the United States District Court for the District of Nevada, Declaration in re: Western States Wholesale Natural Gas Antitrust Litigation (McGraw Hill), Base Case No, 2:03-cv-01431-PMP-PAL, MDL Docket No. 1566, April 9, 2009.

Before the Superior Court of California, County of Los Angeles, Declaration in re: Joseph Ward-Wallace v. City of Los Angeles, Dennis Ellement, Jim Digrado, Randall Judd and Does 1 thorough 100, Inclusive, Case No.: BC 358255, February 4, 2009. Deposition on January 26, 2009.

Before the Chancery Court of Hinds County, Mississippi, First Judicial District, Affidavit in re: State of Mississippi v. Entergy Corporation, Cause No. G2008-1540, November 6, 2008.

Before the United States District Court Southern District of Mississippi Jackson District, Declaration In Re: Entergy Corporation, Entergy Mississippi, Inc. and Entergy Services, Inc. v. Jim Hood, Attorney General of Mississippi, Scott A. Johnson, Special Assistant Attorney General of Mississippi, and Lee McDivitt, Investigator, Mississippi Attorney General's Office, Consumer Protection Division, Civil Action No. 3:08-CV-541-WHB-LRA, September 12, 2008.

In the United States District Court for the Central District of Illinois Springfield Division, Expert Report on Behalf of Enbridge Pipelines (Illinois) LLC, In re: Carlisle Kelly and Deanna Kelly v. Enbridge (US) Inc, January 22, 2008.

Before the Supreme Court of the United States, Morgan Stanley Capital Group Inc., Petitioner, v. Public Utility District No. 1 of Snohomish County, Washington, et al., Respondents, On Writ Certiorari to the United States Court of Appeals for the Ninth Circuit, Brief as *Amici Curiae* in Support of Petitioners, September 12, 2007.

Before the State Assessment Review Board, State of Alaska, Report in the Matter of Trans-Alaska Pipeline System, v. Oil and Gas Property Tax (AS 43.46) 2007 Assessment Year, Appeal of Revenue Decisions, No. 07-56-06 & No. 07-56-07, May 17, 2007.

Before the Superior Court of California County of Placer, Expert Report In People of the State of California, ex rel. Edmund G. Brown, Jr., Attorney General of California, State Air Resources Board and the Placer County Air Pollution Control District v. Sierra Pacific Industries, Inc, No. SCV 17449, March 19, 2007.

Before the United States Bankruptcy Court for the Southern District of New York, Expert Report in Enron Power Marketing, Inc. vs. Virginia Electric and Power Co. d/b/a Dominion Virginia Power, Case No. 01-16034 (AJG), November 6, 2006.

Before the Circuit Court of Holmes Mississippi, Expert Report In Re: Charles U. Donald, Virginia Donald and Mary Snowden Newton, vs. Entergy Corporation, Entergy Mississippi Inc., Entergy Services, Inc., Entergy Technology Holding Company, and Entergy Technology Company, Civil Action No. 2004-340, September 1, 2006.

Before the State Assessment Review Board, State of Alaska, Report in the Matter of the Trans-Alaska Pipeline System, v. Oil and Gas Property Tax (AS 43.46) 2006 Assessment Year, Appeal of Revenue Decision, No.06-56-17, May 16, 2006.

Before the United States District Court of Idaho, Expert Report in Powerex Corp v. IDACORP Energy, L.P., Civil Case No.CV-04-441-S-EJL, October 28, 2005.

Before the United States District Court, District of Washington, Expert Reply Report In re Calpine Corporation Securities Litigation, August 24, 2005.

Before the United States District Court, District of Nevada, Declaration In the Matter of the Nevada Power Company, v. El Paso Corporation, No. CV-S-03-0875-RLH-RJJ, August 15, 2005.

Before the United States District Court, District of Nevada, Expert Report In the Calpine Corporation Securities Litigation, Master File No. C02-1200 SBA, August 3, 2005.

Before the State Assessment Review Board, State of Alaska, Report In the Matter of the Trans-Alaska Pipeline System, v. Oil and Gas Property Tax (AS 43.46) 2005 Assessment Year, OAll No. 05-0307-TAX, Appeal of Revenue Decisions, No. 05-56-12 & No. 05-56-13, May 9, 2005.

Before the United States District Court, District of Nevada, Reply To Reports of Brett Friedman and Craig Berg in Nevada Power Company, v. El Paso Corporation, et al., Civil Case No. CV-S-03-0875-RLH-RJJ, February 9, 2005.

Before the Court of Chancery of the State of Delaware, in and for New Castle County, Report in VLIW Technology, L.L.C. v. Hewlett Packard Company, and STMICROELECTRONICS, Civil Case No. 20069-NC, January 21, 2005

Before the United States District Court, District of Nevada, Report in Nevada Power Company, v. El Paso Corporation, et al., Civil Case No. CV-S-03-0875-RLH-RJJ, January 10, 2005.

Before the United States District Court, District of New Hampshire. Expert Report in Enterasys Networks, Inc., v. Gulf Insurance Company, Civil Action No. 1:04-CV-27-SM, October 2004.

Expert Report In the Matter of Idacorp Energy L.P. v. Overton Power District No. 5, CV OC 0107870D, March 4, 2003.

Before the American Arbitration Association, Expert Affidavit on behalf of Vulcan Geothermal Power Company, Del Ranch, L.P., and CE Turbo LLC, October 2, 2002.

Before the United States District Court for the Western District of Wisconsin, Second Affidavit in Support of Plaintiffs' Motion for Summary Judgment and in Opposition to Defendants' Motion For Summary Judgment on behalf of Alliant Energy Corporation and Wisconsin Power and Light Corporation, Docket No. 00-C-0611-S, April 23, 2002.

Before the USDC, Eastern District of Virginia, Expert Report in Federal Energy Sales v. AES, Civil Action 01-420-A, July 13, 2001.

Before the United States District Court for the Western District of Wisconsin, Expert Affidavit on behalf of Alliant Energy Corporation and Wisconsin Power and Light Corporation, Docket No. 00-C-0611-S, February 12, 2002.

Before the United States District Court for the Western District of Wisconsin, Expert Affidavit on behalf of Alliant Energy Corporation and Wisconsin Power and Light Corporation, No. 00-C-0611-S, February 1, 2001.

Before the District Court of Lancaster County, Nebraska, Trial testimony on behalf of KN Energy in KN Energy vs. Cities of Alliance Case Nos. CI 00:1309, CI 00:1310, CI 00:1311, CI 00:1312 (Consolidated), January 22, 2001.

Before the California Superior Court, County of Los Angeles, Deposition testimony on behalf of Tosco Corporation of Tosco Corporation vs. The Los Angeles Water and Power, Case No. BC 215396, January 17, 2001.

Before the District Court of Lancaster County, Nebraska Deposition testimony on behalf of KN Energy in KN Energy vs. Cities of Alliance Case Nos. CI 00:1309, CI 00:1310, CI 00:1311, CI 00:1312 (Consolidated), November 1, 2000.

Before the United States District Court for the Central District of California, Affidavit in the Matter of United States of America v. Montrose Chemical Corporation of California, *et.al.*, Civil Action No. CV 90 3122-R, 21 August 2000.

Before the United States District Court for the Central District of California, Expert Report in the Matter of United States of America v. Montrose Chemical Corporation of California, *et.al.*, Civil Action No. CV 90 3122-AAH (JRx), 15 April 2000.

Before the California Superior Court, County of San Francisco, Deposition testimony on behalf of Raybestos-Manhattan of Whiteley vs. Raybestos-Manhattan, Case No. 303184, November 30, 1999.

Before the California Superior Court, County of Los Angeles, Deposition testimony on behalf of F&M Trust of In Re: The Conservatorship of Leroy and Estelle Strader, September 8 and 9, 1999.

Before the United States District Court, District of Colorado, Deposition in re Atlantic Richfield v. Smallwood, Civil Action No. 95-Z-1767, July 1, 1997.

Before the United States District Court, District of Colorado, Expert Report in re Atlantic Richfield v. Smallwood, Civil Action No. 95-Z-1767, June 16, 1997..

Before the United States District Court for the Western District of Missouri, Western Division, Expert Rebuttal Affidavit on behalf of Western Resources, Inc., No. 94-0509-CV-W-1, March 8, 1996.

Before the United States District Court for the Western District of Missouri, Western Division, Expert Affidavit on behalf of Western Resources, Inc., No. 94-0509-CV-W-1, June 15, 1995.

Before the United States District Court for the Central District of California, Affidavit on behalf of Montrose Chemical Corporation of California, *et.al.*, No. CV90-3122-AAH (JRx), March 1, 1995.

Before the Department of the Interior, Comments re NRDA Regulations, Type B Rule, September 22, 1993.

Before the National Oceanic and Atmospheric Administration, Comments on the Advance Notice of Proposed Rulemaking (57 Federal Register 8964) of Natural Resource Damage Assessment Regulations (Oil Pollution Act, Section 1006), October 1, 1992.

Before The United States District Court for the District of Utah. Testimony on behalf of Kennecott Corporation, Docket No. 86-C-902C, March 26, 1992.

Before the American Arbitration Association, Testimony on behalf of Hard Rock Cafe International, January 22, 1992.

G&H Landfill. Prepared analysis of the statistical effect of landfill location and neighborhood property values (early 1990s).

Before the Superior Court of California, Orange County, Expert Report re economic and stigma analysis related to environmental damages related to groundwater contamination in Bouchier v. MacHoward Leasing (Honda) (early 1990s).

State of Washington v. Nestucca (Sause Brothers). Prepared an economic analysis of sea bird losses related to an oil spill in the Pacific Ocean off the coast of Washington (early 1990s).

Before the Department of Interior, Comments on Notice of Proposed Rulemaking for Natural Resource Damage Assessment Regulations, Type B Rule (43 CFR Part 11), July 12, 1991.

Before the Massachusetts Appellate Tax Board, Analysis of the Fair Market Value of Boston Edison's Mystic Generating Station, Prepared for Boston Edison Company, December 10, 1990.

Before the U.S. Department of Interior, Comments on the U.S. Department of Interior's Advanced Notice of Proposed Rulemaking re: Natural Resource Damage Assessments (43 CFR Part 11), November 13, 1989.

Before the Senate Committee on Energy and Natural Resources, Prepared Statement related to the Demand-Side Provisions of the Public Utility Regulatory Policies Act of 1978 (PURPA) Contained in Subtitle B of Title III of S-324, The National Energy Policy Act of 1989, November 7, 1989

U.S. v. Motorola. Prepared statistical analyses of property values and ground

water for Phoenix metropolitan area (early 1990s).

Before the United States District Court, State of Colorado, Expert Response to ERC's Damages Report in State of Colorado v. Gulf & Western, December 1985.

Before the United States District Court, State of Colorado, Expert Damages Report in State of Colorado v. Gulf & Western, December 2, 1985.

French Limited. Prepared an analysis of environmental damages (late 1980s).

Commonwealth of Massachusetts v. Charles George Trucking Company.
Prepared a damages analysis for environmental damages (late 1980s)

U.S. v. Aerovox (New Bedford Harbor. Prepared numerous economic damage calculations, conducted surveys, and analyzed property data for several different clients in the late 1980s.

Before the House Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, Comments on Hydroelectric Relicensing, June 5, 1985

U.S. v. Gulf Western (Eagle Mine). Prepared expert report related to State of Colorado and Federal Natural Resource Damages Claims (early to mid 1980s)

Before the Department of Health and Social Services, Testimony on behalf of Madison General Hospital, In Application for Certificate of Need for Open Heart Surgery, CON 82-026, November, 1982. (Antitrust)

Before the Senate Committee on Energy and Natural Resources, Prepared Statement related to the Implementation of Title I of the Natural Gas Policy Act of 1978, November 5 and 6, 1981.

Before the Postal Rate Commission, Testimony on behalf of the National Association of Greeting Card Publishers, Docket No. R80-1, August 13, 1980.

Before the House Ways and Means Committee, Washington, D.C., Testimony on Utility Tax Reform, March 8, 1978.

Before the Senate Subcommittee on Energy Conservation and Regulation of the Senate Committee on Energy and Natural Resources, Comments on Utility Tax Reform, July, 1977.

Before the Subcommittee on Energy and Power of the U.S. House of Representatives Interstate and Foreign Commerce, comment with respect to Synthetic Fuel Loans, May, 1976.

Prepared comments on "H.R. 12461, Summary of Major Provisions of Electric Utility Rate Reform and Regulatory Improvement Act (formerly H.R. 10100), March, 1976.

Before the Subcommittee on Energy and Power of the U.S. House of Representatives Interstate and Foreign Commerce, Comments with respect to Electric Utility Reform, March, 1976.

Before the Senate and House Interior Committees, comments on Trans-Alaska Pipeline; Energy Conservation and Pricing; and the Optimum Transportation System for Alaskan Natural Gas, March, 1976

Before the Federal Energy Administration, "Amendments of Entitlements Program," February, 1976.

Before the Wisconsin State Legislature, Environmental Quality Commission Testimony, January, 1976.

Before the Department of Energy, Mines and Resources, Testimony on behalf of the office of Energy Conservation, May 16, 1977.

Before the U.S. Senate Committee on Interstate and Foreign Commerce, Subcommittee on Energy and Power, Testimony, May 25, 1976.

Before the Wisconsin State Legislature, Testimony on the Governor's transportation Program before the Senate Committee on commerce, Joint Committee on Highways, 1975.

Before the Senate Interior Committee re Energy Transportation, Testimony, December 12, 1973.

Before the Senate Sub-Committee on Consumer Economics, Testimony re Electricity Pricing, October 25, 1975.

Before the U.S. Senate Committee on Interior and Insular, Testimony re the Trans Alaska Pipeline, May 3, 1973.

Before the U.S. Senate Committee on Interior and Insular Affairs, Comments re the Role of Energy Conservation in National Energy Policy, March 22, 1973.

Before the Joint Economic Committee, Testimony Concerning the Relative Economic Merits of the Proposed Trans Alaska Pipeline, June 9, 1972.

State of Florida v. U.S. Army Corps of Engineers. Prepared an economic analysis for the State of Florida related to damages on the Kissimmee River related to stream channelization (mid 1970s).

U.S. Forest Service v. Disney. Prepared an economic analysis of preservation versus development of Mineral King Ski development (early 1970s).

Before the Joint Economic Committee, comments on Trans-Alaska Pipeline; Mandatory Oil Import Quotas; Hell's Canyon; Energy Policy; Electricity Pricing;

Before the US Senate Commerce Committee, comments with respect to Natural Gas De-Regulation.

Before the Subcommittee on Energy and Power of the U.S. House of Representatives Interstate and Foreign Commerce, Comments with respect to Energy and Power, Electricity and Natural Gas Utility Policy.

Before the Subcommittee on Energy and Power of the U.S. House of Representatives Interstate and Foreign Commerce, comment with respect to Electricity and Natural Gas Utility Policy.

Before the Department of the Interior, Comments with respect to the Trans-Alaska Pipeline.

Before the New York and New Jersey Environmental Protection Agencies and Civil Proceedings, Testimony With Respect to Tocks Island Dam and Delaware River Development.

Before the Energy Council of the Federal Government, Critique of the Project Independence Report and Critique of Oil and Natural Gas Policy.

Before the Joint Economics Committee, Testimony on the Trans Alaska Pipeline, Mandatory Oil Import Quotas, Hell's Canyon, Energy Policy, and Electricity Pricing.

Before the Florida Federal Courts on Kissimmee River Channelization.

Before Tennessee Federal Courts on Tennessee Tombigbee River Development.

REGULATORY PROCEEDINGS AND RELATED LEGISLATIVE TESTIMONY

Before the Public Utilities Commission of Nevada, Testimony on behalf of the Alliance for Solar Choice in re Application of Nevada Power Company, Docket No. 15-07041, August 20, 2015.

Before the Pennsylvania Public Utility Commission, In re: Pennsylvania Public Utility Commission Bureau of Investigation and Enforcement v. HIKO Energy, LLC, Direct Testimony, Docket No. C-2014-2431410, March 13, 2015.

Before the Public Service Commission of Wisconsin, In re: Joint Application of Wisconsin Electric Power Company and Wisconsin Gas LLC, both d/b/a We Energies, for Authority to Adjust Electric, Natural Gas, and Steam Rates, Surrebuttal Testimony, on behalf of the Milwaukee Metropolitan Sewerage District, Case No. 05-UR. 107, September 22, 2014.

Before the Public Service Commission of Wisconsin, In re: Joint Application of Wisconsin Electric Power Company and Wisconsin Gas LLC, both d/b/a We Energies, for Authority to Adjust Electric Natural Gas, and Steam Rates, Rebuttal Testimony on behalf of the Milwaukee Metropolitan Sewerage District,, 05-UR,107, September 12, 2014.

Before the National Energy Board, In re: Application for Approval of Mainline 2013-2030 Settlement, Additional Written on Behalf of Centra Gas Manitoba, T211-2013-05-01, September 3, 2014.

Before the National Energy Board, In the Matter of Trans Mountain Pipeline ULC, Application for Tariff Amendments Regarding Verification Procedures, Public Written Reply Evidence on Behalf of Phillips 66, Hearing Order RHW-001-2013, August 8, 2014.

Before the National Energy Board, Nova Gas Transmission LTD. Application for the North Montney Project, Written Evidence on Behalf of Westcoast Energy Inc., Carrying on Business as Spectra Energy Transmission, Hearing Order GH-001-2014, July 10, 2014.

Before the National Energy Board, T211-2013-05-01, Application for Approval of Mainline 2013-2030 Settlement, Written Evidence on Behalf of Centra Gas Manitoba, July 4, 2014.

Before the Regulatory Commission of Alaska, Prepared Answering Testimony on Behalf of Cook Inlet Energy, LLC and Aurora Gas, LLC, In the Matter of the Tariff Revisions Designated as TA 252-4 and TA 253-4 Filed by ENSTAR Natural Gas Company, a Division of SEMCO Energy, Inc., U-14-010, May 5, 2014.

Before the State Assessment Review Board (SARB) State of Alaska, Expert Report on the valuation of the Trans Alaska Pipeline System (TAPS) on behalf of various municipalities; May 2014.

Before the National Energy Board, Public Written Direct Evidence on behalf of Phillips 66 in the Matter of Trans Mountain Pipeline ULC Application for Tariff Amendments Regarding Verification Procedures, April 22, 2014.

Before the Minnesota Public Utilities Commission, Rebuttal Testimony on Behalf of Enbridge Energy, Limited Partnership, Docket No. PL-9/CN 13-153, OAH Docket No. 8-2500-30952, March 13, 2014.

In the Matter of Arbitration Proceedings Concerning Disputes with to TAGP'S July 26, 2012 Notice of Force Majeure at Sundance Generating Station Unit 6, Among TransAlta Generation Partnership (TAGP) and Capital Power PPA Management, Inc. (CPPMI) and Balancing Pool (Balancing Pool), Expert Report November 13, 2013.

Before the Regulatory Commission of Alaska, Prepared Testimony in the Matter of the Application Filed by Fairbanks Natural Gas, LLC to Amend Certificate of Public Convenience and Necessity No. 514 to Expand its Service Area and in the Matter of Application Filed by Interior Alaska Natural Gas Utility for a Certificate of Public Convenience and Necessity to Operate as a Natural Gas Utility in Areas of the Fairbanks North Star Borough, RCA Docket Nos. U-13-083/U-13-103, September 9, 2013.

Before the Alberta Handling Commission, Written report of Memoranda in re: Retail Margins (Handling Fee) for the Alberta Bottle Depots August 29, 2013.

Before the Illinois Commerce Commission, Testimony in re: Enbridge Pipelines (FSP) L.L.C., Docket No. 12-0347, July 3, 2012.

Before the Federal Energy Regulatory Commission and the Regulatory Commission of Alaska, Prepared Supplemental Reply Testimony., On Behalf of Anadarko Petroleum Corporation and Tesoro Alaska Company, Phase II Cost of Service-FERC/RCA Concurrent Hearing, Docket No. IS09-348-006, et al., June, 19, 2012.

Before the National Energy Board, Written Evidence on Behalf of Westcoast Energy, Case No. GH-001-2012, May 29, 2012.

Before the Federal Energy Regulatory Commission and the Regulatory Commission of Alaska, Prepared Supplemental Testimony. on Behalf of Anadarko Petroleum Corporation and Tesoro Alaska Company, Phase II Cost of Service-FERC/RCA Concurrent Hearing, May 4, 2012.

Before the Alberta Utility Commission, Written Evidence on behalf of EPCOR Distribution and Transmission Inc., Performance Based Ratemaking Proceeding, Appendix C, Application No. ____; Proceeding ____; July 22, 2011.

Expert Report in Support of the Formation of the Energy Interchange Natural Gas Network Hub in Central Louisiana, on behalf of Energy Interchange Joint Application for Certificates of Public Convenience and Necessity, Abandonment Authority, and for Authority to Offer New Market Based Rates; Docket No. CP11-____; June 2011.

Before the Alberta Handling Commission, on behalf of the Beverage Container Management Board re Appropriate Margin; November 9, 2010.

Before the Alberta Utility Commission, Written Evidence on behalf of ATCO Gas 2011-2012 General rate application, Section 4.4 Appendix A, November 8, 2010.

Before the Federal Energy Regulatory Commission, Comments re Supplemental Notice of Proposed Rulemaking and Notice of Technical Conference, Docket RM10-17-000, August 25, 2010.

Before the Federal Energy Regulatory Commission, Prepared Testimony on Behalf of Puget Sound Energy's Proposed amendment to its Open Access Transmission Tariff to add Schedule 12, Wind Integration-Within Hour Generation Following Service; Docket No. ER10-____000, June 14, 2010.

Before the Federal Energy Regulatory Commission, Comments on behalf of PJM Interconnection, LLC in re: Demand Response Compensation in Organized Wholesale Energy Markets, Docket RM 10-17-00, April 27, 2010.

Before the Alberta Utility Commission, Written Evidence on behalf of EPCOR Distribution and Transmission Inc., In Re: 2010-2011 Phase I Distribution Tariff and 2010-2011 Transmission Facility Owner Tariff, Appendix G-10, December 22, 2009.

Retail Margin Evidence on behalf of EPCOR Energy Alberta Inc., In Re: 2010-2011 Regulated Tariff Application, AppendixE-5, December 22, 2009.

Before the Alberta Utilities Commission, Written Rebuttal Evidence for EPCOR Energy Alberta, Inc., Review Hearing on the AEUB Decision 2008-031, 2007-2009

Regulated Rate Tariff Non-Energy Return, Application No. 1577836 Proceeding Id. 174, September 28, 2009.

Before the Public Utilities Commission of the State of California, Supplemental Rebuttal Testimony on Behalf of the Navajo Nation, In re: Application of Southern California Edison Company Regarding the Distribution of SO2 Allowance Sales Proceeds Related to the Suspended Operation of Mohave Generating Station, Application 06-12-022, August 19, 2009.

Before the Alberta Utilities Commission, Rebuttal Testimony in Support of AltaLink Management LTD 2009-2010 General Tariff Application, April 16, 2009.

Before the Alberta Utilities Commission, Written Evidence In Support of EPCOR Energy Alberta Inc. Review Hearing on AEUB Decision 2008-031 2007-2009 Regulated Rate Tariff (RRT) Non-Energy Return, Appendix T, Application No. 1577836, Proceeding ID 174, April 9, 2009.

Before the Alberta Utilities Commission, Rebuttal Evidence on Behalf of ATCO Electric, Application No. 1578371, February 4, 2009.

Before the Alberta Utilities Commission, Testimony in Support of AltaLink Management LTD 2009-2010 General, Tariff Application, September 16, 2008.

Before the Public Utilities Commission of the State of California, Rebuttal Testimony. on Behalf of the Navajo Nation, In Re: Application of Southern California Edison Company (U 338-E) Regarding the Distribution of SO2 Allowance Sale Proceeds Related to the Suspended Operation of Mohave Generating Station, Application 06-12-022, August 1, 2008

Before the Public Utilities Commission of the State of California, Direct Testimony on Behalf of the Navajo Nation, In Re: Application of Southern California Edison Company (U 338-E) Regarding the Distribution of SO2 Allowance Sale Proceeds Related to the Suspended Operation of Mohave Generating Station, Application 06-12-022, August 1, 2008.

Before the North Carolina Utilities Commission, Rebuttal Testimony for Duke Energy Carolinas, In re: Application of Duke Energy Carolinas, LLC for Approval of Save-a-Watt Approach, Energy Efficiency Rider, and Portfolio of Energy Efficiency Programs, Docket No. E-7, SUB 831, July 21, 2008

Before the Nebraska Public Service Commission, Prefiled Direct Testimony On Behalf of SourceGas Distribution, LLC and Kinder Morgan, Inc., Docket No. FC-1327, July 9, 2008.

Before the Alberta Utility Commission, Direct Evidence on Behalf of ATCO Electric, Application No. 1578371, July 4, 2008.

Before the Indiana Utility Regulatory Commission, Rebuttal Testimony on Behalf of Duke Energy Indiana, Inc. Case No. 43373, July 2, 2008.

Before the Arizona Corporation Commission, Affidavit in Support of Arizona Public Service Company's Motion for Interim Rate, Docket No. E-01345A008-0172, June 4, 2008.

Before the Illinois Commerce Commission, Sur-rebuttal, on Behalf of Enbridge Pipelines (Illinois) LLC, Docket No. 07-0446, May 21, 2008.

Before the North Carolina Utilities Commission, Direct Testimony In Re: Application of Duke Energy Carolinas, LLC for Approval of Save-a-Watt Approach, Energy Efficiency Rider, and Portfolio of Energy Efficiency Programs, Docket No. E-7, SUB 831, April 3, 2008.

Before the Illinois Commerce Commission, Reply Testimony on Behalf of Enbridge Pipelines (Illinois) LLC, Docket No. 07-0446, February 4, 2008.

Before the Public Service Commission of South Carolina, Rebuttal Testimony for Duke Energy Carolinas, In re: Application of Duke Energy Carolinas, LLC For Approval of Energy Efficiency Plan Including Energy Efficiency Rider and Portfolio of Energy Efficiency Programs, January 2008.

Before the Public Utility Commission of Oregon, Declaration (with Jeffrey A. Dubin) in Response to Wah Chang's Renewed, Supplemental and Alternative Motions to Compel Compliance with DR 203, In Wah Chang v PacifiCorp, UM 1002, November 19, 2007.

Before the Public Utility Commission of Oregon, Declaration in Support of PacifiCorp's Post Hearing Brief, In Wah Chang v. PacifiCorp, UM 1002, November 12, 2007.

Before the Illinois Commerce Commission, Testimony On Behalf of Enbridge Pipelines (Illinois) LLC, Docket No. 07-0446, October 5, 2007.

Before the Public Utility Commission for the State of Oregon, Supplemental Reply Testimony (with Jeffrey A. Dubin, Ph.D.) In Wah Chang v. PacifiCorp, Docket No. UM 1002, July 31, 2007.

Before the Oregon Public Utility Commission, Deposition of In Wah Chang v. PacifiCorp, UM 1002, June 14, 2007.

Before the Oregon Public Utility Commission, Reply Testimony In Wah Chang v. PacifiCorp, UM 1002, May 24, 2007.

Before the Illinois Commerce Commission, Expert Testimony of On Behalf of Enbridge Energy Partners, L.P. and Enbridge Energy, Limited Partnership, Docket No. 06-0470, December 21, 2006.

Before the Alberta Energy and Utility Board, Expert Testimony on behalf of DERS and ENMAX In Support of The Direct Energy Regulated Services Default Rate Tariff and Regulated Rate Tariff Application in 2007 and 2008, December 15, 2006.

Before the Alberta Handling Commission, Written report Memoranda in re: Retail Margins (Handling Fee) for the Alberta Bottle Depots September 19, 2006.

Before the Alberta Utility Board, Rebuttal Evidence on Behalf of DERS re Application for Approval of Regulated Rate Tariff (RRT), August 11, 2006.

Before the Alberta Utility Board, Rebuttal Evidence on Behalf of ENMAX re Application for Approval of Regulated Rate Tariff (RRT), August 11, 2006.

Before the Alberta Energy and Utility Board, Expert Testimony In Support of The Enmax Energy Corporation Application for Approval of a Regulated Rate Tariff (RRT) to take effect July 1, 2006, Pursuant to Section 103 of the Electric Utilities Act and Section 23 of the Regulated Rate Option Regulation, April 4, 2006.

Before the Alberta Energy and Utility Board, Expert Testimony In Support of The Direct Energy Regulated Services Application for Approval of a Regulated Rate Tariff (RRT) to take effect July 1, 2006, Pursuant to Section 103 of the Electric Utilities Act and Section 26 of the Regulated Rate Option Regulation, March 21, 2006.

Before the FERC, Prepared Reply Testimony on behalf of Idacorp Energy L.P. and Idaho Power Company, Docket No.EL00-95-147, EL00-98-134, October 17, 2005.

Before the FERC, Prepared Reply Testimony of on behalf of Avista Energy Inc., Docket No. EL 00-95-000, EL00-98-000, November 7, 2005.

Before the FERC, Prepared Supplemental Testimony on behalf of Avista Energy Inc., Docket No. EL00-95-000, EL00-98-000, September 30, 2005.

Before the FERC, Prepared Testimony on behalf of Idacorp Energy L.P. and Idaho Power Company, Docket No. EL00-95-000, EL00-98-000, September 14, 2005.

Before the FERC, Prepared Testimony on behalf of Avista Energy Inc., Docket No. EL00-95-000, EL00-98-000, September 14, 2005.

Before the Florida Public Service Commission, Rebuttal Testimony on behalf of Progress Energy Florida, Docket No. 050078-EI, August 5, 2005.

Before the Florida Public Service Commission, Direct Testimony o on behalf of Progress Energy Florida, Review of Progress Energy Florida's Rate Case Filing, Docket No. 050078, April 29, 2005.

Before the FERC, Direct Testimony. for Pepco Holdings, Inc., Docket No. EC05-43-000, April 11, 2005.

Before the FERC, Affidavit to Comment on Order Granting Motion and Requesting Comments in San Diego Gas & Electric Company, v. Sellers Of Energy and Ancillary Service Into Markets Operated by the California Independent System Operator Corporation And the California Power Exchange, Docket No. EL00-95-045, EL00-98-042, January 10, 2005.

Before the Washington Utilities and Transportation Commission, Prefiled Rebuttal Testimony on behalf of Puget Sound Energy, Inc., Docket No. UE-04/UG-04, November 2004.

Before the National Energy Board, Direct Evidence In the Matter of TransCanada Pipelines, RH-3-2004, June 21, 2004.

Before the California Public Utilities Commission, Rebuttal Testimony on behalf of The Navajo Nation, Application No. 02-05-046, June 4, 2004.

Before the California Public Utilities Commission, Superseding Testimony on behalf of The Navajo Nation, Application No. 02-05-046, May 14, 2004.

Before the California Public Utilities Commission, Reply Testimony on behalf of Cal-CLERA, Docket No. R03-10-003, May 7, 2004.

Before the California Public Utilities Commission, Prepared Testimony on behalf of Cal-CLERA and the City of Victorville, Docket No. R03-10-003, April 15, 2004.

Before the Washington Utilities and Transportation Commission, Prefiled Direct Testimony on behalf of Puget Sound Energy, Inc., Docket No. UE-04/UG-04, April 5, 2004.

Before the FERC, Affidavit for the Independent Energy Producers, on Behalf of Mountainview Power, January 8, 2004.

On Behalf of VENC Corp (Australia), Final Report on Stage 1 Definition of Market Design Packages, December 24, 2003.

On Behalf of VENC Corp (Australia), Initial Report on Stage 1 Definition of Market Design Packages, December 8, 2003.

Before the Public Utilities Commission of the State of California, Prepared Rebuttal Testimony on behalf of The Navajo Nation, Application No. 02-05-046, October 29, 2003.

Before the Public Utilities Commission of the State of California, Comments on behalf of The California Clean Energy Resources Authority (Cal-CLERA), October 22, 2003.

Before the Public Utilities Commission of California, Prepared Direct Testimony on behalf of The Navajo Nation, Application No. 02-5-046, October 10, 2003.

Before the Public Utilities Commission of California, Prepared Rebuttal Testimony on behalf of the Independent Energy Producers Association, Docket No. A-03-03-032, October 6, 2003.

Before the California Public Utilities Commission, Prepared Direct Testimony on behalf of the Independent Energy Producers Association (IEP), Docket No. A.03-07-032, September 29, 2003.

Before the FERC, Testimony on behalf of BP Energy, Docket No. EL03-60-000, April 16, 2003.

Before the FERC, Testimony on behalf of Idacorp Energy L.P. and Idaho Power Company, Docket No. EL01-10-007, March 20, 2003.

Before the FERC, Testimony on Behalf of Avista Energy, Inc., BP Energy Company, Idacorp Energy L.P., Puget Sound Energy Inc., TransAlta Energy Marketing (U.S.) Inc., TransAlta Energy Marketing (California) Inc., and TransCanada Energy, Ltd., Docket No. EL00-95-075, EL00-98-063, March 3, 2003.

Before the FERC, Affidavit to Comment on FERC Staff's Recommendations Related to Natural Gas Prices in California's Electric Markets During the Refund Period, Docket No. EL00-95-045, EL00-98-042, October 14, 2002.

Before the FERC, Prepared Reply Testimony on Behalf of Avista and Accompanying Exhibits, Docket No. EL00-95-045, EL00-98-042, August 9, 2002.

Before the FERC, Prepared Rebuttal Testimony Issues II and III, Docket No. EL00-95-045, EL00-98-042, July 26, 2002.

Before the FERC, Prepared Responsive Testimony Issues II and III, Docket No. EL00-95-045, EL00-98-042, July 3, 2002.

Before the US House of Representatives Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs, Comments in the Matter of "California's Electricity Markets: The Case of Enron and Perot Systems," on behalf of Perot Systems Corporation, July 22, 2002.

Before the Arizona Corporation Commission, Supplemental Testimony on behalf of Arizona Public Service Company, Docket No. E-00000A-02-0051m June 26, 2002.

Before the Arizona Corporation Commission, Rebuttal Testimony on behalf of Arizona Public Service Company, Docket No. E-00000A-02-0051, et al., June 11, 2002.

Before the Alberta Energy and Utilities Board, In the Matter of an Application by NOVA Gas Transmission Ltd. For Fort Saskatchewan Extension & Scotford Sales Meter Station & Josephburg Sales Meter Station & Astotin Sales Meter Station, Supplemental Evidence May 7, 2002.

Before the Arizona Corporation Commission, Rebuttal Testimony on behalf of Arizona Public Service Company, Docket No. E-01345A-01-0822, April 22, 2002.

Before the Alberta Energy Board, Evidence In the Matter of An Application by NOVA Gas Transmission Ltd. for Fort Saskatchewan Extension & Scotford Sales Meter Station & Josephburg Sales Meter Station & Astotin Sales Meter Station March 26, 2002.

Before the Florida Public Service Commission, Rebuttal Testimony on behalf of Florida Power Corporation, Docket No. 000824-EI, February 11, 2002.

Before the Federal Energy Regulatory Commission, Prepared Supplemental Testimony on behalf of Avista Energy Inc., BP Energy Company, Coral Power, LLC, IDACORP

Energy, LP, Puget Sound Energy and Sempra Energy Trading Corp (Competitive Supplier Group), Docket No. EL00-95-045 – EL00-98-042, January 31, 2002.

Before the Federal Energy Regulatory Commission Deposition testimony on behalf of Competitive Suppliers Group, Docket Nos. EL00-95-045 and EL00-98-042, November 28, 2001. (FERC)

Before the Federal Energy Regulatory Commission, Issue I. Prepared Testimony., on behalf of the Competitive Suppliers Group (Cal Refund), Docket No. EL00-95-045 – EL00-98-042, November 6, 2001.

Before the Florida Public Service Commission, Direct Testimony on behalf of Florida Power Corporation, Docket No. 000824-EI, September 14, 2001.

Before the Federal Energy Regulatory Commission, prepared Direct Testimony and Exhibits on behalf of Idacorp Energy, L.P., Docket Nos. EL01-10-000 and EL01-10-001, August 27, 2001.

Before the State Corporation Commission of the State of Kansas, Rebuttal Testimony on behalf of Western Resources, Inc., Docket No. 01-WRSE-949-GIE, June 2001.

Before the State Corporation Commission of the State of Kansas, Direct Testimony on behalf of Western Resources, Inc., Docket No. 01-WRSE-949-GIE, June 2001.

Before the California Energy Commission, Statement and Affidavit re the Baldwin Energy Facility, June 2001.

Before the State Corporation Commission of the State of Kansas, Surrebuttal Testimony on behalf of Western Resources, Inc., Docket No. 01-WRSE-436-RTS, May 2001.

Before the State Corporation Commission of the State of Kansas, Rebuttal Testimony on behalf of Western Resources, Inc., Docket No. 01-WRSE-436-RTS, April 2001.

Before the State Corporation Commission of the State of Kansas, Direct Testimony on behalf of Western Resources, Inc., Docket No. 01-WRSE-436-RTS, January 2001.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of Entergy Power Marketing Corp. and Koch Energy Trading, Inc., Docket No. EC00-106, 20 June 2000.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of Western Resources, Inc., Docket No. ER00-00-000, 28 April 2000.

Before the Public Service Commission of Florida, Intervenor Testimony on behalf of Florida Power Corporation, Docket No. 991462, 7 March 2000.

Before the Public Service Commission of Wisconsin, Direct Testimony on behalf of ANR Pipeline Company, Docket No. 6650-CG-194, 6 March 2000.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Duke Energy South Bay, LLC, Docket Nos. ER98-496-000 and ER98-2160-000, 1 March 2000.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of ANR Pipeline Company, Docket Nos. CP00-36-000, CP00-37-000, and CP00-38-000, 28 December 1999.

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of Duke Energy South Bay, LLC, Docket Nos. ER98-496-000 and ER98-2160-000, 22 December 1999.

Before the Public Service Commission of Wisconsin, Rebuttal Testimony on behalf of Alliant Energy Corporation, Docket Nos. 9403-YI-100 and 6680-UM-100, 23 September 1999.

Before the Public Service Commission of Wisconsin, Direct Testimony on behalf of Alliant Energy Corporation, Docket Nos. 9403-YI-100 and 6680-UM-100, 1 July 1999.

Before the Public Service Commission of the State of Missouri, Surrebuttal Testimony on behalf of Western Resources, Inc. and Kansas City Power & Light, Case No. EM-97-515, 10 June 1999.

Before the State Corporation Commission of the State of Kansas, Rebuttal Testimony on behalf of Western Resources, Inc., Docket No. 97-WSRE-676-MER, 18 March 1999.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of Duke Energy South Bay LLC, Docket No. ER98-496-000 and ER98-2160-000, February 1999.

Before the Georgia Public Service Commission, Rebuttal Testimony on behalf of Georgia Power Company, GPSC Docket No. 9355-U, 27 October 1998.

Before the Public Service Commission of the State of Missouri, Direct Testimony on behalf of Western Resources, Inc. and Kansas City Power & Light Company, Case No. EM-97-515, Volume III, June 1998.

Before the State Corporation Commission of the State of Kansas, Direct Testimony on behalf of Western Resources, Inc., Docket No. 97-WSRE-676-MER, 17 June 1998.

Before the Georgia Public Service Commission, Direct Testimony on behalf of Georgia Power Company, GPSC Docket No. 9355-U, 3 June 1998.

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of Duke Energy, Docket No. ER98-496-000 and ER98-2160-000 24 April 1998.

Before the Public Service Commission of Wisconsin, Surrebuttal Testimony on behalf of Wisconsin Electric Power Company, Docket No. 05-BE-100, ___ March 1998.

Before the Public Service Commission of Wisconsin, Rebuttal Testimony on behalf of Wisconsin Electric Power Company, Docket No. 05-BE-100, 23 March 1998.

Before the Public Service Commission of Wisconsin, Testimony on behalf of Wisconsin Electric Power Company, Docket No. 05-BE-100, 9 March 1998.

Before the Pennsylvania Public Utilities Commission, Rebuttal Testimony on behalf of Pennsylvania Power Company, Docket No. R-00974149, 19 February 1998.

Before the State Corporation Commission of Kansas, Prepared Statement on behalf of Western Resources, Inc., 28 October 1997

Before the Federal Energy Regulatory Commission, Testimony on behalf of Wisconsin Energy Corporation and ESELCO, Inc., Docket No. EC97-___-000, 22 October 1997.

Before the Pennsylvania Public Utilities Commission, Direct Testimony on behalf of Pennsylvania Power Company, Docket No. R-00974149, 26 September 1997.

Before the Public Utilities Commission of the State of California, Testimony on behalf of Southern California Edison Company, Docket No. U-338-E, September 15, 1997.

Before the Federal Energy Regulatory Commission, Affidavit on behalf of The Power Company of America, L.P., Docket No. ER95-111-000, November 1, 1996.

Before the Public Service Commission of Wisconsin, Rebuttal Testimony on behalf of Wisconsin Energy Corporation, Wisconsin Electric Power Company, *et.al.* (Applicants), Docket Nos. 6630-UM-100, 4220-UM-101, October 23, 1996.

Before the Public Utilities Commission of the State of California, Rebuttal Testimony on behalf of Pacific Telesis Group, No. 96-04-038, October 15, 1996.

Before the Commonwealth of Massachusetts Department of Public Utilities, Rebuttal Testimony on behalf of Boston Gas Company, Docket No. D.P.U. 96-50, Exhibit BGC-117, August 16, 1996.

Before the State Corporation Commission of the State of Kansas, Revised Direct Testimony on behalf of Western Resources, Inc. and Kansas Gas and Electric, Docket Nos. 193,306-U and 193,307-U, July 11, 1996.

Before the Federal Energy Regulatory Commission, Prepared Rebuttal Testimony on behalf of Koch Gateway, Docket No. RP95-362-000, June 18, 1996.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Wisconsin Electric Power Company, Northern States Power Company (Minnesota and Wisconsin), and Cenerprise, Docket Nos. EC95-16-000, ER95-1357-000, and ER95-1358-000, May 28, 1996.

Before the Arkansas Public Service Commission, Rebuttal Testimony on behalf of Arkansas Power & Light, Docket No. 89_128 U, 1996.

Before the New Mexico Public Utility Commission, Direct Testimony on behalf of Southwestern Public Service Company, Case No. _____, November 1995.

Before the State Corporation Commission of the State of Kansas, Direct Testimony on behalf of Kansas Gas and Electric Company, August 11, 1995.

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of Koch Gateway Pipeline Company, Docket No. RP-95- 000, June 28, 1995.

Before the National Energy Board of Canada, Evidence in the Matter of Fort St. John and Grizzly Valley Expansion Projects, British Columbia Gas, January 1995.

Before the Federal Energy Regulatory Commission, Rebuttal Comments in the Matter of Pricing Policy for New and Existing Facilities Constructed by Interstate Natural Gas Pipelines on behalf of Cascade Natural Gas Corporation, *et.al.* Docket No. PL94-4-000, December 5, 1994.

Before the Federal Energy Regulatory Commission, Comments Related to Pricing Policy for New and Existing Facilities Constructed by Interstate Natural Gas Pipelines on behalf of Cascade Natural Gas Corporation, LFC Gas Company, Northwest Natural Gas Company, and Washington Natural Gas Company, Docket No. PL94-4-000, November 4, 1994.

Affidavit on behalf of Barr Devlin, October 1994. (FERC)

Before the Federal Energy Regulatory Commission, Comments and Responses Related to Pricing Policy for New and Existing Facilities Constructed by Interstate Natural Gas Pipelines on behalf of Cascade Natural Gas Corporation, LFC Gas Company, Northwest Natural Gas Company, and Washington Natural Gas Company, Docket No. PL94-4-000, September 26, 1994

Before the Federal Energy Regulatory Commission, Statement on behalf of Buckeye Pipe Line Company, L.P., Docket Nos. OR94-6-000 and IS87-14-000, February 22, 1994.

Before the Federal Energy Regulatory Commission, Surrebuttal Testimony on behalf of Koch Gateway Pipeline Company, Docket No. RP93-205-000, November 29, 1993

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of Koch Gateway Pipeline Company, Docket No. RP93-205-000, September 30, 1993.

Before the Indiana Utility Regulatory Commission, Direct Testimony on behalf of PSI Energy, Inc., Cause Nos. 39646, 39584-S1, June 23, 1993.

Before the Minnesota Public Utilities Commission, Rebuttal Testimony on behalf of Northern States Power Company, Docket Nos. E002/GR-92-1185, G002/GR-92-1186, March 23, 1993.

Before the Pennsylvania Public Utility Commission, Rebuttal Testimony on behalf of Pennsylvania Gas and Water Company, Docket No. R-22482, March 9, 1993.

Before the State of Maine Public Utilities Commission, Direct Testimony on behalf of Central Maine Power, Docket No. 90-085-A, January 7, 1993.

Before the Federal Energy Regulatory Commission, Affidavit regarding Order 636-A Compliance Filing Proposed Restructuring on behalf of United Gas Pipe Line Company, Docket No. RS92-26-000, October 29, 1992.

Before the Federal Energy Regulatory Commission, Rebuttal and Cross Answering Testimony on behalf of Exxon Pipeline Company, Docket Nos. IS92-3-000, *et.al.*, August 10, 1992.

Before the Arizona Corporation Commission Task Force on Externalities, Comments in Response to Shortcomings and Pitfalls in Attempts to Incorporate Environmental Externalities into Electric Utility Least-cost Planning, Docket No. U-000-92-035, March 20, 1992.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Texas Eastern Transmission Corporation, Docket Nos. CP90-2154-000, RP85-177-008, RP88-67-039, *et.al.*, RP90--119-001, *et.al.*, RP91-4-000, RP91-119, and RP90-15-000, January 30, 1992.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Washington Gas Light Company, Docket Nos. RP90-108-000, *et.al.*, RP90-107-000, January 17, 1992.

Before the Federal Energy Regulatory Commission, Comments in Response to Notice of Proposed Rulemaking on behalf of United Gas Pipe Line Company, Docket No. RM92-11-000, October 15, 1991.

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of Washington Gas Light Company, Docket Nos. RP91-82-000, *et.al.*, August 27, 1991.

Before the Arizona Corporation Commission, Rejoinder Testimony on behalf of Arizona Public Service Company, Docket Nos. U-1345-90-007 and U-1345-89-162, June 18, 1991.

Before the Federal Energy Regulatory Commission, Comments submitted in Response to Notice of Public Conference and Request for Comments on Electricity Issues, Docket No. PL91-1-000, June 10, 1991.

Before the Arizona Corporation Commission, Rebuttal Testimony on behalf of Arizona Public Service Company, Phase II, Docket Nos. U-1345-90-007 and U-1345-89-162, May 3, 1991.

Before the Federal Energy Regulatory Commission, Direct Testimony on behalf of United Gas Pipe Line Company, Docket Nos. RP91-126-000, CP91-1669-000, CP91-1670-000, CP91-1671-000, CP91-1672-000, and CP91-1673-000, April 15, 1991.

Before the Federal Energy Regulatory Commission, Comments on Electricity Issues, Docket No. PL91-1-000, April 12, 1991.

Before the Arizona Corporation Commission, Rebuttal Testimony on behalf of Arizona Public Service Company, Docket No. U-0000-90-088, November 26, 1990.

Before the State of Maine Public Utilities Commission, Rebuttal Testimony and Exhibits on behalf of Central Maine Power, Docket No. 90-076, November 16, 1990.

Before the State Corporation Commission of Virginia, Direct Testimony on behalf of Historic Manassas, Inc., SCC Case No. PUE 890057, VEPCO Application 154, November 2, 1990.

Before the Iowa Utilities Board, Comments Prepared at the Request of Iowa Electric Light and Power Company on Iowa's Proposed Rulemaking Related to Utility Energy Efficiency Programs, Docket No. RMU90-27, October 15, 1990.

Before the Arkansas Public Service Commission, Testimony on behalf of Arkla, Inc., Docket no. 90-036-U, August 31, 1990.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Northeast Utilities Service Company, Docket Nos. EC90-10-000, ER90-143-000, ER90-144-000, ER90-145-000 and EL90-9-000, July 20, 1990.

Before the Illinois Commerce Commission, Testimony on behalf of Commonwealth Edison, Docket No. 90-0169, July 17, 1990.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of New York State Customer Group (Niagara Mohawk Power Corporation; Rochester Gas & Electric Corporation; New York State Electric & Gas Corporation), Docket Nos. RP88-211-000, RP88-10-000, RP90-27-000, June 1, 1990.

Before the Federal Energy Regulatory Commission, Statement on behalf of Public Service Company of Indiana, Docket Nos. ER89-672-000, February 15, 1990.

Before the Federal Energy Regulatory Commission, Prepared Direct Testimony submitted on behalf of The New York State Customer Group, which includes Niagara Mohawk Power Corporation, Rochester Gas and Electric Corporation and New York State Electric & Gas Corporation, Docket Nos. RP88-211-000, RP88-10-000, RP88-215-000 and RP90-27-000, January 23, 1990.

Before the Arkansas Public Service Commission, Rebuttal Testimony on behalf of Arkansas Power & Light Company, Docket No. 89-128-U, January 12, 1990.

Before the Federal Energy Regulatory Commission, Prepared Answering Testimony Sponsored by Texas Eastern Transmission Corporation, Docket Nos. RP88-67-000 and RP88-81-000, January 10, 1990.

Before the Federal Energy Regulatory Commission, Comments on the Federal Energy Regulatory Commission's Proposed Policy Statement on Gas Inventory Charges, Docket No. PL89-10999, July 1989.

Before the Public Utilities Commission of Texas, Direct Testimony on behalf of Enron-Dominion Cogen Corporation, Docket No. 8636, June 12, 1989.

Before the Maine Public Utilities Commission, Direct Testimony on behalf of Central Maine Power Company, Docket No. 88-310, March 1, 1989.

Before the Public Utilities Commission of Ohio, Comments Submitted on behalf of Dayton Power and Light Company, In the Matter of the Revision and Promulgation of Rules for Long Term Forecast reports and Integrated Resource Plans of Electric Light Companies, Case no. 88-816-EL-OR, November 21, 1988.

Before the Federal Energy Regulatory Commission, Comments of the Energy and Environmental Policy Center, RE: Regulations Governing Independent Power Producers, Docket No. RM88-4-000, July 18, 1988.

Before the Federal Energy Regulatory Commission, Comments of the Energy and Environmental Policy Center, RE: Regulations Governing Bidding Programs, Docket No. RM88-5-000, July 18, 1988.

Before the Federal Energy Regulatory Commission, Comments of the Energy and Environmental Policy Center, Re: Administrative Determination of Full Avoided Costs, Sales of Power to Qualifying Facilities, and Interconnection Facilities, Docket No. RM88-66-000, July 18, 1988.

Before the Maine Public Utilities Commission, Testimony on behalf of Central Maine Power Company, Docket No. 88-111, June 22, 1988.

Before the Federal Energy Regulatory Commission, Comments of the Energy and Environmental Policy Center, Re: Brokering of Interstate Natural Gas Pipeline Capacity, Docket No. RM88-13-000, June 17, 1988.

Before the Federal Energy Regulatory Commission, Comments of the Energy and Environmental Policy Center, Re: Administrative Determination of Full Avoided Costs, Sales of Power to Qualifying Facilities, and Interconnection Facilities, Docket No. RM88-6-000, June 16, 1988.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Public Service Company of New Mexico, April 12, 1988.

Before the Federal Energy Regulatory Commission, Oral Comments, Re: Order No. 500, Docket No. RM87-34-000 *et.al.*, March, 1988.

Before the Federal Energy Regulatory Commission, Statement on behalf of Transwestern Pipeline Company, Docket No. CP88-143-000, March, 1988.

Before the Public Service Commission of New Hampshire, Testimony on behalf of Public Service Company of New Hampshire, Docket No DR88-000, January 7, 1988.

Before the Ontario Energy Board, Testimony on behalf of ICG Utilities (Ontario) LTD, The 1987 Amended Gas Pricing Agreement, E.B.R.O. 411-III *et.al.*, November, 1987.

Before the New Hampshire Public Utility Commission, Technical Statement on behalf of Public Service Company of New Hampshire, Filing of special Contract No. NHPUC-54 Between Nashua Corporation and Public Service Company of New Hampshire, October 30, 1987.

Before the Federal Energy Regulatory Commission, Statement on behalf of Arkla, Inc., included as an exhibit in Arkla, Inc.'s Comments on Notice of Proposed Rulemaking, Docket No. RM87-34-000, October 13, 1987.

Before the Pennsylvania Public Utility Commission, Rebuttal Testimony on behalf of West Penn Power Company, Docket No. R-850220, September 28, 1987.

Before the Public Service Commission of New York, Prepared Rebuttal Testimony on behalf of National Fuel Gas Distribution Company, September 14, 1987.

Before the New Hampshire Public Utilities Commission, Prefiled Direct Testimony on behalf of Public Service Company of New Hampshire, Docket No. DR87-151, August 28, 1987.

Before the Pennsylvania Public Utility Commission, Direct Testimony on behalf of West Penn Power Company, Docket No. R-850220, Reconsideration, July 27, 1987.

Before the Commonwealth of Massachusetts Department of Public Utilities, Statement on behalf of Boston Edison Company, Docket Nos. 86-36, June 12, 1987.

Before the State of Illinois Commerce Commission, Rebuttal Testimony on behalf of Commonwealth Edison Company, Docket Nos. 87-0043, 87-0044, 8700096, May 4, 1987.

Before the Federal Energy Regulatory Commission, Comments on behalf of Tennessee Gas Pipeline Company, In the Matter of Iroquois Gas Transmission System, Docket No. CP86-523-001, March 9, 1987.

Before the New Hampshire Public Utility Commission, Direct Testimony on behalf of Public Service Company of New Hampshire, NHPUC Docket No. DR86-122, March 3, 1987.

Before the Federal Energy Regulatory Commission, Comments on behalf of Transwestern Pipeline Company, In the Matter of Notice of Inquiry into alleged anticompetitive Practices Related to Marketing Affiliates of Interstate Pipelines, Docket No. RM87-5-000, December 29, 1986.

Before the Maine Public Utilities Commission, Testimony on behalf of Central Maine Power Company, Docket No. 86-215, Re: Proposed Amendments to Chapter 36, December 18, 1986.

Before the Utah Public Service Commission, Surrebuttal Testimony on behalf of NUCOR Steel Corporation, In the Matter of the Investigation of Cost of Service Issues for Utah Power & Light Company, Case No. 85-035-06, December 5, 1986.

Before the Public Service Commission of New York, Prepared Direct Testimony on behalf of National Fuel Gas Distribution Corporation, Case Nos. 38947 and 28954, November 21, 1986.

Before the Federal Energy Regulatory Commission, Prepared Rebuttal Testimony on behalf of Transwestern Pipeline Company, Docket No. RP86-126, November 13, 1986.

Before the Federal Energy Regulatory Commission, Prepared Cross-Answering Testimony on behalf of Members of the New England Customer Group, Docket No. RP86-119, October 28, 1986.

Before the Federal Energy Regulatory Commission, Prepared Testimony on behalf of Members of the New England Customer Group, Docket No. RP86-119, October 14, 1986.

Before the Utah Public Service Commission, Rebuttal Testimony on behalf of NUCOR Steel Corporation, Docket No. 85-035-04, September 30, 1986.

Before the State of New Jersey Department of Energy, Board of Public Utilities, Rebuttal Testimony on behalf of Elizabethtown Gas Company, September, 1986.

Before the State of Illinois Commerce Commission, Testimony on behalf of Commonwealth Edison Company, Docket No. 86-0249, August 25, 1986.

Before the Public Utilities Commission of Ohio, Rebuttal Testimony on behalf of Ohio Power Company, Case No. 85-726-EL-AIR, April, 1986.

Before the State of New Jersey Department on Energy, Board of Public Utilities, Testimony on behalf of Elizabethtown Gas Company, Docket No. 8112-1039, March, 1986.

Before the Maine Public Utilities Commission, Rebuttal Testimony on behalf of Central Maine Power Company, Docket No. 85-132, March, 1986.

Before the Federal Energy Regulatory Commission, Comments on behalf of National Economic Research Associates, Inc., Notice of Inquiry Re: Regulation of Electricity Sales-for-Resale and Transmission Service, 18 C.F.R. Parts 35 and 290, Issued June 28, 1985, Docket No. RM85-17-000 (Phase II), January 23, 1986.

Before the Alaska Public Utilities Commission, Rebuttal Testimony on behalf of Seagull, Enstar Corporation, and Enstar Natural Gas Company, U-84-67, December, 1985.

Before the Virginia State Corporation Commission, Rebuttal Testimony on behalf of Dominion Resources, Inc. and Virginia Electric and Power Company, Case No. PUE 830060, November 26, 1985.

Before the Federal Energy Regulatory Commission, Comments on behalf of National Economic Research Associates, Inc., Notice Requesting Supplemental Comments Re: Regulation of Natural Gas Pipeline After Partial Wellhead Decontrol, Docket No. RM85-1-000 (Part D), November 18, 1985.

Before the Federal Energy Regulatory Commission, Oral Comments on behalf of National Economic Research Associates, Inc., Notice of Inquiry Re: Regulation of Electricity Sales-for-Resale and Transmission Services (Phase II), Docket No. RM85-17-000, November 4, 1985.

Before the Public Service Commission of Wisconsin, Rebuttal Testimony on behalf of Eastern Wisconsin Utilities, Docket No. 05-EP-4, November, 1985.

Before the Federal Energy Regulatory Commission, Oral Comments on behalf of National Economic Research Associates, Inc., Notice of Inquiry Re: Regulation of Electricity Sales-for-Resale and Transmission Services (Phase I), Docket No. RM85-17-000, August 9, 1985.

Before the Maine Public Utilities Commission, Direct Testimony on behalf of Central Maine Power Company, Docket No. 85-132, August, 1985.

Before the Public Utilities Commission of Ohio, Direct Testimony on behalf of Ohio Power Company, Docket No. 85-726-EL-AIR, July, 1985.

Before the Public Service Commission of Wisconsin, Direct Testimony on behalf of Wisconsin Gas Company, Docket Nos. 05-UI-18 and 6650-DR-2, June, 1985.

Before the Ontario Energy Board, Testimony on behalf of Unicorp of Canada Corporation, In the Matter of Union Enterprises Ltd. and Unicorp of Canada Utilities Corporation, E.B.R.L.G. 28, Exhibit 10.4, April, 1985.

Before the Utah Public Utilities Commission, Testimony on behalf of NUCOR Steel, Docket No. 84-035-01 (Rate Spread Phase), January, 1985.

Before the Nuclear Regulatory Commission, Affidavit for Alabama Power Company, October 1984.

Before the Federal Energy Regulatory Commission, Prepared Direct Testimony on behalf of Consolidated Gas Supply Corporation, Application of Consolidated Gas Supply Corporation for Rate Relief, Docket No. RP82-115, April, 1984.

Before the Public Utilities Commission of Ohio, Rebuttal Testimony on behalf of East Ohio Gas Company, *et.al.*, In the Matter of the Investigation into Long Term Solutions Concerning Disconnection of Gas and Electric Service During Winter Emergencies, Case No. 83-303-GE-COI, March, 1984.

Before the Federal Energy Regulatory Commission, Testimony on behalf of Florida Power and Light Company, Docket Nos. ER82-793 and EL83-24, February, 1984.

Before the Public Utilities Commission of Ohio, Direct Testimony on behalf of East Ohio Gas Company, *et.al.*, In the Matter of the Investigation into Long Term Solutions Concerning Disconnection of Gas and Electric Service During Winter Emergencies, Case No. 83-303-COI, January, 1984.

Before the Federal Energy Regulatory Commission, Supplemental Direct Testimony on behalf of Consolidated Gas Supply Corporation, Docket No. RP81-80, September, 1983.

Before the Arkansas Public Service Commission, Direct Testimony on behalf of Arkansas Louisiana Gas Company, Docket No. 83-161-U, August, 1983.

Before the New Mexico Public Service Commission, Testimony on behalf of Public Service Company of New Mexico, Case No. 1811, July 17, 1983.

Before the Federal Communications Commission, Rebuttal Case Testimony on behalf of Interstate Mobile Phone Company, in American Mobile Commission of Washington and Oregon, CC Docket No. 83-445, June, 1983.

Before the Public Service Commission of Indiana, Prepared Rebuttal Testimony on behalf of Northern Indiana Public Service Company, Case No. 37023, May, 1983.

Before the Public Service Commission of New York, Testimony on behalf of the Industrial Energy Users Association, in Procedure to Inquire into the Benefits to Ratepayers and Utilities from Implementation of Conservation Programs that will Reduce Electric Use, Case No. 28223, May, 1983.

Before the Public Utilities Commission of Maryland, Testimony on behalf of the Mid-Atlantic Petroleum Distributors Association, the Oil Heat Association of Washington, and Steuart Petroleum Company, Case No. 7649, May, 1983.

Before the Connecticut Department of Public Utility Control, Testimony on behalf of the Independent Petroleum Association, Docket No. 83-01-01, April, 1983.

Before the State Corporation Commission of Virginia, Testimony on behalf of the Mid-Atlantic Petroleum Distributors Association, the Oil Heat Association of Washington, and Steuart Petroleum Company, Case No. PUE 830008, March, 1983.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Arkansas Louisiana Gas Company, Docket Nos. RP82-75-000 *et.al.*, February 1983.

Before the Federal Communications Commission, Rebuttal Case Testimony on behalf of Interstate Mobile Phone Company, in American Mobile Communications of Washington and Oregon, CC Docket No. 83-3, February, 1983.

Before the Federal Energy Regulatory Commission, Prepared Testimony on behalf of Consolidated Gas Supply Corporation, in Application of Consolidated Gas Supply Corporation for Rate Relief, Docket No. RP82-115, July, 1982.

Before the Federal Energy Regulatory Commission, Rebuttal Testimony on behalf of Consolidated Gas Supply Corporation, Docket No. RP81-80, April, 1982.

Before the Florida Public Service Commission, Testimony on behalf of Florida Power & Light Company, Docket No. 820097-EU, April, 1982.

Before the Massachusetts Department of Public Utilities, Direct Testimony on behalf of Boston Edison Company, Docket No. 906, January, 1982.

Before the New Mexico Public Service Commission, Testimony on behalf of Public Service Company of New Mexico, In the Matter of New Mexico Public Service Commission Authorization for Southern Union Company to Transfer Certain Property to Western Gas Company, NMPSC Case 1689, January, 1982.

Before the Connecticut Department of Public Utility Control Authority, Testimony on behalf of Southern Connecticut Gas Works, DPUC Investigation Into Utility Financing of Conservation and Efficiency Improvements, Docket No. 810707, August, 1981.

Before the Connecticut Public Utility Control Authority, Prepared Testimony on behalf of Connecticut Natural Gas Corporation, July, 1981.

Before the Philadelphia Gas Commission, Testimony on behalf of Philadelphia Gas Works, in PGW Rate Investigations, July, 1981.

Before the California Public Utility Commission, Prepared Testimony on behalf of Pacific Gas and Electric Company, In Application of Pacific Gas and Electric Company for Rate Relief, Application No. 68153, June, 1981.

Before the Federal Energy Regulatory Commission, Prepared Testimony on behalf of Consolidated Gas Supply Corporation, Docket No. RP81-80, June, 1981.

Before the Tennessee Valley Authority Board, Comments on Tennessee Valley Authority Proposed Determinations on Ratemaking Standards, Contract TV-53565A, October, 1980.

Before the Federal Energy Regulatory Commission, Testimony on behalf of Pennsylvania Power and Light Company, Split-Savings and Emergency Tariffs, August, 1980.

Before the Public Service Commission of Maryland, Answering Testimony on behalf of the People's Counsel of Maryland re Baltimore Gas & Electric Company, Docket No. 7159, May 1, 1980.

Final Report of Consultants' Activities Submitted to Tennessee Valley Authority Division of Energy Conservation and Rates, in Consideration of Ratemaking Standards Pursuant to the Public Utility Regulatory Policy Act of 1978 (P.L. 95-617) and One Additional Standard, Contract No. TV-53575A, May, 1980.

Before the Utah Public Service Commission, Direct Testimony on behalf of NUCOR Steel, PSCU Case No. 83-035-06, 1980.

Before the Council on Environmental Quality, Washington, D.C., statement on "Alaskan Natural Gas, May, 1980.

Presentation entitled "An Analysis of the Proposed Building Energy Performance Standards (BEPS)," Washington, D.C. in March, 1980.

Before the Ontario Energy Board, Testimony on behalf of the Public Interest Advocacy Board and National Anti-Poverty Organization, February 27, 1979.

Before the Ontario Energy Board, Transcript of Testimony on behalf of the Public Interest Advocacy Board and National Anti-Poverty Organization, February 27, 1979.

Before the Federal Power Commission/Federal Energy Regulatory Commission, Testimony with respect to Cogeneration Pricing Rules, 1979.

Before the Federal Energy Regulatory Commission, Testimony on behalf of the State of Wisconsin in the Matter of the Northwest Alaskan Pipeline Company, Docket No. CP78-123, 1979.

Before the Federal Energy Administration, "The Effects of Middle Distillate Decontrol on the American Consumer: A Critique of the Decontrol Monitoring and Price Index Actions of the FEA with Michael McNamara and Rod Shaughnessy, Washington, D.C., August, 1977.

Before the Pennsylvania Public Utility Commission in Case No. 76-PRND-7, February 7, 1977.

Statements before the Council on Environmental Quality, Washington D.C., May 1977

Before the Wisconsin Public Service Commission, Testimony on behalf of the Environmental Defense Fund, December 1, 1976.

Before the Public Utilities Control Authority of the State of Connecticut, Testimony re Marginal Cost Pricing of Electricity and Natural Gas on behalf of the Environmental Defense Fund, July 22, 1976.

Before the Federal Energy Administration, "Analysis and Recommendations of Northern Tier Pipeline Proposals, July, 1976.

Before the Energy Council of the Federal Government, "Third State of EPCA: Additional Incentives," June, 1976.

Before the Wisconsin Public Service Commission, Testimony with respect to Electric Rate Structures; Price Elasticity of Demand for Electricity; and Application for WEPCO for Authority to Construct and Place in Operation a Coal Fired Power Plant and Related Facilities in the Town of Pleasant Prairie, Kenosha County and Certain Related Transmission and Substation Additions, CA-5489, June, 1976.

Before the Federal Power Commission/Federal Energy Regulatory Commission, Testimony with respect to Alaskan Natural Gas, March, 1976.

Before the Federal Power Commission/Federal Energy Regulatory Commission, Testimony with respect to Natural Gas Pricing, March, 1976.

Before the Wisconsin Assembly Environmental Quality Committee, Testimony re Assembly Bill 1228, January 22, 1976.

Before the Public Utility Commission of Maine, Testimony on behalf of Attorney General of the State of Maine re electricity pricing principles, 1976 .

Before the Federal Energy Administration, "Allocation of Canadian Crude Oil," December, 1975.

Before the Federal Energy Administration, "Establish Energy Administration to Establish Mandatory Allocation of Canadian Crude Oil," December 1975.

Before the Federal Energy Administration, Comments re Modification or Termination of the State Set-Aside Program, November 20, 1975.

Comments before the U.S. Department of Interior on its Study: Alaskan Natural Gas Transportation Systems, October 29, 1975.

Before the Public Service Commission of Minnesota, Rebuttal Testimony on behalf of the Minnesota Energy Agency in the Application of Northern States Power to Raise Rates, September 4, 1975.

Before the Public Service Commission of Minnesota, Testimony on behalf of the Minnesota Energy Agency in the Application of Northern States Power to Raise Rates, July 25, 1975

Before the Federal Energy Administration, "Rate Design and Its Relationship to Loan Management," June, 1975.

Comments before the Federal Power Commission on Proposed Rulemaking RM 75-19 on end Use Rate Schedules, May 30, 1975.

Before the Public Utilities Commission of Maine, Testimony in CMP Case No. F.C. 2072, February 7, 1975.

Before the Federal Energy Administration, "Modification or Termination of the State Set-Aside Program," 1975.

Before the California Public Utilities Commission, Testimony on behalf of the Environmental Defense Fund in the Application of Pacific Gas & Electric to raise its rates, Application No. 54279, 1975.

Before the Public Service Commission of the State of Nevada, Testimony on behalf of the Washoe County District Attorney's Office in the Matter of the Application of Sierra Pacific Power Company for Authority to Increase Rates for Electric, Gas and Water Service, Docket Nos. 574, 575, and 576, 1974-76

Before the Michigan Public Service Commission, Testimony in the matter of Detroit Edison Company, Case No. U-4570 and Consumers Power Company, Case No. U-4576, 1974.

Before the Virginia State Corporation Commission, Testimony on behalf of the Central Virginia Environmental League, Case No. 10848, 1974.

Before the Federal Energy Regulatory Commission, Testimony on behalf of the Environmental Defense Fund re electricity pricing, October 8, 1974.

Before the New Jersey Public Utility Commission, Supplemental Testimony on behalf of the Environmental Defense Fund in PSEG rate increase case, August 8, 1974.

Before the Michigan Public Service Commission, Testimony on behalf of the Environmental Defense Fund in Detroit Edison Case No. U-4570, August 8, 1974.

Before the Maryland Public Service Commission, Testimony on behalf of the Environmental Defense Fund in Baltimore Gas & Electric Case No. 6700, January 24, 1974.

Before the Public Service Commission of Wisconsin, Supplemental Testimony on behalf of the Environmental Defense Fund in Madison Gas & Electric Rate Increase Case 1973.

Before the Federal Power Commission/Federal Energy Regulatory Commission Testimony With Respect to El Paso Natural Gas Coal Gasification, 1972.

Before the Federal Power Commission/Federal Energy Regulatory Commission Testimony With Respect to El Paso Natural Gas Pricing, 1972.

Comments before various Utility Regulatory Commissions (Maryland, New York, Michigan, New Jersey, Arkansas, Maine, California, Florida, Rhode Islands, Minnesota, Connecticut, Massachusetts, Missouri, Nevada, New Hampshire, Vermont, Virginia, Wisconsin, Texas, Ontario, Philadelphia, New Mexico, Pennsylvania, TVA, Indiana) on Marginal Cost Pricing of Electricity; Conservation; Rate of Return; Diversification; Nuclear Cancellation; Sale of Utility Property; and Public Policy, 1972-1976..

Before various Canadian Regulatory Commissions, Testimony on Energy and Telephone Pricing, 1972-1976.

Before the U.S. Postal Rate Commission, Testimony on Marginal Cost Pricing of Postal Rates, 1972.

Before the Federal Communications Commission, Testimony on Telegraph Price Elasticity and Cellular Mobile Telephone Pricing, 1972

Before the Public Service Commission of Wisconsin, Testimony on behalf of the Environmental Defense Fund in Madison Gas & Electric Rate Increase Case, 1972.

Before the Federal Power Commission, A Testimony with respect to The Economics Preservation versus Development of Hell's Canyon, 1969.

Before the FCC, Testimony for Western Union Telegraph Company re Statistical Analysis of Elasticity of Demand for Public Message Telegraph Service, 1968.