

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Application of Pacific Gas and Electric Company
for (1) Administration of Stress Test Methodology
Developed Pursuant to Public Utilities Code
Section 451.2(b) and (2) Determination That
\$7.5 Billion of 2017 Catastrophic Wildfire
Costs and Expenses Are Stress Test Costs
That May be Financed Through Issuance of
Recovery Bonds Pursuant to Section 451.2(c)
and Section 850 seq (U39E)

Application 20-04-023

**TESTIMONY OF ROBERT EARLE ON BEHALF OF
THE COALITION OF CALIFORNIA UTILITY EMPLOYEES**

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Rachael E. Koss
Adams Broadwell Joseph & Cardozo
601 Gateway Blvd., Suite 1000
South San Francisco, CA 94080
(650) 589-1660
rkoss@adamsbroadwell.com

Attorneys for the Coalition of California
Utility Employees

TABLE OF CONTENTS

I.	Introduction.....	1
II.	PG&E’s Proposed Securitization Benefits Ratepayers.....	1
III.	RISK to Customer Reimbursement is Mitigated	2
IV.	The Proposed Securitization Supports California’s Policy Goals	5
V.	Proposals to Municipalize Parts of PG&E’s System Are Out-of-Scope in this Proceeding.....	6
VI.	Exclusion of the Securitized Debt from PG&E’s Ratemaking Capital Structure is Appropriate and Beneficial to Ratepayers	8
VII.	The Commission Should Act Swiftly to Approve PG&E’s Proposed Transaction.....	10

Attachment A – Curriculum Vitae of Dr. Robert Earle

1 **I. INTRODUCTION**

2 While the financial engineering and regulatory details are complicated, the essence of the
3 benefit from Pacific Gas & Electric Company’s (“PG&E”) proposed securitization is simple:
4 ratepayers will benefit from a lower cost of debt if PG&E attains investment-grade status sooner.
5 The proposed securitization provides a path to achieve that status sooner.

6 While customers pay a Fixed Rate Charge (“FRC”) to pay for the Recovery Bonds, the
7 Customer Credit Trust reimburses customers for the FRC. There is a potential risk that the
8 Customer Credit Trust would not have sufficient funds to reimburse customers fully. There are
9 layers of protection for ratepayers, however: the Customer Credit Trust will likely have a
10 positive return to customers, and the structure of the Customer Credit Trust shields it from
11 bankruptcy. These layers of protection mitigate the risk of non-reimbursement to customers.

12 The Coalition of California Utility Employees (“CUE”) supports PG&E’s application for
13 securitization because it will benefit ratepayers and advances California’s policy goals. The rest
14 of this testimony addresses: how PG&E’s proposed securitization benefits ratepayers, the
15 mitigation of risk of non-reimbursement, how the proposed transaction supports California’s
16 policy goals, why consideration of municipalization proposals are out-of-scope in this
17 proceeding, why the Recovery Bonds should be excluded from PG&E’s ratemaking capital
18 structure, and that the Commission should act swiftly to approve PG&E’s proposed transaction.

19 **II. PG&E’S PROPOSED SECURITIZATION BENEFITS RATEPAYERS**

20 PG&E’s proposed securitization benefits ratepayers. Improving PG&E’s credit rating to
21 investment grade will reduce its borrowing costs. PG&E illustrates the fact that better credit
22 ratings generally lead to lower debt costs. The average 10-year BBB- index is 60 basis points

1 (0.60%) above the BBB+.¹ These lower borrowing costs mean ratepayers will pay a lower rate of
2 return, and PG&E will be able to provide safe and reliable service more easily. PG&E estimates
3 savings of \$423 million for the benefit of its customers.²

4 Along with lower debt costs and facilitating safe and reliable service, the proposed
5 securitization has expected net present value payout of \$118 million to customers.³ As discussed
6 below, the \$118 million payout appears to be based on conservative assumptions about market
7 returns to the Customer Trust portfolio.

8 Finally, the securitization would allow for the acceleration of payment of \$700 million to
9 wildfire victims.⁴ TURN spurns this as small potatoes compared with the total of \$13.5 billion.⁵
10 Nonetheless, accelerating payments of \$700 million is a benefit to those who receive it. It also
11 helps restore confidence in the ability of PG&E and the Commission to manage the fallout of the
12 wildfire crisis.

13 III. RISK TO CUSTOMER REIMBURSEMENT IS MITIGATED

14 The risk to customers from the Customer Credit Trust not fully reimbursing customers
15 for the FRC is mitigated in at least two ways. First, the Monte Carlo simulation that shows a
16 positive return to customers at the end of the Customer Credit Trust used a conservative return-
17 on-investment. Figure 1 compares 30-year annualized historical returns versus the returns
18 simulated in the Monte Carlo model. The historical returns are derived from every 30-year time

¹ PG&E, Securitization Prepared Testimony – Updated (“PG&E), August 7, 2020, p. 5-31.

² PG&E, p. 5-33.

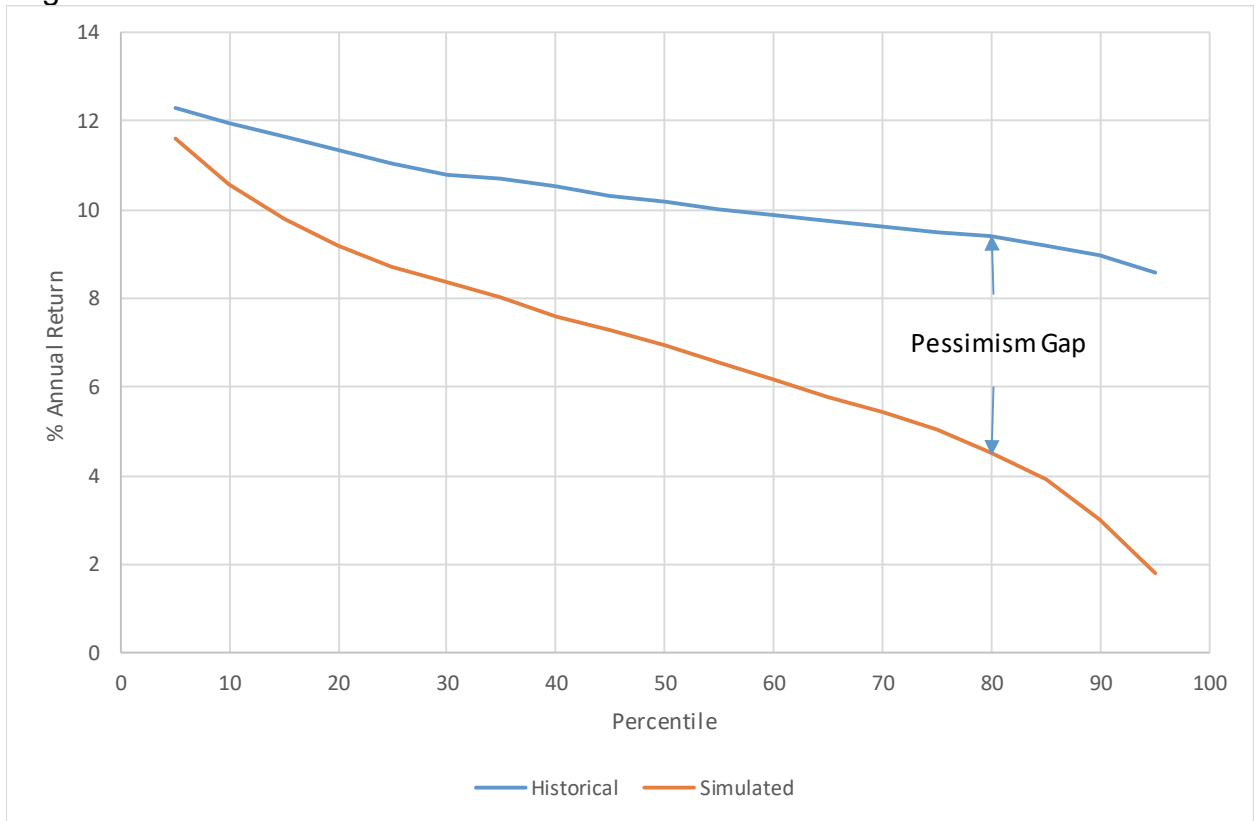
³ PG&E, p. 1-14.

⁴ PG&E, p. 3-2.

⁵ TURN Protest, p. 6.

1 period from the beginning of 1926 through March 31, 2020. The portfolio mix for the historical
2 returns is similar to the portfolio used in the simulation: an 80/20 stock/bond mix.⁶

3 Figure 1: Pre-Tax 30 Year Annualized Historical Returns vs. Simulated Returns⁷



4
5 The percentile values are the number for which that percent of outcomes exceed that
6 value. For example, at the 5th percentile, the historical return is 12.28%, meaning that 5% of the
7 annualized returns historically exceeded 12.28%. At the 95th percentile, the historical value is
8 8.57%, meaning that 95% of annualized returns exceeded 8.57%.

⁶ PG&E, p. 6-30. The simulated returns have some non-US stocks (24% of the total portfolio). PG&E, p. 6-28, Table 6-6.

⁷ Data from PG&E, p. 6-31, Table 6-8.

1 At each percentile in Figure 1, historical returns are larger than the simulated returns. So,
2 the simulated returns result in a more conservative prediction of returns from the Customer
3 Credit Trust than historical returns.

4 Moreover, at the lower percentiles, the “pessimism gap” is smaller than at higher
5 percentiles. That is, the simulated returns are closer to the historical returns at higher levels of
6 return. At the 5th percentile, the pessimism gap is only 0.65%.⁸ For the 50th percentile, the gap is
7 3.24%. In other words, the historical return is higher than the simulated return by 3.24%. Finally,
8 at the 95th percentile, the pessimism gap is 6.75%.

9 As a result, not only are the simulated returns conservative at all percentiles, they are also
10 increasingly conservative at higher percentiles because of the increasing pessimism gap. So, the
11 Monte Carlo simulation emphasizes the potential downside with lower returns in the worst-case
12 scenarios.

13 As PG&E points out, the worst return in the historical record for a 30-year period was
14 7.49%. This is significantly higher than the break-even pre-tax return of 4.04% for the Customer
15 Credit Trust.⁹ An alternate simulation using historical returns rather than simulated returns shows
16 a positive return in 95% of the cases compared with 84% of the cases for the simulated returns.¹⁰

17 Therefore, the Monte Carlo results using simulated returns are conservative and show
18 that the risk to customers is small.

⁸ At the 5th percentile, the historical return is 12.28% and the simulated return is 11.63%. 12.28%-11.63% = 0.65%.

⁹ PG&E, p. 6-31:3-9.

¹⁰ PG&E, p. 6-33:1-6.

1 The risk that customers will not be fully reimbursed is also mitigated because the
2 proposed transaction limits the distribution of Customer Credit Trust funds to fund the Customer
3 Credit (the reimbursement), trust administration expenses, and taxes. PG&E shareholders would
4 not be able to access these funds for any other purpose. Also, PG&E creditors would not be able
5 to access Customer Credit Trust funds. Moreover, PG&E agrees that in the event of another
6 PG&E bankruptcy, the Commission could continue to mandate that PG&E continue to fund the
7 Customer Credit.¹¹

8 **IV. THE PROPOSED SECURITIZATION SUPPORTS CALIFORNIA’S**
9 **POLICY GOALS**

10 Utilities in California are stretched thin in addressing wildfire concerns and assisting in
11 decarbonizing the California economy. For instance, in its 2021 GRC application, Southern
12 California Edison Company (“SCE”) finds itself pressed by resource constraints and limited by
13 how much it can raise rates. To fund wildfire mitigation efforts, SCE proposes to defer \$1,424
14 million in infrastructure replacement that supports safe and reliable service, which SCE
15 acknowledges should be done now.¹² It is crucial to pursue the lower debt costs afforded by a
16 higher credit rating so that PG&E can do the work necessary to provide safe and reliable service.

17 When signing AB 1054, Governor Newsom stated:¹³

18 The rise in catastrophic wildfires fueled by climate change is a direct threat to
19 Californians. Strengthening our state’s wildfire prevention, preparedness and
20 mitigation efforts will continue to be a top priority for my administration and our
21 work with the Legislature.

¹¹ PG&E, p. 6-17:20-6-18:

¹² A.19-08-013, Exh. SCE-02 Vol 01 pt. 1, p. 14:5-17. See, also, A.19-08-013, Testimony of Robert Earle on behalf of The Coalition of California Utility Employees, (CUE-01), p. 14:8-15:11.

¹³ <https://www.gov.ca.gov/2019/07/12/governor-gavin-newsom-signs-wildfire-safety-and-accountability-legislation/>

1 Decarbonizing the California economy will require more electricity usage and electricity
2 that is affordable. PG&E needs every dollar it can spare for infrastructure investment, wildfire
3 mitigation, and provision of safe and reliable service. From 2021 to 2024, PG&E plans to make
4 an average of \$8.37 billion in capital investments per year.¹⁴ The proposed transaction will
5 support this without raising customer rates and providing savings to customers through lower
6 utility debt costs.

7 **V. PROPOSALS TO MUNICIPALIZE PARTS OF PG&E’S SYSTEM ARE**
8 **OUT-OF-SCOPE IN THIS PROCEEDING**

9 CCSF suggested in its protest that PG&E cannot meet the Stress Test requirements
10 “without a detailed and thorough analysis and accounting of the opportunities presented by
11 [these] local government entities” to purchase PG&E core assets.¹⁵ CCSF errs in several ways.

12 First, in considering whether a utility has Excess Cash, it is non-core assets that are at
13 issue, not core assets. The Stress Test addresses non-core assets, not assets that are fundamental
14 to its business, as CCSF seems to acknowledge when it quotes the Stress Test decision:¹⁶

15 The utility shall provide a detailed analysis and explanation of the potential
16 opportunities to effectuate ratepayer mitigating *non-core* asset sales.

17 The assets that CCSF and other local government entities wish to purchase are clearly
18 core assets, assets that are essential to PG&E carrying on its business. Therefore, consideration
19 of potential revenues from municipalization sales should be excluded because they are sales of
20 core assets.

¹⁴ PG&E, p. 5-33:5-9.

¹⁵ CCSF Protest, p. 9.

¹⁶ CCSF Protest, p. 8 citing D.19-06-027, p. 32. (emphasis added)

1 Second, the CCSF errs because the Stress Test decision considers “pending and potential
2 near-term asset sales.”¹⁷ As PG&E has pointed out, CCSF references offers which are merely
3 ‘non-binding “indications of interest,”’¹⁸ a far cry from something that is “pending” or
4 “potential[ly] near-term.” Moreover, municipalization is often a slow process.¹⁹ LILCO took
5 eight years to municipalize, and Winter Park, Florida, took four years.²⁰ Boulder, Colorado,
6 began its process in 2011. Now, nine years later, there is a ballot proposition that would end the
7 effort.²¹

8 Third, CCSF errs in reliance on the Regulatory Adjustment as a way to force core asset
9 sales. CCSF quotes the Stress Test decision: “...the Commission may consider potential asset
10 sales in the Regulatory Adjustment (both used and useful as well as non-revenue generating
11 assets where the value of the asset is not clearly defined at the time of the Stress Test[]).”²²
12 CCSF, however, left off the end of the sentence: “...the primary consideration of asset sales will
13 be completed as part of the excess cash calculation.”²³ The point of the sentence is that the
14 Commission “may” consider asset sales in the Regulatory Adjustment, but it does not *have to*,
15 because consideration of asset sales will *primarily* take place in the Excess Cash calculation:²⁴

16 While the Commission may consider potential asset sales in the Regulatory
17 Adjustment (both used and useful as well as non-revenue generating assets where
18 the value of the asset is not clearly defined at the time of the Stress Test), the
19 primary consideration of asset sales will be completed as part of the excess cash

¹⁷ D.19-06-027, p. 32.

¹⁸ PG&E, Reply to Protest,

¹⁹ The *San Jose Mercury News* estimates the average municipalization requires ten years.

<https://www.mercurynews.com/2020/02/09/opinion-california-cant-buy-pge-and-harden-the-grid/>

²⁰ “An Analysis of Municipalization and Related Utility Practices,” Synapse Energy Economics, Inc., September 17, 2017.

²¹ <https://boulderbeat.news/2020/07/28/boulder-xcel-municipalization-settlement/>

²² CCSF Protest, p. 8 quoting D.19-06-027, p. 32.

²³ D.19-06-027, p. 32.

²⁴ *Ibid.*

1 calculation. By moving the consideration of asset sales to the excess cash
2 component we address the concern that a utility could sell a large asset and
3 generate cash proceeds in excess of the potential Regulatory Adjustment.

4 Therefore, the Commission should not consider municipalization proposals in this
5 proceeding.

6 **VI. EXCLUSION OF THE SECURITIZED DEBT FROM PG&E'S**
7 **RATEMAKING CAPITAL STRUCTURE IS APPROPRIATE AND**
8 **BENEFICIAL TO RATEPAYERS**

9 PG&E proposes to exclude the securitized debt from its ratemaking capital structure.²⁵ As
10 PG&E notes, the Special Purpose Entity ("SPE"), not PG&E, will have the legal obligation to
11 pay the principal and interest on the debt, and such payments will be supported by the FRC
12 dedicated to paying off the debt. Thus, the securitized debt is not part of PG&E's capital
13 structure.²⁶ To put it another way, the securitization proceeds are not being used to finance rate
14 base and, therefore, should not be included in PG&E's ratemaking capital structure.

15 In considering whether the securitized debt should be included or excluded from PG&E's
16 ratemaking capital structure, it is useful to review the purpose of mandating a capital structure
17 for a regulated utility. The Commission stated in its Decision on the 2020 cost of capital that
18 adopted equity ratios must be sufficient to maintain reasonable credit ratings:²⁷

19 Because the level of financial risk that the utilities face is determined in part by
20 the proportion of their debt to permanent capital, or leverage, we must ensure that
21 the utilities' adopted equity ratios are sufficient to maintain reasonable credit
22 ratings and attract capital while also ensuring there are adequate ratepayer

²⁵ PG&E, p.1-16:13-16. PG&E notes that it has been given a temporary waiver of its capital structure requirements for five years, but because the Recovery Bonds will be outstanding for longer than five years, the exclusion is still appropriate (PG&E p. 1-16, fn. 27).

²⁶ PG&E, p. 1-16:23-1:17:3.

²⁷ D.19-12-056, p. 6.

1 protections regarding the costs of the components of capitalization.
2

3 In other words, the Commission has sought a balance in its mandated capital structure
4 between efficiency for the utility and equity for the ratepayers. Distorting this balance by
5 including the securitized debt that is not part of the rate base in the capital structure would hinder
6 the twin goals of attaining and then maintaining favorable credit ratings and the ability to attract
7 capital. Moreover, it might send a negative signal to the markets that the Commission does not
8 believe that the securitized debt (and the right to the revenues from the FCR) would actually be
9 the responsibility of the SPE. Such a signal would be detrimental to securitization efforts and,
10 therefore, harmful to ratepayers.

11 The Commission has excluded other securitized debt from utilities' ratemaking structure
12 in the past. The 2006 cost-of-capital proceeding that securitized debt, including Rate Reduction
13 Bonds and Energy Recovery Bonds, was not included in the IOUs' ratemaking capital
14 structure.²⁸

15 Indeed, it is unclear how including securitized debt in PG&E's capital structure could
16 logically work. It is desirable that PG&E, in due course, return to an appropriate capital
17 structure. Counting debt in the capital structure that it is not responsible for is illogical. Including
18 it and mandating that PG&E still move towards a structure like that mandated in D.19-12-056
19 would result in higher debt to equity ratios than the Commission had approved. Indeed, in D.20-
20 05-053, the Commission indicated that it "expect[ed] PG&E to expeditiously pay down

²⁸ Data Response, A4NR_002, p. 4, Question 07.

1 Temporary Utility debt over the projected five-year period and regain a closer alignment
2 between aggregate utility debt and the amount of recoverable utility debt.”²⁹

3 For these reasons, CUE recommends that the Commission exclude the securitized debt
4 from PG&E’s ratemaking capital structure.

5 **VII. THE COMMISSION SHOULD ACT SWIFTLY TO APPROVE**
6 **PG&E’S PROPOSED TRANSACTION**

7 An unnecessary delay in approving PG&E’s proposed transaction would decrease its
8 benefits to customers. As discussed above, every dollar is urgently needed for California to meet
9 its decarbonization goals at an affordable cost. CUE urges the Commission to act swiftly to
10 approve PG&E’s proposed transaction.

²⁹ D.20-05-053, p. 92.

ATTACHMENT A

ROBERT EARLE, PH.D.

Dr. Earle is an economist with extensive experience in the energy, telecomm, and finance sectors including valuation, environmental mitigation methods and costs, and regulatory economics. Having worked as a consultant as well as an industry manager, he currently supports clients in analyzing market opportunities, strategy, regulatory issues, and litigation. His areas of expertise include electric power sector modeling, economics of environmental mitigation, electric power and gas markets, regulatory policy and ratemaking, demand response, and system optimization.

Dr. Earle has also worked extensively on tariff and market design, including as an expert witness before a number of regulatory commissions. He was the architect of an economic model used to evaluate alternative methods for environmental mitigation including BPM/BACT technology, incentives, and markets. Results from this work were used in numerous studies for investment decisions, policy studies, and litigation.

Dr. Earle was manager of economic analysis at the California Power Exchange where his responsibilities included developing an overall analytic infrastructure for market analysis, analysis of new products, and briefing regulatory and legislative bodies. Dr. Earle holds Ph.D. and M.S. degrees in Operations Research, both from Stanford University.

EDUCATION

- Ph.D. Operations Research, Stanford University
- M.S. Operations Research, Stanford University
- A.B. Mathematics, the College of William & Mary

REPRESENTATIVE PAST EXPERIENCE

Electricity Sector Structure and Regulation

- Advised in the development of transmission strategy for several renewables companies in the United States and Canada (wind and biomass) including analysis of transmission access, planning, cost allocation and siting conditions in regions in North America.
- Developed transmission pricing structure for Saudi Electric Company.
- Advised clients in Canada, the Middle East, and the United States on transmission pricing structures.
- Conducted numerous demand response potential and valuation studies for utilities across the United States.
- Analyzed energy efficiency potential in the Southeast for environmental and ratepayer advocates.
- Provided expert testimony on energy efficiency incentives for Oklahoma Gas & Electric.
- Led analysis for Midwest ISO of wholesale market interface with demand response.

Bidding/Auction Design and Analysis, Market Modeling

- Conducted detailed studies of participant bidding behavior for the purpose of product development, policy changes, and investigations. The results of these studies were used to establish standard

methodologies for staff to use. In addition, Dr. Earle invented new techniques for characterizing bids to examine product ideas and various alternative market structures.

- Led the development of a new type of multivariate statistical model to track market changes and rigorously assess auction participant behavior. Reflecting the auction structure, this model uniquely codetermined all prices at the same time. To do this, a number of new statistical techniques were created.
- Advised two merging companies needing advice on divestiture of their generation assets with respect to both asset value and issues of strategic behavior. For this purpose, Dr. Earle designed and implemented an oligopoly simulation of the market. This game theoretic model explicitly represents company strategies and interactions in the marketplace. Dr. Earle's findings were used to shape the decisions of the investment bank in selling the merged companies' assets and win regulatory approval.

Environment

- Architect of economic model used to evaluate alternative methods for environmental mitigation including BPM/BACT technology, incentives, and markets. Results from this work were used in numerous studies for investment decisions, policy studies, and litigation.
- Advised clients on approaches to environmental mitigation in the oil, electric power, and water sectors.
- Managed a 2-year project to develop a carbon mitigation strategy for a major country in the Middle East.
- Managed a successful water privatization for a city of five million where environmental concerns formed a key part of the privatization effort.

Valuation of Assets, Market Strategies

- For the Electric Power Research Institute (EPRI), developed a methodology for the valuation of alternative market strategies for hydroelectric power plants using stochastic dynamic programming. The changing dynamics of the electricity market, in particular the structure of electricity prices, may have significant implications for the value of a technology that can store energy and release it according to market conditions, thereby leading to a premium value for such resources. The methodology Dr. Earle developed was published in an EPRI report.
- Assessed the impact of market structure changes on plant value that resulted in the restructuring of a bid for generation assets.
- As a result of reorganization, a utility company needed help in valuation of its load management technology and program. At the time, its program was one of the top five in the United States. Dr. Earle directed a team to conduct market research on this technology and teach a class on its current status. As a follow-on, Dr. Earle acted as a facilitator to the client in their development of a valuation methodology. This project resulted in the client deciding to phase-out its efforts in this area.

Corporate Strategy

- In preparation for deregulation of the generation sector in the power industry, Dr. Earle co-led a team to formulate valuation and corporate asset deployment strategies for a \$5 billion southeastern utility. The various options considered included: asset spin-off, divestiture, mergers, and acquisitions. Different scenarios implied different trade-offs among the business units of the company. This required extensive financial modeling of the various options and sensitivity to the client's cultural

issues in order to reach a unified decision. These recommendations were adopted by the board as the basis for ongoing company strategy.

- Conducted market research for a company that was considering starting an energy brokerage in California. Key issues investigated were market size and structure, first mover advantage, and risk. As a result of this work, the company selected an effective start-up strategy for its new operation in California.
- Reporting to the CEO, co-negotiated a settlement calculation involving a billion dollars. Co-wrote the filing implementing the settlement and then coordinated its implementation through the IT and settlements process.

EXPERT TESTIMONY

- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning the Southern California Edison's Application for Wildfire Cost Securitization.
- Before the Washington Utilities and Transportation Commission, on behalf of the Attorney General of the State of Washington, concerning power costs and interjurisdictional allocation in the PacifiCorp 2021 General Rate Case.
- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning the Southern California Edison 2021 General Rate Case.
- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning Major Updates to the Avoided Cost Calculator.
- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning the Pacific Gas & Electric Gas 2020 General Rate Case.
- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning the Pacific Gas & Electric Gas Transmission and Storage Rate Case.
- Before the California Public Utilities Commission, on behalf of the Coalition of California Utility Employees, concerning the Power Charge Indifference Adjustment.
- Before the Ohio Public Utilities Commission, on behalf of FirstEnergy, concerning the market for renewable energy credits.
- Before the District Court in Dallas, Texas, on behalf of O Mart, submitted an expert affidavit concerning the appropriate method to value a breach of an electric power purchase contract.
- Before the Superior Court of California in Los Angeles County, on behalf of several municipal utilities, submitted two expert reports on the structure of California electricity markets and on certain transactions in the California electricity marketplace.
- Before the Oklahoma Corporation Commission, on behalf of Oklahoma Gas & Electric, concerning cost recovery and shareholder incentives for DSM programs.
- Before the Public Utilities Commission of Texas, on behalf of El Paso Electric, concerning the capacity value of certain electric power contracts in a fuel cost reconciliation proceeding.
- Before the Federal Energy Regulatory Commission, on behalf of El Paso Electric, concerning the effect of certain power market transactions on California and western markets and the effect of information sharing on California markets.

- Before the New Brunswick Public Utilities Board, on behalf of J.D. Irving, Ltd. and the Canadian Manufacturers and Exporters, concerning the transmission tariff application by New Brunswick Power.

PUBLICATIONS AND PRESENTED PAPERS

“Attack of zombie companies: don’t let them eat bailouts that are vital to restore the economy,” with Jung Park and Karl Schmedders, *the Conversation*, June 2, 2020, republished in *The National Interest*.

“Coronavirus: the economic recovery won’t only be U-shaped – it’ll look like a wheelbarrow,” with Jung Park and Karl Schmedders, *the Conversation*, April 14, 2020, republished in *World Economic Forum Agenda* and *The National Interest*.

“Spectrum Auctions Around the World: An Assessment of International Experiences with Auction Restrictions”, with David W. Sosa, July 2013, prepared for Mobile Future.

“Hydraulic Fracturing: the regulatory year in review,” *Oil and Gas Financial Journal*, January 2012, Vol. 9, No. 1.

“How not to improve surface water quality,” with Virginia Perry-Failor, *Regulation*, Fall 2010, Cato Institute Press.

“The Costs of Compliance to EPA’s Advance Notice of Proposed Rulemaking on the PCB Use Authorization for Interstate Natural Gas Pipelines,” with Susan Tierney, prepared on behalf of the Interstate Natural Gas Association of America (“INGAA”), September 10, 2010.

“Demand Response on Steroids: Extra Value from using the Smart Grid?,” *Natural Gas and Electricity*, February 2010.

“Measuring the Capacity Impacts of Demand Response,” with Ed Kahn and Edo Macan, *Electricity Journal*, June 2009.

“Ethanol 2.0,” with Ahmad Faruqi, *Regulation*, Winter 2008, Cato Institute Press.

“Fostering Economic Demand Response in the Midwest ISO,” with Sam Newell, Ahmad Faruqi, Attila Hajos, and Ryan Hledik, prepared for the Midwest ISO, December 30, 2008.

“Transforming America’s Power Industry: The Investment Challenge 2010-2030,” with Mark Chupka, Peter Fox-Penner, and Ryan Hledik, prepared for the Edison Foundation, November 2008.

“The Role of Expectations in Modeling Costs of Climate Change Policies,” with Paul Bernstein and David Montgomery, to appear in *Integrated Assessment of Human-induced Climate Change*, Cambridge University Press, 2007.

“On Price Caps under Uncertainty,” with Karl Schmedders and Tymon Tatur, *Review of Economic Studies*, January 2007.

“Demand Response and Advance Metering,” with Ahmad Faruqi, *Regulation*, The Cato Institute, Spring 2006.

“Toward a New Paradigm for Valuing Demand Response,” with Ahmad Faruqi, *The Electricity Journal*, May 2006.

“Rate Case Mania,” with Ahmad Faruqi, *Public Utilities Fortnightly*, February 2006.

“Controlling the Thirst for Demand,” with Anees Azzouni and Ahmad Faruqi, *Middle East Economic Digest*, December 2, 2005.

“Reforming Electricity Pricing in the Middle East,” with Anees Azzouni and Ahmad Faruqui, *Middle East Economic Survey*, December 5, 2005.

“Ontario Demand-Supply Balance Update: Where will the hot trading occur?,” Interjurisdictional Power Transaction Conference, The Canadian Institute, Toronto, invited talk, April 8, 2002.

“Price Caps and Uncertain Demand,” with Karl Schmedders and Tymon Tatur, Discussion Paper #1340, CMS-EMS: The Center for Mathematical Studies in Economics and Management Sciences, Kellogg School of Management, Northwestern University, March 6, 2002.

“Demand Uncertainty and Risk-Aversion: Why Price Caps May Lead to Higher Prices,” with Karl Schmedders, Discussion Paper #1330, CMS-EMS: The Center for Mathematical Studies in Economics and Management Sciences, Kellogg School of Management, Northwestern University, October 2, 2001.

“Demand Elasticity in the California Day-Ahead Market,” *Electricity Journal*, October 2000.

“Electric Power Deregulation and Market Monitoring,” with Philip Q. Hanser and James D. Reitzes, *Electricity Journal*, October 2000.

“How Many Firms Are Enough?—Deregulating Electric Generation,” with Philip Q. Hanser and James D. Reitzes, Western Economic Association Conference, Vancouver, B.C., July 2000.

“Review of Price Behavior in the California Power Exchange,” Western Power Trading Forum, invited talk, May 2000.

“Electric Power Restructuring: Industrial Organization,” Department of Management and Strategy, Kellogg School of Management, Northwestern University, invited talk, April 26, 2000.

“Reply to Borenstein and Bushnell,” with Philip Q. Hanser and James D. Reitzes, *Electricity Journal*, March 2000.

“Market Power Basics,” IEEE Los Angeles Chapter, invited talk, March 14, 2000.

“Lessons from the Early Days of Competition in California,” with Philip Q. Hanser, Weldon C. Johnson, and James D. Reitzes, *Electricity Journal*, October 1999.

“Optionality in Energy and Ancillary Services Markets,” with Jason A. Hicks, Deregulation Progress Report: Issues and Insights Conference, invited talk, August 4, 1999.

“Measuring Market Power: Back to the Basics,” with Jason A. Hicks, invited talk, Deregulation Progress Report: Issues and Insights Conference, August 4, 1999.

Mechanisms for Evaluating the Role of Hydroelectric Generation in Ancillary Services Markets, with R.P. Broehm, F.C. Graves, T.J. Jenkin, and D.M. Murphy, EPRI, Palo Alto, CA: 1998. Report TR-111707.

“Power Market Price Forecasting: Pitfalls and Unresolved Issues,” with Frank C. Graves and Philip Q. Hanser, *USAEE/IAEE Annual North American Conference Proceedings*, October 1998.

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