

## **Robert McCullough – *Curriculum Vitae***

*Principal*

*McCullough Research, 3816 S.E. Woodstock Place, Portland, OR 97202 USA*

### **Professional Experience**

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| 1985-present | Principal, McCullough Research: provide strategic planning assistance, litigation support, and planning for a variety of customers in energy, regulation, and primary metals                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 1996-present | Adjunct Professor, Economics, Portland State University                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 1990-1991    | Director of Special Projects and Assistant to the Chairman of the Board, Portland General Corporation: conducted special assignments for the Chairman in the areas of power supply, regulation, and strategic planning                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 1988-1990    | Vice President in Portland General Corporation's bulk power marketing utility subsidiary, Portland General Exchange: primary negotiator on the purchase of 550 MW transmission and capacity package from Bonneville Power Administration; primary negotiator of PGX/M, PGC's joint venture to establish a bulk power marketing entity in the Midwest; negotiated power contracts for both supply and sales; coordinated research function                                                                                                                                                                                                                                                                                                                                                                |
| 1987-1988    | Manager of Financial Analysis, Portland General Corporation: responsible for M&A analysis, restructuring planning, and research support for the financial function; reported directly to the CEO on the establishment of Portland General Exchange; team member of PGC's acquisitions task force; coordinated PGC's strategic planning process; transferred to the officer's merit program as a critical corporate manager                                                                                                                                                                                                                                                                                                                                                                               |
| 1981-1987    | Manager of Regulatory Finance, Portland General Electric: responsible for a broad range of regulatory and planning areas, including preparation and presentation of PGE's financial testimony in rate cases in 1980, 1981, 1982, 1983, 1985, and 1987 before the Oregon Public Utilities Commission; responsible for preparation and presentation of PGE's wholesale rate case with Bonneville Power Administration in 1980, 1981, 1982, 1983, 1985, and 1987; coordinated activities at BPA and FERC on wholesale matters for the InterCompany Pool (the association of investor-owned utilities in the Pacific Northwest) since 1983; created BPA's innovative aluminum tariffs (adopted by BPA in 1986); led PGC activities, reporting directly to the CEO and CFO on a number of special activities, |

including litigation and negotiations concerning WPPSS, the Northwest Regional Planning Council, various electoral initiatives, and the development of specific tariffs for major industrial customers; member of the Washington Governor's Task Force on the Vancouver Smelter (1987) and the Washington Governor's Task Force on WPPSS Refinancing (1985); member of the Oregon Governor's Work Group On Extra-Regional Sales (1983); member of the Advisory Committee to the Northwest Regional Planning Council (1981)

1979-1980

Economist, Rates and Revenues Department, Portland General Electric: responsible for financial and economic testimony in the 1980 general case; coordinated testimony in support of the creation of the DRPA (Domestic and Rural Power Authority) and was a witness in opposition to the creation of the Columbia Public Utility District in state court; member of the Scientific and Advisory Committee to the Northwest Regional Power Planning Council

### **Economic Consulting**

2016-present

Expert witness to the U.S. Department of Justice on nuclear rate case

2016-present

Advisor to the City of Logansport on utility project development and decision-making

2016

Expert testimony for Gratl and Company before the Supreme Court of British Columbia on costs of Site C project delay

2015-present

Advisor to Huu-ay-aht tribe on Sarita Bay LNG project in British Columbia

2015-present

Analysis and expert testimony for Illinois Attorney General in official FERC complaint against MISO

2015-present

Advisor to Calbag Metals on generation project

2015-2016

Advisor to Oregon Department of Justice in the investigation of taxes owed the state by Powerex Corp.

2015

Economic analysis of the proposed 1100 MW hydro project, Site C, for the Peace Valley Landowner Association

2014-2015

Market analysis of the NYISO for the New York State Assembly

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| 2014         | Advisor to the Grand Council of the Cree on uranium mining in Quebec                                                                          |
| 2014-present | Support for the investigation of Barclays Bank                                                                                                |
| 2013-present | Retained to do a business case analysis of the Columbia Generating Station by the Physicians for Social Responsibility                        |
| 2013         | Advisor to Environmental Defense Fund on gasoline and oil issues in California                                                                |
| 2013         | Advisor to Energy Foundation on Ohio competitive issues                                                                                       |
| 2013         | Export market review in the Maritime Link proceeding                                                                                          |
| 2011         | Consultant to Citizens Action Coalition of Indiana on Indiana Gasification LLC project                                                        |
| 2010         | Analysis and expert witness testimony for Block Island Intervenors concerning Deepwater offshore wind project                                 |
| 2010         | Analysis for Eastern Environmental Law Center of 25 closed cycle plants in New York State                                                     |
| 2010         | Advisor on BPA transmission line right of way issues                                                                                          |
| 2009-2010    | Advisor to Gamesa USA on a marketing plan to promote a wind farm in the Pacific Northwest                                                     |
| 2009-2010    | Expert witness in City of Alexandria vs. Cleco                                                                                                |
| 2009         | Expert witness in City of Beaumont v. Entergy                                                                                                 |
| 2008-2009    | Consultant to AARP Connecticut and Texas chapters on the need for a state power authority (Connecticut) and balancing energy services (Texas) |
| 2008         | Expert witness on trading and derivative issues in Barrick Gold litigation                                                                    |
| 2008-2014    | Advisor to Jackson family in Pelton/Round Butte dispute                                                                                       |
| 2007-2014    | Advisor to the American Public Power Association on administered markets                                                                      |
| 2006-present | Advisor to the Illinois Attorney General on electric restructuring issues                                                                     |

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| 2006-2007 | Advisor to the City of Portland in the investigation of Portland General Electric                               |
| 2006      | Expert witness for Lloyd's of London in SECLP insurance litigation                                              |
| 2005-2007 | Expert witness for Federated Rural Electric Insurance Company and TIG Insurance in Cowlitz insurance litigation |
| 2005-2007 | Advisor to Grays Harbor PUD on market manipulation                                                              |
| 2005-2007 | Advisor to the Montana Attorney General on market manipulation                                                  |
| 2005-2006 | Expert witness for Antara Resources in Enron litigation                                                         |
| 2005-2006 | Advisor to Utility Choice Electric                                                                              |
| 2004-2005 | Expert witness for Factory Mutual in Northwest Aluminum litigation                                              |
| 2004      | Advisor to the Oregon Department of Justice on market manipulation                                              |
| 2003-2006 | Expert witness for Texas Commercial Energy                                                                      |
| 2003-2004 | Advisor to The Energy Authority                                                                                 |
| 2002-2005 | Advisor to the U.S. Department of Justice on market manipulation issues                                         |
| 2002-2004 | Expert witness for Alcan in Powerex arbitration                                                                 |
| 2002-2003 | Expert witness for Overton Power in IdaCorp Energy litigation                                                   |
| 2002-2003 | Expert witness for Stanislaus Food Products                                                                     |
| 2002      | Advisor to VHA Pennsylvania on power purchasing                                                                 |
| 2002      | Expert witness for Sierra Pacific in Enron litigation                                                           |
| 2002-2004 | Advisor to U.S. Department of Justice                                                                           |
| 2002-2007 | Expert witness for Snohomish PUD in Enron litigation                                                            |

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| 2002-2010 | Expert witness for Snohomish in Morgan Stanley investigation                                                                                         |
| 2001-2008 | Expert witness for City of Seattle, Seattle City Light and City of Tacoma in FERC's EL01-10 refund proceeding                                        |
| 2001-2008 | Advisor to VHA Southwest on power purchasing                                                                                                         |
| 2001-2005 | Advisor to Nordstrom                                                                                                                                 |
| 2001-2005 | Advisor to Steelscape Steel on power issues in Washington and California                                                                             |
| 2001      | Advisor to California Steel on power purchasing                                                                                                      |
| 2001      | Advisor to the California Attorney General on market manipulations in the Western Systems Coordinating Council power markets                         |
| 2000-2007 | Expert witness for Wah Chang in PacifiCorp litigation                                                                                                |
| 2000-2001 | Expert witness for Southern California Edison in Bonneville Power Administration litigation                                                          |
| 2000-2001 | Advisor to Blue Heron Paper on West Coast price spikes                                                                                               |
| 2000      | Expert witness for Georgia Pacific and Bellingham Cold Storage in the Washington Utilities and Transportation Commission's proceeding on power costs |
| 1999-2002 | Advisor to Bayou Steel on alternative energy resources                                                                                               |
| 1999-2000 | Expert witness for the Large Customer Group in PacifiCorp's general rate case                                                                        |
| 1999-2000 | Expert witness for Tacoma Utilities in WAPA litigation                                                                                               |
| 1999-2000 | Advisor for Nucor Steel and Geneva Steel on PacifiCorp's power costs                                                                                 |
| 1999-2000 | Advisor to Abitibi-Consolidated on energy supply issues                                                                                              |
| 1999      | Expert report for the Center Helios on Freedom of Information in Québec                                                                              |
| 1999      | Advisor to GTE regarding Internet access in competitive telecommunication markets                                                                    |

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| 1999      | Advisor to Logansport Municipal Utilities                                                                                                              |
| 1998-2001 | Advisor to Edmonton Power on utility plant divestiture in Alberta                                                                                      |
| 1998-2001 | Energy advisor for Boise Cascade                                                                                                                       |
| 1998-2000 | Advisor to California Steel on power purchasing                                                                                                        |
| 1998-2000 | Advisor to Nucor Steel on power purchasing and transmission negotiations                                                                               |
| 1998-2000 | Advisor to Cominco Metals on the sale of hydroelectric dams in British Columbia                                                                        |
| 1998-2000 | Advisor to the Betsiamites on the purchase of hydroelectric dams in Québec                                                                             |
| 1998-1999 | Advisor to the Illinois Chamber of Commerce concerning the affiliate electric and gas program                                                          |
| 1998      | Intervention in Québec's first regulatory proceeding on behalf of the Grand Council of the Cree                                                        |
| 1998      | Market forecasts for Montana Power's restructuring proceeding                                                                                          |
| 1997-2004 | Expert witness for Alcan in BC Hydro litigation                                                                                                        |
| 1997-2003 | Advisor to the Manitoba Cree on energy issues in Manitoba, Minnesota and Québec; Advisor to the Grand Council of the Cree on hydroelectric development |
| 1997-1999 | Advisor to the Columbia River Intertribal Fish Commission on Columbia fish and wildlife issues                                                         |
| 1997-1998 | Advisor to Port of Morrow regarding power marketing with respect to existing gas turbine plant                                                         |
| 1997-1998 | Expert witness for Tenaska in BPA litigation                                                                                                           |
| 1997      | Advisor to Kansai Electric on restructuring in the electric power industry (with emphasis on the California markets)                                   |
| 1996-1997 | Bulk power purchasing for the Association of Bay Area Cities                                                                                           |
| 1996-1997 | Advisor to Texas Utilities on industrial issues                                                                                                        |

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| 1996-1997 | Expert witness for March Point Cogeneration in Puget Sound Power and Light litigation                                                                                                                                                          |
| 1996      | Advisor to Longview Fibre on contract issues                                                                                                                                                                                                   |
| 1995-2000 | Bulk power supplier for several Pacific Northwest industrials                                                                                                                                                                                  |
| 1995-1999 | Advisor to Seattle City Light on industrial contract issues                                                                                                                                                                                    |
| 1995-1997 | Advisor to Tacoma Utilities on contract issues                                                                                                                                                                                                 |
| 1995-1996 | Expert witness for Tacoma Utilities in WAPA litigation                                                                                                                                                                                         |
| 1994-1995 | Advisor to Idaho Power on Southwest Intertie Project marketing                                                                                                                                                                                 |
| 1993-2001 | Northwest representative for Edmonton Power                                                                                                                                                                                                    |
| 1993-1997 | Expert witness for MagCorp in PacifiCorp litigation                                                                                                                                                                                            |
| 1992-1995 | Advisor to Citizens Energy Corporation                                                                                                                                                                                                         |
| 1992-1994 | Negotiator on proposed Bonneville Power Administration aluminum contracts                                                                                                                                                                      |
| 1992      | Bulk power marketing advisor to Public Service of Indiana                                                                                                                                                                                      |
| 1991-2000 | Strategic advisor to the Chairman of the Board, Portland General Corporation                                                                                                                                                                   |
| 1991-1993 | Chairman of the Investor Owned Utilities' (ICP) committee on BPA financial reform                                                                                                                                                              |
| 1991-1992 | Financial advisor on the 'Trojan owners' negotiation team                                                                                                                                                                                      |
| 1991      | Advisor to Shasta Dam PUD on the California Oregon Transmission Project and related issues                                                                                                                                                     |
| 1990-1991 | Advised the Chairman of the Illinois Commerce Commission on issues pertaining to the 1990 General Commonwealth Rate Proceeding; prepared an extensive analysis of the bulk power marketing prospects for Commonwealth in ECAR and MAIN         |
| 1988      | Facilitated the settlement of Commonwealth Edison's 1987 general rate case and restructuring proposal for the Illinois Commerce Commission; reported directly to the Executive Director of the Commission; responsibilities included financial |

advice to the Commission and negotiations with Commonwealth and interveners

1987-1988      Created the variable aluminum tariff for Big Rivers Electric Corporation: responsibilities included testimony before the Kentucky Public Service Commission and negotiations with BREC's customers (the innovative variable tariff was adopted by the Commission in August 1987); supported negotiations with the REA in support of BREC's bailout debt restructuring

1981-1989      Consulting projects including: financial advice for the Oregon AFL-CIO; statistical analysis of equal opportunity for Oregon Bank; cost of capital for the James River dioxin review; and economic analysis of qualifying facilities for Washington Hydro Associates

1980-1986      Taught classes in senior and graduate forecasting, micro-economics, and energy at Portland State University

## **Education**

Unfinished Ph.D.      Economics, Cornell University; Teaching Assistant in micro- and macro-economics

M.A.      Economics, Portland State University, 1975; Research Assistant

B.A.      Economics, Reed College, 1972; undergraduate thesis, "Eurodollar Credit Creation"

Areas of specialization include micro-economics, statistics, and finance

## **Papers and Publications**

February 28, 2017      "My View: Trade tariffs would hurt Americans", *The Portland Tribune*

January 8, 2017      "Many lives of Jordan Cove may have come to an end", *The Oregonian*

July 22, 2016      "Balancing an aging Hanford nuke plant against cheaper firm market power purchases", *The Oregonian*

July 7, 2016      "More roads needed to handle growth", *The Portland Tribune*

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|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| July 7, 2016      | “Close the expensive Columbia Generating Station”, <i>The Oregonian</i>                                                                                             |
| June 29, 2016     | “Our future is in green energy, not aging, costly nuclear plants”, <i>The Seattle Times</i>                                                                         |
| May 12, 2016      | “Diesel tax on heavy trucks is the right move”, <i>The Portland Tribune</i>                                                                                         |
| May 2016          | “Aspirational Planning: A Statistical Model of Hawthorne Bridge and Tilikum Crossing Bicycle Ride Counts”, <i>Hatfield Graduate Journal of Public Affairs</i> 1(1). |
| January 19, 2016  | “A good time for a sensibly managed Portland gas tax”, <i>The Oregonian</i>                                                                                         |
| October 15, 2015  | “A plan to fix Portland's roads”, <i>The Portland Oregonian</i>                                                                                                     |
| June 2015         | “Estimating the Longevity of Commercial Nuclear Reactors”, <i>Public Utilities Fortnightly</i>                                                                      |
| December 2014     | “Nuclear Winter”, <i>Electricity Policy</i>                                                                                                                         |
| July 2013         | “Mid-Columbia Spot Markets and the Renewable Portfolio Standard”, <i>Public Utilities Fortnightly</i>                                                               |
| April 14, 2013    | “Selling Low and Buying High”, <i>The Oregonian</i>                                                                                                                 |
| December 2012     | “Are Electric Vehicles Actually Cost-Effective?”, <i>Electricity Policy</i>                                                                                         |
| November 30, 2012 | “Portland’s Energy Credits: The trouble with buying ‘green’”, <i>The Oregonian</i>                                                                                  |
| July 2009         | “Fingerprinting the Invisible Hand”, <i>Public Utilities Fortnightly</i>                                                                                            |
| February 2008     | Co-author, “The High Cost of Restructuring”, <i>Public Utilities Fortnightly</i>                                                                                    |
| March 27, 2006    | Co-author, “A Decisive Time for LNG”, <i>The Daily Astorian</i>                                                                                                     |
| February 9, 2006  | “Opening the Books”, <i>The Oregonian</i>                                                                                                                           |
| August 2005       | “Squeezing Scarcity from Abundance”, <i>Public Utilities Fortnightly</i>                                                                                            |
| April 1, 2002     | “The California Crisis: One Year Later”, <i>Public Utilities Fortnightly</i>                                                                                        |

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|------------------|----------------------------------------------------------------------------------------------------------------------------|
| March 13, 2002   | “A Sudden Squall”, <i>The Seattle Times</i>                                                                                |
| March 1, 2002    | “What the ISO Data Says About the Energy Crisis”, <i>Energy User News</i>                                                  |
| February 1, 2001 | “What Oregon Should Know About the ISO”, <i>Public Utilities Fortnightly</i>                                               |
| January 1, 2001  | “Price Spike Tsunami: How Market Power Soaked California”, <i>Public Utilities Fortnightly</i>                             |
| March 1999       | “Winners & Losers in California”, <i>Public Utilities Fortnightly</i>                                                      |
| July 15, 1998    | “Are Customers Necessary?”, <i>Public Utilities Fortnightly</i>                                                            |
| March 15, 1998   | “Can Electricity Markets Work Without Capacity Prices?”, <i>Public Utilities Fortnightly</i>                               |
| February 1998    | “Coping with Interruptibility”, <i>Energy Buyer</i>                                                                        |
| January 1998     | “Pondering the Power Exchange”, <i>Energy Buyer</i>                                                                        |
| December 1997    | “Getting There Is Half the Cost: How Much Is Transmission Service?”, <i>Energy Buyer</i>                                   |
| November 1997    | “Is Capacity Dead?”, <i>Energy Buyer</i>                                                                                   |
| October 1997     | “Pacific Northwest: An Overview”, <i>Energy Buyer</i>                                                                      |
| August 1997      | “A Primer on Price Volatility”, <i>Energy Buyer</i>                                                                        |
| June 1997        | “A Revisionist’s History of the Future”, <i>Energy Buyer</i>                                                               |
| Winter 1996      | “What Are We Waiting for?” <i>Megawatt Markets</i>                                                                         |
| October 21, 1996 | “Trading on the Index: Spot Markets and Price Spreads in the Western Interconnection”, <i>Public Utilities Fortnightly</i> |

### **McCullough Research Reports**

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| February 15, 2017 | “Replacing the Columbia Generating Station with Renewable Energy”                                    |
| November 14, 2016 | “Review of ‘Economic Analysis of Proposed Changes to the Single Dwelling Zone Development Standard’” |

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| October 5, 2016    | "The Falling Price of Renewable Energy Relative to Conventional Generation"                                         |
| October 3, 2016    | "Statistical Evidence on the Increase in Portland Home Values Correlated with Historic Districts"                   |
| September 5, 2016  | "Why are House Prices so high in the Portland Metropolitan Area?"                                                   |
| July 8, 2016       | "Historic District Econometric Literature Review"                                                                   |
| June 21, 2016      | "Columbia Generating Station (CGS) Market Update"                                                                   |
| November 19, 2015  | "Market Cost of the Columbia Generating Station During the FY 2014/2015 Refueling Cycle"                            |
| September 30, 2015 | "Decrypting New York's "Secret" Electric Bids"                                                                      |
| September 9, 2015  | "Market Power in West Coast Gasoline Markets: September Update"                                                     |
| September 8, 2015  | "August 10, 2015 PADD 2 Gasoline Spike at BP Whiting's Pipestill 12"                                                |
| July 23, 2015      | "Market Power in West Coast Gasoline Markets: July Update"                                                          |
| June 23, 2015      | "Market Power in West Coast Gasoline Markets: June Update"                                                          |
| May 25, 2015       | "Site C Business Case Assumptions Review"                                                                           |
| April 7, 2015      | "2015 Paducah Update"                                                                                               |
| April 6, 2015      | "Market Power in West Coast Gasoline Markets: April Update"                                                         |
| March 23, 2015     | "Market Power in West Coast Gasoline Markets"                                                                       |
| March 20, 2015     | "Daniel Poneman and the Paducah Transaction"                                                                        |
| January 2, 2015    | "Data and Methodological Errors in the Portland Commercial Street Fee"                                              |
| December 15, 2014  | Report to the Bureau d'audiences publiques sur l'environnement (BAPE), "Uranium Mining in Quebec: Four Conclusions" |
| February 11, 2014  | "Energy Northwest's Revised Analysis of the Paducah Fuels Transaction"                                              |

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|-------------------|------------------------------------------------------------------------------------------------------------------|
| January 25, 2014  | "Energy Northwest Losses in the 2013 Forward Purchase of Nuclear Fuel"                                           |
| January 2, 2014   | "Review of the November 2013 Energy Northwest Study"                                                             |
| December 11, 2013 | "Economic Analysis of the Columbia Generating Station"                                                           |
| February 21, 2013 | "McCullough Research Rebuttal to Western States Petroleum Association"                                           |
| November 15, 2012 | "May and October 2012 Gasoline Price Spikes on the West Coast"                                                   |
| June 5, 2012      | "Analysis of West Coast Gasoline Prices"                                                                         |
| October 3, 2011   | "Lowering Florida's Electricity Prices"                                                                          |
| July 14, 2011     | "2011 ERCOT Blackouts and Emergencies"                                                                           |
| March 1, 2010     | "Translation" of the September 29, 2008 NY Risk Consultant's Hydraulics Report to Manitoba Hydro CEO Bob Brennan |
| December 2, 2009  | "Review of the ICF Report on Manitoba Hydro Export Sales"                                                        |
| June 5, 2009      | "New York State Electricity Plants' Profitability Results"                                                       |
| May 5, 2009       | "Transparency in ERCOT: A No-cost Strategy to Reduce Electricity Prices in Texas"                                |
| April 7, 2009     | "A Forensic Analysis of Pickens' Peak: Speculation, Fundamentals or Market Structure"                            |
| March 30, 2009    | "New Yorkers Lost \$2.2 Billion Because of NYISO Practices"                                                      |
| March 3, 2009     | "The New York Independent System Operator's Market-Clearing Price Auction is Too Expensive for New York"         |
| February 24, 2009 | "The Need for a Connecticut Power Authority"                                                                     |
| January 7, 2009   | "Review of the ERCOT December 18, 2008 Nodal Cost Benefit Study"                                                 |
| August 6, 2008    | "Seeking the Causes of the July 3rd Spike in World Oil Prices" (updated September 16, 2008)                      |
| April 7, 2008     | "Kaye Scholer's Redacted 'Analysis of Possible Complaints Relating to Maryland's SOS Auctions'"                  |

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|--------------------|------------------------------------------------------------------------------------------------------------------------|
| February 1, 2008   | “Some Observations on Societe Generale’s Risk Controls”                                                                |
| June 26, 2007      | “Looking for the ‘Voom’: A Rebuttal to Dr. Hogan’s ‘Acting in Time: Regulating Wholesale Electricity Markets’”         |
| September 26, 2006 | “Did Amaranth Advisors, LLC Attempt to Corner the March 2007 NYMEX at Henry Hub?”                                      |
| May 18, 2006       | “Developing a Power Purchase/Fuel Supply Portfolio: Energy Strategies for Cities and Other Public Agencies”            |
| April 12, 2005     | “When Oil Prices Rise, Using More Ethanol Helps Save Money at the Gas Pump”                                            |
| April 12, 2005     | “When Farmers Outperform Sheiks: Why Adding Ethanol to the U.S. Fuel Mix Makes Sense in a \$50-Plus/Barrel Oil Market” |
| April 12, 2005     | “Enron’s Per Se Anti-Trust Activities in New York”                                                                     |
| February 15, 2005  | “Employment Impacts of Shifting BPA to Market Pricing”                                                                 |
| June 28, 2004      | “Reading Enron’s Scheme Accounting Materials”                                                                          |
| June 5, 2004       | “ERCOT BES Event”                                                                                                      |
| August 14, 2003    | “Fat Boy Report”                                                                                                       |
| May 16, 2003       | “CERA Decision Brief”                                                                                                  |
| January 16, 2003   | “California Electricity Price Spikes”                                                                                  |
| November 29, 2002  | “C66 and Artificial Congestion Transmission in January 2001”                                                           |
| August 17, 2002    | “Three Days of Crisis at the California ISO”                                                                           |
| July 9, 2002       | “Market Efficiencies”                                                                                                  |
| June 26, 2002      | “Senate Fact Sheet”                                                                                                    |
| June 5, 2002       | “Congestion Manipulation”                                                                                              |
| May 5, 2002        | “Enron’s Workout Plan”                                                                                                 |
| March 31, 2002     | “A History of LJM2”                                                                                                    |
| February 2, 2002   | “Understanding LJM”                                                                                                    |

January 22, 2002                      “Understanding Whitewing”

**Testimony and Comment**

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| December 14, 2016  | Testimony to the U.S. Court of Federal Claims on behalf of the U.S. Department of Justice regarding nuclear rate case                                                                                                                    |
| February 10, 2016  | Testimony before the Supreme Court of British Columbia on the costs and benefits of delaying Site C dam                                                                                                                                  |
| August 24, 2015    | Testimony to the New York State Public Service Commission on behalf of the New York State Legislative Assembly                                                                                                                           |
| May 29, 2015       | Testimony before the Federal Energy Regulatory Commission on behalf of Illinois Attorney General Lisa Madigan                                                                                                                            |
| December 15, 2014  | Testimony before the Bureau d’audiences publiques sur l’environnement (BAPE) in Quebec, “Uranium Mining in Quebec: Four Conclusions”                                                                                                     |
| November 15, 2012  | Testimony before the California State Senate Select Committee on Bay Area Transportation on West Coast gasoline price spikes in 2012                                                                                                     |
| July 20, 2010      | Testimony before the Rhode Island Public Utility Commission on the Deepwater offshore wind project                                                                                                                                       |
| April 7, 2009      | Testimony before the U.S. Senate Committee on Energy and Natural Resources on “Pickens’ Peak”                                                                                                                                            |
| March 5, 2009      | Testimony before the New York Assembly Committee on Corporations, Authorities and Commissions, and the Assembly Committee on Energy, “New York Independent System Operators Market Clearing Price Auction is Too Expensive for New York” |
| February 24, 2009  | Testimony before the Energy and Technology Committee, Connecticut General Assembly, “An Act Establishing a Public Power Authority” on behalf of AARP                                                                                     |
| September 16, 2008 | Testimony before the U.S. Senate Committee on Energy and Natural Resources, “Depending On 19th Century Regulatory Institutions to Handle 21st Century Markets”                                                                           |
| January 7, 2008    | Supplemental Comment (“The Missing Benchmark in Electricity Deregulation”) before the Federal Energy                                                                                                                                     |

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|                          | Regulatory Commission on behalf of American Public Power Association, Docket Nos. RM07-19-000 and AD07-7-000                                                                                                                                                                                                                         |
| August 7-8, 2007         | Testimony before the Oregon Public Utility Commission on behalf of Wah Chang, Salem, Oregon, Docket No. UM 1002                                                                                                                                                                                                                      |
| February 23 and 26, 2007 | Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL03-180                                                                                                                                                                            |
| October 2, 2006          | Direct Testimony before the Régie de l'énergie, Gouvernement du Québec on behalf of the Grand Council of the Cree                                                                                                                                                                                                                    |
| August 22, 2006          | Rebuttal Expert Report on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. H-01-3624                                                                                                                                                                                                              |
| June 1, 2006             | Expert Report on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. H-01-3624                                                                                                                                                                                                                       |
| May 8, 2006              | Testimony before the U.S. Senate Democratic Policy Committee, "Regulation and Forward Markets: Lessons from Enron and the Western Market Crisis of 2000-2001"                                                                                                                                                                        |
| December 15, 2005        | Direct Testimony before the Public Utility Commission of the State of Oregon on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002                                                                                                                                                                                       |
| December 14, 2005        | Deposition before the United States District Court Western District of Washington at Tacoma on behalf of Federated Rural Electric Insurance Exchange and TIG Insurance Company, Federated Rural Electric Insurance Exchange and TIG Insurance Company v. Public Utility District No. 1 of Cowlitz County, No. 04-5052RBL             |
| December 4, 2005         | Expert Report on behalf of Utility Choice Electric in Civil Action No. 4:05-CV-00573                                                                                                                                                                                                                                                 |
| July 27, 2005            | Expert Report before the United States District Court Western District of Washington at Tacoma on behalf of Federated Rural Electric Insurance Exchange and TIG Insurance Company, Federated Rural Electric Insurance Exchange and TIG Insurance Company v. Public Utility District No. 1 of Cowlitz County, Docket No. CV04-5052RBL |
| May 6, 2005              | Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.                                                                                                                                                            |

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| May 1, 2005       | Rebuttal Expert Report on behalf of Factory Mutual, Factory Mutual v. Northwest Aluminum                                                                                                                                                                |
| March 24-25, 2005 | Deposition by Enron Power Marketing, Inc. before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.                                                        |
| February 14, 2005 | Expert Report on behalf of Factory Mutual, Factory Mutual v. Northwest Aluminum                                                                                                                                                                         |
| January 27, 2005  | Supplemental Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL03-180, et al.                                                                          |
| April 14, 2004    | Deposition by Enron Power Marketing, Inc. and Enron Energy Services before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.                              |
| April 10, 2004    | Rebuttal Testimony on behalf of the Office of City and County Attorneys, San Francisco, California, City and County Attorneys, San Francisco, California v. Turlock Irrigation District, Non-Binding Arbitration                                        |
| February 24, 2004 | Direct Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No.EL03-180, et al.                                                                                 |
| March 20, 2003    | Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of the City of Seattle, Washington, Docket No. EL01-10, et al.                                                                                                             |
| March 11-13, 2003 | Deposition by IdaCorp Energy L.P. before the District Court of the Fourth Judicial District of the State of Idaho on behalf of Overton Power District No. 5, State of Nevada, IdaCorp Energy L.P. v. Overton Power District No. 5, Case No. OC 0107870D |
| March 3, 2003     | Expert Report before the District Court of the Fourth Judicial District of the State of Idaho on behalf of Overton Power District No. 5, State of Nevada, IdaCorp Energy L.P. v. Overton Power District No. 5, Case No. OC 0107870D                     |

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| February 27, 2003  | Direct Testimony before the Federal Energy Regulatory Commission on behalf of the City of Tacoma, Washington and the Port of Seattle, Washington, Docket No. EL01-10-005                                                                                                                       |
| October 7, 2002    | Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.                                                                                                                      |
| October 2002       | Expert Report before the Circuit Court of the State of Oregon for the County of Multnomah on behalf of Alcan, Inc., Alcan, Inc. v. Powerex Corp., Case No. 50 198 T161 02                                                                                                                      |
| September 27, 2002 | Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.                                                                                                |
| August 8-9, 2002   | Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.                                                                                                |
| August 8, 2002     | Deposition by Morgan Stanley Capital Group, Inc. before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.                                                                                        |
| June 28, 2002      | Direct Testimony before the Federal Energy Regulatory Commission on behalf of the City of Tacoma, Washington, Docket No. EL02-26, et al.                                                                                                                                                       |
| June 25, 2002      | Direct Testimony before the Federal Energy Regulatory Commission on behalf of Public Utility District No. 1 of Snohomish County, Washington, Docket No. EL02-26, et al.                                                                                                                        |
| June 25, 2002      | Direct Testimony before the Federal Energy Regulatory Commission on behalf of Nevada Power Company and Sierra Pacific Power Company, Docket No. EL02-26, et al.                                                                                                                                |
| May 6, 2002        | Rebuttal Testimony before the Public Service Commission of Utah on behalf of Magnesium Corporation of America in the Matter of the Petition of Magnesium Corporation of America to Require PacifiCorp to Purchase Power from MagCorp and to Establish Avoided Cost Rates, Docket No. 02-035-02 |
| April 11, 2002     | Testimony before the U.S. Senate Committee on Commerce, Science and Transportation, Washington DC                                                                                                                                                                                              |

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| February 13, 2002 | Testimony before the U.S. House of Representatives Subcommittee on Energy and Air Quality, Washington DC                                                                                                                                                         |
| January 29, 2002  | Testimony before the U.S. Senate Committee on Energy and Natural Resources, Washington DC                                                                                                                                                                        |
| August 30, 2001   | Rebuttal Testimony before the Federal Energy Regulatory Commission on behalf of Seattle City Light, Docket No. EL01-10                                                                                                                                           |
| August 16, 2001   | Direct Testimony before the Federal Energy Regulatory Commission on behalf of Seattle City Light, Docket No. EL01-10                                                                                                                                             |
| June 12, 2001     | Rebuttal Testimony before the Public Utility Commission of the State of Oregon on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002                                                                                                                 |
| April 17, 2001    | Before the Public Utility Commission of the State of Oregon, Direct Testimony on behalf of Wah Chang, Wah Chang v. PacifiCorp in Docket UM 1002                                                                                                                  |
| March 17, 2000    | Rebuttal Testimony before the Public Service Commission of Utah on behalf of the Large Customer Group in the Matter of the Application of PacifiCorp for Approval of Its Proposed Electric Rate Schedules and Electric Service Regulations, Docket No. 99-035-10 |
| February 1, 2000  | Direct Testimony before the Public Service Commission of Utah on behalf of the Large Customer Group in the Matter of the Application of PacifiCorp for Approval of Its Proposed Electric Rate Schedules and Electric Service Regulations, Docket No. 99-035-10   |

## **Presentations**

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| January 23-24, 2017 | “Are Electric Markets Obsolete?”, Buying & Selling Electric Power Conference, Seattle, Washington                                   |
| December 3, 2015    | “Ozymandias: Seventeen years of administered markets, high costs, and poor eligibility”, Utility Markets Today, Rockville, Maryland |
| May 6, 2014         | “Economic Analysis of the Columbia Generating Station”, Energy Northwest, Boise, Idaho                                              |

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| April 30, 2014   | "Economic Analysis of the Columbia Generating Station",<br>Portland State University, Portland, Oregon                                                         |
| April 22, 2014   | "Economic Analysis of the Columbia Generating Station",<br>Clark County, Vancouver, Washington                                                                 |
| January 9, 2014  | "Economic Analysis of the Columbia Generating Station",<br>Northwest Power & Conservation Council, Portland, Oregon                                            |
| January 1, 2014  | "Economic Analysis of the Columbia Generating Station",<br>Bonneville Power Administration, Portland, Oregon                                                   |
| December 2, 2013 | "Economic Analysis of the Columbia Generating Station",<br>Skamania, Carson, Washington                                                                        |
| December 1, 2013 | "Peak Peddling: Has Portland Bicycling Reached the Top of<br>the Logistic Curve?" Oregon Transportation Research and<br>Education Consortium, Portland, Oregon |
| July 12, 2013    | "Economic Analysis of the Columbia Generating Station",<br>Tacoma, Washington                                                                                  |
| June 21, 2013    | "Economic Analysis of the Columbia Generating Station",<br>Seattle City Light, Seattle, Washington                                                             |
| January 29, 2013 | "J.D. Ross (Who)", Portland Rotary Club, Portland, Oregon.                                                                                                     |
| January 13, 2011 | "Estimating the Consumer's Burden from Administered<br>Markets", American Public Power Association conference,<br>Washington, DC                               |
| October 15, 2009 | "The Mysterious New York Market", EPIS, Tucson, Arizona                                                                                                        |
| October 14, 2009 | "Do ISO Bidding Processes Result in Just and Reasonable<br>Rates?", legal seminar, American Public Power Association,<br>Savannah, Georgia                     |
| June 22, 2009    | "Pickens' Peak Redux: Fundamentals, Speculation, or Market<br>Structure", International Association for Energy Economics                                       |
| June 5, 2009     | "Transparency in ERCOT: A No-cost Strategy to Reduce<br>Electricity Prices in Texas", Presentation at Texas Legislature                                        |
| May 8, 2009      | "Pickens' Peak", Economics Department, Portland State<br>University                                                                                            |
| April 7, 2009    | "Pickens' Peak: Speculators, Fundamentals, or Market<br>Structure", 2009 EIA energy conference, Washington, DC                                                 |

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| February 4, 2009   | “Why We Need a Connecticut Power Authority”, presentation to the Energy and Technology Committee, Connecticut General Assembly            |
| October 28, 2008   | “The Impact of a Volatile Economy on Energy Markets”, NAESCO annual meeting, Santa Monica, California                                     |
| April 1, 2008      | “Connecticut Energy Policy: Critical Times...Critical Decisions”, House Energy and Technology Committee, the Connecticut General Assembly |
| May 23, 2007       | “Past Efforts and Future Prospects for Electricity Industry Restructuring: Why Is Competition So Expensive?”, Portland State University   |
| February 26, 2007  | “Trust, But Verify”, Take Back the Power Conference, National Press Club, Washington, DC                                                  |
| May 18, 2006       | “Developing a Power Purchase/Fuel Supply Portfolio”                                                                                       |
| February 12, 2005  | “Northwest Job Impacts of BPA Market Rates”                                                                                               |
| January 5, 2005    | “Why Has the Enron Crisis Taken So Long To Solve?”, Public Power Council, Portland, Oregon                                                |
| September 20, 2004 | “Project Stanley and the Texas Market”, Gulf Coast Energy Association, Austin, Texas                                                      |
| September 9, 2004  | “Back to the New Market Basics”, EPIS, White Salmon, Washington                                                                           |
| June 8, 2004       | “Caveat Emptor”, ELCON West Coast Meeting, Oakland, California                                                                            |
| June 9, 2004       | “Enron Discovery in EL03-137/180”                                                                                                         |
| March 31, 2004     | “Governance and Performance”, Public Power Council, Portland, Oregon                                                                      |
| January 23, 2004   | “Resource Choice”, Law Seminars International, Seattle, Washington                                                                        |
| January 17, 2003   | “California Energy Price Spikes: The Factual Evidence”, Law Seminars International Seattle, Washington                                    |
| January 16, 2003   | “The Purloined Agenda: Pursuing Competition in an Era of Secrecy, Guile, and Incompetence”                                                |

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| September 17, 2002 | "Three Crisis Days", California Senate Select Committee, Sacramento, California                                          |
| June 10, 2002      | "Enron Schemes", California Senate Select Committee Sacramento, California                                               |
| May 2, 2002        | "One Hundred Years of Solitude"                                                                                          |
| March 21, 2002     | "Enron's International Ventures", Oregon Bar International Law Committee, Portland, Oregon                               |
| March 19, 2002     | "Coordinating West Coast Power Markets", GasMart, Reno, Nevada                                                           |
| March 19, 2002     | "Sauron's Ring", GasMart, Reno, Nevada                                                                                   |
| January 25, 2002   | "Deconstructing Enron's Collapse: Buying and Selling Electricity on The West Coast", Seattle, Washington                 |
| January 18, 2002   | "Deconstructing Enron's Collapse", Economics Seminar, Portland State University                                          |
| November 12, 2001  | "Artifice or Reality", EPIS Energy Forecast Symposium, Skamania, Washington                                              |
| October 24, 2001   | "The Case of the Missing Crisis" Kennewick Rotary Club, Kennewick, Washington                                            |
| August 18, 2001    | "Preparing for the Next Decade"                                                                                          |
| June 26, 2001      | "Examining the Outlook on Deregulation"                                                                                  |
| June 25, 2001      | Presentation, Energy Purchasing Institute for International Research (IIR), Dallas, Texas                                |
| June 6, 2001       | "New Horizons: Solutions for the 21st Century", Federal Energy Management-U.S. Department of Energy, Kansas City, Kansas |
| May 24, 2001       | "Five Years"                                                                                                             |
| May 10, 2001       | "A Year in Purgatory", Utah Industrial Customers Symposium-Utah Association of Energy Users, Salt Lake City, Utah        |
| May 1, 2001        | "What to Expect in the Western Power Markets this Summer", Western Power Market Seminar, Denver, Colorado                |

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| April 23, 2001    | “Emerging Markets for Natural Gas”, West Coast Gas Conference, Portland, Oregon                                           |
| April 18, 2001    | “Demystifying the Influence of Regulatory Mandates on the Energy Economy” Marcus Evans Seminar, Denver, Colorado          |
| April 4, 2001     | “Perfect Storm”, Regulatory Accounting Conference, Las Vegas, Nevada                                                      |
| March 21, 2001    | “After the Storm 2001”, Public Utility Seminar, Reno, Nevada                                                              |
| February 21, 2001 | “Future Imperfect”, Pacific Northwest Steel Association, Portland, Oregon                                                 |
| February 12, 2001 | “Power Prices in 2000 through 2005”, Northwest Agricultural Chillers, Bellingham, Washington                              |
| February 6, 2001  | Presentation, Boise Cascade Management, Boise, Idaho                                                                      |
| January 19, 2001  | “Wholesale Pricing and Location of New Generation Buying and Selling Power in the Pacific Northwest”, Seattle, Washington |
| October 26, 2000  | “Tsunami: Market Prices since May 22nd”, International Association of Refrigerated Warehouses, Los Vegas, California      |
| October 11, 2000  | “Tsunami: Market Prices since May 22nd”, Price Spikes Symposium, Portland, Oregon                                         |
| August 14, 2000   | “Anatomy of a Corrupted Market”, Oregon Public Utility Commission and Oregon State Energy Office, Salem, Oregon           |
| June 30, 2000     | “Northwest Market Power”, Governor Locke of Washington, Seattle, Washington                                               |
| June 10, 2000     | “Northwest Market Power”, Oregon Public Utility Commission and Oregon State Energy Office, Salem, Oregon                  |
| June 5, 2000      | “Northwest Market Power”, Georgia Pacific Management                                                                      |
| May 10, 2000      | “Magnesium Corporation Developments”, Utah Public Utilities Commission                                                    |
| May 5, 2000       | “Northwest Power Developments”, Georgia Pacific Management                                                                |

January 12, 2000

“Northwest Reliability Issues”, Oregon Public Utility  
Commission

### **Volunteer Positions**

2015-Present

Board member, Portland State University Master in Public  
Policy Advisory Committee

2016-Present

Eastmoreland Neighborhood Association, Treasurer

2013-2016

Eastmoreland Neighborhood Association, President

2013-Present

Southeast Uplift Neighborhood Coalition, President

2013-Present

City of Portland Office of Management and Finance Advisory  
Committee

1990-Present

Chairman, Portland State University Economics Department  
Advisory Committee