

PAUL R. CARPENTER

Principal

San Francisco, CA

+1.415.217.1000

Paul.Carpenter@brattle.com

Dr. Paul Carpenter holds a Ph.D. in applied economics and an M.S. in management from the Massachusetts Institute of Technology, and a B.A. in economics from Stanford University. He specializes in the economics of the natural gas, oil, electric utility and other infrastructure industries. Dr. Carpenter was a co-founder of Incentives Research, Inc. in 1983. Prior to that he was employed by the NASA/Caltech Jet Propulsion Laboratory and Putnam, Hayes & Bartlett, and he was a post-doctoral fellow at the MIT Center for Energy Policy Research. He is currently a Principal and former Chairman of The Brattle Group.

AREAS OF EXPERTISE

- Energy economics
- Regulation
- Corporate planning
- Pricing Policy
- Antitrust

EXPERIENCE

Natural Gas, Oil and Electricity Industries

- Consulting and testimony on nearly all of the economic and regulatory issues surrounding the transition of the natural gas, oil and electric power industries from strict regulation to greater competition. These issues have included stranded investments and contracts, design and pricing of unbundled services, evaluation of supply, demand and price forecasting models, the competitive effects of pipeline expansions and performance-based ratemaking. He has consulted on the regulatory and competitive structures of the gas, oil and electric power industries in the U.S., Canada, the United Kingdom, continental Europe, Australia and New Zealand.
- Expert reports and testimony in numerous arbitrations involving the redetermination of prices in long term natural gas and LNG supply contracts in Australia and Asia.

Valuation and Damages

- Expert testimony before courts, tribunals and in arbitrations concerning asset valuation and damages associated with breach of contract, bankruptcy and commercial disputes. Experience includes expert testimony in U.S. federal and state courts, the British High Court of Justice, the Australian Competition Tribunal and various arbitration and mediation panels in Australia, Canada, New Zealand and the U.S. Listed as a leading expert in quantum of damages in *Who's Who Legal: Consulting Experts 2017*.

Antitrust

- Expert testimony in several of the seminal cases involving the alleged denial of access to regulated facilities; analysis of relevant market and market power issues, business justification defenses, and damages.

Regulation

- Studies and consultation on alternative ratemaking methodologies for oil and gas pipelines and other utilities, on “bypass” of regulated facilities before the U.S. Congress; advice and testimony before several state utility commissions and the National Energy Board of Canada on new facility certification policy.

Finance

- Research on business and financial risks in the regulated industries and testimony on risk, cost of capital, and asset valuation for network industries, airports and seaports in the U.S., Canada., Australia and New Zealand.

PROFESSIONAL AFFILIATIONS

- American Economic Association

ACADEMIC HONORS AND FELLOWSHIPS

- Stewart Fellowship, 1983
- MIT Fellowships, 1981, 1982, 1983
- Brooks Master’s Thesis Prize (Runner-up), MIT, 1978

PUBLICATIONS

“Pipeline Regulatory Issues Arising From Oil and Natural Gas Production Growth in North America” with Matthew O’Loughlin and Steve Levine, *The Energy Law Advisor*, Volume 8, No. 1, February 2014.

“A Framework for Analyzing Market Manipulation.” *Review of Law and Economics*, September 2012 (with Shaun D. Ledgerwood)

“Shale Gas and Pipeline Risk,” *Public Utilities Fortnightly*, April 2012 (with Steven H. Levine, A. Lawrence Kolbe and Bente Villadsen)

“Options for Reforming the Building Blocks Framework.” Report to the Australian Energy Market Commission, 16 December 2009, (with Toby Brown).

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“The Advent of U.S. Gas Demand Destruction and Its Likely Consequences for the Pricing of Future European Gas Supplies,” (with Carlos Lapuerta and Morten Frisch), 16 March 2005.

“REx Incentives: Performance Based Ratemaking (PBR) Choices that Reflect Firms’ Performance Expectations,” (with Johannes P. Pfeifenberger and Paul C. Liu), *The Electricity Journal*, November 2001.

“Asset Valuation and the Pricing of Monopoly Infrastructure Services: A Discussion Paper,” (with Carlos Lapuerta) 28 July 2000.

“Competition in Gas Pipeline Markets: International Precedent for Regulatory Coverage Decisions,” Report to the National Competition Council of Australia (with Judy Chang), June 2000.

“Methodologies for Establishing National and Cross-Border Systems of Pricing of Access to the Gas System in Europe,” Report to the European Commission (with Carlos Lapuerta and Boaz Moselle), February 2000.

“A Critique of Light-handed Regulation: The Case of British Gas,” (with Carlos Lapuerta), *Northwestern Journal of International Law & Business*, Volume 19, No. 3, Spring 1999.

“Separate Marketing of Natural Gas by Joint Venture Producers in Australia,” (with Jurgen Weiss), prepared for Optima Energy, Australia, submitted to the Upstream Issues Working Group, Australian and New Zealand Minerals and Energy Council, 26 September 1998.

“Likely Trends in Canadian Natural Gas Imports,” (with Matthew P. O’Loughlin and Gao-Wen Shao), *Natural Gas*, Volume 14, No. 8, March 1998.

“Pipeline Pricing to Encourage Efficient Capacity Additions,” (with Frank C. Graves and Matthew P. O’Loughlin), prepared for Columbia Gas Transmission Corporation and Columbia Gulf Transmission Company, February 1998.

“The Outlook for Imported Natural Gas,” (with Matthew P. O’Loughlin and Gao-Wen Shao), prepared for The INGAA Foundation, Inc., July 1997.

“Basic and Enhanced Services for Recourse and Negotiated Rates in the Natural Gas Pipeline Industry,” (with Frank C. Graves, Carlos Lapuerta, and Matthew P. O’Loughlin) May 29, 1996, prepared for Columbia Gas Transmission Corporation, Columbia Gulf Transmission Company.

“Estimating the Social Costs of PUHCA Regulation,” (with Frank C. Graves) submitted on behalf of Central and South West Corp. to the U.S. Securities and Exchange Commission in its Request for Comments on the Modernization of Regulation of Public Utility Holding Companies, File No. S7-32-94, February 6, 1995.

“Review of the Model Developer’s Report, Natural Gas Transmission And Distribution Model (NGTDM) Of The National Energy Modeling System,” December 1994, prepared for U.S. Department of Energy,

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Energy Information Administration and Oak Ridge National Laboratory under Subcontract No. 80X-SL220V.

“Pricing of Electricity Network Services to Preserve Network Security and Quality of Frequency Under Transmission Access,” (with Frank C. Graves, Marija Ilic, and Asef Zebian) response to the Federal Energy Regulatory Commission’s Request for Comments in its Notice of Technical Conference Docket No. RM93-19-000, November 1993.

“Creating a Secondary Market in Natural Gas Pipeline Capacity Rights Under FERC Order No. 636,” (with Frank C. Graves) draft December 1992, Incentives Research, Inc.

“Review of the Component Design Report, Natural Gas Annual Flow Module, National Energy Modeling System,” August 1992, prepared for the U.S. Department of Energy, Energy Information Administration.

“Unbundling, Pricing, and Comparability of Service on Natural Gas Pipeline Networks,” (with Frank C. Graves) November 1991, prepared for the Interstate Natural Gas Association of America.

“Review of the Gas Analysis Modeling System (GAMS): Final Report of Findings and Recommendations,” August 1991, prepared for the U.S. Dept. of Energy, Energy Information Administration.

“Estimating the Cost of Switching Rights on Natural Gas Pipelines,” (with F.C. Graves and J.A. Read) *The Energy Journal*, October 1989.

“Demand-Charge GICs Differ from Deficiency-Charge GICs,” (with F.C. Graves) *Natural Gas*, Vol. 6, No. 1, August 1989.

“What Price Unbundling?” (with F.C. Graves) *Natural Gas*, Vol. 5 No. 10, May 1989.

Book Review of *Drawing the Line on Natural Gas Regulation: The Harvard Study on the Future of Natural Gas*, Joseph Kalt and Frank Schuller, eds., in *The Energy Journal*, April 1988.

“Adapting to Change in Natural Gas Markets,” (with Henry D. Jacoby and Arthur W. Wright) in *Energy, Markets and Regulation: What Have We Learned?*, Cambridge: MIT Press, 1987.

Evaluation of the Commercial Potential in Earth and Ocean Observation Missions from the Space Station Polar Platform, Prepared by Incentives Research for the NASA Jet Propulsion Laboratory under Contract No. 957324, May 1986.

An Economic Comparison of Alternative Methods of Regulating Oil Pipelines, (with Gerald A. Taylor) Prepared by Incentives Research for the U.S. Department of Energy, Office of Competition, July 1985.

“The Natural Gas Policy Drama: A Tragedy in Three Acts,” (with Arthur W. Wright) MIT Center for Energy Policy Research Working Paper No. 84-012WP, October 1984.

Oil Pipeline Rates and Profitability under Williams Opinion 154, (with Gerald A. Taylor), Prepared by Incentives Research for the U.S. Department of Energy, Office of Competition, September 1984.

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Natural Gas Pipelines After Field Price Decontrol: A Study of Risk, Return and Regulation, Ph.D. Dissertation, Massachusetts Institute of Technology, March 1984. Published as a Report to the U.S. Department of Energy, Office of Oil and Gas Policy, MIT Center for Energy Policy Research Technical Report No. 84-004.

The Competitive Origins and Economic Benefits of Kern River Gas Transmission, Prepared by Incentives Research, Inc., for Kern River Gas Transmission Company, February 1994.

“Field Price Decontrol of Natural Gas, Pipeline Risk and Regulatory Policy,” in *Government and Energy Policy*, Richard L. Itteilag, ed., Washington D.C., June 1983.

“Risk Allocation and Institutional Arrangements in Natural Gas,” (with Arthur W. Wright) invited paper presented to the American Economic Association Meetings, San Francisco, December 1983.

“Vertical Market Arrangements, Risk-shifting and Natural Gas Pipeline Regulation,” Sloan School of Management Working Paper No. 1369-82, September 1982 (Revised April 1983).

Natural Gas Pipeline Regulation After Field Price Decontrol (with Dr. Henry Jacoby and Arthur W. Wright), prepared for U.S. Department of Energy, Office of Oil and Gas Policy, MIT Energy Lab Report No. 83-013, March 1983.

Book Review of *An Economic Analysis of World Energy Problems*, by Richard L. Gordon, *Sloan Management Review*, Spring 1982.

“Perspectives on the Government Role in New Technology Development and Diffusion,” (with Drew Bottaro) MIT Energy Lab Report No. 81-041, November 1981.

International Plan for Photovoltaic Power Systems (co-author), Solar Energy Research Institute with the Jet Propulsion Laboratory Prepared for the U.S. Department of Energy, August 1979.

Federal Policies for the Widespread Use of Photovoltaic Power Systems (contributor), Jet Propulsion Laboratory Report to the U.S. Congress DOE/CS-0114, March 24, 1980.

“An Economic Analysis of Residential, Grid-connected Solar Photovoltaic Power Systems,” (with Gerald A. Taylor) MIT Energy Laboratory Technical Report No. 78-007, May 1978.

SPEECHES/PRESENTATIONS

“The Global Context for Alaskan Oil and LNG,” Energy in Alaska Conference, Anchorage, Alaska, December 12, 2016.

“The Global Context for Alaskan LNG,” Energy in Alaska Conference, Anchorage, Alaska, December 7, 2015.

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“The Collapse of World Oil Prices and its Effects on Global LNG Trade,” Energy Regulatory Commission of Thailand, Bangkok, March 8, 2015.

“Changing Times – New Uncertainties: Assessing Their Effects on Global Energy and LNG Export Markets,” Energy Markets and Regulation in Alaska Conference, December 8, 2014.

“Russia, Ukraine, and Trade,” Georgetown Center for Business and Public Policy, Washington D.C., April 23, 2014.

“The Uncertain Future For ANS LNG Exports,” Energy in Alaska Conference, Anchorage, Alaska, December 3, 2012.

“The Uncertain Future for Alaska North Slope Gas in the Lower-48,” Energy in Alaska Conference, Anchorage, Alaska, December 2, 2011.

“Economic Perspectives on Gas Trading Markets and Regulation,” Canada/U.S. Energy Transactions Conference, Vancouver B.C., August 24, 2010.

“Incentive Regulation – Design: Key Plan Components,” Alberta Utility Commission Workshop on Performance Based Regulation, Edmonton, Alberta, May 26, 2010.

“LNG Access Policy and California,” California Resources Agency Workshop on LNG, June 1, 2005.

Opening Remarks at the Eighth Central and Eastern European Power Industry Forum (CEEPIF 2001), Budapest, March 29, 2001.

“CPUC v. El Paso Merchant Energy, et al., FERC Docket No. RP00-241-000,” ABA Forum, Washington, DC, September 6, 2001.

“Overseas Experience B Lessons for Australian Gas and Power Markets from California and Europe,” 2001 Gas Industry Forum, The Australian Gas Association, Melbourne, Victoria, Australia, June 26, 2001.

“Liberalizing Energy Markets: Lessons from California’s Crisis,” 20th Annual Conference on US-Turkish Relations, Washington, DC, March 27, 2001.

“Opening Remarks from the Chair: Rates, Regulations and Operational Realities in the Capacity Market of the Future,” AIC conference on “Gas Pipeline Capacity ‘97,” Houston, Texas June 17, 1997.

“Lessons from North America for the British Gas TransCo Pricing Regime,” prepared for AIC conference on: Gas Transportation and Transmission Pricing, London, England, October 17, 1996.

“GICs and the Pricing of Gas Supply Reliability,” California Energy Commission Conference on Emerging Competition in California Gas Markets, San Diego, Ca. November 9, 1990.

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“The New Effects of Regulation and Natural Gas Field Markets: Spot Markets, Contracting and Reliability,” American Economic Association Annual Meeting, New York City, December 29, 1988.

“Appropriate Regulation in the Local Marketplace,” Interregional Natural Gas Symposium, Center for Public Policy, University of Houston, November 30, 1988.

“Market Forces, Antitrust, and the Future of Regulation of the Gas Industry,” Symposium on the Future of Natural Gas Regulation, American Bar Association, Washington D.C., April 21, 1988.

“Valuation of Standby Tariffs for Natural Gas Pipelines,” Workshop on New Methods for Project and Contract Evaluation, MIT Center for Energy Policy Research, Cambridge, March 3, 1988.

“Long-term Structure of the Natural Gas Industry,” National Association of Regulatory Utility Commissioners Meeting, Washington D.C., March 1, 1988.

“How the U.S. Gas Market Works or Doesn’t Work,” Ontario Ministry of Energy Symposium on *Understanding the United States Natural Gas Market*, Toronto, March 18, 1986.

“The New U.S. Natural Gas Policy: Implications for the Pipeline Industry,” Conference on Mergers and Acquisitions in the Gas Pipeline Industry, Executive Enterprises, Houston, February 26-27, 1986.

Various lectures and seminars on U.S. natural gas industry and regulation for graduate energy economics courses at Massachusetts Institute of Technology, 1984-96.

Panelist in University of Colorado Law School workshop on state regulations of natural gas production, June 1985. (Transcript published in *University of Colorado Law Review*.)

“Oil Pipeline Rates after the *Williams* 154 Decision,” Executive Enterprises, Conference on Oil Pipeline Ratemaking, Houston, June 19-20, 1984.

“Issues in the Regulation of Natural Gas Pipelines,” California Public Utilities Commission Hearings on Natural Gas, San Francisco, May 21, 1984.

“The Natural Gas Pipelines in Transition: Evidence From Capital Markets,” Pittsburgh Conference on Modeling and Simulation, Pittsburgh, April 20, 1984.

“Financial Aspects of Gas Pipeline Regulation,” Pittsburgh Conference on Modeling and Simulation, Pittsburgh, April 19-20, 1984.

“Natural Gas Pipelines After Field Price Decontrol,” Presentations before Conferences of the International Association of Energy Economists, Washington D.C., June 1983, and Denver, November 1982.

“Spot Markets for Natural Gas,” MIT Center for Energy Policy Research Semi-annual Associates Conference, March 1983.

“Pricing Solar Energy Using a System of Planning and Assessment Models,” Presentations to the XXIV

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International Conference, The Institute of Management Science, Honolulu, June 20, 1979.

TESTIMONY

Federal, State and International Courts/Arbitration

In the United States District Court for the Northern District of Texas, Dallas Division, *Exxon Mobil Corp. vs. United States of America*, Case No. 3:16-cv-2921, November 2018 (expert report and trial testimony).

In the United States District Court for the Western District of Oklahoma, *Marcia W. Davilla, et al., vs. Enable Midstream Partners L.P. et al.*, September 2018 (expert report).

In the matter of an arbitration between CBH Group and Brookfield Rail under the *Railways Access Code (2000) WA*, Perth, Western Australia, September 2017.

In the matter of an Arbitration between Niko Resources (Bangladesh) Ltd. v. Bangladesh Petroleum and Production Co. (BAPEX) and Bangladesh Oil Gas and Mineral Corp. (Petrobangla), quantum of damages expert report, March 2016.

In the matter of an Arbitration Between Vector Gas Contracts Ltd and Shell (Petroleum Mining) Company Ltd. and Todd Petroleum Mining Company Ltd., Wellington, New Zealand, March 2015.

Before the United States Civilian Board of Contract Appeals, *Rockies Express Pipeline v. Department of the Interior*, No.1821, January 2015, March 2015, (expert reports with Steven H. Levine).

In the High Court of New Zealand, Wellington Registry, *In the matter of an application pursuant to rule 27 of the First Schedule of the Arbitration Act of 1996 for non-party discovery, Between Vector Gas Contracts Ltd. And Contact Energy Ltd.*, October 2014.

In the matter of an Arbitration between the Northwest Shelf Joint Venture and Verve Energy, Perth Western Australia, July 2013.

In the District Court in and for Tulsa County, the State of Oklahoma, *Bettina M. Whyte, as Trustee for the SemGroup Litigation Trust v. PriceWaterhouseCoopers, LLP*, April 2013.

In the matter of an Arbitration between the Gippsland Basin Joint Venture and Australia Gas Light, Melbourne, Victoria, March 2013.

In the British High Court of Justice, Queen's Bench Division, Commercial Court, *GB Gas Holdings Limited v. Accenture*, June 2011 (expert report).

In the matter of an Arbitration between Woodside Energy Ltd and Alinta Sales Pty Ltd, Perth, Western Australia, July 2009, September 2009.

In the Arbitration between Niska Gas Storage US, LLC and Alenco Inc., 2007.

In the Arbitration between the Southwest Queensland Producers and Xstrata, Ltd., Brisbane, Australia, 2006.

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In the Superior Court of the State of California, County of San Diego, *Natural Gas Anti-trust Cases I, II, III, & IV*, February 2006, May 2006, June 2006 (declarations).

In the United States District Court for the State of California, County of Los Angeles, Central District, *TXU Energy Services Company v. American Remedial Technologies*, March 2003, April 2003.

In the United States District Court for the Northern District of Alabama, Northeastern Division, *The City of Huntsville d/b/a Huntsville Utilities v. Proliance Energy, LLC*, February 2003, June 2003, February 2005.

In the Arbitration between Wellington International Airport Ltd., and Air New Zealand and Qantas Airways Ltd., August 2002.

In the United States District Court for the Eastern District of Virginia, Alexandria Division, *Hess Energy Inc. v. Lightning Oil Company, Ltd.*, July 2002.

In the United States District Court for the District of Colorado, *The Farm Credit Bank of Wichita*, formerly known as *The Federal Land Bank of Wichita, et al., v. Atlantic Richfield Company*, April 2001.

In the United States Bankruptcy Court for the District of Delaware, *KCS Energy, Inc., et al., Debtors: Chapter 11*, November 2000.

Mediation between *Methanex LTD, et al* and *Westgate Port*, New Zealand, May 2000.

In the matter of the Arbitration between *American Central Gas Company v. Union Pacific Resources and Duke Energy Fuels, et al.*, July 2000.

In the United States District Court for the Western District of Missouri, *Riverside Pipeline Company, L.P., et al., v. Panhandle Eastern Pipeline Company*, September 1998.

In the United States District Court, District of Columbia, *United States of America, Dept. of Justice v. Enova Corporation*, August 1998.

In the matter of the Arbitration between *Western Power Corp. and Woodside Petroleum Corp., et al.*, Perth, Western Australia, May-July 1998.

In the United States District Court for the District of Montana, Butte Division, *Paladin Associates, Inc. v. Montana Power Company*, November- December 1997.

In the United States District Court for the District of Colorado, *Atlantic Richfield Co. v. Darwin H. Smallwood, Sr., et al.*, July 1997.

In the Australian Competition Tribunal, *Review of the Trade Practices Act Authorisations for the AGL Cooper Basin Natural Gas Supply Arrangements*, on behalf of the Australian Competition and Consumer Commission, February 1997.

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In the Southwest Queensland Gas Price Review Arbitration, Adelaide, South Australia, May 1996.

In the matter of the Arbitration between *Amerada Hess Corp. v. Pacific Gas & Electric Co.*, May 1995.

In re Columbia Gas Transmission Corp., Claims Quantification Proceeding in the U.S. Bankruptcy Court for the District of Delaware, Before the Claims Mediator, July and November 1993.

Deposition Testimony in *Fina Oil & Gas v. Northwest Pipeline Corp. and Williams Gas Supply* (New Mexico) 1992.

Testimony by Affidavit in *James River Corp. v. Northwest Pipeline Corp.* (Fed. Ct. for Oregon) 1989.

Deposition and Testimony by Affidavit in *Merrion Oil and Gas Col, et al., v. Northwest Pipeline Corp.* (Fed. Ct. for New Mexico) 1989.

Deposition Testimony in *Martin Exploration Management Co., et al. v. Panhandle Eastern Pipeline Co.* (Fed. Ct. for Colorado) 1988 and 1992.

Trial Testimony in *City of Chanute, et al. v. Williams Natural Gas* (Fed. Ct. for Kansas) 1988.

Deposition Testimony in *Sinclair Oil Co. v. Northwest Pipeline Co.* (Fed. Ct. for Wyoming) 1987.

Deposition and Trial Testimony in *State of Illinois v. Panhandle Eastern Pipeline Co.* (Fed. Ct. for C.D. Ill) 1984-87.

Economic/Regulatory Testimony

Before the Canada Energy Regulator, *In the Matter of the Enbridge Pipelines Inc. Mainline Contracting Application*, RH-1-2020, December 2020, June 2021 (with Dr. Daniel Arthur and Mr. Michael Tolleth).

Before the Canada Energy Regulator, *In the Matter of an Application by the Explorers and Producers Association of Canada (EPAC) to extend the NOVA Gas Transmission Ltd. (NGTL) Gas Transportation Temporary Service Protocol (TSP) Tariff Provision*, November 19, 2020.

Before the Federal Energy Regulatory Commission, *Columbia Gas Transmission*, Docket No. RP20-1060-000, July 2020.

Before the National Energy Board of Canada, *In the Matter of a Complaint and Application by Suncor Energy Inc. re an Open Season Announced by Enbridge Pipelines Inc.*, August 23, 2019 (with Dr. Daniel Arthur).

Before the National Energy Board of Canada, *Application for NOVA Gas Transmission Rates and Services*, Docket RH-001-2019, for Petronas Energy Canada Ltd., August 16, 2019 (with Dr. Toby Brown).

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Before the Federal Energy Regulatory Commission, *Northern Natural Gas Company*, Docket No. RP19-1353-000, July 2019.

Before the British Columbia Utility Commission, *British Columbia Hydro and Power Authority*, Review of the Regulatory Oversight of Capital Expenditures and Projects, Project No. 1598877, February 15, 2019 (with Dr. Toby Brown).

Before the Federal Energy Regulatory Commission, *Enable Mississippi River Transmission, LLC*, Docket No. RP18-923-004, June 2018.

Before the Alberta Utilities Commission, *Generic Cost of Capital 2018*, Proceeding ID No. 22570, December 2017.

Before the Federal Energy Regulatory Commission, *Spire STL Pipeline LLC*, Docket No. CP17-40-000, February 2017.

Before the Alberta Utilities Commission, *Generic Proceeding to Establish Parameters for the Next Generation of Performance-Based Regulation (PBR) Plans*, Proceeding ID No. 20414, March 2016.

Before the Alberta Utilities Commission, *Generic Cost of Capital 2016*, Proceeding ID No. 20622, February 2016.

Before the Federal Energy Regulatory Commission, *ANR Pipeline Company*, Docket No. RP16-440, January 2016.

Before the Alberta Utilities Commission, *Enmax Power Corp.*, Proceeding ID No. 21149, December 2015.

Before the National Energy Board of Canada, *TransCanada Pipelines Ltd., Application for Approval of Mainline 2013- 2030 Settlement*, August 2014.

Before the National Energy Board of Canada, *TransCanada Pipelines Ltd., Application for Approval of Tariff Amendments*, Docket RH-1-2013, August 2013.

Before the National Energy Board of Canada, *Application of Chevron Canada Ltd. For a Priority Destination Designation on the TransMountain Pipeline*, Docket MH-002-2012, December 2012.

Before the National Energy Board of Canada, *TransCanada PipeLines Limited, NOVA Gas Transmission Ltd., Foothills Pipe Lines Ltd. - Business and Services Restructuring Proposal and Mainline Tolls for 2012-2013*, Docket RH-003-2011, September 2011, May 2012.

Before the Alberta Utilities Commission, *Rate Regulation Initiative*, Proceeding 566, ATCO Gas and

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ATCO Electric Performance Based Regulation Applications, July 2011, April 2012.

Before the Federal Energy Regulatory Commission and the Regulatory Commission of Alaska, *BP Pipelines (Alaska) Inc.*, FERC Docket No. IS09-348, RCA Docket P-08-9, June 2011.

Before the Illinois Commerce Commission, *Northern Illinois Gas Company d/b/a/ Nicor Gas Company, Reconciliation of Revenues Collected under Gas Adjustment Charges with Actual Costs Prudently Incurred*, Docket No. 01-0705, May 2011.

Before the Regulatory Commission of Alaska, *In the Matter of the Petition by Aurora Energy, LLC to Exempt Steam Heat Rates from Economic Regulation*, Docket No. U-10-158, December 2010, January 2011.

Before the Federal Energy Regulatory Commission, *Kern River Gas Transmission*, Docket No. RP04-274, June 2010, September 2010.

Before the Michigan Public Service Commission, *SEMCO Energy Gas Company*, Case No. U-16169, June 2010.

Before the Régie de L'Énergie, *Société en Commandite Gaz Métro Cause Tarifaire 2010*, Docket No. R-3690-2009, May 2009.

Before the Ontario Energy Board, *The Cost of Capital in Current Economic and Financial Market Conditions*, Docket No. EB-2009-0084, April 2009 (report).

Before the Alberta Utilities Commission, *In The Matter Of Alberta Utilities Commission 2009 Generic Cost of Capital Hearing*, Application No. 1578571, November 2008.

Before the Federal Energy Regulatory Commission, *Energy Transfer Partners, LP, Energy Transfer Company, ETC Marketing, Ltd., Houston Pipeline Company*, Docket No. IN06-3-003, September 2008, May 2009.

Before the Regulatory Commission of Alaska, *In the Matter of the Tariff Revision, Designated as TA167-4, Regarding a Proposed Gas Sales Agreement Between ENSTAR Natural Gas Company and ConocoPhillips Alaska, Inc. and a Proposed Gas Sales Agreement Between ENSTAR and Marathon Oil Company*, Docket No. U-08-58, May 2008, July 2008.

Before the California Public Utility Commission, *Application of Pacific Gas & Electric Co. for Authorization to Enter Into Long-Term Natural Gas Transportation Arrangements with Ruby Pipeline*, Docket No. A.07-12-021, May 2008, June 2008.

Before the National Energy Board of Canada, *In the Matter of Trans Québec and Maritimes Pipeline Inc.*, Docket RH-1-2008, December 2007, September 2008, October 2008.

Before the Ontario Energy Board, *Multi-year Incentive Rate Regulation for Natural Gas Utilities*, Docket EB-2007-0606/0615, August 2007, September 2007, November 2007, December 2007.

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Before the Régie de L'Énergie, *Société en Commandite Gaz Métro Cause Tarifaire 2008*, Docket No. R-3630-2007, May 2007, August 2007.

Before the Ontario Energy Board, *Application by Enbridge Gas Distribution Inc. for an Order or Orders Approving or Fixing Just and Reasonable Rates and Other Charges for the Sale, Distribution, Transmission and Storage of Gas Commencing January 1, 2007*, Docket No. EB-2006-0034, August 2006, February 2007.

Before the California Public Utilities Commission, *In the Matter of the Application of San Diego Gas & Electric Company (U 902 G) and Southern California Gas Company (U 904 G) for Authority to Integrate Their Gas Transmission Rates, Establish Firm Access Rights, and Provide Off-System Gas Transportation Services*, Docket No. A. 04-12-004, July 2006.

Before the Federal Energy Regulatory Commission, *Gas Transmission Northwest Corporation*, Docket No. RP06-407, June 2006, October 2006 (affidavits).

Before the Regulatory Commission of Alaska, in the matter of the *Gas Sales Agreement Between ENSTAR Natural Gas Company, A Division of SEMCO Energy Inc. And Marathon Oil Company* filed as TA139-4, Docket No. U-06-2, March 2006, May 2006.

Before the Ontario Energy Board, *Application by Union Gas Limited for an Order or Orders Approving or Fixing Just and Reasonable Rates and Other Charges for the Sale, Distribution, Transmission and Storage of Gas Commencing January 1, 2007*, Docket No. EB-2005-0520, January 2006.

Before the New Jersey Board of Public Utilities, in the matter of the *Joint Petition of Public Service Electric and Gas Company and Exelon Corporation For Approval of a Change in Control of Public Service Electric and Gas Company, and Related Authorizations*, Docket No. EM05020106, November 2005, December 2005, January 2006, March 2006.

Before the Pennsylvania Public Utility Commission, *Application for Approval of the Merger of Public Service Enterprise Group and Exelon Corporation*, Docket No. A-110550F0160, June 2005, August 2005, September 2005.

Before the National Energy Board of Canada, in the matter of *TransCanada Pipelines LTD.*, RH-2-2004 Phase II, Cost of Capital, January 2005.

Before the California Public Utilities Commission, *Order Instituting Investigation into the Gas Market Activities of Southern California Gas Company, San Diego Gas and Electric, Southwest Gas, Pacific Gas and Electric, and Southern California Edison and their Impact on the Gas Price Spike Experience at the California Border from March 2000 through May 2001* on behalf of Southern California Edison, Docket No. I. 02-11-040, December 2003, May 2004, June 2004.

Before the Alberta Energy and Utilities Board in the matter of *Alberta Energy and Utilities Board Generic Cost of Capital Hearing on behalf of Nova Gas Transmission LTD*, Proceeding No. 1271597, November 2003.

Before the Federal Energy Regulatory Commission (FERC), *California Public Utilities Commission v. El*

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Paso Natural Gas Company, El Paso Merchant Energy-Gas, L.P., and El Paso Merchant Energy Company on behalf of Southern California Edison, Docket No. RP00-241-000, May 2001, February 2002.

Before the National Energy Board of Canada, in the matter of *TransCanada Pipelines, Ltd. Fair Return Application*, March 2002.

Before the California Public Utilities Commission, *Application of Wild Goose Storage Inc. to Amend its Certificate of Public Convenience and Necessity to Expand and Construct Facilities For Gas Storage Operation*, Docket No. A. 01-06-029, November 2001.

Before the California Public Utilities Commission, *Application of Southern California Gas Company Regarding Year Six (1999-2000) Under Its Experimental Gas Cost Incentive Mechanism and Related Gas Supply Matters*, Application No. 00-06-023, (On behalf of Southern California Edison Company), November 2001.

Before the U.S. Congress, House of Representatives, Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs, Hearings on *California Natural Gas Market*, October 2001.

Before the New Zealand Commerce Commission, *Inquiry into Airfield Activities at Auckland, Wellington and Christchurch International Airports*, July 2000, August 2001.

Before the National Energy Board of Canada in the matter of the *National Energy Board Act* and the Regulations made thereunder; and in the matter of an *Application by TransCanada PipeLines Limited* for orders pursuant to Part I and Part IV of the *National Energy Board Act*, June 2001.

Before the California Assembly, Subcommittee on Energy Oversight, *Hearings into the Causes of the Natural Gas Price Increases During the California Energy Crisis*, April 2001.

Before the California Public Utilities Commission, *CPN Pipeline Co. & CPN Gas Marketing Co. v. Pacific Gas & Electric*, Case No. C00-09-021, October 2000.

Before the California Public Utilities Commission in the matter of *Southern California Gas Co. for Authority to Implement a Rate for Peaking Service*, Application No. 00-06-032, (On behalf of Kern River Gas Transmission and Questar Southern Trails Pipeline Co.), September 2000.

Before the Federal Energy Regulatory Commission (FERC), *California Public Utilities Commission v. El Paso Natural Gas Company, El Paso Merchant Energy-Gas, L.P., and El Paso Merchant Energy Company*, Docket No. RP00-241-000, August 2000.

Kern River Gas Transmission, Federal Energy Regulatory Commission (FERC) Docket No. RP99-274-003, August 2000.

Before the California Public Utilities Commission, Rulemaking on the Commission's Own Motion to Assess and Revise the Regulatory Structure Governing California's Natural Gas Industry, *California Natural Gas Market Conditions Report*, Docket No. R.98-01-011, on behalf of Southern California Edison, July 1998.

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