

Cliff W. Hamal

Managing Director & Principal

SUMMARY

Cliff Hamal specializes in economic issues pertaining to the electric power and related industries. His work is often grounded in a detailed understanding of the intricacies of electricity markets and involves assessing strategic opportunities and risks during times of changing market conditions. Areas of specialization include market design, competitive strategy, power contracting, investment analysis, environmental strategy, market power analysis and market participant behavior (manipulation) assessment. He is most often involved in matters where unique circumstances require innovative assessments and novel approaches.

Mr. Hamal has provided economic consulting for more than 25 years and prior to that was engaged in technical work involving electric system operations for another decade. His clients have included vertically integrated electric utilities, unregulated electric generation companies, load serving entities, regulatory agencies, fuel and pipeline companies, equipment suppliers, a debt rating agency, a hedge fund and the Department of Justices of both the United States and Canada. He has provided expert testimony in matters before courts, regulators and arbitrators in both the United States and Canada.

PROFESSIONAL HISTORY

2011-Present	Navigant Economics 1200 19th Street, NW, Suite 700 Washington, DC 20036 Direct: 202.481.8303 Main: 202.973.2400 Fax: 202.973.2401 cliff.hamal@navigant.com	1996-2010	LECG
		1995-1996	The Tesla Group, Inc.
		1993-1994	JFG Associates, Inc.
		1989-1993	Putnam, Hayes and Bartlett, Inc.
		1983-1989	Westinghouse Electric Corporation
		1981-1983	General Electric Corporation
		1980-1981	Trinidad Lines and Marine Transport

EDUCATION

MS (with Distinction), Industrial Administration, Carnegie Mellon University, 1989.

BS (with Honors) Marine Engineering and Marine Transportation, U.S. Merchant Marine Academy, 1980.

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TESTIMONY AND EXPERT OPINION

On behalf of OHL Industrial S.L. and OHL Industrial Delegación Guatemala, Sociedad Anónima, before the International Chamber of Commerce, International Court of Arbitration, October 25, 2017, ICC Case No. 21361/RD. Subject: Costs incurred as a result of delay in the construction of a hydroelectric power generator, relative to liquidated damages contract terms.

Before the Federal Energy Regulatory Commission (FERC) on his own behalf, formal pre-filed and live comments in the Technical Conference involving State Policies and Wholesale Markets Operated by IOS New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C., May 2, 2107, Docket No. AD17-11.

On behalf of the Connecticut Public Utilities Regulatory Authority before the FERC, May 27, 2016, Docket No. EL16-1434. Subject: Forward capacity market demand curves.

Before the FERC, November 4, 2015, Dockets Nos. EL15-70, EL15-71, EL15-72 and EL15-82. Subject: Technical conference comments on the performance of capacity markets in MISO.

On behalf of Her Majesty the Queen in Right of Canada, before the Federal Court of Canada, May 30, 2014, March 6, 2015, November 28-30, 2016, and December 1 and 5, 2016, Court File No. T-2579-91, in the matter of Roger Southwind and Lac Seul First Nation v. Canada, Ontario and Manitoba. Subject: Analysis of potential damages related to the sharing of benefits associated with hydroelectric generating facilities.

On behalf of Ameren Missouri, before the U.S. District Court for the Eastern District of Missouri, Eastern Division, May 16, 2014, August 31, 2016 and September 1, 2016, Docket no. CA No. 4:11-cv-00077-RWS, in the matter of United States of America v. Ameren Missouri. Subject: Analysis of how the changing nature of the electricity industry has expanded the range of the market for sale of energy generated in Missouri.

On behalf of the Ontario Power Generation, Inc., before the Ontario Energy Board, September 27, 2013, in a rate proceeding, EB-2013-0321, Exhibit E1, Tab 2, Schedule 1, Attachment 1. Subject: Economic evaluation of proposed modification to the hydroelectric incentive mechanism payment methodology having to do with dispatch efficiency.

Before the FERC, December 18, 2013, Docket No. AD13-7. Subject: Performance of markets for installed capacity in eastern Regional Transmission Organizations (RTOs).

On behalf of the Association of Power Producers of Ontario, before the Ontario Energy Board, October 1, 2012 and February 25-26, 2013, in the rate proceeding of Hydro One Networks, Inc., EB-2012-031. Subject: Evaluation of export tariff rates.

On behalf of Montana Alberta Tie Ltd. (a subsidiary of Enbridge Inc.), before the Alberta Utilities Commission, June 15 and September 18 and 19, 2012, Proceeding 1633. Subject: The Alberta Electric System Operator's rule modification, Section 203.6, concerning transmission rights following the addition of a merchant transmission interconnection.

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On behalf of Ontario Power Generation, Inc., before the Ontario Superior Court of Justice, Canada, August 26, 2011, February 9, 10 and 13, 2012, Court File No.: 03-CV-252820CMZ. Subject: Review of Mishkeegongamang's claim for damages from electricity sales.

On behalf of PacifiCorp, before the U.S. District Court for the District of Oregon, February 22, 2011, Docket No. 09-1012-HZ. Subject: Dispute over pricing in a power purchase agreement concerning generation, transmission, ancillary services and power in the form of hydroelectric pondage.

On behalf of H.Q. Energy Services (U.S.) Inc., before FERC, September 1, 2010, Docket nos. ER010-787-000, EL10-50-000 and EL10-57-000. Subject: Changes in the forward capacity market in New England.

On behalf of the Narragansett Electric Company (National Grid), before the Rhode Island Public Utilities Commission, December 9, 2009 and March 9, 2010, Docket no. 4111, regarding the Town of New Shoreham Project. Subject: Power price review relevant to the Deepwater offshore wind project.

On behalf of Ontario Power Generation, Inc., before an arbiter under the Canadian Arbitration Act, in 2009, regarding a confidential matter.

On behalf of Ontario Power Generation Energy Trading, Inc., before the FERC, June 19, 2009 (filed June 23, 2009), Docket no. ER08-580-002. Subject: Market power evaluation for market based rate application for the Midwest ISO market.

On behalf of COALSALES II, L.L.C., before the U.S. District Court for the Northern District of Florida, Pensacola Division, August 19, 2008, December 11, 2008 and February 16, 2010, Docket no. 3:06 CV 270/MCR/MD, in the matter of Gulf Power Company v. COALSALES II, L.L.C. Subject: Damages analysis associated with a claimed breach of a coal sales agreement.

On behalf of the U.S. Department of Justice, before the U.S. Court of Federal Claims, report dated August 4, 2008, Docket no. 04-0033C, in the matter of Consolidated Edison Company v. The United States of America. Subject: Analysis of sale prices of coal and nuclear generation units.

On behalf of Ontario Power Generation Energy Trading, Inc., before the FERC, June 19, 2008 (filed June 27, 2008), Docket no. ER08-580-001. Subject: Market power evaluation for market based rate application for the New York ISO market.

In a non-public investigation before the FERC, June 3, 2008, in response to a request for information. Subject: Analysis of financial transmission right (FTR) trading activity.

On behalf of the Ameren Energy Marketing Company, before the FERC, June 12, 2007 (filed June 18, 2007), Docket no. EL07-47-000. Subject: Review and comment on the economic issues raised in a complaint by the Illinois Attorney General concerning the September 2006 auction used to procure wholesale electricity supplies in Illinois.

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On behalf of the Narragansett Electric Company, before the U.S. District Court for the District of Massachusetts, Central Division, May 18, 2007, and June 11, 2007, Docket no. C.A. No. 05-40076, in the matter of TransCanada Power Marketing, LTD v. Narragansett Electric Company. Subject: Review of pricing issues in a wholesale power contract and pricing issues in electricity power contracting more generally.

On behalf of The Association of Power Producers of Ontario (APPrO), before the Ontario Energy Board, March 9, 2007, Docket no. MR-0031-R00. Subject: Evaluation of a proposed change in the pricing algorithm in the Ontario electricity market, with the change related to how generator ramp rates are considered in setting prices.

On behalf of American Electric Power Service Corporation, before the FERC, January 29, 2007, Docket no. EC07-56-000. Subject: Evaluation of the competitive effects of the acquisition of the Lawrenceburg Electric Generation Station.

On behalf of American Electric Power Service Corporation, before the FERC, January 19, 2007, Docket no. EC07-49-000. Subject: Evaluation of the competitive effects of the acquisition of the Darby Electric Generation Station.

On behalf of the U.S. Department of Justice, before the U.S. Court of Federal Claims, report dated June 29, 2006, testimony on October 12 and 16, 2007, and declaration dated September 17, 2008, Docket no. 00-697-C, in the matter of Wisconsin Electric Power Company v. The United States of America. Subject: Evaluation of decisions made by the utility in managing spent nuclear fuel at the Point Beach Nuclear Power Plant.

On behalf of Reliant Energy Services, Inc., before the U.S. Superior Court of California for the County of San Diego, May 25, 2006, in the matter of Jerry Egger, et al., v. Reliant Energy Services, Inc. et al., Wholesale Electricity Antitrust Cases I and II. JCCP Case Nos. 4204 and 4205. Subject: Analysis of purchases made by Montana-based utilities in California markets.

On behalf of The United Illuminating Company, before the FERC, January 20, 2006 and February 28, 2006, Docket no. EL05-76-001. Subject: Evaluation of issues in a contract dispute involving cost responsibilities for reliability must-run generators.

On behalf of Reliant Energy Services, Inc. and four individuals, before the U.S. District Court for the Northern District of California, San Francisco Division, October 7, 2005, Docket no. CR 04-0125 VRW, in the matter of United States of America v. Reliant Energy Services, Inc. et al. Designated as an expert in case involving claims of price manipulation and a criminal violation of the Commodity Exchange Act. Subject: The operation of the California electricity market, price artificiality, and the behavior of market participants.

On behalf of American Electric Power Service Corporation, et al, before FERC, September 8, 2005, Docket no. EC05-134-000. Subject: Evaluation of the market power implications of the acquisition of Reliant Energy's Ceredo generation station with respect to capacity and ancillary service markets.

On behalf of Niagara Mohawk Power Corporation, et al, before FERC, July 19, 2005, Docket no. ER96-2585, et al. Subject: Market-based ratemaking application for National Grid USA affiliated companies.

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On behalf of American Electric Power Service Corporation, et al, before FERC, June 24, 2005, Docket no. EC05-98-000. Subject: Evaluation of market power implications of the acquisition of the PSEG Waterford generation unit with respect to capacity and ancillary services markets.

On behalf of Ontario Energy Trading International Corp., and Ontario Power Generation, Inc., before the FERC, April 11, 2005, Docket no. ER02-1021-000. Subject: Evaluation of the potential for market power in U.S. markets using pivotal supplier and market share screens.

On behalf of the U.S. Department of Justice, before the U.S. Court of Federal Claims, report dated November 22, 2004, testimony on March 28, 2005 and April 1, 2005, Docket no. 98-488C, in the matter of Sacramento Municipal Utility District v. The United States of America. Subject: Review of the damages claim made by SMUD associated with alleged breach of contract for the disposal of spent nuclear fuel.

On behalf of National Grid USA, before FERC, November 4, 2004 (revised November 19, 2004), January 10, 2005, January 28, 2005, March 14, 2005, and March 17, 2005, Docket no. ER03-563-030. Subject: Review of the locational capacity market proposal filed by ISO New England with consideration given to market design, participant behavior, the mechanics of implementing the market, and the cost of new generation capacity.

On behalf of Reliant Energy Services, Inc. and four individuals, before the U.S. District Court for the Northern District of California, San Francisco Division, December 10, 2004, Docket no. CR 04-0125 VRW, in the matter of United States of America v. Reliant Energy Services, Inc. et al. Subject: Review of a report concerning the market effects of certain bidding actions by Reliant on California electricity markets in the summer of 2000.

On behalf of New England Power Co. before FERC, December 24, 2003, March 9, 2004, and April 15, 2004, Docket no. EL03-37-000. Subject: Evaluation of the electricity price forecast used for setting a contract termination charge, as well as the determination of variable costs and generation asset sale prices.

On behalf of Koch Power, Inc., before the Harris County, Texas District Court, Cause no. 2001-48858, in the Matter of Tim Beverick v. Koch Power, Inc., provided testimony summary on August 25, 2003. Subject: Evaluation of the potential for savings under a renegotiated power purchase agreement and the contributions of certain individuals to the renegotiation process.

On behalf of Reliant Energy Services, Inc. before the FERC, April 16, 2003, Docket no. EL03-59-000. Subject: Evaluation of the implications of certain trades of forward energy contracts on the overall electricity market.

On behalf of Reliant Energy Power Generation, Inc. and Reliant Energy Services, Inc. before the FERC, March 3, 2003, with rebuttal March 20, 2003, Docket nos. EL00-95-069 and EL00-98-058. Subject: Investigation into alleged manipulative practices by market participants in the California electricity markets in the 2000-2001 timeframe.

On behalf of Ontario Energy Trading International Corp., and Ontario Power Generation, Inc. subsidiary, before the FERC, February 14, 2002, Docket no. ER02-1021-000. Subject: Evaluation of the potential for market power in U.S. markets.

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On behalf of The New Power Company before the FERC, July 13, 2001 (filed July 17, 2001), Docket no. EL01-105-000. Subject: Evaluation of the capacity credit market in PJM, primarily focusing on market power issues.

On behalf of National Grid USA before the FERC, January 16, 2001, Docket no. EL00-62-005 and EL00-62-013. Subject: Analysis of the incentives for new generation facilities in New England, and in particular the role of the \$8.75/kw-month installed capacity deficiency charge.

On behalf of Oklahoma Gas & Electric before the Arkansas Public Service Commission, November 30, 2000, Docket no. 00-326-U. Subject: Analysis of OG&E's potential market power in a restructured, retail open-access environment.

On behalf of National Grid USA and TransCanada OSP Holdings, LTD before the FERC, August 7, 2000, Docket no. EC00-122. Subject: Analysis of the competitive effects of the proposed acquisition of interests in the Ocean State Power generation facility by TransCanada.

On behalf of Central Illinois Light Company and the AES Corporation before the FERC, February 19, 1999, Docket no. EC99-40. Subject: Analysis of competitive effects of the proposed acquisition of Central Illinois Light Company by the AES Corporation.

On behalf of Public Service Electric & Gas Co., before the United States District Court for the Eastern District of Pennsylvania, Docket no. 96-CV1705, in the Matter of Delmarva Power & Light Company and PECO Energy Company v. Public Service Enterprise Group, Inc. and Public Service Electric and Gas Co., March 28, 1997. Subject: Replacement power costs associated with the multi-year forced outage of the Salem Nuclear Station.

SPEECHES & PAPERS

"Capacity Markets: Call for Reform," American Public Power Association, 2017 National Conference, Orlando, FL, June 20, 2017.

"On the Evaluation Criteria for Capacity Construct Alternatives," PJM Capacity Construct Public Policy Senior Task Force, on behalf of American Municipal Power, Wilmington, DE, April 21, 2017.

"Let's Keep Electricity Markets Working for Albertans," with Chris Ring, whitepaper Commissioned by the Alberta Coal Transition Coalition, November 2016.

"Market Perfection: Just one step away," Mindfirst Seminar: Ontario Capacity Auction – Analysis of Feasibility and Criteria for Design Elements, Toronto, Canada, April 29, 2015.

"Responding to Incentives: The Evolving Ontario Market," Association of Power Producers of Ontario (APPrO) Conference, Toronto, Canada, November 19, 2014.

"Considering a Concave Local Demand Curve," to the ISO New England, Markets Committee, Westborough, MA, November 12, 2014.

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“Putting Markets to Work ~ Incenting CO2 Reductions,” as part of the panel on “Market Based Regulatory Programs and Their Impact on CO2 Reduction,” at COAL-GEN 2014, Nashville, TN, August 21, 2014.

“Dabbling in Capacity Markets: The how-to guide to increasing Ontario’s electricity costs,” with Ian Smyth, guest editorial in *Ippso Facto*, the monthly publication of the Association of Power Producers of Ontario (APPRO), August 2014.

“The UK’s new capacity market will never look so good again,” with Ian Smyth, *New Power*, July 2014.

“Markets Matter: Expect a Bumpy Ride on the Road to Reduced CO₂ Emissions,” white paper, May 2014.

“Time to End Capacity Auctions,” *American Gas*, March 2014, p. 21.

“Enforcement Shifts Energy-Trading Strategies,” with Julie Carey and Ben Ullman, *American Bar Association’s Energy Litigation* newsletter, Winter 2014, March 11, 2014.

“Supporting Energy Infrastructure Through Market Design,” presentation to the Natural Gas Council, Washington, DC, December 4, 2013.

“Is an IESO-run capacity auction right for Ontario?” Association of Power Producers of Ontario (APPRO) Conference, Toronto, Canada, November 20, 2013.

“Looking to the Future, (and to the West),” at EUCI’S Capacity Market Conference, Baltimore, MD, November 8, 2013.

“Locational Capacity Markets,” at EUCI’s Capacity Market Conference, Baltimore, MD, November 7, 2013.

“Trading Firms In Bullseye Amid Stepped Up Oversight Of Energy Markets,” with Julie Carey and Ben Ullman, *Forbes Energy Source*, October 11, 2013.

“Capacity Market Options,” via webcast to the Electricity Committee of the National Association of Regulatory Utility Commissioners (NARUC), October 11, 2013.

“Solving the Electricity Capacity Market Puzzle: The BiCap Approach,” the seminal white paper presenting a new market design and incorporated into a website dedicated to capacity market developments, www.BiCapApproach.com, initiated July 4, 2013.

“Realities in the Pricing of Power in Ontario,” in the session, “Realistic options for getting to truer and more effective price signals,” as part of APPRO 2012, Toronto, Canada, November 7, 2012.

“Opportunities in Spent Nuclear Fuel Consolidation,” as part of a workshop sponsored by the United States Nuclear Infrastructure Council, Baltimore, MD, May 31, 2012.

“How can an economist help with complicated technical and political issues?” in the session, “Spent Nuclear Fuel Storage and Repository Options,” for the Institute of Nuclear Materials Management Spent Fuel Workshop XXVII, Arlington, VA, February 2, 2012.

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"Five Thoughts on Evolutionary Change," in the session, "Market Evolution in the Context of the Electricity Market Forum Road Map and the Post-Election Environment," APPRO 2011, Toronto, Canada, November 16, 2011.

"Spent Nuclear Fuel Management: How centralized interim storage can expand options and reduce costs," with Julie M. Carey and Christopher L. Ring. A study conducted for the Blue Ribbon Commission on America's Nuclear Future, May 16, 2011.

"Nine Trends to Watch in the Renewable Transformation," with Julie M. Carey. *Dialogue*, United States Association for Energy Economics, Volume 18, Number 3 - 2010.

"Capacity Market Design Fundamentals." Workshop for EUCI's conference, "Capacity Resources: Issues and Market Dynamics," Baltimore, MD, October 27, 2010.

"The Impact of Transmission Expansion and New Renewable Generation on the Evolution of FTR Markets." Panel moderated for EUCI's conference, "Financial Transmission Rights: Trends and Trajectory," Arlington, VA, July 19, 2010.

"Managing FTR Credit Risk." Panel moderated for EUCI's conference, "Financial Transmission Rights: Where Are We Now?" Washington, DC, July 28, 2009.

"Credit Coverage Requirements for FTR and Virtual Bidding." Session moderated for EUCI's conference, "Unsecured Credit: Is it the right policy for RTOs/ISOs?" Alexandria, Virginia, April 29, 2009.

"Force Majeure Risk and Ontario Power Authority's Power Contracts." Whitepaper with Julie M. Carey, on behalf of the Ontario Power Authority, March 31, 2008.

"Financial Accommodation for Force Majeure Events." Whitepaper with Julie M. Carey, on behalf of Ontario Power Authority, January 21, 2008.

"Market Design Choices for Ancillary Services Products," with Cleve Tyler. Presented at the EUCI Ancillary Services Conference, Minneapolis, Minnesota, September 12, 2007.

"Cost-Benefit Analysis In the Evaluation of Market Rule Changes: Comments on MR-00332-R00." Whitepaper on behalf of Ontario Power Generation, Inc., July 12, 2007.

"Adopting a Ramp Charge to Improve Performance of the Ontario Market." Whitepaper with Arun Sharma, on behalf of The Association of Power Producers of Ontario (APPRO), June 21, 2006.

"Shifting Regulatory Oversight of Utility Mergers," with Cleve Tyler, *Innovating for Transformation*, The Energy and Utilities Project, Volume 6, 2006, page 37.

"Allocation of Emission Allowances for the Regional Greenhouse Gas Initiative." Whitepaper regarding an initiative under consideration in mid-Atlantic and Northeastern regions of the United States, written with Alan Madian, September 20, 2005.

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"Toward a Capacity Demand Curve Market," with Julie Murphy, *Innovation for the Future*, The Energy and Utilities Project, Volume 5, 2005, page 46.

"LICAP Key Issues." Presented to Commissioners and staff of the Massachusetts Department of Telecommunications and Energy, Boston, Massachusetts, March 28, 2005.

"Market Power Screens." Presented at the Electric Power Supply Association (EPSA) Annual Fall Membership Meeting, Washington, DC, November 10, 2004.

"Ancillary Service Pricing Dynamics." Presented at the EUCI Ancillary Service Conference, Westminster, Colorado, March 13, 2003.

"California's Electricity Markets: Structure, Crisis, and Needed Reforms." Contributor, January 16, 2003.

"Capacity Payment Schedules: A Workable Approach for Resource Adequacy." Presented to the Energy Bar Association, Washington, D.C., December 12, 2002.

"Power Market Panel." Speaker in the Standard & Poor's 2002 Project, Power & Energy Credit Conference, New York, New York, November 13, 2002.

"Market-Based Pricing of Ancillary Services: Market Design Choices, Consequences and Performance." Presented at the EUCI Ancillary Services Conference, Atlanta, Georgia, September 27, 2002.

"Ancillary Service Market Performance During the Summer of 2002." Presented at the EUCI Ancillary Services Conference, Atlanta, Georgia, September 26, 2002.

"Revenue and Risk from the Lender's Perspective." Presented at the Merchant Plant Development and Finance Conference, Houston, Texas, March 30, 2000.

"Preparing for Antitrust Scrutiny." Panel discussion at the Utility Mergers & Acquisitions Conference, Washington, D.C., July 15, 1998.

"Perspectives of Investors and Developers." Presented at the American Education Institute Conference on Power Contracts in affiliation with the United States Energy Association to the Romanian Electric Authority, Washington, D.C., March 19, 1997.

"Risk and Risk Management in Electricity Markets." Presented at the Electric Load Aggregation Conference, Washington, D.C., November 18, 1996.

"Developing Firm Plans During Uncertain Times: Anticipating Change." Presented during a session titled "Integrated Resource Planning and Demand Side Management After Federal Endorsement," to the Institute of Public Utilities, Williamsburg, Virginia, December 15, 1992.

Numerous speeches and training programs regarding nuclear power plant operations, accident analysis, nuclear engineering and related subjects were given to operators and technical engineering personnel from power plants around the world, 1984-1986.

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AFFILIATIONS AND PROFESSIONAL QUALIFICATIONS

Member of the Energy Bar Association (non-attorney professional), U.S. Association for Energy Economics and International Association for Energy Economics.

Mr. Hamal has held U.S. Nuclear Regulatory Commission certification as Senior Reactor Operator; U.S. Department of Energy qualifications as Nuclear Plant Engineer and Nuclear Engineer Officer of the Watch; and U.S. Coast Guard licenses as Third Assistant Engineer and Third Mate.

November 2017