

1 **SUBJECT: Price Forecast**

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3 **QUESTION: MH-POT-1**

4 Please file the curriculum vitae for each member of your firm who has participated in the  
5 preparation of your report and the curriculum vitae of each third party (if any) retained to assist  
6 in preparation of your report. Please specify those individuals who intend to appear to give  
7 evidence during the oral portion of the proceeding.

8

9 **RESPONSE:**

10 Please see attached resums for Dr. Robert Sinclair (witness); Dr. David Patton; Mr. Jason  
11 Fogarty, and Mr. Gabriel Murtaugh.

**ROBERT A. SINCLAIR**  
**(January 2014)**

**Business Address**

Potomac Economics  
9990 Fairfax Blvd Suite 560  
Fairfax VA 22030

**Education**

Ph.D., Economics, University of Pittsburgh (1993)  
B.A., Economics, Indiana University of Pennsylvania (1986)

**Fields of Concentration**

Applied Microeconomics, Law and Economics, Empirical Industrial Organization

**Professional Experience**

2001 - Vice President, Potomac Economics, Fairfax, VA  
2000 - 2001, Economic Consultant, Micronomics, Washington, DC  
1993 - 2000, Economic Consultant, J.W. Wilson and Associates, Washington, DC

**Expert Testimony**

*Before the Louisiana Public Service Commission, Application Entergy Gulf States, Inc. for Authorization to Participate in an MSS-4 Contracts, etc. (2011), Docket No. U-32031; and Joint Application of Entergy Louisiana, LLC for approval to Construct Unit 6 at Ninemile Station and of Entergy Gulf States, etc. (2011), Docket No. U-31971; prepared and filed expert testimony at the request of the Louisiana Public Service Commission Staff on the independent monitoring of Entergy's evaluation of power supply proposals.*

*Before the Federal Energy Regulatory Commission, Northeast Utilities Service Company and NSTAR Electric (2009), Docket No. EL09-20-000; prepared affidavit on behalf of Nalcor Energy addressing vertical market power issues associated with a participant-funded transmission line.*

*Before the Régie de Énergie, Quebec, Complaint by Transmission Customer Newfoundland and Labrador Hydro concerning Transmission provider Hydro Quebec's Administration of its Tariff, etc. (2008), Case No: P-110-1692; prepared and filed expert testimony on behalf of Newfoundland and Labrador Hydro on issues relating to the technical requirements for receiving certain-transmission service.*

*Before the Régie de Énergie, Quebec, Complaint by Transmission Customer Newfoundland and Labrador Hydro concerning Transmission provider Hydro Quebec's Administration of its Tariff, etc. (2008), Case No: P-110-1565 and No: P-110-1597; prepared and filed expert testimony on behalf of Newfoundland and Labrador Hydro on issues relating to calculation of available transmission capacity and open access policies.*

*Before the Louisiana Public Service Commission, Joint Application of Entergy Louisiana, LLC. And Entergy Gulf States, Inc. for Authorization to Participate in Contracts for the Purchase of Electric Power (2007), Docket No.U-29955; prepared and filed expert testimony at the request of the Louisiana Public Service Commission Staff on the independent monitoring of Entergy's evaluation of power supply proposals.*

*Before the Federal Energy Regulatory Commission, Progress Energy, Inc. (2003), Docket No. ER03-1389-000, *et al*; prepared affidavit on behalf of Florida Municipal Power Agency and Seminole Electric Power Cooperative addressing market power issues associated with Progress Energy's application to sell wholesale power at market-based rates.*

*Before the United States District Court for the Northern District of California—San Jose Division, ABB Power T&D Company v. Alstom ESCA Corporation (2001), Case No. C-99-21242 SW PVT ENE; prepared expert report on behalf of plaintiff on economic and structural issues in the electric power industry.*

*Before the Connecticut Department of Environmental Protection, In the Matter of the Determination to Issue the Draft Air and Water Permits to Towantic Energy (2001); prepared expert report on behalf of citizens group opposing new plant construction; report addressed economic benefits of new plant construction.*

*Before the Federal Communications Commission, In the Matter of Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities (2000), GN Docket No. 00-185; prepared affidavit to support comments on behalf of various consumer groups and Internet Service Providers relating to policies on open access cable broadband.*

*Before the Superior Court of the State of Arizona in and for the County of Santa Cruz, Sam and Sherri Chilcote, et al., v. Citizens Utilities Company, et al. (2000), Case No. CV 98-471; prepared expert report on behalf of a class of electricity customers relating to damages resulting from inadequate electric service.*

*Before the United States District Court for the Southern District of Ohio -- Western Division, PepsiCo, Inc. v. Central Investment Corporation (2000), Case No. C-1-98-389; prepared expert report on behalf of PepsiCo on economic issues relating to soft drink production and distribution (co-authored with Roy Weinstein).*

*Before the Federal Energy Regulatory Commission, Western Resources, Inc. (1998), Docket No. ER98-2157-000; prepared affidavit on behalf of the Kansas City Board of Public Utilities addressing market power issues associated with Western Resources' application to sell wholesale power at market-based rates.*

*Before the Corporation Commission of the State of Oklahoma, Joint Application of American Electric Power Company, Inc. Public Service Company of Oklahoma and Central and South West Corporation Regarding Proposed Merger (1999), Cause No. PUD 980000444; prepared testimony on behalf of public power entities on merger-related market power issues.*

*Before the Public Service Commission of the State of Wisconsin, In the matter of Proposed Revision of Chapter PSC 100, Wis. Admin. Code – Rules for Wholesale Merchant Plants (1999), Docket No. 1-AC-174; prepared testimony on behalf of various intervenors concerning market power issues relating to merchant plant development.*

*Before the Federal Energy Regulatory Commission, New England Electric Power Company, et al. (1998), Docket Nos. ER98-6-000 and EC98-1-000; prepared affidavit on behalf of the Town of Norwood addressing market power issues associated with the New England Power's sale of generating assets to U.S. Generating Company.*

*Before the Mississippi Public Service Commission, Report on Retail Market Power Issues (1998), Docket No. 96-UA-389; prepared expert report on market power issues associated with electric utility restructuring in Mississippi on behalf of the Municipal Energy Agency of Mississippi.*

*Before the Connecticut Department of Public Utility Control, Review of the Connecticut Light & Power Company Rates and Charges (1998), Docket No. 98-01-02; prepared testimony and exhibits on cost allocation and rate design issues on behalf of the Connecticut Office of Consumer Counsel.*

*In United States District Court for the District of Massachusetts, Town of Norwood, Massachusetts v. New England Power Company, et al. (1998), Case No. 97-CV10818-PBS; prepared affidavit on behalf of the Town of Norwood addressing antitrust issues associated with New England Power Company's sale of generating assets.*

*In United States District Court for the District of Massachusetts, Town of Norwood, Massachusetts v. New England Power Company, et al. (1998), Case No. 97-CV10818-PBS; prepared affidavit on behalf of the Town of Norwood addressing recent changes in the corporate organization of Pacific Gas & Electric Company pertinent to New England Power's sale of its generating assets to an affiliate of Pacific Gas & Electric Company.*

*Before the Federal Energy Regulatory Commission, San Diego Gas & Electric Company, Enova Energy, Inc. (1997), Docket No. EC97-12-000; prepared affidavit on behalf of Southern California Public Power Authority addressing market power issues associated with the San Diego Gas & Electric/Southern California Gas merger.*

*Before the Federal Energy Regulatory Commission, The Cleveland Electric Illuminating Company and Market Responsive Energy, Inc. (1997), Docket Nos. ER96-372-000 and ER95-1295-000, respectively; prepared affidavit on behalf of Cleveland Public Power in opposition to CEI's and MREI's settlement offer to resolve market power issues in their filing under §206 of the Energy Policy Act to sell power at market-based rates.*

*Before the California Public Service Commission, Joint Application of Pacific Enterprises, Enova, et al. (merger of San Diego Gas & Electric Company and Southern California Gas Company, (1997)), Application No. A96-10-038; prepared testimony on behalf of Southern California Public Power Authority addressing market power issues associated with the merger.*

*Before the Public Utilities Commission of Ohio, Application of the Toledo Edison Company and the Cleveland Electric Illuminating Company for authority to increase rates (1996), Case No. 95-299-EL-AIR and 95-300-EL-AIR; prepared testimony on cost allocation and rate design issues on behalf of the Ohio Office of Consumers' Counsel.*

*Before the South Carolina Public Service Commission, South Carolina Electric & Gas Company Application for Increases in Electric Rates and Charges (1995), Docket No. 95-1000-E; prepared testimony on behalf of the South Carolina Department of Consumer Affairs analyzing the Company's proposal to shift depreciation reserves and shorten amortization schedules in order to reduce the unrecovered costs of generation assets in preparation for retail competition.*

*Before the Public Service Commission of the District of Columbia, Application of the Potomac Electric Power Company for an Increase in its Retail Rates (1995), Formal Case No. 939; prepared testimony on cost allocation and rate design issues on behalf of the District of Columbia Office of People's Counsel.*

#### Other Expert Reports

*To the Federal Energy Regulatory Commission, Quarterly Independent Monitoring Report on Entergy's Weekly Procurement Process, (2012-2013) Docket No. ER09-555, principal author of report to FERC on the Energy weekly activities to procuring network resources from third-party suppliers.*

*Energy Community Regulatory Board – Electricity Working Group, Market Monitoring Guidelines for the 8<sup>th</sup> Congestion Management Region of Europe, (2010); Developed draft Market Monitoring Guidelines to South East Europe Regulators for screens and indices to monitor cross-border transmission capacity market.*

*To the Federal Energy Regulatory Commission, Seasonal Independent Monitoring Report on Duke Energy Corporation and Progress Energy, (2011-2013) Docket No. EC11-60, principal author of independent monitoring report to FERC addressing interim market power mitigation issues relating to seasonal power sale agreements.*

*International Upper Great Lakes Study Hydropower Technical Working Group, IUGLS Hydropower Technical Working Group (TWG) Contextual Narrative, (2009); Provided technical economic analysis of Hydro production at Sault Ste. Marie to inform the final TWG narrative.*

*To the South East Europe Energy Regulation Forum, Report on Market Monitoring in South East Europe (2007-2008), principal author of market monitoring report for the United States Agency for International Development Market Monitoring Pilot Project addressing electricity market activities among the countries of South East Europe.*

*To the Federal Energy Regulatory Commission, Quarterly Market Monitoring Report on the Public Service Co. of New Mexico, (2005-2010) Docket No. EC05-29-000, principal author of market monitoring report to FERC addressing the potential for market power related to the company's operation of its transmission and generation facilities.*

*To the Federal Energy Regulatory Commission, Quarterly Market Monitoring Report on the Arizona Public Service Co., (2005-2010) Docket No. EC03-131-000, principal author of market monitoring report to FERC addressing the potential for market power related to the company's operation of its transmission and generation facilities.*

*To the Federal Energy Regulatory Commission, Quarterly Market Monitoring Report on the Oklahoma Gas & Electric Company, (2004-2006) Docket No. EC03-131-000, principal author of market monitoring report to FERC addressing the potential for market power related to the company's operation of its transmission and generation facilities.*

## **Publications and Papers**

### ARTICLES

1. "Electric Power: Generating Controversy," with D.B. Patton *Industry Studies*, 3<sup>rd</sup> edition, Larry Duetsch, editor, New York: M.E. Sharpe (2002).
2. "An Empirical Model of Entry and Exit in Airline Markets," (October 1995) 10 *Review of Industrial Organization*
3. "Incremental Transmission Pricing, the Comparability Standard, and an Alternative to the FERC's 'Higher of' Policy," with D. F. Greer and J.W. Wilson (December 1994) *The Electricity Journal*
4. "Airport Dominance and State Action Antitrust Immunity for Airport Operators," (Fall 1991), 96 *Dickinson Law Review*

### BOOK REVIEWS

1. "Designing Competitive Electricity Markets," by Hung-po Chao and Hillard G. Huntington (eds.), for the *Review of Industrial Organization* 2000.
2. "Power Structure - Ownership, Integration, and Competition in the U.S. Electric Utility Industry," by John Kwoka for the *Review of Industrial Organization*, 1998
3. "Electric Utility Mergers - Principles of Antitrust Analysis", by M. Frankena and B. Owens for the *Review of Industrial Organization*, 1994

## Teaching Experience

*The George Washington University (2005)*

Law and Economics

*The University of Pittsburgh (1989-1993)*

Microeconomics (intro and advanced), Industrial Organization and Antitrust, Macroeconomics (intro),

Department of Economics Outstanding Teaching Award (1992)

## Speeches

1. “Market Monitoring Process in South East Europe,” presented at Regional Workshop on Emerging Issues in Cross-Border Trade, Market Monitoring and Regulatory Role in Energy Efficiency in the Black Sea Region, sponsored by USAID and NARUC, Kiev, Ukraine, October 2013.
2. “Who Should be the Market Monitor?” presented at Southeast Europe Electricity Market Monitoring Workshop, sponsored by USAID and NARUC, Athens, Greece, October 2005.
3. “Market Monitoring and Standard Market Design,” presented at Standard Market Design – Dealing with the New Giga-NOPR sponsored by Infocast, Washington, D.C., December 5, 2002.
4. “The Role of Market Monitoring in Competitive Electricity Markets,” presented at How’s It Going – Snapshots of the Status of Electric Restructuring sponsored by the Energy Bar Association, Midwest Energy Conference, Kansas City Missouri, February 7, 2002.
5. “Measuring Market Shares in the ‘Energy Services’ Market,” presented at Communicating Competitive Concerns, sponsored by the American Gas Association, Arlington, VA, February 25, 1998.
6. “Hostile Takeovers in the Electric Utility Merger Wave,” presented at Antitrust, Merger Guidelines, and Regulation of Utility Consolidation, sponsored by the Institute of Public Utilities at Michigan State University, Washington D.C., November 7, 1996.
7. “Telecommunications: Developing the Future at Home and Abroad,” presented at The Future of Competition, sponsored by National Association of Regulatory Utility Commissioners, Columbus, OH, September 13, 1996.
8. “Economic Aspects of FERC’s Policy on Electric Utility Mergers,” presented at Mergers: A Threat to Competition? sponsored by the McGraw-Hill Company, Washington, D.C., March 15, 1996.

**PROFESSIONAL BACKGROUND OF  
DAVID B. PATTON, PH.D.**

**EDUCATION**

Ph.D., Economics, George Mason University  
Areas of specialization: Industrial Organization, International Finance

M.A., Economics, George Mason University

B.A., Economics, New Mexico State University  
Minor in Mathematics

**EMPLOYMENT**

*President, Potomac Economics, 2001 – present*

Serve as Market Advisor for the New York ISO and ISO New England, responsible for assisting in monitoring the markets to identify and remedy market design flaws and market power concerns.

Lead and direct Potomac Economics' activities in its role as Independent Market Monitor for the Midwest ISO. Responsible for developing and performing the market monitoring function in the Midwest ISO region.

Provide expert testimony, analysis, and advice for clients on competitive issues in the electricity and natural gas industries, including mergers, market power and antitrust issues, competitive market design, and transmission pricing.

*Director of Energy Practice, Capital Economics, 1997 – 2001*

Provided expert advice and testimony to clients in cases involving transmission pricing, wholesale electric market design, mergers, market power, and antitrust matters.

Assisted electric utilities in developing regional transmission organizations by providing expert advice regarding transmission pricing, congestion management, market development, and market monitoring.

Retained by the New York ISO to service as the Independent Market Advisor regarding the development and monitoring of the wholesale electricity market.

*Senior Economist, Office of Economic Policy, Federal Energy Regulatory Commission, 1995 – 1997*

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Developed transmission open access policies, including power pool, ISO, and comparability requirements in FERC's Open Access Rule (Order 888).

Developed the analytical framework in FERC's Merger Policy Statement for assessing the competitive effects of electric and natural gas utility mergers.

Responsible for analysis of transmission and ancillary service pricing issues associated with restructuring of the electric utility industry.

*Director of Buildings Policy*, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, 1992 – 1995

Responsible for development of U.S. policy related to the energy efficiency of housing and commercial buildings. Managed data and analysis programs to estimate the effects of energy efficiency policies and programs.

*Staff Economist*, Office of Policy, Planning and Analysis, U.S. Department of Energy, 1989 – 1992

Responsible for development and assessment of energy policies in President Bush's National Energy Strategy and federal legislation, including the Energy Policy Act of 1992.

## REPORTS AND ANALYSES

Midwest ISO. Prepared Annual State of the Market Reports for 2004 through 2011 that review the performance of the New York electricity markets, including recommending improvements to the operation and design of the markets.

ISO New England. Prepared Annual Reports for 2003 to 2011 that analyze the performance of the nodal electricity markets implemented in New England in March 2003.

New York ISO. Prepared Annual Reports for 2001 through 2011 that review the performance of the New York electricity markets, including recommending improvements to the operation and design of the markets.

New York ISO. Prepared expert testimony and affidavits in 2007 to 2011 regarding market power in the New York City capacity market, including the design and execution of both supply-side and buyer-side mitigation measures to address the market power.

Midwest ISO. Prepared filed comments and answer in 2012 regarding capacity trading between MISO and PJM.

New York ISO. Filed multiple affidavits and supplemental affidavits regarding proposed installed capacity demand curves in 2007 to 2011.

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- Midwest ISO. Prepared and filed multiple comments in 2011 with FERC regarding the need for a sloped capacity demand curve and market power mitigation in the MISO capacity market.
- New York ISO. Prepared affidavit in 2010 regarding market power and proposed mitigation associated with local reliability requirements.
- Midwest ISO. Prepared a report and multiple affidavits addressing cost-causation and the allocation of Revenue Sufficiency Guarantee Payments, 2008-2011.
- Midwest ISO. Prepared Market Power Study in 2007 evaluating market power issues in the proposed Ancillary Services Markets in the Midwest and proposing mitigation to address the market power concerns.
- Public Utility Commission of Texas. Provided expert testimony and rebuttal testimony in 2005 regarding the proposed design of the nodal energy markets to be implemented in 2009.
- Public Utility Commission of Texas. Prepared an assessment of the operation of the current ERCOT market in 2004, which provides detailed recommendations to address a number of issues identified in the report.
- Midwest ISO. Prepared quarterly reports regarding the effectiveness of market power mitigation from 2004 to 2011. Also prepared expert testimony supporting filings to renew the mitigation measures.
- Public Utility Commission of Texas. Prepared Annual Reports for 2003 to 2006 that evaluate the ERCOT electricity markets. The reports provide recommendations for improvements to the existing zonal markets.
- ISO New England. Prepared a report evaluating the market operations during the first six months of the new multi-settlement wholesale electricity markets in New England.
- Midwest ISO. Prepared annual reports for 2002 through 2004 evaluating the sale and utilization of electricity transmission capacity in the Midwest, the results of the wholesale market, and the potential for market power problems in the future.
- ISO New England. Prepared annual reports for 2001 and 2002 analyzing withholding and market power in the New England electricity markets.
- Midwest ISO. Assessed the economic efficiency and potential risks associated with the configuration of the RTO's in the Midwest.
- ISO New England. Prepared a report analyzing the pricing in New England's energy and ancillary services markets, and recommending changes in the market rules.
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New England Power Pool. Developed and negotiated a market power monitoring and mitigation plan with the NEPOOL, the State Commissions, and the New England Independent System Operator.

TransConnect LLC. Provided expert advice and analysis to transmission owners seeking to form an independent transmission company regarding an incentive pricing proposal to promote efficient operation of and investment in the transmission network.

Northern States Power. Advised client on alternative transmission pricing and service proposals associated with the development of an independent transmission Co.

FirstEnergy Merger (Ohio Edison Company / Centerior). Advised client on competitive issues related to the merger and on market power mitigation alternatives.

Exxon and British Petroleum. Prepared economic analyses of wholesale gasoline prices in the California market.

Northern States Power/Wisconsin Electric Power merger (Primergy). Advised FERC regarding competitive issues associated with the merger.

Electricity and Transmission Pricing in Electric Utility Industry. Analyzed alternative auction and bilateral contracting regimes for FERC.

Ameren Merger (Union Electric/ Central Illinois Public Service). Advised FERC regarding competitive issues associated with the merger.

American Electric Power / Central & Southwest Merger. Negotiated market power mitigation commitments with FERC staff on behalf of client.

PJM Power Pool. Analyzed the generation and transmission pricing aspects of restructuring proposal for FERC.

Fannie Mae/U.S. Department of Energy. Developed partnership to use loan and mortgage products to improve the energy efficiency of U.S. housing.

Freddie Mac. Analyzed the issues related to liquidity and risk in the mortgage finance and asset-backed securities markets.

Gas Pipeline Analysis. Submitted a competitive analysis of a potential natural gas pipeline acquisition to the Federal Trade Commission.

Midwest Natural Gas Market. Submitted a competitive analysis of Midwest pipeline and storage capacity to the U.S. Department of Justice regarding a civil antitrust investigation of a natural gas marketing joint venture.

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## SELECTED PUBLICATIONS AND PRESENTATIONS

- “RTO Energy Markets: Theory, Design and Challenges”, presented at the Energy Bar Association 2012 Annual Meeting, April 2012.
- “How Markets Improve Reliability in Wholesale Electricity Markets”, workshop presented to the Western Electricity Coordinating Council, December 2011.
- “Independent Market Monitoring: In RTO and Non-RTO Areas”, presented to the Energy Regional State Committee and its stakeholders, August 2011.
- “Independent Market Monitoring: Current Issues”, presented to the Harvard Electricity Policy Group, June 2011.
- ” Emerging Issues in Forward Capacity Markets”, presented at an EUCI industry conference, October 2010.
- “The Role of Financial Entities in Wholesale Electricity Markets”, presented at the Energy Bar Association 2009 Annual Meeting, April 2009.
- “Comments of the Midwest ISO Independent Market Monitor”, presented at a Technical Conference hosted by the Federal Energy Regulatory Commission regarding market monitoring policies, April 2007.
- “Potential Market Power in the Midwest ISO Ancillary Services Markets”, presented to Midwest ISO Markets Committee and the Federal Energy Commission in Fall 2007.
- “Load Pockets and Local Market Power”, presented at a Technical Conference hosted by the Federal Energy Regulatory Commission, February 2004.
- “Electric Power: Generating Controversy”, with R.A. Sinclair, Industry Studies, 3<sup>rd</sup> edition, Larry Duetsch, editor, New York: M.E. Sharpe (2003).
- “Market Configuration and Coordination in the Midwest”, presented to the Energy Bar Association, October 2003.
- “Market Monitoring Roles and Responsibilities”, presented at the National Association of Regulatory Utility Commissioners’ 2003 Winter Meeting, Committee on Electricity, February 2003.
- “Lessons Learned from Market Monitoring in North American Electricity Markets”, presented at the World Bank Electricity Forum, February 2003.
- “Setting Efficient Wholesale Electricity Prices During Periods of Shortage”, presented to the Electric Power Supply Association, October 2002.
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- “Development of Competitive Wholesale Markets in the Northeast”, presented to the NARUC Winter Meeting, February 2002.
- “Detecting and Mitigating Market Power in Deregulated Electric Markets”, presented at the Market Monitoring Conference hosted by the American Antitrust Institute, December 2001.
- “Monitoring Wholesale Electric Markets”, presented to the MIT Energy and Environmental Policy Workshop, December 2001.
- “The Role of Market Monitoring in Competitive Electric Markets”, presented to the Energy Bar Association, November 2001.
- “Assessing the Competitive Performance of Electricity Markets”, presented at the Market Monitoring and Mitigation Workshop by the Edison Electric Institute, June 2001.
- “Transmission Pricing Issues”, presented to the EEI Transmission Pricing Workshop, May 2001.
- “Developing Efficient Incentives for A Transco”, presented to the Electric Power 2001 Conference, March 2001.
- “Managing and Pricing Congestion in Competitive Electric Markets”, presented to the Energy Bar Association, February 2001.
- “Defining an Appropriate Role for Market Monitoring in a Deregulated Electric Industry”, Association of Power Exchanges and International Electric Industry Conference, October 2000.
- “Defending Innovative Pricing Proposals for Regional Transmission Organizations”, Edison Electric Institute Members’ Workshop -- Developing Incentive Rates: Applications and Problems, July 2000.
- “Cost Shifting and Other RTO Pricing Issues”, EEI – Energy Daily Incentive Transmission Ratemaking Conference, July 2000.
- “Innovative Pricing Workshop: Developing and Defending Proposals for RTOs”, Infocast Transmission Pricing Conference, May 2000.
- “Addressing Market Power in Deregulated Electric Markets”, presented at the Spring Meeting, Antitrust Law Section of the American Bar Association, April 2000.
- “Evaluating Investment Opportunities in Emerging Competitive Power Markets”, presented at Lehman Brothers’ Competitive Generation Conference, March 2000.
- “RTO Monitoring of Competitive Electric Markets”, presented at the Annual Energy & Project Finance Conference, February 2000.
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- “Monitoring Competitive Electric Markets”, presented at 1999 Mid-Year Meeting of the Federal Energy Bar Association, November 1999.
- “Merger Review and Analysis”, presented at Antitrust Issues in Competitive Electric and Natural Gas Markets sponsored by Howrey and Simon, September 1999.
- “The Role of Regional Transmission Organizations in Emerging Competitive Electric Markets”, *CCH Power and Telecom Law*, July 1999.
- “Transmission Congestion in Competitive Electric Markets”, presented at the Transmission Business Forum, July 1999
- “Designing Efficient Performance Based Rates”, Incentive Ratemaking Workshop conducted at Independent Transmission Company conference hosted by Infocast, April 1999.
- “Designing an Independent Transmission Company to Promote Competition and Efficiency”, presented at Independent Transmission Company conference hosted by Infocast, April 1999.
- “Mitigating Market Power in a Deregulated Electric Utility Industry”, *CCH Power and Telecom Law*, May 1998.
- "ISOs as a Safeguard Against Market Power Abuse", presented at Independent System Operator conference sponsored by Howrey & Simon, May 1998.
- “Competitive Analysis of Electric Utility Mergers: An Evolving Standard”, *CCH Power and Telecom Law*, March 1998.
- "Key Transmission Issues for an Independent System Operator", presented to Desert Star Independent System Operator participants, August 1997.
- “FERC Perspective on Electricity Trading and Derivatives”, presented at Electricity Trading and Derivatives Strategies Conference hosted by Infocast, March 1997.
- “Market Power in Electricity: Analysis and Mitigation”, presented to National Association of Regulatory Utility Commissioners’ Winter Meeting, February 1997.

## **PROFESSIONAL ACTIVITIES AND AWARDS**

American Economic Association  
International Association of Energy Economists  
National Association of Business Economists  
U.S. Department of Energy, Commendation from Secretary of Energy, 1992  
Phi Kappa Phi honorary society  
Omicron Delta Epsilon, economics honorary society

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**PROFESSIONAL BACKGROUND OF  
JASON K. FOGARTY**

**EDUCATION**

Bachelor of Arts, Economics, 2001  
Northwestern University, Evanston, IL

**EMPLOYMENT**

*Senior Market Analyst*, Potomac Economics, 2004 – present

Led update and redesign of Real-Time and Day-Ahead Automated Mitigation Procedure (AMP) software for the Midwest ISO ancillary services market.

Coded and implemented Reference Price calculation software that supports the Conduct & Impact market power mitigation framework of the Midwest ISO.

Managed the development of Default Energy Bid calculation software for the California ISO's Market Redesign and Technical Upgrade (MRTU) market.

*Consultant*, LECG, 2001-2004

Performed economic and statistical analyses in support of expert testimony for litigation. Projects included simulating multi-tiered demand systems in the beverage industry, modeling the decay curve of generic pharmaceutical prices, and analyzing the competitive effects and implications of several potential mergers.

Managed staff supporting subject matter experts in LECG's London and Chicago offices.

Conducted advanced SAS training sessions for LECG's US offices.

# GABRIEL MURTAUGH

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(315) 418-8569 (cell)

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## WORK EXPERIENCE

### Potomac Economics

Associate

Oct 2013 - Present

- Monitor behavior of energy market participants.
- Evaluate claims regarding power plant operating characteristics, outage events, variable operating costs, maintenance costs, and environmental compliance costs.
- Review and evaluate estimated costs to develop new resources or repower existing resources.
- Collaborate with power system engineers, software programmers, economists, other team members to develop custom software for assessing generator performance.

### SNL Financial

Content Manager, Mergers & Acquisitions

Feb 2012 - Sept 2013

**Key Results:** Improved time-to-market for critical M&A data by 40%. Started a global operations team in Manila. Expanded data collection into European and Asian markets. Executed on key initiatives increasing robustness of the core data set.

- Oversaw all mergers and acquisitions data collection and planned initiatives to expand content.
- Managed a team of 80+ employees.
- Managed a \$1.3mm annual budget.
- Oversaw global operations in India, Pakistan and Manila.
- Developed employees and delivered feedback for 7 direct reports.
- Worked with an Agile development team to execute on software enhancements.

Content Owner – Statutory insurance Financials

March 2011 – Feb 2012

Senior Systems Analyst, Automated Content – Statutory Insurance

Nov 2010- Feb 2012

UAT Lead

Oct 2010 – Feb 2012

Systems Analyst, Automated Content – Statutory Insurance

Aug 2010-Nov 2010

- Reviewed, analyzed, and evaluated content systems and user needs.
- Worked with multiple Agile teams to deliver data management software solutions.
- Used relational database tools to provide tier-4 support for data testing, troubleshooting, and end-user support.

### University of Virginia

Head Teaching Assistant, Principles of Microeconomics, Macroeconomics

Fall 2007-Spring 2009

- Coordinated and managed all technical, scheduling, and administrative logistics for 1000+ student courses.
- Served as liaison between professor(s) and 17 Teaching Assistants each semester.
- Assisted in exam writing.
- Taught weekly discussion sections.

### IBM

Programmer/Technical Writer

2005-2006

- Worked on multiple accounts for the IBM Global Services focused on strategic outsourcing.
- Database management using in house data and document management software.
- Wrote white paper on outsourcing standards, emphasizing Process and Quality Management.

## EDUCATION

University of Virginia, M.A. in Economics

2007

Bucknell University, B.S. in Computer Science

2005

Minors in Mathematics, Economics, and History

## PROGRAMMING LANGUAGES:

- SQL, SAS, MATLAB, C++, C, Java, Stata

1 **SUBJECT: Price Forecast**

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3 **QUESTION: MH-POT-2**

4 Please provide copies of all documents received from the PUB, PUB advisors, or any third party  
5 in connection with your retainer and/or in contemplation of preparing your report in this  
6 proceeding. Please provide notes of all meetings with PUB, PUB advisors or any third party in  
7 connection with your participation in this proceeding (in confidence if necessary)

8

9 **RESPONSE:**

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1 **SUBJECT: Price Forecast**

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3 **QUESTION: MH-POT-3a**

4 Please provide details of the experience of each of the contributors to your report with respect to  
5 Manitoba markets.

6

7 **RESPONSE:**

8 Please see generally attached resumes which show extensive experience working in MISO,  
9 which is the main market in which Manitoba participates. Since 2003 when MISO began  
10 operating as an centralized, multilateral RTO market, Potomac Economics has been involved in  
11 analyzing market structure, participant conduct, and market outcomes. This includes Manitoba  
12 Hydro's participation in these markets.

1 **SUBJECT: Price Forecast**

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3 **QUESTION: MH-POT-3b**

4 Please provide details of the experience of each of the contributors to your report with respect to  
5 hydro-electric systems.

6

7 **RESPONSE:**

8 Please refer to resumes in IRs MH-POT-1 and MH-POT-2 describing the extensive experience in  
9 markets across the US (including MISO, ISO-NE, and NYISO) all of which are served partially  
10 by hydro-electric facilities. Our work in these markets has required familiarity with the  
11 advantages and limits of hydro system operations, costs, and development. Please see also Dr.  
12 Sinclair's experience in regards to hydro-electric issues in Quebec and Newfoundland.

1 **SUBJECT: Price Forecast**

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3 **QUESTION: MH-POT 003c**

4 Please provide details of the experience of each of the contributors to your report with respect to  
5 creation of export price forecasts.

6

7 **RESPONSE:**

8 Please refer to resumes in response to MH-POT-1 that reflect the extensive experience in  
9 markets across the US (MISO, ISO-NE, and NYISO). In all of these markets we assess past and  
10 future market conditions, including costs, prices, and market rules and provide expert  
11 conclusions and other assessment and analyses. For example, we routinely make forecasts of net  
12 revenues for assessing and anticipating results in capacity markets. This includes analyzing  
13 demand, units costs, and using prices to estimate expected revenues.

14 Our work in the area of power procurement monitoring has also involved the use of price  
15 forecasts that we were expected to assess and validate. Much like the case before the Panel, this  
16 work involved assessing the economic merits of new generation resources. The evaluation  
17 included assessing the long-term revenues, which depended on price forecasts.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Figures 1-8**

4

5 **QUESTION: MH-POT-004**

6 Please confirm the vertical axes are in real dollars and indicate for which year.

7

8 **RESPONSE:**

9 The axes are in real 2013 \$US.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section III - Capacity Price Forecast, Pages 37-38**

4

5 **QUESTION: MH-POT-005**

6 Please confirm that the CONE value of \$89.95 is an annual fixed cost in \$/ kW-yr. Please  
7 indicate what years' dollars.

8

9 **RESPONSE:**

10 CONE value is 2013\$US per kW yr and is an annual cost that would need to be recovered to  
11 break even on an investment..

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section II - Potomac Economics Energy Price Forecast, Page 19**

4

5 **QUESTION: MH-POT-006a**

6 Please indicate which EIA data fields were used in Potomac's price forecast.

7

8 **RESPONSE:**

9 Potomac Economics used three EIA cases. (1) The EIA reference case; (2) the EIA “High  
10 Resource” case (we sometimes refer to this as the low-fuel price case as it results in low natural  
11 gas prices); (3) High (Macroeconomic) Growth case. The data was produced using the AEO  
12 Table Browser. The following fields were queried:

13 Natural gas prices – We used the Henry hub price using table “Natural Gas Supply, and  
14 Disposition”

15 Coal prices -- We use the Powder River Basin price using table “Coal Minemouth Prices  
16 by Region and Type”.

17 Generation additions and retirements - we use capacity planned and unplanned additions  
18 and retirements using the locations MRO-E, MRO-W, RFC, and Gateway. Using Table  
19 “Electric Power Projections for EMM Region”

20 Load - We use Total Sales using Table “Electric Power Projections for EMM Region”

21 We also make minor adjustments to these data series, for specific reasons, as discussed in our  
22 report.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section II - Potomac Economics Energy Price Forecast, Page 19**

4

5 **QUESTION: MH-POT -006b**

6 Were any adjustments made to the EIA data fields? If so, please provide details.

7

8 **RESPONSE:**

9 Yes, we made adjustments to specific data fields and these are discussed in the report. See  
10 section II.B.5.

11

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section II - Potomac Economics Energy Price Forecast, Page 19**

4

5 **QUESTION: MH-POT-006c**

6 Where no adjustments were made, please describe any analysis that was undertaken by Potomac  
7 to validate the EIA assumptions.

8

9 **RESPONSE:**

10 We first examined the key assumptions used in the EIA reference case by reviewing the forecasts  
11 in light of our own experience with these matters in our role as market monitors and in other  
12 assignments over time. In this review, we also used MISO forecasts of capacity and load. Based  
13 on this review, we found the EIA reference case to generally represent a reasonable expectation  
14 of future outcomes. Next we sought to identify other EIA cases that would represent plausible  
15 alternative scenarios. EIA estimates a large number of alternative cases (28 altogether). Among  
16 these, we identified two which we believe would cover a large range of the possible future  
17 outcomes. One is the “High Resource case” which represents the continued accelerated  
18 development of new extracting technologies for natural gas, and the other is the “High Growth”  
19 case, which represented more robust macroeconomic conditions. We then reviewed these key  
20 case assumptions against the reference case to determine whether these alternatives reflect  
21 reasonable departures from the base case. All along this process, we relied on our industry  
22 experience to analyze the assumptions in these cases and to assess their reasonableness.

23

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section II - Potomac Economics Energy Price Forecast, Page 19**

4

5 **QUESTION: MH-POT 006d**

6 Were any other data sources used? If so, please provide details.

7

8 **RESPONSE:**

9 All data sources used were identified in our report.

10

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section III- Capacity Price Forecast, Page 39**

4

5 **QUESTION: MH-POT 007**

6 Please provide a calculation to convert the PJM RPM auction price from \$160/ MW-Day to  
7 \$49.64/ kW-yr.

8

9 **RESPONSE:**

10 The quoted passage reflects a typographical error in the report. The actual PJM RPM auction  
11 price we intended to use in the referenced passage was the 2015-2016 clearing price of  
12 \$136/MW-day. This translates to \$49.64/kW-yr by multiplying the MW-day value by 365 and  
13 then dividing by 1000 to arrive at kW-yr. We will be filing an errata to correct this.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 008a**

6 Is Potomac Economics required to produce electricity price forecasts in its role as Market  
7 Monitor?

8

9 **RESPONSE:**

10 Please see response to MH-POT 003c regarding the forecasting experience of Potomac  
11 Economics.

12

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 008b**

6 If so, how many forecasts does Potomac Economics produce each year in its role as MISO  
7 Market Monitor?

8

9 **RESPONSE:**

10 Please see response to MH-POT 003c.

11

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 008c**

6 Please identify the length, in years, of the forecast(s) identified in part b) of this Information  
7 Request.

8

9 **RESPONSE:**

10 Please see response to MH-POT 003c.

11

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 008d**

6 Have market forecasts from Potomac Economics in its role as MISO Market Monitor been used  
7 in other regulatory proceedings? If so, please provide references.

8

9 **RESPONSE:**

10 Please see response to MH-POT 003c.

11

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 009a**

6 Aside from forecasts produced in Potomac Economics' role as MISO Market Monitor, please  
7 identify how many long-term electricity price forecasts Potomac Economics produced annually  
8 in the last 5 years. Please also advise how many of these forecasts are being used for long-term  
9 (10 year+) resource planning.

10

11 **RESPONSE:**

12 Potomac Economics experience regarding forecasting in energy markets is addressed in MH-  
13 POT003c. While we find our reports and various other analyses that tend to enter the public  
14 domain are used by others to support various other analyses, we are not specifically aware of our  
15 work being used in resource planning.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Executive Summary, Page 4**

4

5 **QUESTION: MH-POT 009b**

6 Is Potomac aware of whether its customers of its long-term forecasts rely solely on the Potomac  
7 forecast for resource planning purposes?

8

9 **RESPONSE:**

10 We are not aware of our work product being relied upon for resource planning purposes.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section B. Specifics of the Forecast Model, Page 20**

4

5 **QUESTION: MH-POT 010a**

6 What MISO market footprint is used in the forecast model?

7

8 **RESPONSE:**

9 The forecast model uses the MISO historic footprint, the market participants in MISO prior to  
10 the Integration of MISO South in December, 2013. We describe in our report why we do not  
11 expect MISO South integration to significantly impact MISO West, where MH makes export  
12 sales.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section B. Specifics of the Forecast Model, Page 20**

4

5 **QUESTION: MH-POT 010b**

6 How are intertie transactions modeled?

7

8 **RESPONSE:**

9 The level of net imports into MISO during 2011 and 2012 are assumed to continue into the  
10 future, with the exception of new MH imports resulting from the development plan. We based  
11 additional imports from Manitoba on the expected exportable Surplus as estimated by Manitoba  
12 Hydro in its NFAT Appendix 4.2 (p. 20-21).

13

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section 2. Clearing the Hourly Forward Market in Future Hours, Pages**  
4 **19-22**

5

6 **PREAMBLE:** "We adjust the hourly supply curves to account for changes in fuel costs, new  
7 capacity additions and retirements, and carbon taxes."

8

9 **QUESTION: MH-POT 011**

10 Please confirm in performing this adjustment for CO2 emissions, only two types of units are  
11 considered: Coal at 1.02 metric tons/ MWh and natural gas at 0.516 tons/ MWh. Does this mean  
12 that the emissions of CTs and CCCTs are given the same adjustment? If not, please explain?

13

14 **RESPONSE:**

15 We considered emissions rates for three types of units based on fuel-used: coal, natural gas, and  
16 diesel. We did not distinguish the emissions rate for natural gas units between CCGTs and CTs.  
17 The emissions rate for diesel units was 0.76ton/MWH.

18

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section 2. Clearing the Hourly Forward Market in Future Hours, Pages**  
4 **19-22**

5

6 **PREAMBLE:** "We adjust the hourly supply curves to account for changes in fuel costs, new  
7 capacity additions and retirements, and carbon taxes."

8

9 **QUESTION: MH-POT 012**

10 Please provide a detailed explanation as to how the supply curve is adjusted for fuel price  
11 changes. Is an implied heat rate back calculated for each unit or offer?

12

13 **RESPONSE:**

14 We first decomposed each historical generation offer into equal-sized steps (maximum 5 MW).  
15 For each of these steps we then backed out an implied heat rate using an historical daily fuel  
16 price and technology-specific variable O&M rate. We limited the implied heat rates to the  
17 bounds of 6000 and 19000 BTU/kWh – adding or subtracting costs to the O&M component  
18 when the implied heat rate exceeded these bounds. We then multiplied this “bounded” implied  
19 heat rate by the future delivered index price and added the O&M component and any forecast  
20 carbon costs to form the future generation offer price for that 5-MW step.

21 To approximate the peaking unit pricing effects of Enhanced LMP pricing, we increased the heat  
22 rate of CTs by 2500 to account for including no-load and start-up costs to their incremental  
23 energy offers.

24 Wind unit offers were not adjusted. To reflect opportunity-cost-based offers from hydro and  
25 pumped storage resources, offers were adjusted the same as non-CT natural gas units using  
26 natural gas as the proxy fuel type.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section 2. Clearing the Hourly Forward Market in Future Hours, Pages**  
4 **19-22**

5

6 **PREAMBLE:** "We adjust the hourly supply curves to account for changes in fuel costs, new  
7 capacity additions and retirements, and carbon taxes."

8

9 **QUESTION: MH-POT 013**

10 Please explain how wind generation is considered in the supply curve and how additional wind  
11 generation is modeled.

12

13 **RESPONSE:**

14 Wind is added in accordance with EIA capacity projections. We assume new wind capacity is  
15 offered at -\$20. The portion of the rated capacity for new wind generation that is assumed to be  
16 available to the market in a given hour is based on the historical portion of existing wind  
17 capacity that is offered into the day-ahead market, which is based on day-ahead wind forecasts.

18

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section 2. Clearing the Hourly Forward Market in Future Hours, Pages**  
4 **19-22**

5

6 **PREAMBLE:** "We adjust the hourly supply curves to account for changes in fuel costs, new  
7 capacity additions and retirements, and carbon taxes."

8

9 **QUESTION: MH-POT 014**

10 Are the capacity additions determined by an economic optimization or as a fixed schedule of  
11 new units adjusted to meet MISO capacity needs?

12

13 **RESPONSE:**

14 Capacity additions and retirements are based on a fixed schedule in accordance with EIA case  
15 projections. However, the specific unit to retire is based on that unit's \$/kW net revenue during  
16 the most recent year. More precisely, the scheduled retirements quantity for each technology  
17 type indicated by the relevant EIA case, is satisfied by assuming the retirements of the least-  
18 profitable existing units within the given type (based variable profit per kW of capacity for the  
19 recent year). Also, capacity beyond the scheduled additions may be included in a given year  
20 when a capacity deficit on the system is more than 200 MW, i.e., the planning reserve is not met.  
21 When additional capacity is needed, we assume 50 percent is CCGT capacity and 50 percent is  
22 CT capacity.

23

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section 3. Formation of Supply Curves, Page 22**

4

5 **QUESTION: MH-POT 015**

6 How are planned and forced outages accounted for in the price forecast model?

7

8 **RESPONSE:**

9 Planned and forced outages are reflected in the historical supply offers and are thereby reflected  
10 in each further hour.

11

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section C. Estimates of Losses and Congestion, Page 28**

4

5 **PREAMBLE:** "For losses, we use the average observed marginal losses calculated by MISO  
6 over the two year period 2011-2012 as the marginal loss factor going forward". Manitoba Hydro  
7 notes that this was a period of above-average exports due to high water flows and that there was  
8 a significant forced outage of a portion of the US interconnection in June / July 2012.

9

10 **QUESTION: MH-POT 016a**

11 Please advise if Potomac accounted for these events in their analysis, and if so, how?

12

13 **RESPONSE:**

14 It was not necessary to account for these specific events. By using two years of historical data,  
15 we are able to account for events that may increase losses, as well as events that may decrease  
16 losses. Moreover, we believe there is not a substantial variance in losses from year to year and  
17 so any possible bias would likely be small.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section C. Estimates of Losses and Congestion, Page 28**

4

5 **QUESTION: MH-POT 016b**

6 If not, and given the magnitude of the forced outage in June and July 2012, and the fact that high  
7 water flows cannot be assumed to occur every year, is it appropriate to assume this condition will  
8 impact each year of the future forecast?

9

10 **RESPONSE:**

11 We are not assuming that this condition will impact each future year. Please see response as  
12 MH-POT 016a.

13

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: 3rd paragraph, Page 19**

4

5 **QUESTION: MH-POT 017**

6 Please confirm the System Marginal Price (SMP) calculated by Potomac is equivalent to the  
7 energy component of the locational marginal price over the entire MISO footprint, and that this  
8 SMP must be separately adjusted for congestion and losses to each studied pricing node such as  
9 Minn Hub or MHEB.

10

11 **RESPONSE:**

12 Yes, we confirm this statement.

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Figure 4, Page 15**

4

5 **PREAMBLE:** According to data sourced directly from MISO, the average Off-Peak Price for  
6 MHEB price node in 2013 was approximately \$22/MWh and has been above \$18/MWh in 2012  
7 despite severely depressed fuel prices.

8

9 **QUESTION: MH-POT 018**

10 Please reconcile Potomac's Off-Peak Energy price starting at approximately \$17/MWh in 2015  
11 considering the higher historical prices that have been experienced over the past two years.

12

13 **RESPONSE:**

14 In 2015, there are 2000 MW of additional wind, which will disproportionately affect off-peak  
15 prices by creating congestion. The 2013 actual prices quoted in the question would not reflect  
16 the additional wind expected by 2015. Note also that, these wind additions are not offset by coal  
17 retirements until 2016, when price are forecast to increase by almost 8 percent.

18

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section C. Estimates of Losses and Congestion, Page 32**

4

5 **PREAMBLE:** "The regression is an AR(1) model. For the ordinary least squares model, the  
6 Durbin-Watson statistic indicated that the data had a high degree of correlation between the  
7 hourly observations, which was not unexpected. Accordingly, we used an AR(1) model to  
8 account for this correlation."

9

10 **QUESTION: MH-POT 019**

11 Does the high degree of autocorrelation imply that the remaining factors considered in the  
12 regression analysis are not major drivers in the overall level of congestion at MHEB in  
13 comparison with the reference bus used to calculate the SMP?

14

15 **RESPONSE:**

16 No. Assuming "remaining factors" refer to the explanatory variable in the regression equation,  
17 these factors have a significant impact on congestion.

18

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section C. Estimates of Losses and Congestion, Page 32**

4

5 **PREAMBLE:** "The regression is an AR(1) model. For the ordinary least squares model, the  
6 Durbin-Watson statistic indicated that the data had a high degree of correlation between the  
7 hourly observations, which was not unexpected. Accordingly, we used an AR(1) model to  
8 account for this correlation."

9

10 **QUESTION: MH-POT 020**

11 Please provide the estimates and standard error for the variables of the "ordinary least squares  
12 model"- that is without using auto correlation. What is the regression R-Square/ adjusted R-  
13 squared? Is this a meaningful level of fit?

14

15 **RESPONSE:**

16 Please see attached SAS output.

17

The AUTOREG Procedure

Dependent Variable MCC

Ordinary Least Squares Estimates

SSE	359615.238	DFE	17495
MSE	20.55532	Root MSE	4.53380
SBC	102699.077	AIC	102613.603
MAE	2.9083871	AICC	102613.618
MAPE	304.708319	HQC	102641.749
Durbin-Watson	0.2082	Regress R-Square	0.3401
		Total R-Square	0.3401

Parameter Estimates

Variable	DF	Estimate	Standard Error	t Value	Approx Pr >  t
Intercept	1	15.2838	0.3365	45.42	<.0001
MEC	1	-0.1543	0.005623	-27.44	<.0001
MARKET_GEN	1	-0.000210	7.285E-6	-28.78	<.0001
RAMPDEMAND	1	-0.000134	0.0000137	-9.77	<.0001
WINDSHARE	1	-28.6738	1.4816	-19.35	<.0001
MHEB_EXPORT	1	-0.001029	0.0000915	-11.24	<.0001
PEAK	1	1.2039	0.0957	12.58	<.0001
SUMMER	1	1.0836	0.1006	10.77	<.0001
WINTER	1	2.8170	0.1070	26.32	<.0001
HEADROOM_WEST	1	-0.002054	0.0000395	-51.98	<.0001
SPARK	1	1.3121	0.1408	9.32	<.0001

Estimates of Autocorrelations

Lag	Covariance	Correlation	-1	9	8	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	8	9	1	
0	20.5424	1.000000																						*****
1	18.4195	0.896657																						*****

Preliminary MSE 4.0264

18

19

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section C. Estimates of Losses and Congestion, Page 32**

4

5 **QUESTION: MH-POT 021**

6 What does the Intercept in the regression equation represent in a physical sense? Does it imply  
7 that congestion between Minn Hub and the SMP reference bus would be \$12.0768 / MWh, and  
8 that congestion between MHEB and the SMP reference bus would be \$8.6284 \$/ MWh when  
9 each of the variables is zero? In other words, there would be significant congestion when the  
10 SMP is zero, market generation is zero, wind generation is zero etc...

11

12 **RESPONSE:**

13 No. The intercept has no meaning in this model, which is common in regression models. It is  
14 simply the place where the liner estimate intercepts the “y” axis. There were no instances in the  
15 data where the aforementioned variables were simultaneously zero. Hence, the model only  
16 attempts to fit the liner curve equation to the data that is observed.

17

18

1 **SUBJECT: Price Forecast**

2

3 **REFERENCE: Section I. Consultants Price Forecasts, Page 11**

4

5 **PREAMBLE:** "As explained below, we assume 6 GW of MISO-wide coal plant retirements."

6

7 **QUESTION: MH-POT 022a**

8 Please explain in detail the rationale for using an assumption of 6 GW of MISO-wide coal plant  
9 retirements when the stated MISO MTEP 2013 projection is 12.6 GW of coal retirements in the  
10 Business as Usual future.

11

12 **RESPONSE:**

13 We used the EIA point of view on MISO coal retirements. We do not believe the 12 GW of coal  
14 retirements projected by MTEP will materialize.

15