TODD SCHATZKI, Ph.D.
VICE PRESIDENT
ANALYSIS GROUP INC.

Phone: (617) 425-8250
Fax: (617) 425-8001
tschatzki@analysisgroup.com

111 Huntington Avenue
Tenth Floor
Boston, MA 02199

Dr. Schatzki is an expert in energy and environmental economics and policy, and specializes in the application of microeconomics, econometrics, and data analysis to complex business and policy problems. He has worked with clients on corporate strategy, public policy design, and problems arising in regulation and litigation.

Dr. Schatzki has worked extensively on the design of electricity markets, analysis of wholesale electricity markets, economic analysis of energy and environmental regulations, asset valuation, resource planning and procurement, utility ratemaking and retail electricity markets. He has submitted testimony to both state and federal energy commissions. His research has been supported by organizations such as the Electric Power Research Institute, Edison Electric Institute, Federal Energy Regulatory Commission, and National Association of Regulatory Utility Commissioners. His work has appeared in journals such as the *Journal of Environmental Economics and Management, the Electricity Journal, Public Utilities Fortnightly*, and *AEI-Brooking Joint Center for Regulatory Studies.* He has also provided litigation support in many cases, including several high profile cases involving alleged wholesale electricity price manipulation and the implications of such manipulation for derivative contracts.

Prior to joining Analysis Group, he had research and consulting affiliations with the Harvard Institute for International Development and the International Institute for Applied Systems Analysis (Vienna, Austria), and was an economist at LECG, LLC and National Economic Research Associates.

EDUCATION

1998 Ph.D., Public Policy, Harvard University, Cambridge, MA

Specialized Fields: Microeconomics, econometrics, industrial organization, natural resource and environmental economics

- Doctoral Fellow, Harvard University, Cambridge, MA (1993-1995)
- Crump Fellowship, Harvard University, Cambridge, MA (1995-1996)
- Pre-doctoral Fellow, Harvard Environmental Economics Program

1993 M.C.P., Environmental Policy and Planning (Urban Studies and Planning,), M.I.T., Cambridge, MA

1986 B.A., Physics, Wesleyan University, Middletown, CT

PROFESSIONAL EXPERIENCE

2005-present	Analysis Group, Inc
2001-2005	LECG, LLC, *Managing Economist*
1998-2001	National Economic Research Associates, Inc., *Senior Consultant*
1997-1998	Harvard Institute for International Development, *Consultant*
1996-1997	Department of Economics, Harvard University, *Teaching Fellow and Research Assistant*
1994	International Institute for Applied Systems Analysis (IIASA)
1992	Toxics Reduction Institute, University of Massachusetts
1987-1991	Tellus Institute, *Research Associate*

SELECTED CASE WORK

Energy

- **ISO New England.** Assessment of the economic costs associated with winter 2013/2014 reliability programs, including oil inventory, dual fuel, liquefied natural gas and demand response programs
- **ISO New England.** Assessment of and testimony regarding the economic and reliability impacts of proposed capacity market rules introducing new performance incentives
- **ITC Midwest.** Analysis of and testimony regarding the LMP and production cost impacts of new transmission infrastructure (using PROMOD)
- **Entergy.** Evaluation of economic damages associated with an alleged contract breach
- **Ameren.** Analysis of the impact of the Illinois River Project, a new transmission project, on energy market competition in Illinois (using PROMOD)
- **Dayton Power and Light.** Evaluation of the aggregate benefits created by a proposed rate plan
- **Corporation with distribution companies across multiple jurisdictions.** Regulatory assessment considering current ratemaking models, regulatory environment and alternative ratemaking structures
- **ISO New England.** Assessment of the costs, feasibility and effectiveness of technical options to securing fuel supply for gas-fired generators
- **ISO New England.** Assessment of reliability risks and potential market and regulatory solutions to electric-gas interdependencies
- **Pacific Gas and Electric.** Assessment of ratemaking issues, including cost of capital adjustments, associated with a gas pipeline safety plan
- **Confidential Technology Company.** Analyzed the regional economic impacts of a prototype biofuels production facility at two potential development sites using the IMPLAN model.
- **ISO New England.** Statistical analysis of the performance of resources responding to system contingencies
- **Direct Energy.** Assistance developing regulatory options for promoting retail competition in Pennsylvania, including development of customer service auctions

- **ISO New England.** Assistance developing design enhancements for the region's Forward Reserve Markets
- **Confidential Client.** Analysis of energy and capacity market implications of a potential asset agreement (using GE's Multi-Area Production Simulation Software)
- **Confidential Client.** Analysis of fleet turnover decisions and outcomes (using GE's Multi-Area Production Simulation Software)
- **Confidential Regulated Utility.** Development of a white paper on transmission planning and policy needed to support legislative and regulatory goals for renewable development
- **Commonwealth Edison.** Analysis of appropriate ratemaking tools (cost of equity adjustment) in light of energy efficiency program requirements
- **New England Power Generators Association.** Analysis of impacts of proposed electric power company merger
- **Confidential Technology Company.** Development of a quantitative model of energy savings associated with end-use technological modifications..
- **Confidential Regulated Utility.** Development of a white paper assessing the potential for alternative ratemaking tools to mitigate multiple utility capital, load and service challenges
- **EDF Group.** Analysis of financial and credit implications of the sale of a portion of power generation assets
- **New England States Committee on Electricity.** Technical support and analysis related to design of regulations and wholesale electricity markets to achieve resource adequacy
- **National Grid Utilities.** Assistance developing ratemaking plans including revenue decoupling and associated revenue adjustments
- **NARUC and FERC.** Analysis of "best practices" in state policies for competitive procurement of retail electricity supply
- **New York ISO.** Analysis of single-clearing-price versus pay-as-bid market designs
- **Confidential System Operator.** Analysis of metrics for characterizing the economic value provided by regional transmission organizations
- **TransCanada.** Assessment of regulatory and finance issues involved in fuel adjustment clauses within long-term standard offer service contracts
- **New York ISO.** Analysis of market implications of fuel diversity issues
- **Confidential.** Analysis of alleged exercise and extension of market power in a wholesale electricity market, including statistical analysis of spot and real-time electricity markets and statistical modeling of outages using hazard model methods to examine potential physical withholding
- **Confidential.** Financial and strategic analysis of gas supply contracting alternatives
- **Confidential.** Analysis of value of generating assets using real options analysis
- **Confidential.** Statistical analysis of prices in the spot and forward markets using time-series methods for an energy trading firm in a federal proceeding related to the reasonableness of the terms of certain forward market contracts
- **Confidential.** Financial and strategic analysis of renewable generation technologies

Environment

- **Chevron.** Development of a white paper on post-2020 climate policy for California.
- **American Petroleum Institute.** Assessment of issues related to the impact of changes to National Ambient Air Quality Standard Requirements on oil and gas exploration and production
- **Greater Boston Real Estate Board.** Development of a white paper on mandatory building energy labeling/benchmarking policies
- **Little Hoover Commission.** Analysis of the economic and environmental consequences of a local climate policy plan implemented in the context of a state-wide cap-and-trade system
- **Exelon.** Analysis of the economic and market consequences of EPA's Clean Air Transport Rule
- **Chevron.** Assessment of lessons learned from Federal requirements for regulatory review for the potential development of state requirements
- **Western States Petroleum Association and Chevron.** Regulatory support and analysis related to climate policy in California, including submission of various comments and reports to the Air Resources Board
- **Honeywell.** Analysis of proposed limits on HFC consumption under domestic climate policy
- **Electric Power Research Institute.** Analysis of three 2006 studies on the economic impact of meeting the California carbon emissions reduction targets (in the California Global Warming Solutions Act of 2006)
- **Confidential.** Assessment of various policy issues in the design of national climate change policies, including market-based policies, approaches to cost containment, offset projects, and non-CO_2 GHGs
- **Confidential.** Quantitative analysis of the impacts for technology, consumers and asset owners of a market-based domestic climate policy
- **Toyota.** Analysis of the economic value of emissions for a major auto manufacturer associated with alleged non-compliance with emissions control requirements
- **Barajas Airport.** Evaluated the regional economic impacts of runway expansions at the Barajas airport in Spain.

Finance and Commercial Damages

- Analysis of financial and credit implications of the sale of a portion of power generation assets
- Analysis of bond pricing, transactions and holdings related to default of sovereign bonds
- Analysis of transfers between financial institutions within credit card networks
- Analysis of the impact of product taxes on firm market shares related to determination of payments under a settlement agreement
- Analysis of damages related to breached contract and appropriation of trade secrets in the development of a pharmaceutical product
- Analysis of damages from breach of commodity swap contract (petroleum)
- Analysis of allegations regarding mutual fund day trading, including analysis of trading patterns and calculation of dilution

Antitrust

- Estimation of damages associated with an alleged monopolization and foreclosure resulting from a distribution agreement (retail consumer products)
- In a price-fixing case across multiple markets in the pharmaceutical industry, estimated overcharges and cartel periods based on a time-series analysis of price data
- Analysis of multiple antitrust claims (including foreclosure, monopolization, and vertical restraints) related to an alleged collusive distribution arrangement (retail consumer product)
- Analysis of alleged tying of aftermarket products and the provision of service, including evaluation of the alleged tie, competitive effects, and damages (office systems)
- Analysis of liability, timing, geographic scope, and damages issues for a petrochemical company facing potential price-fixing charges by DOJ and private parties
- Analysis of tying, monopolization, and patent abuse claims involving a patent licensing scheme for process and instrument patents (scientific equipment)
- Analysis of foreclosure, attempted monopolization of innovation markets, and damages claims arising from the termination of an investment/licensing agreement (medical devices)
- Estimation of damages related to alleged invalid patents and tying of products to patent rights associated with a process patent (scientific equipment)

ARTICLES AND PAPERS

Three Lingering Design Issues Affecting Market Performance in California's GHG Cap-and-Trade Program (with Robert N. Stavins), *Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, Harvard Kennedy School*, January 2013.

Using the Value of Allowances from California's GHG Cap-and-Trade System (with Robert N. Stavins), *Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, Harvard Kennedy School*, August 27, 2012.

Implications of Policy Interactions for California's Climate Policy (with Robert N. Stavins), *Regulatory Policy Program, Mossavar-Rahmani Center for Business and Government, Harvard Kennedy School*, August 27, 2012.

"The Interdependence of Electricity and Natural Gas: Current Factors and Future Prospects," (with Paul Hibbard), *The Electricity Journal*, May 2012.

"California's Cap-and-Trade Decisions," Forbes.com, August 19, 2010.

"Competitive Procurement of Retail Electricity Supply: Recent Trends in State Policies and Utility Practices," (with Susan F. Tierney), *The Electricity Journal*, March 2009.

"Pay-as-Bid vs. Uniform Pricing: Discriminatory Auctions Promote Strategic Bidding and Market Manipulation" (with Susan F. Tierney and Rana Mukerji), *Public Utilities Fortnightly*, March 2008.

"Free Greenhouse Gas Cuts: Too Good to Be True?" (with Judson Jaffe and Robert Stavins) VoxEU.org, January 3, 2008.

"Too Good to Be True? An Examination of Three Economic Assessments of California Climate Change Policy" (with Robert N. Stavins and Judson Jaffe), AEI-Brookings Joint Center for Regulatory Studies, Related Publication 07-01. Jan 2007.

"Options, Uncertainty and Sunk Costs: An Empirical Analysis of Land Use," Journal of Environmental Economics and Management, Vol. 46, p. 86-105, 2003.

"The database on the economics and management of endangered species (DEMES)," (with David Cash, Andrew Metrick, and Martin Weitzman) in *Protecting Endangered Species in the United States: Biological Needs, Political Realities, Economic Choices*. Cambridge University Press, 2001

"The Issue of Climate," *Fundamentals of the Global Power Industry, Petroleum Economist, 2000.*

Review of "Sustainable Cities: Urbanization and the Environment in International Perspective," *Environmental Impact Assessment Review*, (Vol. 12, No, 4), 1993.

"Bottle Bills and Municipal Recycling," *Resource Recycling*, June 1991.

WORKING PAPERS

"Can Cost Containment Raise Costs? Allowance Reserves in Practice," March 2012.

Schatzki, Todd, Paul Hibbard, Pavel Darling and Bentley Clinton, Generation Fleet Turnover in New England: Modeling Energy Market Impacts, June, 2011.

"A Hazard Rate Analysis of Mirant's Generating Plant Outages in California," with William Hogan and Scott Harvey. Presented at the IDEI Conference on Competition and Coordination in the Electricity Sector, Toulouse, France, January 16-17, 2004.

"Estimating Structural Change in Industries with Application to Cartels," June 2003.

"The Pollution Control and Management Response of Thai Firms to Formal and Informal Regulation," (with Theodore Panayotou) draft, 1999.

"Differential Industry Response to Formal and Informal Environmental Regulations in Newly Industrializing Economies: The Case of Thailand," (with Theodore Panayotou and Qwanruedee Limvorapitak), Harvard Institute for International Development 1997 Asia Environmental Economics Policy Seminar, Bangkok, Thailand, February 1997.

"The Effects of Uncertainty on Landowner Conversion Decisions," John F. Kennedy School of Government, Center for Science and International Affairs, Environment and Natural Resources Program, Discussion Paper 95-14, December 1995.

SELECTED PRESENTATIONS

"Quality *and* Quantity: Alternatives for Addressing Reliability Concerns from Shifting Resource Mixes," Center for Research In Regulated Industries 27th Annual Western Conference June 26, 2014.

"Climate Policy Choices – RPS, Cap-and-Trade & the Implications for Actions (and Exits) that Affect Emissions," Electric Utilities Environmental Conference, February 4, 2014.

"Multiple Dimensions of Gas-Electric Coordination Concerns," Electric Utilities Environmental Conference, February 3, 2014.

"The Economics of Cap-and-Trade in the California Power Markets," EUCI Conference, California Carbon Policy Impacts on Western Power Markets, January 27, 2014.

"Market-Based Policies to Address Climate Change," Sustainable Middlesex, May 4, 2013.

"Market Forces and Prospects/Economic Ripple Effects, 5-10 Years Ahead," Air & Waste Management Association, New England Section, October 12, 2012.

"Gas and Electric Coordination: Is It Needed? If So, To What End?" Harvard Electric Policy Group, Cambridge, MA, October 11, 2012.

"Reliability and Resource Performance," Center for Research In Regulated Industries 31st Annual Eastern Conference May 16, 2012.

"Can Cost Containment Raise Costs? Allowance Reserves in Practice," International Industrial Organization Conference, Boston, MA, April 9, 2011.

"Ratemaking Mechanisms/Tools as Carrots for Achieving Desirable Regulatory Outcomes," Conference on Electric Utility Rate Cases, Law Seminars International, Boston, Massachusetts, November 9, 2010.

"Evolving Issues in Revenue Decoupling: Designs for an Era of Rising Costs," Center for Research In Regulated Industries 29th Annual Eastern Conference May 19, 2010.

"Aligning Interest with Duty: Revenue Decoupling as a Key Element of Accomplishing Energy Efficiency Goals," National Conference of State Legislatures, Fall Forum, December 8, 2009.

"Federal Proposals to Limit Carbon Emissions and How They Would Affect Market Structures – Regional Trading Programs' Futures in Light of New Federal Interest in Reducing GHG Emissions," Energy in California, Law Seminars International, San Francisco, California, September 15, 2009.

"Current Market, Technology and Regulatory Risks: Impact on Investment and Implications for Policy", Utility Rate Case, Issues and Strategy 2009, Law Seminars International, Las Vegas, Nevada, February 9, 2009.

"An Economic Perspective on the Benefits of Going Green," Harvard Electricity Policy Group, Atlanta, Georgia, December 11-12, 2008.

"Implications of Current Regulatory, Technology and Market Risks," Energy in California, Law Seminars International, San Francisco, California, September 22-23, 2008.

"Competitive Procurement of Retail Electricity Supply: Recent Trends in State Policies and Utility Practices," National Association of Regulatory Utility Commissioners Summer Committee Meetings, Portland, Oregon, July 20, 2008.

"Too Good to Be True? An Examination of Three Economic Assessments of California Climate Change Policy, Key Findings and Lessons Learned," POWER Research Conference on Electricity Markets and Regulation, University of California at Berkeley, March 21, 2008.

"Preliminary Findings: Study of Model State and Utility Practices for Competitive Procurement of Retail Electric Supply," National Association of Regulatory Utility Commissioners Annual Meeting, Washington, D.C., February 17, 2008.

"The ABC's of California's AB 32: Issues and Analysis, Cost Analyses and Policy Design" Environmental Market Association Webinar, April 12, 2007.

SELECTED CONSULTING REPORTS

Beyond AB 32: Post-2020 Climate Policy for California (with Robert N. Stavins), January 2014.

Assessment of the Impact of ISO-NE's Proposed Forward Capacity Market Performance Incentives (with Paul Hibbard), prepared for ISO New England, September 2013.

"LMP Impacts of Proposed Minnesota-Iowa 345 kV Transmission Project: Supplemental Analysis," with Rodney Frame and Pavel Darling, Appendix M, ITC Midwest LLC, Application to the Minnesota Public Utilities Commission for a Certificate of Need, Docket No. ET6675/CN-12-1053, April 9, 2013.

"LMP Impacts of Proposed Minnesota-Iowa 345 kV Transmission Project," with Rodney Frame and Pavel Darling, Appendix M, ITC Midwest LLC, Application to the Minnesota Public Utilities Commission for a Certificate of Need, Docket No. ET6675/CN-12-1053, March 22, 2013.

"Analysis of Reserve Resources: Activation Response following Contingency Events," prepared for ISO New England, May 29, 2012.

Economic and Environmental Implications of Allowance Benchmark Choices (with Robert N. Stavins), prepared for the Western States Petroleum Association, October 2011.

Next Steps for California Climate Policy II: Moving Ahead under Uncertain Circumstances (with Robert N. Stavins), prepared for the Western States Petroleum Association, April 2010.

Options for Addressing Leakage in California's Climate Policy (with Jonathan Borck and Robert N. Stavins), prepared for the Western States Petroleum Association, February 2010.

Addressing Environmental Justice Concerns in the Design of California's Climate Policy (with Robert N. Stavins), prepared for the Western States Petroleum Association and the AB 32 Implementation Group, November 2009.

Next Steps for California with Federal Cap-and-Trade Policy On the Horizon (with Robert N. Stavins and Jonathan Borck), prepared for the Western States Petroleum Association, July 2009.

Evolving GHG Trading Systems Outside Its Borders: How Should California Respond? (with Robert N. Stavins and Jonathan Borck), prepared for the Western States Petroleum Association, July 2009.

Competitive Procurement of Retail Electricity Supply: Recent Trends in State Policies and Utility Practices, (with Susan Tierney) prepared for the National Association of Regulatory Utility Commissioners in collaboration with the Federal Energy Regulatory Commission, July 2008.

Uniform Pricing versus Pay-as-bid: Does it Make a Difference?, (with Susan Tierney and Rana Mukerji) prepared for the New York Independent System Operator, March 2008.

Prospects for the U.S. Nuclear Industry, (co-author), prepared for a major Japanese electric power company, January 2001.

Economic Evaluation of EPA's Proposed Rules for Cooling Water Intake Structures for New Facilities, (with David Harrison) prepared for the Utility Water Act Group, November 2000.

The Impacts of Revised Salem Refueling Schedules on the Wholesale and Retail Electric Market, (with David Harrison and Gene Meehan) prepared for Public Service Enterprise Group as a filing to New Jersey Department of Environmental Protection, September 2000.

Setting Baselines for Greenhouse Gas Credit Trading Programs: Lessons from Experience with Environmental and Non-Environmental Program, (with David Harrison) Electric Power Research Institute Report #1000147, December 2000.

Fueling Electricity Growth for a Growing Economy, Background Paper, (with David Harrison) prepared for the Edison Electric Institute, July 2000.

Energy-Environment Policy Integration and Coordination Study (E-EPIC) Phase 2 Executive Report (Contributor), Electric Power Research Institute, Technical Report 1000097, December 2000.

Economic Evaluation of Alternative Revised Refueling Outage Schedules for Salem Power Plant, (with D. Harrison and J. Murphy), prepared for Public Service Electric and Gas Company as a filing to New Jersey Department of Environmental Protection, July 2000.

Critical Review of "Economic Impacts of On Board Diagnostic Regulations," (with D. Harrison and S. Chamberlain) prepared for Alliance of Automobile Manufactures, January 2000.

Costs and Benefits of Fish Protection Alternatives at the Salem Facility, (with D. Harrison and J. Murphy) prepared for Public Service Electric and Gas Company as a filing to New Jersey Department of Environmental Protection, March 1999.

Energy-Environment Policy Integration and Coordination Study (E-EPIC) Phase 1 Executive Report, (Contributor) Electric Power Research Institute, February 1999.

Economic Benefits of Barajas Airport to the Madrid Region and the Neighboring Communities, (with D. Harrison, J. Garcia-Cobos, and D. Rowland) prepared on behalf of the Spanish Government, January 1999.

Disposal Cost Fee Study, (with Frank Ackerman, Gretchen McClain, Irene Peters, and John Schall) prepared for the California Integrated Waste Management Board, 1991.

The Marginal Cost of Handling Packaging Materials in the New Jersey Solid Waste System, (with John Schall) prepared for The Council of State Governments and the New Jersey Department of Environmental Protection, 1990.

Energy Implications of Alternative Solid Waste Management Systems, (with Monica Becker and Allen White), prepared for the Northeast Regional Biomass Program, Coalition of Northeastern Governors Policy Research Center, 1990.

TESTIMONY AND OTHER FILINGS

Rebuttal Testimony on behalf of ITC Midwest LLC, Minnesota Public Utilities Commission, Docket No. CN-12-1053, April 25, 2014.

Direct Testimony on behalf of ITC Midwest LLC, Minnesota Public Utilities Commission, Docket No. CN-12-1053, February 24, 2014.

Testimony on behalf of the ISO New England, FERC Docket No. ER14-1050-001, February 12, 2014.

Affidavit on behalf of the ISO New England, Performance Incentives Market Rule Changes, FERC Docket No. ER14-1050-001, January 14, 2014.

Comments submitted to the California Air Resources Board Regarding on the Proposed Regulation to Implement the AB 32 Cap-and-Trade Program, August 2011 (with Robert N. Stavins).

Comments submitted to the Little Hoover Commission's Study of Regulatory Reform in California, January 2011 (with Robert N. Stavins).

Comments submitted to the California Air Resources Board Regarding on the Proposed Regulation to Implement the AB 32 Cap-and-Trade Program, December 2010.

Comments submitted to the California Air Resources Board Regarding Cost Containment Provisions of Preliminary Draft Cap-and-Trade Regulation, July 2010.

Comments submitted to the Economics and Allocation Advisory Committee, California Air Resources Board regarding draft report "Allocating Emissions Allowances Under California's Cap-and-Trade System," December 1, 2009 (with Robert N. Stavins).

PROMOD Modeling and Data

This exhibit provides a summary of the PROMOD IV ("PROMOD") model, data and assumptions used in analyzing the transmission projects proposed by ATXI and MEC and the methodology for estimating the effect of these projects on wholesale electric energy prices and supply to the MISO Illinois region.[1] These projects are referred to herein as Multi Value Project 16 ("MVP 16").

The PROMOD Model

PROMOD is an electric market simulation model marketed by Ventyx. PROMOD provides a geographically and electrically detailed representation of the topology of the electric power system, including generation resources, transmission resources, and load. This detailed representation allows the model to capture the effect of transmission constraints on the ability to flow power from generators to load, and thus calculates Locational Marginal Prices ("LMPs") at individual nodes within the system. PROMOD and similar dispatch modeling programs are used to forecast electricity prices, understand transmission flows and constraints, and predict generation output. It can also perform and support various reliability analyses, including calculation of loss-of-load probability, expected unserved energy, and effective capacity support.

Data and Assumptions

The analysis of MVP 16 relies on data developed by the Midcontinent Independent System Operator, Inc. ("MISO") in its Multi Value Project ("MVP") process. A detailed description of MISO's MVP process and data analysis is provided in the MVP Report.[2] The principal purpose of the MVPs are, as described by MISO, "to meet one or more of three goals: reliably and economically enable regional public policy needs; provide multiple types of

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[1] The MISO Illinois region is comprised of portions of Illinois in the MISO footprint.

[2] MISO, *Multi Value Project Portfolio: Results and Analyses*, January 10, 2012 (hereafter "MVP Report").

economic value; and provide a combination of regional reliability and economic value."[3] To support the identification of these transmission projects, MISO has performed detailed economic and engineering analyses of many alternative transmission projects and portfolios using PROMOD, along with other engineering tools and analyses. The analyses herein are based on the same data sets and analyses developed by MISO to perform its analysis.

The data and assumptions used by MISO in its MVP analysis are based on Ventyx-provided data, and have been modified as needed by MISO. This data includes:

1. load forecasts provided by individual utilities within MISO,[4]
2. transmission line data from transmission operators,[5]
3. unit specifications for existing generation resources,[6]
4. new generation resources based on units planned and under construction,[7]
5. future generation resource additions developed by a capacity expansion model,[8]
6. retirement of generation facilities based on currently announced retirements, but not in response to economic or regulatory factors, including EPA regulation,[9]
7. "hurdle rates" for transactions between NERC regions,[10] and

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[3] MISO website, available at https://www.midwestiso.org/Planning/Pages/MVPAnalysis.aspx, accessed July 22, 2014.

[4] Demand and energy growth rates for each region are provided in: MISO, *MISO Transmission Expansion Plan 2011: PROMOD Case Assumptions Document*, p 23 ("MTEP PROMOD Assumptions" hereafter).

[5] Transmission constraints are based on the then-most recent Book of Flowgates from MISO and North American Electric Reliability Corporation (NERC), updated to include rating and configuration changes from studies performed during the MTEP 11 process. Transmission line data includes items such as the voltage rating of the line and the buses that each line runs between.

[6] Individual unit specifications include maximum operating capacity; fuel type; variable costs; no-load and startup costs; minimum run times; emission rates; and heat rate curves.

[7] Detailed information on the existing, under construction and planned units in each region is provided in MTEP PROMOD Assumptions, p 17.

[8] MISO relies upon the Electric Generation Expansion Analysis System (EGEAS) model developed by the Electric Power Research Institute. EGEAS is designed to find the optimized capacity expansion plan to meet forecast demand (load plus planning reserve margin target minus losses) through a least cost-mix of supply-side and demand-side resources. Planning reserve margins are identified in MTEP PROMOD Assumptions, pp 23-24.

[9] As part of MTEP 2011, MISO has performed an EPA Regulation Impact Analysis that identifies planning needs arising from the retirement of coal-fired generation facilities due to EPA regulations and other market factors (*e.g.*, competition from natural gas-fired generation). MISO's MVP analysis does not incorporate any retirements of coal-fired generation, aside from already announced retirements.

8. fuel and emission price forecasts.

The system modeled includes individual generator data and complete transmission information for the Eastern Interconnection,[11] at the bus[12] level.

The quantity and location of future renewable resources, including wind and solar, are determined by MISO both to meet state renewable energy requirements and reduce the combined cost of renewable and transmission resources.[13] Based on these requirements, MISO's analysis assumes that 8,765 MW of new wind resources are added by 2021, and an additional 2,272 MW of new wind resources are added by 2026.[14]

MVP 16 includes new transmission from an existing substation near Oak Grove, Illinois to a new substation (Sandburg) near Galesburg, Illinois before continuing eastward to a substation (Fargo) near Peoria, Illinois. In connection with MVP 16, a new 345/138 kV transformer will be installed at the new Sandburg substation adjacent to the existing Galesburg substation, along with additions or upgrades to the substations at Oak Grove, Galesburg and Fargo. The MVP 16 path is shown geographically in Figure 1. The analysis herein compares scenarios with and without MVP 16 transmission elements. MVP 16 is assumed to include a line upgrade to an existing 161 kV line from Oak Grove to Galesburg.[15] Scenarios include all of

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[10] PROMOD allows power to flow between regions based on economic transactions (subject to security constraints and congestion) such that prices must exceed generator costs in a neighboring region by a dollar per MWh "hurdle rate" in order for power to flow across regions.

[11] The Eastern Interconnection comprises roughly the eastern two-thirds of the "lower 48" (excluding portions of Texas), including the Canadian provinces east of Alberta and the following NERC regions: Midwest Reliability Organization (MRO), Southwest Power Pool (SPP), SERC Reliability Corporation (SERC), Florida Reliability Coordinating Council (FRCC), Reliability*First* Corporation (RFC), and Northeast Power Coordinating Council (NPCC). MISO's PROMOD modeling excludes Peninsular Florida, New England, and Eastern Canada, but accounts for aggregate regional flows to and from these areas through the use of fixed transactions. For more detail, see MTEP PROMOD Assumptions, p 24.

[12] A bus is the specific geographical point that a generator is located at or that a transmission line connects to.

[13] MISO determined the amount of wind enabled by the MVP portfolio by first determining the amount of wind needed to comply with state renewable energy requirements, and then determining what amount of wind would not be supported but for the MVP portfolio. This process is detailed by MISO in the MVP Report, pp 17-20 and 48-49.

[14] Table 4.2, MVP Report. MISO also finds that the MVP portfolio can support an additional 2,230 MW of additional wind power from the wind zones without incurring additional reliability constraints. MVP Report, pp 48-49.

[15] Direct communication with Ameren and MidAmerican, July 2, 2014.

MISO's other (*i.e.*, non-MVP 16) MVPs.[16] Apart from the presence of MVP 16 itself, the only other difference between the "with MVP 16" and "without MVP 16" cases is the capacity of wind resources in service. In the "without MVP 16" case, the quantity of new wind resources has been reduced ("curtailed") because the transmission system cannot support all new MVP wind resources without introducing reliability risks. Unless new wind additions are reduced, power flows may exceed line capacities under certain contingencies. To determine the quantity of wind capacity that can be supported, MISO performs an analysis that identifies the minimum quantity of wind capacity curtailments that allow line loading to be kept within limits.[17] Table 1 reports the difference in dispatched wind power capacity between the "with MVP 16" and "without MVP 16" cases for curtailed resources based on analysis by MISO.[18]

Table 1

Reduction in New Wind Capacity in the "Without MVP 16" Case

Wind Zone	State	MW Reduction
Wisconsin (Zone B)	Wisconsin	211
H007	Iowa	37
Total		248

Note: Zones refer to wind zones within each state, identified as a part of MISO's MVP process.

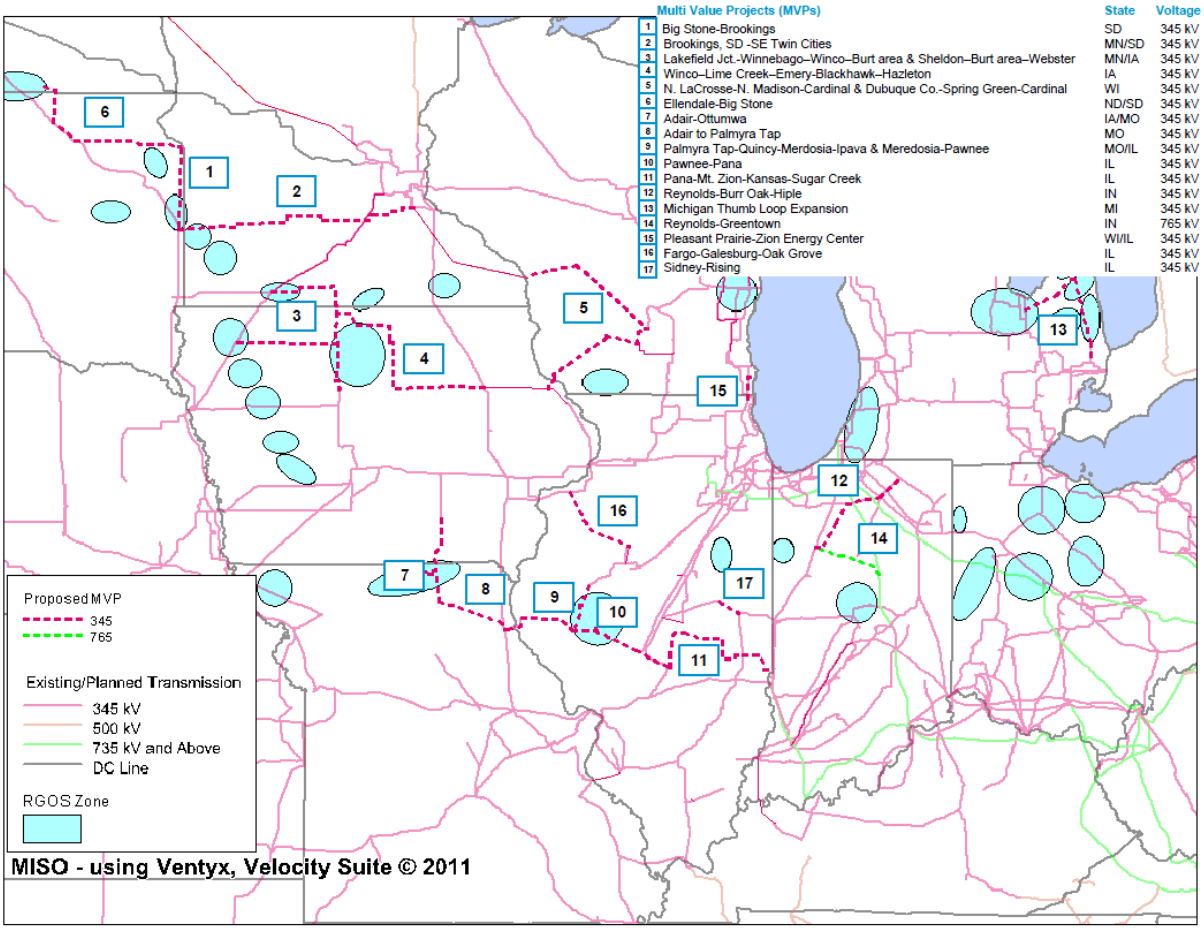
[16] These "other" MVPs are identified in Table 1.1 of the MVP Report.

[17] For further detail on this analysis, see MVP Report at p 48.

[18] Direct communication with MISO, June 5, 2014. The wind zones identified in Table 1 refer to wind zones defined by MISO through its wind siting strategy. For more detail, see MVP Report at pp 17-18.

Figure 1

Map of MVP Portfolio



Analytical Method

Two computations were performed, (i) a wholesale electric energy price comparison that evaluates the changes in LMPs and accompanying customer payments as a result of MVP 16, and (ii) a Delivered Price Test ("DPT"), which determines changes in Economic Capacity[19] available to serve the MISO Illinois region as a result of MVP 16, both from within the MISO Illinois region and via imports. The analytical method used for these two computations is described further below.

[19] Economic Capacity is a term used by the Federal Energy Regulatory Commission in competitive analyses to refer to generation capacity that is located within, or can be delivered into, a market area at a delivered cost that is no greater than 1.05 times the competitive price in the market.

Wholesale Electric Energy Price and Payment Comparison

Computation of wholesale electric energy prices and payments is based on several outputs from the PROMOD model, including area LMPs, area load, and output and costs for certain generation units. The process used to develop changes in wholesale energy prices and payments is as follows:

1. Area LMPs are calculated by PROMOD and reflect the load-weighted LMP of all nodes within the area. Results are first presented which show the LMP differences across the MISO Illinois region between the "with MVP 16" and "without MVP 16" cases.[20]
2. Area load is based on the PROMOD inputs used by MISO, and reflects hour-by-hour load forecasts for individual areas within MISO.[21] The hourly area load is multiplied by the hourly LMP to calculate the hourly cost of wholesale electric energy for each area. The cost of wholesale electric energy for 2021 and 2026 is calculated by summing hourly costs across all 8,760 hours in the year and across the areas in MISO Illinois.
3. An adjustment to the hourly wholesale energy payments is made for CWLP and SIPC. Because CWLP is a municipal utility and SIPC is an electric cooperative, any changes in profits (revenues minus costs) to generation facilities owned by CWLP and SIPC can be used to reduce the rates charged to CWLP and SIPC customers. Consequently, in each scenario, the profits earned by CWLP and SIPC's generators are subtracted from the LMP-based payments for wholesale energy to arrive at a net payment.
4. Using these cost estimates for 2021 and 2026, changes in net payments are estimated for a 20-year period starting in 2018. The year 2018 is chosen to start the flow of changes in wholesale electric energy payments, because this is the first full year in which all elements of MVP 16 are in service.[22] Twenty years of payment reductions

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[20] To simplify the analysis given the structure of the information in the market simulation model employed, the impacts evaluated reflect a very high portion – approximately 95 percent of the load in MISO Illinois – but not the entire load.

[21] These loads reflect forecasts for annual peak load and annual energy shaped over 8,760 hours.

[22] Testimony of ATXI witness Dennis Kramer.

are calculated, consistent with the shorter of the two evaluation periods used in MISO's MVP economic analysis.[23] Payment changes over the period 2018 to 2037 are calculated through interpolation and extrapolation from the 2021 and 2026 results. Annual results are then discounted back to 2014 using both a 3.0 percent and 8.2 percent discount rate to account for a range of possible opportunity costs.[24]

5. The net change in payments from MVP 16 also reflects presumed transmission payments by MISO Illinois customers to support the cost of MVP 16. These costs reflect two components. The first is capital costs for new transmission plant. For the purposes of the analysis, customers are assumed to incur the costs for new transmission plant in the year in which associated capital expenditures are made. These project costs are based on estimates developed by Ameren and MEC.[25] The second component is annual expenses. This cost is based on each company's March 2014 Attachment O rate formula filing.[26] The portion of O&M and Taxes (other than income taxes) allocated to transmission in the formula rate is divided by transmission gross plant in service to calculate an annual transmission expense factor.[27] This factor is then applied to the MVP 16 capital cost to estimate ongoing annual expenses for MVP 16. All future costs are discounted back to 2014. As with all MVPs, transmission costs are then allocated to MISO customers based on their share of MWh load.[28] In the computations herein, MISO Illinois customers are assigned 9.5 percent of the total cost of MVP 16.[29] Transmission payments for MISO Illinois customers total $33.4 million on a present value basis using a 3 percent discount rate and $26.5 million using an 8.2 percent discount rate.

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[23] MISO evaluates the MVP Portfolio over 20- and 40-year horizons. *See* MVP Report at p 68.

[24] These discount rates are consistent with those used by MISO in its economic analysis. *See* MVP Report at p 68.

[25] Testimony of MEC witness Thomas Specketer and ATXI witness Lucas Klein.

[26] Attachment O to MISO Tariff filing, March 2014. Available at https://www.midwestiso.org/Library/Pages/ManagedFileSet.aspx?SetId=259, accessed July 22, 2014.

[27] Transmission O&M charges are adjusted to exclude LSE Expenses, Account 565 expenses, FERC Annual Fees, and EPRI & associated expenditures as detailed in Ameren Illinois Company's and MEC's Attachment O.

[28] MISO Tariff, Attachment MM, Multi-Value Project Charge.

[29] 9.5 percent is calculated as the MISO Illinois share of total MISO load based on the 2021 Business as Usual: Low Demand scenario.

These net benefits are conservative, because they reflect only reduced wholesale electric energy payments but do not include other possible payment reductions such as those relating to the cost of meeting capacity, operating reserve and other ancillary service requirements.[30] The estimate also does not account for other benefits to customers, such as improved reliability and the increased ability to meet renewable energy requirements.

Delivered Price Test

There are two components measured by the DPT for the MISO Illinois region: (1) Economic Capacity within the MISO Illinois region and (2) Economic Capacity from outside the MISO Illinois region that can be imported into MISO Illinois.

Economic Capacity within MISO Illinois

The first step is to develop Reference Prices for each scenario based on the results from the PROMOD runs. Reference Prices are developed for each of the following three periods.

a. *Summer Extreme Peak*. The 1 percent highest load summer on-peak hours, where summer on-peak hours include June to August, M-F, 6am to 10pm ET, excluding NERC holidays.

b. *Summer Peak.* Summer on-peak hours, excluding Summer Extreme Peak hours. Summer on-peak hours include June to August, M-F, 6am to 10pm ET, excluding NERC holidays.

c. *Off-peak*. Off-peak hours, where off-peak hours include 24 hours on Saturday, Sunday and NERC holidays, and 8 hours (10pm to 6am ET) M-F (excluding NERC holidays).

The second step is to determine the Economic Capacity within the region, which is the capacity (MW) of generator units located in MISO Illinois that have a production cost less than or equal to 1.05 times the Reference Price as defined above. Production costs reflect each unit's average production cost at full capacity. Available capacity by unit is calculated as the unit's full capacity less an average forced outage rate (applied during all seasons) and planned outage rate (applied

[30] MVP Report, pp. 50-65.

only during non-summer months). Outage data is based on PROMOD inputs that are used by MISO.[31] In addition, wind generation capacity is de-rated to account for expected utilization levels. As shown in Table 1, based on MISO analysis, curtailment of wind unit capacity as a consequence of not developing MVP 16 would all occur outside of the MISO Illinois region.[32]

Economic Capacity outside MISO Illinois

Economic Capacity from outside MISO Illinois is based on imports into MISO Illinois as determined by the PROMOD analysis. Hourly imports are calculated as the sum of gross positive inflows into the MISO Illinois region over transmission lines.[33] Economic Capacity from outside MISO Illinois is measured by the average imports into MISO Illinois during the 10 percent highest import hours.

Scenarios

The results presented in the body of this testimony reflect several scenarios, which are detailed below and in Table 2. Each scenario was designed by MISO in its MVP portfolio analysis, and no additional changes have been made. The definitions are provided by MISO in its MVP portfolio analysis report.[34]

- **Business As Usual: Low Demand** – assumes that current energy policies will be continued, with continuing "recession-level" demand and energy growth projections.[35]
- **Business As Usual: High Demand** – assumes that current energy policies will be continued, with demand and energy returning to pre-recession growth rates.[36]

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[31] Forced and planned outages are provided by Ventyx in the PROMOD data, and reflect Generating Availability Data System (GADS) data from the North American Electric Reliability Corporation (NERC).

[32] Direct communication with MISO, June 5, 2014. Two wind zones outside of MISO Illinois are curtailed in capacity, as show in Table 1.

[33] Negative flows (that is, exports from MISO Illinois) therefore are not reflected in this calculation.

[34] MVP Report, p 52.

[35] Note that the MVP Report titles this case "Business As Usual with Continued Low Demand and Energy Growth (BAULDE)."

- **Combined Energy Policy** – assumes multiple energy policies are enacted, including a 20 percent federal RPS, a carbon cap modeled on the Waxman-Markey Bill, implementation of a smart grid and widespread adoption of electric vehicles.
- **Carbon Constrained** – assumes that current energy policies will be continued, with the addition of a carbon cap modeled on the Waxman-Markey Bill.
- **Business As Usual: Low Demand High Gas** – same as the Low Demand scenarios listed above, except with higher gas prices (gas prices in 2011 were increased from $5 to $8/MMBtu).
- **Business As Usual: High Demand High Gas** – same as the High Demand scenarios listed above, except with higher gas prices (gas prices in 2011 were increased from $5 to $8/MMBtu).

[36] Note that the MVP Report titles this case "Business As Usual with Historic Demand and Energy Growth (BAUHDE)."

Table 2

Scenario Assumptions[37]

Future Scenarios	Wind Penetration	Effective Demand Growth Rate	Effective Energy Growth Rate	Gas Price	Carbon Cost / Reduction Target
Business As Usual: Low Demand	State RPS	0.78 percent	0.79 percent	BAU	None
Business As Usual: High Demand	State RPS	1.28 percent	1.42 percent	BAU	None
Combined Energy Policy	20 percent Federal RPS by 2025	0.52 percent	0.68 percent	BAU + $3	$50/ton (42 percent by 2033)
Carbon Constrained	State RPS	0.03 percent	0.05 percent	BAU + $3	$50/ton (42 percent by 2033)
Business As Usual: Low Demand, Hi Gas	State RPS	0.78 percent	0.79 percent	BAU + $3	None
Business As Usual: High Demand, Hi Gas	State RPS	1.28 percent	1.42 percent	BAU + $3	None

[37] Table 2 is based on Table 8.1 from the MVP Report.

Exhibit ATXI 9.3
LMP Reduction Due to MVP 16
MISO Illinois

Scenario	Year	Load Weighted LMP ($ per MWh) With MVP 16 [A]	Without MVP 16 [B]	Difference [A] - [B] = [C]	Percent Difference [C]/[B]
Business as Usual: Low Demand	2021	$33.65	$34.01	-$0.36	-1.07%
	2026	$40.01	$40.45	-$0.44	-1.10%
Business as Usual: High Demand	2021	$39.82	$40.44	-$0.61	-1.51%
	2026	$50.64	$51.49	-$0.84	-1.64%
Combined Energy Policy	2021	$87.36	$88.62	-$1.27	-1.43%
	2026	$106.82	$110.43	-$3.61	-3.27%
Carbon Constrained	2021	$79.68	$79.80	-$0.12	-0.16%
	2026	$91.37	$92.39	-$1.02	-1.10%
Business as Usual: Low Demand, High Gas	2021	$41.47	$42.07	-$0.60	-1.42%
	2026	$50.24	$51.13	-$0.88	-1.73%
Business as Usual: High Demand, High Gas	2021	$52.07	$53.03	-$0.96	-1.82%
	2026	$68.72	$70.44	-$1.72	-2.44%

Note:
[1] MISO Illinois is defined as AMIL, CWLP, and SIPC.
[2] "With MVP 16" scenarios include a MVA rating upgrade on the 161 kV line from Galesburg to Oak Grove.

Exhibit ATXI 9.4
Payment Reduction Due to MVP 16
MISO Illinois Region

	Discount Rate 3%				Discount Rate 8.2%			
	Reduction in Wholesale Energy (LMP) Payments (millions $2014)	MISO Illinois Share of MVP 16 Costs (millions $2014)	Net Reduction in Payments (millions $2014)	Ratio	Reduction in Wholesale Energy (LMP) Payments (millions $2014)	MISO Illinois Share of MVP 16 Costs (millions $2014)	Net Reduction in Payments (millions $2014)	Ratio
	[A]	[B]	[C]=[A]-[B]	[D]=[A]/[B]	[E]	[F]	[G]=[E]-[F]	[H]=[E]/[F]
Business as Usual: Low Demand	$326.6	$33.4	$293.2	9.8	$171.9	$26.5	$145.4	6.5
Business as Usual: High Demand	$684.7	$33.4	$651.3	20.5	$347.9	$26.5	$321.4	13.1
Combined Energy Policy	$2,627.3	$33.4	$2,593.9	78.7	$1,195.7	$26.5	$1,169.2	45.1
Carbon Constrained	$705.9	$33.4	$672.5	21.1	$297.8	$26.5	$271.3	11.2
Business as Usual: Low Demand - High Gas	$1,562.4	$33.4	$1,529.0	46.8	$695.7	$26.5	$669.2	26.3
Business as Usual: High Demand - High Gas	$1,387.3	$33.4	$1,353.9	41.5	$672.9	$26.5	$646.4	25.4

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Business as Usual: Low Demand
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$1,482.2	$1,466.4	$15.8	1.1%	0.888	0.730	$14.0	$11.5
2019	$1,563.8	$1,547.0	$16.8	1.1%	0.863	0.674	$14.5	$11.3
2020	$1,645.4	$1,627.6	$17.7	1.1%	0.837	0.623	$14.8	$11.0
2021	$1,726.9	$1,708.3	$18.7	1.1%	0.813	0.576	$15.2	$10.8
2022	$1,808.5	$1,788.9	$19.6	1.1%	0.789	0.532	$15.5	$10.5
2023	$1,890.1	$1,869.5	$20.6	1.1%	0.766	0.492	$15.8	$10.1
2024	$1,971.6	$1,950.1	$21.6	1.1%	0.744	0.455	$16.0	$9.8
2025	$2,053.2	$2,030.7	$22.5	1.1%	0.722	0.420	$16.3	$9.5
2026	$2,134.8	$2,111.3	$23.5	1.1%	0.701	0.388	$16.5	$9.1
2027	$2,216.4	$2,191.9	$24.4	1.1%	0.681	0.359	$16.6	$8.8
2028	$2,297.9	$2,272.5	$25.4	1.1%	0.661	0.332	$16.8	$8.4
2029	$2,379.5	$2,353.1	$26.4	1.1%	0.642	0.307	$16.9	$8.1
2030	$2,461.1	$2,433.7	$27.3	1.1%	0.623	0.283	$17.0	$7.7
2031	$2,542.6	$2,514.3	$28.3	1.1%	0.605	0.262	$17.1	$7.4
2032	$2,624.2	$2,595.0	$29.3	1.1%	0.587	0.242	$17.2	$7.1
2033	$2,705.8	$2,675.6	$30.2	1.1%	0.570	0.224	$17.2	$6.8
2034	$2,787.4	$2,756.2	$31.2	1.1%	0.554	0.207	$17.3	$6.4
2035	$2,868.9	$2,836.8	$32.1	1.1%	0.538	0.191	$17.3	$6.1
2036	$2,950.5	$2,917.4	$33.1	1.1%	0.522	0.177	$17.3	$5.8
2037	$3,032.1	$2,998.0	$34.1	1.1%	0.507	0.163	$17.3	$5.6
					Total Payment Reduction (millions $2014):		$326.6	$171.9

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Business as Usual: High Demand
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$1,705.4	$1,681.3	$24.1	1.4%	0.888	0.730	$21.4	$17.6
2019	$1,865.1	$1,837.9	$27.2	1.5%	0.863	0.674	$23.4	$18.3
2020	$2,024.8	$1,994.5	$30.3	1.5%	0.837	0.623	$25.3	$18.9
2021	$2,184.5	$2,151.1	$33.3	1.5%	0.813	0.576	$27.1	$19.2
2022	$2,344.1	$2,307.8	$36.4	1.6%	0.789	0.532	$28.7	$19.4
2023	$2,503.8	$2,464.4	$39.5	1.6%	0.766	0.492	$30.2	$19.4
2024	$2,663.5	$2,621.0	$42.5	1.6%	0.744	0.455	$31.7	$19.3
2025	$2,823.2	$2,777.6	$45.6	1.6%	0.722	0.420	$32.9	$19.2
2026	$2,982.8	$2,934.2	$48.7	1.6%	0.701	0.388	$34.1	$18.9
2027	$3,142.5	$3,090.8	$51.8	1.6%	0.681	0.359	$35.2	$18.6
2028	$3,302.2	$3,247.4	$54.8	1.7%	0.661	0.332	$36.2	$18.2
2029	$3,461.9	$3,404.0	$57.9	1.7%	0.642	0.307	$37.2	$17.8
2030	$3,621.5	$3,560.6	$61.0	1.7%	0.623	0.283	$38.0	$17.3
2031	$3,781.2	$3,717.2	$64.0	1.7%	0.605	0.262	$38.7	$16.8
2032	$3,940.9	$3,873.8	$67.1	1.7%	0.587	0.242	$39.4	$16.2
2033	$4,100.6	$4,030.4	$70.2	1.7%	0.570	0.224	$40.0	$15.7
2034	$4,260.2	$4,187.0	$73.3	1.7%	0.554	0.207	$40.6	$15.1
2035	$4,419.9	$4,343.6	$76.3	1.7%	0.538	0.191	$41.0	$14.6
2036	$4,579.6	$4,500.2	$79.4	1.7%	0.522	0.177	$41.4	$14.0
2037	$4,739.3	$4,656.8	$82.5	1.7%	0.507	0.163	$41.8	$13.5
					Total Payment Reduction (millions $2014):		$684.7	$347.9

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Combined Energy Policy Scenario
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$3,740.6	$3,749.0	-$8.4	-0.2%	0.888	0.730	-$7.5	-$6.1
2019	$3,990.3	$3,975.0	$15.2	0.4%	0.863	0.674	$13.1	$10.3
2020	$4,239.9	$4,201.0	$38.9	0.9%	0.837	0.623	$32.5	$24.2
2021	$4,489.5	$4,427.0	$62.5	1.4%	0.813	0.576	$50.8	$36.0
2022	$4,739.1	$4,653.0	$86.1	1.8%	0.789	0.532	$68.0	$45.8
2023	$4,988.8	$4,879.0	$109.7	2.2%	0.766	0.492	$84.1	$54.0
2024	$5,238.4	$5,105.0	$133.4	2.5%	0.744	0.455	$99.2	$60.6
2025	$5,488.0	$5,331.0	$157.0	2.9%	0.722	0.420	$113.4	$66.0
2026	$5,737.6	$5,557.0	$180.6	3.1%	0.701	0.388	$126.7	$70.2
2027	$5,987.3	$5,783.0	$204.2	3.4%	0.681	0.359	$139.1	$73.3
2028	$6,236.9	$6,009.0	$227.9	3.7%	0.661	0.332	$150.7	$75.6
2029	$6,486.5	$6,235.0	$251.5	3.9%	0.642	0.307	$161.4	$77.1
2030	$6,736.1	$6,461.0	$275.1	4.1%	0.623	0.283	$171.4	$78.0
2031	$6,985.8	$6,687.0	$298.8	4.3%	0.605	0.262	$180.8	$78.2
2032	$7,235.4	$6,913.0	$322.4	4.5%	0.587	0.242	$189.4	$78.0
2033	$7,485.0	$7,139.0	$346.0	4.6%	0.570	0.224	$197.3	$77.4
2034	$7,734.6	$7,365.0	$369.6	4.8%	0.554	0.207	$204.7	$76.4
2035	$7,984.3	$7,591.0	$393.3	4.9%	0.538	0.191	$211.4	$75.1
2036	$8,233.9	$7,817.0	$416.9	5.1%	0.522	0.177	$217.6	$73.6
2037	$8,483.5	$8,043.0	$440.5	5.2%	0.507	0.163	$223.2	$71.9
					Total Payment Reduction (millions $2014):		$2,627.3	$1,195.7

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Carbon Constrained Scenario
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$3,458.6	$3,477.9	-$19.2	-0.6%	0.888	0.730	-$17.1	-$14.0
2019	$3,576.4	$3,587.3	-$10.9	-0.3%	0.863	0.674	-$9.4	-$7.3
2020	$3,694.1	$3,696.7	-$2.6	-0.1%	0.837	0.623	-$2.1	-$1.6
2021	$3,811.9	$3,806.1	$5.8	0.2%	0.813	0.576	$4.7	$3.3
2022	$3,929.7	$3,915.5	$14.1	0.4%	0.789	0.532	$11.2	$7.5
2023	$4,047.4	$4,025.0	$22.5	0.6%	0.766	0.492	$17.2	$11.1
2024	$4,165.2	$4,134.4	$30.8	0.7%	0.744	0.455	$22.9	$14.0
2025	$4,283.0	$4,243.8	$39.1	0.9%	0.722	0.420	$28.3	$16.5
2026	$4,400.7	$4,353.2	$47.5	1.1%	0.701	0.388	$33.3	$18.4
2027	$4,518.5	$4,462.7	$55.8	1.2%	0.681	0.359	$38.0	$20.0
2028	$4,636.2	$4,572.1	$64.2	1.4%	0.661	0.332	$42.4	$21.3
2029	$4,754.0	$4,681.5	$72.5	1.5%	0.642	0.307	$46.5	$22.2
2030	$4,871.8	$4,790.9	$80.8	1.7%	0.623	0.283	$50.4	$22.9
2031	$4,989.5	$4,900.3	$89.2	1.8%	0.605	0.262	$54.0	$23.4
2032	$5,107.3	$5,009.8	$97.5	1.9%	0.587	0.242	$57.3	$23.6
2033	$5,225.0	$5,119.2	$105.9	2.0%	0.570	0.224	$60.4	$23.7
2034	$5,342.8	$5,228.6	$114.2	2.1%	0.554	0.207	$63.2	$23.6
2035	$5,460.6	$5,338.0	$122.5	2.2%	0.538	0.191	$65.9	$23.4
2036	$5,578.3	$5,447.4	$130.9	2.3%	0.522	0.177	$68.3	$23.1
2037	$5,696.1	$5,556.9	$139.2	2.4%	0.507	0.163	$70.5	$22.7
					Total Payment Reduction (millions $2014):		$705.9	$297.8

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Business as Usual: Low Demand - High Gas
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$1,734.0	$1,750.1	-$16.1	-0.9%	0.888	0.730	-$14.3	-$11.8
2019	$1,856.2	$1,857.0	-$0.8	0.0%	0.863	0.674	-$0.7	-$0.5
2020	$1,978.5	$1,963.9	$14.6	0.7%	0.837	0.623	$12.2	$9.1
2021	$2,100.7	$2,070.8	$29.9	1.4%	0.813	0.576	$24.3	$17.2
2022	$2,223.0	$2,177.7	$45.3	2.0%	0.789	0.532	$35.8	$24.1
2023	$2,345.2	$2,284.5	$60.7	2.6%	0.766	0.492	$46.5	$29.8
2024	$2,467.4	$2,391.4	$76.0	3.1%	0.744	0.455	$56.6	$34.6
2025	$2,589.7	$2,498.3	$91.4	3.5%	0.722	0.420	$66.0	$38.4
2026	$2,711.9	$2,605.2	$106.7	3.9%	0.701	0.388	$74.9	$41.5
2027	$2,834.2	$2,712.1	$122.1	4.3%	0.681	0.359	$83.1	$43.8
2028	$2,956.4	$2,819.0	$137.4	4.6%	0.661	0.332	$90.9	$45.6
2029	$3,078.6	$2,925.8	$152.8	5.0%	0.642	0.307	$98.1	$46.9
2030	$3,200.9	$3,032.7	$168.2	5.3%	0.623	0.283	$104.8	$47.7
2031	$3,323.1	$3,139.6	$183.5	5.5%	0.605	0.262	$111.0	$48.1
2032	$3,445.4	$3,246.5	$198.9	5.8%	0.587	0.242	$116.8	$48.1
2033	$3,567.6	$3,353.4	$214.2	6.0%	0.570	0.224	$122.2	$47.9
2034	$3,689.8	$3,460.3	$229.6	6.2%	0.554	0.207	$127.1	$47.5
2035	$3,812.1	$3,567.1	$244.9	6.4%	0.538	0.191	$131.7	$46.8
2036	$3,934.3	$3,674.0	$260.3	6.6%	0.522	0.177	$135.9	$46.0
2037	$4,056.6	$3,780.9	$275.7	6.8%	0.507	0.163	$139.7	$45.0
					Total Payment Reduction (millions $2014):		$1,562.4	$695.7

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.5
Payment Reduction Due to MVP 16
Business as Usual: High Demand - High Gas
MISO Illinois Region

	Wholesale Energy Market Payments						Reduction in Wholesale Energy Payments (PV as of 2014, $ million)	
Year	Without MVP 16 (millions $2014)	With MVP 16 (millions $2014)	Reduction (millions $2014)	Percent Difference	PV Factor (3%)	PV Factor (8.2%)	PV (3%)	PV (8.2%)
	[A]	[B]	[C]=[A]-[B]	[D]=[C]/[A]	[E]	[F]	[G]=[C]*[E]	[H]=[C]*[F]
2018	$2,095.9	$2,070.2	$25.6	1.2%	0.888	0.730	$22.8	$18.7
2019	$2,333.4	$2,298.8	$34.6	1.5%	0.863	0.674	$29.8	$23.3
2020	$2,570.9	$2,527.3	$43.5	1.7%	0.837	0.623	$36.5	$27.1
2021	$2,808.4	$2,755.9	$52.5	1.9%	0.813	0.576	$42.7	$30.2
2022	$3,045.9	$2,984.5	$61.4	2.0%	0.789	0.532	$48.5	$32.7
2023	$3,283.4	$3,213.0	$70.4	2.1%	0.766	0.492	$53.9	$34.6
2024	$3,520.9	$3,441.6	$79.3	2.3%	0.744	0.455	$59.0	$36.1
2025	$3,758.4	$3,670.1	$88.3	2.3%	0.722	0.420	$63.8	$37.1
2026	$3,995.9	$3,898.7	$97.2	2.4%	0.701	0.388	$68.2	$37.8
2027	$4,233.4	$4,127.2	$106.2	2.5%	0.681	0.359	$72.3	$38.1
2028	$4,470.9	$4,355.8	$115.1	2.6%	0.661	0.332	$76.1	$38.2
2029	$4,708.4	$4,584.4	$124.1	2.6%	0.642	0.307	$79.6	$38.0
2030	$4,945.9	$4,812.9	$133.0	2.7%	0.623	0.283	$82.9	$37.7
2031	$5,183.4	$5,041.5	$142.0	2.7%	0.605	0.262	$85.9	$37.2
2032	$5,420.9	$5,270.0	$150.9	2.8%	0.587	0.242	$88.6	$36.5
2033	$5,658.4	$5,498.6	$159.8	2.8%	0.570	0.224	$91.2	$35.8
2034	$5,895.9	$5,727.1	$168.8	2.9%	0.554	0.207	$93.5	$34.9
2035	$6,133.4	$5,955.7	$177.7	2.9%	0.538	0.191	$95.5	$34.0
2036	$6,370.9	$6,184.3	$186.7	2.9%	0.522	0.177	$97.4	$33.0
2037	$6,608.4	$6,412.8	$195.6	3.0%	0.507	0.163	$99.1	$31.9
					Total Payment Reduction (millions $2014):		$1,387.3	$672.9

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] The wholesale energy payments for CWLP and SIPC are net of the profits of the generating units owned by CWLP and SIPC respectively.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Business as Usual: Low Demand

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	12,273	12,273	0	0.0%	12,472	12,472	0	0.0%
Summer Peak	11,280	11,280	0	0.0%	11,305	11,305	0	0.0%
Off-Peak	4,866	4,866	0	0.0%	6,944	6,944	0	0.0%
Imports								
Summer Extreme Peak	3,503	3,719	216	6.2%	3,581	3,809	228	6.4%
Summer Peak	3,503	3,719	216	6.2%	3,581	3,809	228	6.4%
Off-Peak	3,503	3,719	216	6.2%	3,581	3,809	228	6.4%
Total								
Summer Extreme Peak	15,777	15,992	216	1.4%	16,052	16,281	228	1.4%
Summer Peak	14,783	14,999	216	1.5%	14,886	15,114	228	1.5%
Off-Peak	8,369	8,585	216	2.6%	10,525	10,753	228	2.2%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Business as Usual: High Demand

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	13,372	13,372	0	0.0%	14,388	14,388	0	0.0%
Summer Peak	11,354	11,354	0	0.0%	12,384	12,384	0	0.0%
Off-Peak	6,817	6,817	0	0.0%	9,073	9,073	0	0.0%
Imports								
Summer Extreme Peak	3,468	3,675	207	6.0%	3,589	3,760	171	4.8%
Summer Peak	3,468	3,675	207	6.0%	3,589	3,760	171	4.8%
Off-Peak	3,468	3,675	207	6.0%	3,589	3,760	171	4.8%
Total								
Summer Extreme Peak	16,841	17,048	207	1.2%	17,977	18,148	171	1.0%
Summer Peak	14,822	15,029	207	1.4%	15,972	16,143	171	1.1%
Off-Peak	10,285	10,492	207	2.0%	12,661	12,833	171	1.4%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Combined Energy Policy Scenario

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	12,802	12,802	0	0.0%	12,607	12,607	0	0.0%
Summer Peak	11,400	11,400	0	0.0%	12,025	12,025	0	0.0%
Off-Peak	5,011	5,011	0	0.0%	7,750	7,750	0	0.0%
Imports								
Summer Extreme Peak	3,318	3,467	149	4.5%	3,483	3,641	158	4.5%
Summer Peak	3,318	3,467	149	4.5%	3,483	3,641	158	4.5%
Off-Peak	3,318	3,467	149	4.5%	3,483	3,641	158	4.5%
Total								
Summer Extreme Peak	16,120	16,269	149	0.9%	16,090	16,248	158	1.0%
Summer Peak	14,718	14,867	149	1.0%	15,508	15,666	158	1.0%
Off-Peak	8,329	8,478	149	1.8%	11,233	11,391	158	1.4%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Carbon Constrained Scenario

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	11,711	11,711	0	0.0%	10,830	10,830	0	0.0%
Summer Peak	10,946	10,946	0	0.0%	9,252	9,252	0	0.0%
Off-Peak	3,853	3,853	0	0.0%	4,857	4,857	0	0.0%
Imports								
Summer Extreme Peak	3,480	3,484	4	0.1%	3,585	3,699	114	3.2%
Summer Peak	3,480	3,484	4	0.1%	3,585	3,699	114	3.2%
Off-Peak	3,480	3,484	4	0.1%	3,585	3,699	114	3.2%
Total								
Summer Extreme Peak	15,191	15,194	4	0.0%	14,415	14,529	114	0.8%
Summer Peak	14,426	14,430	4	0.0%	12,837	12,951	114	0.9%
Off-Peak	7,333	7,337	4	0.1%	8,442	8,556	114	1.4%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Business as Usual: Low Demand - High Gas

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	12,316	12,316	0	0.0%	12,526	12,526	0	0.0%
Summer Peak	11,035	11,035	0	0.0%	12,472	12,472	0	0.0%
Off-Peak	8,823	8,823	0	0.0%	9,015	9,015	0	0.0%
Imports								
Summer Extreme Peak	3,287	3,458	171	5.2%	3,386	3,600	214	6.3%
Summer Peak	3,287	3,458	171	5.2%	3,386	3,600	214	6.3%
Off-Peak	3,287	3,458	171	5.2%	3,386	3,600	214	6.3%
Total								
Summer Extreme Peak	15,604	15,775	171	1.1%	15,913	16,126	214	1.3%
Summer Peak	14,322	14,493	171	1.2%	15,858	16,071	214	1.3%
Off-Peak	12,110	12,282	171	1.4%	12,401	12,615	214	1.7%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.

Exhibit ATXI 9.6
Increased Supply to MISO Illinois Region Due to MVP16
Business as Usual: High Demand - High Gas

	2021				2026			
Economic Capacity	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**	**Without MVP16 (MW)**	**With MVP16 (MW)**	**Difference (MW)**	**% Difference**
	[A]	**[B]**	**[C]=[B]-[A]**	**[D]=[C]/[A]**	**[E]**	**[F]**	**[G]=[F]-[E]**	**[H]=[G]/[E]**
Internal MISO Illinois								
Summer Extreme Peak	13,097	13,097	0	0.0%	14,367	14,367	0	0.0%
Summer Peak	11,352	11,352	0	0.0%	11,438	11,438	0	0.0%
Off-Peak	9,061	9,061	0	0.0%	9,220	9,220	0	0.0%
Imports								
Summer Extreme Peak	3,300	3,486	186	5.6%	3,483	3,642	159	4.6%
Summer Peak	3,300	3,486	186	5.6%	3,483	3,642	159	4.6%
Off-Peak	3,300	3,486	186	5.6%	3,483	3,642	159	4.6%
Total								
Summer Extreme Peak	16,397	16,583	186	1.1%	17,849	18,009	159	0.9%
Summer Peak	14,652	14,838	186	1.3%	14,921	15,081	159	1.1%
Off-Peak	12,362	12,548	186	1.5%	12,703	12,862	159	1.3%

Notes:
[1] The MISO Illinois Region includes Ameren Illinois, City Water, Light & Power (CWLP) and Southern Illinois Power Cooperative (SIPC).
[2] Imports equal the average imports into MISO Illinois during the 10% highest import hours.