



Synapse
Energy Economics, Inc.

485 Massachusetts Avenue, Suite 2
Cambridge, MA 02139
Tel 617 661 3248 F 617 661 0599
www.synapse-energy.com

January 7, 2013

Department of Administration, Purchasing Division
2019 Washington Street East
P.O. Box 50130
Charleston, WV 25305-0130

RE: Solicitation No. PSC13532

To Whom it May Concern:

Enclosed please find the proposal from Synapse Energy Economics, Inc. (Synapse) to the Consumer Advocate Division of the West Virginia Public Service Commission (CAD) to provide consulting services in connection with the petition for approval of a generation transaction filed by Monongahela Power Company and the Potomac Edison Company before the Public Service Commission of West Virginia as Case No. 12-1571-E-PC.

Per the instructions in the RFQ, we have enclosed one original Technical Proposal and one original Cost Proposal in separate, sealed envelopes. Please note that our Certification and Signature Page, Addendum Acknowledgement Form, and Purchasing Affidavit have been provided as appendices to our Technical Proposal.

The primary contact for this proposal is Rick Hornby, Synapse's project manager for this work. Mr. Hornby can be reached at 617-453-7043 or rhornby@synapse-energy.com.

Please let us know if you have any questions concerning the proposed work, if you need additional descriptive information on the services proposed, or if additional qualifications information is required. We look forward to the opportunity of assisting the CAD in this matter.

Sincerely,

Bruce Biewald, President
Synapse Energy Economics, Inc.

01/08/13 09:32:27 AM
West Virginia Purchasing Division

Consulting Bid Form

Following is Synapse's completed Consulting Bid Form for this proposal. Please note that the hourly rates listed below have been "loaded" to include all expenses, per the RFQ.

PSC13532 – CONSULTING BID FORM			
Employee/Title	Not to Exceed Number of Hours*	Hourly Rate	Extended Price
Rick Hornby, senior consultant	72	\$220	\$15,840
Rachel Wilson, associate	104	\$150	\$15,600
Tyler Comings, associate	88	\$140	\$12,320
Patrick Knight, research associate	88	\$125	\$11,000
		Total	\$54,760

Bidder / Vendor Information:

Name: Synapse Energy Economics, Inc.
 Address: 485 Massachusetts Ave, Suite 2
 Cambridge, MA 02139
 Phone #: 617-661-3248
 Email Address: admin@synapse-energy.com

Contact Coordinator Information:

Name: Rick Hornby, project manager
 Address: Same as above
 Phone #: 617-453-7043
 Email Address: rhornby@synapse-energy.com

The Consultant will not be reimbursed for hours that exceed the total hours for each Employee/Title.

The following table provides a more detailed breakdown of Synapse's proposed budget by staff member and task.

Proposed Budget by Task and Staff Member

	Hornby	Wilson	Comings	Knight	Total
Hourly Rate (US\$/Hr)	\$220	\$150	\$140	\$125	
Staff Effort - Hours, Total					
1. Evaluate Companies' resource plan to determine if proposed acquisition/sale is most cost-effective strategy	12	32	24	24	92
2. Recommend alternative demand-side and/or supply-side resources as appropriate	12	16	16	16	60
3. Address proposed timing of resource acquisitions	8	8	8	8	32
4. Review analyses and testimonies filed by companies and other parties	16	16	16	16	64
5. Prepare and present testimony supporting analysis of Resource Plan, recommended alternatives and critique of analyses of Companies and other parties	24	32	24	24	104
Total Hours	72	104	88	88	352
Staff Costs - \$					
1. Evaluate Companies' resource plan to determine if proposed acquisition/sale is most cost-effective strategy	\$2,640	\$4,800	\$3,360	\$3,000	\$13,800
2. Recommend alternative demand-side and/or supply-side resources as appropriate	\$2,640	\$2,400	\$2,240	\$2,000	\$9,280
3. Address proposed timing of resource acquisitions	\$1,760	\$1,200	\$1,120	\$1,000	\$5,080
4. Review analyses and testimonies filed by companies and other parties	\$3,520	\$2,400	\$2,240	\$2,000	\$10,160
5. Prepare and present testimony supporting analysis of Resource Plan, recommended alternatives and critique of analyses of Companies and other parties	\$5,280	\$4,800	\$3,360	\$3,000	\$16,440
Total: Including Estimated Travel Costs	\$15,840	\$15,600	\$12,320	\$11,000	\$54,760

1. Introduction & Overview of Synapse

Synapse Energy Economics, Inc. (Synapse) is pleased to present this proposal to the Consumer Advocate Division of the West Virginia Public Service Commission (CAD) to provide consulting services in connection with the petition for approval of a generation transaction filed by Monongahela Power Company and the Potomac Edison Company (collectively "the Companies") before the Public Service Commission of West Virginia (PSC) as Case No. 12-1571-E-PC. The goal of our analyses will be to help the CAD determine whether or not the Companies' proposed acquisition of approximately 1,600 MW from the Harrison facility and sale of approximately 100 MW of the Pleasants facility is the most cost-effective method of providing service to the Companies' customers.

The key component of our analyses will be a review of the Companies' evaluation of generation alternatives in the Resource Plan it filed on August 31, 2012 in Case No. 11-1274-E-P. Our review will examine the range of potential resources that the Companies considered, as well as the key assumptions the Companies used to calculate the levelized cost of each of those alternatives. Here are a few aspects we have identified based upon our initial review of the Resource Plan:

- The Companies have considered several "all-or-nothing" strategies to meet the projected shortfall in capacity through 2026. For example, they have evaluated acquiring 1,476 MW of existing baseload coal resources immediately, but have not evaluated a strategy composed of multiple resources acquired over time, such as acquiring 500 MW of existing baseload coal plus 400 MW of peaking capacity now, and continuing to purchase the remaining required quantities over time.
- The Companies have failed to evaluate other potential resources that could play a role through 2026, including peaking capacity (i.e., a gas-fired combustion turbine), demand response, and energy efficiency.
- Several of the key base case assumptions the Companies used to calculate the levelized cost of each resource over 20 years are questionable, including an 80% capacity factor for the Harrison facility and natural gas prices rising to \$8/MMBtu by 2025.

Synapse is especially well-suited to provide CAD with these analyses. In addition to our extensive general experience reviewing and preparing electric utility resource plans throughout the U.S. and Canada, we are very familiar with supply options and market conditions facing utilities operating in West Virginia and its neighboring states. We are currently completing an analysis of the supply resource options available to APCo and WPCo in Case No. 11-1775-E-P, and in May 2012 we completed an analysis of the supply options available to Kentucky Power in order to evaluate the cost-effectiveness of retrofitting Big Sandy coal unit 2. In late 2011, Synapse completed two other relevant long-term electricity resource planning projects in Kentucky: one investigating the potential impacts of a renewable and energy efficiency portfolio standard, and one evaluating utility supply planning options.

Synapse has a proven track record of assisting consumer advocates with integrated resource planning (IRP) analyses. In addition to our ongoing project for the CAD, we have conducted recent IRP analyses for consumer advocates in Hawaii, California, Nevada, Missouri, and Ohio.

Descriptions of additional Synapse projects related to integrated resource planning are provided in Section 5 of this proposal, "Selected Relevant Projects."

Synapse has assembled an experienced project team, with Rick Hornby and Rachel Wilson as expert witnesses. Mr. Hornby and Ms. Wilson have worked together on the West Virginia and Kentucky projects mentioned above. Our project team brings demonstrated experience in the analyses relevant to this project, including:

- Reviewing and preparing forecasts of energy and demand;
- Analyzing the technical, economic, and environmental attributes of generation resources, both conventional and new, fossil fuel based and renewable; and
- Preparing risk and sensitivity analyses of various resource plans under a range of alternative assumptions and scenarios.

The qualifications of our project team members are discussed further in Section 4 of this proposal, "Project Team and Qualifications."

Required Forms and Cost Proposal

Please note that the required forms provided in the CAD's RFQ have been included as appendices to this Technical Proposal: Appendix A provides Synapse's Certification and Signature Page, Appendix B provides our signed Addendum Acknowledgement Form, and Appendix C provides our notarized Purchasing Affidavit.

Synapse's Cost Proposal, consisting of the required Consulting Bid Form, has been provided in a separate, sealed envelope per the instructions in the CAD's RFQ. No budget or cost information has been included in this Technical Proposal.

About Synapse

Synapse Energy Economics was founded in May 1996 to specialize in consulting on electric industry regulatory, restructuring, and environmental issues. Our firm provides research, testimony, reports, and regulatory support to consumer advocates, environmental organizations, regulatory commissions, state energy offices, and others. Synapse's professional staff has more than 200 years of combined experience in studying the electricity industry, and we are frequently at the forefront of electricity industry regulation and restructuring debates. Synapse is managed by its President and Founder Bruce Biewald, Vice President and Chief Operating Officer Ezra Hausman, and Vice President Tim Woolf.

Synapse works for a wide range of clients throughout the United States, including environmental groups, public utility commissions and their staff, governmental associations, public interest groups, attorneys general, offices of consumer advocates, foundations, and federal governmental organizations such as the U.S. Environmental Protection Agency and the Department of Justice.

Synapse has extensive experience in reviewing and preparing IRPs. This includes an understanding of the capital and operating costs of conventional, renewable, and energy efficiency resources, the lead times associated with bringing those resources into service, and the environmental regulations that will affect their operations. It also includes experience with wholesale markets for electric energy and capacity, and with running production cost models.

2. Conflict of Interest Statement

Synapse is not aware of any current or future conflict of interest with respect to this contract. Before bidding on any future work related to the substance or stakeholders associated with this contract, Synapse will consult with the CAD to ensure that there are no real or perceived conflicts of interest.

3. Scope of Work

Synapse proposes to provide the analyses and expert testimony specified in the RFQ regarding the Companies' proposed acquisition of approximately 1,600 MW from the Harrison facility and sale of approximately 100 MW of the Pleasants facility. Our consulting services will include:

1. Evaluating the Resource Plan to determine if the Companies' proposed acquisition/sale is the most cost-effective strategy for providing service to its customers;
2. Recommending alternative demand-side and/or supply-side resources if we determine the Companies' proposal is not the most cost-effective;
3. Addressing the proposed timing of the recommended resource acquisitions;
4. Reviewing analyses and testimonies filed by the Companies and other parties; and
5. Preparing and presenting testimony supporting our analysis of the Resource Plan, our recommended alternative, and our critique of analyses of the Companies and other parties.

The Companies are proposing to acquire 1,476 MW of existing baseload coal capacity effective May 2013 because they project that they will need approximately 1,400 MW of capacity by 2026, and because they have an opportunity to acquire this capacity now at what they consider to be an attractive cost. The Companies' proposal raises numerous concerns. First, in the near-term they only need to replace 408 MW of coal capacity that is retiring in 2013. Even if they replaced all of their purchased capacity, they only would need 938 MW in 2013. Moreover, it is not clear that the Companies need to acquire 938 MW of baseload capacity. Instead, it may be more cost-effective to acquire a combination of baseload capacity and low capital cost peaking capacity. By acquiring 1,476 MW of baseload capacity, the Companies may be imposing a large financial risk on ratepayers in the form of high fixed costs that are not ultimately justified by high levels of generation. For example, if the Companies do not achieve high levels of off-system sales using the Harrison capacity, they will not operate that capacity at their assumed 80% capacity factor and they will not have chosen the best resource strategy.

Following is brief description of our proposed approach to analyzing the Companies' proposal and underlying analyses through substantive tasks 1, 2 and 3.

- Synapse will review the Companies' Resource Plan and ask them to provide their support for the range of resources they have evaluated. In addition, we will determine through discovery their rationale for failing to evaluate other potential resources that could play a role through 2026, and for failing to consider strategies composed of combinations of resources acquired over time, such as a mix of existing baseload coal, peaking capacity, and purchases.

- Synapse will review the Companies' Resource Plan and ask them to provide their support for each of their base case assumptions for key inputs over 20 years. We will focus in particular on their projections of natural gas prices, coal prices, electricity market prices, environmental regulations, and capacity factors of each potential resource.
- We will assess the reasonableness of the Companies' range of potential resources and its input assumptions based upon their supporting rationale and our database of resource planning assumptions. That database includes assumptions used by comparable utilities and their consultants as well as projections by independent sources such as the EIA.
- Synapse will review the Companies' calculations of levelized costs, and will calculate the levelized costs of alternatives we identify and also calculate these costs using alternative assumptions for inputs such as natural gas prices.
- Synapse will prepare and present direct written testimony based on the research and analysis described above. We expect that Rachel Wilson and Rick Hornby will be the primary expert witnesses. We will respond to information requests on the direct testimony and on the analysis.

4. Project Team and Qualifications

The project team will include the following members:

- Rick Hornby – project manager, witness on resource planning issues (in particular, gas price assumptions and benefits of a diverse resource mix)
- Rachel Wilson – assistant project manager, witness on resource planning (in particular, the range of resources available to the Companies, and levelization calculations)
- Tyler Comings – analysis of resource options and planning assumptions
- Patrick Knight – analysis of levelization calculations and planning assumptions

Below we offer short bios for each member of the proposed project team. Full resumes are provided in Appendix D.

A. Project Team Bios

Rick Hornby - Project Manager

Rick Hornby is a senior consultant at Synapse Energy Economics. He has worked in the energy industry since 1976 as a regulatory consultant, senior civil servant, and project engineer. Mr. Hornby's primary areas of focus are resource planning and ratemaking in the electricity and natural gas industries. He has provided expert testimony and litigation support on these IRP issues in over 120 proceedings on behalf of utility regulators, consumer advocates, environmental groups, energy marketers, gas producers, and utilities.

Mr. Hornby has a Master of Science in Technology and Policy from the Massachusetts Institute of Technology and a Bachelor of Industrial Engineering from Dalhousie University. Prior to joining Synapse, Mr. Hornby was a Principal with CRA International, formerly Tabors Caramanis & Associates. He also held positions as Director of the Energy Group and Manager of the Natural



Gas Program at the Tellus Institute (formerly Energy Systems Research Group). Earlier in his career he served as Assistant Deputy Minister of Energy in the Nova Scotia Department of Mines and Energy and as a Member of the Canada-Nova Scotia Offshore Oil and Gas Board. Mr. Hornby has also been a project engineer responsible for energy management programs in industry.

Since joining Synapse in 2006, Mr. Hornby has analyzed a range of electricity resource planning and ratemaking issues for staff of regulatory commissions, consumer advocates and environmental groups. Examples of his current and recent resource planning cases, described in Section 5, include:

- Analysis of Apco/Wpco Merger (Project Manager, witness)
- Evaluation of Kentucky Power Company's application for recovery of cost of FGD and other EPA regulation compliance measures at Big Sandy coal plant (Project Manager, witness)
- Potential Impacts of a Renewable and Energy Efficiency Portfolio Standard in Kentucky (Project Manager, editor)
- Avoided Energy Supply Cost Study 2011 for New England (Project Manager, editor)
- Evaluation of Oklahoma Gas & Electric wind power purchase agreements and associated Windspeed Transmission Project (Project Manager, witness)
- Avoided Costs for ACEEE Clean Energy Studies of Ohio, Virginia, Arkansas, North Carolina, and South Carolina (Project Manager)

Rachel Wilson - Associate

Rachel Wilson conducts research and assists in writing testimony and publications. Her work focuses on a variety of issues related to electric utilities, including federal and state clean air policy; emissions from electricity generation; environmental compliance technologies, strategies, and costs; integrated resource planning; valuation of environmental externalities from power plants; and the nexus between water and energy.

As part of her work, Ms. Wilson uses optimization and electricity dispatch models, including Strategist, PROMOD, and PROSYM/Market Analytics, to analyze regional energy markets and to evaluate the modeling analyses performed by utilities. She has served as the primary modeling specialist in several recent Synapse projects analyzing proposed retrofits of aging coal-fired power plants, and has testified on related issues before the public utilities commissions of Kentucky and Minnesota.

Since joining Synapse in 2008, Ms. Wilson has contributed to dozens of publications and reports, including: *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region*, prepared for the Energy Future Coalition; *Comments Regarding MidAmerican Energy Company Filing on Coal-Fired Generation in Iowa*, prepared for the Iowa Office of the Consumer Advocate; and *Global Best Practices: Strategies for Decarbonizing Electric Power Supply*, prepared for the Regulatory Assistance Project.

Prior to joining Synapse, Ms. Wilson worked for an economic and business consulting firm where she focused on issues of energy, the electric industry, and coal production. Ms. Wilson holds a



Master of Environmental Management from Yale University and a BA in Environment, Economics, and Politics from Claremont McKenna College.

Examples of her current and recent resource planning cases, described in Section 5, include:

- Evaluation of Kentucky Power Company application for recovery of cost of FGD and other EPA regulation compliance measures at Big Sandy coal plant (review Company Strategist runs, re-run Strategist for alternative assumptions regarding load and supply resources, witness)
- Evaluation of Louisville Gas & Electric and Kentucky Utilities (the Companies) application for certificates of public convenience and necessity to invest billions of dollars in existing coal-fired power plants to enable them to comply with new, tighter environmental regulations (review Company Strategist runs, re-run Strategist for alternative assumptions regarding load and supply resources, witness)
- Review of comments regarding potential impacts of EPA regulations on coal-fired generation in Iowa. Ms. Wilson assisted the Iowa OCA by reviewing comments submitted in this docket and preparing comments to submit to the Board.
- Avoided Energy Supply Cost Study 2011 for New England (lead modeler)

Tyler Comings - Associate

Tyler Comings is an economic specialist, conducting research on energy system planning and coal plant economics, and performing economic modeling and analysis in support of a wide range of Synapse projects. Mr. Comings has significant experience in performing economic impact and benefit-cost analyses, statistical modeling, and research on environmental issues. His analyses often incorporate the use of economic models such as REMI and IMPLAN.

At Synapse, Mr. Comings has performed economic impact modeling for Vermont's Comprehensive Energy Plan and its energy efficiency investments, and for Kentucky's renewable and energy efficiency portfolio standard. He has evaluated resource adequacy and planning in comments on a generation procurement policy in Maryland and on the Connecticut Department of Energy and Environmental Protection's draft 2012 Integrated Resource Plan. Mr. Comings has also analyzed coal plant economics for several cases and was lead author on an assessment of the forward-going economics of Midwest Generation coal plants in Illinois compared to forecasts of PJM market prices.

Prior to joining Synapse, Mr. Comings served as a senior associate at ideas42, a think tank specializing in behavioral economics research. There, he performed research on consumer behavior, including conducting case studies of innovative financial products in developing countries and leading studies on behavioral interventions to prevent foreclosure. Prior to that, he served as an economic consultant and research analyst at Economic Development Research Group, Inc., a consulting firm. His responsibilities there included analyzing transportation and environmental policies, creating economic development strategies, and modeling the economic impact of renewable energy and energy efficiency investments.

Mr. Comings holds an MA in Economics from Tufts University and a BA in Mathematics and Economics from Boston University.



Examples of his current and recent resource planning cases, described in Section 5, include:

- Analysis of Apco/Wpco Merger (research on renewable potential)
- Evaluation of TVA's 2011 Integrated Resource Plan (research on renewable potential)
- Evaluation of Kentucky Power Company application for recovery of cost of FGD and other EPA regulation compliance measures at Big Sandy coal plant (research support)
- Potential Impacts of a Renewable and Energy Efficiency Portfolio Standard in Kentucky (economic analysis and modeling)
- Analysis of Illinois Coal Fleet Economics (lead analyst and author)

Patrick Knight – Research Associate

Patrick Knight performs consulting, conducts research, and assists in writing testimony and reports for Synapse. His work covers a range of issues, such as the costs of environmental controls and compliance, coal-fired power plant retirements, forward capacity markets, costs and benefits of energy efficiency programs and measures, water and energy interactions, air emissions of electricity generation, consumer advocacy, and technology strategy within the energy industry.

Mr. Knight's recent work at Synapse includes:

- Building a model for the U.S. EPA to project the hourly changes in generation along with the associated changes in air emissions at individual generating units resulting from the introduction of new energy efficiency or renewable energy resources in a specific region
- Coauthoring a Synapse report on greenhouse gas emissions associated with hydroelectric resources
- Coauthoring Synapse's November 2011 report for the Civil Society Institute, *Toward a Sustainable Future for the U.S. Power Sector: Beyond Business as Usual 2011*
- Designing a model for a study on the economic and environmental impacts of geothermal residential heating and cooling systems

Prior to joining Synapse, Mr. Knight worked for New Ecology, Inc., where he helped develop a utility tracking and management software program. He holds a BS in Geophysics from Boston College, with minors in mathematics and philosophy, and an MA in Urban and Environmental Planning and Policy from Tufts University. Mr. Knight provided research and analysis support for several of the IRP projects described in Section 5, including the Evaluation of Big Rivers Electric Coop's Applications for CPCNs, the Evaluation of Kentucky Power Company's application for recovery of cost of FGD and other EPA regulation compliance measures at Big Sandy coal plant, and the 2011 Avoided Energy Supply Cost Study.

5. Selected Relevant Projects

Synapse is exceptionally well-qualified to provide the CAD with the consulting services outlined in the Scope of Work above. Below we provide descriptions of selected ongoing, recent, and relevant Synapse project work, including details on associated clients.

A. Projects for the West Virginia Consumer Advocate Division

Analysis of Apco/Wpco Merger

Client: West Virginia Consumer Advocate Division

Synapse is providing analyses to help the Consumer Advocate determine if the proposed merger of Appalachian Power Company (Apco) and Wheeling Power Company (Wpco) would be beneficial for West Virginia ratepayers. The analyses include preparation of two integrated resource plans (IRPs), one for Apco and Wpco operating on a stand-alone basis, and one for Apco and Wpco operating on a merged basis. Project ongoing.

Stranded Costs and Divestiture of Generation Assets

Client: West Virginia Consumer Advocate Division

Synapse and Resource Insight assessed the stranded costs of American Electric Power and Allegheny Power. The results, including a discussion of divestiture of generation assets and the responsibility for stranded costs and gains, were presented in the testimony of Bruce Biewald before the West Virginia Public Service Commission in Case No. 98-0452-E-GI. Project completed in 1999.

Measures to Ensure Fair Competition and Protect Consumers in a Restructured Electricity Industry in West Virginia

Client: West Virginia Consumer Advocate Division

Synapse, with assistance from MacGregor Energy Consultancy, prepared a study of the following consumer protection measures: divestiture of generation, codes of conduct, licensing standards, reliability of distribution services, consumer education, and disclosure of information. The report was presented in the testimony of Tim Woolf before the West Virginia Public Service Commission, Case No. 98-0452-E-GI. Project completed in 1999.

B. Utility Resource Planning Projects

Development of Electric Utility IRP

Client: Hawaii Division of Consumer Advocacy

Synapse is providing expert witness and consulting services to the Hawaii Division of Consumer Advocacy in a proceeding to develop and review integrated resource plans (IRPs) for three electric companies. Project ongoing.

Evaluation of TVA's 2011 Integrated Resource Plan

Client: Sierra Club

Synapse will evaluate an IRP produced by TVA in March 2011 to determine if all cost effective energy efficiency and reasonable penetrations of renewable energy would substantially change the outcome of the IRP, particularly pertaining to the continued use of potentially non-economic coal plants. Synapse will conduct an extensive literature review on energy efficiency and renewable energy potential in the TVA service territory, re-create the TVA preferred portfolio (and subsequently announced retirements) in a spreadsheet-based analysis, and determine the availability and cost of energy efficiency/renewable energy resources to replace at least four coal-fired plants owned by TVA. Synapse anticipates working with both Sierra Club and TVA in examining future energy efficiency/renewable energy economic potential and its impact in the TVA system. Project ongoing.



Evaluation of Big Rivers Electric Coop's Applications for CPCNs

Client: Sierra Club

On behalf of the Sierra Club, Synapse is reviewing and will provide expert witness testimony regarding the Big Rivers Electric Cooperative's applications for Certificates of Public Convenience and Necessity (CPCNs) and rate recovery to retrofit nine units at five existing coal-fired power plants in Kentucky. These plants include the D.B. Wilson, R.D. Green, Robert A. Reid, Kenneth Coleman, and City of Henderson facilities. Project ongoing.

PacifiCorp Utah General Rate Case and 2013 Integrated Resource Plan

Client: Sierra Club

Synapse is providing expert testimony as required for a PacifiCorp general rate case in Utah regarding the prudence of environmental retrofits undertaken in the 2008-2009 timeframe. As part of this project, Synapse is also providing expert services in a PacifiCorp multi-state IRP development stakeholder process on behalf of the Sierra Club. Project ongoing.

Evaluation of Kentucky Power Company's Application for Recovery of Cost of FGD and other EPA Regulation Compliance Measures at Big Sandy Coal Plant

Client: Sierra Club

In December 2011 Kentucky Power, owned by American Electric Power (AEP), one of the country's largest electric holding companies, requested approval for a Certificate of Public Convenience and Necessity (CPCN) and associated cost recovery to invest approximately \$950 million on environmental compliance measures at its Big Sandy Unit 2, an 800 MW coal unit approximately 40 years old. Synapse, testifying on behalf of the Sierra Club, demonstrated that the proposed investment was not reasonable because it was more cost-effective for Kentucky Power to retire that unit and meet its capacity and energy requirements from other resources. The utility withdrew its request on May 30, 2012, just days before the Kentucky Commission was scheduled to issue its Order. Project completed in 2012.

Potential Impacts of a Renewable and Energy Efficiency Portfolio Standard in Kentucky

Client: Mountain Association for Community Economic Development; Kentucky Sustainable Energy Alliance

Legislation introduced in the Kentucky General Assembly proposes to establish a Renewable and Energy Efficiency Portfolio Standard (REPS) for utilities in the state. Synapse estimated the potential impacts of a REPS on Kentucky's portfolio of electricity resources, average electric rates, and on the state's economy. Project completed January 2012.

Evaluation of Utility Planning and Expenditures in Kentucky

Clients: Sierra Club and the National Resource Defense Council

For this project, Synapse provided expert testimony, comments, and litigation support in three cases before the Kentucky Public Service Commission involving resource planning and environmental upgrade expenditures by Louisville Gas & Electric and Kentucky Utilities (the Companies). In two certificate of public convenience and necessity cases, Synapse reviewed and critiqued the Companies' proposals to invest billions of dollars in existing coal-fired power plants to make them compliant with potential environmental regulations that may apply to those plants. Synapse's comments on the Companies' 2011 Integrated Resource Plan (IRP) covered the modeling process and assumptions regarding energy efficiency, load forecasts, renewable energy, and other supply-side alternatives. In all of these cases, our review included factors influencing the

decision to retire a plant versus the costs of bringing a plant into compliance with anticipated environmental regulations. Project completed in 2011.

Long Term Procurement Plan Rulemaking

Client: California Division of Ratepayer Advocates

Synapse is providing technical and expert witness services to the CA DRA in connection with the Long Term Procurement Plan proceeding affecting the three largest investor-owned utilities in California. The proceeding embraces both updates to the rules for those plans and reviews of plans to be submitted in 2011 and 2012. Project ongoing.

Energy Efficiency and Integrated Resource Planning in Nevada

Client: Nevada Bureau of Consumer Protection

Synapse is assisting the Bureau of Consumer Protection in reviewing and critiquing Nevada Power and Sierra Pacific Power's energy efficiency programs and triennial integrated resource plans. Analysis will include the review of appropriate energy efficiency budgets, and the role of energy efficiency in complying with the state's renewable portfolio standard. This work may require providing expert testimony before the Nevada Public Utility Commission. Project ongoing.

Analysis of Illinois Coal Fleet Economics

Client: Sierra Club

The Sierra Club contracted with Synapse to provide an assessment of the market viability of Edison International's Illinois coal-fired power plants. Synapse produced a report providing an initial analysis of the forward-going economics facing Edison International's merchant coal units in Illinois (known as Midwest Generation, or MWG), and addressing the reliability implications of coal retirements in the western PJM area. Project completed in 2012.

Minnesota Power Integrated Resource Plan

Client: Minnesota Center for Environmental Advocacy

The purpose of this project was to provide comments on Minnesota Power's 2010 IRP after analyzing the Company's Strategist modeling results and presenting our own modeling scenarios and results. Synapse participated in several rounds of discovery questions asked to MN Power, replicated the five modeling scenarios analyzed by the Company, performed sensitivity analysis modeling on those scenarios, and created a "Synapse Reference Case." Synapse also modeled several retirement scenarios based on the Synapse Reference Case. Project completed in 2011.

Review of comments regarding potential Impacts of EPA regulations on coal-fired generation in Iowa

Client: Iowa Office of Consumer Advocate

The Iowa Utilities Board opened Docket No. NOI-2011-0003 and requested comments on the ways in which federal environmental regulations will affect coal-fired power plants in the state. Synapse assisted the Iowa OCA in reviewing comments submitted in this docket, and in preparing comments to submit to the Board. Project completed in 2011.

2011 Avoided Energy Supply Cost Study

Client: AESC 2011 Study Group (New England efficiency program administrators)

Synapse and a team of subcontractors developed projections of marginal energy supply costs that would be avoided due to reductions in electricity, natural gas and other fuels resulting from energy efficiency programs offered to customers. The report provides projections of avoided costs of electricity and natural gas by year from 2012 through 2026 with extrapolations through 2041. In



addition to projecting the costs of energy and capacity avoided directly by program participants, the report provides estimates of the Demand-Reduction-Induced Price Effect ("DRIPE") of efficiency programs on wholesale market prices for electric energy and capacity. The report also provides a projection of annual externality costs associated with emissions of CO₂. The 2011 AESC Study was sponsored by a group representing all of the major electric and gas utilities in New England as well as efficiency program administrators, energy offices and regulators. Project completed July 2011.

Integrated Resource Planning in Missouri

Client: Missouri Office of People's Counsel

Synapse assisted the OPC in reviewing and critiquing the integrated resource plan of Ameren Missouri. Synapse drafted a technical report addressing the following issues: energy efficiency potential and cost-effectiveness, renewable resource potential, costs and risks associated with new nuclear projects, the costs to existing coal plants of new environmental regulations, and proper methodologies for selecting preferred resources plans. Project completed June 2011.

Appalachian Power Company Virginia IRP

Client: Southern Environmental Law Center

On behalf of the Southern Environmental Law Center, the Chesapeake Climate Action Network, Appalachian Voices, and the Virginia Chapter of the Sierra Club, Synapse provided expert testimony regarding the 2009 integrated resource plan filed by the Appalachian Power Company. Project completed in 2010.

Review and Analysis of Delmarva Power Integrated Resource Plan

Client: Delaware Public Service Commission Staff

Synapse evaluated the Integrated Resource Plan filing of Delmarva Power and Light. Synapse reviewed the way in which the plan complied or did not comply with state directives on integrated resource planning and provision of default service supply. Synapse also provided advice to the Commission on related issues with Delaware's RFP for new generation to be long-term contracted with Delmarva. The first phase of the project was completed in 2009, and a second phase was completed in 2010. Project completed in 2010.

Evaluation of Oklahoma Gas & Electric wind power purchase agreements and associated Windspeed Transmission Project

Client: Arkansas Public Service Commission Staff

Oklahoma Gas and Electric Company acquired the OU Spirit wind facility, entered two wind energy purchase agreements and built the Windspeed transmission line to access that new wind generation. Synapse analyzed, and provided testimony on, whether the OU Spirit project and two WEPA's were in the public interest, as well as on the need for and reasonableness of the Windspeed transmission line. Testimony filed November 2010 and March 2011.

Review of Dominion Virginia Power's IRP

Client: Southern Environmental Law Center

Synapse provided expert testimony on the IRP submitted to the Virginia PUC by Dominion. Key issues included energy efficiency programs, conservation voltage reduction and supply portfolios. Project completed June 2010.



the four investor-owned electric utilities in Arkansas for compliance. As part of this review, Synapse evaluated each utility's financial and production costing models, energy supply forecasting, demand analysis, load forecasting, and other pertinent data and issues. Project completed in June 2005.

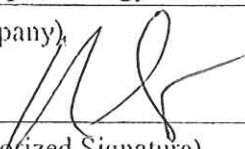


CERTIFICATION AND SIGNATURE PAGE

By signing below, I certify that I have reviewed this Solicitation in its entirety; understand the requirements, terms and conditions, and other information contained herein; that I am submitting this bid or proposal for review and consideration; that I am authorized by the bidder to execute this bid or any documents related thereto on bidder's behalf; that I am authorized to bind the bidder in a contractual relationship; and that to the best of my knowledge, the bidder has properly registered with any State agency that may require registration.

Synapse Energy Economics, Inc.

(Company)


(Authorized Signature)

Robert Sapiro, Finance and Administration Manager

(Representative Name, Title)

617-453-7030

(Phone Number)

617-661-0599

(Fax Number)

1/7/2013

(Date)

ADDENDUM ACKNOWLEDGEMENT FORM**SOLICITATION NO.:** PSC13532

Instructions: Please acknowledge receipt of all addenda issued with this solicitation by completing this addendum acknowledgment form. Check the box next to each addendum received and sign below. Failure to acknowledge addenda may result in bid disqualification.

Acknowledgment: I hereby acknowledge receipt of the following addenda and have made the necessary revisions to my proposal, plans and/or specification, etc.

Addendum Numbers Received:

(Check the box next to each addendum received)

<input checked="" type="checkbox"/> Addendum No. 1	<input type="checkbox"/> Addendum No. 6
<input type="checkbox"/> Addendum No. 2	<input type="checkbox"/> Addendum No. 7
<input type="checkbox"/> Addendum No. 3	<input type="checkbox"/> Addendum No. 8
<input type="checkbox"/> Addendum No. 4	<input type="checkbox"/> Addendum No. 9
<input type="checkbox"/> Addendum No. 5	<input type="checkbox"/> Addendum No. 10

I understand that failure to confirm the receipt of addenda may be cause for rejection of this bid. I further understand that any verbal representation made or assumed to be made during any oral discussion held between Vendor's representatives and any state personnel is not binding. Only the information issued in writing and added to the specifications by an official addendum is binding.

Synapse Energy Economics, Inc.

Company

Authorized Signature

1/7/2013

Date

NOTE: This addendum acknowledgment should be submitted with the bid to expedite document processing.

Appendix C: Purchasing Affidavit

The Purchasing Affidavit provided on the following page serves to certify that neither Synapse nor a related party owe a debt to the State of West Virginia in excess of \$1,000.

RFQ No. PSC13532STATE OF WEST VIRGINIA
Purchasing Division**PURCHASING AFFIDAVIT**

West Virginia Code §5A-3-10a states: No contract or renewal of any contract may be awarded by the state or any of its political subdivisions to any vendor or prospective vendor when the vendor or prospective vendor or a related party to the vendor or prospective vendor is a debtor and the debt owed is an amount greater than one thousand dollars in the aggregate.

DEFINITIONS:

"Debt" means any assessment, premium, penalty, fine, tax or other amount of money owed to the state or any of its political subdivisions because of a judgment, fine, permit violation, license assessment, defaulted workers' compensation premium, penalty or other assessment presently delinquent or due and required to be paid to the state or any of its political subdivisions, including any interest or additional penalties accrued thereon.

"Debtor" means any individual, corporation, partnership, association, limited liability company or any other form or business association owing a debt to the state or any of its political subdivisions. "Political subdivision" means any county commission; municipality; county board of education; any instrumentality established by a county or municipality; any separate corporation or instrumentality established by one or more counties or municipalities, as permitted by law; or any public body charged by law with the performance of a government function or whose jurisdiction is coextensive with one or more counties or municipalities. "Related party" means a party, whether an individual, corporation, partnership, association, limited liability company or any other form or business association or other entity whatsoever, related to any vendor by blood, marriage, ownership or contract through which the party has a relationship of ownership or other interest with the vendor so that the party will actually or by effect receive or control a portion of the benefit, profit or other consideration from performance of a vendor contract with the party receiving an amount that meets or exceeds five percent of the total contract amount.

EXCEPTION: The prohibition of this section does not apply where a vendor has contested any tax administered pursuant to chapter eleven of this code, workers' compensation premium, permit fee or environmental fee or assessment and the matter has not become final or where the vendor has entered into a payment plan or agreement and the vendor is not in default of any of the provisions of such plan or agreement.

Under penalty of law for false swearing (*West Virginia Code §61-5-3*), it is hereby certified that the vendor affirms and acknowledges the information in this affidavit and is in compliance with the requirements as stated.

WITNESS THE FOLLOWING SIGNATUREVendor's Name: Synapse Energy Economics, Inc.Authorized Signature: _____ Date: 1/7/2013State of MassachusettsCounty of Middlesex, to-wit:Taken, subscribed, and sworn to before me this 7th day of January, 2013.My Commission expires July 27, 2018.

AFFIX SEAL HERE

NOTARY PUBLIC



MELISSA SCHULTZ
Notary Public
Commonwealth of Massachusetts
My Commission Expires
July 27, 2018

James Richard Hornby

Senior Consultant

Synapse Energy Economics, Inc.

485 Massachusetts Ave., Suite 2, Cambridge, MA 02139

(617) 453-7043 • fax: (617) 661-0599

www.synapse-energy.com

rhornby@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA.

Senior Consultant, 2006 to present.

Provides analysis and expert testimony regarding planning, market structure, ratemaking and supply contracting issues in the electricity and natural gas industries. Major projects regarding alignment of financial incentives with aggressive pursuit of energy efficiency by electric and gas utilities include testimony on the “save-a-watt” approach proposed by Duke Energy in North Carolina, Indiana and South Carolina. Major projects regarding proposals for advanced metering infrastructure (smart grid or AMI) and dynamic pricing include testimony in the Baltimore Gas and Electric case. Resource planning cases include the development of long-term projections of avoided costs of electricity and natural gas in New England for a coalition of utility program administrators in 2007, 2009, and 2011.

Charles River Associates (formerly Tabors Caramanis & Associates), Cambridge, MA.

Principal, 2004-2006, Senior Consultant, 1998-2004.

Expert testimony and litigation support in energy contract price arbitration proceedings and various ratemaking proceedings. Productivity improvement project for electric distribution companies in Abu Dhabi. Analyzed market structure and contracting issues in wholesale electricity markets.

Tellus Institute, Boston, MA.

Vice President and Director of Energy Group, 1997-1998.

Manager of Natural Gas Program, 1986-1997.

Presented expert testimony on rates for unbundled retail services, analyzed the options for purchasing electricity and gas in deregulated markets, prepared testimony and reports on a range of gas industry issues including market structure, strategic planning, market analyses, and supply planning.

Nova Scotia Department of Mines and Energy, Halifax, Canada.

Member, Canada-Nova Scotia Offshore Oil and Gas Board, 1983-1986.

Assistant Deputy Minister of Energy 1983-1986.

Director of Energy Resources 1982-1983

Assistant to the Deputy Minister 1981-1982

Nova Scotia Research Foundation, Dartmouth, Canada, Consultant, 1978-1981.

Canadian Keyes Fibre, Hantsport, Canada, Project Engineer, 1975-1977.

Imperial Group Limited, Bristol, England, Management Consultant, 1973-1975.

EDUCATION

M.S., Technology and Policy (Energy), Massachusetts Institute of Technology, 1979.

B.Eng., Industrial Engineering (with Distinction), Dalhousie University, Canada, 1973

TESTIMONY

Jurisdiction	Company	Docket	Date	Issue
Kentucky	Kentucky Power Company	2011-00401	March 2012	CPCN for Big Sandy Unit 2
Nova Scotia	Heritage Gas	NG-HG-R-11	September 2011	Cost allocation and rate design
Arkansas	Oklahoma Gas & Electric	10-109-U	May 2011 and June 2011	Advanced metering infrastructure (AMI)
Texas	Texas-New Mexico Power	PUC 38306	April 2011	Advanced metering infrastructure (AMI)
Arkansas	Oklahoma Gas & Electric	10-067-U	March 2011	Windspeed transmission line
Pennsylvania	PECO Energy	M-2009-2123944	December 2010 and January 2011	Dynamic Pricing
Arkansas	Oklahoma Gas & Electric	10-073-U	November 2010	Wind power purchase agreement
Indiana	Vectren Energy Delivery of Indiana	Cause No. 43839	July 2010	Sales Reconciliation Adjustment
Alaska	Enstar Natural Gas	U-09-069 and U-09-070	March 2010	Rate Design
Pennsylvania	Allegheny Power	M-2009-2123951	March 2010 and October 2009.	Smart meters / advanced metering infrastructure (AMI)
Massachusetts	All Massachusetts regulated	D.P.U. 09-125 et al.	December 2009	Avoided Energy Supply Costs in New England

Jurisdiction	Company	Docket	Date	Issue
	electric and gas utilities			
Pennsylvania	Metropolitan Edison Company	M-2009-2123950	October 2009.	Smart meters / AMI
Maryland	Potomac Electric Power	No. 9207	October 2009 and July 2011.	Smart meters / AMI
Maryland	Baltimore Gas and Electric	No. 9208	October 2009 and July 2010.	Smart meters / AMI
New Jersey	Jersey Central Power & Light	EO08050326 and EO08080542	July 2009	Demand response programs
Minnesota	CenterPoint Energy	G-008/GR-08-1075	June 2009.	Conservation Enabling Rider
South Carolina	Progress Energy Carolinas	2008-251-E	January 2009.	Compensation for efficiency programs
North Carolina	Progress Energy Carolinas	No. E-2 sub 931	December 2008.	Compensation for efficiency programs
Maine	Central Maine Power	2007 – 215	October 2008.	Smart meters / AMI
North Carolina	Duke Energy Carolinas	E-7 Sub 831	June 2008	Compensation for efficiency programs (save-a-watt)
Indiana	Duke Energy Indiana	No. 43374	May 2008.	Compensation for efficiency programs (save-a-watt)
Pennsylvania	PECO Energy Company	P-2008-2032333	June 2008.	Residential Real Time Pricing pilot

Jurisdiction	Company	Docket	Date	Issue
Arkansas	Entergy Arkansas	06-152-U Phase II A	October 2007	Interim tolling agreement and proposed allocation of Ouachita Power capacity
Washington	Avista Utilities	UE-070804 and UG-070805	September 2007.	Cost allocation, rate design
Arkansas	Entergy Arkansas	06-152-U	January 2007.	Need for load-following capacity
Michigan	Consumers Energy Company	U-14992	December 2006.	Proposed sale of Palisades nuclear plant and associated power purchase
Connecticut	Connecticut Natural Gas Corporation	06-03-04PH01	November 2006.	Gas supply strategy and proposed rate recovery
Michigan	Consumers Energy Company	U-14274-R	October 2006.	Purchases from Midland Cogeneration Venture Limited Partnership
Illinois	WPS Resources and Peoples Energy Corporation	Docket No. 06-0540	October and December 2006.	Service quality metrics and benchmarks
Arizona	Arizona Public Service	E-01345A-05-0816	August 2006 and September 2006.	Hedging strategy and base fuel recovery amount
Ontario	Transalta Energy Corporation versus Bayer Inc.	Private arbitration	January 2006.	Price for steam under a 20-year contract
Nova Scotia	Nova Scotia Power vs Shell	Private arbitration	October 2005.	New natural gas price under a 10-year supply contract

Jurisdiction	Company	Docket	Date	Issue
New York	Consolidated Edison of New York, New York State Electric and Gas	Case 00-M-0504	September and October 2002.	Rates for unbundled supply, distribution, metering and billing services
New Jersey	Public Service Electric and Gas	BPU Docket GM00080564	April 2001.	Proposed transfer of gas contracts to an unregulated affiliate and supply contract associated with that transfer.
Nova Scotia	Sempra	NSUARB-NG-SEMPRA-SEM-00-08	February 2001.	Proposed distribution service tariff rates including market-based rates
New Jersey	Generic proceeding	BPU Docket EX99009676	March 2000.	Design and pricing of unbundled customer account services
United States of America	Bonneville Power Administration	BPA Docket WP-02	November 1999.	Functionalization of communication plant
South Carolina	South Carolina Electric and Gas	99-006-G	October 1999.	Purchased gas costs
New Jersey	Public Service Electric & Gas, South Jersey Gas, New Jersey Natural Gas and Elizabethtown Gas	GO99030122–GO99030125	July and September 1999.	Service unbundling policies and rates
Maine	Northern Utilities Inc.	Docket 97-393	September and December 1998.	Rate redesign and partial unbundling

Jurisdiction	Company	Docket	Date	Issue
Pennsylvania	Peoples Natural Gas	R-00984281; A-12250F0008	May 1998.	Purchased gas costs and proposal to transfer production assets to affiliate
New Jersey	Rockland Electric Company	BPU E09707 0465 OAL PUC-7309-97 BPU E09707 0464 OAL PUC-7310-97	January and March 1998.	Rate unbundling
New Jersey	Jersey Central Power & Light d/b/a GPU Energy.	BPU EO9707 0459 OAL PUC- 7308-97 BPU E09707 0458 OAL PUC-7307-97	November 1997.	Rate unbundling
Pennsylvania	Equitable Gas Company	R-00963858	June and July 1997.	Rate structure proposals
Pennsylvania	Peoples Natural Gas Company	R-00973896 and A-0012250F-0007	May 1997.	Purchased gas costs, proposal to transfer producing assets to CNG Producing Company and proposed Migration Rider
South Carolina	South Carolina Pipeline Corporation	97-009-G	April 1997.	Reasonableness of proposal to acquire additional pipeline capacity
FERC	Transcontinental Gas Pipeline	RP95-197-001; RP97-71-000	March 1997.	Review of proposed rolled-in ratemaking for Leidy Line incremental facilities
Arkansas	Arkla	95-401-U	September 1996.	Gas purchasing and transportation plan
Maine	Northern Utilities Inc. and Granite State Gas	95-480; 95-481	April 1996	Precedent Agreement for LNG Storage Service and PNGTS Transportation Service

Jurisdiction	Company	Docket	Date	Issue
	Transmission			
Rhode Island	ProvGas	2025	November 1995	Settlement Agreement
Pennsylvania	T.W. Phillips Gas and Oil	R-953406	October 1995	Cost allocation, rate design
Illinois	Northern Illinois Gas	95-0219	August 1995	Cost allocation, rate design
Pennsylvania	Columbia Gas of Pennsylvania	R-953316	May 1995	Purchased gas costs
Pennsylvania	Peoples Natural Gas	R-943252	May 1995	Cost allocation, rate design
South Carolina	South Carolina Pipeline Corporation.	94-007-G	April 1995	1994 purchased gas costs
Pennsylvania	National Fuel Gas Distribution Corp	R-943207	March 1995	1995 Purchased Gas Adjustment filing
Pennsylvania	UGI Utilities	R-00943063	December 1994	FERC Order 636 transition cost tariff
South Carolina	South Carolina Electric and Gas Co.	94-008-G	October 1994	1994 Purchased Gas Adjustment
Oklahoma	Public Service of Oklahoma	PUD 920 001342	September and November 1994	Gas supply strategy, transportation and agency services and rate mechanism
Pennsylvania	Pennsylvania Gas and Water	R-943078	September 1994	Market Sensitive Sales Service

Jurisdiction	Company	Docket	Date	Issue
Massachusetts	Generic proceeding	D.P.U. 93-141-A	September 1994	Policies on interruptible transportation and capacity release
Hawaii	HELCO	7259	August 1994	DSM programs for competitive energy end-use markets, multi-attribute analysis
Pennsylvania	Pennsylvania Gas and Water	R-00943066	July 1994	1994 Purchased Gas Adjustment
Pennsylvania	Pennsylvania Gas and Water	R-942993; R-942993 C0001-C0004	May 1994	Take-or-Pay Cost Recovery
Pennsylvania	Columbia Gas of Pennsylvania	R-943001	May 1994	Cost allocation, rate design
Pennsylvania	Columbia Gas of Pennsylvania	R-943029	May 1994	1994 Purchased Gas Adjustment; Negotiated Sales Service
Pennsylvania	Peoples Natural Gas	R-932866; R-932915	March 1994	Cost allocation, rate design
Kansas	Generic proceeding	180; 056-U	February 1994	IRP rules for gas utilities
Arizona	Citizens Utility Company Arizona Gas Division	E-1032-93-111	December 1993	Cost allocation, rate design
Hawaii	HECO	7257	December 1993	Residential sector water heating program
Hawaii	GASCO	7261	September 1993	IRP

Jurisdiction	Company	Docket	Date	Issue
Pennsylvania	Pennsylvania Gas and Water	R-932655; R-932655 C001; R-932655 C002	September 1993	Balancing service
Pennsylvania	Pennsylvania Gas and Water	R-932676	July 1993	1993 Purchased Gas Adjustment filing
Rhode Island	Providence Gas Company	2025	April 1993	IRP
Pennsylvania	Equitable	I-900009; C-913669	March 1993	Charges for transportation service and cost allocation methods in general
Arkansas	Arkla Energy Resources, Arkansas Louisiana Gas	92-178-U	August 1992	Gas cost and purchasing practices
Colorado	Generic proceeding	91R-642EG	August 1992	Gas integrated resource planning rule
Pennsylvania	Pennsylvania Gas and Water	R-00922324	July 1992	1992 Purchased Gas Adjustment filing
Pennsylvania	Peoples Natural Gas Company	R-922180	May 1992	Cost allocation, rate design
Michigan	Consumers Power Company	U-10030	April 1992	Gas Cost Recovery Plan, role of demand-side management as a resource in five-year forecast and supply plan
Pennsylvania	T.W. Phillips	R-912140	March 1992	1992 Purchased Gas Adjustment

Jurisdiction	Company	Docket	Date	Issue
FERC	Columbia Gas Transmission and Columbia Gulf Transmission	RP91-161-000 et al RP91-160-000 et al.	February 1992	Cost allocation, rate design
Arkansas	Arkla Energy Resources	91-093-U	February 1992	Base cost of gas
New Hampshire	Energy North Natural Gas	DR90-183	January 1992	Cost allocation, rate design
Arizona	Southwest Gas Corporation	U-1551-89-102 & U-1551-89-103; U-1551-91-069	September 1991	Gas Procurement Practices and Purchased Gas Costs
Maryland	Baltimore Gas and Electric	8339	July 1991	Cost allocation, rate design
Rhode Island	Bristol and Warren Gas	1727	June 1991	Gas procurement
New Mexico	Gas Company of New Mexico	2367	June 1991	Gas transportation policies
Pennsylvania	T.W. Phillips	R-911889	March 1991	Gas supply
Michigan	Michigan Gas Company	U-9752	March 1991	Gas Cost Recovery Plan
Arkansas	Arkla	90-036-U	August and September 1990	Gas supply contracts, including Arkla-Arkoma transactions
Arizona	Southern Union Gas	U-1240-90-051	August 1990	Cost Allocation and Rate Design
Utah	Mountain Fuel Supply	89-057-15	July 1990	Cost Allocation and Rate Design

Jurisdiction	Company	Docket	Date	Issue
Pennsylvania	Equitable Gas Company	R-901595	June 1990	Cost Allocation and Rate Design
West Virginia	APS	90-196-E-GI ; 90-197-E-GI	May 1990	Coal supply strategy
Pennsylvania	T.W. Phillips Gas and Oil Co.	R-891572	March 1990	Purchased Gas Costs
Colorado	Generic proceeding	89R-702G	January 1990	Policies and rules for gas transportation service
Arizona	Generic proceeding	U-1551-89-102 and U-1551-89-103	October 1989	Regulatory Oversight of Purchased Gas Costs
Rhode Island	Narragansett Electric Company	1938	October 1989	Sales Forecast, Cost Allocation, rate design
Pennsylvania	Pennsylvania Gas and Water	R891293	July 1989	Purchased Gas Costs
Pennsylvania	Columbia Gas of Pennsylvania	R891236	May 1989	Take-or-Pay Cost Recovery
New Jersey	Elizabethtown Gas Company	GR 88081-019	December 1988 and February 1989	Take-or-Pay Cost Recovery
Montana	Montana-Dakota Utilities	87.7.33; 88.2.4; 88.5.10; 88.8.23	December 1988	Gas Procurement, Transportation Service Gas Adjustment Clause

Jurisdiction	Company	Docket	Date	Issue
New Jersey	South Jersey Gas Company	GR 88081-019 and GR 88080-913-	November 1988 and February 1989	Take-or-Pay Cost Recovery
New Jersey	Public Service Electric and Gas	GR 88070-877	October 1988 and February 1989	Take-or-Pay Cost Recovery
District of Columbia	District of Columbia Natural Gas	Formal Case 874	September 1988	Gas Acquisition, Gas Cost Allocation, take or pay-costs; Regulatory Oversight
Illinois	Generic proceeding	88-0103	July 1988	Take-or-Pay Cost Recovery
West Virginia	Generic proceeding	240-G	June 1988	Gas Transportation Rate Design
Pennsylvania	Pennsylvania Gas & Water	R-880958	June 1988	Purchased Gas Adjustment
Utah	Mountain Fuel Supply	86-057-07	March 1988	Gas Transportation Rate Design
South Carolina	South Carolina Electric and Gas	87-227-G	September 1987	Gas Supply and Rate Design
Arizona		U-1345-87-069	September 1987	Fuel Adjustment Clause

Rachel Wilson

Associate

Synapse Energy Economics

485 Massachusetts Ave., Suite 2, Cambridge, MA 02139

(617) 453-7044 • fax: (617) 661-0599

www.synapse-energy.com

rwilson@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. Associate, 2010 – present, Research Associate, 2008 – 2010.

- Performs consulting, conducts research, and assists in writing testimony and reports on a wide range of issues relating to electric utilities, including: federal and state clean air policies; emissions from electricity generation; environmental compliance technologies, strategies, and costs; integrated resource planning; valuation of environmental externalities from power plants; and the nexus between water and energy.
- Uses optimization and electricity dispatch models, including Strategist, PROMOD, PROSYM/Market Analytics, and PLEXOS to conduct analyses of utility service territories and regional energy markets.

Analysis Group, Inc., Boston, MA. Associate, Energy Practice, 2007 - 2008.

- Supported an expert witness asked to opine on various topics in the electric industry as they applied to merchant generators and provided incentives for their behavior in the late 1990s and early 2000s.
- Analyzed data related to coal production on Indian land and contractual royalties paid to the tribe over a 25 year period to determine if discrepancies exist between these values for the purposes of potential litigation.
- Examined Canadian policies relating to carbon dioxide, and assisted with research on linkage of international tradable permit systems.
- Managed analysts' work processes and evaluated work products.

Senior Analyst Intern, Energy Practice, 2006 - 2007.

- Supported an expert witness in litigation involving whether a defendant power company could financially absorb a greater investment in pollution control under its debt structure while still offering competitive rates. Analyzed impacts of federal and state clean air laws on energy generators and providers. Built a quantitative model showing the costs of these clean air policies to the defendant over a 30 year period. Built a financial model calculating impacts of various pollution control investment requirements.
- Researched the economics of art; assisted in damage calculations in arbitration between an artist and his publisher.

Yale Center for Environmental Law and Policy, New Haven, CT. Research Assistant, 2005 – 2007.

- Gathered and managed data for the Environmental Performance Index, presented at the 2006 World Economic Forum. Interpreted statistical output, wrote critical analyses of results, and edited report drafts.
- Part of the team that produced *Green to Gold*, an award-winning book on corporate environmental management and strategy. Managed data, conducted research, and implemented marketing strategy.

CERES, Boston, MA. Student Consultant, Spring 2006.

- As part of a four-person team, made strategic recommendations on all aspects of messaging and engagement to encourage corporate directors to act on the issue of climate change. First strategic recommendation was sustainable governance forums, which were profiled in New York Times article “Global Warming Subject for Directors at Big Companies” on September 21, 2006.

Marsh Risk and Insurance Services, Inc., Los Angeles, CA. Risk Analyst, Casualty Department, 2003 – 2005.

- Evaluated Fortune 500 clients’ risk management programs/requirements and formulated strategic plans and recommendations for customized risk solutions.
- Supported the placement of \$2 million in insurance premiums in the first year and \$3 million in the second year.
- Utilized quantitative models to create loss forecasts, cash flow analyses and benchmarking reports.
- Completed a year-long Graduate Training Program in risk management; ranked #1 in the western region of the US and shared #1 national ranking in a class of 200 young professionals.

EDUCATION

Yale School of Forestry & Environmental Studies, Master of Environmental Management, New Haven, Connecticut, 2007.

Concentration in Law, Economics, and Policy with a focus on energy issues and markets.

Claremont McKenna College, Bachelor of Arts in Environment, Economics, Politics (EEP) Claremont, California, 2003.

cum laude and EEP departmental honors.

School for International Training Quito, Ecuador. Spring 2002.

Semester abroad studying Comparative Ecology. Microfinance Intern – Viviendas del Hogar de Cristo in Guayaquil, Ecuador.

SKILLS AND ACCOMPLISHMENTS

Microsoft Office Suite, Lexis-Nexis, Platts Energy Database, Strategist, PROMOD, PROSYM/Market Analytics, and PLEXOS, some SAS and STATA.

Competent in oral and written Spanish.

Hold the Associate in Risk Management (ARM) professional designation.

PUBLICATIONS AND PRESENTATIONS

Wilson R., P. Luckow, B. Biewald, F. Ackerman, E.D. Hausman, *2012 Carbon Dioxide Price Forecast*. Synapse Energy Economics, October 2012.

Hornby R., R. Fagan, D. White, J. Rosenkranz, P. Knight, R. Wilson, *Potential Impacts of Replacing Retiring Coal Capacity in the Midwest Independent System Operator (MISO) Region with Natural Gas or Wind Capacity*. Synapse Energy Economics for the Iowa Utilities Board. September 2012.

Fagan R., M. Chang, P. Knight, M. Schultz, T. Comings, E. Hausman, R. Wilson, *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region*. Synapse Energy Economics for the Energy Future Coalition. May 2012.

Wilson R., *Comments Regarding MidAmerican Energy Company Filing on Coal-Fired Generation in Iowa*. Synapse Energy Economics for the Iowa Office of the Consumer Advocate. December 2011.

Johnston L., R. Wilson, *Global Best Practices: Strategies for Decarbonizing Electric Power Supply*. Synapse Energy Economics for Regulatory Assistance Project (RAP). December 2011.

Hausman E., T. Comings, R. Wilson, and D. White, *Electricity Scenario Analysis for the Vermont Comprehensive Energy Plan 2011*. Synapse Energy Economics for the Vermont Department of Public Service. September 2011.

Hornby R., P. Chernick, C. Swanson, D. White, J. Gifford, M. Chang, N. Hughes, M. Wittenstein, R. Wilson, B. Biewald, *Avoided Energy Supply Costs in New England: 2011 Report*. Synapse Energy Economics for the Avoided-Energy-Supply-Component (AESC) Study Group, July 2011.

Wilson R., P. Peterson, *A Brief Survey of State Integrated Resource Planning Rules and Requirements*. Synapse Energy Economics for the American Clean Skies Foundation, April 2011.

Johnston L., E. Hausman., B. Biewald, R. Wilson, D. White, *2011 Carbon Dioxide Price Forecast*. Synapse Energy Economics, February 2011.

Fisher J., R. Wilson, N. Hughes, M. Wittenstein, B. Biewald, *Benefits of Beyond BAU: Human, Social, and Environmental Damages Avoided Through the Retirement of the US Coal Fleet*. Synapse Energy Economics for the Civil Society Institute, January 2011.

Peterson P., V. Sabodash, R. Wilson, D. Hurley, *Public Policy Impacts on Transmission Planning*. Synapse Energy Economics for Earthjustice, December 2010.

Fisher J., S. Levy, Y. Nishioka, P. Kirshen, R. Wilson, M. Chang, J. Kallay, C. James, *Co-Benefits of Energy Efficiency and Renewable Energy in Utah*. Synapse Energy Economics for the State Energy Office of Utah, March 2010.

Wilson R., *The Energy-Water Nexus: Interactions, Challenges, and Policy Solutions*. Synapse Energy Economics presented at the National Drinking Water Symposium 2009, October 2009.

Fisher J., C. James, L. Johnston, D. Schlissel, R. Wilson, *Energy Future: A Green Alternative for Michigan*. Synapse Energy Economics for Natural Resources Defense Council and Energy Foundation, August 2009.

Schlissel, D., R. Wilson, L. Johnston, D. White, *An Assessment of Santee Cooper's 2008 Resource Planning*. Synapse Energy Economics for the Rockefeller Family Fund, April 2009.

Schlissel, D., A. Smith, R. Wilson, *Coal-Fired Power Plant Construction Costs*. Synapse Energy Economics, July 2008.

TESTIMONY

Kentucky Public Service Commission. Direct testimony before the Commission on behalf of the Sierra Club. July 23, 2012

Kentucky Public Service Commission. Direct testimony before the Commission on behalf of the Sierra Club. Testimony included discussion of STRATEGIST modeling relating to the application of Kentucky Power Company for a Certificate of Public Convenience and Necessity, and for approval of its 2011 environmental compliance plan and amended environmental cost recovery surcharge. March 12, 2012.

Kentucky Public Service Commission. Direct testimony before the Commission on behalf of Sierra Club and Natural Resources Defense Council. Testimony included discussion of STRATEGIST modeling relating to the applications of Kentucky Utilities Company, and Louisville Gas and Electric Company for Certificates of Public Convenience and Necessity, and approval of its 2011 compliance plan for recovery by environmental surcharge. September 16, 2011.

Minnesota Public Utilities Commission. Rebuttal testimony before the Commission on behalf of Izaak Walton League of America, Fresh Energy, Sierra Club, and Minnesota Center for Environmental Advocacy. Testimony described STRATEGIST modeling performed in the docket considering Otter Tail Power's application for an Advanced Determination of Prudence for BART retrofits at its Big Stone plant. September 7, 2011.

Resume dated October 2012.

Tyler Comings

Associate

Synapse Energy Economics

485 Massachusetts Ave., Suite 2, Cambridge, MA 02139

(617) 453-7050 • fax: (617) 661-0599

www.synapse-energy.com

tcomings@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics Inc., Cambridge, MA. Associate, July 2011 – present.

Provides consulting services, conducts research, and performs economic impact analysis of renewable energy and energy efficiency investments. Recent work includes developing economic impacts of energy efficiency programs in Vermont and a scenario of clean energy investments for the U.S.

Ideas42, Boston, MA. Senior Associate, 2010 – 2011.

Organized studies analyzing behavior of consumers regarding finances, and worked with top researchers in behavioral economics. Managed implementation and data analysis for a study of mitigation of default for borrowers that were at-risk of delinquency. Performed case studies for World Bank on financial innovations in developing countries.

Economic Development Research Group Inc., Boston, MA. Research Analyst, Economic Consultant, 2005 – 2010.

Performed economic impact modeling and benefit-cost analyses using IMPLAN and REMI for transportation and renewable energy projects, including support for Federal stimulus applications. Performed statistical modeling, including results on the timing of effects of highway construction on economic growth in Appalachia. Developed a unique Web-tool for the National Academy of Sciences on linkages between economic development and transportation, and presented findings to state government officials around the country. Created economic development strategies and improvements to company's economic development software tool.

Harmon Law Offices, LLC., Newton, MA. Billing Coordinator, Accounting Liaison, 2002 – 2005.

Allocated IOLTA and Escrow funds, performed bank reconciliation and accounts receivable. Projected legal fees and costs for cases at the firm.

Massachusetts Department of Public Health, Boston, MA. Data Analyst (contract), 2002.

Designed statistical programs using SAS based on data taken from health-related surveys. Extrapolated trends in health awareness and developed benchmarks for performance of clinics and other healthcare facilities for statewide assessment.

EDUCATION

Tufts University, Medford, MA, MA Economics, 2007.

Graduate work in micro- and macroeconomics, econometrics, development economics, and international finance (Fletcher School of Law and Diplomacy).

Boston University, Boston, MA, BA Mathematics and Economics, 2002. *Cum Laude*, Dean's Scholar.

ADDITIONAL SKILLS

Software: MS Office, STATA, SPSS, SAS, REMI, IMPLAN, Mathematica

Programming: C++

Languages: Conversant in French

RELEVANT REPORTS

Keith G., S. Jackson, A. Napoleon, T. Comings, J. Ramey, *The Hidden Costs of Electricity: Comparing the Hidden Costs of Power Generation Fuels*. Synapse Energy Economics for Civil Society Institute, September 2012.

Fagan B., M. Chang, P. Knight, M. Schultz, T. Comings, E. Hausman, R. Wilson, *The Potential Rate Effects of Wind Energy and Transmission in the Midwest ISO Region*. Synapse Energy Economics for Energy Future Coalition, August 2012.

Bower S., S. Huntington, T. Comings, W. Poor, *Economic Impacts of Efficiency Spending in Vermont: Creating an Efficient Economy and Jobs for the Future*. Optimal Energy, Synapse Energy Economics, and Vermont Department of Public Service for ACEEE, August 2012

Comings T., E. Hausman, *Midwest Generation's Illinois Coal Plants: Too Expensive to Compete?* Synapse Energy Economics for Sierra Club, April 2012

Woolf T., J. Kallay, E. Malone, T. Comings, M. Schultz, J. Conyers, *Commercial & Industrial Customer Perspectives on Massachusetts Energy Efficiency Programs*. Synapse Energy Economics for Massachusetts Energy Efficiency Advisory Council, April 2012.

Hornby R., T. Comings, *Comments on Draft 2012 Integrated Resource Plan for Connecticut (January 2012)*. Synapse Energy Economics for AARP, February 2012.

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Hausman E., T. Comings, K. Takahashi, R. Wilson, W. Steinhurst, N. Hughes, G. Keith, *Electricity Scenario Analysis for the Vermont Comprehensive Energy Plan 2011*. Synapse Energy Economics, for Vermont Department of Public Service, September 2011.

Steinhurst W., T. Comings, *Economic Impacts of Energy Efficiency Investments in Vermont*. Synapse Energy Economics for the Vermont Department of Public Service, August 2011.

Petraglia L., T. Comings, G. Weisbrod, *Economic Development Impacts of Energy Efficiency and Renewable Energy in Wisconsin*. EDR Group and PA Consulting, for Wisconsin Department of Administration, March 2010.

EDR Group, *Economic Assessment of Proposed Brockton Power Facility*. September 2009.

Howland J., D. Murrow, L. Petraglia, T. Comings, *Energy Efficiency: Engine of Economic Growth*. Environment Northeast and EDR Group, 2009.

EDR Group, KEMA, *Economic Benefits of Connecticut's Clean Energy Program*. EDR Group and KEMA for Connecticut Clean Energy Fund, April and May 2009.

EDR Group, KEMA, *New York Renewable Portfolio Standard: Economic Benefits Report*. EDR Group and KEMA for New York State Energy Research and Development (NYSERDA), November 2008.

EDR Group, Navigant Consulting, *Economic Potential of an Advanced Biofuels Sector in Massachusetts*, EDR Group and Navigant Consulting for Massachusetts Office of Energy and Environmental Affairs, spring 2008.

EDR Group, *Environmental Impacts of Massachusetts Turnpike and Central Artery/Tunnel Projects*, EDR Group for Massachusetts Turnpike Authority, spring 2006

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Patrick Knight

Research Associate

Synapse Energy Economics

485 Massachusetts Ave., Suite 2, Cambridge, MA 02139

(617) 453-7051 • fax: (617) 661-0599

www.synapse-energy.com

pknight@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. Research Associate, 2010 – present.

Performs consulting, conducts research, and assists in writing testimony and reports on a wide range of issues including economic technologies and policies, water and energy interactions, air emissions of electricity generation, consumer advocacy, costs and benefits of energy efficiency programs and measures, and environmental compliance and technology strategy within the energy industry.

New Ecology, Inc., Boston, MA. Associate, 2009.

Wrote reports for project managers and clients on how to economically make green energy improvements for low-income housing projects. Designed content, tested programming, and wrote business presentations for WegoWise, an in-house utility tracking and management software system. Prepared documentation for LEED Credits and other green certification programs.

Save the Harbor / Save the Bay, South Boston, MA. Senior Marine Educator, Summer 2008.

Led outreach programs from local Boys and Girls Clubs, YMCAs, and other youth groups in marine biology at Piers Park and Constitution Beach in East Boston. Educated twenty to thirty East Boston students between the ages of six and fourteen on marine biology in the Boston Harbor Explorers program.

ACTIVITIES

Beyond Solar Energy – Exploring Urban Renewable Energy Sources in Boston Field Project, Medford, MA, Spring 2009.

Studied the efficacy and viability of urban wind and biomass generators in conjunction with Boston's Department of Energy. Interviewed wind power stakeholders in the public, private and nonprofit sectors and created a final report and presentation.

Solar Decathlon Team – Tufts University / Boston Architectural College, Medford, MA, Fall 2008 – Fall 2009.

Developed a web-based analytic software tool used for finding the cost and payback time for solar panels in any location in the United States based on costs, rebates, and solar input. Aided in the research and planning of a zero-energy house that participated in the National Solar Decathlon competition in Washington, DC. Researched regulations and incentives that would

help to make a zero-energy house affordable and would allow it to be sited in Boston. Designed and managed web content for the competition.

ADDITIONAL EXPERIENCE

Tufts University Department of Urban and Environmental Policy and Planning Web Manager, 2008 – 2010

Boston College Geology and Geophysics Research Assistant, Fall 2007 – Spring 2008

Boston College Student Tutor, Spring 2007 – Spring 2008

EDUCATION

Tufts University, Master of Arts in Urban and Environmental Planning and Policy, Medford, MA, 2010.

Boston College, Bachelor of Science in Geophysics, Chestnut Hill, MA, 2008.

Minors in mathematics and philosophy. Dean's List all semesters. Best Undergraduate Presentation; BC Geology and Geophysics Dept. Student Colloquium 2006. Member of Golden Key International Honor Society, Slavic Honor Society.

PUBLICATIONS

Hornby R., B. Fagan, D. White, J. Rosenkranz, P. Knight, R. Wilson. *Potential Impact of Replacing Retiring Coal Capacity in the Midwest Independent System Operator (MISO) Region with Natural Gas or Wind Capacity*. Synapse Energy Economics for the Iowa Utilities Board (IUB), September 2012.

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