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October 26, 2020

Ms. Kathryn H. Bowman
Executive Counsel
Louisiana Public Service Commission
602 North Fifth Street (Galvez Building) (70802)
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RE: Response to RFP 20-17-Docket X-35643 – Entergy Louisiana, LLC, ex parte, In re: Report on Assessment of the Economic Viability of Entergy Louisiana, LLC’s Legacy Gas Generation.

Dear Ms. Bowman:

Davis Energy Advisors (Davis Energy) is pleased to provide this proposal to assist the Louisiana Public Service Commission (PSC) with the Economic Viability Study of Entergy Louisiana, LLC’s Legacy Generation Units, pursuant to RFP 20-17. Thank you for the opportunity to submit this proposal.

Davis Energy Advisors is a specialty energy consulting practice, focused on providing consulting support to state regulatory agencies, Attorney’s General Offices, and ratepayer advocates. We have extensive experience in the power sector, focusing on supply procurement, resource planning, PPA evaluation and negotiation, bid evaluation and risk assessment, and wholesale power market analysis. Our principal consultant has completed many assessments of generation assets and generation portfolios, including economic feasibility analyses and generation retirement studies.

Davis Energy would be pleased to provide assistance to the PSC in evaluating the Entergy Louisiana LLC (ELL) economic viability analysis of its Legacy Generation Units, and contributing to the PSC’s review and assessment of which units should remain in operation, and which units should be targeted for retirement.

The basic approach Davis Energy is proposing includes the following steps:

- Assist the PSC in reviewing ELL’s analysis and study of its legacy generation assets, particularly after commercial operation is achieved for ELL’s Washington Parish Generation Unit, and Lake Charles Generation Station.
- Assist the PSC Staff in reviewing whether ELL’s analysis and report is in compliance with the Commission’s directive from its February 21, 2018 Business and Executive Session, directing ELL to study the economic status/viability of each ELL legacy facility, and to review whether the addition of the Washington Parish Energy Center would allow for deactivation of any legacy gas unit.
- Review production cost modeling and other economic modeling and analyses completed by ELL in evaluating the economic operation of its Legacy Generation units, including assessment of how the dispatch and operations of those units is affected by both MISO-South market developments, and by commercial operation of the Washington Parish and Lake Charles generation projects.

- Develop a framework for evaluating ELL's unit retirement analysis, including assessment of whether permanent retirement is warranted, or whether some legacy units should be deactivated on a contingent basis, but maintained at sufficient levels to warrant a return to service if economic conditions so warrant. Develop a list of data requests to further examine details of ELL's analysis, and to better understand data assumptions and analytic techniques driving key conclusions in ELL's analysis
- Examine ELL's assessment of reliability impacts of generator deactivations, and measures for addressing identified reliability impacts, including review of Entergy's transmission analyses. As the balance of legacy natural gas generation is located in the Amite South load pocket and the Down Stream Gypsy sub-load pocket, assessment of reliability impacts will be a key component of the overall review of Entergy's analysis.
- Assist PSC Staff in detailed assessment of ELL's study and in completing supplemental analyses, as needed
- Provide other support to the PSC Staff and Commission, as directed

Please review this proposal and let me know of any questions. We truly appreciate the opportunity to submit this proposal and would be pleased to work with you.

Sincerely,



Roger Schiffman
Managing Director



Enclosure



Proposal for:

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Prepared for:

Louisiana Public Service Commission

Submitted by:
DavisEnergy Advisors

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1. Proposed Approach

Davis Energy Advisors is proposing to assist the Louisiana Public Service Commission (PSC or Commission) in evaluating the economic viability of Entergy Louisiana, LLC’s (ELL’s) legacy generation units. At its February 21, 2018 Business and Executive Session, the Commission directed PSC Staff to open a docket to examine the economic viability of ELL’s legacy generation units, and to determine if Commission action to order retirement of any or all of those units is necessary, considering the additions of ELL’s Washington Parish Generation Unit and Lake Charles Power Station.

Based on ELL’s 2019 Integrated Resource Plan, ELL’s legacy natural gas units aggregate to 3,115 MW of capacity, and each unit utilizes natural gas-fueled steam turbine technology. Table 1 lists the legacy units, and also lists the historical 5-year average capacity factor for each legacy plant. As shown, the 5-year average heat rate for these units is in excess of 10,700 Btu/kWh, and annual capacity factor has averaged over 27%.

Table 1: Entergy Louisiana, LLC Legacy Generation Units

Plant	Unit	Capacity (MW)	Fuel	Technology	Location	COD	Operating Age	5-Year Average Heat Rate (Btu/kWh)	5-Year Average Capacity Factor (%)
Little Gypsy	2	401	Natural Gas	Steam	Saint Charles,	1966	54	11,104	26.73
Little Gypsy	3	508	Natural Gas	Steam	Saint Charles,	1969	51	11,104	26.73
Ninemile	4	669	Natural Gas	Steam	Jefferson, LA	1971	49	9,999	39.46
Ninemile	5	740	Natural Gas	Steam	Jefferson, LA	1973	47	9,999	39.46
Waterford	1	399	Natural Gas	Steam	Saint Charles,	1975	45	11,092	15.11
Waterford	2	399	Natural Gas	Steam	Saint Charles,	1975	45	11,092	15.11
Total/Average		3,116					49	10,732	27.10

These legacy generating units are inefficient and operationally inflexible compared to new generation technology, and have operating costs that are considerably higher than new combined-cycle units. The legacy natural gas units are located in the Amite South load pocket and the Down Stream Gypsy sub-load pocket areas of the ELL’s service territory, which are areas with considerable industrial electricity demand, and which are import constrained. Those conditions have contributed to relatively high capacity factors for the legacy units given the inefficiency and high operating costs, as the units are dispatched to provide local area reliability and voltage support. As such, the study of the legacy unit’s economic viability will necessarily focus on economic operation of the units, but will also focus on whether the addition of the Washington Parish combined-cycle and Lake Charles simple-cycle units, also within the Amite South load pocket, are sufficient to maintain system reliability in the face of legacy unit retirement. These elements are addressed in the economic viability study report filed by Entergy on August 17, 2020.

Davis Energy Advisors is proposing to assist the PSC Staff in evaluating the Entergy study of the economic viability of the legacy generating units. This assistance will include a thorough review of ELL’s study, developing data requests to better understand detailed assumptions and analytic approaches underlying the study, and preparing additional analyses to support the PSC’s review of the study.

Specific steps in the approach being proposed include:

1. Review ELL’s viability study of the legacy generating units. In completing its review, Davis Energy will develop a summary of the key assumptions and methodology employed by ELL, and



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key conclusions. We will also develop an assessment of how key assumptions and approach are driving study conclusions, and will identify any study assumptions that depart from industry standard approaches, or that vary from a set of reasonable assumptions. The review of ELL’s study will include:

- a. Evaluate fundamental assumptions underlying the ELL study, including demand growth (including in load pockets such as Amite South), natural gas prices, coal prices, generation retirements and additions, transmission system upgrades and additions, environmental regulations, generation replacement costs, transmission upgrade costs, etc.
- b. Evaluate ELL’s Aurora production cost modeling approach and results, and specific approach used in evaluating the legacy generation units, and in modeling supply/demand and transmission system conditions. This review will also include an assessment of how ELL is modeling the Amite South and Down Stream Gypsy load pockets, including modeling of transmission import capacity into the load pockets, and treatment of any reliability must-run generation within the load pockets.
- c. Evaluate ELL’s approach in modeling its own power system, and interactions with the overall MISO system. This assessment will also examine how ELL is modeling the broader regional power market, including the Southeast and ERCOT, to ensure that ELL’s analysis is sufficiently robust to capture power market conditions.
- d. Evaluate ELL’s transmission powerflow modeling and system reliability modeling approach and results. As anticipated, Entergy’s study includes an assessment of how system reliability will be maintained in the Amite South load pocket, with assumed retirement of the legacy generating units, and with the Washington Parish and Lake Charles generation additions. This assessment will also review ELL’s study assumptions for consistency with recent MISO Transmission Expansion Plans.
- e. Evaluate ELL’s study conclusions and develop an assessment of whether those study conclusions are consistent with the data assumptions and study approach outlined in ELL’s study, and with production cost and transmission modeling results provided by ELL to support its analysis.
- f. Evaluate any generation or transmission system upgrades identified in ELL’s viability study, as needed in the event of legacy unit retirement, and complete an assessment of whether any proposed upgrades are needed. This evaluation will include review of whether transmission constraints identified with legacy generation unit retirement are categorized as thermal import constraints into the load pocket areas, or as voltage and stability constraints within the load pocket areas. The evaluation will also review transmission solutions and alternatives considered by ELL in its study, including consideration of converting some or all of the legacy generators to synchronous condensers in the event that load pocket reliability solutions require reactive power and voltage support.
- g. Evaluate revenue requirement and rate impact analyses and conclusions in ELL’s viability study, including projected costs associated with de-activating and/or decommissioning the legacy generating units, incremental operating costs and capital expenditures needed to keep the legacy units operating to support reliability in the Amite South load pocket, revenue requirement treatment of such costs, and overall reasonableness of ELL’s projections. Davis Energy anticipates that this aspect of ELL’s analysis will also evaluate suitability of the legacy generating unit’s existing sites and infrastructure as brownfield sites for future generation expansion, if needed.



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- h. Evaluate study scenarios and risk analysis included in the ELL viability study, including whether such scenarios fully address risks and uncertainties surrounding legacy generating unit retirement, and whether the Commission has adequate information to make a determination.
2. Davis Energy will work with PSC Staff to identify any data or methodological gaps in the ELL viability study, and in developing data requests to submit to ELL requesting additional data, explanation or assessment. Davis Energy will review data responses received from ELL, and will utilize those data responses to further complete its assessment of the viability study, and/or to develop additional data requests. Davis Energy will similarly work with PSC Staff to facilitate discovery related to legacy unit retirement analyses submitted by other parties in the case.
3. Davis Energy’s review of the ELL viability study will also include an assessment for completeness and compliance with the Commission’s General Order 10-19-2018, outlining criteria and data to be include in applications to deactivate or retire a generating unit (Docket R-34407).
4. Based on data responses received, and its assessment of those data responses and ELL’s initial viability report, Davis Energy will complete additional analyses as needed to assist the PSC staff in its review of the Entergy study.
5. Based on the analysis outlined above, Davis Energy will assist the PSC Staff in reviewing whether ELL’s analysis and report is in compliance with the Commission’s directive from its February 21, 2018 Business and Executive Session, directing ELL to study the economic status/viability of each ELL legacy facility, and to review whether the addition of the Washington Parish Energy Center would allow for deactivation of any legacy gas unit.
6. Davis Energy, at direction of PSC Staff, will participate in informal meetings, phone calls, video conferences, etc., between PSC Staff and ELL, and other parties. In our experience, such meetings are often helpful in understanding details of analytic studies and in clarifying positions taken by different parties in assessing the studies.
7. Davis Energy will also be available to participate in meetings, conference calls and video conferences with the Commission and with PSC Staff, as directed by the PSC.
8. Davis Energy’s support in this case will continue through conclusion of the docket through the Commission’s final vote.¹

¹ As outlined in the RFP, Davis Energy does not anticipate providing testimony in this case. Davis Energy is open to providing testimony, if the Commission decides that such testimony would be helpful during the course of the proceeding.



2. Qualifications and Background

Davis Energy Advisors is a newly formed specialty consulting practice formed by Roger Schiffman. Roger has over 30 years of electric industry experience. With over 22 years in consulting he has focused on power market analysis and utility system planning utilizing production simulation and resource planning models. Roger has served Director roles at Navigant Consulting, Inc., a Principle Consultant role at Black & Veatch, and a Vice President role at Ventyx, which was the predecessor to the ABB Advisors group.

Roger also has extensive regulatory experience, both in his consulting career, and in having spent 8 years on the staff of the Public Service Commission of Wisconsin. During that time, he has developed expertise in a number of key regulatory areas:

- Utility system planning and resource procurement.
- Purchased Power Arrangement terms and conditions and risk allocation.
- Wholesale market analysis and price forecasting, and production cost simulation
- Avoided cost analysis
- Rate Case review and cost of service
- Request for Proposal development and independent bid evaluation
- Utility rates and tariff structures
- Utility accounting and rate-making, including treatment of rate base investments
- Cost of capital and rate of return analysis.

Roger has testified on utility accounting issues, utility system modeling, generation economic and retirement analysis, utility system planning, avoided cost, wholesale markets, utility mergers, state vs. federal regulatory jurisdiction, utility rates and cost of service, PPA terms and conditions, and numerous other issues.

Davis Energy is currently actively engaged with the Arkansas Public Utilities Commission and the Puerto Rico Energy Board, and is well-positioned to provide support to the Louisiana PSC..

Roger’s resume is included as Attachment A.

Roger has completed numerous economic assessments of generation assets, to support retirement decisions, development and acquisition decisions, and utility system planning decisions. Roger is also expert in power market simulation modeling, having developed and managed wholesale markets teams at several large consulting firms, and having completed production cost modeling, system expansion modeling, and transmission system modeling using numerous simulation platforms. Roger is also expert at diagnosing economic studies, including production cost modeling and transmission powerflow modeling completed by other parties. Given this experience, Davis Energy is well-positioned to assist the PSC in fully reviewing Entergy’s viability study.

Specific examples of generation retirement studies Roger has completed include:



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San Juan Generating Station: Roger completed an economic assessment of the San Juan Generating Station, including an assessment of the economic viability of retrofitting San Juan with Carbon Sequestration Utilization and Storage (CCUS) technology. This study included detailed production cost simulation and dispatch modeling to assess how the San Juan plant would operate post-CCUS retrofit, and how it could optimized economic performance through electricity sales, and generation of 45Q tax credits and CO₂ sales for Enhanced Oil Recovery. Roger also completed a transmission study to examine viable transmission paths and options for delivering energy from San Juan to market off-takers. He also presented testimony to the New Mexico Public Regulation Commission related to his analysis, in the Public Service New Mexico Abandonment case where PNM sought Commission approval to exit its ownership in San Juan, and to recover stranded costs related to that exit, and related to replacement power procurement.

Navajo Generating Station: Roger completed a series of economic assessments of the Navajo Generating Station. These assessments included detailed studies assessing the economic viability of the plant including substantial capital investment in environmental control equipment. These assessments included evaluation of economic viability of the plant after investment of \$1 billion in pollution control equipment, and evaluation of replacement power options through PPA or through construction of new generation resources. Navigant also completed review and assessment of an economic retirement study prepared by plant owners, including assessment of key assumptions and drivers underlying study results. Navigant participated in forums discussing Navajo retirement at the U.S. Department of Interior, the U.S. Department of Energy, and the Arizona Corporation Commission.

Fort Calhoun Nuclear Power Plant: Roger led and was the principal analysis for a detailed study examining potential retirement of Fort Calhoun. This was an all-encompassing study where Roger led the economic assessment of Fort Calhoun’s economic viability in the SPP market. The economic assessment included detailed production cost modeling to assess power supply costs with and without Fort Calhoun, and to evaluate whether lower cost supply resources were available. The study also included developing a plant staffing analysis and transition plan in the event that the plant was shut-down. For that part of the study, Roger identified and retained a human resources consulting firm to develop a transition period and shutdown human resources staffing plan. Roger also developed a replacement power RFP on behalf of Fort Calhoun’s owner, and issued that RFP to seek bids for replacement power from SPP market participants. Roger completed the economic analysis of bids received, and also coordinated powerflow modeling for low cost bids, to ensure deliverability of energy and capacity to replace Fort Calhoun. Roger also completed an assessment of plant decommissioning activities, and decommissioning costs, including utilization of monies from the decommissioning trust fund. Roger worked closely with utility management and analytic staff in completing this all-encompassing retirement study, and in developing plant retirement transition plans.



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3. Schedule

Davis Energy Advisors available to begin this project immediately, and will work under a project schedule developed by the Commission and by PSC Staff. Davis Energy understands that the current expectation is that the project duration will be 6 months, but that it may be shorter or longer. Davis Energy commits to provide support to the PSC in this case through final decision by the Commission.



4. Pricing

Davis Energy Advisors is proposing to complete its work on a time and materials basis, at a rate of \$200 per hour. Estimated time for each task is outlined below. Davis Energy Advisors is proposing a competitive budget in the interest of establishing a relationship with the PSC, and will not seek to alter these rates or budget absent explicit consent of the Commission.

Consulting and Expert Witness Support - Estimated Budget

Task #	Task Description	Hours	Rate	Amount
1)	Assessment of ELL Legacy Generation Viability Report	40	\$200	\$8,000
2)	Develop Data Requests and Review Data Responses	20	\$200	\$4,000
3)	Complete Assessment of ELL Production Cost & Transmission Modeling	40	\$200	\$8,000
4)	Provide Additional Support to PSC Staff	12	\$200	\$2,400
5)	Participate in Meetings, Phone Calls, Video Conferences, etc.	15	\$200	\$3,000
Total		127		\$25,400

Davis Energy is anticipating that it will work remotely in supporting the PSC’s review, including participation on phone calls, video conferences, etc. If the PSC conducts in-person meetings and trial/hearings, and requests in-person presence, then actual travel costs will be billed at cost with no markup.

Davis Energy Advisors is not submitting a Consulting Services Agreement, as we assume the Commission will issue its own agreement for execution, if this proposal is accepted.

Davis Energy Advisors, and Mr. Schiffman, has no known conflict of interest in providing the proposed services to the Commission.



Appendix A. Team Resumes

Our Managing Director brings years of industry knowledge and a perspective gained through numerous, relevant engagements and direct experience.

ROGER SCHIFFMAN

SUMMARY OF QUALIFICATIONS

Mr. Schiffman has 30 years of energy industry experience covering utility resource planning, electricity market evaluation, market assessment and simulation modeling; regulatory policy development; economic and financial analysis, contract evaluation and cost of capital/rate-of-return analysis. Mr. Schiffman has worked with public and private utility companies on resource planning decisions, power plant retirement decisions, avoided cost determinations, and on power supply procurement activity. Mr. Schiffman has worked extensively with electric utility staff, power plant developers, regulatory personnel, investment bankers and other industry participants in both consulting and regulatory environments. Mr. Schiffman possesses extensive financial analysis skills, supported by thorough knowledge of financial, economic and accounting principles. He has a strong technical understanding of the electric utility industry and excellent analytical problem-solving skills, including quantitative analysis and computer modeling techniques.

EXPERIENCE

Managing Director, Davis Energy Advisors, Davis, CA

- Independent Consulting Practice focused on economic analysis and expert witness support for market participants, public agencies and public power organizations. Range of services includes wholesale and retail power markets, Integrated Resource Planning, power supply procurement, competitive solicitations and bid evaluation, independent evaluator services, power market modeling, PPA negotiation and evaluation, rate of return analysis, financial analysis, and utility rates and tariffs.

Director, Navigant Consulting, Folsom, CA, November, 2015 – August, 2020

- Assisting Enchant Energy in completing DOE-funded feasibility study of CCUS retrofit of the San Juan Generating Station, including development of economic and operations projections for SJGS, and coordination of cost and performance benchmarking.
- Completed PPA review and revision, and PPA negotiation support for a California municipal utility, resulting in successful PPA execution for a floating solar power plant.
- Completed review of PPA contract terms and pricing, and post-PPA market value of a portfolio of solar and battery storage projects under construction in central California. This review and analysis was completed to support buy-side due diligence activities for a financial client.
- Completed buy-side market valuation of large combined solar/battery storage project under development in Central California. Assessed merchant energy revenue projections for solar facilities, and combined resource adequacy, Day-Ahead and Real-Time energy market arbitrage revenue, and



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ancillary services revenue for the battery storage component of the project. Advised financial investor on acquisition value and strategy.

- On behalf of the Government of Puerto Rico, COR3 Agency, developed regulatory and policy guidelines and revisions to support energy system modernization initiative in Puerto Rico. Led stakeholder workgroup tasked with identifying key areas where regulatory reforms are needed to facilitate transformation of the Puerto Rico energy system to a more reliable, resilient and economic system, with greater reliance upon renewable and distributed generation resources. Also served on Puerto Rico Energy Bureau Distribution Planning and Resilience working groups to develop guidelines for distribution planning rulemaking and policy development.
- Completed market analysis and financing support for 1,200 MW natural gas-fueled combined-cycle project under development in the PJM-ComEd zone. As part of this engagement, developed energy and capacity market forecasts, and stochastic basis analysis of hedge transaction to support a \$700 million debt financing the project. Developed numerous presentation and Q&A responses to lender consortium due diligence questions.
- Completed detailed economic viability assessment of the Navajo Generating Station. Completed review and assessment of an economic retirement study prepared by plant owners, including assessment of key assumptions and drivers underlying study results. Presented study results in forums discussing Navajo retirement at the U.S. Department of Interior, the U.S. Department of Energy, and the Arizona Corporation Commission.
- On behalf of the Balancing Area of Northern California (BANC) completed analysis of energy market balancing requirements, and assessment of how those balancing requirements are likely to change with large-scale solar and wind generation additions in California and in Oregon, Arizona and Nevada. This study examined detailed hourly and sub-hourly generation and load data, and developed estimated changes in balancing requirements over the next 12 years, as California moves toward a 50% renewable portfolio standard. The study also included a review of BANC member’s integrated resource plans, and examined technologies that may be used to meet additional balancing requirements.
- Completed review of regulatory requirements and capital spending plans for two large investor-owned utility companies, as part of a due diligence review of those entities for potential acquisition. The projects involved review of integrated and other supply planning activities of each entity, and review of historical capital spending programs. Provided confidential client with forecast capital expenditure plan, and with assessment of the risks and opportunities associated with the potential acquisitions. Ultimately, client did acquire one of the two entities.
- Completed buy-side due diligence and market analysis support on behalf of a consortium of investors related to potential acquisition of the Neptune transmission line. The Neptune line is a high voltage direct current underwater cable connecting PJM and Long Island, NY. This project included development of energy and capacity market value for the line, and also included an examination of re-contracting potential with the Long Island Power Authority.
- Developed fundamental market simulation database for Panama, including development of background report on the energy industry in the country, and completed power market simulations of Panama and Central America for evaluation of a combined cycle power plant under development. As part of this engagement, also completed assessment and developed price forecast of LNG prices for delivery in Panama.
- Developed fundamental market simulation database for Iran, researched the electricity and natural gas industry in the country, and completed market simulations and dispatch analysis of generating assets in the country. Completed competitiveness assessment for different generation types in Iran.



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- Completed markets assessment report for solar generation assets in Colorado, California and New England, in support of asset valuation and due diligence engagement. Evaluated re-contracting opportunities and key market players operating in each region.
- Completed market analysis and due diligence project for 14 natural gas fueled assets operating in California, New Mexico, Oklahoma, Connecticut, to support bid development for purchasing those assets. Oversaw project execution, and developed market report, energy and capacity revenue projections, and gross margin analysis for the portfolio assets.
- Completed market assessment report for solar generation assets in Colorado, California and New England, in support of asset valuation and due diligence engagement. Evaluated re-contracting opportunities and key market players operating in each region

Principal, Black and Veatch Corporation, Inc., Sacramento, CA, November, 2008 to October, 2015

- * Initiated Integrated Resource Plan for the Virgin Islands Water & Power Authority. This project was a multi-faceted IRP, where detailed planning and potential siting impacts were to be considered in the overall planning, due to geographic and topology limitations on the islands. Mr. Schiffman directed the analysis and playing the lead analytic role in assessing resource needs. This included directing the data gathering efforts, taking technical lead in completing production cost and financial modeling, and managing Black & Veatch’s team of technical experts. Mr. Schiffman also developed a stakeholder process and gave multiple presentations before stakeholder and customer groups.
- * Led a study examining potential retirement of Fort Calhoun nuclear power station. This was an all-encompassing study where I led the economic assessment of Fort Calhoun’s economic viability in the SPP market. The economic assessment included detailed production cost modeling to assess power supply costs with and without Fort Calhoun, and to evaluate whether lower cost supply resources were available. The study also included developing a plant staffing analysis and transition plan in the event that the plant was shut-down. For that part of the study, identified and retained a human resources consulting firm to develop a transition period and shutdown human resources staffing plan. Also developed a replacement power RFP on behalf of Fort Calhoun’s owner, and issued that RFP to seek bids for replacement power from SPP market participants. Completed the economic analysis of bids received, and also coordinated powerflow modeling for low cost bids, to ensure deliverability of energy and capacity to replace Fort Calhoun. Also completed an assessment of plant decommissioning activities, and decommissioning costs, including utilization of monies from the decommissioning trust fund. Worked closely with utility management and analytic staff in completing this all-encompassing retirement study, and in developing plant retirement transition plans.
- * Completed several detailed studies of the Navajo Generating Station, including economic assessment of Navajo if required to invest \$1 billion in pollution control equipment. Presented study results to Board of Directors of Central Arizona Project.
- * Completed nodal market simulation and congestion study for a concentrating solar plant in Northern Nevada. This engagement includes a review of transmission system impact studies, power flow data and development of a PROMOD nodal simulation database to assess congestion likelihood for the project.
- * Completed economic assessment of a large pumped storage project in Southern California, including development of energy market arbitrage, capacity market and ancillary services market revenue forecasts. Developed pro forma financial statements examining economics of project under different ownership and off-take agreement structures.



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- * Completed Integrated Resource Plan for Azusa Light & Water, a municipal utility in southern California. This project involved using Black & Veatch’s EMP database and price forecast, specifying thermal and renewable resource options, and completing detailed market simulation and financial modeling to determine a preferred power supply plan for Azusa. A key focus of the study is to identify resource options to replace output from the San Juan 3 coal plant, which is scheduled to retire.
- Completed Integrated Resource Plan for Pasadena Water & Power, a municipal utility in southern California. This project involved using Black & Veatch’s EMP database and price forecast, specifying thermal and renewable resource options, and completing detailed market simulation and financial modeling to determine a preferred power supply plan for Pasadena. The project also included reflection of key stakeholder input, and testing stakeholder driven policy proposals for advancing renewable resource procurement beyond state-mandated RPS levels. A key focus of the study is to identify resource options to replace output from the Intermountain coal plant, which is scheduled to retire.
- Completed generation reliability study for the Brownsville Public Utility Board. This study included directing the completion of detailed reliability modeling using GE-MARS, and evaluating loss-of-load probabilities for BPUB based on its existing system and based on the addition of a 200 MW ownership share in the combined cycle power plant being developed in Brownsville by Tenaska. The study also included detailed pro forma modeling of partial ownership of the combined cycle plant, and a financial and risk assessment presented to BPUB’s Board of Directors, and also used to address rating agency questions about credit impacts of the new power plant. On behalf of Southern California Edison, completed nodal power price forecast and assessment of high voltage transmission upgrades and additions in Southern California. This project included an assessment of congestion, locational marginal pricing, transmission system losses, and economic impacts of adding new transmission facilities in WECC, with particular focus on Southern California. PROMOD IV was used to complete the nodal market analysis, and PROMOD simulation results were translated into GE-PSLF for more detailed transmission system modeling of power flow cases under a variety of supply and demand conditions throughout the year.
- Completed four projects focused on nodal market modeling in California, Arizona and Southern Nevada. These studies were used to assess congestion risk faced by solar and wind generation projects at the sites where each is being developed. Completed PROMOD IV dispatch and nodal analyses for each project, and developed risk assessments for generation curtailment risk. Also developed analyses of transmission system congestion along delivery paths for each project, and on key economic transmission paths in Northern and Southern California, transmission import paths into Southern California, and transmission paths in Southern Nevada.
- Completed resource and power supply planning/procurement project for confidential SPP energy supplier. Completed a competitiveness assessment of major electricity supplier in Nebraska, examining cost structure, net resource position, generation asset characteristics, transmission access and delivery options, and overall competitive positioning of SPP, MISO and MRO entities that have potential to provide wholesale electricity service in Nebraska. Worked collaboratively with client and a wholesale customer task force
- Completed due diligence analysis of portfolio of power supply assets to support bid development. The generators being sold were located in SPP, WECC, and the Northeast. The WECC asset is a qualifying facility, which required detailed representation and modeling of the California PUC Short-Run Avoided Cost tariff and pricing formula. One of the SPP assets is also a qualifying facility, which required detailed analysis of the steam load and interaction between joint power and steam production. Completed modeling analysis and risk assessment of power supply agreements, developed revenue



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forecasts for each power plant, and completed merchant plant analysis of plant operations after PPA expiration.

- On behalf of a municipal utility client, developed database of renewable energy resource bids solicited through an RFP process, developed assessment of delivery terms and transmission tariffs associated with power delivery from distant resources, and completed bid screening analysis of 240 separate bids/pricing options.
- Completed detailed review of California ISO ancillary services markets, and opportunity for renewable energy and energy storage markets to participate in those markets. Analysis included assessment of day-ahead, hour-ahead, and real-time market operation.
- Completed dispatch modeling and power supply planning study examining construction of a pumped storage hydro project in Hawaii. The evaluation included assessments of project revenue in energy, ancillary services, and capacity markets in Hawaii, expected dispatch and operation of the pumped storage project, and comparison of long-term power supply plans with and without addition of the pumped storage project.
- Completed deliverability and congestion analysis of wind energy resources being located in California. Developed nodal market simulations, and examined locational marginal price differences, congestion components, and transmission line loadings of facilities impacted by the wind assets being studied.
- Completed detailed financial and dispatch modeling (deterministic and stochastic) of energy storage project being developed in Southern California, to create dispatch profile and estimated long-term project value of the facility. The evaluation included assessments of project revenue in energy, ancillary services, and capacity markets in Southern California.
- Completed dispatch analysis and financial modeling of pumped storage hydro project in Colorado, for use in regulatory proceedings. The evaluation included assessments of project revenue in energy, ancillary services, and capacity markets in Colorado.
- Completed nodal power price forecast and assessment of high voltage transmission upgrades and additions in Southern California. This project included an assessment of congestion, locational marginal pricing, transmission system losses, and economic impacts of adding new transmission facilities in WECC, with particular focus on Southern California. PROMOD IV was used to complete the nodal market analysis, and PROMOD simulation results were translated into GE-PSLF for more detailed transmission system modeling of power flow cases under a variety of supply and demand conditions throughout the year.
- Completed PROMOD IV dispatch and economic analysis of Lodi Energy Center, with focus upon expected dispatch of the project, and its fit into the overall power supply portfolio of a Southern California Municipal Utility.
- Completed PROMOD IV market price forecasts and detailed analyses of power markets in all North American regions, including hourly energy price forecasts, annual capacity price forecasts, and detailed assessment of supply/demand conditions and generator dispatch. The assessments included forecasts of renewable energy development in each region/submarket, forecast greenhouse gas regulation, and economic assessment of fossil and renewable energy technologies.

Vice President, Ventyx, Inc., Sacramento, CA, June 2007 to November 2008

- Managed project and led analysis for consortium of upper Midwest utilities focused on developing plans for long-term transmission expansion to ensure reliability in the region and to accommodate



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economic transfer of large-scale wind-based electricity generation. This project examined congestion, reliability and economic benefits associated with large-scale wind generation expansion in the upper Midwest, and accompanying needs for transmission system expansion. Evaluation was completed on both nodal and zonal basis.

- Developed projections of expected dispatch, revenue, and operating costs for new combined-cycle power plant under development in Southern California. Prepared financial projections under merchant plant and other likely economic scenarios. Completed evaluation of tolling agreement terms and conditions.
- Assisted Southern California energy supplier in completing due diligence analysis for investment and development of 300-500 MW wind generation project located in Central/Southern California. Reviewed due diligence documents and completed economic evaluation of expected revenue, operating costs and investment cash flows for the project at a range of capacities varying from 100 MW to 500 MW.

Director, Navigant Consulting, Inc., Sacramento, CA, April, 2000 to June, 2007

- Responsible for managing the price forecasting subpractice within Navigant Consulting’s Energy Market Assessment group. Responsibilities included a wide variety of engagements focused on evaluating wholesale power market conditions. Completed market assessment and simulation studies of all North American regional power markets, including Canada and Mexico.
- Created and Developed NCI’s PROSYM market simulation practice and capabilities in modeling WECC and Eastern Interconnected markets. Completed numerous market simulation and assessment engagements throughout the U.S. covering all North American market regions.
- With a team of consultants, assisting the California Energy Commission in defining and evaluating scenarios for its 2007 Integrated Energy Plan. Reviewing market simulation results from each of the scenarios and completing analysis of industry and consumer risks likely to be faced in California over the next decade (ongoing).
- Directed NCI’s market simulation efforts as independent consultant to the State of California Department of Water Resources, leading to the successful underwriting of \$11 billion in bond financing and supporting the execution of power supply agreements aggregating to over 13,000 MW.
- Developed projections of lost revenue and operating profits due to construction delays at a large combined-cycle project in the Desert Southwest. Prepared evaluation of WECC power market conditions during the construction period for this project, and completed power market simulations used to measure likely dispatch, revenue and operating profits of the project during the construction delay period. Successfully presented and defended those estimates before an Arbitration Panel, resulting in a significant financial award for our client.
- Developed and maintained power market simulations to evaluate likely dispatch, costs, and spot market purchases and sales associated with the California Department of Water Resources purchased power contract portfolio. Results from these simulations have been used in each of the last five years to support CDWR’s annual revenue requirement filing before the California Public Utilities Commission. Provide ongoing regulatory support to CDWR, including consultation and limited training of CPUC staff in power market modeling.
- Directed a number of nationwide market simulation and valuation engagements examining current market value of power plant portfolios owned by Calpine, Mirant, NRG and other independent power



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producers. Worked with bond investors to develop refined valuation estimates for subsets of each portfolio.

- Served on WECC’s Power Simulation Task Force which was formed to assess available options for the WECC to procure, maintain and use a power market simulation database and model in its generation and transmission planning efforts. Participated in task force meetings where criteria were developed for selecting a simulation database and model, and assisted in evaluating proposals submitted to the WECC task force
- Assisted a California investor-owned utility in conducting RFP and in evaluating bids received for short-term and medium-term power supply contracts. Developed cost rankings, economic screening, risk assessment and preferred bid evaluations, and assisted the utility’s planning and bid evaluation staff in presenting results to the company’s senior management.
- Developed WECC market simulations and assessment of investment conditions for numerous clients used in feasibility analysis and financing support of new generation projects being developed in WECC markets. These analyses included separate evaluation of power market conditions in California, Mexico (Baja), Arizona, Colorado, Nevada, Oregon, Washington, British Columbia, and Alberta.



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Senior Consultant, Henwood Energy Services, Inc., Sacramento, CA, 1998 to 2000

- Prepared numerous forecasts of wholesale market electricity prices using Henwood’s proprietary market simulation tools. Drafted reports presenting price forecasts to consulting clients. Worked closely with clients and sponsors of new merchant power plants to provide customized market price forecasts and to serve individual client needs. Presented study results to clients and their constituents.
- Directed project evaluation and revenue forecast for major merchant power plant in Texas. Presented revenue forecast to investment bankers, and to several potential equity investors. Advised and worked with project developer to successfully obtain debt and equity financing for the project, which is currently under construction.
- Advised and worked with PricewaterhouseCoopers to perform economic evaluation and market simulations of proposed Purchase Power Arrangements under development in Alberta, Canada. The Power Purchase Arrangements are to be sold at auction in coming months. Prepared economic study of market power held by incumbent electricity suppliers in Alberta.
- Developed software and modeling tools to estimate investment cash flows and pro forma financial results for new merchant power plants. Developed Henwood approach for evaluating profitability of new market entrants and incorporating equilibrium amounts of new entry in its market studies.

Senior Financial Analyst, Public Service Commission of Wisconsin, Madison, WI, 1990 to 1998

- Developed policy proposals for restructuring wholesale and retail electricity markets. Evaluated competing policy proposals for impacts upon consumers and upon electrical system operation. Drafted formal electricity industry restructuring policy adopted by the Wisconsin Commission.
- Developed policies for addressing wholesale and retail market power in Primergy and Interstate Energy Corporation merger cases. Evaluated feasibility and corporate finance implications of asset divestiture and spin-off options for mitigating market power.
- Presented evaluation of proposed electric utility merger legislation to subcommittee of Wisconsin legislature. Advised individual legislators on merger policy.
- Developed policy proposal and draft legislation for reforming power plant siting law and for allowing development of new merchant power plants in Wisconsin.
- Directed industry-wide efforts to revise the PSCW generation competitive bidding procedures. Conducted workshops on proposed revisions for utility and other industry participants. Drafted policy reforms adopted by the Wisconsin Commission.

Research Assistant, University of Wisconsin, Madison, WI, 1989-1990

- Co-authored and provided research support for study of consolidation and mergers in the electric utility industry.



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EDUCATION

University of Wisconsin-Madison

- Graduate Studies toward MS-Finance, September 1988 - May 1990.
- Bachelor of Business Administration, Finance, Investment and Banking, May 1988.
- Curriculum concentrated heavily upon financial economics, with additional emphasis upon economics, mathematics, and accounting.

TESTIMONY

Public Service Commission of Wisconsin, Docket 6630-UR-104, Wisconsin Electric Power Company Rate Case, 1990, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 6690-UR-106, Wisconsin Public Service Corporation Rate Case, 1991, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 4220-UR-105, Northern States Power Company (Wisconsin) Rate Case, 1991, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Rate of Return on Equity, Cost of Capital and Financial Condition, Wisconsin Electric Power Company, Docket 6630-UR-105, Public Service Commission of Wisconsin, 1991

Public Service Commission of Wisconsin, Docket 05-EP-6, Advance Plan 6, 1992, “Alignment of Managerial Interests and Incentives with Integrated Resource Planning Goals” (with Paul Newman).

Public Service Commission of Wisconsin, Docket 6680-UR-107, Wisconsin Power & Light Company Rate Case, 1992, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 4220-UR-106, Northern States Power Company (Wisconsin) Rate Case, 1992, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 6630-UR-106, Wisconsin Electric Power Company Rate Case, 1992, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 05-EI-112, Investigation on the Commission’s Own Motion Into Barriers to Contracts Between Electric Utilities and Non-Utility Cogenerators and Certain Related Policy Issues, 1992, “Contract Risk in Long-Term Purchase Power Arrangements.”

Public Service Commission of Wisconsin, Docket 3270-UR-106, Madison Gas and Electric Company Rate Case, 1993, “Rate of Return on Equity, Cost of Capital and Financial Condition.”

Public Service Commission of Wisconsin, Docket 6630-CE-187, Wisconsin Electric Power Company, 1993, “Memorandum to Commission Presenting Economic Analysis of Competitively Bid Proposals for New Power Plants” (co-authored).



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- Public Service Commission of Wisconsin, Docket 6680-UR-108, Wisconsin Power & Light Company Rate Case, 1993, “Rate of Return on Equity, Cost of Capital and Financial Condition.”
- Public Service Commission of Wisconsin, Docket 4220-UR-107, Northern States Power Company (Wisconsin) Rate Case, 1993, “Rate of Return on Equity, Cost of Capital and Financial Condition.”
- Public Service Commission of Wisconsin, Docket 6630-CE-202, Wisconsin Electric Power Company Auburn to Butternut Transmission Line Case, 1994, “Economic Cost Comparison of Transmission Upgrade and Distributed Generation Wind Turbine Project.”
- Public Service Commission of Wisconsin, Docket 3270-UR-107, Madison Gas and Electric Company, 1994 “Rate of Return on Equity, Cost of Capital and Financial Condition.”
- Public Service Commission of Wisconsin. Docket 6690-CE-156, Application of Wisconsin Public Service Corporation for Authority to Increase Electric Generating Capacity (Stage One Competition Among Alternative Suppliers), 1994 & 1995, “Economic Analysis of Competitively Bid Power Plant Proposals” (with Paul Newman), “Contract Risk in Purchased Power Arrangements,” “Accounting Treatment for Long-Term Purchased Power Contracts,” “Contract Risk and Analysis of True-Up Mechanisms and Balancing Accounts.”
- Public Service Commission of Wisconsin, Docket 6630-UM-100/4220-UM-101, Wisconsin Electric Power Company/Northern States Power Company Merger Case, 1996, “Market Power Remedies; State/Federal Jurisdictional Issues.”
- Public Service Commission of Wisconsin, Docket 05-EP-7, Advance Plan 7 (Integrated Resource Planning), 1996, “Risk-Adjusted Discount Rates.”
- Public Service Commission of Wisconsin, Docket 6680-UM-100, WPL Holdings/IES Industries/Interstate Power Merger Case, 1997, “Market Power Remedies; State/Federal Jurisdictional Issues.”
- Public Service Commission of Wisconsin, Docket 6630-UR-110, Wisconsin Electric Power Company Rate Case, 1997, “Rate of Return on Equity, Cost of Capital and Financial Condition.”
- Public Service Commission of Wisconsin, Docket 05-EP-8, Advance Plan 8, 1997, “Purchased Power Costs, Supply Planning Risks and Supply Planning Parameters (Integrated Resource Planning).”
- North Dakota Public Service Commission, Docket No. PU-399-01-186, Montana-Dakota Utilities Co., 2000 Electric Operations Annual Report (Commission Investigation of Excess Earnings), February, 2002, “Wholesale power market conditions in the upper midwest, and the impact on the level and profitability of off-system sales for Montana-Dakota Utilities Co.”
- California Public Utilities Commission, Rulemaking 02-01-011 Implementation of the Suspension of Direct Access Pursuant to Assembly Bill 1X and Decision 01-09-0. June, 2002. “Rebuttal Testimony of Roger Schiffman on behalf of the California Department of Water Resources: Market modeling issues.”
- Washington DC Arbitration Panel, “Estimate of lost energy sales and lost revenue due to construction delay” for two new combined cycle projects that were built in Michigan and Arizona markets, January-February, 2006.
- Montana Public Service Commission, “Avoided Cost Value for Greycliff Wind Project.” May/June, 2016.



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Montana Public Service Commission, “Avoided Cost Estimates and Methodology for QF-1 standard tariff to apply to small wind and solar renewable energy projects.” October, 2016.

South Dakota Public Utilities Commission, “Avoided Cost Estimates for Juhl Energy Wind Projects.” September, 2016.

Minnesota Public Utilities Commission, “Avoided Cost Estimates and Methodology for wind and solar resources on Otter Tail Power System.” 2017

Montana Public Service Commission, “Avoided Cost Estimate and Methodology Recommendations for TransAlta New Colony Wind project.” 2017.

New Mexico Public Regulation Commission, “Enchant Energy Testimony Concerning PNM’s Replacement Power Resources.” 2020.