August 31, 2017

Ms. Kim Trosclair
Louisiana Public Service Commission
Office of the General Counsel
602 North Fifth Street, 12th Floor (Galvez Building) (70802)
P.O. Box 91154
Baton Rouge, Louisiana 70821-9154

E-Mail: kim.trosclair@la.gov

Reference: RFP 17-10 for Docket No. U-34369 Southwestern Electric Power Company, ex parte. In Re: Application for Prudence determination of certain improvements at Welsh Units 1 and 3 and Flint Creek and associated cost recovery.

Dear Ms. Trosclair:

PF Engineers is pleased to provide the Louisiana Public Service Commission (the "LPSC" or "Commission Staff") with this proposal in response to the August 15th Request for Proposal for an outside independent technical consultant to assist LPSC in the review of certain environmental retrofits at the Southwester Electric Power Company ("SWEPCO") coal units in Texas (Welsh 1 and 3) and at Flint Creek plant in Arkansas. SWEPCO obtained an accounting deferral for the costs for these environmental retrofits for recovery.

SCOPE OF WORK

PF Engineers proposes to provide the following services to assist the Commission Staff in the review of the environmental retrofits at the SWEPCO Welsh and Flint Creek facilities. Based on our experience in reviewing power plants and with other PUC reviews, our proposed scope of work is as follows:

1 Site Visits

PF Engineers will perform a site visit to both the Welsh plant and the Flint Creek plant to verify the installation of the environmental retrofits.

2 Review the Retrofit Costs

PF Engineers will work with SWEPCO and the Commission Staff to review the claimed costs for completing the environmental retrofits. The review of the invoices applicable to environmental retrofit work is to ensure that the claimed costs were properly applied. PF Engineers will opine on the validity of the expenses presented by SWEPCO for recovery.

3 Provide a Report on the Site Inspection and Cost Review

PF Engineers will work with the Commission Staff to provide a detailed report on the findings from our site visit to the Welsh and Flint Creek facilities and our review of SWEPCO's claimed costs for the environmental retrofits. PF Engineers will work with the Commission Staff to ensure that the report is in the form best suited for presentation to the Commission and/or any legal counsel.

4 Support the Commission Staff

PF Engineers will support Commission Staff relative to any technical issues or concerns regarding Docket U-34369. This support includes, but is not limited to:

4.1 Documentation

PF Engineers will support Commission Staff with the development of any additional document requests for discovery and provide any specific memos or presentations relative to WPEC to be used for the review of the potential acquisition of WPEC.

4.2 Hearings/Testimony

PF Engineers will review any witness depositions/testimonies and assist the Commission Staff in the development of cross-examinations of adverse witnesses. PF Engineers will travel to Louisiana to provide direct testimony to support Commission Staff.

PF ENGINEERS TEAM

PF Engineers provides primarily Independent Engineering and Expert Witness services for the energy industry. In response to RFP 17-10, the Scope of Work is to be completed by Trent J. Markell, P.E., the founder and Principal of PF Engineers. Mr. Markell has over 25 years of engineering experience in the power generation industry with a specific expertise in turbomachinery.

Qualifications

Mr. Markell's experience as an Independent Engineer qualifies him for this assignment. Independent Engineers are well versed in reviewing construction projects, evaluating contracts, financial requirements, and governmental requirements, which provides unique mix of technical and financial capabilities and can satisfy the minimum requirements per Section IV of RFP 17-10.

Mr. Markell has been involved in the design or review of numerous power plants including the technical review of the Clean Air Clean Jobs Act for the Colorado PUC Staff. This technical review helped the Commission Staff to evaluate the potential application of environmental retrofits to the existing coal fired power plants in Colorado versus the retirement of said power plants in favor of new, utility owned, natural gas fired power plant(s).

Detailed CV for Mr. Markell is included in Appendix A.

FEE STRUCTURE

PF Engineers is proposing to provide consulting services on a time and material basis plus any travel expenses required. The budgetary estimate for the Scope of Work is:

Budgetary Estimate Scope of Work for RFP 17-10	
Description	**Estimate**
Technical Review and Cost verification of environmental retrofits.	$32,550
Travel Expenses (*Assumes a visit to each site and one on-site meeting with LPSC.*)	$ 2,450
Total Estimate	**$35,000**

The above budgetary estimate to provide consulting services is based on a time and material basis plus any travel expenses required. The hourly rate for the PF Engineers personnel assigned to this Scope of Work is defined in the table below.

PF Engineers Rate Sheet 2017(1)		
Name	**Function**	**Hourly Rate**
Trent Markell	Principal	$350

Notes:

1. *All rates are in US Dollars are subject to annual change at the beginning of each calendar year to account for salary and cost of living adjustments.*

Expenses

All expenses are included, with the exception of travel and living expenses. All travel and living expenses will be billed at cost.

Change in Scope

In the situation where the Scope of Work changes, PF Engineers will work with the Client to develop a budgetary estimate for the revised Scope of Work prior to commencing with any revised or additional work.

Invoicing

Charges will be billed every calendar month with a detailed breakdown of the time spent by each staff member on the Project.

PROJECT COMMENCEMENT

To the best of our knowledge, PF Engineers does not have a conflict of interest that would prevent us from completing this work. PF Engineers' personnel are available to start immediately upon the proposed Scope of Work.

Please feel free to contact me via e-mail at trent.markell@pfengineers.com or by phone at 970-670-0187 if you have any questions. Thank you for considering PF Engineers.

Sincerely,

Trent J. Markell, P.E.
Principal

ec. Melanie Verzwyvelt (Melanie.v@la.gov)
Rene Robertson (rene.robertson@la.gov)

enc. Appendix A: CV

APPENDIX A: CV

TRENT J. MARKELL, P.E.

Principal

KEY QUALIFICATIONS

A registered professional engineer with over 25 years of experience in the engineering field, Mr. Markell has an extensive background in power generation, biofuels, and independent engineering services. As an independent engineer, he has a thorough knowledge of project design, contracting, construction, and operations and maintenance for a wide range of power generation and biofuels technologies. He has lead and/or been involved in the review of technologies including, but not limited to: coal, combined and simple cycle, cogeneration, landfill gas, nuclear, hydro, geothermal, wind, solar, ethanol, cellulosic ethanol, biodiesel, gasification, waste to energy, and biomass. Mr. Markell has been involved with the review or design of over 45,000 Megawatts ("MW") of power generation facilities and the review of biofuels facilities with a combined capacity of over 2 billion gallons per year.

Areas of expertise include:

- Independent Engineering Reviews
- Project Finance
- Financial Modelling
- Contract Analysis
- Construction Budgets and Schedules
- Construction Management
- Liquidated Damages Analysis
- Power Plant Design
- Steam Turbine Design and Technology
- Gas Turbine Design and Technology
- Performance Testing and Test Protocols
- Environmental Permitting
- Plant Operations and Maintenance
- Turbine Control Systems
- Ethanol Plant Design
- Expert Witness Services

EDUCATION AND PROFESSIONAL STATUS

Master of Science in Mechanical Engineering, Union College
Bachelor of Science in Mechanical Engineering, Rochester Institute of Technology
Member of the American Society of Mechanical Engineers
Professional Engineer (Colorado)

PF Engineers

EXPERIENCE RECORD

2012 – Present PF ENGINEERS, LLC
Principal

Mr. Markell is the founder of PF Engineers, which was established to provide technical due diligence, engineering consulting, and development support for energy projects. The focus of PF Engineers is to provide an additional level of engineering support to help developers to finance projects, and to help lenders to understand and to mitigate their technical risk on projects. Mr. Markell strives to provide value through the highest level of service and engineering expertise on a wide range of technologies.

2011 – 2012 MOTT MACDONALD GROUP
Senior Vice President

Mr. Markell worked with Mott MacDonald's senior executives to develop an Independent Engineering practice in the United States to expand Mott MacDonald's international presence. These responsibilities include managing the US Independent Engineering practice, providing Quality Assurance reviews both internally and externally, sales/business development to promote the US Independent Engineering practice, and all staffing for the US Independent Engineering practice. Mr. Markell also frequently supported project reviews as the project manager to maintain a presence in the market and to support Mott MacDonald's clients both in North America and throughout the world.

2006 – 2011 HARRIS GROUP INC.
Vice President, Financial Consulting

Mr. Markell was responsible for the P&L of Financial Consulting business unit, reporting directly to the CEO and the Board of Directors. Developed marketing plans and annual budgets to grow the Independent Engineering practice with annual revenues of approximately $1.8M supported with a staff of seven people.

Provided internal Quality Assurance by providing detailed review of all reports prior to issuance to the client. Support the due diligence review of the project technology, contracts, construction, and Operations and Maintenance.

2001 – 2006 R. W. BECK
Project Manager

Mr. Markell managed the due diligence effort on a wide range of facilities and technologies ranging from greenfield power facilities to sludge handling systems. He was one of the primary reviewers for Operations and Maintenance of power generation facilities and he developed and maintained the firm's O&M database. Mr. Markell was one of three engineers responsible for maintaining the firm's technology reviews for combustion and steam turbines.

He supported many of Calpine's due diligence reviews during their large build cycle including financing, construction monitoring, performance test monitoring, and annual operations and maintenance reviews.

EXPERIENCE RECORD - Continued

1998 – 2001 GENERAL ELECTRIC (formerly WOODWARD GOVERNOR)
Mechanical Systems Engineer

Mr. Markell performed mechanical retrofits for all types of turbine control systems, specializing in mechanical-hydraulic control retrofits for large main-line turbines. He interfaced with customers to support technical integration of new turbine controls and provided direction on the proper demolition of old hydraulic control system and installation of the new turbine control system.

He developed process to outsource all fabricated parts (i.e. valve actuators, manifolds, HPUs, etc.) and worked with purchasing and vendors to ensure an on-time delivery of mechanical components.

Mr. Markell also supported the Woodward ISO9000 efforts by assisting with internal audits and acting as a mentor for other internal auditors on the quality team.

1996 – 1998 ZYGO (formerly NEXSTAR AUTOMATION)
Software Engineer/Project Engineer

Mr. Markell developed software to control the operation of state of the art automation systems. He lead junior software engineers in the development of controls software for the automation systems primarily for the hard drive industry.

Mr. Markell also designed and engineered large, high volume automation systems. Maintained project budgets, bill of materials, purchased parts, drawings, and customer relations. Directed drafters, designers, other engineers, and technicians towards the completion of the design and installation of the automation systems.

1995 – 1996 COPPER MOUNTAIN RESORT
Full Time Youth Ski Instructor

1992 – 1995 GENERAL ELECTRIC
Steam Turbine Design Engineer

Mr. Markell designed new advanced-aero steampaths to provide efficiency gains for existing steam turbines and lead multi-disciplined engineering and drafting team to complete the design. In addition to overall steampath design responsibilities, he also has detailed design experience with high-pressure casings, advanced-aero buckets, and rotors.

Mr. Markell performed quality audits as a member of GE's internal ISO9000 audit staff for the Power Generation division.

PROJECT EXPERIENCE

Traditional Power

Coal

- Independent engineering review of a 300 MW pulverized coal plant in Panama including a detailed analysis of the performance, design, and O&M requirements.
- Independent engineering review of a 160 MW pulverized coal unit in Colombia including a detailed analysis of the performance, design, and O&M requirements.
- Independent engineering review of a 650 MW ultra-supercritical coal unit in Morocco with an emphasis on the evaluation of the plant performance.
- Independent engineering review of a 1,000 MW supercritical coal unit in Malaysia.
- Independent engineering review of construction modifications including verification of the specification and system performance testing of a 500 MW lignite plant in Ackerman, Mississippi utilizing Alstom CFB boilers. The project is a mine mouth facility.
- Independent engineering review of a 50 MW waste to energy facility, landfill, and the mining of lignite to support the facility in Haiti.
- Independent engineering review of the O&M for a 363 MW coal facility and potential repowering options located in Wales, UK.
- Independent engineering review to support the Colorado Public Utilities Commission's review of Colorado's Clean Air, Clean Jobs legislation and the utilities' plan to retire 900 MW of coal facilities. Including a review of scrubber and NOx reduction retrofit options and installation costs.
- Independent engineering review of a 300 MW pulverized coal unit in Springerville, Arizona including a detailed analysis of the performance, mechanical design, and material handling systems.
- Annual Operations and Maintenance review of 280 MW pulverized coal facility in Roanoke Valley, North Carolina utilizing wet and dry scrubber units.
- Technology review for the replacement of an existing coal facility in Ohio with an integrated coal gasification facility.
- Technology review for a 200,000 ton per year coking facility utilizing Chinese technology for implementation in Colombia.

Natural Gas (Combined Cycle and Simple Cycle)

- Independent Engineering review for a 1,000 MW combined cycle plant utilizing Siemens SGT6-8000H technology in Maryland.
- Independent engineering review for a 1,000 MW combined cycle plant utilizing GE 7FA.05 technology in Dover, New York.
- Independent engineering review of a portfolio of nine simple-cycle facilities with a combined capacity of approximately 250MW in California. These plants exported steam for enhanced oil recovery and utilized GE LM2500 and LM5000 technology.
- Technology review and support for 2,600MW portfolio of combined cycle and simple cycle facilities located in California utilizing GE 7FA and Pratt & Whitney FT4 technologies.
- Technology review and development support for a 100MW simple cycle facility to potentially utilize LM6000, LMS100, or TM2500 units near Panama City, Panama.
- Independent engineering review of a 45MW cogeneration facility utilizing LM5000 technology in Binghamton, New York.
- Independent engineering review of 60MW combined cycle facility utilizing GE Frame 6 technology in Castleton, New York.
- Independent engineering review of a 120MW combined cycle facility providing 3 million gallons of desalinated water per year in Karachi, Pakistan.
- Condition assessment and useful life evaluation of 213MW combined cycle facility utilizing W251AA technology in Brush, Colorado.
- Annual Operations and Maintenance review for two combined cycle units with a combined capacity of over 500MW located in Freeport, Texas and Mankato, Minnesota.
- Independent engineering review for the refinancing of a 300MW peaking facility utilizing GE 7FA technology in Aurora, Colorado.
- Independent engineering review, construction monitoring, performance test monitoring, and the subsequent refinancing for a 325MW cogeneration facility in Freeport, Texas and a 375MW combined cycle facility in Mankato, Minnesota utilizing Siemens 501F technology.
- Independent engineering review of a 570 MW combined cycle uprate located in Waco, Texas.
- Independent engineering review of the construction of an 875MW combined cycle facility in Brampton, Ontario utilizing GE 7FB technology.
- Independent engineering review of a 1,000MW combined cycle facility in Ontario, Canada utilizing Siemens 501F technology.
- Independent engineering review of a 120MW cogeneration facility in King City, California utilizing GE 7EA technology.
- Independent engineering review of a portfolio of landfill gas facilities utilizing various reciprocating engine technologies.
- Construction monitoring and performance testing of a 1050MW combined cycle facility in Fairfield, Texas utilizing GE 7FA technology.

Natural Gas (Combined Cycle and Simple Cycle) - Continued

- Construction monitoring and performance testing for two 725MW combined cycle facilities in Decatur, Alabama utilizing Siemens 501F technology.
- Performance test monitoring for a 720MW combined cycle facility in Hudson, Colorado utilizing Siemens 501F technology.
- Performance test monitoring for a 630MW combined cycle cogeneration facility in Columbia, South Carolina utilizing GE 7FA technology.
- Independent engineering review, construction monitoring, and performance test monitoring of a 300MW peaking facility in Aurora, Colorado utilizing GE 7FA technology.
- Annual Operations and Maintenance review of a portfolio of combined cycle projects owned and operated by Calpine.
- Operations and Maintenance review of the MACH Gen facilities utilizing 501G technology.
- Independent engineering review, construction monitoring, and performance test monitoring of nine (9) peaking facilities in California utilizing GE LM6000 technology.
- Operations and maintenance review for 530MW of power facilities in and around Anchorage, Alaska utilizing various gas turbine technologies.
- Independent engineering review of 150MW cogeneration facility in Fort St. John, British Columbia utilizing Westinghouse W251 technology.

Reciprocating Engines

- Owner's engineering support of the development of two 500 kW facilities utilizing Caterpillar engines in St. Croix.
- Independent engineering review of a 12 MW cogeneration facility located in New York, New York utilizing Caterpillar engines supporting the production of approximately 60 tons of ice per day.
- Owner's engineering support of the development of an 18 MW facility utilizing Jenbacher engines in Newport News, Virginia.
- Owner's engineering support for the development of a project in Panama to potentially use Jenbacher J920 engines.
- Independent engineering review of a number of heavy fuel oil facilities in Saipan including a review of the technical performance and the O&M.
- Independent engineering review of a portfolio of reciprocating engine facilities in California ranging in size of less than 1 MW to over 6 MW utilizing Jenbacher engines to burn biogas.

Renewable Energy

Wind

- Independent engineering review of 228 MW facility utilizing Gamesa G80, G87, and G90 technology in Oaxaca, Mexico.
- Independent engineering review of 100 MW facility utilizing Enercon E92 technology in Quebec, Canada.
- Independent engineering review of 100 MW facility utilizing Vestas V82 technology near North Powder, Oregon.
- Independent engineering review of 200 MW facility utilizing Gamesa G87 technology near Abilene, Texas.
- Independent engineering review of 100 MW facility utilizing Vestas V82 technology near Austin, Minnesota.
- Independent engineering review of 100 MW facility utilizing Vestas V100 technology near Payne, Ohio.
- Independent engineering review of 200 MW facility utilizing Vestas V82 technology near Bloomington, Illinois.
- O&M and technology review of 125 MW facility utilizing Clipper Liberty 2.5MW technology located in Cohocton, New York
- O&M and technology review of 30 MW facility utilizing GE 1.5sle technology on the island of Maui, Hawaii.
- O&M and technology review of 42 MW facility utilizing GE 1.5sle technology in Aroostook County, Maine.
- O&M and technology review of 35 MW facility utilizing Clipper Liberty 2.5MW technology in Lackawanna, New York.
- O&M and technology review of 57 MW facility utilizing GE 1.5sle technology in Washington County, Maine.
- Independent engineering review and construction completion certification of 38MW facility utilizing Nordex N90 technology in Cambria County, Pennsylvania.
- Independent engineering review of 73 MW facility utilizing Nordex N100 technology in Cambria County, Pennsylvania.
- Independent engineering review of 51 MW facility utilizing Repower technology in Howard, New York.
- Independent engineering review and construction monitoring of a 22 MW facility utilizing GE 1.6xle technology located in Glenns Ferry, Idaho
- Independent engineering review and construction monitoring of two 1.0 MW community wind facilities in California utilizing GE 1.5xle technology.
- Independent engineering review of a 150 MW facility utilizing Vestas V90 technology in Alta, California.
- Independent engineering review and construction monitoring for a 6 MW facility utilizing GE 1.5sle technology located in Aberdeen, Washington.
- Independent engineering review of a 24 MW wind generation in Tehachapi, California utilizing Vestas technology.

Solar

- Independent engineering review/site inspection of a portfolio of seven PV facilities ranging from 3MW to 6MW in North Carolina utilizing Astronergy modules and Eaton inverters.
- Independent engineering review of a 5MW PV facility in Henderson, North Carolina utilizing Silvantis modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Fair Bluff, North Carolina utilizing Silvantis modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Shannon, North Carolina utilizing Silvantis modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Chadbourn, North Carolina utilizing Silvantis modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in New Bern, North Carolina utilizing Canadian Solar modules and Eaton inverters.
- Independent engineering review of two, 5MW PV facility in Newton, North Carolina utilizing Canadian Solar modules and inverters from Eaton and SMA.
- Independent engineering review of a 5MW PV facility in Marshville, North Carolina utilizing Canadian Solar modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Burlington, North Carolina utilizing Canadian Solar modules and Eaton inverters.
- Independent engineering review of a 5MW PV facility in Warsaw, North Carolina utilizing Canadian Solar modules and Eaton inverters.
- Independent engineering review of a 5MW PV facility in Randleman, North Carolina utilizing Trina modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Monroe, North Carolina utilizing Canadian Solar modules and SMA inverters.
- Independent engineering review of a 5MW PV facility in Willow Springs, North Carolina utilizing Trina modules and TMEIC inverters.
- Independent engineering review of annual O&M for a PV (2.5 MW) facility in Casa Grande, AZ utilizing Suntech modules with inverters from Satcon and Advanced Energy.
- Independent engineering review of a 75MW CPV facility utilizing Amonix technology to be located in South Africa.
- Independent engineering review of two 10MW CPV facilities utilizing Amonix technology to be located in South Africa.
- Independent engineering review and construction monitoring of a 3MW PV facility utilizing Chinese technology located in Orange, Massachusetts.
- Independent engineering review of a portfolio of PV (10MW) and LFG (12MW) facilities throughout the US.

Hydro

- Independent engineering review of NE Hydro run of river portfolio consisting of:
  - 192 MW utilizing Francis technology in Vermont and New Hampshire.
  - 167 MW utilizing Francis technology in Vermont and New Hampshire.
  - 11 MW utilizing Kaplan technology in Vermont and New Hampshire.
  - 41 MW utilizing Kaplan technology in Vermont and New Hampshire.
  - 48 MW utilizing Francis technology in Vermont and New Hampshire.
  - 36 MW utilizing Kaplan/Francis technology in Vermont.
  - 5 MW utilizing Francis technology in Massachusetts.
  - 41 MW utilizing Francis technology in Massachusetts.
  - 6 MW utilizing Francis technology in Massachusetts.
  - 14 MW utilizing Francis technology in Massachusetts.
  - 6 MW utilizing Francis technology in Massachusetts.
  - 7 MW utilizing Double-Francis technology in Massachusetts.
  - 7 MW utilizing Double-Francis technology in Massachusetts.
  - 3-Non-generation dams in New Hampshire and Massachusetts
- Initial due diligence review for potential acquisition of 3,000 MW pumped storage facility utilizing Francis-pump turbines in Virginia and West Virginia.
- Independent engineering review of Michigan run of river hydro facilities, including a review of the FERC Part 12 safety reviews, operations and maintenance, capital expenditures, and general site condition assessment. The approximate size and technologies utilized included:
  - 1.6 MW utilizing Francis technology.
  - 2.5 MW utilizing Francis technology.
  - 4.1 MW utilizing Francis technology.
  - 8.5 MW utilizing Francis technology.
  - 4.4 MW utilizing Francis technology.
  - 2.0 MW utilizing Francis technology.
  - 12.2 MW utilizing Francis technology.
- Owner's engineer support for the development of a pumped storage facility with a capacity of 50 MW to 75 MW in Cyprus.
- Independent engineering review and construction monitoring of a 34 MW hydro facility in Mexico utilizing pelton technology including over 5 kM of tunnels and multiple diversion dams. Review included a review of the hydrology for the project.
- Independent engineering review of a 2.4 MW facility in Emporia, Virginia.
- Independent engineering review of a 2.6 MW facility in Clinton County, New York.
- Independent engineering review of a 1.6 MW facility in North Smithfield, Rhode Island.
- Independent engineering review of a 1.6 MW facility in Halifax, Virginia.
- Independent engineering review of a 5.0 MW facility in Mt. Shasta, California.
- Independent engineering review of a 0.3 MW facility in Greenwich, New York.
- Independent engineering review of a 0.6 MW facility in Greenwich, New York.

Biomass

- Life expectancy evaluation for two biomass facilities in California.
- Expert witness for a 13 MW biomass facility in Gypsum, Colorado.
- An initial independent engineering assessment of a proposed development of a 66MW biomass facility in Ft. Meade, Florida.
- Expert witness for a 495 kW biomass facility near Raeford, North Carolina.
- Expert witness for an 850 kW biomass facility in Rome, New York.
- Expert witness for a 74 MW biomass facility in Covington, Virginia.
- Independent engineering review of a 21MW biomass facility in St. Félicien, Quebec
- Independent engineering review of a 37.5MW biomass facility in Plainfield, Connecticut
- Independent engineering review of a 30MW biomass facility outside of Hilo, Hawaii including an assessment of the construction progress, budget, and schedule.
- Independent engineering review of a 30MW biomass facility in Wendel, California.
- Independent engineering review of a 50MW biomass facility in the Inland Empire, California.
- Independent engineering review of a 20MW biomass facility in Tracy, California.
- Independent engineering review of a 30MW biomass facility near Eureka, California.
- Independent engineering review of a 40MW biomass facility in La Crete, Alberta.
- Independent engineering review of a 15MW biomass facility in Rabun Gap, Georgia.
- Independent engineering review of a 17MW biomass facility utilizing Wellons boilers in Warm Springs, Oregon.

Other Renewable Technologies

- Independent engineering review of a 7MW closed loop anaerobic digester project to utilize Giant King Grass on St. Croix, US Virgin Islands.
- Technology assessment review of a 2MW waste to energy project processing approximately 1,000 tons of MSW and biosolids per week in Allentown, Pennsylvania.
- Independent engineering review of an activated carbon facility in Shreveport, Louisiana.
- Independent engineering review of a portfolio of anaerobic digesters to be installed at numerous dairy farms in California ranging in size of less than 1 MW to over 6 MW.
- Engineering review of the conversion of a 150 MW coal facility to fire on biomass with a revised output of approximately 80 MW located in Brookfield, Florida.
- Independent engineering review of a portfolio (18 MW) of LFG facilities in California and Texas.
- Due diligence review of operations and maintenance costs for a 6 MW landfill gas facility in Providence, Rhode Island.
- Independent engineering review and expert witness support of a 24.5 MW waste to energy facility in Harrisburg, Pennsylvania.
- Fatal flaw review for a biosolid conversion technology facility to be located in Rialto, California.
- Technology review for tidal turbine for application in rivers.

Biofuels

- Supported the engineering report for a DOE Part II loan guarantee application for a 120 MGY advance biofuel production facility utilizing wheat and barley in Montana including a gasifier to provide additional energy.
- Supported the engineering report for a DOE Part II loan guarantee application for an advance biofuel production facility producing jet fuel from camelina in California.
- Supported the engineering report for a DOE Part II loan guarantee application for an integrated commercial cellulosic ethanol and biomass power project in Kansas.
- Technology and fatal flaw review of a biosolid gasification and clean diesel facility to be co-located with wastewater treatment facilities with pilot plant located in Los Angeles, California.
- Independent engineering review of a 50 MGY sugar cane to ethanol facility in Lacassine, Louisiana utilizing Praj technology.
- Independent engineering review and construction monitoring of a 60 MGY corn to ethanol facility in North Carolina utilizing KATZEN technology.
- Independent engineering review, construction monitoring, and performance test monitoring of a 110 MGY corn to ethanol facility in Liberal, Kansas utilizing ICM technology.
- Construction monitoring and performance testing of 88 MGY corn to ethanol facility in Ravenna, Nebraska utilizing Vogelbusch technology.
- Independent engineering review for two-60 MGY barley to ethanol facilities in Virginia and South Carolina utilizing KATZEN technology
- Independent engineering review of three 110 MGY ethanol facilities in Nebraska and Iowa utilizing Delta-T and fractionation technology.
- Independent engineering review of the completion of a 55 MGY ethanol facility located Lima, Ohio.
- Independent engineering review of a 100 MGY corn to ethanol facility in Albany, Georgia utilizing ICM technology.
- Independent engineering review of 40 MGY corn to ethanol facility in Columbia, Oregon utilizing Delta-T technology.
- Independent engineering review of 60 MGY corn to ethanol facility in Burley, Idaho utilizing Delta-T technology.
- Independent engineering review of 60 MGY corn to ethanol facility in Stockton, California utilizing Delta-T technology.
- Independent engineering review of 40 MGY corn to ethanol facility in Madera, California utilizing Delta-T technology.
- Independent engineering review of 99 MGY corn to ethanol facility in Cloverdale, Indiana utilizing POET technology.
- Independent engineering review of 90 MGY corn to ethanol facility in Granite City, Illinois utilizing Vogelbusch technology.
- Supporting the litigation as an expert witness relative to the construction of a biodiesel facility in Sante Fe Springs, California.
- Fatal flaw review of a 4 MGY biodiesel facility utilizing yellow grease as a feedstock to be located outside of Fort Morgan, Colorado.

Design

Steam Turbine Designs

- Paiton – 400MW Advanced Aero steampath
- El Kureimat – 600MW Advanced Aero steampath
- Jim Bridger – 530MW Advanced Aero steampath
- Spurlock – 300MW Advanced Aero steampath
- Tiger Bay Cogen – 160MW High Pressure Casing
- Tepco ABWR - 1,350MW High Pressure Casing support
- Coyote Springs – 150MW Steampath support
- Smith Cogen – 100MW Steampath support for barge mounted unit

Turbine Controls Retrofits

- Nine Mile – Two 750MW oil fired facility utilizing Westinghouse steam turbines
- Plant Branch – 200MW coal fired facility utilizing GE steam turbine
- Coastal Aruba – 35MW oil fired facility utilizing Parsons steam turbine
- Plant Bowen – 200MW of oil fired facility utilizing GE steam turbines
- Baxter Wilson – 400MW oil/gas fired facility utilizing a Westinghouse steam turbine
- PEMEX compressor station – Frame 5 gas turbine system
- Plant McManus – 40MW oil/gas fired facility utilizing GE steam turbine
- Kodak – 130 MW facility utilizing Dresser Rand steam turbine
- Long Lake – 71MW hydro facility utilizing Francis units
- Little Falls – 32MW hydro facility utilizing Francis units
- Mountain Creek – 400MW oil fired facility utilizing GE steam turbines
- Huntington Beach – Two 220MW Westinghouse steam turbines for oil fired facility

Expert Witness

- Engages by Eagle Valley Clean Energy as an expert witness of litigation involving a construction and performance dispute with the EPC Contractor, *Wellons, Inc. vs. Eagle Valley Clean Energy*
- Engaged by the US Department of Justice as an expert witness for litigation involving a Section 1603 application for an open-loop biomass project, *Meadwestvaco Virginia Corp. vs. United States*
- Engaged by the US Department of Justice as an expert witness for litigation involving a Section 1603 application for an open-loop biomass project, *GUSC Energy, Inc. vs. United States*
- Engaged by the US Department of Justice as an expert witness for litigation involving a Section 1603 application for Fuel Cells, *RP1 Fuel Cell, LLC and UTS SJ-1, LLC vs. United States*
- Engaged by the US Department of Justice as an expert witness for litigation involving a Section 1603 application for an open-loop biomass project, *W.E. Partners II, LLC vs. United States*
- Provided testimony to the Colorado PUC regarding the potential acquisition of an aging combined cycle facility to be incorporated into the Colorado rate base.
- Provided testimony to the Colorado PUC regarding the Clean Air Clean Jobs Act evaluating the retirement of 900MW of coal facilities in Colorado.
- Engaged to provide expert witness support for litigation relative to an 800 ton per day, 22MW waste to energy project in Harrisburg, Pennsylvania. Case settled out of court.
- Engaged to provide expert witness support for litigation relative to the construction of a 5 MGY biodiesel facility in Sante Fe Springs, California. Case settled out of court.

PUBLICATIONS/PRESENTATIONS/PATENTS

"Managing Technical and Resource Risk" – presented at Infocast Project Finance Tutorial Fall 2013.

"Managing Technical Risk on Thermal Generation Projects" – presented at Infocast Project Finance Tutorial Fall 2012 and Spring 2013.

"Biomass: Risk Mitigation"– presented at Infocast Project Finance Tutorial: 2011

"Is a Power Plant Shortage Looming" – published Greentech Media 2010

"Natural Gas Poised for Bigger Development" – published Denver Business Journal 2010

"The Energy Puzzle – How the Utility Industry Can Put the Pieces Together" – published epOverviews 2010

"Turbine Control Retrofits: Why, How, What and When" – presented at Power-Gen 2003

"Quality Assurance of Surface Treatments by Analysis of Substrate Surface Line Traces" – Patent for GE 1993