



Fox Rothschild LLP
ATTORNEYS AT LAW

434 Fayetteville Street
Suite 2800
Raleigh, NC 27601
Tel (919) 755-8764
Kkemerait@foxrothschild.com
www.foxrothschild.com

January 8, 2019

Ms. Lynn Jarvis
Chief Clerk
North Carolina Utilities Commission
430 N. Salisbury Street
Raleigh, NC 27603

***RE: In the matter of: Petition for Approval of Revisions to Generator
Interconnection Standards
Docket No E-100, Sub 101***

Dear Ms. Jarvis:

On behalf of North Carolina Clean Energy Business Alliance, hereby submits the **Rebuttal
Testimony of Michael R. Wallace, PE, CEM, GBE** in the above- referenced docket.

If you have any questions or comments regarding this filing, please do not hesitate to call me.

Thank you in advance for your assistance.

Very truly yours,

/ES/ Karen M. Kemerait

Enclosure

cc: All Parties of Record

A Pennsylvania Limited Liability Partnership

California Colorado Delaware District of Columbia Florida Georgia Illinois Minnesota
Nevada New Jersey New York North Carolina Pennsylvania South Carolina Texas Washington

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH
DOCKET NO. E-100, SUB 101
BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

In the Matter of:

Petition for Approval of Revisions to Generator
Interconnection Standards

REBUTTAL TESTIMONY
OF
MICHAEL R. WALLACE, PE, CEM, GBE
ON BEHALF OF THE
NORTH CAROLINA CLEAN ENERGY BUSINESS ALLIANCE

JANUARY 8, 2019

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Michael R. Wallace. My business address is 807 East Main Street, Suite 6-050, Durham North Carolina 27701.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am the Vice President of Development in Southeast United States for Ecoplexus, Inc. ("Ecoplexus").

Q. PLEASE DESCRIBE YOUR EDUCATIONAL AND PROFESSIONAL BACKGROUND.

A. I received a Bachelor of Science degree in Mechanical Engineering from the University of Maine. I am a professional engineer licensed in North Carolina, South Carolina, Maine, New Hampshire, Vermont, Massachusetts, New York, Virginia, Georgia, Florida, California, and Washington. I am a Certified Energy Manager in the United States, and I am currently half-way to completing a Masters of Business Administration degree from the University of North Carolina at Chapel Hill.

I have more than fourteen years' experience in progressively responsible engineering and business leadership.

As the Vice President of Development in Southeast United States for Ecoplexus, I am responsible for leading business planning, business development, and design expertise in all aspects of utility scale solar with a focus on projects designed for distribution and transmission interconnections ranging from 2 megawatts ("MW") to 300 MW AC in the Eastern United States. I manage a team of eight to twelve individuals who initiate

projects from concept through development and onto construction. I am also responsible for strategy and business planning in the Southeast United States. I am currently managing a pipeline of approximately 3,000 MW AC. I am responsible for origination of projects with utilities, including Duke Energy, Florida Power & Light, South Carolina Electric & Gas, Dominion, Southern Company, Tampa Electric, and Santee Cooper. Additionally, I am responsible for complete development of utility scale projects to construction, including negotiation and purchase power agreements and interconnection agreements.

My curriculum vitae is attached hereto as Exhibit 1.

Q. WHO ARE YOU SUBMITTING REBUTTAL TESTIMONY FOR IN THIS PROCEEDING?

A. I am submitting rebuttal testimony in this proceeding on behalf of the North Carolina Clean Energy Business Alliance (“NCCEBA”).

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. The purpose of my testimony is to address the direct testimony submitted by Duke Energy Progress, LLC and Duke Energy Carolinas, LLC (collectively, “Duke”) that the addition of storage to solar facilities should constitute a Material Modification.

Q. DID YOU PARTICIPATE IN THE STAKEHOLDER PROCESS THAT CONSIDERED WHETHER REVISIONS SHOULD BE MADE TO THE NC INTERCONNECTION STANDARD?

A. Yes. I was present for many of the stakeholder meetings in 2017, and I supported revisions to the NC Interconnection Standard designed to improve the interconnection study process. As an active participant of the stakeholder process, I was involved in the discussions about the Material Modification implications of adding energy storage to existing and planned distributed energy resource projects.

Q. HAVE YOU HAD AN OPPORTUNITY TO REVIEW DUKE WITNESS JOHN GAJDA'S TESTIMONY ABOUT ENERGY STORAGE AND MATERIAL MODIFICATION?

A. Yes. I have read Duke Witness John Gajda's direct testimony, and I have carefully considered his testimony about energy storage and Material Modification.

Q. PLEASE RESPOND TO WITNESS GAJDA'S TESTIMONY ABOUT ENERGY STORAGE AND MATERIAL MODIFICATION.

A. I would first like address Duke Witness Gajda's testimony that the stakeholders did not reach consensus on the "utilization of the System Impact Study agreement execution date as a decision point for certain modification considerations, and the importance of only allowing changes to the DC portion of a facility if all elements of the production profile are considered." *See* Duke Witness Gajda Direct Testimony, p. 38. The stakeholders did not agree to Duke's position that changes to the DC portion of a facility would be allowed only if all elements of the production profile are considered because the production profile is not a typical element of the System Impact Study and should therefore not have to be considered. Section 9.0 of the System Impact Study specifies the

study requirements of System Impact Study: short circuit analysis, stability analysis, power flow analysis, voltage drop and flicker studies, protection and set point coordination studies, and grounding reviews as necessary.

Q. DO YOU AGREE WITH DUKE WITNESS GAJDA THAT A MATERIAL MODIFICATION WILL BE TRIGGERED IF THE DAILY PRODUCTION PROFILE OF A GENERATING FACILITY CHANGES?

A. I do not believe that any change to the daily production profile due to the addition of energy storage should constitute a Material Modification. Changes to the daily production of the generating facility will not necessitate further study of the facility to prevent inaccurate study results for the short-circuit study, stability analysis, voltage drop and flicker analysis, and production and set point coordination studies.

Short-Circuit Study

It is my understanding that during the short-circuit study, Duke considers a “worst case” scenario, which could include summer or winter peak conditions. It is my understanding that the addition of energy storage to a solar facility would not affect the results of this study.

Stability Analysis

It is my understanding during the stability analysis, Duke studies the “worst case” scenario regardless of summer or winter peak conditions. Again, the addition of energy storage to a facility would not affect the previous study results.

Voltage Drop & Flicker Analysis

It is my understanding during the voltage drop and flicker analysis, Duke considers the “worst case” scenario, which is typically light load conditions. The addition of battery storage would not affect the previous study results.

Protection and Set Point Coordination Studies

It is my understanding during the protection and set point coordination studies, Duke studies the “worst case” scenario regardless of summer or winter peak. Thus, the addition of energy storage to a facility would not affect the previous study results.

Q. SHOULD DUKE BE ABLE TO TRIGGER A MATERIAL MODIFICATION IF THE POWER FLOW ANALYSIS RESULTS NEED TO BE CONSIDERED DUE TO A CHANGE IN THE DAILY PRODUCTION PROFILE?

A. No. As background to this issue, I want to point out that it is my understanding that the Eastern Interconnection Reliability Assessment Group (ERAG) shares responsibilities on behalf of the Southern Electric Reliability Council (SERC) in defining cases to be studied during power flow assessments. Case studies are snap shots in time and not dependent on the production profiles. The power flow model would be based on the load forecast, which assumes statistical probability of one occurrence in two years and that renewable generation should be dispatched at seasonally expected values corresponding to the appropriate model.

As I understand Duke’s System Impact Study methodology, Duke incorporates summer peak load and light load case conditions. I do not believe it unreasonable to assume winter peak load conditions, as Duke may have assumed winter peak load conditions in many cases of the studies already.

Below is the definition of each case study as defined by ERAG:

Summer Peak Load (yyyySUM) is defined as the summer peak demand expected to be served, reflecting load reductions for peak shaving. Topological modeling changes shall be incorporated into the model if they are to go into effect on or before July 15. Summer interchange schedules should reflect transactions expected to be in place on July 15. Planned summer maintenance of generation and transmission should be reflected in the operating year case.

Winter Peak Load (yyyyWIN) is defined as the winter peak demand expected to be served, reflecting load reductions for peak shaving. Topological modeling changes shall be incorporated into the model if they are to go into effect on or before January 15 of the following year (yyyy + 1). Winter interchange schedules should reflect transactions expected to be in place on January 15. Planned winter maintenance of generation and transmission should be reflected in the operating year case.

Light Load (yyyySLL) is defined as a typical early morning load level, modeling at or near minimum load conditions. Topological modeling changes shall be incorporated into the model if they are to go into effect on or before April 15. Pumped storage hydro units should either be modeled off-line or in the pumping mode, with appropriate pumping interchange schedules in place. Dispatchable hydro units should generally be modeled off-line, with run-of-river hydro on-line. Generation dispatch and interchange schedules should be commensurate with the experience of the area during such load

periods, not just including firm transactions. Planned spring maintenance of generation and transmission should be reflected in this case. Summer or appropriate equipment ratings should be used.

It is my understanding that the power flow study results are the results that might change due to a winter peak case. As Duke considers the winter peak case, Duke will typically rework the following inputs:

- System demand under the winter peaking scenario – This will change based on the time of day, and it could therefore be affected by energy storage.
- Added generation under the winter peaking scenario – This is the only case where the use of production profiles are useful to Duke for the study of storage since batteries may not discharge at the full nameplate output of the array, and Duke will need to understand what the applicant intends.
- Firm transactions – Duke purchases and sells energy on a regular basis, and this could be affected by the addition of energy storage.
- Topology of the system – This is typically constant, but is affected by time and could be affected by energy storage.
- Facilities ratings – Facilities ratings are utility defined, and are temperature dependent from season to season. These ratings may change at the utility's discretion.

For the power flow analysis, it is my understanding that Duke could consider energy storage using the winter peak case, which would require about four to eight hours of study time with an additional four to eight hours of review time.

Q. EVEN IF DUKE HAS TO CONSIDER THE POWER FLOW ANALYSIS AGAIN DUE TO A CHANGE IN PRODUCTION PROFILE, SHOULD A MATERIAL MODIFICATION BE TRIGGERED THAT WOULD REQUIRE A NEW SYSTEM IMPACT STUDY?

A. No. Since the addition of energy storage will not impact the vast majority of the study results and because the power flow analysis requires only a minimal time commitment from Duke, the addition of DC-coupled energy storage that alters the daily production profile should not trigger a Material Modification.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.

MICHAEL R. WALLACE, PE, CEM, GBE

mwallace@ecoplexus.com | phone: 207.217.2216 | 25 Carriage Way, Scarborough ME 04074



Ecoplexus, Inc, Vice President, Southeast Development

Versatile and outcome-oriented individual with 14+ years' achievement in progressively responsible engineering and business leadership and a proven history of success at the helm of challenging, multimillion-dollar projects. Multidisciplinary engineer and business owner who effectively manages clients, vendors and staff, excels at building teams, and delivers process improvement initiatives that fuel bottom-line growth. Adept in all aspects of construction management, field engineering, design engineering and process engineering. Wholehearted leader with the business and financial planning acumen to conduct reliable forecasting and complete projects on-time and under-budget. Core stakeholder responsible for identifying risk, secure funding, project procurement and managing resources. Professional Engineering (PE), Certified Energy Manager (CEM), Green Building Engineer (GBE).

Areas of Expertise:

OPERATIONS MANAGEMENT, INVESTMENT STRATEGIES, PROJECT MANAGEMENT, DESIGN, NEW CONSTRUCTION, RENOVATIONS, STRATEGIC PLANNING & ANALYSIS, P&L, COMPLIANCE, CONTINUOUS IMPROVEMENTS, BUDGETING, REPAIRS, CAPITAL REPLACEMENT PROJECTS, REPORTING, TRAINING, INSPECTIONS, CONTRACT NEGOTIATION, LEASE NEGOTIATIONS, REQUEST FOR PROPOSAL, BUSINESS PLANNING, PURCHASE POWER AGREEMENTS, INTERCONNECTION AGREEMENTS; DEVELOPMENT STRATEGY

PROFESSIONAL EXPERIENCE

Ecoplexus, Inc. – Durham, NC

A Better Energy Future

May 2017 to Present

mwallace@ecoplexus.com

Vice President, Ecoplexus, Inc.

Ecoplexus believes in a better energy future. We are a leader in the development, design, construction, and financing of solar power projects for the commercial, municipal, non-profit and utility markets in the US and key International markets. The Company's energy services capabilities, and strong analytical and project finance expertise are the foundation from which we have successfully developed, built and financed many solar energy facilities in a short period of time. We focus on distributed generation and utility scale projects in the 2MW-AC to 100MW-AC range and are currently working a pipeline of over 3000 MW-AC of projects in the US and Internationally.

Ecoplexus currently has employees in San Francisco CA, Dallas TX and Raleigh NC in the United States, as well as International offices in Japan, Mexico, Turkey and Thailand. The EcoPlexus project teams have completed, or currently have under construction, over two hundred (350) MWs of projects, and include Licensed General Contractors (B), Licensed Electrical Contractors (C-10), Specialty Solar Contractors (C-46), and NABCEP certified professionals.

The finance team has originated over (\$300m) three hundred million in projects to date under Power Purchase Agreements with excellent returns for investors.

- <http://www.ecoplexus.com/>
- Lead business planning, business development, and design expertise in all aspects of utility scale solar with a focus on projects designed for distribution and transmission interconnections ranging from 2 MW AC to 300 MW AC in the Eastern US. Manage a team of 8-12 individuals who initiate projects from concept through development and onto construction to deliver to long term value to Stakeholders.
- Responsible for strategy and business planning in Southeast United States. Currently managing a pipeline of approximately 3000 MW-AC. Responsible for origination of projects with utilities including Duke Energy, Florida Power & Light, South Carolina Electric & Gas, Dominion, Southern Company, Tampa Electric, Seminole, and Santee Cooper.
- Responsible for complete development of utility scale projects to construction including negotiation and Purchase Power Agreement and Interconnection Agreement.

Sunlight Partners – Portland, ME

2015 to 2017

Our Mission + Your Land = Environmentally Friendly Clean Energy

Michael.Wallace@sunlightpartners.com

Senior Vice President, Sunlight Partners, LLC

Led business planning, business development, operations and design expertise in all aspects of utility scale solar with a focus on projects designed for distribution and transmission interconnections ranging from 2 MW AC to 40 MW AC. Manage a team of 6-10 people who initiate projects from concept through development to deliver to long term owners/investors at "Notice to Proceed" (NTP) status ready for construction. Responsible for creating and maintaining a P&L plan for Sunlight Partners. Responsible for managing all consultants and vendors in states of operation. Understanding of solar tax equity structures critical for financing solar projects. Key development areas and tasks include:

- SUNLIGHT PARTNERS – NC, GA, and NY | UTILITY SCALE SOLAR DEVELOPER: Developed of over 425 MW AC of solar in North Carolina consisting of two portfolios. Ongoing development efforts for distribution and transmission scale projects in North Carolina, Georgia and New York. Over 300 leases secured and ongoing, approximately 80 projects developed or in various development stages. Strong communicator and networker which has led to the growth and recognition of Sunlight Partners in the industry across the United States. Created and maintain Sunlight Partners business plan, development strategy, development schedule and execution. Total portfolios value to date of approximately \$50 MM.
- Managed and provided development expertise of each individual site including; identifying sites, interconnection application, power purchase agreement, interconnection agreement, site single line drawings, site layout design, site engineer of record, state regulatory and legislative knowledge, PVsyst power output analysis, phase 1 & phase 2 environmental site assessment, wetland delineation including jurisdictional determination, site surveying, Nation Environmental Policy Act (NEPA) permitting, over 200 planning board & County Commissioner hearings resulting in Special Use permits, Utilities Commission Applications and management, FERC Applications and management, Archaeological Survey, EPC management to establish baseline pricing.
- Currently continuing to work with Sunlight Partners as a Senior Vice President to finalize a 170 MW-DC with Duke Energy Progress in North Carolina. www.sunlightpartners.com

Cate Street Capital – Portland, ME

2014 to 2017

Intelligent Investing For a Sustainable Future.

mwallace@catecapital.com

Managing Director, Engineering Cate Street

Provided engineering and project management expertise and guidance across multiple business ventures for Cate Street Capital.

- BURGESS BIOPOWER – BERLIN, NH | ENGINEERING DESIGN & PROJECT MANAGEMENT: Served as a professional engineer to evaluate and offer assistance for a 75 MW bio-mass facility in northern New Hampshire. Duties included:
 - a.) Preparation and review of the site Spill Prevention Plan.
 - b.) Physical review of punch list items during project close to assists Babcock and Wilcox to get to substantial completion.
 - c.) Managed a landfill gas and natural gas feasibility study in which both were considered to help offset the rising cost of biomass fuel. Project involved looking at new sub gun assemblies for the existing bubbling fluidized bed as well as a combine heat and power unit at 5.4 MW AC to help offset the parasitic loads. Based on the projects return on investment, a landfill gas pricing model was derived to understand how much Burgess Power could afford to pay for this technology.
- ORGANIC NUTRITION INDUSTRIES – RATON BOCCA, FL | FACILITY DESIGN: Served as a professional engineer to assists in the design and construction of a facility intended to convert organic waste streams into edible protein for animals. Duties include assisting with a complete design package to provide finance, engineering, construction management, permitting, regulatory affairs and operational support to prepare the site commercial operation.
- THERMOGEN – MILLINOCKET, ME | ENGINEERING DESIGN & MANAGEMENT: Served as a professional engineer to assist and support in the design of a 330 metric ton/yr black pellet plant in Millinocket, Maine. Duties included:
 - a.) Working with outside engineers to develop a plant layout and process flow.
 - b.) Directing and working with vendors to identify equipment necessary to meet the project pro-forma material output.
 - c.) Review, input and guidance of the plant mass balance.

D.E.E.P. Engineering Solutions LLC – Scarborough, ME
Design, Evaluate, Execute, Performance – Engineering Design Company.

2013 to 2017

Michael.wallace@deepengsolutions.com

Owner & President/Principal Engineer

Provide design and operational expertise in all aspects of commercial and industrial engineering with a focus on industrial process and energy conservation. Manage project teams of 5-10 people for an engineered wood product facility, commercial building design and process piping design. Effectively analyze the task presented, construct a scope based on available budget and client expectation and complete the task in the time allotted. The company has expanded in revenue 30%-35% since its inception with 100k + of contracts on the books in 2016.

D.E.E.P. Engineering Solutions is a multi-discipline engineering consulting firm with professional liability insurance to handle projects valued up to \$10 MM. D.E.E.P. utilizes Paragon Management for CPA and financial services as well as Brann & Isaacson for legal advice and contracting. Key clients and projects include:

- **SUNLIGHT PARTNERS, LLC – PORTLAND, ME | ENGINEER OF RECORD:** Principal Engineer in charge of all solar design work which is submitted to the utility and local jurisdictions for approval. These tasks include preliminary single line drawings, site layouts, FERC applications, Public Utility Applications, and Utility Applications.
- **IDEXX LABORATORIES, INC. – WESTBROOK, ME | CHILLED WATER UPGRADE OWNERS ENGINEER:** Owners Engineer responsible for reviewing a chilled water tie-in between the East and West buildings. Duties include P&ID review, pumping requirements review, site layout & piping design review, control narrative review.
- **LOUISIANA PACIFIC – HOULTON, ME | LOG DECK & SLASHING MODERIZATION:** Principal Engineer in charge of new log deck and slashing system. Reviewed the existing log deck and slashing system design as intended during the Laminated Strand Lumber, (LSL) upgrade. Current log singulation and pendulum slashing design did not meet LSL board output. Worked with the plant team to confirm the existing mass balance and desired throughput. Developed a vendor specification and worked with three equipment suppliers on various layouts which were reviewed and graded. Based on equipment cost, schedule and functionality a vendor was selected to assist in the final design. The project is scheduled to be implemented in early 2018. Project valued at \$4MM.
- **LOUISIANA PACIFIC – HOULTON, ME | REGENATIVE THERMAL OXIDIZER STACK EVALUATION:** Principal Engineer in charge. Reviewed the existing 100 foot process stack for structural integrity. Ultra-Sonic thickness measurements were taken in six locations every 5 to 6 feet in height. Measurements were compared to ASME-STS-1-2000 and revision ASME-STS-1a-2003 for code compliance. Anchor bolts were evaluated and a recommendation made to protect the integrity of the bolts.
- **STEEL-PRO INCORPORATED – ROCKLAND, ME | ASME VESSEL DESIGN REVIEW:** Provided review of filter and accumulator assembly design per ASME standards and client design specifications. Upon completion of review, provided Professional Engineering Stamp for construction and installation. Have completed these reviews in Washington and California.
- **RAMSAY WELDING & MACHINE – LINCOLN, ME | CONVEYOR DESIGN & RECORD DRAWINGS:** Serving as the Principal Engineer responsible for working with an engineered wood products company on behalf of Ramsay Welding & Machine. Design of a heavy industrial Oriented Strand Board sanding line including rolls conveyor, chain conveyor, jump chain conveyor, paint both conveyor, paint booth, boxing ring conveyor, strapper and discharge rolls. Responsible for all equipment design and shop drawings. Shop drawings supplied to Ramsay Welding & Machine to construct and install the approved design. Sizing of conveyor structural members was a key to the success of the project. Drawings were finalized as record prints and stamped with Professional Engineering Seal. Project valued at \$330k.
- **RAMSAY WELDING & MACHINE – LINCOLN, ME | COMMERCIAL BUILDING FLOOR ANALYSIS:** Served as the Principal Engineer responsible for evaluating an existing 2nd story floor to determine additional beam sizes needed to support a client requested live and dead load while maintaining proper deflection per code. Final stamped calculations were provided to Ramsay Welding & Machine with Professional Engineering Seal.

WOODARD & CURRAN – Portland, ME

2011 to 2013

840-person, integrated engineering, science, and Operations Company.

Project Manager

Provided expertise in all aspects of project management, construction management, field engineering, design engineering, and process engineering. Managed 3–15-person project teams on diverse engagements, including: process design for engineered wood product facilities; paper and tissue manufacturing design; water room treatment design; food and beverage utility and process design; steam design; and boiler systems design. Effectively managed client expectations, carefully monitor scheduling, and ensure accurate reporting. Implement broad-spectrum process improvements and spearhead compliance initiatives for diverse clientele. Key clients and projects included:

- **IDEXX LABORATORIES – WESTBROOK, ME | FACILITY BOILER STUDY, DESIGN & INSTALLATION:** Lead Principal Engineer of record, responsible for completing a detailed energy study of a campus boiler system. The campus was composed of two buildings covering 200,000 sqft and 350,000 sqft respectively. The study included steps necessary to combine the East 550 HP boiler system with West 800 HP boilers system. Five boilers total. Responsible for complete design including friction loss, pipe routing, pipe sizing, boiler lifespan analysis and overall system efficiency. Effectively managed the engineering, procurement and installation within the purposed scope, schedule and budget. Responsible for holding daily project meetings with 3-5 contractors, the client and engineering staff throughout the 6 month project. Total project savings were calculated at \$300k and are on target as three of the five boilers were placed on backup once the two buildings were combined.
- **CON EDISON – NEW YORK, NY | POWER ENGINEERING BOILER DESIGN:** Serving as lead Project Engineer on \$500K, year-long component of \$46MM project for one of the nation's largest investor-owned utility companies. Proactively managed client expectations while directing 6–7-person team and ensuring on-time project scheduling. Reviewed piping and instrumentation diagram (P&ID) for a new, 12-inch Natural Gas line addition for 5 boilers on West 59th Street and 7 boilers on East 74th Street and created functional test procedures for commission team. Conceived, managed, and maintained project schedule comprising 300+ procedures and codes, including NFPA 54, NFPA 56, NFPA 85 and American Gas Association Purging 2001.
- **COCA-COLA – ATLANTA, GA | STEAM & POWER COGENERATION DESIGN:** Built full facility from scratch, serving as lead Project Engineer on intensive year-long project. Held direct management responsibility for 2–4 engineers throughout all phases of implementation. Designed utility connections for GE-supplied engine. Completed stress analysis of 6" steam line utilizing Caesar II, checking codes B31.1 and B31.3. Determined and identified anchor points, expansion joints, and valve locations. Performed hydraulic calculations relating to engine's high- and low-cooling circuits for pump selection, potable water system for booster pump selection, process waste for pump selection, feed water line for pump skid selection and condensate line for pump skid selection. Developed P&IDs for the compressed air system, potable water system, process waste system, feed water system, condensate return system and steam system. Drafted mechanical specifications for the contractor to purchase and install piping, valves, insulation and components.
- **COCA-COLA – NATIONWIDE | 1881 CLOSURE UPGRADES:** Lead Project Engineer to convert 32 small PET lines to 1881 closures, which improved sustainability (utilizing a single thread start) and reduced closure inventory levels across North America. Managed 9 plant conversions across the U.S. and assisted on others. Supported plant maintenance teams in assessments of cappers. Developed plant shutdown schedule for implementations of key improvements, with the duration of outages ranging from 2–5 days. Personally supervised all shutdowns and startups.

D&S ENGINEERING, INC. – Millinocket, ME

2009 to 2010

Offering broad-spectrum construction services as well as designs and studies.

Project Engineer

Assisted process design in paper mills and surrounding industrial facilities throughout Maine for a small, multidisciplinary firm. Identified inefficiencies and implemented process improvement initiatives.

Signal achievements as project engineer at D&S Engineering, Inc. (2009–2010):

- HOSPITAL – MAINE: Evaluated an existing hospital kitchen and measured heat loads generated throughout normal day. Calculated sensible and latent heat loads; subsequently selected appropriate cooling coil for an existing air makeup unit.
- POWER PLANT – NORTH CAROLINA: Identified Reverse Osmosis (RO) system that could effectively treat the water supply that the plant received from the city (and used to produce steam). Assisted vendors in selecting an RO system and submitted pricing for selection.
- CORRECTIONAL FACILITY – MAINE: Designed 6" return-and-supply hot water line, transferring water to new 1.2-MMBTU/hr pellet boiler stationed in a building approximately 100 ft. from existing mechanical room. Installed pipe outside at 10'-elevation and placed in compliance with new pipe stands. Produced detailed design, encompassing valving, insulation, wall penetrations and thermal expansion

LOUISIANA PACIFIC CORPORATION – Houlton, ME

2004 to 2008

Leading manufacturer of quality engineered wood building materials.

Senior Plant Engineer/Project Manager (2005 to 2008)

Served as in-house engineer and project manager, leading all phases of capital projects ranging in scope from \$20K to \$3.5M. Ran pre-bid and construction meetings to ensure clear communication and strategic alignment between the plant, contractors and all vendors for each project. Acted as construction manager, POC, and field-engineer throughout implementation. Leveraged financial planning skillset to assist in the calculation of ROI for each project. Managed 14 maintenance personnel during internal plant projects, while holding indirect management responsibility for up to ~115 workers across 3 shifts during day-to-day operations. Undertook plant wide process improvements initiatives, designed structural supports for equipment/catwalks, and implemented product storage systems.

- OVERSAW \$7M in capital expenditures in 2007, including \$3.5M replacement of a Regenerative Thermal Oxidizer for the plant's dryer gases.
- MANAGED phases of large-scale project to flush and refill 45K gallons of thermal oil fluid from an LP plant's energy system. Captured 33% increase in capacity by designing conveyor modifications for 8-belt and drag-chain conveyors.
- DESIGNED AND INSTALLED new wet-bin distribution conveyors to transport wood flakes to various bins for storage, forecast to increase capacity by 25%.
- KEY CONTRIBUTOR on 2-year, \$150M design and build of new Laminated Strand Lumber (LSL) line at the New Limerick facility. Performed design reviews during execution of LSL line and at various OEM facilities and conducted extensive field engineering during LSL construction phase. Served as plant representative on all subsequent design changes as the project developed and managed small pieces up to \$250K.
- LED project team in overhauling 6K gallon propane farm, bringing the system into compliance with NFPA 58.
- DIRECTED project teams of 5–50 direct reports—and as many as 80 during shutdowns.

Plant Engineer II /Project manager (2004 to 2005)

Efficiently coordinated diverse capital projects for Louisiana Pacific, with management responsibilities spanning budgeting, scheduling, and engineering. Reviewed the equipment proposals of OEMs for all processes within the plant. Led teams within the facility to modify and improve existing equipment and processes. Directed plant shutdown activities and created a work schedule governing all plant functions.

PROFESSIONAL PROFILE

| | |
|------------------|--|
| Organizations | Town of Scarborough Maine Energy Committee, North Carolina Clean Energy Business Alliance, North Carolina Sustainable Energy Association, South Carolina Clean Energy Business Alliance, South Carolina Solar Business Alliance. |
| Education | Bachelor of Science in Mechanical Engineering – University of Maine – Orono, ME |
| Associations | American Society of Heating, Refrigeration & Air Conditioning Eng (ASHRAE) American Society of Mechanical Engineers(ASME) Project Management Institute (PMI) Association of Energy Engineers (AEE) |
| Technical Skills | Microsoft Office (Word, Excel, PowerPoint, Outlook & Project 2013), Adobe Acrobat 9 Professional Design software: Micro Station, Math Cad, Auto Cad 2013, Pipe-Flo (Hydraulic Modeling), Mechanical Desktop, TRANE – TRACE 700, Compress Codeware, Caesar II Stress Analysis, PVsyst Computer Programming: FORTRAN & Q-Basic |
| Registrations | Licensed Professional Engineer, ME, 12281; Registered Professional Engineer: NH, 13239; VT, 72395; MA, 48926; GA, 35979; CA, 35984; NY, 091268; the Commonwealth of Virginia, 052010; WA 50397; North Carolina, 041311; Florida, 77501 Certified Energy Manager-CEM# 20388 Green Building Engineer-GBE |