

RMS Energy TDEC Statement of Qualifications

Submitted By:

**RMS Energy Co, LLC
T&D Engineering and Consulting**

Charlie McClelland
Longroad Energy
(814) 490 7369

SOQ
Date: September 9, 2025
Rev #: A

Statement of Qualifications

Dear Mr. McClelland,

RMS Energy is pleased to submit this State of Qualifications (SOQ) in response to Longroad Energy's request for the purpose of supporting their bid for MA DOER RFP.

Our team members bring more than 350 years of combined professional experience delivering a wide range of services across a project life cycle. We have supported multiple utilities, developers, investors, and other entities on projects involving Protection & Control enhancements, Traditional Transmission Systems, High Voltage Direct Current (HVDC) systems, Flexible AC Transmission Systems (FACTS) technologies, data center integration, energy storage integration, and other grid-enhancing solutions across North America.

Key areas of Capabilities include:

- Performing various interconnection studies to support integration of generation (i.e. BESS, PV, Wind) or large load (i.e. data centers).
- Serving as Owner's Engineer providing technical oversight and strategic guidance through any stage of a project life cycle.
- Providing technical solutions for transmission, distribution, and generator system protection and automation as well as detailed P&C design.
- Providing substation engineering and design services for systems up to 765 kV.
- Conducting operational and performance reviews to assess technical and contractual compliance and ongoing project viability.

We are pleased to have supported Longroad Energy for this project and look forward to our continued partnership.

Yours sincerely,

Shariq Siddiqui

Vice President

T&D Engineering and Consulting | **RMS Energy**

Phone: (724) 900-5962

Email: shariq.siddiqui@rmsenergy.com

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RMS Energy Qualifications

OWNER'S ENGINEERING SERVICES

As the Owner's Engineer, we deliver strategic support across every stage of project development—from preliminary engineering, Scope of Work (SOW) development, and Request for Proposal (RFP) preparation to bid evaluation, equipment specifications, design review, implementation, and commissioning. Our role includes reviewing protection and control (P&C) systems to ensure they align with operational goals, budget requirements, and regulatory standards. Serving as the Owner's trusted advisor, we remain focused on protecting the project's best interests.

We provide customized P&C solutions designed to address the unique demands of complex loads, captive generation, and process-critical equipment. From conducting fault studies to implementing system upgrades, we engineer protection schemes that maximize reliability, safety, and uptime. Our involvement extends through Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) to ensure system performance and quality.

ENGINEER OF RECORD SERVICES

As an Engineer of Record, we assume professional responsibility for the engineering design that is within our specified discipline for a project, providing accountability for the project's integrity and performance. We develop and/or review and stamp all design documents, including calculations, drawings, and specifications, to guarantee full compliance with all applicable building codes and industry standards. We actively engage in critical coordination with other project disciplines, review and approve specialty designs and shop drawings, and provide construction-phase support through timely RFI responses and site observations. Our commitment extends to upholding the highest standards of public and professional safety and welfare by delivering sound, constructible, and code-compliant engineering solutions throughout the project lifecycle.

SUBSTATION ENGINEERING & DESIGN SERVICES

A. Core Technical Capabilities

Our team includes subject matter experts (SMEs) in System Protection & Automation, Owner's Engineering Support, Protection and Control (P&C) Systems, Detailed Electrical and Civil Design, Regulatory and Compliance Studies (NERC/FERC/PRC), and Testing, Commissioning, and Energization Procedures.

B. Substation Electrical Design Expertise

Our team includes professionals with experience in substation electrical design for substations ranging from 115 kV to 765 kV, including:

- Developing substation drawing sets (one-lines, site layouts, grounding, conduit routing and control/auxiliary building plans)
- Review structural steel and foundation design inputs
- Development and validation of protection schemes, relay settings, and logic
- Architecture design and validation for SCADA/EMS, including cybersecurity compliance per NERC CIP and industry best practices
- AC/DC single-line and three-line diagram reviews
- Review of 30%, 60%, 90%, and IFC design packages
- OEM Technical Documentation and Drawing Package Review
- Execution of design-phase electrical studies such as:
 - Cable ampacity, Load flow, Reactive power analysis, Short-circuit, Stability, Harmonics, and Fault analysis studies

C. Grounding & Lightning Protection Expertise

Our team includes professionals with more than 12 years of specialized experience in:

- Grounding studies for AIS and GIS substations (12.5 kV to 550 kV)
- Application of CDEGS and WinIGS for step/touch potential analysis and grid design
- Lightning protection system design using WinIGS, Empirical methods, Rolling Sphere, and hand calculations

These capabilities are applied in full compliance with IEEE Std 80, 998, NESC, and client-specific standards to provide safe and effective system performance.

D. Client Utility Experience

Our track record includes successful engagements with leading utilities and regional operators, including:

- PSE&G, Southern California Edison (SCE), PEPCO, ITC Midwest, FirstEnergy, AEP, Georgia Power (GPC), Duke Energy, Delmarva Power, National Grid, MISO, PJM, Oklahoma Gas & Electric, and other confidential clients.

These collaborations have refined our ability to deliver **safe, reliable, and technically rigorous infrastructure** that meets the operational and regulatory needs of clients across North America.

SYSTEM PROTECTION AND AUTOMATION

A. System Protection Studies

Systems Protection is an art by itself. There is not one single solution for a specific challenge, and this is why our team relies on its solid expertise and knowledge of the top industry relay manufacturers to deliver precise and reliable relay settings to optimize protection systems. We account for fault studies, equipment ratings, and system operating conditions to configure relays for maximum performance. We don't stop at the protective settings, but we also provide custom logic. We also provide detailed documentation and testing procedures to validate relay settings in the field, ensuring compliance with standards and reliability criteria.

B. System Protection Standards

Our team partners with Investor-Owned Utilities, Municipal Utilities, Rural Utilities, Power Generating plants, Large Load facilities, Renewable Energy providers, including Inverter-Based Resources, to develop customized protection philosophies that align with grid compliance requirements, industry standards, guidelines, and best practices. We tailor each philosophy to address the unique needs of a project, focusing on defining protection zones, identifying critical assets, redundancy, regulatory compliance, and determining the most suitable protection schemes. RMS engineers strive to balance security, dependability, selectivity, and speed, providing a solid foundation for system stability and performance.

C. Protection Coordination Studies

Our System Protection team provides industry-leading Area Protection Coordination Studies, ensuring electrical systems are optimized for reliable and safe operation under specified conditions. Using advanced tools such as Aspen OneLiner, CAPE, ETAP, and EasyPower, we analyze system parameters, equipment characteristics, fault currents, and voltage levels to design effective protection schemes.

What sets our reports apart is their clarity and actionable insights. Each report includes detailed coordination curves, settings recommendations, and clear justifications, presented in a format that is both comprehensive and easy to understand. We go beyond standard practices by offering tailored solutions that consider project-specific requirements and compliance with industry standards. Our comprehensive documentation enables effective implementation and serves as a valuable reference for engineers and operators alike. Whether for new installations or system upgrades, our studies improve enhanced operational reliability and compliance.

D. Relay Settings

We are experienced with Microprocessor based and Electro-Mechanical relays. Our competencies include Schweitzer, Siemens, GE, Beckwith, Basler relays and their proprietary tools.

RMS's system protection engineering broad competence and experience encompasses:

- Transmission Lines 69 kV – 765 kV (Overcurrent, Distance, Line Current Differential, and Communications-Based Schemes like DCB, POTT, DCUB and PUTT)
- Distribution Lines 4 kV – 35 kV
- Substation Equipment (Buses, Transformers, Breakers, Capacitors, Reactors, etc.)
- Generating Stations

E. Legacy Protection Systems

RMS Energy long experience in system protection allows to work with legacy schemes like:

- Pilot Protection
- Electromechanical Relays
- Electromechanical Relay Upgrades

F. System Protection Tools

- ASPEN Oneliner
- CAPE
- SEL AcSELerator
- GE Enervista UR
- Siemens DIGSI
- Basler BESTCOMSPlus

G. Automation and Relay Communications

We design and implement relay communication schemes that enable data exchange between devices for improved system monitoring and faster fault response. Whether configuring mirror-bit, IEC 61850-based GOOSE messaging or legacy protocols, our team designs secure and efficient communication systems tailored to project needs.

P&C DETAILED ENGINEERING

Our team at RMS Energy specializes in delivering complete Protection and Control (P&C) design packages for utility substations and industrial projects, ensuring effective integration and reliable operation of protection systems. Using industry-standard tools like AutoCAD, we develop detailed and accurate schematics that encompass every aspect of the P&C system, including single line diagrams, AC and DC schematics, wiring diagrams, and relay logic. RMS provides equipment technical specification of relay panels, relays, cables, control building, etc.

What sets us apart is our rigorous internal QA/QC process, which provides quality and consistency in our deliverables. Our experienced team of engineers not only provides technical accuracy but also strives to optimize designs, balancing functionality, cost-efficiency, and future scalability. Whether it's a greenfield project or an upgrade to an existing system, our

P&C drawing packages are designed to meet project costs, timelines, regulatory standards, and industry benchmarks.

Each project begins with a clear understanding of the scope, budget, and schedule. Our Project Management team facilitates the interaction between clients and RMS's engineering team with onsite and remote meetings. A kickoff meeting and project walkdown is essential with all key members of the project. Any potential obstacles to the project are reviewed and plans to address them are developed. Issued for Review (IFR) are developed and after addressing comments, Issued for Construction (IFC) package is provided. During the construction, testing and commissioning phase, our engineering team is there to provide field support. At the end of the project, we work on the as-left/red-lines/closing package to prepare updated drawings, relay settings, etc., memorialized for operation.

POWER SYSTEM STUDIES

A. Power System Studies

RMS Energy has decades of experience in performing power system studies. Our team specializes in conducting Steady-State, Short-Circuit, Dynamic Stability and Electromagnetic Transient (EMT) Studies. RMS Energy team brings deep expertise in navigating the latest requirements established by interconnecting or affected ISOs, RTOs, and Transmission Owners (TOs), supporting clients in addressing the complexities of today's grid environment. With the increasing presence of Inverter-Based Resources (IBRs), electronically coupled loads, and advanced technologies such as Flexible Alternating Current Transmission Systems (FACTS) and High Voltage Direct Current (HVDC) devices, we apply modern technological solutions and align with current regulatory standards to deliver tailored strategies that support grid efficiency, reliability, and resiliency. Our team has extensive experience in performing power system studies and model development for utilities and developers in ERCOT region. In addition to the power system studies outlined in the following sections, RMS Energy also possesses advanced capabilities to perform both dynamic stability and Electromagnetic Transient (EMT) studies. These specialized studies address critical aspects of system behavior that are not fully captured through traditional steady-state analysis. In dynamic stability studies the ability of the system to maintain synchronism after being subjected to a large disturbance, such as a fault will be evaluated. As part of the dynamic stability studies, RMS Energy evaluates system performance against transient voltage response and damping criteria defined by TOs or ISOs. These studies involve simulating a range of contingencies consistent with NERC categories P1 through P7, including single and multiple element outages.

Additionally, RMS Energy offers comprehensive EMT studies which are crucial for identifying potential risks to transmission facilities. Our expertise encompasses Temporary Overvoltage (TOV) studies, which are vital for understanding the impact of events like ground faults and load rejection, particularly for generators. We also conduct Transient Recovery Voltage (TRV) studies to evaluate whether breakers can effectively interrupt fault currents. Furthermore, RMS Energy performs Capacitor Switching studies to support appropriate sizing

of current limiting reactors and assess the necessity for Point-On-Wave (POW) breakers implementation. Our capabilities extend to Transformer Energization studies, allowing us to evaluate inrush currents and prevent protection and control mis-operations. By offering these comprehensive EMT and system related study capabilities, RMS Energy supports the safe and reliable operation of transmission facilities.

B. Load Flows

Load Flow analysis plays a critical role in maintaining the safe and efficient operation of the power grid. It checks whether all system components operate within their designated thermal and voltage limits under a variety of conditions, thereby preventing equipment from violating thermal limits or experiencing voltage instability. These precautions are vital to avoid potential equipment damage, failures, or cascading outages across the network.

RMS Energy conducts Thermal and Voltage Limit Assessment, which evaluates the thermal ratings of transmission lines and equipment, confirming they remain within safe thermal thresholds. It also verifies that voltage levels throughout the network are maintained within acceptable limits defined by TOs. This foundational assessment provides a baseline for system stability. As part of the load flow analysis, we perform N-1 contingency analysis to test the system's ability to remain stable following the unexpected loss of a single element, such as a transmission line or generator. It evaluates whether thermal and voltage levels can be maintained within safe limits under such a scenario. The N-1-1 contingency analysis introduces a more rigorous test by simulating the loss of a second system component after the first has been lost and adjustments have been made. This analysis offers a deeper understanding of the system's resilience and its ability to adapt to multiple, sequential failures without violating thermal or voltage constraints. NERC-defined contingency events (P1-P7) and ERCOT's PSS/E base cases provided by Steady State Working Group (SSWG) will be used to perform load flow analysis.

C. System Studies

RMS Energy stands ready to be your trusted partner in navigating the intricacies for performing power system studies for various types of projects. From the initial stages, RMS Energy can support you through the screening study by performing steady-state analysis to identify potential thermal and voltage violations and upgrades required due to the addition of a new project. Our insights at this stage can be crucial in understanding potential limitations early in the process. Moving forward, RMS Energy possesses a deep technical knowledge and experience to guide you through every aspect of system studies. This encompasses steady-state, stability, and short-circuit studies to determine the reliability impact of your project and identify necessary upgrades required. RMS Energy can assist in the scoping process, addressing all necessary study elements. Furthermore, RMS Energy can contribute to the Facility Study by providing conceptual design support and understanding the associated cost estimates for required facilities. RMS Energy is equipped with a team of experienced professionals capable of performing EMT studies (such as TRV analysis and transformer energization studies) to support detailed and project-specific evaluations. In addition to

localized studies, we perform wide-area EMT analyses that require modeling large sections of the transmission network at EMT-level detail. These studies are particularly relevant in regions, where Sub-Synchronous Resonance (SSR) studies are frequently conducted. Other key applications of wide-area EMT analysis include the evaluation of grid support technologies (such as SVCs, STATCOMs, and synchronous condensers), accurate simulation of complex control interactions, and enhanced analysis of grid stability under high-stress or high-inverter-penetration conditions. In conducting system studies, RMS Energy will check requirements defined by the governing ISO/RTO including voltage stability margin, steady-state voltage criteria, transient voltage response criteria, damping criteria, minimum deliverability criteria and maintenance outage reliability criteria.

System Studies Tools

RMS Energy has access to the following commercially available software for system studies and benefits from utilizing cloud servers to maximize simulation speed and enable parallel processing for computationally intensive simulation, improving overall efficiency and performance.

- PSSE
- PSCAD
- PSLF
- DSA Tools
- TARA

Appendix 1 - RMS Energy Previous Owner's Engineer, Advisory, EOR Experience

Independent / Owner's Engineering & Advisory Service Experience		
Client	Project	Description
Confidential	HVDC Studies and Owner's Engineering	- Developed scopes and reviewed results for interconnection studies, integration studies, HVDC OEM design studies, and AC substation/line design studies. - Developed generic HVDC PSCAD model for system studies. - Reviewed system studies from HVDC OEM including dynamic AC system equivalents and interaction studies. - Reviewed design studies from HVDC OEM and AC substation/line design. - Managed study scopes and FEED deliverables across multiple EPC/OEM/utility/ISO interfaces in WECC.
Confidential	HVDC Studies and FEED Support	- Developed and led scope of work for interconnection/impact studies in SPP. - Documented study assumptions and detailed results for approval by SPP Transmission Working Group (TWG). - Developed reduced AC network model of SPP system for wide-area PSCAD studies. - Performed model verification for project-specific OEM model for impact studies. - Performed IEEE 2800 verification of HVDC model from OEM as well as generic model. - Developed grid interconnection requirements, grid code, and study scope for generation interconnection requests. - Developed and led scope of work for several generation GW connecting to the HVDC system. - Developed models for system impact studies in MISO and performed material modification and design optimization studies.
ATCO	HVDC Transmission Capital Management Program	Managed transmission capital maintenance (TCM) and sparing strategy programs. Directed and led field team responding to HVDC equipment outage root cause analysis for forensic troubleshooting and safe restoration to operation at EATL and McNeill HVDC facilities.
Manitoba Hydro	Roseau 500kV Series Compensation Upgrade Project	Led QA/QC reviews and validated simulation models of the consultant's user model submission for the new Roseau 500kV tag-less series compensation user model.
Invenergy Grain Belt Express	HVDC BOP Owner's Engineering	- Leading technical support for GBX multi-terminal 600 kV HVDC link - BOP specification development - RFIs with OEMs/EPC contractors - Project financial audits
Confidential	NY PPTN HVDC	- Managed technical support - Evaluated converter site designs, drafting designs basis documents - Coordinated RFIs with OEMs and platform partners - Oversaw schedule development, cable systems, and permitting - Identified outage and risk management strategies
Confidential	HVDC Owner's Engineering	Comprehensive reviews of OEM submissions and technical documentation to ensure compliance and quality
Confidential	HVDC	Consulting for grant funding applications for back-to-back HVDC project refurbishment
ATCO Electric	Nalcor LIL HVDC	Review design change, regression, FAT, OEM studies, and technical memos

Confidential	HVDC Technical Due Diligence	• Interconnection studies evaluation • Evaluation of cost estimates and permitting requirements • Assessed environmental factors, cable routing, and preliminary project schedules to support informed transaction decisions.
Confidential	FACTS Indoor Solution	• Consulting services reviewing indoor solution materials and internal engineering documentation.
Confidential	Offshore Wind HVDC	• Feasibility assessments of voltage classes and submarine cable technologies • Multi-infeed analysis • Risk registry development • Project scheduling
Confidential	Weak AC Grid Screening Studies for Wind Generation	• Specialized weak AC grid screening PSCAD studies of large DFIG wind development and control interaction with nearby HVDC and FACTS facilities. • QA/QC review of vendor's detailed wind turbine and power plant control PSS/E and PSCAD models • Submission of engineering studies by other contractors • Study report preparation to summarize study results, observations and recommendations for ISO requirement compliance.
ATCO Electric	HVDC & FACTS O&M	• Responsible for daily operation and maintenance engineering services at two HVDC and multiple FACTS facilities. Led HVDC & FACTS operation and preventive maintenance strategy development. Supported annual EATL system outage program for equipment deficiencies and condition assessments.
ATCO	Rycroft STATCOM Project Owner's Engineer	• As owner's engineer employee, provided QA/QC review of OEM's engineering package, design studies, specification studies, virtual FAT witnessing of STATCOM C&P and cooling systems, commissioning procedure for contractual and performance compliance enforcement for the direct-assigned ±50 Mvar Rycroft STATCOM project for grid support in a relative weak transmission region.
Manitoba Hydro	System Operations Support	• Maintenance engineer support for generation, transmission, and HVDC/FACTS facilities • Resolved equipment mis-operations and failures • Led real-time disturbance analysis for timely restoration of generation, transmission, and HVDC/FACTS systems. • P&C asset maintenance systems (health indexing, data availability, preventative maintenance planning) • Commissioning activity support and NERC compliance verification
Manitoba Hydro	HVDC model verification	• Led RTDS HIL testing and model development • Oversaw planning, logistics, testing procedures, and electrical construction • Developed detailed models • Created an automation program to streamline testing and analysis processes • Fully tested and deployed new directional current scheme before field commissioning.
Confidential	HVDC Studies and FEED Support	• Developed and led scope of work for interconnection/impact studies in SPP. • Documented study assumptions and detailed results for approval by SPP Transmission Working Group (TWG). • Developed reduced AC network model of SPP system for wide-area PSCAD studies. • Performed model verification for project-specific OEM model for impact studies. • Performed IEEE 2800 verification of HVDC model from OEM as well as generic model. • Developed grid interconnection requirements, grid code, and study scope for generation interconnection requests. • Developed and led scope of work for several GW of generation connecting to the HVDC system. • Developed models for system impact studies in MISO and performed material modification and design optimization studies.

Confidential	HVDC Modeling Support	- Developed PSSE model of in-service HVDC system and performed grid code verification as part of MOD-032 process involving multiple ISOs in the Eastern Interconnection. - Benchmarked PSSE model to measure dynamic quantities. - Evaluated compliance of HVDC system for nearby TPL-001 dynamic contingencies for appropriate dynamic response.
Confidential	HVDC Modernization	Technical feasibility and availability assessment
Confidential	HVDC Modeling and Interconnection	Developed and reviewed models of proposed HVDC system for interconnection studies.
Manitoba Hydro	Bipole 3 HVDC Riel	- Defined technical specifications, prepared bid packages, evaluated bids, and supported contract negotiations. - Led technical execution - Conducted feasibility studies - Oversaw FAT testing and on-site commissioning - Served as on-site commissioning acceptance authority
Manitoba Hydro	Bipole 3 HVDC AC Filters	- Defined technical specifications, prepared bid packages, evaluated bids, and supported contract negotiations. - Led technical execution - Conducted feasibility studies - Oversaw FAT testing and on-site commissioning - Served as on-site commissioning acceptance authority
Manitoba Hydro	Bipole 3 On-Site Commissioning RTDS HIL Testing	- Technical oversight for RTDS HIL testing of control and protection replicas - Developed Python-based power flow posturing program - Led design and specification reviews - Evaluated HVDC OEM engineering studies, equipment specifications, and type test reports. - Attended FAT at Siemens facilities to ensure compliance with technical specifications and addressed non-compliance issues. - Supported pre-commissioning, system commissioning, and technical claim resolution
Confidential	HVDC model and reduced AC network model review	Provided owner's engineering services reviewing HVDC models and reduced AC network models.
Manitoba Hydro	Gerdau Steel Rolling Mill Power Quality Annual Review	- Conducted annual harmonic audits and compliance review of the Gerdau Steel Rolling Mill plant - Recommended filter tuning and monitoring improvements after steel mill operation mode changes

Appendix 2 - RMS Energy Previous Large Load Integration Project Experience

Large Load Integration Experience		
Client	Project	Description
Confidential	Various	Led a team responsible for all large load interconnections (>10 MW) which included developing longer-term conceptual plans with higher voltage overlay backbone and HVDC
Confidential	Various	- Lead a team for industrial large load interconnection [300 MW – 150 MW each phase] in Ontario. - As Electrical member contributed to site selection, development of SLDs (GA, P&C), Protection Philosophy document and interconnection application. - Represent client in discussions with regulator (IESO) on technical matters.
Confidential	Confidential	Developing the model for large load data centers with BESS inverter in ERCOT area
Confidential	Confidential	Developing the models for large load data centers co-located with BESS in ERCOT footprint
Confidential	Clarksville–Dardanelle 161 kV load-tap study	Used TARA proportional-load module to screen (1) 500 MW withdrawal, identified thermal & voltage constraints, scoped 230 kV double-circuit upgrade path.
Confidential	Various	- Developing the models for large load data centers co-located with BESS in ERCOT footprint - Withdrawal analysis for 10 different POIs. - PSSE model development for data center loads
Confidential	Confidential	Withdrawal analysis for large loads (Data Centers), mitigation solution, and cost estimate

Appendix 3 - RMS Energy Previous System Protection/P&C Project Experience

Transmission Planning Project Experience		
Client	Project	Description
Pacific Gas and Electric Company	System Protection Engineer (1991-2006)	- System Protection Studies - Short Circuit Analysis (ASPEN) - System Modeling - Relay Coordination Studies/Settings
Silicon Valley Power	System Protection Engineer (2009-2011)	- System Protection Studies - Short Circuit Analysis (ASPEN) - System Modeling - Relay Coordination Studies/Settings
Entergy	Major Project System Protection - Churchill Substation – New BAAH (500kV) - Waterford Substation – Upgrade BAAH (500kV)	- System Protection Studies - Short Circuit Analysis (CAPE) - System Modeling - Relay Coordination Studies/Settings
PREPA (Puerto Rico)	Central Office of Recovery, Reconstruction and Resiliency (COR3), Development of System Protection Standards	Developed newer PREPA Transmission and Distribution System Protection Standards to design and build a more resilient electrical grid that minimizes damages and outages from future weather events, such as hurricanes and flooding. The new PREPA Transmission and Distribution System Protection Standards are based on hybrid IEC 61850 inter-IED communication-based technology and traditional wire based.
Eversource	Brighton Substation (115kV) Ridgefield Substation (115kV) Ludlow Substation – Reactor Installation (345kV)	- System Protection Studies - Short Circuit Analysis (ASPEN) - System Modeling - Relay Coordination Studies/Settings
Wolf Creek NOC	NERC Compliance	NERC compliance with PRC 023, 024 and 025, plant and adjacent 345kV lines Out-of-Step settings review
Iberdrola	Livermore and Maguire Substations – Upgrades (115kV)	- System Protection Studies - Short Circuit Analysis (ASPEN) - System Modeling - Relay Coordination Studies/Settings
Confidential	Wind and Solar Projects - Paintearth Wind Farm (200 MW) - Lanfine Wind Farm (175 MW) - Sharp Hills Wind Farm (300 MW) - Forty Mile Wind Project (400 MW) - Enterprise Solar Farm (150 MW)	- System Protection Studies - Short Circuit Analysis - System Modeling - Relay Coordination Studies - Proficient in ASPEN Oneliner, EasyPower, ETAP and CYME - Relay Settings for Numerical, Static and Electromechanical relays. Sample types of relays and software: - Schweitzer Relays (SEL 411L, 421, 311C, 487E, 387E, 487B, 587Z, 451, etc.) - Schweitzer Software (SEL AcSELeator 5030, 5032) - GE Relays (Multilin UR L90, D60, T60, B90, F60, MiCom P443, etc.) - GE Software (Enervista UR)

	<u>Battery Energy Storage Systems (BESS)</u> • Hagersville BESS (300 MW) • Convergent BESS (80 MW) <u>Utility & Industrial Substation Projects</u> • Zero Emission Bus 230 kV Substation • Manic 5 Refurbishment • Richmond South 115 kV Substation • VCNA 115 kV Breaker Replacement • Kakabeka Falls Arc Flash Study • GM Posco Battery Factory Substation • Vantage Data Center (86 MW IT Capacity)	• Siemens Relays (SIPROTEC Family) • Siemens Software DIGSI 4 and 5 • Protection and Controls Systems for Transmission, Substation and Distribution • Compliance Studies (NERC PRC) • Project Management • Relay & Protection Design Standards and Project Specific Designs • Commissioning Engineering • Detailed Engineering Design of Entire Substation P&C packages (OLD, 3LD, schematics, wiring diagrams, etc.) • Relay Event Evaluations for Post-Fault Analysis
Manitoba Hydro	Radisson AC Filter Protection Misoperation Investigation	• Conducted forensic analysis of AC filter protection misoperations at Radisson HVDC converter station. Developed detailed PSCAD models to reproduce protection behavior during filter switching events and external faults. Prepared a study report with findings and recommendations to improve protection coordination and reduce nuisance trips.
Confidential	HIL Testing and EMT modeling	• Protection and control system HIL testing for commissioning power plant • HIL testing of P&C system of microgrid system • EMT modeling and study of P&C system for root-cause analysis
Southern California Edison (SCE)	New approach to prevent wildfire	• Patented 2 innovative approaches to detect a broken falling conductor in transmission and distribution lines • Conducted more than 1000 test cases to evaluate the approaches in different conditions • Developed a RSCAD/RTDS model of large portion of SCE's 230kV transmission system • Modeled more than 20 synchronous generation facilities in RSCAD/RTDS • Conducted HIL and PHIL test to ensure accuracy of the wildfire prevention inventions
American Electric Power (AEP)	Transmission lines protection	• Transmission system protection evaluation on a periodic basis • Firmware upgrade and setting conversion for GE and SEL relays • Root cause analysis to identify mis-operations or setting issues

Appendix 4 - RMS Energy Previous Transmission Planning Project Experience

Transmission Planning Project Experience		
Client	Project	Description
Confidential	Various	- Led a team responsible for planning a large utility electric system (>25GW) spanning transmission systems from 50 kV up to 500 kV, in addition to certain HVDC assets (LCC technology) - Personally responsible for developing a portfolio of projects with capital value of >\$5B USD across career
Confidential	MISO MTEP, NYISO-LIPPTN	- Lead a team to develop transmission planning solutions in MISO area for a developer. - Lead a team to provide technical support on NYISOs Long Island PPTN requirement for a developer.
Confidential	Hybrid HVAC-HVDC Transmission	- Evaluated feasibility of hybrid transmission lines [500 kV] on the same tower to deliver reliable power transmission for a competitive transmission solution. - Prepare detailed report on conductor sizing, tower structure, insulators and required clearances with recommendations.
PJM	Regional Transmission Expansion Plan	- Executed N-1 and N-1-1 study for thermal and voltage concerns using TARA. - Performed Generation Deliverability analysis on new transmission planning solutions. - Developed IDV models for requested solutions from clients.
PJM	Renewable Generation System Impact Study	- Developed PSS®E generic model for inverter-based resources (IBRs) - Created contingency definitions and performed stability analysis using PJM seasonal base cases
ERCOT	System Impact Studies	Perform steady-state and short-circuit studies for multiple utilities in ERCOT including developing PSS/E and ASPEN models.
Confidential	NYCPPTN	- Supported one of the largest North American transmission developer, for the NYCPPTN, in performing the analyses to design and evaluate transmission network solutions - Prepared Transmission Interconnection Application (TIA) packages for the proposed transmission solutions, involving detailed power flow and short circuit models and one-line diagrams.
PJM	N-1-1 Transient Stability Analysis	Performed N-1-1 Stability Analysis, Phase I, II & III
SPP	Cluster Project – Transient analysis	Performed two transient analysis for two cluster projects
SRP	Various Projects	- Short Circuit Mitigation (Transient stability) - IPP RAS Study - Cluster projects (transient analysis)
MISO	LRTP technical due-diligence	See LRTP work (steady-state, stability, transient) informing 765 kV expansion; provided written technical-risk appraisal for board submission.
Confidential	230 kV corridor optimization	Evaluated FACTS vs reconductor vs double-circuit build-out; delivered CAPEX vs loss-saving model.

Appendix 5 - RMS Energy Previous System Studies Project Experience

System Studies Project Experience		
Client	Project	Description
Confidential	- TRV, TOV and FFT studies for STATCOM project in Taiwan - King Plains [KP] Wind Project TOV	- Lead a team to develop EMTDC model for the facility - Review study criteria, analysis and results. - Review detailed study report and final recommendations. - Prepare detailed Power Quality and Harmonics report for KP to demonstrate compliance with IEEE 519.
Confidential	- Arc Flash (AF) Studies for T&D substations - AF studies for Onshore wind, BESS and PV solar plants	- Lead a team and performed AF studies (AC and DC) for various transmission and distribution stations (AIS, Switchgear) of Manitoba Hydro system. - Prepared detailed individual station report with recommendations, draft AF labels and AF labels. - Performed AF studies for various onshore wind, BESS and Solar PV plants as part of regulatory compliance. - Prepared detailed AF reports for individual project with recommendations and draft AF labels.
Confidential	Feasibility study for Hydrogen production from onshore Wind [Chile]	- Lead a team of engineers for development of EMTDC model and detailed studies [load flow, transient analysis] to demonstrate stable operations for hydrogen generation from renewable resources. - Investigate suitability of STATCOM and Synchronous condenser for stability. - Prepare detailed report with recommendations.
Confidential	Various	- PSCAD model development, EMT simulation and technical report preparation - TRV Evaluation - Insulation Coordination - SSCI Analysis - Circuit Breaker Delayed Current Zero Crossing Investigation - Transformer Ferroresonance and Inrush Current Analysis - Parallel Line Resonance Investigation - Circuit Breaker Secondary-arc Current Evaluation - Shunt Compensation Analysis
NPPD	TRV Synchronous Generator	- IEEE C37.06, 37.013, C37.011 - IEC/IEEE 62271 - Break trip time sensitivity, point on wave sensitivity
Various	- TRV - TOV - Capacitor Switching - Insulation Coordination - Renewable sites (Solar, Wind, BESS)	- IEEE C37.06, 37.013, C37.011, C37.012, C37.04 - IEC/IEEE 62271 - IEC 60099-4 / IEEE 66.11 - IEEE C62.82.1, C62.82.22, C62.91.1, C62.22, C62.11 - Detailed PSCAD modelling - Lightning and surge protection

Confidential	SSR (Sub-Synchronous Resonance)-SSCI	- Developing detailed PSCAD models and performing the studies for numerous utilities/developers. - TRV (Transient Recovery Voltage) - Transformer Energization
Confidential	Generator SF6 metal-clad circuit breaker standards	Led the development of standardized requirements for SF6 metal-clad circuit breakers at hydro-electrical generating stations.
Confidential	Confidential 345kV GIS design basis manual (SF6 or SF6-free)	Led the development of the design basis manuals for 345kV SF6 or alternative for VSC HVDC AC substations in NYISO footprint
Manitoba Hydro	Riel 500kV (800kV class) circuit breaker TRV & other switching studies	- Led the development of specification of 500kV (800kV) live-tank circuit breakers for the 500kV Riel-Forbes series-compensated tie-line. - Circuit breaker specification verification - Out-of-step duty verification
Manitoba Hydro	Riel 230kV circuit breaker controlled-switching for HVDC converter transformers	- Led the testing and verification of industry first controlled-switching with estimation of remanence flux for Bipole 3 HVDC converter transformers with OLTC movement. - Developed specifications and FAT requirements - Supported the development of the testing plan and acceptance criteria - Led the on-site testing and acceptance.
Manitoba Hydro	Riel 230kV circuit breaker specification	Led the development of specification of 230kV circuit breakers at Riel 230kV/500kV substation.
Manitoba Hydro	Jepeng Generator Circuit Breaker TRV	- Conducted EMT studies to determine the TRV requirements for Jenpeg generator metallic-enclosed SF6 circuit breakers. - Prepared a comprehensive study report detailing findings and recommendations.
Multiple Utilities in North America	Transmission substations TRV studies	- Transient modeling of the system using traveling wave model in PSCAD - Conducting TRV and insulation coordination including lightning, TOV, and SOV - Conducting VFFO studies for GIS substations
Multiple Generation and Transmission Developers in North America	Solar PV, BESS, Wind, and Synchronous Generation facilities	- Conducting PSSE, PSCAD, Etap, and ASPEN modeling - Parameter tuning and model validation for dynamic performance evaluations - NERC compliance studies and testing - Conducting design studies such as cable sizing, ampacity, thermal analysis, harmonic and flicker studies, short circuit, equipment duty, arc flash, TOV, TRV, Lightning, ground grid design - SSR, SSCI, and SSFR studies and mitigations
Manitoba Hydro	Gerdau Arc Furnace Voltage Flicker Semi-Annual Compliance Studies	Led annual reviews of voltage flicker compliance for a large industrial arc furnace at Gerdau MRM connected to the 115kV point of interconnection (POI) with the Manitoba Hydro system. Conducted analyses to extrapolate and calculate the accumulated percentage of weekly Pst values based on IEC standards. Correlated elevated flicker levels with customer complaints, on-site SVC performance, and operational changes in the arc furnace. Conducted on-site audits of operational and SVC control changes made by the arc furnace operator. Prepared detailed semi-annual reports documenting findings and recommendations.
Manitoba Hydro	St. Leon Wind Power Plant Interconnection Facility Harmonic Study	Conducted harmonic analysis using PSCAD to identify potential resonance issues as part of the Interconnection Request and Interconnection Operating Agreement (IOA) for increased generation output and capacitor bank installation at the St. Leon wind power plant 230kV POI. The study included network boundary identification, harmonic impedance profiling under various operating and contingency conditions, and analysis of different Bipole 1 and Bipole 2 HVDC loading scenarios. Prepared a comprehensive study report detailing findings and recommendations.

Dubai Electric and Water Authority (DEWA)	Water Desalination Plant	- Detailed modeling of the entire plant in Etap - Conducting voltage flicker, Rapid Voltage Change (RVC), harmonic study, short circuit, load flow, and equipment duty
Saudi Electric Company (SEC)	Ibn Khaldoun Transmission substations	- EMT modeling of a transmission substation and its GIS bus - Conducting Lightning stude, SOV, and VFFO - Conducting root cause analysis for MV SA failure
Confidential	Low Frequency investigation and mitigation	- Small signal analysis in SSAT - Participation factor analysis - IBR, SVC, and Generators PSS model upgrade - Controller tuning to resolve the issue
Confidential	SSR, SSCI, SSFR investigation and mitigation for over 20 IBR plants	- System conversion from PSSE to PSCAD - SSO screening study - SSO transient study - Controller turning for SSO mitigation

Appendix 6 - RMS Energy Previous Interconnection Studies Project Experience

Interconnection Studies Project Experience		
Client	Project	Description
Confidential	Various Projects	- Develop project interconnection models in PSS and PSCAD. - Perform steady state studies to evaluate performance of projects. - Perform parameterization of control variables for PSSE dynamics model. - Benchmark project performance between PSSE and PSCAD models. - Prepare detailed study report with recommendations.
Various	Multiple projects	Interconnections projects for MISO, GTC, NYISO, AESO, Nevada Energy, Idaho Energy, SRP, SPP. Tasks include project modeling, load flow analysis, short circuit analysis and transient analysis.
Confidential	Various Projects	- Prepare plant level and wide area models in PSS/E and PSCAD models for IBRs - Perform model quality tests for IBRs for numerous developers - Perform steady-state and short-circuit studies for multiple utilities in ERCOT
Various	Various Studies	- Energy interconnection studies, including steady state thermal, voltage, short circuit and stability analysis for various generation projects in NYISO and ISO-NE - Deliverability studies for various projects in NYISO and ISO-NE - Screening injection/withdrawal studies for POI selection in NYISO, ISO-NE, PJM, MISO, SPP and WECC Areas.
ISO-NE	New Generation Curtailment Analysis – Pilot Study	- Analyzed potential curtailments that could be experienced by proposed new generation. - Focused on offshore wind on Cape Cod
PJM	TC1 Cluster System Impact Studie	Managed power-flow, stability & short-circuit studies for ≈3 GW renewables/BESS; created mitigation plans & cost allocation matrices.
MISO	System Impact Studies	Steady-state, reactive power requirements, short circuit studies for cluster studies in MISO footprint
NYISO, ISO-NE	Various	- Energy (thermal) analysis for generation projects in NYISO and ISO-NE - Deliverability studies for generation projects in NYISO and ISO-NE - Screening injection/withdrawal studies for POI selection in ERCOT region.
Confidential	Various Projects	- Develop project interconnection models in PSS and PSCAD. - Perform steady state studies to evaluate performance of projects. - Perform parameterization of control variables for PSSE dynamics model. - Benchmark project performance between PSSE and PSCAD models. - Prepare detailed study report with recommendations.
ISO-NE	System Impact Studies for Offshore Wind and BESS (Multiple)	- Steady-state analysis (PSSE/TARA) - Short Circuit Analysis (ASPEN) - Stability Analysis (PSSE) - EMT Analysis (PSCAD), SSTI Screening Analysis, and SSR Screening Analysis.
ISO-NE	Feasibility Studies for Offshore Wind and BESS (Multiple)	- Steady-State Analysis (PSSE and TARA) - Short Circuit Analysis (ASPEN)

Appendix 7 - RMS Energy Previous BESS, PV, Wind Project Experience

Renewable Resource Project Experience		
Client	Project	Description
Confidential	Tatanka Wind Farm, Roaring Brook Wind Farm, Vineyard Wind, Offshore Wind	- Perform detailed design studies (30%, 60%, 90% and IFC) – Load Flow analysis, SC study, Ampacity study, Reactive Power Compensation. - Prepare detailed report with recommendations for each individual study. - Review & revise project SLDs and other electrical SLDs for P&C. - Perform Power Quality and Harmonics study for Offshore wind project - Prepare detailed Power Quality and Harmonics report to demonstrate compliance with IEEE 519.
Confidential	Hydrogen and Methanol generation from renewable resources [Uruguay]	- Lead a team of engineers to develop preliminary interconnection plan (Wind and Solar generation), equipment specifications and budget for an interconnecting substation 500kV/150 kV and project substation. - Prepare detailed report with calculations, options and detailed recommendations for client to submit to National regulator.
Confidential	Grid-forming Inverter	- Development of a GFM inverter for PV/BESS - Benchmarking the results against PSSE and Power factory - Development of a reduced network from PSSE in PSCAD and RSCAD including 50 dynamic models such as wind, PV, and BESS.
Various	Various Studies	- Reactive power design studies for various projects, including offshore wind projects, involving HVDC, STATCOM, and onshore, HDD and offshore cables, in ISO-NE, NYISO and ERCOT - Cable Ampacity Studies, involving AC/DC, and onshore, offshore cables, for optimal cable sizing, routing and voltage selection.
NPPD	Confidential Wind Generation Weak AC Grid Screening Studies	Directed and led a specialized weak AC grid screening PSCAD studies of a large DFIG wind development and control interaction with nearby HVDC and FACTS facilities, provide QA / QC review of vendor's detailed wind turbine and power plant control PSS/E and PSCAD models, submission of engineering studies by other contractors. Prepared a study report summarizing the study results, observations and recommendations to clients for compliance with ISO requirements.
Confidential	IBRs	- Commissioning and post commissioning support for : BESS, WIND farm, PV plant, and hybrid plant (BESS+ PV) - NERC compliance : PRC -19, -24, -25, -26, -27 - Commissioning test and as-built modeling - MOD-25, -26, -27 testing and model testing
AES	Multiple wind farms repowering studies	- Conducting a thorough evaluations to assess the usability of existing infrastructure with upgraded wind turbines - Developed detailed model of the plant in PSSE, PSCAD, and Etap - Conducted cable thermal analysis and ampacity, short circuit and equipment duty, and load flow.