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Phoventus



GLOBAL. RENEWABLE. THINKING.

# STATEMENT OF QUALIFICATIONS

VOL1.4

GLOBAL. RENEWABLE. THINKING.

TORONTO

2401 Bristol Circle  
Suite 103, Oakville, ON L6H 5S9 Tel:  
647-797-7926



SAN FRANCISCO

303 Twin Dolphin Drive  
Suite 600, Redwood City, CA 94065  
Tel: 650-474-5704



SAO PAULO

Rua Olimpiadas, 205 – 4º andar, Vila  
Olímpia, Sao Paulo, São Paulo, CEP  
04551-00, Brazil



[www.phoventus.com](http://www.phoventus.com)

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# POWER ENGINEERING

Excellence in power engineering is the core of Phoventus. Our teams of dedicate engineers and consultants are committed to bringing the best possible outcome to your renewable power or energy storage project.



10 years of consulting and advisory service and a reputation for excellence in customer service.

## SPECIALTIES

- Solar Power Design
- Energy Storage Engineering
- Solar Re-powering
- Owners Engineer
- Micro-grid Engineering
- Off-grid Power Engineering

# DESCRIPTION OF SERVICES

## ELECTRICAL ENGINEERING

- Single Line development
- Connection Impact Assessment application
- Load flow, short circuit, protection coordination, arc flash studies
- Procurement specification

## PROJECT MANAGEMENT

- Owners construction project oversight/management
- Coordination of engineering services e.g. Electrical Civil
- Contractor and Vendor Pre-Qualification
- Racking and Structural design coordination
- Design basis development
- Procurement support

## PERMITTING AND APPROVALS

- Approval, permit, bylaw, zoning ordinance requirement identification
- Approval/Permit constraints analysis
- Approval/Permit condition review/analysis
- Cost identification/evaluation

## PROCUREMENT SUPPORT

- Contract formation
- Technical appendix, statements of work and terms of reference
- Bid specs and RFP composition, distribution and management
- Bid ratings and bid management
- Design basis and unit measure takeoff calculations

## PERFORMANCE ENGINEERING

- Energy production modeling
- Layout development
- Operational performance analysis

## INDEPENDENT ENGINEERING

- Project/portfolio Due Diligence
- Site inspection
- Bid review
- Design review
- Vendor/product evaluation
- Independent engineer certification

## ENVIRONMENTAL

- Pre-feasibility assessment, environmental regulatory constraints analysis
- Compliance obligation identification, evaluation, review
- Environmental program development, implementation and oversight
- Wildlife program evaluation
- Cost identification/evaluation
- Evaluation of contractor environmental programs including, but not limited to, construction environmental management programs, storm water management, soil erosion and sedimentation control plans

## MANAGEMENT CONSULTING

- Change Management
- Engineering change review and alignment with contract expectations and market
- Cost-benefit analysis and risk allocation
- Contractor supervision
- Project Controls

## FORENSIC ENGINEERING

- Expert and technical review of change disputes
- Forensic engineering studies and reporting
- Counsel technical support
- Lien, waiver and closeout documentation management

## TRANSPARENT POWER INC.

*"Phoventus was a pleasure to work with on the preliminary design of two utility scale ground-mounted solar projects in western Canada. Leveraging their significant industry experience, they provided quality project layouts and energy resource assessments on time and budget. We welcome the opportunity to work with Phoventus soon again. Thanks for all your great work!"*

Kolja Vainstein, P. Eng., Transparent Power Inc.



# ENERGY STORAGE, SOLAR + STORAGE

BESS , Lithium-Ion, L-ion, Battery, Solar + Storage

## ELECTRICAL ENERGY STORAGE DESIGN ENGINEERING

We build on our passion for the expansion of renewable energy use and universal access to affordable electricity for all, ensuring we stay at the forefront of developments in renewable energy, storage and microgrid/off-grid technology, project development and finance, and environmental and energy policy, so our clients can be confident they are in safe hands.



*"Rob and his team are among the best professional engineers that we have worked with in solar space. They provide timely advice and critical insight into design, procurement and development problems that reduce costs, reduce risk and move projects forward."*

Thomas J. Timmins, Gowling WLG

## SPECIALTIES

### Procurement Support

- Vendor and technology evaluation
- Integrator bid review and scorecard
- Lithium-Ion, battery performance specifications
- Controller selection
- Warranty and remedy review
- System safety and ARC flash conformance

### Storage Engineering

- System Design and modelling
- Grid interconnection specifications and engineering
- Electrical, instrumentation & controls
- Ramp Rate and C rate calculation
- Permit and ITC compliance
- Protections and control

### Owners Engineering

- EPC Contract review
- 30%,60% 90% IFC Engineering reviews
- Change management and tracking
- Onsite Construction monitoring
- Completion Certificates
- Vendor Dispute resolution



Hands on approach



Energy Storage  
and system design



Electrification



Interconnection



# ELECTRICAL & DESIGN ENGINEERING

Phoventus brings a compressive understanding of electrical power systems to your project. Decades of interconnection and substation design experience enhance our appreciation of renewable power project requirements and timelines. Protections and controls integration with your Energy Storage, Solar Power or Electrification project is a specialty.

## DETAILED ENGINEERING & DESIGN

- Preliminary layout design
- Single Line Diagram construction
- 30%, 60%, 90% & IFC design
- Electrical schedules
- Riser diagrams and elevations
- Plant Control & Optimization

## INTERCONNECTION ENGINEERING

- LV/MV Substation Design
- Power Quality and Output Metering
- Transfer Trip Switchgear & Communication
- CIA/DTCA package approval

## ELECTRICAL STUDIES

- Industry standard software (ETAP, DigSILENT) & proprietary tools
- Load Flow/Reactive Compensation
- Conduit routing and cable tray design
- Fault Level
- Protection Coordination
- Arc Flash Hazard
- Power Quality (Harmonics, Flicker)
- Transient Stability Studies (Load Rejection, Voltage Control, etc.)
- NEC, IEEE 1547, IEEE 1584 and NFPA 70E compliance



## Bloomberg

*"Technical due diligence companies like Phoventus do a great job working to ensure PV products work in the field as they are supposed to. We appreciate Phoventus' participation in our annual survey."*

Cecilia L'Ecluse, Bloomberg ( BNEF)



# SOLAR RE-POWERING & RE-VAMPING

## SPECIALITIES

### Forensic Investigation

- Single Line Drawing and Bill of Material reconstruction
- Surrogate component recommendations appraisal
- Warranty review and remedy recommendation
- Electrical Protection and control
- Electrical Fault investigation and remedy
- Component Obsolescence appraisal
- Arc flash and Hazard study updates

### Engineering

- Interconnection and fault compliance
- Storage addendum engineering
- Relay and Switchgear coordination
- Energy production modelling ( Pvsyst etc... )
- Electrical system modelling
- Component Obsolescence appraisal
- Electrical Engineering and Design

### Operations Support

- O&M Capital planning
- Critical Spares and stocking studies
- Component Failure forecasting
- Arc Flash and Hazard Safety
- Performance & Maintenance reviews
- Onsite Spares inventory reviews

## REPOWER SOLAR

Phoventus is uniquely qualified to deliver your re-powering project. Our team of experienced engineers have helped deliver over 500 renewable energy projects to date.

We bring together an in-depth understanding of the current state of PV Module , Inverter and interconnection engineering that directly translates to longstanding stability, profitability and sustainability of your re-powered project.

*“Phoventus is uniquely qualified to deliver your re-powering project. Our team of experienced engineers have helped deliver over 500 renewable energy projects to date.”*





# MICROGRID ENGINEERING MINE POWER ENGINEERING

Islanded Microgrids are prevalent today in remote locations and Island nations. They represent a modern approach to solving a variety of energy supply challenges. Most notable the integration of renewable power and energy storage with preexisting generation. Their unique nature, however, can still trip up even the most advanced engineers. Before starting to design a system, it is important to understand the process of bringing about a micro-grid from initial concept to real-world operations. Most important is understanding how to design it.

## PREFEASIBILITY AND DESIGN ENGINEERING

- Preliminary engineering, design and studies
- Capital and operational cost budgeting
- Environmental constraints assessment, environmental impact assessments and permitting (including government, public and Indigenous consultation)
- Energy yield assessment

## MANAGEMENT CONSULTING, CONTRACT FORMATION, AND ECONOMIC ANALYSIS

- Techno-economic assessments of on-site power generation options
- Integration studies and synthetic PPA evaluation
- Review of significant agreements and pro forma

## OWNERS ENGINEERING AND INSTALLATION SUPERVISION

- Contract reviews
- Owner's engineering services
- Preparing and managing specifications
- Reviewing bids
- Reviewing contractor performance

“Phoventus is here to help you through the maze of hybrid power options available. **We understand what will and won't work – and why.**”

## BARRICK

“Rob Lydan demonstrates an impressive understanding of the complex technical and commercial implications of integrating renewable power into mining operations. He was able to present this in a way that it could be understood and recommunicated within the organization.”

Russel Blades,  
Director - Energy and Climate Change  
Barrick Gold



# OWNERS ENGINEERING SERVICES

The management, supervision, and closeout of EPC construction contracts are fundamental to the success of our clients. We are uniquely qualified to assist our client in closing gaps between themselves and their construction partners.

## CHANGE MANAGEMENT

- Engineering change review and alignment with contract expectations and market value
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- Contractor supervision
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*"All of us at Entropy would like to express our appreciation for the work of the team performed as Independent Engineer for the project finance of Entropy's 5MW Cayman Solar Project by CIBC First Caribbean International Bank."*

*The project was the first utility scale solar project developed in Cayman Islands, which posed a unique set of challenges. A number of unusual design and engineering principals needed to be incorporated to address hurricane force wind loading, difficult soil and rock conditions, and the lack of a substantial service and support infrastructure to accommodate the service and maintenance needs of the plant. The team worked with us to fully understand and address potential risks, delivering their work professionally, on time, and on budget."*

**David March, Managing Partner,**  
**Entropy Investment Management**







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