

# **Preliminary Operations and Maintenance Plan**

**Baron Winds Project**

August 2017

## Table of Contents

1. Introduction .....	3
2. O&M Philosophy and Process.....	3
3. Typical O&M Responsibilities and Maintenance Schedules .....	4
3.1. Turbines .....	4
3.2. Balance of Plant Components.....	4
4. Training and Notifications.....	5
Appendix A.....	7

## 1. Introduction

An Operations and Maintenance Plan is a project-specific plan that is typically created based on the specific turbine selected, the turbine manufacturer, and other project-specific considerations. This preliminary Operations and Maintenance Plan (“O&M Plan”) is intended to be the foundation of the final O&M Plan that will be implemented at the Baron Winds Project (the “Project”) once it becomes operational and reflects typical O&M maintenance requirements based on EverPower’s experience. EverPower’s employees at the Project (“Project Operators”) will be responsible for the Plan’s implementation.

The objective of the Plan is to optimize the Facility’s operational capacity and availability through best in class maintenance guidelines and inspections that are designed to pro-actively detect any significant safety or maintenance issues.

## 2. O&M Philosophy and Process

EverPower has an operational philosophy and process that forms the overarching goals and objectives of its operations. This philosophy and process includes:

- Best in Class
  - Safety, First and Foremost
  - Continuous safety and technical training
  - Community and environment stewardship
  - High fleet availability that translates into strong production
  - Proactive management – minimizing Mean Time Between Failure (MTBF)
  - Technical library that is comprehensive and up-to-date
  - Wind Turbine Generators (WTGs) are maintained to the highest industry standards
- Taking Ownership
  - Holistic approach to project operations that entails working closely with stakeholders including turbine maintenance providers, Balance of Plant (BOP) providers, utilities, state agencies and local communities
  - Technical oversight of turbine manufacturers’ teams on a day-to-day basis
  - Contract compliance
  - Ensure critical BOP infrastructure is well maintained
  - Technical and Safety Audits
- Asset Optimization
  - Real-time performance monitoring via control center
  - Internal supervisory control and data acquisition (SCADA) system that converts turbine manufacturers’ SCADAs to a common platform
  - What we want to improve, we need to measure
    - Maximize revenues and enhance performance
      - Standardization of performance metrics for the entire fleet
      - Validation of actual production levels regardless of under- or over-production
      - Validation of wind energy models to real asset performance
      - Site manager bonus incentives tied to specific performance indicators
  - Lightning detecting program – to reduce major damage
  - Anomaly Detection Algorithm – thousands of data points monitored

- Feedback loop to site managers

### 3. Typical O&M Responsibilities and Maintenance Schedules

Wind energy projects typically consist of multiple wind-to-energy generators that are electrically connected together to produce the desired project output. Each of these stand-alone generators requires periodic preventive maintenance as well as corrective maintenance in the event of a malfunction within the individual generator. In addition, the collection system that ties the generators together, as well as the substation that steps up voltage for delivery to the bulk electric system, require periodic maintenance.

#### 3.1. Turbines

Each individual WTG typically requires preventive maintenance semi-annually. One of these maintenance outages is typically designated as “minor scheduled maintenance” and is completed in one working day per unit. The other is “major scheduled maintenance” and usually takes one to two working days to complete. For a typical wind energy facility, each semi-annual maintenance cycle is scheduled to be performed outside of high-wind season (usually spring or fall) and a crew or crews will work on individual units until the entire project maintenance cycle is completed. Depending on the size of the project, each maintenance cycle typically lasts for about two months for the entire project. On any given day during the maintenance cycle, one or more WTGs is taken out of service for scheduled maintenance, typically no more than five percent of the project’s generating capacity. EverPower is an experienced manager of turbine services and has five different turbine suppliers under long-term service agreements.

Turbine EverPower O&M responsibilities and contracting typically include:

- Ensure Turbine O&M service providers are fulfilling contractual obligations including but not limited to: availability guarantees, maintenance schedule, manpower requirements, turbine repairs, safety, etc. Typical contract services provided by the O&M service provider consist of an all-inclusive service (scheduled and unscheduled repairs, all parts, labor, and ancillary equipment or tooling necessary to perform the work).
  - Turbine O&M service contract term is 5 years minimum
- Turbine O&M service provider staffing typically consists:
  - Site Supervisor
  - Administrator
  - One Technician per 10 turbines
- Contract typically includes a warranty period for serial defects
- Turbine O&M service provider typically performs two scheduled services each year at 6-month intervals. This consists of replacement of consumables, torque checks, equipment testing, and housekeeping.
- Turbine O&M service provider also monitors security and safety lighting to ensure appropriate function

#### 3.2. Balance of Plant Components

Project BOP EverPower provides O&M services for BOP components. Collection system and substation preventive maintenance activities are typically performed once a year, outside of high-wind season. Annual collection and substation maintenance usually requires the entire project to be shut down. Minor annual maintenance typically takes one to two days, while more extensive maintenance (usually performed at five-year intervals) typically takes three to four days.

Project BOP EverPower's O&M responsibilities typically include:

- a. Oversee operations, repair and maintain BOP including, but not limited to, substation, collector system, interconnect transmission lines, roads, grounds, foundations, transformers, etc.);
- b. Furnish all labor (or cause to be furnished) and perform (or cause to be performed) all maintenance and repair activities, sufficient to maintain the BOP in good working condition, consistent with prudent business practices and any applicable operation and maintenance manual;
- c. Maintain all materials, including spare parts inventory, required to maintain the BOP in the normal course of business;
- d. Prepare purchase orders to procure parts, materials and supplies necessary for the operation, maintenance and repair of the projects;
- e. Schedule power outages and maintenance shutdowns in coordination with the turbine schedule provider(s), power purchaser(s) and transmission provider(s) to minimize revenue loss and interference with facility operations;
- f. Supervise, monitor and report on the operation and maintenance of interconnection facilities, in accordance with the Interconnection Agreement;
- g. Respond to trips as reported by the auto-dial monitoring system and provide trip reports of all faults, defects and breakdowns occurring in respect of such electrical system;
- h. Calibrate Power Purchaser('s) revenue meters;
- i. Produce monthly operating reports including turbine performance, BOP performance, safety and environmental matters, etc.;
- j. Coordinate and pursue all warranty and other claims against suppliers of materials and equipment to the BOP or turbines, including any claims against any insurance carrier for payment of claims, liabilities, or losses in connection with the BOP and turbines or its operation covered by such insurance, and including any litigation associated with any such claims;
- k. Oversee North American Electric Reliability Corporation (NERC) compliance
- l. Operate and maintain the projects in compliance with all governmental requirements, loan and material project documents;
- m. Produce and provide facility data and information requested by governmental authorities; and
- n. Provide SCADA overlay service, which includes tracking, trending, and internet access to Dashboard as well as record of the facility data.

#### 4. Training and Notifications

New site personnel will be oriented to the O&M Plan via a copy and review of this document in combination with their orientation to other Baron Wind policies and plans such as the Emergency Action Plan and Health and Safety Plan.

Beyond new hire orientation, the Project Operators, or the employee's direct supervisor, shall provide training in accordance with this Plan as needed to support their job function. A copy of the O&M Plan is provided to each person on site and is to be available at all times for all site personnel to review at the O&M building.

If work is necessary within a public right-of-way in order to conduct maintenance in accordance with the O&M Plan, notification and any necessary work permit(s) will be discussed and obtained with the appropriate agencies prior to starting the work. During any substation maintenance visits, security lighting will be checked to ensure it is functioning appropriately.

Appendix A

***O&M Plan Acknowledgement Form***

