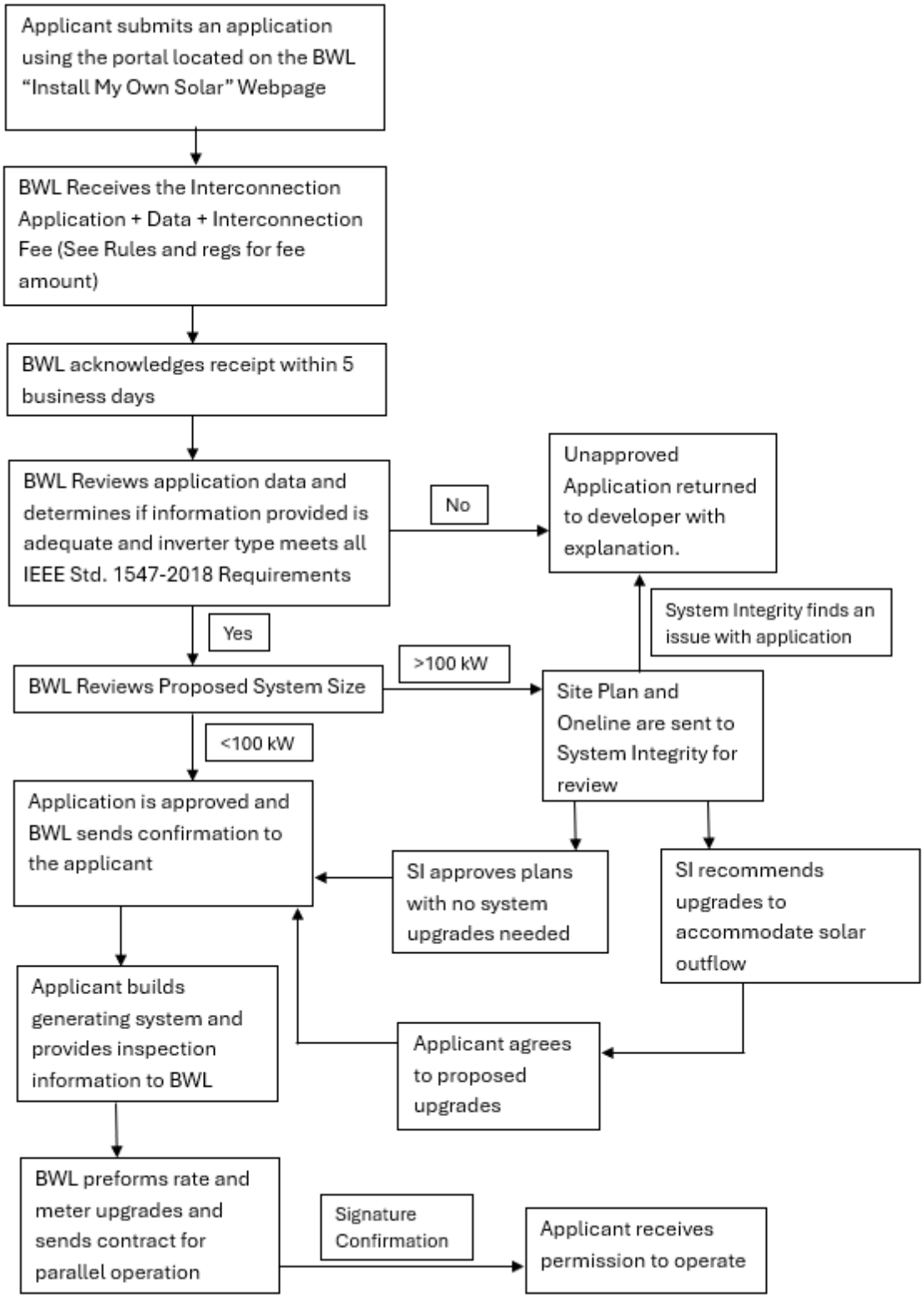
BWL Renewable Energy Generator Interconnection Application Process



Customer Owned Renewable Energy Generators Inverter-Type Projects

BWL DISTRIBUTION INTERCONNECTION

The potential hazards associated with high voltage systems require specific work rules and protection schemes. These are designed to protect the public, BWL workers, and assure electric distribution system operating integrity. Interconnection to the BWL electric distribution system shall not create any safety hazards or cause any power quality problems to occur on the circuit to which the generator is connected. The reverse power flow conditions that the generators are capable of producing must be evaluated to ensure that safety and proper coordination is not compromised.

BWL PROTECTION SYSTEMS

- Natural hazards (lightning, ice, and wind), human interference (vehicles, vandalism) and electrical equipment malfunction can cause damage to the electric transmission and distribution system. Such causes can result in short circuits or faults, as commonly referenced in the utility industry. Faults create a safety hazard for personnel, jeopardize the stability of the entire electrical network, and can impose severe damage to equipment. All of the electrical equipment that comprises a utility network is protected by the various protection systems.
- Generation or other new electric energy sources connected in parallel with the electric transmission and distribution system have the potential to create two problems for the utility.

    1. It provides an additional energy source(s) that increase fault current magnitudes. This additional fault current can interfere with the operation of existing protective devices on the system.
    2. The generation or other electric energy source, along with a portion of the BWL electric system, can become isolated from the bulk of the electric system. Such isolation is commonly referred to as islanding and is considered most unsafe and thus is not an acceptable mode of operation.

- The majority of faults on an overhead electric system are transient in nature. By quickly de-energizing the line and then automatically re-energizing or reclosing it, the overhead fault is usually cleared and the system returned to service. The BWL follows the common utility practice of automatically reclosing the circuit breaker of the overhead 13.2 kV circuits originating at 138 kV transmission substations. Remote reclosing methods may be used elsewhere in the circuit.

- Generating equipment connected to electric systems utilizing reclosing schemes can experience severe damage during automatic reclosing. The damage is often the result of the reconnection of the electric system and generator being out of synchronism. Such an event may result in a hazard and/or damage to both the BWL and the customer systems. BWL is not responsible for any damage to the customer's equipment because of reclosing.

- Studies must be performed to evaluate any adverse affects the added generation may have on the electric system. Solutions to prevent such affects, such as modification of the BWL electric system including system protection may be required and will be billed to the owner of the generator. The extent of any modifications is dependent upon both the size of the generation or other electric source and the electrical characteristic of the BWL electric system at and near the point of common coupling. Thus the BWL will require, in most cases, the customer-owned generation to have BWL specified protection systems at the point of interconnection dedicated to protecting the BWL electrical system. The customer is also responsible for protecting customer-owned equipment directly impacted by the aforementioned natural, human, and equipment malfunction hazards, along with BWL protection device and reclosing operations.

- If the interconnection system is certified by a nationally recognized testing laboratory to satisfy all requirements of IEEE Std. 1547-2018, no additional protective equipment is required except for an outdoor easily accessible disconnect switch with lockout provisions. This disconnect switch is required to provide a visible break isolation of this generation by BWL line crews, when they are working on the BWL electric distribution system. Because this is a BWL crew safety requirement BWL will designate where this disconnect switch will be located. In general, it should be located in the same vicinity as the electric meter.

- If the interconnection system does not use inverters which are certified to satisfy requirements of IEEE Std. 1547-2018, the system must have the following.

    1. Under/overvoltage, under/over frequency and overcurrent relaying. If the system is three phase, the relays must monitor all three phases. All protection must use utility grade relays.

    2. If an isolation transformer is called for in three-phase installations, BWL will review and approve specific winding types. BWL may also require additional ground fault protection.

TECHNICAL REQUIREMENTS

The following details present the technical requirements for interconnection of the Project. The BWL has adopted IEEE Std. 1547-2018, "Standard for Interconnecting Distributed Resources with Electric Power Systems" to simplify the technical requirements. Certain requirements, as specified by this document, must be met to provide compatibility between the Project and the BWL's electric distribution system, and to assure the safety and reliability of the electric system is not degraded by the interconnection.

Interconnection Design Requirements

- The Project Developer must read, provide all pertinent information, sign and submit the attached "Interconnection Application" to the BWL Customer Projects and Development Department.

- The data the BWL requires to evaluate the proposed interconnection is a necessary part of the Interconnection Application. All major equipment and protection equipment proposed by the Project Developer, must be submitted as part of the

initial Application for review and approval by the BWL. A site plan, one-line diagram, and interconnection protection system details, of the project, are required. The generator and inverter manufacturers supplied data packages are also required.

- The BWL may request additional data be submitted as necessary during the review phase to clarify the operation of the Project.

GENERATION METERING

- To protect and maintain the integrity of BWL's electric distribution system, customers installing solar arrays equal to or larger than 20 kW are required to install generation metering. For customer owned and installed arrays equal to or over 20 kW, the BWL requires that the following equipment installations will be provided by the BWL at the cost of the customer:
    1. Metering enclosure, including 1000 Amp CT Cabinet
    2. Revenue-grade meter and accompanied socket
    3. If necessary, upgraded connection to Advanced Metering Infrastructure (AMI)

INTERCONNECTION FEES

- BWL levies a fee for generation sources looking to interconnect with BWL's electric distribution system. These fees are based on the kVA size of the proposed system and are as follows:
    1. Up to 20 kVA: $50
    2. 21 to 100 kVA: $250
    3. 101 kVA to 16 MVA – non-outflow: $520
    4. Greater than 16 MVA – outflow: $1,215

- The Interconnection Fee for the Application shall be directed to the BWL Remittance Department as indicated below:

    Lansing Board of Water & Light
    Attn: Remittance Processing
    PO Box 13007
    Lansing, MI 48901

INSTALLATION AND DESIGN APPROVAL

- When the Online Submission Form or Interconnection Application and data requirements have been received, BWL will review the data and design drawings, for approval.

- After review, the BWL will either approve the Project Developer's proposed installation as submitted or return the Application to the Project Developer with a clear statement as to why they were not approved. Where appropriate, the BWL will indicate required changes on the Application and/or the engineering drawings. When revisions are necessary to the Project Developer's submitted system data and design, the Project Developer can make corrections and resubmit the revised data

and design drawings to the BWL. The BWL will either approve, in writing, the Project Developer's revised design as resubmitted, or return it to the Project Developer with a clear statement as to why they were not approved. For arrays over 100 kW, BWL will perform an Interconnection Study to ensure that the distribution system can accommodate the proposed solar array. If there are any necessary upgrades to BWL's distribution system required, BWL will provide a cost estimate and clear statement to the customer and contractor of the proposed upgrades and associated costs.

- Where appropriate, the BWL will indicate required changes on the engineering drawings. The BWL will retain one copy of the approved design drawings

- If the Project Developer proposes an alternative to the BWL's approved electric distributions system protection and control equipment, they must submit a description and engineering design drawings of the proposed changes. The BWL will either approve the Project Developer's alternative design or return it to the Project Developer with a clear statement as to why they were not approved. Where appropriate, the BWL will indicate required changes on the engineering drawings.

- After the Interconnection Form has been approved by BWL, the developer may proceed with the construction/installation of the generating system as long as an Electric Permit has been issued by the city/township that has local jurisdiction.

- The Project Developer must provide the BWL with a minimum of 10 business days advance written notice, depending on the size of the project, of when the Project will be ready for inspection, testing, and approval.

- Prior to final approval for Parallel Operation, the commissioning test must be witnessed by the BWL System Integrity Engineer. Upon satisfactory completion of this test and final inspection, the BWL will provide a "Contract for Parallel Operation of Renewable Energy Generators"**,** which if accepted and signed will grant permission for the generator to be operated in parallel with BWL's electric system. If the results are unsatisfactory, the BWL will provide written communication of these results and required action to the Project Developer.

- Any questions on this process should be directed to the BWL representative as indicated below:

  Carbon Neutral Programs Department
  Attention: Braedon Halle
  Board of Water & Light
  PO Box 13007
  Lansing, Michigan 48901-3007
  Phone: 517-702-6076