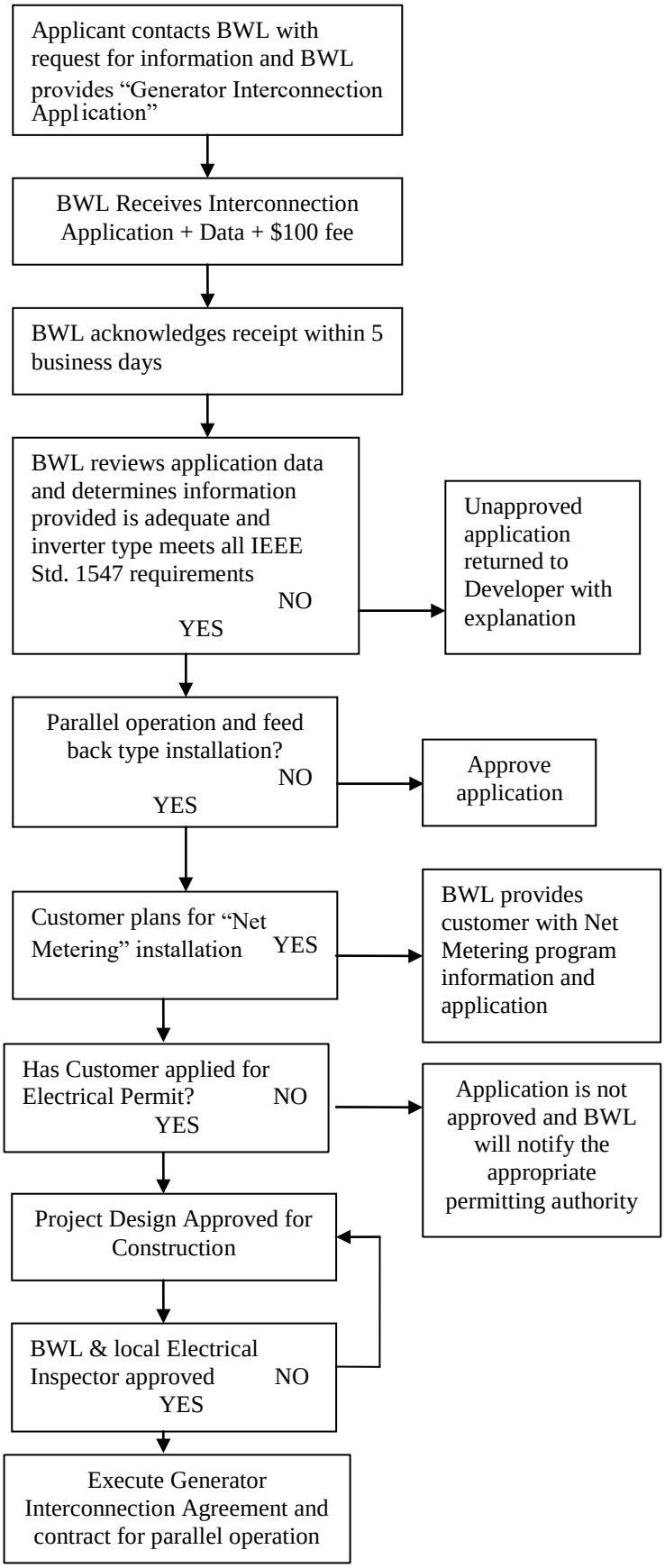
BWL Interconnection Process



Customer Owned Renewable Energy Generators Inverter-Type Projects 20kW or Less

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 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 deenergizing 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 protect the BWL electrical system. The customer is also responsible for protecting customer-owned equipment directly impacted by the aforementioned natural, human, 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, 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, the system must have the following.

    1. Under/overvoltage, under/overfrequency 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, "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.

INSTALLATION AND DESIGN APPROVAL

- When the 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. 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 application 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 5-10 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 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.

INTERCONNECTION APPLICATION FOR
Customer Owned Renewable Energy Generators Inverter-Type Projects 20kW or Less

1. The undersigned, _____, Project Developer submits this Generator Interconnection Application and appropriate filing fee to interconnect _____ , a new Project, to the Board of Water & Light (BWL) Electric System or to increase the capacity of _____, an existing Project interconnected to the BWL Electric System.

2. The undersigned requesting interconnection or an increase in the capacity of an existing interconnection project to the BWL Electric System must provide the following information:

   - Completed Interconnection Application Data sheet appropriate for the capacity rating and type of generating unit(s), as found in the BWL's Generator Interconnection Requirements (the appropriate Interconnection Application Data sheet must be attached to this Interconnection Application).
   - Description of the equipment configuration and proposed interconnection one-line diagram (one-line diagram must be attached to this Interconnection Application).
   - Project Developer (Single Point of Contact):

     Name: _____

     Address: _____

     Phone Number: _____

     Fax Number: _____

     E-mail Address: _____

     Project Site Address: _____

3. This Generator Interconnection Application shall be directed to the BWL representative as indicated below:

   Electric System Integrity Engineering
   Attention: Anthony Fields
   Board of Water & Light
   PO Box 13007
   Lansing, Michigan 48901-3007
   Phone: 517-702-6587
   Email: Anthony.Fields@lbwl.com

4. I, the undersigned an authorized representative of _____, the Project, submit this Generator Interconnection Application and required technical data for the BWL. I understand that upon acceptance, the BWL may subsequently provide an "Interconnection Study Agreement", if a comprehensive engineering analysis is determined to be necessary. The Interconnection Study Agreement will include the scope of the interconnection study. I also understand that I may be required to furnish additional required technical data as requested by the BWL in support of this study and reimburse the BWL for its study expenses.

   Authorized Signature: _____

   Printed Name: _____

   Title: _____

   Company Name: _____

   Date: _____

PROJECT:_____

PROVIDED BY: _____ DATE: _____

Instructions: Fill in answers to questions or reference to attachment number in the table below and attach data sheets as required. Indicate in the table below the page number of the attached data on which the requested information is provided. Indicate NA in answer block for anything which is not applicable to your particular proposed project.

General Information

Item No.	Data Description	Answers or reference to Attachments
1	Generator type and size with manufacturer provided installation & specifications documents	
2	Inverter type and capacity with manufacturer provided installation & specifications documents	
3	Documents proving inverter certification for IEEE std. 1547, 1547.1 and UL 1741.	
4	Is installation to be Flow-back or Non-Flow-back	
5	Is installation contingent on approval of NET METERING	
6	Provide a simple One-Line Diagram(s) for Project and Project Load	
7	Proposed parallel operation date for system start up testing	
8	Proposed date for final interconnected operation	
9	Estimated Total Project Cost	
10	Estimated/calculated pay back time in years including all government incentives, grants and tax credits.	

Isolating Transformer(s) at Project:_____ Transformer No._____

Item No.	Data Description	Answers or reference to Attachments
1	Rated kV and connection (delta, wye, wye-grnd) of each winding	
2	kVA of each winding	
3	BIL of each winding	
4	Fixed taps available for each winding	
5	Positive/negative range for any LTC windings	
6	%Z impedance on transformer self cooled rating	
7	Load loss Watts at full load or X/R ratio	

The following information on these system components shall appear on the preliminary One-Line Diagram, including manufacturer make and model for the items listed below:

__ Breaker - Rating, location and normal operating status (open or closed)
__ Buses - Operating voltage
__ Generators – Type, capacity rating (kVA), method of grounding
__ Inverter type, capacity, operating voltages and 3 phase or single phase operation
__ Inverter testing and certification for meeting IEEE Standard 1547, 1547.1 and UL 1741
__ Isolating transformers - Capacity rating (kVA), location, impedance, voltage ratings, primary and secondary connections and method of grounding
__ Switches - Location and normal operating status (open or closed), type, rating
__ All metering types and locations

__ Outdoor disconnect switch and lockout point - Location, identification

Interconnection Request Status

To be filled out by BWL

PROJECT:_____

DATE

_____ BWL receives Interconnection Application + Data + Filing fee.

_____ Filing Fee of $_____ Posted to Acct. No. _____

_____ BWL acknowledges Receipt within 5 business days of receiving application.

_____ Completed review of Application and Data for Completeness

_____ Application and Data returned to Project Developer with deficiencies noted in application or data.

_____ Assigned to engineer _____ for data review and potential system impact.

_____ Application approved for Non-parallel operation.

_____ Executed “Interconnection Study Agreement”.

_____ Assigned to engineer _____ for interconnection study

_____ Executed “Agreement for Parallel Operation of Customer Owned Generation”.

Upon review of the application data by the BWL we recommend the following :

☐ Subject to verification by visual inspection, interconnection for non-parallel operation is authorized.

☐ Subject to verification by visual inspection and testing, interconnection for parallel operation requires execution of a "Contract for Parallel Operation of Renewable Energy Generators".

☐ Interconnection for parallel operation requires execution of an "Interconnection Study Agreement" prior to any execution of a "Contract for Parallel Operation of Renewable Energy Generators".

Authorized Signature: _____

Printed Name: _____

Title: _____

Date: _____