BUTLER ELECTRIC
UNIFORM TECHNICAL AND PROCEDURAL INTERCONNECTION REQUIREMENTS FOR NET METERING FACILITIES FOR INVERTER BASED WIND AND PHOTOVOLTAIC SYSTEMS AND COGENERATION SYSTEMS OF 200 kW OR SMALLER

September 1, 2017

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1.0 Objectives

This document has been prepared by Butler Electric for Customers installing inverter based wind and Photovoltaic (PV) systems and Cogeneration systems up to 200kW that are eligible for interconnection under net metering. This document addresses the technical requirements, and the procedural process for the interconnection between the Utility's distribution system and a Customer's Wind or PV System.

2.0 Definitions

Cogeneration System – A system that produces electricity using waste heat (as in steam) from an industrial process or the use of steam from another source of heat to generate electricity.

Customer - Anyone taking electric delivery service from, and desiring to interconnect generation with, the Utility.

Inverter - A solid-state power converter with control, protection and filtering functions that converts Direct Current (DC) to Alternating Current (AC) output. Inverters must be of the anti-islanding type as defined and tested in accordance with IEEE 929 and UL1741.

Inverter Based Generation - The production of AC electrical energy by solid state inverters, operating in parallel with and connected to the Utility's electrical distribution system either directly or through a step-up transformer, producing energy from a DC source supplied by a Wind or PV System.

Interconnection Point - The point at which the Utility and Customer interface occurs. Typically, this is the Customer side of the Utility revenue meter and is commonly referred to as the Point of Common Coupling.

Photovoltaic (PV) System - A renewable energy generation system also called a solar electric system utilizing the DC output from solar electric modules in the production of AC electrical energy via a DC to AC inverter.

Wind System - A renewable energy generation system utilizing the DC output from wind turbine generators in the production of AC electrical energy via a DC to AC inverter.

Utility - The electric delivery company to which the Customer is interconnected, i.e. Butler Electric.

3.0 Interconnection Technical Requirements

3.1 General

Interconnection with the Utility's distribution system requires utilization of generation equipment meeting the requirements outlined in Section 3.3 and 3.4 of this document. The system must be equipped with either integral protective functionality or with external protective devices, which provides safety for personnel, affords adequate protection against damage to the Utility's system or to the Customer's property and prevents any interference with the Utility's supply of service to other customers. Such protective equipment shall be installed, owned and maintained by the Customer at the Customer's expense. The Customer's equipment must be installed and configured so that parallel operation must cease immediately and automatically during system outages or loss of the Utility's electric source. The Customer must also cease parallel operation upon notification by the Utility of a system emergency, abnormal condition or in cases where such operation is determined to be unsafe, interferes with the supply of service to other customers or interferes with the Utility's system maintenance or operation. Generation systems and equipment that comply with the following requirements and standards shall be deemed by the Utility to have generally complied with the technical provisions of this section.

The Utility will not assume any responsibility for protection of the Customer's generating equipment, or any portion of the Customer's equipment. The Customer is solely responsible for protecting its equipment in such a manner that faults, imbalances or other disturbances on the Utility's system do not cause damage to the Customer's equipment.

There may be instances where there may be significant costs associated with the interconnection, which are the Customer's responsibility. In order to be aware of all potential costs, it is strongly recommended that the Customer follow the submittal procedure outlined in Section 4 and illustrated in Attachment B.

3.2 Code Compliance and Inspections

It is the responsibility of the Customer to insure that their Cogeneration, Wind or PV System complies with all applicable Federal, State and Local Regulatory Agencies and all applicable electrical and safety codes including the latest revision of the National Electrical Code, ("NEC"). The Customer must obtain, at the Customer's expense, all necessary inspections and approvals required by the local public authorities before the electric generation facility can be connected to the Utility's electric system.

3.3 Photovoltaic Systems

PV Systems must be in compliance with the latest revisions of the following standards:

1) Underwriters Laboratories (UL) 1741, *Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems;*

2) UL 1703, *Standard of Safety: Flat-Plate Photovoltaic Modules and Panels;*

3) IEEE 1262-1995, *IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules*

4) IEEE Standard 929-2000, *Recommended Practice of Utility Interface of Photovoltaic (PV) Systems.*

3.4 All Systems (Wind or PV)

All Systems must be in compliance with the latest revisions of the following standards:

1) All systems must utilize anti-islanding inverters as defined and tested in accordance with IEEE Std. 929 and UL-1 741.

2) The inverter output must conform to IEEE Std. 519-1992, *IEEE Recommended Practices and Requirements for Harmonic Control In Electrical Power Systems.*

3) All systems must conform to IEEE Std. P1547, *Draft Standard for Interconnecting Distributed Resources with Electric Power Systems.*

4) If the system is designed to provide uninterruptible power to critical loads, either through energy storage, back-up generator, or the generation source, the system shall include a parallel blocking scheme for this backup source. This function may be integral to the inverter manufacturer's packaged system.

3.5 Disconnect Switch

All systems must have an outdoor, visible, and lockable disconnect switch which can be used to isolate the generation system from the Utility. This disconnect switch must be accessible to Utility personnel at all times and preferably located at the electric service meter location. The disconnect switch shall be a general duty type safety switch with visible break and shall be lockable in the open or off position. In accordance with the provisions of the NEC, a sign shall be provided by the Customer and shall be securely affixed to the disconnect switch or immediately adjacent to it in accordance with the sample shown in Attachment D. If the disconnect switch is not directly adjacent to the meter, the location must be approved by the Utility and a second sign in accordance with the sample shown in Attachment D shall be provided by the Customer and shall be securely affixed immediately adjacent to the meter to indicate the location of the disconnect switch. If the installation has more than one disconnect switch, each disconnect switch must be identified with its function.

3.6 Warning Label

A warning label provided by the Utility shall be affixed on or immediately adjacent to the meter location indicating that a source of Customer owned generation is installed behind the meter. See Attachment D for a sample.

3.7 Inverter Set Points

On inverters with adjustable set points, the voltage and frequency set points must conform to the settings listed in Section 5.0 of IEEE Std. 929-2000, unless otherwise directed by the Utility. Once set, the settings may not be changed without Utility approval.

3.8 Interconnection Study

In some cases, depending on system size and the Customer's location on the Utility's distribution system, a detailed interconnection study including harmonics may be needed. The cost of the study will be the responsibility of the Customer in accordance with the provisions outlined in Attachment C.

The study results may require that the Customer install additional protection equipment over that normally provided, or that modifications are necessary on the Utility system. The Customer will be notified of these additional requirements, all of which would be at the Customer's expense, to determine if the Customer desires to proceed with the installation.

An interconnection study may be required:

1) For radial feeders where the application will result in aggregate generation of more than 50 kW on a single-phase feeder or more that 150 kW on a three-phase feeder.
2) For any system installed on the Utility's looped secondary network where the system will result in aggregate generation:

   (a) greater than 200 kW or

   (b) exceeding 50 percent of the minimum load on the network bus to which the system is connected

   Such a system may not be permitted to be connected to a network system or additional protective devices may be required to ensure power does not flow into the network system.

3.9 Characteristics of the Customer Interconnection

The voltage and phase configuration of the Customer's generating system must match the Utility service voltage and phase configuration at the Interconnection Point.

4.0 Interconnection Application Process

The application process is detailed below. The application process is also illustrated in the flowchart on Attachment B.

4.1 The Customer contacts the Utility and requests an “Interconnection Application/Agreement for Net Metering Facilities for Inverter Based Wind & Photovoltaic Systems and Cogeneration Systems 200 kW or Smaller” (Application) along with these Uniform Technical and Procedural Interconnection Requirements.

4.2 The Customer submits the following to the Utility at the address shown in Attachment E:

1) Page one of the Interconnection Application (Sections A, B & C)

2) The Application Fee of $100.00, in the form of a check made payable to Butler Electric.

3) A One-Line Diagram of the proposed installation.

4) A Plot Plan showing, at a minimum, the location of the main breaker, metering location, location of the disconnect switch and the inverter/controller for the Wind or PV System.

5) Inverter documentation necessary to verify conformity with IEEE Std. 929-2000 and UL 1741.

6) Proposed set points on all of the protective functions associated with the system protection, if the proposed inverter has adjustable set points.

4.3 The Utility reviews the Interconnection Application/Agreement for Net Metering Systems and any accompanying documents.

1) Utility response to Interconnection Application/ Agreement will be provided within 30 days of submission, and will either notify the Customer that they should proceed with the installation as proposed or notify the Customer of any deficiencies in the Application.

2) In the event that there is a deficiency, the Interconnection Application/ Agreement will not be accepted. Once the deficiency is corrected and

satisfactory documentation or notification has been provided to the Utility, a response will be provided within 30 days of submittal.

3) The Utility also determines whether an interconnection study is needed as outlined in Paragraph 3.8.

In those cases where an interconnection study is deemed to be necessary, the costs for the study shall be assessed to the Customer according to the Standardized Costs for Electric Distribution Company Interconnection Studies for Net Metering-qualified Systems (see Attachment C). The Utility will advise the Customer of the study costs and request Customer authorization before proceeding.

Once the interconnection study has been completed the Customer will be notified of the results, including any specific protection requirements over that normally provided, or of any modifications necessary to the Utility system. The Utility will advise the Customer of the costs associated with any identified Utility system modifications and request Customer authorization before proceeding.

4.4 The Customer then proceeds to install the clean energy system and have the system inspected by the local code official.

4.5 The Customer completes page two of the Application, which contains the electric code inspection signoff (Section E) and Customer acknowledgement (Section F), after the system has been installed and the system has been inspected and approved by the electrical code official. The application is then resubmitted to the Utility.

Please be advised, if the Customer does not follow the Interconnection Application Process and installs the system before submitting the Application (Sections A through F submitted in one step), there may be additional costs associated with the interconnection not yet identified. The Customer shall assume the risk of any additional costs identified by the Utility in order to implement the interconnection.

4.6 The Utility reviews the Interconnection Application/Agreement for Net Metering Systems and any accompanying documents following the same steps described in Paragraphs 4.4 1) and 4.4 2) above and will provide a response within 30 days of submission. The response will indicate a “yes” (proceed) or “no, because…”. Any response other than a simple “yes” will be accompanied by a project specific explanation of the reason for the denial, including what additional information is needed and/or what modifications may be required before acceptance can be granted. A site inspection may be performed by the Utility.

4.7 When the interconnection review is completed satisfactorily, the Utility completes Section G of the Interconnection Application/Agreement form and the Customer will be notified that they may commence parallel operation of the Wind or PV System. The Utility will send a copy of the accepted Interconnection Application/Agreement form to the Customer.

The Utility may need to replace the watt-hour meter at the Customer’s location so as to properly measure the net energy consumed by the Customer or the net energy delivered by the Customer’s electric generation facility for the monthly billing period. The Utility shall furnish, maintain, and own all metering equipment needed for measurement of the service provided.

5. Purchase of Excess Generation

a. Municipal Utility and Customer shall enter into an agreement that addresses all purchase and payment obligations. The Municipal Utility shall only be required to purchase energy in accordance with the rules of NJAC 14:8 Renewable Energy and Energy Efficiency.

b. Rates for the purchase of excess energy from the qualifying facility shall be based upon the Municipal Utility’s avoided cost. The avoided cost shall be inclusive of the cost of energy, including capacity costs. This is commonly known as the LEAC portion of the municipal rate.

Attachment A – Application

BUTLER ELECTRIC

INTERCONNECTION APPLICATION/AGREEMENT

FOR NET METERING FACILITIES FOR INVERTER BASED WIND AND PHOTOVOLTAIC SYSTEMS and COGENERATION SYSTEMS of 200 kW OR SMALLER

A. Applicant Information

Name: _____

Mailing Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Street Address (if different from above): _____

City: _____ **State:** _____ **Zip Code:** _____

Daytime Phone: _____ Fax: _____ **Email:** _____

Butler Electric Account No. (from Utility Bill): _____

B. System Information

Inverter Manufacturer Name Plate AC Power Rating: _____ **kW**

System Type: __ Wind__PV__Cogen System Location: _____

Inverter Manufacturer: _____

Inverter Model No: _____ **Inverter Serial No:** _____

Inverter Location: __Indoor __Outdoor __Self-Contained Location: _____

Outdoor Manual AC Disconnect Switch - Location: _____

C. Installation Contractor Information/Hardware and Installation Compliance

Installation Contractor (Company Name) _____

Contractor's License No.: _____ **Proposed Installation Date:** _____

Mailing Address: _____

City: _____ **State** _____ Zip Code _____

Daytime Phone: _____ Fax: _____ **Email:** _____

The proposed System hardware and installation shall be in compliance with the New Jersey Uniform Technical and Procedural Interconnection Requirements for Net Metering Facilities for Inverter Based Wind and Photovoltaic Systems of 100 kW or Smaller, with *Underwriters Laboratories (UL) 1741, Standard for Static Inverters and Charge Controllers for Use in Photovoltaic Systems.* System shall be installed in compliance with *IEEE Standard 929-2000, Recommended Practice for Utility Interface of Photovoltaic Systems.* All System types shall be installed in compliance with applicable requirements of local electrical codes, Butler Electric and the *National Electrical Code® (NEC)* and shall use a non-islanding inverter as defined under *IEEE Standard 929-2000.*

If solar electric, the proposed System shall also be in compliance with *UL 1703, Standard for Safety: Flat-Plate Photovoltaic Modules and Panels;* and *IEEE 1262-1995, IEEE Recommended Practice for Qualification of Photovoltaic (PV) Modules.*

The System shall have an outdoor lockable, visible disconnect switch, accessible at all times to Butler Electric personnel. If the System is designed to provide uninterruptible power to critical loads, either through energy storage, back-up generator, or the generation source, the System shall include a parallel blocking scheme for this backup source. This function may be integral to the inverter manufacturer's packaged system.

Signed (Contractor): _____ Date: _____

Name (Print): _____

BUTLER ELECTRIC
INTERCONNECTION APPLICATION/AGREEMENT
FOR NET METERING FACILITIES FOR INVERTER BASED WIND AND PHOTOVOLTAIC SYSTEMS
and COGENERATION SYSTEMS of 200 kW OR SMALLER (Continued)

D. Additional Terms and Conditions

a) Operation/Disconnection

If it appears to Butler Electric, at any time, in the reasonable exercise of its judgment, that operation of the System is adversely affecting or may adversely affect Butler Electric's electrical system, Butler Electric may immediately take any and all steps it reasonably believes necessary to mitigate or cure the conditions including, without limitation, disconnecting the System from Butler Electric's electrical system. Applicant/Customer shall at all times permit Butler Electric employees and inspectors reasonable access to inspect, test, or examine the System or metering equipment after notice by Butler Electric. Applicant/Customer shall be liable for the costs and expenses incurred by Butler Electric related to disconnection and reconnection of the System by Butler Electric when disconnection is permitted under this paragraph D.

b) Liability/Indemnity

Applicant/Customer hereby covenants and agrees to assume all risk of and liability for personal injuries (including death) and damage to property arising out of or caused by the operation of the System. Applicant/Customer hereby covenants and agrees to indemnify, protect, defend and save harmless Butler Electric, its affiliates, officers, employees and agents from and against any and all claims and demands for damages to property and injury or death to persons which may arise out of, or be related to, or caused by, the operation of the System or its interconnection to the Butler Electric electrical system, except if caused solely by the gross negligence or willful misconduct of Butler Electric as determined by a court of law.

E. **Electrical Code Inspection**

The System referenced above satisfies applicable electrical code requirements.

Inspector Name (Print): _____

Signed (Inspector): _____

(in lieu *of* **the signature** *of* **the inspector, a copy** *of* **the final inspection certificate may be** *attached).*

Date: _____ Municipality: _____

F. Customer Acknowledgment

The System has been installed to my satisfaction and I have been given System warranty information, and an operation manual. Also, I have been informed as to whether my Wind, Cogeneration or PV System is eligible for net metering, and been provided with a copy of Butler Electric's net metering tariff and interconnection requirements. I have also been instructed in the operation of the System by the manufacturer and/or the installer of the System.

I agree to abide by the terms of this Application /Agreement and I agree to operate and maintain the System in accordance with manufacturer's recommended practices as well as the New Jersey Single, Uniform Interconnection Requirements. Further, I agree to notify Butler Electric 30 days prior to modification or replacement of the System's components or design. Any such modification or replacement shall require submission of a new Application to Butler Electric.

I agree not to operate the System in parallel with Butler Electric until this Application/Agreement is accepted by Butler Electric.

I also agree to provide and install all warning labels as required by Butler Electric on or near the Utility Safety Disconnect and/or at my service meter location as described in Sections 3.5 and 3.6 of the New Jersey Uniform Interconnection Requirements.

Signed (Customer): _____

Date: _____

G. Utility Application Acceptance

Butler Electric does not, by acceptance of this Application/Agreement, assume any responsibility or liability for damage to property or physical injury to persons. Further, this Application/Agreement does not constitute a dedication of the Customer's System to Butler Electric's electrical system equipment or facilities.

This Application is accepted by Butler Electric on this _____ day of _____, 200____

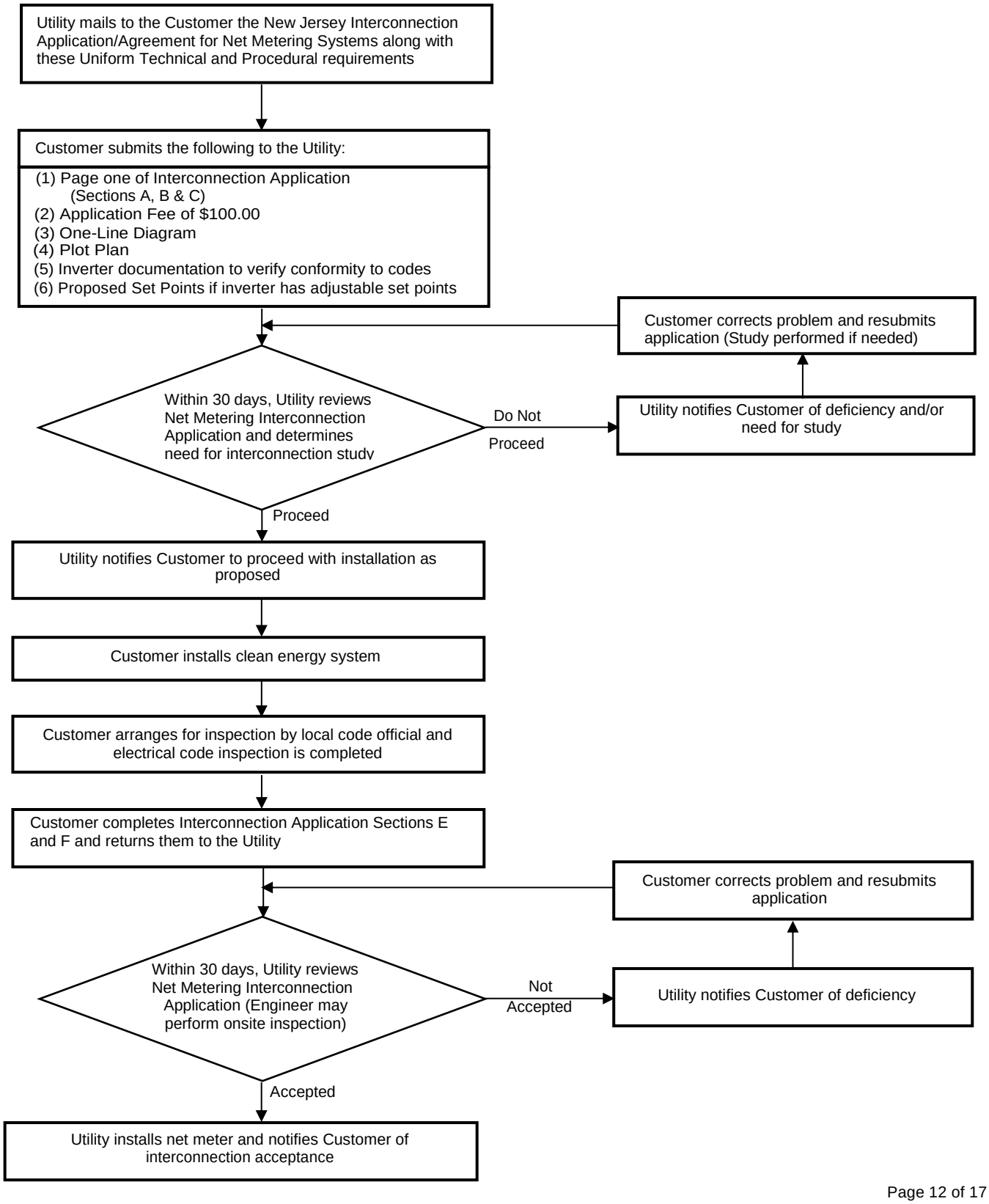
Butler Electric Representative Name (Print): _____

Signed (Butler Electric Representative): _____

Date: _____

Attachment B – Flowchart

New Jersey Interconnection Application Process for Net Metering Customers (Wind and Photovoltaic systems of 100 kW or smaller)



Standardized Costs for Electric Distribution Company Interconnection Studies for Net Metering-qualified Systems

The following are “standardized” study costs for Customers seeking to interconnect net metering qualified systems to an EDC’s system, when such systems (individually or in aggregate) meet the criteria specified below. These charges would be in addition to the $100 application fee.

1) For requests to interconnect (i) single phase systems on single phase branches where the total aggregate generation is greater than 50 kW but less than or equal to 200 kW; or (ii) single phase and 3 phase systems on 3 phase feeders where the total aggregate generation is greater than 150 kW but less than or equal to 300 kW, the study cost may be up to, but not exceed, the cost of 3 man-days of study labor at the current EDC loaded labor rate. These charges will be based on actual time incurred up to the maximum cost.

2) Requests to interconnect any generation up to 200 kW for network service installations may incur a maximum study cost based on 5 man-days of study labor at the current EDC loaded labor rate. These charges will be based on actual time incurred up to the maximum cost. (Note: depending on the proposed size of the unit and the data available for the network, this cost to the Customer may be significantly less than this maximum amount).

Study costs for proposed installations that fall outside of the “standards” will be estimated for the facility owner before any work is performed and billed at the respective EDC’s loaded labor rate.

In all cases Customers/contractors have a right to receive a bill with a detailed explanation of the charge.

Attachment D – Sample Warning Label and Signs

Warning Label – The following warning label will be provided by the utility for installation on or immediately adjacent to the meter box.

Disconnect Switch Signs – Signs shall be made of yellow laminated engraving stock with at least 3/8 inch high blacl letters. Sign shall be either glued with silicone adhesive or mechanically attached. Size of the signs shall be as large as practical and in any case shall not be less than 4 inched by 6 inches.

If the disconnect switch is not located at or immediately adjacent to the meter location, then the Customer shall provide and install a sign next to the meter box to direct Utility personnel to the disconnect switch location. The following is an example of a sign that shall be placed near the meter. It shall provide the specific location of the disconnect switch such as “Safety Disconnect Switch is located at rear of building” or “Safety Disconnect Switch is located on end wall of garage”.

Attachment E – Utility Contact List

Butler Electric Company

Butler Electric
One Ace Road
Butler, NJ 07405
Attn: Electric Superintendent
973-838-0063 or 973-838-7200 (ext. 511)