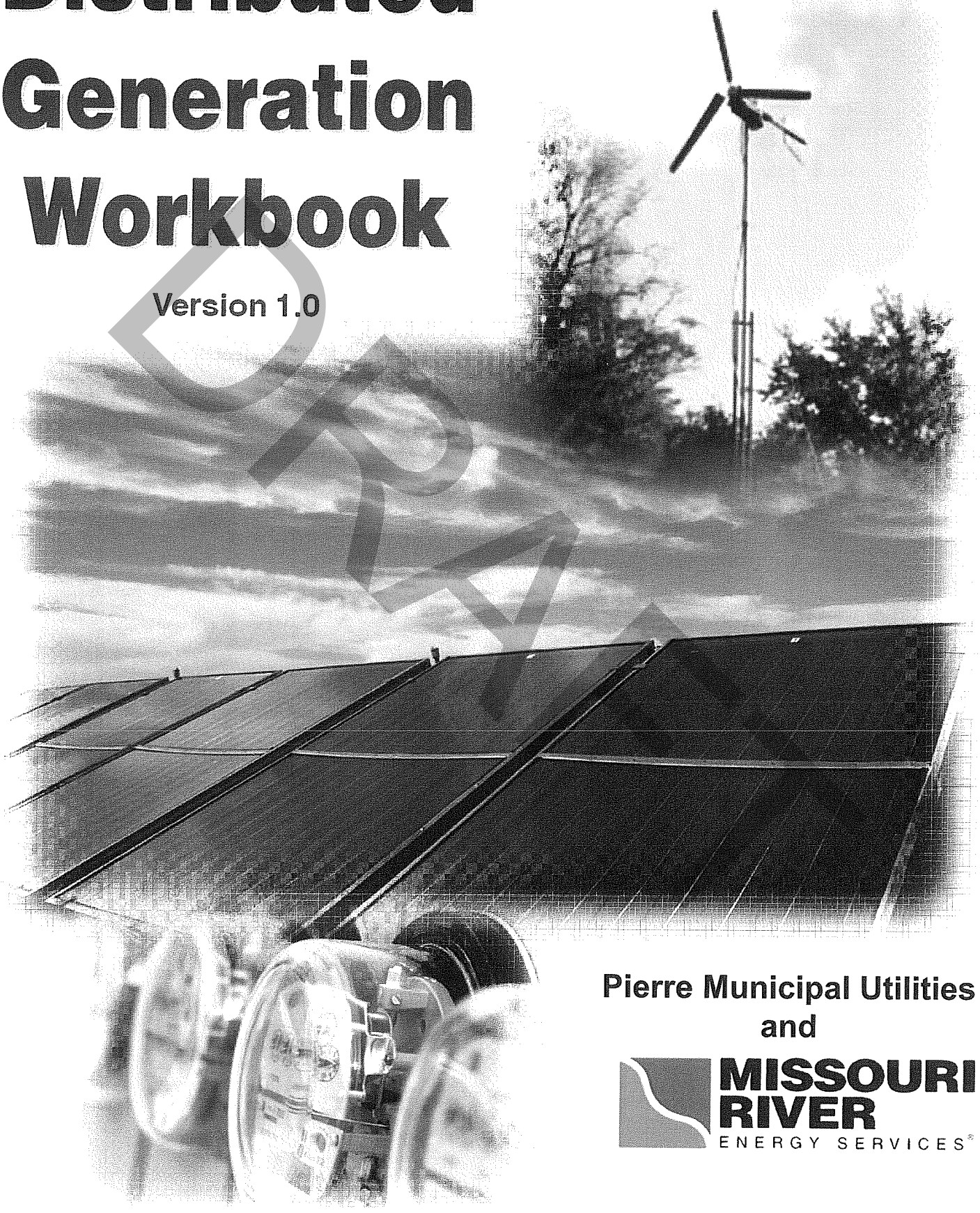
Distributed Generation Workbook

Version 1.0



Pierre Municipal Utilities
and
MISSOURI RIVER ENERGY SERVICES®

City of PIERRE
Municipal Electric Utility

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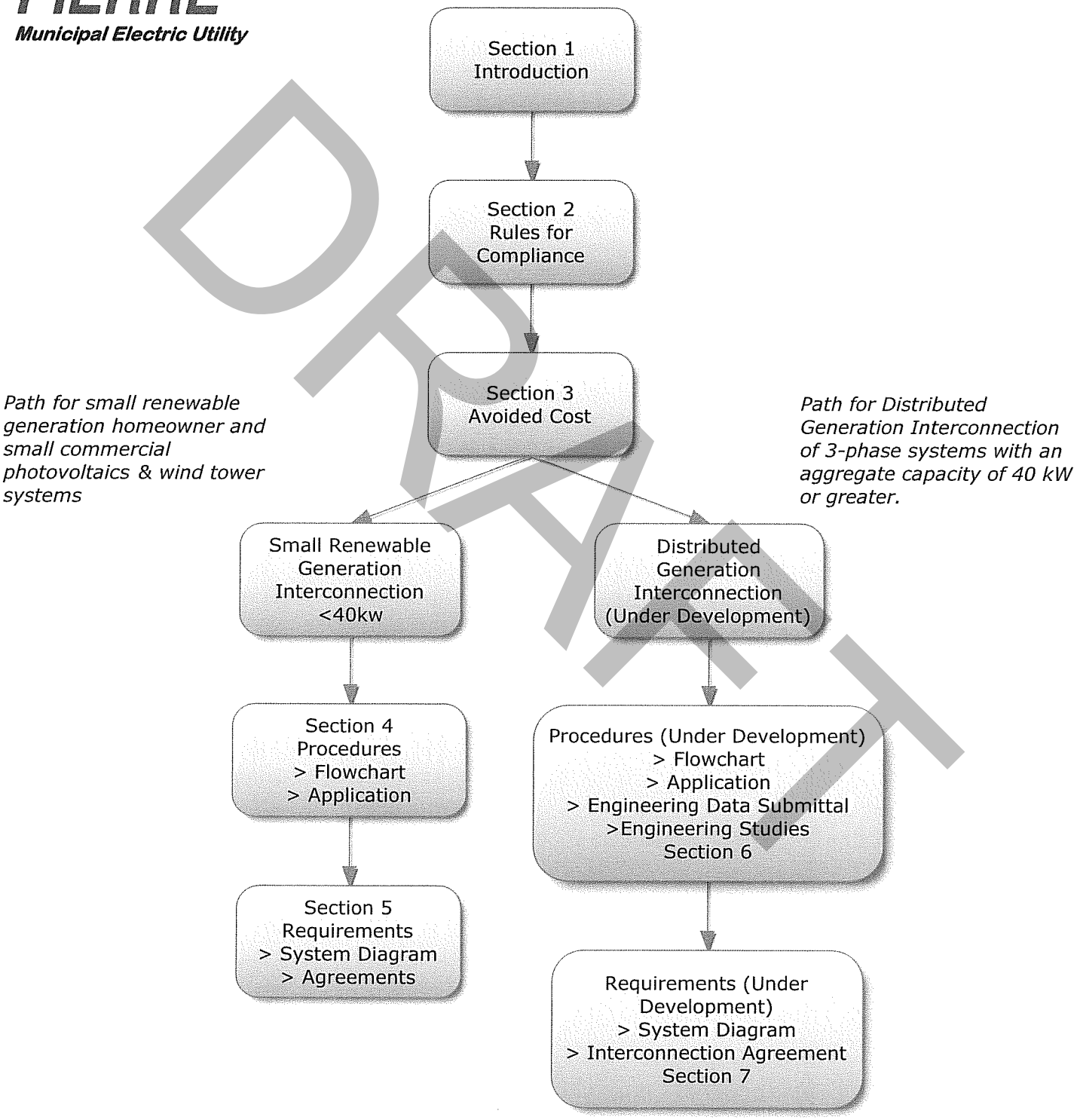

City of PIERRE
Municipal Electric Utility

Section 1

Introduction

City of PIERRE
Municipal Electric Utility

INTRODUCTION TO DISTRIBUTED GENERATION INTERCONNECTION WITH PIERRE MUNICIPAL UTILITIES

Pierre Municipal Utilities and Missouri River Energy Services

Pierre Municipal Utilities (PMU) is owned by the citizens of the community and operated for the distribution of electric power and energy to the consumer. Wholesale electric power supply is provided to your community by Western Area Power Administration (Western) and Missouri River Energy Services (MRES).

The base power supply resource from Western for your community is the hydroelectric power produced from the dams on the Missouri River constructed by the U.S. Army Corps of Engineers and marketed as firm power through Western. In the early 1970s, all preference power customers were informed that the hydroelectric system could not continue to supply all firm power requirements beyond the 1977 power and energy levels and thus they would have to look elsewhere to meet new load growth requirements.

MRES, a joint action agency, began in the early 1960s as an informal association of northwest Iowa municipalities with their own electric systems, which decided to coordinate their efforts in negotiating power supply contracts. MRES began supplying supplemental power and energy above the levels received from Western to communities, like yours, after 1977. Your community has executed a Power Sale Agreement (S-1) with MRES, pursuant to which MRES has agreed, to supply to S-1 Members all Supplemental Power requirements above the power supplied by Western. Such a comprehensive and exclusive agreement was needed in order to provide financial security to bond holders that have advanced funds to construct facilities for MRES. The term of the S-1 Agreement extend to January 1, 2046.

The Public Utilities Regulatory Policies Act of 1978 (PURPA)

PURPA, as amended by the Energy Policy Act of 2005, requires PMU to buy power and sell power to any Qualifying Facility (QF) at nondiscriminatory rates. The Federal Energy Regulatory Commission (FERC) has since issued certain rules and regulations which encourage small power production and cogeneration, but are not entirely clear when dealing with local utilities which have entered into long-term arrangements with a power supplier like MRES.

In certain circumstances, PURPA may require a duplication of obligations to buy and sell power with QFs where, for example, cooperatives, joint action agencies, and their respective MEMBERS each have statutory duties under PURPA to interconnect and exchange power with QFs. This means that both MRES and PMU could be required to buy generation output of the QF and sell supplemental, backup, and maintenance power to a QF located within PMU's service territory.

PMU and MRES filed a Petition of Waiver with FERC on Section 210 of PURPA and have been granted such from FERC. This limited Waiver continues to protect a QF's legitimate interests under PURPA, while clearing up the confusion as to which entity (PMU or MRES) is best situated to fulfill the PURPA obligations of buying and selling to a QF. This waiver also clears up any possible conflict with the S-1 Agreement that was signed by PMU. As a condition of the waiver, FERC required PMU and MRES to abide by a set of Rules for Compliance in 1994. (See Section 2.) These rules represent general guidelines since the nature, size, and character of QFs can vary widely. Policies have been prepared based upon these Rules for Compliance.

Qualifying Facilities: Cogeneration and Small Power Production

The purpose of PURPA Sections 201 and 210 and the FERC rules is to encourage the use of cogeneration and small production facilities where such devices might utilize alternate fuels and thus might make a significant contribution to the nation's effort to conserve energy resources.

PURPA defines these customer-owned distributed generation devices by dividing them into several categories: small power production facilities, cogeneration facilities, and hydroelectric small power production facilities. Small power production facilities rely on biomass, waste, or renewable resources, including wind, solar, and geothermal to produce electric power. Cogeneration facilities simultaneously produce two forms of useful energy such as electric power and steam. Cogeneration facilities use significantly less fuel to produce electricity and steam (or other forms of energy) than would be needed to produce the two separately. Hydroelectric small power production facilities include a generation facility that impounds or diverts the water of a natural watercourse by means of a new dam or diversion. Any customer-owned generation that meets one of the above descriptions as defined by PURPA and authorized by FERC, will be defined as a QF.

Under the FERC regulations and Petition of Waiver, PMU is generally obligated to interconnect with, and operate in parallel with, a QF. Parallel operation is the operation of on-site generation by a customer while the customer is connected to PMU's utility system. PMU is also required to sell electricity to generators who qualify under FERC standard, while MRES is required to purchase electricity from those QFs who qualify under FERC standards. All generation and transmission interconnections sought by QFs must comply with the requirements of the North American Electric Reliability Corporation (NERC), Mid-Continent Area Power Pool (MAPP), and/or other regional transmission providers.

FERC regulations allow PMU and MRES to establish interconnection standards to ensure electrical system safety and reliability. The regulations also make it clear that MRES, PMU and

its retail customers are not to be detrimentally affected as a result of a customer interconnection. Thus, other customers should not have a higher cost of electricity or lower quality of service because of the QF's interconnection. MRES and PMU will not be required to make uncompensated investments to interconnect with QFs.

As stated by FERC, the purchase rate from QFs is based on the cost that can be avoided by MRES with such purchases, unless a state requires a mandated rate methodology that is applicable to PMU. Avoided costs are classified in two basic components: energy related and capacity related. Energy related avoided costs are those associated with the cost of not burning or purchasing certain fuels. In the near-term, the only costs that can be avoided are those associated with energy, i.e., not burning coal, nuclear fuel, oil, etc. Capacity avoided costs are those associated with the capital cost of adding new generation, of a demand-side management (DSM)/energy efficiency option, or of the demand portion of a wholesale power purchase. If the QF has a reliable capacity value, then MRES will also include a capacity component as part of the purchase rate. Federal regulations require MRES to keep on file avoided cost data for the next five years and to update the data every two years. This can be requested from MRES at any time.

Any prospective customer who wishes to interconnect and operate in parallel with PMU should contact PMU and discuss the generation interconnect with staff. A set of documents defines the policies and general requirements for interconnection and parallel operation.

Non-Qualifying Facilities: Standby and Emergency Generation

PMU is not required to allow a customer-owned distributed generation to operate in parallel with PMU's electrical system if the generation does not satisfy qualifying status QF requirements. When a customer wishes to install non-qualifying generation, PMU will review these requests on a case-by-case basis. These devices will only be connected to PMU by an approved transfer switch that will break the circuit connected to PMU's electrical system before making the circuit with the Customer's generation or with a PMU approved closed-transition switch.

Pierre Municipal Utilities
City of Pierre

City of PIERRE
Municipal Electric Utility

Section 2

Rules for Compliance

RULES FOR COMPLIANCE
WITH
FEDERAL ENERGY REGULATORY COMMISSION ORDER NO. 69
COGENERATION AND SMALL POWER PRODUCTION

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1. Introduction

1.1 The Public Utility Regulatory Policies Act of 1978 (PURPA), under Section 210, requires the Federal Energy Regulatory Commission (FERC) to develop rules which encourage Cogeneration and Small Power Production. Pursuant to Section 210, regulations have been prepared by FERC and published in the Federal Register (45 FR 12214, February 25, 1980). Missouri Basin Municipal Power Agency, d.b.a. Missouri River Energy Services ("Utility") and its member municipal utilities ("Member"), which are nonregulated electric utilities, will implement, to the extent possible, the procedures and requirements of FERC Order no. 69, pursuant to these rules.

1.2 These rules apply to all entities willing and able to enter into an agreement with the Utility and its Members. Provisions of these rules shall not supersede existing contracts. Entities who have the status of "qualifying small power production facility" and/or "qualifying cogeneration facility" hereinafter referred to collectively as qualifying facility, pursuant to FERC Order No. 70 (45 FR 17959, March 20, 1980) are eligible to apply for service under these rules.

1.3 These rules represent general guidelines since the nature, size, and character of qualifying facilities can vary widely. The Utility reserves the right to evaluate qualifying facilities on a case by case basis.

1.4 The Utility is a wholesale supplier of power and energy to municipal Utilities; and as such, has no sales other than sales for resale. Qualifying facilities which seek to do business with the Utility shall interconnect with the Members, since the Utility has no sales for retail supplemental power, back-up power, maintenance power, and interruptible power.

2. Definitions: Terms as defined in Order No. 69 (18 CFR Part 292) shall have the same meaning for these rules unless further defined.

2.1 Accredited Capacity: The electrical rating given to generating equipment that meets the Utility's criteria for uniform rating of generating equipment. This criteria includes, but is not limited to, reliability, availability, type of equipment, and the degree of coordination between the qualifying facility and the Utility.

2.2 Capacity Costs: The costs associated with providing the capability to deliver energy. They consist of the capital costs of facilities used to generate and transmit electricity or the cost to purchase such capacity from other utilities.

2.3 Demand: The average rate in kilowatts at which electric capacity is made available as determined at the point of measurement during any 30 minute period or any other period to be determined by the Utility.

2.4 Energy: Electric energy as measured in kilowatt hours at the point of measurement.

2.5 Energy Costs: The variable costs associated with the production of electric energy. They represent energy related cost only, or the average cost of purchased energy. Identifiable capacity charges included in purchased power agreements shall not be included in the calculation of the cost of purchased energy.

2.6 Point of Measurement: The point or points where energy and/or demand are metered.

2.7 Point of Interconnection: The point or points at which the qualifying facility is to receive and/or deliver energy or capacity and energy under normal operating conditions.

2.8 Prudent Utility Practice: Any of the practices, methods, and acts engaged in, or approved by, a significant portion of the electrical utility industry consistent with reliability, safety, and expedition.

3. Conditions of Service: The conditions listed in this paragraph shall apply to all qualifying facilities served under these rules.

3.1 The Utility shall purchase energy or capacity and energy from any qualifying facility who offers to sell energy or capacity and energy.

3.2 The Member interconnected with the qualifying facility shall sell any capacity and energy that is required by the qualifying facility to the qualifying facility. The qualifying facility shall be billed under the applicable residential, general, industrial, or contractual service schedule.

3.3 The Member shall offer to provide maintenance, interruptible, supplementary, and back-up power to qualifying facility if requested by the qualifying facility.

3.4 The qualifying facility shall execute written agreements with the Utility and the Member to be interconnected. The Utility reserves the right to waive this requirement. The waiving of this requirement by the Utility does not relinquish the Utility's right to require the execution of a written agreement in the future.

3.5 The qualifying facility shall comply with all requirements of the National Electrical Safety Code, American National Standards Institute, Institute of Electrical and Electronic Engineers, American Society of Mechanical Engineers,

and any other applicable local, state, or national code and operate its equipment according to prudent utility practice. In case of any conflict in the foregoing codes or standards, the Utility shall decide which shall govern.

3.6 The Member shall interconnect in parallel with the qualifying facility. The qualifying facility shall, to the point of interconnection; furnish, install, operate, and maintain in good order and repair and without cost to the Utility or the Member such relays, locks and seals, breakers, automatic synchronizers, and other control and protective equipment as shall be designated by the Member as being required as suitable for the operation of the qualifying facility in parallel with the Member's system. The qualifying facility shall take appropriate steps to insure that operating in parallel will not degrade in any fashion the quality of service that is normally maintained on the Utility's or Member's systems.

3.7 Switching equipment capable of isolating the qualifying facility from the Member's system shall be assessable to the Member or its agent at all times.

3.8 At its option, the Member may choose to operate, without notice or liability, the switching equipment described in 3.6 and 3.7 above if, in the opinion of the Member or its agent, continued operation of the qualifying facility in connection with the Member's system may create or contribute to a system emergency or safety hazard. The Utility's obligation to purchase from the qualifying facility ceases when the Member or its agent operates the switching equipment described in 3.6 and 3.7 above. The Utility and the Member shall endeavor to minimize any adverse effects of such operation on the qualifying facility.

3.9 The qualifying facility shall indemnify and hold harmless the Member and the Utility from any and all liability arising from the operation and interconnection of the customer's facilities. The qualifying facility shall bear full responsibility for the installation and safe operation of the equipment required to generate and deliver energy or capacity and energy to the point of interconnection.

3.10 The Utility shall provide, upon request, sufficient data to allow the customer to determine the cost effectiveness of the qualifying facility if it goes into operation pursuant to these rules. The data given will conform to the outline given in § 292.302 (Order no. 69 - 45 FR Part 292).

3.11 Any costs of interconnection incurred by the Utility or the Member due to the interconnection of the qualifying facility, which are over and above the interconnection costs that would be incurred due to the connection of a comparable non-generating customer, shall be the responsibility of the qualifying facility. Interconnection cost may be amortized over a period of time not greater than the length of the contract between the Utility and the qualifying facility.

3.12 The Utility may discontinue purchase from the qualifying facility if the Utility determines that purchase from the qualifying facility would result in cost greater than those which the Utility would incur if it did not make such purchases.

3.13 The Utility will give sufficient notice to the qualifying facility when it intends to invoke paragraph 3.12.

3.14 The Member may discontinue sales to the qualifying facility during a system emergency, providing that such discontinuance is on a nondiscriminatory basis.

3.15 By mutual agreement between the Utility and the qualifying facility, the Utility will transmit or arrange for the transmission of energy or capacity and energy to another utility for purchase by that utility. The Utility shall be fairly compensated for such transmission.

3.16 The qualifying facility shall provide an advance payment to the Utility if in the opinion of the Utility or the Member, as appropriate, the costs of interconnection will be excessive and/or the amount of work that must be done by the Member to provide the interconnection facilities will be excessive.

3.17 The Utility and the Member reserve the right to approve, inspect, and test the qualifying facility's generating equipment and all associated equipment.

4. Rates for Sales

4.1 The Utility shall purchase the surplus energy or surplus capacity and energy from qualifying facilities in which construction was commenced on or before November 8, 1978. The rate paid by the Utility to the qualifying facility for such surplus energy or surplus capacity and energy shall be a negotiated rate.

4.2 Qualifying facilities of 100 kW or less shall be paid a standard rate, except as otherwise stated in 4.1, based on avoided cost as outlined in 4.4 and 4.5. The installation of metering equipment shall be according to Utility policy.

4.3 For qualifying facilities of 100 kW or more, the qualifying facility may negotiate a contract with the Utility. For qualifying facilities who choose not to negotiate, or in the event of an impasse in negotiations between the Utility and the qualifying facility, avoided costs will be paid. Such avoided costs shall be determined as outlined in 4.4 and 4.5, except as otherwise stated in 4.1.

4.4 Avoided energy costs shall be the estimated or actual energy costs adjusted for the following items:

A. The costs or savings to the Utility resulting from variations in line losses from those that would have existed in the absence of purchase from the

qualifying facility, if the Utility generated or purchased an equivalent amount of energy.

B. Sanctions imposed for noncompliance with these rules and any contract between the Utility and the qualifying facility.

4.5 Capacity payments shall be made only in those periods of time in which the Utility is able to avoid capacity purchases and the qualifying facility enters into a legally enforceable contract to provide accredited capacity. The payment for the capacity purchase from the qualifying facility shall reflect the cost of the Utility's alternate source of capacity of similar capability. The capacity payments shall take into account the following items of information.

A. Length of the contract term.

B. Reasonable scheduling of maintenance.

C. Willingness and ability of the customer to allow the Utility to dispatch the customer's generation.

D. The Utility's ability to defer a purchase from another source or to defer construction of a facility or a portion of a facility.

E. Sanctions imposed for noncompliance with these rules and any contract between the Utility and qualifying facility.

F. Availability and reliability of the qualifying facility.

4.6 In the event of the imposition of any tax or payment in lieu thereof on the Utility by any lawful authority on the production, transmission, sale, or purchase of energy or capacity and energy that would not occur due to a comparable non-generating customer, such tax or payment shall be the responsibility of the qualifying facility.

City of PIERRE
Municipal Electric Utility

Section 3

Avoided Cost

AVOIDED COSTS AND CAPACITY PLANS

PIERRE MUNICIPAL UTILITIES
MISSOURI RIVER ENERGY SERVICES
COMPLIANCE WITH FEDERAL ENERGY REGULATORY COMMISSION'S
REGULATIONS ORDER 69, 18 CFR PART 292.302

FERC has adopted certain rules and regulations which require MRES to prepare and maintain for public inspection electric utility system cost and rate data as defined in the regulations Section 292.302(b)(1) through (d).

The purpose of this submittal is to make available to potential cogenerators and small power producers present and anticipated future avoided cost data of electric energy and capacity for MRES. This data is intended to help potential owners of such QFs to evaluate the financial feasibility of a cogeneration or small power production project.

This data is not intended to represent a rate for purchases from QFs, but rather the first step towards rate determination.

Rates for QF

1. 100 kW or less: Any QF 100 kW or less shall be paid a standard rate as per PURPA or as otherwise required by law. MRES Board of Directors sets PURPA Standard Rate each year for the following calendar year.

2. Greater than 100 kW: Rates to QFs in this category are negotiated and will also take into consideration those factors enumerated in Section 292.304 of the regulations.

PURPA AVOIDED ENERGY COST
Section 292.302 (b) (1)
Date of last update: 11/2009

Avoided Energy Cost

Seasonal Avoided Energy Costs
(cents /kWh):

	2009		2010		2011	
	Summer	Winter	Summer	Winter	Summer	Winter
On-Peak	2.78	2.42	3.58	3.12	4.41	3.84
Off-Peak	1.39	1.50	1.78	1.93	2.20	2.38

	2012		2013		2014	
	Summer	Winter	Summer	Winter	Summer	Winter
On-Peak	4.59	4.00	4.78	4.16	4.94	4.30
Off-Peak	2.29	2.47	2.38	2.57	2.46	2.66

Annual Avoided Costs
(cents per kWh):

2009	2010	2011	2012	2013	2014
2.06	2.65	3.27	3.40	3.54	3.66

Rates

For QF facilities 100 kW or less, the PURPA Standard Rate is 2.65 cents per kWh for 2010 adopted in 2009 by the MRES Board of Directors

Qualifying facilities greater than 100 kW will be treated on a case-by-case basis as allowed by federal regulations.

City of PIERRE
Municipal Electric Utility

Section 4

Procedures

SMALL RENEWABLE GENERATION INTERCONNECTION PROCEDURE FOR INVERTER CONNECTED SYSTEMS RATED LESS THAN 40 KW

Introduction

To interconnect a Generation System with Pierre Municipal Utilities (PMU), there are several steps that must be followed. This document outlines a streamlined version of those steps for inverter connected systems rated less than 40kW. At any point in the process, if there are questions, please consult your PMU Contact.

This streamlined version of the interconnection process has been prepared to explain the process to interconnect a specific type and size of Generation System: a PURPA qualified generation system utilizing a Grid Tie Inverter rated below 40kW. If your system does not meet these qualifications, then this procedure is not applicable for interconnecting your system. Please refer to the "Distributed Generation Interconnection Procedure" in Section 9.

This document does not discuss the associated interconnection Technical Requirements, which are covered in the "Small Renewable Generation Interconnection: Requirements for Inverter Connected System Rated less than 40kW" in Section 8. Please refer to that document for Technical Requirements and additional explanation of the terms utilized herein.

General Information

A. Definitions

1. Applicant: The person, customer, or entity which is requesting the interconnection of a Generation System with Pierre Municipal Utilities (PMU) and has overall responsibility for ensuring that the Generation System is designed, operated, and maintained in compliance with the Technical Requirements.

2. Area EPS: An electric power system (EPS) that serves Local EPS. Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc.

3. Distribution System: The PMU system which is not part of the Area EPS Transmission System or any Generation System.

4. Extended Parallel: The Generation System is designed to remain connected with PMU for an extended period of time.

5. Generation: Any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, or any other electric producing device, including energy storage technologies.

6. PMU Coordinator: The person or persons designated by PMU to provide a single point of coordination with the Applicant for the generation interconnection process.

7. Generation System: The interconnected generator(s), controls, relays, switches, breakers, transformers, inverters, and associated wiring and cables up to the Point of Common Coupling.

8. Grid Tie Inverter: A device that converts DC electricity to AC electricity. While a Grid Tie Inverter usually has been specially designed and constructed to safely interconnect with an Area EPS, for the purposes of this interconnection proceducre, a Grid Tie Inverter must also have been designed and tested to meet the requirements of IEEE 1547 and ANSI 929 standards and has been certified with a UL 1741 label.

9. Interconnection Customer: The party or parties who will own/operate the Generation System and are responsible for meeting the requirements of the agreements and Technical Requirements. This could be the Generation System applicant, installer, owner, designer, or operator.

10. Local EPS: An EPS contained entirely within a single premise or group of premises.

11. Point of Common Coupling: The point where the Local EPS is connected to an Area EPS.

12. Technical Requirements: The complete set of requirements outlined in the "PMU Distributed Generation Interconnection Requirements." Also includes the more concise subset of the technical requirements provided for smaller inverter interconnected generation systems titled "PMU Small Renewable Generation Interconnection Requirements for Inverter Connected Systems Rated less than 40kW".

B. PMU Coordinator

For questions regarding this generation interconnection process or any other questions regarding generation installation in general, please contact the following:

Name: Bradley E. Palmer
Title: Utilities Director
Company: Pierre Municipal Utilities
Address 222 East Dakota, PO Box 1253, Pierre, South Dakota 57501
Phone 605-773-3067
E-mail: brad.palmer@ci.pierre.sd.us

This PMU Coordinator may not be able to directly answer or resolve all of the issues involved in the review and implementation of the interconnection process and standards, but shall be available to provide coordination assistance with the Applicant.

C. Insurance

In connection with the Interconnection Customer's performance of his or her duties and obligations under the Small Renewable Generation Interconnection Procedure and subsequent agreement, the Interconnection Customer shall maintain, during the term of the Agreement, general liability insurance from a qualified insurance agency with a B+ or better rating by "Best" and with a combined single limit as determined by PMU based on the Generation System of the Interconnection Customer.

Procedure for Small Renewable Generation Interconnection

Step 1 Application (By Applicant)

Upon decision to interconnect a Small Renewable Generation System with PMU, Applicant shall supply PMU with the following information:

1. Completed Generation Interconnection Application (Appendix A) including:

    a. One-line diagram
    b. Site plan of the proposed installation
    c. Proposed schedule of the installation

2. Payment of the application fee. This application fee is to contribute to PMU's labor costs for administration, review of the design concept, and engineering screening for the proposed Generation System interconnection.

Step 2 Review of Application (By PMU)

Within 30 business days of receipt of all the information listed in Step 1, the PMU Coordinator shall respond to the Applicant with the information listed below. If the information required in Step 1 is not complete, the Applicant will be notified within 10 business days of what is missing and no further review will be completed until the missing information is submitted. (The 30 day clock will restart with the new submittal.)

The proposed Generation System will be screened to determine if additional engineering studies are required. The base screening criteria is listed in the general information section of this document.

1. A single point of contact with PMU for this project. (PMU Coordinator)

2. Approval or rejection of the generation interconnection request.

    a. Rejection – PMU shall supply the technical reasons, with supporting information, for rejection of the Application.

    b. Approval – An approved Application is valid for 6 months from the date of the approval. The PMU Coordinator may extend this time upon request of the Applicant

PMU will conduct a high level review to confirm that, with the incremental addition of this QF into the PMU Distribution System, the sum of all generation does not exceed 50% of the minimum annual hourly load at the PMU high voltage substation. If it does exceed 50% of the minimum annual hourly load at the PMU substation, a more detailed analysis may be needed including discussions with and evaluations by MRES to confirm there are no significant transmission impacts related to the addition of the interconnected generation.

3. Comments on the schedule provided.

4. Interconnection and Power Purchase Agreement.

5. Cost estimate and payment schedule for required PMU work, including, but not limited to:

    a. Labor costs related to the final design review
    b. Labor & expense costs for attending meetings
    c. Required equipment and other PMU modification(s)
    d. Final acceptance testing costs

Step 3 Final Go/No-Go Decision (By Applicant)

The Applicant shall have the opportunity to indicate whether they want to proceed with the proposed generation interconnection. If the decision is to NOT proceed, the Applicant will notify the PMU Coordinator, so that other generation interconnections in the queue are not adversely impacted.

Should the Applicant decide to proceed, the following information is to be supplied to the PMU Coordinator:

1. Applicable up-front payment required by PMU, per Payment Schedule, provided in Step 2. (if applicable)

2. Signed Interconnection and Power Purchase Agreement

3. Final proposed schedule, incorporating the PMU comments or requirements

4. Detailed information on the proposed equipment, if required by PMU in Step2, including wiring diagrams, models and types

Step 4 Order Equipment and Construction (By PMU /Applicant)

The following activities shall be completed:

By the Applicant's personnel:

1. Installing Generation System

2. Filing of required state electrical inspection forms

3. Inspecting and functional testing of Generation System components

By PMU personnel:

1. Installing and testing any PMU facilities or line extensions

2. Assisting Applicant's personnel with interconnection installation coordination issues

3. Providing review and input for testing process

Step 5 Final Tests (By PMU/Applicant)

(Due to equipment lead times and construction, a significant amount of time may pass between the execution of Step 4 and Step 5.)

Final acceptance testing will commence when all equipment has been installed and all contractor preliminary testing has been accomplished. A week or two prior to the start of the final testing of the generation interconnection, the Applicant shall provide PMU with a report certifying:

1. The Generation System meets all interconnection requirements.

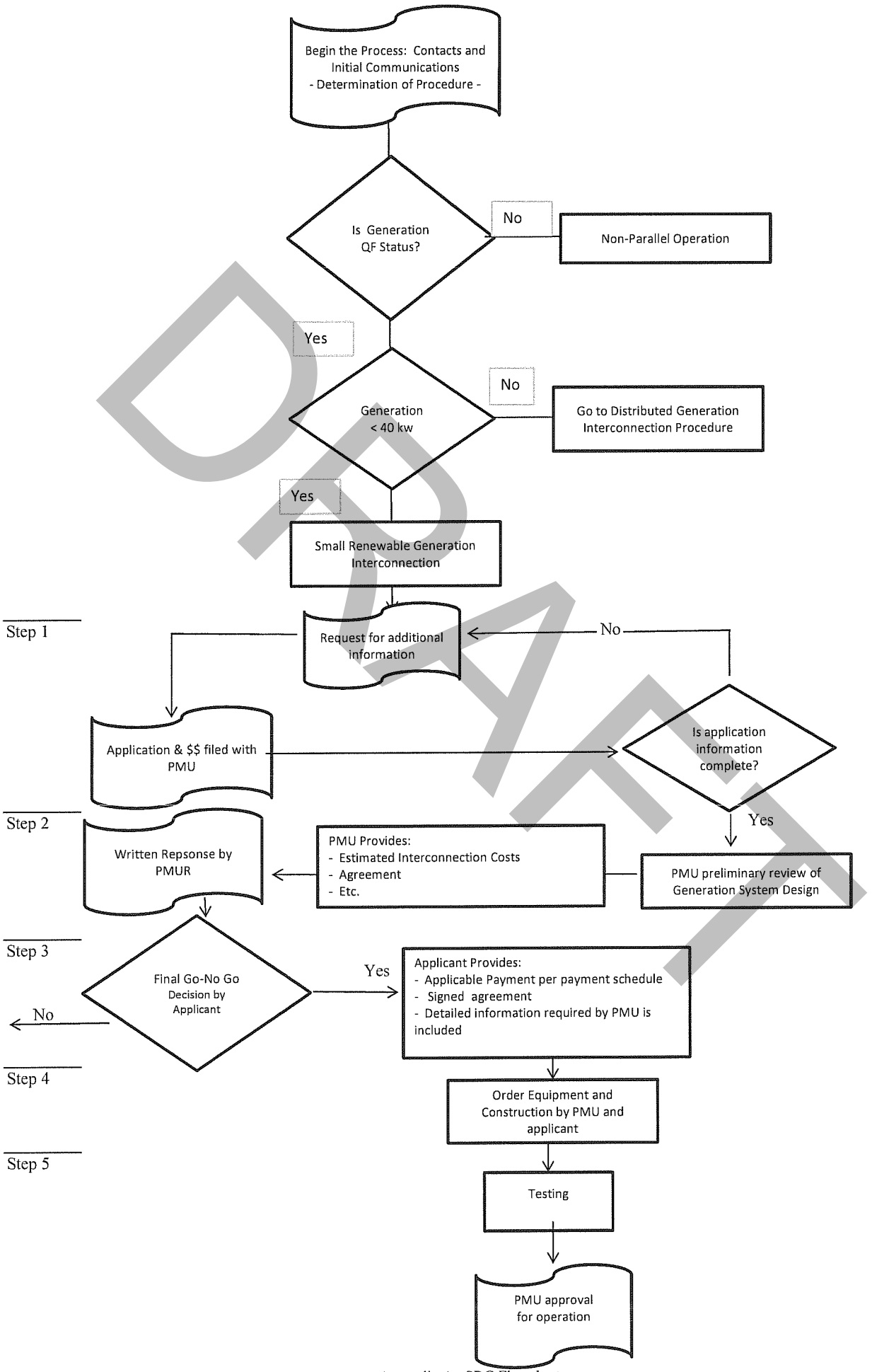
2. All contractor preliminary testing has been completed.

3. A proposed date that the Generation System will be ready to be energized and to be acceptance tested.

Appendix A

Small Renewable Generation Interconnection Procedure Flowchart

Appendix A: Small Renewable Generation Interconnection Procedure Flowchart



Appendix B

Small Renewable Generation Application

Small Renewable Generation Application (w/Inverter and < 40 kW)

WHO SHOULD FILE THIS APPLICATION: Customers interested in installing generation, rated less than 40 kw, which will interconnect to Pierre Municipal Utilities (PMU) distribution system using a Grid Tie Inverter. This application should be completed and returned to PMU's Coordinator, in order to begin processing the request.

INFORMATION: PMU will perform an interconnection review based on the information provided. The Applicant shall complete as much of the form as possible. The fields in BOLD are required to be completed to the best of the Applicant's ability. The Applicant will be contacted if additional information is required. The response may take up to 30 business days after receipt of all the required information.

APPLICATION FEE: filing fee to cover the cost of processing and reviewing this application.

OWNER/APPLICANT		
Applicant:	**Phone Number:**	**FAX Number:**
Mailing Address:		
Email Address:		

PROPOSED LOCATION OF GENERATION SYSTEM INTERCONNECTION
Street Address, Legal Description, or GPS coordinates:

ELECTRICAL CONTRACTOR (if applicable)		
Company:		
Representative:	**Phone Number:**	**FAX Number:**
Mailing Address:		
Email Address:		

TYPE OF INTERCONNECTED OPERATION	
Type of Generation System **Solar** **Wind(Circle one) or other Describe** _____	
Proposed use of generation: (Check all that may apply) ☐ **Peak Reduction** ☐ **Standby** ☐ **Energy Sales** ☐ **Cover Load**	**Duration Parallel:** ☐ **None** ☐ **Limited** ☐ **Continuo**
Pre-Certified System: Yes / No / Don't know (Circle one)	**Exporting Energy** **Yes / No (Circle**

ESTIMATED START/COMPLETION DATES	
Order Equipment:	
Construction Start Date:	
Start Acceptance Testing:	
Generation In Service:	

GENERATOR or (Solar Panel) INFORMATION		
Manufacturer:	Type (Model):	Phases: 1 or 3
Rated Output (each unit) kW	# of Units to be installed:	Rated Voltage (Volts):
Supplier of Equipment		
Address		
Phone		
Additional Information:		

INVERTER		
Manufacturer:	Model:	
Rated Power Factor (%):	Rated Voltage (Volts):	Rated Current (Amperes):
% Total harmonics at full load	%Current	% Voltage
Inverter Type (ferroresonant, step, pulse-width modulation, etc.):		
Additional Information:		

MISCELLANEOUS (Use this area and any additional sheets for applicable notes and comments)
SIGN OFF AREA:
With this Application, I, the Applicant, requests PMU to review the proposed Generation System Interconnection. I request that PMU identify any additional equipment and costs/fees involved with the interconnection of this system and to provide an estimate of those costs. I understand that the costs supplied by PMU will be estimated using the information provided. I also agree that I will supply, as requested, any additional information requested by PMU for evaluation of this proposed Generation System interconnection. I have read the PMU Small Renewable Generation Interconnection Procedure and Requirements and will design, operate, and maintain the Generation System and interconnection in accordance with those requirements.
Applicant Name (print):
Applicant Signature: Date:
SEND THIS COMPLETED & SIGNED APPLICATION AND ATTACHMENTS TO THE PMU COORDINATOR at 222 East Dakota, PO Box 1253, Pierre, South Dakota 57501

City of PIERRE
Municipal Electric Utility

Section 5

Requirements

SMALL RENEWABLE GENERATION INTERCONNECTION REQUIREMENTS FOR INVERTER CONNECTED SYSTEMS RATED LESS THAN 40 kW

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Introduction

Electric distributed generation systems span a wide range of sizes and electrical characteristics. Electrical distribution system designs vary widely from that required to serve the residential customer to that needed to serve the large commercial customer. With so many variations possible, it becomes complex and difficult to create one interconnection standard that fits all generation interconnection situations.

This Technical Requirements document has been written to cover only the technical interconnection requirements to interconnect a specific type and size of generation system with Pierre Municipal Utilities (PMU); specifically, a PURPA qualified generation system utilizing a Grid Tie Inverter and rated below 40 kW. If your system does not meet these qualifications, then these requirements are not applicable; please refer to the "Distributed Generation Interconnection Requirements" found in Section 10.

This Technical Requirements document is based on assumptions of a "typical" under 40kW Generation System. As a result, there may be areas not covered within this document. In such cases, the "Distributed Generation Interconnection Requirements" located in Section 10 should be referenced.

This document covers only the technical requirements and does not cover the interconnection procedure. Please read the companion document "Small Renewable Generation Interconnection Procedure for Inverter Connected Systems Rated less than 40 kW", located in Section 7, for the description of the procedure to follow for interconnection approval and construction. It is important to also get copies of PMU and MRES rates.

A. Definitions

The definitions defined in the "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems" (IEEE 1547) apply to this document. The following definitions are in addition to the ones defined in IEEE 1547, or are repeated from the IEEE 1547 standard.

1. Area EPS: An electric power system (EPS) that serves Local EPS. Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc. PMU is an Area EPS.

2. Generation: Any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, or any other electric producing device including energy storage technologies.

3. Generation System: The interconnected Distributed Generation(s), controls, relays, switches, breakers, transformers, inverters and associated wiring and cables up to the Point of Common Coupling.

4. Grid Tie Inverter: The inverter is a device that converts DC electricity to AC electricity. While a Grid Tie Inverter usually has been specially designed and constructed to safely interconnect with an Area EPS; for the purposes of this document, a Grid Tie Inverter should also be designed and tested to meet the requirements of IEEE 1547 and ANSI 929 standards and should also be certified with a UL 1741 label.

5. Interconnection Customer: The party or parties who are responsible for meeting the requirements set forth in this document. This could include the Generation System applicant, installer, designer, owner, or operator.

6. Local EPS: An EPS contained entirely within a single premises or group of premises.

7. Point of Common Coupling: The point where the Local EPS is connected to an Area EPS.

8. Type-Certified: Generation paralleling equipment that is listed by an Occupational Safety and Health Administration (OSHA) national testing laboratory as having met the applicable type testing requirement of UL 1741. At the time of preparation of this document, this was the only national standard available for certification of generation transfer switch equipment. Other subsequent forms of type-certification are permitted if acceptable to PMU.

B. Interconnection Requirements Goals

This document defines the minimum technical requirements for the implementation of the electrical interconnection between the Generation System and PMU's distribution system. It does not define the overall requirements for the Generation System. The requirements in this document are intended to achieve the following:

1. Ensure the safety of PMU personnel and contractors working on the electrical power system.

2. Ensure the safety of PMU customers and the general public.

3. Protect and minimize the possible damage to the electrical power system and other PMU's property.

4. Ensure proper operation to minimize adverse operating conditions on the electrical power system.

C. Area EPS Modifications

Depending upon the size of the Generation System, the location on PMU's distribution system, and how the Generation System is operated; certain modifications and/or additions may be required to the existing PMU distribution system, due to the addition of the Generation System. To the extent possible, this document describes the modifications, which could be necessary to PMU's distribution system for different types of Generation Systems. If any additional modifications are necessary, they will be identified by PMU during the application review process.

D. Generation System Protection

The Interconnection Customer is solely responsible for providing protection for the Generation System. Protection systems required in this document are structured to protect PMU's distribution system and the public. Additional protection equipment may be required by PMU to ensure proper operation for the Generation System. This is especially true when operating disconnected from PMU's distribution system. PMU and MRES do not assume responsibility for protection of the Generation System equipment or of any portion of the Local EPS.

E. Electrical Code Compliance

The Interconnection Customer shall be responsible for complying with all applicable local, independent, state, and federal codes such as building codes, NEC, NESC, and noise and emissions standards. As required by applicable state law, PMU's distribution system will require proof of compliance with the NEC and installation approval by an electrical inspector recognized by an appropriate state governing board before the interconnection.

The Interconnection Customer's Generation System and installation shall comply with the latest applicable revisions of the ANSI/IEEE standards, in particular, IEEE 1547; "Standard for Interconnecting Distributed Resources with Electric Power Systems". See the reference section of this document for a partial list of the industry standards which apply.

References

The following standards shall be used in conjunction with this standard. When the stated version of the following standards is superseded by an approved revision, then that revision shall apply.

IEEE Std 100-2000, "IEEE Standard Dictionary of Electrical and Electronic Terms"

IEEE Std 519-1992, "IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems"

IEEE Std 929-2000,"IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems"

IEEE Std 1547, "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems"

IEEE Std C37.90.1-1989 (Current Version), "IEEE Standard Surge Withstand Capability (SEC) Tests for Protective Relays and Relay Systems"

IEEE Std C37.90.2 (Current Version), "IEEE Standard Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers"

IEEE Std C62.41.2-2002, "IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits"

IEEE Std C62.42-1992 (Current Version), "IEEE Recommended Practice on Surge Testing for Equipment Connected to Low Voltage (1000V and less) AC Power Circuits"

ANSI C84.1-1 995, "Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)"

ANSI/IEEE 446-1995, "Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications"

ANSI/IEEE Standard 142-1991, "IEEE Recommended Practice for Grounding of Industrial a Commercial Power Systems – Green Book"

UL Std. 1741 "Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources"

NEC – "National Electrical Code", National Fire Protection Association (NFPA), NFPA-70-2002

NESC – "National Electrical Safety Code." ANSI C2-2000, Published by the Institute of Electrical and Electronics Engineers, Inc

Interconnection Issues and Technical Requirements

A. Inverter Connection: This is a continuous parallel connection with the distribution system. Small generation systems may utilize inverters to interface to the PMU distribution system. Solar, wind, and fuel cells are some examples of generation which typically use inverters to connect to the PMU distribution system. The design of such inverters shall either contain all necessary protection to prevent unintentional islanding or the Interconnection Customer shall install conventional protection to affect the same protection.

1. Inverter Certification - Prior to installation, the inverters shall be Type-Certified for interconnection to the electrical power system. The certification will confirm anti-islanding protection and power quality related levels at the Point of Common Coupling. Also, utility compatibility, electric shock hazard, and fire safety will be approved through UL listing of the model. Once this Type Certification is completed, additional design review of the inverters should not be necessary by PMU.

2. For three-phase operation, the inverter control must also be able to detect and separate for the loss of one phase. Larger inverters will still require customer protection settings which must be calculated and designed to be compatible with the PMU distribution system.

3. A visible disconnect is required for safely isolating the distributed generation when connecting with an inverter. The inverters shall not be used as a safety isolation device.

4. When banks of inverter systems are installed at one location, a design review by PMU must be performed to determine if any additional protection systems, metering or other modifications are needed. These additional systems or modifications will be identified by PMU during the interconnection study process.

B. General Requirements - The following requirements apply to the interconnected generating equipment. PMU's distribution system shall be considered the source side and PMU's system shall be considered the load side in the following interconnection requirements.

1. Visible Disconnect – A disconnecting device shall be installed to electrically isolate the Inverter from the rest of the load. The visible disconnect shall provide a visible air gap between Interconnection Customer's Generation and PMU's distribution system in order to establish the safety isolation required for work on PMU's distribution system. This disconnecting device shall be readily accessible 24 hours per day by PMU field personnel and shall be capable of being padlocked by PMU field personnel. The disconnecting device shall be lockable in the open position.

   The visible disconnect shall be a UL approved or National Electrical Manufacture's Association approved, manual safety disconnect switch of adequate ampere capacity. The visible disconnect shall not open the neutral when the switch is open.

The visible disconnect shall be labeled, as required by PMU.

2. Energization of Equipment by Generation System – The Generation System shall not energize any de-energized portion of PMU's distribution system.

3. Fault and Line Clearing – The Generation System shall be removed from PMU's distribution system for any faults or outages occurring on the electrical circuit serving the Generation System.

4. Interference – The Interconnection Customer shall disconnect the Distributed Generation from PMU's distribution system if the Distributed Generation causes radio, television or electrical service interference to other PMUs or customers, via the EPS or interference with the operation of Area EPS. The Interconnection Customer shall either effect repairs to the Generation System or reimburse PMU for the cost of any required modifications to PMU's distribution system due to the interference.

5. Unintended Islanding – Under certain conditions with extended parallel operation, a part of PMU's distribution system may be disconnected from the rest of PMU's distribution system and may require the Generation System to continue to operate and to provide power to a portion of the isolated circuit. This is called "islanding". It is not possible to successfully reconnect the energized isolated circuit to the rest of PMU's distribution system since there are no synchronizing controls associated with all of the possible locations of disconnection. Therefore, it is required that the Generation System be automatically disconnected from PMU's distribution system immediately by protective relays for any condition that would cause PMU's distribution system to be de-energized. The Generation System shall either isolate itself from the PMU's distribution system and serve only the Customer's load, or shut down completely. The Generation System must be blocked from closing back into PMU's distribution system until PMU's distribution system is reenergized and PMU's distribution system voltage is within Range B of ANSI C84.1 Table 1 for a minimum of one minute. Depending upon the size of the Generation System, it may be necessary to install direct transfer trip equipment from PMU's distribution system source(s) to remotely trip the generation interconnection to prevent islanding for certain conditions.

6. Protective Systems – In general, a Grid Tie Inverter is designed, constructed, and tested so that the necessary protective functions are built into the inverter, to ensure isolation of the generation system from the distribution system. The functions required by IEEE 1547 and IEEE 929 standards include Over/Under Voltage, Over/Under Frequency, phase, and ground overcurrent; so, no further protective equipment is typically necessary. Please note that the NEC or other state or local codes may require you to install additional protective equipment, such as fuses.

7. Disconnection – PMU's distribution system operator may refuse to connect, or may disconnect without prior notice, a Generation System from PMU's distribution system under the following conditions:

   a. Lack of approved Standard Application Form, and Interconnection and Power

Purchase Agreement.

b. Termination of interconnection by mutual agreement.

c. Non-Compliance with the technical or contractual requirements.

d. System Emergency or imminent danger to the public or PMU personnel (Safety).

e. Routine maintenance, repairs and modifications to PMU's distribution system. PMU shall coordinate planned outages with the Interconnection Customer to the best extent possible.

f. Any other reason described in the Interconnection and Power Purchase Agreement.

Generation Metering, Monitoring, and Control

Metering, Monitoring, and Control – For small renewable generation systems less than 40 kW, the following are the Metering, Monitoring, and Control requirements. This document assumes that the Generation System is a QF under the PURPA requirements and that the power is not being sold to a third party.

A. Metering Requirements

For Generation Systems that are QFs under PURPA, metering requirements are:

1. For single-phase Generation Systems, the applicant is required to provide and install a PMU-approved single phase meter socket (Exhibit A), unless otherwise specified by PMU. PMU will supply the single-phase metering required. Responsibility of the metering cost will be determined by PMU.

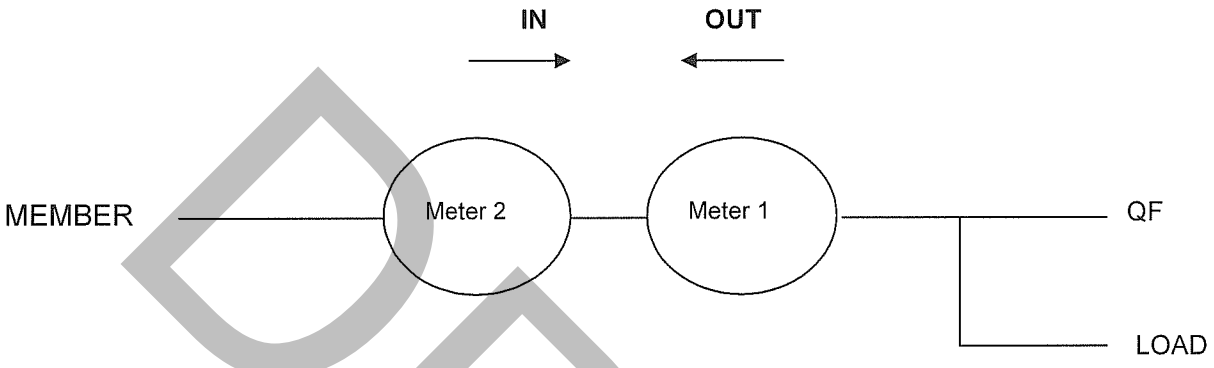
2. For three-phase Generation Systems, the applicant is required to provide a PMU-approved commercial three phase meter socket, unless otherwise specified by PMU. PMU will supply the three-phase metering required. Responsibility for the metering cost will be determined by PMU.

B. Monitoring and Control Requirements

For qualified inverter connected Generation Systems 40 kW and less, there are no requirements for monitoring and remote control of the generation system by PMU.

Exhibit A:

METERING ARRANGEMENTS



Assumes QF first supplies Customer's own load and supplies instantaneous excess or surplus to PMU which is purchased by UTILITY as recorded on Meter 1. PMU supplies the instantaneous load deficiency as recorded on Meter 2.

Agreements

A. Interconnection and Power Purchase Agreement – The contract between the Applicant, PMU, and MRES defining the parties' respective rights and duties relating to interconnection, operation, and power purchases.

Testing Requirements

A. Certification of Equipment

The most important part of the process to interconnect generation is safety. One of the key components of ensuring safety is to ensure that the design and implementation of the elements connected to the electrical power system operate as required. Therefore, all of the electrical wiring in a business or residence should be listed for its intended purpose by a recognized testing and certification laboratory. Typically we see this referred to as "UL" listed. In order to comply with this requirement, the Inverter used shall be listed by a nationally recognized testing laboratory as having met the applicable type-testing requirements of UL 1741 and IEEE 929. If so listed, the Inverter shall be acceptable for interconnection without additional protection system requirements.

B. Commissioning Testing

The following tests shall be completed by the Interconnection Customer. PMU has the right to witness all field testing and to review all records prior to allowing the system to be made ready for normal operation.

1. Before testing – The Generation System shall be inspected and approved by a designated electrical inspector prior to interconnecting the Generation System with the electrical system.

2. Any pre-testing recommended by the equipment manufacturer and/or installer shall be completed prior to the On-line Commissioning Test.

3. On-Line Commissioning Test – PMU and the Interconnection Customer shall complete the following tests once the Generation System has completed Pre-testing and the results have been reviewed and approved by PMU. Generation System functionally shall be verified for specific interconnections as follows:

    a. Anti-Islanding Test Steps

        i. The Generation System shall be started and operated in parallel with PMU's distribution system source.

        ii. PMU's distribution system source shall be removed by opening a switch, fuse, or breaker or other means on the PMU side of the inverter.

        iii. Under the condition established in step (ii), the Generation System shall stop generating.

iv. Under the condition established in step (ii), the Generation System shall not reenergize any part of PMU's distribution system (Area EPS).

v. The device that was opened to disconnect PMU's distribution system source shall be closed and the Generation System shall not re-parallel/reconnect with PMU's distribution system for at least 5 minutes or for another agreed-to duration.

vi. For three phase systems this test will be repeated for each phase of the system and also for a complete three phase loss of Utility power.

C. Periodic Testing and Record Keeping

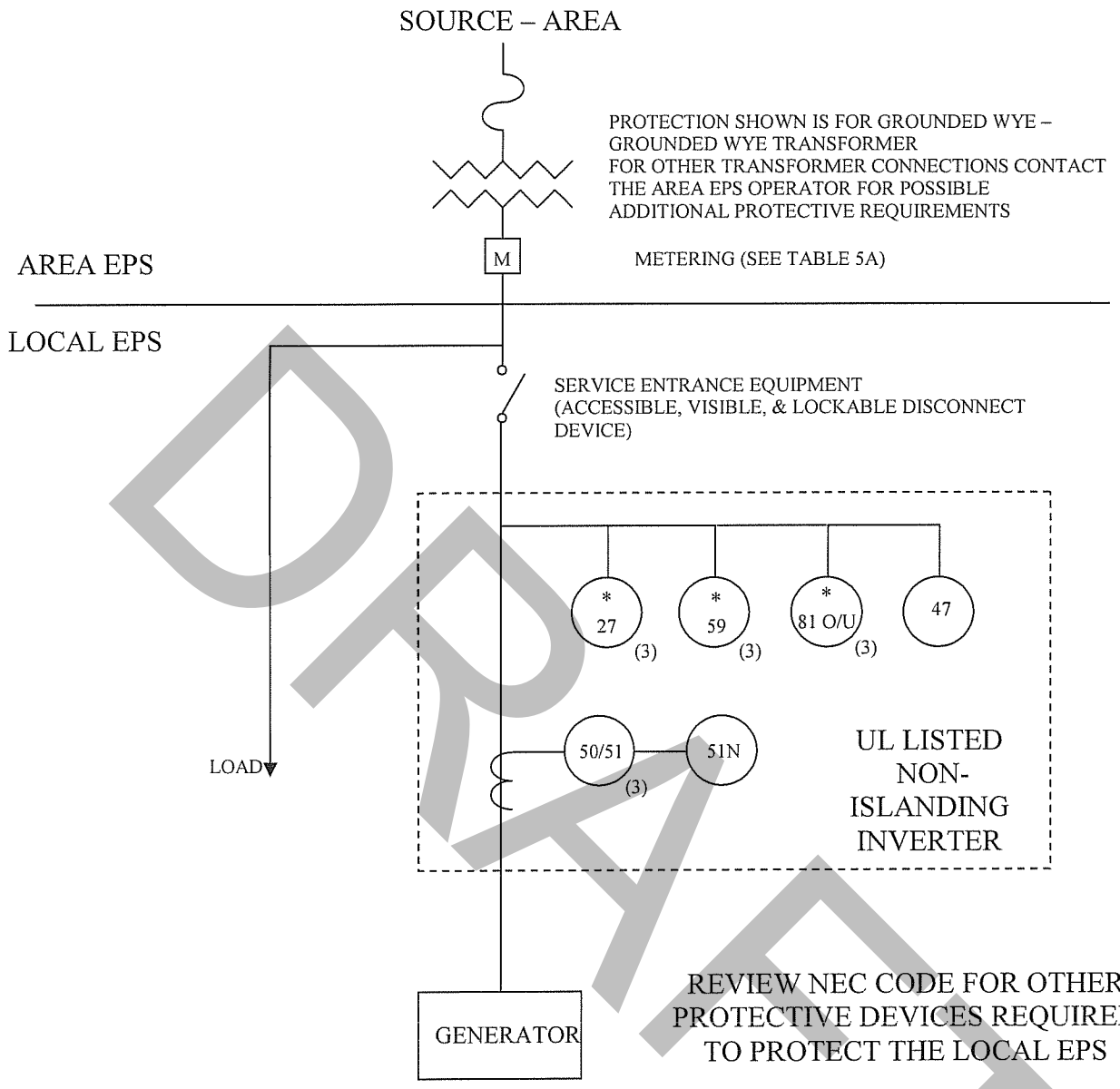
1. Any time the inverter hardware or software is replaced and/or modified, the PMU Coordinator shall be notified. This notification shall be as soon as reasonably possible and, if possible, be provided with sufficient warning so that PMU personnel can be involved and/or witness the verification testing. Verification testing shall be completed on the replaced and/or modified equipment and systems. The involvement of PMU personnel will depend upon the complexity of the Generation System and the component being replaced and/or modified. Since the Interconnection Customer and PMU are now operating an interconnected system, it is important for each to communicate to the other changes in operation, procedures, and/or equipment in order to ensure the safety and reliability of the Local and Area EPS.

2. All interconnection-related protection systems shall be periodically tested and maintained by the Interconnection Customer, at intervals specified by the manufacturer or system integrator. These intervals shall not exceed 5 years. Periodic test reports and a log of inspections shall be maintained by the Interconnection Customer and made available to PMU upon request.

Appendix A

Example Inverter Diagram

Appendix A: Example Inverter Diagram



Device No.	Function
27/59	*Under/Over Voltage
47	Negative Sequence
50/51	Phase Overcurrent
51N	Ground Overcurrent
81 O/U	*Over/Under Frequency

(1) (2) (3) Indicates Number of Phases Monitored

*Indicates Minimum Required Protection.
Other Relays Shown are Recommended for Generator Protection.

INVERTER	
DATE: CONNECTED	
Nov 2009	Figure 1

Appendix B

Interconnection
and
Power Purchase Agreement

Appendix B
INTERCONNECTION AND POWER PURCHASE AGREEMENT – SMALL RENEWABLE GENERATION (<40kW)

This Interconnection and Power Purchase Agreement – Small Renewable Generation (<40kW) (the "Agreement") is made and entered into _____, 20__, by and among Missouri Basin Municipal Power Agency, d/b/a Missouri River Energy Services, 3724 West Avera Drive, PO Box 88920, Sioux Falls, SD 57109-8920, a body politic and corporate and public agency organized in Iowa and existing under the laws of the States of Iowa, Minnesota, North Dakota and South Dakota ("MRES"), Pierre Municipal Utilities (PMU), 222 East Dakota, PO Box 1253, Pierre, South Dakota, 57501 ("Utility"), and _____, with an address as set forth in Exhibit A hereto ("Customer").

RECITALS

A. Customer has installed, or plans to install, electric generating facilities rated at less than 40 kilowatts of electricity on certain real property owned or leased by Customer, which facilities and property are more particularly described in Exhibit A hereto. The generating facilities are hereinafter referred to as the "Qualifying Facility".

B. Utility is a municipal utility that owns and operates an electrical distribution system (the "Utility System") and provides retail electric power to Customer and other customers.

C. MRES is a joint action agency that supplies wholesale electric power supply to Utility pursuant to a long-term exclusive supply contract that requires Utility to purchase from MRES all electric power supply in excess of that provided by Western Area Power Administration.

D. Pursuant to a waiver/agreement with the Federal Energy Regulatory Commission under the Public Utilities Regulatory Policies Act ("PURPA"), MRES is required to purchase power from "qualifying facilities," as defined by PURPA, and Utility is required to interconnect, supply power to, and allow qualifying facilities to operate in parallel with the Utility System. MRES and Utility are also permitted, but not required, to take such actions with respect to electric generating facilities which do not constitute "qualifying facilities" under PURPA.

E. Customer desires to interconnect and operate the Qualifying Facility in parallel with the Utility System and sell power generated by the Qualifying Facility to MRES, and Utility and MRES are willing to do so pursuant to the terms and conditions of this Agreement.

NOW, THEREFORE, the parties hereby agree as follows:

1. Scope and Purpose. This Agreement sets forth the terms and conditions under which the Qualifying Facility may be interconnected to, and operated in parallel with, the Utility System and under which MRES will purchase power generated by the Qualifying Facility. This Agreement does not constitute an agreement by MRES or Utility to deliver power generated by the Qualifying Facility or to provide any services to Customer except as described in this Agreement.

2. Interconnection Rules. The procedures and technical requirements governing the interconnection and operation of the Qualifying Facility are described in the documents of Utility entitled "Small Renewable Generation Interconnection Procedure for Inverter Connected Systems Rated Less Than 40kW" (the "Procedures") and "Small Renewable Generation Interconnection Requirements for Inverter Connected Systems Rated Less Than 40kW" (the "Requirements"), each as may be amended by Utility from time to time (collectively, the "Interconnection Rules"). Utility shall have the right to amend the Interconnection Rules from time to time in its sole discretion. The Interconnection Rules are incorporated and made part of this Agreement by this reference. Customer acknowledges it has received a copy of the Interconnection Rules and agrees to comply with the terms of the Interconnection Rules. In the event any terms of this Agreement conflict with the terms of the Interconnection Rules, the terms of this Agreement shall govern.

3. Point of Common Coupling. The point where the electrical facilities of the Utility System electrically connect to the electrical facilities of the Qualifying Facility is the "Point of Common Coupling" as shown on the diagram attached hereto as Exhibit B. Exhibit B shall depict the Point of Common Coupling, the location of meter(s), the point of delivery, and such other detail as may be required by Utility. Customer and Utility shall interconnect the Qualifying Facility to the Utility System at the Point of Common Coupling in accordance with the Interconnection Rules and all applicable laws, regulations and prudent utility practices. Utility and Customer shall each own and be responsible for the installation, maintenance and repair of the lines, wires, switches and other equipment on their respective sides of the Point of Common Coupling. Unless otherwise specified in Exhibit A, Customer, at its cost, shall furnish, install, own, maintain and repair all interconnection equipment required at the Point of Common Coupling, in accordance with the Interconnection Rules and applicable laws, regulations and prudent utility practices. Final electrical connections between the Utility System and the Qualifying Facility shall be made by Utility.

4. Installation, Operation and Maintenance of Qualifying Facility. Customer shall install, operate and maintain the Qualifying Facility in accordance with the terms of this section.

a. Responsibility; Standards. Customer shall install, operate, maintain, repair and inspect the Qualifying Facility and shall be fully responsible for the Qualifying Facility, unless otherwise specified in Exhibit A. Customer's installation, operation, maintenance and repair of the Qualifying Facility shall be in accordance with this Agreement, the Interconnection Rules, all applicable laws, regulations, ordinances and building codes, and, as applicable, the National Electrical Safety Code ("NESC"), American National Standards Institute ("ANSI"), Institute of Electrical and Electronic Engineers ("IEEE"), National Electrical Code ("NEC"), and Underwriter's Laboratory ("UL"). In addition, Customer shall maintain the Qualifying Facility in accordance with applicable manufacturers' recommended maintenance schedules.

b. Costs. Unless otherwise specified in Exhibit A, Customer shall be responsible for all costs associated with the Qualifying Facility, including all costs of installation, operation, maintenance, inspection and repair. Any costs incurred by Utility due to interconnection of the Qualifying Facility which exceed interconnection costs that would be incurred to interconnect a comparable non-generating customer shall be paid by Customer.

c. Permits. Prior to installation of the Qualifying Facility, Customer shall obtain all environmental and other permits required by any governmental authorities to install, own and operate the Qualifying Facility. Customer shall maintain and comply with the requirements of all such permits during the term of this Agreement.

d. Disruption to Utility System. Customer shall design, install, equip, maintain, operate and repair the Qualifying Facility to insure that the Utility System and Utility's service to other customers are not adversely affected by the Qualifying Facility, either due to disruptions to the Utility System or power quality issues.

e. Alterations. Customer shall not materially alter, modify or add to the Qualifying Facility without receiving prior written consent of Utility in accordance with this subsection. Not less than twenty (20) days prior to the commencement of any proposed alteration, modification or addition to the Qualifying Facility, Customer shall notify Utility of the proposal and provide Utility with all information reasonably required by Utility to review such proposal, including any change in generation capacity of the Qualifying Facility and any alterations to applicable interconnection equipment. Utility shall have ten (10) days to either deny Customer's proposal, consent to Customer's proposal with conditions, or consent to Customer's proposal without conditions.

f. Operator in Charge. Customer shall identify an individual (by name or title) who will act as "Operator in Charge" of the Qualifying Facility. This individual must be familiar with the terms of this Agreement, the Interconnection Rules, and any other laws, regulations or agreements that may apply to the Qualifying Facility.

5. Operation of Utility System. Utility shall operate, maintain and repair the Utility System in accordance with this Agreement, the Interconnection Rules, all applicable laws, rules, ordinances and building codes, and, as applicable, the NESC, ANSI, IEEE, NEC, and UL.

6. Electric Service. Utility shall provide electric service to Customer for the electricity requirements of Customer not supplied by the Qualifying Facility. Such electric service shall be supplied by Utility under the rules and rate schedules of Utility applicable to Customer's class of service, as revised from time to time by Utility in its sole discretion.

7. Cooperation. Customer and Utility shall promptly notify one another upon the occurrence of any malfunction error, disturbance, emergency or hazardous condition relating to its facilities which may adversely impact the safety or effective operation of the other party's facilities.

8. Metering.

a. Metering Equipment. Utility shall purchase, own, install and maintain such metering equipment as is necessary to meter all electrical energy of the Qualifying Facility delivered to the Utility System. The metering equipment and cost responsibilities associated with such equipment are set forth in Exhibit A. Utility shall test the metering equipment on a scheduled basis. If the metering equipment fails to register proper amounts or the registration thereof becomes so erratic as to be meaningless, the energy delivered to the Utility System shall be determined by Utility from the best information available.

b. Metering Arrangement. The metering arrangement used to meter and record electrical energy delivered from the Qualifying Facility to the Utility System, and from the Utility to Customer, is described in attached Exhibit C.

9. Testing. Customer shall test the Qualifying Facility and interconnection equipment and provide to Utility all records of testing in accordance with the Interconnection Rules. Such testing shall occur prior to commencement of operation of the Qualifying Facility and periodically thereafter, in accordance with the Interconnection Rules or as otherwise requested by Utility. Utility and MRES shall have the right to witness all field testing and review all records prior to allowing the Qualifying Facility to commence normal operations. Such tests are for purposes of assuring the protection and operation of the Utility System and in no way represent any assurance of protection and operation of the Qualifying Facility.

10. Right of Access; Inspection. Utility and MRES shall have the right to inspect the Qualifying Facility and observe the Qualifying Facility's installation, commissioning, startup, operation and maintenance. Utility and MRES shall have access to the Qualifying Facility for any reasonable purpose in connection with the interconnection described in this Agreement or the Interconnection Rules or to provide service to other customers.

11. Disconnection. The Qualifying Facility shall or may be disconnected from the Utility System at such times as described in, and in accordance with, the terms of this section.

a. Disconnection by Customer. Customer shall disconnect the Qualifying Facility from the Utility System upon the effective date of the termination of this Agreement as described in Section 18 below.

b. Disconnection by Utility. Utility shall have the right to disconnect, or cause Customer to disconnect, the Qualifying Facility from the Utility System for the following reasons: (i) to allow Utility to operate, construct, install, maintain, repair, replace or inspect any facilities of Utility; (ii) the disruption or potential disruption of the Utility System as described in Section 4(d) above; (iii) the presence of a condition which could cause injury or loss of life or damage to the Utility System or property of a third party; (iv) if Utility is required to disconnect by MRES or Utility's transmission provider; (v) Customer's noncompliance with the terms of this Agreement; (vi) the termination of this Agreement as provided in Section 18 below; or (vii) any other reason for disconnection as set forth in the Interconnection Rules. Utility shall use reasonable efforts to provide prior notice and coordination of any disconnection of the Qualifying Facility due to routine maintenance, repairs or modifications to the Utility System. Neither Utility nor MRES shall be liable to Customer for any damages, losses or other liabilities, including consequential damages, due to the disconnection of the Qualifying Facility as described in this section.

12. Interconnected Operation. Customer may operate interconnected with the Utility System only in accordance with this Agreement and the Interconnection Rules. Utility, MRES and Customer shall comply with all requirements of the transmission provider and any regulatory authorities having jurisdiction over distributed generation interconnected to the Utility System.

13. Power Sales to MRES. MRES shall purchase all electrical energy generated by the Qualifying Facility which is delivered to the Utility System. The rate paid by MRES for such electrical energy shall be equal to the sum of: (a) the MRES PURPA Rate for qualifying facilities of 100kW or less, as adjusted from time to time by MRES in its discretion, and (b) the Loss Factor Adjustment, as adjusted from time to time by MRES and Utility in their discretion. The MRES PURPA Rate and the Loss Factor Adjustment, along with their currently applicable amounts, are described in attached Exhibit C. Customer shall receive payment for electrical energy sales to MRES through a credit on Customer's monthly invoice from Utility, which credit may be one month in arrears. MRES, in turn, shall credit the monthly wholesale power supply bill submitted by MRES to Utility in an amount equal to the electrical energy purchases of MRES from the Qualifying Facility during the preceding month. Utility shall provide to MRES, as soon as available following the end of each month, data indicating the amount of electrical energy purchased by MRES from the Qualifying Facility during the preceding month.

14. **Limitation of Liability.** ***[Utility must choose one of the following paragraphs for inclusion in its form agreement – the first paragraph limits liability under the Agreement for all parties and the second paragraph limits liability only for Utility and MRES]***

[Each party's liability to the other parties herein for failure to perform its obligations under this Agreement shall be limited to the amount of direct damages actually incurred. In no event shall a party be liable to another party under this Agreement for any punitive, incidental, indirect, special or consequential damages, including for loss of business opportunity or profits. In addition, and notwithstanding any other provision in this Agreement, Utility's liability to Customer under this Agreement shall be further limited as set forth in Utility's tariffs and/or terms and conditions for electric service, which limitations are incorporated herein by this reference.]

[Neither Utility nor MRES shall be liable to Customer for any punitive, incidental, indirect, special or consequential damages, including for loss of business opportunity or profits, resulting from or arising from Utility's or MRES performance or non-performance of its obligations under this Agreement. In addition, and notwithstanding any other provision in this Agreement, Utility's liability to Customer under this Agreement shall be further limited as set forth in Utility's tariffs and/or terms and conditions for electric service, which limitations are incorporated herein by this reference.]

15. **Indemnification.** ***[Utility must choose one of the following paragraphs for inclusion in its form agreement – the first paragraph mutually requires each party to indemnify the other parties for damages resulting from the indemnifying party's breach of the Agreement, and the second paragraph imposes indemnification obligations only on Customer]***

[Each party shall indemnify, defend and hold harmless the other parties from and against any and all damages, losses, claims, costs and expenses, including reasonable attorneys' fees and courts costs but excluding damages described in Section 14 above, arising out of or resulting from such party's performance or non-performance of its obligations under this Agreement, except to the extent such damages, losses or claims were caused by the negligence or intentional acts of the party to be indemnified.]

[Customer shall indemnify, defend and hold harmless Utility and MRES from and against any and all damages, losses, claims, costs and expenses, including reasonably attorneys' fees and court costs, arising out of or resulting from Customer's performance or non-performance of its obligations under this Agreement, except in the event such damages, losses or claims were caused solely by the negligence or intentional acts of the party to be indemnified.]

16. Insurance. If the Qualifying Facility has a nameplate capacity of 10 kilowatts or less, Customer shall maintain general liability insurance coverage, such as homeowner's insurance, in an amount sufficient to insure against all reasonably foreseeable direct liabilities in light of the size of the Qualifying Facility. If the Qualifying Facility has a nameplate capacity of more than 10 kilowatts, Customer shall maintain general liability insurance in an amount determined by Utility, provided such amount does not exceed $300,000. All such insurance shall include coverage against claims for damages resulting from bodily injury, death and property damage arising out of Customer's ownership and operation of the Qualifying Facility. Such insurance, by proper endorsement, shall include Utility as an additional insured and shall provide for thirty (30) days' written notice to Utility of cancellation, termination, alteration or material change of such insurance. Customer shall furnish proof of the insurance required by this section prior to initial operation of the Qualifying Facility and thereafter as requested by Utility.

17. Default; Remedies. A party shall be in default under this Agreement if such party fails to comply with, observe or perform, or defaults in the performance of, any covenant or obligation under this Agreement and fails to cure the failure within thirty (30) days' after receiving written notice from another party, which notice shall identify the basis of the default. If a default is not cured within the cure period, the non-defaulting party or parties shall have the right to terminate this Agreement by written notice to the defaulting party, shall be relieved of any further obligation under this Agreement, and shall be entitled to pursue all other damages and remedies available under this Agreement or at law or in equity.

18. Term. This Agreement shall take effect upon execution by all parties hereto and shall remain in effect unless terminated in accordance with this section. This Agreement may be terminated as follows: (a) any party may terminate this Agreement at any time upon ninety (90) days' written notice to the other parties; (b) Utility or MRES may terminate this Agreement at any time upon thirty (30) days' written notice to the other parties if the Qualifying Facility is not, or at any time ceases to be, a "qualifying facility" under PURPA; (c) any party may terminate this Agreement after a default under Section 17 above; and (d) MRES may terminate this Agreement upon sixty (60) days' written notice to the other parties in the event MRES determines that its purchase of electrical energy generated by the Qualifying Facility under Section 13 above would result in cost greater than those which MRES would incur if it did not make such purchases, as permitted by the PURPA waiver/agreement described in Recital D above. In the event this Agreement is terminated pursuant to subsection (d), Utility and Customer shall enter into a new agreement which defines their respective rights and obligations with respect to the interconnection and operation of the Qualifying Facility to and with the Utility System in accordance with PURPA.

19. Force Majeure. For purposes of this Agreement, a force majeure event is any event that is beyond the reasonable control of the affected party and that the affected party is unable to

prevent by exercising reasonable diligence, including the following events or circumstances, but only to the extent they satisfy the preceding requirements: acts of war, terrorism, public disorder, rebellion or insurrection; floods, hurricanes, earthquakes, lighting, storms or other acts of God; explosions or fires; strikes, work stoppages or labor disputes; embargoes; and sabotage. If a force majeure event prevents a party from fulfilling its duties under this Agreement, such party shall promptly notify the other party in writing and shall keep the other party informed on a continuing basis of the scope and duration of the force majeure event. The affected party shall specify the circumstances of the force majeure event, its expected duration, and the steps being taken to mitigate the effect of the event. The affected party shall be entitled to suspend or modify its performance under this Agreement but will use reasonable efforts to resume its performance as soon as possible.

20. Non-Warranty. Neither by inspection, if any, nor by non-rejection or in any other way does Utility or MRES give or make any warranty, express or implied, as to the adequacy, safety or other characteristics of any lines, wires, switches, or other equipment or structures owned, installed or maintained by Customer.

21. Assignment. Customer may assign this Agreement to an entity or individual to whom Customer transfers ownership of the Qualifying Facility, so long as Customer obtains prior written consent of Utility and MRES, which consent shall not be unreasonably withheld, and such assignee agrees in writing to assume all obligations of Customer under this Agreement. Utility and/or MRES may assign this Agreement upon written notice to Customer.

22. No Waiver. The failure of a party to insist, on any occasion, upon strict performance of any provision of this Agreement shall not be considered to waive the obligations, rights or duties imposed upon the parties.

23. Notices. Notices given under this Agreement shall be deemed to have been duly delivered if hand delivered or sent by United States certified mail, return receipt requested, postage prepaid, to the respective addresses of the parties set forth in the opening paragraph of this Agreement. Such addresses may be changed by written notification to the other parties.

24. Severability. If any provision of this Agreement is adjudged by any court of competent jurisdiction to be illegal or unenforceable, such provision shall be deemed separate and independent, and the remainder of this Agreement shall remain in full force and effect.

25. Entire Agreement; Amendments. This Agreement, including the Interconnection Rules and all Exhibits hereto, constitutes the entire agreement and understanding between the parties concerning the subject matter of this Agreement. The parties are not bound by or liable for any statement, representation, promise, understanding or undertaking of any kind or nature, whether written or oral, with regard to the subject matter hereof not set forth or provided for herein. It is expressly acknowledged that the parties may have other agreements covering other services not expressly provided for in this Agreement, which agreements are unaffected by this Agreement. This Agreement may be amended only upon mutual agreement of the parties, which amendment will not be effective until reduced to writing and executed by the parties.

26. Governing Law; Jurisdiction. This Agreement and the rights and obligations of the parties hereunder shall be construed in accordance with and shall be governed by the laws of the state of South Dakota.

[Signature Page Follows]

IN WITNESS WHEREOF, the parties have caused this Interconnection and Power Purchase Agreement – Small Renewable Generation (<40kW) to be signed by their respective duly authorized representatives.

Pierre Municipal Utilities

BY: _____
TITLE: _____
DATE: _____

[CUSTOMER NAME]

BY: _____
TITLE: _____
DATE: _____

MISSOURI RIVER ENERGY SERVICES

BY: _____
TITLE: _____
DATE: _____

EXHIBIT A
DESCRIPTION OF QUALIFYING FACILITY

1. Name and Address of Customer:

2. Location of Qualifying Facility (mailing address or legal description of property):

3. Description of Qualifying Facility (make, model):

4. Interconnected capacity (kW):

5. Interconnection voltage:

6. Technical aspects of metering (type, voltage, location, loss adjustments, other):

7. Equipment to be furnished by Utility, if any:

8. Cost responsibilities of Utility, if any:

EXHIBIT B
ONE LINE DIAGRAM OF POINT OF INTERCONNECTION

EXHIBIT C
METERING ARRANGEMENT AND PURCHASE RATE

1. MRES PURPA Rate. The rate to be paid by MRES for electrical energy purchased from the Qualifying Facility under Section 13 of the Agreement shall be equal to the MRES PURPA rate for 100kW or less, as established by MRES in its sole discretion each year or upon other intervals as determined by MRES. The MRES PURPA rate for 100kW or less for 2010 is $0.0265/kWh. MRES shall notify Utility, and Utility shall notify Customer, of any change in such rate adopted by MRES. Customer's right to payments under Section 13 is subject to Customer's compliance with the terms, covenants and conditions of the Agreement.

2. Loss Factor Adjustment. The MRES PURPA Rate for 100 kW or less, as described in Section 1 above, shall be increased by a percentage factor to reflect the savings resulting from reduced Utility System losses associated with electrical energy purchased from the Qualifying Facility under Section 13 of the Agreement. For example, if the Loss Factor Adjustment was 5%, the Loss Factor Adjustment to the 2010 MRES PURPA Rate, in dollars, would be $0.001325 ($0.0265 x 0.05), causing the total combined rate paid for power purchased from the Qualifying Facility to be $0.027825/kWh. Utility and MRES shall establish the Loss Factor Adjustment each year or upon other intervals as they determine, and Utility shall notify Customer of any change in this factor. The Loss Factor Adjustment for 2010 is _____%.

3. Metering Arrangement. *[Utility must choose one of the following paragraphs for inclusion in its form agreement – the first paragraph provides for bi-directional metering and the second paragraph establishes net metering]*

[The metering shall be such that all power delivered to Utility from the Qualifying Facility (net of Customer's own use) shall be measured separately from power delivered from Utility to Customer. The meter measuring power delivered to Customer shall not permit reduction of measured power already delivered to Customer during periods when the Qualifying Facility generation exceeds Customer demand. The meter may not run backwards. Utility shall credit Customer's monthly bill for power received by the Utility System and purchased by MRES.]

[The metering shall be such that power delivered to Customer by Utility is netted against power received by Utility from the Qualifying Facility. Utility's monthly invoice to Customer will indicate: (a) a credit to Customer if the power received by Utility from the Qualifying Facility exceeds the power provided by Utility to Customer or (b) the payment due by Customer to Utility if the power delivered by Utility to Customer exceeds the power received by Utility from the Qualifying Facility.]

4. Environmental Attributes. Power purchased by MRES from the Qualifying Facility does not include any environmental attributes (i.e., renewable energy credits), if any, associated with the environmental character of the Qualifying Facility, nor any federal income tax credits for renewable energy that are accruable to Customer with respect to the Qualifying Facility.