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July 21, 2017

VIA ELECTRONIC FILING
Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

RE: In the Matter of Minnesota Power's Petition for
Approval of Revisions to Rider for Parallel Generation
Docket No. E015/M-16-204

Dear Mr. Wolf:

Minnesota Power hereby electronically submits its Compliance Filing in the above-referenced Docket.

Please contact me at the number or the email address provided if you have any questions.

Yours truly,

Marcia A. Podratz

Marcia A. Podratz

MAP:sr
Attach.
cc: Official Service List

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

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In the Matter of Minnesota Power's Petition for Approval of Revisions to Rider for Parallel Generation	Docket No. E015/M-16-204 COMPLIANCE FILING

****

I. INTRODUCTION

In its May 22, 2017 Order Approving Tariffs as Modified in the above referenced proceeding (the "May 22, 2017 Order"), the Minnesota Public Utilities Commission ("Commission") approved Minnesota Power's cogeneration and small-power-production tariff subject to additional requirements. The May 22, 2017 Order further stated that within 60 days, Minnesota Power, Xcel, and Otter Tail shall refile compliance tariffs reflecting the decisions made by the Commission in this Order. Pursuant to the May 22, 2017 Order, Minnesota Power (or "the Company") submits its compliance filing of the revised redline and clean versions of the tariff sheets for the Rider for Parallel Generation. The Commission's additional requirements are addressed in the following section.

II. ADDITIONAL REQUIREMENTS

The May 22, 2017 Order contained six additional requirements labeled as order points 2a. through 2f. These order points are addressed below:

2a. Minnesota Power shall include the Department's requested additions that it agreed to incorporate in its December 12, 2016, reply comments;

Per the Department recommendations, the Company has incorporated the following additional tariff language:

- Defining terms used in the tariff, as found in Minnesota Rules 7835.0100;
- Setting compliance, interconnection, and generation system standards as described in Minnesota Rules 7835.2100;

- Indicating that the Company will provide the customer a copy of, or access to, the relevant Commission Order establishing Interconnection Standards before the customer signs the Uniform Statewide Contract;
- Referencing where the Uniform Statewide Contract, the most recent Interconnection Standards and related Commission Order, and any other pertinent Rules, Statutes, and documents can be found;
- Indicating that any contract between a utility and a qualifying facility of less than 40 kW remains in force until terminated by mutual agreement or as otherwise specified in the contract;
- Governing how ownership of renewable energy credits is treated (Minnesota Rules, part 7835.5950);
- Indicating that the Uniform Statewide Contract must be used for all facilities under 1,000 kW;
- Providing compensation options for customers providing non-firm power under both the Simultaneous Purchase and Sale Rate and the Time-of-Day Purchase Rate;
- Clarifying how the customer will qualify as a firm power provider;
- Clarifying if customer does not elect to be compensated for net input in the form of a kilowatt-hour credit, that the customer will be compensated for the net input at the utility's avoided cost rate;
- Clarifying the Company's metering policy for serving qualifying facility ("QF") customers;
- Inserting language regarding dispute resolution;
- Specifying the terms and conditions of meter aggregation; and
- Specifying the conditions under which utilities may impose standby charges, as specified in Minnesota Statutes 216B.164 Subd. 3a.

Additionally, Minnesota Power has included terms and conditions of meter aggregation in its Rider for Parallel Generation consistent with the tariffs of both Xcel and Otter Tail Power.

2b. Minnesota Power shall include the updates to Schedule E proposed in its March 14, 2017 information-request response;

Minnesota Power provides updates to the Schedule E in Attachment A to this filing.

2c. The Commission approves provisionally Minnesota Power's monthly service charges based on generation size and meter costs as listed in its initial February 29, 2016 filing;

As detailed in the Company's June 21, 2017 response to the Commission's Information Request No. 2 in this Docket, it was concluded that after completing the necessary analysis needed to answer this Information Request, Minnesota Power proposed to eliminate the current monthly service charge and remove all related language from its tariff. As described in the Company's June 21, 2017 IR response, this is because the Company has recently reached a point in the rollout of its Advanced Metering Instructure ("AMI") system to where the majority of Minnesota Power customers are now in the AMI coverage area.

2d. Record development on Minnesota Power's monthly service charges will continue in Docket No. E-015/M-16-204; the Commission delegates authority to the Executive Secretary to issue notices and set deadlines;

Minnesota Power continues to participate in record development in this Docket. There is an open comment period regarding the Company's proposal to remove the monthly service charge. Comments are due July 21, 2017 with Reply Comments due July 31, 2017. At the conclusion of this round of comments and reply comments and subject to the Commission's approval, the Company proposes to submit a second Compliance filing to remove the monthly service charge.

2e. Minnesota Power shall incorporate language into its tariff specifying that production meters are required only for systems between 40 kW and 1,000 kW;

The following language has been added to the tariff sheet accompanying this filing:

"Customers with generators sized between 40 kW and 1,000 kW taking service under the Rider for Parallel Generation will be required to install a separate production meter to record generation.

2f. Minnesota Power shall replace "same legal entity" with "customer" in the meter-aggregation sections of its tariff.

The Meter Aggregation section 2) of the tariff sheet now reads as follows:

> 2) the account(s) associated with the meters must be in the name of the customer;

III. CREDIT CORRECTION

Through a conversation with Commission staff, an error was discovered in the non-firm energy credit amounts that were submitted in the Company's latest annual Cogeneration and Small Power Production Tariff Filing.[1] The non-firm energy credits are equal to the estimated system average incremental energy costs adjusted for line losses. The incremental energy costs can be seen on Schedule A of the Company's 2017 annual filing. For example, Schedule A shows an annual On-Peak energy cost of $28.95/MWh (equivalent to 2.895¢/kWh.) The $28.95 amount had been adjusted by adding back half of system line losses. This step was inadvertently done a second time for the credits shown on the tariff sheet. In this example the energy credit for kWh delivered to Company during On-Peak periods was shown on the tariff sheet as 3.047¢/kWh. This was also the case with the Off-Peak credits and the Simultaneous Purchase and Sale energy credit. This error impacted zero customers as no customers are on the Simultaneous Purchase and Sale Rate or the Time-of-Day Purchase Rate. The tariff sheet included with this filing reflects the correct Off-Peak credit of 2.89¢/kWh as well as the correct energy credits for the Simultaneous Purchase and Sale Rate and the Time-of-Day Purchase Rate, which all match the calculations on Schedule A of the Company's 2017 annual filing.

[1] Annual Cogeneration Filing, dated January 4, 2017, Docket No. E999/PR-17-09

IV. CONCLUSION

Minnesota Power respectfully requests the proposed changes to the language and rates contained in the Company's Rider for Parallel Generation be effective the first day of the month following this compliance filing with an effective date of August 1, 2017.

Dated: July 21, 2017

Respectfully submitted,

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Schedule E

(Rule 7835.0800)

Interconnection Agreement

Schedule E must contain the utility's safety standards, required operating procedures for interconnected operations, and the functions to be performed by any control and protective apparatus. These standards and procedures must not be more restrictive than the standards contained in the electrical code under part 7835.2100 or the interconnection standards distributed to customers under part 7835.4750. The utility may include in schedule E suggested types of equipment to perform the specified functions. No standard or procedure may be established to discourage cogeneration or small power production.

State of Minnesota

Interconnection Process for Distributed Generation Systems

Introduction

This document has been prepared to explain the process established in the State of Minnesota, to interconnect a Generation System with Minnesota Power, the Area Electrical Power System (Area EPS). This document covers the interconnection process for all types of Generation Systems which are rated 10MW's or less of total generation Nameplate Capacity; are planned for interconnection with Minnesota Power's Distribution System; are not intended for wholesale transactions and aren't anticipated to affect the transmission system. This document does not discuss the interconnection Technical Requirements, which are covered in the **"State of Minnesota Distributed Generation Interconnection Requirements"** document. This other interconnection requirements document also provides definitions and explanations of the terms utilized within this document. To interconnect a Generation System with Minnesota Power, there are several steps that must be followed. This document outlines those steps and the Parties' responsibilities. At any point in the process, if there are questions, please contact the Generation Interconnection Coordinator at Minnesota Power. Since this document has been developed to provide an interconnection process which covers a very diverse range of Generation Systems, the process appears to be very involved and cumbersome. For many Generation Systems the process is streamlined and provides an easy path for interconnection.

The promulgation of interconnection standards for Generation Systems by the Minnesota Public Utilities Commission (MPUC) must be done in the context of a reasonable interpretation of the boundary between state and federal jurisdiction. The Federal Energy Regulatory Commission (FERC) has asserted authority in the area, at least as far as interconnection at the transmission level is concerned. This, however, leaves open the question of jurisdiction over interconnection at the distribution level. The Midwest Independent System Operator's (MISO) FERC Electric Tariff, (first revised volume 1, August 23,2001) Attachment R (Generator Interconnection Procedures and Agreement) states in section 2.1 that "Any existing or new generator connecting at transmission voltages, sub-transmission voltages, or distribution voltages, planning to engage in the sale for resale of wholesale energy, capacity, or ancillary services requiring transmission service under the Midwest ISO OATT must apply to the Midwest ISO for interconnection service". Further in section 2.4 it states that "A Generator not intending to engage in the sale of wholesale energy, capacity, or ancillary services under the Midwest ISO OATT, that proposes to interconnect a new generating facility to the distribution system of a Transmission Owner or local distribution utility interconnected with the Transmission System shall apply to the Transmission Owner or local distribution utility for interconnection". It goes on further to state "Where facilities under the control of the Midwest ISO are affected by such interconnection, such interconnections may be subject to the planning and operating protocols of the Midwest ISO…."

Through discussions with MISO personnel and as a practical matter, if the Generation System Nameplate Capacity is not greater in size than the minimum expected load on the distribution substation, that is feeding the proposed Generation System, and Generation System's energy is not being sold on the wholesale market, then that installation may be considered as not "affecting" the transmission system and the interconnection may be considered as governed by this process. If the Generation System will be selling energy on the wholesale market or the Generation System's total Nameplate Capacity is greater than the expected distribution substation minimum load, then the Applicant shall contact MISO (Midwest Independent System Operator) and follow their procedures.

GENERAL INFORMATION

A) Definitions

1) "Applicant" is defined as the person or entity who is requesting the interconnection of the Generation System with Minnesota Power and is responsible for ensuring that the Generation System is designed, operated and maintained in compliance with the Technical Requirements.

2) "Area EPS" is defined as an electric power system (EPS) that serves Local EPS's. Note. Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc. Minnesota Power's distribution system is an AREA EPS.

3) "Area EPS Operator" is the entity who operates the Area EPS, here Minnesota Power.

4) "Dedicated Facilities" is the equipment that is installed due to the interconnection of the Generation System and not required to serve other Minnesota Power customers.

5) "Distribution System" is Minnesota Power's facilities which are not part of Minnesota Power's Transmission System or any Generation System.

6) "Extended Parallel" means the Generation System is designed to remain connected with Minnesota Power for an extended period of time.

7) "Generation" is defined as any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, etc.; or any other electric producing device, including energy storage technologies.

8) "Generation Interconnection Coordinator" is the person or persons designated by Minnesota Power to provide a single point of coordination with the Applicant for the generation interconnection process.

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

10) "Interconnection Customer" is 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.

11) "Local EPS" is an electric power system (EPS) contained entirely within a single premises or group of premises

12) "Nameplate Capacity" is the total nameplate capacity rating of all the Generation included in the Generation System. For this definition the "standby" and/or maximum rated kW capacity on the nameplate shall be used.

13) "Open Transfer" is a method of transferring the local loads from Minnesota Power to the generator such that the generator and Minnesota Power are never connected together.

14) "Point of Common Coupling" is the point where the Local EPS is connected to an Minnesota Power.

15) "Quick Closed" is a method of generation transfer which does not parallel or parallels for less then 100msec with Minnesota Power and has utility grade timers which limit the parallel duration to less then 100 msec with Minnesota Power.

16) "Technical Requirements" "is the State of Minnesota Distributed Generation Interconnection Requirements".

17) "Transmission System" means those facilities as defined by using the guidelines established by the Minnesota State Public Utilities Commission; "In the Matter of Developing Statewide Jurisdictional Boundary Guidelines for Functionally Separating Interstate Transmission from Generation and Local Distribution Functions" Docket No. E-015/M-99-1002.

B) Dispute Resolution

The following is the dispute resolution process to be followed for problems that occur with the implementation of this process.

1) Each Party agrees to attempt to resolve all disputes arising hereunder promptly, equitably and in a good faith manner.

2) In the event a dispute arises under this process, and if it cannot be resolved by the Parties within thirty (30) days after written notice of the dispute to the other Party, the Parties shall submit the dispute to mediation by a mutually acceptable mediator, in a mutually convenient location in the State of Minnesota. The Parties agree to participate in good faith in the mediation for a period of 90 days. If the parties are not successful in resolving their disputes through mediation, then the Parties may refer the dispute for resolution to the Minnesota Public Utilities Commission, which shall maintain continuing jurisdiction over this process

C) Minnesota Power's Generation Interconnection Coordinator.

Minnesota Power shall designate a Generation Interconnection Coordinator(s) and this person or persons shall provide a single point of contact for an Applicant's questions on this Generation Interconnection process. Minnesota Power may have several Generation Interconnection Coordinators assigned, due to the geographical size of their electrical service territory or the amount of interconnection applications. This Generation Interconnection Coordinator will typically 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

D) Engineering Studies

During the process of design of a Generation System interconnection between a Generation System and Minnesota Power, there are several studies which many need to be undertaken. On the Local EPS (Customers side of the interconnection) the addition of a Generation System may increase the fault current levels, even if the generation is never interconnected with Minnesota Power's system. The Interconnection Customer may need to conduct a fault current analysis of the Local EPS in conjunction with adding the Generation System. The addition of the Generation System may also affect Minnesota Power and special engineering studies may need to be undertaken looking at Minnesota Power's distribution system with the Generation System included. Appendix D, lists some of the issues that may need to receive further analysis for the Generation System interconnection.

While, it is not a straightforward process to identify which engineering studies are required, we can at least develop screening criteria to identify which Generation Systems may require further analysis. The following is the basic screening criteria to be used for this interconnection process.

1) Generation System total Nameplate Capacity does not exceed 5% of the radial circuit expected peak load. The peak load is the total expected load on the radial circuit when the other generators on that same radial circuit are not in operation.

2) The aggregate generation's total Nameplate Capacity, including all existing and proposed generation, does not exceed 25% of the radial circuit peak load and that total is also less then the radial circuit minimum load.

3) Generation System does not exceed 15% of the Annual Peak Load for the Line Section, which it will interconnect with. A Line Section is defined as that section of the distribution system between two sectionalizing devices in Minnesota Power's distribution system.

4) Generation System does not contribute more than 10% to the distribution circuit's maximum fault current at the point at the nearest interconnection with Minnesota Power's primary distribution voltage.

5) The proposed Generation System total Nameplate Capacity, in aggregate with other generation on the distribution circuit, will not cause any distribution protective devices and equipment to exceed 85 percent of the short circuit interrupting capability.

6) If the proposed Generation System is to be interconnected on a single-phase shared secondary, the aggregate generation Nameplate Capacity on the shared secondary, including the proposed generation, does not exceed 20kW.

7) Generation System will not be interconnected with a "networked" system

E) Scoping Meeting

During Step 2 of this process, the Applicant or Minnesota Power has the option to request a scoping meeting. The purpose of the scoping meeting shall be to discuss the Applicant's interconnection request and review the application filed. This scoping meeting is to be held so that each Party can gain a better understanding of the issues involved with the requested interconnection. Minnesota Power and Applicant shall bring to the meeting personnel, including system engineers, and other resources as may be reasonably required, to accomplish the purpose of the meeting. The Applicant shall not expect Minnesota Power to complete the preliminary review of the proposed Generation System at the scoping meeting. If a scoping meeting is requested, Minnesota Power shall schedule the scoping meeting within the 15 business day review period allowed for in Step 2. Minnesota Power shall then have an additional 5 days, after the completion of the scoping meeting, to complete the formal response required in Step 2. The Application fee shall cover Minnesota Power's costs for this scoping meeting. There shall be no additional charges imposed by Minnesota Power for this initial scoping meeting.

F) Insurance

1) At a minimum, in connection with the Interconnection Customer's performance of its duties and obligations under this 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 of not less then:

   a) Two million dollars ($2,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is greater then 250kW.

   b) One million dollars ($1,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is between 40kW and 250kW.

   c) Three hundred thousand ($300,000) for each occurrence if the Gross Nameplate Rating of the Generation System is less then 40kW.

   d) Such general liability insurance shall include coverage against claims for damages resulting from (i) bodily injury, including wrongful death; and (ii) property damage arising out of the Interconnection Customer's ownership and/or operating of the Generation System under this agreement.

2) The general liability insurance required shall, by endorsement to the policy or policies, (a) include Minnesota Power as an additional insured; (b) contain a sever ability of interest clause or cross-liability clause; (c) provide that Minnesota Power shall not by reason of its inclusion as an additional insured incur liability to the insurance carrier for the payment of premium for such insurance; and (d) provide for thirty (30) calendar days' written notice to Minnesota Power prior to cancellation, termination, alteration, or material change of such insurance.

3) If the Generation System is connected to an account receiving residential service from Minnesota Power and it total generating capacity is smaller then 40kW, then the endorsements required in Section F.2 shall not apply.

4) The Interconnection Customer shall furnish the required insurance certificates and endorsements to Minnesota Power prior to the initial operation of the Generation System. Thereafter, Minnesota Power shall have the right to periodically inspect or obtain a copy of the original policy or policies of insurance

5) Evidence of the insurance required in Section F.1. shall state that coverage provided is primary and is not excess to or contributing with any insurance or self-insurance maintained by Minnesota Power.

6) If the Interconnection Customer is self-insured with an established record of self-insurance, the Interconnection Customer may comply with the following in lieu of Section F.1 – 5:

7) Interconnection Customer shall provide to Minnesota Power, at least thirty (30) days prior to the date of initial operation, evidence of an acceptable plan to self-insure to a level of coverage equivalent to that required under section F.1

8) If Interconnection Customer ceases to self-insure to the level required hereunder, or if the Interconnection Customer is unable to provide continuing evidence of it's ability to self-insure, the Interconnection Customer agrees to immediately obtain the coverage required under section F.1.

9) Failure of the Interconnection Customer or Minnesota Power to enforce the minimum levels of insurance does not relieve the Interconnection Customer from maintaining such levels of insurance or relieve the Interconnection Customer of any liability.

G) Pre-Certification

The most important part of the process to interconnect generation with Local EPS and Minnesota Power is safety. One of the key components of ensuring the safety of the public and employees is to ensure that the design and implementation of the elements connected to the electrical power system operate as required. To meet this goal, all of the electrical wiring in a business or residence, is required by the State of Minnesota to be listed by a recognized testing and certification laboratory, for its intended purpose. Typically we see this as "UL" listed. Since Generation Systems have tended to be uniquely designed for each installation they have been designed and approved by Professional Engineers. This process has been set up to be able to deal with these uniquely designed systems. As the number of Generation Systems installed increase, vendors are working towards creating equipment packages which can be tested in the factory and then will only require limited field testing. This will allow us to move towards "plug and play" installations. For this reason, this interconnection process recognizes the efficiently of "pre-certification" of Generation System equipment packages that will help streamline the design and installation process.

An equipment package shall be considered certified for interconnected operation if it has been submitted by a manufacture, tested and listed by a nationally recognized testing and certification laboratory (NRTL) for continuous utility interactive operation in compliance with the applicable codes and standards. Presently generation paralleling equipment that is listed by a nationally recognized testing laboratory as having met the applicable type-testing requirements of UL 1741 and IEEE 929 shall be acceptable for interconnection without additional protection system requirements. An "equipment package" shall include all interface components including switchgear, inverters, or other interface devices and may include an integrated generator or electric source. If the equipment package has been tested and listed as an integrated package which includes a generator or other electric source, it shall not required further design review, testing or additional equipment to meet the certification requirements for interconnection. If the equipment package includes only the interface components (switchgear, inverters, or other interface devices), then the Interconnection Customer shall show that the generator or other electric source being utilized with the equipment package is compatible with the equipment package and consistent with the testing and listing specified for the package. Provided the generator or electric source combined with the equipment package is consistent with the testing ad listing performed by the nationally recognized testing and certification laboratory, no further design review, testing or additional equipment shall be required to meet the certification requirements of this interconnection procedure. A certified equipment package does not include equipment provided by Minnesota Power.

The use of Pre-Certified equipment does not automatically qualify the Interconnection Customer to be interconnected to Minnesota Power. An application will still need to be submitted and an interconnection review may still need to be performed, to determine the compatibility of the Generation System with Minnesota Power.

H) Confidential Information

Except as otherwise agreed, each Party shall hold in confidence and shall not disclose confidential information, to any person (except employees, officers, representatives and agents, who agree to be bound by this section). Confidential information shall be clearly marked as such on each page or otherwise affirmatively identified. If a court, government agency or entity with the right, power, and authority to do so, requests or requires either Party, by subpoena, oral disposition, interrogatories, requests for production of documents, administrative order, or otherwise, to disclose Confidential Information, that Party shall provide the other Party with prompt notice of such request(s) or requirements(s) so that the other Party may seek an appropriate protective order or waive compliance with the terms of this Agreement. In the absence of a protective order or waiver the Party shall disclose such confidential information which, in the opinion of its counsel, the party is legally compelled to disclose. Each Party will use reasonable efforts to obtain reliable assurance that confidential treatment will be accorded any confidential information so furnished.

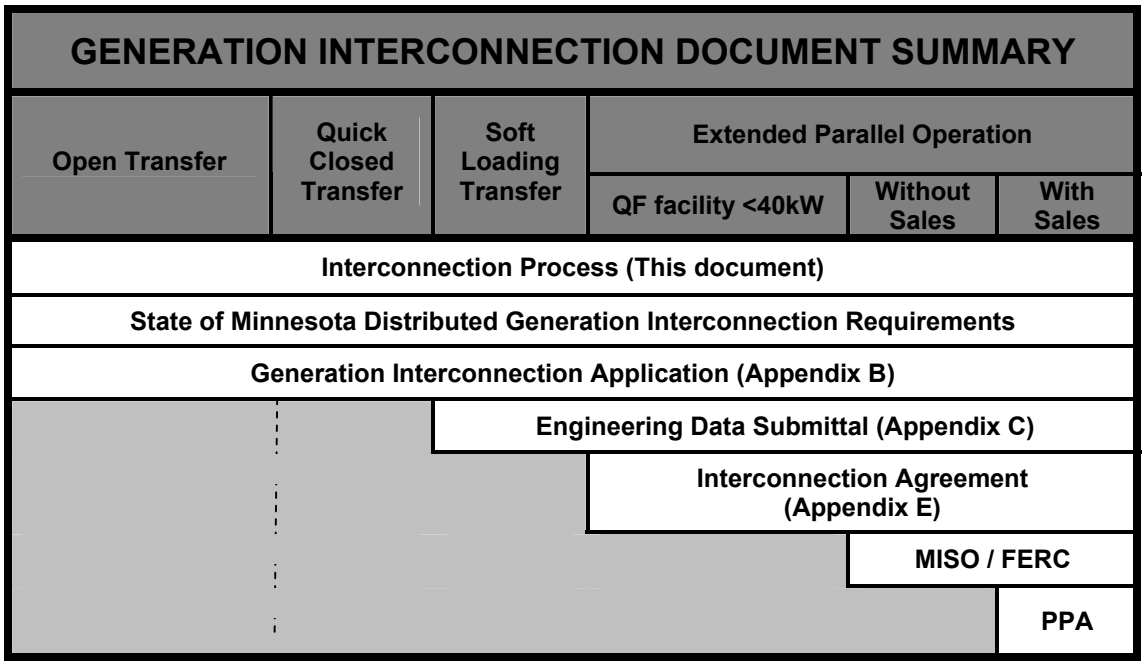
I) Non-Warranty.

Neither by inspection, if any, or non-rejection, nor in any other way, does Minnesota Power give any warranty, expressed or implied, as to the adequacy, safety, or other characteristics of any structures, equipment, wires, appliances or devices owned, installed or maintained by the Applicant or leased by the Applicant from third parties, including without limitation the Generation System and any structures, equipment, wires, appliances or devices pertinent thereto.

J) Required Documents

The chart below lists the documents required for each type and size of Generation System proposed for interconnection.

Find your type of Generation System interconnection, across the top, then follow the chart straight down, to determine what documents are required as part of the interconnection process.



Interconnection Process = "State of Minnesota Interconnection Process for Distributed Generation Systems." (This document)

State of Minnesota Distributed Generation Interconnection Requirements = "State of Minnesota Distributed Generation Interconnection Requirements"

Generation Interconnection Application = The application form in Appendix B of this document.

Engineering Data Submittal = The Engineering Data Form/Agreement, which is attached as Appendix C of this document.

Interconnection Agreement = "Minnesota State Interconnection Agreement for the Interconnection of Extended Parallel Distributed Generation Systems with Electric Utilities", which is attached as Appendix E to this document.

MISO. = Midwest Independent System Operator, www.midwestiso.org

FERC = Federal Energy Regulatory Commission, www.ferc.gov

PPA = Power Purchase Agreement.

Process for Interconnection

Step 1 Application (By Applicant)

Once a decision has been made by the Applicant, that they would like to interconnect a Generation System with Minnesota Power, the Applicant shall supply Minnesota Power with the following information:

1) Completed Generation Interconnection Application (Appendix C), including;
   a) One-line diagram showing;
      i) Protective relaying.
      ii) Point of Common Coupling.
   b) Site plan of the proposed installation.
   c) Proposed schedule of the installation.
2) Payment of the application fee, according to the following sliding scale.

Generation Interconnection Application Fees

Interconnection Type	≤ 20kW	>20kW & ≤250kW	>250kW & ≤500kW	> 500 kW & ≤1000kW	>1000 kW
Open Transfer	$0	$0	$0	$100	$100
Quick Closed	$0	$100	$100	$250	$500
Soft Loading	$100	$250	$500	$500	$1000
Extended Parallel (Pre Certified System)	$0	$250	$1000	$1000	$1500
Other Extended Parallel Systems	$100	$500	$1500	$1500	$1500

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

For the Application Fees chart, above;
The size (kW) of the Generation System is the total maximum Nameplate Capacity of the Generation System.

Step 2 Preliminary Review (By Minnesota Power)

Within 15 business days of receipt of all the information listed in Step 1, Minnesota Power's Generation Interconnection 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 15-day clock will restart with the new submittal)

As part of Step 2 the proposed Generation System will be screened to see 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 Minnesota Power for this project. (Generation Interconnection Coordinator)

2) Approval or rejection of the generation interconnection request.
   a) Rejection – Minnesota Power shall supply the technical reasons, with supporting information, for rejection of the interconnection Application.
   b) Approval - An approved Application is valid for 6 months from the date of the approval. Minnesota Power's Generation Interconnection Coordinator may extend this time if requested by the Applicant

3) If additional specialized engineering studies are required for the proposed interconnection, the following information will be provided to the Applicant. Typical Engineering Studies are outlined in Appendix D. The costs to the Applicant, for these studies shall be not exceed the values shown in the following table for pre-certified equipment.

Generation System Size	Engineering Study Maximum Costs
<20kW	$0
20kW – 100kW	$500
100kW – 250kW	$1000
>250kW or not pre-certified equipment	Actual costs

   a) General scope of the engineering studies required.
   b) Estimated cost of the engineering studies.
   c) Estimated duration of the engineering studies.
   d) Additional information required to allow the completion of the engineering studies.
   e) Study authorization agreement.

4) Comments on the schedule provided.

5) If the rules of MISO (Midwest Independent System Operator) require that this interconnection request be processed through the MISO process, the Generation Interconnection Coordinator will notify the Applicant that the generation system is not eligible for review through the State of Minnesota process.

Step 3 Go-No Go Decision for Engineering Studies (By Applicant)

In this step, the Applicant will decide whether or not to proceed with the required engineering studies for the proposed generation interconnection. If no specialized engineering studies are required by Minnesota Power, Minnesota Power and the Applicant will automatically skip this step.

If the Applicant decides NOT to proceed with the engineering studies, the Applicant shall notify Minnesota Power's Generation Interconnection Coordinator, so other generation interconnection requests in the queue are not adversely impacted. Should the Applicant decide to proceed, the Applicant shall provide the following to Minnesota Power's Generation Interconnection Coordinator:

1) Payment required by Minnesota Power for the specialized engineering studies.
2) Additional information requested by Minnesota Power to allow completion of the engineering studies.

Step 4 Engineering Studies (By Minnesota Power)

In this step, Minnesota Power will be completing the specialized engineering studies for the proposed generation interconnection, as outlined in Step 2. These studies should be completed in the time frame provided in step 2, by Minnesota Power. It is expected that Minnesota Power shall make all reasonable efforts to complete the Engineering Studies within the time frames shown below. If additional time is required to complete the engineering studies the Generation Interconnection Coordinator shall notify the Applicant and provide the reasons for the time extension. Upon receipt of written notice to proceed, payment of applicable fee, and receipt of all engineering study information requested by Minnesota Power in step 2, Minnesota Power shall initiate the engineering studies.

Generation System Size	Engineering Study Completion
<20kW	20 working days
20kW – 250kW	30 working days
250kW – 1MW	40 working days
> 1MW	90 working days

Once it is known by Minnesota Power that the actual costs for the engineering studies will exceed the estimated amount by more the 25%, then the Applicant shall be notified. Minnesota Power shall then provide the reason(s) for the studies needing to exceed the original estimated amount and provide an updated estimate of the total cost for the engineering studies. The Applicant shall be given the option of either withdrawing the application, or paying the additional estimated amount to continue with the engineering studies.

Step 5 Study Results and Construction Estimates (By Minnesota Power)

Upon completion of the specialized engineering studies, or if none was necessary, the following information will be provided to the Applicant.

1) Results of the engineering studies, if needed.

2) Monitoring & control requirements for the proposed generation.

3) Special protection requirements for the Generation System interconnection.

4) Comments on the schedule proposed by the Applicant.

5) Distributed Generation distribution constrained credits available

6) Interconnection Agreement (if applicable).

7) Cost estimate and payment schedule for required Minnesota Power work, including, but not limited to;
   a) Labor costs related to the final design review.
   b) Labor & expense costs for attending meetings
   c) Required Dedicated Facilities and other Minnesota Power modification(s).
   d) Final acceptance testing costs.

Step 6 Final Go-No Go Decision (By Applicant)

In this step, the Applicant shall again have the opportunity to indicate whether or not they want to proceed with the proposed generation interconnection. If the decision is NOT to proceed, the Applicant will notify Minnesota Power's Generation Interconnection Coordinator, so that other generation interconnections in the queue are not adversely impacted. Should the Applicant decide to proceed, a more detailed design, if not already completed by the Applicant, must be done, and the following information is to be supplied to Minnesota Power's Generation Interconnection Coordinator:

1) Applicable up-front payment required by Minnesota Power, per Payment Schedule, provided in Step 5. (if applicable)

2) Signed Interconnection Agreement (if applicable).

3) Final proposed schedule, incorporating Minnesota Power's comments. The schedule of the project should include such milestones as foundations poured, equipment delivery dates, all conduit installed, cutover (energizing of the new switchgear/transfer switch), Minnesota Power work, relays set and tested, preliminary vendor testing, final Minnesota Power acceptance testing, and any other major milestones.

4) Detailed one-line diagram of the Generation System, including the generator, transfer switch/switchgear, service entrance, lockable and visible disconnect, metering, protection and metering CT's / VT's, protective relaying and generator control system.

5) Detailed information on the proposed equipment, including wiring diagrams, models and types.

6) Proposed relay settings for all interconnection required relays.

7) Detailed site plan of the Generation System.

8) Drawing(s) showing the monitoring system (as required per table 5A and section 5 of the "State of Minnesota Distributed Generation Interconnection Requirements". Including a drawing which shows the interface terminal block with Minnesota Power's monitoring system.

9) Proposed testing schedule and initial procedure, including;
   a) Time of day (after-hours testing required?).
   b) Days required.
   c) Testing steps proposed.

Step 7 Final Design Review (By Minnesota Power)

Within 15 business days of receipt of the information required in Step 6, Minnesota Power's Generation Interconnection Coordinator will provide the Applicant with an estimated time table for final review. If the information required in Step 6 is not complete, the Applicant will be notified, within 10 business days of what information is missing. No further review may be completed until the missing information is submitted. The 15-business day clock will restart with the new submittal. This final design review shall not take longer then 15 additional business days to complete, for a total of 30 business days.

During this step, Minnesota Power shall complete the review of the final Generation System design. If the final design has significant changes from the Generation System proposed on the original Application which invalidate the engineering studies or the preliminary engineering screening, the Generation System Interconnection Application request may be rejected by Minnesota Power and the Applicant may be requested to reapply with the revised design.

Upon completion of this step the Generation Interconnection Coordinator shall supply the following information to the Applicant.

1) Requested modifications or corrections of the detailed drawings provided by the Applicant.

2) Approval of and agreement with the Project Schedule. (This may need to be interactively discussed between the Parties, during this Step)

3) Final review of Distributed Generation Credit amount(s) (where applicable).

4) Initial testing procedure review comments. (Additional work on the testing process will occur during Step 8, once the actual equipment is identified)

Step 8 Order Equipment and Construction (By Both Parties)

The following activities shall be completed during this step. For larger installations this step will involve much interaction between the Parties. It is typical for approval drawings to be supplied by the Applicant to Minnesota Power for review and comments. It is also typical for Minnesota Power to require review and approval of the drawings that cover the interconnection equipment and interconnection protection system. If Minnesota Power also requires remote control and/or monitoring, those drawings are also exchanged for review and comment.

By the Applicant's personnel:

1) Ordering of Generation System equipment.
2) Installing Generation System.
3) Submit approval drawings for interconnection equipment and protection systems, as required by Minnesota Power.
4) Provide final relay settings provided to Minnesota Power.
5) Submit Completed and signed Engineering Data Submittal form.
6) Submit proof of insurance, as required by Minnesota Power's tariff(s) or interconnection agreements.
7) Submit required State of Minnesota electrical inspection forms ("blue Copy) filed with Minnesota Power.
8) Inspecting and functional testing Generation System components.
9) Work with Minnesota Power personnel and equipment vendor(s) to finalize the installation testing procedure.

By Minnesota Power personnel:

1) Ordering any necessary Minnesota Power equipment.
2) Installing and testing any required equipment.
   a) Monitoring facilities.
   b) Dedicated Equipment.
3) Assisting Applicant's personnel with interconnection installation coordination issues
4) Providing review and input for testing procedures.

Step 9 Final Tests (By Minnesota Power/ Applicant)

(Due to equipment lead times and construction, a significant amount of time may take place between the execution of Step 8 and Step 9.) During this time the final test steps are developed and the construction of the facilities are completed.

Final acceptance testing will commence when all equipment has been installed, all contractor preliminary testing has been accomplished and all Minnesota Power preliminary testing of the monitoring and dedicated equipment is completed. One to three weeks prior to the start of the acceptance testing of the generation interconnection the Applicant shall provide, a report stating;

- that the Generation System meets all interconnection requirements.
- all contractor preliminary testing has been completed.
- the protective systems are functionally tested and ready.
- and provides a proposed date that the Generation System will be is ready to be energized and acceptance tested.

For non-type certified systems a Professional Electrical Engineer registered in the State of Minnesota is required to provide this formal report.

For smaller systems scheduling of this testing may be more flexible, as less testing time is required than for larger systems.

In many cases, this testing is done after hours to ensure no typical business-hour load is disturbed. If acceptance testing occurs after hours, Minnesota Power's labor will be billed at overtime wages. During this testing, Minnesota Power will typically run three different tests. These tests can differ depending on which type of communication / monitoring system(s) Minnesota Power decides to install at the site.

For, problems created by Minnesota Power or any Minnesota Power equipment that arise during testing, Minnesota Power will fix the problem as soon as reasonably possible. If problems arise during testing which are caused by the Applicant or Applicant's vendor or any vendor supplied or installed equipment, Minnesota Power will leave the project until the problem is resolved. Having the testing resume will then be subject to Minnesota Power personnel time and availability.

Step 10 (By Minnesota Power)

After all Minnesota Power's acceptance testing has been accomplished and all requirements are met, Minnesota Power shall provide written approval for normal operation of the Generation System interconnection, within 3 business days of successful completion of the acceptance tests.

Step 11 (By Applicant)

Within two (2) months of interconnection, the Applicant shall provide Minnesota Power with updated drawings and prints showing the Generation System as it were when approved for normal operation by Minnesota Power. The drawings shall include all changes which were made during construction and the testing process.

Attachments:

Attached are several documents which may be required for the interconnection process. They are as follows;

Appendix A:
Flow chart showing summary of the interconnection process.

Appendix B:
Generation Interconnection Application Form.

Appendix C:

Engineering Data Submittal Form.

Appendix D:

Engineering Studies: Brief description of the types of possible Engineering Studies that may be required for the review of the Generation System interconnection.

Appendix E:

State of Minnesota Interconnection Agreement for the Interconnection of Extended Paralleled Distributed Generation Systems with Electric Utilities.

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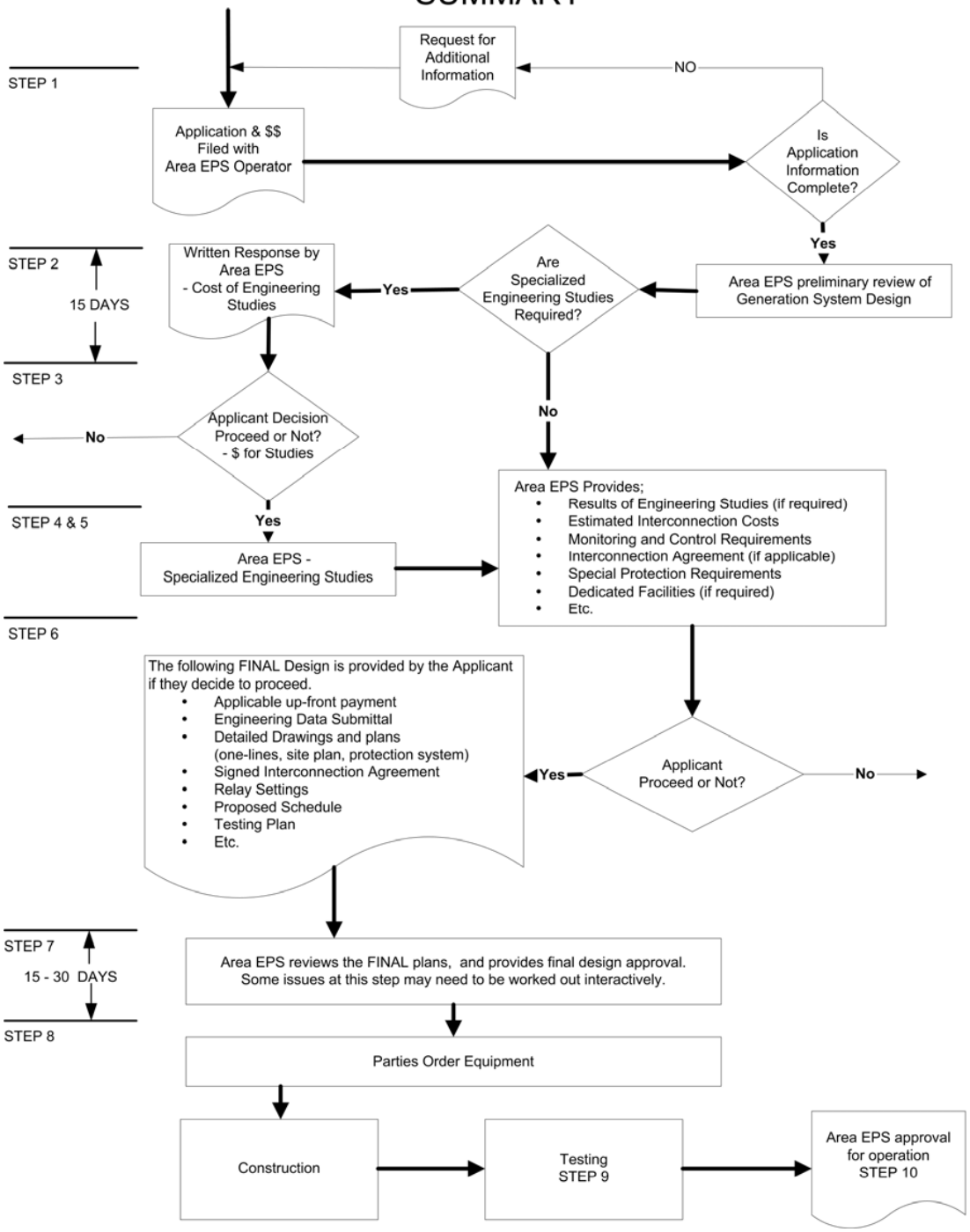
APPENDIX A

DISTRIBUTED GENERATION INTERCONNECTION PROCESS SUMMARY



APPENDIX B

INSERT

INTERCONNECTION

APPLICATION

FORM

APPENDIX C

INSERT

ENGINEERING DATA

SUBMITTAL

FORM

APPENDIX D

Engineering Studies

For the engineering studies there are two main parts of the study: 1. Does the distributed generator cause a problem? and 2. What would it cost to make a change to handle the problem.? The first question is relatively straightforward to determine as the Minnesota Power Engineer reviews the proposed installation. The second question typically has multiple alternatives and can turn into an iterative process. This iterative process can become quite large for more complex generation installations. For the Engineer there is no "cook book" solution which can be applied.

For some of the large generation installations and/or the more complex Minnesota Power may suggest dividing up the engineering studies into the two parts; identify the scope of the problems and attempt to identify solutions to resolve the problems. By splitting the engineering studies into two steps, it will allow for the Applicant to see the problems identified and to provide the Applicant the ability to remove the request for interconnection if the problems are too large and expensive to resolve. This would then save the additional costs to the Applicant for the more expensive engineering studies; to identity ways to resolve the problem(s).

This appendix provides an overview of some of the main issues that are looked at during the engineering study process. Every interconnection has its unique issues, such as relative strength of the distribution system, ratio of the generation size to the existing area loads, etc. Thus many of the generation interconnections will require further review of one or several of the issues listed.

- Short circuit analysis – the system is studied to make sure that the addition of the generation will not over stress any of Minnesota Power's equipment and that equipment will still be able to clear during a fault. It is expected that the Applicant will complete their own short circuit analysis on their equipment to ensure that the addition of the generation system does not overstress the Applicant's electrical equipment.

- Power Flow and Voltage Drop
  - Reviews potential islanding of the generation
  - Will Minnesota Power Equipment be overloaded
    - Under normal operation?
    - Under contingent operation? With backfeeds?

- Flicker Analysis –
  - Will the operation of the generation cause voltage swings?
    - When it loads up? When it off loads?
  - How will the generation interact with Minnesota Power voltage regulation?
  - Will Minnesota Power capacitor switching affect the generation while on-line?

- Protection Coordination
  - Reclosing issues – this is where the reclosing for the distribution system and transmission system are looked at to see if the Generation System protection can be set up to ensure that it will clear from the distribution system before the feeder is reenergized.
    - Is voltage supervision of reclosing needed?
  - Is transfer-trip required?
  - Do we need to modify the existing protection systems? Existing settings?
  - At which points do we need "out of sync" protection?
  - Is the proposed interconnection protection system sufficient to sense a problem on Minnesota Power's distribution system?
  - Are there protection problems created by the step-up transformer?

- Grounding Reviews
  - Does the proposed grounding system for the Generation System meet the requirements of the NESC? "National Electrical Safety Code" published by the Institute of Electrical and Electronics Engineers (IEEE)

- System Operation Impact.
  - Are special operating procedures needed with the addition of the generation?
  - Reclosing and out of sync operation of facilities.
  - What limitations need to be placed on the operation of the generation?
  - Operational Var requirements?.

APPENDIX E

INSERT

STATE OF MINNESOTA
INTERCONNECTION AGREEMENT

FOR THE

INTERCONNECTION OF EXTENDED PARALLELED
DISTRIBUTION GENERATION SYSTEMS

WITH

ELECTRIC UTILITIES

STATE OF MINNESOTA

DISTRIBUTED GENERATION INTERCONNECTION REQUIREMENTS FOR MINNESOTA POWER

TABLE OF CONTENTS

Foreword

Electric distribution system connected generation units span a wide range of sizes and electrical characteristics. Electrical distribution system design varies widely from that required to serve the rural 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.

In establishing a generation interconnection standard there are three main issues that must be addressed; Safety, Economics and Reliability.

The first and most important issue is safety; the safety of the general public and of the employees working on the electrical systems. This standard establishes the technical requirements that must be met to ensure the safety of the general public and of the employees working with Minnesota Power. Typically designing the interconnection system for the safety of the general public will also provide protection for the interconnected equipment.

The second issue is economics; the interconnection design must be affordable to build. The interconnection standard must be developed so that only those items, that are necessary to meet safety and reliability, are included in the requirements. This standard sets the benchmark for the minimum required equipment. If it is not needed, it will not be required.

The third issue is reliability; the generation system must be designed and interconnected such that the reliability and the service quality for all customers of the electrical power systems are not compromised. This applies to all electrical systems not just Minnesota Power's distribution system.

Many generation interconnection standards exist or are in draft form. The IEEE, FERC and many states have been working on generation interconnection standards. There are other standards such as the National Electrical Code (NEC) that, establish requirements for electrical installations. The NEC requirements are in addition to this standard. This standard is designed to document the requirements where the NEC has left the establishment of the standard to "the authority having jurisdiction" or to cover issues which are not covered in other national standards.

This standard covers installations, with an aggregated capacity of 10MW's or less. Many of the requirements in this document do not apply to small, 40kW or less generation installations. As an aid to the small, distributed generation customer, these small unit interconnection requirements have been extracted from this full standard and are available as a separate, simplified document titled: "Standards for Interconnecting Generation Sources, Rated Less then 40kW with Minnesota Electric Utilities"

1. Introduction

This standard has been developed to document the technical requirements for the interconnection between a Generation System and an area electrical power system "Utility system or Area EPS", here Minnesota Power. This standard covers 3 phase Generation Systems with an aggregate capacity of 10 MWs or less and single phase Generation Systems with a aggregate capacity of 40kW or less at the Point of Common Coupling. This standard covers Generation Systems that are interconnected with Minnesota Power's distribution facilities. This standard does not cover Generation Systems that are directly interconnected with Minnesota Power's Transmission System, Contact Minnesota Power for their Transmission System interconnection standards.

While, this standard provides the technical requirements for interconnecting a Generation System with a typical radial distribution system, it is important to note that there are some unique Area EPS, which have special interconnection needs. One example of a unique Area EPS would be one operated as a "networked" system. This standard does not cover the additional special requirements of those systems. The Interconnection Customer must contact the Owner/operator of the Area EPS with which the interconnection is intended, to make sure that the Generation System is not proposed to be interconnected with a unique Area EPS. If the planned interconnection is with a unique Area EPS, the Interconnection Customer must obtain the additional requirements for interconnecting with the Area EPS.

Minnesota Power has the right to limit the maximum size of any Generation System or number of Generation Systems that, may want to interconnect, if the Generation System would reduce the reliability to the other customers connected to Minnesota Power.

This standard only covers the technical requirements and does not cover the interconnection process from the planning of a project through approval and construction. Please read the companion document "State of Minnesota Interconnection Process for Distributed Generation Systems" for the description of the procedure to follow and a generic version of the forms to submit. It is important to also get copies of Minnesota Power's tariff's concerning generation interconnection which will include rates, costs and standard interconnection agreements. The earlier the Interconnection Customer gets Minnesota Power involved in the planning and design of the Generation System interconnection the smoother the process will go.

A) Definitions

The definitions defined in the "IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems" (1547 Draft Ver. 11) apply to this document as well. The following definitions are in addition to the ones defined in IEEE 1547 , or are repeated from the IEEE 1547 standard.

i) "Area EPS" an electric power system (EPS) that serves Local EPS's. Note. Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc. Minnesota Power's distribution system is an AREA EPS.

ii) "Generation" any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, etc.; or any other electric producing device, including energy storage technologies.

iii) "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.

iv) "Interconnection Customer" the party or parties who are responsible for meeting the requirements of this standard. This could be the Generation System applicant, installer, designer, owner or operator.

v) "Local EPS" an electric power system (EPS) contained entirely within a single premises or group of premises.

vi) "Point of Common Coupling" the point where the Local EPS is connected to Minnesota Power.

vii) "Transmission System", are those facilities as defined by using the guidelines established by the Minnesota State Public Utilities Commission; "In the Matter of Developing Statewide Jurisdictional Boundary Guidelines for Functionally Separating Interstate Transmission from Generation and Local Distribution Functions" Docket No. E-015/M-99-1002.

viii) "Type-Certified" Generation paralleling equipment that is listed by an OSHA listed national testing laboratory as having met the applicable type testing requirement of UL 1741. At the time is document was prepared this was the only national standard available for certification of generation transfer switch equipment. This definition does not preclude other forms of type-certification if agreeable to Minnesota Power.

B) Interconnection Requirements Goals

This standard defines the minimum technical requirements for the implementation of the electrical interconnection between the Generation System and Minnesota Power. It does not define the overall requirements for the Generation System. The requirements in this standard are intended to achieve the following:

i) Ensure the safety of utility personnel and contractors working on the electrical power system.

ii) Ensure the safety of utility customers and the general public.

iii) Protect and minimize the possible damage to the electrical power system and other customer's

property.

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

C) Protection

The Generation System and Point of Common Coupling shall be designed with proper protective devices to promptly and automatically disconnect the Generation from Minnesota Power in the event of a fault or other system abnormality. The type of protection required will be determined by:

i) Size and type of the generating equipment.

ii) The method of connecting and disconnecting the Generation System from the electrical power system.

iii) The location of generating equipment on Minnesota Power's distribution system.

D) Minnesota Power Modifications

Depending upon the match between the Generation System, Minnesota Power and how the Generation System is operated, certain modifications and/or additions may be required to Minnesota Power's distribution system with the addition of the Generation System. To the extent possible, this standard describes the modifications which could be necessary to Minnesota Power for different types of Generation Systems. For some unique interconnections, additional and/or different protective devices, system modifications and/or additions will be required by Minnesota Power; In these cases Minnesota Power will provide the final determination of the required modifications and/or additions. If any special requirements are necessary they will be identified by Minnesota Power during the application review process.

E) Generation System Protection

The Interconnection Customer is solely responsible for providing protection for the Generation System. Protection systems required in this standard, are structured to protect Minnesota Power's electrical power system and the public. The Generation System Protection is not provided for in this standard. Additional protection equipment may be required to ensure proper operation for the Generation System. This is especially true while operating disconnected, from Minnesota Power. Minnesota Power does not assume responsibility for protection of the Generation System equipment or of any portion Local EPS.

F) Electrical Code Compliance

Interconnection Customer shall be responsible for complying with all applicable local, independent, state and federal codes such as building codes, National Electric Code (NEC), National Electrical Safety Code (NESC) and noise and emissions standards. As required by Minnesota State law, Minnesota Power will require proof of complying with the National Electrical Code before the interconnection is made, through installation approval by an electrical inspector recognized by the Minnesota State Board of Electricity.

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

2. 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 (1995), "IEEE Standard Surge Withstand Capability (SEC) Tests for Protective Relays and Relay Systems".

IEEE Std C37.90.2 (1995), "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 (2002), "IEEE Recommended Practice on Surge Testing for Equipment Connected to Low Voltage (1000V and less) AC Power Circuits"

ANSI C84.1-1995,"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 an Commercial Power Systems – Green Book",

UL Std. 1741 "Inverters, Converters, and Controllers for use in Independent Power Systems"

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.

3. Types of Interconnections

A) The manner in which the Generation System is connected to and disconnected from Minnesota Power can vary. Most transfer systems normally operate using one of the following five methods of transferring the load from Minnesota Power to the Generation System.

B) If a transfer system is installed which has a user accessible selection of several transfer modes, the transfer mode that has the greatest protection requirements will establish the protection requirements for that transfer system.

i) Open Transition (Break-Before-Make) Transfer Switch – With this transfer switch, the load to be supplied from the Distributed Generation is first disconnected from Minnesota Power and then connected to the Generation. This transfer can be relatively quick, but voltage and frequency excursions are to be expected during transfer. Computer equipment and other sensitive equipment will shut down and reset. The transfer switch typically consists of a standard UL approved transfer switch with mechanical interlocks between the two source contactors that drop the Minnesota Power source before the Distributed Generation is connected to supply the load.

(1) To qualify as an Open Transition switch and the limited protective requirements, mechanical interlocks are required between the two source contacts. This is required to ensure that one of the contacts is always open and the Generation System is never operated in parallel with Minnesota Power. If the mechanical interlock is not present, the protection requirements are as if the switch is a closed transition switch.

(2) As a practical point of application, this type of transfer switch is typically used for loads less then 500kW. This is due to possible voltage flicker problems created on Minnesota Power's distribution system, when the load is removed from or returned to the Minnesota Power source. Depending up Minnesota Power's stiffness this level may be larger or smaller then the 500kW level.

(3) Figure 1 at the end of this document provides a typical one-line of this type of installation.

ii) Quick Open Transition (Break-Before-Make) Transfer Switch – The load to be supplied from the Distributed Generation is first disconnected from Minnesota Power and then connected to the Distributed Generation, similar to the open transition. However, this transition is typically much faster (under 500 ms) than the conventional open transition transfer operation. Voltage and frequency excursions will still occur, but some computer equipment and other sensitive equipment will typically not be affected with a properly designed system. The transfer switch consists of a standard UL approved transfer switch, with mechanical interlocks between the two source contacts that drop the Minnesota Power source before the Distributed Generation is connected to supply the load.

(1) Mechanical interlocks are required between the two source contacts to ensure that one of the contacts is always open. If the mechanical interlock is not present, the protection requirements are as if the switch is a closed transition switch

(2) As a practical point of application this type of transfer switch is typically used for loads less then 500kW. This is due to possible voltage flicker problems created on Minnesota Power's distribution system, when the load is removed from or returned to the Minnesota Power source. Depending up the Minnesota Power's stiffness this level may be larger or smaller than the 500kW level.

(3) Figure 2 at the end of this document provides a typical one-line of this type of installation and shows the required protective elements.

iii) Closed Transition (Make-Before-Break) Transfer Switch – The Distributed Generation is synchronized with Minnesota Power prior to the transfer occurring. The transfer switch then parallels with Minnesota Power for a short time (100 msec. or less) and then the Generation System and load is disconnect from Minnesota Power. This transfer is less disruptive than the Quick Open Transition because it allows the Distributed Generation a brief time to pick up the load before the support of Minnesota Power is lost. With this type of transfer, the load is always being supplied by Minnesota Power or the Distributed Generation.

(1) As a practical point of application this type of transfer switch is typically used for loads less then 500kW. This is due to possible voltage flicker problems created on Minnesota Power's distribution system, when the load is removed from or returned to the Minnesota Power source. Depending up the Minnesota Power's stiffness this level may be larger or smaller then the 500kW level.

(2) Figure 2 at the end of this document provides a typical one-line of this type of installation and shows the required protective elements. The closed transition switch must include a separate parallel time limit relay, which is not part of the generation control PLC and trips the generation from the system for a failure of the transfer switch and/or the transfer switch controls.

iv) Soft Loading Transfer Switch

(1) With Limited Parallel Operation – The Distributed Generation is paralleled with Minnesota Power for a limited amount of time (generally less then 1-2 minutes) to gradually transfer the load from Minnesota Power to the Generation System. This minimizes the voltage and frequency problems, by softly loading and unloading the Generation System.

(a) The maximum parallel operation shall be controlled, via a parallel timing limit relay (62PL). This parallel time limit relay shall be a separate relay and not part of the generation control PLC.

(b) Protective Relaying is required as described in section 6.

(c) Figure 3 at the end of this document provide typical one-line diagrams of this type of installation and show the required protective elements.

(2) With Extended Parallel Operation – The Generation System is paralleled with Minnesota Power in continuous operation. Special design, coordination and agreements are required before any extended parallel operation will be permitted. The Minnesota Power interconnection study will identify the issues involved.

(a) Any anticipated use in the extended parallel mode requires special agreements and special protection coordination.

(b) Protective Relaying is required as described in section 6.

(c) Figure 4 at the end of this document provides a typical one-line for this type of interconnection. It must be emphasized that this is a typical installations only and final installations may vary from the examples shown due to transformer connections, breaker configuration, etc.

v) Inverter Connection

This is a continuous parallel connection with the system. Small Generation Systems may utilize inverters to interface to Minnesota Power. Solar, wind and fuel cells are some

examples of Generation which typically use inverters to connect to Minnesota Power. 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. All required protective elements for a soft-loading transfer switch apply to an inverter connection. Figure 5 at the end of this document, shows a typical inverter interconnection.

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

(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 custom protection settings, which must be calculated and designed to be compatible with the specific Area EPS being interconnected with.

(3) A visible disconnect is required for safely isolating the Distributed Generation when connecting with an inverter. The inverter shall not be used as a safety isolation device.

(4) When banks of inverter systems are installed at one location, a design review by Minnesota Power must be preformed to determine any additional protection systems, metering or other needs. The issues will be identified by Minnesota Power during the interconnection study process

4. Interconnection Issues and Technical Requirements

A) General Requirements - The following requirements apply to all interconnected generating equipment. Minnesota Power shall be the source side and the customer's system shall be the load side in the following interconnection requirements.

i) Visible Disconnect - A disconnecting device shall be installed to electrically isolate Minnesota Power from the Generation System. The only exception for the installation of a visible disconnect is if the generation is interconnected via a mechanically interlocked open transfer switch and installed per the NEC (702.6) "so as to prevent the inadvertent interconnection of normal and alternate sources of supply in any operation of the transfer equipment."

The visible disconnect shall provide a visible air gap between Interconnection Customer's Generation and Minnesota Power in order to establish the safety isolation required for work on Minnesota Power's distribution system. This disconnecting device shall be readily accessible 24 hours per day by Minnesota Power field personnel and shall be capable of padlocking by Minnesota Power 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. A draw-out type circuit breaker can be used as a visual open.

The visible disconnect shall be labeled, as required by Minnesota Power to inform Minnesota Power field personnel.

ii) Energization of Equipment by Generation System – The Generation System shall not energize a de-energized Minnesota Power's distribution system. The Interconnection Customer shall install the necessary padlocking (lockable) devices on equipment to prevent the energization of a de-energized electrical power system. Lock out relays shall automatically block the closing of breakers or transfer switches on to a de-energized Minnesota Power's distribution system.

iii) Power Factor - The power factor of the Generation System and connected load shall be as follows;

(1) Inverter Based interconnections – shall operate at a power factor of no less then 90%.at the inverter terminals.

(2) Limited Parallel Generation Systems, such as closed transfer or soft-loading transfer systems shall operate at a power factor of no less then 90%, during the period when the Generation System is parallel with Minnesota Power, as measured at the Point of Common Coupling.

(3) Extended Parallel Generation Systems shall be designed to be capable of operating between 90% lagging and 95% leading. These Generation Systems shall normally operate near unity power factor (+/-98%) or as mutually agreed between Minnesota Power and the Interconnection Customer.

iv) Grounding Issues

(1) Grounding of sufficient size to handle the maximum available ground fault current shall be designed and installed to limit step and touch potentials to safe levels as set forth in "IEEE Guide for Safety in AC Substation Grounding", ANSI/IEEE Standard 80.

(2) It is the responsibility of the Interconnection Customer to provide the required grounding for the Generation System. A good standard for this is the IEEE Std. 142-1991 "Grounding of Industrial and Commercial Power Systems"

(3) All electrical equipment shall be grounded in accordance with local, state and federal electrical and safety codes and applicable standards

v) Sales to Minnesota Power or other parties – Transportation of energy on the Transmission system is regulated by the area reliability council and FERC. Those contractual requirements are not included in this standard. Minnesota Power will provide these additional contractual requirements during the interconnection approval process.

B) For Inverter based, closed transfer and soft loading interconnections - The following additional requirements apply:

i) Fault and Line Clearing - The Generation System shall be removed from Minnesota Power's distribution system for any faults, or outages occurring on the electrical circuit serving the Generation System

ii) Operating Limits in order to minimize objectionable and adverse operating conditions on the electric service provided to other customers connected to Minnesota Power, the Generation System shall meet the Voltage, Frequency, Harmonic and Flicker operating criteria as defined in the IEEE 1547 standard during periods when the Generation System is operated in parallel with Minnesota Power.

If the Generation System creates voltage changes greater than 4% on Minnesota Power's distribution system, it is the responsibility of the Interconnection Customer to correct these voltage sag/swell problems caused by the operation of the Generation System. If the operation of the interconnected Generation System causes flicker, which causes problems for others customer's interconnected to Minnesota Power, the Interconnection Customer is responsible for correcting the problem.

iii) Flicker - The operation of Generation System is not allowed to produce excessive flicker to adjacent customers. See the IEEE 1547 standard for a more complete discussion on this requirement.

The stiffer Minnesota Power's distribution system, the larger a block load change that it will be able to handle. For any of the transfer systems the Minnesota Power voltage shall not drop or rise greater than 4% when the load is added or removed from Minnesota Power. It is important to note, that if another interconnected customer complains about the voltage change caused by the Generation System, even if the voltage change is below the 4% level, it is the Interconnection Customer's responsibility to correct or pay for correcting the problem. Utility experience has shown that customers have seldom objected to instantaneous voltage changes of less then 2% on Minnesota Power's distribution system, so Minnesota Power uses a 2% design criteria.

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

v) Synchronization of Customer Generation-

(1) An automatic synchronizer with synch-check relaying is required for unattended automatic quick open transition, closed transition or soft loading transfer systems.

(2) To prevent unnecessary voltage fluctuations on Minnesota Power's distribution system, it is required that the synchronizing equipment be capable of closing the Distributed Generation into Minnesota Power's distribution system within the limits defined in IEEE 1547. Actual settings shall be determined by the Registered Professional Engineer establishing the protective settings for the installation.

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

vi) Disconnection – Minnesota Power may refuse to connect or may disconnect a Generation System from Minnesota Power under the following conditions:

(1) Lack of approved Standard Application Form and Standard Interconnection Agreement.

(2) Termination of interconnection by mutual agreement.

(3) Non-Compliance with the technical or contractual requirements.

(4) System Emergency or for imminent danger to the public or Minnesota Power personnel (Safety).

(5) Routine maintenance, repairs and modifications to Minnesota Power's distribution system. Minnesota Power shall coordinate planned outages with the Interconnection Customer to the extent possible.

5. Generation Metering, Monitoring and Control

Metering, Monitoring and Control – Depending upon the method of interconnection and the size of the Generation System, there are different metering, monitoring and control requirements Table 5A is a table summarizing the metering, monitoring and control requirements..

Due to the variation in Generation Systems and Minnesota Power operational needs, the requirements for metering, monitoring and control listed in this document are the expected maximum requirements that Minnesota Power will apply to the Generation System. It is important to note that for some Generation System installations Minnesota Power may wave some of the requirements of this section if they are not needed. An example of this is with rural or low capacity feeders which require more monitoring then larger capacity, typically urban feeders.

Another factor which will effect the metering, monitoring and control requirements will be the tariff under which the Interconnection Customer is supplied by Minnesota Power. Table 5A has been written to cover most application, but some Minnesota Power tariffs may have greater or less metering, monitoring and control requirements then, as shown in Table 5A. .

TABLE 5A Metering, Monitoring and Control Requirements			
Generation System Capacity at Point of Common Coupling	**Metering**	**Generation Remote Monitoring**	**Generation Remote Control**
< 40 kW with all sales to Minnesota Power	Bi-Directional metering at the point of common coupling	None Required	None Required
< 40 kW with Sales to a party other then Minnesota Power	Recording metering on the Generation System and a separate recording meter on the load	Interconnection Customer supplied direct dial phone line.	None Required
40 – 250kW with limited parallel	Detented Minnesota Power Metering at the Point of Common Coupling	None Required	None Required
40 – 250kW with extended parallel	Recording metering on the Generation System and a separate recording meter on the load	Interconnection Customer supplied direct dial phone line. Minnesota Power to supply it's own monitoring equipment	None Required
250 – 1000 kW with limited parallel	Detented Minnesota Power Metering at the Point of Common Coupling	Interconnection Customer supplied direct dial phone line and monitoring points available. See B (i)	None Required
250 – 1000 kW With extended parallel operation	Recording metering on the Generation System and a separate recording meter on the load.	Required Minnesota Power remote monitoring system See B (i)	None Required
>1000 kW With limited parallel Operation	Detented Minnesota Power Metering at the Point of Common Coupling	Required Minnesota Power SCADA monitoring system. See B (i)	None required
>1000 kW With extended parallel operation	Recording metering on the Generation System and a separate recording meter on the load.	Required Minnesota Power SCADA monitoring system See B (i)	Direct Control via SCADA by Minnesota Power of interface breaker.

"Detented" = A meter which is detented will record power flow in only one direction.

A) Metering

i) As shown in Table 5A the requirements for metering will depend up on the type of generation and the type of interconnection. For most installations, the requirement is a single point of metering at the Point of Common Coupling. Minnesota Power will install a special meter that is capable of measuring and recording energy flow in both directions, for three phase installations or two detented meters wired in series, for single phase installations.. A dedicated - direct dial phone line may be required to be supplied to the meter for Minnesota Power's use to read the metering. Some monitoring may be done through the meter and the dedicated – direct dial phone line, so in many installations the remote monitoring and the meter reading can be done using the same dial-up phone line.

ii) Depending upon which tariff the Generation System and/or customer's load is being supplied under, additional metering requirements may result. Contact Minnesota Power for tariff requirements. In some cases, the direct dial-phone line requirement may be waived by Minnesota Power for smaller Generation Systems.

iii) All Minnesota Power's revenue meters shall be supplied, owned and maintained by Minnesota Power. All voltage transformers (VT) and current transformers (CT), used for revenue metering shall be approved and/or supplied by Minnesota Power. Minnesota Power's standard practices for instrument transformer location and wiring shall be followed for the revenue metering.

iv) For Generation Systems that sell power and are greater then 40kW in size, separate metering of the generation and of the load is required. A single meter recording the power flow at the Point of Common Coupling for both the Generation and the load, is not allowed by the rules under which the area transmission system is operated. Minnesota Power is required to report to the regional reliability council (MAPP) the total peak load requirements and is also required to own or have contracted for, accredited generation capacity of 115% of the experienced peak load level for each month of the year. Failure to meet this requirement results in a large monetary penalty for Minnesota Power.

v) For Generation Systems which are less then 40kW in rated capacity and are qualified facilities under PURPA (Public Utilities Regulatory Power Act – Federal Gov. 1978), net metering is allowed and provides the generation system the ability to back feed Minnesota Power at some times and bank that energy for use at other times. Some of the qualified facilities under PURPA are solar, wind, hydro, and biomass. For these net-metered installations, Minnesota Power may use a single meter to record the bi-directional flow or Minnesota Power may elect to use two detented meters, each one to record the flow of energy in one direction.

B) Monitoring (SCADA) is required as shown in table 5A. The need for monitoring is based on the need of the system control center to have the information necessary for the reliable operation of Minnesota Power's. This remote monitoring is especially important during periods of abnormal and emergency operation.

The difference in Table 5A between remote monitoring and SCADA is that SCADA typically is a system that is in continuous communication with a central computer and provides updated values and status, to Minnesota Power, within several seconds of the changes in the field. Remote monitoring on the other hand will tend to provide updated values and status within minutes of the change in state of the field. Remote monitoring is typically less expensive to install and operate.

i) Where Remote Monitoring or SCADA is required, as shown in Table 5A, the following monitored and control points are required:

(1) Real and reactive power flow for each Generation System (kW and kVAR). Only required

if separate metering of the Generation and the load is required, otherwise #4 monitored at the point of Common Coupling will meet the requirements.

(2) Phase voltage representative of Minnesota Power's service to the facility.

(3) Status (open/close) of Distributed Generation and interconnection breaker(s) or if transfer switch is used, status of transfer switch(s).

(4) Customer load from Minnesota Power service (kW and kVAR).

(5) Control of interconnection breaker - if required by Minnesota Power.

When telemetry is required, the Interconnection Customer must provide the communications medium to Minnesota Power's Control Center. This could be radio, dedicated phone circuit or other form of communication. If a telephone circuit is used, the Interconnection Customer must also provide the telephone circuit protection. The Interconnection Customer shall coordinate the RTU (remote terminal unit) addition with Minnesota Power. Minnesota Power may require a specific RTU and/or protocol to match their SCADA or remote monitoring system.

6. Protective Devices and Systems

A) Protective devices required to permit safe and proper operation of Minnesota Power's distribution system while interconnected with customer's Generation System are shown in the figures at the end of this document. In general, an increased degree of protection is required for increased Distributed Generation size. This is due to the greater magnitude of short circuit currents and the potential impact to system stability from these installations. Medium and large installations require more sensitive and faster protection to minimize damage and ensure safety.

If a transfer system is installed which has a user accessible selection of several transfer modes, the transfer mode which has the greatest protection requirements will establish the protection requirements for that transfer system.

The Interconnection Customer shall provide protective devices and systems to detect the Voltage, Frequency, Harmonic and Flicker levels as defined in the IEEE 1547 standard during periods when the Generation System is operated in parallel with Minnesota Power. The Interconnection Customer shall be responsible for the purchase, installation, and maintenance of these devices. Discussion on the requirements for these protective devices and systems follows:

i) Relay settings

(1) If the Generation System is utilizing a Type-Certified system, such as a UL listed inverter a Professional Electrical Engineer is not required to review and approve the design of the interconnecting system. If the Generation System interconnecting device is not Type-Certified or if the Type-Certified Generation System interconnecting device has additional design modifications made, the Generation System control, the protective system, and the interconnecting device(s) shall be reviewed and approved by a Professional Electrical Engineer, registered in the State of Minnesota.

(2) A copy of the proposed protective relay settings shall be supplied to Minnesota Power for review and approval, to ensure proper coordination between the generation system and Minnesota Power.

ii) Relays

(1) All equipment providing relaying functions shall meet or exceed ANSI/IEEE Standards for protective relays, i.e., C37.90, C37.90.1 and C37.90.2.

(2) Required relays that are not "draw-out" cased relays shall have test plugs or test switches installed to permit field testing and maintenance of the relay without unwiring or disassembling the equipment. Inverter based protection is excluded from this requirement for Generation Systems <40kW at the Point of Common Coupling.

(3) Three phase interconnections shall utilize three phase power relays, which monitor all three phases of voltage and current, unless so noted in the appendix one-lines.

(4) All relays shall be equipped with setting limit ranges at least as wide as specified in IEEE 1547, and meet other requirements as specified in the Minnesota Power interconnect study. Setting limit ranges are not to be confused with the actual relay settings required for the proper operation of the installation. At a minimum, all protective systems shall meet the requirements established in IEEE 1547 .

(a) Over-current relays (IEEE Device 50/51 or 50/51V) shall operate to trip the protecting

breaker at a level to ensure protection of the equipment and at a speed to allow proper coordination with other protective devices. For example, the over-current relay monitoring the interconnection breaker shall operate fast enough for a fault on the customer's equipment, so that no protective devices will operate on Minnesota Power's distribution system. 51V is a voltage restrained or controlled over-current relay and may be required to provide proper coordination with Minnesota Power.

(b) Over-voltage relays (IEEE Device 59) shall operate to trip the Distributed Generation per the requirements of IEEE 1547.

(c) Under-voltage relays (IEEE Device 27) shall operate to trip the Distributed Generation per the requirements of IEEE 1547

(d) Over-frequency relays (IEEE Device 81O) shall operate to trip the Distributed Generation off-line per the requirements of IEEE 1547.

(e) Under-frequency relay (IEEE Device 81U) shall operate to trip the Distributed Generation off-line per the requirements of IEEE 1547. For Generation Systems with an aggregate capacity greater then 30kW, the Distribution Generation shall trip off-line when the frequency drops below 57.0-59.8 Hz. typically this is set at 59.5 Hz, with a trip time of 0.16 seconds, but coordination with Minnesota Power is required for this setting.

Minnesota Power will provide the reference frequency of 60 Hz. The Distributed Generation control system must be used to match this reference. The protective relaying in the interconnection system will be expected to maintain the frequency of the output of the Generation.

(f) Reverse power relays (IEEE Device 32) (power flowing from the Generation System to Minnesota Power shall operate to trip the Distributed Generation off-line for a power flow to the system with a maximum time delay of 2.0 seconds.

(g) Lockout Relay (IEEE Device 86) is a mechanically locking device which is wired into the close circuit of a breaker or switch and when tripped will prevent any close signal from closing that device. This relay requires that a person manually resets the lockout relay before that device can be reclosed. These relays are used to ensure that a denergized system is not reenergized by automatic control action, and prevents a failed control from auto-reclosing an open breaker or switch.

(h) Transfer Trip – All Generation Systems are required to disconnect from Minnesota Power's distribution system when Minnesota Power's distribution system is disconnected from its source, to avoid unintentional islanding. With larger Generation Systems, which remain in parallel with Minnesota Power, a transfer trip system may be required to sense the loss of the Minnesota Power source. When the Minnesota Power source is lost, a signal is sent to the Generation System to separate the Generation from Minnesota Power. The size of the Generation System versus the capacity and minimum loading on the feeder will dictate the need for transfer trip installation. The Minnesota Power interconnection study will identify the specific requirements.

If multiple Minnesota Power sources are available or multiple points of sectionalizing on Minnesota Power's distribution system, then more then one transfer trip system may be required. The Minnesota Power interconnection study will identify the specific requirements. For some installations the alternate Minnesota Power source(s) may not be utilized except in rare occasions. If this is the situation, the Interconnection Customer may elect to have the Generation System locked out when

the alternate source(s) are utilized, if agreeable to Minnesota Power.

(i) Parallel limit timing relay (IEEE Device 62PL) set at a maximum of 120 seconds for soft transfer installations and set no longer then 100ms for quick transfer installations, shall trip the Distributed Generation circuit breaker on limited parallel interconnection systems. Power for the 62 PL relay must be independent of the transfer switch control power. The 62PL timing must be an independent device from the transfer control and shall not be part of the generation PLC or other control system.

TABLE 6A
SUMMARY OF RELAYING REQUIREMENTS

Type of Interconnection	Over-current (50/51)	Voltage (27/59)	Frequency (81 0/U)	Reverse Power (32)	Lockout (86)	Parallel Limit Timer	Sync-Check (25)	Transfer Trip
Open Transition Mechanically Interlocked (Fig. 1)	—	—	—	—	—	—	—	—
Quick Open Transition Mechanically Interlocked (Fig. 2)	—	—	—	—	Yes	Yes	Yes	—
Closed Transition (Fig. 2)	—	—	—	—	Yes	Yes	Yes	—
Soft Loading Limited Parallel Operation (Fig. 3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—
Soft Loading Extended Parallel < 250 kW (Fig. 4)	Yes	Yes	Yes	—	Yes	—	Yes	—
Soft Loading Extended Parallel >250kW (Fig.4)	Yes	Yes	Yes	—	Yes	—	Yes	Yes
Inverter Connection (Fig. 5)								
< 40 kW	Yes	Yes	Yes	—	Yes	—	—	—
40 kW – 250kW	Yes	Yes	Yes	—	Yes	—	—	—
> 250 kW	Yes	Yes	Yes	—	Yes	—	—	Yes

7. Agreements

A) Interconnection Agreement – This agreement is required for all Generation Systems that parallel with Minnesota Power. Minnesota Power's tariffs contain standard interconnection agreements. There are different interconnection agreements depending upon the size and type of Generation System. This agreement contains the terms and conditions upon which the Generation System is to be connected, constructed and maintained, when operated in parallel with Minnesota Power. Some of the issues covered in the interconnection agreement are as follows;

i) Construction Process

ii) Testing Requirements

iii) Maintenance Requirements

iv) Firm Operating Requirements such as Power Factor

v) Access requirements for Minnesota Power personnel

vi) Disconnection of the Generation System (Emergency and Non-emergency)

vii) Term of Agreement

viii) Insurance Requirements

ix) Dispute Resolution Procedures

B) Operating Agreement – For Generation Systems that normally operate in parallel with Minnesota Power, an agreement separate from the interconnection agreement, called the "operating agreement", is usually created. This agreement is created for the benefit of both the Interconnection Customer and Minnesota Power and will be agreed to between the Parties. This agreement will be dynamic and is intended to be updated and reviewed annually. For some smaller systems, the operating agreement can simply be a letter agreement for larger and more intergraded Generation Systems the operating agreement will tend to be more involved and more formal. The operating agreement covers items that are necessary for the reliable operation of the Local EPS and Minnesota Power. The items typically included in the operating agreement are as follows;

i) Emergency and normal contact information for both Minnesota Power's operations center and for the Interconnection Customer.

ii) Procedures for periodic Generation System test runs.

iii) Procedures for maintenance on Minnesota Power's distribution system that effect the Generation System.

iv) Emergency Generation Operation Procedures.

8. Testing Requirements

A) Pre-Certification of equipment

The most important part of the process to interconnect generation with Local EPS and Minnesota Power is safety. One of the key components of ensuring the safety of the public and employees is to ensure that the design and implementation of the elements connected to the electrical power system operate as required. To meet this goal, all of the electrical wiring in a business or residence, is required by the State of Minnesota to be listed by a recognized testing and certification laboratory, for its intended purpose. Typically we see this as "UL" listed. Since Generation Systems have tended to be uniquely designed for each installation they have been designed and approved by Professional Engineers. As the number of Generation Systems installed increase, vendors are working towards creating equipment packages which can be tested in the factory and then will only require limited field testing. This will allow us to move towards "plug and play" installations. For this reason, this standard recognizes the efficiency of "pre-certification" of Generation System equipment packages that will help streamline the design and installation process.

An equipment package shall be considered certified for interconnected operation if it has been submitted by a manufacture, tested and listed by a nationally recognized testing and certification laboratory (NRTL) for continuous utility interactive operation in compliance with the applicable codes and standards. Presently generation paralleling equipment that is listed by a nationally recognized testing laboratory as having met the applicable type-testing requirements of UL 1741 and IEEE 929, shall be acceptable for interconnection without additional protection system requirements. An "equipment package" shall include all interface components including switchgear, inverters, or other interface devices and may include an integrated generator or electric source. If the equipment package has been tested and listed as an integrated package which includes a generator or other electric source, it shall not required further design review, testing or additional equipment to meet the certification requirements for interconnection. If the equipment package includes only the interface components (switchgear, inverters, or other interface devices), then the Interconnection Customer shall show that the generator or other electric source being utilized with the equipment package is compatible with the equipment package and consistent with the testing and listing specified for the package. Provided the generator or electric source combined with the equipment package is consistent with the testing ad listing performed by the nationally recognized testing and certification laboratory, no further design review, testing or additional equipment shall be required to meet the certification requirements of this interconnection procedure. A certified equipment package does not include equipment provided by Minnesota Power.

The use of Pre-Certified equipment does not automatically qualify the Interconnection Customer to be interconnected to Minnesota Power. An application will still need to be submitted and an interconnection review may still need to be performed, to determine the compatibility of the Generation System with Minnesota Power.

B) Pre-Commissioning Tests

i) Non-Certified Equipment

(1) Protective Relaying and Equipment Related to Islanding

(a) Distributed generation that is not Type-Certified (type tested), shall be equipped with protective hardware and/or software designed to prevent the Generation from being connected to a de-energized Minnesota Power's distribution system.

(b) The Generation may not close into a de-energized Minnesota Power distribution system and protection provided to prevent this from occurring. It is the Interconnection Customer's responsibility to provide a final design and to install the protective measures required by Minnesota Power. Minnesota Power will review and approve the design, the types of relays specified, and the installation. Mutually agreed upon exceptions may at times be necessary and desirable. It is strongly recommended that the Interconnection Customer obtain Minnesota Power written approval prior to ordering protective equipment for parallel operation. The Interconnection Customer will own these protective measures installed at their facility.

(c) The Interconnection Customer shall obtain prior approval from Minnesota Power for any revisions to the specified relay calibrations.

C) Commissioning Testing

The following tests shall be completed by the Interconnection Customer. All of the required tests in each section shall be completed prior to moving on to the next section of tests. Minnesota Power 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. Minnesota Power shall be notified, with sufficient lead time to allow the opportunity for Minnesota Power personnel to witness any or all of the testing.

i) Pre-testing – The following tests are required to be completed on the Generation System prior to energization by the Generator or Minnesota Power. Some of these tests may be completed in the factory if no additional wiring or connections were made to that component. These tests are marked with a "*"

(1) Grounding shall be verified to ensure that it complies with this standard, the NESC and the NEC.

(2) * CT's (Current Transformers) and VT's (Voltage Transformers) used for monitoring and protection, shall be tested to ensure correct polarity, ratio and wiring

(3) CT's shall be visually inspected to ensure that all grounding and shorting connections have been removed where required.

(4) Breaker / Switch tests – Verify that the breaker or switch cannot be operated with interlocks in place or that the breaker or switch cannot be automatically operated when in manual mode. Various Generation Systems have different interlocks, local or manual modes etc. The intent of this section is to ensure that the breaker or switches controls are operating properly.

(5) * Relay Tests – All Protective relays shall be calibrated and tested to ensure the correct operation of the protective element. Documentation of all relay calibration tests and settings shall be furnished to Minnesota Power.

(6) Trip Checks - Protective relaying shall functionally tested to ensure the correct operation of the complete system. Functional testing requires that the complete system is operated by the injection of current and/or voltage to trigger the relay element and proving that the relay element trips the required breaker, lockout relay or provides the correct signal to the next control element. Trip circuits shall be proven through the entire scheme (including breaker trip)

For factory assembled systems, such as inverters the setting of the protective elements may occur at the factory. This section requires that the complete system including the wiring and the device being tripped or activated is proven to be in working condition

through the injection of current and/or voltage.

(7) Remote Control, SCADA and Remote Monitoring tests – All remote control functions and remote monitoring points shall be verified operational. In some cases, it may not be possible to verify all of the analog values prior to energization. Where appropriate, those points may be verified during the energization process

(8) Phase Tests – the Interconnection Customer shall work with Minnesota Power to complete the phase test to ensure proper phase rotation of the Generation and wiring.

(9) Synchronizing test – The following tests shall be done across an open switch or racked out breaker. The switch or breaker shall be in a position that it is incapable of closing between the Generation System and Minnesota Power for this test. This test shall demonstrate that at the moment of the paralleling-device closure, the frequency, voltage and phase angle are within the required ranges, stated in IEEE 1547 . This test shall also demonstrate that is any of the parameters are outside of the ranges stated; the paralleling-device shall not close. For inverter-based interconnected systems this test may not be required unless the inverter creates fundamental voltages before the paralleling device is closed.

ii) On-Line Commissioning Test – The following tests will proceed once the Generation System has completed Pre-testing and the results have been reviewed and approved by Minnesota Power. For smaller Generation Systems Minnesota Power may have a set of standard interconnection tests that will be required. On larger and more complex Generation Systems the Interconnection Customer and Minnesota Power will get together to develop the required testing procedure. All on-line commissioning test shall be based on written test procedures agreed to between Minnesota Power and the Interconnection Customer.

Generation System functionally shall be verified for specific interconnections as follows:

(1) Anti-Islanding Test – For Generation Systems that parallel with the utility for longer then 100msec.

(a) The Generation System shall be started and connected in parallel with the Minnesota Power source

(b) The Minnesota Power source shall be removed by opening a switch, breaker etc.

(c) The Generation System shall either separate with the local load or stop generating

(d) The device that was opened to remove the Minnesota Power source shall be closed and the Generation System shall not reparallel with Minnesota Power for at least 5 minutes.

iii) Final System Sign-off.

(1) To ensure the safety of the public, all interconnected customer owned generation systems which do not utilize a Type-Certified system shall be certified as ready to operate by a Professional Electrical Engineer registered in the State of Minnesota, prior to the installation being considered ready for commercial use.

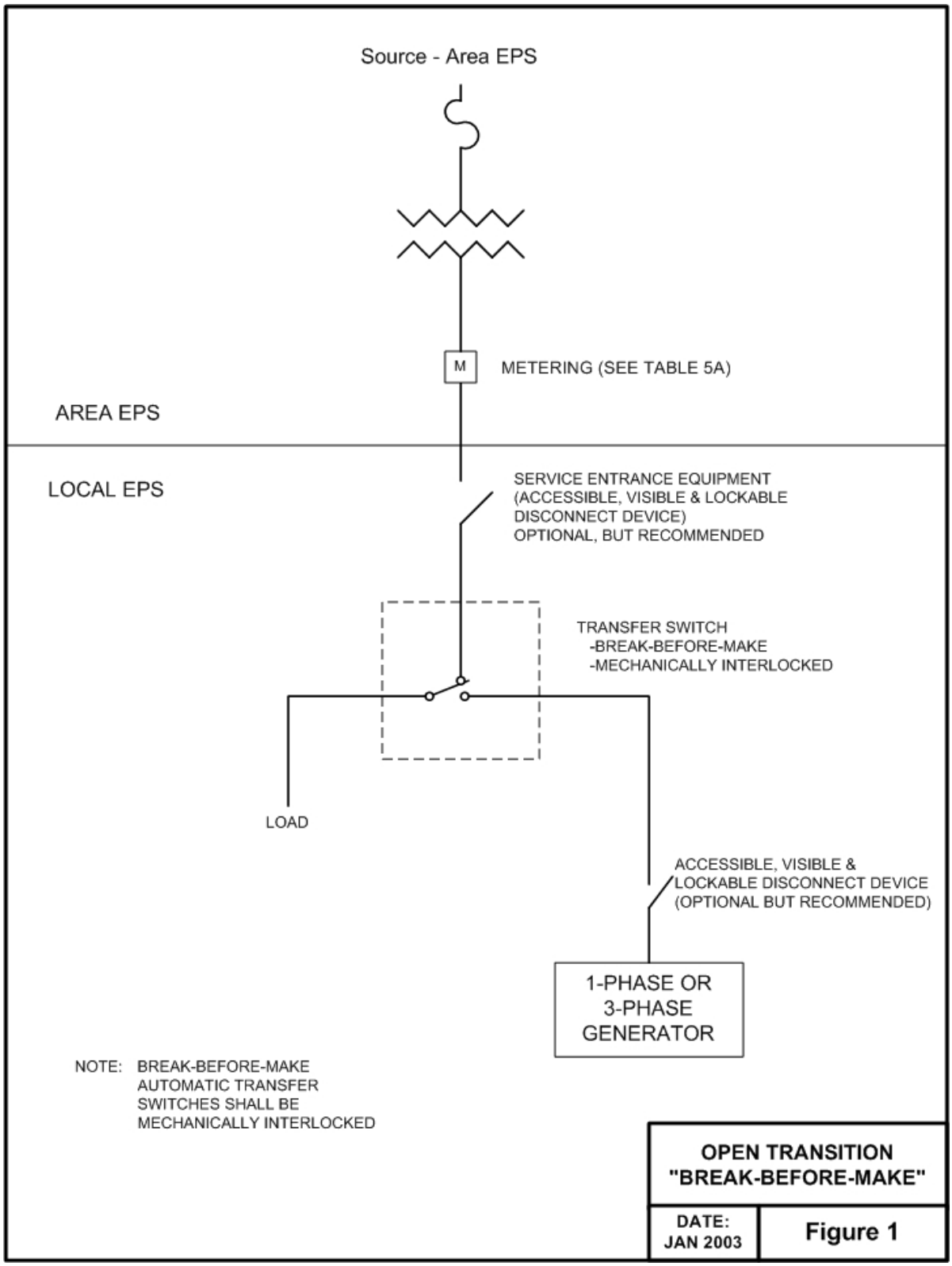
iv) Periodic Testing and Record Keeping

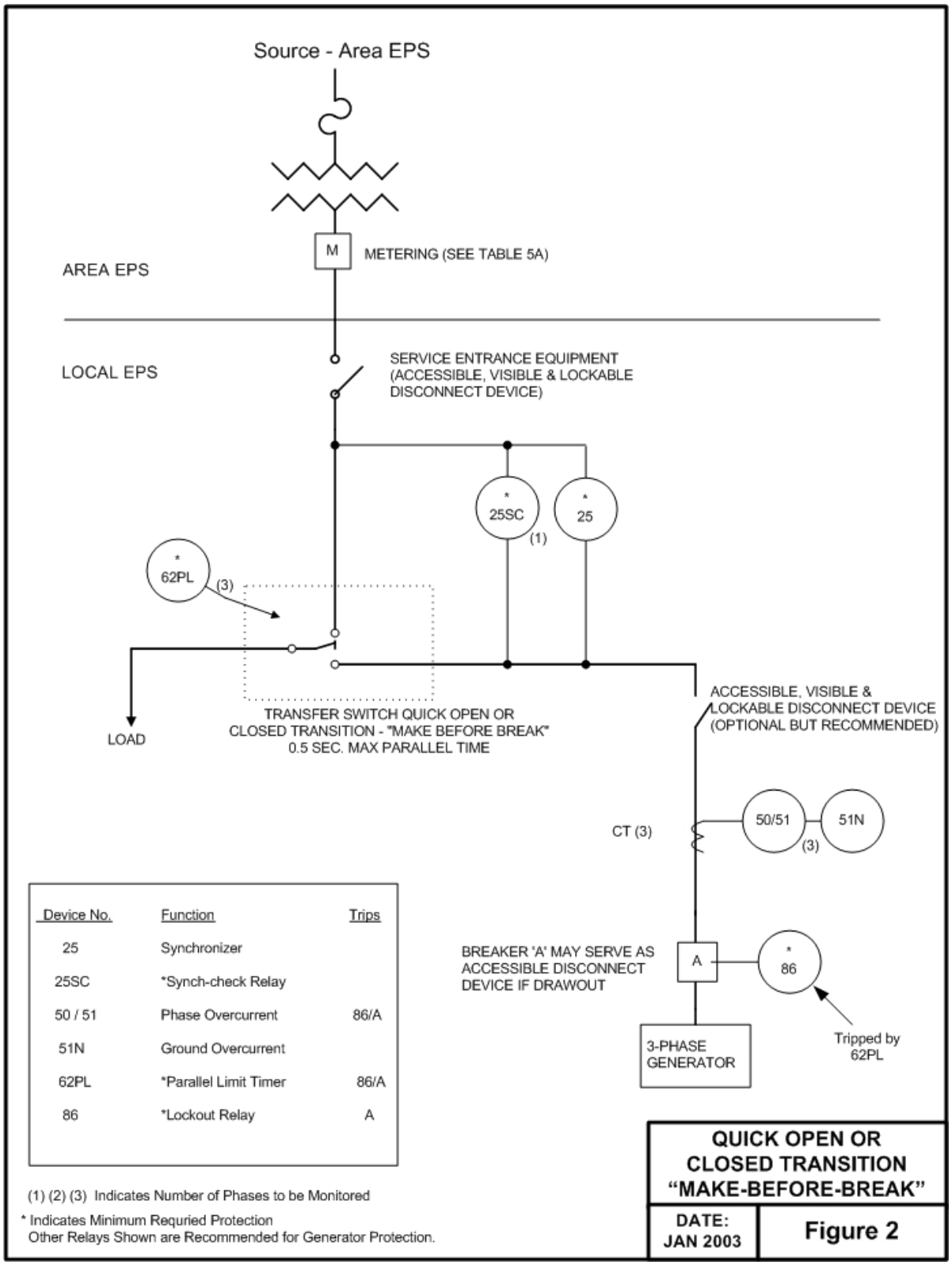
(1) Any time the interface hardware or software, including protective relaying and generation control systems are replaced and/or modified, Minnesota Power shall be notified. This notification shall, if possible, be with sufficient warning so that Minnesota Power personnel can be involved in the planning for the modification and/or witness the verification testing. Verification testing shall be completed on the replaced and/or modified equipment and systems. The involvement of Minnesota Power personnel will depend upon the complexity of the Generation System and the component being replaced and/or modified. Since the Interconnection Customer and Minnesota Power are now operating an interconnected system. It is important for each to communicate changes in operation, procedures and/or equipment to ensure the safety and reliability of the Local EPS and Minnesota Power.

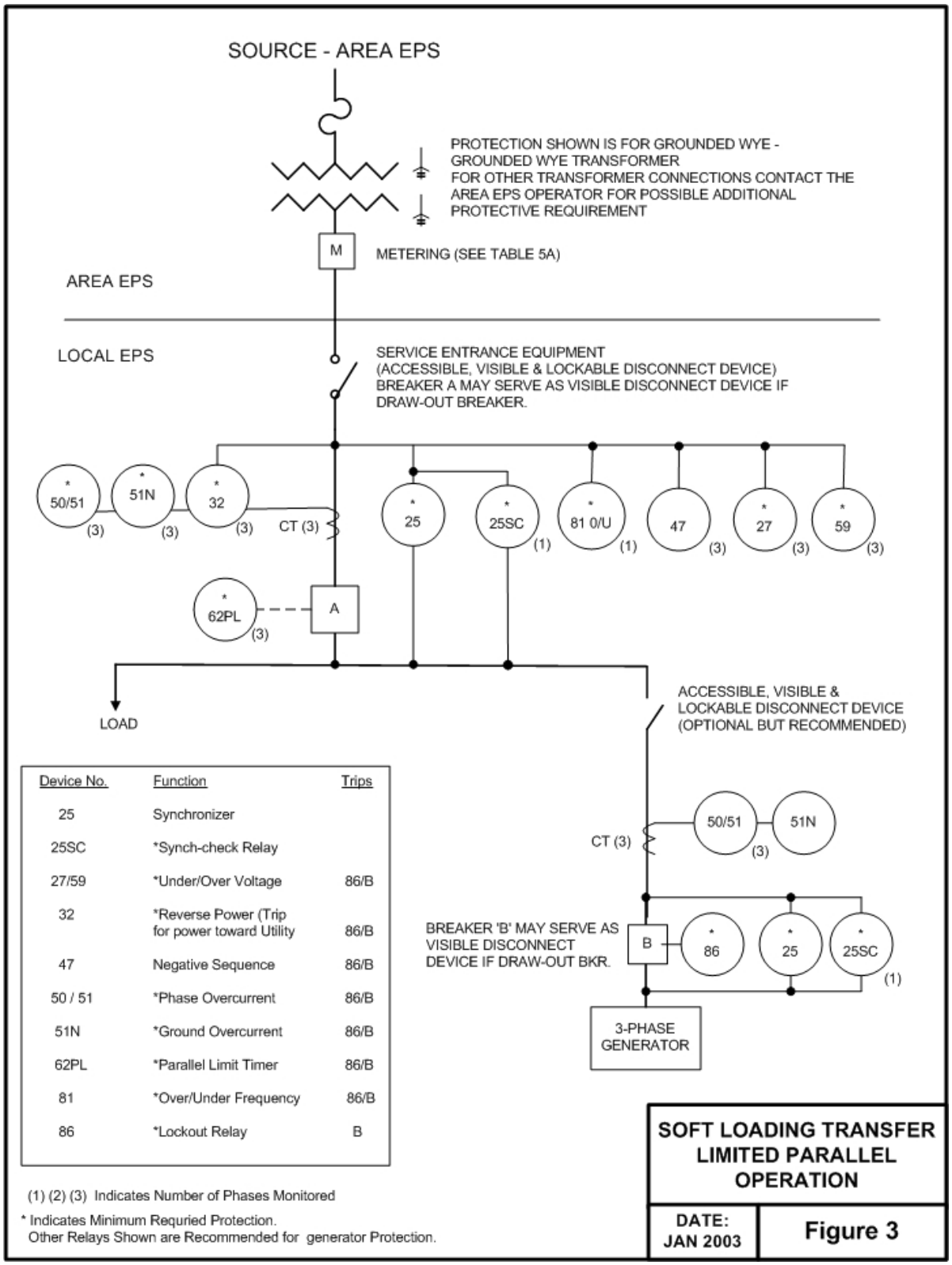
(2) All interconnection-related protection systems shall be periodically tested and maintained, by the Interconnection Customer, at intervals specified by the manufacture or system integrator. These intervals shall not exceed 5 years. Periodic test reports and a log of inspections shall be maintained, by the Interconnection Customer and made available to Minnesota Power upon request. Minnesota Power shall be notified prior to the period testing of the protective systems, so that Minnesota Power personnel may witness the testing if so desired.

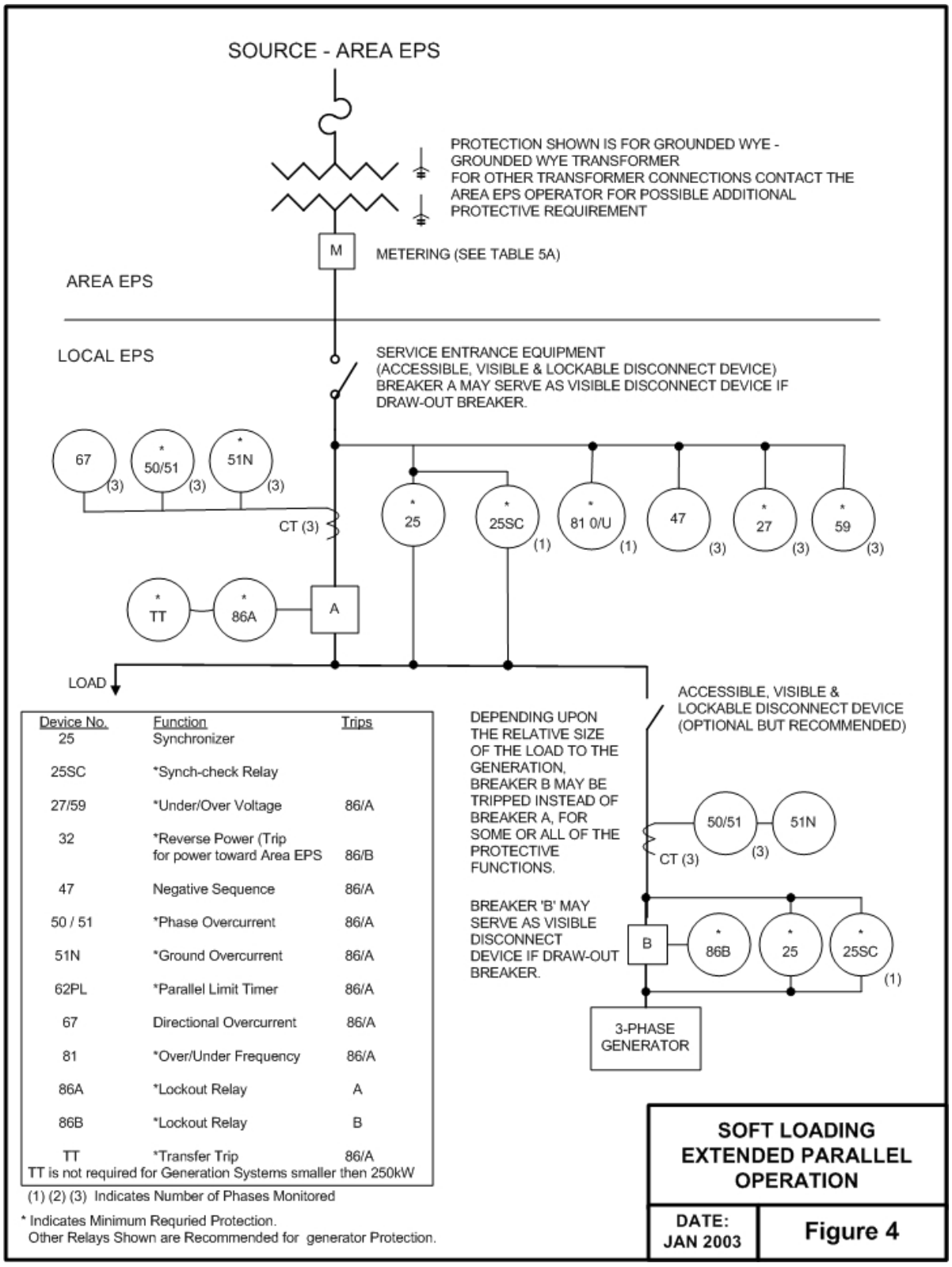
(a) Verification of inverter connected system rated 15kVA and below may be completed as follows; The Interconnection Customer shall operate the load break disconnect switch and verify the Generator automatically shuts down and does not restart for at least 5 minutes after the switch is close

(b) Any system that depends upon a battery for trip/protection power shall be checked and logged once per month for proper voltage. Once every four years the battery(s) must be either replaced or a discharge test performed. Longer intervals are possible through the use of “station class batteries” and Minnesota Power approval.


Source - Area EPS
M
METERING (SEE TABLE 5A)
AREA EPS
LOCAL EPS
SERVICE ENTRANCE EQUIPMENT
(ACCESSIBLE, VISIBLE & LOCKABLE
DISCONNECT DEVICE)
OPTIONAL, BUT RECOMMENDED
TRANSFER SWITCH
-BREAK-BEFORE-MAKE
-MECHANICALLY INTERLOCKED
LOAD
ACCESSIBLE, VISIBLE &
LOCKABLE DISCONNECT DEVICE
(OPTIONAL BUT RECOMMENDED)
1-PHASE OR
3-PHASE
GENERATOR
NOTE: BREAK-BEFORE-MAKE
AUTOMATIC TRANSFER
SWITCHES SHALL BE
MECHANICALLY INTERLOCKED
OPEN TRANSITION
"BREAK-BEFORE-MAKE"
DATE:
JAN 2003
Figure 1


Source - Area EPS
M
METERING (SEE TABLE 5A)
AREA EPS
LOCAL EPS
SERVICE ENTRANCE EQUIPMENT
(ACCESSIBLE, VISIBLE & LOCKABLE
DISCONNECT DEVICE)
* 25SC
(1)
* 25
* 62PL
(3)
LOAD
TRANSFER SWITCH QUICK OPEN OR
CLOSED TRANSITION - "MAKE BEFORE BREAK"
0.5 SEC. MAX PARALLEL TIME
ACCESSIBLE, VISIBLE &
LOCKABLE DISCONNECT DEVICE
(OPTIONAL BUT RECOMMENDED)
CT (3)
50/51
(3)
51N
BREAKER 'A' MAY SERVE AS
ACCESSIBLE DISCONNECT
DEVICE IF DRAWOUT
A
* 86
Tripped by
62PL
3-PHASE
GENERATOR
Device No. | Function | Trips
25 | Synchronizer |
25SC | *Synch-check Relay |
50 / 51 | Phase Overcurrent | 86/A
51N | Ground Overcurrent |
62PL | *Parallel Limit Timer | 86/A
86 | *Lockout Relay | A
(1) (2) (3) Indicates Number of Phases to be Monitored
* Indicates Minimum Requried Protection
Other Relays Shown are Recommended for Generator Protection.
QUICK OPEN OR
CLOSED TRANSITION
"MAKE-BEFORE-BREAK"
DATE:
JAN 2003
Figure 2


SOURCE - AREA EPS
PROTECTION SHOWN IS FOR GROUNDED WYE - GROUNDED WYE TRANSFORMER
FOR OTHER TRANSFORMER CONNECTIONS CONTACT THE AREA EPS OPERATOR FOR POSSIBLE ADDITIONAL PROTECTIVE REQUIREMENT
M
METERING (SEE TABLE 5A)
AREA EPS
LOCAL EPS
SERVICE ENTRANCE EQUIPMENT
(ACCESSIBLE, VISIBLE & LOCKABLE DISCONNECT DEVICE)
BREAKER A MAY SERVE AS VISIBLE DISCONNECT DEVICE IF DRAW-OUT BREAKER.
* 50/51 (3)
* 51N (3)
* 32 (3)
CT (3)
* 25
* 25SC (1)
* 81 0/U (1)
47 (3)
* 27 (3)
* 59 (3)
* 62PL (3)
A
LOAD
ACCESSIBLE, VISIBLE & LOCKABLE DISCONNECT DEVICE (OPTIONAL BUT RECOMMENDED)
CT (3)
50/51
51N
(3)
BREAKER 'B' MAY SERVE AS VISIBLE DISCONNECT DEVICE IF DRAW-OUT BKR.
B
* 86
* 25
* 25SC (1)
3-PHASE GENERATOR
Device No. | Function | Trips
25 | Synchronizer |
25SC | *Synch-check Relay |
27/59 | *Under/Over Voltage | 86/B
32 | *Reverse Power (Trip for power toward Utility | 86/B
47 | Negative Sequence | 86/B
50 / 51 | *Phase Overcurrent | 86/B
51N | *Ground Overcurrent | 86/B
62PL | *Parallel Limit Timer | 86/B
81 | *Over/Under Frequency | 86/B
86 | *Lockout Relay | B
(1) (2) (3) Indicates Number of Phases Monitored
* Indicates Minimum Requried Protection.
Other Relays Shown are Recommended for generator Protection.
SOFT LOADING TRANSFER
LIMITED PARALLEL
OPERATION
DATE:
JAN 2003
Figure 3

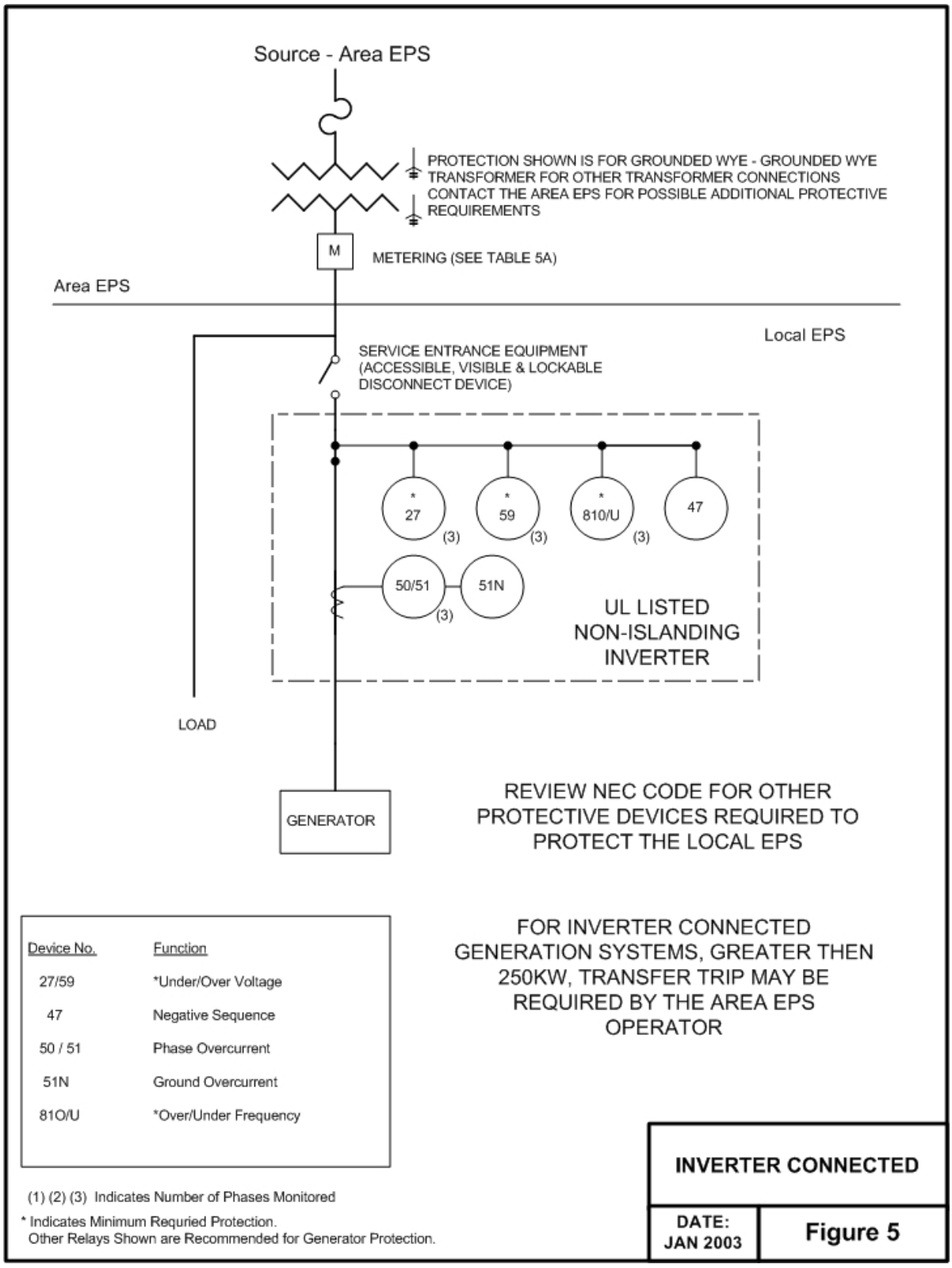


Device No.	Function	Trips
25	Synchronizer	
25SC	*Synch-check Relay	
27/59	*Under/Over Voltage	86/A
32	*Reverse Power (Trip for power toward Area EPS	86/B
47	Negative Sequence	86/A
50 / 51	*Phase Overcurrent	86/A
51N	*Ground Overcurrent	86/A
62PL	*Parallel Limit Timer	86/A
67	Directional Overcurrent	86/A
81	*Over/Under Frequency	86/A
86A	*Lockout Relay	A
86B	*Lockout Relay	B
TT	*Transfer Trip	86/A

TT is not required for Generation Systems smaller then 250kW

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

* Indicates Minimum Requried Protection.
Other Relays Shown are Recommended for generator Protection.


Source - Area EPS
PROTECTION SHOWN IS FOR GROUNDED WYE - GROUNDED WYE TRANSFORMER FOR OTHER TRANSFORMER CONNECTIONS CONTACT THE AREA EPS FOR POSSIBLE ADDITIONAL PROTECTIVE REQUIREMENTS
M
METERING (SEE TABLE 5A)
Area EPS
Local EPS
SERVICE ENTRANCE EQUIPMENT (ACCESSIBLE, VISIBLE & LOCKABLE DISCONNECT DEVICE)
* 27 (3)
* 59 (3)
* 810/U (3)
47
50/51 (3)
51N
UL LISTED NON-ISLANDING INVERTER
LOAD
GENERATOR
REVIEW NEC CODE FOR OTHER PROTECTIVE DEVICES REQUIRED TO PROTECT THE LOCAL EPS
FOR INVERTER CONNECTED GENERATION SYSTEMS, GREATER THEN 250KW, TRANSFER TRIP MAY BE REQUIRED BY THE AREA EPS OPERATOR
Device No. Function
27/59 *Under/Over Voltage
47 Negative Sequence
50 / 51 Phase Overcurrent
51N Ground Overcurrent
81O/U *Over/Under Frequency
(1) (2) (3) Indicates Number of Phases Monitored
* Indicates Minimum Requried Protection.
Other Relays Shown are Recommended for Generator Protection.
INVERTER CONNECTED
DATE: JAN 2003
Figure 5

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 1

For the Interconnection of Distributed Generation to Minnesota Power

WHO SHOULD FILE THIS SUBMITTAL: Anyone in the final stages of interconnecting a Generation System with the Minnesota Power. This submittal shall be completed and provided to Minnesota Power's Generation Interconnection Coordinator during the design of the Generation System, as established in the "State of Minnesota Interconnection Process for Distributed Generation Systems".

INFORMATION: This submittal is used to document the interconnected Generation System. The Applicant shall complete as much of the form as applicable. The Applicant will be contacted if additional information is required.

OWNER / APPLICANT		
Company / Applicant:		
Representative:	Phone Number:	FAX Number:
Title:		
Mailing Address:		
Email Address:		

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

PROJECT DESIGN / ENGINEERING (if applicable)		
Company:		
Representative:	Phone:	FAX Number:
Mailing Address:		
Email Address:		

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

TYPE OF INTERCONNECTED OPERATION	
Interconnection / Transfer method: □ Open □ Quick Open □ Closed □ Soft Loading □ Inverter	
Proposed use of generation: (Check all that may apply) □ Peak Reduction □ Standby □ Energy Sales □ Cover Load	Duration Parallel: □ None □ Limited □ Continuous
Pre-Certified System: Yes / No (Circle one)	Exporting Energy Yes / No (Circle one)

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 2

For the Interconnection of Distributed Generation to Minnesota Power

GENERATION SYSTEM OPERATION / MAINTENANCE CONTACT INFORMATION		
Maintenance Provider:	Phone #:	Pager #:
Operator Name:	Phone #:	Pager #:
Person to Contact before remote starting of units		
Contact Name:	Phone #:	Pager #:
	24hr Phone #:	

GENERATION SYSTEM OPERATING INFORMATION	
Fuel Capacity (gals):	Full Fuel Run-time (hrs):
Engine Cool Down Duration (Minutes):	Start time Delay on Load Shed signal:
Start Time Delay on Outage (Seconds):	

ESTIMATED LOAD		
The following information will be used to help properly design the interconnection. This Information is not intended as a commitment or contract for billing purposes.		
Minimum anticipated load (generation not operating):	kW:	kVA:
Maximum anticipated load (generation not operating):	kW:	kVA:

REQUESTED CONSTRUCTION START/COMPLETION DATES	
Design Completion:	
Construction Start Date:	
Footings in place:	
Primary Wiring Completion:	
Control Wiring Completion:	
Start Acceptance Testing:	
Generation operational (In-service):	

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 3

For the Interconnection of Distributed Generation to Minnesota Power

(Complete all applicable items, Copy this page as required for additional generators)

SYNCHRONOUS GENERATOR (if applicable)

Unit Number:	Total number of units with listed specifications on site:		
Manufacturer:	Type:	Phases: 1 or 3	
Serial Number (each)	Date of manufacture:	Speed (RPM):	Freq. (Hz);
Rated Output (each unit) kW Standby:	kW Prime:	kVA:	
Rated Power Factor (%):	Rated Voltage(Volts):	Rated Current (Amperes):	
Field Voltage (Volts):	Field Current (Amperes):	Motoring Power (kW):	

Synchronous Reactance (X_d):	% on	kVA base
Transient Reactance (X'_d):	% on	kVA base
Subtransient Reactance (X''_d):	% on	kVA base
Negative Sequence Reactance (X_s):	% on	kVA base
Zero Sequence Reactance (X_o):	% on	kVA base

Neutral Grounding Resistor (if applicable):

I^2t or K (heating time constant):

Exciter data:

Governor data:

Additional Information:

INDUCTION GENERATOR (if applicable)

Rotor Resistance (R_r):	Ohms	Stator Resistance (R_s):	Ohms
Rotor Reactance (X_r):	Ohms	Stator Reactance (X_s):	Ohms
Magnetizing Reactance (X_m):	Ohms	Short Circuit Reactance (X_d''):	Ohms
Design Letter:		Frame Size:	
Exciting Current:		Temp Rise (deg C°):	

Rated Output (kW):

Reactive Power Required: k Vars (no Load) kVars (full load)

If this is a wound-rotor machine, describe any external equipment to be connected (resistor, rheostat, power converter, etc.) to rotor circuit, and circuit configuration. Describe ability, if any, to adjust generator reactive output to provide power system voltage regulation.

Additional Information:

PRIME MOVER (Complete all applicable items)

Unit Number:	Type:
Manufacturer:	
Serial Number:	Date of Manufacture:

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 4

For the Interconnection of Distributed Generation to Minnesota Power

H.P. Rated:	H.P. Max:	Inertia Constant: lb.-ft.^{2}
Energy Source (hydro, steam, wind, wind etc.):		

INTERCONNECTION (STEP-UP) TRANSFORMER (If applicable)			
Manufacturer:		kVA:	
Date of Manufacture:	Serial Number:		
High Voltage: kV	Connection: delta wye	Neutral solidly grounded?	
Low Voltage: kV	Connection: delta wye	Neutral solidly grounded?	
Transformer Impedance (Z):	% on	kVA base	
Transformer Resistance (R):	% on	kVA base	
Transformer Reactance (X):	% on	kVA base	
Neutral Grounding Resistor (if applicable)			

TRANSFER SWITCH (If applicable)	
Model Number:	Type:
Manufacturer:	Rating(amps):

INVERTER (If applicable)		
Manufacturer:	Model:	
Rated Power Factor (%):	Rated Voltage (Volts):	Rated Current (Amperes):
Inverter Type (ferroresonant, step, pulse-width modulation, etc.):		
Type of Commutation: forced line	Minimum Short Circuit Ratio required:	
Minimum voltage for successful commutation:		
Current Harmonic Distortion	Maximum Individual Harmonic (%): Maximum Total Harmonic Distortion (%):	
Voltage Harmonic Distortion	Maximum Individual Harmonic (%): Maximum Total Harmonic Distortion (%):	
Describe capability, if any, to adjust reactive output to provide voltage regulation:		
NOTE: *Attach all available calculations, test reports, and oscillographic prints showing inverter output voltage and current waveforms.*		

POWER CIRCUIT BREAKER (if applicable)					
Manufacturer:			Model:		
Rated Voltage (kilovolts):			Rated Ampacity (Amperes):		
Interrupting Rating (Amperes):			BIL Rating:		
Interrupting Medium (vacuum, oil, gas, etc.)			Insulating Medium (vacuum, oil, gas, etc.)		
Control Voltage (Closing):	(Volts)	AC	DC		
Control Voltage (Tripping):	(Volts)	AC	DC	Battery	Charged Capacitor
Close Energy (circle one):	Spring	Motor	Hydraulic	Pneumatic	Other
Trip Energy (circle one):	Spring	Motor	Hydraulic	Pneumatic	Other

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 5

For the Interconnection of Distributed Generation to Minnesota Power

Bushing Current Transformers (Max. ratio):	Relay Accuracy Class:
CT'S Multi Ratio? (circle one); No / Yes: (Available taps):	

State of Minnesota

ENGINEERING DATA SUBMITTAL

Page 6

For the Interconnection of Distributed Generation to Minnesota Power

MISCELLANEOUS (Use this area and any additional sheets for applicable notes and comments)

SIGN OFF AREA
This Engineering Data Submittal documents the equipment and design of the Generation System. We agree to supply Minnesota Power with an updated Engineering Data Submittal any time significant changes are made in the equipment used or the design of the proposed Generation System. The Applicant agrees to design, operate and maintain the Generation System within the requirements set forth by the "State of Minnesota Distributed Generation Interconnection Requirements".
Applicant Name (print):
Applicant Signature: **Date:**
SEND THIS COMPLETED & SIGNED ENGINEERING DATA SUBMITTAL AND ANY ATTACHMENTS TO MINNESOTA POWER'S GENERATION INTERCONNECTION COORDINATOR

State of Minnesota

Generation Interconnection Application to Minnesota Power

WHO SHOULD FILE THIS APPLICATION: Anyone expressing interest to install generation which will interconnect with Minnesota Power (Local electric utility). This application should be completed and returned to Minnesota Power's Generation Interconnection Coordinator, in order to begin processing the request.

INFORMATION: This application is used by Minnesota Power to perform a preliminary interconnection review. 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 15 business days after receipt of all the required information.

COST: A payment to cover the application fee shall be included with this application. The application fee amount is outlined in the "State of Minnesota Interconnection Process for Distributed Generation Systems".

OWNER/APPLICANT		
Company / Applicant's Name:		
Representative:	**Phone Number:**	**FAX Number:**
Title:		
Mailing Address:		
Email Address:		

LOCATION OF GENERATION SYSTEM INTERCONNECTION
Street Address, legal description or GPS coordinates:

PROJECT DESIGN / ENGINEERING (if applicable)		
Company:		
Representative:	Phone:	FAX Number:
Mailing Address:		
Email Address:		

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

GENERATOR		
Manufacturer:		Model:
Type (Synchronous Induction, Inverter, etc):		**Phases: 1 or 3**
Rated Output (Prime kW):	**(Standby kW):**	**Frequency:**
Rated Power Factor (%):	**Rated Voltage (Volts):**	Rated Current (Amperes):
Energy Source (gas, steam, hydro, wind, etc.)		

TYPE OF INTERCONNECTED OPERATION	
Interconnection / Transfer method: **□ Open □ Quick Open □ Closed □ Soft Loading □ Inverter**	
Proposed use of generation: (Check all that may apply) **□ Peak Reduction □ Standby □ Energy Sales** **□ Cover Load**	**Duration Parallel:** **□ None □ Limited □ Continuous**
Pre-Certified System: Yes / No (Circle one)	**Exporting Energy Yes / No (Circle one)**

State of Minnesota

Generation Interconnection Application to Minnesota Power

ESTIMATED LOAD INFORMATION		
The following information will be used to help properly design the interconnection. This Information is not intended as a commitment or contract for billing purposes.		
Minimum anticipated load (generation not operating):	**kW:**	**kVA:**
Maximum anticipated load (generation not operating):	**kW:**	**kVA:**

ESTIMATED START/COMPLETION DATES	
Construction start date:	**Completion (operational) date:**

DESCRIPTION OF PROPOSED INSTALLATION AND OPERATION
Attach a single line diagram showing the switchgear, transformers, and generation facilities. Give a general description of the manner of operation of the generation (cogeneration, closed-transition peak shaving, open-transition peak shaving, emergency power, etc.). Also, does the Applicant intend to sell power and energy or ancillary services and/or wheel power over Minnesota Power's facilities. If there is an intent to sell power and energy, also define the target market.

SIGN OFF AREA:
With this Application, we are requesting Minnesota Power to review the proposed Generation System Interconnection. We request that Minnesota Power identifies the additional equipment and costs involved with the interconnection of this system and to provide a budgetary estimate of those costs. We understand that the estimated costs supplied by Minnesota Power, will be estimated using the information provided. We also agree that we will supply, as requested, additional information, to allow Minnesota Power to better review this proposed Generation System interconnection. We have read the "State of Minnesota Distributed Generation Interconnection Requirements" and will design the Generation System and interconnection to meet those requirements.
Applicant Name (print):
Applicant Signature: **Date:**

SEND THIS COMPLETED & SIGNED APPLICATION AND ATTACHMENTS TO MINNESOTA POWER'S GENERATION INTERCONNECTION COORDINATOR

20kW (and under) Solar/Inverter Installations

Generation Interconnection Application to Minnesota Power

Minnesota Power
Schedule E
Document 5

minnesota power
AN ALLETE COMPANY

power of one
a conservation program

WHO SHOULD FILE THIS APPLICATION: Anyone expressing interest to install generation which will interconnect with Minnesota Power (local electric utility). This application should be completed and returned to Minnesota Power in order to begin processing the request.

INFORMATION: This application is used by Minnesota Power to perform a preliminary interconnection review. The Applicant shall complete as much of the form as possible. The fields in BOLD are required to be completed for application processing. The Applicant will be contacted if additional information is required. The response may take up to 15 business days after receipt of all the required information.

For further details regarding Minnesota Power's interconnection processes and standards, refer to the "State of Minnesota Interconnection Process for Distributed Generation Systems", the "State of Minnesota Distributed Generation Interconnection Requirements", the terms and conditions outlined in this application and other interconnection information. These documents can be found on Minnesota Power's website at: **www.mnpower.com/DistributedGeneration**

COST: Customer will be notified of cost, if any, by Minnesota Power during the approval process. The application fee amount is outlined in the "State of Minnesota Power Interconnection Application for Distributed Generation Systems".

Owner / Applicant		
MP Customer Name:		
Account Number:	Meter Number:	
Representative:	Phone Number:	FAX Number:
Title:		
Mailing Address:		
Email Address:		

Location of Generation System Interconnection
Street Address, legal description or GPS coordinates:

Project Design / Engineering (if applicable) / Installer		
Company:		
Representative:	Phone Number:	FAX Number:
Mailing Address:		
Email Address:		

Electrical Contractor (if applicable)		
Company:		
Representative:	Phone Number:	FAX Number:
Mailing Address:		
Email Address:		

20kW (and under) Solar/Inverter Installations

Generation Interconnection Application to Minnesota Power

Solar Panel	
Manufacturer:	**Model:**
Rated Output (prime kW):	Estimated Annual kWh production:

Inverter (if applicable)	
Manufacturer:	**Model:**

System Design Specifications	
Tilt Angle:	Azimuth:

System Cost
System Cost Before Incentives:

Transfer Switch (if applicable) Visible Lockable Disconnect Switch (within ten feet of utility meter)	
Model Number:	Type:
Manufacturer:	Rating (amps):

Estimated Start / Completion Dates	
Construction Start Date:	Completion (operational) Date:

Please attach the following documents to this application:

- Attach a 1-line diagram using MP preferred symbology (see page 5 for sample drawing and preferred symbology)
- Attach a site drawing (see page 6 for sample)
- Attach shade drawing
- Attach solar panel spec sheet**
- Attach inverter spec sheet**
- Attach evidence of intent*
- Attach site photos

Prior to engergizing the system the following will be provided:

- Proof of liability insurance
- Electrical inspection
- Signed Uniform Statewide Contract

*Proof of intent to proceed, I.E. signed purchase agreement.
**Please submit new specification sheets and any other changes to the proposed installation as soon as possible so that MP can determine the status of the current application.

Terms & Conditions

Eligible Equipment

1. Photovoltaic modules must be certified as meeting the most current edition of Underwriters Laboratory Standard 1703 (UL1703)
2. All inverters must be certified as meeting the current edition of Underwriters Laboratory 1741 (UL1741).

Installation Requirements

1. A visible open, lockable disconnect must be installed within 10' of the utility meter(s).
2. A production meter must be installed within 10' from the existing utility meter as described in Minnesota Power's Distribution Construction Standards (DCS) 4800.
3. All systems must have a Preliminary Review conducted by Minnesota Power and approved prior to installation. During the review, the service will be analyzed and the customer will be notified if modifications or upgrades are required.
4. Customers must obtain liability insurance against personal or property damage due to engineering studies the installation, interconnection, and operation of its electric generating facilities. The amount of liability insurance required is covered in the interconnection contract. DG systems 40 kW and under require $300,000.00 liability insurance.
5. Installations must comply with all applicable building and zoning codes. Proof of an approved electrical inspection must be submitted prior to energizing the system.
6. Installations are subject to the requirements and provisions of Minnesota Statute (216B.164), Minnesota Rules (Chapter 7835), the currently adopted edition of the National Electrical Code (NEC), IEEE 1547 and electric utility requirements.

SolarSense Rebate Requirements (applicable to customers awarded SolarSense funds only)

1. Be a Minnesota Power retail customer installing a grid-tied solar system. All conservation program-eligible customer classes can apply—residential, commercial and industrial. Rebates are generally limited to one per customer, per year based on market activity and dollar availability.
2. Submit an interconnection application to Minnesota Power between January 1 and February 28.
3. Get preapproval of the project prior to purchase and installation.
4. Install new components, including all major system components, and use a solar energy installer.
5. Own the PV system and the property/building where the system will be installed.
6. Complete the installation within three months of receiving system approval and a signed uniform statewide contract or before the end of the program calendar year.
7. You must have completed an energy analysis within the immediately preceding 24 months.
8. You may not install a system with kWh generation capacity of more than 120% of the premise's twelve months energy consumption.
9. You must install a system with a nameplate capacity of 20 kW or less.
10. PV modules must come with a 20-year or greater manufacturer's performance warranty. All inverters must come with a minimum 10-year manufacturer's performance warranty.
11. Installers are responsible for informing the customer of system location and design characteristics that may affect the overall system production.
12. You must submit the final installation costs to Minnesota Power.
13. Complete and submit the SolarSense Renewable Energy Credit (REC) Contract once the installation is complete.

Declaration

The undersigned warrants, certifies and represents the following:

1. The information provided in this form is true and correct to the best of my knowledge; and
2. The installation will meet all SolarSense Rebate Program requirements, if applying for rebate.
3. Any substantive changes to the system design, equipment, or other specifications may require submittal of a new application and restart the review process. Contact Minnesota Power regarding any scope changes.

Sign Off Area:	
With this Application, we are requesting Minnesota Power to review the proposed Generation System Interconnection. We request that Minnesota Power identifies the additional equipment and costs involved with the interconnection of this system and to provide a budgetary estimate of those costs. We understand that the estimated costs supplied by Minnesota Power, will be estimated using the information provided. We also agree that we will supply, as requested, additional information, to allow Minnesota Power to better review this proposed Generation System Interconnection. We have read the "State of Minnesota Interconnection Process for Distributed Generation Systems", the "State of Minnesota Distributed Generation Interconnection Requirements", the terms and conditions outlined in this application and other interconnection information and will design the Generation System and interconnection to meet those requirements.	
MP Customer Name (print):	
MP Customer Signature:	Date:
Installer Name (print):	
Installer Signature:	Date:

Send this completed & signed application and attachments to:

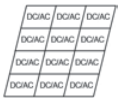
Minnesota Power
ATTN: Paul Helstrom
30 West Superior Street
Duluth, MN 55802-2093

Reference Materials

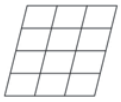
DG Symbols

Minnesota Power Preferred Symbology

Solar Array with Micro Inverters

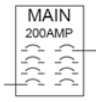


Solar Array



Transformer
Type:
Rating:

Main Service Panel



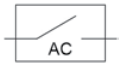
Breaker Panel

Breaker

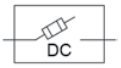
Junction Box

DC Disconnect Switch

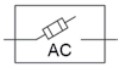
AC Disconnect Switch



DC Fused Disconnect Switch



AC Fused Disconnect Switch



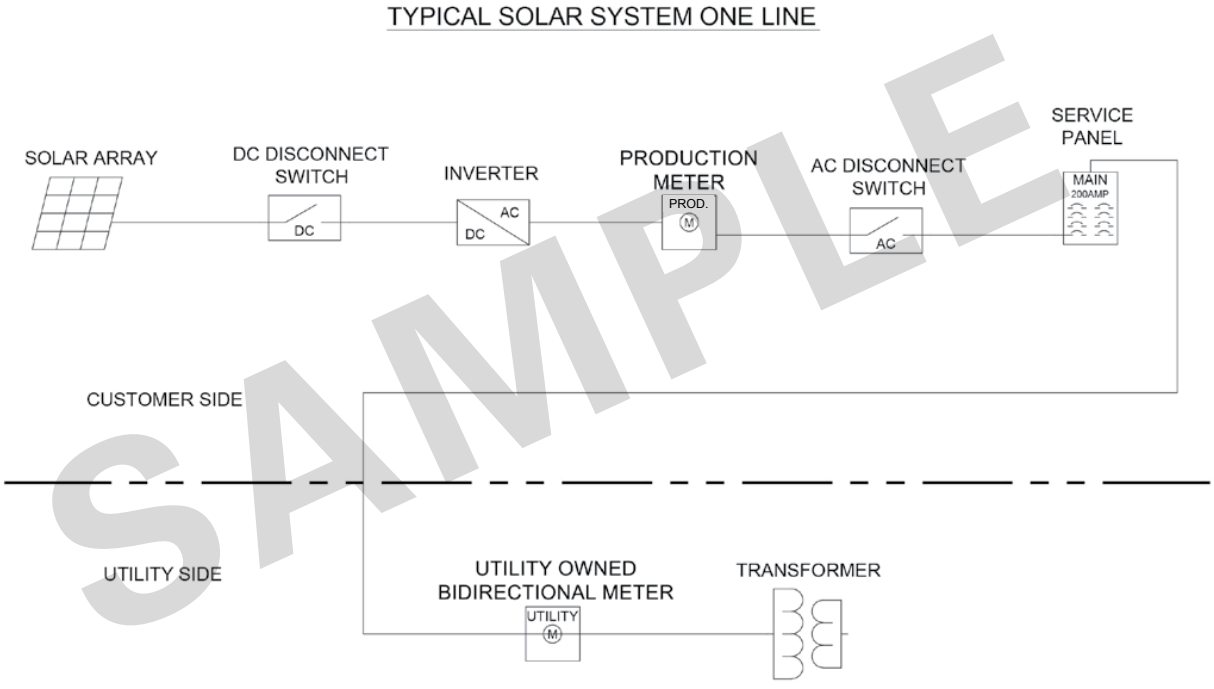
Battery

Inverter

Ground

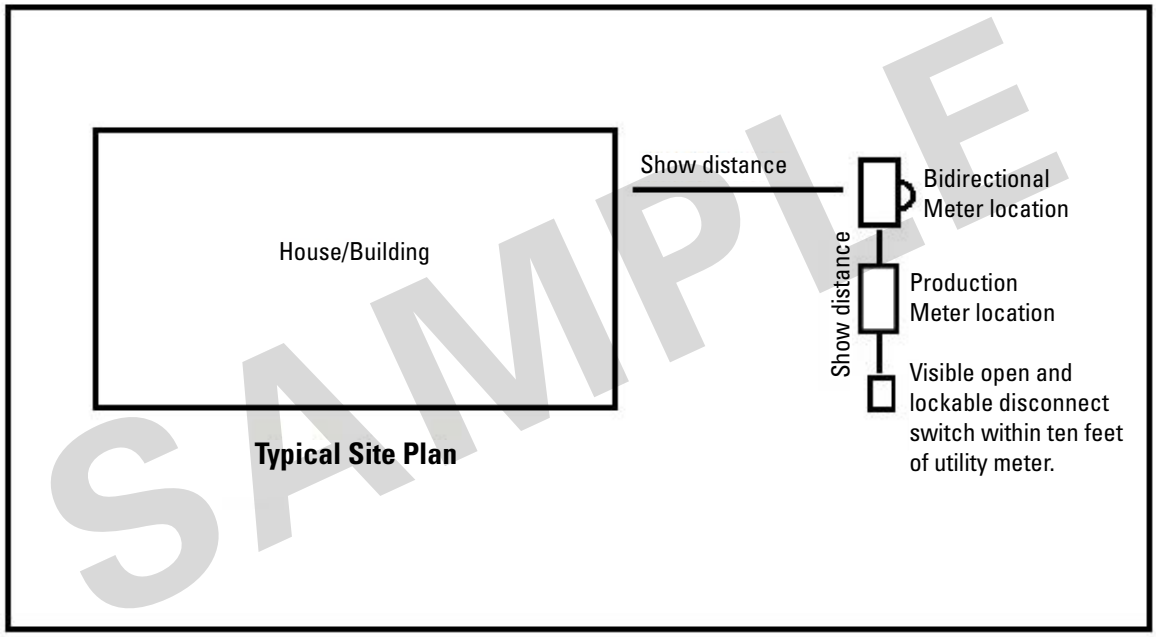
Utility Owned Bidirectional Meter

Production Meter

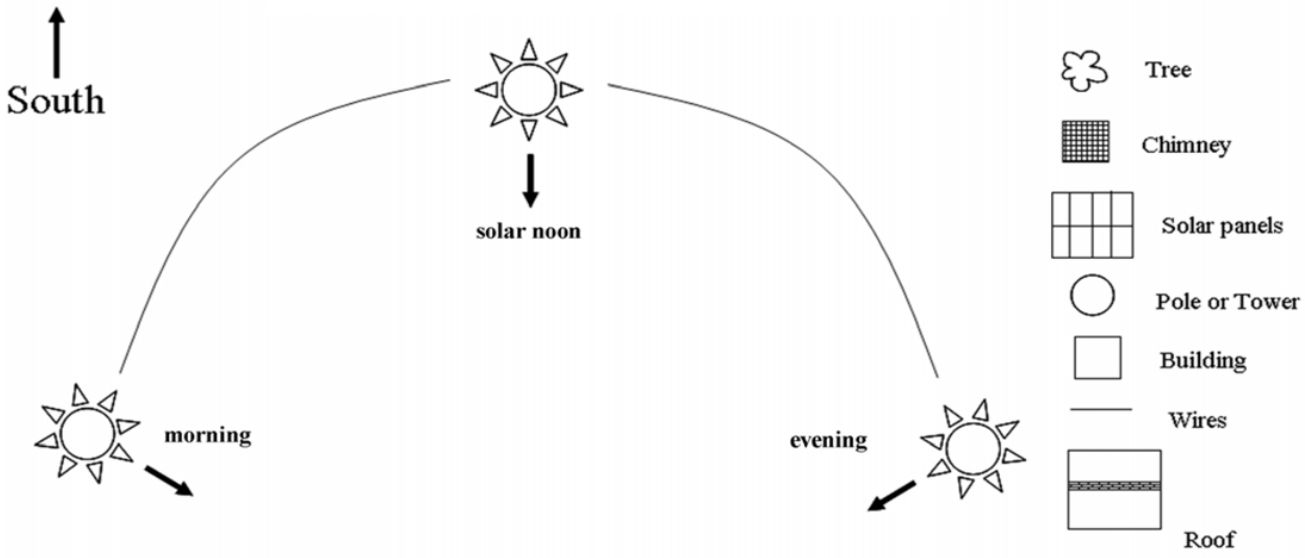


Label visible, open and lockable disconnect switch shown on site plan.

Site Drawing



Solar Site Diagram - Top View



This Diagram must be completed as part of the Minnesota Power SolarSense Application. Using the symbols (at right of the diagram) sketch the locations and distances between the proposed array and surrounding objects. Include estimated heights above ground for all objects.

What angle will the array face?_____(180º - due south)

1. Draw the proposed location of the solar system using the appropriate symbols.
2. Determine the orientation of the system.
3. Draw any objects that appear in the photos of the horizon. Pay particular attention to those objects which may appear to present a shading obstruction in the horizon photos.

    a. You do not need to draw objects that are located behind the solar panels unless they reach over the top of the solar panels.
    b. Estimate the appropriate width at the widest point of each object.
    c. Measure and make note of the distance from the solar array to each object on the diagram.
    d. Include heights of objects and the height of the lowest point of the PV array.

This site diagram must accompany the application. The site diagram is a representation of the solar installation's location along with nearby objects that might shade the system. It is designed to help interpret the photos included with the application form and as a cross reference to the shading analysis.

Reference Materials

Definitions

Anti-islanding test – a utility representative will test the completed system for safety before an interconnection contract is processed

Azimuth – the direction measured in degrees from North that the solar installation is oriented

Building code – check with city and/or county to identify permits needed for the solar installation

DC rating – solar capacity, measured in watts

Evidence of Intent – evidence that the applicant is serious about participating in the solar rebate program: $500 down payment to the installer or utility interconnection application is acceptable

Grid connected – PV system is interconnected to an electric utility; grid connected systems in Minnesota benefit from net metering if the capacity is less than 1 mW*

Interconnection agreement – a contract with the electric utility to let a customer sell electricity back to the utility; utilities must use standard state contract (MN Rule 7835.9910 www.leg.state.mn.us)

Interconnection guidelines – safety and technical requirements for the solar installation

Inverter – converts DC electricity from the solar panels into AC electricity

Kilowatt (kW) – 1000 watts (four 250 watt solar modules = 1 kilowatt)

*Net metering rules vary by system size.

State of Minnesota

Interconnection Agreement

For the Interconnection of Extended Parallel Distributed Generation Systems With Minnesota Power

This Generating System Interconnection Agreement is entered into by and between Minnesota Power and the Interconnection Customer "_____". The Interconnection Customer and Minnesota Power are sometimes also referred to in this Agreement jointly as "Parties" or individually as "Party".

In consideration of the mutual promises and obligations stated in this Agreement and its attachments, the Parties agree as follows:

I. SCOPE AND PURPOSE

A) Establishment of Point of Common Coupling. This Agreement is intended to provide for the Interconnection Customer to interconnect and operate a Generation System with a total Nameplate Capacity of 10MWs or less in parallel with Minnesota Power at the location identified in Exhibit C and shown in the Exhibit A one-line diagram.

B) This Agreement governs the facilities required to and contains the terms and condition under which the Interconnection Customer may interconnect the Generation System to Minnesota Power. This Agreement does not authorize the Interconnection Customer to export power or constitute an agreement to purchase or wheel the Interconnection Customer's power. Other services that the Interconnection Customer may require from Minnesota Power, or others, may be covered under separate agreements.

C) To facilitate the operation of the Generation System, this agreement also allows for the occasional and inadvertent export of energy to Minnesota Power. The amount, metering, billing and accounting of such inadvertent energy exporting shall be governed by Exhibit D (Operating Agreement). This Agreement does not constitute an agreement by Minnesota Power to purchase or pay for any energy, inadvertently or intentionally exported, unless expressly noted in Exhibit D or under a separately executed power purchase agreement (PPA).

D) This agreement does not constitute a request for, nor the provision of any transmission delivery service or any local distribution delivery service.

E) The Technical Requirements for interconnection are covered in a separate Technical Requirements document know as, the "State of Minnesota Distributed Generation Interconnection Requirements", a copy of which as been made available to the Interconnection Customer and incorporated and made part of this Agreement by this reference.

II. DEFINITIONS

A) "Area EPS" an electric power system (EPS) that serves Local EPS's. Note: Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc. Minnesota Power's distribution system is an Area EPS.

B) "Area EPS Operator" the entity that operates the Area EPS, here Minnesota Power.

C) "Dedicated Facilities" the equipment that is installed due to the interconnection of the Generation System and not required to serve other Minnesota Power customers.

D) "EPS" (Electric Power System) facilities that deliver electric power to a load. Note: This may include generation units.

E) "Extended Parallel" means the Generation System is designed to remain connected with Minnesota Power for an extended period of time.

F) "Generation" any device producing electrical energy, i.e., rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, etc.; or any other electric producing device, including energy storage technologies.

G) "Generation Interconnection Coordinator" the person or persons designated by Minnesota Power to provide a single point of coordination with the Applicant for the generation interconnection process.

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

I) "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.

J) "Local EPS" an electric power system (EPS) contained entirely within a single premises or group of premises.

K) "Nameplate Capacity" the total nameplate capacity rating of all the Generation included in the Generation System. For this definition the "standby" and/or maximum rated kW capacity on the nameplate shall be used.

L) "Point of Common Coupling" the point where the Local EPS is connected to Minnesota Power.

M) "Point of Delivery" the point where the energy changes possession from one party to the other. Typically this will be where the metering is installed but it is not required that the Point of Delivery is the same as where the energy is metered.

N) "Technical Requirements" "State of Minnesota Requirements for Interconnection of Distributed Generation.

III. DESCRIPTION OF INTERCONNECTION CUSTOMER'S GENERATION SYSTEM

A) A description of the Generation System, including a single-line diagram showing the general arrangement of how the Interconnection Customer's Generation System is interconnected with Minnesota Power's distribution system, is attached to and made part of this Agreement as Exhibit A. The single-line diagram shows the following;

1) Point of Delivery (if applicable)

2) Point of Common Coupling

3) Location of Meter(s)

4) Ownership of the equipment.

5) Generation System total Nameplate Capacity _____ kW

6) Scheduled operational (on-line) date for the Generation System.

IV. RESPONSIBILITIES OF THE PARTIES

A) The Parties shall perform all obligations of this Agreement in accordance with all applicable laws and regulations, operating requirements and good utility practices.

B) Interconnection Customer shall construct, operate and maintain the Generation System in accordance with the applicable manufacture's recommend maintenance schedule, the Technical Requirements and in accordance with this Agreement.

C) Minnesota Power shall carry out the construction of the Dedicated Facilities in a good and workmanlike manner, and in accordance with standard design and engineering practices.

V. CONSTRUCTION

The Parties agree to cause their facilities or systems to be constructed in accordance with the laws of the State of Minnesota and to meet or exceed applicable codes and standards provided by the NESC (National Electrical Safety Code), ANSI (American National Standards Institute), IEEE (Institute of Electrical and Electronic Engineers), NEC (National Electrical Code), UL (Underwriter's Laboratory), Technical Requirements and local building codes and other applicable ordinances in effect at the time of the installation of the Generation System.

A) Charges and payments

The Interconnection Customer is responsible for the actual costs to interconnect the Generation System with Minnesota Power, including, but not limited to any Dedicated Facilities attributable to the addition of the Generation System, Minnesota Power labor for

installation coordination, installation testing and engineering review of the Generation System and interconnection design. Estimates of these costs are outlined in Exhibit B. While estimates, for budgeting purposes, have been provided in Exhibit B, the actual costs are still the responsibility of the Interconnection Customer, even if they exceed the estimated amount(s). All costs, for which the Interconnection Customer is responsible for, must be reasonable under the circumstances of the design and construction.

1) Dedicated Facilities
   a) During the term of this Agreement, Minnesota Power shall design, construct and install the Dedicated Facilities outlined in Exhibit B. The Interconnection Customer shall be responsible for paying the actual costs of the Dedicated Facilities attributable to the addition of the Generation System.

   b) Once installed, the Dedicated Facilities shall be owned and operated by Minnesota Power and all costs associated with the operating and maintenance of the Dedicated Facilities, after the Generation System is operational, shall be the responsibility of Minnesota Power, unless otherwise agreed.

   c) By executing this Agreement, the Interconnection Customer grants permission for Minnesota Power to begin construction and to procure the necessary facilities and equipment to complete the installation of the Dedicated Facilities, as outlined in Exhibit B. If for any reason, the Generation System project is canceled or modified, so that any or all of the Dedicated Facilities are not required, the Interconnection Customer shall be responsible for all costs incurred by Minnesota Power, including, but not limited to the additional costs to remove and/or complete the installation of the Dedicated Facilities. The Interconnection Customer may, for any reason, cancel the Generation System project, so that any or all of the Dedicated Facilities are not required to be installed. The Interconnection Customer shall provide written notice to Minnesota Power of cancellation. Upon receipt of a cancellation notice, Minnesota Power shall take reasonable steps to minimize additional costs to the Interconnection Customer, where reasonably possible.

2) Payments

   a) The Interconnection Customer shall provide reasonable adequate assurances of credit, including a letter of credit or personal guaranty of payment and performance from a creditworthy entity acceptable under Minnesota Power's credit policy and procedures for the unpaid balance of the estimated amount shown in Exhibit B.

   b) The payment for the costs outlined in Exhibit B, shall be as follows;

      i. 1/3 of estimated costs, outlined in Exhibit B, shall be due upon execution of this agreement.

      ii. 1/3 of estimated costs, outlined in Exhibit B, shall be due prior to initial energization of the Generation System, with Minnesota Power.

      iii. Remainder of actual costs, incurred by Minnesota Power, shall be due within 30 days from the date the bill is mailed by Minnesota Power after project completion.

VI. DOCUMENTS INCLUDED WITH THIS AGREEMENT

A) This agreement includes the following exhibits, which are specifically incorporated herein and made part of this Agreement by this reference*: (if any of these Exhibits are deemed not applicable for this Generation System installation they may be omitted from the final Agreement by Minnesota Power.)*

1) Exhibit A – Description of Generation System and single-line diagram. This diagram shows all major equipment, including, visual isolation equipment, Point of Common Coupling, Point of Delivery for Generation Systems that intentionally export, ownership of equipment and the location of metering.

2) Exhibit B – Estimated installation and testing costs payable by the Interconnection Customer. Included in this listing shall be the description and estimated costs for the required Dedicated Facilities being installed by Minnesota Power for the interconnection of the Generation System and a description and estimate for the final acceptance testing work to be done by Minnesota Power.

3) Exhibit C – Engineering Data Submittal – A standard form that provides the engineering and operating information about the Generation System.

4) Exhibit D – Operating Agreement – This provides specific operating information and requirements for this Generation System interconnection. This Exhibit has a separate signature section and may be modified, in writing, from time to time with the agreement of both parties.

5) Exhibit E – Maintenance Agreement – This provides specific maintenance requirements for this Generation System interconnection. This Exhibit has a separate signature section and may be modified, in writing, from time to time with the agreement of both parties.

VII. TERMS AND TERMINATION

A) This Agreement shall become effective as of the date when both the Interconnection Customer and Minnesota Power have both signed this Agreement. The Agreement shall continue in full force and effect until the earliest date that one of the following events occurs:

1) The Parties agree in writing to terminate the Agreement; or

2) The Interconnection Customer may terminate this agreement at any time, by written notice to Minnesota Power, prior to the completion of the final acceptance testing of the Generation System by Minnesota Power. Once the Generation System is operational then VII.A.3 applies. Upon receipt of a cancellation notice, Minnesota Power shall take reasonable steps to minimize additional costs to the Interconnection Customer, where reasonably possible.

3) Once the Generation System is operational the Interconnection Customer may terminate this agreement after 30 days written notice to Minnesota Power, unless otherwise agreed to within the Exhibit D, Operating Agreement; or

4) Minnesota Power may terminate this agreement after 30 days written notice to the Interconnection Customer if:

   a) The Interconnection Customer fails to interconnect and operate the Generation System per the terms of this Agreement; or

   b) The Interconnection Customer fails to take all corrective actions specified in Minnesota Power's written notice that the Generation System is out of compliance with the terms of this Agreement, within the time frame set forth in such notice, or

   c) If the Interconnection Customer fails to complete Minnesota Power's final acceptance testing of the generation system within 24 months of the date proposed under section III.A.5.

B) Upon termination of this Agreement the Generation System shall be disconnected from Minnesota Power. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing, at the time of the termination.

VIII. OPERATIONAL ISSUES

Each Party will, at its own cost and expense, operate, maintain, repair and inspect, and shall be fully responsible for, the facilities which it now or hereafter may own, unless otherwise specified.

A) Technical Standards: The Generation System shall be installed and operated by the Interconnection Customer consistent with the requirements of this Agreement; the Technical Requirements; the applicable requirements located in the National Electrical Code (NEC); the applicable standards published by the American National Standards Institute (ANSI) and the Institute of Electrical and Electronic Engineers (IEEE); and local building and other applicable ordinances in effect at the time of the installation of the Generation System.

B) Right of Access: At all times, Minnesota Power's personnel shall have access to the disconnect switch of the Generation System for any reasonable purpose in connection with the performance of the obligations imposed on it by this Agreement, to meet its obligation to operate Minnesota Power safely and to provide service to its customers. If necessary for the purposes of this Agreement, the Interconnection Customer shall allow Minnesota Power access to Minnesota Power's equipment and facilities located on the premises.

C) Electric Service Supplied: Minnesota Power will supply the electrical requirements of the Local EPS that are not supplied by the Generation System. Such electric service shall be supplied, to the Interconnection Customer's Local EPS, under the rate schedules applicable to the Customer's class of service as revised from time to time by Minnesota Power.

D) Operation and Maintenance: The Generation System shall be operated and maintained, by the Interconnection Customer in accordance with the Technical Standards and any additional requirements of Exhibit D and Exhibit E, attached to this document, as amended, in writing, from time to time.

E) Cooperation and Coordination: Both Minnesota Power and the Interconnection Customer shall communicate and coordinate their operations, so that the normal operation of Minnesota Power does not unduly effect or interfere with the normal operation of the Generation System and the Generation System does not unduly effect or interfere with the normal operation of Minnesota Power. Under abnormal operations of either the Generation System or Minnesota Power's system, the responsible Party shall provide reasonably timely communication to the other Party to allow mitigation of any potentially negative effects of the abnormal operation of their system.

F) Disconnection of Unit: Minnesota Power may disconnect the Generation System as reasonably necessary, for termination of this Agreement; non-compliance with this Agreement; system emergency, imminent danger to the public or Minnesota Power personnel; routine maintenance, repairs and modifications to Minnesota Power's distribution system. When reasonably possible Minnesota Power shall provide prior notice to the Interconnection Customer explaining the reason for the disconnection. If prior notice is not reasonably possible Minnesota Power shall after the fact, provide information to the Interconnection Customer as to why the disconnection was required. It is agreed that Minnesota Power shall have no liability for any loss of sales or other damages, including all consequential damages for the loss of business opportunity, profits or other losses, regardless of whether such damages were foreseeable, for the disconnection of the Generation System per this Agreement. Minnesota Power shall expend reasonable effort to reconnect the Generation System in a timely manner and to work towards mitigating damages and losses to the Interconnection Customer where reasonably possible.

G) Modifications to the Generation System: When reasonably possible the Interconnection Customer shall notify Minnesota Power, in writing, of plans for any modifications to the Generation System interconnection equipment, including all information needed by Minnesota Power as part of the review described in this paragraph, at least twenty (20) business days prior to undertaking such modification(s). Modifications to any of the interconnection equipment, including, all interconnection required protective systems, the generation control systems, the transfer switches/breakers, interconnection protection VT's & CT's, and Generation System capacity, shall be included in the notification to Minnesota Power. When reasonably possible the Interconnection Customer agrees not to commence installation of any modifications to the Generating System until Minnesota Power has approved the modification, in writing, which approval shall not be unreasonably withheld. Minnesota Power shall have a minimum of five (5) business days to review and respond to the planned modification. Minnesota Power shall not take longer then a maximum of ten (10) business days, to review and respond to the modification after the receipt of the information required to review the modifications. When it is not reasonably possible for the Interconnection Customer to provide prior written notice, the Interconnection Customer shall provide written notice to Minnesota Power as soon as reasonably possible, after the completion of the modification(s).

H) Permits and Approvals: The Interconnection Customer shall obtain all environmental and other permits lawfully required by governmental authorities prior to the construction of the Generation System. The Interconnection Customer shall also maintain these applicable permits and compliance with these permits during the term of this Agreement.

IX. LIMITATION OF LIABILITY

A) Each Party shall at all times indemnify, defend, and save the other Party harmless from any and all damages, losses, claims, including claims and actions relating to injury or death of any person or damage to property, costs and expenses, reasonable attorneys'

fees and court costs, arising out of or resulting from the Party's performance of its obligations under this agreement, except to the extent that such damages, losses or claims were caused by the negligence or intentional acts of the other Party.

B) Each Party's liability to the other Party for failure to perform its obligations under this Agreement, shall be limited to the amount of direct damage actually incurred. In no event shall either Party be liable to the other Party for any punitive, incidental, indirect, special, or consequential damages of any kind whatsoever, including for loss of business opportunity or profits, regardless of whether such damages were foreseen.

C) Notwithstanding any other provision in this Agreement, with respect to Minnesota Power's provision of electric service to any customer including the Interconnection Customer, Minnesota Power's liability to such customer shall be limited as set forth in Minnesota Power's tariffs and terms and conditions for electric service, and shall not be affected by the terms of this Agreement.

X. DISPUTE RESOLUTION

A) Each Party agrees to attempt to resolve all disputes arising hereunder promptly, equitably and in a good faith manner.

B) In the event a dispute arises under this Agreement, and if it cannot be resolved by the Parties within thirty (30) days after written notice of the dispute to the other Party, the Parties agree to submit the dispute to mediation by a mutually acceptable mediator, in a mutually convenient location in the State of Minnesota. The Parties agree to participate in good faith in the mediation for a period of 90 days. If the parties are not successful in resolving their disputes through mediation, then the Parties may refer the dispute for resolution to the Minnesota Public Utilities Commission (MPUC), which shall maintain continuing jurisdiction over this Agreement.

XI. INSURANCE

A) At a minimum, In connection with the Interconnection Customer's performance of its duties and obligations under this 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 of not less then:

1) Two million dollars ($2,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is greater then 250kW.

2) One million dollars ($1,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is between 40kW and 250kW.

3) Three hundred thousand ($300,000) for each occurrence if the Gross Nameplate Rating of the Generation System is less then 40kW.

4) Such general liability insurance shall include coverage against claims for damages resulting from (i) bodily injury, including wrongful death; and (ii) property damage arising out of the Interconnection Customer's ownership and/or operating of the Generation System under this agreement.

B) The general liability insurance required shall, by endorsement to the policy or policies, (a) include Minnesota Power as an additional insured; (b) contain a severability of interest clause or cross-liability clause; (c) provide that Minnesota Power shall not by reason of its inclusion as an additional insured incur liability to the insurance carrier for the payment of premium for such insurance; and (d) provide for thirty (30) calendar days' written notice to Minnesota Power prior to cancellation, termination, alteration, or material change of such insurance.

C) If the Generation System is connected to an account receiving residential service from Minnesota Power and its total generating capacity is smaller then 40kW, then the endorsements required in Section XI.B shall not apply.

D) The Interconnection Customer shall furnish the required insurance certificates and endorsements to Minnesota Power prior to the initial operation of the Generation System. Thereafter, Minnesota Power shall have the right to periodically inspect or obtain a copy of the original policy or policies of insurance.

E) Evidence of the insurance required in Section XI.A. shall state that coverage provided is primary and is not excess to or contributing with any insurance or self-insurance maintained by Minnesota Power.

F) If the Interconnection Customer is self-insured with an established record of self-insurance, the Interconnection Customer may comply with the following in lieu of Section XI.A – E:

1) Interconnection Customer shall provide to Minnesota Power, at least thirty (30) days prior to the date of initial operation, evidence of an acceptable plan to self-insure to a level of coverage equivalent to that required under section XI.A.

2) If Interconnection Customer ceases to self-insure to the level required hereunder, or if the Interconnection Customer is unable to provide continuing evidence of its ability to self-insure, the Interconnection Customer agrees to immediately obtain the coverage required under Section XI.A.

G) Failure of the Interconnection Customer or Minnesota Power to enforce the minimum levels of insurance does not relieve the Interconnection Customer from maintaining such levels of insurance or relieve the Interconnection Customer of any liability.

H) All insurance certificates, statements of self-insurance, endorsements, cancellations, terminations, alterations, and material changes of such insurance shall be issued and submitted to the following:

Minnesota Power
Attention: Purchasing Manager
30 West Superior Street
Duluth, MN 55802

XII. MISCELLANEOUS

A) FORCE MAJEURE

1) An event of Force Majeure means any act of God, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment, any curtailment, order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. An event of Force Majeure does not include an act of negligence or intentional wrongdoing. Neither Party will be considered in default as to any obligation hereunder if such Party is prevented from fulfilling the obligation due to an event of Force Majeure. However, a Party whose performance under this Agreement is hindered by an event of Force Majeure shall make all reasonable efforts to perform its obligations hereunder.

2) Neither Party will be considered in default of any obligation hereunder if such Party is prevented from fulfilling the obligation due to an event of Force Majeure. However, a Party whose performance under this Agreement is hindered by an event of Force Majeure shall make all reasonable efforts to perform its obligations hereunder.

B) NOTICES

1) Any written notice, demand, or request required or authorized in connection with this Agreement ("Notice") shall be deemed properly given if delivered in person or sent by first class mail, postage prepaid, to the person specified below:

   a) If to Minnesota Power:
   Minnesota Power
   Attention: Frank Kornbaum
   PO Box 60,
   Little Falls, MN 56345

   b) If to Interconnection Customer:
   _____
   Attention: Generation Coordinator
   _____
   _____, MN _____

2) A Party may change its address for notices at any time by providing the other Party written notice of the change, in accordance with this Section.

3) The Parties may also designate operating representatives to conduct the daily communications which may be necessary or convenient for the administration of this Agreement. Such designations, including names, addresses, and phone numbers may be communicated or revised by one Party's notice to the other Party.

C) ASSIGNMENT

The Interconnection Customer shall not assign its rights nor delegate its duties under this Agreement without Minnesota Power's written consent. Any assignment or delegation the Interconnection Customer makes without Minnesota Power's written consent shall not be valid. Minnesota Power shall not unreasonably withhold its consent to the Generating Entities assignment of this Agreement.

D) NON-WAIVER

None of the provisions of this Agreement shall be considered waived by a Party unless such waiver is given in writing. The failure of a Party to insist in any one or more instances upon strict performance of any of the provisions of this Agreement or to take advantage of any of its rights hereunder shall not be construed as a waiver of any such provisions or the relinquishment of any such rights for the future, but the same shall continue and remain in full force and effect.

E) GOVERNING LAW AND INCLUSION OF MINNESOTA POWER'S TARIFFS AND RULES

1) This Agreement shall be interpreted, governed and construed under the laws of the State of Minnesota as if executed and to be performed wholly within the State of Minnesota without giving effect to choice of law provisions that might apply to the law of a different jurisdiction.

2) The interconnection and services provided under this Agreement shall at all times be subject to the terms and conditions set forth in the tariff schedules and rules applicable to the electric service provided by Minnesota Power, which tariff schedules and rules are hereby incorporated into this Agreement by this reference.

3) Notwithstanding any other provisions of this Agreement, Minnesota Power shall have the right to unilaterally file with the MPUC, pursuant to the MPUC's rules and regulations, an application for change in rates, charges, classification, service, tariff or rule or any agreement relating thereto.

F) AMENDMENT AND MODIFICATION

This Agreement can only be amended or modified by a writing signed by both Parties.

G) ENTIRE AGREEMENT

This Agreement, including all attachments, exhibits, and appendices, constitutes the entire Agreement between the Parties with regard to the interconnection of the Generation System of the Parties at the Point(s) of Common Coupling expressly provided for in this Agreement and supersedes all prior agreements or understandings, whether verbal or written. It is expressly acknowledged that the Parties may have other agreements covering other services not expressly provided for herein, which agreements are unaffected by this Agreement. Each party also represents that in entering into this Agreement, it has not relied on the promise, inducement, representation, warranty, agreement or other statement not set forth in this Agreement or in the incorporated attachments, exhibits and appendices.

H) CONFIDENTIAL INFORMATION

Except as otherwise agreed or provided herein, each Party shall hold in confidence and shall not disclose confidential information, to any person (except employees, officers, representatives and agents, who agree to be bound by this section). Confidential information shall be clearly marked as such on each page or otherwise affirmatively identified. If a court, government agency or entity with the right, power, and authority to do so, requests or requires either Party, by subpoena, oral disposition, interrogatories, requests for production of documents, administrative order, or otherwise, to disclose Confidential Information, that Party shall provide the other Party with prompt notice of such request(s) or requirements(s) so that the other Party may seek an appropriate protective order or waive compliance with the terms of this Agreement. In the absence of a protective order or waiver the Party shall disclose such confidential information which,

in the opinion of its counsel, the party is legally compelled to disclose. Each Party will use reasonable efforts to obtain reliable assurance that confidential treatment will be accorded any confidential information so furnished.

I) NON-WARRANTY

Neither by inspection, if any, or non-rejection, nor in any other way, does Minnesota Power give any warranty, expressed or implied, as to the adequacy, safety, or other characteristics of any structures, equipment, wires, appliances or devices owned, installed or maintained by the Interconnection Customer or leased by the Interconnection Customer from third parties, including without limitation the Generation System and any structures, equipment, wires, appliances or devices appurtenant thereto.

J) NO PARTNERSHIP

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

XIII. SIGNATURES

IN WITNESS WHEREOF, the Parties hereto have caused two originals of this Agreement to be executed by their duly authorized representatives. This Agreement is effective as of the last date set forth below.

Interconnection Customer

By: _____

Name: _____

Title: _____

Date: _____

Minnesota Power

By: _____

Name: _____

Title: _____

Date: _____

EXHIBIT A

GENERATION SYSTEM DESCRIPTION
AND SINGLE-LINE DIAGRAM

EXHIBIT B

SUMMARY OF MINNESOTA POWER COSTS AND DESCRIPTION OF DEDICATED FACILITIES BEING INSTALLED BY MINNESOTA POWER FOR THE INTERCONNECTION OF THE GENERATION SYSTEM

This Exhibit shall provide the estimated total costs that will be the responsibility of the Interconnection Customer. It is assumed that the Initial application has been filed and the engineering studies have been paid for and completed, so those costs are not included on this listing.

What is listed below is a general outline of some of the major areas where costs could occur. Other costs then those listed below may be included by Minnesota Power, provided that those costs are a direct result from the request to interconnect the Generation System. The following list is only a guideline and Minnesota Power, for each installation, will be creating a unique Exhibit B that is tailored for that specific Generation System interconnection.

A) Dedicated Facilities (equipment, design and installation labor)

B) Monitoring & Control System (equipment, design and installation labor)

C) Design Coordination and Review

D) Construction Coordination labor costs

E) Testing (development of tests and physical testing)

F) Contingency

EXHIBIT C

ENGINEERING DATA SUBMITTAL

Attach a completed Engineering Data Submittal form from Appendix C of “State of Minnesota Interconnection Process for Distributed Generation Systems”.

EXHIBIT D

OPERATING AGREEMENT

Each Generation System interconnection will be unique and will require a unique Operating Agreement. The following is a listing of some of the possible areas that will be covered in a operating agreement. The following has not been developed into a standard agreement due to the unique nature of each Generation System. It is envisioned that this Exhibit will be tailored by Minnesota Power for each Generation System interconnection. It is also intended that this Operating Agreement Exhibit will be reviewed and updated periodically, to allow the operation of the Generation System, to change to meet the needs of both Minnesota Power and the Interconnection Customer, provided that the change does not negatively affect the other Party. There may also be operating changes required by outside issues, such has changes in FERC and MISO requirements and/or policies which will require this Operating Agreement to be modified.

The following items are provided to show the general types of items which may be included in this Operating Agreement. The items included in the Operating Agreement shall not be limited to the items shown on this list.

A) Applicable Minnesota Power Tariffs – discussion on which tariffs are being applied for this installation and possibly how they will be applied.

B) Var Requirements – How will the Generation System be required to operate so as to control the power factor of the energy flowing in either direction across the interconnection?

C) Inadvertent Energy – This Operating Agreement needs to provide the method(s) that will be used to monitor, meter and account for the inadvertent energy used or supplied by the Generation System. Tariffs and operating rules that apply for this Generation System interconnection shall be discussed in this Operating Agreement.

D) Control Issues - Starting and stopping of the generation, including the remote starting and stopping, if applicable.

E) Dispatch of Generation Resources - What are the dispatch requirements for the Generation System, Can it only run during Peak Hours? Are there a limited number of hours that it can run? Is it required to have met an availability percentage? This will greatly depend upon the PPA and other requirements. Is the Interconnection Customer required to coordinate outages of the Generation System, with Minnesota Power?

F) Outages of Distribution System – How are emergency outages handled? How are other outages scheduled? If the Interconnection Customer requires Minnesota Power to schedule the outages during after-hours, who pays for Minnesota Power's overtime?

G) Notification / Contacts - Who should be notified? How should they be notified? When should they be notified? For what reasons, should the notification take place?

   1) Starting of the Generation

2) Dispatching of Generation

3) Notification of failures (both Minnesota Power and Generation System failures)

H) Documentation of Operational Settings – How much fuel will the generation System typically have on hand? How long can it run with this fuel capacity? How is the generation system set to operate for a power failure? These may be issues that should be documented in the Operating Agreement. The following are a couple of examples:

1) "The Generation System will monitor Minnesota Power phase voltage and after 2 seconds of any phase voltage below 90% the generation will be started and the load transferred to the generator, if the generation is not already running."

2) "The Generation System will wait for 30 minutes after it senses the return of Minnesota Power frequency and voltage, before it will automatically reconnect to Minnesota Power"

I) Cost of testing for future failures – If a component of the Generation System fails or needs to be replaced, which effects the interconnection with Minnesota Power, what is the process for retesting, and for replacement? Who pays for the additional costs of Minnesota Power to work with the Interconnection Customer to resolve these problems and/or to complete retesting of the modified equipment?

J) Right of Access: At all times, Minnesota Power shall have access to the disconnect switch of the Generation System for any reasonable purpose in connection with the performance of the obligations imposed on it by this Agreement, to meet its obligation to operate Minnesota Power's distribution system safely and to provide service to its customers, at all times. If necessary for the purpose of this Agreement, the Interconnection Customer shall allow Minnesota Power access to Minnesota Power's equipment and facilities located on the premises.

IN WITNESS WHEREOF, the Parties hereto have caused two originals of this Agreement to be executed by their duly authorized representatives. This Agreement is effective as of the last date set forth below.

Interconnection Customer

By: _____

Name: _____

Title: _____

Date: _____

Minnesota Power

By: _____

Name: _____

Title: _____

Date: _____

EXHIBIT E

MAINTENANCE AGREEMENT

Each Generation System interconnection will be unique and will require a unique Maintenance Agreement. It is envisioned that this Exhibit will be tailored for each Generation System interconnection. It is also intended that this Maintenance Agreement Exhibit will be reviewed and updated periodically, to allow the maintenance of the Generation System be allowed to change to meet the needs of both Minnesota Power and the Interconnection Customer, provided that change does not negatively affect the other Party. There may also be changes required by outside issues; such has changes in FERC and MISO requirements and/or policies which will require this agreement to be modified.

A) Routine Maintenance Requirements –

1) Who is providing maintenance – Contact information

2) Periods of maintenance

B) Modifications to the Generation System - The Interconnection Customer shall notify Minnesota Power, in writing of plans for any modifications to the Generation System interconnection equipment at least twenty (20) business days prior to undertaking such modification. Modifications to any of the interconnection equipment, including all required protective systems, the generation control systems, the transfer switches/breakers, VT's & CT's, generating capacity and associated wiring shall be included in the notification to Minnesota Power. The Interconnection Customer agrees not to commence installation of any modifications to the Generating System until Minnesota Power has approved the modification, in writing. Minnesota Power shall have a minimum of five (5) business days and a maximum of ten (10) business days, to review and respond to the modification, after the receipt of the information required to review the modifications.

IN WITNESS WHEREOF, the Parties hereto have caused two originals of this Agreement to be executed by their duly authorized representatives. This Agreement is effective as of the last date set forth below.

Interconnection Customer

By: _____

Name: _____

Title: _____

Date: _____

Minnesota Power

By: _____

Name: _____

Title: _____

Date: _____

RIDER FOR PARALLEL GENERATION

APPLICATION

Applicable to cogenerator or small power producers rated at less than 1,000 kW~~100 kW or less~~. To any customer taking single or three phase service under one of the Company's standard electric rate schedules and who has entered into a contract with the Company for the sale of electricity as a cogenerator or small power producer (Seller) as defined under State or Federal Law.

RATE (Monthly)

The following charges and credits are applicable in addition to all charges for service being taken under Company's standard rate schedule:

I. Sellers with facilities rated at less than 40 kW shall have the option of selling to Company under either the Average Retail Energy Rate~~Net Energy Billing Rate~~, the Simultaneous Purchase and Sale Rate or the Time-of-Day Purchase Rate. The Rate selected shall be as specified in the Cogeneration and/or Small Power Production Facilities Agreement between Seller and Minnesota Power.

A. Average Retail Energy Rate~~Net Energy Billing Rate~~

~~Net Energy shall be the difference between all kWh's supplied by the Company to the Seller and those generated by the Seller and fed back into the Company's distribution system as surplus energy during the month. Seller shall be billed on Company's standard applicable rate schedule based on the amount of net energy "to Seller" or based on zero kWh's where the amount of Net Energy is "to Company." In addition, if the amount of Net Energy is "to Seller," Seller shall be subject to the following Service Charge; or, if the amount of Net Energy is "to Company," Seller shall be subject to the following Service Charge and Energy Credit:~~The Seller shall be billed according to the Company's applicable standard rate schedule for the energy (kWh) supplied by the Company that exceeds the amount of energy supplied by the Seller to the Company's distribution system during each billing period. ~~(Net Energy). Net Energy shall be the difference between all energy (kWh) supplied by the Company to the Seller and energy generated by the Seller and fed back into the Company's distribution system as surplus energy during the month. The Seller will be subject to the following service charge.~~ The Seller will be subject to the following Service Charge and Meter Aggregation Charge. When energy supplied by the Seller exceeds the amount of energy supplied by the Company, the Seller shall be subject to the following Average Retail Energy Rate Credit:

Service Charge (Monthly)
$~~2.55~~1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)

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$0.00

Average Retail Energy Rate Credit
~~9.25~~9.60¢ per kWh of Net Energy - Residential Customers
~~9.80~~10.32¢ per kWh of Net Energy - General Service Customers
~~7.68~~8.28¢ per kWh of Net Energy - Large Light & Power Customers

B. Simultaneous Purchase and Sale Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and ~~Energy and Firm Power~~applicable ~~Capacity~~ Credit:

Service Charge (Monthly)
$~~2.55~~1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
~~3.24~~2.96¢ per kWh delivered to Company ~~during period~~.

C. Time-of-Day Purchase Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and ~~Energy and Firm Power Capacity~~applicable Credit:

Service Charge (Monthly)
$~~2.55~~1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

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Energy and Firm Power Capacity Credit
3.823.90¢ per kWh delivered to Company during On-Peak periods.
2.732.14¢ per kWh delivered to Company during Off-Peak periods.

I.II. Facilities rated at 40 kW or greater and less than 500100 kW shall have the option of selling to Company under either the Kilowatt-Hour Energy Credit, the Simultaneous Purchase and Sale Rate, or the Time-of-Day Puchase Rate. Customers who do not elect to be compensated for net input in the form of a kilowatt-hour credit under the Kilowatt-Hour Energy Credit rate will be compensated for the net input at the Company's Simultaneous Purchase and Sale Rate or Time-of-Day Purchase Rate. be subject to the following Time-of-Day Purchase Rate.

A. Kilowatt-Hour Energy Credit Rate
The Seller shall be compensated for net input in the form of a kilowatt-hour credit shown on the customer's bill, which will be carried forward on subsequent energy bills. The Seller will be subject to the following Service Charge and Meter Aggregation Charge. Any remaining net input at the end of the calendar year shall be compensated at the Energy and Firm Power Capacity applicable Credit as shown below:

Service Charge (Monthly)
$2.711.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company during period

B. Simultaneous Purchase and Sale Rate
The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and Energy and Firm Power Capacityapplicable Credit:

Service Charge (Monthly)
$2.711.31

Meter Aggregation Charge (Monthly, if option selected by Customer)

RIDER FOR PARALLEL GENERATION

$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company ~~during period~~.

C~~A~~. Time-of-Day Purchase Rate
The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and Energy and ~~Firm Power Capacity~~applicable Credit:

Service Charge (Monthly)
$~~3.57~~1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

Energy and Firm Power Capacity Credit
~~3.82~~3.90¢ per kWh delivered to Company during On-Peak periods.
~~2.73~~2.14¢ per kWh delivered to Company during Off-Peak periods.

III. Facilities rated at 500 kW or greater and less than 1,000 kW shall have the option of selling to Company under either the Kilowatt-Hour Energy Credit, the Simultaneous Purchase and Sale Rate, or the Time-of-Day Puchase Rate.

A. Kilowatt-Hour Energy Credit Rate
The Seller shall be compensated for net input in the form of a kilowatt-hour credit shown on the customer's bill, which will be carried forward on subsequent energy bills. The Seller will be subject to the following Service Charge and Meter Aggregation Charge. Any remaining net input at the end of the calendar year shall be compensated at the ~~Energy and Firm Power Capacity~~ applicable Credit as shown below:

Service Charge (Monthly)

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$2.991.84

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company during period

B. Simultaneous Purchase and Sale Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and Energy and Firm Power Capacityapplicable Credit:

Service Charge (Monthly)
$2.991.84

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company during period.

C. Time-of-Day Purchase Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and Energy and Firm Power Capacity appliable Credit:

Service Charge (Monthly)
$2.991.22

Meter Aggregation Charge (Monthly, if option selected by Customer)

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$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

Energy and Firm Power Capacity Credit
3.90¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

DETERMINATION OF FIRM POWER

Energy delivered by the QF to the Company must have a 65 percent on-peak capacity factor in the month to be considered "firm power". The capacity factor is based upon the QF's maximum on-peak metered capacity delivered to the Company during the month. If the QF does not meet the firm power requirments, compensation will be for the energy portion only.

~~**DEFINITION OF PEAK PERIODS**~~

~~On-Peak periods shall include all hours between 7 a.m. and 10 p.m. Monday through Friday excluding holidays. Off-Peak periods shall include all hours not included in On-Peak periods.~~

INDIVIDUAL SYSTEM CAPACITY LIMITS

1) Customers with a facility of 40-kilowatt AC capacity or more and participating in net metering and net billing may be required to limit the total generation capacity of individual distributed generation systems by either:
   a. for wind generation systems, limiting the total generation system capacity kilowatt alternating current to 120 percent of the customer's on-site maximum electric demand; or
   b. for solar photovoltaic and other distributed generation, limiting the total generation system annual energy production kilowatt hours alternating current to 120 percent of the customer's on-site annual electric energy consumption.
2) Limits under paragraph (a) applicable to measuring on-site maximum electric demand must be based on standard 15-minute intervals, measured during the previous 12 calendar months, or on a reasonable estimate of the average monthly maximum demand or average annual consumption if the customer has either:
   a. less than 12 calendar months of actual electric usage; or
   b. no demand metering available.
3) The total generation capacity of individual distributed generation systems is determined by the total capacity of all of the customer's systems which are on the same set of aggregated meters. On-site maximum electric demand and on-site annual electric energy consumption are determined by total demand or electric energy consumption associated with the same set of aggregated meters.
4) For wind generation systems, the Company will estimate customer demand use for purposes of calculating the 120 percent rule by determining a demand-billed customer's highest billed on-site kW demand in all bills issued during the most recent calendar year. For non-demand customers, the Company shall impute the equivalent peak demand level by first determining the customer's

most recent on-site annual (12-month) billed kWh sales. Those kWh sales shall be divided by the product of the annual load factor for the applicable customer class and the number of actual hours in that year (either 8,760 hours in a standard year or 8,784 hours in a leap year). The resulting quotient will serve as the customer's estimated on site maximum electric demand. The load factor is 19.3 percent for the residential customer class and 24.2 percent for the non-demand general service customer class as calculated in the Company's 2013 Load Research study.

5) For solar photovoltaic and other distributed generation systems, where 12 months of usage data is not available, the Company will estimate customer energy use for purposes of calculating the 120 percent rule by averaging four months of usage. If four months of usage is not available, the Company will estimate usage based on home size for residential customers and other substantiating documentation for commercial and demand billed customers.

~~For wind generation systems rated at 40 kW or more, total generation system capacity will be limited to 120 percent of the customer's on-site maximum electric demand. For solar photovoltaic and other distributed generation rated at 40 kW or more, total generation system annual energy production will be limited to 120 percent of the customer's on-site annual electric energy consumption.~~

METER AGGREGATION

The Company will aggregate for billing purposes a Customer's designated distributed generation bidirectional meter with one or more aggregated retail meters if a Customer requests that it do so and the following conditions are satisfied:

1) the meters must be located on contiguous property owned by the customer requesting the aggregation;
2) the account(s) associated with the meters must be in the name of the customer;
3) the retail services associate with the aggregated meters of a customer must be either all time-of-day or all non-time-of-day;
4) the total of all aggregated meters must be subject in the aggregate to the size limitation under the single rate chosen by the Customer applicable to all of the aggregated meters; and
5) the total of all aggregated meters is subject in the aggregate to the Individual System Capacity Limits.

As the term is used here, "contiguous property" means property owned or leased by the Customer sharing a common border, without regard to interruptions in contiguity caused by easements, public thoroughfares, transportation rights-of-way, or Company rights-of-way. The Company must comply with a request by a customer-generator to aggregate additional meters within 90 days. The specific meters must be identified at the time of the request. In the event that more than one meter is identified, the Customer must designate the rank order for the aggregated meters to which the net metered credits are to be applied. At least 60 days prior to the beginning of the next annual billing period, a Customer may amend the rank order of the aggregated meters.

The aggregation of meters applies only to charges that use kilowatt-hours as the billing determinant. All other charges applicable to each meter account shall be billed to the customer. The

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Company will first apply the kilowatt-hour credit to the charges for the designated meter and then to the charges for the aggregated meters in the rank order specified by the customer. If the Net Metered Facility supplies more electricity to the Company than the energy usage recorded by the customer-generator's designated and aggregated meters during a monthly billing period, the Company will apply, at the election of the Customer, any excess production based on a monthly credit or the Annual Net Metering (kWh) Banking Option. Where a monthly credit is selected, the Company shall apply monetary credits to the customer's next monthly bill for the excess kilowatt-hours.

FACILITIES OF 1,000 KILOWATT CAPACITY OR MORE

A Seller with 1,000 kW capacity or more must negotiate a contract with the Company to set the applicable rates for payments to the customer of avoided capacity and energy costs. Sellers fueled by natural gas or a renewable fuel, or another similarly clean fuel or combination of fuels of no more than 10,000 kW of interconnected capacity at a point of common coupling to Company's distribution system may also apply for service under the Company's Rider for Distributed Generation Service.

DEFINITIONS

"Average retail utility energy rate" means, for any class of utility customer, the quotient of the total annual class revenue from sales of electricity minus the annual revenue resulting from fixed charges, divided by the annual class kilowatt-hour sales. Data from the most recent 12-month period available before each filing required by parts 7835.0300 to 7835.1200 must be used in the computation.

"Capacity" means the capability to produce, transmit, or deliver electric energy, and is measured by the number of megawatts alternating current at the point of common coupling between a qualifying facility and a utility's electric system.

"Firm power" means energy delivered by the qualifying facility to the utility with at least a 65 percent on-peak capacity factor in the month. The capacity factor is based upon the qualifying facility's maximum on-peak metered capacity delivered to the utility during the month.

"Interconnection costs" means the reasonable costs of connection, switching, metering, transmission, distribution, safety provisions, and administrative costs incurred by the utility that are directly related to installing and maintaining the physical facilities necessary to permit interconnected operations with a qualifying facility. Costs are considered interconnection costs only to the extent that they exceed the corresponding costs which the utility would have incurred if it had not engaged in interconnected operations, but instead generated from its own facilities or purchased from other sources an equivalent amount of electric energy or capacity. Costs are considered interconnection costs only to the extent that they exceed the costs the utility would incur in selling electricity to the qualifying facility as a nongenerating customer.

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"Net metered facility" means an electric generation facility constructed for the purpose of offsetting energy use through the use of renewable energy or high-efficiency distributed generation sources.

"Off-Peak periods" shall include all hours not included in On-Peak periods.

"On-Peak periods" shall include all hours between 7 a.m. and 10 p.m. Monday through Friday excluding holidays.

"Qualifying facility" means a cogeneration or small power production facility which satisfies the conditions established in Code of Federal Regulations, title 18, part 292. The initial operation date or initial installation date of a cogeneration or small power production facility must not prevent the facility from being considered a qualifying facility for the purposes of this chapter if it otherwise satisfies all stated conditions.

"Standby charge" means the rate or fee a utility charges for the recovery of costs for the provision of standby service or standby power.

"Standby service" means:
A. for public utilities, service or power that includes backup or maintenance services, as described in the public utility's commission-approved standby tariff, necessary to make electricity service available to the distributed generation facility; and
B. for a utility not subject to the commission's rate authority, the service associated with the applicable tariff in effect under Minnesota Statutes, section 216B.1611, subdivision 3, clause (2).

TERMS AND CONDITIONS

1. The interconnection between the QF and the Company must comply with the requirements in the most recently published edition of the National Electrical Safety Code issued by the Institute of Electrical and Electronics Engineers.
2. The QF is responsible for complying with all applicable local, state, and federal codes, including building codes, the National Electrical Code (NEC), the National Electrical Safety Code (NESC), and noise and emissions standards. The Company requires proof that the QF is in compliance with the NEC before the interconnection is made. The QF must obtain installation approval from an electrical inspector recognized by the Minnesota State Board of Electricity.
3. The QF's generation system and installation must comply with the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) standards applicable to the installation.
4. Any existing interconnection contract executed between the Company and a QF with capacity of less than 40 kilowatts remains in force until terminated by mutual agreement of the parties or as otherwise specified in the contract.
5. In accordance with Minnesota Rules 7835.5950, generators own all renewable energy credits unless other ownership is expressly provided for by a contract between the generator and the

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Company, state law specifies a different outcome, or specific commission orders or rules specify a different outcome.

6. Customers with generators under 1,000 kW shall execute the Uniform Statewide Contract with the Company in the form prescribed by Minn. Rules 7835.9910. Before the Customer signs the Uniform Statewide Contract the Company shall provide the Customer a copy of, or link to current interconnection standards in accordance with Minnesota Rules 7835.4750.
7. In accordance with Minnesota Rules 7835.4500, in case of a dispute between the Company and a QF or an impasse in the negotiations between them, either party may request the Minnesota Public Utilities Commission (MPUC) to determine the issue. When the MPUC makes the determination, the burden of proof must be on the utility. Fees and costs for disput resolution shall be in accordance with Minnesota Rules 7835.4550.
8. QFs with distributed generation systems rated at more than 100 kW may be required to take service under the Company's Rider for Standby Service, as described in the tariff.
~~1.~~9. Customers with generators sized between 40 kW and 1,000 kW taking service under the Rider for Parallel Generation will be required to install a separate production meter to record generation.

RIDER FOR PARALLEL GENERATION

APPLICATION

Applicable to cogenerator or small power producers rated at less than 1,000 kW. To any customer taking single or three phase service under one of the Company's standard electric rate schedules and who has entered into a contract with the Company for the sale of electricity as a cogenerator or small power producer (Seller) as defined under State or Federal Law.

RATE (Monthly)

The following charges and credits are applicable in addition to all charges for service being taken under Company's standard rate schedule:

I. Sellers with facilities rated at less than 40 kW shall have the option of selling to Company under either the Average Retail Energy Rate, the Simultaneous Purchase and Sale Rate or the Time-of-Day Purchase Rate. The Rate selected shall be as specified in the Cogeneration and/or Small Power Production Facilities Agreement between Seller and Minnesota Power.

A. Average Retail Energy Rate
The Seller shall be billed according to the Company's applicable standard rate schedule for the energy (kWh) supplied by the Company that exceeds the amount of energy supplied by the Seller to the Company's distribution system during each billing period.. The Seller will be subject to the following Service Charge and Meter Aggregation Charge. When energy supplied by the Seller exceeds the amount of energy supplied by the Company, the Seller shall be subject to the following Average Retail Energy Rate Credit:

Service Charge (Monthly)
$1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Average Retail Energy Rate Credit
9.60¢ per kWh of Net Energy - Residential Customers
10.32¢ per kWh of Net Energy - General Service Customers
8.28¢ per kWh of Net Energy - Large Light & Power Customers

B. Simultaneous Purchase and Sale Rate
The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and applicable Credit:

Service Charge (Monthly)
$1.31

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Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company.

C. Time-of-Day Purchase Rate
The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and applicable Credit:

Service Charge (Monthly)
$1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

Energy and Firm Power Capacity Credit
3.90¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

II. Facilities rated at 40 kW or greater and less than 500 kW shall have the option of selling to Company under either the Kilowatt-Hour Energy Credit, the Simultaneous Purchase and Sale Rate, or the Time-of-Day Puchase Rate. Customers who do not elect to be compensated for net input in the form of a kilowatt-hour credit under the Kilowatt-Hour Energy Credit rate will be compensated for the net input at the Company's Simultaneous Purchase and Sale Rate or Time-of-Day Purchase Rate. .

A. Kilowatt-Hour Energy Credit Rate
The Seller shall be compensated for net input in the form of a kilowatt-hour credit shown on the customer's bill, which will be carried forward on subsequent energy bills. The Seller will be subject to the following Service Charge and Meter Aggregation

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Charge. Any remaining net input at the end of the calendar year shall be compensated at the applicable Credit as shown below:

Service Charge (Monthly)
$1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company

B. Simultaneous Purchase and Sale Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and applicable Credit:

Service Charge (Monthly)
$1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company.

C. Time-of-Day Purchase Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and Energy and applicable Credit:

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Service Charge (Monthly)
$1.31

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

Energy and Firm Power Capacity Credit
3.90¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

III. Facilities rated at 500 kW or greater and less than 1,000 kW shall have the option of selling to Company under either the Kilowatt-Hour Energy Credit, the Simultaneous Purchase and Sale Rate, or the Time-of-Day Puchase Rate.

A. Kilowatt-Hour Energy Credit Rate
The Seller shall be compensated for net input in the form of a kilowatt-hour credit shown on the customer's bill, which will be carried forward on subsequent energy bills. The Seller will be subject to the following Service Charge and Meter Aggregation Charge. Any remaining net input at the end of the calendar year shall be compensated at the applicable Credit as shown below:

Service Charge (Monthly)
$1.84

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company

B. Simultaneous Purchase and Sale Rate
The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and applicable Credit:

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Service Charge (Monthly)
$1.84

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.49¢ per kWh delivered to Company.

Energy and Firm Power Capacity Credit
2.96¢ per kWh delivered to Company.

C. Time-of-Day Purchase Rate

The Seller shall be billed for all energy and capacity it consumes during each billing period according to the Company's applicable retail rate schedule. The Company may require those facilities that choose to sell power on a time-of-day basis to also purchase power on a time-of-day basis. The Company shall purchase all energy and capacity which is made available to it by the Seller. The Seller will be subject to the following Service Charge, Meter Aggregation Charge and appliable Credit:

Service Charge (Monthly)
$1.22

Meter Aggregation Charge (Monthly, if option selected by Customer)
$0.00

Energy Credit
2.89¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

Energy and Firm Power Capacity Credit
3.90¢ per kWh delivered to Company during On-Peak periods.
2.14¢ per kWh delivered to Company during Off-Peak periods.

DETERMINATION OF FIRM POWER

Energy delivered by the QF to the Company must have a 65 percent on-peak capacity factor in the month to be considered "firm power". The capacity factor is based upon the QF's maximum on-peak metered capacity delivered to the Company during the month. If the QF does not meet the firm power requirments, compensation will be for the energy portion only.

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INDIVIDUAL SYSTEM CAPACITY LIMITS

1) Customers with a facility of 40-kilowatt AC capacity or more and participating in net metering and net billing may be required to limit the total generation capacity of individual distributed generation systems by either:
    a. for wind generation systems, limiting the total generation system capacity kilowatt alternating current to 120 percent of the customer's on-site maximum electric demand; or
    b. for solar photovoltaic and other distributed generation, limiting the total generation system annual energy production kilowatt hours alternating current to 120 percent of the customer's on-site annual electric energy consumption.
2) Limits under paragraph (a) applicable to measuring on-site maximum electric demand must be based on standard 15-minute intervals, measured during the previous 12 calendar months, or on a reasonable estimate of the average monthly maximum demand or average annual consumption if the customer has either:
    a. less than 12 calendar months of actual electric usage; or
    b. no demand metering available.
3) The total generation capacity of individual distributed generation systems is determined by the total capacity of all of the customer's systems which are on the same set of aggregated meters. On-site maximum electric demand and on-site annual electric energy consumption are determined by total demand or electric energy consumption associated with the same set of aggregated meters.
4) For wind generation systems, the Company will estimate customer demand use for purposes of calculating the 120 percent rule by determining a demand-billed customer's highest billed on-site kW demand in all bills issued during the most recent calendar year. For non-demand customers, the Company shall impute the equivalent peak demand level by first determining the customer's most recent on-site annual (12-month) billed kWh sales. Those kWh sales shall be divided by the product of the annual load factor for the applicable customer class and the number of actual hours in that year (either 8,760 hours in a standard year or 8,784 hours in a leap year). The resulting quotient will serve as the customer's estimated on site maximum electric demand. The load factor is 19.3 percent for the residential customer class and 24.2 percent for the non-demand general service customer class as calculated in the Company's 2013 Load Research study.
5) For solar photovoltaic and other distributed generation systems, where 12 months of usage data is not available, the Company will estimate customer energy use for purposes of calculating the 120 percent rule by averaging four months of usage. If four months of usage is not available, the Company will estimate usage based on home size for residential customers and other substantiating documentation for commercial and demand billed customers.

METER AGGREGATION

The Company will aggregate for billing purposes a Customer's designated distributed generation bidirectional meter with one or more aggregated retail meters if a Customer requests that it do so and the following conditions are satisfied:

1) the meters must be located on contiguous property owned by the customer requesting the aggregation;
2) the account(s) associated with the meters must be in the name of the customer;

RIDER FOR PARALLEL GENERATION

3) the retail services associate with the aggregated meters of a customer must be either all time-of-day or all non-time-of-day;
4) the total of all aggregated meters must be subject in the aggregate to the size limitation under the single rate chosen by the Customer applicable to all of the aggregated meters; and
5) the total of all aggregated meters is subject in the aggregate to the Individual System Capacity Limits.

As the term is used here, “contiguous property” means property owned or leased by the Customer sharing a common border, without regard to interruptions in contiguity caused by easements, public thoroughfares, transportation rights-of-way, or Company rights-of-way. The Company must comply with a request by a customer-generator to aggregate additional meters within 90 days. The specific meters must be identified at the time of the request. In the event that more than one meter is identified, the Customer must designate the rank order for the aggregated meters to which the net metered credits are to be applied. At least 60 days prior to the beginning of the next annual billing period, a Customer may amend the rank order of the aggregated meters.

The aggregation of meters applies only to charges that use kilowatt-hours as the billing determinant. All other charges applicable to each meter account shall be billed to the customer. The Company will first apply the kilowatt-hour credit to the charges for the designated meter and then to the charges for the aggregated meters in the rank order specified by the customer. If the Net Metered Facility supplies more electricity to the Company than the energy usage recorded by the customer-generator's designated and aggregated meters during a monthly billing period, the Company will apply, at the election of the Customer, any excess production based on a monthly credit or the Annual Net Metering (kWh) Banking Option. Where a monthly credit is selected, the Company shall apply monetary credits to the customer's next monthly bill for the excess kilowatt-hours.

FACILITIES OF 1,000 KILOWATT CAPACITY OR MORE

A Seller with 1,000 kW capacity or more must negotiate a contract with the Company to set the applicable rates for payments to the customer of avoided capacity and energy costs. Sellers fueled by natural gas or a renewable fuel, or another similarly clean fuel or combination of fuels of no more than 10,000 kW of interconnected capacity at a point of common coupling to Company’s distribution system may also apply for service under the Company’s Rider for Distributed Generation Service.

DEFINITIONS

"Average retail utility energy rate" means, for any class of utility customer, the quotient of the total annual class revenue from sales of electricity minus the annual revenue resulting from fixed charges, divided by the annual class kilowatt-hour sales. Data from the most recent 12-month period available before each filing required by parts 7835.0300 to 7835.1200 must be used in the computation.

RIDER FOR PARALLEL GENERATION

"Capacity" means the capability to produce, transmit, or deliver electric energy, and is measured by the number of megawatts alternating current at the point of common coupling between a qualifying facility and a utility's electric system.

"Firm power" means energy delivered by the qualifying facility to the utility with at least a 65 percent on-peak capacity factor in the month. The capacity factor is based upon the qualifying facility's maximum on-peak metered capacity delivered to the utility during the month.

"Interconnection costs" means the reasonable costs of connection, switching, metering, transmission, distribution, safety provisions, and administrative costs incurred by the utility that are directly related to installing and maintaining the physical facilities necessary to permit interconnected operations with a qualifying facility. Costs are considered interconnection costs only to the extent that they exceed the corresponding costs which the utility would have incurred if it had not engaged in interconnected operations, but instead generated from its own facilities or purchased from other sources an equivalent amount of electric energy or capacity. Costs are considered interconnection costs only to the extent that they exceed the costs the utility would incur in selling electricity to the qualifying facility as a nongenerating customer.

"Net metered facility" means an electric generation facility constructed for the purpose of offsetting energy use through the use of renewable energy or high-efficiency distributed generation sources.

“Off-Peak periods” shall include all hours not included in On-Peak periods.

“On-Peak periods” shall include all hours between 7 a.m. and 10 p.m. Monday through Friday excluding holidays.

"Qualifying facility" means a cogeneration or small power production facility which satisfies the conditions established in Code of Federal Regulations, title 18, part 292. The initial operation date or initial installation date of a cogeneration or small power production facility must not prevent the facility from being considered a qualifying facility for the purposes of this chapter if it otherwise satisfies all stated conditions.

"Standby charge" means the rate or fee a utility charges for the recovery of costs for the provision of standby service or standby power.

"Standby service" means:
A. for public utilities, service or power that includes backup or maintenance services, as described in the public utility's commission-approved standby tariff, necessary to make electricity service available to the distributed generation facility; and
B. for a utility not subject to the commission's rate authority, the service associated with the applicable tariff in effect under Minnesota Statutes, section 216B.1611, subdivision 3, clause (2).

RIDER FOR PARALLEL GENERATION

TERMS AND CONDITIONS

1. The interconnection between the QF and the Company must comply with the requirements in the most recently published edition of the National Electrical Safety Code issued by the Institute of Electrical and Electronics Engineers.
2. The QF is responsible for complying with all applicable local, state, and federal codes, including building codes, the National Electrical Code (NEC), the National Electrical Safety Code (NESC), and noise and emissions standards. The Company requires proof that the QF is in compliance with the NEC before the interconnection is made. The QF must obtain installation approval from an electrical inspector recognized by the Minnesota State Board of Electricity.
3. The QF's generation system and installation must comply with the American National Standards Institute/Institute of Electrical and Electronics Engineers (ANSI/IEEE) standards applicable to the installation.
4. Any existing interconnection contract executed between the Company and a QF with capacity of less than 40 kilowatts remains in force until terminated by mutual agreement of the parties or as otherwise specified in the contract.
5. In accordance with Minnesota Rules 7835.5950, generators own all renewable energy credits unless other ownership is expressly provided for by a contract between the generator and the Company, state law specifies a different outcome, or specific commission orders or rules specify a different outcome.
6. Customers with generators under 1,000 kW shall execute the Uniform Statewide Contract with the Company in the form prescribed by Minn. Rules 7835.9910. Before the Customer signs the Uniform Statewide Contract the Company shall provide the Customer a copy of, or link to current interconnection standards in accordance with Minnesota Rules 7835.4750.
7. In accordance with Minnesota Rules 7835.4500, in case of a dispute between the Company and a QF or an impasse in the negotiations between them, either party may request the Minnesota Public Utilities Commission (MPUC) to determine the issue. When the MPUC makes the determination, the burden of proof must be on the utility. Fees and costs for disput resolution shall be in accordance with Minnesota Rules 7835.4550.
8. QFs with distributed generation systems rated at more than 100 kW may be required to take service under the Company’s Rider for Standby Service, as described in the tariff.
9. Customers with generators sized between 40 kW and 1,000 kW taking service under the Rider for Parallel Generation will be required to install a separate production meter to record generation.

STATE OF MINNESOTA	)	AFFIDAVIT OF SERVICE VIA
	) ss	ELECTRONIC FILING
COUNTY OF ST. LOUIS	)	

Susan Romans, of the City of Duluth, County of St. Louis, State of Minnesota, says that on **July 21, 2017**, she served Minnesota Power's Compliance Filing in **Docket No. E015/M-016-204** on the Minnesota Public Utilities Commission and the Energy Resources Division of the Minnesota Department of Commerce via electronic filing. The persons on the Official Service List were served as requested.

Susan Romans

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Susan	Ludwig	sludwig@mnpower.com	Minnesota Power	30 West Superior Street Duluth, MN 55802	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Kavita	Maini	kmaini@wi.rr.com	KM Energy Consulting LLC	961 N Lost Woods Rd Oconomowoc, WI 53066	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Pam	Marshall	pam@energycents.org	Energy CENTS Coalition	823 7th St E St. Paul, MN 55106	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Samuel	Mason	smason@beltramielectric.com	Beltrami Electric Cooperative, Inc.	4111 Technology Dr. NW PO Box 488 Bemidji, MN 56619-0488	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Erica	McConnell	mcconnell@smwlaw.com	Shute, Mihaly & Weinberger LLP	396 Hayes St San Francisco, California 94102-4421	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Dave	McNary	David.McNary@hennepin.us	Hennepin County DES	701 Fourth Ave S Ste 700 Minneapolis, MN 55415-1842	Electronic Service	No	OFF_SL_16-204_Official List 16-204
John	McWilliams	jmm@dairynet.com	Dairyland Power Cooperative	3200 East Ave SPO Box 817 La Crosse, WI 54601-7227	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Thomas	Melone	Thomas.Melone@AllcoUS.com	Minnesota Go Solar LLC	222 South 9th Street Suite 1600 Minneapolis, Minnesota 55120	Electronic Service	No	OFF_SL_16-204_Official List 16-204
David	Moeller	dmoeller@allete.com	Minnesota Power	30 W Superior St Duluth, MN 558022093	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Dalene	Monsebroten	dalene@mncable.net	Northern Municipal Power Agency	123 2nd St W Thief River Falls, MN 56701	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Martin	Morud	mmorud@trunorthsolar.com	Tru North Solar	5115 45th Ave S Minneapolis, MN 55417	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Michael	Murray	mmurray@missiondata.org	Mission:Data Coalition	1020 16th St Ste 20 Sacramento, CA 95814	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Ben	Nelson		CMMPA	459 South Grove Street Blue Earth, MN 56013	Paper Service	No	OFF_SL_16-204_Official List 16-204
Ron	Nelson	ron.nelson@ag.state.mn.us	Office of the Attorney General-RUD	Bremer Tower, Suite 1400 445 Minnesota Street Saint Paul, Minnesota 55101	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Carl	Nelson	cnelson@mncee.org	Center for Energy and Environment	212 3rd Ave N Ste 560 Minneapolis, MN 55401	Electronic Service	No	OFF_SL_16-204_Official List 16-204
David W.	Niles	david.niles@avantenergy.com	Minnesota Municipal Power Agency	Suite 300 200 South Sixth Street Minneapolis, MN 55402	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Rolf	Nordstrom	rnordstrom@gpisd.net	Great Plains Institute	2801 21ST AVE S STE 220 Minneapolis, MN 55407-1229	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Samantha	Norris	samanthanorris@alliantenergy.com	Interstate Power and Light Company	200 1st Street SE PO Box 351 Cedar Rapids, IA 524060351	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jeff	O'Neill	jeff.oneill@ci.monticello.mn.us	City of Monticello	505 Walnut Street Suite 1 Monticelllo, Minnesota 55362	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Gary	Oetken	goetken@agp.com	Ag Processing, Inc.	12700 West Dodge Road P.O. Box 2047 Omaha, NE 681032047	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Russell	Olson	rolson@hcpd.com	Heartland Consumers Power District	PO Box 248 Madison, SD 570420248	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Dan	Patry	dpatry@sunedison.com	SunEdison	600 Clipper Drive Belmont, CA 94002	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jeffrey C	Paulson	jeff.jcplaw@comcast.net	Paulson Law Office, Ltd.	7301 Ohms Ln Ste 325 Edina, MN 55439	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Mary Beth	Peranteau	mperanteau@wheelerlaw.com	Wheeler Van Sickle & Anderson SC	44 E. Mifflin Street, 10th Floor Madison, WI 53703	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jennifer	Peterson	jjpeterson@mnpower.com	Minnesota Power	30 West Superior Street Duluth, MN 55802	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Donna	Pickard	dpickardgsss@gmail.com	Citizen	1215 Lilac Lane Excelsior, MN 55331	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Marcia	Podratz	mpodratz@mnpower.com	Minnesota Power	30 W Superior S Duluth, MN 55802	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Hannah	Polikov	hpolikov@aee.net	Advanced Energy Economy Institute	1000 Vermont Ave, Third Floor Washington, DC 20005	Electronic Service	No	OFF_SL_16-204_Official List 16-204
David G.	Prazak	dprazak@otpco.com	Otter Tail Power Company	P.O. Box 496 215 South Cascade Street Fergus Falls, MN 565380496	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Gregory	Randa	granda@lakecountrypower.com	Lake Country Power	2810 Elida Drive Grand Rapids, MN 55744	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Mark	Rathbun	mrathbun@grenergy.com	Great River Energy	12300 Elm Creek Blvd Maple Grove, MN 55369	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Michael	Reinertson	michael.reinertson@avantenergy.com	Avant Energy	220 S. Sixth St. Ste 1300 Minneapolis, Minnesota 55402	Electronic Service	No	OFF_SL_16-204_Official List 16-204
John C.	Reinhardt		Laura A. Reinhardt	3552 26Th Avenue South Minneapolis, MN 55406	Paper Service	No	OFF_SL_16-204_Official List 16-204
Kevin	Reuther	kreuther@mncenter.org	MN Center for Environmental Advocacy	26 E Exchange St, Ste 206 St. Paul, MN 551011667	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Michael	Riewer	MRiewer@otpco.com	Otter Tail Power Company	PO Box 4496 Fergus Falls, MN 56538-0496	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Michelle	Rosier	michelle.rosier@sierraclub.org	Sierra Club	2327 E. Franklin Avenue Minneapolis, MN 554061024	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Craig	Rustad	crustad@minnkota.com	Minnkota Power	1822 Mill Road PO Box 13200 Grand Forks, ND 582083200	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Robert K.	Sahr	bsahr@eastriver.coop	East River Electric Power Cooperative	P.O. Box 227 Madison, SD 57042	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Thomas	Scharff	thomas.scharff@newpagecorp.com	New Page Corporation	P.O. Box 8050 610 High Street Wisconsin Rapids, WI 544958050	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Larry L.	Schedin	Larry@LLSResources.com	LLS Resources, LLC	332 Minnesota St, Ste W1390 St. Paul, MN 55101	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jacob J.	Schlesinger	jschlesinger@kfwlaw.com	Keyes, Fox &Wiedman LLP	1400 16th St. 16 Market Sq., Suite 400 Denver, CO 80202	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Christopher	Schoenherr	cp.schoenherr@smmpa.org	SMMPA	500 First Ave SW Rochester, MN 55902-3303	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Dean	Sedgwick	N/A	Itasca Power Company	PO Box 457 Bigfork, MN 56628-0457	Paper Service	No	OFF_SL_16-204_Official List 16-204
Maria	Seidler	maria.seidler@dom.com	Dominion Energy Technology	120 Tredegar Street Richmond, Virginia 23219	Electronic Service	No	OFF_SL_16-204_Official List 16-204
William	Seuffert	Will.Seuffert@state.mn.us		75 Rev Martin Luther King Jr Blvd 130 State Capitol St. Paul, MN 55155	Electronic Service	No	OFF_SL_16-204_Official List 16-204
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First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Doug	Shoemaker	dougs@mnRenewables.org	MRES	2928 5th Ave S Minneapolis, MN 55408	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Mrg	Simon	mrgsimon@mrenergy.com	Missouri River Energy Services	3724 W. Avera Drive P.O. Box 88920 Sioux Falls, SD 571098920	Electronic Service	No	OFF_SL_16-204_Official List 16-204
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Trevor	Smith	trevor.smith@avantenergy.com	Avant Energy, Inc.	220 South Sixth Street Suite 1300 Minneapolis, Minnesota 55402	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Ken	Smith	ken.smith@districtenergy.com	District Energy St. Paul Inc.	76 W Kellogg Blvd St. Paul, MN 55102	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Ken	Smith	ken.smith@ever-greenenergy.com	Ever Green Energy	1350 Landmark Towers 345 St. Peter St St. Paul, MN 55102	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Beth H.	Soholt	bsoholt@windonthewires.org	Wind on the Wires	570 Asbury Street Suite 201 St. Paul, MN 55104	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Ron	Spangler, Jr.	rlspangler@otpco.com	Otter Tail Power Company	215 So. Cascade St. PO Box 496 Fergus Falls, MN 565380496	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Tom	Stanton	tstanton@nrri.org	NRRI	1080 Carmack Road Columbus, OH 43210	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Byron E.	Starns	byron.starns@stinson.com	Stinson Leonard Street LLP	150 South 5th Street Suite 2300 Minneapolis, MN 55402	Electronic Service	No	OFF_SL_16-204_Official List 16-204
James M.	Strommen	jstrommen@kennedy-graven.com	Kennedy & Graven, Chartered	470 U.S. Bank Plaza 200 South Sixth Street Minneapolis, MN 55402	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Eric	Swanson	eswanson@winthrop.com	Winthrop Weinstine	225 S 6th St Ste 3500 Capella Tower Minneapolis, MN 554024629	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Thomas P.	Sweeney III	tom.sweeney@easycleanenergy.com	Clean Energy Collective	P O Box 1828 Boulder, CO 80306-1828	Electronic Service	No	OFF_SL_16-204_Official List 16-204
SaGonna	Thompson	Regulatory.records@xcelenergy.com	Xcel Energy	414 Nicollet Mall FL 7 Minneapolis, MN 554011993	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Steve	Thompson	stevet@cmmpa.org	Central Minnesota Municipal Power Agency	459 S Grove St Blue Earth, MN 56013-2629	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Stuart	Tommerdahl	stommerdahl@otpco.com	Otter Tail Power Company	215 S Cascade St PO Box 496 Fergus Falls, MN 56537	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Pat	Treseler	pat.jcplaw@comcast.net	Paulson Law Office LTD	Suite 325 7301 Ohms Lane Edina, MN 55439	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
Lise	Trudeau	lise.trudeau@state.mn.us	Department of Commerce	85 7th Place East Suite 500 Saint Paul, MN 55101	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Karen	Turnboom	karen.turnboom@newpagecorp.com	NewPage Corporation	100 Central Avenue Duluth, MN 55807	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Lisa	Veith	lisa.veith@ci.stpaul.mn.us	City of St. Paul	400 City Hall and Courthouse 15 West Kellogg Blvd. St. Paul, MN 55102	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Roger	Warehime	warehimer@owatonnautilities.com	Owatonna Public Utilities	208 South WalnutPO Box 800 Owatonna, MN 55060	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jenna	Warmuth	jwarmuth@mnpower.com	Minnesota Power	30 W Superior St Duluth, MN 55802-2093	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Paul	White	paul.white@prcwind.com	Project Resources Corp./Tamarac Line LLC/Ridgewind	618 2nd Ave SE Minneapolis, MN 55414	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Jason	Willett	jason.willett@metc.state.mn.us	Metropolitan Council	390 Robert St N Saint Paul, MN 55101-1805	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Daniel	Williams	DanWilliams.mg@gmail.com	Powerfully Green	11451 Oregon Avenue N Champlin, MN 55316	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Cam	Winton	cwinton@mnchamber.com	Minnesota Chamber of Commerce	400 Robert Street North Suite 1500 St. Paul, Minnesota 55101	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Robyn	Woeste	robynwoeste@alliantenergy.com	Interstate Power and Light Company	200 First St SE Cedar Rapids, IA 52401	Electronic Service	No	OFF_SL_16-204_Official List 16-204

First Name	Last Name	Email	Company Name	Address	Delivery Method	View Trade Secret	Service List Name
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Thomas J.	Zaremba	TZaremba@wheelerlaw.com	WHEELER, VAN SICKLE & ANDERSON	44 E. Mifflin Street, 10th Floor Madison, WI 53703	Electronic Service	No	OFF_SL_16-204_Official List 16-204
Christopher	Zibart	czibart@atcllc.com	American Transmission Company LLC	W234 N2000 Ridgeview Pkwy Court Waukesha, WI 53188-1022	Electronic Service	No	OFF_SL_16-204_Official List 16-204