



**Cass County
Electric Cooperative**

Interconnection Process for Generation Systems

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised January 2013**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502

Table of Contents

Interconnection Process for Generation Systems

Appendix A: Interconnection Process for Generation Systems
Flow Diagram Summary

Appendix B: Application for Interconnection of Generation System

Appendix C: Engineering Data Submittal for the Interconnection of
Generation System

Appendix D: Engineering Studies for Interconnection of Generation
Systems

Appendix E: Interconnection Agreement for Generation Systems

Appendix F: Interconnection Requirements for Generation Systems



**Interconnection Process for
Generation Systems**

- I. INTRODUCTION 3
- II. GENERAL INFORMATION 4
 - A. Definitions 4
 - B. Cass County Electric Generation Interconnection Contacts 5
 - C. Engineering Studies 6
 - D. Scoping Meeting 7
 - E. Insurance 7
 - F. Non-Warranty 8
 - G. Required Documents 9
- III. PROCESS FOR INTERCONNECTION 9
 - A. Step 1 Application (By Applicant) 9
 - B. Step 2 Preliminary Review (By Cass County Electric) 10
 - C. Step 3 Go/No-Go Decision for Engineering Studies (By Applicant) 11
 - D. Step 4 Engineering Studies (By Cass County Electric) 11
 - E. Step 5 Study Results and Construction Estimates (By Cass County Electric) 12
 - F. Step 6 Final Go/No-Go Decision (By Applicant) 12
 - G. Step 7 Final Design Review (By Cass County Electric) 13
 - H. Step 8 Order Equipment and Construction (By Cass County Electric /Applicant) 13
 - I. Step 9 Final Tests (By Cass County Electric / Applicant) 14
 - J. Step 10 (By Cass County Electric) 15
 - K. Step 11 (By Applicant) 15
- IV. ATTACHMENTS 15

I. INTRODUCTION

This document has been prepared to explain the process to interconnect a Generation System with Cass County Electric. This document covers the interconnection process for all types of Generation Systems which meet the following criteria:

- A. Rated less than 10MW of total generation Nameplate Capacity
- B. Planned for interconnection with the Cass County Electric Distribution System
- C. Not intended for wholesale transactions
- D. Not anticipated to affect the transmission system.

This document does not discuss the interconnection Technical Requirements, which are covered in the “Cass County Electric Interconnection Requirements for Generation Systems” document. This document and the requirements document also provide definitions and explanations of the terms utilized throughout this process and the documents pertaining to it.

To interconnect a Generation System with Cass County Electric, there are several steps that must be followed. This document outlines those steps (see Section III.) and the Parties’ responsibilities. At any point in the process, if there are questions, please contact Cass County

Electric. 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. But for many Generation Systems the process is streamlined and provides an easy means for interconnection.

II. GENERAL INFORMATION

A. Definitions

1. **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.
2. **Area EPS Operator:** the entity that operates the Area EPS.
3. **Closed Transition Transfer:** Method of transferring the local loads between Cass County Electric's system and the generator such that the generator and CCEC 's system are interconnected for a short time (100 msec. or less).
4. **Dedicated Facilities:** the equipment that is installed due to the interconnection of the Generation System and not required to serve other Area EPS Members.
5. **EPS:** (Electric Power System) facilities that deliver electric power to a load. Note: This may include generation units.
6. **Extended Parallel:** The Generation System is designed to remain connected with Cass County Electric for an extended period of time.
7. **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.
8. **Generation Interconnection Coordinator:** the person or persons designated by Cass County Electric to provide a single point of coordination with the Applicant for the generation interconnection process.
9. **Generation System:** the interconnected generator(s), controls, relays, switches, breakers, transformers, inverters and associated wiring and cables, up to the Point of Common Coupling.
10. **Interconnection Member:** 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:** an electric power system (EPS) contained entirely within a single premises or group of premises.
12. **Open Transition Transfer:** Method of transferring the local loads between Cass County Electric's system and the generator such that the generator and CCEC's system are never interconnected.
13. **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.
14. **Point of Common Coupling:** the point where the Local EPS is connected to an Area EPS
15. **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
16. **Soft Loading Transfer:** Method of transferring the local loads between Cass County Electric's system and the generator such that the generator and CCEC's system are interconnected for a limited amount of time (generally less than three minutes). If the interconnection extends beyond three minutes, the interconnection is then defined as extended parallel.
17. **Technical Requirements:** Cass County Electric Cooperative, Inc. "Interconnection Requirements for Generation Systems"; see Appendix F.

B. Cass County Electric Generation Interconnection Contacts

Questions that arise during the planning, design, and installation process of interconnecting generation to Cass County Electric's system should be directed to one of two areas depending on the nature of the question.

Areas that involve energy rates and Cass County Electric's load management program should be directed to CCEC's marketing personnel. Technical questions involving areas such as the design, installation, interconnection, or operation of generation should be directed to CCEC's engineering personnel.

In both instances, these people can be reached at the following address and phone number:

Cass County Electric Cooperative, Inc.
4100 32nd Ave SW
Fargo, ND 58104
701/356-4400
800/248-3292

C. Engineering Studies

During the process of designing an interconnection between a Generation System and Cass County Electric, there are several studies which may 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 the Cass County Electric grid. 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 Cass County Electric and special engineering studies may need to be undertaken looking at the Cass County Electric grid 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 straight forward process to identify which engineering studies are required, certain criteria can help 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 than 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 the Cass County Electric grid.
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 the Cass County Electric 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

D. Scoping Meeting

During Step 2 of this process, the Applicant or Cass County Electric 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.

Cass County Electric and the 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 Cass County Electric to complete the preliminary review of the proposed Generation System at the scoping meeting. If a scoping meeting is requested, Cass County Electric shall schedule the scoping meeting within the 15 business day review period allowed for in Step 2.

Cass County Electric 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 Cass County Electric's costs for this scoping meeting. There shall be no additional charges imposed by Cass County Electric for this initial scoping meeting

E. Insurance

1. 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 than:
 - a. Two million dollars (\$2,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is greater than 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 than 40KW.
 - d. Such general liability insurance shall include coverage against claims for damages resulting from:
 - i. bodily injury, including wrongful death
 - 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 Cass County Electric as an additional insured
 - b. Contain a severability of interest clause or cross-liability clause
 - c. Provide that Cass County Electric 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
 - d. Provide for thirty (30) calendar days' written notice to Cass County Electric 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 Cass County Electric and its total generating capacity is smaller than 40KW, then the endorsements required in Section E.2 shall not apply.
4. The Interconnection Customer shall furnish the required insurance certificates and endorsements to Cass County Electric prior to the initial operation of the Generation System. Thereafter, Cass County Electric 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 E.1. shall state that coverage provided is primary and is not in excess to or contributing with any insurance or self-insurance maintained by Cass County Electric.
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 E.1 – 5:
 - a. Interconnection Customer shall provide to Cass County Electric, 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 E.1
 - b. 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 E.1
 - c. Failure of the Interconnection Customer or Cass County Electric 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

F. Non-Warranty

Neither by inspection, if any, or non-rejection, nor in any other way, does Cass County Electric 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.

G. Required Documents

The following chart lists the CCEC documents required for each type of generation system proposed for use in conjunction with Cass County Electric’s system. By following the steps outlined in this process document and the subsequent documents listed for each type of generation connection transfer type, the Interconnecting Member will assure them of keeping within CCEC’s policy as it relates to the use of a generator in conjunction with receiving electric service from CCEC.

Open Transition	Closed Transition	Soft Loading	Extended Parallel
CCEC Interconnection Process.....			
CCEC Interconnection Requirements for Generation System.....			
	CCEC Application for Interconnection of Generation System.....		
	CCEC Engineering Data Submittal.....		
	CCEC Interconnection Agreement.....		
	CCEC Operating Agreement for Interconnected Generation Systems.....		
	CCEC Maintenance Agreement for Interconnected Generation Systems.....		
			Electric Service Agreement

III. PROCESS FOR INTERCONNECTION

A. Step 1 Application (By Applicant)

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

1. Completed Generation Interconnection Application (Appendix B), including:
 - a. One-line diagram showing the Point of Common Coupling (PCC).
 - 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

Application Fees for Generation System Interconnection Applications				
Project Size/Type	Open Transition	Closed Transition	Soft Loading	Extended Parallel
< 21 KW	N/A	N/A	N/A	\$250
21 – 500 KW	N/A	N/A	N/A	\$250
501 – 750 KW	N/A	N/A	N/A	\$500
751 – 1,000 KW	N/A	N/A	N/A	\$500
> 1,000 KW	N/A	N/A	N/A	\$500

This application fee is to partially offset Cass County Electric’s labor costs for administration, review of the design concept, and preliminary engineering screening for the proposed Generation System interconnection.

3. Completed Engineering Data Submittal (Appendix C) (if applicable), including:

- a. One-line diagram of the generation system showing:
 - i. The generator installation
 - ii. Transfer switch/switchgear
 - iii. Service entrance
 - iv. Lockable and visible disconnect
 - v. Protection and metering CTs and VTs
 - vi. Protective relaying and generator control system
- b. Detailed information on the proposed equipment, including:
 - i. Wiring diagrams
 - ii. Models and types
- c. Proposed relay settings for all interconnection required relays
- d. Detailed site plan of the Generation System

4. Proof of insurance (if applicable):

- a. See Appendix E: XI. Insurance, for detailed requirements

B. Step 2 Preliminary Review (By Cass County Electric)

Within 15 business days of receipt of all the information listed in Step 1, Cass County Electric 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)

- 1. Contact names with Cass County Electric for this project
- 2. Approval or rejection of the generation interconnection request
 - a. Rejection – Cass County Electric 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. Cass County Electric 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.
 - 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

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.

C. 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 Cass County Electric, this step will automatically be skipped by Cass County Electric and the Applicant.

If the Applicant decides NOT to proceed with the engineering studies, the Applicant shall notify the Cass County Electric 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 Cass County Electric:

1. Payment required by Cass County Electric for the specialized engineering studies
2. Additional information requested by Cass County Electric to allow completion of the engineering studies

D. Step 4 Engineering Studies (By Cass County Electric)

In this step, Cass County Electric 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 Cass County Electric. If additional time is required to complete the engineering studies, Cass County Electric shall notify the Applicant and provide the reasons for the time extension.

If Cass County Electric determines that the actual costs for the engineering studies will exceed the estimated amount by more than 25%, the Applicant shall be notified. Cass County Electric shall 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.

E. Step 5 Study Results and Construction Estimates (By Cass County Electric)

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. Interconnection Agreement (if applicable).
6. Cost estimate and payment schedule for required Cass County Electric 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 Cass County Electric modification(s)
 - d. Final acceptance testing costs

F. 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 Cass County Electric 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 Cass County Electric:

1. Applicable up-front payment required by Cass County Electric per Payment Schedule provided in Step 5 (if applicable)
2. Signed Interconnection Agreement (if applicable)
3. Final proposed schedule incorporating the Cass County Electric 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), Cass County Electric work, relays set and tested, preliminary vendor testing, final Cass County Electric 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 CTs / VTs, 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. If applicable, drawing(s) showing the monitoring system as specified by Cass County Electric including a drawing which shows the interface terminal block with the Cass County Electric 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

G. Step 7 Final Design Review (By Cass County Electric)

Within 15 business days of receipt of the information required in Step 6, Cass County Electric 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 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 than 15 additional business days to complete, for a total of 30 business days.

During this step, Cass County Electric 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 Application for Interconnection of the Generation System request may be rejected by Cass County Electric and the Applicant may be requested to reapply with the revised design.

Upon completion of this step Cass County Electric 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. Initial testing procedure review comments. (Additional work on the testing process will occur during Step 8, once the actual equipment is identified)

H. Step 8 Order Equipment and Construction (By Cass County Electric /Applicant)

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 Cass County Electric for review and comments. It is also typical for Cass County Electric to require review and approval of the drawings which cover the interconnection equipment and interconnection protection system. If remote control and/or monitoring are also required by Cass County Electric, those drawings are also exchanged for review and comment.

1. By the Applicant's personnel
 - a. Ordering of Generation System equipment
 - b. Installing Generation System
 - c. Submit approval drawings for interconnection equipment and protection systems, as required by Cass County Electric
 - d. Provide final relay settings provided to Cass County Electric
 - e. Submit Completed and signed Engineering Data Submittal form (Appendix C)
 - f. Submit proof of insurance as required by Cass County Electric interconnection agreements
 - g. Submit required State of North Dakota electrical inspection forms filed with Cass County Electric
 - h. Inspecting and functional testing Generation System components
 - i. Work with Cass County Electric personnel and equipment vendor(s) to finalize the installation testing procedure

2. By Cass County Electric personnel
 - a. Ordering any necessary Cass County Electric equipment
 - b. Installing and testing any required equipment
 - i. Monitoring facilities
 - ii. Dedicated Equipment
 - c. Assisting Applicant's personnel with interconnection installation coordination issues
 - d. Providing review and input for testing procedures

I. Step 9 Final Tests (By Cass County Electric / 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 Cass County Electric 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
- ✓ Provides a proposed date that the Generation System will be ready to be energized and acceptance tested.

For smaller systems, scheduling of this testing may be more flexible as less testing time is required than for larger systems. In some cases this testing may be done after hours to ensure no typical business-hour load is disturbed. If acceptance testing occurs after hours, Cass County Electric's labor will be billed at overtime wages. During this testing Cass County Electric will typically run three different tests. These tests can differ depending on which type of communication / monitoring system(s) Cass County Electric decides to install at the site. For problems created by Cass County Electric or any Cass County Electric equipment that arise during testing, Cass County Electric 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, Cass County Electric will leave the project until the problem is resolved. Having the testing resume will then be subject to Cass County Electric personnel time and availability.

J. Step 10 (By Cass County Electric)

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

K. Step 11 (By Applicant)

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

IV. 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 which may be required for the review of the Generation System interconnection

Appendix E: Cass County Electric Interconnection Agreement for Generation Systems

Appendix F: Cass County Electric Interconnection Requirements for Generation Systems



**Cass County
Electric Cooperative**

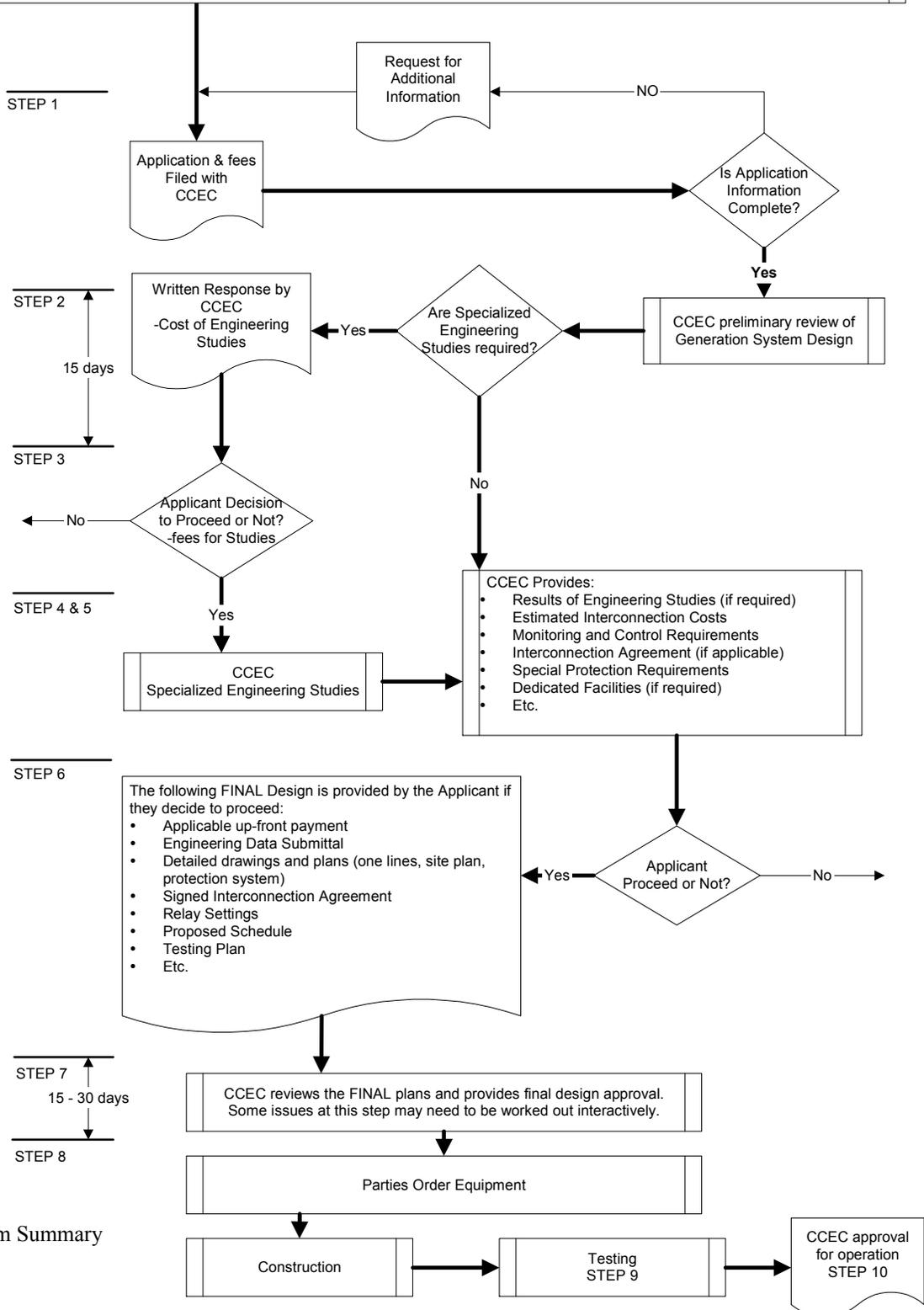
Appendix A

Interconnection Process for Generation Systems Flow Diagram Summary

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised January 2013**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502

Before beginning this process, the applicant or their consultant should first obtain information on CCEC's requirements for interconnection of a generator, have a basic design concept in mind, and an electrical one-line diagram of the project prepared. Applicant or their consultant should also be aware of special rates and programs available by using a generator to participate in CCEC's load management program. Please contact CCEC for more information at 701/356-4400 or 1-800-248-3292, or check our web site out at www.kwh.com.





**Cass County
Electric Cooperative**

Appendix B

Application for Interconnection Of Generation System

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised January 2013**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502



**Application for Interconnection
Of Generation System**

WHO SHOULD FILE THIS APPLICATION: Anyone expressing interest to install generation which will interconnect with Cass County Electric Cooperative’s system. This application should be completed and returned to CCEC Engineering Department in order to begin processing the request.

INFORMATION: This application is used by CCEC 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.

MEMBER/APPLICANT (required)		
Company / Applicant’s Name:		
Representative:	Phone Number:	FAX Number:
Title:		
Mailing Address:		
City:	State:	Zip code:
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:		
City:	State:	Zip code:
Email Address:		
ELECTRICAL CONTRACTOR (if applicable)		
Company:		
Representative:	Phone:	FAX Number:
Mailing Address:		
City:	State:	Zip code:
Email Address:		
GENERATOR SUPPLIER (if applicable)		
Company:		
Representative:	Phone:	FAX Number:
Mailing Address:		
City:	State:	Zip code:
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 (check all that apply)		
Interconnection / Transfer method:		
<input type="checkbox"/> Open <input type="checkbox"/> Closed <input type="checkbox"/> Soft Loading <input type="checkbox"/> Extended Parallel <input type="checkbox"/> Inverter		
Proposed use of generation: (Check all that may apply)		Duration Parallel:
<input type="checkbox"/> Peak Reduction <input type="checkbox"/> Standby <input type="checkbox"/> Energy Export Sales <input type="checkbox"/> Cover Load		<input type="checkbox"/> None <input type="checkbox"/> Limited <input type="checkbox"/> Continuous
ESTIMATED START/COMPLETION DATES		
Construction start date:		Completion (operational) date:
DESCRIPTION OF PROPOSED INSTALLATION AND OPERATION		
<p>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 CCEC's facilities. If there is an intent to sell power and energy, also define the target market. <Note: If applicant is providing a completed CCEC Engineering Data Submittal form with this application, this part may be omitted; simply note below "See attached Engineering Data Submittal".></p>		
APPLICATION ACKNOWLEDGEMENT & AGREEMENT		
<p>With this Application, CCEC is requested to review the proposed Generation System Interconnection, identify the additional equipment and costs involved with the interconnection of this system to CCEC's system, and to provide a budgetary estimate of those costs. It is understood that the estimated costs supplied by the CCEC will be determined using the information provided. The applicant also agrees to supply as requested, additional information, to allow CCEC to better review this proposed Generation System interconnection. By signing below, the applicant agrees and acknowledges they have read CCEC's Interconnection Requirements for Generation System and will design, operate and maintain the Generation System and interconnection in accordance with those requirements.</p>		
Applicant Name (print):		
Applicant Signature:		Date:



**Cass County
Electric Cooperative**

Appendix C

Engineering Data Submittal For the Interconnection of Generation Systems

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised 2010**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502



**ENGINEERING DATA
SUBMITTAL**
For the Interconnection of Generation

WHO SHOULD FILE THIS SUBMITTAL: Anyone in the final stages of interconnecting a Generation System with Cass County Electric Cooperative, Inc. This submittal shall be completed and provided to CCEC’s Engineering Department during the design of the Generation System, as established in the “CCEC’s Interconnection Process for Distributed Generation Systems”.

INFORMATION: This submittal is used to document the interconnected Generation System. The Applicant’s Engineer (if applicable) should complete as much of the form as applicable and the Applicant shall sign and return the form to CCEC. The Applicant will be contacted if additional information is required.

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

If an Application for Interconnection has already been filled out, check this box and continue to page 2.

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: <input type="checkbox"/> Open <input type="checkbox"/> Closed <input type="checkbox"/> Soft Loading <input type="checkbox"/> Extended Parallel <input type="checkbox"/> Inverter	
Proposed use of generation: (Check all that may apply) <input type="checkbox"/> Peak Reduction <input type="checkbox"/> Standby <input type="checkbox"/> Energy Export Sales <input type="checkbox"/> Cover Load	Duration Parallel: <input type="checkbox"/> None <input type="checkbox"/> Limited <input type="checkbox"/> Continuous

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):	

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 #:	

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):	

Relay Information : Please Include pickup setting and time delay for each protective element

Relay Type	Relay Model No.	
CT Ratio	VT Ratio	
Under-voltage (27)	Reverse Power (32R)	
Over-current (50/51)	Lockout Relay (86) trips...	
Over-voltage (59)	Synch Check Relay (25)	
Under-frequency (81U)	Parallel Limit Timer (62PL)	
Over-frequency (81O)	Shunt trip breaker (gen, utility)?	

PRIME MOVER (Complete all applicable items)			
Unit Number:	Type:		
Manufacturer:			
Serial Number:		Date of Manufacture:	
H.P. Rated:	H.P. Max:	Inertia Constant:	lb.-ft. ²
Energy Source (hydro, steam, wind, wind etc.):			

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_2):	% on	kVA base	
Zero Sequence Reactance (X_0):	% on	kVA base	
Neutral Grounding Resistor (if applicable):			
I^2t or K (heating time constant):			
Exciter data:			
Governor data:			
Additional Information:			

TRANSFER SWITCH (If applicable)	
Number of Transfer Switches planned _____	Amperage of Switchgear & Transfer Switches
1. Transfer Switch Mfg. _____ Model _____	Switchgear _____ Transfer Switch _____
2. Transfer Switch Mfg. _____ Model _____	Switchgear _____ Transfer Switch _____
3. Transfer Switch Mfg. _____ Model _____	Switchgear _____ Transfer Switch _____
4. Transfer Switch Mfg. _____ Model _____	Switchgear _____ Transfer Switch _____
5. Transfer Switch Mfg. _____ Model _____	Switchgear _____ Transfer Switch _____

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:			

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)			

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	<u>Maximum Individual Harmonic (%):</u> Maximum Total Harmonic Distortion (%):	
Voltage Harmonic Distortion	<u>Maximum Individual Harmonic (%):</u> 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
Bushings Current Transformers (Max. ratio):				Relay Accuracy Class:	
CT'S Multi Ratio? (circle one); No / Yes: (Available taps):					



**Cass County
Electric Cooperative**

Appendix D

Engineering Studies for Interconnection of Generation Systems

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised January 2013**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502

There are two main parts of an engineering study relating to the interconnection of generation systems into a utility grid:

1. Does the distributed generation system cause a problem?
2. What would it cost to make a change that rectifies the problem?

The first question is relatively straightforward to determine as CCEC engineering staff reviews the proposed installation. The second question typically has multiple alternatives and can turn into an iterative process, which can become quite large and involved for more complex generation system installations. From an engineering perspective relative to this particular issue, there are no ‘cook book’ solutions which can be applied.

For some of the large generation installations and/or the more complex interconnections, CCEC may suggest dividing up the engineering studies into the two parts: identifying the problem scope and attempting to identify solutions to resolve the problem(s). By dividing the engineering studies into two steps, it may allow the Applicant to see the problems identified, thereby affording the Applicant an opportunity to reconsider the project if they feel the problems are too large and possibly expensive to resolve. Or they may choose to move forward with the next step which might involve more extensive engineering studies to identify problem solutions and thus additional costs.

This document 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 distribution system is studied to make sure that the addition of the generation system will not overstress any of CCEC’s distribution plant or equipment, and that the equipment will be able to operate properly during a faulted condition. 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.

Distribution System Protection Coordination: System protection analysis studies using computerized modeling of CCEC’s system with and without the generation system will be performed. Areas studied in this work include:

- Fault current studies: Distribution system fault currents are calculated with and without the generation system to determine fault current levels under different

types of faulted conditions. Distributed generation systems may contribute fault current to CCEC's distribution system under faulted circuit operating conditions.

- Reclosing/Clearing issues: Once fault currents have been calculated, the engineer studies the coordination of distribution and transmission system devices along with the generation system equipment to ensure that proper coordination of all devices can be achieved. Depending on the proposed size of the generation system, various operating parameters may be established or required, such as:
 - Voltage supervision of reclosing
 - Transfer trip requirements for the generation system
 - Changing of existing set points for system protection equipment
 - Requirements for synchronous operation and the impact of out-of-sync operation
 - Requirements for reverse power flow protection
 - Potential problems caused by any voltage transformations within the generation system
 - Sensitivity of the generation system equipment to problems on CCEC's distribution system

Grounding design and review: Electrical grounding is one of the most fundamental safety considerations for any electrical system. In addition to the National Electric Code, which CCEC presumes will be complied with in the design process, CCEC will also determine if the proposed design relative to grounding complies with the National Electric Safety Code (NESC) which applies more to utility operations.

Power Flow and Voltage Drop/Flicker: Load flow analysis using computerized modeling of CCEC's system with and without the generation system will be performed. Areas studied in this work include:

- Potential effects for and from islanding of the generation system
- Effect of generation system on CCEC's system loading - will the system ever be overloaded under normal, contingent, or backfeed operation?
- Will operation of the generation system result in any voltage swings or flicker during up-loading or offloading and will additional voltage regulation be required?
- How will the generation system interact with CCEC's distribution system voltage regulation?
- How will the generation system affect CCEC's distribution system power factor and will power factor correction be required?

Special Operation Impact: These considerations will determine if special operating procedures are needed with the addition of the generation system into CCEC's distribution system and what, if any, limitations need to be placed on the operation of the system.



**Cass County
Electric Cooperative**

Appendix E

Interconnection Agreement for Generation Systems

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.**

Revised 2012

Revised January 2013

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502



**Interconnection Agreement
for Generation Systems**

**Interconnection of Distributed
Generation Systems in Parallel
With
Cass County Electric Cooperative**

I. SCOPE AND PURPOSE2

II. DEFINITIONS2

III. DESCRIPTION OF INTERCONNECTION MEMBER’S GENERATION SYSTEM.....4

IV. RESPONSIBILITIES OF THE PARTIES4

V. CONSTRUCTION4

 A. Charges and payments5

 B. Payments6

VI. DOCUMENTS INCLUDED WITH THIS AGREEMENT6

VII. TERM AND TERMINATION7

VIII. OPERATIONAL ISSUES8

IX. LIMITATION OF LIABILITY/INDEMNITY10

X. DISPUTE RESOLUTION.....11

XI. INSURANCE13

XII. MISCELLANEOUS14

 A. FORCE MAJEURE.....14

 B. NOTICES15

 C. ASSIGNMENT15

 D. NON-WAIVER.....16

 E. GOVERNING LAW AND INCLUSION OF CASS ELECTRIC’S RATES AND RULES16

 F. AMENDMENTS AND MODIFICATION16

 G. ENTIRE AGREEMENT16

 H. CONFIDENTIAL INFORMATION16

 I. NON-WARRANTY17

 J. NO PARTNERSHIP17

XIII. SIGNATURES17

 EXHIBIT A – Generation System Description18
 and Single-Line Diagram.....18

 EXHIBIT B – Summary of Cass County Electric Costs19
 and Description of Dedicated Facilities.....19

 EXHIBIT C – Engineering Data Submittal20

 EXHIBIT D – Operating Agreement.....21

This Generating System Interconnection Agreement is entered into by and between Cass County Electric Cooperative Inc. (“Cass Electric”) and Interconnection Member (the “Interconnection Member”). The Interconnection Member and Cass County Electric (Cass Electric) 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. This Agreement is intended to outline the terms, conditions, rights and obligations under which the Interconnection Member may interconnect and operate a Generation System with a total Nameplate Capacity of less than 10MW, in parallel for any length of time with Cass Electric's electrical distribution system at the location identified in Exhibit C and shown in the Exhibit A one-line diagram.
- B. This Agreement does not authorize the Interconnection Member to export power or constitute an agreement to purchase or wheel the Interconnection Member's power. Other services that the Interconnection Member may require from Cass Electric, or others, may be covered under separate agreements.
- C. To facilitate the operation of the Generation System, this agreement allows for the occasional and inadvertent export of energy to Cass Electric's distribution system. The amount, metering, billing and accounting of such inadvertent energy exporting shall be governed by Exhibit D (Operating Agreement). Cass Electric is not obligated 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 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 known as, the "Cass County Electric Cooperative Inc. Interconnection Requirements for Generation Systems", a copy of which has been made available to the Interconnection Member and incorporated and made part of this Agreement by this reference.

II. DEFINITIONS

(Note: The definitions used in this document are also used throughout all Cass Electric documents pertaining to the interconnection of generation systems. As such, some terms may not be used or found in all documents.)

- 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.
- B. **Area EPS Operator:** the entity that operates the Area EPS.
- C. **Closed Transition Transfer:** Method of transferring the local loads between Cass Electric's system and the generator such that the generator and CCEC's system are interconnected for a short time (100 msec. or less).

- D. **Dedicated Facilities:** the equipment that is installed by Cass Electric in order to establish the interconnection between the Generation System and Cass Electric's distribution facilities. Dedicated facilities may not be required for Cass Electric to provide any service to a party other than the Interconnection Member.
- E. **EPS:** (Electric Power System) facilities that deliver electric power to a load. Note: This may include generation units.
- F. **Extended Parallel:** The Generation System is designed to remain connected with Cass Electric for an extended period of time.
- G. **Generation:** any device producing electrical energy, including, without limitation, rotating generators driven by wind, steam turbines, internal combustion engines, hydraulic turbines, solar, fuel cells, and any other device or technology producing or storing electrical energy.
- H. **Generation Interconnection Coordinator:** the person or persons designated by Cass Electric to provide a single point of coordination with the Applicant for the generation interconnection process.
- I. **Generation System:** the interconnected generator(s), controls, relays, switches, breakers, transformers, inverters and associated wiring and cables, up to the Point of Common Coupling.
- J. **Interconnection Member:** the party or parties listed above who will own/operate the Generation System and are responsible for meeting the requirements of this agreement, the Operating Agreement, and Technical Requirements. This could be the Generation System applicant, installer, owner, designer, or operator.
- K. **Local EPS:** an electric power system (EPS) contained entirely within a single premises or group of premises.
- L. **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.
- M. **Open Transition Transfer:** Method of transferring the local loads between Cass Electric's system and the generator such that the generator and CCEC's system are never interconnected.
- N. **Point of Common Coupling:** the point where the Local EPS is connected to an Area EPS
- O. **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

- P. **Soft Loading Transfer:** Method of transferring the local loads between Cass County Electric's system and the generator such that the generator and CCEC's system are interconnected for a limited amount of time, but for a limited amount of time (generally less than three minutes). If the interconnection extends beyond three minutes, the interconnection is then defined as extended parallel.
- Q. **Technical Requirements:** Cass County Electric Cooperative Inc. "Interconnection Requirements for Generation Systems", as they may be amended or modified by Cass Electric, from time to time.

III. DESCRIPTION OF INTERCONNECTION MEMBER'S GENERATION SYSTEM

- A. A description of the Generation System, including a single-line diagram showing the general arrangement of how the Interconnection Member's Generation System is interconnected with the Cass Electric'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 Member shall construct, operate and maintain the Generation System in accordance with all the applicable laws and regulations, the applicable manufacture's specifications, maintenance schedules, and other recommendations, the Technical Requirements and this Agreement. Interconnection Member is responsible for all costs arising out of the design, construction, purchase, installation, operation, maintenance, repair, inspection, or replacement of the Generation System.
- C. Cass Electric shall construct the Dedicated Facilities in a good and workmanlike manner, and in accordance with standard design and engineering practices. Interconnection Member is responsible for the costs and expenses incurred by Cass Electric in the acquisition, construction and installation of the Dedicated Facilities as provided below.

V. CONSTRUCTION

The Parties agree to cause their facilities or systems to be constructed in accordance with all applicable federal, state, and local laws, ordinances, and regulations, (including all environmental laws), and all applicable codes and standards, including without limitation, 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), 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 Member is responsible for the actual costs to interconnect the Generation System with Cass Electric, including, but not limited to all costs arising out of (i) Cass Electric's design, installation, coordination, engineering review, and testing of any portion of the Generator System, and (ii) the construction, installation, acquisition, design or testing of any Dedicated Facilities provided to connect Cass Electric's distribution system to the Generation System,. Estimates of these costs are outlined in Exhibit B. While estimates, for budgeting purposes, have been provided in Exhibit B, the Interconnection Member is responsible for the actual costs incurred by Cass Electric subject to reimbursement under this Agreement, even if they exceed the estimated amount(s). Unless otherwise expressly provided in Exhibit B Cass Electric's charges for the Dedicated Facilities will be determined consistent with the following parameters:

- For each person who provides labor on behalf of Cass Electric in connection with the design, construction, installation, or other related work in connection with the Dedicated Facilities, Cass Electric may charge the applicable hourly rate payable by Cass Electric for the labor provided, plus overhead attributable to such costs, as calculated by CCEC in its system of internal management accounting.
- The actual costs incurred by Cass Electric for any materials or supplies (including freight and taxes) or outside labor used or consumed in the project plus overhead attributable to such costs, as calculated by CCEC in its system of internal management accounting.
- All costs, for which the Interconnection Member is responsible for, must be reasonable under the circumstances of the design and construction.

1. Dedicated Facilities

- a. During the term of this Agreement, Cass Electric shall design, construct and install the Dedicated Facilities outlined in Exhibit B. The Interconnection

Member 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 Cass Electric and all costs associated with the operating and maintenance of the Dedicated Facilities, after the Generation System is operational, shall be the responsibility of Cass Electric, unless otherwise agreed.
- c. By executing this Agreement, the Interconnection Member grants permission for Cass Electric to begin construction and to procure the necessary facilities and equipment to complete the installation of the Dedicated Facilities on Interconnection Member's property, as outlined in Exhibit B. If for any reason, the Generation System project is canceled under Article VIII of this Agreement, so that any or all of the Dedicated Facilities are not required, the Interconnection Member will, nonetheless, remain responsible for all costs incurred by Cass which are reimbursable by Interconnection Member under this Agreement, other than any costs which, in the exercise of reasonable care, Cass Electric could have avoided after delivery to Cass Electric of a notice of termination in the manner required under this Agreement.

B. Payments

1. The Interconnection Member 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 Cass Electric's credit policy and procedures for the unpaid balance of the estimated amount shown in Exhibit B.
2. The payment for the costs outlined in Exhibit B, shall be as follows;
 - a. 1/3 of estimated costs, outlined in Exhibit B, shall be due upon execution of this agreement.
 - b. 1/3 of estimated costs, outlined in Exhibit B, shall be due prior to initial energization of the Generation System with Cass Electric.
 - c. Remainder of actual costs, incurred by Cass Electric, shall be due within 30 days from the date the bill is mailed by Cass Electric after project completion. Amounts not paid within 10 days after due will accrue interest at the rate of 1% per month.

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 Cass Electric.)

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 Member. Included in this listing shall be the description and estimated costs for the required Dedicated Facilities being installed by Cass Electric for the interconnection of the Generation System and a description and estimate for the final acceptance testing work to be done by Cass Electric.
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 – The Operating Agreement 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.

VII. TERM AND TERMINATION

- A. This Agreement is effective on the date when both the Interconnection Member and Cass Electric have 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 mutually agree in writing to terminate the Agreement; or
 2. The Interconnection Member terminates this agreement, by written notice to Cass Electric, prior to the completion of the final acceptance testing of the Generation System by Cass Electric. Once the Generation System is operational then VII.A.3 applies. Upon receipt of a cancellation notice, Cass Electric must take reasonable steps to minimize additional costs to the Interconnection Member, where reasonably possible.
 3. After the Generation System is operational the Interconnection Member terminates this agreement after 30 days written notice to Cass Electric, unless otherwise set forth in Exhibit D or in the Operating Agreement; or
 4. Cass Electric terminates this agreement after 30 days written notice to the Interconnection Member following:

- a. The Interconnection Member's failure to pay when due any amounts owing by the Interconnection Member to Cass Electric under this agreement, the Operating Agreement, or the Maintenance Agreement
 - b. The Interconnection Member's failure to interconnect and operate the Generation System per the terms of this Agreement or any other breach by the Interconnection Member of the terms of this Agreement; or
 - c. The Interconnection Member fails to take all corrective actions specified in Cass Electric'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
 - d. If the Interconnection Member fails to complete Cass Electric's final acceptance testing of the generation system within 24 months of the date proposed under section III.A.6.
 - e. The operation of the Generating System becomes illegal or impracticable as the consequence of the application of any statute, law or governmental rule or regulation.
5. Upon termination of this Agreement the Generation System shall be disconnected from Cass Electric's distribution by or under the direction of Cass Electric. Costs incurred by Cass Electric in connection with the disconnection of the Generation System will be the responsibility of the Interconnection Member. The termination of this Agreement will not relieve either Party of its liabilities and obligations which by their terms, must continue following termination, or which arise out of any transaction or occurrence which occurred, prior to 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 Member 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, Cass Electric employees and agents will have access to the disconnect switch of the Generation System. Cass Electric may disconnect

the Generation System for any reasonable purpose arising out of the rights and obligations under this Agreement, as necessary to satisfy its obligation to operate the Cass Electric grid safely and to provide service to its Members. Interconnection Member authorizes Cass Electric employees and agents access to the Cass Electric equipment and facilities located on the premises in order to carry out its rights and obligations under this agreement.

- C. **Electric Service Supplied:** Cass Electric will supply all the electrical requirements of the Interconnection Member that are not supplied by the Generation System. Such electric service shall be supplied by Cass Electric under the rate schedules applicable to the Member's class of service, as revised from time to time by Cass Electric.
- D. **Operation and Maintenance:** The Generation System shall be operated, inspected, tested and maintained, by the Interconnection Member in accordance with the Technical Standards and any additional requirements of Exhibit D, attached to this document, as amended, in writing, from time to time.
- E. **Cooperation and Coordination:** Both Cass Electric and the Interconnection Member shall communicate and coordinate their operations, so that the normal operation of the Cass Electric grid 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 the Cass Electric grid. Under abnormal operations of either the Generation System or the Cass Electric grid, 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:** Cass Electric may disconnect the Generation System as necessary, upon termination of this Agreement; non-compliance with this Agreement by Interconnection Member; system emergency, imminent danger to the public or Cass Electric personnel; routine maintenance, repairs and modifications to the Cass Electric grid. When reasonably possible, Cass Electric shall provide prior notice to the Interconnection Member explaining the reason for the disconnection. If prior notice is not reasonably possible, Cass Electric shall after the fact, provide information to the Interconnection Member as to why the disconnection was required. Cass Electric is not liable for any loss or damage suffered by Interconnection Member, its tenants, subtenants licensees or other occupants of its premises, as a result of the disconnection of the Generation System, including without limitation, all damages for any loss of sales, consequential damages, loss of business opportunity, profits or other losses, regardless of whether such damages were foreseeable Cass Electric shall expend reasonable effort to reconnect the Generation System in a timely manner and to work towards mitigating damages and losses to the Interconnection Member where reasonably possible.

- G. Modifications to the Generation System: Member shall notify Cass Electric, in writing, prior to making any changes, alternations, additions, replacements or modifications to the Generation System. Such notice must be made no less than twenty business days prior to the modification. The notice must include all information reasonably required by Cass Electric to undertake the review described in this paragraph. The nature of the proposed 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, must be included in the notification to Cass Electric. Interconnection Member agrees not to commence installation of any modifications to the Generating System until Cass Electric has approved the modification, in writing. Cass Electric shall have a minimum of five (5) business days to review and respond to the planned modification. Cass Electric shall not take longer than 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. Notwithstanding the foregoing, in the event of any emergency creating risk of injury, death or property damage, Interconnection Member may undertake modifications without the approval of Cass Electric, provided that, the Interconnection Member provides written notice to Cass Electric as soon as reasonably possible of the intent to make changes or of the changes made.
- H. Permits and Approvals: The Interconnection Member must at all times comply with all governmental laws, ordinances, rule, regulations or other requirements, shall obtain all environmental and other permits lawfully required by governmental authorities in connection with its construction, installation, acquisition, operation and maintenance of the Generation System. The Interconnection Member shall also maintain all required permits and comply with the requirements of such permits at all times during the term of this Agreement.

IX. LIMITATION OF LIABILITY/INDEMNITY

- A. Notwithstanding any other provision in this Agreement, with respect to the Cass Electric's provision of electric service to Interconnection Member and the services provided by the Cass Electric pursuant to this Agreement, Cass Electric's liability to Interconnection Member shall be limited as set forth in the Cass Electric's policies relating to the provision of electric service, which are incorporated herein by reference.
- B. If a Force Majeure event as defined in this agreement prevents a party from fulfilling any obligations under this agreement, such party will promptly notify the other party in writing and will keep the other party informed on a continuing basis as to the scope and duration of the Force Majeure event. The affected party will specify the circumstances of the Force Majeure event, its expected duration and the steps that the affected party is taking to mitigate the effect of the event on its performance. The affected party will be entitled to suspend or modify its

performance of obligations under this Agreement but will use reasonable efforts to resume its performance as soon as possible.

- C. The Interconnection Member assumes all liability for and must indemnify, defend, and save harmless, Cass Electric and its members, directors, officers, managers, employees, agents, representatives, affiliates, successors and assigns for from and against any claims, losses, costs, and expenses of any kind or character to the extent that they result from Interconnection Member's negligence or other wrongful conduct in connection with the design, construction, installation, operation or maintenance of the Facilities or Interconnection Facilities, the breach of this agreement, or personal injury, death or property damage to an employee of Interconnection Member. Such indemnity shall include, but is not limited to, financial responsibility for (a) monetary losses; (b) reasonable costs and expenses of defending an action or claim; (c) damages related to death or injury; (d) damages to property; and (e) damages for the disruption of business.
- D. Cass Electric and Interconnection Member are each responsible for the safe installation, maintenance, repair and condition of their respective lines, wires, switches, or other equipment or property on their respective sides of the Point of Delivery. Cass Electric does not assume any duty of inspecting the Interconnection Member's lines, wires, switches, or other equipment or property except to assure the installation is completed as specified by CCEC and agreed upon by the Interconnection Member and CCEC, and will not be responsible therefore. Interconnection Member assumes all responsibility for the electric service supplied hereunder and the facilities used in connection therewith at or beyond the Point of Interconnection.
- E. For the mutual protection of the Interconnection Member and the Cass Electric, only with Cass Electric's prior written authorization are the connections between the Cass Electric's service wires and the Interconnection Member's service entrance conductors to be energized.
- F. 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.

X. DISPUTE RESOLUTION

- A. **Dispute Resolution:** Except as provided below, all claims, disputes, controversies, and other matters in question arising out of or relating to this Agreement, the alleged breach thereof, the relationship between the parties, or the making or termination of this agreement, including claims of fraud in the inducement or claims under and federal, state or local statutes or ordinances, shall be settled by negotiation between the parties as described in Part B of this Article, if negotiation

is unsuccessful, by binding arbitration in accordance with the procedures set forth in Part C of this Article. Notwithstanding the foregoing, any Reserved Claim, as defined below, by Cass Electric is not subject to the limitations of this Article. With respect to any Reserved Claim, Cass Electric is authorized, at its sole option, to bring any such claim before any proper court of competent jurisdiction, either before or after the commencement of informal resolution proceedings under Subpart B, but before the commencement of any arbitration proceedings under Subpart C. For the purposes of this provision, a “Reserved Claim is:

1. Any claim of Cass Electric against Interconnection Member for collection of amounts due for reimbursement for professional services, labor and materials provided by or on behalf of Cass Electric under this Agreement, (whether or not such non-payment results all or in part from any set-off or counterclaim by Interconnection Member against Cass Electric), or
 2. Any claim for injunctive relief by Cass Electric against Interconnection Member resulting from the alleged violation by Interconnection Member of any provision of this agreement.
- B. Informal Resolution: Except as provided in Part A, in the event either party desires to resolve any bona fide dispute with respect to matters which relate to a party's rights or obligations under this agreement, such party shall, by written notice to the other party, have such dispute referred to no more than two of their respective employees or agents for attempted resolution by good faith negotiations within 30 days after such notice is received. Any settlement reached by the parties under this section shall not be binding until reduced to writing and signed by the Cass Electric and Interconnection Member. When reduced to writing, such settlement agreement shall supersede all other agreements, written or oral, to the extent such agreements specifically pertain to the matters so settled. If the designated employees are unable to resolve such dispute within in such 30 day period, any party may invoke the provisions of Part C below.
- C. Arbitration: Except as provided in Part A, any controversy or claim arising out of or relating to this contract, including disputes relating to the formation of this agreement, or the breach thereof, must be settled by arbitration in Fargo, North Dakota, at a time and location designated by the arbitrator, but not exceeding 30 days after a demand for arbitration has been made. Arbitration shall be conducted by the American Arbitration Association in accordance with its Rules of Commercial Arbitration, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The arbitrator shall be a retired state or federal judge or an attorney who has practiced commercial litigation for at least 10 years.

The arbitrators shall have the authority to award any remedy or relief that a court of this state could order or grant according to the terms of this agreement and consistent with applicable law, including, without limitation, equitable remedies, rescission, specific

performance of any obligation created under this agreement, the issuance of an injunction, or the imposition of sanctions for abuse or frustration of the arbitration process; provided, however, that punitive or exemplary damages may not be awarded by the arbitrators or by any court. The arbitrators must award to the prevailing party, if any, as determined by the arbitrators, all of its costs and fees, including the arbitrators' fees, administrative fees, travel expenses, out-of-pocket expenses such as copying and telephone, court costs, witness fees and reasonable attorney's fees.

XI. INSURANCE

- A. In connection with the Interconnection Member's performance of its duties and obligations under this Agreement, the Interconnection Member 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 than:
1. Two million dollars (\$2,000,000) for each occurrence if the Gross Nameplate Rating of the Generation System is greater than 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 than 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 Member'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 Cass Electric as an additional insured; (b) contain a severability of interest clause or cross-liability clause; (c) provide that Cass Electric shall not be liable for the payment of premium for such insurance; and (d) provide for thirty (30) calendar days' written notice to Cass Electric 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 Cass Electric and its total generating capacity is smaller than 20kW, then the endorsements required in Section XI.B shall not apply.
- D. The Interconnection Member shall furnish the required insurance certificates and endorsements to Cass Electric prior to the initial operation of the Generation

System. Thereafter, Cass Electric 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 Cass Electric.
- F. If the Interconnection Member is self-insured with an established record of self insurance, the Interconnection Member may comply with the following in lieu of Section XI.A – E:
 - 1. Interconnection Member shall provide to Cass Electric, 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 Member ceases to self-insure to the level required hereunder, or if the Interconnection Member is unable to provide continuing evidence of its ability to self-insure, the Interconnection Member agrees to immediately obtain the coverage required under Section XI.A.
- G. Failure of the Interconnection Member or Cass Electric to enforce the minimum levels of insurance does not relieve the Interconnection Member from maintaining such levels of insurance or relieve the Interconnection Member 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:

Cass County Electric Cooperative Inc.
4100 32nd Ave SW
Fargo, ND 58104

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 Cass Electric

Cass County Electric Cooperative Inc.
Attention: President
4100 32nd Ave SW
Fargo, ND 58104

- b. If to Interconnection Member

Interconnection Member
Attention: Member
207 Cooperative Way
Fargo, ND 58104

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 Member shall not assign its rights nor delegate its duties under this Agreement without Cass Electric’s written consent. Any assignment or delegation the Interconnection Member makes without Cass Electric’s written consent shall not be valid. Cass Electric shall not unreasonably withhold its consent to the Interconnection Member’s assignment of this Agreement to any responsible future owner of the real property the Generating System is authorized serve.

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 CASS ELECTRIC'S RATES AND RULES.

1. This Agreement shall be interpreted, governed and construed under the laws of the State of North Dakota as if executed and to be performed wholly within the State of North Dakota 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 rate schedules and policies applicable to the electric service provided by Cass Electric, which rate schedules and policies are hereby incorporated into this Agreement by this reference.

F. AMENDMENTS 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 Cass Electric 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 Member or leased by the Interconnection Member 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 Member

Cass County Electric Cooperative Inc.

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

**EXHIBIT A – Generation System Description
and Single-Line Diagram.**

**EXHIBIT B – Summary of Cass County Electric Costs
and Description of Dedicated Facilities
being installed by
Cass County Electric
for the
Interconnection of the Generation System**

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

A: Acceptance Testing Costs

Cass County Electric Cooperative (CCEC) typically performs the acceptance testing of customer owned generator installations and hires an outside service to perform the actual relay testing portion of the acceptance testing process. Since CCEC is a cooperative, Interconnection Member, Inc. will only be charged the true costs associated with this testing. The cost associated for the acceptance testing process is typically in the neighborhood of \$1,500 to \$3,000 depending on how long the testing process takes. There are many factors that directly influence the time it takes to complete the acceptance testing, such as the type and number of relays, the complexity of the generator installation and the outcome of the tests performed.

EXHIBIT C – Engineering Data Submittal

EXHIBIT D – Operating Agreement

This Generation System Operating Agreement is entered into by and between Cass County Electric Cooperative Inc. (“Cass County Electric”) and Interconnection Member (“Interconnection Member”). Interconnection Member and Cass County Electric 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, the Parties agree as follows:

XIV. SCOPE AND PURPOSE

- A. This Agreement is intended to outline the terms, conditions, rights, obligations and maintenance requirements under which Interconnection Member may interconnect and operate a Generation System with a total Nameplate Capacity of kW at the generator location in parallel with Cass County Electric’s electrical distribution system.
- B. This Agreement does not authorize Interconnection Member, to export power or constitute an agreement to purchase or wheel West Fargo School power. Other services that Interconnection Member may require from Cass County Electric, or others, may be covered under separate agreements.
- C. This agreement does not constitute a request for the provision of any transmission delivery service or any local distribution delivery service.
- D. The Technical Requirements for interconnection are covered in a separate Technical Requirements document know as, the “Cass County Electric Cooperative Inc. Interconnection Requirements for Generation Systems”, a copy of which as been made available to Interconnection Member and incorporated and made part of this Agreement by this reference.

XV. 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 Interconnection Members 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: Cass County Electric shall have access at all times 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 the Cass County Electric grid safely, and to provide service to its members at all times. If necessary for the purpose of this Agreement, Interconnection Members shall allow Cass County Electric access to Cass County Electric's equipment and facilities located on its premises.
- C. Cooperation and Coordination: Both Cass County Electric and Interconnection Members shall communicate and coordinate their operations, so that the normal operation of the Cass County Electric grid does not unduly effect or interfere with the normal operation of the Generation System and the Generation System does not unduly affect or interfere with the normal operation of the Cass County Electric grid. Under abnormal operations of either the Generation System or the Cass County Electric grid, 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.
- D. Modifications to the Generation System: Interconnection Members shall notify Cass County Electric, in writing, prior to making any changes, alternations, additions, replacements or modifications to the Generation System. Such notice must be made no less than twenty business days prior to the modification. The notice must include all information reasonably required by Cass County Electric to undertake the review described in this paragraph. The nature of the proposed 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, must be included in the notification to Cass County Electric. Interconnection Members agrees not to commence installation of any modifications to the Generating System until Cass County Electric has approved the modification, in writing. Cass County Electric shall have a minimum of five (5) business days to review and respond to the planned modification. Cass County Electric 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. Notwithstanding the foregoing, in the event of any emergency creating risk of injury, death or property damage, Interconnection Members may undertake modifications without the approval of Cass County Electric, provided that, Interconnection Members provides written notice to Cass County Electric as soon as reasonably possible of the intent to make changes or of the changes made.
- E. Permits and Approvals: Interconnection Members must at all times comply with all governmental laws, ordinances, rule, regulations or other requirements, shall obtain all environmental and other permits lawfully required by governmental authorities

in connection with its operation and maintenance of their Generation System. Interconnection Members shall also maintain all required permits and comply with the requirements of such permits at all times during the term of this Agreement.

- F. Routine Maintenance Requirements: Both Cass County Electric and Interconnection Members shall communicate and coordinate their maintenance, so that the normal operation of the Cass County Electric grid 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 the Cass County Electric grid. Interconnection Members is required to inspect and perform routine maintenance on their generator. Interconnection Members should also inspect the relays for power and errors a minimum of four (4) times per year. The inspection and maintenance items shall include but are not limited to the cooling system, fuel system, air induction and exhaust system, lube oil system, starting system, engine monitors and safety controls, generator, and control panel
- G. Re-certification Inspection and Testing Schedule: For all closed transition installations, Cass County Electric requires that all relay settings be made per Cass County Electric's direction and tested by an approved entity after the installation is completed. If Interconnection Members does not have access to an approved testing entity, Cass County Electric can arrange for the testing procedure. All closed transition installations shall be inspected by Cass County Electric or Cass County Electric approved agent every five years from the initial date of installation. The inspection process shall include an on-site review of the installation, review of any maintenance work performed on the installation, and testing of all relays. Interconnection Members shall be responsible for all inspection and relay testing costs.
- H. Notification / Contacts: Cass County Electric Power Control Center (701-356-4400); Interconnection Members (701-356-2002)
- I. Cost of Testing: Interconnection Members is responsible for all costs arising out of the retesting of failed or modified equipment as well as the interconnection recertification inspection and testing costs as required in Appendix F of Cass County Electric's Interconnection Requirements for Generation Systems and Exhibit B – Summary of Cass County Electric Costs and Description of Dedicated Facilities.

XVI. 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 Members

By: _____

Name: _____

Title: _____

Date: _____

Cass County Electric Cooperative Inc

By: _____

Name: _____

Title: _____

Date: _____



**Cass County
Electric Cooperative**

Appendix F

Interconnection Requirements for Generation Systems

**As adopted by the Board of Directors of
Cass County Electric Cooperative Inc.
December 2004
Revised January 2013**

Cass County Electric Cooperative, Inc.
4100 32nd Avenue S
Fargo, ND 58104
PH: 701-356-4400
PH: 800-248-3292
FAX: 701-356-4502

I.	Foreword	1
II.	Introduction	2
III.	Definitions.....	2
IV.	Interconnection Requirements Goals	4
V.	Protection	4
VI.	CCEC System Modifications	4
VII.	Generation System Protection	4
VIII.	Electrical Code Compliance.....	5
IX.	References	5
X.	Types of Interconnections	6
XI.	Interconnection Issues and Technical Requirements.....	9
XII.	Generation Metering, Monitoring and Control	12
XIII.	Protective Devices and Systems.....	13
XIV.	Testing Requirements.....	18

I. 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 Cass County Electric Cooperative (CCEC) employees and its system. 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 members of CCEC is not compromised.

Many generation interconnection standards exist or are in draft form. The Institute of Electrical and Electronics Engineers (IEEE), Federal Energy Regulatory Commission (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 above requirements are in addition to this standard. This standard is designed to document the requirements where the others have 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 up to 10MW.

II. Introduction

This standard has been developed to document the technical requirements for the interconnection between a Generation System and CCEC’s system. This standard covers Generation Systems with an aggregate capacity of 10 MW or less at the Point of Common Coupling. This standard covers Generation Systems that are interconnected with CCEC’s system

CCEC 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 members connected to CCEC’s system.

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 “Cass County Electric Cooperative’s Interconnection Process for 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 CCEC’s rate schedules which will include available rates and applicable costs. The earlier the member or their consultant gets CCEC involved in the planning and design of the Generation System interconnection, the smoother the process will go.

III. Definitions

The definitions defined in the “IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems” (1547) 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.

- A. **Area EPS:** an electric power system (EPS) that serves Local EPSs. Note: Typically, an Area EPS has primary access to public rights-of-way, priority crossing of property boundaries, etc.
- B. **Area EPS Operator:** the entity that operates the Area EPS.
- C. **Closed Transition Transfer:** Method of transferring the local loads between Cass County Electric’s system and the generator such that the generator and CCEC’s system are interconnected for a short time (100 msec. or less).
- D. **Dedicated Facilities:** the equipment that is installed due to the interconnection of the Generation System and not required to serve other Area EPS Members.

- E. **EPS:** (Electric Power System) facilities that deliver electric power to a load. Note: This may include generation units.
- F. **Extended Parallel:** The Generation System is designed to remain connected with Cass County Electric for an extended period of time.
- G. **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.
- H. **Generation Interconnection Coordinator:** the person or persons designated by Cass County Electric to provide a single point of coordination with the Applicant for the generation interconnection process.
- I. **Generation System:** the interconnected generator(s), controls, relays, switches, breakers, transformers, inverters and associated wiring and cables, up to the Point of Common Coupling.
- J. **Interconnection Member:** 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, or any combination of these entities.
- K. **Local EPS:** an electric power system (EPS) contained entirely within a single premises or group of premises.
- L. **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.
- M. **Open Transition Transfer:** Method of transferring the local loads between Cass County Electric’s system and the generator such that the generator and CCEC’s system are never interconnected.
- N. **Point of Common Coupling:** the point where the Local EPS is connected to an Area EPS
- O. **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
- P. **Soft Loading Transfer:** Method of transferring the local loads between Cass County Electric’s system and the generator such that the generator and CCEC’s system are interconnected for a limited amount of time (generally less than three minutes). If the interconnection extends beyond three minutes, the interconnection is then defined as extended parallel.

Q. Technical Requirements: Cass County Electric Cooperative, Inc. “Interconnection Requirements for Generation Systems”

IV. Interconnection Requirements Goals

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

- A. Ensure the safety of utility personnel and contractors working on the electrical power system.
- B. Ensure the safety of utility members and the general public.
- C. Protect and minimize the possible damage to the electrical power system and other members’ property.
- D. Ensure proper operation to minimize adverse operating conditions on CCEC’s electrical power system.

V. Protection

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

- A. Size and type of the generating equipment.
- B. The method of connecting and disconnecting the Generation System from CCEC’s electrical power system.
- C. The location of generating equipment on CCEC’s system.

VI. CCEC System Modifications

Depending upon the match between the Generation System, CCEC’s system, and how the Generation System is operated, certain modifications and/or additions may be required to CCEC’s existing system with the addition of the Generation System. To the extent possible, this standard describes the modifications which could be necessary to CCEC’s system 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 CCEC. In these cases CCEC will provide the final determination of the required modifications and/or additions. If any special requirements are necessary they will be identified by CCEC during the application review process.

VII. Generation System Protection

The Interconnection Member is solely responsible for providing protection for the Generation System. Protection systems required in this standard are structured to protect CCEC’s 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 CCEC's system. CCEC does not assume any responsibility or liability for protection of the Generation System equipment or of any portion Local EPS.

VIII. Electrical Code Compliance

The Interconnection Member shall be responsible for complying with all applicable local, independent, state and federal codes such as, but not limited to: building codes, National Electric Code (NEC), National Electrical Safety Code (NESC) and noise and emissions standards. As required by North Dakota State law, CCEC will require proof of complying with the National Electrical Code through installation approval by an electrical inspector recognized by the North Dakota State Electrical Board before the interconnection is made.

The Interconnection Member'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 list of the standards which apply to the generation installations covered by this standard.

IX. 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 80, “IEEE Guide for Safety in AC Substation Grounding”,

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.

X. Types of Interconnections

The manner in which the Generation System is connected to and disconnected from CCEC’s system can vary. 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. Most transfer systems normally operate using one of the following four methods of transferring the load from CCEC’s system to the Generation System. References to loads or capacity level refer to the total capacity of the generator or combined generators in the case of multiple power sources. Where multiple transfer switches are used with one or more generators, the combined total of the generation capacity or load served is the value to be used when determining which type of interconnection is applicable.

- A. Open Transition (Break-Before-Make) Transfer Switch – With this transfer switch, the load to be supplied from the Generation System is first disconnected from CCEC’s system 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 CCEC’s system source before the Generation System 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 CCEC’s system. 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 than 500KW. This is due to possible voltage flicker problems created on CCEC's system, when the load is removed from or returned to CCEC's system as a source. CCEC strongly recommends the Interconnecting Member discuss all relative aspects of an open transition transfer switch operation with CCEC's Power Quality Department to properly understand the possible detrimental effects of this transition switch operation on the Member's equipment.

3. CCEC will allow a maximum project size of 500 KW using this type of transfer switch.
 4. Figure 1 at the end of this document provides a typical one-line diagram of this type of installation.
- B. Closed Transition (Make-Before-Break) Transfer Switch – The Generation System is synchronized with CCEC's system prior to the load transfer occurring. The transfer switch then parallels with CCEC's system for a short time (100 msec. or less) and then the Generation System and load is disconnect from CCEC's system. This transfer is less disruptive than the Open Transition because it allows the Generation System a brief time to pick up the load before the support of CCEC's system is lost. With this type of transfer, the load is always being supplied by CCEC's system or the Generation System.
1. As a practical point of application this type of transfer switch is typically used for loads less than 500KW. This is due to possible voltage flicker problems created on CCEC's system, when the load is removed from or returned to CCEC's system source. Depending up CCEC's system's stiffness this level may be larger or smaller then the 500KW level.
 2. CCEC will allow generators up to 750 KW to utilize this type of transfer switch.
 3. Figure 2 at the end of this document provides a typical one-line diagram of this type of installation and shows the required protective elements. The closed transition switch must include a separate parallel time limit relay, reverse power flow relay, and overcurrent relay which is not part of the generation control Programmable Logic Control (PLC). These relays trip the generation from the system for a failure of the transfer switch and/or the transfer switch controls.
- C. Soft Loading Transfer Switch
1. With Limited Parallel Operation – The Generation System is paralleled with CCEC's system for a limited amount of time (generally less then 3 minutes) to gradually transfer the load from CCEC's system to the Generation System. This minimizes the voltage and frequency problems by gradually loading and unloading the Generation System.
 - a. CCEC requires this type of transfer switch for any generators larger than 750 KW.

A minimum project size of 500 KW is required to utilize this type of transfer switch.

- b. 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.
 - c. Additional protective relaying is required as described in section XIII.
 - d. Figure 3 at the end of this document provides a typical one-line diagram of this type of installation and shows the required protective elements.
2. with Extended Parallel Operation – The Generation System is paralleled with CCEC’s system in continuous operation. Special design, coordination and agreements are required before any extended parallel operation will be permitted. CCEC will complete an interconnection study that will identify the issues involved.
- a. Any anticipated use of the Generation System in the extended parallel mode requires special agreements and special protection coordination.
 - b. Protective Relaying is required as described in section XIII.
 - c. Figure 4 at the end of this document provides a typical one-line diagram for this type of interconnection. It must be emphasized that this is a typical installation only and final installations may vary from the example shown due to transformer connections, breaker configuration, etc.
- D. Inverter Connection - This is a continuous parallel connection with the system. Small Generation Systems may utilize inverters to interface to CCEC’s system. Solar, wind and fuel cells are some examples of Generation which typically use inverters to connect to CCEC’s system. The design of such inverters shall either contain all necessary protection to prevent unintentional islanding, or the Interconnection Member shall install conventional protection to provide 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 Approval – The inverter shall be approved by CCEC for interconnection to the electrical power system prior to installation. The approval 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 approval is completed for that specific model, additional design review of the inverter should not be necessary by CCEC.
 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 CCEC's system.

3. A visible disconnect is required for safely isolating the Generation System 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 CCEC must be performed to determine any additional protection systems, metering or other needs. The issues will be identified by CCEC during the interconnection study process

XI. Interconnection Issues and Technical Requirements

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

1. Visible Disconnect - A disconnecting device shall be installed to electrically isolate CCEC's system 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."
 - a. The visible disconnect shall provide a visible air gap between Interconnection Member's Generation and CCEC's system in order to establish the safety isolation required for work on CCEC's system. This disconnecting device shall be readily accessible 24 hours per day by CCEC's field personnel and shall be capable of padlocking by CCEC's field personnel. The disconnecting device shall be lockable in the open position.
 - b. The visible disconnect shall be a manual safety disconnect switch of adequate ampere capacity approved by either Underwriter's Laboratories (UL) or the National Electrical Manufacturer's Association (NEMA). 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.
 - c. The visible disconnect shall be clearly labeled "Generation Disconnect" to inform CCEC's field personnel.
 - d. Energization of Equipment by Generation System – The Generation System shall not energize CCEC's system if it is de-energized. The Interconnection Member 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 CCEC system.

B. 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 than +/- 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 than +/-90%, during the period when the Generation System is parallel with CCEC's system, 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 CCEC and the Interconnection Member.

C. 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 Member 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

D. Energy sales to others by the Interconnecting Member – 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. CCEC will provide these additional contractual requirements during the interconnection approval process.

E. Additional Requirements - For Inverter based, closed transfer and soft loading interconnections, the following additional requirements apply:

1. Fault and Line Clearing - The Generation System shall be removed from CCEC's system for any faults, or outages occurring on the electrical circuit serving the Generation System
2. 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 CCEC's system through operating limits in order to minimize objectionable and adverse operating conditions on the electric service provided to other members connected to CCEC's system.

If the Generation System creates voltage changes greater than 4% on CCEC's system, it is the responsibility of the Interconnection Member 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 other members interconnected to CCEC's system, the Interconnection Member is responsible for correcting the problem.

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

The stiffer CCEC's system, the larger a block load change that it will be able to handle. For any of the transfer systems CCEC's system voltage shall not drop or rise greater than 4% when the load is added or removed from CCEC's system. It is important to note that if another interconnected member complains about the voltage change caused by the Generation System, even if the voltage change is below the 4% level, it is the Interconnection Member'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 than 2%, so most utility operators use a 2% design criteria.

4. Interference - The Interconnection Member shall disconnect the Generation System from CCEC's system if the Generation System causes radio, television or electrical service interference to other members via the EPS or interference with the operation of CCEC's system, including possible degradation of CCEC's load management 220 Hz ripple system signal. The Interconnection Member shall either effect repairs to the Generation System or reimburse CCEC for the cost of any required system modifications due to the interference.

5. Synchronization of Member Generation Systems

- a. An automatic synchronizer with synch-check relaying is required for unattended automatic closed transition or soft loading transfer systems.
- b. To prevent unnecessary voltage fluctuations on CCEC's system, it is required that the synchronizing equipment be capable of closing the Generation System into CCEC's system within the limits defined in IEEE 1547. Actual settings shall be determined by CCEC to establish the protective settings for the installation.
- c. Unintended Islanding – Under certain conditions with extended parallel operation, it would be possible for a part of CCEC's system to be disconnected from the rest of CCEC's 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 CCEC’s 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 CCEC’s system immediately by protective relays for any condition that would cause CCEC’s system to be de-energized. The Generation System must either isolate with the member’s load or trip off line. The Generation System must also be blocked from closing back into CCEC’s system until CCEC’s system is reenergized and CCEC’s system 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 CCEC’s system source(s) to remotely trip the generation interconnection to prevent islanding for certain conditions. The costs involved with this control modification would be the responsibility of the Interconnection Member.

- d. Disconnection – CCEC may refuse to connect, or may disconnect, a Generation System from CCEC’s system under the following conditions:
 - i. Lack of approved interconnection application, interconnection agreement, or interconnection operating agreement.
 - ii. Termination of interconnection by mutual agreement.
 - iii. Non-Compliance with the technical or contractual requirements.
 - iv. System Emergency or for imminent danger to the public or CCEC’s personnel (safety).
 - v. Routine maintenance, repairs and modifications to CCEC’s system. CCEC shall coordinate planned outages with the Interconnection Member to the extent possible.

XII. Generation Metering, Monitoring and Control

- A. CCEC’s revenue meter(s) and any necessary instrument transformers for meter installations shall be supplied, owned and maintained by CCEC.
- B. For Generation Systems that sell power, 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. Meters shall have detents installed to prevent reverse rotation of the meter.
- C. SCADA (Supervisory Control and Data Acquisition) options are possible through CCEC’s system operation, including remote and tele-metering. Members interested in this option should contact CCEC for more information and details.

XIII. Protective Devices and Systems

Protective devices required to permit safe and proper operation of CCEC's system while interconnected with Member's Generation System are listed in Table 1 and shown in the figures at the end of this document. In general, an increased degree of protection is required for increased Generation System size. This is due to the greater magnitude of short circuit currents and the potential impact to system stability from these installations. Larger 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 Member 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 CCEC's system. The Interconnection Member shall be responsible for the purchase, installation, and maintenance of these devices. Discussion on the requirements for these protective devices and systems follows:

A. Relay settings and Testing (Trip Checks)

1. For all closed transition, soft loading transition, and extended parallel transition installations, CCEC requires that all relay settings be made per CCEC's direction and tested by an approved entity after the installation is completed. If the Interconnection Member does not have access to an approved testing entity, CCEC can arrange for the testing procedure. The Interconnection Member shall be responsible for all relay testing costs.
2. All closed transition transfer installations shall be inspected by CCEC every five years from the initial date of installation. All soft loading transfer installations shall be inspected by CCEC every three years from the initial date of installation. The inspection process shall include an on-site review of the installation, review of any maintenance work performed on the installation, and testing of all relays. The Interconnection Member shall be responsible for all relay testing costs. (See Commission Testing for more information)

B. Relays

1. All equipment providing relaying functions shall be utility grade and 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 less than 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-line diagrams.
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 CCEC's system interconnect study of the Generation System installation. 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 member's equipment, so that no protective devices will operate on CCEC's system. 51V is a voltage restrained or controlled over-current relay and may be required to provide proper coordination with CCEC's system.
 - b. Over-voltage relays (IEEE Device 59) shall operate to trip the Generation System per the requirements of IEEE 1547.
 - c. Under-voltage relays (IEEE Device 27) shall operate to trip the Generation System per the requirements of IEEE 1547
 - d. Over-frequency relays (IEEE Device 81O) shall operate to trip the Generation System off-line per the requirements of IEEE 1547.
 - e. Under-frequency relay (IEEE Device 81U) shall operate to trip the Generation System off-line per the requirements of IEEE 1547. For Generation Systems with an aggregate capacity greater than 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 CCEC's system is required for this setting. CCEC's system will provide the reference frequency of 60 Hz. The Generation System 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 CCEC's system) shall operate to trip the Generation System off-line for a power flow to the system with a maximum time delay of 1.0 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 de-energized 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 CCEC’s system when CCEC’s system is disconnected from its source to avoid unintentional islanding. With larger Generation Systems which remain in parallel with CCEC’s system, a transfer trip system may be required to sense the loss of CCEC’s system source. When CCEC’s system source is lost, a signal is sent to the Generation System to separate the Generation from CCEC’s system. The size of the Generation System vs. the capacity and minimum loading on the feeder will dictate the need for transfer trip installation. CCEC’s system interconnection study of the Generation System installation will identify the specific requirements.

If multiple power sources or multiple points of sectionalizing are available on CCEC’s system, then more than one transfer trip system may be required. The area EPS interconnection study will identify the specific requirements. For some installations the alternate CCEC 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 CCEC.

- i. Parallel limit timing relay (IEEE Device 62PL) set at a maximum of 120 seconds for soft transfer installations and set no longer than 100ms for closed transition transfer installations, shall trip the Generation System 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.

I. Agreements

- A. Interconnection Agreement – This agreement is required for all Generation Systems that parallel at any time with CCEC’s 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 CCEC’s system. Some of the issues covered in the interconnection agreement are as follows;
 - 1. Construction Process
 - 2. Testing Requirements

TABLE 1 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 62PL	Sync-Check (25)	Transfer Trip
Open Transition Mechanically Interlocked (Fig. 1)	—	—	—	—	—	—	—	—
Closed Transition (Fig. 2)	—	—	—	Yes	Yes	Yes	Yes	—
Soft Loading Limited Parallel Operation (Fig. 3)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—
Soft Loading Extended Parallel (Fig. 4)	Yes	Yes	Yes	—	Yes	—	Yes	Maybe
Inverter (Fig 5)								
< 40 KW	Yes	Yes	Yes	—	Yes	—	Yes	—
> 40 KW	Yes	Yes	Yes	—	Yes	—	Yes	Maybe

3. Maintenance Requirements
4. Firm Operating Requirements such as Power Factor
5. Access requirements for CCEC's system personnel
6. Disconnection of the Generation System (Emergency and Non-emergency)
7. Term of Agreement
8. Insurance Requirements
9. Dispute Resolution Procedures

B. Operating Agreement – For Generation Systems that normally operate in extended parallel with CCEC's system, an agreement separate from the Interconnection Agreement, called the "Interconnection Operating Agreement", is usually created. This agreement is created for the benefit of both the Interconnection Member and CCEC 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 integrated 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 both the

Interconnecting Member's and CCEC's systems. The items typically included in the operating agreement are as follows:

1. Emergency and normal contact information for both CCEC's Power Control center and for the Interconnection Member
 2. Procedures for periodic Generation System test runs.
 3. Procedures for maintenance on CCEC's system that affect the Generation System.
 4. Emergency Generation Operation Procedures
- C. 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 to be changed to meet the needs of both Cass County Electric and the Interconnection Member, provided that such change does not negatively affect the other Party. There may also be changes required by outside issues such as changes in MAPP, FERC, and MISO requirements and/or policies which will require this agreement to be modified.

Issues defined in this agreement will include:

1. Routine Maintenance Requirements
 - a. Who is providing maintenance and their contact information
 - b. Periods of maintenance
 2. Modifications to the Generation System - The Interconnection Member shall notify Cass County Electric 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, VTs & CTs, generating capacity and associated wiring shall be included in the notification to Cass County Electric. The Interconnection Member agrees not to commence installation of any modifications to the Generating System until Cass County Electric has approved the modification in writing. Cass County Electric 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.
- D. Electric Service Agreement – This agreement will pertain to those systems which are interconnected to CCEC's for extended periods of time for the purpose of reselling electrical energy to CCEC. Each agreement will be unique to the installation for which it is written and contain the terms and conditions on the sale of the energy between the Interconnection member and CCEC.

XIV. Testing Requirements

A. Protective Relaying and Equipment Related to Islanding

1. Generation System shall be equipped with protective hardware and/or software designed to prevent the Generation from being connected to a de-energized CCEC system.

The Generation may not close into a de-energized CCEC system and protection must be provided to prevent this from occurring. It is the Interconnection Member's responsibility to provide a final design and to install the protective measures required by CCEC. CCEC 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 Member obtain CCEC's written approval prior to ordering protective equipment for parallel operation. The Interconnection Member will own these protective measures installed at their facility.

2. The Interconnection Member shall obtain prior approval from CCEC for any revisions to the specified relay calibrations.

B. Commission Pre-testing

The following tests shall be completed by the Interconnection Member for all transfer designs except open transition. All of the required tests in each section shall be completed prior to moving on to the next section of tests. CCEC 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 CCEC shall be notified with sufficient lead time to allow the opportunity for its personnel to witness any or all of the testing.

The following tests are required to be completed on the Generation System prior to energization by the Generator or CCEC's system. 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 an “*”:

1. Grounding shall be verified to ensure that it complies with this standard, the NESC and the NEC.
2. * CTs (Current Transformers) and VTs (Voltage Transformers) used for monitoring and protection, shall be tested to ensure correct polarity, ratio and wiring
3. CTs 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

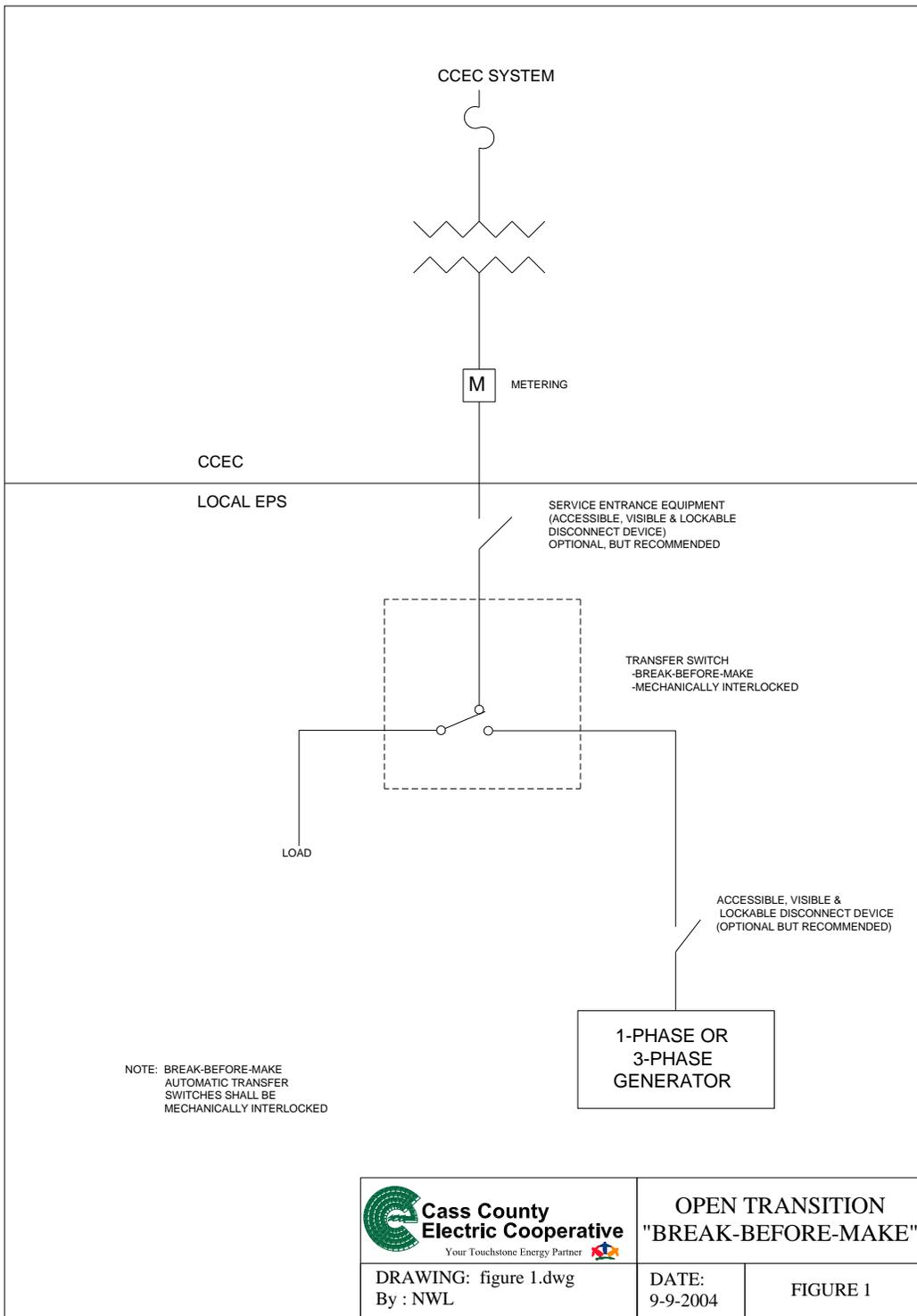
when in manual mode. Various Generation Systems have different interlocks, local or manual modes etc. The intent of this section is to ensure that the breaker or switch controls are operating properly.

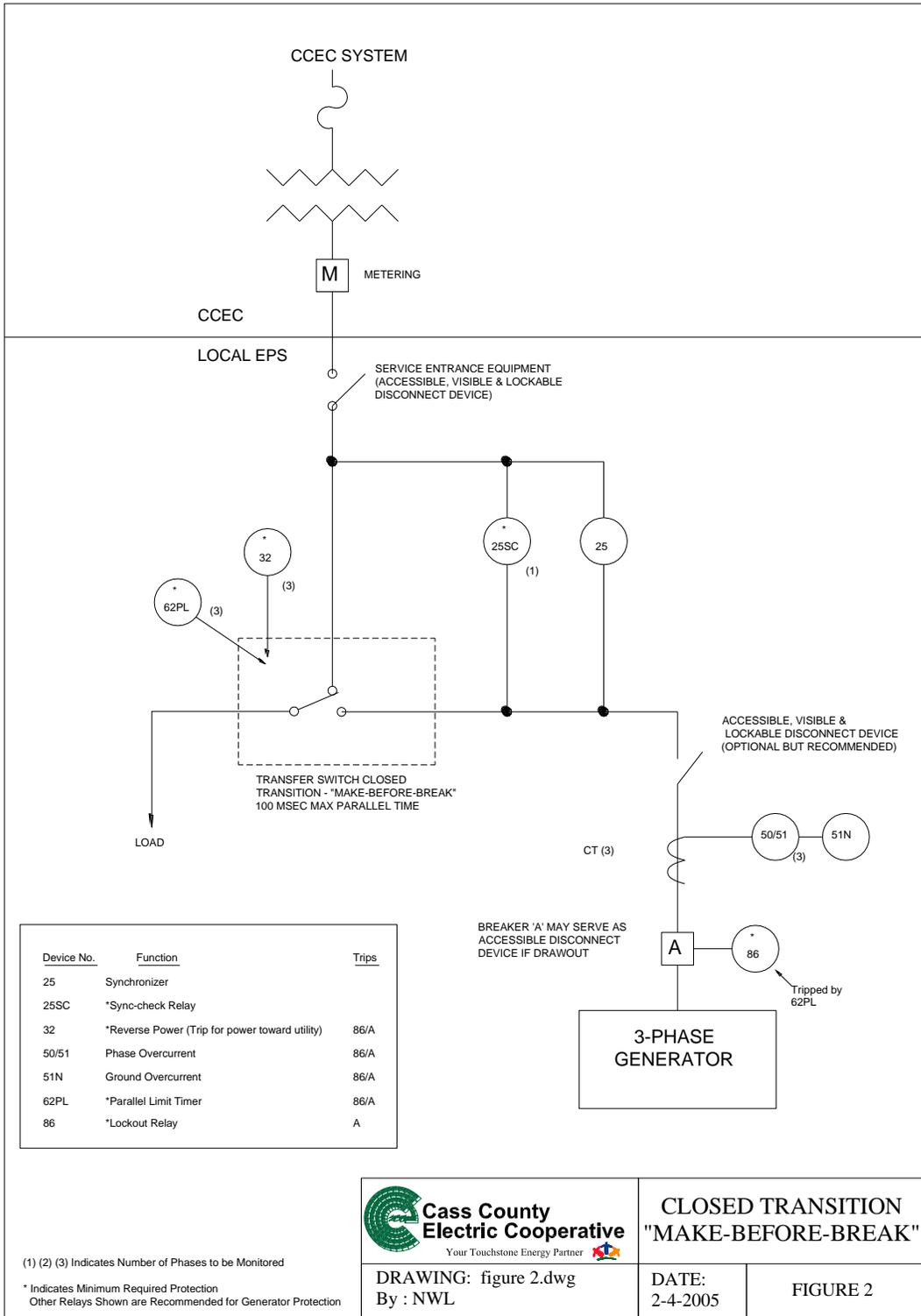
5. * Relay Tests – All Protective relays shall be calibrated and tested to ensure the correct operation of the protective element. Documentation of all relay calibration tests and settings shall be furnished to CCEC.
6. Trip Checks - Protective relaying shall be functionally tested to ensure the correct 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. Phase Tests – the Interconnection Member shall work with CCEC to complete the phase test to ensure proper phase rotation of the Generation and wiring.
 8. 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 CCEC's system 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 if 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.
- C. 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 CCEC. The Generation System shall be functionally verified for specific interconnections as follows:
1. Anti-Islanding Test – For Generation Systems that parallel with the utility for longer then 100msec.
 2. The Generation System shall be started and connected in parallel with CCEC's system source
 3. CCEC's system source shall be removed by opening a switch, breaker etc.
 4. The Generation System shall either separate with the local load or stop generating

5. The device that was opened to remove CCEC's system source shall be closed and the Generation System shall not re-parallel with CCEC's system for at least 5 minutes.
6. Periodic Testing and Record Keeping
 - a. Any time the interface hardware or software, including protective relaying and generation control systems are replaced and/or modified, CCEC shall be notified. This notification shall, if possible, be with sufficient warning so that CCEC 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 CCEC will depend upon the complexity of the Generation System and the component being replaced and/or modified. Since the Interconnection Member and CCEC 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 Member's and CCEC's system.
 - b. All closed transition transfer installations shall be inspected by CCEC every five years from the initial date of installation. All soft loading transfer installations shall be inspected by CCEC every three years from the initial date of installation. The inspection process shall include an on-site review of the installation, review of any maintenance work performed on the installation, and testing of all relays. The Interconnection Member shall be responsible for all relay testing costs (see Commission Testing for more information). Periodic test reports and a log of inspections shall be maintained by the Interconnection Member and made available to CCEC upon request. CCEC shall be notified prior to the periodic testing of the protective systems so that it may witness the testing if so desired.
 - c. Verification of inverter connected system rated 15kVA and below may be completed as follows. The Interconnection Member 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 closed.
 - d. Any system that depends on 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" with CCEC approval.





(1) (2) (3) Indicates Number of Phases to be Monitored
 * Indicates Minimum Required Protection
 Other Relays Shown are Recommended for Generator Protection

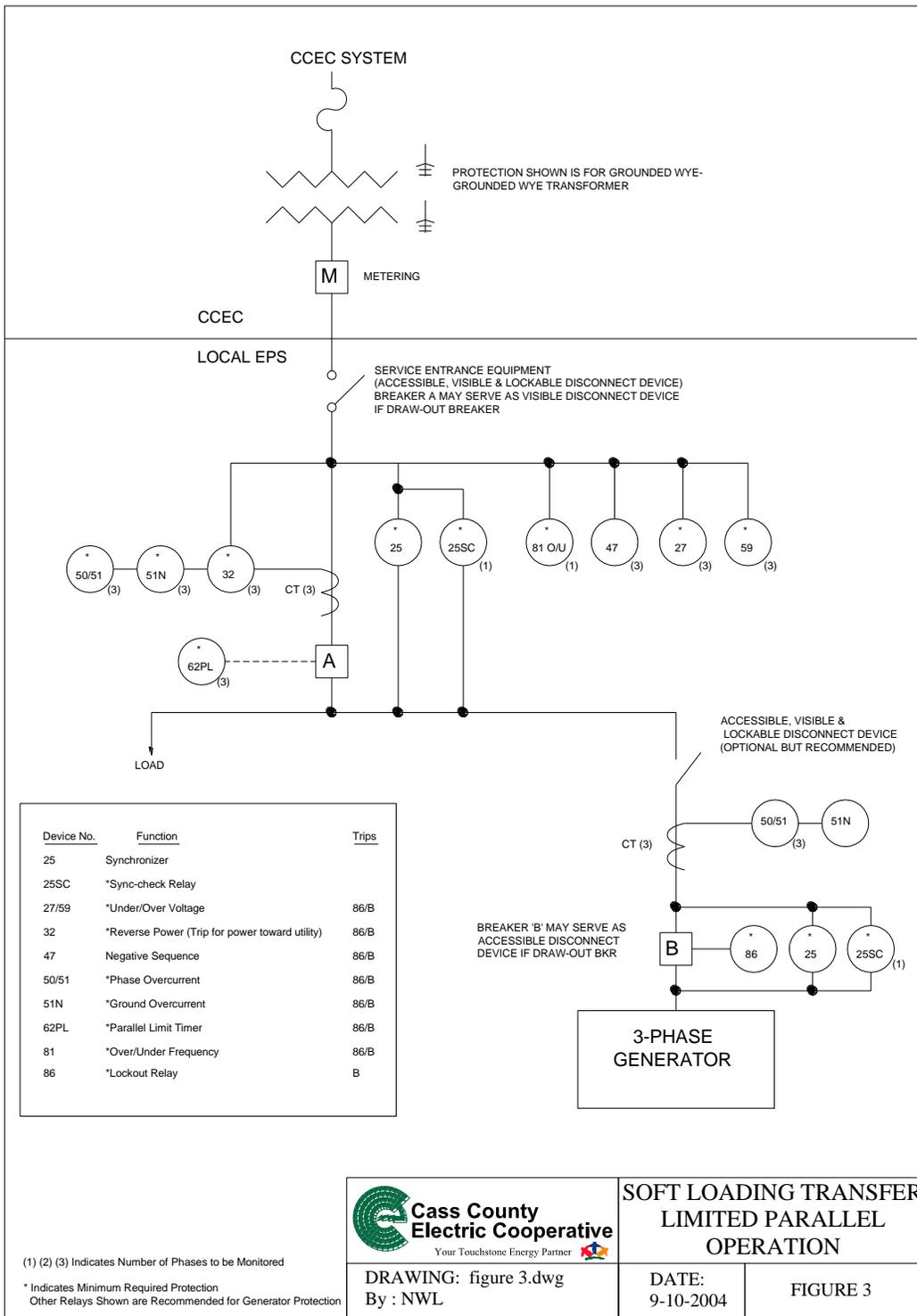


CLOSED TRANSITION "MAKE-BEFORE-BREAK"

DRAWING: figure 2.dwg
 By : NWL

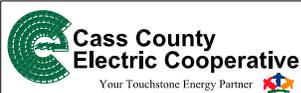
DATE:
 2-4-2005

FIGURE 2



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

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



**SOFT LOADING TRANSFER
LIMITED PARALLEL
OPERATION**

DRAWING: figure 3.dwg
By : NWL

DATE:
9-10-2004

FIGURE 3

