Requirements For Generation and Transmission Interconnections
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APPENDICES

A GLOSSARY
1.0 INTRODUCTION

Corn Belt Power Cooperative ("Corn Belt") is a generation and transmission owner and operator serving twenty-eight (28) counties in north central Iowa. Corn Belt is a Rural Utilities Service (RUS) borrower of the US Department of Agriculture and is not regulated by the Federal Energy Regulatory Commission (FERC).

Corn Belt is the designated transmission provider for eleven (11) local rural electric cooperatives (RECs) and one municipal cooperative. The RECs own and operate their 12.7 kV distribution system. Corn Belt’s transmission system contains 161 kV and 69 kV transmission lines.

Corn Belt’s member cooperatives include:

- Butler County REC
- Calhoun County REC
- Franklin REC
- Glidden REC
- Grundy County REC
- Humboldt County REC
- Iowa Lakes Electric Cooperative
- Midland Power Cooperative
- Prairie Energy Cooperative
- Sac County REC
- North Iowa Municipal Electric Cooperative Association (NIMECA)

Corn Belt has ties with FERC-regulated and non-FERC-regulated electric utilities. Corn Belt has developed this document to follow the applicable requirements of the FERC’s Order No. 888 (Large Generator Interconnection Procedure), Order No. 2006-A (Small Generator Interconnection Procedure), and Order No. 661 (Interconnection for Wind Energy) and the reliability standards as imposed by the regional reliability organization, the Midwest Reliability Organization or its successor and the North American Electric Reliability Corporation (NERC).

The Interconnection Request is to interconnect to Corn Belt’s transmission system (69 kV and above). The Interconnection Request shall be administered in accordance to Corn Belt’s Open Access Transmission Tariff (OATT) and supplemented by Attachment K to the Corn Belt OATT.

As a RUS borrower, Corn Belt is not required to offer transmission credits for any facilities deemed to be network upgrades or direct connection costs. Therefore, Corn Belt requires the Interconnection Customer to pay the full amount of the interconnection costs; this includes the interconnection studies, the switching station, the circuit breakers, the meter and associated metering equipment, the telemetry and communications equipment, the testing and maintenance of this equipment, and any upgrades or modification to the transmission system as identified by the interconnection studies.

An Interconnection Customer requesting interconnection to serve end-use load on one of Corn Belt’s member cooperatives must be made through the distribution cooperative that serves the area where the anticipated load is to be connected. Information on which cooperative serves certain areas can be found by calling Corn Belt Power Cooperative’s Headquarters at 515-332-2571.

A glossary of terms can be found in Appendix A of this document.
2.0 INTERCONNECTION POLICY

Corn Belt Power Cooperative’s Interconnection Policy permits an Interconnection Customer (the “Customer”) to operate generating equipment in parallel with the Corn Belt transmission system, provided it can be operated safely during start-up, normal and emergency situations. The policy strives to be nondiscriminatory and applicable to all customers interconnecting to Corn Belt's transmission system (the “System”).

In supporting Corn Belt’s Interconnection Policy, this document serves as a guideline stipulating the requirements necessary to interconnect. This document is not all-inclusive in capturing all specific equipment and installation requirements as they may necessitate modification of particular installations. The goals of this document are to:

- Protect the general public and Corn Belt personnel from injury, maintain system reliability, and to prevent damage to Corn Belt and customer-owned electrical equipment,
- Enforce standardization and consistency in the design, construction and maintenance of Corn Belt’s transmission and electrical facilities,
- Avoid inadequate designs of interconnection facilities that would degrade the System, thereby, contributing to the uniform service to all parties connected to Corn Belt system,
- Provide a starting point for the planning and conceptual design of the interconnection,
- Outline the minimum technical requirements for safe and effective operation of the Interconnection Customer’s generation connected in parallel with Corn Belt’s electric system,
- Ensure all approved parallel-operated, customer-owned generation are separated from the Corn Belt electric system during certain abnormal operating conditions, and
- Abide to the applicable procedures and policies of the Regional Reliability Coordinator and maintain compliance to the NERC Reliability Standards.

In adhering to the Interconnection Policy, the following assumptions are made:

- Corn Belt reserves the right to provide additional specific requirements applicable to either the Interconnection Request or the Transmission Service Request.
- Corn Belt requires that protective devices, as outlined in this policy, be installed at locations where a customer desires to operate their facility in parallel with Corn Belt.
- Corn Belt will reserve the right to discontinue interconnection service to any customer who violates any of established interconnection and operating requirements.
- Corn Belt shall not assume responsibility for the protection of customer’s generation or any other customer owned equipment.
- The Customer shall be responsible for protecting their system from all abnormalities, including those created by the operation of the Corn Belt system.
- The Customer has provided detailed design drawings showing the proposed interconnection and complies with good engineering and utility practices.
- The Customer facilities does not jeopardize the safety of Corn Belt personnel and the general public or have a detriment impact on Corn Belt’s system reliability.
3.0 STANDARD INTERCONNECTION PROCESS

The Standard Interconnection Process involves various interconnection forms, agreements, and studies, which are required to be performed in sequential order. FERC has established a time schedule that should be maintained in the course of the interconnection approval process. Deviations from the timeline may occur due to the change of study scope, contractor’s work schedule, which is beyond Corn Belt’s control, and the need for agreements to be drafted, altered and/or approved.

3.1. ASSUMPTIONS

Interconnecting with Corn Belt’s Transmission System, the following assumptions are made:

- The Interconnection Customer is a duly constituted legal entity authorized to transact business in the State of Iowa, is financially and otherwise capable of performing its obligations under Interconnection and Operating Agreement, and is experienced in the construction, operation, and maintenance of power generation supply facilities of the type and size contemplated by the Agreement.

- The Interconnection Customer is cognizant of and shall comply with all applicable safety rules, regulations, and practices applicable to the personnel and equipment that will be utilized in the performance of its obligations under the Agreement.

- Safety of personnel and equipment has priority.

3.2. INTERCONNECTION REQUEST

Parties requesting to interconnect to Corn Belt’s 161 kV, 69 kV or 12.47 kV systems shall submit an Interconnection Request to the following address:

Corn Belt Power Cooperative
Kevin Bornhoft
Vice President, Engineering & System Operations
P.O. Box 508
1300 13th Street North
Humboldt, IA 50548-0508

To assist a prospective Interconnection Customer, Corn Belt shall designate a contact person from whom information on the Interconnection Request and about the System can be obtained through informal requests regarding a proposed project. Information will not be made public if disclosure of such materials would violate security requirements or confidentiality agreements, or be contrary to law.

All Interconnection Requests will require the name, title, phone number and address for each person of responsibility:

- Study Contact The individual who will be resolving any questions pertaining to the proposed project.
- Billing Contact The individual who should receive the study cost invoices for the proposed project.
- Owner of Facility The individual or company who will be operating the facility after it is in-service. This individual would be the 24-hour contact person in case of operating issues.
- Operator of Facility The engineering firm who designed the proposed facility.

In addition to the above, the Interconnection Request must include:
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3.3. TYPES OF INTERCONNECTION

3.3.1. GENERATION INTERCONNECTION

An Interconnection Customer that wants to operate their generating facility in parallel with Corn Belt’s System must complete an Interconnection Request. In addition to the above, the request shall also include the following information:

- Number of generators
- Generator operating hours per year
- Anticipated Customer load with and without the generator
- Type of generating unit (i.e. synchronous or induction)
- Manufacturer and model number
- Rated output
- Rated power factor min and max
- Rated voltage
- Rated amps
- Energy source
  - If the generator is above 50 kW, please provide data for modeling the unit in steady state load flow and short circuit studies.
  - If the generator is above 10 MW, please provide the above data plus data for modeling the unit in dynamic stability studies.

3.3.1.1. TYPES OF GENERATOR INTERCONNECTION

The Interconnection process divides Interconnection Requests into groups according to whether the interconnection is to the 69 kV and above transmission system or to the distribution system, less than 69 kV. The aggregate amount of generation and the transmission system dictates as to how the Generator Interconnection Request is processed.

<table>
<thead>
<tr>
<th>Type of Generator</th>
<th>MW</th>
<th>&lt; 69 kV</th>
<th>69 kV and above</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Less than 1 MW</td>
<td>x</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>1 MW &lt; x &lt; 20 MW</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Large</td>
<td>20 MW or larger</td>
<td>--</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Note: Any interconnection on 69 kV and above requires at least a three-breaker switching station.

3.3.2. TRANSMISSION INTERCONNECTION

An Interconnection Customer who wants to interconnect their transmission system with Corn Belt’s must provide the following:

- Loop or radial interconnection
- Equivalent system impedance at point of interconnection for load flow and short circuit studies
- Length of line to next substation
• System relay and control scheme
• Tap transformer sizes, voltages, winding connections, and impedances.

### 3.3.3. END-USER INTERCONNECTION

A Customer who wants to be interconnected, as an end-user must provide the following:

• Load kW
• Load kVAR and anticipated power factor
• Power factor correction equipment
• Harmonic generating sources, frequencies and magnitudes
• Step down transformer sizes, voltages, winding connections, and impedances
• Expected power usage curve by day and week.

### 3.4. INITIAL REVIEW

The Interconnection Request will be evaluated on the basis of the aggregate capacity of the site. The site may include multiple energy production devices, as might occur for a wind farm or an industrial cogeneration project serving multiple facilities, for which the Interconnection Customer seeks a single Point of Interconnection (POI).

After reviewing the Interconnection Request, any additional data required to complete the Interconnection Request or in preparation of an Interconnection Study shall be provided by the Interconnection Customer in a timely fashion. Otherwise, adjustments to the timeline for deliverables may be necessary.

### 3.5. QUEUE POSITION

Projects proposing to interconnection to the existing transmission system are placed in a queue in order to evaluate the proposal. The queue position may affect the Interconnection Customer's cost responsibility for any upgrades. This is because upgrades for interconnections higher in the queue may affect the need for upgrades for interconnections lower in the queue. This would impact the cost of the interconnection for a particular customer.

However, as such costs for Generating Facilities may be relatively localized; the Interconnection Customer can ask to be interconnected out of queue order if it agrees to pay the full cost of the required upgrades. This only applies to the Small Generating Facility, not the Large Generating Facility.

#### 3.5.1. REGIONAL QUEUE

After confirming the Interconnection Request is complete, Corn Belt will notify the Reliability Authority’s Tariff Administrator (the Midwest Independent System Operator, or successor) of the Interconnection Customer’s intention to interconnect to Corn Belt’s transmission system. The notice will stipulate the:

• Interconnect Request receipt date,
• Control area,
• Type of interconnection (generator or transmission),
• Description of the proposed project (wind, coal, gas turbine, etc.),
• Total amount of energy (MW),
• Point of interconnection (POI),
• County in which the POI is in,
• Proposed in-service date, and
• Other information the Reliability Authority may require at the time.
The request will be placed in Tariff Administrator’s queue (known as the Generation Interconnection Queue), which lists all Interconnection Requests in the Mid-Continent Area Power Pool (MAPP) region. As subsequent projects rely on previous projects recommended improvements and/or study results, Corn Belt will notify MISO of any changes to the status of the Interconnection Request in the queue.

3.5.2. CORN BELT INTERCONNECTION QUEUE

Corn Belt maintains an internal queue consisting of only projects wishing to interconnect directly to Corn Belt’s System. Each proposed project is assigned a unique number. The numbering format is of “TI-xx”, where the “xx” is a numerical number assigned in sequential order. The queue consists of a spreadsheet listing the Reliability Authority’s queue date and assigned queue number, if it exists, the interconnection customer, project name, size of project (in MW), point of interconnection and the Interconnection Request date. As a minimum, this spreadsheet acts as a management tool to track the timeline from receiving the interconnection request to completing the final interconnection study and denoting the implementation of the Interconnection and Operating Agreement.

3.6. RECORD RETENTION

Corn Belt, as the Transmission Provider, shall maintain records of all Interconnection Requests received, the times required to complete Interconnection Request approvals and disapprovals, and justifications for the actions taken on the Interconnection Requests. Such records shall be kept on file for three years.

3.7. REGIONAL REVIEWS AND APPROVAL

Corn Belt is subject to the rules and regulations of the Mid-Continent Area Power Pool (MAPP), which is one of the North American Electric Reliability Corporation (NERC) Regional Reliability Councils. The Mid-Continent Area Power Pool (MAPP) Design Review Subcommittee is established for the purpose of reviewing system generation and transmission plans (additions and retirements) to assure compliance by the Parties with MAPP’s System Design Standards and to determine overall reliability for the area. MAPP’S Regional Working Groups divides the MAPP region into five sub-regions, with the Iowa Transmission Working Group (ITWG) as one in which Corn Belt is a member of.

Corn Belt shall abide by the latest version of DRS’s Policies and Procedures when presenting the interconnection study for their review and approval. All transmission interconnections of 1 MW or greater that is planned to be accredited must be presented, studied, and approved by MAPP’s Design Review Subcommittee (DRS). System addition(s) of bulk electric supply facilities shall maintain or improve MAPP system operation, reliability and transfer capability. Additions, which cause degradation of operations, reliability, or transfer capability, will not be approved.

The interconnection study may also be reviewed and approved by the Ad Hoc Study Group in accordance to MAPP requirements and the DRS’s Policies and Procedures.

3.8. FINANCIAL RESPONSIBILITY

3.8.1. DISTRIBUTION UPGRADE COSTS

The costs of Distribution Upgrades shall be directly assigned to the Interconnection Customer. This is because Distribution Upgrades do not generally benefit all users. Distribution facilities generally deliver electricity to particular localities, and do not provide a bulk delivery service for the entire system. Accordingly, it is not appropriate that all users share the cost of Distribution Upgrades. Rather, the Interconnection Customer itself shall be solely responsible for the cost of Distribution Upgrades.
3.8.2. INTERCONNECTION POINTS

Corn Belt may propose to interconnect more than one Generating Facility at a single Point of Interconnection in order to minimize costs. However, an Interconnection Customer may elect to pay the entire cost for separate interconnection facilities.

3.8.3. INTERCONNECTION STUDY COSTS

To alleviate the need for the Customer to show creditworthiness and to ease the potential burden of its review, Corn Belt requires the full estimated study cost to be paid before the initial interconnection study begins. For the remaining interconnection studies, the Customer is required to pay either a pre-defined deposit or the entire amount of the good faith estimated cost of performing each Interconnection Study to Corn Belt Power Cooperative. The Customer shall pay all of Corn Belt's actual costs of performing each study. The Customer shall pay any costs that arise beyond the estimated study cost.

3.8.4. INTERCONNECTION COSTS

Once the steps called for in the interconnection process are completed, Corn Belt will provide a good faith best estimate of costs to be paid by the Interconnection Customer to effect the interconnection, and the Parties will negotiate Milestones for completing the interconnection, all of which will be incorporated into the Interconnection and Operating Agreement.

Any upgrade or modifications to Corn Belt's System identified to be required to support the proposed interconnection facility, is the financial responsibility of the Interconnection Customer. Corn Belt is the sole owner of any upgrades and modifications to Corn Belt's System. Note, as a RUS borrower, Corn Belt is not required to offer any transmission credits.

3.8.5. CHANGES

Once the Interconnection process is completed for the specified Interconnection Request, any material modification to the proposed Generating Facility, Interconnection Customer's Interconnection Facilities, or site of the interconnection not agreed to in writing by Corn Belt, shall require submission of a new Interconnection Request.

3.8.6. INSURANCE

The Interconnection Customer shall obtain and pay the cost of insurance coverage on the generating facility in such amounts as may be required by Corn Belt.

3.9. PROVISIONS FOR ALL REQUESTS

3.9.1. REASONABLE EFFORTS

Corn Belt shall make reasonable efforts to meet all time frames provided in these procedures unless Corn Belt and the Interconnection Customer agree to a different schedule. If Corn Belt cannot meet a deadline provided herein, it shall notify the Interconnection Customer, explain the reason for the failure to meet the deadline, and provide an estimated time by which it will complete the applicable interconnection process in the process.

3.9.2. INTERCONNECTION METERING

Any metering necessitated by the use of the Generating Facility shall be installed at the Interconnection Customer's expense in accordance with Federal Energy Regulatory Commission, state or local regulatory requirements and/or Corn Belt's specifications.
3.9.3. COMMISSIONING

Commissioning tests of the Interconnection Customer’s installed equipment shall be performed pursuant to applicable codes and standards. Corn Belt must be given at least five (5) Business Days written notice, or as otherwise mutually agreed to by the Parties, of the tests and may be present to witness the commissioning tests.

3.9.4. CONFIDENTIALITY

Confidential information shall mean any confidential and/or proprietary information provided by one Party to the other Party that is clearly marked or otherwise designated “Confidential.” For purposes of these procedures all design, operating specifications, and metering data provided by the Interconnection Customer shall be deemed confidential information regardless of whether it is clearly marked or otherwise designated as such.

Corn Belt may require the Generator to sign a Non-Disclosure Agreement.

Confidential Information does not include information previously in the public domain, required to be publicly submitted, or divulged by Governmental Authorities (after notice to the other Party and after exhausting any opportunity to oppose such publication or release), or necessary to be divulged in an action to enforce these procedures. Each Party receiving Confidential Information shall hold such information in confidence and shall not disclose it to any third party nor to the public without the prior written authorization from the Party providing that information, except to fulfill obligations under these procedures, or to fulfill legal or regulatory requirements.

Each Party shall employ at least the same standard of care to protect Confidential Information obtained from the other Party as it employs to protect its own Confidential Information.

Each Party is entitled to equitable relief, by injunction or otherwise, to enforce its rights under this provision to prevent the release of Confidential Information without bond or proof of damages, and may seek other remedies available at law or in equity for breach of this provision.

Notwithstanding anything in this article to the contrary, and pursuant to 18 CFR § 1b.20, if FERC, during the course of an investigation or otherwise, requests information from one of the Parties that is otherwise required to be maintained in confidence pursuant to these procedures, the Party shall provide the requested information to FERC, within the time provided for in the request for information. In providing the information to FERC, the Party may, consistent with 18 CFR § 388.112, request that the information be treated as confidential and non-public by FERC and that the information be withheld from public disclosure. Parties are prohibited from notifying the other Party prior to the release of the Confidential Information to FERC. The Party shall notify the other Party when it is notified by FERC that a request to release Confidential Information has been received by FERC, at which time either of the Parties may respond before such information would be made public, pursuant to 18 CFR § 388.112. Requests from a state regulatory body conducting a confidential investigation shall be treated in a similar manner if consistent with the applicable state rules and regulations.

3.9.5. COMPARABILITY

Corn Belt shall receive, process and analyze all Interconnection Requests in a timely manner as set forth in this document. Corn Belt shall use the same reasonable efforts in processing and analyzing Interconnection Requests from all Interconnection Customers, whether the Generating Facility is owned or operated by Corn Belt, its subsidiaries or affiliates, or others.
3.9.6. RECORD RETENTION

Corn Belt shall maintain for three years records, subject to audit, of all Interconnection Requests received under these procedures, the times required to complete Interconnection Request approvals and disapprovals, and justification for the actions taken on the Interconnection Requests.

3.9.7. INTERCONNECTION AND OPERATING AGREEMENT

After receiving an Interconnection and Operating Agreement from Corn Belt, the Interconnection Customer shall have thirty (30) Business Days or another mutually agreeable timeframe to sign and return the Interconnection and Operating Agreement. If the Interconnection Customer does not sign the Interconnection and Operating Agreement within thirty (30) Business Days, the Interconnection Request shall be deemed withdrawn. After the Interconnection and Operating Agreement is signed by the Parties, the interconnection of the Generating Facility shall proceed under the provisions of the Interconnection and Operating Agreement.

3.9.8. COORDINATION WITH AFFECTED SYSTEMS

Corn Belt shall coordinate the conduct of any studies required to determine the impact of the Interconnection Request on Affected Systems with Affected System operators and, if possible, include those results (if available) in its applicable interconnection study within the time frame specified in these procedures. Corn Belt will include such Affected System operators in all meetings held with the Interconnection Customer as required by these procedures. The Interconnection Customer will cooperate with Corn Belt in all matters related to the conduct of studies and the determination of modifications to Affected Systems. A Transmission Provider, which may be an Affected System, shall cooperate with Corn Belt with whom interconnection has been requested in all matters related to the conduct of studies and the determination of modifications to Affected Systems.

3.9.9. CAPACITY OF SMALL GENERATING FACILITY

If the Interconnection Request is for an increase in capacity for an existing Generating Facility, the Interconnection Request shall be evaluated on the basis of the new total capacity of the Generating Facility.
If the Interconnection Request is for a Generating Facility that includes multiple energy production devices at a site for which the Interconnection Customer seeks a single Point of Interconnection, the Interconnection Request shall be evaluated on the basis of the aggregate capacity of the multiple devices.

The Interconnection Request shall be evaluated using the maximum rated capacity of the Generating Facility.
4.0 LARGE GENERATOR INTERCONNECTION PROCEDURE

To evaluate the impacts and determine what modifications are needed on the transmission system to allow the proposed interconnection, the interconnection studies must be performed within the general requirements of the MAPP region's planning guidelines. The studies performed by Corn Belt are solely for the use of Corn Belt and the Interconnection Customer. Additional studies required by MAPP or its successor organizations are the responsibility of the requester.

The interconnection procedure for the Large Generator, 20 MW or greater, consists of three sequential interconnection studies, including the optional Feasibility Study, System Impact Study, and Facility Study, in accordance to the general requirements of the FERC Order No. 888. In addition, a Transmission Service Request Study is required for non-MISO members.

The transmission system under study primarily involves Corn Belt’s transmission system, as Corn Belt is considered the Transmission Provider. However, since the interconnection of a generator with Corn Belt’s transmission system may directly or indirectly affect other electric systems, the studies may also identify modifications necessary on Corn Belt’s neighboring utilities’ transmission system (Affected System). In order to maintain communication of changes, upgrades, or interconnections to the grid, Corn Belt will inform their neighboring electrical transmission utilities of the Interconnection Request. Corn Belt will conduct each study to determine the impact of the Interconnection Request has on any and all Affected Systems and include those results in the applicable study within the time frame specified in these procedures. Affected System representatives will be invited to all meetings held with the Interconnection Customer as required by these procedures.

Corn Belt cannot compel the owner/operator of the Affected System to perform their network upgrades within the specified time lines. Corn Belt will use its best efforts to coordinate and complete necessary studies and upgrades in time for the interconnection of the Generator.

NOTE: The listed dates in the following paragraphs, and in Table 4.1, represent the optimal time line suggested by the FERC order(s) to accomplish each task. Corn Belt relies on the input and support from other electric utilities and organizations for each interconnection study. Therefore, Corn Belt cannot be held accountable to timelines that is beyond Corn Belt's control.

4.1 SCOPING MEETING

A Scoping Meeting will be scheduled within ten (10) Business Days after Corn Belt has notified the Interconnection Customer that the Interconnection Request is deemed complete. The purpose of the meeting shall be to review the Interconnection Request, and identify existing studies relevant to the Interconnection Request. Parties are expected to bring to the meeting personnel; including system engineers and other resources as may be reasonably required to accomplish the purpose of the meeting. Representatives from Affected Systems which interconnect to Corn Belt’s transmission system may be invited if it has been determined that the interconnection affects their system.

Within ten (10) Business Days after the Scoping Meeting, Corn Belt will offer a Feasibility Study Agreement including an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study, to the Interconnection Customer for the proposed interconnection.

4.2 FEASIBILITY STUDY

4.2.1 PURPOSE

The Feasibility Study will preliminarily evaluate the feasibility of interconnecting the proposed facility to Corn Belt’s transmission system. The Feasibility Study will consider the capability and configuration of Corn Belt’s current transmission system, as well as all generating facilities that, on the date the Feasibility Study is commenced:
Requirements for Generation and Transmission Interconnections

- Are directly interconnected to Corn Belt’s transmission system,
- Are interconnected to a neighboring transmission or distribution system,
- May have an impact on the Interconnection Customer’s request, and
- Have a pending higher queued Interconnection Request to interconnect to Corn Belt’s transmission system.

4.2.2. PROCESS

Corn Belt will respond to the Interconnection Request in writing notifying the requesting party of the need for a Feasibility Study and the estimated cost for the study. The Feasibility Study Agreement must be completed and executed within the specified time schedule and the full estimated study cost paid before the requesting party loses its position to other requesters. The estimated study cost for the performance of the study is required with the signed agreement.

The Interconnection Customer is responsible for the actual costs of the study. If the study cannot be completed in the specified time period, Corn Belt will notify the requesting party, revise the estimated time until completion, estimate any additional costs, and provide an explanation of the reasons that additional time is required to complete the study. If the estimated study cost paid by the requesting party exceeds the cost of the Feasibility Study, the excess amount shall be refunded.

4.2.3. SCOPE

The Feasibility Study will consist of a power flow and short circuit analysis. It will provide a list of facilities and a non-binding good faith estimate of cost responsibility and a non-binding good faith estimated time to construct. Corn Belt will utilize existing studies to the extent practicable when it performs the Feasibility Study. Corn Belt contemplates that it will require approximately forty-five (45) Business Days to complete the Feasibility Study after all of the necessary data is received. Corn Belt will, in writing, advise the Interconnection Customer of any additional time that may be necessary to complete the Study.

If Interconnection Customer requests that the Feasibility Study evaluate multiple potential points of interconnection, additional evaluations may need to be performed. The Interconnection Customer shall pay all such evaluations.

4.2.4. DELIVERABLES

A Feasibility Study will include the following analyses for the purpose of identifying a potential Adverse System Impact to Corn Belt's Transmission System that would result from the interconnection:

- Initial identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection,
- Initial identification of any thermal overload or voltage limit violations resulting from the interconnection,
- Initial review of grounding requirements and system protection, and Preliminary description and non-binding estimated cost of facilities required to interconnect the generating facility to Corn Belt's transmission system in a safe and reliable manner. The description and cost are
for information only and should not be considered final. The Facility Study will determine the final requirements and cost associated with the interconnection.

4.2.5. ADDITIONAL REVIEW

The Transmission Service Request System Impact Study Agreement will be issued to the Interconnection Customer within the specified time of receiving the final Feasibility Study Report.

NOTE: The second interconnection study is either a System Impact Study (Section 4.3) or a Transmission Service Request System Impact Study (Section 4.5) depending if the customer has submitted a Transmission Service Request (TSR) to Corn Belt Power Cooperative. If no TSR has been submitted, then a System Impact Study will be performed, with the TSR Study to be conducted in the near future once the Customer has defined the delivery point or purchaser of the generated energy.

4.3. SYSTEM IMPACT STUDY (SIS)

4.3.1. PURPOSE

The System Impact Study shall identify and detail the system impacts on the safety and reliability of Corn Belt's transmission system and, if applicable, Affected Systems, that would result if the generating facility were interconnected without project modifications or system modifications. The study focuses on the adverse system impacts identified in the Feasibility Study, and studies potential impacts, including but not limited to those identified in the Scoping Meeting.

If an end-user interconnection request is below 500 kVA, no study is required. The requesting party and Corn Belt will proceed to the Interconnection and Operating Agreement. If an end-user interconnection request is above 500 kVA, a System Impact Study is required. The requesting party and Corn Belt will proceed with the complete process.

4.3.2. PROCESS

Corn Belt will make a good faith attempt to complete the System Impact Study within the specified number of days from receipt of the signed System Impact Study Agreement. A deposit for the performance of the study is required with the signed agreement. The interconnection customer is responsible for the actual costs of the study. If the study cannot be completed in the specified time period, Corn Belt will notify the requesting party, revise the estimated time until completion, estimate any additional costs, and provide an explanation of the reasons that additional time is required to complete the study.

On the date the System Impact Study is commenced, the study will consider the base case as well as all generating facilities that:

- Are directly interconnected with Corn Belt's transmission system,
- Are interconnected with Affected Systems and may have an impact on the proposed interconnection, and
- Have a signed Interconnection Agreement to interconnect with Corn Belt's transmission system.

Where the Feasibility Study shows a potential transmission system Adverse System Impact, within the specified time following transmittal of the Feasibility Study report, Corn Belt shall notify any Affected Systems in accordance with the procedures provided for in Corn Belt's Tariff on file with FERC. Corn Belt shall also send the interconnection customer a System Impact Study
Agreement, including an outline of the scope of the study and a good faith estimate of the cost to perform the study.

4.3.3. SCOPE

The System Impact Study will consider, as appropriate, a short circuit analysis, a stability analysis, a power flow analysis, voltage drop and flicker studies, protection and set point coordination studies, and grounding reviews.

The study scope will be developed outlining the following major items:

- Summary of request to be studied including MW amount, the specified source and sink, the point of receipt (POR) and the point of delivery (POD), and the start and stop dates.
- Listing of parties to be included on the Ad Hoc Study Group for yearly firm point-to-point TSRs.
- Description of the models proposed as the starting point for the study models.
  - Describe the lineage of the models as well as known changes that will be made.
  - Listing of any must-run generators.
- Description of the contingencies to be run and the flowgates to be monitored.
- Discussion of the manner in which the project under study will be modeled. Describe which generators will be incremented and decremented to simulate the request. Non-dispatchable resources shall typically be dispatched against on-line generating units that operate on Automatic Generation Control (AGC). For point-to-point requests the generator specified as the Source will be incremented and the generator specified as the Sink will be decremented.
- Description of the report review procedures.

4.3.4. DELIVERABLES

The System Impact Study will state the results of the analyses and provide the requirements or potential impediments to providing the requested interconnection service, including a preliminary indication of the cost and length of time that would be necessary to correct any problems identified in those analyses and implements the interconnection. The study will provide a list of facilities that are required as a result of the interconnection request and a non-binding good faith estimate of cost responsibility and a non-binding good faith cost estimate to construct.

The System Impact Study report shall provide the following information:

- Identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- Identification of any thermal overload or voltage limit violations resulting from the interconnection;
- Identification of any instability or inadequately damped response to system disturbances resulting from the interconnection; and
- Description and non-binding good faith estimated cost of facilities required to interconnect the Generating Facility to Corn Belt’s Transmission System and to address the identified short circuit, instability, and power flow issues.
4.3.5. ADDITIONAL REVIEW

All affected parties shall be afforded an opportunity to review and comment upon a System Impact Study that covers potential Adverse System Impacts on their systems.

Once the System Impact Study is complete and the report has been finalized, Corn Belt will notify the MAPP Design Review Subcommittee (DRS) for approval. The cost of any additional studies required by the DRS, will be the responsibility of the interconnection customer. Any changes to the timeline established will be adjusted to accommodate the DRS’ review and approval processes. Upon the DRS’ approval for generation interconnection only, the interconnection process will continue with the Interconnection Facility Study. However, if a Transmission Service Request has been submitted while the System Impact Study was started, a Transmission Service Request Study needs to be performed and approved by the DRS for deliverability of the generation.

Upon completion of the System Impact Study, a report will be transmitted to Interconnection Customer along with an Interconnection Facility Study Agreement, which includes an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study.

4.4. TRANSMISSION SERVICE REQUEST STUDY (TSR STUDY)

4.4.1. PURPOSE

The Interconnection Customer must submit a Transmission Service Request (TSR) through the Reliability Authority’s Tariff Administrator, or its successor, for Corn Belt’s transmission service and for approval. The TSR is required for the Interconnection Customer to be able to deliver the generated output to the purchaser.

4.4.2. PROCESS

Corn Belt receives notification from the Reliability Authority’s Tariff Administrator, or its successor, when a TSR has been submitted for transmission service on Corn Belt’s transmission system (69 kV and above) initiating the need for a TSR Study.

Corn Belt will make a good faith attempt to complete the Transmission Service Request Study within the specified number of days from receipt of the signed Transmission Service Request Study Agreement. A deposit for the performance of the study is required with the signed agreement. The Interconnection Customer is responsible for the actual costs of the study. If the study cannot be completed in the specified time period, Corn Belt will notify the requesting party, revise the estimated time until completion, estimate any additional costs, and provide an explanation of the reasons that additional time is required to complete the study.

The Transmission Service Request Study will be carried out in accordance with the general guidelines of the MAPP or its successor organization, North American Energy Reliability Corporation (NERC), and prudent utility practice.

4.4.3. SCOPE

The TSR Study evaluates the deliverability of the proposed generation to the Corn Belt system. The long term, firm network TSR is requested under the Corn Belt Open Access Transmission Energy Market Tariff. The generator must reserve the number of megawatts long term, firm network service from the generating facility in the specific control area to the load in the specific control area. The duration of the requested service is listed (from date/to date).
The Transmission Service Request Study will perform the following activities to ensure that a complete evaluation of deliverability is made:

- **AFC/ATC/ASTFC** – will be based on the MAPP Impact Calculator results and contract pass ATC evaluation no included in the MAPP process.
- **Facility limits** – those limits provided by the transmission provider, Corn Belt.
- **Service Points**
- **Pricing**
- **Timing**

If a firm TSR fails in its AFC evaluation, the customer will be notified and may request a Flowgate Redispatch (FRD) according to the MAPP Policy and Procedures within the timing requirements. FRD is not permissible for a TSR that fails ATC.

### 4.4.4. DELIVERABLES

The Transmission Service Request Study will perform:

- **Flowgate Analysis** –
  - Determine whether available transmission capacity exists to accommodate the portion of the proposed transaction flowing on the concerned interface with capacity being preserved for transmission reliability (TRM) and capacity benefit margin (CBM).
  - TRM and CBM are applied through existing flowgate ratings.
  - Provide recommended corrective actions, network upgrades, and/or operating procedure in resolving generation’s negative impact on the flowgates.

- **Steady State Analysis** –
  - Assess impacts of the proposed transmission service on the Corn Belt and surrounding systems.
  - Distribution factors are determined through comparisons of cases with and without the transaction.
  - Provide recommended corrective actions, network upgrades, mitigation solutions, and/or operating procedures in resolving generation’s negative impact on thermal overload and/or voltage limit violations on Corn Belt’s and other utilities’ transmission lines.

- **Assessment** –
  - Provide basis for approval of the proposed reservation, including whether approval depends on the outcome of higher priority pending transactions.
  - Provide conditions for approval of the proposed reservation, including, but not limited to the need for redispatch and/or reduced level of the Transmission Service.
  - Provide stipulations regarding rollover period limitations.

- If above analysis determines the proposed service cannot be granted:
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- Provide improvements needed in the Facility Study.
- Identify conceptual facility improvements.

4.4.5. ADDITIONAL REVIEW

All affected parties shall be afforded an opportunity to review and comment upon a Transmission Service Request Study that covers potential Adverse System Impacts on their systems.

Once the Transmission Service Request Study is complete and the report has been finalized, Corn Belt will notify the MAPP Design Review Subcommittee (DRS) for approval. The cost of any additional studies required by the DRS, will be the responsibility of the interconnection customer. Any changes to the timeline established will be adjusted to accommodate the DRS’ review and approval processes. Upon the DRS’ approval for deliverability of the generation only, the interconnection process will continue with the Interconnection Facility Study.

Upon completion of the study, a report will be transmitted to Interconnection Customer along with an Interconnection Facility Study Agreement, which includes an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study.

4.5. TRANSMISSION SERVICE REQUEST - SYSTEM IMPACT STUDY (TSR-SIS)

If the Transmission Service Request Study and the FERC-defined System Impact Study are performed at the same time, it is referred to as the “Transmission Service Request System Impact Study (TSR System Impact Study)”. The Interconnection Customer must submit a Transmission Service Request (TSR) through the Reliability Authority’s Tariff Administrator, or its successor, for Corn Belt’s transmission service and for approval. The submission of a TSR will define if a TSR Study can be performed in conjunction with the System Impact Study.

NOTE: The Customer can take advantage of the study cost savings and time reduction by requesting a TSR System Impact Study.

The Transmission Service Request System Impact Study shows that the capacity can be delivered to the purchaser of the generation and identifies any negative impacts of the generator interconnecting the transmission system. The Transmission Service Request System Impact Study is reviewed and voted on by the MAPP’s Design Review Subcommittee (DRS) for deliverability and for interconnection.

4.5.1. PURPOSE

The Transmission Service Request System Impact Study shall identify and detail the system impacts on the safety, stability and reliability of Corn Belt’s transmission system and, if applicable, Affected Systems, that would result if the generating facility were interconnected without project modifications or system modifications. The study focuses on the adverse system impacts identified in the Feasibility Study, and studies potential impacts, including but not limited to those identified in the Scoping Meeting.

The study also evaluates the deliverability of the proposed generation to the Corn Belt system. The long term, firm network TSR is requested under the Corn Belt Open Access Transmission Energy Market Tariff. The generator must reserve the number of megawatts long term, firm network service from the generating facility in the specific control area to the load in the specific control area. The duration of the requested service is listed (from date/to date).
4.5.2. PROCESS

Corn Belt will make a good faith attempt to complete the Transmission Service Request System Impact Study within the specified number of days from receipt of the signed Transmission Service Request System Impact Study Agreement. A deposit for the performance of the study is required with the signed agreement. The Interconnection Customer is responsible for the actual costs of the study. If the study cannot be completed in the specified time period, Corn Belt will notify the requesting party, revise the estimated time until completion, estimate any additional costs, and provide an explanation of the reasons that additional time is required to complete the study.

The Transmission Service Request System Impact Study will be carried out in accordance with the general guidelines of the MAPP or its successor organization, North American Energy Reliability Corporation (NERC), and prudent utility practice.

4.5.3. SCOPE

The Transmission Service Request System Impact Study will perform the following activities to ensure that a complete evaluation of the system impact is made:

- Short Circuit Analysis
- Stability Analysis
- Steady State Power Flow Analysis
- Reliability Studies
- Protection Coordination Studies
- Transfer Capability Studies

The Transmission Service Request System Impact Study will meet the following objectives:

- Assess the delivery adequacy for proposed transaction.
- Assess the impact that the proposed transaction will have on voltage security.
- Assess the impact that the proposed transaction will have on existing constrained interfaces.
- Identify limiting conditions aggravated or introduced by proposed transaction.
- Identify mitigating measure(s) to enable system performance within operating criteria including reduced level of transmission service and/or system improvements.
- Identify rollover issues for the proposed transaction.

4.5.4. DELIVERABLES

The study will consider the base case as well as all generating facilities that, on the date the Transmission Service Request System Impact Study are commenced:

- Are directly interconnected with Corn Belt's transmission system,
• Are interconnected with Affected Systems and may have an impact on the proposed interconnection, and
• Have a signed Interconnection Agreement to interconnect with Corn Belt's transmission system.

The Transmission Service Request System Impact Study will state the results of the analyses and provide the requirements or potential impediments to providing the requested interconnection service. The study will provide a list of facilities that are required as a result of the Interconnection Request and a non-binding good faith estimate of cost responsibility and a non-binding good faith cost estimate to construct.

4.5.5. ADDITIONAL REVIEW

All affected parties shall be afforded an opportunity to review and comment upon a Transmission Service Request System Impact Study that covers potential Adverse System Impacts on their systems.

Once the Transmission Service Request System Impact Study is complete and the report has been finalized, Corn Belt will notify the MAPP Design Review Subcommittee (DRS) for approval. The cost of any additional studies required by the DRS, will be the responsibility of the Interconnection Customer. Any changes to the timeline established in Table 4.1 will be adjusted to accommodate the DRS’ review and approval processes. Upon the DRS’ approval, the interconnection process will continue with the Facility Study.

Upon completion of the Transmission Service Request System Impact Study, a report will be transmitted to Interconnection Customer along with a Facility Study Agreement, which includes an outline of the scope of the study and a non-binding good faith estimate of the cost to perform the study.

4.6. FACILITY STUDY

4.6.1. PURPOSE

The Facility Study shall specify and estimate the cost of the equipment, engineering, procurement and construction work (including overhead) needed to implement the conclusions of the Transmission Service Request System Impact Study in accordance with Good Utility Practice to physically and electrically connect the Interconnection Facility to the transmission system.

4.6.2. PROCESS

The Facility Study Agreement will be issued once Corn Belt receives DRS approval of the SIS. The Interconnection Customer will have thirty (30) Business Days to sign the Facility Study Agreement including the required deposit to perform the study.

Corn Belt will make a good-faith effort to complete the required the Facility Study within 180 Business Days of receiving the Facility Study Agreement and deposit. If the Facility Study cannot be completed in the specified time period, Corn Belt will notify the requesting party, revise the estimated time until completion, estimate any additional costs, and provide an explanation of the reasons that additional time is required to complete the study.
4.6.3. DELIVERABLES

The Facility Study shall identify:

- The electrical switching configuration of the interconnection’s equipment, including, without limitation: the transformer, switchgear, meters, and other station equipment;
- The nature and non-binding estimated good faith cost of any Corn Belt’s facilities and network upgrades necessary to accomplish the interconnection; and
- An estimate of the time required for completing the construction and installation of such facilities.

The Parties may agree to permit the Interconnection Customer to separately arrange for a third party to design and construct the required interconnection facility. In such cases, Corn Belt may review the design of the facility, under the provisions of the Facility Study Agreement. If the parties agree to separately arrange for design and construction, and comply with any security and confidentiality requirements, Corn Belt shall make all relevant information available to the Interconnection Customer in order to permit the Interconnection Customer to obtain an independent design and cost estimate for the facilities.

Upon completion of the Facility Study, and with the agreement of the Interconnection Customer to pay for Interconnection Facilities and Upgrades identified in the Facility Study, Corn Belt shall provide the Interconnection Customer an Interconnection and operating agreement.

4.6.4. ADDITIONAL REVIEW

The requesting party is allowed ten (10) Business Days to review the draft Facility Study. Corn Belt will meet with the requesting party to discuss the results of the Facility Study. Corn Belt will issue the final Facility Study Report. The Interconnection Customer has thirty (30) Business Days to notify Corn Belt of their intent to proceed with the interconnection. From there, the Interconnection and operating agreement can be launched.
<table>
<thead>
<tr>
<th>Action</th>
<th>Feasibility Study</th>
<th>System Impact Study (SIS)</th>
<th>Transmission Service Request (TSR) Study</th>
<th>Facility Study</th>
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</thead>
<tbody>
<tr>
<td>Initiation of Study</td>
<td>Interconnection Request</td>
<td>Interconnection Request or Feasibility Study Report</td>
<td>Customer requests transmission service on CBPC OASIS</td>
<td>SIS and TSR Study Completed</td>
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<tr>
<td>Complete Agreement 2</td>
<td>30</td>
<td>30</td>
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<td>30</td>
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<tr>
<td>Deposit Required ¹ ≥ 20 MW</td>
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<td>Estimated Study Cost or $50,000</td>
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<tr>
<td>Time to Complete Study ²</td>
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<td>Ad Hoc Study Group Review</td>
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<td>N/A</td>
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<td>30/15</td>
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<td>Issue Next Agreement ²</td>
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<tr>
<td>Re-study ²</td>
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<tr>
<td>Approval Required</td>
<td>Ad Hoc Study Group</td>
<td>Ad Hoc Study Group and DRS</td>
<td>Ad Hoc Study Group and MAPPCOR</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### Scope of Study

- **Steady State Power Flow Analysis**
  - N-1 Contingency summer peak (near term)
  - Short Circuit Analysis
  - Flowgate Analysis (for information only)
  - Interconnection Only
    - Models have all higher queued generators regardless of their study status.
  - Steady State Power Flow Analysis
    - N-1 Contingency on summer peak and summer off-peak case (near term and long term)
    - N-2 Contingency on summer peak case (near term and long term)
  - Short Circuit Analysis
  - Stability Analysis
  - Flowgate Analysis (MAPP and other reciprocal flowgates)
  - Deliverability
    - Models only have higher queued generators with confirmed delivery service
    - Steady State Power Flow Analysis
      - N-1 Contingency on summer peak (near term and long term)
      - N-2 Contingency on summer peak (near term and long term)
  - Specify & estimate the cost of the equipment, engineering, procurement and construction work needed to implement the conclusions
  - Identify electrical switching configuration of the connection equipment including transformer, switchgear, meters, and other station equipment
  - Estimate nature of cost necessary to accomplish interconnection
  - Estimate time required to complete construction and installation of facilities

¹ These values may be the estimated cost of the study if Interconnection Customer fails to prove Creditworthiness.
² Business Days
5.0 SMALL GENERATOR INTERCONNECTION PROCEDURE

The Small Generator Interconnection Procedure is similar to the Large Generator Interconnection Procedure with the exception of the number of MW to be studied, and the required study deposit amounts.

Small Generators can either be interconnected to the REC distribution system or Corn Belt’s 69 kV and above transmission. For Generating Facilities on the REC distribution system, Corn Belt normally does not accredit this generation removing the requirement for regional reviews and approvals by the DRS.

<table>
<thead>
<tr>
<th>MW</th>
<th>Less than 69 kV</th>
<th>69 kV and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 MW</td>
<td>x</td>
<td>--</td>
</tr>
<tr>
<td>1 MW &lt; x &lt; 20 MW</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

5.1 GENERATOR LESS THAN 1 MW

Generating Facilities no larger than 1 MW are encouraged to interconnect their facilities to Corn Belt’s member rural electric cooperative’s (REC) distribution system rather than to Corn Belt’s transmission system, 69 kV and above. The REC shall study the impact the generating facility has on the distribution system and the interconnection to the distribution system. The REC dictates the amount of energy permitted to flow on their distribution system.

5.1.1. INTERCONNECTION IMPACT STUDY

Corn Belt Engineering and System Operations Department’s “Small Generator Interconnecting to Distribution System” guide stipulates what Corn Belt requires of the small generator who proposes to interconnect to Corn Belt’s member’s distribution system. The guide address the metering and communication requirements to ensure the energy delivered at the point of interconnection is properly recorded and measured, and that the Corn Belt Control Center can adequately monitor the energy flowing into Corn Belt’s 69 kV and above transmission system. An Interconnection Impact Study is required to analyze the impacts of the small generator may have on Corn Belt’s System.

5.2 GENERATOR 1 MW AND LARGER, BUT LESS THAN 20 MW

A Small Generating Facility that is at least 1 MW but less than 20 MW shall abide by the Large Generator Interconnection Procedure as described in Section 4.0, with the following exceptions.

5.2.1. STUDY DEPOSIT

- Similar to the Large Generator, the Feasibility Study’s estimated study cost must be paid in full by the Customer prior to the start of the study.

- For the TSR System Impact Study or the System Impact Study, depending on whether a TSR has been submitted to date, has a deposit of lesser than the estimated study cost or $50,000. If a TSR Study is performed after the System Impact Study, the amount of deposit will be lesser than the estimated study cost or $50,000.

- The Facility Study has a deposit of lesser than the estimated study cost or $100,000.

5.2.2. REGIONAL REVIEW AND APPROVALS

- Since any Generating Facility interconnected to Corn Belt’s 69 kV or above transmission may be accredited, the review and approval required by the DRS will be obtained through the appropriate governing policies and procedures.
Along with all other interconnection requirements set forth in this document, the wind generating plant must apply to the following requirements and provisions specific to a wind generating plant.

For the wind generating plant, the closest point of the wind turbine (tower base or blade) shall be at least 300 feet, or the hub height plus the length of one blade; whichever is greater, from Corn Belt's transmission lines.

6.1 SPECIAL PROCEDURES APPLICABLE TO WIND GENERATORS

The wind plant Interconnection Customer, in completing the Interconnection Request, may provide Corn Belt a set of preliminary electrical design specifications depicting the wind plant as a single equivalent generator. Upon satisfying these and other applicable Interconnection Request conditions, the wind plant may enter the queue and receive the queue.

No later than six months after submitting an Interconnection Request completed in this manner, the wind plant Interconnection Customer must submit completed detailed electrical design specifications and other data (including collector system layout data) needed to allow Corn Belt to complete Transmission Service Request System Impact Study.

6.2 TECHNICAL STANDARDS APPLICABLE TO A WIND GENERATING PLANT

6.2.1. LOW VOLTAGE RIDE-THROUGH (LVRT) CAPABILITY

A wind generating plant shall be able to remain online during voltage disturbances up to the time periods and associated voltage levels set forth in the FERC Order 661.

- Wind generating plants are required to remain in-service during three-phase faults with normal clearing (which is a time period of approximately 4-9 cycles) and single line to ground faults with delayed clearing, and subsequent post-fault voltage recovery to prefault voltage unless clearing the fault effectively disconnects the generator from the system. The clearing time requirement for a three-phase fault will be specific to the wind generating plant substation location, as determined by and documented by Corn Belt. The maximum clearing time the wind generating plant shall be required to withstand for a three-phase fault shall be 9 cycles after which, if the fault remains following the location-specific normal clearing time for three-phase faults, the wind generating plant may disconnect from the Corn Belt transmission system. A wind generating plant shall remain interconnected during such a fault on the transmission system for a voltage level as low as zero volts, as measured at the high voltage side of the wind GSU.

- This requirement does not apply to faults that would occur between the wind generator terminals and the high side of the GSU.

- Wind generating plants may be tripped after the fault period if this action is intended as part of a special protection system.

- Wind generating plants may meet the LVRT requirements by the performance of the generators or by installing additional equipment (e.g., Static VAR Compensator) within the wind generating plant or by a combination of generator performance and additional equipment.

- Existing individual generator units that are replaced are required to meet this LVRT standard.
### 6.2.2. POWER FACTOR DESIGN CRITERIA (REACTIVE POWER)

A wind generating plant shall maintain a power factor within the range of 0.95 leading to 0.95 lagging, measured at the Point of Interconnection, if Corn Belt’s Transmission Service Request System Impact Study shows that such a requirement is necessary to ensure safety or reliability. The power factor range standard can be met by using, for example, power electronics designed to supply this level of reactive capability (taking into account any limitations due to voltage level, real power output, etc.) or fixed and switched capacitors if agreed to by Corn Belt, or a combination of the two. The Interconnection Customer shall not disable power factor equipment while the wind plant is in operation. Wind plants shall also be able to provide sufficient dynamic voltage support in lieu of the power system stabilizer and automatic voltage regulation at the generator excitation system if Transmission Service Request System Impact shows this to be required for system safety or reliability.

### 6.2.3. SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) CAPABILITY

The wind plant shall provide SCADA capability to transmit data and received instructions from Corn Belt to protect system reliability. Corn Belt shall determine what SCADA information is essential for the proposed wind plant, taking into account the size of the plant and its characteristics, location, and importance in maintaining generation resource adequacy and transmission system reliability in its area.
Once all the required Interconnection Studies have been completed and Corn Belt has received all the required industry approvals and the Customer’s intent to proceed, if mutually agreed upon, Corn Belt and the requesting party will execute the Interconnection and operating agreement, and Corn Belt will begin the Engineering and Construction process and, subsequently, prepare the Commissioning process.

7.1 INTERCONNECTION AND OPERATING AGREEMENT

If the Customer elects to proceed with the delivery point, it shall execute an “Interconnection and Operating Agreement” with Corn Belt. This agreement shall be referred to herein as the “Agreement”.

The guidelines for implementing the Agreement are:

- The Interconnection Process was completed in sequential order with due diligence.

- All applicable industry reviews and approvals have been received in association with the interconnection and transmission service, such as the review of the system generation and transmission plans to assure compliance with NERC reliability standards and system design standards.

- Corn Belt shall issue the Agreement within ninety (90) Calendar Days of receiving notification of the Customer’s intent to proceed. Transmission Service Request System Impact and the Facility Study will provide the basis for the specifications of the Agreement.

- The Customer shall have thirty (30) Calendar Days to execute the Agreement with Corn Belt and provide a letter of credit or other form of security acceptable to Corn Belt, equivalent to the costs of the new facilities or upgrades or the request shall be deemed terminated and withdrawn.

- Corn Belt and the Customer will use due diligence to negotiate any terms and specifications of the Agreement and an Agreement amendment, if applicable.

- Along with the Agreement, Corn Belt will file, as appropriate, any amendments to the Agreements or tariffs affected by addition of the proposed delivery point with the appropriate regulatory authorities.

7.2 INTERCONNECTION FACILITIES, ENGINEERING, PROCUREMENT, AND CONSTRUCTION

Corn Belt shall design, procure, and construct the Interconnection Facilities and Network Upgrades, using reasonable efforts to complete the project by the dates mutually agreed upon. Corn Belt shall not be required to undertake any action, which is inconsistent with its safety practices, its material and equipment specifications, its design criteria and construction procedures, its labor agreements, and Applicable Laws and Regulations. In the event Corn Belt reasonably expects that it will not be able to complete the project by the specified dates, Corn Belt shall promptly provide written notice to the Customer and shall undertake reasonable efforts to meet the earliest dates thereafter.

Corn Belt shall commence design of the project and procure necessary equipment as soon as practicable after all of the following conditions are satisfied:

- All of the required Interconnection Studies have been completed;

- Review and approval of the MAPP’s Design Review Subcommittee has been received, if applicable;
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- Receipt of written authorization to proceed with design and procurement from the Customer by the specified date; and

- The Customer has provided a deposit to Corn Belt Power Cooperative in accordance to the specified date.

- Corn Belt shall commence construction of the project for which it is responsible as soon as practicable after the following additional conditions are satisfied:
  1) Approval of the appropriate Governmental Authority has been obtained for any facilities requiring regulatory approval;
  2) Necessary real property rights and rights-of-way have been obtained, to the extent required for the construction of the project; and
  3) Corn Belt has received written authorization to proceed with construction from the Customer by the specified date.

Corn Belt will proceed with any final engineering work after the executed Agreement has been finalized and the necessary funding is in place. The completion date of such engineering will be consistent with the construction schedule defined in the Agreement.

Corn Belt shall provide written notification to the Customer if Corn Belt determines from the final engineering work that the cost estimate in the Facility Study has changed.

NOTE: Corn Belt will be the final approval entity for the planning, design, construction, and commissioning of facilities directly connected to Corn Belt system. Corn Belt shall, unless agreed to by the parties, design and construct the facility.

7.3 COMMISSIONING PROCESS

After construction is completed but before energizing the interconnection, Corn Belt shall witness the commission testing and/or review the test results of the new facility. The intent of the Commissioning Process shall be as extensive and complete as specified to provide positive assurance of totally correct installation and operation of all equipment. The requirements are governed by the:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Institute of Electrical and Electronics Engineers (IEEE)
- National Electrical Manufacturers Association (NEMA) and Insulated Cable Engineers Association (ICEA)
- National Fire Protection Association (NFPA)
- National and Iowa Electrical Safety Codes
- If the facilities appear to meet Corn Belt’s requirements, then the Commissioning Process will proceed.

Commissioning will include, but not limited to:
- Equipment Tests
- Auxiliary Equipment Energization (600V and below)
- Control System Tests
- Initial Energization
- Post Energization Tests

Each party shall make any modifications to its facilities that are found to be necessary as a result of such testing. The Customer shall bear the cost of all such testing and modifications. Each party shall at its own expense, unless mutually agreed upon in a signed agreement, perform routine inspection and testing of its facilities and equipment in accordance with Good Utility Practice as may be necessary to ensure the continued interconnection of the facility with Corn Belt’s transmission system in a safe and reliable manner. Each party shall notify the other party in advance of its performance of tests of its Interconnection Facilities.

Each party shall comply with the Applicable Reliability Council requirements. Corn Belt shall install Metering Equipment at the Point of Interconnection prior to any operation of the Generating Facility and shall own, operate, test and maintain such Metering Equipment. Power flows to and from the Generating Facilities shall be measured at, or compensated to, the Point of Interconnection. The Customer shall bear all reasonable documented costs associated with the purchase, installation, operation, testing and maintenance of the Metering Equipment. The testing and inspection of the Metering Equipment will follow Corn Belt’s established Maintenance and Inspection Plans and applicable procedures.

NOTE: Corn Belt operators have the sole discretion to determine and resolve any switching issues associated with the actual energizing of the interconnection.
8.0 FACILITY DESIGN REQUIREMENTS

All facility designs must meet applicable Federal, State, and Local laws, ordinances, rules, regulations, codes, etc. Substation facilities must be designed to RUS 1724E-300 "Design Guide for Rural Substations". In addition, the interconnection must be designed for operation in accordance with the North American Electric Reliability Council's (NERC) Operating Policies and Planning Standards, the Mid-Continent Area Power Pool System Design Standards, and any independent system operator requirements to ensure that the electric system operates reliably.

**Corn Belt shall not be required to undertake any action, which is inconsistent with its standard safety practices, its material and equipment specifications, its design criteria and construction procedures, its labor agreements, and Applicable Laws and Regulations.**

Facility connections to the Corn Belt transmission system shall be designed such that faults in the interconnection transformer(s), circuit breaker(s), bus, or bus connections, and misoperations of any protective relaying will not cause interruption of transmission service.

**Corn Belt shall have final approval on all protection schemes applied to the applicant's facilities and the interconnection facilities.**

8.1 GENERAL REQUIREMENTS

All forms of interconnection to the Corn Belt Transmission System must meet, or exceed, the following requirements:

8.1.1. **SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)**

The Customer must provide and install a Remote Terminal Unit (RTU), which meets Corn Belt's specifications or request that Corn Belt provide and install the RTU at the customer's expense. The Customer's load and equipment status information will be telemetered to the Corn Belt Control Center.

8.1.2. **TELEMETERING AND METERING**

The Meter shall be located on the high side of the Customer's transformers on the Customer's side of the Delivery Point, or Point of Interconnection. The Meter shall be used for the recording and measuring the Energy delivered to the point where the electric energy leaves the wires or facilities owned by the Customer and enter the wires or facilities owned by Corn Belt.

The Meter measures the Purchased Energy delivered by the Generator. The meter reading accounts for any transformer loss and line losses attributable to the generating facility occurring between the generating facility and the Delivery Point. The Purchased Energy is the net energy produced and delivered by the Customer.

Corn Belt shall purchase, own, and maintain meter and associated metering equipment at Customer's sole expense. The Customer shall purchase, install, and maintain the instrumentation potential transformers and current transformers, the test switch, the power supply, the mounting pole, the meter socket, the lockable latch enclosure, and a steel meter enclosure, and associated wiring. Metering equipment accuracy shall be better than 1%. The Customer shall provide and install telemetering equipment, or request Corn Belt to provide and install such equipment at the Customer's expense, capable of providing real time (2 second scan) data to the Corn Belt Control Center via the RTU. All metering shall be capable of accurately measuring all generation or bi-directional quantities, including station service requirements.
End-user facilities shall include provisions for Corn Belt to install revenue meter equipment. No other burdens shall be permitted in the revenue metering circuits except transducers. The provisions shall include adequate spacing required to install metering equipment and by-pass switches to allow maintenance of metering equipment. All Corn Belt revenue meter equipment will be calibrated on an annual basis and the facility owner will be given the opportunity to witness calibration tests. Corn Belt will install telemetering equipment at off-system substations when necessary to properly estimate off-system loads. All revenue metering voltage transformers shall be furnished to meet accuracy with the following burdens:

- “W” through “Y” burden for 12.47 kV and,
- “W” through “ZZ” burden for 69 kV and 161 kV.

Corn Belt shall purchase, own, install, and maintain, the telemetry and communications equipment associated with the Metering equipment, at Customer’s expense. The Customer shall provide a location within the substation to install Corn Belt’s SCADA equipment and other telemetry and communication equipment. The Customer shall install the SCADA antenna on their structure, tower or pole, along with the wiring from the antenna to the SCADA equipment per Corn Belt’s installation specifications.

8.1.3. COMMUNICATION DURING NORMAL AND EMERGENCY CONDITIONS

1) NORMAL: Subject to Corn Belt's request, the Interconnection Customer shall provide a dedicated voice communication device (telephone, cellular phone, satellite phone, ring-down phone, radio, or an attended phone with which the control room has communication by means of plant intercom, radio, or other means) connected to Corn Belt System Control Center. Such a dedicated communication device shall originate from the Interconnection Customer’s 24-hour operations office and shall typically be required for the Customer’s synchronization and operation of significant capacity within Corn Belt’s Control Area that significantly affect Corn Belt’s transmission network capacity and operations. All other normal voice communication concerning facility operations shall be conducted through the public telephone network to the Control Center's phone number(s) issued by Corn Belt.

2) EMERGENCY: Voice communications in the event of a transmission facility emergency shall use the dedicated voice communication device, if available, or public telephone network and phone number(s) designated for emergency use.

8.1.4. VOLTAGE AND POWER FACTOR CONTROL

The voltage at the point of connection shall be regulated to maintain 95% - 105% of the nominal bus voltage, during normal operating conditions. As a guideline to power factor operation, the Customer's power factor, as measured at the point of interconnection, must comply with limits stated in the Operating Agreement.

- The generation facility shall match or contribute to the performance of the transmission system. The Customer’s facility may be required to supply or receive reactive power, depending on the status of the transmission system as directed by Corn Belt Control Center and the capabilities of the unit. Synchronous units shall be able to operate at a minimum across the range of 0.90 lead to 0.90 lag reactive capability.

- The Transmission facility must supply the amount of reactive power as specified in Corn Belt’s transmission planning criteria.

- The end-user facility must maintain a load power factor as close to unity as reasonably possible. Corn Belt may apply penalties when the power factor is not met.
8.1.5. EQUIPMENT RATINGS

Electrical equipment provided by the generation provider shall meet the applicable ANSI and IEEE standards. The equipment shall be designed and rated for operation within the full ranges of voltage and frequency normal for a power system without damage.

8.1.6. SHORT CIRCUIT CONDITIONS

All facilities must meet or exceed the fault duty capability necessary to meet short circuit requirements as determined through short circuit analyses.

8.1.7. SYSTEM PROTECTION AND OTHER CONTROLS

The Customer is responsible for providing protective devices that will protect against faults and disturbances on Corn Belt's transmission system as well as their own system.

- The Customer is responsible for providing protective devices that will protect its equipment against faults and disturbances on Corn Belt's and its own system. All protective relays must be calibrated at least every two years. The Customer must provide a test report to Corn Belt documenting the current settings as well as the "as found" and "as left" test results.

- Underfrequency relay protection applied on a turbine-generator must coordinate with underfrequency relays applied on the Transmission and Distribution (T&D) system. The turbine-generator relays must be set to allow all T&D underfrequency relays to operate first. Typical T&D underfrequency relays are set at 59.3 Hz (10%), 59.0 Hz (11%), and 58.7 Hz (9%) with a 0.5 second time delay. Generator isolation underfrequency relays are set at 58.3 Hz.

- Other relays may be required as transmission conditions or operating guidelines warrant. Underfrequency relays must be applied to disconnect at least 30% of connected load. These settings must coordinate with other Corn Belt Control Area underfrequency relays.

- Generator connections to Corn Belt transmission system shall be designed such that faults in the generator, generator step-up (GSU) transformer, circuit breakers, bus, or bus connections and misoperations of any generator protective relaying will not cause interruption of transmission service.

- Line protective relaying, primary and secondary relays shall include, as a minimum, three zones of phase distance (with time delay trip for zones 2 and 3), ground directional overcurrents (with instantaneous and time delay elements), and breaker failure. Three zones of ground distance may be substituted for the ground directional overcurrent. Transfer trip (or other communication-assisted) relaying may be required in certain instances and other relays may be required as transmission conditions or operating guidelines warrant.

- End-user transformer fault isolation shall include circuit breakers, phase and ground overcurrents, and sudden pressure on both the high and low voltage sides. End-user transformer relaying shall include, as a minimum, differential, phase and ground over currents, and sudden pressure.

For transformers connected to the 69 kV and 12.47 kV transmission system and rated 10 MVA or less, a power fuse may serve as the high side fault protection and fault-interrupting device instead of the aforementioned high voltage circuit breaker and transformer relays.
8.1.8. GENERATION CONTROL

Corn Belt shall retain the right, but not the obligation, to immediately sever or disconnect with the generation facility if, in the sole judgment of Corn Belt Control Center personnel, such action is necessary to protect its facilities, system’s customers, employees, or the general public, and shall not be liable for any damage which may result from disconnection.

8.1.9. MAINTENANCE COORDINATION

The owner of the generator facility is responsible for all maintenance requirements except those specified in the Facilities Operating Requirements section of this report. All maintenance projects that have any effect on the transmission system shall be coordinated in advance with regional transmission security coordinators through Corn Belt Control Center. The Operating Agreement will specify required maintenance intervals and support documentation.

8.1.10. SYNCHRONIZATION FACILITIES

The Customer will be responsible for synchronizing its facility to Corn Belt's electric system. Generator voltage regulation is required to be in service whenever the generator is synchronized to the system. The facility shall not be synchronized unless authorized by Corn Belt Control Center. Automatic synchronization shall be supervised by a synch check relay, IEEE Device 25.

8.1.11. SYSTEM GROUNDING


8.1.12. RESPONSIBILITIES DURING EMERGENCY CONDITIONS

The generation provider shall communicate with and shall cooperate with Corn Belt Control Center personnel in such a manner to support Corn Belt's recovery efforts during emergency conditions. This may include, but may not be limited to: switching operations, VAR support, changes in generation output, increases or decreases of the generator provider's internal plant load, tripping of generating unit(s) or starting of generating unit(s).

8.1.13. ABNORMAL FREQUENCY AND VOLTAGE OPERATION

The voltage at the point of connection shall be regulated between 95% - 105% of the nominal bus voltage during normal operating conditions, and 92% - 110% of the nominal bus voltage during single contingency outage conditions.

The frequency of the power system shall be 60 Hz nominal and shall be maintained within the limits of 59.95 Hz - 60.05 Hz under normal steady-state operation. Voltage unbalance shall be limited to no more than 1 percent and current unbalance limited to no more than 5 percent as measured by the maximum deviation of one phase from the average of all three phases.

Harmonics shall be limited as specified in IEEE Standard 519, IEEE Recommended Practices and Requirements for Harmonic Control in Electric Power Systems.

8.1.14. INSPECTION

Before a Customer owned substation can be energized; it must pass a final inspection by Corn Belt personnel. This inspection concentrates on all substation equipment up to and including the first protective fault interrupting device and the ground system. This may include circuit breakers,
circuit switchers, power fuses, instrument transformers, switches, surge arresters, bushings, and relays and associated equipment (including battery and battery chargers).

The inspection will consist of a visual inspection of all major equipment as well as review of required test results. The ground system must be checked by using the resistance measurement procedures in accordance to IEEE Standard 81, *IEEE Recommended Guide for Measuring Ground Resistance and Potential Gradients in the Earth*. Corn Belt will document the inspection by completing a site-specific form supplied by the Engineering Department.

### 8.2 INTERCONNECTION SPECIFIC

Connection requirements to the Corn Belt Transmission System may vary according to type of interconnection facility, the voltage level, location on Corn Belt System, and the number of lines or facilities that are terminating. Corn Belt shall approve the final interconnection specifications. The following components are essential in interconnecting to the Corn Belt Transmission System. They are:

1) For a 12.47 kV line –
   - Three phase circuit breakers
   - Three phase disconnect switches
   - Protection relays

2) For a 69 kV or a 161 kV line –
   - Three- or four-breaker switching station
   - Three phase circuit breakers
   - Three phase disconnect switches
   - Ring bus or a main and transfer bus
   - Protection relays
   - High side metering
   - Switching or breaker station

Breakers shall have operational ratings to interrupt loop flow, line charging, load and fault current. All 69 kV and above interconnection breakers shall have remote operation for Corn Belt operators.

Switches shall be arranged to provide isolation of the transmission line and the facility terminating at the connection point.

Metering accuracy instrumentation transformers class will be required.
9.0 OPERATING REQUIREMENTS

Corn Belt will operate, maintain, and own all components that are an integral (networked) part of Corn Belt transmission system including all buses, circuit breakers, relays, and switches on the transmission side of the generator’s, transmission facility’s, or end-user facility’s isolating switch.

Prior to establishing service for parallel operation, the customer shall obtain an approved Corn Belt Power Cooperative’s Interconnection and Operating Agreement. The customer is responsible for specifying appropriate equipment so that the parallel generation is compatible with the Corn Belt electric system. The customer, in satisfying the requirements, is also responsible for meeting applicable federal, state and local codes, including but not limited to National Electric Code Article 705.

Isolation of paralleled, customer owned generation from Corn Belt's system does not require Corn Belt approval. A normally open switch is not considered an acceptable isolation device between the customer generation and the Corn Belt system. The customer is required to have a licensed electrician complete the installation of any transfer equipment to meet Article 230 of the National Electrical Code. This transfer equipment must separate the generation from the Corn Belt system within 30 cycles.

The information in this section provides general operating and design requirements.

FEDERAL, STATE, AND LOCAL OPERATING GUIDE

The Corn Belt Transmission System operates under guidelines set forth by the Mid-Continent Area Power Pool (MAPP), Regional Transmission Organizations (RTO's), Rural Utilities Service (RUS), the Federal Energy Regulatory Committee (FERC), the North American Electric Reliability Council (NERC), and the National Electric Code (NEC) as approved by the American National Standards Institute (ANSI). The information contained in this document is supplementary to and does not intentionally conflict with or supersede the NEC, RUS, FERC, NERC, or any federal, state, or municipal laws, ordinances, rules, regulations, etc. It is the responsibility of the Interconnection Customer to conform to all applicable national, state, and local laws, ordinances, rules, regulations, codes, etc.

9.1. CORN BELT POWER COOPERATIVE PROCEDURES

The operation of the Corn Belt Transmission System will adhere to the following procedures:

9.1.1 COMMUNICATIONS

Generating facilities must either have SCADA control or on-site control personnel to react to Corn Belt’s Control Center instructions. The customer shall provide a contact person and phone number for the generating facility and for coordinating operations of the generation facility with Corn Belt. The customer shall provide a contact person who can perform Corn Belt’s Control Center requested operations within 10 minutes of initial notification. If the customer cannot provide this level of service, SCADA control of the customer’s generator breakers and generator control equipment will be required.

9.1.1.1 NORMAL CONDITION

Subject to Corn Belt’s request, the Interconnection Customer shall provide a dedicated voice communication device (telephone, cellular phone, satellite phone, ring-down phone, radio, or an attended phone with which the control room has communication by means of plant intercom, radio or other means) to Corn Belt’s Control Center. Such a dedicated communication device shall originate from the Interconnection Customer's 24 hour operations office and shall be required for:
REQUIREMENTS FOR
GENERATION AND TRANSMISSION INTERCONNECTIONS

- Generation Facilities – Synchronization and operation of significant capacity within Corn Belt's Control Area.

- Transmission Facilities – Connected transmission facilities that significantly affect Corn Belt's transmission network capacity and operations.

- End-user Facilities – End-user loads that significantly affect Corn Belt's transmission network capacity and operations.

All other normal voice communication concerning facility operations shall be conducted through the public telephone network to the Control Center's phone number(s) issued by Corn Belt.

The Customer shall provide a contact person and phone number for the generating facility and for coordinating operations of the generation facility with Corn Belt. The Customer shall provide a contact person who can perform Corn Belt's Control Center’s requested operations within 10 minutes of initial notification. If the Customer cannot provide this level of service, SCADA control of the Customer's generator breakers and generator control equipment will be required.

9.1.1.2 EMERGENCY CONDITION

Voice communications in the event of a transmission facility emergency shall use the dedicated voice communication device, if available, or public telephone network and phone number(s) designated for emergency use.

9.1.1.3 RESPONSIBILITY DURING NORMAL AND EMERGENCY CONDITIONS

As owner, Corn Belt has the responsibility to preserve uniformity of service throughout its transmission system. It is the responsibility of Corn Belt and all interconnected entities to work together to reduce and eliminate emergency conditions as quickly as possible. Therefore Corn Belt requires interconnected facilities to communicate with and cooperate with Corn Belt Control Center personnel in such a manner to support recovery efforts. This may include, but may not be limited to: switching operations, VAR support, changes in generation output, increases or decreases of the generator provider's internal plant load, tripping of generating unit(s), starting of generating units, changes in transmission schedules, interruption of transmission schedules, an interruption of load, changes in load, or changes in scheduled energy deliveries.

9.2.1. VOLTAGE RANGE & SCHEDULE

The Customer shall operate their generator(s) to maintain the same voltage level as the Corn Belt system at the point of interconnection when synchronized. The Customer shall operate at the voltage schedule and power factor designated by either the Corn Belt System Operators or the MEC Control Center. The customer shall meet and operate within all of the requirements of the state utility commissions, Midwest ISO, Reliability Councils, and FERC.

Corn Belt or the Midwest ISO shall provide a voltage schedule with maximum and minimum voltages as measured at the customer interconnection point to maintain transmission reliability and security. The Customer shall operate so as to follow this voltage schedule. The Customer agrees to cooperate with Corn Belt in setting main transformer taps to optimize the Customer’s ability to operate within the voltage schedule.
During an Emergency situation, the Customer may be required to adjust generator output levels to provide voltage support to the transmission system as directed by the Corn Belt transmission system operator or the MISO.

The voltage, at the point of connection shall be regulated to maintain 95% – 105% of the nominal bus voltage, during normal operating conditions. As a guideline to power factor operation, the Customer's power factor, as measured at the point of interconnection, must comply with limits stated in the Operating Agreement.

Generation facilities must match or contribute to the performance of the Corn Belt Transmission System to maintain transmission reliability. The generation facility may be required to supply or receive reactive power as directed by Corn Belt’s Control Center. If a transmission facility is capable of voltage or power factor control, it may be required to supply or receive reactive power based on the reactive power support necessary to maintain transmission voltages within the limits specified in Corn Belt's transmission planning criteria. The load power factor at all end-user facilities should be maintained as close to unity as reasonably possible. Corn Belt may apply penalties when the percent power factor is not met.

9.2.2. VOLTAGE FLUCTUATIONS

The Customer shall not cause voltage fluctuations (flicker) in excess 2% at the point of interconnection during generator startup or shut down. Switching of capacitors or other shunt devices shall not cause voltage fluctuations or flicker in excess of 2% at the point of interconnection.

Voltage fluctuations at a point of common coupling (inside Corn Belt control area and connected to Corn Belt 69kV, 69 kV and 12.47 kV transmission systems) with a fluctuating load directly connected to the system shall not exceed the following:

1) There is a limit of one percent of the voltage level for step changes, which may occur repetitively. Any large voltage excursions, other than step changes, may be allowed up to a level of 3.5% if this does not constitute a risk to Corn Belt's system or in Corn Belt's view, to the Systems of the Cooperatives.

2) A measure of visual severity of flicker shall be determined from measurements conducted at a consumer's premises that have complained of flicker or equivalent over a 10-minute period. The measured results shall be compared against Figure 10.3 of ANSI/IEEE Standard 519, "Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems" to determine whether the measurements exceed the "Border Lines of Irritation" on the figure.

9.2.3. POWER FACTOR

The Customer shall operate with a power factor, measured at the point of interconnection at a minimum of 95%, lead or lag, with the point of interconnection as defined in the Corn Belt Interconnection & Operating Agreement, except for wind turbines and similar generators as defined by FERC. For these generators, power factor requirements will be determined through detailed study. At a minimum, generators determined by FERC that are exempt from power factor requirements must, at a minimum, maintain a 98% power factor to offset the VAR requirements of a collector system and step-up transformers or any equivalent system.

9.2.4. FREQUENCY

All generation shall operate at a nominal 60-hertz and within normal fluctuations as seen by the electric grid, and fluctuations shall not exceed 0.7 hertz without automatic disconnection. The
The customer shall provide automatic means to disconnect from the Corn Belt system when generation falls outside the values prescribed in Table 9.1.

The Customer shall operate the generation facility with its governors in operation whenever the facility is operated in parallel with the Corn Belt transmission system. The facility shall meet NERC criteria under Policy 1C – Frequency Control and Bias for Units Greater than 10MW. The customer shall not cause its facility to disconnect automatically or instantaneously from the Corn Belt transmission system for any under-frequency condition greater than 57.5 Hz. A minimum frequency based on the operating limitations of the generation agreed to between Corn Belt and the customer may be used for automatic disconnection of the customer’s facility.

### Table 9.1. Voltage/Frequency Disturbance Delay & Trip Times

<table>
<thead>
<tr>
<th>Frequency Range (Hz)</th>
<th>Trip Time</th>
<th>Seconds</th>
<th>Cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;57</td>
<td>0.166</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>57-59.3</td>
<td>1.0</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>59.3-60.5</td>
<td>Normal Operating Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;60.5</td>
<td>0.166</td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

Note: Voltage based on 120V, nominal.

### 9.2.5. HARMONICS

Harmonic distortion is defined as the ratio of the root mean square value of the harmonic to the root mean square value of the fundamental voltage or current. Harmonics can cause telecommunication interference and thermal heating in transformers, disabling solid-state equipment and creating resonant over voltages. To protect equipment from damage, harmonics must be managed and mitigated. The interconnected generator or load shall not create voltage and current harmonics on Corn Belt's facilities that exceed the limits specified in ANSI/IEEE Standard 519, or other state or national guidelines, with the most current guideline superceding.

The maximum total level of harmonic distortion on the system from all sources (under both planned outages and fault outage conditions) shall not exceed the following:

- At 161 kV, a total harmonic distortion of 1.5% with no individual harmonic greater than 1.0%.
- At 69 kV and 12.47 kV a total harmonic distortion of 2.5% with no individual harmonic greater than 1.5%.

Single frequency and total harmonic distortion measurements may be conducted at the point of interconnection, generation, or load site or other locations on Corn Belt's transmission system to determine whether the project is the source of excessive harmonics.

The preferred method for restriction is to install a transformer with at least one delta connection between the generator or load and Corn Belt's facilities. This method significantly limits the amount of voltage and current harmonics entering the transmission system. Should harmonic levels be detected that exceed the above levels, the facility shall be disconnected until the harmonics levels are corrected.
9.2.6. **SYSTEM PROTECTION**

The Customer is responsible for providing adequate protection, as enumerated in Section 8, for Corn Belt facilities for conditions that arise during parallel generation. The Customer is also responsible for providing adequate protection to their facility under any Corn Belt operating condition whether or not the parallel generation is in operation. The types of conditions the Customer may experience include but are not limited to:

- Single phasing of supply,
- System faults,
- Equipment failures,
- Abnormal voltage or frequency,
- Lightning and switching surges,
- Excessive harmonic voltages or currents,
- Excessive negative sequence voltages,
- Separation from Corn Belt supply known as islanding.

The Customer shall cooperate with Corn Belt in the analysis of disturbances to either the Customer's facility or Corn Belt's electric system by gathering and providing access to any information relating to a disturbance, including information from oscillographs, protective relay targets and reports, breaker operations and sequence of events recorders.

9.2.7. **SYNCHRONIZING**

The Customer shall be solely responsible for synchronizing their generator(s) with the Corn Belt system. Corn Belt will have the right to review, approve and inspect the method of synchronization. Automatic synchronizing settings will not be changed following installation unless mutually agreed to by both parties. The Customer must install proper sensing devices to sense a de-energized circuit to assure that a de-energized circuit of Corn Belt's is not energized by the Customer's attempt to synchronize with the grid.

The Customer shall not energize a de-energized Corn Belt circuit except under specific orders from the Corn Belt Control Center to provide aid in system restoration during Emergency conditions, including black-start conditions. Any energization of the Corn Belt Transmission System by the Customer shall be completed only as directed by the Corn Belt Control Center.

Corn Belt requires synch-check relays to be installed on all circuit breakers interconnecting a generating unit to the Corn Belt electric system.

Induction generators may use a speed-matching relay (Device 15) as a means of synchronization and to limit the magnetizing inrush current/voltage drop. The speed matching must keep voltage flicker at the point of interconnection within Corn Belt voltage flicker requirement and within IEEE 519 requirements.

9.2.8. **EMERGENCY DISPATCH**

During Corn Belt's declared Emergency situations, Corn Belt may request control of customer-owned generation. Generation that is not synchronized to the Corn Belt Transmission System...
shall be made available to Corn Belt for start-up and/or dispatch. If the generation is
synchronized with the Corn Belt system, Corn Belt may request that generation levels be placed
within the exclusive control of Corn Belt for the duration of the Emergency.

9.2.9. RECLOSING

Corn Belt utilizes automatic reclosing on some transmission circuits. Upon request, these
reclosing times for the Corn Belt breaker(s) will be provided to the Customer. It is the Customer’s
responsibility to coordinate the design of their system to properly isolate parallel generation upon
loss of the Corn Belt supply before any reclosing operation.

9.2.10. INTERRUPTING DEVICE

To properly isolate parallel generation from the Corn Belt system, Customers with generation
shall provide a three-phase interrupting device with appropriate protective relays. These devices
shall also be capable of interrupting the maximum available fault current at that location. Three-
phase devices shall interrupt all three phases simultaneously, and shall have a separate tripping
control independent of the AC source, i.e., a DC battery and charger.

The interrupting device shall be located within the Customer’s facility in accordance with
applicable codes. If specific interconnection issues require that the interrupting device be located
within a Corn Belt facility, all costs for installation, maintenance, and performance testing of the
interrupting device shall be completed by Corn Belt and billed to the Customer.

9.2.11. TRANSFORMER

In all cases, the Customer is required to transform the power generated to the voltage of the Corn
Belt electric system they are wishing to interconnect to. Customer transformer connection (i.e.
delta, wye) and grounding method (i.e., solid, ungrounded, impedance) will be subject to review
and approval by Corn Belt.

9.2.12. SAFETY DISCONNECTION MEANS

The Customer shall provide a three phase disconnecting switch or equivalent device for use by
Corn Belt as a means of electrically isolating the Corn Belt system from the generator and to
establish working clearances for maintenance and repair work in accordance with Corn Belt
safety rules. This disconnecting device will be located immediately after the metering point at the
point of interconnection between the Customer and Corn Belt’s electric system. Depending on
the location on the system and application, Corn Belt will require that the disconnecting device be
gang operated and may also include load break capability.

The disconnecting device shall be physically located for ease of access by Corn Belt personnel.
Access shall be available at all times for Corn Belt personnel to operate the device. The
disconnecting device must provide visual indication of the contact’s position. The disconnecting
device’s operating handle shall be lockable with a standard Corn Belt padlock.

Three phase, gang-operated disconnect switches (circuit breakers) are required at voltages
greater than 50 kV. Below 50 kV, single-phase disconnect switchblades are acceptable. Fuse
cut-outs are not acceptable disconnect switches.

Figure 1, on the next page, represents an acceptable configuration.
9.2.13. MAINTENANCE

All Interconnection Customer-owned substation equipment up to and including the first protective fault-interrupting device shall be maintained to Corn Belt standards. This may include circuit breakers, power fuses, instrument transformers, switches, surge arresters, bushings, and relays and associated equipment (including battery and battery charger). Maintenance intervals and support documentation is specified in the Operating Agreement.

The Interconnection Customer is responsible for coordinating with Corn Belt’s Control Center all maintenance projects that have any affect on the Corn Belt transmission system. All such coordination shall take place prior to the maintenance project.

The Interconnection Customer shall have a Corn Belt-approved organization test and maintain all devices and control schemes provided by the Interconnection Customer for the protection of the Corn Belt System. Included in the testing and maintenance will be any initial setup, calibration, and checkout of the required protective devices, periodic routine testing and maintenance, and any testing and maintenance caused by a Interconnection Customer or Corn Belt change to the protective devices.

If the Interconnection Customer’s testing and maintenance program is not performed to the satisfaction of Corn Belt or at the required maintenance interval, Corn Belt reserves the rights to inspect, test, or maintain the protective devices required for the protection of Corn Belt System. All costs associated with the testing and maintenance of the protection devices provided by the
Interconnection Customer, including the costs incurred by Corn Belt in performing any necessary tests or inspections, shall be the responsibility of the Interconnection Customer. Corn Belt reserves the right to approve the testing and maintenance practices of an Interconnection Customer when the Interconnection Customer's system is operated as a network with the Corn Belt System.

9.2.13.1 ROUTINE MAINTENANCE AND EMERGENCY REPAIRS

Corn Belt performs most routine maintenance during normal working hours. The customer may request that this maintenance occur outside of normal working hours or to meet an expedited schedule. The customer shall reimburse Corn Belt for all costs incurred for meeting special schedule requirements. If the customer moves a routine scheduled maintenance of their facility, which also affects work anticipated by Corn Belt, the customer shall also be responsible to pay costs incurred for rescheduling of Corn Belt generator maintenance. This payment requirement is exempt if the change in schedule is at the behest of Midwest ISO and the customer provides the documentation from the Midwest ISO showing the requested change.

9.2.14. INSPECTIONS

Before a Customer-owned substation can be energized, it must pass a final inspection by Corn Belt personnel. This inspection concentrates on all substation equipment up to and including the first protective fault interrupting device, the ground system, and metering. This may include circuit breakers, power fuses, instrument transformers, switches, surge arresters, bushings, and relays and associated equipment (including battery and battery chargers). This list is not all-inclusive.

The inspection will consist of a visual inspection of all major equipment as well as review of required test results. The ground system must be checked using the resistance measurement procedures in accordance with IEEE Standard 81.

Meter calibration records will be inspected to ensure compliance with specified System Design Requirements for generation, transmission, and end-user interconnections. Corn Belt will document the inspection by completing a site-specific form supplied by the Engineering Department.
10.0 COMMUNICATIONS & METERING REQUIREMENTS

The following are the Corn Belt communications equipment requirements and specifications for all generators to the Corn Belt system. Corn Belt shall purchase, own, install and maintain such metering equipment as may be necessary to meter the electrical output of the Facilities in accordance with this Section. All costs associated therewith shall be borne by the Generator. Metering in general shall track the kWh production of the Facility. Metering shall meet accuracy standards required for equivalent electrical services and can be done with standard meters or any devices that meet data collection and accuracy requirements. Corn Belt will furnish and install meter, RTU, radio and antenna at Generator expense. This Section specifies the required metering equipment to be purchased by the Generator.

Corn Belt requires generation facilities connecting to the Corn Belt system that are greater than 200 kW in size to have communications and telemetry to the generator on an instantaneous basis. To monitor real-time output and other distributed generation functions for large and medium generators that are operated remotely; provided, however, that telemetry shall not be required if the Facility is prevented via protective relaying from injecting energy into Corn Belt’s System. Telemetry data shall be available to Corn Belt and the communication of such data shall be compatible with Corn Belt’s communication protocols.

Corn Belt thus requires all generators connecting to the 69 kV and above transmission system to have SCADA communications to the Corn Belt Control Center. Generating facilities must either have SCADA control or on-site control personnel to react to Corn Belt Control Center’s instructions.

If the generator is located outside of the Corn Belt service territory, all metering will be for net generation. The local distribution company will serve station service for times when the generation is not operating or operating below the station service requirements.

Station service is the power consumed by the generator for power requirements of transformers, lighting, and other auxiliary equipment used to operate the facility.

10.1 MINIMUM DATA REQUIREMENTS

This section identifies the minimum metering and SCADA information required by the generator to be collected and/or passed to Corn Belt:

1) All meters for generation facilities that can generate less than 10% of nameplate, will be required to utilize extended range, metering accuracy current transformers (CT). This is to maintain metering accuracy during all possible levels of generation.

2) Metering current transformers (CT) will conform to either Corn Belt provided or industry standards. Customer will provide documentation for each metering CT showing its accuracy, test reports, wiring diagrams, and accompanying manual.

3) Potential transformers (PT) will conform to either Corn Belt provided or industry standards. Customer will provide documentation for each metering PT showing its accuracy, test reports, wiring diagrams, and its accompanying manual.

4) Instantaneous information from the meter, including kW, kVAR, kWh and kVAR-hr of both power generated and consumed by the generator.

5) Phase voltages from the main disconnecting device or metering device.

6) Indication of position of the main protective device located immediately after the metering equipment.
7) Frequencies at the point of interconnection either from the metering device or from the main disconnecting device.

8) Historical data for all kW and kVAR information from the meter mass memory.

- All check metering equipment will be required to have both in and out channels activated and the 15-minute interval timing and clock coordinated with Corn Belt. Check metering will not utilize CT’s or PT’s used for interconnection metering unless prior approval from Corn Belt is granted.

- PT’s and CT’s used for metering will not be utilized for any other activity unless prior approval from Corn Belt is granted. Approvals from Corn Belt will only be provided after the customer provides a copy of all documentation from the PT and CT manufacturer that shows the total allowed burden.

10.2. 69 KV INTERCONNECT METERING REQUIREMENTS

This section provides the required metering equipment to support the interconnection. The metering equipment will be connected following the circuit breaker or the disconnecting device on Corn Belt’s side of the Point of Interconnection. The metering equipment will monitor voltage levels on the high side of the Generator’s transformer. The Generator will be solely responsible for any transformer loss. No deviations from this requirement will be allowed. The metering requirements for 69 kV interconnections are:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Model No.</th>
<th>Equipment</th>
<th>Description</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Electric</td>
<td>Type JKW-350</td>
<td>Current Transformer (CT)</td>
<td>350 kV BIL, or equivalent</td>
<td>3</td>
</tr>
<tr>
<td>General Electric</td>
<td>Type JVS-350</td>
<td>Potential Transformer (PT)</td>
<td>350 kV BIL, 600/350:1 or equivalent</td>
<td>3</td>
</tr>
<tr>
<td>Gullwing</td>
<td>Aluminum, weather-tight Enclosure with Lockable Latch</td>
<td>36” H x 30” W x 12” D, NEMA 4</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>States</td>
<td>C3-410-M6</td>
<td>Test Switch</td>
<td>120 Volt, from external potential transformer</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Power Supply</td>
<td></td>
<td>For radio antenna</td>
<td>1</td>
</tr>
<tr>
<td>Marwell (exterior installation)*</td>
<td>2200</td>
<td>Mounting Pole</td>
<td>13 terminal, CT shorting</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>STS13-2B</td>
<td>Steel Meter Enclosure</td>
<td>SKT/SW20 A; 13t-H0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Type of equipment depends if the metering equipment will be inside a control building or not.

10.3. GREATER THAN 69 KV INTERCONNECT METERING REQUIREMENTS

The metering requirements for Facilities greater than 69 kV will follow suit to those listed in this Section. The Facility Study will provide additional details and/or requirements as they pertain to the project under study.
10.4. MINIMUM COMMUNICATION REQUIREMENTS

The list below identifies minimum Corn Belt communications equipment requirements. Corn Belt will take the responsibility to transfer the data to the appropriate control centers.

- Customer will provide necessary high-voltage protection equipment required by the local telephone company.
- Installation of a XXX type radio to communicate with the Corn Belt system.
- Installation of a dedicated phone circuit that is connected to the metering equipment for the purpose of recall and downloading of the metering mass memory information.
- Customer will pay for all operations expenses arising from failure to maintain the SCADA equipment and requiring Corn Belt to have personnel maintain the equipment.
- Failure of the customer to maintain payments and provide maintenance on the SCADA equipment will result in action by Corn Belt up to and including disconnection of interconnection service pursuant to the Corn Belt Interconnection & Operating Agreement.
- The customer will be required to pay an Operation and Maintenance fee to Corn Belt for use of the Microwave/Radio system. This fee is based on the Operations and Maintenance expenses of Corn Belt and will be pro-rated to the customer.

10.5. DATA REQUIREMENTS FOR FACILITIES WITH MULTIPLE DISPATCHABLE UNITS LOCATED AT THE SAME SITE

This section is intended for generation facilities that have multiple dispatchable units located in a single location. The requirements in this section are in addition to the previous minimum requirements.

- Instantaneous individual Generator outputs in MW and MVAR quantities – Net if internal auxiliaries exist.
- Hour end of individual Generator outputs in MWh and MVAR-hr quantities – Net if internal auxiliaries exist.
- Instantaneous Auxiliary or station service transformers connected to the 69 kV and above system in MW, MVAR and kV quantities.
- Hour end of Auxiliary or station service transformers connected to the 69 kV and above system in MWh and MVAR-hr quantities.
- Single interconnection meters with bi-directional settings to capture net generation less any station service.

10.6. FACILITIES WITHOUT 24 HOUR ON-SITE PERSONNEL WITH GENERATION 5 MW OR GREATER

This section is for generators who do not have personnel either on-site 24 hours a day, or have customer owned SCADA at a 24 hour manned facility that can control a customer’s facility and react within 5 minutes to Corn Belt Control Center’s operation instructions.

The information listed below is in addition to the minimum communication and data requirements. This information will provide Corn Belt’s Control Center with the status, condition and loads of the equipment.
• For facilities with multiple feeders for collector systems, the customer will allow control and indication of both the main breaker and all individual feeder breakers by Corn Belt to limit generation during times of system emergency or maintain transmission system security as defined in the Corn Belt Interconnection & Operating Agreement.

• For facilities with single common point for collector systems and no individual feeder breakers, the customer will allow control and indication of the main breaker.

• Information of the operating condition of the breaker(s) and transformer(s), IE: Low SF6, overpressure, low oil, etc will be provided to the Corn Belt Control Center per Corn Belt’s standards.

• Corn Belt will notify the customer of any alarms. The customer must inform the operators of any action they wish the Corn Belt Control Center to take upon being notified by Corn Belt. Corn Belt will not be responsible for damage that occurs to equipment during normal operations or after alarms have indicated a problem.
11.0 PROTECTION REQUIREMENTS

Corn Belt requires adequate interconnection protection to separate customer-owned generation from the Corn Belt electric system. The purpose of this equipment is to detect Customer energization of an Corn Belt circuit that has been deenergized, detect the Customer’s generation operating at an abnormal voltage or frequency, or detect a fault or abnormal condition on the Corn Belt electric system that requires separation of the customer’s parallel generation facilities.

All relays shall have appropriate test switches (i.e.: ABB type FT-1) to allow testing the operation of the relays without interrupting the generator unwiring/disassembling the relay, and without causing unnecessary operation of protective equipment by lockout relays and breaker failure schemes. The relays shall be grouped with respect to protective equipment in dedicated panels or cabinets accessible to Corn Belt personnel.

11.1 LARGE SYNCHRONOUS GENERATOR

This section addresses larger (>10MW) synchronous generators that have fuel sources that allow the unit to be dispatched at any time. All synchronous generators, depending on the system they connect to, will be subject to the requirements of the Corn Belt Transmission Interconnection study process.

Large synchronous dispatchable generators can deliver a significant amount of energy to a fault. A higher level of protection for this class of generation is required in order to provide high-speed separation of the generation during system disturbances. This not only protects the generator, but also the transmission system and personnel.

1) Output contacts of relays installed on these generators shall directly energize the trip coil of the customer's main breaker or an intermediate auxiliary tripping relay, which directly energizes the breaker trip coil. The relaying system shall have at least two reliable sources of power independent from each other (AC system and DC battery and charger) to assure proper operation of the protection scheme. The protective relays shall be utility grade devices as defined in ANSI/IEEE Standard C37.90, "Relays and Relay Systems Associated with Electric Power Apparatus".

2) Corn Belt may require a communications channel be installed as part of the relay protection scheme for the generation. This communication circuit and any associated communication equipment, at both the Customer and Corn Belt ends, shall be installed and maintained by Corn Belt at the customer’s expense. The communications channel requirement will be determined by Corn Belt, and may consist of but not be limited to:
   - Power line carrier or pilot wire
   - Microwave

11.2 CONNECTIONS TO 69 KV SYSTEM

Connections to the 69 kV system will be defined through Corn Belt’s Interconnection study process. Customers should consult Section 9 to determine the type of tap that will be allowed.

11.2.1. “T” LINE TAPS ONLY

- For any transformer with a base rating greater than 5 MVA, the Customer will install a three-phase breaker for the high-side transformer protective device. No deviations from this requirement will be allowed.

- For any transformer with a base rating of 5 MVA or less, and the Customer installs a main low side breaker, fuses will be allowed on a case by case basis requiring prior approval of fuse sizing and coordination.
Lightning arresters are required at terminal equipment for 69 kV line taps. 42 kV Maximum Continuous Operating Voltage (MCOV) arresters will be required on wye connected systems.

No metering on the low side of the transformer will be allowed. The Customer is responsible for all kW and kVAR losses of the transformer. All metering requirements are to be at the point of interconnection.

11.2.2. SUBSTATIONS WITH LINE BREAKERS

For any transformer the Customer will install a three-phase breaker for the high-side transformer protective device. No deviations from this requirement will be allowed.

Lightning arresters are required at terminal equipment for 69 kV line taps. 42 kV MCOV arresters will be required on wye connected systems.

No metering on the low side of the transformer will be allowed. The Customer is responsible for all kW and kVAR losses of the transformer. All metering requirements are to be at the point of interconnection.

A common fence between the Customer and Corn Belt will be installed to partition the substation between Corn Belt equipment and Customer equipment. A common wall of a control enclosure may also be utilized as a partition. If a door exists in the common wall, Corn Belt will have sole access.

11.3 CONNECTIONS TO THE 100 kV AND ABOVE SYSTEMS

Connections to the 100 kV and above systems will be determined at the time of the Corn Belt’s Transmission Interconnection study process. Customers should consult Section 9 to determine the type of tap that will be allowed.

No “T” taps to the 115kV and 161 kV systems will be allowed for any generation facility. No exceptions to this requirement will be allowed.

Substation configurations will be determined at the time of the Facility Study stage of the Corn Belt Transmission Interconnection Process.

For any transformer, the Customer will install a three-phase breaker for the high-side transformer protective device. Unless a ring bus or other multiple breaker bus configurations is used (i.e., folded ring, breaker and ½ scheme), no deviations from this standard will be allowed.

All lightning arresters will be to the Corn Belt standards for the transmission system the Customer is connecting to.

No metering on the low side of the transformer will be allowed. The Customer is responsible for all kW and kVAR losses of the transformer. All metering requirements are to be at the point of interconnection.

A common fence between the Customer and Corn Belt will be installed to partition the substation between Corn Belt equipment and Customer equipment. A common wall of a control enclosure may also be utilized as a partition. If a door exists in the common wall, Corn Belt will have sole access.
11.4 PROTECTION RELAYS

Corn Belt has pre-approved a number of microprocessor relays that provide many of the necessary protective functions. Additional relays will be reviewed and approved on a case-by-case basis. The approved relays include:

- Schweitzer Engineering Laboratories SEL-311C - line protection
- Schweitzer Engineering Laboratories SEL-501 – breaker failure & bus differential

11.5 ADDITIONAL NOTES FOR RELAY DEVICES

An acceptable protection scheme is shown in the one-line diagram below.

<table>
<thead>
<tr>
<th>Relay Device</th>
<th>Description, Purpose and Setting Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Synchronizing. Provide voltage and phase angle supervision of generator breaker closure.</td>
</tr>
<tr>
<td>27</td>
<td>Undervoltage. Provide tripping of the customer breaker should the Corn Belt line voltage not be maintained within an acceptable lower limit. The relay should be capable of providing a trip time in the ½ to 2-second range. Actual voltage and time delay settings will be determined on a case by case basis.</td>
</tr>
</tbody>
</table>

![Figure 2. Protection One-Line Diagram](image)

NOTES:

1. THE 25 AND 27 DEVICES AT THE CORN BELT STATION ARE REQUIRED IF GENERATION IS GREATER THAN 50% OF MINIMUM FEEDER LOAD.

11.6 OWNERSHIP OF FACILITIES

Corn Belt will take ownership of all interconnection facilities greater than 30 kV that are part of the transmission network.

- For interconnections for 30-72kV lines "T" tap type interconnections, Corn Belt ownership will end at the metering CT’s on the Customer’s line or substation facility.
For interconnections from 30 kV to 400 kV with substations facilities as part of the network, the ownership of the facilities will end at the disconnect switch just prior to the metering current transformers for the Customer.
12.0 OTHER GENERAL DESIGN REQUIREMENTS

12.1 TRANSFORMER CONFIGURATION

Corn Belt shall review and approve the configuration of any customer-owned interconnection transformer(s). This requirement will generally be for, but is not limited to, transformer connection configuration (delta, wye) and grounding method (solid ground, ungrounded, impedance grounded).

Corn Belt will not approve physical or electrical size, no-load tap changer specifications, load tap changer settings or specifications, or general physical characteristics of the transformer.

12.2 VOLTAGE AND CURRENT TRANSFORMER PROTECTION

Voltage transformers installed on the primary side of the step-down transformer connected phase to ground are required for some of the protective functions. A primary fused cutout and secondary fused safety switch are required to prevent accidental backfeed from wound-potential transformers.

Current transformers shall have shorting terminal blocks as necessary for metering and relaying.

The protection of PT’s and CT’s will be in accordance to Rural Utility Services (RUS) Design Guide for Rural Substations, the above information is general requirements that may be superceded by the design and safety standard.

12.3 FACILITY SIZE & DESIGN LIMITS

12.3.1 FACILITIES BELOW 100 KV

Corn Belt does not construct facilities below 50 kV that exceed 600 A and between 50 and 100 kV that exceed 900A. These limits are only exceeding in unique circumstances to serve load or generation. Unless a Customer’s generator is located such that a higher voltage cannot serve it, no exceptions will be granted during the Corn Belt’s Interconnection process.

- Generation may be limited to 600 A.
- Generation 5 MW or greater will require line breakers on the line that is being intercepted for the generator. No exceptions allowed.
- A breaker station will be required to address reliability and insure safe operation of the Corn Belt system during maintenance, and emergency situations.
- The Generator will be responsible for the purchase of the synch check relays.

12.3.2 FACILITIES BETWEEN 100 KV AND 200 KV

Corn Belt does not construct facilities between 100 kV and 200 kV that exceed 1100 A except in very unique circumstances. Unless a Generator is located such that a higher voltage cannot serve it, no exceptions will be granted during the Corn Belt’s Interconnection process. Additionally,

- Generation exceeding 1100 A may have limits set on generation output.
- Two feeds are required into the interconnection substation from the transmission network. Customer may construct a radial system to the interconnection substation.
- Line breakers are required on all transmission lines at the interconnection substation.
- A breaker station will be required to address reliability and insure safe operation of the Corn Belt system during maintenance, and emergency situations.

12.3.3 FACILITIES 200 KV AND ABOVE

Corn Belt does not construct facilities 200 kV and above that exceed 2000 A except in unique circumstances. Generation above 2000 A may be subject to these additional requirements.

- Generation is limited to 2000 A.
- Ring bus or equivalent configuration is required for all connections. Bus configurations will be determined at the time of interconnection; in no case will Corn Belt install a ring bus with more than six (6) terminals.
13.0  DESIGN & CONSTRUCTION REVIEW PROCESS

13.1. DECLARATION OF CONTRACTOR FOR CUSTOMER

The purpose of this section is for the Customer to designate their proposed contractor(s) to design, procure and construct the interconnection facility. This is required to let Corn Belt communicate directly with the Customer’s correct contractor(s).

Without this information, Corn Belt has to assume that all requests for information or coordination of work are not from the actual Customer’s contractor, but those trying to bid a job for the Generator.

a. The Customer will designate in writing the name, phone number, e-mail address and mailing address of the firm(s) that they will utilize for the design, construction and check-out of the Customer’s interconnection facilities.

b. If the Customer changes firm(s) in the midst of any stage of the interconnection process, the customer, within ten (10) days of doing so, will notify Corn Belt’s Vice President, Engineering & System Operations in writing. Failure to do so will result in delays in construction of the Corn Belt interconnection facilities.

13.2. STAND ALONE NETWORK UPGRADE CONSTRUCTION

This section is supplemental information to Section 7.1 and requirements by Corn Belt for Customers wishing to construct stand-alone facilities.

Stand-Alone facilities will be determined by Corn Belt during the Corn Belt’s Interconnection Facility Study stage. This determination by Corn Belt of Stand-Alone facilities will consist of those facilities that do not currently exist will not be constructed within existing Corn Belt owned property or those facilities that can be constructed with no outages to the Transmission System. Any facility that requires a Transmission System outage or is on Corn Belt property is deemed not to be Stand-Alone and will not be eligible for construction by the customer.

If the Customer chooses to construct the Corn Belt Stand-Alone Interconnection Facilities and Network Upgrades pursuant to the Corn Belt Interconnect & Operating Agreement, the Customer will be required to follow the below standards:

a. Business Days are as defined in the Corn Belt Interconnect & Operating Agreement.

b. All Design firms, vendors and contractors working for the Customer on Corn Belt Stand-Alone facilities will be approved by Corn Belt prior to issuing any contracts. Customer will submit the proposed list of vendors, contractors and design firms not less than thirty (30) Business Days in advance of Corn Belt granting any contract for approval.

c. Requests for all Corn Belt design standards will require no less than twenty (20) Business Days.

d. Requests for review of any design drawing will require no less than twenty (20) Business Days.

e. Requests for review of any procurement contract will require no less than thirty (30) Business Days.

f. Requests for approval of procurement contracts or change orders will require no less than fifteen (15) Business Days.

g. All procurement contracts greater than $50,000 (including any service charges or taxes) or change orders in excess of $5,000 will require prior Corn Belt approval. Procurement contracts or change
contracts for similar equipment or services may not be broken into separate contracts to avoid approvals.

h. All contracts to be approved by Corn Belt must show the normal price and include any acceleration or advancement charges due to the customer’s schedule.

i. The Customer will obtain all warranties as transferable and will conform to Corn Belt’s procurement and/or design standards. Any expenses to make the warranties compatible or transferable to Corn Belt standards will be at the Customer’s sole expense. These expenses must be detailed on all invoices by the vendor(s).

j. Substation Land: The Customer will transfer ownership of land purchased for substation use to Corn Belt. The customer will obtain all local, state and federal permits prior to deeding the property to Corn Belt. Use of easements is acceptable if using Corn Belt standard easement document. Easements shall not have clauses limiting use of the property by Corn Belt or place conditions on Corn Belt. Use of leases is strictly prohibited. All property transfers will occur as a “$1 and other valuable consideration” transaction.

k. Transmission Line Property: The Customer will purchase easements on standard Corn Belt easement documents with no conditions attached. The Customer will pay for all easements at the standard Corn Belt rate. Any deviation from the Corn Belt standard easement rate must be approved by Corn Belt prior to committing to an easement. If the Customer fails to obtain prior approval from Corn Belt, the cost difference between the amount paid and the standard Corn Belt rate will be a sole cost to the customer.

l. All property & easement transfers will occur as a “$1 and other valuable consideration” transaction.

13.3. REQUIRED DESIGN INFORMATION PRIOR TO ENERGIZATION

The Customer will submit to Corn Belt pursuant to the Corn Belt Interconnection & Operating Agreement detailed designs and all proposed equipment settings prior to the construction and commissioning of any interconnection equipment provided and constructed by the Generator.
14.0 COMMISSION, TESTING, AND MAINTENANCE

Pursuant to the Corn Belt Interconnection & Operating Agreement, Corn Belt will be present during all commissioning and testing of interconnection related equipment. Corn Belt and the Customer will work together to develop the proper settings for all relays, controlled equipment, and all meters and communication devices.

Requests for Corn Belt to witness check-outs, testing, etc. will require no less than twenty (20) Business Days advance notice. Requests for witnessing activities may not be advanced and must be in writing. Exception to advance notification will be at the discretion of Corn Belt. These requests may be in the form of standard U.S. mail, facsimile or electronic mail.

Corn Belt personnel will only work overtime at the sole expense of the Customer; any test, review, etc requiring overtime will be billed directly to the customer.

The customer has sole responsibility for the routine maintenance of their generating, protective equipment and generator interconnection equipment pursuant to the Corn Belt Interconnection & Operating Agreement. Complete maintenance records shall be maintained by the customer and be made available upon request for Corn Belt review pursuant to the Corn Belt Interconnection & Operating Agreement.
**A**

**Additional Review:** A technical evaluation by the Transmission Provider of a proposed interconnection will determine whether minor modifications to the Transmission Provider's Transmission System (e.g., changing meters, fuses, relay settings) can be performed in order to enable the interconnection to be made safely and reliably.

**Adverse System Impact:** The negative effects due to technical or operational limits on conductors or equipment being exceeded that may compromise the safety and reliability of the electric system.

**Affected System:** An electric system other than the Transmission Provider's Transmission System that may be affected by the proposed interconnection.

**Affiliate:** With respect to a corporation, partnership or other entity, each such other corporation, partnership or other entity that directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, such corporation, partnership or other entity.

**Alternate Current (AC):** That form of electric current that alternates or changes in magnitude and polarity (direction) in what is normally a regular pattern for a given time period called frequency.

**Ampere:** The unit of current flow of electricity. It is analogous to quantity per unit of time when referring to the flow of water. One ampere is equal to a flow of one coulomb per second.

**Applicable Laws and Regulations:** All duly promulgated applicable federal, state and local laws, regulations, rules, ordinances, codes, decrees, judgments, directives, or judicial or administrative orders, permits and other duly authorized actions of any Governmental Authority.

**Applicable Reliability Council:** The reliability council applicable to the Transmission System to which the Generating Facility is directly interconnected.

**Applicable Reliability Standards:** The requirements and guidelines established by NERC, the Applicable Reliability council, and the Control Area of the Transmission System to which the Generating Facility is directly interconnected.

**Automatic Reclosing:** A feature of some circuit breakers, which allows them to reclose automatically after being tripped under abnormal conditions.

**Automatic Tripping (Automatic Opening):** The opening of a circuit breaker under predetermined conditions without the intervention of an operator.

**B**

**Balanced Load:** An equal distribution of load on all phases of an alternating current circuit.

**Base Case:** The base case power flow, short circuit, and stability databases used for the Interconnection Studies by the Transmission Provider or Interconnection Customer.

**Breach:** The failure of a Party to perform, or observe, any material term or condition of the Interconnection and operating agreement or any other agreement.

**Breaching Party:** A Party that is in Breach of the Interconnection and operating agreement or any other agreement.

**Business Day:** Shall mean Monday through Friday, excluding Federal Holidays.

**Calendar Day:** Any day, including Saturday, Sunday or a Federal Holiday.

**Capacity:** The number of amperes of electric current a wire will carry without becoming unduly heated; the capacity of a machine, apparatus, or devices is the maximum of which it is capable under existing service conditions; the load for which a generator turbine, transformer, transmission circuit, apparatus, station, or system is rated.
Capacity Factor: The ratio of average load on a generating resource to its capacity rating during a specified period of time, expressed in percentages.

Circuit Breaker: A device for interrupting a circuit between separable contacts under normal or fault conditions.

Commercial Operation Date: The date on which the Interconnection Customer commences commercial operation of the unit at the Generating Facility after testing of such unit has been completed.

Conductor: Material that can be used as a carrier of an electric current.

Confidential Information: Any confidential, proprietary or trade secret information of a plan, specification, pattern, procedure, design, device, list, concept, policy or compilation relating to the present or planned business of a Party, which is designated as confidential by the Party supplying the information, whether conveyed orally, electronically, in writing, through inspection, or otherwise.

Control Area: An electrical system or systems bounded by interconnection metering and telemetry, capable of controlling generation to maintain its interchange schedule with other Control Areas and contributing to frequency regulation of the interconnection. A Control Area must be certified by NERC.

Control Switch: A switch controlling the circuit through circuit breakers or other switches, which are magnetically operated.

Corn Belt Power Cooperative (CBPC): A corporation organized under the laws of Iowa, which owns certain transmission and/or distribution lines and facilities in Iowa (“Corn Belt’s System”).

Current Transformer (CT): A transformer, intended for metering, protective or control purposes, which is designed to have its primary winding connected in series with a circuit carrying the current to be measured or controlled. A current transformer normally steps down current values to safer levels. A CT secondary circuit must never be open circuited while energized.

Customer Generation: Any customer device designed to convert energy of one form or another into electric energy.

Dead-End Structure: The structure on which the last span of CBPC-owned conductors terminates.

Delta Connected Circuit: A three-phase circuit with three-source winding connected in a closed delta (triangle). A closed delta is a connection in which each winding terminal is connected to the end (terminal) of another winding.

Demand: The rate at which electric energy is delivered to or by a system; normally expressed in kilowatts, megawatts or kilovolt amperes.

Designated CBPC Control Center: The Control Center that has been assigned operational jurisdiction over a Load or Generation Entity’s substation.

Designated CBPC Switching Center: The CBPC Control Center.

Direct Current (DC): A unidirectional current in which the changes in value are either zero or so small that they may be neglected.

Disconnect: A device used to isolate a piece of equipment. A disconnect may be gang operated (three operated together) or individually operated.

Dispatch Ability: Ability and availability of a generating facility to operate so that a utility can call upon it to increase or decrease deliveries of capacity to any level up to contract capacity.

Dispute Resolution: The procedure for resolution of a dispute between the Parties in which they will first attempt to resolve the dispute on an informal basis.

Distribution System: The Transmission Provider’s facilities and equipment used to transmit electricity to ultimate usage points such as homes and industries directly from nearby generators or from interchanges with higher voltage transmission networks which transport bulk power over longer distances. The voltage level at which Distribution Systems operate differ among areas.
**Distribution Upgrades:** The additions, modifications, and upgrades to the Transmission Provider's Distribution System at or beyond the Point of Interconnection to facilitate interconnection of the Generating Facility and render the transmission service necessary to effect Interconnection Customer's wholesale sale of electricity in interstate commerce. Distribution Upgrades do not include Interconnection Facilities.

**Effective Date:** The date on which the Interconnection and operating agreement becomes effective upon execution by the Parties subject to acceptance by the Commission, or if filed unexecuted, upon the date specified by the Commission.

**Emergency:** A condition or situation: (1) that in the judgment of the Party making the claim is imminently likely to endanger life or property, or (2) that, in the case of a The Transmission Provider, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to the Transmission Provider’s Transmission System, the Transmission Provider's Interconnection Facilities or the electric systems of others to which the Transmission Provider's Transmission System is directly connected, or (3) that, in the case of Interconnection Customer, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the Generating Facility or Interconnection Customer’s Interconnection Facilities. System restoration and black start shall be considered Emergency Conditions; provided, that the Interconnection Customer is not obligated by the Interconnection and operating agreement to possess black start capability.

**End-User:** A purchaser of electric power who purchases such power to satisfy a Load directly connected to the ISO Controlled Grid or to a Distribution System and who does not resell the power.

**Energize:** To apply voltage to a circuit or piece of equipment; to connect a de-energized circuit or piece of equipment to a source of electric energy.

**Engineering & Procurement (E&P) Agreement:** An agreement that authorizes the Transmission Provider to begin engineering and procurement of long lead-time items necessary for the establishment of the interconnection in order to advance the implementation of the Interconnection Request.

**Environmental Law:** Applicable Laws or Regulations relating to pollution or protection of the environment or natural resources.

**Facility Study:** A study conducted by the Transmission Provider or a third party consultant for the Interconnection Customer to determine a list of facilities (including the Transmission Provider's Interconnection Facilities and Network Upgrades as identified in Transmission Service Request System Impact Study), the cost of those facilities, and the time required to interconnect the Generating Facility with the Transmission Provider's Transmission System. The scope of the study is defined by the Interconnection Procedures.

**Facility Study Agreement:** The form of agreement for conducting the Facility Study.

**Fault Current:** The current that is produced by an electrical fault, such as single-phase to ground, double-phase to ground, three-phase to ground, phase-to-phase, and three-phase. The Fault Current is several times larger in magnitude than the current that normally flows through a circuit. A protective device must be able to interrupt this Fault Current within a few cycles. The Fault Current increases when a new generator is interconnected.

**Feasibility Study:** A preliminary evaluation of the system impact and cost of interconnecting the Generating Facility to the Transmission Provider’s Transmission System, the scope of which is described in the Interconnection Procedures.

**Feasibility Study Agreement:** The form of agreement for conducting the Feasibility Study.

**Feeder:** A circuit having as its primary purpose, the distribution of electric energy.

FERC: The Federal Energy Regulatory Commission (Commission) or its successor.

Firm Capacity: Power committed to be available at all times during the period covered, except for forced outages and scheduled maintenance.

Force Majeure: Any act of God, labor disturbance, act of the public enemy, war, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment, any order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A Force Majeure event does not include an act of negligence or intentional wrongdoing.

Forced Outage: Any unplanned outage resulting from a design defect, inadequate construction, operator error or a breakdown of the mechanical or electrical equipment that fully or partially curtails the delivery of electricity between a Load or Generation Entity's facility and CBPC's Power System.

Frequency: The number of cycles occurring in a given interval of time (usually one second) in an electric current. Commonly expressed in Hertz (Hz).

Fuse: A short piece of conducting material of low melting point, which is inserted in a circuit and will melt and open the circuit when the current reaches a certain value.

Generation Entity: An entity interconnected to CBPC's Power System who has generation facilities (including back-up generation in parallel) on its side of the point of interconnection with CBPC's Power System.

Generation Facility: A plant in which electric energy is produced from some other form of energy by means of suitable converting apparatus. The term “generation facility” includes the generation apparatus and all associated equipment owned, maintained and operated by the Generation Entity.

Generating Facility Capacity: The net capacity of the Generating Facility and the aggregate net capacity of the Generating Facility where it includes multiple energy production devices.

Generator: The physical electrical equipment that produces electric power.

Generator Interconnection Agreement: An interconnection agreement between CBPC and wholesale Generators connected to the CBPC's Transmission System.

Generator Operating Agreement: An agreement that establishes operating responsibilities and associated procedures for communications between a Generator and CBPC’s system operators.

Good Utility Practice: Any of the practices, methods and acts engaged in or approved by a significant portion of the electric industry during the relevant time period, or any of the practices, methods and acts which, in the exercise of reasonable judgment in light of the facts known at the time the decision was made, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather to be acceptable practices, methods, or acts generally accepted in the region.

Governmental Authority: Any federal, state, local or other governmental regulatory or administrative agency, court, commission, department, board, or other governmental subdivision, legislature, rulemaking board, tribunal, or other governmental authority having jurisdiction over the Parties, their respective facilities, or the respective services they provide, and exercising or entitled to exercise any administrative, executive, police, or taxing authority or power; provided, however, that such term does not include Interconnection Customer, the Transmission Provider, or any Affiliate thereof.

Ground: A term used to refer to the earth as a conductor or as the zero of potential. For safety purposes, circuits are grounded while any work is being done on or near a circuit or a piece of equipment in the circuit; this is usually called protective grounding.

Ground Fault: An unintentional electric current flow between one or more energized conductors and the ground.
Hazardous Substances: Any chemicals, materials or substances defined as or included in the definition of "hazardous substances," "hazardous wastes," "hazardous materials," "hazardous constituents," "restricted hazardous materials," "extremely hazardous substances," "toxic substances," "radioactive substances," "contaminants," "pollutants," "toxic pollutants" or words of similar meaning and regulatory effect under any applicable Environmental Law, or any other chemical, material or substance, exposure to which is prohibited, limited or regulated by any applicable Environmental Law.

High-Voltage: Any voltage level that is 69 kV, or greater.

IEEE (Institute of Electrical and Electronics Engineers): Among other things, the IEEE develops technical standards applicable to the electric industry including relays, transformers, and metering.

Inductance: The property of an electric circuit, which produces a voltage by electromagnetic induction when the current in the circuit changes or varies. It opposes any change of circuit current.


In-Service Date: The date upon which the Interconnection Customer reasonably expects it will be ready to begin use of the Transmission Provider’s Interconnection Facilities to obtain back feed power.

Interconnection Agreement: The form of interconnection agreement applicable to an Interconnection Request pertaining to a Large Generating Facility that is included in the Transmission Provider’s Tariff.

Interconnection and Operating Agreement: The form of interconnection agreement applicable to an Interconnection Request pertaining to a Generating Facility, that is included in the Transmission Provider’s Tariff.

Interconnection Customer: Any entity, including the Transmission Provider, Transmission Owner or any of the Affiliates or subsidiaries of either, that proposes to interconnect its Generating Facility with the Transmission Provider's Transmission System.

Interconnection Customer's Interconnection Facilities: All facilities and equipment that are located between the Generating Facility and the Point of Change of Ownership, including any modification, addition, or upgrades to such facilities and equipment necessary to physically and electrically interconnect the Generating Facility to the Transmission Provider’s Transmission System. Interconnection Customer's Interconnection Facilities are sole use facilities.

Interconnection Facilities: All means required and apparatus installed to interconnect and deliver power from a Load or Generation Entity facility to the CBPC Power System including, but not limited to, connection, transformation, switching, metering, communications, and safety equipment, such as equipment required to protect (1) the CBPC Power System and Load or Generation Entities from faults occurring at the Load or Generation and (2) the Load or Generation facility from faults occurring on the CBPC Power System or on the systems of others to which the CBPC Power System is directly or indirectly connected. Interconnected facilities also include any necessary additions and reinforcements by CBPC to its system required as a result of the interconnection of a facility to the CBPC Power System.

Interconnection Request: An Interconnection Customer's request, in accordance with the Tariff, to interconnect a new Generating Facility, or to increase the capacity of, or make a Material Modification to the operating characteristics of, an existing Generating Facility that is interconnected with the Transmission Provider's Transmission System.

Interconnection Service: The service provided by the Transmission Provider associated with interconnecting the Interconnection Customer's Generating Facility to the Transmission Provider's Transmission System and enabling it to receive electric energy and capacity from the Generating Facility at the Point of Interconnection, pursuant to the terms of the Interconnection and operating agreement and, if applicable, the Transmission Provider's Tariff.

**Interruption**: A temporary discontinuance of the supply of electrical power.

**J**

**Kilovolt (kV)**: 1,000 volts.

**Kilovolt-Ampere (kVA)**: The product of kilovolts and amperes. Used to refer to high voltage alternating current systems.

**Kilowatt-Hour (kWh)**: A basic unit of electric energy equal to the use of 1 kilowatt for a period of 1 hour.

**Kilovolt-Ampere-Reactive (kVar)**: A measure of reactive power, which is required to regulate system voltage.

**L**

**Lagging Power Factor**: Occurs when reactive power flows in the same direction as real power. Stated with respect to the generator, lagging power factor occurs when generator is producing Vars.

**Large Generating Facility**: A Generating Facility having a Generating Facility Capacity of more than 20MW.

**Leading Power Factor**: Occurs when reactive power flows in the opposite direction to real power. Stated with respect to the generator, lagging power factor occurs when generator is absorbing Vars.

**Line Losses**: Electrical energy converted to heat in the resistance of all transmission and/or distribution lines and other electrical equipment, such as transformers, on the system.

**Load Entity**: An entity interconnected to CBPC’s Power System at a transmission or distribution voltage level who does not have generation of its own in parallel with CBPC’s Power System, and is not interconnected with any source of generation other than CBPC’s.

**Low-Voltage**: Voltage levels below 69 kV.

**M**

**Material Modification**: A modification that has a material impact on the cost or timing of any Interconnection Request with a later queue priority date.

**Maximum Torque Angle (MTA)**: The phase angle between the relay measured quantities at which the relay is the most sensitive.

**Megawatt (MW)**: 1 million watts; to describe the capacity of a Generating Facility.

**Megger**: An ohmmeter device used to measure the ability of insulation to withstand voltage, as well as measuring the insulation resistance.

**Metering**: The methods of applying devices that measure and register the amount and direction of electrical quantities with respect to time.

**Metering Equipment**: All metering equipment installed or to be installed at the Generating Facility pursuant to the Interconnection Agreement at the metering points, including but not limited to instrument transformers, MWh-meters, data acquisition equipment, transducers, remote terminal unit, communications equipment, phone lines, and fiber optics.

**Metering Services**: Consist of removal, ensuring meter design specifications, installation, calibration, and ongoing testing and maintenance of meters.

**Milestones**: The events and associated dates listed in the Interconnection and operating agreement. The Milestones describe events that are to be met by either Party as the Generating Facility proceeds to interconnection and Parallel Operation.

**N**

**Nameplate Rating (Facility)**: Output rating information appearing on a generator nameplate, or other electrical device, in accordance with applicable industry standards.
NERC: The North American Electric Reliability Council or its successor organization.

Net Energy Output: The generator facility’s gross output in kilowatt-hours less station use to the point of delivery into the CBPC Power System.

Network Resource: The portion of a Generating Facility that is integrated with the Transmission Provider’s Transmission System, designated as a Network Resource pursuant to the terms of the Tariff, and subjected to redispatch directives as ordered by the Transmission Providers in accordance with the Tariff.

Network Resource Interconnection Service: An Interconnection Service that allows the Interconnection Customer to integrate its Generating Facility with the Transmission Provider’s Transmission System in a manner comparable to that in which the Transmission Provider integrates its generating facilities to serve native load customers; or (2) in an RTO or ISO with market based congestion management, in the same manner as all other Network Resources. Network Resource Interconnection Service in and of itself does not convey transmission service.

Network Upgrades: The additions, modifications, and upgrades to the Transmission Provider’s Transmission System required at or beyond the point at which the Interconnection Customer interconnects to the Transmission Provider’s Transmission System to accommodate the interconnection of the Generating Facility to the Transmission Provider’s Transmission System.

Ohm: The unit of resistance of an electric circuit.

One-Line Diagram: A diagram in which a single line represents several conductors and various devices or pieces of equipment are denoted by simplified symbols. The purpose of such a diagram is to present an electrical circuit in a simple way so that its function and configuration can be readily grasped.

Operating Requirements: Any operating and technical requirements that may be applicable due to Regional Transmission Organization, Independent System Operator, Control Area, or the Transmission Provider requirements, including those set forth in the Interconnection and operating agreement.

Optional Interconnection Study: A sensitivity analysis based on assumptions specified by the Interconnection Customer in the Optional Interconnection Study Agreement.

Optional Interconnection Study Agreement: The form of agreement for conducting the Optional Interconnection Study.

Outage: A condition existing when a line or a substation is de-energized.

Output: The energy delivered by a generation facility during its operation.

Overload: A load in amperes greater than an electric device or circuit is designed to carry.

Overvoltage: Voltage higher than that desired or higher than that for which the equipment in question is designed.

Parallel Generation: Any customer generation that is connected to and operating in synchronism for more than 30 cycles or ½ of a second with the Transmission Provider’s system.

Parallel Operation: The two-way flow of power between a generator and a Transmission System. Generators that operate in parallel with a Transmission System require additional protection and control devices. This may be contrasted with a stand-alone generator that operates isolated from the utility company’s electric system.

Party or Parties: The Transmission Provider, Transmission Owner, Interconnection Customer or any combination of the above.

Peaking: Operation of generating facilities to meet maximum instantaneous electrical demands.

Point of Change of Ownership: The point where the Interconnection Customer’s Interconnection Facilities connect to The Transmission Provider’s Interconnection Facilities.
Point of Common Coupling: The point in the interconnection of the Generating Facility with the Transmission Provider's Transmission System at which the harmonic limits are applied.

Point of Interconnection: The point where the Load or Generation Entities’ conductors or those of the respective agents meet CBPC’s Power System (point of ownership change).

Potential Transformer (PT): A transformer, which is intended to reproduce in its secondary circuit, in a known proportion, the voltage of the primary circuit. Also known as a Voltage Transformer.

Power: The time rate of transferring or transforming energy.

Power Factor: The ratio of real (MW) power to apparent power (MVA). Power factor is the cosine of the phase angle difference between the current and voltage of a given phase.

Precertified: Where a Generating Facility is an identical sample of a manufacturer's model, which has been submitted to a national testing laboratory and found, after appropriate testing, to be in compliance with applicable consensus industry operational and safety standards.

Protection: All of the relays and other equipment, which are used to open the necessary circuit breakers to clear lines or equipment when trouble develops.

Protective Relay: A device whose function is to detect defective lines or apparatus, or other power-system conditions of an abnormal or dangerous nature and to initiate appropriate control circuit action.

Queue Position: The order of a valid Interconnection Request, relative to all other pending valid Interconnection Requests, that is established based upon the date and time of receipt of the valid Interconnection Request by the Transmission Provider.

Reactance: The opposition to the flow of current attributable to the inductance and capacitance in an alternating current circuit.

Reactive Load: In alternating current work, a load’s current which is not in phase with the voltage across the load.

Reasonable Efforts: With respect to an action required, by attempting, or taking by a Party under the Interconnection and operating agreement, efforts that are timely and consistent with Good Utility Practice and are otherwise substantially equivalent to those a Party would use to protect its own interests.

Reclose: To again close a circuit breaker after it has opened by relay action.

Remote Terminal Unit (RTU): A remotely located equipment used for collecting data and/or for supervisory control via communication channel.

Residual Current: The current which flows in the neutral or star (wye) connected current transformers when the current in the three phases of a line are unbalanced.

Resistance: Anything placed in an electric circuit, or already there, which offers resistance to or opposes the flow of electric current.

Rules: Corn Belt’s operational control, reliability and/or safety standards, rules, regulations, by-laws, rates, and tariffs, which may include but are not limited to all applicable standards, regulations, and data reporting requirements established by the Mid-Continent Area Power Pool (MAPP), North American Electric Reliability Council (NERC), and/or the Federal Energy Regulation Commission (FERC), as may be amended, revised, or modified from time to time by Corn Belt in its sole discretion.

SCADA (Supervisory Control and Data Acquisition): SCADA is the combination of telemetry and data acquisition and consists of collecting information, transferring it back to a central site, carrying out necessary analysis and control, and then displaying this data on a number of operator screens. SCADA is used to monitor and control a plant, a substation, or other utility installations.
Schematic: A diagram showing the essential features of a piece of equipment or a control system.

Scoping Meeting: The meeting between representatives of the Interconnection Customer and the Transmission Provider conducted for the purpose of discussing alternative interconnection options, to exchange information including any transmission data and earlier study evaluations that would be reasonably expected to impact such interconnection options, to analyze such information, and to determine the potential feasible Points of Interconnection.

Secondary Network: A low-voltage alternating current system, which connects the secondaries of distribution transformers to the consumer’s services.

Service Reliability: The time an entity or group of entities is served compared to the amount of time the entity or entities are without service over a given time period.

Service Restoration: The switching procedure a system operator directs or executes to restore services to the entities following an outage.

Single Phase Circuit: A circuit in which all current can be represented by only one regular sine wave pattern. Differs from a three-phase circuit, where when all circuit current is plotted, it produces three regular sine wave patterns, 120 electrical degrees apart.

Site Control shall mean documentation reasonably demonstrating: (1) ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing the Generating Facility, (2) an option to purchase or acquire a leasehold site for such purpose, or (3) an exclusivity or other business relationship between the Interconnection Customer and the entity having the right to sell, lease or grant the Interconnection Customer the right to possess or occupy a site for such purpose.

Small Generating Facility: A Generating Facility having a Generating Facility Capacity of no more than 20MW.

Stand Alone Network Upgrades shall mean Network Upgrades that an Interconnection Customer may construct without affecting day-to-day operations of the Transmission System during their construction. Both the Transmission Provider and the Interconnection Customer must agree as to what constitutes Stand Alone Network Upgrades and identify them in the Interconnection Agreement.

Interconnection Procedures (SGIP): The interconnection procedures applicable to an Interconnection Request pertaining to a Generating Facility that is included in the Transmission Provider’s Tariff.

Standby Capacity: The lesser of (1) net generation capacity, (2) connected loads to generator, or (3) 80% of main switch rating.

Station Use: Energy used to operate the generating facility’s auxiliary equipment. (Auxiliary equipment includes, but is not limited to, forced and induced draft fans, cooling towers, boiler feed pumps, lubricating oil systems, power plant lighting, fuel handling systems, control systems, and sum pumps.)

Spot Network: A type of Low-Voltage system found within modern commercial buildings to provide high reliability of service. Spot Networks generally use 12kV to 480/277-volt vaults on site.

Step-Down Transformer: A transformer in which the secondary winding has fewer turns than the primary, so that the secondary delivers a lower voltage than is supplied to the primary.

Step-Up Transformer: A transformer in which the secondary winding has more turns than the primary, so that the secondary delivers a lower voltage than is applied to the primary.

Supervisory Control: A system by which equipment is operated by remote control at a distance using some type of code transmitted by wire or electronic means.

Switch: A device for making, breaking or changing the connections in an electric circuit.

Switch, Auxiliary: One actuated by some main device such as a circuit breaker for signaling, interlocking, or other purpose.

Synchronism: Expresses the condition across an open circuit wherein the voltage sine wave on one side matches the voltage sine wave on the other side in frequency and without phase angle difference.
**System Emergency:** Conditions beyond the normal control that affect the ability of the Control Area to function normally including any abnormal system condition which requires immediate manual or automatic action to prevent losses of load, equipment damage, or tripping of system elements which might result in cascading outages or to restore system operation to meet the minimum operating reliability criteria.

**Transmission Service Request System Impact Study:** An engineering study that evaluates the interconnection’s impact on the safety and reliability of the Transmission Provider’s Transmission System and, if applicable, any Affected System, as well as the ability to deliver the energy on the Transmission System. The study shall identify and detail the system impacts that would result if the Generating Facility were interconnected without project modifications or system modifications, focusing on the Adverse System Impacts identified in the Feasibility Study, or to study potential impacts, including but not limited to those identified in the Scoping Meeting as described in the Interconnection Procedures.

**Transmission Service Request System Impact Study Agreement:** The form of agreement for conducting the Transmission Service Request System Impact Study.

**System Protection Facilities:** The equipment, including necessary protection signal communications equipment, required to protect (1) the CBPC’s Power System from faults or other electrical disturbances occurring at the Load or Generating Entities’ facility and (2) the Load or Generating Entities’ facility from faults or other electrical system disturbances occurring on CBPC’s Power System or on other delivery systems or other generating systems to which the CBPC’s Power System is directly or indirectly connected.

**Tariff:** A tariff setting out a participating transmission owner’s rates and charges for transmission access to the Controlled Grid and whose other terms and conditions are the same as those contained in the document referred to as the Transmission Owners Tariff approved by FERC as it may be amended or supplemented from time to time, or any successor tariff.

**Telemetering:** Remote measurement of a physical value or status (i.e. generator kV, status of a switch, etc.) by means of a communication channel. Telemetering of kW, kVAR, etc. to CBPC’s Control Center is required for all generators equal to or greater than 10 MVA.

**Term:** The duration of the agreement.

**Transfer Trip:** A form of remote trip in which a communication channel is used to transmit the trip signal from the relay location to a remote location.

**Transformer:** An electrical device, without continuously moving parts, in which electromagnetic induction transforms electric energy from one or more other circuits at the same frequency, usually with changes in value of voltage and current.

**Transformer Ratio:** The ratio of the voltage secured from a transformer to the voltage supplied to that transformer.

**Transmission Line:** A line used for electric power transmission. Distinguished from a distribution line by voltage. Lines rated 60 kV and over are transmission lines.

**Transmission Owner:** An entity that owns, leases or otherwise possesses an interest in the portion of the Transmission System at the Point of Interconnection and may be a Party to the Interconnection and operating agreement to the extent necessary.

**Transmission Provider:** The public utility (or its designated agent) that owns, controls, or operates transmission or distribution facilities used for the transmission of electricity in interstate commerce and provide transmission service under the Tariff. This document’s relevant Transmission Provider is Corn Belt Power Cooperative (Corn Belt).

**Transmission Provider's Interconnection Facilities (“Corn Belt's Interconnection Facilities”):** All facilities and equipment owned, controlled, or operated by Corn Belt from the Point of Change of Ownership to the Point of Interconnection as identified in the Interconnection and operating agreement, including any...
modifications, additions or upgrades to such facilities and equipment. Corn Belt's Interconnection Facilities are sole use facilities and shall not include Distribution Upgrades or Network Upgrades.

**Transmission System:** The facilities owned, controlled or operated by Transmission Provider that are used to provide transmission service under the Tariff.

**Upgrades:** The required additions and modifications to Corn Belt's Transmission System at or beyond the Point of Interconnection. Upgrades may be Network Upgrades or Distribution Upgrades. Upgrades do not include Interconnection Facilities.

**Undervoltage Protection:** Upon failure or reduction of voltage, the protection device interrupts power to the main circuit and maintains the interruption.

**Undervoltage Release:** Upon failure or reduction of voltage, the protection device interrupts power to the main circuit but does not prevent again completing the main circuit upon return to voltage.

**Unity Power Factor:** A power factor wherein the voltage and current are in phase.

**Var:** A unit of measurement of reactive power. It is an expression of the difference between current and voltage sine waves in a given circuit.

\[ VA^2 = (Watts)^2 + (Vars)^2 \]

**Volt:** The unit of electrical pressure similar to the pounds per square inch pressure on a steam gauge.

**Volt-Ampere:** A unit of apparent power in an alternating-current circuit. Equal to the product of volts and amperes without reference to the phase difference, if any. At unity power factor, a volt-ampere equals a watt.

**Voltage Loss:** The drop of potential in an electric circuit due to the resistance and reactance of the conductor.

**Watt:** The unit of electric power. Watts AC = volts x amperes x power factor (single-phase circuits).

**Watt-hour Meter:** An electrical measuring instrument, which indicates power in watt-hour.

**Wye Connected Circuit:** A three-phase circuit which is star-connected: the windings of all three phases have one common connection, which may be connected to ground.