Generator Interconnection Procedures

Level 3

Projects with

DER Capacity

Greater Than 150 kW, but Less Than or

Equal to 550 kW [1]

April 11, 2025

Revised October 2, 2025

[1] Non-Certified Inverter based generation projects, synchronous and induction projects less than or equal to 150kW are defined as Category 3 projects and are implemented under the Category 3 procedures and applications.

INTRODUCTION

Level 3

This Generator Interconnection Procedure document outlines the process & requirements used to install or modify generation projects with DER Capacity ratings greater than 150 kWac, but less than or equal to 550 kWac[2] designed to operate in parallel with the Consumers Energy Company (Consumers Energy or the Company) electric system. Technical requirements (data, equipment, relaying, telemetry, metering) are defined according to generation type, location of the interconnection, and mode of operation (Export or Non-Export). The process is designed to provide an expeditious interconnection to the Consumers Energy electric system that is both safe and reliable.

This document has been filed with the Michigan Public Service Commission (MPSC) and complies with rules established for the interconnection of parallel generation to the Consumers Energy electric system in the MPSC Order in Case No. U-20890.

The term "Project" will be used throughout this document to refer to electric generating equipment and associated facilities that are not owned or operated by Consumers Energy. The term "Applicant" means a person or entity submitting an interconnection application, a legacy net metering program application, or a distributed generation program application. An applicant is not required to be an existing customer of an electric utility.

This document does not address other Project concerns such as environmental permitting, local ordinances, or fuel supply. Nor does it address agreements that may be required with Consumers Energy and/or the transmission provider, or state or federal licensing, to market the Project's energy. An interconnection request does not constitute a request for transmission service.

It may be possible for Consumers Energy to adjust the requirements stated herein on a case-by-case basis. The review necessary to support such adjustments, however, may be extensive and may exceed the costs and time frames established by the MPSC and addressed in these procedures. Therefore, if requested by the Applicant, adjustments to these procedures will only be considered if the Applicant agrees in advance to compensate Consumers Energy for the added costs of the additional reviews and to also allow Consumers Energy additional time for the additional reviews.

Consumers Energy may apply for a technical waiver from one or more provisions of these rules and the MPSC may grant a waiver upon a showing of good cause.

[2] Non-Certified Inverter based generation projects, synchronous and induction projects less than or equal to 150 kWac are defined as Category 3 projects and are implemented under the Category 3 procedures and applications

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INTERCONNECTION PROCEDURES

INTERCONNECTION PROCESS

CUSTOMER PROJECT PLANNING PHASE

An Applicant may contact Consumers Energy before or during the application process regarding the project. Consumers Energy can be reached by phone, e-mail, or by the external website to access information, forms, rates, and agreements. Consumers Energy requires a pre-application report to be completed for Level 4 or greater projects.

An interconnection process flow diagram can be found in ***Appendix A***.

Interconnection fees and timelines can be found in ***Appendix B***. Procedure definitions can be found in ***Appendix C.***

PRE-APPLICATION REPORT

An Applicant shall submit a completed pre-application report form (**Appendix J)** for any proposed level 4 or 5 project. A pre-application report fee will be required (**Appendix B**). Consumers Energy provides the following in its pre-application reports if the following is existing and readily available, otherwise it will be indicated as such in the report:

1. The substation bus, bank, or circuit most likely to serve the proposed point of common coupling (PCC). This identification does not necessarily indicate that this would be the circuit to which the project would ultimately connect.
2. The total capacity, in MWac, of the substation bus, bank, or circuit based on normal or operating ratings likely to serve the proposed PCC.
3. The existing export capacity, in MWac, interconnected to a substation bus, bank, or circuit likely to serve the proposed PCC.
4. The export capacity, in MWac, of DER not yet built, but found in previously accepted interconnection applications, for a substation bus, bank, or circuit likely to serve the proposed PCC.
5. The available capacity, in MWac, of the substation bus, bank, or circuit likely to serve the proposed PCC.
6. The substation nominal distribution voltage.
7. The nominal distribution circuit voltage as the proposed PCC.
8. The label, name, or identifier of the distribution circuit on which the proposed PCC is located.
9. The approximate circuit distance between the proposed PCC and the substation.
10. The actual or estimated peak load and minimum load data at any relevant line section or sections, including daytime minimum load and absolute minimum load, when available. If not

readily available, the report must indicate whether the generator is expected to exceed the minimum load on the circuit.

11. Whether the point of common coupling is located behind a line voltage regulator and whether the substation has a load tap changer.
12. Limiting conductor ratings from the proposed point of common coupling to the distribution substation.
13. Number of phases available at the primary voltage level at the proposed point of common coupling, and, if a single phase, distance from the 3-phase circuit.
14. Whether the point of common coupling is located on a spot network, area network, grid network, radial supply, or secondary network.
15. Based on the proposed PCC, power quality issues may be present on the circuit.
16. Whether or not the area has been identified as having a prior affected system.
17. Whether or not the site will require a system impact study for high voltage distribution based on size, location, and existing system configuration.

Consumers Energy will process pre-application report requests in the order in which they are received. Pre-application reports will be provided within 20 business days of receipt of the completed request form and payment of the fee. Any pre-application reports produced by Consumers Energy are non-binding and do not confer any rights on the Applicant. Pre-application reports will only contain existing and readily available data, though Consumers Energy will note where information is not readily available. A request for a pre-application report does not obligate Consumers Energy to conduct a study or other analysis of the proposed Project if data is not readily available.

An applicant may request additional pre-application reports, including different proposed PCCs for the same project, and each such additional pre-application will require a distinct fee. No more than 10 pre-application reports may be submitted by an applicant and its affiliates during a 1-week period.

APPLICATION REVIEW & TRACK ASSIGNMENT

The Applicant must first submit an Interconnection Application or a Combined Interconnection and Distributed Generation Application to Consumers Energy. A separate application is required for each Project, or Project site. If a single Project contains multiple types of DER, include all DER in a single application form. The blank Interconnection Application or Combined Interconnection and Distributed Generation Application can be found on the Consumers Energy website (www.consumersenergy.com).

An Applicant shall complete a submittal of required interconnection application and interconnection filing fee per the table in Appendix B. For any interconnection filing fee paid to Consumers Energy, the Applicant shall file an application within 10 business days, or the fee will be returned. Any application submitted to Consumers Energy shall have its fee paid by the later of 10 business days or the due date indicated on an associated invoice, or the application will be withdrawn.

Documentation of site control must be submitted with the application by the Applicant. For level 1 and level 2 DERs, proof of site control may be demonstrated by the site owners' signature and contact information on the application. For level 3 or greater DERs, site control may be demonstrated by providing documentation that shows any of the following:

- Ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing and operating the DER.
- An enforceable option to purchase or acquire a leasehold site for this purpose.
- A legally binding agreement transferring a present real property right to specified real property along with the right to construct and operate a DER on the specified real property for a period of time not less than 5 years.

An Applicant is required to provide the export capacity in the application, which is either the DER Capacity or a lower amount defined below when using one of the following methods.

- The Applicant's load can be used to ensure power is not continuously exported across the point of common coupling when the DER Capacity is less than 50% of the Applicant's verifiable minimum load over the past 12 months. The Applicant must list the export capacity as zero in the application when the above condition is met.
- The Applicant may install a reverse power protective function for power limited projects to ensure power is not continuously exported above a desired limit across the point of common coupling. The Applicant must list the export capacity in the application to the desired limit when using a reverse power protective function. The reverse power setting will be set slightly above the desired value.
- The Applicant may install an under-power protective function for power limited projects to ensure at least a minimum amount of power is imported across the point of common coupling and, therefore, that power is not continuously exported. The Applicant must list the export capacity as zero in the application when using an under power protective function.
- The Applicant may install a Nationally Recognized Testing Laboratory (NRTL) Certified Power Control System (PCS) to ensure power is not continuously exported above a desired limit across the point of common coupling, and if so, the DER disconnects from the distribution system, ceases to energize the distribution system, or halts energy production within 2 seconds if the period of continuous inadvertent export exceeds 30 seconds. Failure of the control or inverter system for more than 30 seconds, resulting from loss of control or measurement signal, or loss of control power, must result in the DER entering an operational mode where no energy is exported across the point of common coupling to the distribution system. The Applicant must list the export capacity as the desired limit in the application when using a NRTL PCS.
- The Applicant may propose alternative methods to ensure power is not continuously exported above a mutually agreed upon limit across the point of common coupling. The Applicant must provide detailed documentation stating how the alternate method limits export and inadvertent export to levels approved by Consumers Energy. The Applicant must list the export capacity as the mutually agreed upon limit in the application when using an alternate method.

Consumers Energy will notify the Applicant within 10 business days of receipt of an Interconnection Application. If any portion of the Interconnection Application, data submittal (site plan and one-line diagrams), or filing fee is incomplete and/or missing; Consumers Energy will return the application and data to the Applicant with explanations. The Applicant will need to resubmit the application with all the missing items. The Applicant shall provide a modified application within 60 business days from the date the Applicant was notified by Consumers Energy, with up to two resubmissions during this time to provide a modified application. After each submission of information, Consumers Energy will notify the Applicant within 10 business days that the interconnection application is either accepted or rejected due to continuing deficiencies. If the Applicant does not meet the timelines required, the application may be withdrawn. Once Consumers Energy has accepted the application, Consumers Energy will notify the Applicant that the application is complete and whether the Project will be processed following the non-export track, fast track, or study track.

NON-EXPORT TRACK

The non-export track is available to projects under 2 MWac[3] of DER Capacity with an export capacity of zero requesting to connect to the Low Voltage Distribution system. Within 20 business days of providing notice of an approved application, Consumers Energy will perform a study using the initial review screens in Appendix H to determine the suitability of the interconnection equipment and provide the results.

If the results indicate that no interconnection facilities, distribution upgrades, further study, or Project modifications are required, Consumers Energy will provide specifications within 20 business days for any equipment required to be installed to the Applicant. Within 10 business days of receiving the equipment specifications, the Applicant shall notify Consumers Energy whether it will proceed to an Interconnection and Operating Agreement or will withdraw the application. The failure of the Applicant to notify Consumers Energy within the required time shall result in the application being withdrawn.

If the proposed interconnection passes the initial review screens but requires a facilities study, the Applicant will proceed to Facilities Study.

If the proposed interconnection fails any of the initial review screens, and Consumers Energy does not or cannot determine that the DER may be interconnected consistent with safety, reliability, and power quality standards, Consumers Energy shall notify the Applicant and provide the Applicant with the results of the application of the initial review screens. Consumers Energy shall provide the Applicant with the options to attend a customer options meeting, proceed to Supplemental Review, submit a

[3] Consumers Energy distribution transformers are typically tapped to HVD lines. The protective line relaying at electric HVD substations is required to protect HVD lines with infeed from LVD connected DER. The 2MWac threshold is required to enable Consumers Energy to study the impact of the DER on HVD protective line relaying.

project modification, or withdraw the application. The Applicant shall have 10 business days to decide on a course of action and notify Consumers Energy, otherwise the application shall be withdrawn. After the application is accepted, the initial review screen process will be repeated.

Upon the Applicant's request, Consumers Energy and the Applicant shall schedule a customer options meeting between Consumers Energy and the Applicant to review possible facility modifications, screen analysis, and related results to determine what further steps are needed to permit the DER to be connected safely and reliably to the distribution system. The customer options meeting must take place within 30 business days of the date of notification. Consumers Energy shall provide the Applicant with the options of proceeding to Supplemental Review, proceeding to the Study Track, submitting a project modification, or withdrawing the application. The Applicant shall have 20 business days to decide on a course of action and notify Consumers Energy, otherwise the application shall be withdrawn. The customer options meeting may take place in person or via telecommunications.

If a Project modification is offered by Consumers Energy, the Applicant shall either withdraw the interconnection application or provide a modified application within 60 business days from the date the Applicant was notified by Consumers Energy, with up to 2 resubmissions during this time to provide a modified application. The application modifications must mitigate or eliminate the factors that caused the interconnection application to fail 1 or more of the initial review screens. After each submission of information, Consumers Energy will notify the Applicant within 10 business days that the interconnection application is either accepted or rejected due to continuing deficiencies. If the Applicant does not meet the timelines required, the application may be withdrawn. After the application is accepted, the initial review screen process will be repeated.

If the results indicate further study is required, Consumers Energy will present options and the Applicant shall decide whether to proceed to a supplemental review under the fast-track process, the study track, or to withdraw the application. The Applicant shall have 10 business days to decide on a course of action and notify Consumers Energy, otherwise the application may be withdrawn.

When an Applicant changes from a non-exporting system to an exporting system, the Applicant shall submit a new interconnection application.

FAST TRACK

The fast track is available to Projects up to 5 MWac requesting to connect to the Low Voltage Distribution system. Level 5 applications proposing to interconnect at 4.8 kV or below are not eligible for the fast track. These applications may include applications that provide for the use of an acceptable method for limited export. An Applicant may choose to forgo the fast track for an eligible project and proceed directly to the study track. Consumers Energy may aggregate all existing and proposed generation on a site in determining fast track eligibility.

Within 20 business days of providing notice of an approved application, Consumers Energy will perform a study using the initial review screens in Appendix H to determine the suitability of the interconnection equipment and provide the results. Consumers Energy may waive application of any of the initial review screens. This timeline is reduced to within 10 business days for level 1 and level 2 projects.

If the proposed interconnection passes the initial review screens, or if the proposed interconnection fails the screens but Consumers Energy determines that the DER may be interconnected consistent with safety, reliability, and power quality standards, Consumers Energy shall notify the Applicant and inform the Applicant whether the Project will proceed to Facilities Study or directly to Interconnection and Operating Agreement.

If the proposed interconnection fails any of the initial review screens, and Consumers Energy does not or cannot determine that the DER may be interconnected consistent with safety, reliability, and power quality standards, Consumers Energy shall notify the Applicant and provide the Applicant with the results of the application of the initial review screens. Consumers Energy shall provide the Applicant with the options to attend a customer options meeting, proceed to Supplemental Review, submit a project modification, or withdraw the application. The Applicant shall have 10 business days to decide on a course of action and notify Consumers Energy, otherwise the application shall be withdrawn.

Upon the Applicant's request, Consumers Energy and the Applicant shall schedule a customer options meeting between Consumers Energy and the Applicant to review possible facility modifications, screen analysis, and related results to determine what further steps are needed to permit the DER to be connected safely and reliably to the distribution system. The customer options meeting must take place within 30 business days of the date of notification. Consumers Energy shall provide the Applicant with the options of proceeding to Supplemental Review, proceeding to the Study Track, submitting a project modification, or withdrawing the application. The Applicant shall have 20 business days following the meeting to decide on a course of action and notify Consumers Energy, otherwise the application shall be withdrawn. The customer options meeting may take place in person or via telecommunications.

If a Project modification is offered by Consumers Energy, the Applicant shall provide a modified application within 60 business days from the date the Applicant was notified by Consumers Energy, with up to 2 resubmissions during this time to provide a modified application. The application modifications must mitigate or eliminate the factors that caused the interconnection application to fail one or more of the initial review screens. After each submission of information, Consumers Energy will notify the Applicant within 10 business days that the interconnection application is either accepted or rejected due to continuing deficiencies. If the Applicant does not meet the timelines required, the application may be withdrawn. After the application is accepted, the initial review screen process will be repeated.

SUPPLEMENTAL REVIEW

An applicant shall submit payment of the supplemental review fee (Appendix B) within 20 business days of agreeing to a supplemental review. If payment of the fee has not been received by Consumers Energy within 25 business days, the application shall be withdrawn.

Within 30 business days after the Applicant pays the applicable supplemental review fee, and provides reasonable requested data, Consumers Energy will perform a study using the supplemental review screens in Appendix I and notify the Applicant of the results. Consumers Energy may waive application of any of the supplemental review screens.

If the proposed interconnection passes the supplemental review screens, or if the proposed interconnection fails the screens but Consumers Energy determines that the DER may be interconnected consistent with safety, reliability, and power quality standards, Consumers Energy shall notify the Applicant and inform the Applicant whether the Project will proceed to Facilities Study or directly to Interconnection and Operating Agreement.

If the proposed interconnection fails any of the supplemental review screens, and Consumers Energy does not or cannot determine that the DER may be interconnected consistent with safety, reliability, and power quality standards, Consumers Energy shall notify the Applicant and provide the Applicant with the results of the application of the supplemental review screens. Consumers Energy shall provide the Applicant with the options to proceed to the Study Track or withdraw the application. The Applicant shall have 10 business days to decide on a course of action and notify Consumers Energy, otherwise the application shall be withdrawn.

STUDY TRACK

The study track is available to all Projects that are not eligible for the non-export track, or the fast track. Projects that do not pass the initial review screens or supplemental review screens or are otherwise identified to require further study while proceeding through another track may also be evaluated in the study track. A Project that is eligible for the fast track may also elect to be evaluated in the study track.

If a project is ineligible for any other study track, Consumers Energy shall provide an individual study agreement to the Applicant within 10 business days after the interconnection application has been accepted.

If a project begins in another track and is moved to the study track for any other reason listed above, within 10 business days after the Applicant has notified Consumers Energy to proceed to the study track, Consumers Energy shall provide an individual study agreement.

INDIVIDUAL STUDY PROCESS

Consumers Energy will proceed to study each Project in the order in which the Projects were placed into the study track, considering withdrawn interconnection applications and electrically remote Projects. An electrically remote Project in an individual study may be studied on an expedited schedule relative to electrically coincident DERs. Electrically remote DERs will be studied in order that the interconnection applications were deemed complete.

Upon request of the Applicant, a scoping meeting shall be scheduled to discuss the interconnection application and review existing fast track results, if any. The scoping meeting must take place within 20 business days after the interconnection application is considered complete by the electric utility or, if applicable, the fast track has been completed and the Applicant has elected to continue with the system impact study or facilities study

If a Project in an individual study is delayed due to an affected system issue, other Projects that were placed into the study track on a later date may continue to progress.

An individual study will begin in the System Impact Study section and proceed to Facilities Study.

SYSTEM IMPACT STUDY

Consumers Energy will provide the Applicant with a system impact study agreement within five business days of entering the study track either directly after an application is deemed complete or after a Project moves to the study track from another track. The Applicant shall return the completed system impact study agreement, provide any technical data requested by Consumers Energy, and pay the required fee (Appendix B) within 20 business days, including an appropriate credit, if any, for previously completed fast track or non-export track studies, to the extent they reduce the cost of the system impact study. Consumers Energy may consider the application withdrawn if the system impact study agreement, payment, and required technical data are not returned within 20 business days.

The system impact study report will identify and describe the electric system impacts that would result if the proposed Project were interconnected without electric system modifications. It will also provide a non-binding, good faith list of facilities that are required because of the application and non-binding estimates of costs and time to construct these facilities.

Consumers Energy will complete the system impact study and provide both a system impact study and, if necessary, a facilities study agreement within 60 business days of receipt of the signed system impact study agreement, payment of all applicable fees, and any necessary technical data.

Consumers Energy may request reasonable additional data from the Applicant within 20 business days of beginning the system impact study. Consumers Energy and the Applicant shall work together to resolve the additional data request so that Consumers Energy will be able to complete the system impact study within the 60 business day period. If the Applicant does not provide the requested

additional data in a timely manner, Consumers Energy will notify the Applicant that the system impact study is on hold and the date the hold started. Consumers Energy will resume work on the study when the additional data is received.

Within 15 business days of receiving the system impact study report, the Applicant shall notify Consumers Energy whether it elects to pursue a system impact study review meeting, proceed to Facilities Study, or withdraw the application. If the Applicant fails to notify Consumers Energy within 15 business days, Consumers Energy may consider the application to be withdrawn.

Upon request by Applicant, a system impact study review meeting shall be scheduled to review system impact study results and determine what further steps are needed to permit the Project to be connected safely and reliably to the distribution system. The system impact study review meeting must take place within 25 business days of Consumers Energy receiving notification that the Applicant plans to attend a system impact study review meeting. At the meeting Consumers Energy will offer the Applicant to proceed to Facilities Study, proceed directly to Interconnection & Operating Agreement if utility determines Facility study is not needed, or withdraw the application. If an applicant fails to notify Consumers Energy of its selection within 45 business days of the meeting, Consumers Energy may consider the application to be withdrawn.

FACILITIES STUDY

If a Project receives a system impact study, Consumers Energy will provide the Applicant with a facilities study agreement with the system impact study report. If no system impact study was performed, Consumers Energy will provide a facilities study agreement within 10 business days of proceeding to Facilities Study. The Applicant shall return the signed facilities study agreement and pay the required facilities study fee (Appendix B) within 20 business days, including an appropriate credit, if any, for previously completed fast track or non-export track studies, to the extent they reduce the cost of the facilities study. Consumers Energy may withdraw the application if the facilities study agreement and payment are not returned within 20 business days.

The facilities study report will specify and estimate the cost of the required equipment, engineering, procurement, and construction work, including overheads, needed to interconnect the Project, and an estimated timeline for the completion of construction.

Consumers Energy will complete the facilities study and provide a facilities study report to the Applicant within 80 business days of the receipt of the signed facilities study agreement and payment of the facilities study fee.

Within 10 business days of receiving a facilities study report from Consumers Energy, the Applicant shall notify Consumers Energy whether it elects to pursue a facilities study review meeting, proceed to an Interconnection & Operating Agreement, or withdraw the application. If the Applicant fails to notify

Consumers Energy within 10 business days, Consumers Energy may consider the application to be withdrawn.

Upon request by Applicant, a facilities study review meeting shall be scheduled to review facilities study results and determine what further steps are needed to permit the Project to be connected safely and reliably to the distribution system. The facilities study review meeting must take place within 25 business days of Consumers Energy receiving notification that the Applicant plans to attend a facilities study review meeting. At the meeting Consumers Energy will offer the Applicant to proceed to Interconnection & Operating Agreement or withdraw the application. If an applicant fails to notify Consumers Energy of its selection within 20 business days of the meeting, Consumers Energy may withdraw the application.

COST ALLOCATION METHODOLOGY

Shared interconnection facilities shall be split equally amongst Applicants whose Projects necessitate the shared interconnection facilities. Once an Applicant's Project interconnection facilities are in service, the upfront original cost to install those interconnection facilities can no longer be shared by future Applicants. Costs of ongoing ownership, maintenance, and future repair/replacement can still be shared by future applicants that share the interconnection facilities in accordance with interconnection agreements.

Shared distribution upgrade costs shall be allocated according to the impact of each Applicant's generator on the limits exceeded for the shared distribution facilities. A simple example is shown below for a thermal constraint and the same methodology would be used for voltage, interrupting capability, or other constraints.

Limit Exceeded	Distribution Upgrade Cost	Impact of Project A	Impact or Project B
Loading on line X exceeded limit by 5 MVA	line X upgrade ($1M)	3 MVA	2 MVA
Cost Allocation		=(3/5*$1M) =$0.6M	=(2/5*$1M) =$0.4M

Distribution upgrade costs for higher queued Applicants that have agreed to proceed to interconnection agreements will not be considered for cost allocation to lower queued applicants, unless requested and agreed to by all applicants affected.

Distribution upgrade costs and allocations of costs are subject to change due to the potential for an Applicant to withdraw up until an Applicant's Project is in service and costs are reconciled per the interconnection agreements. Consumers Energy shall endeavor to notify an Applicant as soon as possible after the it becomes aware that an Applicant's cost for distribution upgrades changes due to any other Applicant withdrawing a Project or Projects.

AFFECTED SYSTEM STUDY PROCESS

If during a System Impact Study or a Facilities Study Consumers Energy determines that another utility's system may be affected by a proposed interconnection project, Consumers Energy shall notify the Applicant of such and place the Project in an on-hold status regarding all interconnection study timelines while an affected system study is completed. Consumers Energy shall send notification and information on the project to the affected system owner and request that an affected system study be completed, and scope, costs, and lead times of any upgrades required on the affected system be provided. Once Consumers Energy receives the affected system study results from the affected system owner, the results will be incorporated into the Consumers Energy study report, and the hold will be removed from the Project and the interconnection timelines will resume.

INTERCONNECTION AND OPERATING AGREEMENT

A level 1, 2, and 3 certified projects interconnection agreement or a level 4 and 5 and non-certified projects interconnection agreement will be provided to the Applicant in this stage dependent on Project level and equipment certification. An Applicant shall pay the actual cost of the interconnection facilities and distribution upgrades, subject to R 460.964 (8).

Level 1, 2, or 3 Certified Projects Only

For level 1, 2, or 3 Certified Projects, where no construction of interconnection facilities or distribution upgrades is required, Consumers Energy will provide its standard level 1, 2 and 3 certified projects interconnection agreement, which may include modifications to address any special operating conditions, to the Applicant within 3 business days of reaching this stage. If construction of interconnection facilities or distribution upgrades is required, Consumers Energy will provide its standard level 1, 2 and 3 certified projects interconnection agreement with modifications to address any special operating conditions, required construction activities, estimated construction milestone timing, and estimated cost to the Applicant within 5 business days of reaching this stage. The Applicant and Consumers Energy will mutually agree on the timing of construction milestones.

The applicant shall sign and return the interconnection agreement with payment, if applicable, within 20 business days of receiving the agreement. If this deadline is missed, the Applicant will be informed of the missed deadline and granted an extension of 15 business days. If the interconnection agreement and payment are not received during the 15-business-day extension, Consumers Energy may consider the interconnection application withdrawn.

Consumers Energy will countersign and provide a completed copy of the interconnection agreement within 10 business days of the Applicant returning the signed interconnection agreement.

Level 4 or 5 or Non-Certified Projects Only

For level 4 or 5 or non-certified projects, Consumers Energy will provide its level 4 and 5 and non-certified projects interconnection agreement, which may include modifications to address any special operating conditions, within 15 business days of reaching this stage. When construction interconnection facilities or distribution upgrades is necessary, the level 4 and 5 and non-certified projects interconnection agreement will contain either estimated timelines for completion of activities and estimates of construction costs or a timetable when these requirements can be determined. The interconnection agreement will include a payment schedule that corresponds to the milestones established.

The Applicant shall sign and return the interconnection agreement with payment, if applicable, within 30 business days of receiving the agreement. If this deadline is missed, the Applicant will be informed of the missed deadline and granted an extension of 15 business days. If the interconnection agreement and payment are not received during the 15-business-day extension, Consumers Energy may consider the interconnection application withdrawn.

Consumers Energy will countersign and provide a completed copy of the interconnection agreement within 10 business days of the Applicant returning a mutually agreed-upon and signed interconnection agreement.

INSPECTION, TESTING, AND COMMISSIONING

The Applicant is required to notify Consumers Energy when the installation of a Project and any required local code inspection and approval is complete. The Applicant is also required to provide any test reports or configuration documents as defined in the standard level 1, 2, and 3 certified projects interconnection agreement or level 4 and 5 and non-certified projects interconnection agreement.

Consumers Energy will review the Applicant's inspection, test reports, or configuration documents and communicate its intent to perform a witness or commissioning test or waive its rights to perform a witness test and commissioning test, within 10 business days. If Consumers Energy finds the Applicant's inspection, test reports, or configuration documents to be incomplete, insufficient, or unsatisfactory, Consumers Energy shall provide the reasons for doing so in writing and the Applicant shall have not less than 20 business days or a mutually agreed upon timeframe with Consumers Energy to implement corrections to those documents. The Applicant, after taking corrective action, shall request Consumers Energy to reconsider the inspection, test reports, or configuration documents.

If Consumers Energy intends to witness or perform commissioning test, it must do so within ten business days of receiving the notification from the Applicant for level 1, 2, and 3 certified projects. For level 4 and 5 and non-certified projects, the tests must be performed within a mutually agreed upon timeline. Within 5 business days of receipt of the completed commissioning test report, Consumers Energy will notify the Applicant it has accepted or rejected the commissioning test report and if it has

found the site to be satisfactory. If the commissioning test is accepted and the site is found satisfactory, Consumers Energy will notify the Applicant, and the Project will proceed to Authorization to Operate in Parallel.

The commissioning testing required by Consumers Energy may include but is not limited to confirmation of installed equipment, functional testing, and verification of protection and control system settings. Consumers Energy will provide the utility settings and commissioning test requirements prior to witness testing. The Applicant is responsible for applying Consumers Energy requirements prior to the date of witness testing and may request temporary parallel authorization if needed to apply and confirm the requirements.

If Consumers Energy waives its right to visit the site and inspect the Project or perform the commissioning tests, it will provide a written waiver to the Applicant within 10 days of receiving notice. The Applicant shall provide Consumers Energy with the completed commissioning test report within 20 business days of receipt of this waiver. Within 5 business days of receipt of the completed commissioning test report, Consumers Energy will notify the Applicant it has accepted or rejected the commissioning test report. If the commissioning test is accepted, Consumers Energy will notify the Applicant, and the Project will proceed to Authorization to Operate in Parallel.

If Consumers Energy attempts to conduct the inspection and testing at the arranged time and is unable to access the Project or complete the testing, the Project must remain disconnected until the Applicant and Consumers Energy can complete the inspection and testing.

If Consumers Energy rejects a commissioning test or finds a site unsatisfactory, it will provide its reasons for doing so in writing, and the Applicant has 20 business days to implement corrections. The Applicant, after taking corrective action, shall request Consumers Energy to reconsider its findings. Do note that the Applicant may be billed the actual cost of any re-inspections.

If the Applicant does not notify Consumers Energy that the Project is installed and ready to test, Consumers Energy may, in writing, query the status of the Project. If the Applicant does not provide a written response within 10 business days or no progress is evident, Consumers Energy may consider the Project withdrawn.

AUTHORIZATION TO OPERATE IN PARALLEL

Consumers Energy will provide the Applicant with written authorization to operate its Project in parallel with Consumers Energy's distribution system within five business days of all the following conditions being met:

- Consumers Energy notified the Applicant that the commissioning test and inspection, where applicable, are accepted.
- The Applicant has executed a standard level 1, 2, and 3 certified project interconnection agreement or level 4 and 5 and non-certified project interconnection agreement and complied

with all applicable parallel operation requirements as set forth in these procedures and the applicable interconnection agreement.

- The Applicant complied with all applicable local, state, and federal requirements.
- Consumers Energy has received payment in full for all outstanding bills.

With this written authorization, the Project is considered approved for parallel operation, the Project may begin operating, and the Applicant is considered an interconnection customer.

The Applicant shall not operate its Project in parallel with Consumers Energy's distribution system without prior written permission to operate from Consumers Energy. Subject to reasonable timing and other conditions, including completion of conditions in the applicable interconnection agreement or these procedures, Consumers Energy will allow for reasonable, but limited, testing before written authorization has occurred.

MATERIAL MODIFICATION PROCESS

In the event of a change to the Project design any time after receiving notification by Consumers Energy of a complete interconnection application, the Applicant will be required to submit a revised interconnection application, including the associated fee, detailing the proposed changes to Consumers Energy for review. The Application Review section above details the process by which Consumers Energy will review this application. At such a time when the revised interconnection is deemed complete by Consumers Energy, Consumers Energy will determine whether the proposed changes constitute a Material Modification and, if so, whether any further restudy is required. If further restudy is required, the Applicant shall notify Consumers Energy whether it will withdraw the proposed changes, withdraw the application, or continue with the restudy, at the associated fee, within 10 business days of being notified of the determination or Consumers Energy may withdraw the application.

A definition of Material Modification is included in Appendix C.

All Material Modifications need to be reviewed by Consumers Energy to determine if they are acceptable without further or additional study as written above. Each Material Modification must be reviewed by Consumers Energy on a case-by-case basis. A non-exhaustive list of example Material Modifications that may or may not require additional study are listed below.

Material Modifications that would be acceptable and typically would not require re-study:

a. Inverter Changes
    i. Export capacity remains unchanged (a minor change in total output may be allowed depending on connection type and/or previous study results)
    ii. The number of inverters changes, but the total export capacity remains the same
b. Small Transformer Changes (base rating remains unchanged)
    i. Minor Impedance change (evaluated on a case-by-case basis, dependent on connection type and/or previous study results)

ii. X/R Ratio change only

c. Changes to collector system cable lengths (conductor type/size remains unchanged)
    i. Minor change in lengths (evaluated on a case-by-case basis, dependent on connection type and/or previous study results)
d. Small relocation of the point of interconnection (evaluated on a case-by-case basis)

Material Modifications that would typically require re-study to determine acceptability:

a. Inverter Changes (other than above)
b. Collector System Re-Design
    i. System Voltage Change
    ii. Number of Transformation Levels change
c. Transformer base rating or impedance change (other than above)
d. Collector system cable changes (other than above)
e. Relocation of the point of interconnection (other than above)
f. Change in export limitations of a project (e.g., non-export to export, increasing power limiting settings, etc.)

If a DER must be restudied due to a Material Modification, the electric utility may offer an expedited study of the application with the proposed modification if possible. Timelines for the potential expedited studies if available will be communicated to the Applicant along with any associated study fees and study agreements. The timelines and fees will be determined on a case-by-case basis and determined based on the scope and scale of the modifications and extent of study required.

OPERATIONAL PROVISION

If a Contact List (Appendix G) is required, the Applicant is required to notify Consumers Energy prior to synchronizing to and prior to scheduled disconnection from the electric system.

The Project may not commence parallel operation until approval has been given by Consumers Energy. The completed installation is subject to inspection by Consumers Energy prior to approval. Preceding this inspection, all contractual agreements must be executed by the Applicant.

DISCONNECTION

Consumers Energy may refuse to connect, or may disconnect, a project from the electric system if any of the following conditions apply:

a. Lack of written authorization from Consumers Energy to interconnect or fully executed Generator Interconnection and Operating Agreement.
b. Termination of interconnection by mutual agreement.

c. Noncompliance with technical or contractual requirements in the Generator Interconnection and Operating Agreement, after 30 business days of notification is provided to the Applicant of the technical or contractual deficiency that does not degrade the reliability of the distribution system, electric utility equipment, and electric customers' equipment or presents a safety hazard.
d. Electric distribution system emergency.
e. Routine maintenance, repairs, and modifications, performed in a reasonable time and with prior notice.
f. Other material noncompliance with technical or contractual requirements in the Generator Interconnection and Operating Agreement.

Consumer Energy may require disconnection of a Project from the distribution system for the above conditions, which may include but is not limited to the following examples:

a. When public safety is being jeopardized.
b. During voltage, frequency, or loading problems.
c. When abnormal sectionalizing or circuit configuration occurs on the Consumers Energy system.
d. During scheduled shutdown of Consumers Energy equipment that are necessary to facilitate maintenance or repairs.
e. In the event electrical interference (e.g., Voltage Flicker, Harmonic Distortion, etc.) is demonstrated to Consumers Energy customers, suspected to be caused by the Project, and such interference exceeds then current system standards. Consumers Energy reserves the right to install special test equipment as may be required to perform a disturbance analysis and monitor the operation and control of the Project to evaluate the quality of power produced by the Project. If no standards exist, then the applicable tariffs and rules governing electric service shall apply. If the Project is the source of the interference, and that interference exceeds Consumers Energy standards or generally accepted industry standards, then it shall be the responsibility of the Applicant to eliminate the interference problem.
f. When the Project or its associated synchronizing and protective equipment fails or is demonstrated by Consumers Energy to be improperly maintained, to present a hazard to the Consumers Energy system or its customers.
g. Whenever the Project is operating isolated (islanded) with other Consumers Energy customers, for whatever reason.

Consumers Energy may disconnect electric service to disconnect a Project from the electric system, pursuant to R 460.136.

ANTI-ISLANDING REQUIREMENTS

Islanding occurs when a Project and utility load become isolated from the rest of the Consumers Energy electrical system. Consumers Energy uses the following screens to determine if additional studies are required to identify the need for supplemental anti-islanding protection:

Screen Questions	Pass / Fail Criteria
Question 1: Is the Project DER nameplate less than or equal to 550 kW with certified inverters?	If "Yes," the screen has passed
	If "No," the screen has failed
Question 2: Is the Project non-export with reverse power relaying?	If "Yes," the screen has passed
	If "No," the screen has failed

Note: Examples that will fail the first screening question include, but are not limited to: Projects that are greater than 550kW; non-certified inverter Projects that have a DER nameplate less than or equal to 550kW; Induction or synchronous generators Projects.

If the Project passes either of the screening questions, then additional study is not required. If the Project fails both of the screening questions, Consumers Energy may perform a study to identify where voltage and frequency protective relaying at the Project are not capable of detecting an island. If the study determines the Project relaying cannot detect the island, then supplemental protection (e.g. DTT - Direct Transfer Trip) is required. Refer to the DTT section.

During the study process, Consumers Energy uses the following criteria to identify when the protective relaying cannot detect the island, but other criteria may apply:

- For synchronous and induction type projects, Consumers Energy generally requires DTT when the total generation within a protective zone is greater than 33% of the minimum Utility load that could be isolated along with the generation. In cases where it can be shown that self-excitation of the induction generator cannot occur when isolated from the Consumers Energy system, Consumers Energy may waive the requirement.
- For inverter-type Projects, Consumers Energy generally requires DTT when the total generation within a protective zone is greater than 50% of the minimum Utility load that could be isolated along with the generation. This prevents sustained isolated operation of the generation for conditions where the inverter anti-islanding may not otherwise trip the Project.

MAINTENANCE AND TESTING

Consumers Energy reserves the right to test the relaying and control equipment that involves protection of the Consumers Energy electric system whenever Consumers Energy determines a reasonable need for such testing exists.

The Applicant is solely responsible for conducting and documenting periodic maintenance and testing on the generating equipment and its associated control, protective equipment, interrupting devices, and

main isolation device[4], per manufacturer recommendations. Refer to the Sample Periodic Interconnection Test Log (Appendix K).

If protective relaying is required per the technical requirements, the Applicant is responsible for conducting and documenting periodic maintenance and testing every 4 years on relays and the associated interrupting devices, control schemes, and batteries, unless a written extension is provided by Consumers Energy. If testing is required, it shall be conducted in accordance with the test procedures provided by Consumers Energy as part of inspection testing.

Consumers Energy reserves the right to witness the testing. The Applicant is responsible for maintaining written reports for the above tests for four years. These written reports shall be made available to Consumers Energy upon request.

INSURANCE

For level 3, 4, and 5 projects, the Applicant shall obtain and continuously maintain, as required in the applicable interconnection agreement, General Liability insurance written on a standard occurrence form, or other form acceptable to Consumers Energy, and covering bodily injury and property damage liability with a per occurrence and annual policy aggregate amount of at least:

Interconnection Level	Minimum Limit
3	$1,000,000
4	$2,000,000
5	$3,000,000

When requested in writing by Consumers Energy, said limit shall be increased each to a limit no greater than the amount arrived at by increasing the original limit by the same percentage change as the Consumer Price Index - All Urban Workers (CPI-U.S. Cities Average). Such a policy shall include, but not be limited to, contractual liability for indemnification assumed by the Applicant under the applicable interconnection agreement.

Consumers Energy Company, its Directors, Officers, and Employees are to be included as ADDITIONAL INSUREDS and such coverage shall be primary to any insurance maintained by Consumers Energy

[4] Main Isolation Device – When required by Consumers Energy operating practices, a readily accessible, lockable, visible-break isolation device located between Consumers Energy and the Project.

Company. Consumers Energy shall not be responsible for any unpaid premiums under the Applicant's policy.

TECHNICAL REQUIREMENTS

The following discussion details the technical requirements for interconnection of Level 3 Projects greater than 150 kWac, but less than or equal to 550 kWac of generation[5]. Many of these requirements will vary based on the capacity rating of the Project, generation type, and mode of operation (Export or Non-Export). A few of the requirements will vary based on location of the interconnection (isolated load and available fault current).

Certain requirements, as specified in this document, must be met to provide compatibility between the Project equipment and the Consumers Energy electric system, and to ensure that the safety and reliability of the electric system is not degraded by the interconnection. Consumers Energy reserves the right to evaluate and apply newly developed protection and/or operation schemes at its discretion. All protective schemes and functions are evaluated for compliance to IEEE 1547. In addition, Consumers Energy reserves the right to evaluate Projects on an ongoing basis as system conditions change, such as circuit loading, additional generation placed online, etc.

MAJOR COMPONENT DESIGN REQUIREMENTS

The data requested for all major equipment and relaying proposed by the Applicant, must be submitted as part of the initial interconnection application for review and approval by Consumers Energy (Appendix D). Consumers Energy may request additional data be submitted during the interconnection process to clarify the operation of the Project facilities.

Once installed, the interconnection equipment must be reviewed and approved by Consumers Energy prior to being connected to the Consumers Energy electric system, and before parallel operation is allowed.

DATA

The data that Consumers Energy requires to evaluate the proposed interconnection is documented on the generator interconnection application (Appendix D). A site plan and one-line diagram with details of the interconnection protection system are required as part of the application data. The one-line diagram must be sealed by a professional engineer licensed in the state of Michigan or by an electrical contractor

[5] Non-Certified Inverter based generation projects, synchronous and induction projects less than or equal to 150 kWac are defined as Category 3 projects and are implemented under the Category 3 procedures and applications.

licensed in the state of Michigan with the electrical contractor's license number noted on the diagram. The generator manufacturer data package should also be supplied.

The Applicant may request Consumers Energy study the Project at a reduced power output (Export Capacity) below the DER nameplate capacity. The Applicant must provide the export capacity and method used to reduce the power output as part of the application data for review and approval by Consumers Energy.

ISOLATING TRANSFORMERS(S)

If a transformer is utilized, the transformer shall meet the following requirements.

- The transformer shall comply with the current ANSI Standard C57.12.
- The transformer shall have voltage taps on the high and/or low voltage windings sufficient to assure satisfactory generator operation over the range of voltage variation expected on the Consumers Energy electric system.
- The proper selection and specification of transformer impedance is important relative to enabling the proposed Project to meet Consumers Energy's reactive power requirements (see "Reactive Power Capability and Voltage Control").
- The transformer utility and Project side winding connections shall be selected using the following table. The transformer may have multiple project side windings.

PCC Voltage	Utility System Configuration PCC	Transformer Winding Connection		Special Requirements
		Utility Side	Project Side	
46 kV	Grounded Wye	Delta	No Preference	
		Grounded Wye	Delta	See Note 1
Below 46 kV	Grounded Wye	Grounded Wye	Ungrounded Wye	See Note 2
			Grounded Wye	See Notes 3, 4
	Delta	Delta	No Preference	

Table – Three Phase Transformer Winding Connections

Note 1: Requires the Project to be connected to its own dedicated line exit.

Note 2: Additional transformers connected to the Project side transformer winding cannot in combination with each other be a source of zero sequence current. For example, an ungrounded wye to delta transformer with the neutrals of both ungrounded wye transformer windings connected. The connection of the neutrals would cause the series combination of the grounded wye to ungrounded wye transformer and the ungrounded

wye to delta transformer to mimic a grounded wye to delta transformer which is a source of zero sequence current.

Note 3: Additional transformers connected to the Project side transformer winding cannot be a source of zero sequence current. For example, the transformer may not be connected Grounded Wye (utility side) – Delta (Project side).

Note 4: Additional transformers connected to the Project side transformer winding cannot be connected as Delta.

INTERRUPTING DEVICE

A three-phase interrupting device is required between the Project and Consumers Energy when external tripping is needed, for example when interconnection relaying, direct transfer trip, or remote trip capability via SCADA are required. The interrupting device may be required to be located at the Point of Common Coupling (PCC) depending on protective and operational requirements of the area. If required, the interrupting device shall meet the following requirements.

- Must be a recloser, circuit switcher, or breaker.
- Must be approved for use on the Consumers Energy electric system.
- Must comply with current relevant ANSI and/or IEEE Standards.
- Must be rated for the application.
- Must have adequate interrupting capability. Consumers Energy will provide maximum short circuit currents and X/R ratios for faults at the PCC upon request.

ISOLATION DEVICE

An isolation device is required and should be placed at the PCC. It can be a pole top switch, load-break disconnect, etc., depending on the electrical system configuration. The isolation device shall meet the following requirements:

- Must be approved for use on the Consumers Energy electric system.
- Must comply with current relevant ANSI and/or IEEE Standards.
- Must have load break capability, unless used in series with a three-phase interrupting device.
- Must be rated for the application.
- Must be a blade style, visible-open , single input and single output, operable, and accessible by Consumers Energy (24 hours a day, 7 days a week).
- The isolation device will be used as a protective tagging point. The device must have visible open break provisions for padlocking in the open position, and it must be gang operated. If the device has automatic operation, the controls must be located remote from the device.
- Must be clearly marked to include signage per the National Electrical Code (NEC), as applicable.

INTERCONNECTION FACILITIES

The available system voltage, as well as equipment and operational constraints influence the chosen point of interconnection. Consumers Energy has the ultimate authority to determine the acceptability of a particular PCC.

- Any new line construction to connect the Project to the existing Consumers Energy's electric system will be constructed and owned by the Applicant, including any easements and rights-of-way needed for the Applicant's interconnection lines unless determined otherwise by the utility that the utility should construct and own any of the lines/facilities required for interconnection. Consumers Energy's protective device will provide protection of the Applicant's line. An example is the utility determines that the point of interconnection for a 46 kV connected project is at an existing Consumers Energy Substation "A". Then the Applicant would be responsible for obtaining easements and building/owning the 46 kV line from their project location to the existing CE owned Substation "A" and Consumers Energy would install a 46 kV breaker at Substation "A" for automatic isolation of faults on the Applicant-owned 46 kV line. Applicant owned interconnection lines and facilities design must be coordinated with Consumers Energy and approved for use to connect to the Consumers Energy electric system. If applicant owned interconnection facilities are determined to be the cause of outages or reliability issues to existing Consumers Energy customers, the Applicant will be required to correct/mitigate, as necessary. The Applicant may be required, as necessary, to obtain agreements to attach to or cross above or below any existing utility line, including those owned by Consumers Energy.

TERMINATION STRUCTURE

Consumers Energy will construct and own the termination structure connecting the Project to the existing Consumers Energy electric system. The Applicant is responsible for all costs including, but not limited to, materials, installation, operation, and maintenance of all facilities up to and including the termination facilities. If the Company determines that the point of interconnection for a 46 kV connected project is at an existing Consumers Energy Substation, the termination structure will be located outside of the substation fence unless determined otherwise by the company that it should construct the structure elsewhere. If the Applicant pursues a direct connection to an existing Consumers Energy electric line approved by the Company, Consumers Energy will install and own the tap pole and a separate termination structure with a full load-break, gang operated air break switch at the PCC.

The Applicant is responsible for ensuring that structural material strengths are adequate for all requirements. Upon written request, Consumers Energy will provide maximum dead-end line tension information. The structure shall adhere to the latest edition of the National Electric Safety Code (NESC) as adopted by the Commission.

Electrical clearances shall adhere to the latest edition of the NESC as adopted by the Commission and shall be coordinated with Consumers Energy.

The installation of disconnect switches, bus support insulators, and other equipment shall comply with accepted industry practices.

Surge arresters shall be selected to coordinate with the BIL rating of major equipment and rated for the application.

INVERTERS

Certified inverter Projects must use inverter(s) that conform to the IEEE 1547-2018 standard. To show compliance, a certificate of compliance from an OSHA approved national recognized testing laboratory must be submitted as part of the application and the manufacturer must mark the equipment such that a field inspection can verify the certification. The certification of compliance must clearly state the inverter has been tested to UL 1741 using IEEE 1547-2018 as the functional Source Requirement Document.

The inverters shall be certified to meet the following performance Categories.

1. Normal Operating Performance – Category B
2. Abnormal Operating Performance – Category III *

** The manufacturer is required to mark the abnormal operating category on the equipment.*

If the requirements of this section are met, the inverter is deemed “certified” as defined within Appendix C.

INTERCONNECTION PROTECTION

The interconnection relaying design requirements are intended to assure protection of the Consumers Energy electric system. Any additional relaying which may be necessary to protect equipment at the Project is solely the responsibility of the Applicant to determine, design, and apply.

The relaying requirements will vary with the capacity rating of the Project, the type of generation being used, configuration of the Project, and the mode of operation (Export or Non-Export).

All relaying proposed by the Applicant to satisfy these requirements must be submitted for review and approved by Consumers Energy.

PROTECTIVE RELAYING GENERAL CONSIDERATIONS

The installation of utility grade relays is required for synchronous, induction, and non-certified inverter-based projects. All relays must be equipped with targets or other visible indicators to indicate that the relay has operated.

If the protective system uses AC power as the control voltage, it must be designed to disconnect the generation from the Consumers Energy electric system if the AC control power is lost. Consumers Energy will work with the Applicant regarding the system design for this requirement.

The protective system must be designed such that the Applicant is prevented from energizing the Consumers Energy electric system if that system is de-energized.

MOMENTARY PARALLELING

For situations where the Project will only be operated in parallel with Consumers Energy electric system for 100 milliseconds or less, as in a make-before-break automatic transfer scheme, no additional relaying is required. Such momentary paralleling requires a modern integrated Automatic Transfer Switch (ATS) system, which is incapable of paralleling the Project with the Consumers Energy electric system. The ATS must be tested and verified for proper operation at least every 4 years unless a written extension is provided by Consumers Energy. Consumers Energy may be present during this testing.

INSTRUMENT TRANSFORMER REQUIREMENTS

All relaying must be connected into instrument transformers. Consumers Energy may allow the use of Capacitive Voltage Sensors for select protective functions.

All current connections shall be connected into current transformers (CTs). All CTs shall be rated to provide no more than 5 amperes secondary current for all normal load conditions, and must be designed for relaying use, with an “accuracy class” of at least C50. Current transformers with an accuracy class designation such as T50 are NOT acceptable. For three-phase systems, all three phases must be equipped with CTs.

All potential connections must be connected into voltage transformers (VTs). For single-phase connections, the VTs shall be provided such that the secondary voltage does not exceed 120 volts for normal operations. For three-phase connections, the VTs shall be provided such that the line-to-line voltage does not exceed 208 volts for normal operation, and both the primary and secondary of the VTs shall be connected for grounded-wye connections.

DIRECT TRANSFER TRIP (DTT)

Direct Transfer Trip is supplemental anti-islanding protection required for conditions where voltage and frequency protective relaying at the Project may not otherwise operate during islands. Consumers Energy screens and performs studies throughout the Interconnection Process (e.g. concurrently with System Impact Study, Facilities study, etc.) to determine when DTT is required. Direct Transfer Trip is generally not required for Projects that will operate in the Non-Export Mode since a more economic reverse power relay scheme can usually meet the requirements. For Export Projects, the need for DTT is generally determined based on the location of the PCC and generation type.

Direct transfer trip adds to the cost and complexity of an interconnection. The Applicant will be responsible for all expenses associated with the installation, operation, and maintenance of the DTT system. A DTT transmitter, installed by Consumers Energy, is generally required for each Utility protective device whose operation could result in sustained isolated operation of the Project. At least one associated DTT receiver, which is supplied, owned, operated, and maintained by Consumers Energy, is required at the Project. A data Communication Circuit is required at each transmitter and receiver location depending on the DTT technology. Telemetry is required to monitor the status of the DTT communication, even if telemetry would not otherwise have been required.

The Applicant shall provide a suitable location, approved by Consumers Energy, for the Applicant to install the DTT receiver and associated equipment. The Applicant shall provide the following connections and associated equipment to the location, which may include but is not limited to:

1. A 24 V, 48 V or 125 V DC power supply capable of providing an 8-hour backup. The Applicant shall coordinate with Consumers Energy to properly size the DC power supply.
2. A 120 V AC power supply for heating unconditioned (e.g., outdoor) locations and for use with AC/DC converters. The Applicant shall coordinate with Consumers Energy to properly size the AC power supply.
3. A control circuit or communication cable to allow the DTT receiver to trip and lockout the Project.
4. A control circuit for transferring telemetry and disturbance monitoring statuses (e.g., LOG, RTX) to the Project prior to being passed to the RTU using the Communication Interface.
5. An antenna cable for connection to an external antenna. Consumers Energy will supply the antenna cable.
6. A communication cable for connection to Communication Circuit equipment (e.g., Router/Switch).
7. A voice Communication Circuit, when cellular phone service is not available, for the commissioning and checkout of the metering, DTT, and RTU.

The above connections shall be connected to the DTT receiver by the Applicant where indicated by Consumers Energy.

REVERSE POWER RELAYING FOR NON-EXPORT

Reverse power relaying is required for Projects that operate in non-Export Mode. Projects that operate in non-Export Mode are generally not subject to telemetry, disturbance, power quality monitoring and DTT requirements. Projects with a DER capacity below 50% of the verifiable minimum load that are designed to not export are not required to install a reverse power relay but are still considered to operate in Export Mode. Therefore, a project with a DER capacity below 50% of the verifiable minimum load without reverse power relaying is subject to telemetry, disturbance, and power quality monitoring and DTT requirements. Reverse power relaying will detect power flow from the Project into the Consumers Energy system, and operation of the reverse power relaying will separate the Project from the Consumers Energy system.

AUTOMATIC RECLOSING

Consumers Energy employs automatic multiple-shot reclosing on most of the circuit breakers and circuit reclosers to increase the reliability of service to its customers. Automatic single-phase overhead reclosers are regularly installed on distribution circuits to isolate faulted segments of these circuits.

The Applicant is advised to consider the effects of Automatic Reclosing (both single-phase and three-phase) to assure that the Project's internal equipment will not be damaged. In addition to the risk of damage to the Project, an out-of-phase reclosing operation may also present a hazard to Consumers Energy equipment not rated or built to withstand this type of reclosing.

Consumers Energy will determine relaying and control equipment (e.g., volt check relays) that needs to be installed to protect its own equipment from out-of-phase reclosing. Installation of this protection will be done by Consumers Energy at the expense of the Applicant. Consumers Energy shall not be liable to the customer with respect to damage(s) to the Project arising because of Automatic Reclosing.

SINGLE-PHASE SECTIONALIZING

Consumers Energy also installs single-phase fuses and/or reclosers on its distribution circuits to increase the reliability of service to its customers. Three-phase generator installations may require replacement of fuses and/or single-phase reclosers with three-phase circuit breakers or circuit reclosers at the Applicant's expense.

SYNCHRONOUS PROJECTS

Three-phase or three single-phase over/under frequency (81O/U) relaying and under/overvoltage (27/59) relaying are required. The 27, 59 and 81O/U relays shall be connected to VTs located at the PCC, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g., ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

Each Project must also be equipped with three-phase voltage-restrained overcurrent (51V) relays to detect faults in the Consumers Energy electric system. The (51V) shall be connected to VTs located on the generator branch or bus, unless otherwise approved by Consumers Energy. The (51V) relay shall be connected to CTs that monitor current on the generator branch, unless otherwise approved by Consumers Energy.

To minimize damage to both Project equipment and to the Consumers Energy electric system equipment for loss-of-synchronism (also called out-of-step), and to minimize disruptions to other Consumers Energy customers in the area, out-of-step relaying may also be required. The out-of-step relaying would usually be installed at the same location as the metering and would isolate the Project from the Consumers Energy electric system.

If the Project is connected to a grounded distribution system via one of the approved isolation transformer connections, ground fault detection for utility faults may be required at the discretion of Consumers Energy and will consist of a (59N) ground overvoltage relay or (51N) time overcurrent relay. The specific application of this relay will depend on the connection of the isolation transformer and the available ground fault current.

1. If a delta Utility side/grounded-wye Project side isolation transformer connection is used, a (59N) relay will be connected into the secondary of a set of three-phase VTs, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open or grounded-wye depending on the relay input requirements. The primary windings of the VTs will be connected to the Utility side of the isolation transformer.
2. If a grounded-wye Utility side/grounded-wye Project side isolation transformer connection is used, a (51N) relay will be connected into either a CT located on the Utility side isolation transformer neutral or three phase CTs located on the Utility side of the isolation transformer depending on the relay input requirements. A (59N) relay will be required, in place of the (51N) relay, if the Project does not provide an adequate quantity of ground fault current as determined by Consumers Energy. The (59N) relay will be connected into the secondary of a set of three-phase VTs, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open or grounded-wye depending on the relay input requirements. The primary windings of the VTs will be connected to the Utility side of the isolation transformer.
3. If a grounded-wye Utility side/delta Project side isolation transformer connection is used, a (51N) relay will be connected into either a CT located on the Utility side isolation transformer neutral

connection or three phase CTs located on the Utility side of the isolation transformer depending on the relay input requirements.

In some instances, additional (51N) or (59N) relaying may be required for situations where Consumers Energy owns an isolation transformer.

FOR A SAMPLE ONE-LINE DIAGRAM OF THIS TYPE OF FACILITY, SEE APPENDIX D.

INDUCTION PROJECTS

For induction Projects that use certified inverters, and the interconnection system meets all requirements of IEEE 1547, no additional protective equipment is required.

For induction Projects that do not use certified inverters or do not interface using inverters, three-phase or three single-phase over/under frequency (81O/U) relaying and under/overvoltage (27/59) relaying are required. The 27, 59 and 81O/U relays shall be connected to VTs located at the PCC, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g., ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

If the Project is connected to a grounded distribution system via one of the approved isolation transformer connections, ground fault detection for utility faults may be required at the discretion of Consumers Energy and will consist of a (59N) ground overvoltage relay or (51N) time overcurrent relay. In cases where it can be shown that self-excitation of the induction generator cannot occur when isolated from the Consumers Energy system, Consumers Energy may waive the requirement. The specific application of this relay will depend on the connection of the isolation transformer and the available ground fault current.

1. If a delta Utility side/grounded-wye Project side isolation transformer connection is used, a (59N) relay will be connected into the secondary of a set of three-phase VTs, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open or grounded-wye depending on the relay input requirements. The primary windings of the VTs will be connected to the Utility side of the isolation transformer.
2. If a grounded-wye Utility side/grounded-wye Project side isolation transformer connection is used, a (51N) relay will be connected into either a CT located on the Utility side isolation transformer neutral or three phase CTs located on the Utility side of the isolation transformer depending on the relay input requirements. A (59N) relay will be required, in place of the (51N) relay, if the Project does not provide an adequate quantity of ground fault current as determined by Consumers Energy. The (59N) relay will be connected into the secondary of a set of three-phase VTs, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open or grounded-wye depending on the relay input requirements. The primary windings of the VTs will be connected to the Utility side of the isolation transformer.
3. If a grounded-wye Utility side/delta Project side isolation transformer connection is used, a (51N) relay will be connected into either a CT located on the Utility side isolation transformer neutral connection or three phase CTs located on the Utility side of the isolation transformer depending on the relay input requirements.

In some instances, additional (51N) or (59N) relaying may be required for situations where Consumers Energy owns an isolation transformer.

FOR A SAMPLE ONE-LINE DIAGRAM OF THIS TYPE OF FACILITY, SEE APPENDIX D.

INVERTER PROJECTS

If the inverters are certified and the interconnection system meets all requirements of IEEE 1547, no additional protective equipment is required.

If the inverters are not certified or the interconnection system does not meet the requirements of IEEE 1547, three-phase or three single-phase over/under frequency (81O/U) relaying and under/overvoltage (27/59) relaying are required. The 27, 59 and 81O/U relays shall be connected to VTs located at the PCC, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g., ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

If the Project is connected to a grounded distribution system, ground fault detection for utility faults is required and will consist of a (59N) ground overvoltage relay. The (59N) relay will be connected into the secondary of a set of three-phase VTs, which will be connected grounded-wye primary, with the secondary connected delta with one corner of the delta left open or grounded-wye depending on the relay input requirements. The 59N relay shall be connected to VTs located at the PCC, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g., ungrounded wye or delta winding connections) is not allowed.

In some instances, additional (59N) relaying may be required for situations where Consumers Energy owns an isolation transformer.

FOR A SAMPLE ONE-LINE DIAGRAM OF THIS TYPE OF FACILITY, SEE APPENDIX D.

INTERCONNECTION PROTECTION SETTINGS

RELAY SETTING CRITERIA

The relay settings as detailed in this section will apply in most applications. Consumers Energy will issue relay settings for each individual Project that will address the settings for these protective functions. All voltages will be adjusted for the specific VT ratio, and all currents will be adjusted for the specific CT ratio.

27 Relay – Under Voltage

The undervoltage relays will normally be set to trip at 88% of the nominal primary voltage at the relay location and must reset from a trip condition if the voltage increases to 90% of the nominal primary voltage at the relay location. To accommodate variations in this criterion, the trip point of the relays shall be adjustable over a range of 70% of the nominal voltage to 90% of the nominal voltage. The trip time shall not exceed 1.0 seconds at 90% of the relay setting.

59 Relay – Over Voltage

Two steps of overvoltage relaying are required. For the first overvoltage set point, the overvoltage relays will normally be set to trip at 107% of the nominal primary voltage at the relay location and must reset from a trip condition if the voltage decreases to 105% of the nominal primary voltage at the relay location. To accommodate variations in this criterion, the trip point of the relays shall be adjustable over a range of 105% of the nominal voltage to 120% of the nominal voltage. The trip time shall not exceed 1.0 seconds at 110% of the relay setting.

For the second overvoltage set point, the overvoltage relays will normally be set to trip at 120% of the nominal primary voltage at the relay location and must reset from a trip condition if the voltage decreases to 118% of the nominal primary voltage at the relay location. To accommodate variations in this criterion, the trip point of the relays shall be adjustable over a range of 115% of the nominal voltage to 140% of the nominal voltage. The trip time shall be instantaneous (relay operating time not to exceed 0.02 seconds at 110% of the trip setting).

81U Relay – Under Frequency

The Underfrequency relay will normally be set for a trip point of 58.5 Hz and must trip within 0.2 seconds. Relays with an inverse time characteristic (where the trip time changes with respect to the applied frequency) are not acceptable. These relays must respond reliably for applied source voltages as low as 70% of the nominal voltage.

81O Relay – Over Frequency

The over frequency relay will normally be set for a trip point of 60.5 Hz and must trip within 0.2 seconds. Relays with an inverse time characteristic are not acceptable. These relays must respond reliably for applied source voltages as low as 70% of the nominal voltage.

51V Relay – Voltage Restrained Overcurrent

For synchronous Project applications, the (51V) relays must be set to detect any phase faults that may occur between the Project and the nearest three-phase fault clearing device on the Consumers Energy system. Since these faults may take up to 1 second to detect and isolate, the appropriate saturated direct-axis reactance of the Project will be used depending on its time constants. The CT ratios and specific relay settings will be determined via a fault study performed by Consumers Energy. The settings of this device will consider the relay manufacturer's recommended practice for the type of Project and prime mover (mechanical energy source) and will be determined by Consumers Energy for the specific system application.

59N Relay – Ground Fault Detection

This relay will be applied to detect ground faults on the Consumers Energy system when the Project is connected to a grounded Utility system and not capable of providing an adequate quantity of ground fault current for a 51N relay. This relay will be set for a 10% shift (10 multiples of pickup) in the apparent power system neutral. For an ungrounded-wye transformer winding with a single 120 V secondary VT, the setting will usually be 12 Volts. For a delta transformer winding with broken delta 120 V secondary VTs, the setting will usually be 20 Volts. The time delay will normally be 1 second.

51N Relay – Ground Fault Detection

This relay will be applied to detect ground faults on the Consumers Energy system when the Project is connected to a grounded Utility system and capable of providing an adequate quantity of ground fault current. This relay will be set to detect faults on the directly connected Utility system, and the timing will be set to comply with Utility practice for overcurrent relay coordination. The CT ratio and specific relay setting will be determined via a fault study performed by Consumers Energy.

32R Relay – Reverse Power

This relay will be applied to non-export projects. The reverse power relay must be selected such that it can detect a power flow into the Consumers Energy system of a small fraction of the overall Project capacity. The relay will normally be set near its minimum (most sensitive) setting and will trip after a 1 second time delay. The delay will avoid unnecessary tripping for momentary conditions.

This relay will be applied to limited export projects. The reverse power relay must be selected such that it can detect a power flow into the Consumers Energy system above the Project export capacity. The relay will normally be set to have 102% of the export capacity and will trip after a 5 second time delay. The delay will avoid unnecessary tripping for momentary conditions.

32U Relay – Under Power (Min Import)

This relay will be applied to limited export projects. The under-power relay must be selected such that it can detect a minimum amount of power flow from the Consumers Energy system. The relay will normally be set near its minimum (most sensitive) setting and will trip after a 5 second time delay. The

delay will avoid unnecessary tripping for momentary conditions. Special consideration should be taken when selecting and setting an under-power function due to the minimum operating quantities required for the function to operate correctly.

INVERTER SETTING CRITERIA

For certified inverter Projects, the Applicant is required to set the inverter to meet the default IEEE 1547-2018 requirements, including default settings to meet Category III shall trip, ride through, and frequency-droop (Freq-Watt) requirements.

For non-certified inverter Projects, Consumers Energy will provide a subset of the inverter settings to the Applicant that are required for safe and reliable operation of the electric distribution system. The Applicant will be responsible for setting the inverters. The settings may include but are not limited to the following:

- Protective Functions – Under/Over Frequency and Voltage Functions
- Voltage and Frequency Ride Through – Ranges, Modes, and Shall Trip Settings
- Dynamic Voltage Support – Ranges, Behavior (e.g., reactive-current injection)
- Voltage and Frequency Support – SPF, Volt-Var, Watt-War, Volt-Watt, etc.
- Frequency Control – Frequency-droop (Freq-Watt)

Consumers Energy may request changes to settings, which impact the safety and reliability of the distribution electric system. Consumers Energy and the Project shall work together to implement any proposed setting changes.

TELEMETRY AND DISTURBANCE MONITORING REQUIREMENTS

If DTT is required, telemetry to monitor the DTT might be required. Disturbance monitoring is also recommended as being beneficial to the Applicant and Consumers Energy but is not required in all cases.

Telemetry and disturbance monitoring when required, will be provided at the Applicant's expense. In addition to other telemetry costs, a one-time charge will be assessed to the Applicant for equipment and software installed at the Consumers Energy System Control Center to process the data signals.

TELEMETRY

Telemetry enables Consumers Energy to operate the electric system safely and reliably under both normal and emergency conditions. Consumers Energy measures its internal load plus losses (generation)

on a real time basis via an extensive telemetry system. This system sums all energy flowing into the Consumers Energy electric system from Projects interconnected to the system and from interconnections with other utilities. During system disturbances when portions of the electrical systems are out of service, it is essential to know if a Project is online or offline to determine the proper action to correct the problem. Time saved during restoration activities translates to fewer outages and outages of shorter duration for Consumers Energy customers.

DISTURBANCE MONITORING

Disturbance monitoring allows Consumers Energy to evaluate the performance of the overall protective system for all faults on the electric system. It is critical that sufficient monitoring of the protective system is in place to determine its response. It is preferable to deploy disturbance monitoring into all Projects, but it can be expensive to deploy. Therefore, disturbance monitoring is required only for installations at Consumers Energy discretion.

REMOTE TERMINAL UNIT (RTU)

Telemetry and disturbance monitoring require the installation of a Remote Terminal Unit (RTU), that is supplied, owned, operated, and maintained by Consumers Energy. A data Communication Circuit is required for Consumers Energy to remotely communicate with the RTU. The Applicant shall provide a suitable location, approved by Consumers Energy, for the Applicant to install the RTU and associated equipment. The Applicant shall provide the following external connections and associated equipment to the RTU location, which may include but is not limited to:

1. A 24, 48 V or 125 V DC power supply capable of providing an 8-hour backup. The Applicant shall coordinate with Consumers Energy to properly size the DC power supply.
2. A 120 V AC power supply for heating unconditioned (e.g., outdoor) locations and for use with AC/DC converters. The Applicant shall coordinate with Consumers Energy to properly size the AC power supply.
3. A control circuit or Communication Interface cable for receiving telemetry and disturbance monitoring statuses.
4. A control circuit or Communication Interface cable to allow the RTU to remotely trip the Project when remote tripping is required by Consumers Energy.
5. An antenna cable for connection to an external antenna. Consumers Energy will supply the antenna cable.
6. A communication cable for connection to the Communication Circuit equipment (e.g., Router/Switch).
7. A communication cable for receiving telemetry from Consumers Energy metering at the PCC.
8. A voice Communication Circuit, when cellular phone service is not available, for the commissioning and checkout of the metering, DTT and RTU.

The above connections shall be connected to the RTU by the Applicant where indicated by Consumers Energy. See “Typical Meter and RTU Installation Where Telemetry is Required” in the Generator Interconnection Supplement.

When telemetry is required, the following values will be monitored on the RTU, unless otherwise specified by Consumers Energy:

1. Real and reactive power flow, voltage, etc. from the Consumers Energy metering at the PCC.
2. The status (normal/fail) of protective relay Communication Channels. A status indication of "FAIL" indicates the Communication Channel used for relaying is unable to perform its protective function. For example, the direct transfer trip receiver loss of guard (LOG) auxiliary relay
3. The status (open/closed) of each main interrupting device, each generating interrupting device, and each tie/transfer device used to change the configuration of the Project.
4. If the Project is composed of multiple inverters, a single logical (OR) status of the individual inverter “On/Off” states, indicating all inverters are offline or any one or more inverters are online, is permissible). An online status would be indicated if any individual inverter is online.
5. The status indicating battery failure of the DC uninterruptible power supplies providing power to the DTT and RTU equipment.
6. The status of the Consumers Energy relays indicating under voltage of the 120V AC power supplies providing power to the DTT and RTU equipment.

The RTU will be equipped with “sequence of events” recording when disturbance monitoring is required. The Applicant shall provide the following disturbance monitoring statuses, unless otherwise specified, to be monitored on the RTU:

1. The trip status of an instantaneous relay to act as a ground fault detector for faults on the Consumers Energy electric system. This relay shall be connected into the same sensing source as the ground fault protective relay required by Consumers Energy.
2. The trip status of each interrupting device, which is initiated by the interconnection relaying schemes required by Consumers Energy.
3. The status indicating operation of the over/under voltage (27/59) relays.
4. The status indicating operation of the under/over frequency (81O/U) relays.
5. The status indicating operation of the ground fault detection (59N and/or 51N) relays.
6. The status indicating operation of voltage restraint overcurrent (51V) relays.
7. The status indicating operation of the reverse power (32R) relays.
8. The status of the following relays, associated to each individual direct transfer trip receiver, which may include but is not limited to:
    i. Loss-of-guard relay (LOG).
    ii. Receive-trip relay (RTX).
    iii. Lockout relay.

The statuses indicated in the above telemetry items 2 through 5 and disturbance monitoring items shall be provided by the Applicant using one of the following methods specified by Consumers Energy:

1. Wiring individual contacts directly to a terminal block near the RTU, or
2. Using a Communication Interface to exchange data with the RTU, or
3. Other communication provisions, acceptable to Consumers Energy, should be provided to remotely access the multi-functional device such that the operation of the individual functions may be evaluated separately.

MISCELLANEOUS OPERATIONAL REQUIREMENTS

Miscellaneous requirements include synchronizing, ramp rates, reclose blocking, remote trip capability, reactive power capability and voltage control, frequency control, standby power, and system stability limitations.

OPERATING IN PARALLEL

The Applicant will be solely responsible for the required synchronizing equipment and for properly synchronizing the Project with the Consumers Energy electric system. Voltage fluctuation at the PCC during synchronizing shall be limited per IEEE 1547-2018.

The Project must be capable of controlling the output of active power (ramp rates) after synchronization to avoid issues on the Consumers Energy system, which includes but is not limited to voltage fluctuations, harmonics, or oscillations. The Project shall, upon request by Consumers Energy, modify the active power output characteristics to prevent such issues after synchronization. Inverter based Projects connected to the Consumers Energy system shall be certified, to be capable of normal and soft ramp rates.

The Project must be designed to prevent the Project from energizing into a de-energized Utility line. The Project's circuit breaker or contactor must be blocked from closing in on a de-energized circuit.

If the Project has shown an unsatisfactory response to requests to separate the generation from the Consumers Energy electric system, Consumers Energy reserves the right to disconnect the Project. For Projects where telemetry is required, the Applicant shall provide Consumers Energy the capability to remotely disconnect the Project. To provide this functionality, the Project may be required to provide a Communication Interface as defined within these requirements.

VOLTAGE AND FREQUENCY RIDE THROUGH

Voltage and frequency ride through are generally not required for synchronous and induction Projects. Certified inverter Projects are required to meet the ride through requirements by implementing the inverter setting criteria defined within these procedures. Non-certified inverter Projects will be reviewed on a case-by-case basis depending on the available ride through capability.

All under/over voltage and under/over frequency protective functions installed by the Applicant or Consumers Energy are required to coordinate with ride through requirements.

REACTIVE POWER CAPABILITY AND VOLTAGE CONTROL

The Project shall be designed to be capable of maintaining a continuous rated power output for the Export portion of the Project, at a power factor within the range of 0.9 (inject) to 0.97 (absorb) for synchronous, non-synchronous and induction Projects and 0.9 (inject) to 0.9 (absorb) for inverter-based Projects. This power factor range standard shall be dynamic and can be met using, for example, power electronics designed to supply this level of reactive capability (considering any limitations due to voltage level, real power output, etc.).

Projects that interconnect within customer-owned facilities must be designed to maintain the above dynamic power factor range for the Export portion of the power delivery.

The Applicant shall control voltage at the PCC in accordance with instructions (e.g., voltage or reactive power schedule) provided by Consumers Energy. Inverter based Projects shall be certified, to be capable of controlling the voltage level at the Export portion of the Project using the control modes specified in the following table. The Applicant may request measurement data from the Consumers Energy metering to control the voltage at the PCC.

Control Mode
Specified Power Factor (SPF)
Voltage-Reactive Power (Volt-VAr)
Active Power- Reactive Power (Watt-Var)
Constant Reactive Power
Voltage-Active Power (Volt-Watt)

For inverter-based Projects where telemetry is required, the Project shall provide Consumers Energy the capability to remotely issue instructions for voltage control, including the ability to read information required to operate the Project. To provide the functionality, the Applicant shall provide a Communication Interface as defined within these requirements. For non-inverter-based projects, the need will be reviewed on a case-by-case basis.

Consumers Energy existing rate schedules, incorporated herein by reference, contain power factor adjustments based on the power factor of the metered load at these facilities.

FREQUENCY CONTROL

Inverter based Projects shall be certified, to be capable of controlling frequency using the control mode(s) specified in the following table. Non-Export projects are subject to the requirement.

Control Mode
Frequency-Watt

The control modes shall respond to frequency measurements at the inverter terminals. Consumers Energy shall provide and specify the control modes and settings applicable to the inverter-based Project.

For inverter-based Projects where telemetry is required, the Project shall provide Consumers Energy the capability to remotely issue instructions for frequency control, including the ability to read information required to operate the Project. To provide the functionality, the Applicant shall provide a Communication Interface as defined within these requirements. For non-inverter-based projects, the need will be reviewed on a case-by-case basis.

STANDBY POWER

Standby power will be provided under the terms of an approved rate set forth in Consumers Energy Standard Rules and Regulations. The Applicant should be aware that to qualify for Standby Rates, a separate meter must be installed at the generator.

SYSTEM STABILITY AND SITE LIMITATIONS

The Stiffness Ratio is the combined three-phase short circuit capability of the Project and the utility system divided by the short circuit capability of the Project measured at the PCC. A stability study may be required for Projects with a Stiffness Ratio of less than 40. Five times the generator rated kVA will be used as a proxy for short circuit current contribution for induction generators. For synchronous Projects with a Stiffness Ratio of less than 40, Consumers Energy requires special generator trip schemes or loss of synchronism (out-of-step) relay protection. If the apparent voltage flicker from a loss-of-synchronism condition exceeds 5%, an out-of-step relay will be required. This type of protection is typically applied at the PCC and trips the entire Project off-line, if instability is detected, to protect the Consumers Energy electric system and its customers. If the Applicant chooses not to provide for mitigation of unacceptable voltage flicker (above five percent), Consumers Energy may disallow the interconnection of the Project or require a new dedicated interconnection at the Applicant’s expense.

The Applicant is responsible for evaluating the consequences of unstable generator operation or voltage transients on Project equipment and determining, designing, and applying any relaying which may be necessary to protect that equipment. This type of protection is typically applied on individual generators to protect the Project facilities.

Consumers Energy will determine if operation of the Project will create objectionable voltage flicker and/or disturbances to other Consumers Energy customers and develop any required mitigation measures at the Applicant’s expense.

REVENUE METERING REQUIREMENTS

Consumers Energy will own, operate, and maintain all required billing metering equipment at the Applicant's expense.

NON- EXPORT PROJECTS

A Consumers Energy meter will be installed that only records energy deliveries to the Project.

EXPORT PROJECTS

The billing metering may need to be replaced. A dedicated data Communication Circuit is required to allow remote access to the billing meter by Consumers Energy. If telemetry is required, the billing metering will be connected to the RTU as part of the installation.

The Applicant shall always provide Consumers Energy access to the premises to install, turn on, disconnect, inspect, test, read, repair, or remove the metering equipment. The Applicant may, at its option, have a representative witness this work. If metering equipment is proposed to be inside customer owned fenced area, the customer shall provide a readily accessible pedestrian gate that is available to Consumers Energy.

The metering installations shall be constructed in accordance with the practices which normally apply to the construction of metering installations for residential, commercial, or industrial customers. For Projects with multiple generators, metering of each generator may be required. When practical, multiple generators may be metered at a common point provided the metered quantity represents only the gross generator output.

Consumers Energy shall supply to the Applicant all required metering equipment and the standard detailed specifications and requirements relating to the location, construction, and access of the metering installation and will provide consultation pertaining to the meter installation as required. Consumers Energy will endeavor to coordinate the delivery of these materials with the Applicant’s installation schedule during normal scheduled business hours.

The Applicant may be required to provide a mounting surface for the metering equipment, including enclosures and conduit. The mounting surface and location must meet Consumers Energy specifications and requirements.

The responsibility for the equipment installation is shared between Consumers Energy and the Applicant. The Applicant may be required to install some of the metering equipment on its side of the PCC, including instrument transformers, cabinets, conduits, and mounting surfaces. Consumers Energy shall install the meters and communication links. Consumers Energy will endeavor to coordinate the installation of these items with the Applicant's schedule during normal scheduled business hours.

COMMUNICATION REQUIREMENTS

COMMUNICATION INTERFACE

A Communication Interface allows for the exchange of data between the Consumers Energy RTU (or alternate) and the Project interface equipment. The data may include but is not limited to generator monitoring and control points, disturbance monitoring, and telemetry. When required, the Applicant shall provide an interface capable of exchanging data with the Consumers Energy RTU over one of the following protocols using the associated transports and physical layers, as defined by Consumers Energy on a case-by-case basis. The Project shall provide a single communication cable to a location near the RTU panel.

Protocol	Transport	Physical Layer
IEEE Std 2030.5 (SEP2)	TCP/IP	Ethernet
IEEE Std 1815 (DNP3)	TCP/IP	Ethernet
	N/A	RS-232
		RS-485
Sunspec Modbus	TCP/IP	Ethernet
	N/A	RS-485

Table - Approved Protocols / Transport / Physical Layer

Consumers Energy will provide the necessary interface information (e.g., data mapping) containing the required monitoring and control functionality. The Applicant and Consumers Energy shall work together to implement the Communication Interface.

COMMUNICATION CIRCUITS

Data Communication Circuits allow for the remote exchange of data between Consumers Energy and equipment located at the Project. Telemetry, disturbance monitoring, power quality monitoring, DTT, metering and pilot relaying generally require the use of data Communication Circuits. The Applicant is responsible for all costs including but not limited to materials, installation, operating, telecommunication, maintenance, cancellation fees and monthly charges for the data Communication Circuits.

Consumers Energy will determine the quantity and type (e.g., cellular, fiber, copper, radio) of the data Communication Circuits required for the application. Consumers Energy is responsible for ordering and acquiring any leased data Communication Circuits required for the Project. In some cases, the Applicant may be required by Consumers Energy to order and acquire the leased data Communication Circuits. Consumers Energy will provide information (e.g., costs, availability) regarding leased data Communication Circuits once made available by the telecommunication provider. Consumers Energy is

not responsible for any delays caused by the telecommunication provider in providing such information or increased interconnection costs.

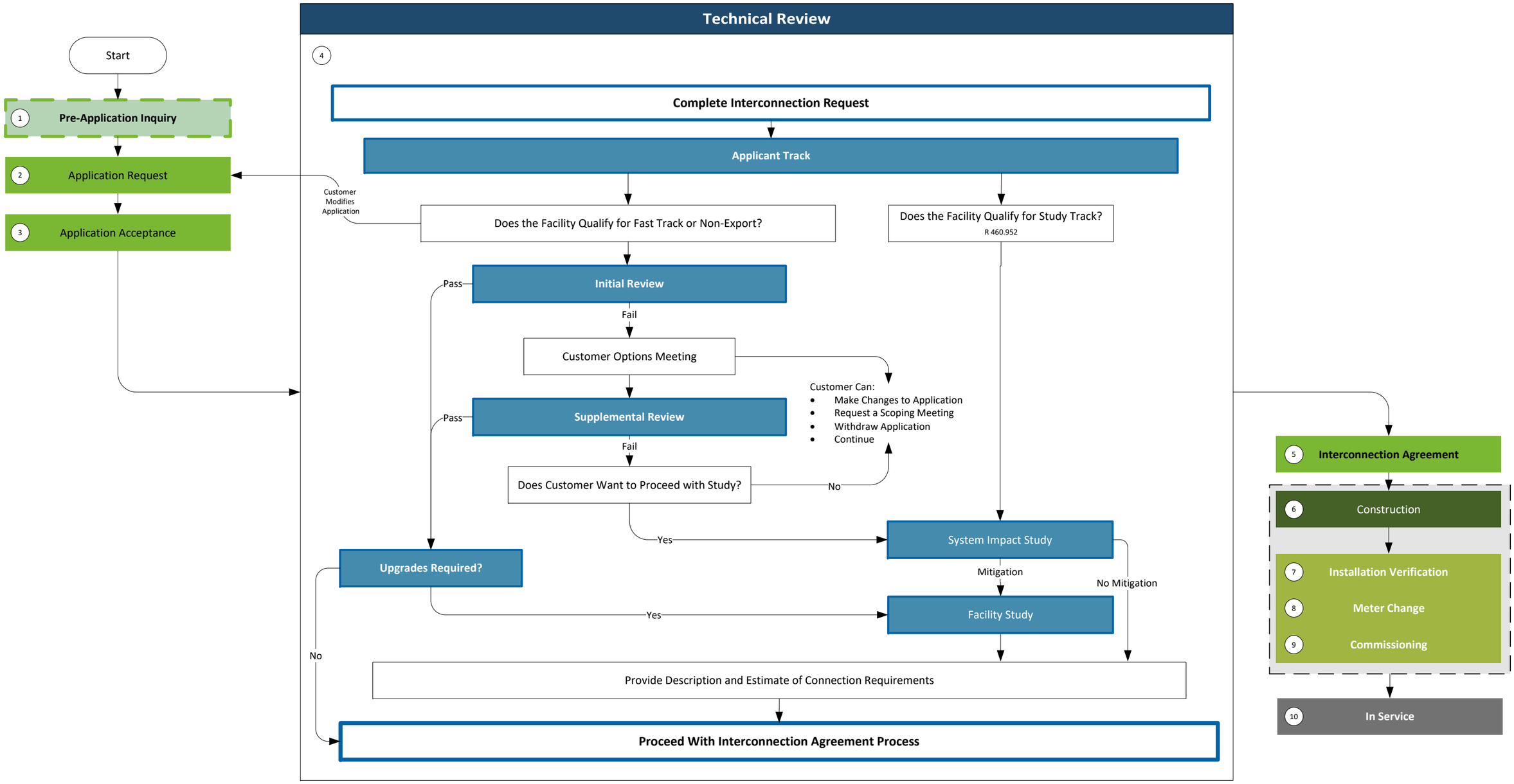
Data Communication Circuits require the installation of equipment at the Project that is accessible to Consumers Energy and the telecommunication provider. The Applicant shall provide a suitable location, approved by Consumers Energy, for the Applicant and/or telecommunication provider to install any necessary Communication Circuit equipment. A review of each installation shall be made to determine the location and space requirements most agreeable to Consumers Energy and the Applicant. Consumers Energy will provide the utility information necessary for proper installation of the equipment. The required equipment will vary based on the type of Communication Circuit. For wireless applications, the required equipment may include but is not limited to coaxial cables, antennas, surge arresters, cabinets, and mounting structures. Wired connections may require the Applicant to install equipment that may include but is not limited to backboards, splice boxes, patch panels, wire, fiber, AC and DC power sources, interface converters, cabinets, and mounting structures. The Applicant and Consumers Energy shall work together to install the data Communication Circuit.

Consumers Energy personnel require the use of cellular phone service while performing checkout of the metering, DTT, RTU, and relaying. The Applicant must provide an alternative voice communication method, approved by Consumers Energy, when cellular phone service is not available.

All copper and fiber Communication Circuits must be properly protected as detailed in IEEE Std. 487 and IEEE Std 1590, respectively.

APPENDIX A

INTERCONNECTION PROCESS FLOW DIAGRAM


Technical Review
Start
1 Pre-Application Inquiry
2 Application Request
3 Application Acceptance
4
Complete Interconnection Request
Applicant Track
Customer Modifies Application
Does the Facility Qualify for Fast Track or Non-Export?
Does the Facility Qualify for Study Track?
R 460.952
Pass
Initial Review
Fail
Customer Options Meeting
Customer Can:
Make Changes to Application
Request a Scoping Meeting
Withdraw Application
Continue
Pass
Supplemental Review
Fail
Does Customer Want to Proceed with Study?
No
Yes
System Impact Study
Mitigation
No Mitigation
Upgrades Required?
Yes
Facility Study
No
Provide Description and Estimate of Connection Requirements
Proceed With Interconnection Agreement Process
5 Interconnection Agreement
6 Construction
7 Installation Verification
8 Meter Change
9 Commissioning
10 In Service

APPENDIX B

COSTS

Interconnection Table – Applicant Costs

	Pre-Application Review	Application Review	Supplemental Review	System Impact Study	Facilities Study
Distributed* Generation	N/A	$50	$0	$0	$0
Non-Export Track (certified)	$300	$100 + $1/kWac	$1,000	Not to Exceed $10,000	Not to Exceed $15,000
Non-Export Track (non-certified)	$300	$100 + $2/kWac	$1,000	Not to Exceed $10,000	Not to Exceed $15,000
Fast Track (certified)	$300	$100 + $1/kWac	$1,000	Not to Exceed $10,000	Not to Exceed $15,000
Fast Track (non-certified)	$300	$100 + $2/kWac	$1,000	Not to Exceed $10,000	Not to Exceed $15,000
Study Track	$300	$300*	N/A	Not to Exceed $10,000	Not to Exceed $15,000

* Any Legacy Net Metering or Distributed Generation program fee in combination with any applicable fast track initial review fee, fast track supplemental review fees and any study track fees, must not exceed a total of $50.

APPENDIX C

PROCEDURE DEFINITIONS

AC: means alternating current at 60 Hertz.

Affected System: Another electric utility's distribution system, a municipal electric utility's distribution system, the transmission system, or transmission system- connected generation which may be affected by the proposed interconnection

Alternative electric supplier (AES): As defined in section 10g of 1939 PA 3, MCL 460.10g

Applicant: The person or entity submitting an interconnection application, a legacy net metering program application, or a distributed generation program application. An applicant is not required to be an existing customer of an electric utility.

Application: An interconnection application, a legacy net metering program application, or a distributed generation program application.

Area Network: A location on the distribution system served by multiple transformers interconnected in an electrical network circuit.

Business day: Monday through Friday, starting at 12:00:00 a.m. and ending at 11:59:59 p.m., excluding the following electric utility holidays: New Year's Day, Martin Luther King Jr. Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Day after Thanksgiving, Christmas Eve, Christmas Day, and New Year's Eve, and any day in which electric service is interrupted for 10% or more of an electric utility's customers.

Calendar day: Every day, including Saturdays, Sundays, and holidays.

Certified: An inverter-based system has met acceptable safety and reliability standards by a nationally recognized testing laboratory in conformance with IEEE 1547.1-2020 and the UL 1741 September 28, 2021, edition except that prior to commercial availability, inverter-based systems which conform to the UL 1741SA September 7, 2016, edition are acceptable.

Commission: The Michigan Public Service Commission

Commissioning test: The test and verification procedure that is performed on a device or combination of devices forming a system to confirm that the device or system, as designed, delivered, and installed, meets the interconnection and interoperability requirements of IEEE 1547-2018. and IEEE 1547.1-2020. A commissioning test must include visual inspections and may include, as applicable, an operability and functional performance test and functional tests to verify interoperability of a combination of devices forming a system.

Conforming: The information in an interconnection application is consistent with the general principles of distribution system operation and DER characteristics.

Customer: A person or entity who receives electric service from an electric utility's distribution system or a person who participates in a legacy net metering program or distributed generation program through an alternative electric supplier or electric utility.

DC: Direct current.

Distributed energy resource (DER): A source of electric power and its associated facilities that is connected to a distribution system. DER includes both generators and energy storage devices capable of exporting active power to a distribution system. An electric vehicle that operates solely as a load is not considered a DER for purpose of this definition.

DER Capacity: The aggregate capacity of the site in real power (W) using the nameplate rating in AC.

Distributed Generation Program: The distributed generation program approved by the commission and included in an electric utility's tariff pursuant to section 6a (14) of 1939 PA 3, MCL 460.6a, or established in an alternative electric supplier distributed generation program plan.

Distribution system: The structures, equipment, and facilities owned and operated by an electric utility to deliver electricity to end users, not including transmission and generation facilities that are subject to the jurisdiction of the federal energy regulatory commission.

Distribution Upgrades: The additions, modifications, or improvements to the distribution system necessary to accommodate a DER's connection to the distribution system.

Electric utility: Any person or entity whose rates are regulated by the commission for selling electricity to retail customers in this state.

Electrically coincident: Two or more proposed DERs associated with pending interconnection applications have operating characteristics and nameplate capacities which require that distribution upgrades will be necessary if the DERs are installed in electrical proximity with each other on a distribution system.

Electrically remote: A proposed DER is not electrically coincident with a DER that is associated with a pending interconnection application.

Eligible electric generator: A methane digester or renewable energy system with a generation capacity limited to the customer's electrical need and that does not exceed the following:

- 550 kWac of aggregate generation at a single site for a renewable energy system

Energy storage device: A device that captures energy produced at one time, stores that energy for a period of time, and delivers that energy as electricity for use at a future time. For purposes of these rules, an energy storage device may be considered a DER.

Export capacity: The amount of power that can be transferred from the DER to the distribution system. Export capacity is either the nameplate rating or a lower amount if limited using an acceptable means defined in an electric utility's interconnection procedures.

Facilities study: A study to specify and estimate the cost of the equipment, engineering, procurement, and construction work if distribution upgrades or interconnection facilities are required.

Fast track: The procedure used for evaluating a proposed interconnection that makes use of screening processes, as described in R 460.944 to R 460.950.

Grid network: A configuration of a distribution system or an area of a distribution system in which each customer is supplied electric energy at the secondary voltage by more than 1 transformer.

High Voltage Distribution: The distribution system that operates at a voltage of 25,000 Volts or greater, not including transmission facilities.

IEEE: Institute of Electrical and Electronics Engineers.

IEEE 1547: IEEE "Standard for Interconnecting and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces"

IEEE 1547.1: IEEE "Standard Conformance Test Procedures for Interconnecting Distributed Energy Resources with Electric Power Systems Interfaces"

Inadvertent export: Unscheduled export of active power from a DER, exceeding a specified magnitude and for a limited duration, due to fluctuations in load following behavior.

Initial review: The fast-track initial review screens.

Interconnection: The process undertaken by an electric utility to construct the electrical facilities necessary to connect a DER with a distribution system so that parallel operation can occur.

Interconnection agreement: An agreement containing the terms and conditions governing the electrical interconnection between the electric utility and the Applicant or interconnection customer. Where construction of interconnection facilities or distribution upgrades are necessary, the agreement, or amendments, shall specify estimated timelines, cost estimates, and payment milestones for construction of facilities and distribution upgrades to interconnect a DER into the distribution system, and shall identify design, controls, settings, procurement, installation, and construction requirements associated with installation of the DER.

Interconnection coordinator: A person or persons designated by the electric utility who shall serve as the point of contact from which general information on the application process and on the affected system or systems can be obtained through informal request by the applicant or interconnection customer.

Interconnection customer: The person or entity, which may include the electric utility, responsible for ensuring a DER is operated and maintained in compliance with all local, state, and federal laws, as well as with all rules, standards, and interconnection procedures. An electric utility is not considered an interconnection customer for temporary DER or a substation backup energy storage device project

Interconnection facilities: Any equipment required for the sole purpose of connecting a DER with a distribution system.

Interconnection procedures: The requirements that govern project interconnection adopted by each electric utility and approved by the commission.

Interconnection study agreement: An agreement between an applicant and an electric utility for the electric utility to study a proposed DER.

Islanding: When a Project and utility load become isolated from the rest of the Consumers Energy electrical system.

kW: kilowatt.

kWac: The electric power, in kilowatts, associated with the alternating current output of a DER at unity power factor

kWh: kilowatt-hours.

Legacy net metering program: The true net metering or modified net metering programs in place prior to commission approval of a distributed generation program tariff pursuant to section 6a (14) of 1939 PA 3, MCL 460.6a, and prior to the establishment of an alternative electric supplier distributed generation plan.

Level 1: A certified project of 20kWac or less.

Level 2: A certified project of greater than 20 kWac and not more than 150 kWac.

Level 3: A project 150 kWac or less that is not certified, or a project greater than 150 kWac and not more than 550 kWac.

Level 4: A project of greater than 550 kWac and not more than 1 MWac.

Level 5: A project of greater than 1 MWac.

Level 4 and 5 and non-certified project interconnection agreement: An interconnection agreement applicable to level 4 and 5 and non-certified project interconnection applications.

Limited export: The exporting capability of a DER whose export capacity is limited by means specified in the interconnection procedures.

Low Voltage Distribution: The distribution system that operates at a voltage of 2,400 Volts or greater but less than 25,000 Volts.

Mainline: A conductor that serves as the three-phase backbone of a low voltage distribution circuit.

Material modification: A modification to the DER nameplate rating, DER export capacity, electrical size of components, bill of materials, machine data, equipment configuration, or the interconnection site of the DER at any time after receiving notification by the electric utility of a complete interconnection application. Replacing a component with another component that has near-identical characteristics

does not constitute a material modification when agreed to by the electric utility. For the proposed modification to be considered material, it shall have been reviewed and been determined to have or anticipated to have a material impact on 1 or more of the following:

(i) The cost, timing, or design of any equipment located between the point of common coupling and the DER.
(ii) The cost, timing, or design of any other application.
(iii) The electric utility's distribution system or an affected system.
(iv) The safety or reliability of the distribution system.

Methane digester: A renewable energy system that uses animal or agricultural waste for the production of fuel gas that can be burned for the generation of electricity or steam.

MW: megawatt.

MWac: The electric power, in megawatts, associated with the alternating current output of a DER at unity power factor.

Nameplate rating: The sum total of maximum rated power output of all a DER's constituent generating units and energy storage units as identified on the manufacturer nameplate, regardless of whether it is limited by any approved means. Nameplate rating includes nominal voltage (V), current (A), maximum active power (W), apparent power (VA), and reactive power (VAr) on an alternating current (AC) basis.

Nationally recognized testing laboratory: Any testing laboratory recognized by the accreditation program of the U.S. Department of Labor Occupational Safety and Health Administration.

Network protector: Those devices associated with a secondary network used to automatically disconnect a transformer when reverse power flow occurs.

Non-export: An installed electric generation project which operates in parallel with the electric utility with a relay protection scheme and isolating device preventing energy flow back to the utility.

Non-export track: The procedure for evaluating a proposed interconnection that will not inject electric energy into an electric utility's distribution system.

Parallel operation: The operation, for longer than 100 milliseconds of a DER while connected to the energized distribution system.

Point of common coupling (PCC): The point where the DER connects with the electric utility's distribution system

Power control system: Systems or devices that electronically limit or control steady state currents to a programmable limit.

Project: Electrical generating equipment and associated facilities that are not owned or operated by an electric utility.

Radial supply: A configuration of a distribution system or an area of a distribution system in which each customer can only be supplied electric energy by 1 substation transformer and distribution line at a time.

Readily available: No creation of data is required, and little or no computation or analysis of data is required.

Renewable energy system: Term as defined in section 11(i) of 2008 PA 295, MCL 460.1011(i).

Secondary network: Those areas of a distribution system that operate at a secondary voltage level and are networked.

Site: Means a contiguous site, regardless of the number of meters at that site. A site that would be contiguous but for the presence of a street, road, or highway is considered to be contiguous.

Spot network: A location on the distribution system that uses 2 or more inter-tied transformers to supply an electrical network circuit.

Standard level 1, 2, and 3 certified project interconnection agreement: The statewide interconnection agreement approved by the commission and applicable to levels 1, 2 and 3 certified project interconnection applications. A cover sheet including modifications to address any special operating conditions may be added.

Study track: The procedure used for evaluating a proposed interconnection utilizing a system impact study and facilities study.

Supplemental review: The fast-track supplemental review screens.

System impact study: A study to identify and describe the impacts to the electric utility's distribution system that would occur if the proposed DER were interconnected exactly as proposed and without any modifications to the electric utility's distribution system. A system impact study also identifies affected systems.

Temporary DER: A DER that is installed on the distribution system by the electric utility with the intention of not operating at the site permanently.

UL: Underwriters Laboratory.

UL 1741: September 28, 2021, edition of the "Standard for Safety of Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources".

UL 1741 CRD for PCS: The Certification Requirement Decision for Power Control Systems for the standard titled Inverters, Converters, Controllers, and Interconnection System Equipment for Use with Distributed Energy Resources, March 8, 2019.

APPENDIX D

INTERCONNECTION APPLICATION

GENERATOR INTERCONNECTION APPLICATION

For All Projects with Aggregate Generator Output
Less Than or Equal to 550 Kw
Also Serves as Application for Distributed Generation Program

ELECTRIC UTILITY CONTACT INFORMATION	FOR OFFICE USE ONLY
Consumers Energy Interconnection Coordinator 1945 West Parnall Road (Room P12-235) Jackson, MI 49201 517-788-1432 Interconnection E-mail: customer.generation@cmsenergy.com	Application Number Date and Time Application Received

CUSTOMER / ACCOUNT INFORMATION

Electric Utility Customer Information (As shown on utility bill)

Name or Entity on Electric Account	Customer Mailing Address (Street, City, State, and Zip Code)
Customer Phone Number ( )	Customer E-mail Address
Electric Service Account(s) #	Electric Service Meter Number(s)
Note: If multiple meters on site for interconnection, please list all account and meter numbers with a ";" between each.	
Are you applying for the Distributed Generation Program? _____ Yes _____ No	**What Level are you applying for?** _____ 1 (≤ 20kW certified Inverter-based project) _____ 2 (> 20kW and ≤ 150kW certified Inverter-based project) _____ 3 (> 150kW and ≤ 550kW certified Inverter-based project OR ≤ 550 non-certified Inverter-based project)
Are you interested in selling Renewable Energy Credits? (Optional) _____ Yes _____ No	**Do you have another Electric Supplier that is not Consumers Energy?** _____ Yes _____ No If Yes, Name _____
Does this project involve renovation to an existing structure or new construction? _____**Yes or** _____**No**	**Rate Type: residential, commercial, or industrial**
Does the site have electric service? _____ Yes or _____ No	

Notes:
1. Account/meter not required for new construction where a permanent meter has not been installed.
2. You must apply to both the Distribution Utility and your Alternate Energy Provider (if applicable) for Distributed Generation
3. If you are applying for Distributed Generation, you may also apply online at https://consumersenergy.powerclerk.com

INSTALLATION INFORMATION

Project Single Point of Contact: (Electric Utility Customer, Installer or Other)

Name	Company (If Applicable)	Phone Number ( )
E-Mail Address		Requested In-Service Date (Optional)
Installer (Name of Firm or Self)		
Installer Name (Last, First, MI)	Installer Phone #	Installer E-mail

EXISTING GENERATION ON SITE

Other than electrically isolated backup generation, are there any existing generators on site? (Are you modifying or adding capacity to an existing system?) _____ Yes _____ No	What program is the existing generation enrolled in?
System Type (Solar, Wind, Anaerobic Digester, Diesel, Other etc.)	Other System Type:

Existing Generator(s) Aggregate Nameplate Capacity _____ kW	

GENERATION SYSTEM SITE INFORMATION	
Physical Site Service Address (If Not Billing Address). Include City and Zip Code	
Physical Site Township	Physical Site County
Annual Site Requirements Without Generation in kWh _____ kWh/year	Peak Annual Site Demand in kW (only for Industrial customers billed on Demand Rates) _____ kW
Attached Site Plan Page # _____	Attached Electrical One-Line Drawing Page # _____
Level 1 and 2 do not need to show any proof of insurance. (Attach) Level 3 Applicant's Proof of General Liability Insurance for a minimum of $1,000,000. Per MSPC rule – Applicant must maintain a minimum of $1,000,000 General Liability Insurance for Level 3 ONLY.	
Level 1 and 2 proof of site control may be demonstrated by the site owner's signature and contact information on the application. Level 3 site control may be demonstrated by providing documents (must be attached): - Ownership of, a leasehold interest in, or a right to develop a site for the purpose of constructing and operating a DER. - An enforceable option to purchase or acquire a leasehold site - A legally binding agreement transferring a present real property right to specified real property along with the right to construct and operate a DER on the specified real property for a period not less than 5 years.	
GENERATION SYSTEM MANUFACTURER INFORMATION	
System Type (Solar, Wind, Anaerobic Digester, Diesel, etc.)	Generator Type (Inverter, Induction, Synchronous)
Total Generator(s) Nameplate AC Rating _____ kW	Total Generator(s) Nameplate DC rating _____ kW
Generator A.C. Operating Voltage	Wiring Configuration (Single Phase, Three Phase)
Export Capacity (kW):	If power limited, list protective method (reverse power relay, min-import relay, UL PCS Certification, Load Offset):
If load offset, list the verifiable minimum load:	Expected Annual Output in Kilowatt Hours _____ kWh/year
BATTERY STORAGE INFORMATION	
Will a stored energy system be onsite (Battery) _____ Yes _____ No	Is the battery AC or DC coupled:
Battery manufacturer:	Battery Model Name:
Battery Model Number:	Battery Power Rating (kWh):
Battery Chemistry Type: Lead Acid, Lithium Ion, Lithium Iron Phosphate or Other:	Other Chemistry Type:
Battery Max Output Rating (kW):	Storage Capacity (kWh):
# of Batteries onsite:	Include Battery Spec Sheet(s)

Microinverter Policy

Once the project has been approved for construction, pictures of installed equipment must be submitted on forms. Microinverter picture submissions should include one of the following:

1. Pictures of all uninstalled microinverters at the physical location including unique identifiers such as a serial number. Pictures that are not taken at the physical location will result in return for correction.
2. A Manufacturer System Summary Report may be provided in lieu of pictures providing it has the following identifiers:
    - Physical site location of the installed equipment.

- Unique serial or manufacturer number(s) of installed equipment.
- Equipment numbers should not be the same as other installs.
- Date report was generated.

Notes:

1. **All applications require an attached Site Plan and Electrical One-Line Drawing**
2. See Page 7 for reference sample Site Plan
3. See Page 8 for reference sample Inverter Generator Electrical One-Line Drawing
4. See Page 9 for reference sample Synchronous Generator Electrical One-Line Drawing
5. See Page 11 for reference sample Induction Generator Electrical One-Line Drawing
6. For Levels 2 and 3, the One-Line Drawing must be signed and sealed by a licensed professional engineer, licensed in the State of Michigan or by an electrical contractor licensed by the State of Michigan with the electrical contractor's license number noted on the diagram.

INVERTER GENERATOR - BASED SYSTEMS

Manufacturer	Model (Name/Number)	Inverter Power Rating (kW) _____ kW
Number of Inverters _____	Total Generator(s) Nameplate AC Rating _____ kW	Total Generator(s) Nameplate DC Rating, where applicable _____ kW
Is this inverter(s) certified?	Is the Inverter tested to IEEE 1547.1? _____ Yes _____ No	

SYNCHRONOUS AND INDUCTION GENERATOR - BASED SYSTEMS

The following information on these system components shall appear on the Electrical One-Line Drawing:

- **Breakers – Rating, location and normal operating status (open or closed)**
- **Buses – Operating voltage**
- **Capacitors – Size of bank in kVAR**
- **Circuit Switchers – Rating, location and normal operating status (open or closed)**
- **Current Transformers – Overall ratio and connected ratio**
- **Fuses – Normal operating status, rating (Amps) and type**
- **Generators – Capacity rating (kVA), location, type and method of grounding**
- **Grounding Resistors – Size (Ohms) and current (Amps)**
- **Isolating Transformers – Capacity rating (kVA), location, impedance, voltage ratings, primary and secondary connections, and method of grounding**
- **Potential Transformers – Ratio and connection**
- **Reactors – Ohms per phase**
- **Relays – Types, quantity, IEEE device numbers, and operator lines indicating the device initiated by the relays**
- **Switches – Location and normal operating status (open or closed), type, and rating**
- **Tagging Point – Location and identification**

CUSTOMER AND PROJECT DEVELOPER/CONTRACTOR SIGNATURES AND FEES

_____**Non-Export Application Only**

_____ $100 + $1/kWac (certified) _____ $100 +$2 / kWac (non-certified) OR

_____ **Combined Interconnection Application and Distributed Generation**

_____$50 (Levels 1 - 3) OR

_____ **Interconnection Application Only (No Distributed Generation)**

_____ $100 + $1/kWac (certified) _____ $100 +$2 / kWac (non-certified)

_____ Check #_____ _____ Money Order # _____

Please send a check for the fee payable to ***Consumers Energy*** along with the signed and completed application to:

Consumers Energy
Interconnection Coordinator
1945 West Parnall Road (Room 12-235)

Jackson, MI 49201

To the best of my knowledge, all the information provided in this application form is complete and correct.

This application is being submitted by _____ Customer _____Developer/Installer

Signature: _____ Date _____

Project Developer/Installer Signature (if applicable): _____ Date _____

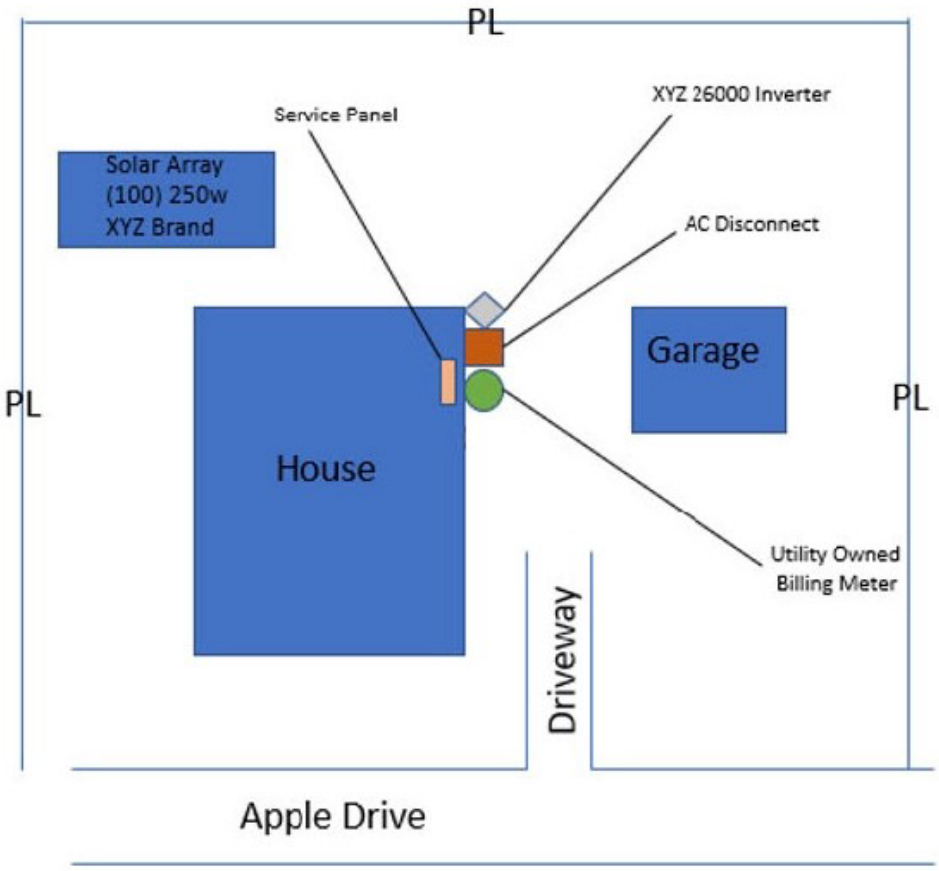
Note: Refer to the applicable "Consumers Energy Company Generator Interconnection Requirements" for a detailed explanation of the Interconnection Process, Fees, Timelines, and Technical Requirements.

SYNCHRONOUS GENERATORS		
GENERATOR INFORMATION		
Generator Nameplate Voltage	Generator Nameplate Watts or Volt-Amperes	
Generator Nameplate Power Factor (pf)	RPM	
Manufacturer _____	Model Name _____	Model Number _____
TECHNICAL INFORMATION		
Minimum and Maximum Acceptable Terminal Voltage	Direct Axis Reactance (saturated) in ohms	
Direct Axis Reactance (unsaturated) in ohms	Quadrature Axis Reactance (unsaturated) in ohms	
Direct Axis Transient Reactance (saturated) in ohms	Direct Axis Transient Reactance (unsaturated) in ohms	
Quadrature Axis Transient Reactance (unsaturated) in ohms	Direct Axis Sub-Transient Reactance (saturated) in ohms	
Direct Axis Sub-Transient Reactance (unsaturated) in ohms	Leakage Reactance	
Stator Resistance in ohms	Negative Sequence Reactance in ohms	
Quadrature Axis Reactance (Saturated) in ohms	Quadrature Axis Transient Reactance (saturated) in ohms	
Zero Sequence Reactance in ohms	Neutral Grounding Resistor in ohms (If Applicable)	
Direct Axis Transient Open Circuit Time Constant	Quadrature Axis Transient Open Circuit Time Constant	
Direct Axis Sub-Transient Open Circuit Time Constant	Quadrature Axis Sub-Transient Open Circuit Time Constant	
Open Circuit Saturation Curve		
Reactive Capability Curve Showing Overexcited and Underexcited Limits (Reactive Information if Non-Synchronous)		
Excitation System Block Diagram with Values for Gains and Time Constants (Laplace Transforms)		
Short Circuit Current Contribution From Generator at the Point of Common Coupling		
Rotating Inertia of Overall Combination Generator, Prime Mover, Couplers and Gear Drives		
Station Power Load When Generator is Off-Line (Watts, pf)	Station Power Load During Start-Up (Watts, pf)	
Station Power Load During Operation (Watts, pf)		

INDUCTION GENERATORS		
GENERATOR INFORMATION		
Generator Nameplate Voltage	Generator Nameplate Watts or Volt-Amperes	
Generator Nameplate Power Factor (pf)	RPM	
Manufacturer _____	Model Name _____	Model Number _____
TECHNICAL INFORMATION		
Synchronous Rotational Speed	Rotation Speed at Rated Power	
Slip at Rated Power	Minimum and Maximum Acceptable Terminal Voltage	
Motoring Power (kW)	Neutral Grounding Resistor in ohms (If Applicable)	
I2 2t or K (Heating Time Constant)	Rotor Resistance in ohms	
Stator Resistance in ohms	Stator Reactance in ohms	
Rotor Reactance in ohms	Magnetizing Reactance	
Short Circuit Reactance	Exciting Current	
Temperature Rise	Frame Size	
Design Letter	Reactive Power Required in Vars (No Load)	
Reactive Power Required in Vars (Full Load)		
Short Circuit Current Contribution from Generator at the Point of Common Coupling		
Rotating Inertia, H in Per Unit on kVA Base, of Overall Combination Generator, Prime Mover, Couplers and Gear Drives		
Station Power Load When Generator is Off-Line (Watts, pf)	Station Power Load During Start-Up (Watts, pf)	
Station Power Load During Operation (Watts, pf)		

SAMPLE SITE PLAN – PROVIDED FOR REFERENCE ONLY
Can be a separate document

Typical Level 1-3 Inverter Based Site Plan



John Doe
4321 Apple Drive
Jackson, MI 48118

Weblink to State of Michigan / Plats:

http://www.cis.state.mi.us/platmaps/sr_subs.asp

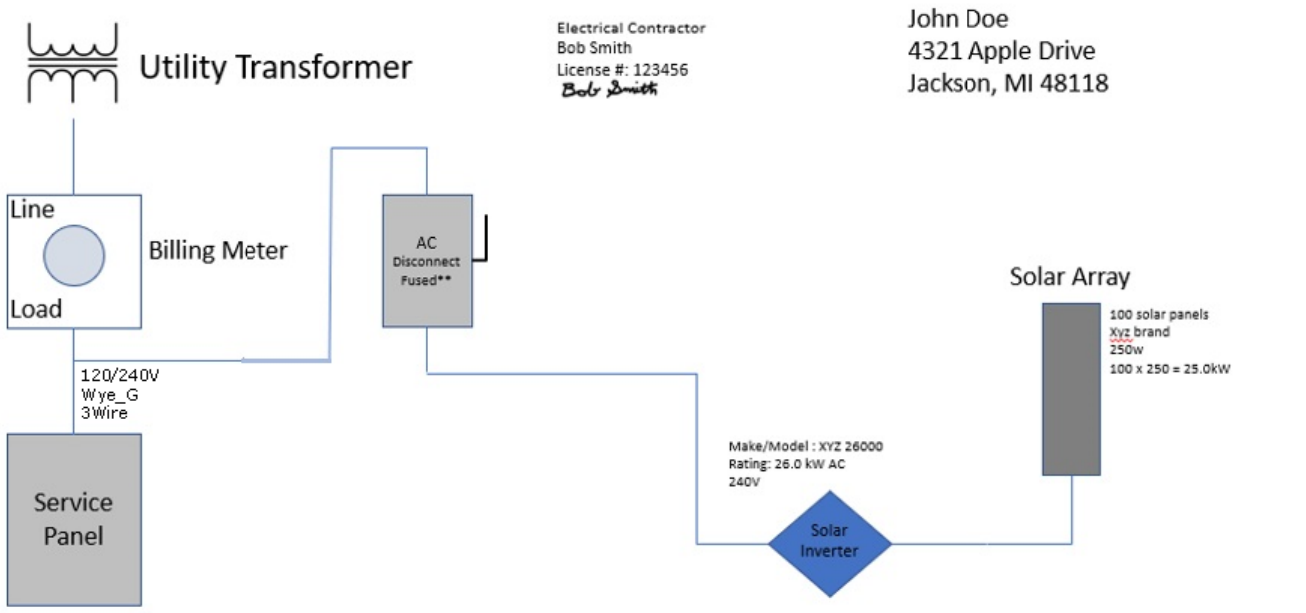
Note: Legible hand drawn site plans are acceptable. Level 3 should be not hand-drawn.

SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
Can be separate document

INVERTER GENERATOR

PE Stamp required for levels 2 & 3
Level 2 can have a Licensed Contractor stamp instead of PE Stamp

Typical Level 1-3 Inverter Based One-Line



The Total Generator Nameplate AC Rating (kW): Is calculated by the number of inverters multiplied by the inverter power rating (kW_AC) per inverter.

The Total Generator Nameplate DC Rating (kW): Is calculated by the number of solar panels multiplied by the max wattage rating (in kW) per panel.

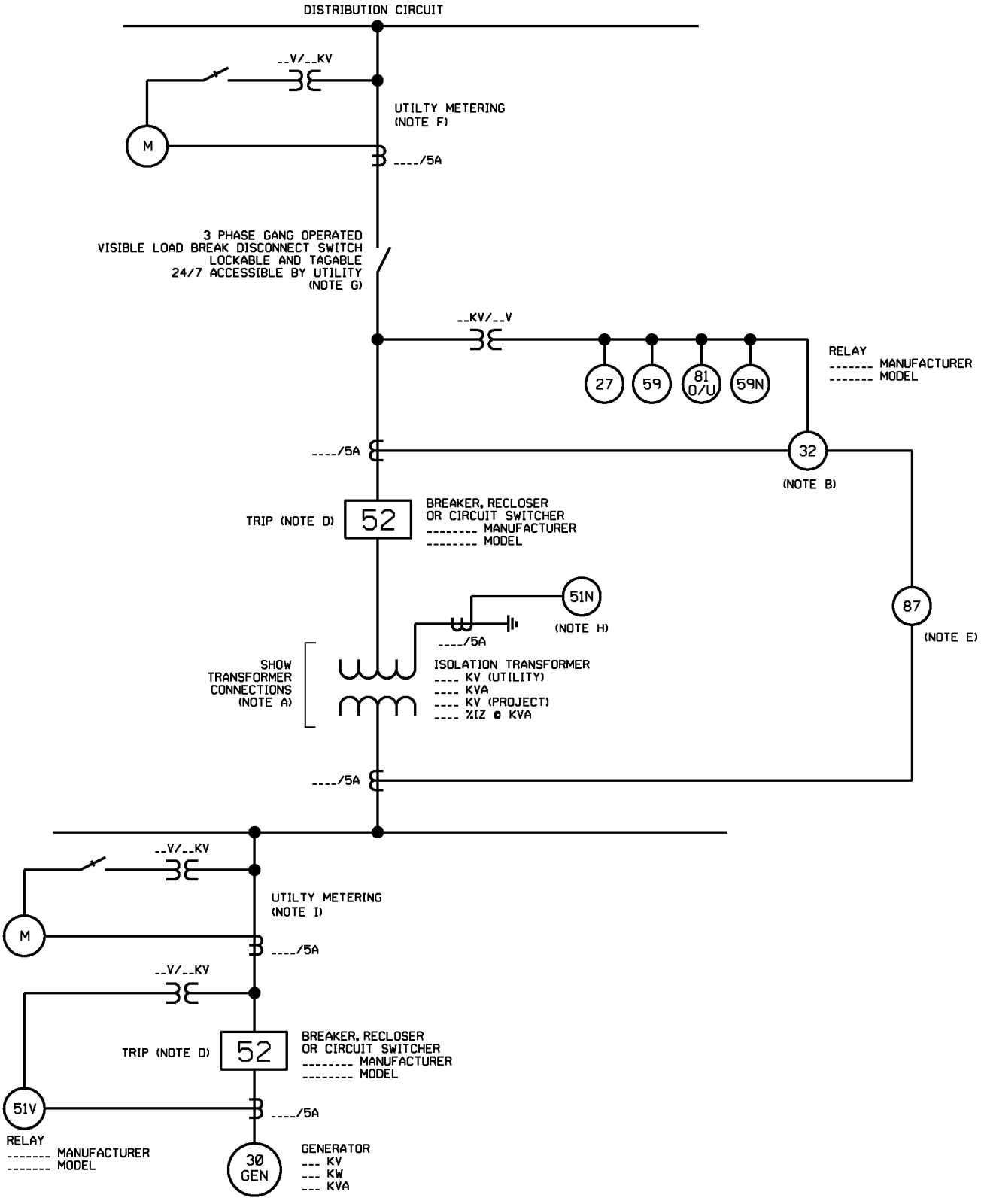
AC Disconnect Requirements:

- Located approx. within 5' of the billing meter
- Outside, 24/7 accessible
- Must be a blade style with a visible open
- Lockable/Taggable

Note: Legible Hand Drawn One-Line is Acceptable

SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
TYPICAL ISOLATION AND FAULT PROTECTION FOR SYNCHRONOUS GENERATOR

PE Stamp required for levels 2 & 3
Level 2 can have a Licensed Contractor stamp instead of PE Stamp



LEGEND

27 Undervoltage
32 Reverse Power (Not Required for Flow-Back)
51N Neutral overcurrent (required for grounded secondary)
59 Overvoltage
59N Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u Over/Underfrequency
51V Voltage Restrained Overcurrent Relays

NOTES

A) See technical requirements for permissible transformer connections. Transformer connections proposed shall be shown on the one-line diagram by the Applicant. Transformer connections and primary grounding to be approved by Utility.

B) The 27, 59, 59N, and 81O/U relays shall be connected to VTs located at the point of common coupling, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g. ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

C) Any additional equipment necessary to protect the Project is the sole responsibility of the Applicant to determine, design, and apply.

D) Tripping of an approved interrupting device between the point of common coupling and distributed energy resource is acceptable, depending on if the Applicant wants to serve its own isolated load after loss of Utility service.

E) Transformers 15 MVA (self-cooled rating) or larger shall be equipped with differential (87) relaying.

F) Utility metering equipment will be owned and supplied by the utility. An Applicant may not connect equipment to the utility metering transformers or metering secondary circuits.

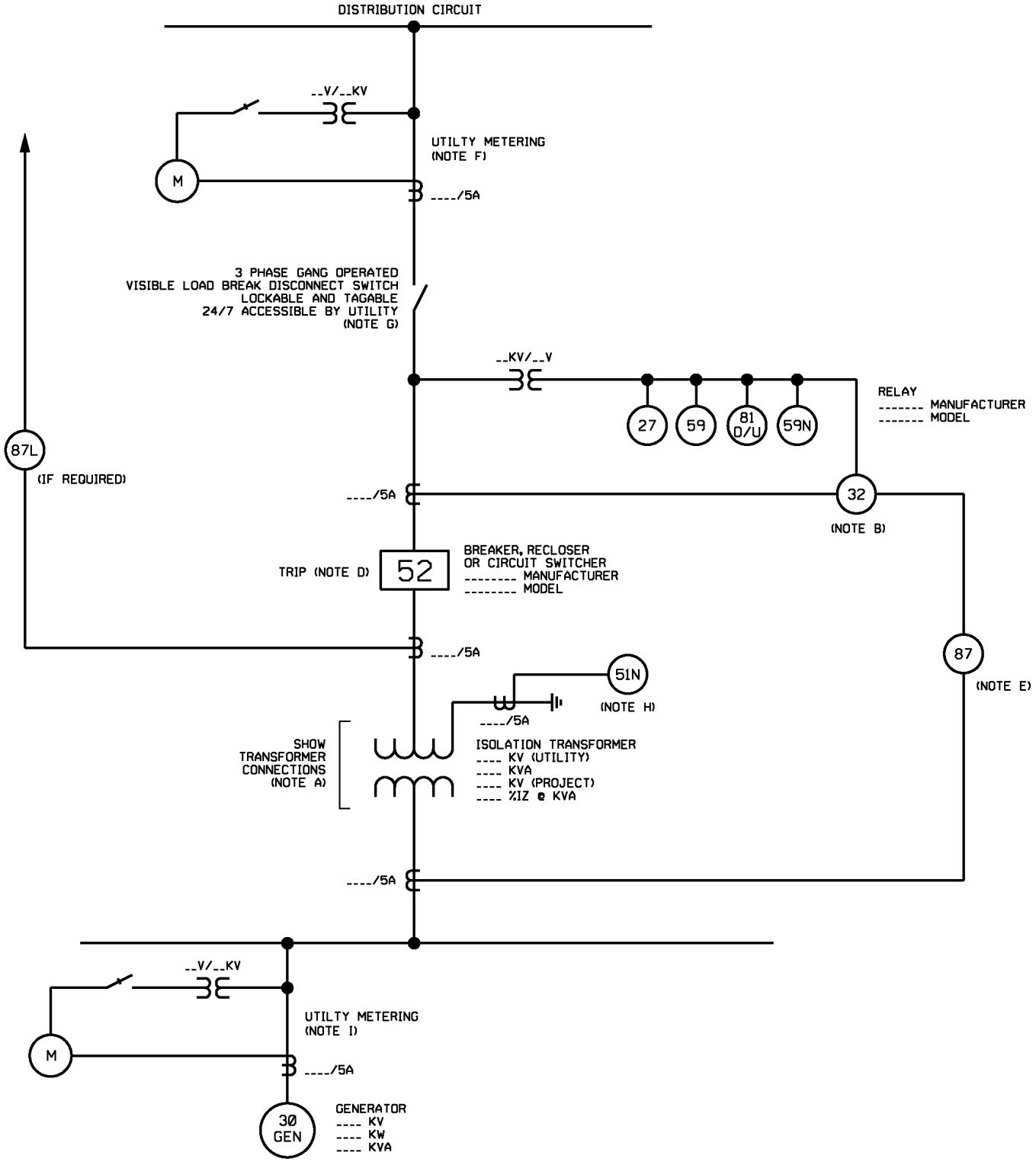
G) The isolation device is to be located on the utility side of the metering CTs and VTs when connected to the high voltage distribution system.

H) The 51N relay is required for isolation transformers with a Delta (Project) and Grounded Wye (Utility) winding connections. Refer to Note A for permissible transformer connections.

I) Utility metering is required for Levels 4 and 5 synchronous and induction generators. Utility metering equipment will be owned and supplied by the utility. An Applicant may not connect equipment to the utility metering transformers or metering secondary circuits.

SAMPLE ELECTRICAL ONE-LINE DRAWING – PROVIDED FOR REFERENCE ONLY
TYPICAL ISOLATION AND FAULT PROTECTION FOR INDUCTION GENERATOR

PE Stamp required for levels 2 & 3
Level 2 can have a Licensed Contractor stamp instead of PE Stamp



LEGEND

27 Undervoltage
32 Reverse Power (Not Required for Flow-Back)
51N Neutral overcurrent (required for grounded secondary)
59 Overvoltage
59N Zero sequence overvoltage (assuming ungrounded secondary on power transformer)
81o/u Over/Underfrequency
51V Voltage Restrained Overcurrent Relays

NOTES

A) See technical requirements for permissible connection configurations and protection. Transformer connections proposed shall be shown on the one-line drawing by the Applicant. Transformer connection and secondary grounding to be approved by Utility.

B) The 27, 59, 59N, and 81O/U relays shall be connected to VTs located at the point of common coupling, unless otherwise approved by Consumers Energy. VTs connected to the Project side of transformers without zero sequence continuity (e.g. ungrounded wye or delta winding connections) on a grounded distribution system is not allowed.

C) Any additional equipment necessary to protect the Project is the sole responsibility of the Applicant to determine, design, and apply.

D) Tripping of an approved interrupting device between the point of common coupling and distributed energy resource is acceptable, depending on if the Applicant wants to serve its own isolated load after loss of Utility service.

E) Transformers 15 MVA (self-cooled rating) or larger shall be equipped with differential (87) relaying.

F) Utility metering equipment will be owned and supplied by the utility. An Applicant may not connect equipment to the utility metering transformers or metering secondary circuits.

G) The isolation device is to be located on the utility side of the metering CTs and VTs when connected to the high voltage distribution system.

H) The 51N relay is required for isolation transformers with a Delta (Project) and Grounded Wye (Utility) winding connections. Refer to Note A for permissible transformer connections.

I) Utility metering is required for Levels 4 and 5 synchronous and induction generators. Utility metering equipment will be owned and supplied by the utility. An Applicant may not connect equipment to the utility metering transformers or metering secondary circuits.

APPENDIX E

SYSTEM IMPACT STUDY, FACILITIES STUDY, AND SUPPLEMENTAL REVIEW AGREEMENTS

SYSTEM IMPACT STUDY AGREEMENT FOR GENERATOR INTERCONNECTION PROJECT

WHEREAS, proposals to construct or upgrade a Project which will be operated in parallel with and interconnected with the Consumers Energy Company ("Company") electric system must be reviewed by the Company to determine how it will impact its electric system.

WHEREAS, on Input Date the Company received from Applicant ("Applicant") a Generator Interconnection Application for Project Name.

Project Number	Project Size

WHEREAS, the Company has determined that a System Impact Study is necessary to determine whether the Company's electric system can accommodate the requested interconnection.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the Company and the Applicant agree as follows:

1. The Company shall complete a System Impact Study in accordance with the Company's Generator Interconnection Procedures and this Agreement. An outline of the scope of the System Impact Study is as follows:
    a. Overview
        i. General
        ii. Summary Impact on Consumers Energy System
        iii. Requirements
    b. System Analysis
        i. Steady-State Thermal and Voltage Impacts
        ii. Short Circuit Loading Impacts
        iii. System Protection
        iv. Anti-Islanding, Protection and Direct Transfer Trip
    c. Interconnection Requirements
        i. Interconnection Protection
        ii. Metering and Telemetry
        iii. Disturbance and Harmonic Monitoring
        iv. Station Power Metering
        v. Point of Interconnection
        vi. Point of Delivery
        vii. Short Circuit Current
        viii. Documentation
    d. Total Planning Cost Estimate of Consumers Energy Network Upgrades
        i. Project Conceptual Cost Estimate for Connection
    e. Construction Schedule and Schedule of Payments.

2. The Company is permitted by the Michigan Public Service Commission to charge the Applicant $Cost for the System Impact Study, which has been reduced by an applicable credit of $Cost for studies previously completed pursuant to a fast track or non-export track.

3. The Company requires the following additional and reasonable technical data from the Applicant to perform the System Impact Study: LIST THE NECESSARY DATA. The Company may also request reasonable additional data from the Applicant within 20 Business Days of beginning the System Impact Study. If the Company requests additional data, the Company and the Applicant shall work together to resolve the additional data request so that the Company will be able to complete the System Impact Study within 60 Business Days as specified in Section 6.

4. Subject to Section 6, the expected timeline for the Company's completion of the System Impact Study is as follows: LIST TIMELINE.

5. The Applicant is to return this executed Agreement and payment to the Company to continue the interconnection process. This Agreement must be executed, and payment must be received, along with any requested information, within 20 Business Days or the application may be considered withdrawn.

6. The Company shall supply a copy of the completed System Impact Study to the Applicant within 60 Business Days after the receipt of the signed System Impact Study Agreement, payment of the system impact study fee, and any necessary technical data. Provided, however, that If the Applicant does not provide the requested additional data under Section 3 in a timely manner, the Company shall notify the Applicant that the System Impact Study is on hold and the date the hold started. The Company shall resume work on the study on the date the additional data is received.

7. The results of the completed System Impact Study shall be valid for 15 Business Days upon issuance by the Company. Within that period, Applicant must decide whether to pursue a System Impact Study review meeting, proceed to a Facilities Study, or withdraw the application. If the Applicant does not select a course of action within 15 Business Days of notice from the Company, the Company shall withdraw the application.

8. Any notice required under this Agreement shall be in writing and mailed or personally delivered to the Party at the address below. Written notice is effective within 3 days of depositing the notice in the United States mail, first class postage prepaid. Personal notice is effective upon delivery. Written notice of any address changes shall be provided. All written notices shall be directed as follows:

   Notice to Utility:
   Consumers Energy Company
   Interconnection Coordinator (Room P-12-235)
   1945 West Parnall Road
   Jackson, MI 49201

   Notice to Applicant:

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective authorized officials.

CONSUMERS ENERGY COMPANY

By: _____
(Signature)

_____
(Print or Type Name)

Title: _____

Date: _____

_____
(Applicant Name)

By: _____
(Signature)

_____
(Print or Type Name)

Title: _____

Date: _____

FACILITIES STUDY AGREEMENT FOR GENERATOR INTERCONNECTION PROJECT

WHEREAS, proposals to construct or upgrade a Project which will be operated in parallel with and interconnected with the Consumers Energy Company ("Company") electric system must be reviewed by the Company to determine how it will impact its electric system.

WHEREAS, on Input Date the Company received from Applicant ("Applicant") a Generator Interconnection Application for Project Name.

Project Number	Project Size

WHEREAS, the Company has determined that a Facilities Study is necessary to determine whether the Company's electric system can accommodate the requested interconnection.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the Company and the Applicant agree as follows:

1. The Company shall complete a Facilities Study in accordance with the Company's Generator Interconnection Procedures and this Agreement. An outline of the scope of the Facility Study is as follows:
    a. Overview
        i. General
        ii. Other requirements
    b. Consumer Energy Distribution System Upgrades
        i. Description of Scope of Work
        ii. Consumers Energy Interconnection Facilities
    c. Total Cost Estimate for Consumers Energy Distribution System Upgrades
        i. Cost Estimate
    d. Construction Schedule and Schedule of Payments

2. The Company is permitted by the Michigan Public Service Commission to charge the Applicant $Cost for the Facilities Study, which has been reduced by an applicable credit of $Cost for studies previously complete pursuant to a fast track or non-export track.

   The Company requires the following additional and reasonable technical data from the applicant to perform the Facility Study: LIST THE NECESSARY DATA.
   Subject to Section 6, the expected timeline for the Company's completion of the Facilities Study is as follows: LIST TIMELINE.
3. The Applicant is to return this executed Agreement and payment to the Company to continue the interconnection process. This Agreement must be executed, and payment must be received, along with any requested information, within 20 business days or the application may be considered withdrawn.

4. The Company shall supply a copy of the completed Facilities Study to the Applicant within 80 Business Days after the receipt of the signed Facilities Study Agreement and payment of the Facilities Study fee.

5. The results of the completed Facilities Study shall be valid for 10 Business Days upon issuance by the Company. Applicant must decide whether to pursue a Facility Study review meeting, proceed to a Generator Interconnection Operating Agreement, or withdraw the application. If

the Applicant does not select a course of action within 10 Business Days of notice from the Company, the Company may withdraw the application.

6. Any notice required under this Agreement shall be in writing and mailed or personally delivered to the Party at the address below. Written notice is effective within 3 days of depositing the notice in the United States mail, first class postage prepaid. Personal notice is effective upon delivery. Written notice of any address changes shall be provided. All written notices shall be directed as follows:

   Notice to Utility:
   Consumers Energy Company
   Interconnection Coordinator (Room P-12-235)
   1945 West Parnall Road
   Jackson, MI 49201

   Notice to Applicant:

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective authorized officials.

CONSUMERS ENERGY COMPANY	_____ (Applicant Name)
By: _____ (Signature)	By: _____ (Signature)
_____ (Print or Type Name)	_____ (Print or Type Name)
Title: _____	Title: _____
Date: _____	Date: _____

SUPPLEMENTAL REVIEW AGREEMENT FOR GENERATOR INTERCONNECTION PROJECT

WHEREAS, proposals to construct or upgrade a Project which will be operated in parallel with and interconnected with the Consumers Energy Company ("Company") electric system must be reviewed by the Company to determine how it will impact its electric system.

WHEREAS, on Date the Company received from Applicant ("Applicant") a Generator Interconnection Application for Project Name.

Project Number	Project Size

WHEREAS, the Company has determined that a Supplemental Review is appropriate to determine whether the Company's electric system can accommodate the requested interconnection.

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the Company and the Applicant agree as follows:

1. The Company shall complete a Supplemental Review in accordance with the Company's Generator Interconnection Procedures and this Agreement.

2. The Company is permitted by the Michigan Public Service Commission to charge the Applicant $Cost for the Supplemental Review.

3. The Applicant is to return this executed Agreement and payment to the Company. The interconnection process will not proceed until this Agreement is executed and payment is received, along with any requested information. If payment is not received by the Company within 20 Business Days after Applicant has signed this Agreement, the Company shall withdraw the application.

4. The Company shall supply the results of the completed Supplemental Review to the Applicant within 30 Business Days after the Applicant pays the amount due under Section 3.

5. The results of the completed Supplemental Review shall be valid for 10 Business Days upon issuance by the Company. If the proposed interconnection passes the Supplemental Review (or the Company determines that the distributed energy resource may be interconnected consistent with safety, reliability, and power quality standards), Applicant must decide whether to proceed to a Facilities Study, or a Generator Interconnection Agreement (if no Facilities Study is required). If the proposed interconnection fails any of the Supplemental Review screens, the Company is unable to perform a Supplemental Review screen, and the Company does not or cannot determine that the distributed energy resource may be interconnected consistent with safety, reliability, and power quality standards, the Company shall notify the Applicant, provide the Applicant with the results of the application of the Supplemental Review screens, and offer the Applicant the option to proceed to the Study Track or withdraw the application. If the Applicant does not select a course of action within 10 Business Days of notice from the Company, the Company shall withdraw the application.

6. Any notice required under this Agreement shall be in writing and mailed or personally delivered to the Party at the address below. Written notice is effective within 3 days of depositing the notice in the United States mail, first class postage prepaid. Personal notice is effective upon delivery. Written notice of any address changes shall be provided. All written notices shall be directed as follows:

Notice to Utility:
Consumers Energy Company
Interconnection Coordinator (Room P-12-235)
1945 West Parnall Road
Jackson, MI 49201

Notice to Applicant:

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective authorized officials.

CONSUMERS ENERGY COMPANY

By: _____
(Signature)

_____
(Print or Type Name)

Title: _____

Date: _____

_____
(Applicant Name)

By: _____
(Signature)

_____
(Print or Type Name)

Title: _____

Date: _____

APPENDIX F

INTERCONNECTION AND PARALLEL OPERATING AGREEMENT

STANDARD LEVEL 1, 2, AND 3 INTERCONNECTION AGREEMENT FOR PROJECTS UP TO 550 KW WITH CERTIFIED EQUIPMENT BETWEEN

Company:
CONSUMERS ENERGY COMPANY
a Michigan Corporation

ONE ENERGY PLAZA
JACKSON MI 49201-2357

Interconnection Customer:

_____
(Legal Name)

_____
(Street & Number)

_____
(Project Number)

This Interconnection Agreement ("Agreement") is entered into on by Consumers Energy Company (the "Utility"), (the "Interconnection Customer"), and if applicable under Paragraph 6) (the "Property Owner") with project number assigned by Utility. Utility and Interconnection Customer are sometimes also referred to in this Agreement collectively as "Parties" or individually as "Party." The Interconnection Customer may be the "Project Developer" or "Applicant" as used in and for purposes of the applicable Michigan Electric Utility Interconnection Procedures ("Interconnection Procedures") approved by the Michigan Public Service Commission ("Commission").

I. RECITALS

A. Interconnection Customer is an electric service customer of Utility in good standing and has submitted a Generator Interconnection Application ("Application") to Utility.

B. Interconnection Customer desires to interconnect a distributed energy resource (DER or Customer Facility) with a maximum capacity of 550 kilowatts ("kWac") or less utilizing a certified inverter pursuant to R 460.901a.(l) with Utility's electric distribution system and operate the DER in parallel with Utility's distribution system, under Utility's Interconnection Procedures for Level 1, 2, and 3 projects, as defined in the Michigan Public Service Commission's ("Commission") Interconnection and Distributed Generation Standards (the "Standards"), as applicable.

C. For purposes of this Agreement, "interconnect" means establishing a connection between a non-utility DER and Utility's distribution system. "Operate in parallel" means the operation, for longer than 100 milliseconds, of a DER while connected to the energized distribution system that is connected to Utility's system. In all cases, terms shall have the meaning as defined in the Standards.

D. Interconnection of the DER with Utility's distribution system is subject to this Agreement, the Application, the Interconnection Procedures, the Standards and utility tariffs approved by the MPSC, as applicable. Interconnection of the DER is also subject to local, county, and state requirements for applicable permits, inspections, and other requirements.

E. This Agreement does not address any purchase or sale of electricity between Utility and Interconnection Customer, nor does it create any agency, partnership, joint venture, or other business arrangement between or among Utility, Interconnection Customer, and/or Property Owner.

F. Pursuant to Michigan Administrative Code Rule 460.964 (3) the Interconnection Customer shall sign and return the interconnection agreement with payment, if applicable, within 20 business days of receiving the agreement. If the Interconnection Customer does not sign and return the interconnection agreement and payment, if applicable, within 20 business days, the Utility shall notify

the Interconnection Customer of the missed deadline and grant an extension of 15 business days. If the Utility does not receive the signed Agreement and any applicable payment during the15-business-day extension period, the Utility may consider the interconnection application withdrawn subject to Michigan Administrative Code Rule 460.964, subrule 3(b).

II. **AGREEMENT**

NOW THEREFORE, in consideration of the above recitals, the mutual covenants contained herein and for good and valuable consideration, the Parties agree as follows:

1. Description of DER

1.1 The DER must be built as described in **Exhibit 1 – Description of Distributed Energy Resource** and as depicted in **Exhibit 2 – Interconnection Diagram**, and, as applicable, in **Exhibit 3 – Interconnection Facilities Scope of Construction**, **Exhibit 4 – Utility Commissioning Testing and Inspection Checklist**, **Exhibit 5 – Protection, Communication and Configuration Requirements and Settings**, **Exhibit 6 - Additional Exceptions, Clarifications, and Special Conditions** and according to the notice requirements herein. The DER may only be modified as permitted under Section 14 of this Agreement.

2. Interconnection Facilities

If it is necessary for Utility to install certain interconnection facilities ("Interconnection Facilities") and make certain system modifications in order to establish an interconnection between the DER and Utility's distribution system, the Interconnection Facilities and modifications shall be described to the Interconnection Customer in **Exhibit 3 – Interconnection Facilities Scope of Construction.**

3. Design Requirements, Testing, and Maintenance of DER

3.1 Interconnection Customer shall be responsible for the design and installation of the DER and obtaining and maintaining any required governmental authorizations and/or permits, which may include, but shall not be limited to, easements to clear trees and necessary rights-of-way for installation and maintenance of the Utility Interconnection Facilities.

3.2 Interconnection Customer shall, at its sole expense, install and properly maintain protective equipment and devices to protect its equipment and service, and the equipment and system of Utility, from damage, injury, or interruptions, and will assume any loss, liability, or damage to the DER caused by lack of or failure of such protection. Such protective equipment specifications and design shall be consistent with the applicable Interconnection Procedures. Prior to the DER operating in parallel with Utility distribution system, Interconnection Customer shall provide satisfactory evidence to Utility that it has met the Interconnection Procedures, including but not limited to the receipt of approval from the local building/electrical code inspector. The Utility's approval, or failure to approve, under this section shall in no way act as a waiver or otherwise relieve the Interconnection Customer of its obligations under this section.

3.3 At its own expense, Interconnection Customer shall perform operational testing. The Utility may, but is not required to, send qualified personnel to the DER to inspect the facility and observe the testing. Upon completion of such testing and inspection, and prior to interconnection, Interconnection Customer shall provide Utility with a written report explaining all test results, including a copy of the DER commissioning test report. The Utility required commissioning testing and inspection checklist is in **Exhibit 4 – Utility Commissioning Testing and Inspection Checklist (if applicable).**

3.4 As required by Utility, Interconnection Customer shall test protective equipment in accordance with manufacturer's specifications and Utility specifications, if available, unless no testing interval is provided, in which case testing shall occur every four years (unless an extension is agreed to by Utility) to verify the calibration indicated on the latest setting document issued by Utility. The results of such tests shall be provided to Utility in writing for review and approval. Utility may, at any time and at its sole expense, inspect and test the DER to verify that the required protective equipment is in service, properly maintained, and calibrated to provide the intended protection. This inspection may also include a review of Interconnection Customer's pertinent records. Inspection, testing

and/or approval by Utility or the omission of any inspection, testing and/or approval by Utility pursuant to this Agreement shall not relieve the Interconnection Customer of any obligations or responsibility assumed under this Agreement.

3.5 Interconnection Customer shall operate and maintain the DER in a safe and prudent manner and in conformance with all applicable laws and regulations. Interconnection Customer shall obtain or maintain any governmental authorizations and permits required for construction and operation of the DER.

3.6 As described in **Exhibit 5 – Protection, Communication and Configuration Requirements and Settings** (if applicable), Interconnection Customer shall install and provision communications equipment, at its own expense, as specified by Utility. Interconnection Customer shall configure the communications system to Utility specification. The Interconnection Customer is responsible for maintaining the communications hardware and software as set forth by Utility. The Interconnection Customer shall install and maintain needed cyber and physical security as specified by Utility. Failure to meet these requirements will result in disconnecting the interconnection. Current requirements are provided in **Exhibit 5 – Protection, Communication and Configuration Requirements and Settings** (if applicable).

3.7 Interconnection Customer shall cooperate with Utility to regulate the voltage level at the Point of Delivery by controlling its DER in accordance with Utility's instructions. Such instructions shall include, but not be limited to: (a) maintaining voltage or (b) delivering real and reactive power to the Point of Delivery at levels specified by Utility. Interconnection Customer shall cooperate with Utility to regulate the frequency by controlling the DER in accordance with Utility's instructions. Such instructions shall include, but not be limited to, frequency-droop curves. The instructions given by Utility shall be consistent with the normal practices adhered to by Utility with respect to its own DERs located on its system. Such instructions shall be described in **Exhibit 6 - Additional Exceptions, Clarifications, and Special Conditions** (if applicable).

3.8 Installation, inspection, and calibration of protective equipment to trip the DER for under- or overvoltage and frequency operation shall be coordinated with Utility, so as not to degrade the security of Utility's distribution system. Operating practices developed by Interconnection Customer which call for manual tripping of the DER for under-or over-voltage and frequency operation shall likewise be coordinated and be consistent with the voltage and frequency ride through provisions listed in the utility interconnection procedures during abnormal system voltage and frequency events, and any successor and/or supplemental documents, which are incorporated herein by reference. Such instructions shall be described in Exhibit 6 - Additional Exceptions, Clarifications, and Special Conditions.

4. Parallel Operation of the Project

Parallel operation of the DER with utility's distribution system shall only begin after the following conditions have been satisfied and confirmed in writing by Utility to Interconnection Customer.

(a) The Utility notified the Interconnection Customer that the commissioning test and inspection, where applicable, are accepted.

(b) The Interconnection Customer has executed a standard level 1, 2, or3 interconnection agreement and complied with all applicable parallel operation requirements as set forth in the Utility's interconnection procedures and this interconnection agreement.

(c) The Interconnection Customer complied with all applicable local, state, and federal requirements.

(d) The Utility received full payments for all outstanding bills.

5. Disconnection

Utility shall be entitled to disconnect the DER from Utility's distribution system, or otherwise refuse to connect the DER, if any of the following conditions are present:

(a) Failure of the Interconnection Customer to bring a DER into compliance pursuant to Michigan Administrative Code Rule 460.976(1).

(b) Failure of the Interconnection Customer to pay costs of remedy pursuant to Michigan Administrative Code Rule 460.976(2).

(c) Termination of interconnection by mutual agreement.

(d) Distribution system emergency, but only for the time necessary to resolve the emergency.

(e) Routine maintenance, repairs, and modifications performed in a reasonable time and with prior notice to the Interconnection Customer.

(f) Noncompliance with technical or contractual requirements in the interconnection agreement that could lead to degradation of distribution system reliability, utility equipment, and/or electric customers' equipment.

(g) Noncompliance with technical or contractual requirements in the interconnection agreement that presents a safety hazard.

(h) Other material noncompliance with the interconnection agreement.

(i) Operating in parallel without prior written authorization from the Utility as provided for in Michigan Admin Code Rule 460.968.

(j) Utility may disconnect electric service, where applicable, pursuant to Michigan Admin Code Rule 460.136.

When reasonable and appropriate, the Utility will attempt to notify Interconnection Customer and coordinate its actions under this Paragraph with Interconnection Customer. This paragraph applies only to Utility actions with respect to DER. Utility shall promptly re-connect the DER to the Utility's distribution system as soon as the reason for disconnection has been remedied.

6. Access to Property

6.1 At its own expense, Interconnection Customer shall make the DER site available to Utility including obtaining from other entities all necessary rights to provide Utility with the required access. The site shall be free from hazards and shall be adequate for the operation and construction of the Interconnection Facilities. Utility, its agents, and employees, shall have full right and authority of ingress and egress at all reasonable times on and across the property at which the DER is located, for the purpose of installing, operating, maintaining, inspecting, replacing, repairing, and removing the Interconnection Facilities. The right of ingress and egress shall not unreasonably interfere with Interconnection Customer's or (if different) Property Owner's use of the property and does not include the right to enter applicant's residence or other enclosed structure on the property where the DER is located with the residence or other enclosed structure, except on reasonable notice where the Interconnection Facilities are located within the residence or other enclosed structure.

6.2 Utility may enter the property on which the DER is located to inspect, at reasonable hours, Interconnection Customer's protective devices and read or test meters. Utility will use reasonable efforts to provide Interconnection Customer or Property Owner, if applicable, at least 24 hours of notice prior to entering said property, in order to afford Interconnection Customer or Property Owner the opportunity to remove any locks or other encumbrances to entry; provided, however, that Utility may enter the property without notice (removing, at Interconnection Customer's expense, any lock or other encumbrance to entry) and disconnect the Interconnection Facilities if Utility believes that disconnection is necessary to address a hazardous condition and/or to protect persons, Utility's facilities, or the property of others from damage or interference caused by the DER.

6.3 By executing this Agreement, Property Owner consents to and agrees to provide access to its property, including ingress and egress, on which the DER is located to Utility as described in this section, but does not assume or guarantee other performance obligations of the Interconnection Customer under this Agreement. If Utility cannot access the property, customer is responsible for providing appropriate access at the cost of the customer.

7. Liability and Indemnity

7.1 Except as set forth in Section 3.2 above, as between the Parties, unless caused by the sole negligence or intentional wrongdoing of the other Party, each Party to this Agreement shall at all times assume all liability for, any and all damages, losses, claims, demands, suits, recoveries, costs, legal fees, and expenses to the extent caused by its directors, officers, employees, and agents: (a) for injury to or death of any person or persons whomsoever occurring on its own system, and/or (b) for any loss, destruction of or damage to any property of third persons, firms, corporations or other entities occurring on its own system, including environmental harm or damage arising out of or resulting from, either directly or indirectly, the Interconnection Facilities or the DER, or arising out of or resulting from, either directly or indirectly, any electric energy furnished to it hereunder after such energy has been delivered to it by such other Party. The provisions of this Section 7 shall not be construed to relieve any insurer of its obligations to pay any insurance claims in accordance with the provisions of any valid insurance policy.

7.2 Notwithstanding anything in this Section, or any other provision of this Agreement to the contrary, any liability of a Party to the other Party shall be limited to direct actual damages, and all other damages at law or in equity are hereby waived. Under no circumstances shall a Party be liable to the other Party, whether in tort, contract or other basis in law or equity for any special, indirect, punitive, exemplary or consequential damages, including lost profits.

7.3 The obligations and limits on liability in this Section 7 shall continue in full force and effect notwithstanding the expiration or termination of this Agreement, with respect to any event or condition giving rise to an obligation that occurred prior to such expiration or termination.

7.4 Nothing in this Section 7 waives or limits, or shall be construed to waive or limit, the governmental immunity of a Party.

7.5 Nothing in this Section 7 shall imply, or be construed to imply, indemnification of any Party by the State of Michigan, its department, and agencies, or by other governmental customers that are restricted from entering into indemnification provisions by law.

8. Insurance

For Level 3 and greater projects, Interconnection Customer shall obtain and continuously maintain throughout the term of this Agreement General Liability insurance written on an occurrence form, or other form acceptable to the Utility, and covering bodily injury and property damage liability with a per occurrence amount of at least:

Interconnection Level	Minimum Limit
1 & 2	Not Applicable
3	$1,000,000

Pursuant to Michigan Admin Code Rule 460.986, an Applicant interconnecting a Level 1 or 2 DER to the distribution system of the Utility is not required by the Utility to obtain any additional liability insurance. For a Level 3 DER, the Applicant shall obtain and maintain general liability insurance of a minimum of $1,000,000 and include Utility as an additional insured. Pursuant to Michigan Administrative Code Rule 460.986(6), for Level 3 projects, the electric utility may describe in its interconnection procedures required terms and conditions that must be specified in the general liability insurance.

For Level 3 DERs, evidence of insurance coverage on a certificate of insurance shall be provided to the Utility when requested by the Utility. Interconnection Customer shall immediately provide the Utility written notice if the policy is cancelled or substantial changes are made that affect the additional insured. At the Utility's request, Interconnection Customer shall provide a copy of the policy to the Utility.

9. Subcontractors

Either Party may contract with a subcontractor to perform its obligations under this Agreement and shall incorporate the obligations of this Agreement into its respective subcontracts, agreements, and purchase orders. Each Party shall remain liable to the other Party for the performance of such subcontractor under this Agreement subject to the provisions of Section 7.

10. Force Majeure

As set forth in Michigan Admin Code Rule 460.901a(ee), Force majeure event means an 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; an emergency order, regulation or restriction imposed by governmental, military, or lawfully established civilian authorities; or another cause beyond a party's control. A force majeure event does not include an act of negligence or intentional wrongdoing.

11. Breach and Default

A breach of this Agreement ("Breach") shall occur upon the failure of a Party to perform or observe any material term or condition of this Agreement. Upon a Breach by one Party, the non-breaching Party shall give written notice of such Breach to the breaching Party. The Party in Breach shall have thirty (30) days from the date of the written notice to cure the Breach. If a Breach is not cured within the thirty (30) day period provided for herein, the party in Breach shall be deemed in default ("Default"). If the Breach is not cured within 30 business days, the Utility, at its sole discretion, may apply a remedy and bill the Interconnection Customer. The Interconnection Customer shall pay this bill within 5 business days. The non-defaulting Party shall then have the right to terminate this Agreement by written notice, shall be relieved of any further obligations hereunder, and may pursue any and all remedies available to it at law or in equity.

12. Retirement

Upon termination or cancellation of this Agreement or at such time after any of the Utility Interconnection Facilities described herein are no longer required, the Parties shall mutually agree upon the retirement of the Interconnection Facilities, which may include without limitation (i) dismantling, demolition, and removal of equipment, facilities, and structures, (ii) security, (iii) maintenance and (iv) disposing of debris. The cost of such removal shall be borne by the Utility.

13. Governing Law

This Agreement shall be interpreted, governed, and construed under the laws of Michigan.

14. Amendment, Modification or Waiver

14.1 Any amendments or modifications to this Agreement shall be in writing and agreed to by both Parties. The failure of any Party at any time to require performance of any provision hereof shall in no manner affect its right at a later time to enforce the same. No waiver by any Party of the breach of any term or covenant contained in this Agreement, whether by conduct or otherwise, shall be deemed to be construed as a further or continuing waiver of any such breach or a waiver of the breach of any other term or covenant unless such waiver is in writing.

14.2 Pursuant to Michigan Administrative Code Rule 460.984, Modifications to the DER, after the execution of this Agreement, the Interconnection Customer shall notify the Utility of any plans to modify the DER. The Utility shall review the proposed modification to determine if the modification is considered a material modification. If the Utility determines that the modification is a material modification, the Utility shall notify the Interconnection Customer, in writing of its determination and the Interconnection Customer shall submit a new application and application fee along with all supporting materials that are reasonably requested by the Utility. The Interconnection Customer may not begin any material modification to the DER until an interconnection agreement incorporating the material modification is fully executed.

15. Notices

Any notice required under this Agreement shall be in writing and mailed, personally delivered, or electronically mailed to the Party at the address below. Written notice is effective within three (3) business days of depositing the notice in the United States mail, first class postage prepaid. Personal notice or electronic mail notice is effective upon delivery, provided it is received by 11:59:59 p.m. local time at the recipient's business location on a business day (or otherwise, on the next business day). Written notice of any address changes shall be provided. Utility may consider changes of address in other Utility systems of record (e.g., Interconnection Customer billing address) as notice of address change under this Agreement. All written notices shall refer to the Interconnection Customer's Utility account number, as provided in Section 1 of this Agreement. All written notices shall be directed as follows:

Notice to Utility:

Utility Name: Consumers Energy Company

Utility Address: 1945 W Parnall Road, P12-235, Jackson, MI 49201

Utility Phone Number: (517) 788-1432

Utility Email: customer.generation@cmsenergy.com

Notice to Interconnection Customer:

Interconnection Customer Name: _____

Interconnection Customer Address: _____

Interconnection Customer Phone Number: _____

Interconnection Customer Email: _____

Notice to Property Owner (if different than Interconnection Customer):

Property Owner Name: _____

Property Owner Address: _____

Property Owner Phone Number: _____

Property Owner Email: _____

16. Term of Agreement and Termination

This Agreement shall become effective upon execution by all Parties and, if applicable, the Property Owner, and it shall continue in full force and effect until terminated upon thirty (30) days' prior notice by the Interconnection Customer, upon Default of either Party as set forth in Section 11, or upon mutual agreement of the Parties. The Utility may terminate the agreement on reasonable notice for reasons consistent with existing law, regulations, and tariffs. In addition, see Section 19 regarding transfers of ownership in the DER.

17. Entire Agreement and Amendments

This Agreement and the Utility Interconnection Procedures shall constitute the entire understanding between the Parties with respect to the subject matter hereof, supersede any and all prior discussions and agreements between the Parties with respect to the subject matter hereof and bind and inure to the benefit of the Parties, their successors, and permitted assigns. No amendments or changes to this Agreement shall be binding unless made in writing and duly executed by both Parties.

18. No Third Party Beneficiary

The terms and provisions of this Agreement are intended solely for the benefit of each Party, and it is not the intention of the Parties to confer third-party beneficiary rights upon any other person or entity.

19. Assignment and Binding Effect

This Agreement shall not be assigned by a Party without the prior written consent of the other Party, which shall not be unreasonably withheld. Any attempt to do so will be void. Subject to the preceding, this Agreement is binding upon, inures to the benefit of, and is enforceable by the Parties and their respective successors and assigns. Interconnection Customer agrees to notify Utility in writing upon the sale or transfer of the Customer Facility. This Agreement shall terminate upon such notice (or upon Utility notifying Interconnection Customer that Utility has identified a change in ownership of the Customer Facility) unless Utility consents to this Agreement remaining in force until an equivalent agreement in a form acceptable to both parties is signed.

20. Severability

If any provision of this Agreement is determined to be partially or wholly invalid, illegal, or unenforceable, then such provision shall be deemed to be modified or restricted to the extent necessary to make such provision valid, binding, and enforceable; or, if such provision cannot be modified or restricted in a manner so as to make such provision valid, binding or enforceable, then such provision shall be deemed to be excised from this Agreement and the validity, binding effect, and enforceability of the remaining provisions of this Agreement shall not be affected or impaired in any manner.

21. Effective Date

This Agreement is effective as of the later (or latest) of the dates set forth below.

22. Counterparts and Electronic Documents

This Agreement may be executed and delivered in counterparts, including by a facsimile or an electronic transmission thereof, each of which shall be deemed an original. Any document generated by the parties with respect to this Agreement, including this Agreement, may be imaged and stored electronically and introduced as evidence in any proceeding as if original business records. Neither party will object to the admissibility of such images as evidence in any proceeding on account of having been stored electronically.

CONSUMER ENERGY COMPANY

By:_____
(Duly Authorized Signature)

_____
(Print or Type Name)

_____
(Title)

Date:_____
(Month/Day/Year)

INTERCONNECTION CUSTOMER

By:_____
(Duly Authorized Signature)

_____
(Print or Type Name)

_____
(Title)

Date:_____
(Month/Day/Year)

PROPERTY OWNER, if applicable

By: :_____
(Duly Authorized Signature)

_____
(Print or Type Name)

_____
(Title)

Date:_____
(Month/Day/Year)

Exhibit 1 – Description of Distributed Energy Resource

Exhibit 2 – Interconnection Site Diagram

Exhibit 3 – Interconnection Facilities Scope of Construction

Exhibit 4 – Utility Commissioning Testing and Inspection Checklist (If Applicable)

Exhibit 5 – Protection, Communication and Configuration Requirements and Settings (If Applicable)

Exhibit 6 - Additional Exceptions, Clarifications, and Special Conditions

EXHIBIT 1
Description of Distributed Energy Resource

The Customer Facility must be built with the following ratings, which shall not be changed without thirty (30) days advance written notice to Utility according to the notice requirements herein and as depicted in Exhibit 2 – Interconnection Site Diagram:

Nameplate Rating: _____ (AC) kW

Export Capacity: _____ (AC) kW

Aggregate Solar Panel Nameplate Rating: _____ (DC) kW

Aggregate Storage Capacity of Energy Storage Device(s): _____ kWh

Number of Batteries onsite: _____

Equipment Specifications:

# of Inverters	Make	Model

Additional Details: _____

Customer Facility Location: _____

If Interconnection Customer is not the owner of the property identified above, the Property Owner must sign this Agreement for the purposes indicated in Section 6.

Interconnection Customer Utility service account number (if applicable): _____

EXHIBIT 2

INTERCONNECTION SITE DIAGRAM

See last pages of document if not on this or the next page.

EXHIBIT 3

INTERCONNECTION FACILITIES SCOPE OF CONSTRUCTION (if applicable)

Notification Number:

Estimated cost of work:

General description of the scope of construction:

EXHIBIT 4

Utility Commissioning Testing and Inspection Checklist (If Applicable)

EXHIBIT 5

Protection, Communication and Configuration Requirements and Settings (if applicable)

EXHIBIT 6

Additional Exceptions, Clarifications and Special Conditions (if applicable)

APPENDIX G

CONTACT LIST

(Example)

[PROJECT NAME]

CONTACT LIST

Normal Operations and Emergency Switching

GENERAL

Switching and clearance procedures for Consumers Energy Company ('Consumers") and the *Company Name (INIT)* provide important documentation to ensure safe working conditions and orderly and reliable service when work is required on the Interconnection Facilities.

PROCEDURE

1. Emergency Switching Procedure:

   Operating Authority for the *(INIT)* will be handled by the following "Priority Contact List."

   NAC Contact List

	Name	Facility	Contact Number
a.	Contact Name 1 (Work)	*(INIT)*	(XXX) XXX-XXXX
b.	Contact Name 1 (Cell)	*(INIT)*	(XXX) XXX-XXXX
c.	Contact Name 2 (Work)	*(INIT)*	(XXX) XXX-XXXX
d.	Contact Name 2 (Cell)	*(INIT)*	(XXX) XXX-XXXX

   Operating Authority for Consumers will be the System Controller located in Jackson, Michigan. Contact the CE SCC Outage Scheduler at [email].

2. Tag Points:

   Normal points of separation between the Consumers and *(INIT)* Systems will be the Consumers *277/480 Volt Metering Potential Secondary fuses or knife switch* and the *Substation Name, high side switching device*.

   NOTE: Consumers work may require the use of Consumers Energy Workers Protection Tags and Consumers locks on points of separation tag points as can be installed.

3. Scheduled Outage Procedure:

   Request initiated by the *(INIT)*.

   (INIT) personnel from the *(INIT)* Contact List will contact the Consumers System Control Scheduler to make the necessary arrangements and to agree on the switching procedures.

Request initiated by Consumers.

Scheduling Authority for Consumers will be the System Control Scheduler located in Jackson, Michigan. Contact numbers are either (XXX) XXX - XXXX or (XXX) XXX - XXXX.

The Consumers System Control Scheduler will contact *(INIT)* Contact List Personnel to make necessary arrangements and to agree on switching procedures.

NOTE: Each authority will attempt to provide a minimum of 10 workday's notice on scheduled outage requests. Emergent or imminent equipment failure outages will be handled on an as needed basis.

4. Connection/Reconnect Procedure

(INIT) personnel from the *(INIT)* Contact List shall contact the Consumers Control Center to receive permission prior to connecting generation with Consumers Energy system. Generation facilities may not be permitted to connect when the Consumers Energy system is in an abnormal condition due to unscheduled outages.

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the Effective Date identified below.

OFFICIAL COMPANY NAME	CONSUMERS ENERGY COMPANY
By: _____	By: _____
Title: _____	Title: _____
	Effective Date: _____

APPENDIX H

INITIAL REVIEW SCREENS

The initial review screens include the following:

(i) The entire proposed DER, including all aggregated site generation and point or points of interconnection, must be located within Consumers Energy's service territory.

(ii) For interconnection of a proposed DER to a radial distribution circuit, the aggregated generation, including the proposed DER, on the circuit may not exceed 15% of the line section annual peak load as most recently measured or calculated if measured data is not available. A line section is that portion of Consumers Energy's distribution system connected to a customer bounded by automatic sectionalizing devices or the end of the distribution line. Consumers Energy shall consider 100% of applicable loading, if available[6], instead of 15% of line section peak load for level 1 and level 2 DER. This screen does not apply to level 1 and level 2 non-export DER applications.

(iii) For interconnection of a proposed DER to the load side of network protectors, the proposed DER must utilize an inverter-based equipment package and, together with the aggregated other inverter-based DERs, may not exceed the smaller of 5% of a network's maximum load or 50 kWac.

(iv) The proposed DER, in aggregation with other DERs on the distribution circuit, may not contribute more than 10% to the distribution circuit's maximum fault current at the point on the primary voltage nearest the proposed point of common coupling. This screen does not apply to level 1 applications.

(v) The proposed DER, in aggregate with other DERs on the distribution circuit, may not cause any distribution protective devices and equipment or interconnection customer equipment on the system to exceed 87.5% of the short circuit interrupting capability. An interconnection may not be proposed for a circuit that already exceeds 87.5% of the short circuit interrupting capability. Distribution protective devices and equipment include, but are not limited to, substation breakers, fuse cutouts, and line reclosers. This screen does not apply to level 1 applications.

(vi) The initial review screen determines the type of interconnection to a primary distribution line for the proposed DER, according to the requirements specified in the table in this subdivision. This screen includes a review of the type of electrical service provided to the Applicant, including line configuration and the transformer connection to limit the potential for creating over-voltages on the Consumers Energy's distribution system due to a loss of ground during the operating time of any anti-islanding function.

Primary Distribution Line Type	Type of Interconnection to Primary Distribution Line	Result
3-phase, 3 wire	3-Phase or Single Phase, Phase-to-Phase	Pass screen
3-phase, 4 wire	Effectively Grounded 3-Phase or Single-Phase, Line-to-Neutral	Pass screen

[6] Consumers Energy expects time of day loading to be available for use in Fast Track screens by June 30, 2026.

(vii) If the proposed DER is to be interconnected on single-phase shared secondary, the aggregate export capacity on the shared secondary, including the proposed DER export capacity, may not exceed 20 kWac or 65% of the transformer nameplate rating.

(viii) If the proposed DER is single-phase and is to be interconnected on a center tap neutral of a 240-volt service, its addition may not create an imbalance between the 2 sides of the 240-volt service of more than 20% of the nameplate rating of the service transformer.

(ix) If the proposed DER is single-phase and is to be interconnected to a 3-phase service, its nameplate rating may not exceed 10% of the service transformer nameplate rating.

(x) If the proposed DER's point of common coupling is behind a line voltage regulator, the DER's nameplate rating must be less than 250 kWac. This screen does not include substation voltage regulators.

APPENDIX I

SUPPLEMENTAL REVIEW SCREENS

The supplemental review screens include the following:

Minimum Load Screen. Where 12 months of line section minimum load data, including onsite load but not station service load served by the proposed DER, are available, can be calculated, can be estimated from existing data, or can be determined from a power flow model, the aggregate export capacity on the line section must be less than minimum load for all line sections bounded by automatic sectionalizing devices upstream of the proposed DER. If minimum load data are not available, or cannot be calculated, estimated, or determined, Consumers Energy shall include the reason or reasons that it is unable to calculate, estimate, or determine minimum load in its supplemental review results notification. All the following must be applied:

(i) The type of generation used by the proposed DER will be considered when calculating, estimating, or determining circuit or line section minimum load. Solar photovoltaic generation systems with no battery storage must use daytime minimum load. All other generation must use absolute minimum load unless an operating schedule is provided.
(ii) When this screen is being applied to a DER that serves some station service load, only the export capacity may be considered.
(iii) Consumers Energy shall not consider as part of the aggregate generation, for purposes of this supplemental screen, DER Capacity known to be already reflected in the minimum load data.

Voltage and Power Quality Screen. In aggregate with existing generation on the line section, all of the following conditions must be met:

(i) The voltage regulation on the line section can be maintained in compliance with relevant requirements under all system conditions.
(ii) The voltage fluctuation is within acceptable limits as defined by the IEEE Standard 1453-2015, IEEE Recommended Practice for the Analysis of Fluctuating Installations on Power Systems.

Safety and Reliability Screen. The location of the proposed DER and the aggregate generation capacity on the line section may not create impacts to safety or reliability that require application of the study track to address. Consumers Energy shall consider all of the following when determining potential impacts to safety and reliability in applying this screen:

(i) Whether the line section has significant minimum loading levels dominated by a small number of customers, such as several large commercial customers.
(ii) Whether the loading along the line section is uniform.
(iii) Whether the proposed DER is located less than 0.5 electrical circuit miles for less than 5 kV or less than 2.5 electrical circuit miles for greater than 5 kV from the substation. In addition, whether the line section from the substation to the point of common coupling is a mainline rated for normal and emergency ampacity.
(iv) Whether the proposed DER incorporates a time delay function to prevent reconnection of the DER to the distribution system until distribution system voltage and frequency are within normal limits for a prescribed time.

(v) Whether operational flexibility is reduced by the proposed DER, such that transfer of the line section or sections of the DER to a neighboring distribution circuit or substation may trigger overloads, power quality issues, or voltage issues.

(vi) Whether the proposed DER employs equipment or systems certified by a recognized standards organization to address technical issues including, but not limited to, islanding, reverse power flow, or voltage quality.

APPENDIX J

PRE-APPLICATION REPORT FORM

PRE-APPLICATION FOR LEVEL 4 AND 5 GENERATOR INTERCONNECTION

MPSC CASE U-20890 RULE 460.930

Contact Information	
Name	Address
Phone	Email Address
Project Location ***(as accurately as can be identified)***	
Street Address	Nearby Cross Streets
City/Town	GPS Coordinates
**Include aerial map with location clearly marked*	

Identifying the Proposed Point of Common Coupling ***(If Available)***			
kWac:	kWdc:	kVA:	kWh for storage:

☐ Single ☐ 3 Phase	Stand Alone Generator (no on-site load other than station service) ☐ Yes ☐ No	Will the DER be Certified? ☐ Yes ☐ No
Is the Location New Construction? ☐ Yes ☐ No	Will New Service be Requested? ☐ Yes ☐ No	

If Existing Service, Provide Information below	
Customer Account Number	
Site minimum electric load (kW) (must be included if available)	Site maximum electric load (kW) (must be included if available)
Current or:	Current or:
Proposed:	Proposed:
Specify How Load is Expected to Change:	

If applicable – will the coupling between the generation and storage be AC or DC and will separate inverters be used

Select One: ☐ AC ☐ DC Separate Inverters? ☐ Yes ☐ No

**Pre-Application Fee of $300 Must be paid along with this form.*

Check payable to Consumers Energy and mailed to:
Consumers Energy
P12-235, Interconnection Coordinator
1945 W Parnall Rd
Jackson, MI, 49201

An invoice can be requested by emailing customer.generation@cmsenergy.com. Please include in the email the Company to be invoiced, a contact name and contact information along with the billing address. The invoice will be sent by email, so include an email address for payment.

NOTE: No more than 10 pre-application requests may be submitted by an applicant and its affiliates during a 1 week period. Additional pre-application requests may be rejected by Consumers Energy.

To the best of my knowledge, all the information provided in this application form is complete and correct

Signature: Date:

APPENDIX K

SAMPLE PERIODIC INTERCONNECTION TEST LOG

IEEE 1547 Periodic test and verifications: All interconnection-related protective functions and associated batteries shall be periodically tested at intervals specified by the manufacturer, system integrator, or the authority who has authority over the DR interconnection. Periodic test reports or a log for inspection shall be maintained.

IEEE 1547 Cease to Energize Functionality test: Check the cease to energize functionality by operating a load interrupting device and verify the equipment ceases to energize its output terminals and does not restart/reconnect for the required time delay. The test shall be performed on each phase individually.

The electric utility recommends periodic interconnection tests but not less than the periodic interval specified by the manufacturer. If no testing interval is provided, testing shall occur every two years. The output terminals should cease to energize within 2 seconds of operation (electrically opening) of the load interrupting device during the Cease to Energize Functionality test. Please refer to the manufacturer for more specific information as it relates to the manufacturer recommendations for periodic interconnection tests and reconnect time upon restoration of the load interrupting device (electrically closing).

Date	Time	Cease to Energize Functionality Test: Pass/Fail	Person Performing Test