SAWNEE EMC

DISTRIBUTED GENERATION INTERCONNECTION PROCEDURES

LARGE DISTRIBUTED GENERATION RESOURCES MORE THAN 100 kW

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SAWNEE®

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DISTRIBUTED GENERATION
INTERCONNECTION PROCEDURES
LARGE DISTRIBUTED GENERATION RESOURCES

I. GENERAL CONSIDERATIONS

A. These processes, requirements and documents ("procedures") establish guidelines for Sawnee EMC (or "the Cooperative") under which Distributed Generation Equipment will be considered for interconnection to Sawnee EMC's distribution system**.** The interconnection procedures contained herein are available to Distributed Generation ("DGen") Customers proposing to interconnect distributed generation facilities under Sawnee EMC's Policy No. 412.

B. Safety, of the general public, the Cooperative's staff, facilities, and equipment is the first and foremost consideration with any interconnection. The procedure exists to ensure that Sawnee EMC does not permit interconnection of Distributed Generation Equipment when doing so presents an unreasonable risk to the safety of Sawnee EMC's employees or the general public, or if it may adversely affect the reliability, integrity or quality of Sawnee EMC's facilities or service. Sawnee EMC does, and shall always, retain the right and authority to deny an application if Sawnee EMC determines the applicant presents an unreasonable risk to safety, reliability, integrity or quality of Sawnee EMC's facilities or service. Further, if the DGen resource does not continue to meet or exceed these interconnection requirements, Sawnee EMC, in its sole discretion, will disconnect the DGen resource from its system.

C. This policy is applicable only to DGen resources interconnected with Sawnee EMC's distribution system. This policy does not apply to stand-alone or backup generation equipment that use open- or closed transition schemes that create momentary parallel operation for no more than 100 milliseconds. In addition, when a generator is isolated through a double-throw, open-transition manual disconnect switch or open-transition automatic transfer switch, it is not subject to these procedures.

D. This interconnection procedure applies to a generation resource greater than 100 kW (AC) of combined output power at a single Point of Common Coupling with the Cooperative.

E. The procedures differ based on the DGen Resource size. For determination of the produces, the summation of all generation and storage resources at the Point of Common Coupling shall be used:

1. "Small" - means a generation resource not more than 100 kW (AC).

2. "Large" - means a generation resource with a capacity rating of greater than 100 kW (AC) and not greater than 10 MW.

The term "DGen Resources" includes battery energy storage systems (BESS) which may be one part of a customer's DGen Resource and consist of batteries, inverter(s), and an associated control system. Electric vehicle charging stations are not considered battery energy storage systems unless the interface between the vehicle battery and the grid is enabled for injecting electric energy to the grid.

F. The DGen customer shall be responsible for the design, installation and maintenance of all equipment and facilities installed or that will be installed on the DGen Customer's side of the point of common coupling. It is the sole responsibility of the DGen customer to obtain all necessary permits and inspections required by city or county inspectors regarding the installation of the DGen resource. Further the DGen resource must operate in compliance with all applicable federal, state and county/city regulations.

G. Once the Cooperative is satisfied the Proposed DGen Resources meet the requirements contained herein, the Cooperative will issue a Permission to Operate.

H. Terms used herein shall have the meanings specified in the Glossary of Terms appended to this document.

II. PROCESS FOR INTERCONNECTION OF LARGE DISTRIBUTED GENERATION RESOURCES

A. The application process will be conducted only after all Application Forms (Reference Appendix "D") are submitted along with the application fee of $500. The additional supporting documents shall include:
   1. DGen site plan showing meter and lockable disconnect switch,
   2. DGen relay and protection scheme,
   3. DGen one-line electrical diagram, and
   4. Written description of various modes of operation of the generators.

   For Large DGen (greater than 100kW) a registered Georgia Professional Engineer must stamp all drawings for submittal. The relay one-line must show all interconnection protection functions specified in the Technical Documents (see Appendix C).

   Some Large DGen Customers utilize inverters for interconnecting with the Cooperative. These inverters shall be certified to be in compliance with industry standards. Sawnee EMC will accept self-certification for inverters meeting UL-1747 and UL-1747SA.

The lockable disconnect switch location shall be proposed and subject to approval by Sawnee EMC. Sawnee EMC shall have unlimited access to this switch.

A lockable and separate disconnect switch for each source of energy (e.g. one for solar and one for BESS unless both can be isolated by a single switch) shall be installed by the DGen Customer near the Sawnee EMC owned meter. The location of the disconnect is subject to approval by Sawnee EMC. Sawnee EMC will open and lock the disconnect switch for safe live-line maintenance of Sawnee EMC facilities.

B. Sawnee EMC will review the application package for completeness and determine if additional information is required. Sawnee EMC's review of the application and supporting documents, or Sawnee EMC's observation of tests by others are for the sole benefit of the Cooperative and are not an endorsement of the fitness of design, installation, or operation of the DGen system or related equipment.

C. Upon receipt of a complete application package, Sawnee EMC will schedule a review meeting with an initial review to discuss the application and any known system limitation relevant to the application. Most of Sawnee EMC's distribution circuits have normal open ties with other distribution circuits, Sawnee EMC will solely determine if the adjacent circuit(s) should be included in the scope of the Distribution Impact Study. If these circuits are not included, the DGen Facilities may not be permitted to operate when connected to the adjacent circuit(s).

D. Sawnee EMC will provide an outline of the scope of a Distribution Impact study and an estimate of the cost to perform the study. Typically, the Distribution Impact Study will include a distribution load flow study, an analysis of equipment interrupting ratings, protection coordination study, voltage and flicker studies, protection and set point coordination studies, grounding reviews, and the impact on system operation, as necessary.

E. For Large DGen that are Qualifying Facilities as defined by PURPA and may export energy to the transmission system, Sawnee EMC will not issue a Permission to Operate ("PTO") without a signed agreement between the Transmission Service Provider and the DGen Customer.

F. If modifications to Sawnee EMC's system are necessary to accommodate the Large DGen then a Facilities Study will be prepared to detail these costs at no cost to the DGen Customer. However, the costs of the modifications of Sawnee EMC's system will be borne by the DGen Customer. Any metering necessitated by the use of the DGen Resource shall be borne at the expense of the DGen Customer.

G. With a notice from the DGen Customer to proceed, the Cooperative will submit an invoice for the estimated cost of system modification. If the invoice is not paid

within 30 days, it will be assumed the application has been withdrawn.

H. Prior to the start of system modifications, the Large DGen Customer will execute the Interconnection Agreement (Reference Appendix "E").

I. If required, the DGen and the Cooperative will work together to determine the final interconnection protection settings.

J. DGen is responsible for obtaining an inspection certificate issued by the Authority Having Jurisdiction ("AHJ") and providing a copy of the certificate to the Cooperative. If no AHJ exists at the DGen Customer site, the DGen Customer shall provide an inspection report by a professional engineer or qualified licensed electrician. Sawnee EMC reserves the right to witness testing of the interconnection protection and control devices including application of test voltage current.

K. Sawnee EMC may require Witness Testing for DGen Customers. As part of the Witness Testing, Sawnee EMC will verify that the installation complies with the non-islanding provisions of IEEE 1547. Verification can take the form of on-site testing or certification by a professional engineer regarding the protection scheme and the settings of relays and inverters. Further if BESS are being utilized by the DGen Facility, Sawnee EMC may test for proper non-islanding provisions of IEEE 1547.

L. Large DGen Customers will be required to obtain a minimum of $1,000,000 Liability Insurance Coverage to insure for claims of property damage and injury. Sawnee EMC will be named as Additional Insured on all insurance liability policies required herein. The DGen Customer shall furnish Sawnee EMC a certificate evidencing compliance with the foregoing requirements which shall provide no less than thirty days prior written notice to Sawnee EMC of any cancellation or material change in the insurance.

M. Sawnee EMC will issue a final Permission to Operate to the DGen with the successful completion of the following items:

1. All conditions outlined in the applicable Distributed Generation Interconnection Procedure document have been satisfied.

2. Upon the Cooperative's receipt of a copy of the inspection certificate issued by the Authority Having Jurisdiction ("AHJ"). If no AHJ exists at the DGen Customer site, the DGen Customer shall provide an inspection report by a professional engineer or qualified licensed electrician.

3. The Large DGen Customer has executed a written Distributed Generation Facility Interconnection Agreement with the Cooperative and complies with all requirements set forth therein.

4. If exporting to the transmission system, a signed agreement between the Transmission Service Provider and the DGen Customer.

5. Provide a certificate of insurance with Sawnee EMC named as additional insured.

III. OPERATION OF LARGE DISTRIBUTED GENERATION RESOURCES

A. DGen Customer is solely responsible for operation and maintenance of the DGen Resource. DGen customer shall provide copies of operation and maintenance records on an annual basis to the Cooperative. Sawnee EMC has no responsibility for maintenance of the DGen resources. In Sawnee EMC's sole opinion, if DGen Customer fails to demonstrate adequate testing and maintenance, the DGen Resource will be the basis for disconnecting from Sawnee EMC's system.

B. DGen Customer is responsible for obtaining Green-e certification necessary for Renewable Energy Credits ("RECs"). The Cooperative shall retain ownership of any and all RECs produced by the DGen Resource, associated with Excess Net Energy purchased by the Cooperative through its Energy Payment under the appliable retail rate, unless there are specific provisions in the Interconnection Agreement with the Cooperative for their sale and/or purchase.

C. Sawnee EMC may temporarily open and lock the disconnect switch at the DGen Resource during emergencies, hazardous conditions, ordinary maintenance and repair of the Cooperative's electric distribution system, failure of components of the Cooperative's electric distribution system, safety, or tampering of the Cooperative's equipment.

D. Violation of any provision of applicable Distributed Generation Interconnection Technical Requirements or other Agreement between the Cooperative and the DGen Customer, or the determination by the Cooperative that any DGen Resource is causing an unreasonable, adverse impact upon safety, electric distribution system reliability or power quality, may result in any action appropriate to address the issue, including, without limitation, disconnection of the DGen Resource from the Cooperative's distribution system and termination of electric service.

IV. DISPOSITION OF ENERGY

All service rules, regulations and restrictions outlined under the Cooperative's schedules for the purchase and sale of electricity will apply, rate schedules for the purchase of electricity and sale of Excess Net Energy and other requirements will apply, in addition to the following provisions.

A. Net Metering Qualifications

For DGen Customers of Sawnee EMC that own and operate a DGen Resource that meets all of the following conditions immediately below, the Net Metering provisions below shall apply.

- The DGen is primarily intended to offset part or all of the consumer's electrical requirements;
- Have executed the Cooperative's Interconnection Agreement (Reference Appendix "E");
- For residential customer, the peak generating capacity and storage capacity if any of residential member shall generally not exceed 10 kW alternating current ("AC") and a commercial member shall not generally exceed 100 kW AC.

For other DGen Customers, the Net Metering provisions shall apply at the discretion of the Cooperative.

When the Net Metering provisions in this section do not apply[1], the Interconnection without Net Metering provisions described below shall apply.

B. Net Metering Customers

1. Measurement of Energy

   If the distributed generation facility is connected to the distribution system on the Net Metering Customer's side of the retail service meter, the Cooperative will use a bi-directional meter for net metering.

[1] Examples include, but are not limited to: a) the DGen Resource is used for purposes of only exporting energy and not to serve the energy requirements of the DGen Customer, and b) the sum of the installed capacity of generation pursuant to the Net Energy Metering Rider, Schedule "NEM", exceeds 0.2% of the Cooperative's annual peak demand or the Cooperative has exceeded any other threshold for limiting the amount of Net Metering installations on its system.

If the distributed generation facility is connected to the distribution system on the Cooperative's side of the retail service meter, the Cooperative will install an additional single directional meter for net metering.

2. Obligation to Purchase Excess Energy from Net Metering Customers

When the electricity generated by the Net Metering Customer's distributed generation facility exceeds the electricity supplied by the Cooperative during the billing period, the Net Metering Customer shall receive a credit for the excess net energy pursuant to the Cooperative's applicable net energy metering rider ("NEM").

The net metering customer shall be charged for electric service under that rate schedule which would otherwise be applicable if the customer was not a net metering customer.

C. Interconnection with Net Billing

1. Metering

The Cooperative shall install utility grade metering at the DGen Resource, at the cost of the DGen Customer, if there is an agreement to purchase the energy provided by the DGen Resource.

2. Purchase of Energy

The Cooperative is not obligated to purchase any energy produced by the DGen Resource, but may do so at the discretion of the Cooperative.

Any energy purchased from the DGen Resource by the Cooperative shall be for all non-Qualifying Facility resources and shall be made in compliance with the Cooperative's Net Energy Metering rider, Schedule "NEM".

The true up of net energy costs will be conducted under the following billing arrangements:

a) When the Energy Payment exceeds the Retail Billing Amount during the billing period, the DGen Customer shall receive a credit to the member's account for the next month's billing.

b) If the Retail Billing Amount exceeds the Energy Payment, then the DGen Customer shall be billed for the difference in accordance with normal billing practices.

D. Qualifying Facilities

For any DGen customer that also has formal status as a Qualifying Facility ("QF"), the following provisions shall apply:

1. The credit for the excess net energy, pursuant to the Cooperative's applicable net energy metering rider, or net billing procedures, shall be based upon Sawnee EMC's Qualifying Facilities Rate for Power Purchase, Schedule "QFPP".

2. The Cooperative has a retail service rate available for any supplemental, back-up, or maintenance power service requirements, as may be requested by the DGen Customer and such service will be provided under Schedule "QF", Qualifying Facilities Service.

E. Renewable Energy Credits

The Cooperative shall retain ownership of any and all RECs produced by the Distributed Generation Facility, associated with Excess Net Energy purchased by the Cooperative through its Energy Payment under the appliable retail rate, unless there are specific provisions in the Interconnection Agreement with the Cooperative for their sale and/ or purchase.

“APPENDICES”

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APPENDIX "A"

GLOSSARY OF TERMS

"Agreement" – means an Interconnection and Parallel Operation Agreement for Distributed Generation Resources by and between Sawnee EMC and the DGen Customer.

"Authority Having Jurisdiction" means an organization, office, or individual responsible for approving equipment, materials, or an installation for compliance to the National Electrical Code.

"Automatic Disconnect Device" – an electronic or mechanical switch used to isolate a circuit or piece of equipment from a source of power without the need for human intervention.

"Battery Energy Storage System" – electric storage resources capable of receiving electric energy from the grid or other electric resource and storing it for later injection of electric energy back to the grid. Electric vehicle charging stations are not considered battery energy storage systems unless the interface between the vehicle battery and the grid is enabled for injecting electric energy to the grid.

"**Billing Period**" means, as to a particular Member account, the time period between the dates on which the Cooperative normally establishes as the service period for billing purposes.

"**Bi-directional Meter**" is a meter capable of measuring (but not necessarily displaying) electricity flow in both directions.

"**Bi-directional Metering**" means measuring the amount of electricity supplied by the Cooperative and the amount of electricity fed back to the Cooperative's System by the Member's Distributed Generation Facility using a Bi-directional Meter.

"**DGen Customer**" must be a member of the Cooperative and either 1.) the owner and operator of a Distributed Generation Facility, or 2.) the lessee of Distributed Generation Facility, or 3.) who has solar technology connected to the member's side of the retail service meter.

"**Direct Transfer Trip"** Remote operation of a circuit breaker or recloser by means of a communication channel.

"**Distributed Generation Facility**" means a facility for the production of electrical energy and can include a Battery Energy Storage System that may interconnect and operate in parallel with the Cooperative's distribution facilities and is connected to the member's side of the Cooperative's

retail service meter. Distributed Generation Facilities are as small meaning not greater than 100kW and large meaning greater than 100kW and not greater than 10 MW.

"Disconnect (verb)" – To isolate a circuit or equipment from a source of power. If isolation is accomplished with a solid-state device, "disconnect" shall mean to cease the transfer of power.

"Disconnect Switch" – a mechanical device used for isolating a circuit or equipment from a source of power.

"Distributed Generation Equipment" – includes any on-site DGen Resources: distributed generation facilities, self-generators, electric generation facilities, and electric customer- owned generators.

"Distributed Generation (or DGen) Facility" – means a Customer owned or leased generation facility operating at a distribution voltage of 25 kV or less, including any generation resource and associated equipment, wiring, protective devices or switches owned or leased by the Customer.

"**Energy Payment**" is limited to net billing and means the electricity generated and fed into the electric grid by the DGen Customer multiplied by the applicable capacity and energy purchase rates, as defined by the terms of the distributed generation interconnection agreement.

"IEEE" – means Institute of Electrical and Electronics Engineers, Inc., a non-profit technical professional organization responsible with members in 150 countries, responsible for technical publishing, conferences, and consensus-based standards activities (www.ieee.org).

"Islanding" – a condition in which a portion of Sawnee EMC's system that contains both load and a distributed generator resource is isolated from the remainder of Sawnee EMC's system [adopted from the Institute of Electrical and Electronics Engineers (IEEE)].

"**Energy Payment**" is a term used exclusively for DGen Customer on a Net Billing arrangement. The term means Excess Net Energy multiplied by the applicable rate.

"**Excess Net Energy**" is a term used exclusively for DGen Customers that qualify and are approved for Net Metering. The term means the difference between the electricity generated by the Member's Distributed Generation Facility and the electricity supplied by the Cooperative during the Billing Period.

"Net Billing" means the difference, over the Billing Period, between the Energy Payment and the Retail Billing Amount.

"**Net Metering Customer**" means a member receiving Net Metering service and 1.) is the owner and operator of a Distributed Generation Facility, or 2.) is the lessee of Distributed Generation Facility, or 3.) who has solar technology connected to the member's side of the meter. Further Distributed Generation Facility shall have a peak generating capacity, rated in alternating current ("AC"), of generally not more than 10 kW for residential applications, or has peak generating capacity, rated in AC, of generally not more than 100 kW for commercial applications, or as may be allowed under the applicable Distributed Generation Interconnection Procedure document, located on or near the member's premises, uses a solar photovoltaic system, fuel cell, or wind turbine; and is intended primarily to offset part, or all, of the Member's requirements for electricity.

"**Net Metering**" means the difference, over the Billing Period, between electricity supplied to a Net Metering Customer from the Cooperative's electric distribution system and the electricity generated and fed back into the Cooperative's distribution system by the Net Metering Customer, which is measured using a single Bi-directional Meter.

"Point of Common Coupling (PCC)" – The point at which the interconnection between Sawnee EMC's system and the DGen Customer's equipment interface occurs. Typically, this is the customer side of Sawnee EMC's revenue meter.

"Qualifying Facility" or "QF" – means a generating facility which meets the requirements set forth in Federal Energy Regulatory Rules promulgated under Sections 201 and 210 of the Public Utility Regulatory Policies Act of 1978 (PURPA). In general, a QF may be a cogeneration facility or a small power production facility. A cogeneration facility is a generating facility that sequentially produces electricity and another form of thermal energy. A small power production facility is 80 MW or less with its primary energy source biomass, renewable resources, geothermal resources or any combination thereof.

"**Renewable Energy Credits**" or "**RECs**" **–** means a renewable energy credit as defined in the Green-e Energy National Standard and shall include all the renewable attributes associated with the applicable level of corresponding energy production.

"**Retail Billing Amount**" means the dollar amount calculated by applying the electricity supplied to a Customer Generator from the distribution system under the applicable retail rate of the Cooperative, plus all other applicable charges under the applicable retail rate schedule.

"Solar Technology" means a system that generates electric energy that is fueled solely by ambient sunlight and installed upon the property owned or occupied by the Member of the Cooperative.

"System Impact Study" – any study or studies performed by Sawnee EMC or a designated third party to ensure that the safety and reliability of the electric power system with respect to the interconnection of DGen Resources as discussed in this document.

"Transmission Service Provider" – means Georgia Transmission Corporation or another electric utility in Georgia that provides transmission and related services for the delivery of electric power and energy to the Cooperative's substations, as well as the necessary ancillary services which are necessary to support the reliable operations of the transmission of electric power.

"Witness Test" – Sawnee EMC or their third-party representatives witness testing performed by the DGen Customer on equipment and protective systems associated with the interconnection.

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APPENDIX "B"

CODES AND STANDARDS

1. **IEEE 1547™ (2018)** Standard for Interconnecting Distributed Resources with Electric Power Systems as adopted and successor or related IEEE-approved standards
2. **UL 1741** Inverters, Converters, and Controllers for Use in Independent Power Systems
3. **UL 1741 SA** – Advanced distributed energy resource testing for smart, reactive control devices
4. **IEEE Std 929-2000** IEEE Recommended Practice for Utility Interface of Photovoltaic (PV) Systems
5. **NFPA 70,** National Electrical Code
6. **ANSI C84.1-2006** Electric Power Systems and Equipment – Voltage Ratings (60 Hertz)
7. **IEEE Std 100-2000**, IEEE Standard Dictionary of Electrical and Electronic Terms
8. **IEEE Std 519-2014**, IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems
9. **ANSI/IEEE C2-2017**, National Electric Safety Code (NESC)
10. **ANSI/IEEE Std 446-1995**, Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications
11. **ANSI/IEEE Std 142-1991**, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems – Green Book

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APPENDIX "C"
LARGE DISTRIBUTED TECHNICAL REQUIREMENTS

I. INTRODUCTION

A. This Appendix contains additional technical requirements for interconnecting large distributed generators ("DGen") with Sawnee EMC's electric distribution system**.** The Customer's DGen facilities shall meet these technical requirements.

B. The Customer's generation and interconnection must meet all applicable federal, state, and local construction and safety codes. The DGen Customer shall be responsible for the design, installation, operation and maintenance of all equipment and facilities installed on the Customer's side of the Point of common coupling.

C. It is not the intent of this document to specify protection of the DGen Resource Customer's generator. Protection of the DGen Resource Customer's generating equipment is the responsibility of the DGen Resource Customer and the Cooperative assumes no liability for damage or failure of the DGen Resource Customer's generation equipment.

II. OPERATING LIMITS

A. Operation of DGen Resource Customer parallel generating equipment shall not compromise the quality of electric service to other members on the Cooperative's system.

B. The DGen Resource Customer's parallel generating equipment shall meet the following minimum requirements:

1. Voltage Range of Operation
   Nominal voltage range of operation shall be 105% of nominal voltage or be less than 95% of nominal voltage. On a 120-volt basis, this range is 114-126 volts.

2. Power Factor
   Generating equipment shall operate at or near unity power factor. Smart Inverters shall be set on the default mode of constant power factor mode at unity power factor. The Cooperative may allow alternate power factor settings which will be mutually agreed upon.

C. Interrupting for Faults
For faults on the Cooperative's electric distribution system, the DGen shall cease to energize and trip.

D. Abnormal Voltages

1. For multi-phase generators, the DGen Resource shall detect and cease to energize and trip all phases for any open phase condition within 2.0 seconds.

2. The DGen Resource shall trip for abnormal system voltages.

Table 1: DGen Response to Abnormal Voltages

Voltage Setting	Voltage at Point of Common Coupling (% of Nominal Voltage)	Clearing Time
Over Voltage 2 (OV2)	V > 120%	0.16 seconds
Over Voltage 1 (OV1)	110% < V < 120%	2 seconds
Near Nominal	70% < V < 110%	Indefinite
Under Voltage 1 (UV1)	45% < V < 70%	2 seconds
Under Voltage 2 (UV2)	V < 45%	0.16 seconds

3. DGen with Smart-Inverters shall cease to energize and trip within the default clearing time specified for abnormal operating performance Category I as defined by IEEE 1547-2018 and shown herein on Table 1.

4. Smart Inverters that meet the requirements of IEEE 1547 shall use voltage disturbance ride-through specified for abnormal operating performance Category I as defined by IEEE 1547-2018, Table 14.

E. Abnormal Frequency

1. Smart Inverters shall use the frequency setpoints for Abnormal Operating Conditions Category I as defined by IEEE 1547-2018 and summarized in Table 2.

Table 2: DGen Response to Abnormal Frequencies		
Inverter Type	**Frequency Range**	**Clearing Time**
Inverter Meeting UL-1741	Greater than 60.5 Hz	0.16 seconds
	Less than 59.3 Hz	0.16 seconds
Smart Inverter UL-1741SA	Greater than 62.0 Hz	0.16 seconds
	Greater than 61.2 Hz	300 seconds
	Less than 58.5 Hz	300 seconds
	Less than 56.5 Hz	0.16 seconds

2. Smart Inverters that meet the requirements of IEEE 1547, the frequency disturbance ride-through requirements shall meet abnormal operating performance Category I as defined by IEEE 1547-2018, Table 19.

3. Smart Inverters that meet the requirements of IEEE 1547, frequency-droop (frequency-power) requirements shall meet operation for high-frequency condition as it applies to abnormal operating performance Category I as defined by IEEE 1547-2018.

F. Return to Service

Under no circumstances shall the DGen Resource Customer-owned generation be used or be capable of energizing the point of common coupling when Sawnee EMC's distribution system is de-energized.

DGen may return to service after default minimum time delay of 300 seconds after voltage and frequency are within the default limits shown in Table 3.

Table 3: Return to Service Criteria		
		Default Settings
Applicable voltage within range	Minimum value	≥ 0.917 per unit
	Maximum value	≤ 1.05 per unit
Frequency within range	Minimum value	≥ 59.5 Hz
	Maximum value	≤ 60.1 Hz

G. Harmonics
Harmonic current distortion shall be limited to meet the requirements of IEEE 1547. Overvoltage contribution shall be limited to meet the requirements of IEEE 1547.

H. Rapid Voltage Changes
The Distribution Generation Customer shall not cause step or ramp change in system voltage at the Point of Common Coupling exceeding 3% of nominal for 12kV and 25kV interconnections and 5% of nominal at low voltage interconnections.

I. Synchronization
1. It is the DGen Resource Customer's responsibility to provide proper synchronizing of its parallel generating equipment such that parallel operation with Sawnee EMC's system will not cause step changes in RMS voltage at the point of common coupling exceeding 3% of nominal.

2. The Cooperative assumes no liability for any DGen Resource Customer-owned generation. The DGen Resource Customer shall operate its equipment at its own risk.

3. Synchronizing equipment shall be capable of matching frequency within plus/minus 0.30 Hz and plus/minus 20 electrical degrees phase angle prior to paralleling breaker closure.

4. Voltage shall be matched within plus/minus 10%.

J. Fault Current Margin
No generating equipment which increases the fault current beyond the design rating of the distribution system equipment may be installed. This condition will be determined during the Distribution System Impact Study. To ensure design ratings of equipment will not be exceeded, Sawnee EMC reserves the right to limit the total amount of distribution generation resources that can operate in parallel with distribution feeders.

III. INTERCONNECTION PROTECTION REQUIREMENTS

A. Tap Line Protection
DGen Customers will be responsible for the cost of any overcurrent protection such as reclosers on a tap line to the DGen Resource. The need for such overcurrent protection will be determined by the Distribution Impact Study.

B. Disconnect Switch
A lockable and separate disconnect switch for each source of energy (e.g. one for solar and one for BESS unless both can be isolated by a single switch) shall be installed by the DGen Customer near the Sawnee EMC owned meter. The location of the disconnect is subject to approval by Sawnee EMC.

C. Unintentional Islanding
DGen must not energize any portion of the Cooperative's distribution that is de-energized. DGen Resource shall provide protection to prevent unintentional backfeeding of the Cooperative's system. This protection may require a communication links between the DGen Resource and the Cooperative's system.

D. Direct Transfer Trip
Direct transfer trip may be required to prevent unintentional islands, and to clear distribution system faults that may not be detectable by the DGen interconnection protection scheme. The need for direct transfer trip will be evaluated in the Distribution Impact Study.

E. Interconnection Breaker Trip Energy Source

The energy source used to trip a breaker is preferred to be a direct current (DC) energy source. DGen Customer shall provide a means of monitoring the health of the energy source. Loss of the interconnection breaker trip energy source must result in immediate shutdown of the DGen Facility.

IV. NON-INVERTER BASED GENERATOR INTERCONNECTION

A. Application
These requirements apply to DGen Facilities that use rotating machines such as synchronous generators, induction generators, or inverters that do not meet UL1741. The DGen Customer must install an interconnection breaker that can be tripped by protection functions that meet the requirements stated in the Operating Limits and requirements specified for Non-Inverter Based DGen equipment. In addition, the Distribution Impact Study may identify additional protection requirements such as anti-islanding protection.

B. Transformer Interconnection
For non-inverter-based interconnection of DGen Resources, the Cooperative requires a grounded wye winding on the Cooperative's side of the Point of Common Coupling. The grounded wye winding is compatible with the Cooperative's 4-wire multi-grounded neutral distribution system. Winding configuration proposed on the DGen Resource side of the transformer will be evaluated in the Distribution Impact Study.

C. Detection of Distribution System Faults
Protection functions required to detect, and clear distribution system faults, include:
1. Voltage (27/59) and frequency (81 O/U) relays
2. Directional time and instantaneous phase-overcurrent relays (67)
3. Directional time and instantaneous ground-overcurrent relays (67)
4. Direct Transfer Trip will be required if the DGen's overcurrent relays cannot sense and clear faults assuming a 40 ohm ground impedance.

D. Detection of faults on the DGen's side of the PCC
1. DGen Customer will be solely response to determine the protection equipment necessary to detect and clear all faults on the DGen's system. Faults on the DGen system must utilize a manual reset on the lockout relay. The protection functions for Distribution System faults and DGen system faults shall be provided by separate relays.

E. Interconnection Breaker Failure
A manual reset, lockout relay shall be used to lockout all DER synchronizing breakers in the event of a failure of the interconnection breaker.

V. GENERATOR INTERFACE TRANSFORMER

A. If a new interface transformer is required, the specification of the interface transformer will be subject to approval by the Cooperative and determination of ownership of said transformer shall be at the Cooperative's option.

B. For inverter-based interconnection of DGen Resource, the Cooperative requires a grounded-wye – grounded wye winding configuration which minimizes the interconnection protection requirements.

VI. CERTIFICATION OF PROTECTION SCHEMES

A. After completion of DGen Facilities construction, the DGen Customer must provide the following data:

1. Manufacturer's certified test reports for each generator, and each generator step-up transformer.
2. One-line electrical and relay drawings.
3. AC three-line diagram showing the current and voltage circuits for all interconnection protection relays.
4. Interconnection power circuit breaker DC elementary diagram, showing trip and close circuits.
5. Written description of various modes of operation of the generators.

If this data is materially different from the originally submitted data, Sawnee EMC will conduct another Distribution Impact Study, at the cost of the DGen Customer. The DGen Customer will be responsible for any additional distribution modification to interconnect the as-built DGen Facilities.

B. Inverters for DGen shall be considered certified for interconnected operation if the inverters are marked as meeting UL 1741.

C. Smart Inverters meeting UL 1741SA which are programmable shall provide a certified test report or a certification letter from a registered professional engineer or a licensed electrician that the settings required herein are programed as specified.

D. If the equipment package is not certified as UL 1741, Sawnee EMC will require certification by a professional engineer that the installed equipment package is compliant with IEEE 1547 and Sawnee EMC may require witness testing of the equipment package

E. For non-inverter based protection schemes, the as-built protection scheme shall be designed by and stamped by a professional engineer. Further, certified relay test reports will be required after installation of the equipment. Sawnee EMC may require witness testing of the equipment package.

F. DGen Customer is solely responsible for operation and maintenance of the DGen Resource. DGen customer shall provide copies of operation and maintenance records on an annual basis to the Cooperative. Sawnee EMC has no responsibility for maintenance of the DGen resources. In Sawnee EMC's sole opinion, if DGen Customer fails to demonstrate adequate testing and maintenance, the DGen Resource will be the basis for disconnecting from Sawnee EMC's system.

VII. MONITORING, INFORMATION & CONTROL

A. The Cooperative may at is sole discretion require monitoring for Large DGen. Monitoring would may information such active power, reactive power, voltage, frequency, operational state, connection status, alarm status, and operational state of change.

B. The Cooperative will not operate any control functions within the DGen's system.

C. If a direct transfer trip is required, the communication interface must be approved by the Cooperative. In the sole opinion of the Cooperative, the interface shall not adversely affect the cyber security of the Cooperative's Supervisory Control and Data Acquisition ("SCADA") system.

SAWNEE EMC
APPLICATION FOR INTERCONNECTION OF
GENERATION EQUIPMENT GREATER THAN 100kW

APPENDIX "D"

An application is a Complete Application when it provides all applicable and correct information required below. (Additional information to evaluate a request for Interconnection may be required pursuant to the application process after the application is deemed complete.)

Section 1 - Applicant Information (PLEASE PRINT)

Legal Name of Interconnecting Applicant (or, if an Individual, Individual's Name)

Name:_____Phone #_____

Mailing Address: _____

City:_____State:_____Zip Code: _____

Facility Address (if different from above)_____

Section 2 – General Information of Generator and Existing Electric Service

Generator Type (check one): Solar _____ Battery _____Wind _____Other _____.___

Provide information on the existing electric system at the existing home or business:

Panel Size:_____ Amperes Service Type:_____(single-phase or three phase)

Voltage:_____Volts (120/240 volts, 120/208 volts, 277/480 volts, etc.)

Section 3 – Installation Information

Proposed Install Date: _____ Proposed Interconnection Date: _____

Section 4 – Certifications

A. ***The system hardware is listed by Underwriters Laboratories to be in compliance with UL 1741***

Installer Representative: _____ Installer E-Mail: _____

Installer Company Name: _____ Phone #_____

Installer Signed: _____ Date: _____

B. ***The system will be installed in accordance with the manufacturer's specifications as well as all applicable provisions of the National Electrical Code and meet all local permitting guidelines:***

Signed (Licensed Electrician): _____ Date: _____

License #_____ Phone #_____

Mailing Address: _____

Section 5 – Cooperative's signature signifies only receipt of the form

Signed (Cooperative Representative): _____ Date: _____

SAWNEE EMC
APPLICATION FOR INTERCONNECTION OF
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Section 6 – Cooperative's Application Fee

The application fee for large distributed generation resources is $500.

Section 7 – Location of Generator

For generators installed at locations with existing electric service:

Provide Existing Sawnee EMC Account Number _____

Section 8 – Mode of Operation

How will the generation resource be used? Check all that apply:

A. Offset energy use for the Location? Yes _____ No _____

B. To export/sell power to Sawnee EMC? Yes _____ No _____

C. Emergency Use? Yes_____ No _____

Section 9 – Type of Generator:

____ Synchronous ___ Induction ____ DC Generator or Solar with Inverter ____ Battery Storage with Inverter

Section 10 – List of Components

Type of Components (Generator, Panels, Battery System, Inverter, Combiner box, etc)	Manufacturer	Model Number	Number of Components	Total DC Power rating of components (if applicable)	Total AC Power Rating of components (if applicable)
			Combined Total Rating of Components/System:		

SAWNEE EMC
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Section 11 – Location of Interconnection Equipment Relative to Existing Meter

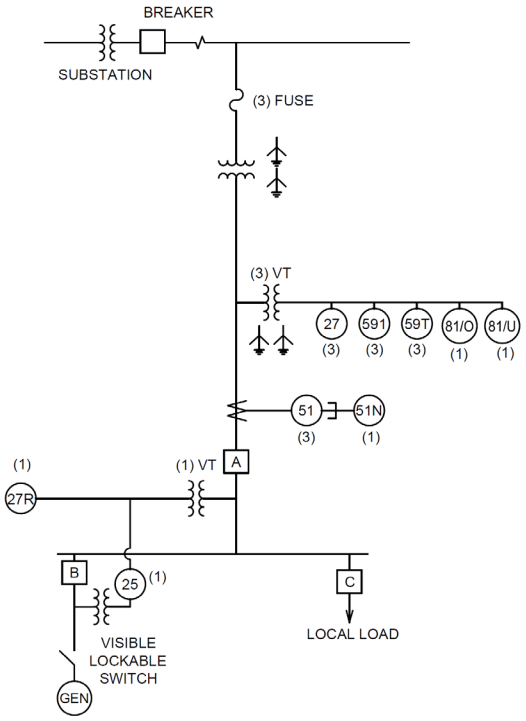
Provide a professional engineer (PE) stamped site plan showing proposed location of equipment relative to meter, including AC disconnect for new generator/inverter, and locations of generating equipment.

Section 12 – Additional Electrical Wiring Information

Provide a block diagram or one-line diagram of the proposed interconnection.

Indicate following items as applicable:
Generator, battery, panels, inverter, Protective equipment, Lockable disconnect switch, utility electric meter

Below is an example one-line diagram:



Section 13 – Settings

Inverters with UL 1741 SA designation will require, at time of install, a screen shot or report showing inverter settings. A stamped, or signed letter, by PE or licensed electrician, confirming these settings, will be required.

Section 14 – Applicant Signature

I hereby certify that, to the best of my knowledge, all the information provided in the Interconnection Application is true and correct.

Signature of Applicant: _____ Date: _____

DISTRIBUTED GENERATION
INTERCONNECTION PROCEDURES
APPENDIX "E"

Sawnee EMC Interconnection Agreement

THIS INTERCONNECTION AGREEMENT ("Agreement") is entered into this _____ day of _____, 20___, ("Effective Date") between Sawnee Electric Membership Corporation (hereinafter called "Cooperative") and _____ (hereinafter called the "Customer").

W I T N E S S E T H:

WHEREAS, the Cooperative is a non-profit electric membership corporation providing retail electric service; and

WHEREAS, the Customer is a Customer Generator; and

WHEREAS, the Customer desires to interconnect (mark boxes as applicable):

☐ a solar photovoltaic generating system of no more than _____ kilowatts (kW) alternating current (AC) power output

☐ a Battery Energy Storage System rated for ____kW for ___ hours

☐ Other: _____

with the Cooperative's System and has complied with the provisions for interconnection contained in the Cooperative's Distributed Generation Policy; and

WHEREAS, the Customer desires to operate its generation equipment in parallel with the Cooperative's System.

NOW THEREFORE, it is understood and agreed that the Cooperative shall permit the Customer to connect its generation system to the Cooperative's System and to operate its generation equipment in parallel with the Cooperative's System subject to the following terms and conditions:

1. Definitions. Capitalized terms not otherwise defined herein have them meanings given them in the Cooperative's Distributed Generator Interconnection Procedures Glossary of Terms. In addition, the following words and terms shall have the following meanings:

   "***Battery Energy Storage System***" – means an electric storage resources capable of receiving electric energy from the grid or other electric resource and storing it for later injection of electric energy back to the grid if allowed by utility. Electric vehicle charging stations are not considered Battery Energy Storage Systems unless the interface between the vehicle battery and the grid is enabled for injecting electric energy to the grid.

   "***Cooperative's System***" means Cooperative's electric distribution system.

Sawnee EMC Interconnection Agreement

"***Customer Generator***" means a member of the Cooperative and that either 1) is the owner and operator of a Distributed Generation Facility, or 2) is the lessee of Distributed Generation Facility, or 3) has solar electric generating technology connected to the member's side of the retail service meter.

"***Distributed Generation Facility***" means a facility for the production of electrical energy and can include a Battery Energy Storage System that:

a. May interconnect and operate in parallel with the Cooperative's distribution facilities;

b. Is connected to the member's side of the Cooperative's retail service meter.

c. Distributed Generation Facilities are categorized according to the following capacity in Alternating Current ("AC") ratings of the resource:

   1) "Small" - means a generation resource with a capacity rating not greater than 100 kW.

   2) "Large" - means a generation resource with a capacity rating of greater than 100 kW, and not greater than 10 MW.

"***Distributed Generation Policy***" means the Cooperative's rules, regulations, policies and procedures applicable to Distributed Generation Facilities, including but not limited to Policy No. 412 and Distributed Generator Interconnection Procedures.

"***Good Utility Practice***" means those standards, practices, methods, equipment, materials, skill and judgment, which in light of the facts known at the time, are considered good, safe and prudent in connection with the design, engineering, installation and construction of facilities similar to the Distributed Generation Facility with commensurate standards of safety, performance, dependability, efficiency, and economy, and as are in accordance with generally accepted standards of professional care, skill, diligence, and competence applicable to design, engineering, inspection, use, maintenance and construction practices in the United States.

2. Scope. The Customer's Distributed Generation Facility will be interconnected to Cooperative's System in accordance with Cooperative's interconnection requirements (e.g., Distributed Generation Policy), Good Utility Practice and the terms and conditions set forth in this Agreement. The Customer shall comply, and will continue to comply, with all presently existing or future regulations, rules, orders or decisions of all governmental authorities with jurisdiction over the Customer's Distributed Generation Facility and generating equipment and its operations including all Distributed Generation Policies.

Sawnee EMC Interconnection Agreement

3. Net Metering and Interconnection Charge. The Customer shall pay the Cooperative in accordance with all service rules and regulations, including, but not limited to, the rates, terms and conditions of any Cooperative rates and rate riders applicable to the Customer Generator. As of the Effective Date, those rates and rate riders include the attached. These rates, terms and conditions are subject to change in accordance with the Cooperative's policies, including Policy No. 412 upon written notice to the Customer Generator.

   Additionally, the Customer Generator shall pay all costs and expenses, direct and indirect, associated with the interconnection and protection of the Distributed Generation Facility. Costs associated with any modification to the Cooperative's System made necessary as a result of the Customer's Distributed Generation Facility interconnected to the Cooperative's System shall be at the expense of the Customer Generator. Such costs will be included in regular cyclical billing on a case-by-case, or as occurred basis.

   If at any time, changes in the characteristics of the Cooperative's System make necessary modification of or additions to the Customer's equipment or modification of or additions to the Cooperative's System as a result of the Customer's Distributed Generation Facility interconnected to the Cooperative's System, costs associated with such modifications and/or additions shall be at the expense of the Customer Generator and will be included in regular cyclical billing on a case by case, or as occurred basis. The Customer Generator shall be given notice before the Cooperative undertakes any such modification of, or additions to, the Cooperative's System.

4. Term. This Agreement shall become effective on the date first above written and shall remain in effect until one (1) year following the start of the initial billing period and thereafter until terminated by either party giving to the other three (3) months' notice in writing.

5. Distributed Generation Facility Description

   Type of Generator: _____

   Expected Interconnection Date: _____

   Location: _____

   Cooperative Account Number: _____

   Point of Common Coupling: _____

6. Customer shall be responsible to, and at its sole expense shall, manage, control, protect, operate and maintain the Distributed Generation Facility in accordance with Good Utility Practice. In addition, Customer shall be responsible to plan, design, construction, install, test, inspect, own, protect, operate and maintain (at its sole cost) the facilities and equipment necessary to interconnect Customer's Distributed Generation Facility to the Cooperative's System. The Customer, at its sole expense, shall

provide the protective equipment necessary to disconnect the Distributed Generation Facility from the Cooperative's System in the event of a fault on the Cooperative's System, a fault on the Customer's system, or any outage of the Cooperative's System. All protective equipment and relay settings necessary for the protection of the Cooperative's System shall be satisfactory to the Cooperative, consistent with generally accepted or prevailing standards in the electric utility industry, prior to operation of the Customer's Distributed Generation Facility in parallel with Cooperative's System.

Customer agrees to not modify, change, or replaced components of the protection scheme without written permission from Cooperative. Further the Customer agrees not to increase the capacity or change any other operational characteristics (e.g., by the addition of battery storage) of the Distributed Generation Facility agreed to herein Customer is responsible to protect its equipment from hazards resulting from parallel operation of the Customer's Distributed Generation Facility and equipment. The Cooperative shall not be liable for damage to the Customer's Distributed Generation Facility or electrical equipment caused by the Customer's failure to provide reasonable protection and the Cooperative assumes no liability for damage or failure of the Customer's generation equipment.

7. Operating Conditions. Customer, at its expense, shall maintain and operate its equipment so that it does not cause unacceptable voltage fluctuations, harmonically related disturbances, overload, or other disturbances on Cooperative's electrical and communications systems, or affect the safe, economical and reliable operation of Cooperative's System. Customer, at its expense, shall immediately correct any such unacceptable use of electric power, including the provision of suitable apparatus to prevent or cure such effects where necessary. In addition to any other requirements set forth in, or required by, this Agreement, the Customer agrees to comply with the requirements set forth in the Cooperative's Distributed Generation Policy.

7.1. Generator Interface Transformer. Interface transformer specifications shall be determined by the Cooperative and ownership of said transformer shall be at the Cooperative's option.

7.2. Safety.

a) Operation of Customer-owned generation equipment shall not present a safety hazard to the Cooperative employees or other members connected to the Cooperative's System or the public at large.

b) The Customer shall be responsible for the design, installation and maintenance of all equipment and facilities installed or that will be installed on the Customer's side of the Point of Common Coupling. It is the sole responsibility of the Customer to obtain all necessary permits and inspections required by city or county inspectors regarding the installation of the Distributed Generation Facility. Further the Distributed Generation Facility must operate in compliance with all applicable federal, state and county/city laws and regulations.

7.3. Operating Limits. Operation of Customer-owned parallel generating equipment shall not compromise the quality of electric service to other members on the Cooperative's System. The Cooperative assumes no liability for any Customer-owned generation. The Customer shall operate its equipment at its own risk.

8. Disconnection. The Cooperative may temporarily disconnect the Distributed Generation Facility upon the following conditions:

8.1 For scheduled outages (e.g., ordinary maintenance and repair) upon notice.
8.2 For unscheduled outages (e.g., failure of components or tampering with equipment), emergency or hazardous conditions or safety.
8.3 If the Distributed Generation Facility does not operate or comply in a manner consistent with this Agreement.
8.4 As otherwise permitted or required the Distributed Generation Policies or other applicable laws, rules, and regulations.
8.5 For reasons relating to the overall reliability and safe operations of the Cooperative distribution system.

The Cooperative shall inform the Customer in advance of any scheduled disconnection, or as is reasonable after an unscheduled disconnection.

The interconnection will remain open until corrective action is taken and suitable testing is completed. In the event separation of the Customer's Distributed Generation Facility and equipment is deemed necessary by the Cooperative, the Customer shall disconnect and not reconnect its Distributed Generation Facility and/or equipment to the Cooperative's System without specific permission to do so by the appropriate authorities of the Cooperative. In no event will reconnection occur until the Cooperative believes it has received adequate assurance that no conditions that may give rise to separation exist.

9. Termination. This Agreement may be terminated under the following conditions:

9.1 By the Customer by providing written sixty (60) day advance notice to the Cooperative.
9.2 By the Cooperative, prior to the expiration of the term hereof, upon any breach of this Agreement by the Customer that is not cured within thirty (30) days from written notice from Cooperative.
9.3 Permanent Disconnection. In the event this Agreement is terminated, the Cooperative shall have the right to disconnect its facilities or direct the Customer to disconnect its Distributed Generation Facility.
9.4 Survival Rights. This Agreement shall continue in effect after termination to the extent necessary to allow or require either party to fulfill rights or obligations that arose under the Agreement.

Sawnee EMC Interconnection Agreement

10. Assignment. This Agreement shall not be assigned without the advance, express written consent of the other party; provided that Cooperative may assign this Agreement without Customer's consent to a successor in interest of the Cooperative.

11. Indemnification. To the fullest extent allowed by applicable law, Customer shall indemnify, release, hold harmless, and, at Cooperative's request, defend Cooperative, its officers, employees, agents, representatives, contractors and assigns (collectively "Persons Indemnified") from or against any claims, demands, suits, enforcement actions, liabilities, causes of action, losses, expenses, damages, fines, penalties, court costs and attorneys' fees (collectively "Claims") caused by, arising out of, or related to an act or omission of Customer, its representatives, suppliers, or contractors including any an officer, director, employee, representative, or agent of any one of them, or anyone for whose acts one of them is liable, that is in any way associated with an obligation of Customer, right of Cooperative or this Agreement, whether or not caused by or arising out of the joint, concurrent, or contributory negligence of a Person Indemnified or a third party, except that Customer is not liable under this Section 11 if the Claim was caused by the sole negligence of a Person Indemnified.

12. Limitation of Liability and Consequential Damages Waiver. As set forth in O.C.G.A. § 46-3-56(f) (2002), the Cooperative shall not be liable to any person, directly or indirectly, for loss of property, injury, or death resulting from the interconnection of a cogenerator or distributed generation facility to its electrical system. Moreover, in no event shall the Cooperative or any Persons Indemnified be liable to Customer for any consequential, special, exemplary, punitive, indirect or incidental losses or damages, and Customer hereby releases Cooperative and Persons Indemnified from any such liability.

DISTRIBUTED GENERATION
INTERCONNECTION PROCEDURES
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Sawnee EMC Interconnection Agreement

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by their duly authorized representatives, as of the Effective Date hereof.

SEMC ATTEST:

By: _____

Michael A. Goodroe, President & CEO
Sawnee EMC

_____
Witness Printed Name

_____
Witness Signature

MEMBER ATTEST:

By: _____

Member Printed Name (Business Name if applicable)

_____
Witness Printed Name

_____
Member Signature

_____
Witness Signature

_____
Name and Title of Officer (if Business)