Generator Interconnection Process

August 15th, 2018
Definitions

Category Size and Net Metering Program Eligibility

Category 1 & 2
- Process Flow Chart
- Generator Interconnection Application
- Site Plan and One-line Diagram
- Complete and Incomplete Applications
- Commissioning Test

Contact Information

Question & Answer
Definitions

- **Parallel Operation*** – The operation, for longer than 100 milliseconds, of a project connected to the energized distribution system.

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

- **Working Days*** – Days excluding Saturdays, Sundays, and other days when the offices of the electric utility are not open to the public.

- **True Net Metering** – means a utility billing method that applies the full retail rate to the net of the bidirectional flow of kW hours across the customer interconnection with the utility distribution system, during a billing period or time-of-use pricing period. (Category 1)

- **Modified Net Metering** – means a utility billing method that applies the power supply component of the full retail rate to the net of the bidirectional flow of kWh across the customer interconnection with the utility distribution system during a billing period or time-of-use pricing. (Category 2)

*Definitions from Generator Interconnection Requirements
<table>
<thead>
<tr>
<th>Category</th>
<th>Aggregate Generation</th>
<th>Power Purchase Agreement</th>
<th>Interconnection Only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1</strong> - Aggregate Generation that is less than or equal to 20kW*</td>
<td>True Net Metering (Eligible upon review)</td>
<td>May opt for Interconnection Only to offset usage</td>
<td></td>
</tr>
<tr>
<td><strong>Category 2</strong> – Aggregate Generation that is greater than 20kW but less than or equal to 150kW</td>
<td>Modified Net Metering (Eligible upon review)</td>
<td>May opt for Interconnection Only to offset usage</td>
<td></td>
</tr>
<tr>
<td><strong>Category 3</strong> – Aggregate Generation that is greater than 150kW but less than or equal to 550kW</td>
<td>Modified Net Metering for Methane Digester Only (Eligible upon review)</td>
<td>Power Purchase Agreement (PPA) to determine compensation for sale of flow-back generation</td>
<td>May opt for Interconnection Only to offset usage</td>
</tr>
<tr>
<td><strong>Category 4</strong> – Aggregate Generation that is greater than 550kW but less than or equal to 2 MW</td>
<td>NOT Net Metering Eligible</td>
<td>Power Purchase Agreement (PPA) to determine compensation for sale of flow-back generation</td>
<td>May opt for Interconnection Only to offset usage</td>
</tr>
</tbody>
</table>

* Generator Output has to be certified for anti-islanding in compliance with IEEE1547 standard et seq
## Net Metering Category Sizes and Compensation Rate

<table>
<thead>
<tr>
<th>Category</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Size</strong></td>
<td>≤ 20 kW</td>
<td>&gt; 20 to ≤150 kW</td>
<td>&gt; 150 to ≤550 kW (Anaerobic digestion only)</td>
</tr>
<tr>
<td><strong>Meter Requirement</strong></td>
<td>Single Meter</td>
<td>Two Meters</td>
<td>Two Meters</td>
</tr>
<tr>
<td><strong>Billing</strong></td>
<td>Net power supply and net delivery charges in addition to other fixed fees</td>
<td>Net power supply and net delivery charges in addition to other fixed fees</td>
<td>Net power supply and net delivery charges in addition to other fixed fees</td>
</tr>
<tr>
<td><strong>Credit</strong></td>
<td>Excess energy credited at power supply and delivery rate</td>
<td>Excess energy credited at power supply rate only</td>
<td>Excess energy credited at power supply rate only</td>
</tr>
</tbody>
</table>
Generator Interconnection Application (PowerClerk or Hard Copy)  
Combined Fee - $100

Application Submitted

Incomplete

Consumers Energy Application Review  
10 Working Days

Approved

Commissioning Test

Construction of Generation System

Generation on-line and approved to operate in parallel with Consumers Energy system

Generator Interconnect and Operating Agreement
Residential systems use the Combined Generator Interconnection Application and Category 1 Net Metering form.

- **Category 1**: generation with a nameplate rating of 20kW or less
- **Category 2**: generation with a nameplate rating between 20kW and 150kW
Category 2

- **Category 2**: Aggregate generation nameplate rating is between 20kW and 150kW.

- **May Require Formal Engineering Review**
  - Voltage impact to other customers can be significant
  - Customer Generation Meter also required between the inverter and the AC Disconnect
  - A stamped One-Line Diagram by a Professional Engineer or Licensed Electrical Contractor
  - Customer is responsible for cost of upgrades if necessary
The Category 2 Interconnection Application is similar to the Category 1 application.

**Category 2 Generation Interconnection**

*INSTALLATION INFORMATION*

<table>
<thead>
<tr>
<th>Name</th>
<th>Company (if Applicable)</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>E-Mail Address</th>
<th>Requested In Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Licensed Professional Engineer Name, if applicable (Last, First, Mi)</th>
<th>Licensed Electrical Contractor Name, if applicable (Last, First, Mi)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contractor/PE Phone Number</th>
<th>Contractor/PE E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CUSTOMER AND PROJECT DEVELOPER/CONTRACTOR SIGNATURES AND FEES**

*Sign and Return Completed Application to Electric Utility Contact*

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

Customer Signature ___________________________ Date ____________

Project Developer/Contractor Signature (If Applicable) ___________________________ Date ____________

*Note:* Refer to the applicable “Michigan Electric Utility Generator Interconnection Requirements” for a detailed explanation of the Interconnection Process, Fees, Timelines, and Technical Requirements.
A sample one-line diagram is provided in the Generator Interconnection Application.

- Shows electrical connectivity
- Clarifies location of equipment.
- Provides additional equipment ratings.
Site Plan

- Property Information:
  - Buildings
  - Location of Generator
  - Driveway & Streets

- Electrical Information
  - Inverter location
  - Meter locations
  - A/C Disconnect location
    - Adjacent to meter
    - Accessible by Consumers Energy
    - Visible Break
    - Lockable & Taggable

- Hand-drawn is acceptable
Submitting the Application

- An application may either be submitted through PowerClerk or by mail to Consumers Energy Interconnection Coordinator.
  - Payment must still be mailed in to the Interconnection Coordinator to be processed manually. This payment can either be check or money order.
  - [https://consumersenergy.powerclerk.com](https://consumersenergy.powerclerk.com)
A review of the application is conducted within 10 working days after the application and payment are received per MPSC requirements.
- Impact on adjacent customers

The customer is emailed or mailed the results of the review depending how the application was submitted.
- Incomplete
- Complete
An incomplete letter is emailed or mailed to the customer

- States what was missing, or incorrect information, from the original application

Customer re-submits application with requested information or corrections.

The results of the re-review are emailed or mailed to the customer.
Complete Application

- Project will be reviewed by Net Metering Team in parallel with the application review (if applicable) to determine eligibility for the program.

- Once the Category 1 application is approved the project moves to the Design and Construction Phase.

- Once the Category 2-4 application is approved the project moves to Formal Engineering Review Phase if needed.
  - Provides voltage fluctuation results to the system
  - Determines if system upgrades are necessary and conceptual cost
  - Provides Short Circuit data
Verification the system shuts-down as expected upon loss of utility voltage

The updated form can be found on our website

Consumers Energy still reserves the right to witness the Commissioning Test
Billing and Meter Set Initiation

- Smart Meters possess bi-directional capabilities and do not have to be replaced. Customer generation is read automatically.

- Electromechanical Meters have to be replaced with a:
  - Smart Meter

- Is Consumers Energy Receiving the customer’s generation?
  - Code Id: 03 kWh Delivered
  - Code Id: 50 kWh Total Received
Contact Information

- PPA Questions - Jarrod Hafner or Keith Troyer
  - Jarrod Hafner: JARROD.HAFNER@cmsenergy.com
  - Keith Troyer: KEITH.TROYER@cmsenergy.com

- Interconnection Coordinators (Nicholas Tenney)
  - Address: 1945 West Parnall Road (Room P14-206)
    Jackson MI, 49201
    Phone: (517) 788-1432
    Email: customer.generation@cmsenergy.com

Net Metering Email: net_metering@cmsenergy.com
Net Metering Phone: (517) 788-2119
Questions

- Generator Interconnection Applications and Net Metering Information can be found online at: [www.ConsumersEnergy.com](http://www.ConsumersEnergy.com)
Appendix

- Category 3 Information
- Category 4 Information
Process Flow Chart – Category 3 Interconnection

Generator Interconnection Application Processing – Hard Copy
Interconnection Fee - $150

Application Submitted

Distribution Study (If Necessary)
15 Working Days
Study Fee - $Actual*

Incomplete

Engineering Review
15 Working Days
Study Fee - $0*

Approved

Consumers Energy Application Review
10 Working Days

Inspection and Commissioning Test
10 Working Days

Construction of Generation System**

Generator Interconnect and Operating Agreement

Generation on-line and approved to operate in parallel with Consumers Energy system

* Costs are subject to change.

** A Facilities Agreement for facilities upgrades may be necessary.
Category 3

Category 3: Aggregate generation nameplate rating is between 150kW and 550kW.

Submitted Hard Copy Processing

Requires Formal Engineering Review
- Voltage impact to other customers can be significant
- Customer Generation Meter also required (Net Metering Eligible Only)
- A stamped One-Line Diagram by a Professional Engineer or Licensed Electrical Contractor
- Customer is responsible for cost of upgrades if necessary
Process Flow Chart – Category 4 Interconnection

Generator Interconnection Application
Processing – Hard Copy
Interconnection Fee - $250

Application Complete
10 Working Days

Distribution Study
45 Working Days*
Study Fee - $Actual*

Engineering Review
25 Working Days
Study Fee - $Actual*

Consumers Energy Application Review
10 Working Days

Incomplete

Construction of Generation System**

Approved

Inspection and Commissioning Test
10 Working Days

Generator Interconnect and Operating Agreement

* Costs are subject to change. Dates may change if mutually agreed upon.

** A Facilities Agreement for facilities upgrades may be necessary.
Category 4

Category 4: Aggregate generation nameplate rating is between 550kW and 2 MW.

Submitted Hard Copy Processing

Requires Formal Engineering Review
- Voltage impact to other customers can be significant
- Telemetry and Disturbance Monitoring is required
- A stamped One-Line Diagram by a Professional Engineer or Licensed Electrical Contractor
- Customer is responsible for cost of upgrades if necessary
- Additional relaying equipment is required
### Category 4 – Cont.

**ISOLATING TRANSFORMERS BETWEEN GENERATOR(S) AND UTILITY**

<table>
<thead>
<tr>
<th>Transformer Model Number</th>
<th>Transformer Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated kV and connection (lower, upper, or center tap) of each winding</td>
<td>kV of each winding (kV)</td>
</tr>
<tr>
<td>R &amp; U of each winding</td>
<td>Rated kVA available for each winding (kVA)</td>
</tr>
<tr>
<td>Footprint/capacity range for any LTC windings</td>
<td>Nominal capacity on transformer (kVA)</td>
</tr>
<tr>
<td>Percent Regulation at rated kV</td>
<td>Load Loss (Watts at full load or 90% rated load)</td>
</tr>
</tbody>
</table>

**Synchronous Induction and Inverter Generator - Based Systems**

(Must complete Pages 3, 4 or 5 and attach Electrical One-Line Drawing)

- Breakers - Ratings, location and normal operating status (open or closed)
- Brakes - Operating voltage
- Capacitors - Max rated in service
- Circuit Breakers - Rating, location and normal operating status (open or closed)
- Current Transformers - Current ratio, connected ratio
- Fuses - Normal operating, rating, Amps type, type
- Generators - Capacity rating (kVA), location, type, method of grounding
- Grounding Transformer - Wire size, number, current (amps)
- Isolating Transformers - Capacity rating (kVA), location, insulation, voltage ratings, primary and secondary connections and method of grounding
- Potential Transformers - Ratios, connection
- Reactors - Capacitance
- Relays - Type, quantity, IEEE device number, operator times indicating the device initiated by the relays
- Shunt Reactor - Location and normal operating status (open or closed), type, rating
- Tagging Points - Location, identification

### INVERTER GENERATORS

**GENERATOR INFORMATION**

- System Type (Solar, Wind, Biomass, Methane Digestor, etc.)
- Generator Nameplate Rating (kW or MW)
- AC Operation Voltage
- Manufacturer
- Model (Name/Number)
- Attached Grid Configuration Page #______

### CUSTOMER AND PROJECT DEVELOPER/CONTRACTOR SIGNATURES AND FEES

- Attached $2100 Interconnection Application Fee
- Check #______
- Money Order #______

Sign and Return Completed Application with Application Fee to Director Utility Contact

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

Customer Signature: ___________________________ Date: __________

Project Developer/Contractor Signature (if applicable): ___________________________ Date: __________

Note: Refer to the applicable “Michigan Electric Utility Generator Interconnection Requirements” for a detailed explanation of the interconnection Process, Fees, Timeslines, and Technical Requirements.