Appendix 1 Interconnection Request

INTERCONNECTION REQUEST

Provide one copy of this completed form pursuant to Section 7 of this Appendix 1 below.

1. The undersigned Interconnection Customer submits this request to interconnect its Generating Facility with the CAISO Controlled Grid pursuant to the CAISO Tariff (check one):
   - Fast Track Process.
   - Independent Study Process.
   - Queue Cluster Process.
   - Annual Deliverability Assessment pursuant to GIDAP Section 9.2.
   - Deliverability Assessment Study for project interconnecting to a Non-Participating TO pursuant to GIDAP Section 9.4.

2. This Interconnection Request is for (check one):
   - A proposed new Generating Facility.
   - An increase in the generating capacity or a Material Modification to an existing Generating Facility.

3. Requested Deliverability Status is for (check one):
   - Full Capacity (For Independent Study Process and Queue Cluster Process only)
     (Note – Deliverability analysis for Independent Study Process is conducted with the next annual Cluster Study – See GIDAP Section 4.6)
   - Partial Deliverability for _____% of electrical output
     (for Independent Study Process and Queue Cluster Process ONLY)
   - Energy Only

4. The Interconnection Customer provides the following information:
   a. Address or location, including the county, of the proposed new Generating Facility site or, in the case of an existing Generating Facility, the name and specific location, including the county, of the existing Generating Facility;
      
      Project Name: Sample Thermal

      Project Location:
      Street Address: 123 Oak Street
      City, State: Blythe, CA
      County: Riverside
      Zip Code: 92225

      GPS Coordinates (decimal format):
      Latitude: +38.6958
      Longitude: -121.2807

   b. Maximum net megawatt electrical output (as defined by section 2.C. of Attachment A to this appendix) of the proposed new Generating Facility or the amount of net megawatt increase in the generating capacity of an existing Generating Facility;
      
      Maximum net megawatt electrical output (MW): 475
      OR
      Net Megawatt increase (MW): _____

      Project Name Features Not Allowed:
      - Company names or types (i.e., LLC)
      - Duplications
      - MW values
      - More than two digits
      - Roman numerals
      - Special characters
      - Abbreviations similar to those used by CAISO
      - Use of the word “Phase” or “Expansion”
      - “License plate” looking configurations

      This MW value is the net MW at the project site and NOT the net MW at the Point of Interconnection as it does not account for gen-tie and project internal transmission losses. The net MW at POI is derived from the power flow model submitted in .epc format provided by the IC as part of its interconnection request package.
c. Type of project (i.e., gas turbine, hydro, wind, etc.) and general description of the equipment configuration (if more than one type is chosen include net MW for each):

- Cogeneration: [ ] (MW)
- Reciprocating Engine: [ ] (MW)
- Biomass: [ ] (MW)
- Steam Turbine: [ ] (MW)
- Gas Turbine: [ ] (MW)
- Wind: [ ] (MW)
- Hydro: [ ] (MW)
- Photovoltaic: [ ] (MW)
- Combined Cycle: [ ] 475 (MW)

Storage
- Storage type (e.g. Pumped-Storage Hydro, Battery (w/type), etc.): [ ]
- Maximum Instantaneous Capability: [ ] (MW)
- Total Storage Capability: [ ] (MWh)
- Maximum Charge Duration: [ ] (hours)
- Maximum Discharge Duration: [ ] (hours)
- Charge/Discharge Cycle Efficiency: [ ] (%)
- Other (please describe): [ ] (MW)

General description of the equipment configuration (e.g. number, size, type, etc):
Three GE generating units, 2 CTGs at 100 MWs each and 1 STG at 300 MW.

d. Proposed In-Service Date (first date transmission is needed to the facility), Trial Operation date and Commercial Operation Date in MM/DD/YYYY format and term of service (dates must be sequential):

- Proposed In-Service Date: 1/31/2021
- Proposed Trial Operation Date: 3/30/2021
- Proposed Commercial Operation Date: 04/30/2021
- Proposed Term of Service (years): 30

Updated: 02/24/2015

e. Name, address, telephone number, and e-mail address of the Interconnection Customer’s contact person (primary person who will be contacted):

- Name: John Smith
- Title: Manager, Thermal Projects
- Company Name: ABC Corporation
- Street Address: 789 Main Street
- City, State: Los Angeles, CA
- Zip Code: 90210
- Phone Number: 213 555 1212
- Fax Number: 213 555 1313
- Email Address: jsmith@abc.com

f. Approximate location of the proposed Point of Interconnection (i.e., specify transmission facility interconnection point name, voltage level, and the location of interconnection):

Colorado River Substation 230kV

g. Interconnection Customer data (set forth in Attachment A)
The Interconnection Customer shall provide to the CAISO the technical data called for in GIDAP Appendix 1, Attachment A. One (1) copy is required.

5. Applicable deposit amount made payable to California ISO. Send check to CAISO (see section 7 for details) along with the:
   a. Interconnection Request for processing.
   b. Attachment A (Interconnection Request Generating Facility Data).

6. Evidence of Site Exclusivity as specified in the GIDAP and name(s), address(es) and contact information of site owner(s) (check one):
   ✔ Is attached to this Interconnection Request
   □ Deposit in lieu of Site Exclusivity attached, Site Exclusivity will be provided at a later date in accordance with this GIDAP

7. This Interconnection Request shall be submitted to the CAISO representative indicated below:

   California ISO
   Attn: Grid Assets
   P.O. Box 639014
   Folsom, CA 95763-9014

   Overnight address:
   California ISO
   Attn: Grid Assets
   250 Outcropping Way
   Folsom, CA 95630

8. Representative of the Interconnection Customer to contact:

   [To be completed by the Interconnection Customer]
   Name: John Smith
   Title: Manager, Thermal Projects
   Company Name: ABC Company
   Street Address: 789 Main Street
   City, State: Los Angeles, CA
   Zip Code: 90210
   Phone Number: 213 555 1212
   Fax Number: 213 555 1313
   Email Address: jsmith@abc.com

9. This Interconnection Request is submitted by:

   Legal name of the Interconnection Customer: Thermal Power, LLC

   By (signature): John Smith (Original Signature)

   Name (type or print): John Smith
   Title: Manager, Thermal Projects
   Date: 04/29/2014

Deposit can be made via Fed Wire transfer or check – ACH is not accepted. Please be sure and reference the project name in the notes area of wire transfer or check for easy matching. Wiring information:

   Wells Fargo Bank (LGIP)
   ABA 121000248
   Acct 4122041825
   Federal Tax ID # 94-3274043

   CAISO is a Corporation. Funds must be received no later than April 30th.
Project Name: Sample Thermal

Attachment A Generating Facility Data
To GIP Appendix 1
Interconnection Request

GENERATING FACILITY DATA

Provide one (1) copy of this completed form pursuant to Section 7 of GIP Appendix 1.

1. Provide one set of original prints (no larger than 11" x 17") or soft copy on cd/flashdrive of the following:
   A. Site drawing to scale, showing generator location and Point of Interconnection with the CAISO Controlled Grid.
   B. Single-line diagram showing applicable equipment such as generating units, step-up transformers, auxiliary transformers, switches/disconnects of the proposed interconnection, including the required protection devices and circuit breakers. For wind and photovoltaic generator plants, the one line diagram should include the distribution lines connecting the various groups of generating units, the generator capacitor banks, the step up transformers, the distribution lines, and the substation transformers and capacitor banks at the Point of Interconnection with the CAISO Controlled Grid.

2. Generating Facility Information
   A. Total Generating Facility rated output (MW): 500
   B. Generating Facility auxiliary Load (MW): 25
   C. Project net capacity (A-B)(MW): 475
   D. Standby Load when Generating Facility is off-line (MW): 1MW
   E. Number of Generating Units: Three, 2 CTGs and 1 STG
   (Please repeat the following items for each generator)
   F. Individual generator rated output (MW for each unit): CTG: 2@100MW; STG: 300MW
   G. Manufacturer: GE
   H. Year Manufactured: 2015
   I. Nominal Terminal Voltage (kV): 18 kV CT; 19 kV ST
   J. Rated Power Factor (%): 90%
   K. Type (Induction, Synchronous, D.C. with Inverter): Synchronous
   L. Phase (three phase or single phase): Three Phase
   M. Connection (Delta, Grounded WYE, Ungrounded WYE, impedance grounded): Impedance Grounded
   N. Generator Voltage Regulation Range (+/- %): +/- 5%
   O. Generator Power Factor Regulation Range: 0.85 Lead/Lag
   P. For combined cycle plants, specify the plant net output capacity (MW) for an outage of the steam turbine or an outage of a single combustion turbine 200 MW

3. Synchronous Generator – General Information:
   (Please repeat the following for each generator model)
   A. Rated Generator speed (rpm): 3600
   B. Rated MVA: CTG: 2@112MVA STG: 333MVA
   C. Rated Generator Power Factor: 0.9
   D. Generator Efficiency at Rated Load (%): 98.3
   E. Moment of Inertia (including prime mover): CTG: 21,352 kg-m2 STG: 26,817 kg-m2
   F. Inertia Time Constant (on machine base) H: CTG: 5.81 STG: 5.15 sec or MJ/MVA
   G. SCR (Short-Circuit Ratio - the ratio of the field current required for rated open-circuit voltage to the field current required for rated short-circuit current): CTG: 0.53 STG: 0.59

This MW value is the net MW at the project site and not the net MW at the Point of Interconnection as it does not account for gen-tie and project internal transmission losses. The net MW at POI is derived from the power flow model submitted in .epc format provided by the IC as part of its interconnection request package. This value must match the value stated in 4b of the Interconnection Request (page 1 of this file).
H. Please attach generator reactive capability curves.
I. Rated Hydrogen Cooling Pressure in psig (Steam Units only): **60 psig**
J. Please attach a plot of generator terminal voltage versus field current that shows the air gap line, the open-circuit saturation curve, and the saturation curve at full load and rated power factor.

4. **Excitation System Information**
   (Please repeat the following for each generator model)
   
   A. Indicate the Manufacturer **Siemens** and Type **IEEE Type ST6B** of excitation system used for the generator. For exciter type, please choose from 1 to 9 below or describe the specific excitation system.
      - (1) Rotating DC commutator exciter with continuously acting regulator. The regulator power source is independent of the generator terminal voltage and current.
      - (2) Rotating DC commentator exciter with continuously acting regulator. The regulator power source is bus fed from the generator terminal voltage.
      - (3) Rotating DC commutator exciter with non-continuously acting regulator (i.e., regulator adjustments are made in discrete increments).
      - (4) Rotating AC Alternator Exciter with non-controlled (diode) rectifiers. The regulator power source is independent of the generator terminal voltage and current (not bus-fed).
      - (5) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers. The regulator power source is fed from the exciter output voltage.
      - (6) Rotating AC Alternator Exciter with controlled (thyristor) rectifiers.
      - (7) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from the generator terminal voltage.
      - (8) Static Exciter with controlled (thyristor) rectifiers. The regulator power source is bus-fed from a combination of generator terminal voltage and current (compound-source controlled rectifiers system).
      - (9) Other (specify): ______
   
   B. Attach a copy of the block diagram of the excitation system from its instruction manual. The diagram should show the input, output, and all feedback loops of the excitation system.
   
   C. Excitation system response ratio (ASA): ______
   
   D. Full load rated exciter output voltage: **CTG: 275V STG: 350V**
   
   E. Maximum exciter output voltage (ceiling voltage): ______
   
   F. Other comments regarding the excitation system? ______

5. **Power System Stabilizer Information**
   (Please repeat the following for each generator model. All new generators are required to install PSS unless an exemption has been obtained from WECC. Such an exemption can be obtained for units that do not have suitable excitation systems.)
   
   A. Manufacturer: **General Electric**
   
   B. Is the PSS digital or analog? **Digital**
   
   C. Note the input signal source for the PSS:
      - Bus frequency
      - Shaft speed
      - Bus Voltage
      - Other (specify source): **Power**
   
   D. Please attach a copy of a block diagram of the PSS from the PSS Instruction Manual and the correspondence between dial settings and the time constants or PSS gain.
   
   E. Other comments regarding the PSS? ______

6. **Turbine-Governor Information**
(Please repeat the following for each generator model)

Please complete Part A for steam, gas or combined-cycle turbines, Part B for hydro turbines, and Part C for both.

A. Steam, gas or combined-cycle turbines:

(1) List type of unit (Steam, Gas, or Combined-cycle): **Combined Cycle**

(2) If steam or combined-cycle, does the turbine system have a reheat process (i.e., both high and low pressure turbines)? **Yes; triple pressure reheat**

(3) If steam with reheat process, or if combined-cycle, indicate in the space provided, the percent of full load power produced by each turbine:
   - Low pressure turbine or gas turbine: **TBD %**
   - High pressure turbine or steam turbine: **TBD %**

B. Hydro turbines:

(1) Turbine efficiency at rated load: _____ %

(2) Length of penstock: _____ ft

(3) Average cross-sectional area of the penstock: _____ ft²

(4) Typical maximum head (vertical distance from the bottom of the penstock, at the gate, to the water level): _____ ft

(5) Is the water supply run-of-the-river or reservoir: ______

(6) Water flow rate at the typical maximum head: _____ ft³/sec

(7) Average energy rate: _____ kW-hrs/acre-ft

(8) Estimated yearly energy production: _____ kW-hrs

C. Complete this section for each machine, independent of the turbine type.

(1) Turbine manufacturer: **Siemens**

(2) Maximum turbine power output: **105(CT) / 328(ST) MW**

(3) Minimum turbine power output (while on line): **105(CT) / 328(ST) MW**

(4) Governor information:
   - Droop setting (speed regulation): **5%**
   - Is the governor mechanical-hydraulic or electro-hydraulic (Electro-hydraulic governors have an electronic speed sensor and transducer.)? **Electro-hydraulic with digital controls**
   - Other comments regarding the turbine governor system?

7. Induction Generator Data:

A. Rated Generator Power Factor at rated load: ______

B. Moment of Inertia (including prime mover): ______

C. Do you wish reclose blocking? ☐ Yes ☐ No

Note: Sufficient capacitance may be on the line now, or in the future, and the generator may self-excite unexpectedly.

7a. Wind Generators

Number of generators to be interconnected pursuant to this Interconnection Request: ______

Average Site Elevation: ______ ☐ Single Phase ☐ Three Phase

Field Volts: ______

Field Amperes: ______

Motoring Power (MW): ______

Neutral Grounding Resistor (if applicable): ______
8. **Generator Short Circuit Data**

For each generator model, provide the following reactances expressed in p.u. on the generator base:

- $X^1$ – positive sequence subtransient reactance: **CTG: 0.2209**  **STG: 0.3335** p.u.
- $X_2$ – negative sequence reactance: **CTG: 0.1862**  **STG: 0.2695** p.u.
- $X_0$ – zero sequence reactance: **CTG: 0.1033**  **STG: 0.1342** p.u.

Generator Grounding (select 1 for each model):

A. [ ] Solidly grounded  
B. [x] Grounded through an impedance  
   (Impedance value in p.u on generator base  R: 51,980  p.u.  X: p.u.)  
C. [ ] Ungrounded

9. **Step-Up Transformer Data**

For each step-up transformer, fill out the data form provided in Table 1.

10. **Interconnection Facilities Line Data**

There is no need to provide data for new lines that are to be planned by the Participating TO. However, for transmission lines that are to be planned by the generation developer, please provide the following information:

- Nominal Voltage: **230** kV  
- Line Length: **7** miles  
- Line termination Points: **One**
- Conductor Type: **ACSR**  
  Size: **2-1780 kcmil**
- If bundled, Number per phase: **2**  
  Bundle spacing: **18** in.
- Phase Configuration. Vertical: **X**  
  Horizontal: 
- Phase Spacing: A-B: **18** ft.  
  B-C: **18** ft.  
  C-A: **36** ft.
- Distance of lowest conductor to Ground at full load and 40°C: **30** ft.
- Ground Wire Type: **OPGW**  
  Size: **3/4”**  
  Distance to Ground: **85** ft.
- Attach Tower Configuration Diagram
- Summer line ratings in amperes (normal and emergency) **2330/2679**
- Positive Sequence Resistance ( R ): **0.000371** p.u.** (for entire line length)
- Positive Sequence Reactance: ( X ): **0.004855** p.u.** (for entire line length)
- Zero Sequence Resistance ( R0 ): **0.002294** p.u.** (for entire line length)
Zero Sequence Reactance: \( \text{X}_0 \) : \( 0.016444 \) p.u** (for entire line length)
Line Charging \( (B/2) \): \( 0.005355 \) p.u**
** On 100-MVA and nominal line voltage (kV) Base

10a. For Wind/photovoltaic plants, provide collector System Equivalence Impedance Data
Provide values for each equivalence collector circuit at all voltage levels.

Nominal Voltage: ____
Summer line ratings in amperes (normal and emergency) ____
Positive Sequence Resistance \( (R_1) \): ____ p.u. ** (for entire line length of each collector circuit)
Positive Sequence Reactance \( (X_1) \): ____ p.u** (for entire line length of each collector circuit)
Zero Sequence Resistance \( (R_0) \): ____ p.u. ** (for entire line length of each collector circuit)
Zero Sequence Reactance: \( (X_0) \): ____ p.u** (for entire line length of each collector circuit)
Line Charging \( (B/2) \): ____ p.u** (for entire line length of each collector circuit)
** On 100-MVA and nominal line voltage (kV) Base

11. Inverter-Based Machines

Number of inverters to be interconnected pursuant to this Interconnection Request: ____

Inverter manufacturer, model name, number, and version:
____

List of adjustable set points for the protective equipment or software:
____

Maximum design fault contribution current:
____

Harmonics Characteristics:
____

Start-up requirements:
____

Note: A completed General Electric Company Power Systems Load flow (PSLF) data sheet must be supplied with the Interconnection Request. If other data sheets are more appropriate to the proposed device then they shall be provided and discussed at the Scoping Meeting.

12. Load Flow and Dynamic Models:

Provide load flow model for the generating plant and its interconnection facilities in GE PSLF *.epc format, including new buses, generators, transformers, interconnection facilities. An equivalent model is required for the plant with generation collector systems. This data should reflect the technical data provided in this Attachment A.

For each generator, governor, exciter and power system stabilizer, select the appropriate dynamic model from the General Electric PSLF Program Manual and provide the required input data. For inverter based generating facilities, select the appropriate generator and control models form the General Electric PSLF Program Manual and provide the required input data. Provide a completed *.dyd file that contains the information specified in this section. One copy of this data should be provided on DVD, CD, or USB flash drive media.

If you require assistance in developing the models, we suggest you contact General Electric. Accurate models are important to obtain accurate study results. Costs associated with any changes in facility
requirements that are due to differences between model data provided by the generation developer and the actual generator test data, may be the responsibility of the generation developer.
TABLE 1

TRANSFORMER DATA
(Provide for each level of transformation)

UNIT CT- Generator Step-Up (GSU)

NUMBER OF TRANSFORMERS Two PHASE Three Phase X/R ratio = 41

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<th>H Winding</th>
<th>X Winding</th>
<th>Y Winding</th>
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</thead>
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<tr>
<td>Rated MVA</td>
<td>180/240/300</td>
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<td></td>
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<tr>
<td>Connection (Delta, Wye, Gnd.)</td>
<td>Gnd Wye</td>
<td>Delta</td>
<td></td>
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<tr>
<td>Cooling Type (OA,OA/FA, etc) :</td>
<td>OA/OA/FA</td>
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<td></td>
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<tr>
<td>Temperature Rise Rating</td>
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<td>65 degC</td>
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</tr>
<tr>
<td>Rated Voltage</td>
<td>230kV</td>
<td>18kV</td>
<td></td>
</tr>
<tr>
<td>BIL</td>
<td>825kV</td>
<td>150kV</td>
<td></td>
</tr>
<tr>
<td>Available Taps (% of rating)</td>
<td>+/-5% @ 2.5% steps</td>
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<td></td>
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<tr>
<td>Load Tap Changer? (Y or N)</td>
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<td>Tap Settings</td>
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<th>H-Y</th>
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<td>Percent</td>
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<tr>
<td>MVA Base</td>
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<tr>
<td>Tested Taps</td>
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<th>X</th>
<th>Y</th>
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<tbody>
<tr>
<td>Ohms</td>
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</table>

CURRENT TRANSFORMER RATIOS

H____   X____   Y____   N____

Percent exciting current at 100% Voltage _____ 110% Voltage _____

Supply copy of nameplate and manufacture’s test report when available

Updated: 04/11/2014
| TABLE 1 | TRANSFORMER DATA  
Provide for each level of transformation |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>UNIT</td>
<td>ST- Generator Step-Up (GSU)</td>
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<tr>
<td>NUMBER OF TRANSFORMERS</td>
<td>One</td>
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<tr>
<td>PHASE</td>
<td>Three Phase X/R ratio = 49</td>
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<table>
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<th>H Winding</th>
<th>X Winding</th>
<th>Y Winding</th>
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<tbody>
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**IMPEDEANCE**

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<tr>
<td>Tested Taps</td>
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**WINDING RESISTANCE**

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<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohms</td>
<td>TBD</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CURRENT TRANSFORMER RATIOS**

H_____ X_____ Y_____ N_____

Percent exciting current at 100% Voltage _____ 110% Voltage _____

Supply copy of nameplate and manufacture’s test report when available

Updated: 04/11/2014