APPENDIX 1 to the GIP

INTERCONNECTION REQUEST FOR A GENERATING FACILITY

Provide two copies of this completed form pursuant to GIP Appendix 1 Section 7 below.

1. The undersigned Interconnection Customer submits this request to interconnect its Generating Facility with the Distribution Provider's Distribution System (check one):
   - ☐ Fast Track Process.
   - ☐ Independent Study Process.
   - ☐ Cluster Study process.
   - ☐ Annual Deliverability Assessment pursuant to GIP Section 4.7

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 Deliverability Capacity (For Independent Study Process and Cluster Study Process only. Note – Deliverability analysis for Independent Study Process is conducted with the next annual Cluster Study – See GIP Section 3.7)
   - ☐ 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:_____

      Project Location:_____

      Street Address:_____

      City, State:_____

      County:_____

      Zip Code:_____

      GPS Coordinates:_____

b. Maximum net megawatt electrical output (as defined by Section 2.C of Attachment A to this Appendix 1) of the proposed new Generating Facility or the amount of net megawatt increase in the generating capacity of an existing Generating Facility (Note: All "MW" references in this Attachment shall be alternating current (AC) only unless otherwise noted):

• Maximum net megawatt electrical output: _____ (MW)

"OR"

• Net Megawatt increase: _____ (MW)

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)
☐ Solar _____ (MW)

☐ Photovoltaic Crystalline
☐ Concentrated Solar PV
☐ Thin Film
☐ Solar-Thermal
☐ Other: _____

• Installation Type: ☐ Ground ☐ Pole ☐ Rooftop ☐ Other
• Tracking: ☐ N/A ☐ 1-Axis ☐ 2-Axis

☐ Combined Cycle _____ (MW)

☐ Other _____ (MW)

Please describe Other above:

_____

General description of the equipment configuration (e.g. number, size, type, etc.)

_____

_____

d. Proposed In-Service Date, Trial Operation date and Commercial Operation Date by day, month, and year and term of service (dates must be sequential):

- Proposed In-Service Date: _____
- Proposed Trial Operation Date: _____
- Proposed Commercial Operation Date: _____
- Proposed Term of Service (years): _____

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

Name: _____
Title: _____
Company Name: _____
Street Address: _____
City, State: _____
Zip Code: _____
Phone Number: _____
Fax Number: _____
Email Address: _____
DUNS Number: _____

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

g. Interconnection Customer Generating Facility Data (set forth in Attachment A).

The Interconnection Customer shall provide to the Distribution Provider the technical data called for in GIP Attachment A to Appendix 1. Two (2) copies are required.

5. Applicable deposit amount as specified in the GIP made payable to San Diego Gas & Electric Company. Please DO NOT include any checks/monies with this Interconnection Request! Upon receipt of your Interconnection Request, Distribution Provider will send a separate invoice for the applicable processing fee. Any checks/monies submitted with an Interconnection Request will be returned to the sender and may result in delaying the application process.

Please send the following separate from any required deposit amounts.

a. Appendix 1 to GIP (Interconnection Request) for processing.
b. Attachment A to Appendix 1 (Interconnection Request Generating Facility Data).

6. Please attach evidence of Site Exclusivity as specified in the GIP and name(s), address(es) and contact information of site owner(s).

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

San Diego Gas and Electric Company
Attention: Customer Generation
8316 Century Park Court CP52F
San Diego, CA 92123-1582
Telephone Number: 858-636-5581
Fax: 619-819-4448
E-Mail Address: **WDATGIPAPPLICATIONS@semprautilities.com**

8. Representative of the Interconnection Customer to contact:

[To be completed by the Interconnection Customer]

Name:_____

Title:_____

Company Name:_____

Street Address:_____

City, State:_____

Zip Code:_____

Phone Number:_____

Fax Number:_____

Email Address:_____

9. This Interconnection Request is submitted by:

Legal name of the Interconnection Customer:_____

By (signature):_____

Name (type or print):_____

Title:_____

Date:_____

ATTACHMENT A to GIP APPENDIX 1:

Interconnection Request for a Generating Facility

GENERATING FACILITY DATA

Provide two copies of this completed form pursuant to Appendix 1 Section 7 of Interconnection Request.

Each Interconnection Customer will complete Sections 1 and 2 of this Attachment A.

Each Interconnection Customer will complete the applicable data in Sections 3 through 6 of this Attachment A based on the type of generating facility(ies) requesting interconnection. (Section 3 for synchronous generators, Section 4 for induction generators, Section 5 for wind turbine generators, and Section 6 for inverter-based generators).

Each Interconnection Customer will complete Sections 7 through 10, as applicable.

At any time, Distribution Provider may require Interconnection Customer to provide additional technical data, or additional documentation supporting the technical data provided, as deemed necessary by the Distribution Provider to perform Interconnection Studies, other studies, or evaluations as set forth under the GIP.

1. Provide two original prints (11"x17" size ONLY, no substitutes) and one reproducible copy of the following:

A. Site drawing to scale, showing generator location and Point of Interconnection with the Distribution Provider's Distribution System.

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 System Protection Facilities and circuit breakers. For wind and photovoltaic generator projects, 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 Distribution Provider's Distribution System. This one-line drawing must be signed and stamped by a licensed Professional Engineer if the Generating Facility is larger than 50 kW.

2. Generating Facility General Information:

A. Total Generating Facility rated output (MW): _____

B. Generating Facility auxiliary Load (MW): _____

C. Project net capacity (MW): _____

D. Standby Load when Generating Facility is off-line (MW): _____

E. Number of Generating Units: _____

(Please repeat the following items for each generator)

F. Individual generator rated output (MW for each unit): _____

G. Type (induction, synchronous, D.C. with inverter): _____

H. Phase (3 phase or single phase): _____

3. Synchronous Generator –Information:

3A. Generator Information:

(Please repeat the following for each generator)

A. Manufacturer: _____

B. Year Manufactured:_____

C. Rated Generator speed (rpm):_____

D. Rated MVA: _____

E. Rated Terminal Voltage (kV): _____

F. Rated Generator Power Factor: _____

G. Generator Efficiency at Rated Load (%): _____

H. Moment of Inertia (including prime mover): _____

I. Inertia Time Constant (on machine base) H: _____ sec or MJ/MVA

J. 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): _____

K. Please attach generator reactive capability curves.

L. Rated Hydrogen Cooling Pressure in psig (Steam Units only): _____

M. 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.

3B. Excitation System Information:

(Please repeat the following for each generator)

A. Indicate the Manufacturer _____ and Type _____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: _____

E. Maximum exciter output voltage (ceiling voltage): _____

F. Other comments regarding the excitation system?

_____

_____

3C. Power System Stabilizer (PSS) Information (if applicable):

(Please repeat the following for each generator)

A. Manufacturer: _____

B. Is the PSS digital or analog? _____

C. Note the input signal source for the PSS:

Bus frequency _____ Shaft speed _____

Bus Voltage _____ Other (specify source) _____

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?

_____

_____

3D. Turbine-Governor Information:

(Please repeat the following for each generator)

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):_____

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

(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:_____%

High pressure turbine or steam turbine:_____%

(4) 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:_____

B. Hydro turbines:

(1) Turbine efficiency at rated load: _____%

(2) Length of penstock: _____ft

(3) Average cross-sectional area of the penstock: _____ft^2

(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: _____ft^3/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: _____

(2) Maximum turbine power output: _____MW

(3) Minimum turbine power output (while on line): _____MW

(4) Governor information:

(a) Droop setting (speed regulation): _____

(b) Is the governor mechanical-hydraulic or electro-hydraulic (Electro-hydraulic governors have an electronic speed sensor and transducer)? _____

(c) Other comments regarding the turbine governor system?

_____

_____

3E. Short Circuit Duty Information:

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

• Xd – Direct Axis Synchronous Reactance: _____ p.u.

• X'd – Direct Axis Transient Reactance: _____ p.u.

• X"d – Direct Axis Subtransient Reactance: _____ p.u.

• R_2 – Negative Sequence Resistance: _____ p.u.

• X_2 – Negative Sequence Reactance: _____ p.u.

• R_1 – Positive Sequence Resistance: _____ p.u.

• X_1 – Positive Sequence Reactance: _____ p.u.

• R_0 – Zero Sequence Resistance: _____ p.u.

• X_0 – Zero Sequence Reactance: _____ p.u.

Generator Grounding (select one for each model):

A. _____ Solidly grounded

B. _____ Grounded through an impedance

(Impedance value in p.u. on generator base. R:_____p.u. X:_____p.u.)

C. _____ Ungrounded

4. Induction Generator Information:

(Please repeat the following for each generator)

A. Motoring Power (kW): _____

B. I_2^2t or K (Heating Time Constant): _____

C. Rotor Resistance, (Rr): _____ ohms

D. Stator Resistance, (Rs): _____ ohms

E. Stator Reactance, (Xs): _____ ohms

F. Rotor Reactance, (Xr): _____ ohms

G. Magnetizing Reactance, (Xm): _____ ohms

H. Short Circuit Reactance,(Xd"): _____ ohms

I. Exciting Current: _____

J. Temperature Rise (deg C^0): _____

K. Frame Size: _____

L. Design Letter: _____

M. Reactive Power Required (No Load): _____ Vars

N. Reactive Power Required (Full Load): _____ Vars

O. Total Rotating Inertia, H: _____ p.u. on kVA Base

5. Wind Turbine Generator (WTG) Information:

(Proposed projects may include one or more WTG types. Please repeat the following for each type of WTG).

A. WTG Manufacturer and Model: _____

B. Number of WTGs: _____

C. WTG Type (check one):

____Type 1 (Squirrel-cage induction generator)

____Type 2 (Wound rotor induction machine with variable rotor resistance)

____Type 3 (Doubly-fed asynchronous generator)

____Type 4 (Full converter interface)

D. Nameplate Rating (each WTG): _____/_____ kW/kVA

E. Rated Terminal Voltage: _____ kV

F. For Type 1 or Type 2 WTGs:

(1) uncompensated power factor at full load: _____

(2) power factor correction capacitors at full load: _____MVAR

(3) number of shunt stages and size: _____

(4) Please attach capability curve describing reactive power or power factor range from no output to full rated output, including the effect of shunt compensation.

G. For Type 3 or Type 4 WTGs:

(1) Maximum under-excited power factor at full load: _____

(2) Maximum over-excited power factor at full load: _____

(3) Control mode: _____ (voltage control, fixed power factor)

(4) Please attach capability curve describing reactive power or power factor range from no output to full rated output.

H. Short Circuit Characteristics: Applicant to provide technical data related to the short circuit characteristics of proposed WTGs for short circuit duty study modeling purposes. For example, the applicant can provide manufacturer short circuit test data showing faulted condition for three phase and single-line-to-ground fault.

Distribution Provider may require testing verification of voltage and harmonic performance during commissioning test of WTG based generation projects.

6. Inverter Based Generation Systems Information:

The Distribution Provider may require inverter-based equipment to provide a range of grid support functions and associated communications interface, as deemed necessary by the Provider. Typical inverter functions that may be required include but not limited to the following:

I. Interaction with Distribution Provider (Response to commands from Distribution Provider)

i. Real-time power production on demand (kW and kVars)

ii. For renewable Distributed Energy Resources (DER), limit

power output or disconnect when directed

iii. Real-time voltage regulation per direction from utility

iv. Real-time P.F. (reactive power) operation per direction from utility

v. Operating status reporting from specific DER to utility when requested

vi. Real-time DER management by CAISO Automatic Generation

Control (AGC) mechanisms when directed

II. Autonomous Reactions (Use of pre-set modes and schedules to direct local operation)

i. Local voltage regulation within pre-set limits

a. Normal conditions voltage regulation

b. Sudden voltage change regulation

ii. Local load following or renewable DER smoothing using pre-set mode

iii. Low voltage ride through for certain conditions in excess of IEEE1547 limits

iv. Pre-set response to voltage anomalies related to fault ride-through conditions

v. Pre-set response to frequency disturbances

vi. Disconnect from the utility grid for pre-defined conditions

vii Operation in compliance with pre-defined schedules

viii.Event / history logging

Proposed inverter based generation projects may include one or more types of inverters.

(Please repeat the following for each type of inverter)

A. Inverter Manufacturer and Model: _____

B. Number of Inverters: _____

C. Nameplate Rating (AC, each inverter): _____/_____ kW

D. Nameplate Voltage Rating (AC): _____ kV and Voltage output range:____VAC to _____VAC

E. Maximum AC line current: _____ Amps

F. Individual Generator Power Factor

Rated Power Factor: Leading:_____ Lagging:_____

G. Please attach capability curve describing reactive power or power factor range from no output to full rated output

H. Inverter control mode (e.g. voltage, power factor, reactive power): _____

I. Short Circuit Characteristics: Applicant to provide equivalent impedance to use for short circuit modeling: _____p.u.

J. Harmonics Characteristics:

(1) Inverter switching frequency: _____

(2) Harmonic characteristics for each unit up to switching frequency: _____

(3) Harmonic characteristics for aggregate generation facility: _____

K. Maximum Ramp-up Rate: _____% generation capacity per minute

Distribution Provider may require testing verification of voltage and harmonic performance during commissioning test of the inverter based generation systems.

7. Step-Up Transformer Data:

For each step-up transformer (e.g. main step-up transformers, padmount transformers), fill out the data form provided in Table 1. Applicant shall attach a copy of fuse manufacturer's minimum melt and total clearing Time-Current curves.

Manufacturer:_____ Type: _____ Size:_____

8. Line Data:

For distribution lines that are to be planned by the generation developer, please provide the following information:

Nominal Voltage (High Side): _____ kV

Line Length (miles): _____

Conductor Type: _____ Size: _____

Positive Sequence Resistance (R_1): _____ p.u.** (for entire line length)

Positive Sequence Reactance: (X_1): _____ p.u.** (for entire line length)

Zero Sequence Resistance (R_0): _____ p.u.** (for entire line length)

Zero Sequence Reactance: (X_0): _____ p.u.** (for entire line length)

Line Charging (B/2): _____ p.u.**

** On 100-MVA and nominal line voltage (kV) Base

9. Model Data:

For Synchronous base generation, Applicant shall provide block diagrams for the governor, exciter, and mechanical drive and associated parameters. For inverter base

generation, Applicant shall provide voltage control block diagram with parameters (i.e. time constants, gain and dead band settings).

TABLE 1

TRANSFORMER DATA
(Provide for each level of transformation)

UNIT_____

NUMBER OF TRANSFORMERS_____ PHASE _____

RATING	H Winding	X Winding	Y Winding
Rated MVA	_____	_____	_____
Connection (Delta, Wye, Gnd.)	_____	_____	_____
Cooling Type (OA,OA/FA, etc) :	_____	_____	_____
Temperature Rise Rating	_____	_____	_____
Rated Voltage	_____	_____	_____
BIL	_____	_____	_____
Available Taps (% of rating)	_____	_____	_____
Load Tap Changer? (Y or N)	_____	_____	_____
Tap Settings	_____	_____	_____

IMPEDANCE	H-X	H-Y	X-Y
Percent	_____	_____	_____
MVA Base	_____	_____	_____
Tested Taps	_____	_____	_____
WINDING RESISTANCE	H	X	Y
Ohms	_____	_____	_____

CURRENT TRANSFORMER RATIOS

H_____ X_____ Y_____ N_____

PERCENT EXCITING CURRENT 100 % Voltage: _____ 110% Voltage_____