APPENDIX 1 to SGIP

Interconnection Request for a Generating Facility

1. The undersigned Interconnection Customer submits this request to interconnect its Generating Facility with Transmission Provider's Transmission System pursuant to the Tariff. Capitalized terms used but not defined herein shall have the meanings given to them in the SGIP.

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

3. The type of interconnection service requested (check one):
   _____ Energy Resource Interconnection Service
   _____ Network Resource Interconnection Service

4. _____ Check here only if Interconnection Customer requesting Network Resource Interconnection Service also seeks to have its Generating Facility studied for Energy Resource Interconnection Service.

5. Interconnection Customer provides the following information:

   (a) Address or location or the proposed new Generating Facility site (to the extent known) or, in the case of an existing Generating Facility, the name and specific location of the existing Generating Facility;

(b) Maximum summer at ____ degrees C and winter at _____ degrees C megawatt electrical output of the proposed new Generating Facility or the amount of megawatt increase in the generating capacity of an existing Generating Facility;

(c) General description of the equipment configuration;

(d) Commercial Operation Date (Day, Month, and Year);

(e) Name, address, telephone number, fax number and e-mail address of Interconnection Customer's contact person;

(f) Approximate location of the proposed Point of Interconnection (optional); and

(g) Interconnection Customer Data (set forth in Attachment A)

(h) Primary frequency response operating range for electric storage resources.

(i) Requested capacity (in MW) of Interconnection Service (if lower than the Generating Facility Capacity).

6. Applicable deposit amount as specified in the SGIP.

7. Evidence of Site Control as specified in the SGIP (check one)
____ Is attached to this Interconnection Request
____ Will be provided at a later date in accordance with the SGIP

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

BC Hydro

Attention: <*>

Telephone: <*>

Facsimile: <*>
Email: <*>

9. Representative of Interconnection Customer to contact:

[To be completed by Interconnection Customer]

Telephone: <*>

Facsimile: <*>

Email: <*>

10. This Interconnection Request is submitted by:

Attachment A
To Appendix 1
Interconnection Request

DATA REQUIREMENTS FOR GENERATOR INTERCONNECTION

Interconnection Customers must submit the applicable data submission form provided in the Transmission Provider's Business Practices identified to be submitted as Attachment A to Appendix 1 Interconnection Request. The data that the Transmission Provider may require in the data submission forms in order to assess the Interconnection Request is set out below. The definition and explanation of the data may be found in the Generator Interconnection Equipment Statement(s) and Technical Interconnection Requirements of the Transmission Provider's Business Practices.

1. Site Location and Point of Interconnection

All Interconnection Customers will be required to submit a site location map, which shall include all generating sites of a project, the point of interconnection (POI), and the transmission line(s) to connect the project into the system at POI. The locations of generating sites, new substations, or new taps on existing lines must also be shown on the map and located by latitude and longitude. On the site location map, the Interconnection Customer shall:

(a) Identify the substation(s), if connecting to an existing BC Hydro substation(s), or

(b) Identify the line by name (such as 2L1) as well as the location of the proposed interconnection, if connecting to an existing BC Hydro transmission line.

The Interconnection Customer will also be required to provide a site layout plan.

2. Electrical Data

The required electrical data must be submitted by a registered professional engineer in the APEGBC.

2.1 One-Line Diagram

All Interconnection Customers will be required to provide a one-line diagram that includes major station equipment (such as generators, transformers, station load, breakers, disconnects, capacitors, reactors, surge arrestors, current transformers, voltage transformers, capacitive voltage transformers), equipment ratings, transformer configuration, generator configuration and grounding, and bus arrangement.

The Interconnection Customer will also be required to provide a protection one-line diagram showing metering and relaying.

2.2 Generator Data

If one or more generators are included, the following data for each different type of generator and generator step up transformer may be required to be provided by the Interconnection Customer. For wind turbine generators, models of all control schemes must be submitted in PSS/E and EMTP formats.

(a) Generator General Specifications

1. Energy source (e.g., hydro, thermal, wind, combined cycle.) and energy profile in a typical year, and/or typical daily pattern for wind.
2. Number of rotating generators with power factor, MW and MVAR ratings.
3. Number of turbines, combustion, steam, wind, hydro, etc.
4. Maximum output in winter, spring and summer, MW.
5. Maximum injected MW's at the POI.

6. Station service load for auxiliaries, MW, MVAR.
7. Station service connection plan.

(b) Generator Data, Synchronous Machines

The Transmission Provider may require the following data for each different generator assembly:

1. Reactive capability, 'P-Q' curves;
2. Excitation 'Vee' curves;
3. Saturation and synchronous impedance curves;
4. Identifier (e.g., Generator unit number);
5. Number of similar generators;
6. Complex power, MVA;
7. Active power, MW;
8. Terminal voltage, kV;
9. Machine parameters:
    a. Sb – Power base (MVA) upon which machine data is specified;
    b. H – Total inertia constant of the generator and turbine, MWs/MVA;
    c. Ra – Armature resistance, pu;
    d. Xd – Direct axis unsaturated synchronous reactance, pu;
    e. Xq – Quadrature axis unsaturated synchronous reactance, pu;
    f. X'd – Direct axis unsaturated transient reactance, pu;
    g. X'q – Quadrature axis saturated and unsaturated transient reactance, pu;
    h. X"d – Direct axis saturated and unsaturated subtransient reactance, pu;
    i. Xlm – Stator leakage reactance, pu;
    j. T'do – Direct axis transient open circuit time constant, seconds;

k. T'qo – Quadrature axis transient open circuit time constant, seconds;

l. T"do – Direct axis subtransient open circuit time constant, seconds;

m. T"qo – Quadrature axis subtransient open circuit time constant, seconds;

n. S(1.0) – Saturation factor at rated terminal voltage; and

o. S(1.2) – Saturation factor at 1.2 per unit of rated terminal voltage;

10. Excitation system modeling information with reference to standard types as specified in PTI PSS/E model library:

a. Type (static, ac rotating, etc.);

b. Maximum/Minimum dc current;

c. Maximum/Minimum de voltage;

d. Nameplate information;

e. Block diagram with control parameter settings; and

f. Power System Stabilizer (PSS) type and settings;

11. Speed governor information with detailed modeling information with reference to standard types as specified in PTI PSS/E model library for each turbine:

a. Turbine type (hydro, thermal, wind);

b. Total capacity, MW (available peak operation rating);

c. Number of stages;

d. Manufacturer and model, if known;

e. Frequency vs. time operational limits, seconds at Hz;

f. Maximum turbine ramping rates, MW/minute, ramp up and ramp down;

(c) Generator Data, Asynchronous Machines

The Transmission Provider may require the following data for each different generator assembly:

1. Shunt reactive compensation devices for power factor correction with induction generators or converters:
   a. Power Factor without compensation;
   b. Power Factor with full compensation;
   c. Reactive power of shunt compensation voltage, kVar; and
   d. Type and model (if required) of shunt compensation device.
2. AC/DC Converter devices employed with certain types of induction motor installations or with DC sources.
   a. Number of converters;
   b. Nominal ac voltage, kV;
   c. Capability to supply or absorb reactive power, MVAR;
   d. Converter manufacturer, model name, number, version; and
   e. Rated/Limitation on Fault current contribution, kA.
3. Machine parameters:
   a. Sb – Power base (MVA) upon which machine data is specified;
   b. H – Total inertia constant of generator and turbine, MWs/ MVA;
   c. Ra – Armature resistance, pu;
   d. Xd – Direct axis saturated and unsaturated synchronous reactance, pu;
   e. X'd – Direct axis saturated and unsaturated transient reactance, pu;
   f. X"d – Direct axis saturated and unsaturated subtransient reactance, pu;
   g. XI – Stator leakage reactance, pu;
   h. T'do – Direct axis transient open circuit time constant, seconds;

i. T”do – Direct axis subtransient open circuit time constant, seconds;
j. S(1.0) – Saturation factor at rated terminal voltage, A/A;
k. S(1.2) – Saturation factor at 1.2 per unit of rated terminal voltage, A/A;
l. Vt – Voltage threshold for tripping, pu;
m. Vr – Voltage at which reconnection is permitted, pu;
n. Tv – Pickup time for voltage-based tripping, seconds;
o. Tvr – Time delay for reconnection, seconds;
p. Ft – Frequency threshold for tripping, Hz;
q. Tf – Pickup time for frequency-based tripping, seconds;
r. Reactive power required at no load, MVAR; and
s. Reactive power required at full load, MVAR.

4. External Shunt Compensation:
   a. Bus Voltage;
   b. Number and rating of each shunt capacitor section; and
   c. Voltage/PF controller scheme description and time delays.

2.3 Load Information Requirements

The Transmission Provider may require the following information regarding the plant load:

(a) Delivery voltage, kV;
(b) Power factor;
(c) Transformer data including high and low voltage levels and impedances.

2.4 Transformer Data

If one or more power transformers are included as part of the proposed connection, the Transmission Provider may require the following data for each unique transformer:

(a) Transformer number or identifier;

(b) Number of similar transformers;

(c) Transformer type and number of windings, (e.g. two winding);

(d) Transformer winding data. For a two winding transformer, only winding H and L data is required.

1. For each winding, H, L, y: (y=tertiary):
   a. Nominal voltage, kV; and
   b. Configuration (Δ or Y) and Y winding connection (ungrounded, solid ground or impedance ground).
2. Transformer MVA ratings:
   a. Winding H, MVA;
   b. Winding L, MVA; and
   c. Winding y, MVA.
3. Transformer impedances, positive and zero sequence:
   a. Winding H to L, % X and R at MVA;
   b. Winding H to Y, % X and R at MVA; and
   c. Winding L to Y, % X and R at MVA.
4. Transformer tap changer information:
   a. No load or load;
   b. Tap changer winding location, H, L, Y; and
   c. Available taps.
5. Transformer cooling requirements if required from BC Hydro:
   a. Load, amps; and

b. Voltage, single or three phase, volts.

2.5 Transmission Line / Cable Data

If a new transmission line or cable is to be included as part of the proposed connection, the Transmission Provider may require the following data:

(a) Nominal operating voltage, kV;
(b) Line length, km and routes shown in map;
(c) Line capacity, amps at ºC;
(d) Overhead/underground construction including conductor type; and
(e) Positive and zero sequence transmission line data in physical units:
    1. Series resistance, R Ω;
    2. Series reactance, X Ω; and
    3. Shunt susceptance, B μ S (or μ Ω –1).

3. Plant Data

The Transmission Provider may require the following information regarding the plant.

(a) Plant designation;
(b) Maximum inject Power (Facility Interconnection Capacity) into the Transmission Provider system;
(c) Contracted capacity to BC Hydro (if applicable);
(d) Total Plant generating capacity;
(e) Total number of generators in the Plant;
(f) Total number of generator transformers in the Plant;
(g) Total Plant Load (MW);
(h) Total Plant Load (MVar);
(i) Total Plant Motor Load;

(j) Total Plant Static Load;

(k) Total Plant Static Load power factor;

(l) Total Plant Reactive compensation;

(m) Ground Grid resistance;

(n) Plant restoration time immediately following a self restoring fault or upset on the transmission line;

(o) Bus length from generation to interconnection station;

(p) Line length from interconnection station to Transmission Provider's transmission line;

(q) Tower number – observed in the field and painted on tower leg;

(r) Number of third party easements required for transmission lines;

(s) Black Start Capability (yes/no);

(t) Is the Generating Facility in the Transmission Provider's service area (yes/no);

1. If no, provide name of Local Provider

(u) Maximum Summer plant output;

(v) Maximum Winter plant output;

(w) Maximum Spring plant output.

4 Primary frequency response operating range for electric storage resources:

(a) Minimum State of Charge:

(b) Maximum State of Charge: