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APPENDIX 2D

ENERGY

1. INTERPRETATION

1.1 Definitions

In this Appendix, in addition to the definitions set out in Schedule 1 of this Agreement:

“Cooling Degree Days” for a period means the figure calculated by the Site Weather Monitoring Stations and pursuant to Section 2.3 of this Appendix setting out the extent to which the average outdoor temperature during that period at the Site was less than a mean temperature of +18 degrees Celsius;

“Design and Construction Energy Target” means 45,866 GJ per year;

“Energy” means electricity, steam, gas, oil, coal and any other fossil-based fuel;

“Energy Consumption” for a period means the total number of equivalent Gigajoules of Energy actually consumed at the Facility during that period;

“Energy Model” means an hourly energy simulation produced using software and modelling methods approved by CaGBC for the purposes of LEED Canada 1.0;

“Environmental Credit” means any income, credit, right, benefit or advantage relating to environmental matters including type and level of emissions, means of production of Energy, input sources and compliance with any environmental laws, regulations, rules or orders;

“Gigajoule” or **“GJ”** means the international unit of energy being 1,000,000,000 Joules;

“Heating Degree Days” for a period means the figure calculated by the Site Weather Monitoring Stations and pursuant to Section 2.3 of this Appendix setting out the extent to which the average outdoor temperature during that period at the Site was greater than a mean temperature of +18 degrees Celsius;

“Monitoring Period” means the period commencing on the Service Commencement Date and ending on the last day of the calendar month in which the second anniversary of the Service Commencement Date occurs;

“Site Weather Monitoring Station” means the properly calibrated weather monitoring stations acceptable to the Authority to be installed by Project Co prior to the commencement of the Monitoring Period in accordance with Section 2.3 of this Appendix;

“Test Period” means the 12 month period commencing on the first day of the calendar month that is at least 6 months after the Service Commencement Date; and

“Weather Data” means the record by the Site Weather Monitoring Station of daily temperature and the calculation of the extent to which the average outdoor temperature during that day was greater or less than a mean temperature of +18 degrees Celsius.

2. ENERGY SUPPLY AND CONSUMPTION

2.1 Energy Supply and Payment

The Authority will from time to time as required enter into contracts with Energy suppliers for the supply of Energy to the Facility, and will be responsible for all payments related to such contracts. Without limiting Project Co's obligations in Appendix 4F [Utilities Management Services], Project Co will administer such contracts, including dealing with suppliers to resolve issues from time to time, and will provide such other reasonable assistance related to such contracts as may be requested by the Authority.

2.2 Energy Incentive Programs

Project Co will, on behalf of the Authority, apply to the BC Hydro Power Smart New Construction Program (and any other applicable energy incentive programs) and take all reasonable steps to obtain for the Authority the maximum benefits (funding, incentives and cost savings) offered by BC Hydro under such program(s). Without limitation, Project Co will:

- (a) meet with BC Hydro at an early stage of the design of the Facility;
- (b) by January 15, 2011, prepare and deliver to BC Hydro and the Authority the proposal required by BC Hydro for the energy studies and energy simulation model described in Section 2.2(c) of this Schedule;
- (c) within 30 Business Days of acceptance of the proposal by BC Hydro, carry out any required energy studies and prepare and deliver to the Authority and BC Hydro a building energy simulation model (developed in accordance ASHRAE Standard 90.1, 2004, Appendix G) to establish baseline energy use for the purpose of measuring electrical savings achieved through the program;
- (d) collaborate with BC Hydro to identify potential improvements to the Facility design that will achieve greater energy efficiency; and
- (e) revise the Facility design as required to improve energy efficiency (to the extent possible without materially changing the Design and Construction Specifications or the intent of the Proposal Extracts (Design and Construction)), and use all reasonable efforts to obtain for the Authority the maximum funding or incentives offered by BC Hydro and minimize the Authority's energy costs during the Operating Period.

2.3 Weather Data Monitoring and Measurement of Energy Consumption

Prior to the commencement of the Monitoring Period, Project Co will install the Site Weather Monitoring Stations on the Site to record and monitor Weather Data and to calculate the Heating Degree Days and Cooling Degree Days.

Project Co will install equipment to record and monitor consumption of each type of Energy in the Facility. Such equipment must be suitable and properly calibrated to enable a detailed monitoring of Energy trends and consumption to allow analysis of the data collected to enable various matters, including:

- (a) comparisons to be made with the declared energy targets; and
- (b) early warning of malfunctions and deviations from norms.

Project Co will secure all such properly recorded information so that it is not lost or degraded as a result of any equipment or service malfunctions, and will secure such information from any adjustment, modification or loss from any source.

2.4 Energy Consumption Certificate

Promptly after the end of each month following the Service Commencement Date, Project Co will deliver to the Authority a certificate showing:

- (a) the Energy Consumption in Gigajoules for each type of Energy in that month;
- (b) the Heating Degree Days or Cooling Degree Days for that month;
- (c) building occupancy; and
- (d) any other variable that affects the Energy Consumption relative to the energy model assumptions set out in Attachment 1 to this Appendix.

3. DESIGN AND CONSTRUCTION ENERGY GUARANTEE

3.1 Facility to Meet or Beat Design and Construction Energy Target

Project Co warrants to the Authority that the Facility will be designed and constructed so that the Energy Consumption per year will not exceed the Design and Construction Energy Target. The consequences to Project Co for breach of this warranty are limited to those set out in Section 3.4 of this Appendix.

3.2 Monitoring of Energy Consumption

During the Monitoring Period and the Test Period, Project Co and the Authority will monitor Energy Consumption in order to determine the Energy Consumption for the Monitoring Period and the Test Period.

3.3 Adjustment to Energy Consumption

Project Co represents that the Design and Construction Energy Target was projected by an Energy Model using the energy model assumptions set out in Attachment 1 to this Appendix.

Within 2 years after Service Commencement, Project Co will engage an independent energy consultant acceptable to the Authority, acting reasonably, to determine whether and to what extent the Energy Consumption for the Test Period should be adjusted based on factors which, in the energy consultant's professional opinion, are applicable, including actual climate conditions, occupancy, equipment use and Authority controlled effects during the Test Period, and differ from the factors taken into account in the energy model assumptions set out in Attachment 1 to this Appendix.

3.4 Failure to Achieve Design and Construction Energy Target

If the Energy Consumption in the Test Period (as may be adjusted pursuant to Section 3.3 of this Appendix) exceeds the Design and Construction Energy Target, then Project Co will do one of the following:

- (a) modify the Facility as required so that annual Energy Consumption does not exceed the Design and Construction Energy Target, subject to compliance with the Design and Construction Specifications and the approval of such modifications by the Authority, not to be unreasonably withheld or delayed; or
- (b) pay to the Authority a lump sum amount that the Authority agrees, acting reasonably, represents the lesser of \$1,000,000 and the net present value of the cost to the Authority during the expected life of the Facility of the amount by which Energy Consumption will exceed the Design and Construction Energy Target, on the assumption that the excess in the Monitoring Period will continue for the balance of the expected life of the Facility, and if this Section 3.4(b) is applied the provisions of Schedule 9 [Compensation on Termination] will be amended as necessary to ensure that the Authority will not, as a consequence of the application of this Section 3.4(b), face any additional liability upon early termination of this Agreement.

4. ENVIRONMENTAL CREDITS

4.1 Entitlement to Environmental Credits

The Authority will be entitled to any and all Environmental Credits related to the Facility and its operation.

ATTACHMENT 1

ENERGY MODEL ASSUMPTIONS

Project Co used the following energy model assumptions to determine the Design and Construction Energy Target:

- (a) model the building for LEED Canada NC 1.0 EAp2 and EAc1 compliance using either the ASHRAE/IESNA 90.1-1999 or the MNECB/CBIP compliance path;
- (b) the term “Reference Case” is the building to which the energy model will be compared;
- (c) identify the energy consumption by fuel type, i.e., electricity, steam, fuel oil, on-site renewable;
- (d) include a table of all assumptions and values utilized in modeling both the Reference Case and Proposed Case buildings; and
- (e) modelling parameters for the Reference Case and Proposed case will be in accordance with 90.1-1999 or MNECB/CBIP compliance rules and requirements. To ensure comparable simulations, use the following Table to determine operating parameters for the various spaces.

Modeling Assumptions

Task Lighting	As per ASHRAE 90.1-1999 Section 9.3 and 9.3.1 or MNECB Section 4.3.1.2		
Domestic Hot Water	ASHRAE 90-1-1999 or MNECB		
Lighting	Determine lighting space functions for the Reference Case in accordance with ASHRAE 90.1-1999 or MNECB		
Scheduled Space	Design Occupancy	Operating Schedule As per <u>MNECB Performance Compliance for Buildings</u> Table 4.3.2.C	Equipment Power (Plug Load) As per <u>MNECB Performance Compliance for Buildings</u> Table 4.3.2.B
Patient Clinical Areas	5 m² per person	Operating Schedule H	N/A
Nurses' Stations –	2.5 m² per person	Operating Schedule H	Health / Institutional: Nurse Station
Waiting Rooms, Reception, & Lounges	1.5 m² per person	Operating Schedule H	Assembly: Recreation / Lounge
Utility Rooms	0	(Note 1)	Storage / Warehouse: Active Storage, Fine
Electrical / Mechanical Rooms	0	(Note 1)	Service and Common: Mechanical / electrical room
Corridors	30 m ² per person	Operating Schedule H	Service and Common: Corridors

Meeting Rooms, Offices, & Admin. Areas	20 m ² per person	Operating Schedule A	Office: Category 1 (Enclosed offices)
Other Public Spaces, including Atria and Lobbies	10 m ² per person	Operating Schedule H	Assembly: Lobby
Laboratory spaces	5 m ² per person	Operating Schedule H	Hospital / Healthcare: Laboratory
Small videoconference rooms and medium videoconference room included in the UBC Videoconference Rooms	Based on intended use	Operating Schedule B	Assembly: Conference / Meeting
Lecture theatre included in the UBC Videoconference Rooms	Based on intended use	Operating Schedule B	Education: Classroom

Note 1: Operating Schedule to be the same as the adjacent area in the most similar thermal zone.