

1 Q. Describe Hydro's distribution system planning policy, criterion and process. Include  
2 in the response the numbers and titles of personnel involved with the distribution  
3 planning process.

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6 A. Hydro's distribution system planning group is responsible for monitoring the  
7 distribution systems (both interconnected and isolated) to determine when  
8 components fail to meet the established planning criteria using load flow and short  
9 circuit analyses. When deficiencies are found, the group prepares and tests  
10 alternative solutions to ensure the distribution systems meet the planning criteria  
11 into the future. Where appropriate, a least life cycle cost analysis of technically  
12 viable alternatives is completed and detailed reports prepared with  
13 recommendations on preferred solutions.

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15 Hydro's distribution system planning group consists of three employees:

- 16 • Manager of Generation and Rural Planning; and
- 17 • Two distribution system planning engineers.

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19 In addition, the group contains a generation planning engineer and a Market  
20 Analysis section (consisting of two employees) responsible for load forecast  
21 development.

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23 The distribution planning criteria are as follows:

- 24 • Normal Voltage – Based on CSA CAN3-C235-83 ("Preferred Voltage Levels  
25 for AC Systems 0 to 50000V") and the CEA "Distribution Planner's Guide";
- 26 • Load – Equipment loading no greater than 100% rating;

- For substations in remote areas where deployment of spare transformers could be restricted by adverse weather conditions or availability of shipping facilities, sufficient spares shall be retained on site such that in the event of loss of a single unit the spare can be installed to restore power within a reasonable time frame;
- Conductor ratings are adjusted for appropriate temperature during peak;
- Short term overloading on transformers permitted;
- Voltage Flicker Limit – maximum of 5% voltage flicker; and
- For isolated diesel generation:
  - The diesel system should have sufficient firm capacity to supply the peak load of the system. Firm generation capacity is defined as the total installed capacity on the system minus the largest unit; and
  - In each diesel system, Hydro installs a minimum of three units to meet the load requirements of the system.

Each year, the distribution planning group completes a review of each of Hydro's distribution systems using the latest load forecast information. The purpose of the annual system review is to check for violations in the distribution criteria such as equipment overloads and/or abnormal voltages using load flow analysis techniques. The depth of the study and the detail of the model are appropriate to the size of the individual system under analysis. For larger systems experiencing load growth, the distribution planning group will initiate load and voltage studies (measurement of voltage and currents on the system during peak load periods) at least every five years to ensure modeling represents field conditions. Larger systems having little or no growth are required to have a load and voltage study completed every ten years. Smaller distribution systems such as those on many of the isolated diesel systems may not require a load and voltage study.

1       The annual system review supports Hydro's capital budget and five year plan.  
2       Typical outputs from the annual system review process include transformer  
3       capacity deficiencies, distribution line thermal overload conditions, and under/over  
4       voltage issues requiring reactive power devices and/or voltage regulator additions,  
5       line re-conductoring, circuit breaker and/or recloser replacements and diesel  
6       generator capacity/fuel storage additions.

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8       In addition to the annual system review process, the distribution planning group  
9       provides:

- 10           • Technical support to Transmission and Rural Operations (TRO) staff;
- 11           • Technical support to Project Execution and Technical Support staff;
- 12           • Response to requests for information from customers and consultants; and
- 13           • Coordinating effort for the preparation of Contribution In Aid of  
14           Construction (CIAC) estimates for construction costs for distribution  
15           interconnection projects in excess of \$100,000.