

1 Q. Please provide a detailed explanation of whether or not Hydro operates its  
2 emergency and standby generation to avoid under frequency load shedding events.

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5 A. Hydro does not operate its emergency and standby generation to avoid under  
6 frequency load shedding events. There are many factors that impact the frequency  
7 response of a transmission system following the loss of either a generator or load.  
8 The sudden loss of generation results in an imbalance in load and generation. This  
9 particular imbalance results in frequency decay (negative rate of change in  
10 frequency,  $df/dt$ ). This decay in frequency must be arrested by the remaining on-  
11 line generation; otherwise the system is at risk of stalling. With stalling comes  
12 system wide outage and potential damage to the previously rotating equipment.

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14 It is the inherent response of the post contingency transmission system that  
15 determines the minimum frequency that will be observed during the recovery  
16 period. Factors affecting a transmission system's frequency response include, but  
17 are not limited to, the system size as measured in terms of inertia or Megawatt  
18 second (MWs), the quantity of generation lost in terms of both MW and MWs  
19 relative to the system size and the responsiveness of the remaining generation. The  
20 responsiveness of generation is a function of generation type and allied design.

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22 Given that the occurrence of a trip to an on line generator and subsequent  
23 activation of the under frequency load shedding scheme cannot be predicted with  
24 any degree of certainty, continued operation of the emergency and standby  
25 generation would be required to ensure it is available to assist in reducing or  
26 eliminating under frequency load shedding. Operating of emergency and standby  
27 generation at minimum load levels 24 hours per day, 365 days per year, would

1 result in substantial fuel, operating and maintenance costs. With a target of six  
2 under frequency load shedding events per year, the costs of this mode of operation  
3 would greatly outweigh any potential benefit.