

1 Q. Please explain the impacts that the operation or non-operation of the Maritime Link  
2 could have on the operation of the Island Interconnected System, i.e. in respect of  
3 spinning reserve and the risks to the system immediately after a trip of the  
4 Maritime Link.

5

6

7 A. The normal mode of operation includes both the Labrador - Island HVdc Link (LIL)  
8 and the Maritime Link (ML) connected to the Island Interconnected System with  
9 both HVdc systems in operation. With the LIL having a rating of 830 MW delivered  
10 at Soldiers Pond, the pro rata share of the delivered power equates to 157 MW for  
11 the Nova Scotia Block to be delivered via the Maritime Link and 673 MW for Island  
12 use. The Nova Scotia Block is to be delivered over 16 hours each day, seven days  
13 per week. The 673 MW for Island use will be scheduled by Hydro in conjunction  
14 with Hydro's on Island hydro-electric resources and other renewable sources to  
15 meet the Island's demand.

16

17 In addition to the existing droop settings and corresponding governor controls on  
18 Hydro's hydro-electric generators on the Island, the LIL converter at Soldiers Pond  
19 will be equipped with a frequency controller to assist with maintaining a nominal  
20 system frequency of 60 Hz. Under normal operation the Automatic Generator  
21 Control on Hydro's Energy Management System located at its Energy Control Centre  
22 will adjust generator outputs on the Island to maintain scheduled flows over both  
23 the LIL and ML as load on the Island changes.

24

25 For loss of an on Island generator, sufficient spinning reserves will be scheduled  
26 between on Island generators and the LIL to ensure acceptable frequency response  
27 of the system with no under frequency load shedding on the Island. In addition,

sufficient ten-minute reserves will be available so that they may be started and loaded to return the LIL loading to its scheduled, pre-event import level at Soldiers Pond.

For loss of the ML during normal operating conditions, the Island system frequency will increase given that the generation (including LIL supply) exceeds the Island load. Given the relative speeds of response of the on Island hydro-electric governors and the LIL frequency controller, the LIL controls will take the lead role to reduce the flow into Soldiers Pond, thereby rebalancing the generation supply with the load to restore the system frequency to nominal with support from the on Island generation. The reduction in the export on the LIL at Muskrat Falls will be on the order of a nominal 170 MW (Nova Scotia Block at Muskrat Falls). Given the magnitude of this load reduction when compared to the size of the Labrador – Quebec Interconnected System (i.e., 35,000 MW), the frequency excursion (increase) in Labrador will be very small. The AGC for the Labrador Interconnected System will, in turn, reduce the generator outputs in Labrador to maintain the scheduled flows between Labrador and Quebec.

In addition, the loss of the ML on the western portion of the Island Interconnected System will reduce the 230 kV transmission line loads and therefore have the potential to increase system bus voltages on the west coast. Analyses conducted to date have indicated that the combined effect of the reactive power capabilities of the Bottom Brook voltage source converter and the excitation systems of generation located west of Bay d’Espoir will limit the potential increase in voltage rise on the west coast to within acceptable limits for the contingency.

For faults involving the loss of a LIL pole, the ML export will be curtailed such that the ten-minute overload capability of the remaining pole can be used to ensure

1 under frequency load shedding on the Island is prevented. Similarly, for temporary  
2 bipole faults on LIL, the ML export is curtailed such that the Island Interconnected  
3 System frequency is acceptable for successful re-start of the LIL.

4  
5 For operation of the LIL and Island Interconnected System with the ML out of  
6 service, operating the LIL with a maximum delivered power of 662 MW at Soldiers  
7 Pond in bipole mode ensures that there is no loss of load on the Island should there  
8 be a permanent pole outage. Recall that the ten-minute monopolar rating of the  
9 LIL is 662 MW. Therefore, in moving from bipole mode with 662 MW delivered at  
10 Soldiers Pond to monopolar mode, there is no change in the Soldiers Pond delivery,  
11 and therefore no impact on supply of Island load. For the temporary bipole fault,  
12 operation of the LIL at 662 MW will not result in load shed, as this value is less than  
13 the net Island take of 673 MW with the ML in service for the same temporary bipole  
14 contingency. For generation contingencies on the Island with the LIL in service, but  
15 ML out, operating LIL at 662 MW also provides sufficient reserves on the LIL to  
16 avoid under frequency load shedding.