

1 Q. In discussions with Nalcor, it was stated that the Voltage Source Converter (VSC)
2 Option was discarded and the Line Commutated Converter (LCC) chosen. One
3 reason the VSC option was discarded was because studies showed that the recovery
4 from a DC fault was too slow at about 900 milliseconds, and also that the system
5 still required an Effective Short Circuit Ratio (ESCR) of 1.5. Please provide copies of
6 the studies performed by Siemens on the HVDC Plus fault recovery rate and the
7 ABB PSS/E ESCR study.

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10 A. It would be incorrect to characterize the choice of technology as specifically
11 excluding the Voltage Source Converter (VSC) option. It may be more accurate to
12 state that, as of DG2, Nalcor has not identified a specific advantage to the use of
13 VSC technology, and has therefore elected to adopt conventional Line Commutated
14 Converter (LCC) technology in the Basis of Design and its capital cost estimate.

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16 Integration studies to date (for example refer to CE-10) have demonstrated the
17 need for high inertia synchronous condensers to prevent system collapse following
18 a three phase fault on the 230 kV AC transmission system (excluding Bay d’Espoir)
19 and for temporary pole to pole faults on the overhead dc transmission line.

20 Screening level studies of the VSC option were undertaken to determine if the VSC
21 offered performance benefits such that high inertia synchronous condenser(s)
22 could be removed from the system, thus reducing overall project cost.

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24 The screening studies have shown that, while the VSC will ride through the three
25 phase 230 kV transmission system faults without the application of high inertia
26 synchronous condensers, the VSC implementation requires the same high inertia
27 synchronous condensers to avoid system collapse following a dc fault as were

1 required in the LCC implementation to avoid system collapse following an ac fault.
2 Consequently, both options require high inertia synchronous condensers to provide
3 satisfactory system performance.

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5 Based upon market information the Line Commutated Converter (LCC) option with
6 high inertia synchronous condensers had a lower total cost when compared to the
7 VSC option with high inertia synchronous condensers.

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9 With no technical or economic benefits identified, Nalcor elected to include the LCC
10 option in the Basis of Design and to avoid the VSC risk premium as identified in
11 Confidential Exhibit CE-52.

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13 Nalcor will be preparing a functional specification for the converter equipment
14 associated with the Labrador – Island Link as part of the detailed design. Should the
15 manufacturer(s) choose to offer a VSC option that meets the technical
16 requirements at a lower cost than the LCC option, Nalcor will consider the VSC
17 option for the application.

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19 Given expected continued advancement of VSC technology, Nalcor has not ruled
20 out VSC as a technology option, but lacking demonstrated advantages of VSC over
21 LCC technology, has prudently included an LCC implementation for DG2. The
22 studies undertaken by Siemens and ABB are proprietary and commercially sensitive
23 and are not available for release.