Q. How many years of operation are expected with the HVDC converter station control and protection systems before they need to be replaced? What is the expected outage time to replace the HVDC converter station control system? What is the estimated cost to replace the HVDC converter station control and protection system?

A. Protection functionality is incorporated into the control system. While a 20-year useful life for an HVdc control system is a reasonable expectation[1], the replacement will be dependent on performance, the ongoing availability of manufacturer support and suitable replacement parts for the control system.

The total duration of fieldwork to replace a converter control system is expected to be in the order of one to two months[2], and during that period, one pole would be available for service, while the other would be expected to be either out of service or restricted to low power operation for several days until commissioning is complete.

A current order of magnitude estimate for the cost of a control system replacement would be $25 million[3]; however, it is difficult to develop to an estimate for a replacement 20 years in advance.

[1] See for example, http://www.ebmag.com/Industry-News/alstom-grid-to-renew-control-system-for-hvdc-link-at-mcneill-converter-station.html.
[2] See for example, http://www.abb.com/cawp/seitp202/e6bed7e8bf59fbedc1257d0800438f86.aspx.
[3] See for example, http://www.abb.com/cawp/seitp202/95dfb0eddce961cdc1257c45003c2a49.aspx.