

Paris Session 2022



Experiences of refurbishment by Hitachi Energy of HVDC systems supplied by a different manufacturer, and refurbishments of VSC HVDC systems

B4

PS 1 HVDC Systems and their Applications

Q 1.6

- What is the worldwide experience in refurbishing HVDC assets with manufacturers other than the original manufacturer? What are the obstacles for a vendor to refurbish an HVDC asset from another vendor?
- What is the refurbishment experience in VSC HVDC systems? Please state the main items replaced, refurbished, and the age of the assets.

HITACHI
Inspire the Next

Hans Bjorklund, Sweden

Experiences of refurbishment of HVDC systems supplied by a different manufacturer

- Square Butte (United States)
 - scope: control and protection system including VBEs
 - refurbished by Hitachi Energy in 2004 after 30 years in operation
- Apollo Station (Republic of South Africa) in the Cahora Bassa HVDC link
 - scope: control and protection, outdoor valves and filter banks
 - refurbished by Hitachi Energy in 2008
- Chateauguay (Canada)
 - scope: control and protection system including VBEs and light guides (VBEs moved out from the valve hall)
 - refurbished by Hitachi Energy 2009 after 25 years in operation
- Eel River (Canada)
 - scope: control and protection system and thyristor valves
 - refurbished by Hitachi Energy in 2014 after 42 years in operation

Experiences of refurbishment of HVDC systems supplied by a different manufacturer (continued)

- Madawaska (Canada)
 - scope: control and protection system and thyristor valves
 - refurbished by Hitachi Energy in 2016 after 31 years
- KontiSkan 1 (Denmark, Sweden)
 - scope: control and protection system including VBEs, also adding bipole control
 - refurbished by Hitachi Energy in 2019 after 11 years in operation

No major obstacles were encountered for any of these refurbishments, but the main complication for all is the availability and accuracy of the documentation, typically wiring and cabling information.

If documentation is insufficient or unreliable, very detailed site investigations must be carried out to establish the interface points for the new C&P system, otherwise there is a great risk of prolonged outage times.

Group Discussion Meeting

Refurbishment experiences of VSC HVDC systems

- Direct Link (Australia)
 - scope: control and protection system including VBE
 - refurbished by Hitachi Energy in 2019 after 19 years in operation
- Murray Link (Australia)
 - scope: control and protection system including VBE
 - refurbished by Hitachi Energy in 2020 after 18 years in operation
- Cross Sound Cable (United States)
 - scope: control and protection system including VBE
 - refurbished by Hitachi Energy in 2022 after 20 years in operation
- Borwin 1 (Germany)
 - scope: control and protection system including VBE
 - refurbished by Hitachi Energy in 2022 after 13 years in operation