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HVDC Interconnectors – Benefits and Challenges

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Abstract

The number of HVDC interconnectors is growing worldwide. HVDC Interconnectors are built for different reasons; primarily for connecting different synchronous areas or for high capacity long distance transmission. Investing in an HVDC Interconnector requires normally a sosio-economic positive business case. Our experience shows that the investments in HVDC Interconnectors have been better than estimated. Payback time has been shorter than estimated in simulation studies before investment decision.

There are a number of benefits from investing in an HVDC Interconnector, depending on the actual situation:

- Increased security of supply for both interconnected areas
- Added value for power producers in surplus situations
- Prepare moves from fossil fuel to renewable energy consumption

Benefits can be achieved through congestion rent, producer surplus and consumer surplus based on day ahead market trade, through capacity mechanism participation and via trade of different ancillary services. Examples will be given in the contribution.

There are several challenges in realizing an HVDC Interconnector project. The challenges can be grouped into technical, commercial, environmental and regulatory issues.

Some of the technical challenges can be common for HVDC Interconnectors based on cables and overhead lines. But for an HVDC Interconnector including submarine cables there are a number of extra technical challenges, like the installation and protection of the cables, crossing of other kind of installations for example oil and gas pipelines, telecom installations, etc. The nature itself and weather conditions can create extra challenges. The impact an HVDC Interconnector has on the existing grid can also create challenges.

Environmentally an HVDC overhead line will face the same kind of challenges as other transmission lines. For a submarine HVDC Interconnector there can be challenges in crossing environmentally vulnerable areas. It can also result in strict operational procedures.

Regulatory and commercial challenges can arise among others from changing market solutions and not harmonized markets.

For the future, there are interesting questions to be solved in connection with HVDC Interconnectors. So far, no HVDC grids have been built. To have an HVDC grid it is necessary to have the possibility to route the power in different ways in the network. When will this be possible? When will it be needed, and what technical solutions must be in place to operate it? Some thoughts on the future will be given in the contribution.