

HVDC Transformer Replacement Financing solutions

Replacement that finances through repair- and loss-savings

The Challenge

Approximately one third of all existing HVDC-lines worldwide are older than 25 years – especially in countries that were the pioneers of this technology like Brazil, Canada and India. In the early years of HVDC the Converter transformer technology wasn't as mature as it is today, which is also proven and documented by CIGRÉ failure surveys conducted from 1972 - 2012. This bears a higher risk for their operators, as failures result in outages and loss of revenue when the power cannot be transmitted. A conservative number of 5% of those old HVDC lines contain equipment that needs to be replaced soon.

However, when the high-tech transformers were installed, they were expected to be operating longer than 25 years. The operators are now facing a dilemma: Shall they invest time and money in transformer repairs and then get a product that is as good as a new transformer in the 1980s was? Or shall they invest in a new product and benefit from the newest technology available? But even if asset managers of those lines would prefer a new transformer out of technical reasons: The costs of an HVDC-transformer are very high. But even if they were not planned at the moment – an investment may be beneficial. This is why Siemens not only offers the products, but also the financing solution to make operators benefit from new equipment, even with budgetary restrictions.

The Solution

Just like investing in electrical equipment at home pays off simply by energy-saving; the same is valid for Power Transformers. The materials used nowadays have improved tremendously and the transformer technology especially in HVDC has matured way from what HVDC-pioneers would have imagined. Converter transformer replacement units produced nowadays would benefit from the experience gained during decades of manufacturing units at both the



Replacing HVDC-transformers by new equipment can pay-off simply because of higher reliability and reduced losses

highest voltage levels and MVA ranges. In addition, grid operators also have to consider transformer loss and its results. If an existing unit fails, a loss in revenue, image and the repair costs as well as the energization of a spare unit need to be considered. Thus, a replacement transformer will pay back its operator due to higher reliability and increased energy-efficiency.

How to calculate if a replacement pays off

At Siemens Transformers we have developed tools to guide our customer's whether an earlier replacement will pay off rather than repairing the existing Converter transformers.

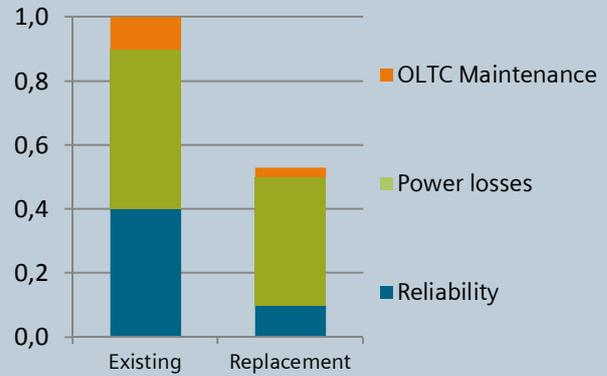
To find the model that suits best we will have a closer look on the following criteria:

- Reliability of existing units (MTBF, FRe)
- Electrical Losses
- Longer Lifetime by Transvisio (Smart cooling)
- Maintenance

Operational Cost Comparison

Assumptions:

- 15 years period
- MTBF: 50 years existing, 490 years Siemens Replacement units
- 5 years expected longer service life due to Transviso Smart Cooling
- On Load Tap Changer: Existing Oil type, Replacement with vacuum type



Test: Is a transformer replacement and its financing something my company should start thinkg about?

Have you identified parallels to your own System in this case study? Check out and evaluate with Siemens wether a replacement can be of interest for your company.

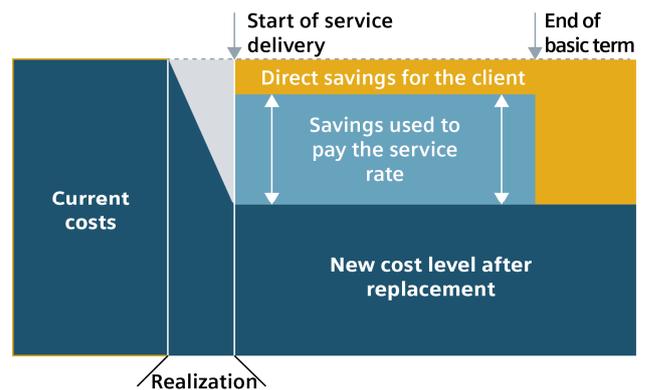
- Your HVDC equipment is older than 20 years?
- The numbers of failures of your transformers rise year by year?
- You are running short of replacement transformer units and respective spare parts?
- Your costs of maintenance are increasing or on a constant, high level?
- You are afraid that you might not know the risks and their results for your company?
- You simply do not feel comfortable about your equipment anymore?
- You are technically convinced that new equipment is more reliable and efficient than your existing equipment?
- You would like to know more about financial cooperations with Siemens as a partner?

You would like to have more information on this? Simply contact us!

Cooperation with Siemens Financial Services

To assist our customers in financial matters, we work in close cooperation with our own financial partner, Siemens Financial Services (SFS). Siemens Financial Services offers alternative financing methods that are structured to help organizations – in the private and the public sector – to afford and acquire the innovative technology that contributes strongly to their competitive position or their efficient operations. These integrated solutions, tend to utilize our very specific knowledge of the technologies involved and provide an optimization of cash flows as an embedded financial offering to the customer.

Example: Performance contracting (exemplary)



An overview of the possible financing solutions provided by Siemens Financial Services is given below.

Customer Challenges

- Optimize cash flows & improve liquidity
- Increase capital efficiency
- Reduce OPEX/Increase productivity
- Optimize balance sheet structure
- Share risks in new ventures/projects

SFS Financial Solutions

- Equipment finance, leasing, factoring, working capital facilities
- Financial advisory, risk management and structuring
- Sale (refurbish) & lease back constructions
- Performance contracting; pay-as-you-save/earn/use models
- Customized financial vehicles/Equity Investments – allow (turnkey) solution provision with optimal cash flows

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