

Total Cost of Ownership (TCO) Lifetime costs for transformers



Do you have control of your transformer costs and you are entitled loss valuation? To calculate the lifetime cost of a transformer, one has to be aware of what affects them and how they are operated.

In the light of global climate concerns, many users agree that low loss transformers should be chosen on criteria other than pure short-term profitability aspects. When purchasing transformers, ABB recommends the use of total cost of ownership (TCO) which considers the future operating costs of a unit over its lifetime, brought back into present day cost and then added to its total purchase price.

These factors affect mainly lifetime costs:

- No-load losses P_o (W)
- Load losses P_k (W)
- The load ratio (average over the year in %)
- Operating time (operating time in hours/year)
- Energy price (EUR/kWh)
- Interest rate (discount rate in %)
- Life (adopted on time in years)
- Emissions (CO₂)

To this can be added the cost of installation, maintenance, storage, repair, administration, etc. but these factors are not addressed here.

In other words, in calculating TCO, the losses are evaluated by their financial impact, capitalized for an expected payback period for the transformer.

$$TCO = C_t + (A \times P_o) + (B \times P_k)$$

- C_t Transformer purchase price
- A Assessed financial value (eg, EUR/W), or capitalization factor, for no-load loss
- B Assessed financial value (eg, EUR/W), or capitalization factor, for load-loss
- P_o No-load loss
- P_k Load loss

Factors A and B can be calculated by many calculators which are available online. Several calculators are available on ABB's web page: www.abb.com/transformers.

The optimal selection would be the design with the lowest calculated TCO. Simply put, the customer/user will obtain a practical balance between investment and reward.

With low loss, high efficient transformers, the higher material cost typically requires a higher first cost. However, this will be compensated by reduced running costs from lower losses. Beyond a certain time, the lower losses will give a net financial saving from reduced energy costs. If higher loss transformers are replaced with new low loss transformers, this saving becomes even greater. Furthermore, lower losses result in cost avoidance derived from elimination or deferral of extra generation and transmission capacity additions.

Application example

Figure 1. compares the TCO of liquid-immersed 800 kVA transformers having conventional, regular grain oriented (RGO) and amorphous metal (AM) cores, wherein the loss capitalization factors are: A = 10 EUR/W and B = 2 EUR/W. The various components comprising the TCO are individually highlighted. Although first costs of amorphous metal transformers may be slightly higher, they are often the preferred choice if TCO is considered.

Liquid-immersed transformer

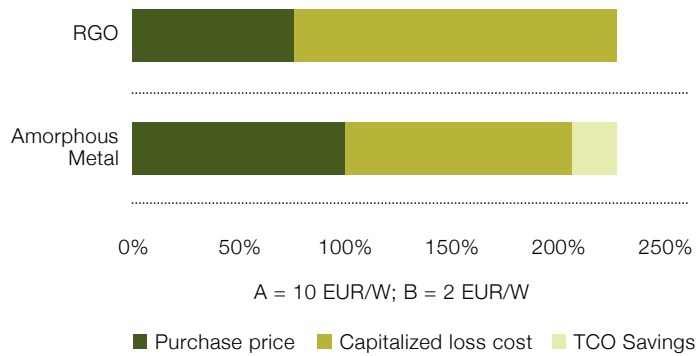


Figure 1.

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