

Optimization of Distribution Transformers (110/12 kv) in Greater Santiago, 1982

Summary:

The aim of this study was to analyze the optimal use of power transformers in Greater Santiago. The study focused primarily on two aspects: designing an assessment methodology; and providing elements and concepts relevant for decision-making. The methodology presented sought to analyze separately three types of substations that serve sectors with typical consumption (load curve): residential, commercial, and industrial. For each type of substation, the costs and benefits of implementing investment programs in transformers of different sizes were compared on the basis of “relaxing” CHILECTRA’s criterion to date of not accepting operational overloads.

The benefits of the project derived mainly from the cost savings resulting from delaying investment and from the economies of scale from using larger equipment. The project costs were associated with a greater loss of the transformer’s useful life, an increase in the transformer’s energy loss, and a higher cost from failure expected due to overload operations.

Regarding failures, the study examined the advisability of having extra capacity in the system and having reserve equipment, as these measures would help to diminish the expected cost of a failure. Even when it is advisable to overload and use larger transformers, it cannot be concluded – from a decision-making perspective – that the values that appear in the text as optimal should be considered as such, because of the higher risk of rendering the equipment useless, which was not evaluated, and the existence of variables not incorporated into the analysis. These unexamined variables

include quality of service, the likelihood of interconnection among substations, differential costs in the medium-tension network, contingency operation (random increases in demand), and the strategy of micro localization of substations (costs and benefits of concentrating versus deconcentrating, which could lead to incorporating larger transformers than those used in the study).