

Economical Transformer Selection Implementing Service Lifetime Cost

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Abstract : In this day and age, there is a proliferate concern from all governments across the globe to barricade the environment from greenhouse gases, which absorb infrared radiation. As a result, solar photovoltaic (PV) electricity has been an expeditiously growing renewable energy source and will eventually undertake a prominent role in the global energy generation. The selection and purchasing of energy-efficient transformers that meet the operational requirements of the solar photovoltaic energy generation plants then become a part of the Independent Power Producers (IPP's) investment plan of action. Taking these into account, this paper proposes a procedure that put into effect the intricate financial analysis necessitated to precisely evaluate the transformer service lifetime no-load and load loss factors. This procedure correctly set forth the transformer service lifetime loss factors as a result of a solar PV plant's sporadic generation profile and related levelized costs of electricity into the computation of the transformer's total ownership cost. The results are then critically compared with the conventional transformer total ownership cost unaccompanied by the emission costs, and demonstrate the significance of the sporadic energy generation nature of the solar PV plant on the total ownership cost. The findings indicate that the latter play a crucial role for developers and Independent Power Producers (IPP's) in making the purchase decision during a tender bid where competing offers from different transformer manufactures are evaluated. Additionally, the susceptibility analysis of different factors engrossed in the transformer service lifetime cost is carried out; factors including the levelized cost of electricity, solar PV plant's generation modes, and the loading profile are examined.

Keywords : solar photovoltaic plant, transformer, total ownership cost, loss factors

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