Modeling and evaluating the customer interruption cost due to dynamic electrical power and energy failure

ABSTRACT

Sequence of failures that aggravates catastrophic events of a power system has attracted a great number of researchers' attention in exploring and analyzing its enormous losses to the society and economy of a country. Power system cascading collapse is an event in which failure of an electrical component such as transmission line or generator leads to sequence of failures in other equipment. This catastrophic event could lead to major electrical energy failure. Therefore, it is imperative to study the effect of power system cascading collapse in assessing reliability cost/worth. This research introduces the assessments of risk and reliability cost/worth-based Customer Interruption Cost (CIC) in relation to dynamic system cascading collapse. The results obtained from the analysis performed have proven that a large cost of CIC is resulted due to dynamic electrical energy failure. This connotes that uncertain disconnection of the exposed transmission lines together with the exposed generator which occurred in the power system failure, ultimately will impose a significant impact on the customer interruption cost. On top of that, the results of customer interruption cost also have proven that the uncertainty of dynamic power electrical power and energy failure should not be neglected. Therefore, the proposed technique is reliable and confers promising results in determining risk and reliability cost/worth of the system.

Keyword: Customer interruption cost; Dynamic system cascading collapse; One machine infinite bus; Protection system hidden failure; Risk and reliability cost/worth