Power Distribution System Planning in Smart Grids with Photovoltaics

Tuesday 14th March
2.00 – 3.00 pm
CO350 – Cotton Building,
Kelburn Campus

Abstract

This study presents a released capacity analysis for the power delivery system of the distribution grid, and the computation of the incremental capacity addition provided by an optimally deployed photovoltaic (PV) system in the IEEE 13 and 34 test feeders. The intrinsic strong correlation that exists between network capacity and reliability gives the inclusion of renewable distribution generation (DG) and the evaluation of their additional load serving capacity a prime place in the emerging active distribution system planning (ADSP). Also, this talk presents a method capable of measuring risk and upgrade deferral in the evolving ADSP using two energy quantities referred to as the Energy Exceeding Normal (EEN) and Unserved Energy (UE). The evaluation of these metrics is used to assess system capacity usage, and as a planning tool to identify required system upgrade and measure the effectiveness of the applied DG incremental solution. This analysis is pivotal as the load growth continues to outpace new feeder construction and network expansion becomes difficult and costly. Therefore, utilizing DG to provide peak load relief and incremental capacity solution is developing into a viable alternative.

Results presented in this article show that apart from optimal positioning and sizing, maximizing the value attributes of PV-DG also, depends on its ability to produce power at proper times and levels.

Presenter

Michael Emmanuel is a research scholar and currently pursuing his Ph.D. at Victoria University of Wellington, New Zealand, with research interests in DERs integration and smart grid communication networks.