

Impact of Increasing Distributed Solar PV Systems on Distribution Networks in South Africa

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Abstract : South Africa is experiencing an exponential growth of distributed solar PV installations. This is due to various factors with the predominant one being increasing electricity tariffs along with decreasing installation costs, resulting in attractive business cases to some end-users. Despite there being a variety of economic and environmental advantages associated with the installation of PV, their potential impact on distribution grids has yet to be thoroughly investigated. This is especially true since the locations of these units cannot be controlled by Network Service Providers (NSPs) and their output power is stochastic and non-dispatchable. This report details two case studies that were completed to determine the possible voltage and technical losses impact of increasing PV penetration in the Northern Cape of South Africa. Some major impacts considered for the simulations were ramping of PV generation due to intermittency caused by moving clouds, the size and overall hosting capacity and the location of the systems. The main finding is that the technical impact is different on a constrained feeder vs a non-constrained feeder. The acceptable PV penetration level is much lower for a constrained feeder than a non-constrained feeder, depending on where the systems are located.

Keywords : medium voltage networks, power system losses, power system voltage, solar photovoltaic

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