Addressing LV network power quality issues through the implementation of a microgrid

Lava, J.(1), Cobben, J. F. G.(1, 2), Kling, W.L.(1), van Overbeeke, F.(3)

(1)Department of Electrical Engineering, Eindhoven University of Technology. PO Box 513, 5600 MB Eindhoven, The Netherlands. j.r.t.lava@student.tue.nl, j.f.g.cobben@tue.nl, w.l.kling@tue.nl

(2) Alliander N.V. PO Box 50, 6920 AB Duiven, The Netherlands. sjef.cobben@alliander.com

(3) EMforce B.V. PO Box 152, NL 2920 AD Krimpen aan den IJssel, The Netherlands. vanoverbeeke@emforce.nl

Abstract. The results of the implementation of an actual microgrid in the Netherlands are presented. This microgrid has photovoltaic panels as microsources, energy storage, and a flexible AC distribution system (FACDS) that can operate connected to the public grid or autonomously where it regulates the site's voltage and frequency. In this paper, the potential of the microgrid in improving power quality issues of the site, specifically harmonic distortions, is demonstrated. Results show that the system was able to compensate voltage harmonics when the microgrid was operating connected to the public grid and when operating autonomously. Other tests such as short-circuit, synchronization and blackstart were also conducted. The improvement in power quality and positive results of the other tests demonstrate that a self-supporting, reliable and efficient operation of the microgrid can be achieved.