Abstract

Distribution Network Operators (DNO’s) are identities that are responsible to operate the electric distribution network and provide customers with electricity supply. Besides the primary goal of supply all the consumers in the most effective and quality way, DNO’s are also responsible and should respond to challenges like climate change, affordability of energy and security of supply. These issues are deeply connected with the long-term well-being of society.

In the coming years, as load growth on UK’s national electric system, DNO’s will need to do network extensions and infrastructure reinforcement. So, this study has as his major concern elaborate techniques which enables DNO’s to obtain the best investment solution in a distribution network for a certain new development analyzed.

The model developed within the elaboration of this study will focus on the impact that demand side management programmes, energy efficiency measures and micro-generations technologies such solar electric photovoltaic, solar thermal hot water, micro-wind, ground source heating pumps, biomass, micro-combined heat and power systems have on reducing the electric demand from a certain new development.

As a study case, it will be analyzed the impact that the previous programmes, measures and technologies have on urban networks. It was made a research in order to understand the suitability of each micro-generation technology for implementation at urban developments.

A sensitive analyses of the developed model is made, for its appliance at urban developments, and several future scenarios were simulated in order to quantify and understand the impact that micro-generation technologies, energy efficiency measures and DSM programs have on reducing the electric development demand and then, determinate a cost effective investment solution for connecting the new development loads to the existing primaries substations.

Once that the analysed investment solutions can represent massive investments for DNO’s to make, the study here presented can provide an interesting toll for determinate the impact that the adoption, at new urban developments, of micro-generation technologies, DSM programmes and energy efficiency measures could possibly have.
This gives DNO’s the possibility to know what measures or programmes they could support in order to favour the expansion of some kind of micro-generation technologies or energy efficiency measures and obtain a better investment solution for an expected development at an urban environment.

The consideration of the impact that the adoption at new developments of micro-generation technologies, DSM programmes and energy efficiency measures was made and analysed in this study because it is expected for these measures and technologies to have a great impact at a medium long term period due to the fact that U.K. government wants to encourage a greater uptake of distributed generation in a bid to turn the country into a low carbon economy. To this end, it is planned and expected a comprehensive review of the incentives and barriers affecting distributed electricity generation, to be carried out jointly with the electricity and gas Great Britain regulator, OFGEM. It is expected to be examined issues such as the economic and other incentives for suppliers to buy electricity from distributed generators as well as examined the potential barriers to installing distribution generation, such as licensing procedures and technical standards for connection.