UNIVERSITEIT GENT
CAMPUS KORTRIJK

LEMCKO
Energy & Power Quality

"Guidelines for the successful integration of small-scale CHP applications, with a view to a changing energetic context"

When investigating the operation of a μ CHP (micro cogeneration) with regard to the electrical properties, it is initially assumed that the μ CHP heat demand is controlled. This means that the electricity produced is actually a by-product, whereby the electrical energy produced is a function of the heat demand. The regulations regarding the connection of decentralized production are laid down by Synergrid in Belgium (ref. C10 / 11). During this study, in the specific case of μWKK, these regulations are analyzed and translated into technological conditions attached to such connections. In addition, account must be taken of possible criteria established by the local distribution network operator with regard to grid connection and maximum injection.

An electrical installation must meet the conditions stated in the AREI, but with an additional decentralized production, the short-circuit capacity of the power supply system may change, while the physical configuration of the installation itself, such as cable cross-sections and protective devices, does not change. In such a case, overloading, short circuiting, direct or indirect contact may give rise to additional measures.

Following the study on the regulation of connection conditions and safety, a study will be carried out of the possible security and linking measures. In addition, it is investigated which possible interactions can exist with PV installations to guarantee the optimal functioning of both installations. From these studies a guideline is drawn up for installing a μWKK in residential installations.

Given that a CHP will always be applied from the point of view of the heat demand and not the electricity demand, the energy injected into the grid can give rise to local overvoltage. This problem manifests itself not only with the end user itself but also with nearby consumers. Knowledge about the problem of maintaining network quality on the one hand and the influence of network failures on the generator of the μ-CHP are on the other hand an important parameter to guarantee the production of electrical energy from a μWKK installation on a residential level. The impact of μWKK installations on the network will be investigated on the basis of real tests on a distribution network with fully equipped residential installations.

In addition to the Power Quality and the electrical aspects, a very important aspect is the quantification of the energy efficiency of proposed solutions in function of the reduction of electricity consumption in order to relieve the grid. This fits in with the use of μWKK in the smart grids. Classically it is assumed that electricity is a by-product and heat is the main product. It is investigated to what extent electricity consumption can be reduced by adding hot water to certain household appliances such as washing machines and dishwashers. Up to 90% of the electricity used by the washing machine is used to heat the water. It is better to use hot water from a solar boiler or a micro CHP. A hot fill washing machine is a special washing machine whose supply pipe is resistant to hot water. This allows it to be connected directly to the hot water tap. The device does not have to heat the water itself. This principle is not only limited to a washing machine but also applies to a dishwasher.

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