Grid interconnection of DG in Europe: Current requirements and recommendations for future activities

Inappropriate interconnection practises – a critical barrier for DG development

Regulation, standardisation and rules for network interconnection play a key role in deployment of new Distributed Generation systems. As such, appropriate rules ease the implementation of projects while inappropriate may result in significant difficulties during the realisation of the network connection. Furthermore the limited availability, diverse structures and contents and last but not least the different languages make it a difficult task to get a clear view of the requirements in various European countries.

These issues have already been identified in the framework of several projects as significant technical barriers for the development and implementation of DG projects. Resolving these barriers is therefore a crucial step in order to make use of the potential benefits distributed generation technologies can provide to European power systems.

In order to provide involved stakeholders with a detailed overview on the applicable rules, their status and contents, an extended review on the national laws, grid codes, regulatory guidelines, company recommendations, practices and standards governing the connection of DG to distribution networks was made.

In the framework of collaborative workshops the national requirements were analysed and gaps, inadequacies and barriers for DG in current regulation of each country were identified. Finally taking into account the different perspectives of the group members, promising solutions and new approaches for future DG interconnection were developed.

Based on these results, a set of fundamental recommendations was developed aiming at initiating a discussion process inside national and international bodies involved into DG standards development.

Results:

> Interconnection standards play a key role to achieve the full potential benefits of DG technologies.
> Current situation in Europe is characterised by high complexity, diversity and often inadequate rules.
> National reports provide stakeholders with a detailed view of the background and technical interconnection practices in European countries.
> Recommendations for future activities provide stakeholders from standardisation bodies and other groups with guidelines for developing DG segment specific requirements that provide a promising solution for future DG mass market.
Currently DG interconnection is not regulated by European directives or standards. Instead, a broad variety of national laws, grid codes, national standards, DSO recommendations, internal practices and other documents define the connection of DG to the distribution networks.

For the review of the current situation in Europe, a three step approach was developed with the aim to provide the information basis for the analysis of gaps and inadequacies and the final development of recommendations.

1. As a first step, all relevant documents were listed based on a functional topic-related questionnaire. The aim of this survey was to provide a complete list of all relevant documents with specific focus on grid interconnection issues. In addition, a list of international standards (IEC, IEEE and UL) which are of relevance for DG was compiled.

2. In a second step, a common topic-based structure was developed, in order to allow a compilation of the information into a uniform, comparable format. The aim was to provide stakeholders, component manufacturers, project developers and other interested parties with a single document containing all relevant information.

3. Finally for each country covered in the survey, a so-called “National Report” was compiled. These national reports contain the full information on the technical interconnection requirements, plus further additional data on the national background for DG and provide a detailed view on the status and contents of the documents which define the framework at the national level. The official requirements stated in legislation, national standards, and grid codes, are supplemented by DNO companies’ recommendations.

These national reports are presently available for seven European countries, Austria, Belgium, France, Germany, Italy, Spain and the UK. In today’s emerging DG markets, a clear segmentation of the market can be recognised, from Micro-Scale residential systems up to industrial systems with a capacity of several MW. However this fact is commonly not reflected in European national regulations. As a result many of the inadequacies or inappropriate technical requirements, which in numerous cases create barriers or delay the development of DG projects, result from the application of regulations to a purpose for which they were originally not intended for.

To overcome this lack of practise orientation, a new approach to DG interconnection standardisation should take into account the market structure and address each segment’s specific issues:

I. Micro scale DG:
   These systems are mostly used in residential applications and represent a potential future mass market for DG. Therefore, the availability of dedicated common, generic technical requirements is crucial to reduce project cost.

II. Intermediate scale DG:
   This segment consists of larger systems with a capacity which can be still connected to the LV networks.

III. Large scale DG:
   The third segment covers all installations with a capacity that requires a connection to MV networks, such as wind parks, or larger CHP units.

For each of the segments a set of recommendations was elaborated for all relevant topics. As a complementary work and in order to include different stakeholders’ opinions, draft recommendations were presented to external experts not directly involved in the project. Their responses represent very widespread point of views depending on the type of business.

Newly developed standards should provide the framework for further deployment of DG technologies by supporting DNOs, manufacturers, project developers and customers. Common, accepted standards, accompanied by certification and testing procedures as well as application guidelines will be the cornerstones for future streamlined DG interconnection.