Distributed Generation: its Impact on Electricity Networks, an SME Perspective

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European society is overly reliant on non-renewable fuel sources: oil, natural gas and coal. Fossil fuels are currently used to generate 80% of the European Union's energy demands, with increasing dependence on imported oil and gas (currently 50% and estimated to rise to 70% by 2030). This situation is unsustainable and is not compatible with the EU's commitment to reducing greenhouse gas emissions.

It is clear that the current dependency on non-renewable fuels must be lessened, both for environmental and economic reasons. If the targets accepted by governments for 2050 are to be met, then clearer alternative strategies are needed, including a significant role to be played by SMEs.

Distributed generation (DG) involving the connection of small-scale, usually renewable energy, generators to distribution networks, is likely to become increasingly common, as the European Union's member states strive to reduce their dependence on fossil fuels and tackle issues of climate change. Generation in the 100kW range should be attractive to SMEs in particular but current uptake is small.

Project Objectives

- ☞ To identify and map current distributed generators in Europe
- ☞ To determine the size and characteristics of the potential market and identify legislative obstacles to greater uptake of DG, especially by SMEs
- ☞ To test the effects of DG on components of European distribution networks by undertaking laboratory testing and evaluation and by drawing on available data
- ☞ To investigate the current problems of metering for DG, propose solutions and recommend best practice
- ☞ To assess the impact of DG on model national networks (specifically Denmark, Italy and the UK)
- ☞ To construct a prototype network model to determine the optimum design for the distribution network of the future
- ☞ To train SME staff in the new technology and to disseminate the results throughout Europe

Major Deliverables

- ☞ Report on the technical network implications of DG across the EU
- ☞ Roadmap to facilitate the integration of DG within EU networks
- ☞ Report on the state of the art in metering technologies in relation to DG
- ☞ Report summarising the technical solutions to the key issues raised in the prenormative study
- ☞ An evaluation of technical solutions to the impact of DG on networks
- ☞ A series of reports, each examining technical solutions to aid DG integration in detail
- ☞ Modelled performance of representative network components
- ☞ Series of reports describing the tested performance of network components under DG conditions
- ☞ Report describing impact of typical DG scenarios based on the network model
- ☞ Recommendations for future development of DG networks
- ☞ Report summarising test results from a RPZ in the UK and similar schemes in other member states as available

Although DG can be found in some locations, notably Combined Heat and Power (CHP) units, its uptake has been hindered by several key problems. First, buildings with DG installed have to be able to export energy to the distribution network operator (DNO) as well as import. Distribution networks were not designed for two-way flow and the performance of these networks with bi-directional energy flow is not well understood. Secondly, due to problems with metering these flows, it is often not economically viable to install DG.

DG (being produced at or near the point of consumption) is able to improve the efficiency of power distribution by minimising distribution losses, and also facilitates the exploitation of small-scale (often renewable) generation sources. This will be of considerable commercial interest to companies, as on-site power production can reduce energy costs by 30%, by reducing transmission and distribution costs. Many of the electrical generators in the future are likely to be small-scale plants, constructed at a residential or industrial unit (e.g. CHP in a block of flats or a factory) or in rural areas with weak distribution networks (e.g. wind farms, small scale hydroelectric). These generators connect directly to the local distribution network, rather than to a high voltage transmission network, to which conventional central generating plants are normally connected.

DG is becoming an increasingly important part of national planning for future electricity supplies. The EU has set an indicative target of 22% of electricity in the EU15 to come from renewable sources by 2010 (compared to 14% in 2000). In order to meet their commitments to reducing greenhouse gas emissions over the next decade, EU governments will need to encourage the development of DG and meet the challenges this will impose on distribution networks. Therefore, opportunities for SMEs will be created in the coming years for appropriate components and technical services in the field of DG. It will also be important to encourage more SMEs to install DG.

The benefits for Europe of increasing DG are clear. Installing a DG energy source can reduce electricity costs by up to 30%. The total EU electricity requirements in 2010 are predicted to be 3.18 PWh per annum. If this project can contribute to a 0.1% increase in the uptake of DG between now and 2010 (a conservative target), this would correlate to an annual energy saving of 9.54 GWh per annum. Enabling SMEs to participate in this new market is thus important for European competitiveness as well as the environment.

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