

PLANNING HIGHLY DISTRIBUTED POWER SYSTEMS: EFFECTIVE TECHNIQUES AND TOOLS

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ABSTRACT

In recent years, environmental concerns, technological advances and new regulatory trends have resulted in a shift towards a more distributed structure of power systems. Consequently, in the coming decades many countries are expected to experience a high penetration of small-scale energy generation and storage devices. Highly Distributed Power Systems (HDPS) utilise a diverse combination of energy sources and technologies to supply dispersed loads. While some concepts of traditional power system planning can be used for HDPS planning; the additional challenges associated with HDPS create the need to develop more appropriate planning techniques. These techniques must reflect the complex nature of HDPS planning: multiple and conflicting objectives, the dynamic nature of the problem, diversity of energy sources and the intricate relationship between generation and demand at a highly distributed level. In this work, the aforesaid aspects of the HDPS planning problem are discussed. The requirements for a solid and flexible planning framework for HDPS are outlined. The suitability of existing distributed generation planning techniques for HDPS planning is analyzed. Some initial results are presented that illustrate the adequacy of the proposed approach. Finally, the next steps towards a fully functional planning framework are discussed.