

THESIS

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National Engineering School of Tunis

To obtain the
Ph.D. Degree
Speciality: **Electrical Engineering**
By

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Bachelor's Degree in Electrical Engineering (ESTI)

Master's Degree in Electrical Systems (ENIT)

**Connection and disconnection of Microgrid integrating
renewable power resources**

Thesis defense on May 13th, 2016

Jury:

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This thesis was performed in the Electrical Systems Laboratory (LR L.S.E.- 11 ES 15) of ENIT in Tunisia

To present the subject of thesis, I propose the following abstract:

Abstract

In future smart grid, power quality and service continuity will be the most important issues. Microgrids, including renewable energy resources, micro-generators, storage systems, critical and non-critical loads, as a part of smart grid, are growing in importance and become nowadays a reality. In this sense, this Phd thesis discusses the microgrid connection and disconnection at grid failure occurrence or total grid loss, that's to say once islanding is detected. In the presented thesis, two islanding techniques are proposed. The first one, based on non-periodic resonance excitation, is implemented in only one Distributed Power Generation System (DPGS) as then in a microgrid including parallel working DPGSs. The second one, based on the creation of virtual a PCC phase-shift, is implemented in a microgrid considering the renewable energy resources based-DPGS as current source while only one of the controllable DPGS executes the proposed method algorithm. The theoretical study is supported by the simulation with PSIM software. Experimental results validate the developed approach.