



*ELECTRICAL POWER ENGINEERING*

Department of Electrical Power Engineering

Postgraduate Research Template

#	Student Name / Surname	MOMA LWALABA CHRISTOPHE	Start Date	APRIL 2019	Supervisor	Dr KABEYA MUSASA
	Title of Project	Grid Integration of Renewable Energy Sources Using Modern Technologies	Completion	2020	Co-Supervisor(s)	Prof I. E. DAVIDSON
Program of Study (M Eng. / D Eng.)			Master of Engineering (M Eng)			
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<p><b>Synopsis of Research Project: (&lt; 300 words)</b></p> <p>Fossil fuel depletion and the environmental issues caused by the extraction and use of petroleum products has become a major concern for the world. Alternatives and renewable energy sources are being developed in order to solve this problem. Currently, the alternative energy sources that are commercially viable are energy from the sun rays, from the wind and from biomass. Among the renewable sources, Wind and solar energy present more reliable for bulk production of electricity. This study consists of a performance's investigation of an offshore wind energy conversion system (WECS) for grid integration through a HVDC transmission interface. The WECS under study comprises of a Permanent Magnet synchronous generator (PSMG) based wind turbine chosen for its ability to operate at variable wind speed and it is cost efficient than the doubly fed induction generator (DFIG). For this study, two converters topologies are used, a three-phase diode rectifier with a multi-channel interleaved boost DC-DC converter at the offshore site and a three level Neutral Point Clamped (NPC) Voltage Source Converter (VSC) in inversion mode at the onshore site for grid integration. The study encompasses a load flow analysis of the system describe above using an IEEE 14 Busbars system, a transient and dynamic studies when disturbances occur at the point of common coupling (PCC) as well a within the high voltage direct current (HVDC) transmission medium that provides the interface between the rotor side converter (RSC) and the grid side convertor (GSC). The last aspect of this research will consist on identifying and mitigating the instabilities that the phase locked loop (PLL) algorithm could feed to the main grid under fault conditions. MATLAB/Simulink 2019 is used to test the performance of the mentioned system.</p>						