



ELECTRICAL POWER ENGINEERING



Department of Electrical Power Engineering

Postgraduate Research Template

#	Student Name / Surname	Jonas Don-yelee Dakora	Start Date	2019	Supervisor	Prof IE Davidson
	Title of Project	Analysis of Modern Space Solar Power Satellite Systems and Space Rectenna	Completion	2021	Co-Supervisor(s)	
Program of Study (M Eng. / D Eng.)		D Eng				
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<p>Synopsis of Research Project: (< 300 words)</p> <p>Space solar power satellite system is the concept of placing large satellite into geostationary earth orbit to harvest and convert large amount of solar energy into microwave energy and transmit the microwaves to a rectifying antenna array on earth. The antenna array captures and converts the microwave power into usable energy that is injected into the terrestrial electric grid for use. The applications range from primary electric power sources for satellites, remote site scientific experiments and villages in developing countries to supplement the commercial electric grid and provide partial power for businesses and domestic use in developed countries. Electricity generated in space by photovoltaic conversion of solar energy is the main stream of power for low earth and geostationary satellite constellations. Space solar power is an environmental friendly energy source and it is yet to be seriously considered a viable technology for providing electrical generating capacity due to constant sunshine in space. As a result of the orbit location, the amount of sunlight shining on the satellite during the year is very effective and consistent. Satellites have the same rotational period as the earth at geosynchronous orbit and are therefore fixed over one location at all times which enables the satellite to deliver almost uninterrupted power to a ground receiving site.</p> <p>The challenge is to harvest and transmit the energy from space to earth using the microwave power transmission technology without the interference with communication satellites such as the military operations systems and aeroplane radar. This project will focus on LEO location of the space satellite and a rectenna</p>						

location between Limpopo and the Northern Cape. Microwaves of about 2.4 GHz frequency with efficiency of 95% within 5km diameter will be considered to transmit the power from the satellite to the recenna.