# DESIGN AND ANALYSIS OF GRID – CONNECTED PV RENEWABLE SOLAR ENERGY SYSTEM FOR IGBINEDION UNIVERSITY OKADA CROWN ESTATE OKADA

**BY**

**UMEOZOR SOPURUCHUKWU STANLEY PG/19/023343/ENG**

**DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING GEN. ABDULSALAMI A. ABUBAKAR**

**COLLEGE OF ENGINEERING IGBINEDION UNIVERSITY, OKADA EDO STATE, NIGERIA**

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**UMEOZOR SOPURUCHUKWU STANLEY PG/19/023343/ENG**

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# 2021

# DECLARATION

This is to declare that **Umeozor Sopuruchukwu Stanley**, with Matriculation Number: **PG/19/023343/ENG** carried out this research work in partial fulfillment for the award of a Master of Engineering in Electrical and Computer Engineering, Igbinedion University Okada.

# UMEOZOR SOPURUCHUKWU STANLEY DATE

# DEDICATION

I dedicate this dissertation work to God Almighty who has kept me moving in the field of academics.

# CERTIFICATION

This is to certify that, this research and written dissertation entitled; **Design and Analysis of Grid – Connected PV Renewable Solar Energy System for Igbinedion University Crown**

**Estate Okada** was carried out by **UMEOZOR SOPURUCHUKWU STANLEY** with

Matriculation Number: **PG/19/023343/ENG**. In partial fulfillment of the requirement for the

award of Master Degree (M.ENG) in Electrical and Computer Engineering Department of

Igbinedion University Okada, Nigeria under my supervision and guidance.

# Dr. (Mrs.) Guiawa Mathurine Date

Project Supervisor

# Dr. (Mrs.) Guiawa Mathurine Date

**Head of Department**

# Dr. C.E. Ochem Date

**Ag. Dean, School of Postgraduate Studies & Research**

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# ABSTRACT

Renewable energy has given institutions and individuals the opportunity to generate and manage their own energy consumption without much interference from power utility

companies. This dissertation focused on design and analysis of Grid – connected PV Renewable

Solar energy system for Igbinedion Crown estate Okada. Nigeria Solar Market study was

carried out to know the available grid PV components in Nigeria, their qualities, suitability,

capacities, and environmental adaptability. Several Capacities of bifacial and mono – facial

systems were designed and analyzed using PVsyst simulation software with the solar data about

Igbinedion University, Okada (IUO) obtained from meteonorm 7.1. The final result revealed

via the Performance ratios and the generated energy from each design that Igbinedion

University Okada Crown estate has vast potential in generating its own energy via solar system.

Finally, bifacial system with trackers proved to be the best system for the institution in

comparison with fixed bifacial system, mono – facial system with trackers and fixed mono –

facial system.

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# List of Abbreviations

|  |  |
| --- | --- |
| a – Si | Amorphous Silicon |
| AC | Alternating Current |
| AM | Air Max |
| BDC | Benin Distribution Company |
| BoS | Balance of System |
| CdTe | Cadmium Telluride |
| CiGs | Copper Indium, Gallium Selenide |
| C-Si | Crystalline Silicon |
| DC | Direct Current |
| EC | Edge of the Conduction Band |
| EV | Edge of the Valence Band |
| EVA | Ethyl Vinyl Acetate |
| FF | Fill Factor |
| GHG | Greenhouse Gas |
| GTI | Global Tilted Irradiance |
| ISC | Short Circuit Current |
| IUO | Igbinedion University Okada |
| MPP | Maximum Power Point |
| NOCT | Nominal Operating Cell Temperature |
| PR | Performance Ratio |
| PV | Photovoltaic |
| STC | Standard Test Conditions |
| UV rays | Ultra Violet Rays |
| VMAX | Maximum Photovoltaic Module Output Voltage |
| VOC | Open Circuit Voltage |
| Ya | Array Yield |
| Yf | Specific Yield |
| Yr | Reference Yield |
| IUO | Igbinedion University Okada |