



**african sun**  
ENERGY

**Presents**

# **INNOVATING AFRICA'S CLEAN ENERGY TRANSITION**





# Powering the Mineral Sector

## WDM Botswana (PTY) Ltd

### DESCRIPTION OF THE PROJECT

The mining sector is a significant part of the Botswana economy and the largest energy consumer. Downstream, in the value chain. The diamond cutting and polishing sector are driving the industries shift to a cleaner energy mix. The client WDM Botswana (Pty) Ltd, part of the global Constell Group, has several Botswana facilities. WDM Botswana (Pty) Ltd has significantly diversified its energy mix at two of its factories. Solar PV is now their primary energy source, proving 90% of their daytime consumption.

This project consists of two roof-mounted solar power plants totaling **114 kWp**.

### TECHNOLOGIES USED

- **PV Modules** - 254 AXIPREMIUM XL HC AC-450w/144V mono-crystalline manufactured in German.
- **Inverters** – two SMA 110 Core 2 Tripower German manufactured units.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting structure** – K2 from Germany.

### REPORTABLE PROJECT IMPACT

- The two solar power plants produce an annual production of **220,720 kWh per annum**.
- This will displace **330,000kg** of carbon dioxide over the lifetime of the technology.
- Estimated savings of **P178,446** per year of imported energy. Optimized to export at least **22,000kWh** of clean energy to the grid per annum.
- Expected to have a return on investment of **4 years**.
- The project has been accepted into the **BPC/Power Africa Rooftop Solar program**.





# Powering Education

## Regent Hill International School

### DESCRIPTION OF THE PROJECT

“As educators, we have a responsibility to demonstrate to our students what a sustainable future for their planet looks like, it was this focus that inspired us to make a Clean energy transition” Frances Palmer, Regent Hill International School Principal. This **39.96kWp** system is the first grid-tied solar school in Botswana.

### REPORTABLE PROJECT IMPACT

- The rooftop solar plant will provide an annual production of **74,214 kWh per annum**.
- This will displace **141,500kg** of carbon dioxide over the lifetime of the technology.
- Estimated savings of **P60,000.00** per year of Imported energy.
- Optimized to export at least **7,413.70 kWh** of clean energy to the grid per annum.
- Expected to have a return on investment of **4 years**.
- The project has been accepted into the **BPC/Power Africa Rooftop Solar program**.

### TECHNOLOGY USED

- **PV Modules** – 108 ZEBRA Brand developed for the SADC Region, 370w/144V monocrystalline solar panel from FuturaSun in Italy.
- **Inverters** - two SMA Tripower 50 German manufactured units.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting structure** – Renusol from Germany.



# Powering Tourism

## Manong Game Lodge

### DESCRIPTION OF THE PROJECT

Tourism is a major growth sector for both Botswana and the Regional economy. Visitors are much more environmentally aware and expect a more responsible tourism offer. This **104 kWp** ground-mounted system is installed to supply power to the whole lodge facility.

### REPORTABLE PROJECT IMPACT

- The Rooftop solar plant will provide an annual production of **202,592 kWh per annum**.
- This will displace **273,684kg** of carbon dioxide over the lifetime of the technology.
- Estimated savings of **P163,790.00** per year of Imported energy.
- Optimized to export at least **20,000 kWh** of clean energy to the grid per annum.
- Expected to have a return on investment of **4 years**.
- The project has been accepted into the **BPC/Power Africa Rooftop Solar program**.

### TECHNOLOGY USED

- **PV Modules** – 282 ZEBRA Brand developed for the SADC Region, 370w/144V monocrystalline solar panel from FuturaSun Italy.
- **Inverters** – 1 SMA 1 1 0 German manufactured unit.
- **Smart meters, control units, and data loggers** SMA.
- **Mounting structure** – Valsa from South Africa





# Powering Agriculture

## Maruleng Farms, Gabane Western & Sandveld

### DESCRIPTION OF THE PROJECT

**Moving towards a more sustainable agricultural sector.**

Food security is a key issue for Botswana and the region. Pumping and reticulating water is key to making agriculture sustainable. The Maruleng farms are a part of a large cattle finishing facility supported by three large estates all off grid located in the Sandveld region. The farm group has four ground-mounted systems totaling **39.2 kWp**, pumping 250 000 liters of water everyday into tanks. Two of the facility have battery storage installed to supply power for the total farm's night-time needs.

### REPORTABLE PROJECT IMPACT

- The ground-mounted solar plant will provide an annual production of **12,436 kWh per annum**.
- This project will displace **139,500kg** of carbon dioxide over the lifetime of the technology.
- Displaced **P260,000** per year of fossil fuel energy costs.
- Expected to have a return on investment of under **4 years**.

### TECHNOLOGY USED

- **PV Modules** –120 Canadian Solar, 325w/144V mono-crystalline solar panels.
- **Inverters/VFD** – 1 – Danfoss Danish manufactured unit.
- **Smart meters, control units, and data loggers.**
- **Mounting structure** – Axial of Spain



# Powering Manufacturing UV Botswana

## DESCRIPTION OF THE PROJECT

UV Botswana is a 100% export-driven manufacturing business established in 2009 to design and manufacture specialist underground utility vehicles for the mining and quarrying industry. They export their equipment to international clients around the globe.

Their purpose-built factory is equipped with the latest state-of-the-art computer-controlled equipment, to support their growing order book. Energy costs are one of the largest OPEX costs and the need to have energy security to keep the factory efficient they decided to introduce Solar PV into their energy mix. Sustainable Energy Botswana was selected as their EPC company, to design, install and provide operation and maintenance services. SEB also assisted and successfully secured the system into the Roof Top Solar program.

## REPORTABLE PROJECT IMPACT

- The Rooftop solar plant will provide an annual production of **102,672 kWh per annum**.
- This will displace **2,328,561.79kg** of carbon dioxide over the lifetime of the technology.
- Estimated savings of **P148,520.80** per annum of Imported energy.
- Optimized to export at least **10,267 kWh** of clean energy to the grid per annum.
- Expected to have a return on investment of **5 years**.
- The project has been accepted into the **BPC/Power Africa Rooftop Solar program**.

## TECHNOLOGY USED

- **PV Modules** – 460Wp Futurasun Halfcut.
- **Inverters** – 50KW SMA Inverter core 1.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting structure** – k2 Roofing Mounting structure.





# Powering the Financial Services Sector

## Standard Chartered Bank Botswana

### DESCRIPTION OF THE PROJECT

The solar PV project was developed to shave off the bank facility's power consumption by **80%**. High-quality materials and tier 1 solar products were used to warrant the client the best and most durable system with a life of **30 - 40 years**. The inclined solar module mounting structure was used as a way of optimizing the system power generation. The bank now runs on solar energy hence greening their daily operations, therefore, contributing positively to climate change.

### REPORTABLE PROJECT IMPACT

The Rooftop solar plant will provide an annual production of **172,800 kWh per annum**.

The project will offset an estimated **P162,744.22** per annum of imported energy.

This will displace **10,400 kg** of carbon dioxide per annum.

Optimized to export at least **17,280 kWh** of clean energy to the grid per annum.

Expected to have a return on investment of **4 years**.

This project, among others, provided 5 Batswana youth with immersive **on-the-job training**.

### TECHNOLOGY USED

- **PV Modules** – 370Wp Futurasun Halfcut Solar Modules.
- **Inverters** – Two 20KW Fronius Symo Inverters.
- **Smart meters, control units, and data loggers** SMA.
- **Mounting structure** –K2-System Roof Mounting Structure.



# Powering Health Research

## Blantyre Blantyre Research Facility, Malawi

### DESCRIPTION OF THE PROJECT

Initially, this facility was built with a vision to become a state of the art, internationally accredited research facility and a resource mobilization tool. This health research facility consists of a **29.6 kWp** roof-mounted system with 80 tier 1 solar panels and a **45 kWh** Lithium-ion storage system. The self-sufficient system will supply interrupted power allowing the lab to run on a 24/7 basis.

### REPORTABLE PROJECT IMPACT

- This will displace **67,020kg** of carbon dioxide in its first 5 months.
- Optimized to export at least **6,085.07kWh** of clean energy to the grid in the first 5 months of the project.
- **Skills development** through our e-learning program on renewable energy delivered to 78 Malawian citizens.
- The project resulted in an immersive competency-based training offered to 8 Malawians, 3 of which got **full-time employment**.

### TECHNOLOGY USED

- **PV Modules** – 80 FuturaSun SRL 370W modules manufactured in Italy.
- **Inverters** - one 25 KW Sunny Tripower and three 8 KW Sunny Islands Germany manufactured units.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting structure** - K2 from Germany
- **Storage** – BYD 45 kWh Lithium-ion Battery.





# Powering the Professional Service Sector

## The Fields Mall (CBD)

### DESCRIPTION OF THE PROJECT

This is the largest solar PV project at Central Business District (CBD), Gaborone to date. The Fields Offices is the headquarters of a number of blue-chip companies, including Orange Botswana, Minchin & Kelly (DLA Piper), Shell Botswana, (Vivo Energy), First National Bank Botswana, and The Owner and Operator Smart Partnership Enterprise. This is the first phase of the much larger project, that is expected to complete in 2023.

This project consists of two roof top – mounted solar power plants totaling **191 kWp**.

### REPORTABLE PROJECT IMPACT

- The solar power plants produce an annual production of **355,260 KWh per annum**.
- This will displace **532,890kg** of carbon dioxide per year.
- Estimated savings of \$ 28,420 of USD per year of imported energy.
- Optimized to export at least **35,536 kWh** of clean energy to the grid per annum.
- This project has been approved by the **BPC Solar Program**.

### TECHNOLOGY USED

- **PV Modules** – Futura sun 460W.
- **Inverters** – SMA TRI Power CORE 2 German manufactured units.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting Structure** –K2 German integrated with Innovative Swiss manufactured Hilti flat roof bonding system.
- **Hilti** – concrete mounting technology was used to secure the mounting structure on the roofing.



# Powering Health Care

## Riverside Hospital

### DESCRIPTION OF THE PROJECT

#### Introducing the First Solar-Powered Hospital in Botswana.

Riverside Hospital, a private hospital with state-of-the-art facilities, is a demonstration of Botswana's premier solarpowered healthcare institution. Nestled within the heart of Francistown, the city center, Riverside Hospital has embarked on a pioneering journey towards sustainable energy practices.

Driven by the vision to reduce energy expenses, minimize reliance on utility, and ensure energy security, especially in the wake of the global COVID-19 pandemic. Riverside Hospital has established itself as a trailblazer in the integration of solar energy within healthcare services, it has embraced the opportunity to promote sustainable energy on this maiden project to mitigate the significant energy demands of health care equipment in Botswana.

The 420kWp project is a series of solar power installations, strategically designed to transform the hospital's energy landscape. The initial phase is marked by the implementation of two roof-mounted solar power plants on the main clinic, collectively yielding a capacity of 63kWp.

### REPORTABLE PROJECT IMPACT

- The solar power plants produce an annual production of **117,180 kWh per annum**.
- This will displace **4,794 tons** of carbon dioxide lifetime saving.
- Estimated savings of **P128 155 per year** of imported energy.
- Optimized to export at least **17 000 kWh** of clean energy to the grid per annum.
- This project has been approved by the **BPC solar program** to export clean energy to the grid.

### TECHNOLOGY USED

- **PV Modules** – FuturaSun 135 units each 460W Monocrystalline PV modules with half cut cells.
- **Inverters** – 1 SMA 110 Tripower German manufactured units.
- **Smart meters, control units, and data loggers** by SMA.
- **Mounting structure** - K2 from Germany.







# Powering Communities Jamataka

## DESCRIPTION OF THE PROJECT

Jamataka, situated in the central region of Botswana, is a rural community that, like many remote villages, has only recently gained access to clean electricity and the transformative services it brings. The village has emerged as a focal point for advancing clean energy innovation, thanks to a collaborative effort between Sustainable Energy Botswana, and partners from the UK. This dynamic partnership has led to its selection as a testbed for the SolaFin2Go technology, an optimal solution for establishing new off-grid energy access infrastructure.

The groundbreaking SolaNetwork technology, coupled with innovative business models, is revolutionizing energy access in Jamataka village. This is being achieved through the implementation of a solar mini-grid network and a battery exchange program. Notably, the local community is actively engaged in these initiatives as integral participants within a profit-oriented Distributed Energy Service Company (DESCO). This approach not only facilitates clean energy access solutions but also fosters local capacity building within the sector.

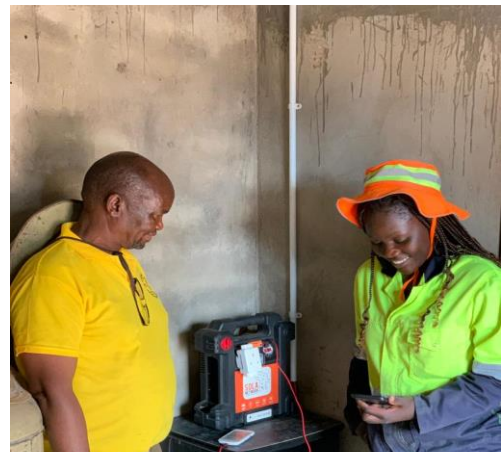
The R&D initiatives, funded by the UK Energy Catalyst program, were guided by the profound belief that a dependable energy source has the potential to significantly enhance lives. By improving the quality of life within the community, this endeavor acts as a catalyst for economic growth and has the potential to expand its impact to other regions, thereby advancing the implementation of Sustainable Development Goal 7 (SDG7).

## REPORTABLE PROJECT IMPACT

- Provision of clean energy to the school and the staff houses.
- Number of new connections (residential, remote cattle posts)
- Establishment of a new community cooperative with a DESCO.
- Training events and activity

## TECHNOLOGY USED

- **Mini Grid PV module** standard size for optimum cost-benefit.
- **Prosumer home systems** - solar PV with storage system
- **Mounting structure** for residential systems K2.
- **Portable Battery** sized for autonomy in cloudy weather periods (205Ah @12V).
- **Solar water heater** with heat retaining thermal diode integrated-collector-storage (28 Liter "Solacatcher").
- **Controller** (MPPT) to manage battery charging & loads & utilize surplus electricity to boost hot water production.
- **Communications** to report energy consumption & system status to cloud via LoRaWAN & mobile phone





# Individual Action

Mr Mhutsiwa  
Residential Solar System

## DESCRIPTION OF THE PROJECT

**Taking action on Climate at a household level has never been easier!**

This **5.18kWp** roof-mounted solar system with a **5.1kWh** storage. Not only does the system provide energy security against load shedding and cost-saving and less dependence on imported energy it also enhances the property value of a residency.

## REPORTABLE PROJECT IMPACT

- The ground-mounted solar plant will provide an annual production of **9934 kWh per annum**.
- This will displace **7500kg** of carbon dioxide over the lifetime of the technology.
- Estimated savings of **P17,874.26** per year of Imported energy.
- Optimized to export at least **993.4 kWh** of clean energy to the Grid.
- Expected to have a return on investment of **7 years**.
- The project has been accepted into the **BPC/Power Africa Rooftop Solar program**.

## TECHNOLOGY USED

- **PV Modules** – 14 ZEBRA Brand developed for the SADC Region, 370w/144V monocrystalline solar panel from FuturaSun in Italy.
- **Inverters** – 1 - 6KW Fronius Hybrid Inverter GEN24 Symo.
- **Smart meters, control units, and data loggers** Integrated in the Fronius Unit.
- **Mounting structure** – K2 from Germany
- **Storage System** - BYD Lithium battery Smart tower system.





# 2021/2022/2023 PROJECTS SUMMARY

## 2021/2022/2023 REPORTABLE PROJECTS IMPACT

### Impact of Reportable Projects in 2021/2022/2023

Over the span of 2021, 2022, and 2023, we have accomplished significant achievements in our projects, resulting in substantial positive impact: Solar PV

#### System Installations:

- During this period, we successfully installed solar PV systems with a combined capacity of 5.4 MWp.

#### Carbon Dioxide Emissions Reduction:

- This collective effort is estimated to displace 15,060 tons of carbon dioxide annually, contributing significantly to environmental preservation.

#### Energy Cost Savings:

- The projected savings from our initiatives amount to approximately \$1,740,960 per year, based on current large business tariff rates, resulting in a reduced reliance on imported energy.

#### Clean Energy Export and Grid Integration:

- Our systems are effectively replacing reliance on thermal energy by exporting clean energy to the grid, facilitating a shift towards more sustainable energy sources.

#### Inclusion in BPC/Power Africa Rooftop Solar Program:

- All of our projects undertaken during 2021, 2022, and 2023 have been accepted into the BPC/Power Africa Rooftop Solar program, highlighting the credibility and quality of our work.

#### Empowerment and Diversity:

- Our projects have not only driven technical advancements but also created employment opportunities, especially for Botswana youth. Over 50 percent of these opportunities have been extended to women, demonstrating our commitment to gender inclusivity.

#### University Collaboration and Education:

- We hosted six industrial placements from the University of Botswana in 2023, with 75% of these placements being women, fostering knowledge exchange and skill development.

#### Research & Development Support:

- Our Research & Development (R&D) initiatives are actively supporting five full-time MSc (Master of Sciences) students at BIUST, promoting academic growth and practical learning.

#### Innovative Apprenticeship Programs:

- Pioneering innovation, we initiated the first solar apprenticeship program in Botswana in 2021, and further extended this program to Zambia, qualifying eight young individuals in the process.

#### Empowerment through Community Initiatives:

- We played a pivotal role in establishing Botswana's first Community Distributed Energy Service company (DESCO), facilitating localized energy solutions.

#### Economic Opportunities for Citizens:

- Our R&D program has led to licensing, employment, and manufacturing opportunities for the citizens of Botswana, contributing to economic growth and self-reliance.

These accomplishments underscore our dedication to sustainable energy solutions, community empowerment, and impactful collaborations. We are committed to continually driving positive change and innovation in the energy sector.

