



Renewable Energy Industries Association of Malawi (REIAMA)

P.O. Box 2474, Lilongwe, Malawi

Phone : +265 996 91 54 89/ +265899579893

E-mail : president@reiamal.org

Website: www.reiamal.org

All correspondences should be addressed to the President

PRODUCTIVE USE OF RENEWABLE ENERGY STANDARD BUSINESS CASE MALAWI

PREPARED BY REIAMA



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Table of Contents

Executive Summary.....	3
Introduction.....	3
Solar Freezer.....	4
Solar Irrigation Water Pumps	9
E-mobility Motor Bikes	16
Solar Fishing Lights	20
Solar Backup Systems	21



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiamo.org
Website: www.reiamo.org

All correspondences should be addressed to the President

Executive Summary

The Productive Use of Renewable Energy (PURE) is crucial for driving economic growth, enhancing livelihoods, and promoting sustainability, particularly in off-grid and rural areas. This report explores the role of five key renewable energy technologies: solar irrigation water pumps, solar freezers, e-mobility motorbikes, Solar fishing lights and solar backup systems in fostering productive energy use. Solar irrigation water pumps enhance agricultural productivity by providing reliable and cost-effective water access, reducing dependency on fossil fuels and rainfall variability. Solar freezers support cold storage for perishable goods, improving food security, reducing post-harvest losses, and enabling income-generating activities such as dairy and fisheries processing. E-motorbikes offer an energy-efficient and sustainable transportation solution, reducing operational costs and emissions while improving mobility for businesses and individuals. Solar fishing lights improve visibility during night fishing, enabling longer fishing hours and increasing fish catches. Solar backup systems provide reliable electricity during power outages, ensuring continuity of business operations.

By integrating these technologies, communities can achieve greater economic resilience, reduce reliance on non-renewable energy sources, and promote sustainable development. The study highlights different business cases in the use of PURE technologies, potential financial models one might use to acquire the products, and technical innovations necessary to accelerate the adoption of these technologies, ensuring their long-term viability and impact.

Introduction

Productive Use of Renewable Energy has various definitions. In this report, Productive Use of Renewable Energy (PURE) refers to the effective and efficient utilization of energy technologies and services that increase the generation of income or productivity to businesses, individuals or households.

PURE plays a crucial role in increasing energy access in developing countries, especially in rural areas. The promotion of PURE products will, thereby, contribute to the modernisation and industrialisation of the Malawi economy.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiamo.org
Website: www.reiamo.org

All correspondences should be addressed to the President

This standard business case focuses on PURE solutions as those that are exclusively solar powered. Not only are they solar powered but there must be a change in machinery from the conventional products to the renewable solution.

Solar Freezer

Solar freezers are appliances that use photovoltaic technology as a power supply to generate cooling and freezing capabilities. These units can be used to keep perishable goods like fish, vegetables or fruits at a chilled temperature ensuring food preservation.

Pros:

- **Ideal for Off-Grid Areas:** Suitable for remote locations with limited access to electricity.
- **Low Maintenance:** Fewer moving parts result in reduced maintenance and lower operational costs.
- **Scalability:** They can be easily scaled by adding more solar panels or batteries to meet higher energy demands.

Cons:

- **High Upfront Cost:** Initial purchase price can be steep.
- **Affordability Options:** Pay-As-You-Go schemes, often provided by suppliers, can help make the appliance more affordable.
- **Efficiency Variability:** The efficiency of solar freezers can vary based on factors like geographic location, panel orientation, and shading, affecting their performance.

Comparison of profitability between no freezer and investing in freezers

The following are the assumptions applied in this case:

- A 60 litres capacity freezer is purchased and used, with an estimated lifespan of 10 years.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

- Assuming fishermen work 30 days/month. Assuming there will be 15 days of no electricity from the grid within one year.
- An estimate of 250kwh of electricity is consumed by the freezer in a year. After purchasing a freezer, plus already possessing a 60l cooler box they will have more fish to store, resulting in a higher revenue.

Metric	No Freezer	Freezer (Grid Connected)	Solar Freezer	Solar Freezer (PAYGO)
CAPEX (MWK)	80,000	295,000	2,650,000	3,250,000
OPEX (MWK)	730,000	73,425	30,000	30,000
Life cycle costs (MWK)	7,380,000	1,819,853.93	2,950,000	3,250,000
Annual Savings (compared to no freezer)		556,014.61	443,000	383,000
Payback period (compared to no freezer)			5.98	8.5
Yield (MWK)	MK73,000,000.00	MK163,520,000.00	MK163,520,000.00	MK163,520,000.00

Table 1

The payback period was calculated by dividing CAPEX by annual savings



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 1: cooler box freezer used to store fish				
Sales Revenue				
Fish sold	8	Dozen	MK 25,000.00	MK200,000.00
Total Daily Revenue				MK200,000.00
Total yearly revenue				MK73,000,000.00
Cost of Sales				
Purchases-Fish	8	Dozen	Mk 20,000.00	MK 58,400,000
Purchases-Ice Block	4		Mk 2000.00	(MK 2,920,000.00)
Yearly Gross profit				MK61,320,000.00
Fixed cost				
Operational Expenses				
Salaries	12	Monthly	MK 150 0000	MK 1,800,000
Security	1	Monthly	MK 10,000	MK 120,000
Transport	1	Daily	MK 10,000	MK 3,650,000
Accumulated Depreciation	10	Years	MK 80,000.00	MK 8000.00
Interest cost				
Total yearly fixed cost				MK 5,578,000
Total cost				MK 66,898,000
Yearly Net profit				MK6,102,000.00

Table 2



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 2: solar freezer used to store fish				
Sales Revenue				
Fish sold	8	large -sized dozen	25000	MK200,000.00
Fish sold	12	small sized dozen	4000	MK48,000.00
Fish sold	8	medium - sized dozen	25000	MK160,000.00
Total Daily Revenue				MK448,000.00
Total yearly revenue				MK163,520,000.00
Cost of Sales				
Purchase -Fish	8	Large-Dozen	MK 20,000.00	MK 58,400,000.00
Purchases-Fish	12	Small sized dozen	MK 3000.00	MK 13,140,000.00
Purchase-Fish	8	Medium dozen	MK 20,000.00	MK 58,400,000.00
Yearly Gross profit				MK129,940,000.00
Fixed cost				
Operational Expenses				
Salaries	12	Monthly	MK 150 0000	MK 1,800,000
Security	1	Monthly	MK 10,000	MK 120,000
Transport	1	Daily	MK 10,000	MK 3,650,000
Accumulated Depreciation	10		MK 2,650,000.00	MK 265,000.00
Interest cost				
Total Yearly fixed cost				MK 5, 835,000.00
Total cost				MK 135,775,000.00
Yearly Net profit				MK 27,745,000.00

Table 3



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 3: grid connected freezer used to store fish				
Sales Revenue				
Fish sold	8	large -sized dozen	25000	MK200,000.00
Fish Sold	12	small sized dozen	4000	MK48,000.00
Fish Sold	8	medium -sized dozen	25000	MK200,000.00
Total Daily Revenue				MK448,000.00
Total yearly revenue				MK163,520,000.00
Cost of Sales				
Electricity cost	250	KWh consumption/year	MK 160.13	MWK 40,033/year
Purchase -Fish	8	large-Dozen	MK 20,000.00	MK58,400,000.00
Purchases-Fish	12	Small sized dozen	MK 3000.00	MK13,140,000.00
Purchase-Fish	8	Medium dozen	MK 20,000.00	MK58,400,000.00
Yearly gross profit				MK129,980,033.00
Fixed cost				
Operational Expenses				
Salaries	12	Monthly	MK 150 0000	MK 1,800,000
Security	1	Monthly	MK 10,000	MK 120,000
Transport	1	Daily	MK 10,000	MK 3,650,000
Accumulated depreciation	10		MK 295,000.00	MK 29,500.00
Total Yearly fixed cost				MK 5,599,500.00
Total cost				MK 135,579,533.00
Yearly Net profit				MK27,940,467.00

Table 4

- In income model 1, where the fisherman uses a cooler box for fish storage, the business generates a yearly net profit of MWK 6,102,000. In contrast, income model 6 shows that by investing in a solar freezer, the yearly net profit increases significantly to MWK 27,745,000. This represents more than a fourfold increase in profitability compared to the cooler box scenario. The improvement is attributed to the increased storage capacity and reduced post-harvest losses, enabling the fisherman to sell a higher volume of fish and operate more efficiently.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

- Even though the grid connected freezer indicates more annual savings compared to the solar powered freezers, it is important to take note that the lifecycle costs consider the cost of electricity which is adjusted to the rate of inflation throughout the ten estimated 10-year lifespan of the freezers. This demonstrates that in the long run, the operational expenditure for the grid connected freezer will continue to increase with each passing year.
- In the case where the fisherman uses a grid-connected freezer to operate their business, the yearly net profit increases significantly to MWK 27,940,467 compared to MWK 6,102,000 when using a cooler box. This represents more than a fourfold increase in profitability, driven by improved storage capacity, reduced spoilage, and increased sales volume.

Alternative Financing Options

- **Microfinance:** Small business owners, such as fish sellers and dairy farmers, can take small loans to acquire solar-powered freezers, ensuring cash flow sustainability.
- **Leasing:** Cold chain service providers can offer a pay-as-you-use model, where users rent freezers for a fixed period instead of owning them.
- **Subsidies:** NGOs and government programs might provide subsidies, especially in off-grid areas, to support food security and reduce post-harvest losses.

Solar Irrigation Water Pumps

Solar water pumps are type of solar technologies that pump water from various sources (e.g. Rivers, wells, ponds) for agricultural irrigation, and is powered by electricity produced from solar panels. They are a climate-friendly and cost-efficient way to pump water to areas where there is limited or have no access to the power grid.

Types of water pumps

Submersible:

This type of pump must be fully submerged into a water source that is not easily accessible. The ideal water source for the submersible pump are boreholes or deep wells.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Surface:

This type of pump is placed on the ground near the water source. They are used to pump water from shallow wells, lakes and rivers.

AC pumps:

Electric motor in this pump needs an inverter to transform the DC voltages produced by the solar panels into AC voltages to operate the pump.

DC pumps:

This pump has an electric motor that uses DC power. However, the power produced is highly dependent on the intensity of the sunlight.

Pros:

- Increase in farm's resilience: ability to irrigate and grow crops even during the drier seasons.
- Reduced reliance on fluctuating fuel prices to power diesel water pumps
- Low operating costs
- Low Maintenance: Solar pumps typically have fewer moving parts and require less maintenance compared to traditional diesel or electric pumps.
- Subsidies and Grants: In many regions, governments offer subsidies, grants, or incentives to encourage the adoption of solar-powered irrigation systems.

Cons:

- Installation cost is higher than traditional electric pumps
- The systems require water storage tank and battery to have an ideal set up.
- Requires regular maintenance.

Comparison of profitability among Rain-fed, Solar water pump and Diesel water pump

Metric	Diesel water pump	Solar water pump	Solar water pump (PAYGO)	Rain-fed
CAPEX	MK493,800.00	MK1,950,000.00	MK2,750,000.00	-



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

OPEX	MK546,800.00	MK30,000.00	MK30,000.00	-
Life cycle costs	MK8,695,800.00	MK2,550,000.00	MK3,050,000.00	-
Payback period	-	3.77	5.32	-
Yield/ Profit	MK6,480,000.00	MK6,000,000.00	MK6,000,000.00	MK 1,680,000.00

Table 5

Income statement model 1: Rainfed Maize Farming				
Sales Revenue				
Maize season (90days)	2400	kg	700	MK1,680,000.00
Total Revenue				MK1,680,000.00
Cost of Sales				
Purchase of Sacks	48	Cycle	MK1500.00	MK 72,000.00
Purchase of Acetylic	4	cycle	MK8,000.00	MK 32,000.00
Wages	-	cycle	MK100,000.00	MK 100,000.00
Transport (Carriage inwards)	1	Cycle	MK150,000.00	MK 150,000.00
Total Cost of Sales				MK 354,000.00
Gross profit				MK1,326,000.00
Fixed cost				
Operational costs				
Farming Tools	1	Cycle	MK 100,000.00	MK 100,000.00
Transport (Carriage Out wards)	1	Cycle	MK150,000.00	MK 150,000.00
Security	5	Monthly	Mk50,000.00	MK 250,000.00
Accumulated depreciation	5%		MK100,000.00	MK 5000.00
Total fixed cost				MK 505,000.00
Total cost				MK 859,000.00
Net profit				MK 821,000.00

Table 6



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 2: maize with solar irrigation				
Sales Revenue				
Maize season (90days)	2400	kg	700	MK1,680,000.00
maize off season	2400	kg	900	MK2,160,000.00
maize off season	2400	kg	900	MK2,160,000.00
Total Revenue				MK6,000,000.00
Cost of Sales				
Purchase of Sacks	48	Cycle	MK1500.00	MK 72,000.00
Purchase of Actellic	4	cycle	MK8,000.00	MK 32,000.00
Wages	-	cycle	MK100,000.00	MK 100,000.00
Transport (Carriage inwards)	1	Cycle	MK150,000.00	MK 150,000.00
Gross profit				MK354,000.00
Fixed cost				
Operational costs				
Farming Tools	1	Cycle	MK 100,000.00	MK 100,000.00
Transport (Carriage Outwards)	1	Cycle	MK150,000.00	MK 150,000.00
Security	5	Monthly	Mk50,000.00	MK 250,000.00
Accumulated depreciation	5%		MK100,000.00 MK1,950,000.00	MK 395,000.00
Total fixed cost				MK 895,000
Total cost				MK 1,249,000.00
Net profit				MK4,751,000.00

Table 7



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 3: maize with fuel-based irrigation				
Sales Revenue				
Maize season (90days)	2400	Kg	700	MK1,680,000.00
maize off season	2400	Kg	1000	MK2,400,000.00
maize off season	2400	Kg	1000	MK2,400,000.00
Total Revenue				MK6,480,000.00
Cost of Sales				
Purchase of Sacks	48	Cycle	MK 1500.00	MK 72,000.00
Purchase of Acetylic	4	cycle	MK 8,000.00	MK 32,000.00
Wages	-	cycle	MK 100,000.00	MK 100,000.00
Transport (Carriage inwards)	1	Cycle	MK 150,000.00	MK 150,000.00
Fuel cost	200	Litres	6687	MK 1,337,400.00
Gross profit				MK 1,691,400.00
Fixed cost				
Operational Expenses				
Farming Tools	-	Cycle	MK 100,000.00	MK 100,000.00
Transport (Carriage Out wards)	1	Cycle	MK150,000.00	MK 150,000.00
Security	5	monthly	Mk50,000.00	MK 250,000.00
Accumulated depreciation	5%		MK100,000.00 MK493,800.00	MK 103,760.00
Total fixed cost				MK 378,760.00
Total cost				MK 2,070,160.00
Net profit				MK3,929,840.00

Table 8

Income Statement Model 1 (Rainfed Maize Farming)

- This model represents traditional rainfed farming with only one production cycle per year. The maize is sold at MK 700 per kg, generating a total revenue of MK 1,680,000.00. After accounting for both variable and fixed costs, the farmer achieves a net profit of MK 821,000.00. This relatively lower profit is due to dependence on rainfall, which limits production to a single season and restricts income potential.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income Statement Model 2 (Maize with Solar Irrigation)

- In this model, the farmer adopts a solar-powered irrigation system, enabling three production cycles per year. The first cycle sells at MK 700 per kg, while the two off-season cycles sell at a higher price of MK 900 per kg, increasing total revenue to MK 6,000,000.00.
- Despite higher initial investment (CAPEX), the operational costs remain relatively low. This results in a significantly higher net profit of MK 4,751,000.00.
- The increase in profit is driven by year-round production and better market prices during the off-season.

Income Statement Model 3 (Maize with Fuel-Based Irrigation)

- This model also allows for three production cycles annually, with total revenue reaching MK 6,480,000.00, partly due to higher off-season pricing assumptions. In this case, an off-season price of up to MK 1,000 per kg is considered to reflect increased production costs, *particularly the use of fuel for irrigation, which makes the maize more expensive to produce.*
- However, the use of fuel for irrigation introduces substantial recurring costs, particularly fuel expenses (MK 1,337,400.00). As a result, although the farmer earns a relatively high net profit of MK 3,929,840.00, it remains lower than that of the solar irrigation model.
- The high operating costs reduce overall profitability despite strong revenue performance, highlighting the impact of expensive fuel inputs on farm income

Overall Comparison and Insight

- Transitioning from rainfed agriculture to irrigation significantly improves productivity and income by enabling multiple growing cycles per year.
- Solar irrigation proves to be the most profitable option, with the highest net returns due to low operating costs and sustainable energy use.
- Fuel-based irrigation, while effective in increasing production, is less efficient in the long term because of high and volatile fuel costs.
- Therefore, even though solar irrigation requires a higher upfront investment, it is the most cost-effective, reliable, and sustainable solution for long-term agricultural productivity and income growth.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

The following are the assumptions applied in this case

1. Irrigation System Costs

- The cash purchase price of the irrigation system is MK 1,950,000.00.
- The credit (Pay-As-You-Go) price is MK 2,750,000.00, with an initial deposit of 60% required upfront.

2. Maize Prices and Production

- During the main season, maize is sold at:
- MK 700 per kg, equivalent to MK 35,000 per 50kg bag.
- During the off-season, maize is sold at:
- MK 1000 per kg, equivalent to MK 50,000 per 50kg bag.
- 1 acre of land produces 2,400 kg per 90-day cycle,
- This is equivalent to 48 bags (50kg each) per cycle.

3. Fuel-Based Irrigation Assumptions

- 1 acre of land requires approximately 200 litres of fuel per cycle.
- The cost of fuel is estimated at MK 6,687 per litre.
- This estimate is based on field data from one respondent, who indicated that 200 litres is sufficient to irrigate 1 acre per production cycle.
- **These assumptions are based on field estimates and prevailing market prices, and actual values may vary depending on location, seasonality, and market conditions.**

Alternative financing Options

- **Microfinance:** Smallholder farmers can access loans through microfinance institutions (MFIs) to purchase solar pumps, allowing them to pay in instalments rather than upfront.
- **Leasing:** Farmers can lease pumps from service providers, paying a periodic fee instead of purchasing outright, making it cost-effective for seasonal use.
- **Subsidies:** Government or donor programs may provide partial subsidies to reduce the initial investment cost, especially for low-income farmers.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

E-mobility Motor Bikes

E-mobility motorbikes, also known as electric motorbikes are two-wheeled vehicles powered by electricity rather than internal combustion engines. They are part of the broader category of electric vehicles (EVs) designed to provide sustainable and eco-friendly alternatives to traditional petrol or diesel-powered vehicles.

Pros:

- **Eco-Friendly:** No tailpipe emissions, helping to reduce air pollution and Lower carbon footprint.
- **Convenience:** Can often be charged at home, eliminating the need for frequent visits to a gas station and Some models offer swappable batteries, allowing quick refuelling.
- **Lower Operating Costs:** Electricity is cheaper than gasoline and Reduced maintenance due to fewer moving parts (no oil changes, spark plugs, or exhaust systems).

Cons:

- **Limited Range:** Shorter travel distances compared to traditional motorbikes, especially for entry-level models, therefore requires careful planning for longer trips.
- **Charging Infrastructure:** Charging stations may not be as widespread as fuel stations in some regions.
- **Higher Upfront Costs:** Initial purchase price is often higher than that of gasoline-powered counterparts, though operating costs are lower.

Comparison of profitability between Electric motorbikes and Fuel based motorbikes



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Metric	Fuel based motorbikes	Electric motorbikes	Electric motorbikes (PAYGO)
CAPEX	MK1,800,000.00	MK7,500,000.00	-
OPEX	MK5,864,700.00	MK876,500.00	-
			-
Life cycle costs	MK48,717,600.00	MK14,512,000.00	-

Table 9

Note: The business models have been placed under the assumptions

The following are the assumptions applied for this case:

Electric Motorbike Model:

- The electric motorbike generates a daily revenue of MK 50,000, resulting in a total annual revenue of MK 18,250,000.00. The main operating cost is electricity for charging, estimated at MK 4,000 per day, which totals MK 1,460,000 annually.
- After deducting this, the gross profit is MK 16,790,000.00. Fixed costs, including maintenance (MK 600,000) and depreciation (MK 1,500,000), amount to MK 2,100,000.00. This brings the total annual cost to MK 3,560,000.00, resulting in a net profit of MK 14,690,000.00. The high profitability is driven by low operating costs, particularly the absence of fuel expenses.

Fuel-Based Motorbike Model:

- Similarly, the fuel-based motorbike generates MK 50,000 per day, giving an annual revenue of MK 18,250,000.00. However, fuel costs are significantly higher, with daily consumption of 6 litres at MK 6,672 per litre, resulting in MK 40,572 per day and a total annual fuel cost of MK 14,808,780.00.



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Income statement model 1: Fuel based motorbikes				
Sales Revenue				
Transport service	1	distance travelled	MK 50,000.00	MK50,000.00
Total Revenue/day				MK50,000.00
Total yearly revenue				MK18,250,000.00
Cost of Sales				
Fuel cost	6	litres/day	MK 6,672.00	MK 40,572.00
Yearly Fuel Cost				MK 14,808,780.00
Yearly Gross profit				MK 3,441,220.00
Fixed cost				
Operational Expenses				
Maintenance	1	Monthly	MK 50,000.00	MK 600,000.00
Accumulated depreciation	5	Years	MK 1,800,000.00	MK 360,000.00
Interest cost				
Total fixed cost				MK 960,000.00
Total cost				MK 15,768,780.00
Net profit				MK 2,481,220.00

Table 10



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

- After deducting fuel expenses, the gross profit is reduced to MK 3,441,220.00. Fixed costs, including maintenance (MK 600,000) and depreciation (MK 360,000), total MK 960,000.00. This leads to a total annual cost of MK 15,768,780.00 and a much lower net profit of MK 2,481,220.00. The reduced profitability is mainly due to the high and recurring fuel costs.

Additional Key Assumptions and Findings

- The motorbike is owner-operated, meaning the owner manages all activities, including transport services, maintenance, and daily operations. This reduces labour costs and improves overall profitability in both models.
- The cost of sales for the electric motorbike includes electricity required for daily

Income statement model 2: Electric motorbikes				
Sales Revenue				
Transport service	1	distance travelled	MK 50,000.00	MK50,000.00
Total Revenue/day				MK50,000.00
Total yearly revenue				MK18,250,000.00
Cost of Sales				
Electricity/Charging	1	per day	MK 4,000/day	MK4,000.00
Yearly charging cost				MK 1,460,000
Yearly Gross profit				MK 16,790,000
Fixed cost				
Maintenance	1	Monthly	MK 50,000.00	MK 600,000.00
Depreciation	5	Years	MK 7,500,000.00	MK 1,500,000.00
Interest cost				
Total fixed cost				MK 2,100,000.00
Total cost				MK 3,560,000.00
Net profit				MK 14,690,000.00

Table 11



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

- charging. Based on Malawi's electricity tariffs and average battery consumption (3-5 kWh per charge), a daily charging cost of MK 4,000 has been assumed to reflect typical operational conditions.
- Based on the models results between Electric motorbike and fuel-based motorbikes, despite that Electric motorbikes require a significantly higher initial investment, they offer lower operational costs (due to zero fuel expenses and reduced maintenance).

Alternative financing Options

- **Microfinance:** Entrepreneurs and delivery businesses can access loans to purchase e-bikes, making them affordable for low-income earners.
- **Leasing:** Fleet operators or ride-hailing services can provide leasing options, allowing riders to use bikes to generate income without high upfront costs.
- **Subsidies:** Green energy initiatives and carbon credit programs may offer subsidies to promote clean mobility and reduce emissions.

Solar Fishing Lights

Solar fishing lights are portable lighting systems powered by solar energy and used by fishing communities during night fishing operations. They replace kerosene lamps, candles, and battery-powered lights, improving safety and reducing operational costs.

Pros

- Eliminates expenditure on kerosene and disposable batteries
- Improved visibility and fishing efficiency
- Environmentally friendly and renewable energy source
- Low maintenance costs
- Enable longer fishing hours and increasing fish catches

Cons

- Performance depends on adequate solar charging
- Battery replacement may be required after several years
- Initial purchase cost may be higher than traditional lighting options



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

Comparison of Profitability Between Battery-powered Lights and Solar Fishing Lights

Metric	Battery-powered lights	Solar Fishing Lights	Solar Fishing Lights (PAYGO)
CAPEX	MK 85,000	MK 270,000.00	MK350,000.00
OPEX	MK	MK	-
			-
Life cycle costs	MK	MK	-

Table 12

Solar Backup Systems

Solar backup systems are solar-powered energy storage solutions designed to provide reliable electricity for productive-use activities such as welding, saloons, barber shops, tailoring, Agro-processing, refrigeration, and other small businesses.

Pros

- Reliable power supply during grid outages
- Reduced electricity costs
- Supports business continuity and productivity
- Environmentally friendly source of energy
- Can increase business revenues through extended operating hours

Cons



Renewable Energy Industries Association of Malawi (REIAMA)
P.O. Box 2474, Lilongwe, Malawi
Phone : +265 996 91 54 89/ +265899579893
E-mail : president@reiama.org
Website: www.reiama.org

All correspondences should be addressed to the President

- High initial investment cost
- Requires adequate system sizing and maintenance
- Battery replacement may be needed after several years

Comparison of profitability for a Barber Shop using Grid versus a Solar Backup System

The following are the assumptions applied for this case

Metric	Barber Shop Using Grid Electricity only	Barber Shop Using Solar Backup System	Barber Shop Using Solar Backup System (PAYGO)
CAPEX	-	MK3,000,000.00	MK3,500,000.00
OPEX			
Life cycle costs			

Table 13