EMPOWERING WOMEN ENTREPRENEURS THROUGH ENERGY AUDITS

Unlocking Renewable Energy Potential in Women-Led MSEs in Nigeria

Survey Coverage: 1000 female-led MSEs in Abuja and Lagos from April to July 2025

RENEWABLE ENERGY ASSOCIATION OF NIGERIA (REAN)

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EMPOWERING WOMEN ENTREPRENEURS THROUGH ENERGY AUDITS:

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Executive Summary

Micro and Small Enterprises (MSEs) in Nigeria are the backbone of the country's private sector, playing a major role in economic output, gender inclusion, and employment.

This factsheet is based on the comprehensive energy audit conducted in June 2025, surveying 1,000 women-led Micro, and Small Enterprises (MSEs) across Abuja and Lagos. The audit examined current energy consumption patterns, costs, equipment profiles, and renewable energy adoption potential.

Why The Energy Audit?

To understand the actual energy consumption patterns, estimate the cost burden of grid and generator use, ascertain the technical readiness for renewable energy adoption, and present the financial feasibility of RE for women-led MSEs.

Key Findings:

The audit reveals that energy costs consume up to 33% of monthly revenue for many MSEs with heavy reliance on expensive and unreliable fossil fuel generators. The findings demonstrate that targeted renewable energy solutions could reduce operational costs by 30-80% while extending business operating hours and improving productivity.

- 54.6% of the MSEs surveyed use generators for 1-8 hours daily at an average cost of N21,146 monthly for fuel, and spend between N5000 – N20,000 on unstable electricity grid monthly
- 70% of the businesses have turned down projects due to electricity issues
- 49% of these female MSEs earn less than N200,000 monthly, with 465 MSEs spending 33.3% of revenue on energy
- Average energy demand across the MSEs type is 119kW, with 70% of MSEs using 10-50kW of energy
- 95.6% of surveyed MSEs are technically and financially ready to adopt solar energy solutions
- 80% of equipment owned is compatible with solar – low energy/energy saving equipment, DC compatible equipment, rechargeable devices, etc.
- 95.6% of MSEs are technically and financially ready for a switch to solar with the right conditions.

Background: Why Women-Led MSEs Matter

MSEs is a broader term that includes micro-enterprises (usually 1–9 employees and up to 5 million turnover), as well as small (10–49 employees, 5–50 million). MSEs thus covers the full spectrum from micro to the small businesses.

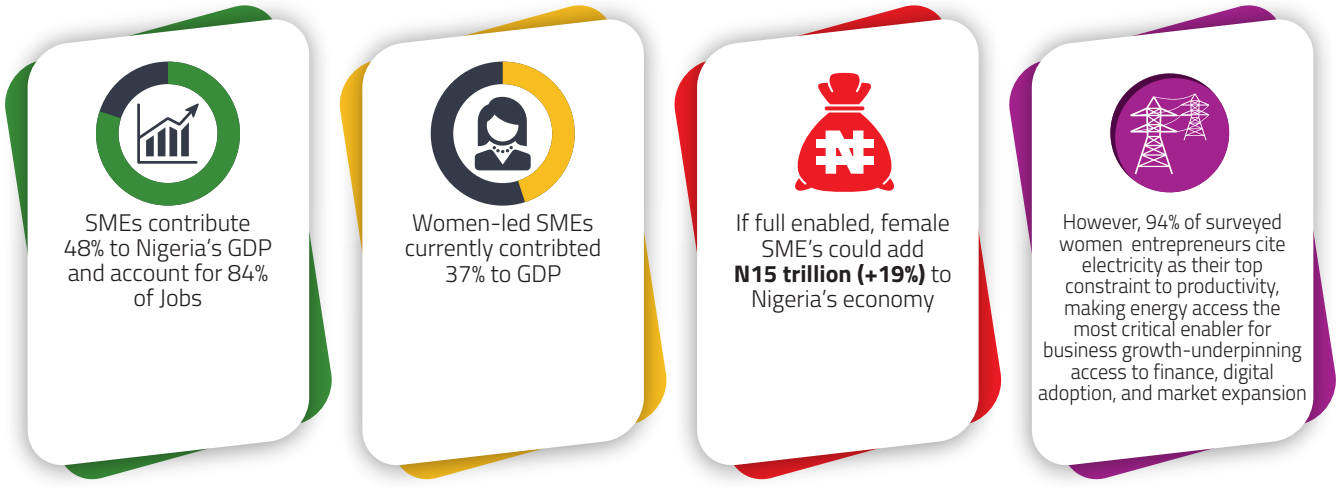
Economic Impact:

As of 2025, Nigeria had between 39 and 41 million MSEs nationwide. These MSEs account for about 48% of Nigeria's total GDP. They provide 84%–86% of all jobs and make up over 96% of total businesses in the country[1].

Women-led MSEs represent 37% of all MSEs in Nigeria, which equal about 15-16 million enterprises[2] and are critical drivers of economic growth, contributing significantly to the country's GDP and employment.

From the survey, Female-led businesses operate across diverse sectors including fashion and textiles (332 businesses), retail provision stores (188), local bar (86 beer parlors), cosmetics (83), bakery and pastry (46), and numerous other sectors.

However, 94% of surveyed women entrepreneurs cite electricity as their top constraint to productivity, making energy access the most critical enabler for business growth—underpinning access to finance, digital adoption, and market expansion.



1. Premium Times, (2025, October 18). MSMEs contributes half of Nigeria's GDP, 84% of jobs – Minister. Report by Moniepoint. (Accessed October 2025). https://www.premiumtimesng.com/news/headlines/828808-msmes-contribute-half-of-nigerias-gdp-84-of-jobs-minister.html

2. BusinessDay. (2025, March 8). "Empowering women-owned businesses with digital tools to drive growth." Reports by NBS and PwC indicate that women-led businesses represent about 33% of total SMEs in Nigeria (accessed July 2025) see also – Women Leader (2025 Edition). Empowering Women-owned MSMEs in Nigeria: Study reveals financial challenges in adopting digital services by GWL Team. Accessed (October 2025)- https://www.globalwomanleader.com/viewpoint/entrepreneur/empowering-women-owned-msmes-in-nigeria-study-reveals-financial-challenges-in-adopting-digital-services-nwid-782.html

Energy Audit Methodology

The energy audit surveyed 1,000 female-led MSEs across Abuja (FCT) and Lagos from April to July 2025. The 1,000 women were selected through targeted sampling of women-led SMEs across Abuja and Lagos, using business listings, market associations, and field enumeration, with enumerators specifically focusing on entrepreneurs operating energy-dependent businesses to ensure representation across sectors and business sizes. The audit methodology included:

- Detailed assessment of current energy sources (grid, generators, solar) of the MSEs
- Documentation of energy reliability, usage hours, and monthly costs
- Equipment inventory and power consumption analysis of the MSEs
- Revenue and operational constraint mapping of the MSEs
- Technical feasibility assessment for renewable energy adoption of the MSEs

Business Sectors Covered: Fashion/tailoring, retail, hospitality, food processing, personal care services, business centers, small-scale manufacturing, agriculture, and professional services.

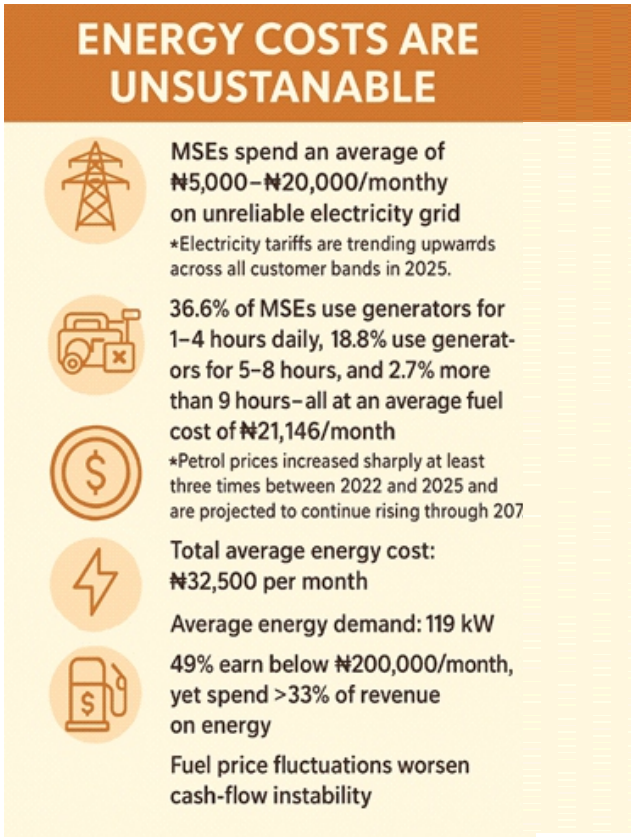
Financial Burden of Current Energy Sources

Monthly Energy Expenditure:

- Grid electricity: N5,000 - N20,000 per month
  Electricity tariffs are trending upwards across the customer bands in 2025.
- Generator fuel: Average N21,146 per month
  Total average energy cost: N32,500 per month

Generator Dependency and Costs:

- Generator ownership: Over 50% of MSEs surveyed rely on generators
- Generator capacity: Majority use 3.3 kVA - 5 kVA generators
- Daily usage: 36.6% use generators 1-4 hours daily, 18.8% use 5-8 hours, only 2.7% exceed 9 hours
- Fuel cost volatility: Petrol prices increased sharply at least three times between 2022 and 2025 and is projected to continue increasing through 2027 (N600 in 2022 to ave. N1,239 in 2025 and projections reaching N1,450 by 2027).



Revenue Impact:

- 49% of MSEs earn less than N200,000 monthly
- 465 MSEs (nearly half) spend 33.3% of their revenue on energy alone
- Nearly 1 in every 3 naira earned funds energy expenses
- 83.8% of businesses face unsustainable energy burdens averaging 21.2% of monthly revenue.

Critical Challenge: Sustaining operations under current cost pressure is becoming increasingly untenable as fuel prices continue rising.

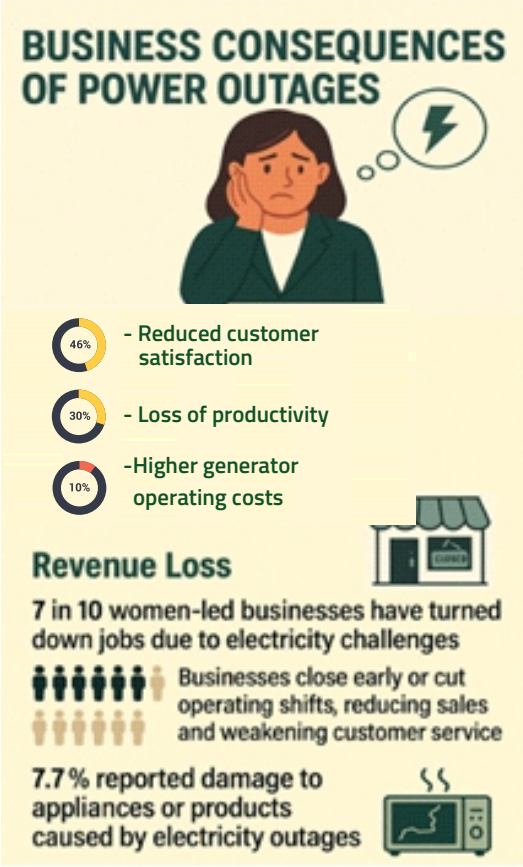
Operational Impacts of Energy Unreliability

Business Consequences of Power Outages:

- **46%** of businesses: Reduced customer satisfaction
- **30%** Loss of productivity
- **10%** Increased generator costs
- **8%** Equipment and product damage
- **2%** Other impacts (reduced operating hours, missed opportunities)

Revenue Loss:

- 7 out of 10 women-led businesses have turned down jobs due to electricity issues
- Businesses close early or reduce shifts, affecting sales and customer service
- 7.7% reported damage to appliances or products caused by electricity outages



Equipment Profile and Energy Demand

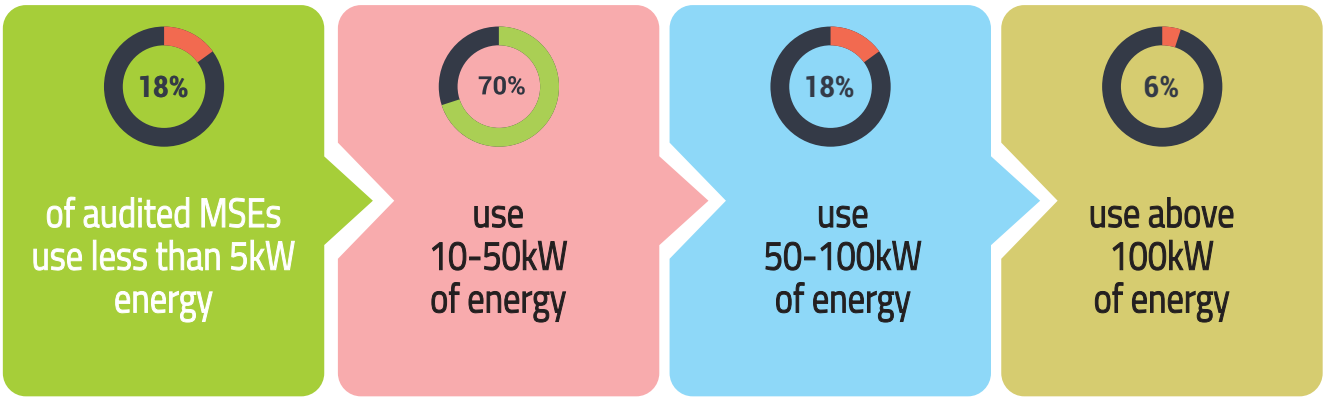
Common Equipment Usage

The audit documented equipment ownership and usage patterns across surveyed MSEs:

Equipment	Ownership %	Avg. Wattage	Daily Hours
Lighting (ave 4 points)	2.1235	18W per bulb	6 hours
Fans (2 units)	0.9549	75W per fan	6 hours
Refrigerator (2 units)	0.3794	150-550W	10 hours
TV (2 units)	0.1951	251W	5 hours

Equipment	Ownership %	Avg. Wattage	Daily Hours
Pressing Iron	0.1725	1,600W	5 hours max
Hair Dryers (2 units)	0.1255	1,500-4,000W	5 hours
Laptop (2 units)	0.0765	50W	5 hours
Air Conditioner	0.0618	1,500W	4 hours

ENERGY DEMAND DISTRIBUTION



Average energy demand: 119kW across all businesses

Renewable Energy Potential: Solutions Analysis

How Solar Energy Addresses Current Challenges

Current Challenge	Impact on Business	Solar Solution
High Generator Costs	Over 30% cite increased costs as direct challenge	Solar can reduce daily fuel costs by 60-80%
Limited Operating Hours	Businesses close early due to power issues	Solar allows night operations and longer shifts
Product Spoilage	12% report damage from outages	Stable power prevents voltage damage, keeps refrigeration running
Revenue Loss	70% turned down projects	Reliable power enables consistent service delivery

Table 2: Renewable energy solutions to current energy challenges

SOLAR SYSTEM SIZING EXAMPLES

For typical business types, recommended include:

Small Retail/ Provision Shop

- Daily load: 3.98 kWh
- Monthly demand: 119.4 kWh
- Solar panels: ~1.600W (4 x 400W panels)
- Battery: 3 x 100Ah lithium batteries at 24V
- Inverter: 1,500W

Beer Parlor/Lounge

- Daily load: 15.71 kWh
- Monthly demand: 471.3 kWh
- Solar panels: ~4,000W (10x400W panels)
- 8 × 100Ah lithium batteries at 24V
- Inverter: 4,000W

System Design Assumptions

- Peak Sun Hours: 5 hours/day
- System Losses: 20% (80% efficiency)
- Battery Depth of Discharge: 80% (lithium)
- System Voltage: 24V
- Inverter sizing: 25% above daily load

Financial Feasibility: Cost-Benefit Analysis

Current (Generator + Grid) vs. Solar Energy Costs

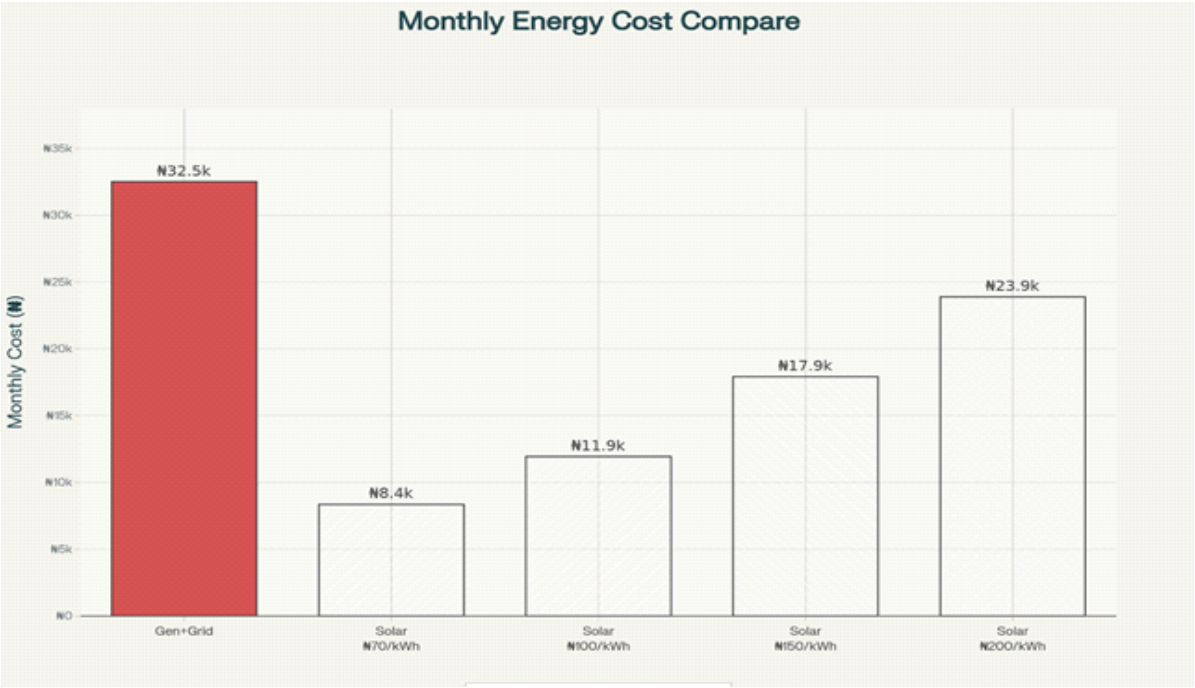


Chart 1: Monthly energy cost comparison for small provision shop

Potential Savings: Even at N150/kWh solar rates, MSEs can save up to 45% compared to current combined generator and grid costs, while accessing reliable 24/7 power.

BARRIERS TO ADOPTION

Despite clear financial benefits, two key barriers must be addressed:

1. Financial Feasibility Barriers:

- 65% consider upfront costs too high

  For instance:

  Small Retail/Provision Shop (1.6 kW system)

  N900,000 – N1,500,000

  (Includes panels, 3 lithium batteries, 1.5 kW inverter, installation, wiring)

  Beer Parlor/Lounge (4 kW system)

  N2,200,000 – N3,500,000

  (Covers panels, 8 lithium batteries, 4 kW inverter, protections, installation)

  Prices vary depending on battery chemistry, panel grade, installer markup, and location. So typical a MSME solar systems cost between 900,000 and 3,500,000 depending on business size, making initial investment a major barrier despite long-term savings.

- 57% operate informally without access to formal credit
- Long payback periods create cash flow concerns
- Commercial lending rates at 23% make financing challenging

2. Technical Feasibility Concerns (Lower Priority):

- 45% have limited technical expertise for maintenance
- 38% have reliability/efficiency concerns (low voltage issues)
- 17% express quality concerns about equipment damage
- High-wattage loads (fridges, irons, dryers, AC) significantly push up consumption and cost

However: 80% of shops already use equipment solar can power, and flexible systems can be tailored to match specific energy demands. With proper training and support, technical feasibility is rated as MEDIUM priority, while financial feasibility remains the HIGH priority barrier.

RECOMMENDED DEPLOYMENT MODEL

Pay-As-You-Go (PAYG) or Lease-to-Own Structure

Given that small businesses currently spend N32,500/month on grid and fossil fuel, and solar providers face 23% bank interest rates, the recommended business model must balance consumer affordability with provider sustainability.

Model Components:

1. **Low Upfront Cost:** Removes barrier of high initial investment
2. **Adopt Pay-As-You-Go (PAYGO) or Lease-to-Own Models:** Businesses pay small monthly instalments instead of a lump sum, spreading the cost over 1–3 years.
3. **Predictable Monthly Payments:** Set at or below N32,500 (current energy spend)
4. **Ownership Pathway:** After 3-5 years, business owns the system
5. **Monthly/Weekly Payment Target:** N28,000 - N32,000 for typical 120 kWh/month system
6. **Energy-as-a-Service (EaaS) Model:** Businesses pay only for the energy they use monthly—zero upfront installation cost.

Example Calculation:

For a N1,000,000 system financed over 5 years at 23% annual interest:

- Monthly payment: N28,000 - N32,000 (N 7,000 a week or N1,000 a day)
- Comparable more affordable than current energy spend
- Eliminates future energy bills after payoff (except maintenance)

Ensure financing options are flexible (pay-as-you-go, microcredit, village saving groups, cooperative lending)

Value-Added Features

To enhance adoption and sustainability:

- Remote monitoring and maintenance included in monthly fee
- Performance guarantees (uptime, response time for repairs)
- System upgrade options as business grows
- Flexible payment holidays during off-peak seasons
- Discounts for early repayment or referrals
- Bundled insurance for theft or major damage (optional at client discretion and risk)

Effective Marketing Strategy– Gender Consideration

Women typically manage energy usage and appliance operation but do not make the main decisions about adopting new technology, including RE solutions. There is a widespread belief that men are more technically capable, so men are usually the ones who choose or approve technology choices, even if the woman owns the SME or controls the finances. Social norms and cultural expectations reinforce these gender roles, often discouraging women from pursuing technical training or being involved in technical decision-making.

Hence, marketing, pilot and deployment of RE strategies need to be multivariable and holistic. The following are possible measures to adopt to improve the adoption of RE:

1. Understand men's motivations such as business profitability, reliability of technology, and social status to tailor product messaging, demonstrations, and sales pitches that appeal to their interests and concerns.
2. Use "spousal influence" channels by equipping women-led SME owners and their husbands/partners with joint information packs, co-hosted demonstration events, and co-benefit messaging that highlights mutual household and business advantages.
3. Actively solicit buy-in from men as advocates, technical supporters, and co-investors, emphasizing how empowering women with RE solutions also benefits men's business interests and family wellbeing.
4. Develop joint marketing and outreach that involve both male and female stakeholders, showing men the business benefits of women's technical empowerment and independent adoption of renewable energy.
5. Organize community demonstrations and trainings for mixed-gender groups, where men are encouraged to support and advocate for women's leadership and technical roles in energy projects.
6. Create campaigns that showcase women as technical adopters and energy entrepreneurs, using real stories of female solar installers, engineers, and business leaders to build confidence and normalize women's expertise in technology.
7. Engage women's business associations, local influencers, and women's co-ops as anchor partners for RE demos, trial installations, and information sessions, emphasizing aspirational leadership rather than passive role models.

Financing Optimization Strategies

To improve margins and affordability:

- Negotiate single-digit interest rates with development finance institutions
- Minimum 5-year loan tenure for lower monthly payments
- Seek concessional funds and grants to offset commercial lending costs
- Bulk procurement and operational efficiencies to reduce system costs
- Aggregate SME demand to increase bargaining power

POLICY AND IMPLEMENTATION RECOMMENDATIONS

For Government and Policymakers

1. Encourage gender-inclusive energy programs with specific targets for MSEs
2. Establish concessional financing mechanisms at single-digit rates for renewable energy adoption
3. Create regulatory frameworks that facilitate PAYG and lease-to-own solar models
4. Provide tax incentives for solar equipment and installation for MSEs
5. Support aggregation platforms that consolidate SME demand for bulk procurement

For Renewable Energy Providers

1. Do not oversize the system – tailor fit solutions with sound energy mix advice to the MSEs
2. Develop tailored PAYG/lease-to-own products with monthly payments at or below N32,500
3. Provide comprehensive training on system use and basic maintenance
4. Establish responsive after-sales support with performance guarantees
5. Partner with women-led SME associations, village groups, cooperative, and market associations to build trust and aggregate demand
6. Offer flexible payment options including seasonal adjustments and early payoff incentives

For Development Partners and Financiers

1. Establish dedicated credit lines with concessional terms for women-led SME energy access
2. Support investment readiness programs to help MSEs attract funding
3. Provide grant funding to reduce upfront costs and improve affordability
4. Finance technical assistance for system design, installation, and maintenance training
5. Create risk-sharing mechanisms to enable provider access to commercial lending at better rates

For SME Associations and Cooperative Groups

1. Aggregate member demand to negotiate better pricing and terms
2. Facilitate collective procurement to reduce per-unit costs
3. Establish peer learning networks for knowledge sharing on solar adoption
4. Coordinate with energy providers to design contextually appropriate solutions
5. Support members in accessing financing through cooperative credit structures

Conclusion:

The Renewable Energy Opportunity

The energy audit of 1,000 women-led MSEs in Abuja and Lagos reveals a clear and urgent opportunity: 95.6% of surveyed businesses are financially and technically ready to adopt solar energy solutions, yet face barriers around upfront costs and access to appropriate financing.

Key Takeaways:

- Current energy costs (N32,500/month average) consume 21-33% of monthly revenue, severely constraining growth
- Solar energy can reduce costs by 30-80% while providing reliable 24/7 power
- PAYG and lease-to-own models can make solar accessible at monthly payments comparable to current energy spending
- With proper financing structures and technical support, renewable energy can transform productivity for thousands of women-led businesses

The Path Forward:

To unlock the transformative potential of renewable energy for women-led MSEs, stakeholders must work together to address financial barriers through innovative financing models, concessional lending, and policy support, while renewable energy providers deliver tailored technical solutions with comprehensive after-sales service.

By empowering women entrepreneurs with reliable, affordable clean energy, Nigeria can unlock N15 trillion in economic potential while creating jobs, reducing poverty, and advancing sustainable development goals.

REDUCING SOLAR UPFRONT COST

Adopt PAYGO or Lease-to-Own

Spread cost over 1–3 years with small monthly payments

Introduce Concessional Loans

Offer low-interest financing for solar systems

Provide RBF Subsidies

Fund part of system cost upon verified installation

Bulk Procurement

Buy in bulk through cooperatives to achieve discounts

Tax Waivers & Duty Exemptio

Remove taxes and import duties on solar components

Local Assembly Support

Promote local assembly of solar products

Performance-Based Partnerships

Pay only after systems demonstrate verified performance

Energy-as-a-Service Model

Offer solar energy with no upfront cost

Blended Finance Mechanisms

Government or Donor Guarantees

Mitigate lender risk