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INDUSTRIAL DEVELOPMENT ORGANIZATION



ENERGY EFFICIENCY  
FOR SUSTAINABLE  
LIVELIHOODS IN AFRICA

# ENERGY EFFICIENCY FOR SUSTAINABLE LIVELIHOODS IN AFRICA (EELA) ZAMBIA

PROVISION OF SERVICES TO SUPPORT ENERGY EFFICIENCY POLICIES, REGULATORY  
FRAMEWORKS, AND MARKET DEVELOPMENT FOR ENERGY-EFFICIENT APPLIANCES,  
INCLUDING AN ASSESSMENT OF THE LOCAL MANUFACTURING SECTOR IN ZAMBIA



## Draft Progress Report

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**Disclaimer**

The contents of this report represent the views of the experts in the short term and do not represent in any way those of the UNIDO nor those of Ministry of Energy

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## List of Acronyms

AC	Alternating Current
AMA	Appliance Market Actors
DC	Direct Current
EE	Energy Efficiency
EELA	Energy Efficiency for Sustainable Livelihoods in Africa
EESAP	Energy Efficiency Strategy and Action Plan
EoL	End-of-Life
EPR	Extended Producer Responsibility
ERB	Energy Regulation Board
GoZ	Government of Zambia
ICTP	Industry Clean Tech Platform
IRP	Integrated Resource Plan
ISO	International Organization for Standardization
ISO/IEC 17025	International Standard for Testing and Calibration Laboratories
KEBS	Kenya Bureau of Standards
KII	Key Informant Interview
LCPDP	Least Cost Power Development Plan
MEPS	Minimum Energy Performance Standards
MFEZ	Multi-Facility Economic Zone
MCDSS	Ministry of Community Development and Social Services
MCTI	Ministry of Commerce, Trade and Industry
MSD	Market Systems Development
PAYGO	Pay-As-You-Go
PRO	Producer Responsibility Organisation
RMI	Research Methods International
SABS	South African Bureau of Standards
SADC	Southern African Development Community
SHS	Solar Home Systems
TEVETA	Technical Education, Vocational and Entrepreneurship Training Authority
UNIDO	United Nations Industrial Development Organization
ZABS	Zambia Bureau of Standards
ZCSA	Zambia Compulsory Standards Agency
ZDA	Zambia Development Agency
ZEMA	Zambia Environmental Management Agency
ZGEN	Zambia Gender Equity Program

# 1. EXECUTIVE SUMMARY

## 1.1 Overview and Purpose

This Progress Report integrates the findings of Task 1 (Situational Analysis and Market Study) and Task 2 (Value Chain Mapping and Assessment of the Local Appliances and Manufacturing Sector) of the Energy Efficiency for Sustainable Livelihoods in Africa (EELA) Zambia Country Window program, implemented by United Nations Industrial Development Organization (UNIDO). The report is designed to feed directly into the Task 3 national stakeholder validation workshop and to provide the consolidated evidence base for EELA's policy, regulatory, and market development interventions.

The synthesis draws on three convergent data streams: a structured survey of 100 Appliance Market Actors (AMAs) conducted across six provinces of Lusaka, Copperbelt, Central, Eastern, Southern and North-Western provinces; 33 in-depth Key Informant Interviews (KIIs) with government officials and sector leaders; and a desk review of 24 national, regional, and international policy documents. Field data were collected between 17 and 24 February 2026.

## 1.2 The Core Finding

### "Zambia is POLICY-READY but NOT IMPLEMENTATION-READY for energy-efficient appliances."

*Vision 2030, the National Energy Policy (2019), the Energy Efficiency Strategy and Action Plan (EESAP) 2022, and the Energy Regulation Act (2019) together provide a coherent enabling framework that designates energy efficiency as a core pillar, sets explicit intensity-reduction targets, and grants ERB legal authority to issue Minimum Energy Performance Standards (MEPS). However, the EELA regulatory gap analysis finds that no appliance-specific MEPS are yet in force, no mandatory national energy-labelling scheme exists at point of sale, and there is no ISO/IEC 17025-accredited laboratory for appliance energy-performance testing in Zambia. In practice, SADC-aligned MEPS remain voluntary, labels are imported from source countries rather than issued under a Zambian scheme, compliance relies on supplier self-declaration, and there is no pre-market conformity assessment or coordinated enforcement mechanism.*

## 1.3 Integrated Findings at a Glance

TASK 1: MARKET STUDY KEY FINDINGS	TASK 2: VALUE CHAIN KEY FINDINGS
<ul style="list-style-type: none"> <li>• 88% import-dependent market; only 17% of firms are manufacturers</li> <li>• No national MEPS, mandatory labelling or import controls in force</li> <li>• 88% cash-purchasing; affordability is top constraint (67%)</li> <li>• 49% unaware of SADC MEPS; 55% company staff untrained on EE</li> <li>• 52% of enterprises have joint/mixed ownership and 41% are male-led, with only 1% formally female-led, 6% not distinct; 70% of firms have &lt; 20% women in technical roles</li> <li>• 88% would like to join ICTP for training programs when its established.</li> </ul>	<ul style="list-style-type: none"> <li>• 71% of manufacturers use mixed domestic-import component sourcing</li> <li>• Only 11% of the surveyed firms use certified test reports; ZABS lacks ISO/IEC 17025 certified EE appliances test lab</li> <li>• On-grid market fastest-growing (59% of firms); solar home systems (65%) and lighting (61%) dominate</li> <li>• Five bottlenecks: MEPS, EE appliance testing, financing, institutional fragmentation, skills</li> <li>• 23% of end-of-life pathways unknown; EPR regulations not operationalised</li> <li>• Productive-use appliances represent highest-potential local manufacturing niche</li> </ul>

## 1.4 Key recommendations

Seventeen integrated recommendations, organised across three implementation tiers, constitute a comprehensive roadmap for transforming Zambia's EE appliance sector from policy-ready to implementation-ready:

Tiers	Recommendations
<b>Tier 1 (Year 1)</b>	<ol style="list-style-type: none"> <li>1. Gazette SADC-aligned MEPS;</li> <li>2. Launch national EE awareness campaign;</li> <li>3. Begin ZABS ISO/IEC 17025 EE Appliance test lab accreditation process;</li> <li>4. Introduce mandatory energy labelling;</li> <li>5. Establish import conformity assessment</li> <li>6. Introduce fiscal incentives for EE appliances and link them to enforceable standards</li> <li>7. Establish inter-agency EE Technical Committee to provide coordination and joint enforcement of national regulatory bodies (ERB, ZABS, ZCSA, ZEMA)</li> <li>8. Introduce mandatory appliance standards. SADC-harmonised MEPS for air conditioners and refrigerators exist in Zambia but are currently voluntary. ERB is currently developing a bill to replace voluntary with mandatory MEPS</li> <li>9. Establish regulatory mechanisms for quality assurance and review modalities</li> </ol>
<b>Tier 2 (Years 1–2)</b>	<ol style="list-style-type: none"> <li>10. Accredit the Zambia Bureau of Standards energy efficiency testing lab with ISO/IEC 17025 and establish SADC mutual recognition of test results to support MEPS enforcement. This requires upgrading equipment, building staff capacity, and formal recognition agreements with regional labs. It will reduce reliance on foreign testing, lower costs, speed up approvals, and strengthen MEPS and labelling enforcement. ISO/IEC 17025 confirms a lab's competence to produce reliable test results.</li> <li>11. Operationalize Extended Producer Responsibility (EPR) regulations by introducing take-back systems, and strengthening recycling and disposal infrastructure;</li> <li>12. Implement Local Content Regulations;</li> <li>13. Develop productive-use (household and agro-processing appliances) manufacturing support program;</li> <li>14. Align TEVETA curriculum with EE competencies;</li> </ol>
<b>Tier 3 (Years 2–3)</b>	<ol style="list-style-type: none"> <li>15. Establish national EE appliance financing facility;</li> <li>16. Integrate EE into power sector planning;</li> <li>17. Embed gender-disaggregated targets in EESAP;</li> </ol>

## 2. INTRODUCTION

### 2.1 Purpose and Context of the Progress Report

Zambia's energy sector stands at a pivotal crossroads. With electricity access expanding through both on-grid and off-grid solutions, and national ambitions anchored in Vision 2030 for universal modern energy access, the demand trajectory for electrical appliances is rising steeply. Yet the quality and energy performance of those appliances and their impact on household expenditure, grid load, and environmental outcomes remain largely unregulated.

The Energy Efficiency for Sustainable Livelihoods in Africa (EELA) program, implemented by the United Nations Industrial Development Organization (UNIDO) with support from SIDA, is designed to address this gap systematically. EELA Zambia commissioned Tasks 1 and 2 to generate the evidence base necessary for designing targeted policy interventions, building institutional capacity, and mobilising private sector investment in energy-efficient (EE) appliances.

This Progress Report serves three connected purposes. First, it integrates the findings from Task 1 (Situational Analysis and Market Study) and Task 2 (Value Chain Mapping) to produce a consolidated evidence base that is greater than the sum of its parts. Second, it provides the inputs required for the Task 3 national stakeholder validation workshop, identifying the key findings, strategic implications, and recommendations that must be tested, refined, and prioritised through broad stakeholder engagement. Third, it incorporates the additional data disaggregation and analytical refinements requested by UNIDO and development partners.

### 2.2 Scope and Audience

The scope of this synthesis encompasses the full EE appliance sector in Zambia: on-grid appliances, off-grid solar solutions, and productive-use equipment across urban, peri-urban, and rural markets in six provinces which included Lusaka, Copperbelt, Central, Eastern, Southern and North-Western provinces. The synthesis addresses market structure and dynamics, the policy and regulatory architecture, institutional capacity and coordination, the local manufacturing and value chain landscape, gender and social inclusion, and circular economy and end-of-life management.

The primary target audience for this report includes: the Ministry of Energy and the Energy Regulation Board (ERB), Ministry of Commerce, Trade and Industry, Zambia Bureau of Standards (ZABS), Zambia Compulsory Standards Agency (ZCSA), and Zambia Environmental Management Agency (ZEMA) as the principal regulatory authorities—with ERB serving as the regulatory authority for Minimum Energy Performance Standards (MEPS), ZABS responsible for standards development and testing, ZCSA overseeing enforcement at import and market entry, and ZEMA responsible for environmental regulation and Extended Producer Responsibility (EPR); UNIDO and development partners as program implementers and funders; the private sector manufacturers, importers, retailers, and distributors as the primary market actors; civil society and gender equality organisations; and the national and international standards bodies engaged in the MEPS and labelling processes. The report is also intended to serve as a public document that can be referenced by researchers, investors, and regional partners.

### 2.3 Process and Sources of Evidence

This report draws on three primary data streams. The first is a structured survey of 100 Appliance Market Actors (AMAs) conducted across six provinces between 17 and 24 February 2026, capturing the perspectives of retailers (52%), importers (26%), manufacturers (17%), and distributors (5%). The second is forty-one (41) in-depth Key Informant Interviews (KIIs) with government officials, industry leaders, and development partners. The third is a desk review of 24 national, regional, and international policy, regulatory, and market documents, including a Technical Assessment Checklist applied to 91 products assessed in the field.

The report also provides an appliance-specific value chain disaggregation by product category; clearer distinction between household and productive-use applications; improved on-grid/off-grid segmentation; reparability data disaggregated by appliance type; and clarification of the SADC MEPS awareness and adoption status for specific product categories including lighting, air conditioners and refrigerators.

## 2.4 The EELA Approach

The EELA approach to change is anchored in a market systems development framework that seeks to transform the entire energy-efficient appliance market rather than addressing isolated constraints. It operates across four interconnected layers as shown on figure 1 below:



Figure 1: The EELA Approach

Source: UNIDO

First, it strengthens the “rules” of the market by supporting the development and enforcement of policies and regulatory instruments such as Minimum Energy Performance Standards (MEPS), energy labelling, and quality assurance frameworks, thereby creating clear and credible market signals. Second, it builds the “supporting functions” necessary for effective market operation, including testing and certification infrastructure, technical skills and training, access to finance for both firms and consumers, and improved market information and awareness. These functions enable market actors to comply with regulations and respond to emerging opportunities. Third, EELA actively engages “market actors” manufacturers, importers, distributors, and retailers to improve product quality, strengthen compliance, and shift business models toward energy-efficient solutions, while also supporting value chain development and local manufacturing where feasible. Fourth, awareness raising is achieved by facilitating knowledge sharing, social media outreach and gender – inclusive messaging. The overall objective is to drive systemic, long-term change by aligning incentives, crowding in private investment, strengthening institutional coordination, and ensuring sustainability beyond donor support. This approach is further reinforced through cross-cutting priorities such as gender inclusion, circular economy practices, and regional harmonisation of standards, ensuring that market transformation is both inclusive and sustainable.

## 3. ANALYTICAL FRAMEWORK

### 3.1 Methodology

This study employed a mixed-methods approach, integrating both quantitative and qualitative techniques to ensure a comprehensive understanding of the appliance market landscape and policy environment. Data was collected through three primary methods: a structured survey of Appliance Market Actors (AMAs), Key Informant Interviews (KIIs), and a desk review of energy relevant policy and market documents.

#### Desk Review

A desk review was undertaken to contextualize primary data findings within the broader policy, regulatory, and market landscape. The review covered 24 national, regional, and international documents, including policy frameworks, regulatory guidelines, market studies, and technical standards related to appliances and energy efficiency. These documents were analyzed to identify existing regulatory provisions, institutional arrangements, and best practices relevant to the appliance market.

#### Key Informant Interviews

To complement the quantitative survey data, thirty-three (33) in-depth Key Informant Interviews (KIIs) were conducted with government officials, industry leaders, and development partners. These interviews were designed to capture expert perspectives on the policy and regulatory framework, market dynamics, enforcement challenges, and opportunities for strengthening appliance standards and energy efficiency initiatives. KIIs followed a semi-structured format, allowing for both consistency across interviews and flexibility to explore emerging themes in greater depth.

#### Structured Survey of Appliance Market Actors

A structured survey was conducted with 100 Appliance Market Actors (AMAs) across six provinces between 17 and 24 February 2026. The survey aimed to capture quantitative and perception-based insights on market conditions, product availability, regulatory awareness, and business practices within the appliance sector. Respondents represented different segments of the market ecosystem, including retailers (52%), importers (26%), manufacturers (17%), and distributors (5%). The survey used a standardized questionnaire to ensure consistency in data collection across all locations.

#### Technical Assessment Checklist

As part of the fieldwork, a Technical Assessment Checklist was applied to 91 products observed in retail outlets and distribution points. This checklist was used to document product characteristics such as energy labels, standards compliance, and technical specifications, providing an objective snapshot of appliances currently available in the market. The findings were based on physical inspection rather than self-reporting.

#### Sampling

Purposive sampling was used to include market actors in six provinces of Lusaka, Copperbelt, Central, Eastern, Southern and North-Western Provinces. Firms were selected from four main categories which are importers, distributors, manufacturers, and retailers. The categories were further disaggregated by product types which are Solar Home Systems, Lighting, Fans, Televisions, Refrigerators, Air Conditioners, Productive-Use Equipment (Home and Industrial), and Solar Refrigeration.

#### Data Analysis

Quantitative data from the AMA survey and technical product assessments were compiled and analyzed using descriptive statistical techniques to identify trends and patterns within the appliance market. Qualitative data from KIIs and the desk review were analyzed using thematic analysis, enabling the identification of key themes related to policy implementation, market barriers, regulatory enforcement, and opportunities for improvement. Triangulation of findings across the three data sources strengthened the validity of the study's conclusions and ensured robust evidence base for the analysis.

## 3.2 Market Systems and Value-Chain Logic

This report adopts a market systems development (MSD) framework as its primary analytical lens. The MSD framework recognises that markets are complex adaptive systems shaped not only by the direct transactions between buyers and sellers as the core market function but also by the supporting functions (information, finance, skills, infrastructure) and the rules (formal regulations and informal norms) that enable or constrain those transactions. Sustainable market transformation requires intervention across all four dimensions, not just at the level of individual transactions or actors.

The value chain analysis component maps the specific relationships, flows, and governance structures that link actors from raw material and component supply through manufacturing, distribution, retail, after-sales service, and end-of-life management. By examining the chain as a whole, the analysis identifies binding constraints that cannot be resolved by any single actor operating in isolation and therefore require coordinated policy, regulatory, or institutional action.

Applied to Zambia's EE appliance sector, this framework reveals a core systems failure: the absence of demand-side regulatory instruments (MEPS, labelling) means there is no market signal that rewards energy efficiency, no quality filter at the point of import, and no investment certainty for manufacturers. The result is a market equilibrium locked into import dependence, low efficiency, and low awareness - an equilibrium that will not shift without deliberate regulatory activation.

## 3.3 Link to the EELA Intervention Framework

This study aligns with two core intervention streams of the EELA Zambia programme: (i) Policy and Regulatory Support (Outcome 1) and (ii) Capacity Development (Outcome 3). Its findings and recommendations are designed to support the effective delivery of these outcomes. Outcome 1 focuses on strengthening the policy and regulatory environment to increase the uptake of energy-efficient appliances through MEPS, energy labelling, and compliance systems. Outcome 3 focuses on building technical and institutional capacity across the value chain, particularly for installation, repair, maintenance, and end-of-life treatment, with a strong emphasis on e-waste management. Together, these outcomes define the scope and strategic focus of this study.

The Task 1 market study provides evidence on appliance markets, market actors, and the policy and regulatory environment, directly informing Outcome 1 (Policy and Regulatory Support). Zambia has a solid policy foundation through Vision 2030, the National Energy Policy (2019), and EESAP 2022–2030, but implementation remains at an early stage. Under SADC harmonisation, Zambia is adopting regional MEPS for priority products such as refrigerators, room air conditioners, lighting products, electric motors, and distribution transformers. However, full gazettement, enforcement, energy labelling systems, and accredited testing infrastructure are still under development. The priority is to operationalise these SADC-aligned MEPS and strengthen compliance, testing, and market-entry controls to ensure effective implementation. UNIDO/EELA work includes preparatory MEPS and testing workstreams for industrial motors and transformers, including equipping ZABS labs for motor tests.

EELA Zambia operates through two relevant intervention streams for this study. The first is the policy and regulatory workstream (Outcome 1), which establishes the formal rules of the market, including MEPS, mandatory energy labelling, import conformity assessment, and Extended Producer Responsibility (EPR) regulations. The second is the capacity development workstream (Outcome 3), which strengthens skills, systems, and institutions required to support the lifecycle of energy-efficient equipment, including installation, maintenance, repair, and environmentally sound end-of-life management, particularly e-waste systems.

This synthesis provides integrated evidence base across these two workstreams. The Task 1 findings inform Outcome 1 by identifying regulatory gaps, institutional weaknesses, and market dynamics that policy instruments must address. The Task 2 findings inform Outcome 3 by mapping skills gaps, value chain bottlenecks, and capacity constraints in areas such as equipment servicing, repair ecosystems, and e-waste management systems. By integrating these two evidence streams, the study generates cross-cutting strategic insights that strengthen regulatory effectiveness while ensuring that the necessary technical and institutional capacities are in place to support sustainable implementation.

Table 1: EELA Intervention Framework

Intervention Pillar	Evidence Source	Key Synthesis Insight
MEPS & Labelling	Task 1: Regulatory gap analysis; Task 2: Compliance paradox	No MEPS in gazette despite 92% label presence, self-declaration, not verified compliance. While no national MEPS are gazetted, Zambia is at an advanced stage of adopting the SADC MEPS on lighting, ACs, and refrigerators, and further, Zambia is exposed to SADC-harmonised MEPS frameworks, which are currently voluntary
Consumer Financing	Task 1: Willingness to Pay (WTP) analysis; Task 2: Retail structure findings	50% WTP conditional on financing; 88% cash-purchasing financing reform is highest-leverage demand-side intervention
Gender Integration	Both tasks: gender data streams	52% joint/mixed ownership but 70% < 20% women in technical roles, ownership inclusion does not translate to productive participation
Circular Economy	Task 2: End-of-Life (EoL) checklist; Task 1: EPR gap analysis	23.1% unknown EoL pathways; EPR un-operationalised intervention window open but narrowing as market volumes grow

## 4. MARKET STUDY FINDINGS (TASK 1)

### 4.1 National Policy Architecture: Sound Intent, Missing Instruments

Zambia's energy governance framework rests on a tiered policy hierarchy that provides a credible enabling foundation for EE appliance market development. Vision 2030 commits to universal modern energy access; the National Energy Policy (2019) designates energy efficiency as one of five core pillars; EESAP 2022 sets a 2% annual energy intensity reduction target with household appliances as a priority intervention area; and the Energy Regulation Act (2019) grants ERB broad regulatory authority. The National Quality Policy Implementation Plan (2025 - 2030) confirms that Zambia is still in the process of establishing testing, certification, and enforcement infrastructure required for MEPS implementation.

However, the desk review of 24 documents identified four critical regulatory absences that collectively nullify this policy intent: **no appliance-specific MEPS in force (they are voluntary and not yet gazetted nationally, i.e. technically ready but not legally in force); no mandatory energy labelling scheme; no pre-market conformity assessment for appliances; and no national EE testing or certification infrastructure.**

Zambia currently applies voluntary Minimum Energy Performance Standards (MEPS) for appliances such as air conditioners and refrigerators, aligned with the Southern African Development Community (SADC) harmonised MEPS framework<sup>1</sup>. SADC has now formally adopted harmonised MEPS for air conditioners and residential refrigeration, referenced as SADC HT 110:2023 (ACs) and SADC HT 111:2023 (refrigerators), which were approved by SADCSTAN and circulated to Member States in early 2024<sup>2</sup>. However, these standards are not formally gazetted at the national level and enforcement remains limited. While no national MEPS are gazetted, Zambia is at an advanced stage of adopting the SADC MEPS on lighting, ACs, and refrigerators, and further, Zambia is exposed to SADC-harmonised MEPS frameworks, which are currently voluntary. This is the defining structural gap in Zambia's EE appliance governance.

<sup>1</sup> <https://united4efficiency.org/harmonized-regional-meps-for-cooling-products-approved-for-sadc-region/>

<sup>2</sup> <https://united4efficiency.org/resources/harmonized-meps-for-air-conditioners-and-residential-refrigeration-appliances-in-sadc-region/>

“SADC standards have been domesticated”  
**KII — ZEMA (Government & Regulators)**

“SADC standards have been localised for the priority equipment, lighting, refrigerators and air conditioners”  
**KII — MCTI (Government & Regulators)**

**REGIONAL BENCHMARKING CONTEXT**

- *South Africa: 15+ product categories, mandatory labelling, accredited labs — regional reference standard*
- *Kenya: 5-star labelling enforced by EPRA, TUV-certified testing — MEPS via Energy Act*
- *Tanzania: MEPS proposed by 2026, NEES 2024–2034 roadmap — on development trajectory*
- **ZAMBIA: No MEPS in force | No mandatory labelling | No accredited testing — lagging all regional peers**

### 4.2 Market Structure and Actor Profiles

The 100 AMA survey reveals a market dominated by retail and import activity. Retailers constitute 52% of firms, importers 26%, and manufacturers only 17% confirming Zambia's structurally import-dependent market character. Lusaka concentrates 57% of all operations, functioning as the import gateway. About 63% of firms have operated for six or more years, indicating an established but structurally stable market.

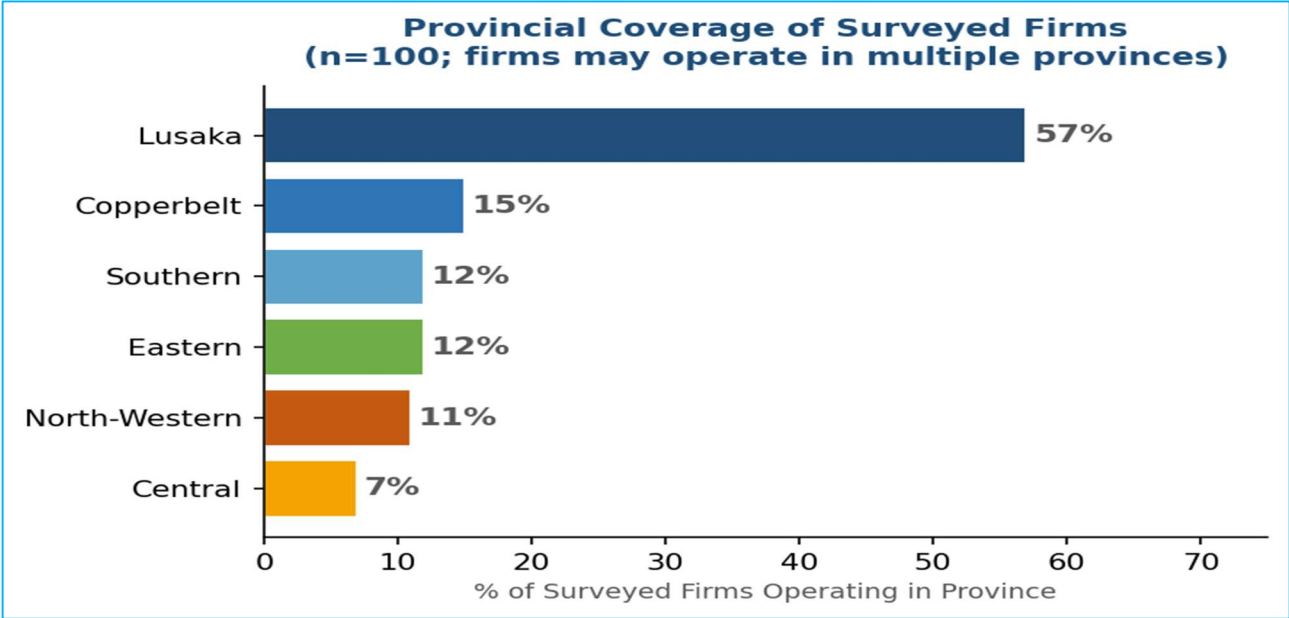


Figure 2: Provincial Coverage of Surveyed Firms (n=100)

### Market Participation by Appliance Category and Business Role

Figure 3 presents the percentage of firms engaged in different appliance categories, disaggregated by business role (manufacturers, importers, retailers, and distributors). It shows a clear concentration of market activity in a few dominant product segments, alongside notable differences in participation across roles.

Solar Home Systems and lighting emerge as the most widely handled product categories, with participation levels consistently high across all business types (approximately 60–70%). This indicates strong market penetration and broad value chain involvement in off-grid and energy-efficient lighting solutions. Productive-use appliances also show relatively balanced engagement (around 40–50%), suggesting growing but still moderate market depth. In contrast, consumer appliances such as televisions, fans, and refrigerators display more variation across roles. Importers and retailers dominate these segments, with participation levels reaching over 50% in some cases, while manufacturers and distributors show comparatively lower involvement. This pattern reflects the import-driven nature of the market and limited domestic production capacity.

Lower participation is observed in air conditioners and solar refrigeration, particularly among manufacturers, indicating either higher entry barriers, lower demand, or more specialized supply chains.

Overall, the figure highlights three key dynamics:

- (i) strong market concentration in lighting and solar home systems,
- (ii) the central role of importers and retailers in shaping product availability, and
- (iii) uneven participation across appliance categories, pointing to structural gaps in local manufacturing and distribution capacity.

The findings below provide a distinction between appliance categories across firm types. The survey data allow for the following disaggregation:

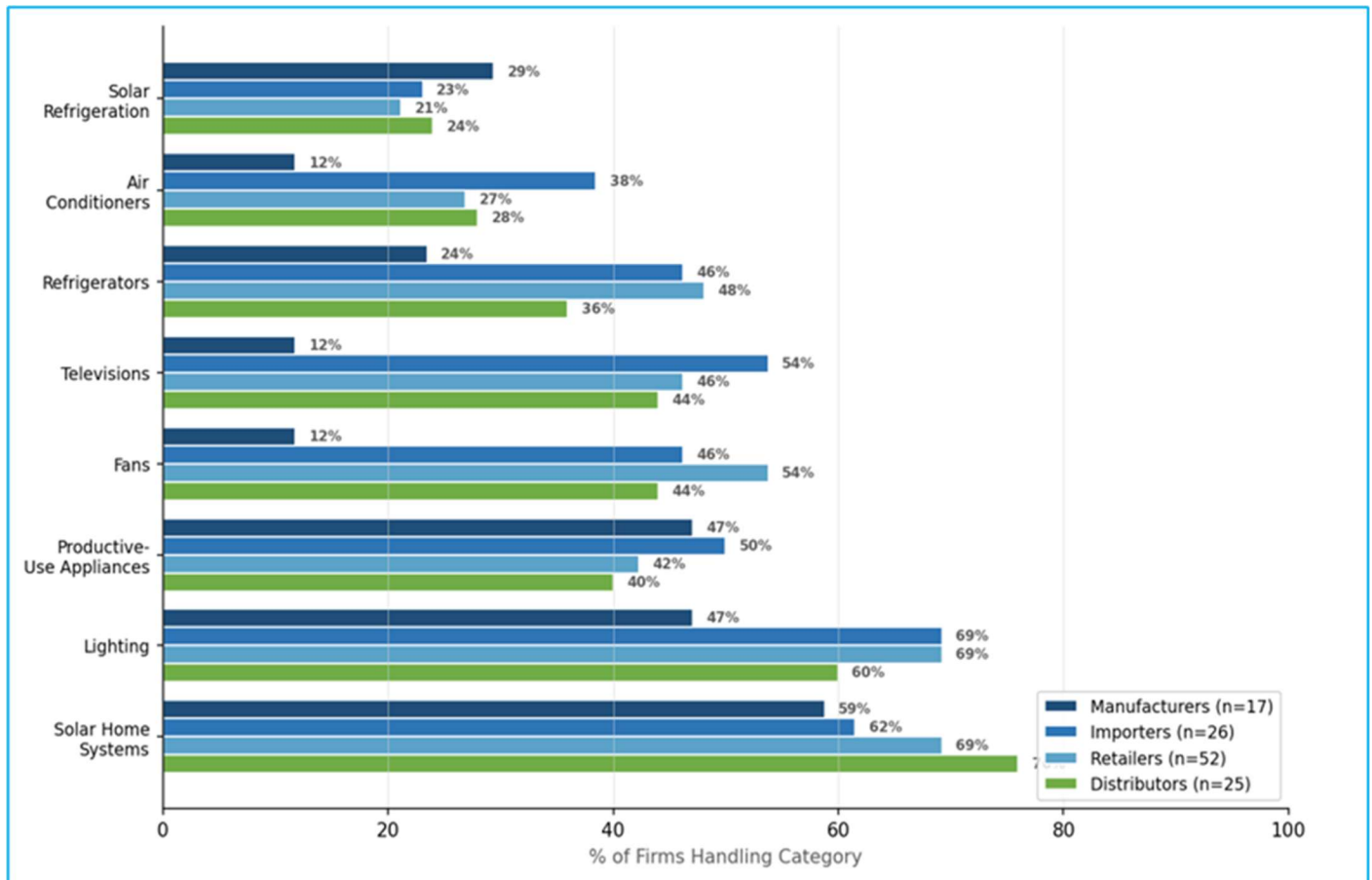


Figure 3: Appliance Categories by Business Role (% of Firms Handling Each Category)

Table 2 further provides detailed insights of the appliances categories by industry players/actors and the key findings.

Table 2: Product Category Distribution by Firm Type

Product Category	Retailers (n=52)	Importers (n=26)	Manufacturers (n=17)	Key Market Notes
Solar Home Systems	85%	75%	35%	65 firms total; fastest off-grid segment; local assembly prevalent
Lighting	82%	65%	29%	61 firms; strong EE product range; LED transition underway
Fans	70%	54%	24%	46 firms; dominated by Chinese imports; MEPS gap most acute
Televisions	63%	58%	12%	42 firms; high-volume import channel; consumer electronics focus
Refrigerators	62%	50%	18%	40 firms; highest energy consumption; MEPS priority product
Air Conditioners	35%	42%	6%	26 firms; commercial focus; SADC MEPS voluntary — low awareness
Productive-Use Equip.	42%	31%	41%	32 firms; highest local manufacturing share; agro-processing led
Solar Refrigeration	22%	19%	35%	19 firms; emerging segment; cold chain / vaccine storage niche

### 4.3 On-Grid vs Off-Grid Segmentation

On-grid household appliances represent the fastest-growing segment (59% of respondents), driven by expanding electrification. Off-grid household appliances represent 28% of the fastest-growing segment, with last-mile solar home systems as the dominant product. Productive-use equipment which spans both on-grid and off-grid contexts accounts for 13% of the fastest-growing segment. See Figure 4.

61% of surveyed firms serve both on-grid and off-grid markets simultaneously, reflecting Zambia's blended energy access reality. Productive-use appliances can apply in both household and industrial contexts for example, solar refrigerators for vaccine storage in clinics and hospitals (institutional off-grid), solar grain mills for rural cooperatives (productive-use off-grid), and induction cookers for catering enterprises (household/commercial on-grid). A clearer disaggregation framework for MEPS development under EELA should distinguish between: (a) household end-use; (b) MSME/commercial use; and (c) industrial/agro-processing use, recognising that many product categories span multiple use contexts.

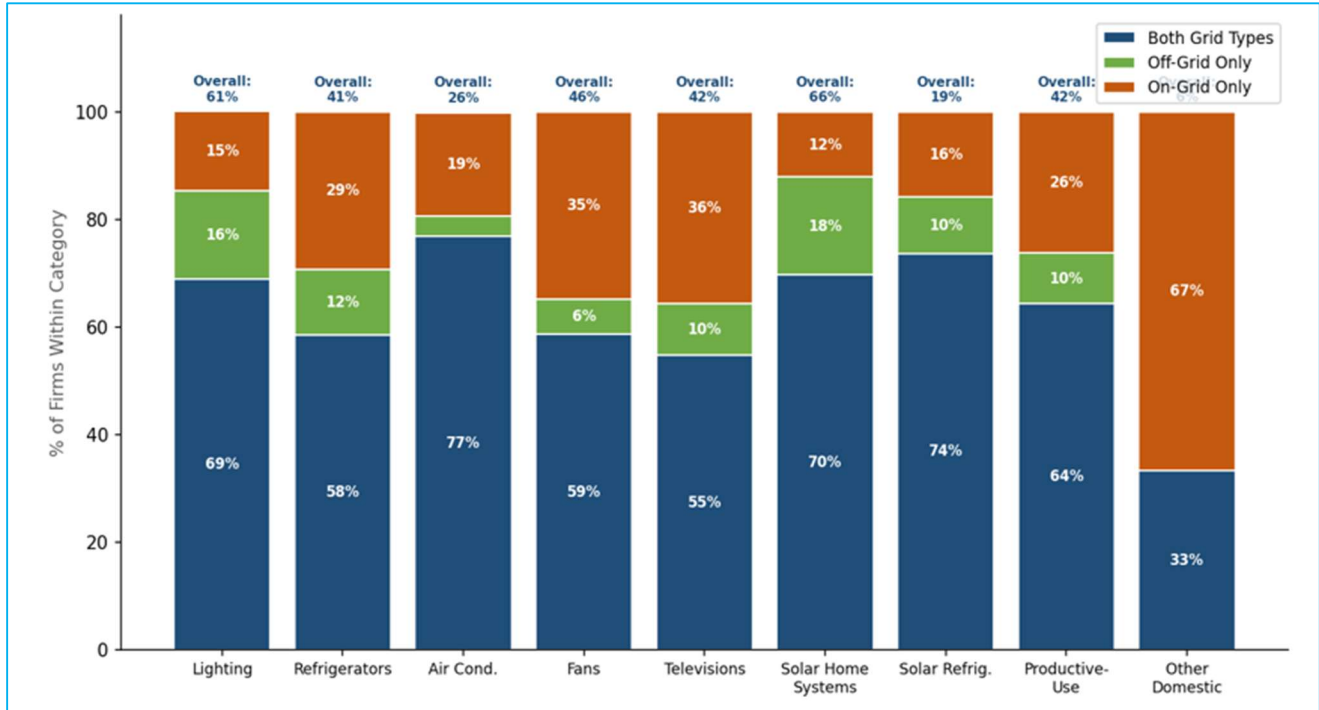


Figure 4: Appliance Categories by Grid Context

#### 4.4 Energy Efficiency and MEPS Compliance: The Paradox

The survey reveals a critical paradox: high label presence coexists with deep awareness gaps. About 92% of the firms reported selling energy-labelled appliances indicating a baseline compliance culture. Yet 49% of firms are not aware of SADC MEPS or labelling standards, and 55% of staff have received no training on MEPS or labelling. For lighting, SADC has adopted a harmonised MEPS and quality standard referenced SADC HT 109:2021, covering general service lamps, tubular lamps, indoor ambient luminaires and street/outdoor luminaires, with specified minimum efficacies, lifetime and quality requirements<sup>3</sup>. Further evidence from key informants confirmed that SADC-harmonised MEPS for air conditioners and refrigerators exist but are currently voluntary in Zambia, with no structured awareness programme in place. These MEPS correspond to the SADC HT 110:2023 and SADC HT 111:2023 references and were finalised in 2023 for regional implementation<sup>4</sup>.

This paradox of 92% label compliance among firms where 49% cannot identify the relevant standards reflects the voluntary commercial nature of current labelling. Firms label products as competitive differentiators, not because MEPS is legally required, and self-declare compliance without external verification. This compliance culture, while a positive baseline, cannot be equated with regulatory compliance under a mandatory MEPS regime.

*“Drafting of a mandatory bill to supersede voluntary standards [is underway] to set regulatory mechanisms for quality assurance and review modalities for assurance.”*

**KII — Energy Regulation Board (ERB)**

<sup>3</sup> [https://united4efficiency.org/wp-content/uploads/2022/05/SE4All-forum\\_220519.pdf](https://united4efficiency.org/wp-content/uploads/2022/05/SE4All-forum_220519.pdf)

<sup>4</sup> [https://iea.blob.core.windows.net/assets/73eac4c1-c444-4233-9175-6a844c7a394b/SADC\\_HarmonisedRegionalMinimumEnergyPerformanceforcoolingproducts\\_IEAEEPPolicyToolkit2025.pdf](https://iea.blob.core.windows.net/assets/73eac4c1-c444-4233-9175-6a844c7a394b/SADC_HarmonisedRegionalMinimumEnergyPerformanceforcoolingproducts_IEAEEPPolicyToolkit2025.pdf)

“Zambia has no labelling standards currently; labels on incoming equipment are based on the source country.”

**KII — SACREEE (Development Partner)**

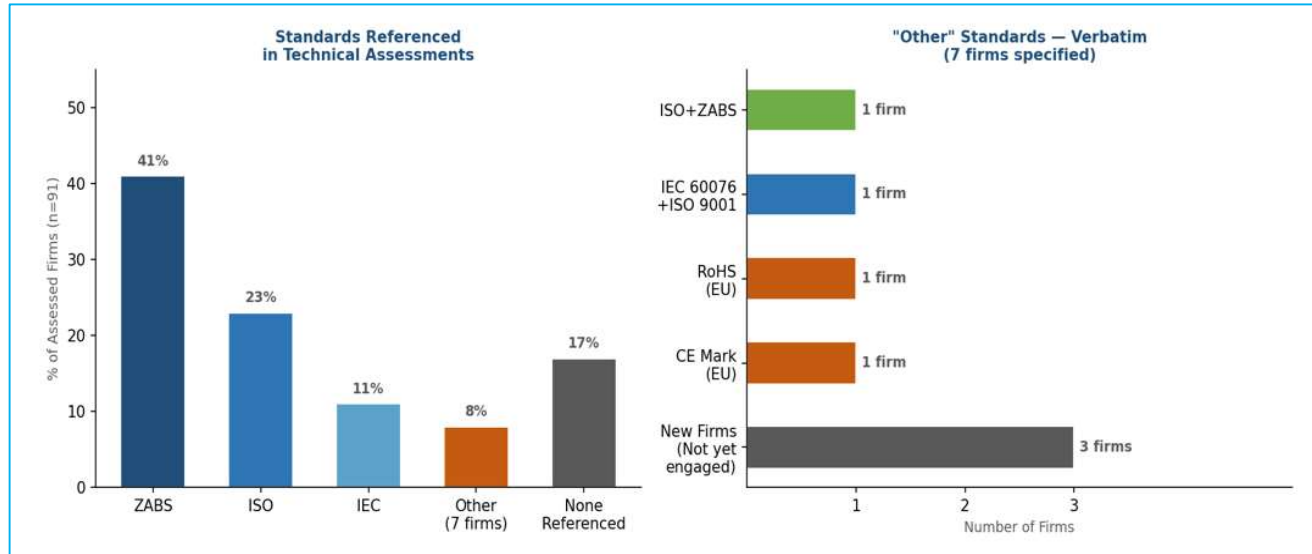


Figure 5: Standards Referenced in Technical Assessments

As shown in Figure 5, Zambia Bureau of Standards (ZABS) is the most-referenced standard at 41%, confirming alignment with the national regulatory framework. ISO standards follow at 23%, primarily among upstream manufacturers and importers. IEC standards (11%) apply to electrical and electronic equipment. However, 17% of assessed firms referenced no applicable standard a significant quality gap. Among the 7 firms specifying "Other": one firm combines ISO 9001 with ZABS (indicating dual-certification); one transformer manufacturer references IEC 60076 combined with ISO 9001; RoHS (EU Restriction of Hazardous Substances) and CE marking appear in imported products; and three recently-established firms had not yet engaged with any standards framework. The presence of EU-standard products signals quality potential, but CE/RoHS does not substitute for SADC-harmonised MEPS compliance. The presence of RoHS and CE-marked products indicates that some importers are sourcing from EU-certified supply chains a quality signal that does not, however, substitute for SADC-harmonised MEPS compliance. Three firms expressing uncertainty or noting new business status confirm that early-stage enterprises face a standards awareness gap at market entry. A streamlined ZABS onboarding process for new firms potentially facilitated through the MEPS frameworks would address this entry-level compliance gap. Newly established firms (14% of sample, under 2 years old) are especially unaware of standards requirements, creating an urgent need for early-stage enterprise onboarding to ZABS and MEPS frameworks

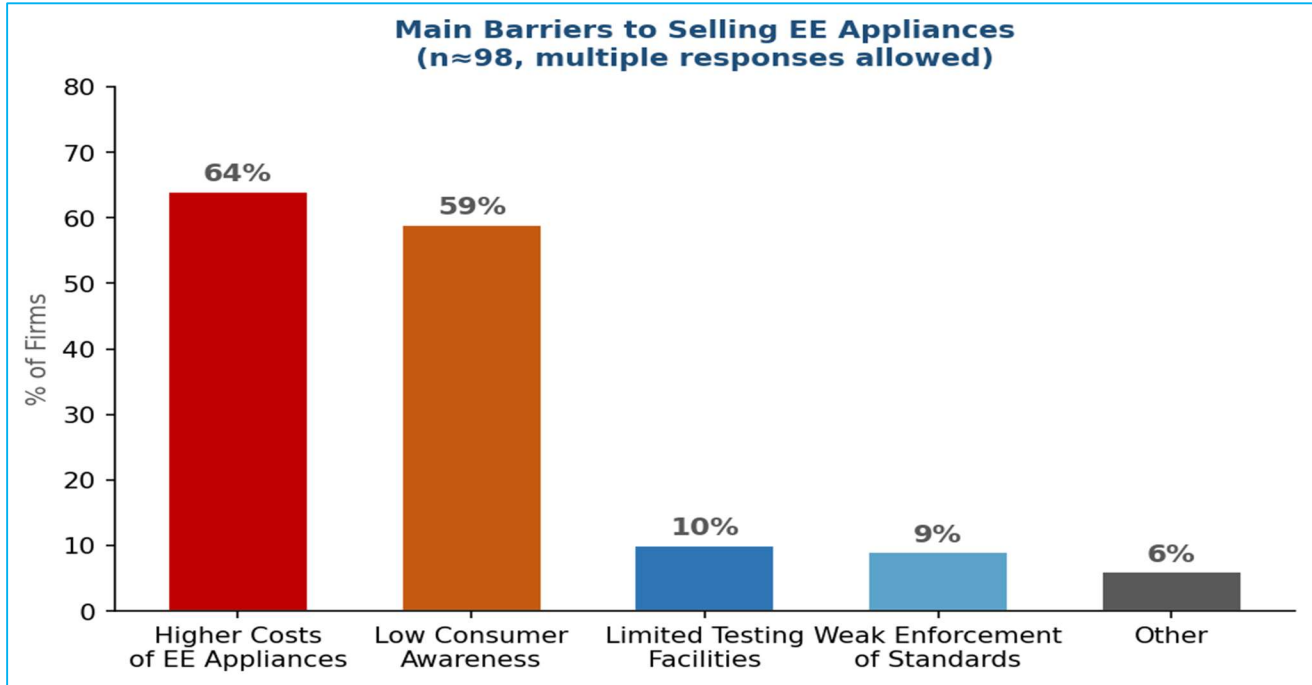


Figure 6: Main Barriers to Selling EE Appliances

Market actors expressed higher costs of EE appliances (64%), as the main barrier to selling EE appliances. As shown in Figure 6, a significant number of consumers are not aware (59%) of EE appliances, limited testing facilities (10%), and weak enforcement of standards (9%). Other (6%), indicated that ZESCO supply fluctuation response is especially critical: it reveals a Zambia-specific market dynamic where reduced load-shedding diminishes the perceived benefit of energy-efficient appliances. One respondent during the "single action" question elaborated that reduced load-shedding over the prior 2-3 months had caused a significant drop in solar and EE appliance sales. Policy must embed EE standards into the mainstream on-grid appliance market independent of electricity reliability cycles to ensure market continuity.

### Market Awareness

Figures 7 below, on Key Market Awareness & Compliance Indicators show that while there is strong market performance in some areas, significant gaps remain in awareness, capacity, and financing. Self-reported compliance shows that a high proportion of firms report positive practices, with about 92% selling energy-labelled products and over 90% indicating MEPS compliance; however, this compliance is largely based on supplier self-declaration rather than independent verification, raising concerns about its reliability. At the same time, there is a strong opportunity for improvement, as 49% are unaware of SADC MEPS, highlighting low awareness of key programs and regulatory frameworks. In addition, 55% of staff lack energy efficiency training, pointing to a significant skills gap. Overall, the findings suggest that although market activity and reported compliance appear strong, they are undermined by weak verification systems, limited awareness, capacity gaps, and financing barriers, underscoring the need for targeted interventions.

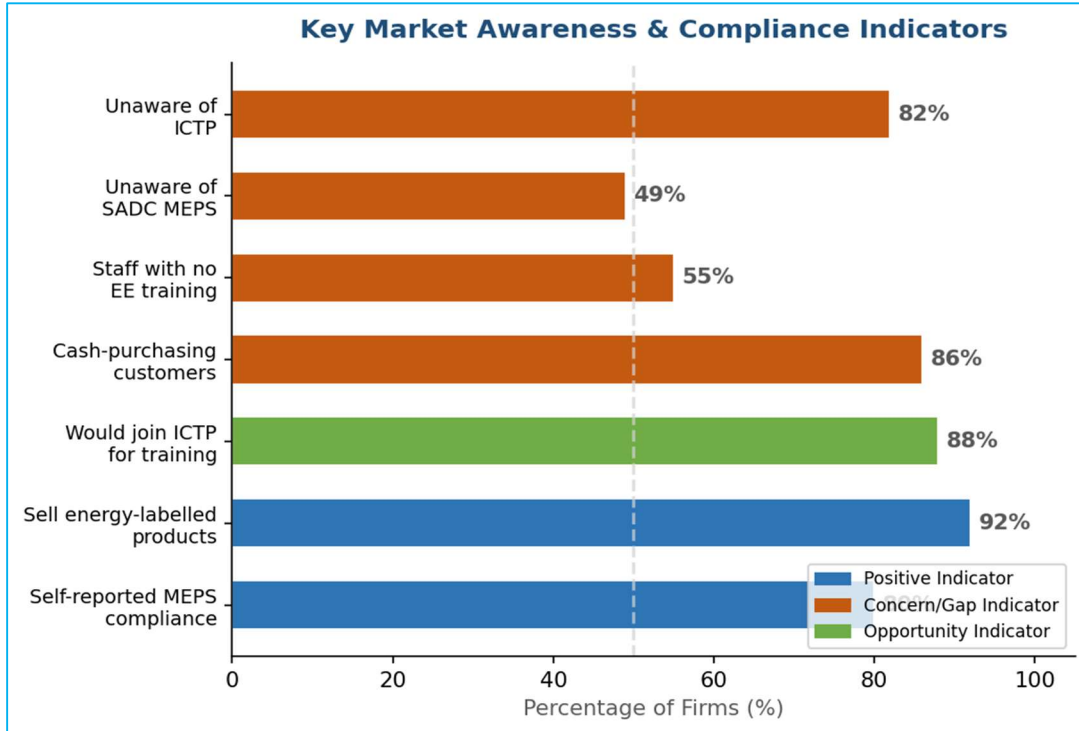


Figure 7: Key Market Awareness and Compliance Indicators

## 4.5 Market Dynamics: Demand Drivers and Financing Constraints

Price is the dominant purchasing driver by a wide margin (55 first-rank votes among purchasing decision factors). 88% of customers pay with cash, making affordability the structural determinant of market access. About 67% of respondents identify affordability as the top barrier to EE appliance uptake while 79% of firms observe an EE price premium in the market; the most common range cited is a 10–25% premium (35%), while 21% report no price differential in the market.

The financing dimension is the most strategically significant demand-side finding: 50% of consumer willingness-to-pay for EE appliances is conditional on financing availability. This finding, taken together with the 88% cash-purchasing baseline, identifies consumer financing as the single highest-leverage demand-side intervention — one that can unlock substantial latent demand for EE products independent of any regulatory action. Only 36% of firms report unconditional customer willingness to pay the EE premium; this share would increase substantially with the introduction of PAYGO, revolving credit, or consumer rebate schemes.

*“Primarily most appliances come from China. People sell appliances based on price, not energy efficiency. No EE regulations. Value chain is mostly import and retailing.”*

**KII — ZARENA (Industry Association)**

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*“There are financial gaps — commercial lending institutions loan interest rates are too high, and thus access to affordable capital is difficult. Competition from imported products would easily kill local manufacturing business costs.”*

**KII — Zambia Gender and Energy Network (ZGEN)**

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*“Blended financing offers a more attractive and effective mechanism as it tackles affordability issues, especially among low-income households.”*

**KII — UNDP (Development Partner)**

### Demand Driver Priority Index (DDPI)

Figure 8 presents the Demand Driver Priority Index (DDPI), showing the relative importance of factors influencing consumer purchasing decisions based on weighted rankings. Price is the most dominant driver with a score of 223, indicating that affordability is the primary consideration for consumers. This is followed by Brand (151) and Reliability (147), which are also strong influences, suggesting that trust in product quality and performance plays a significant role in decision-making. In contrast, Energy Savings (54) ranks much lower, implying that efficiency benefits are not a major purchasing motivator. Policy Incentives (19) have the least influence, indicating minimal impact of existing policy measures on consumer behavior. Overall, the figure highlights that economic and perceived quality factors far outweigh energy efficiency considerations, pointing to the need for **stronger incentives and awareness** efforts to shift demand toward energy-efficient products.

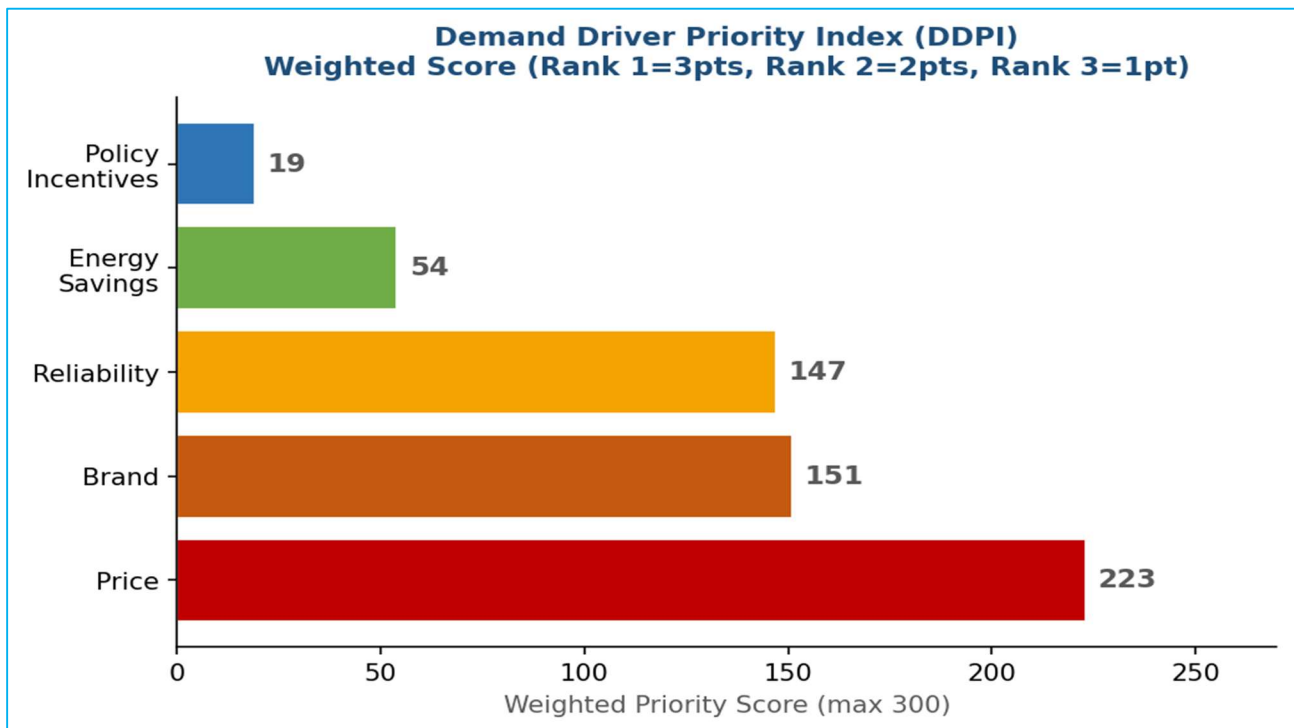


Figure 8: Demand Driver Priority Index (DDPI) - Weighted Scores

### Market Demand Dynamics & Structure

Figure 9 on Market Demand Dynamics & Structure illustrates key characteristics of the appliance market in terms of growth segments, business models, and purchasing behavior. The market is primarily driven by on-grid demand, identified by 59% of respondents as the fastest-growing segment, compared to 28% for off-grid and only 13% for productive-use applications, indicating relatively limited growth in income-generating uses. In terms of business models, a majority of firms (61%) operate across both on-grid and off-grid markets, reflecting a diversified approach to market coverage. Consumer purchasing behavior is heavily skewed toward cash transactions, with 86% of customers buying upfront, which highlights a major constraint for scaling access to energy-efficient appliances. However, there is notable potential for financing solutions, as 50% of respondents indicate willingness to pay (WTP) is conditional on access to financing. Overall, the figure shows a market that is growing but constrained by affordability barriers, with significant opportunity to unlock demand through financial mechanisms.

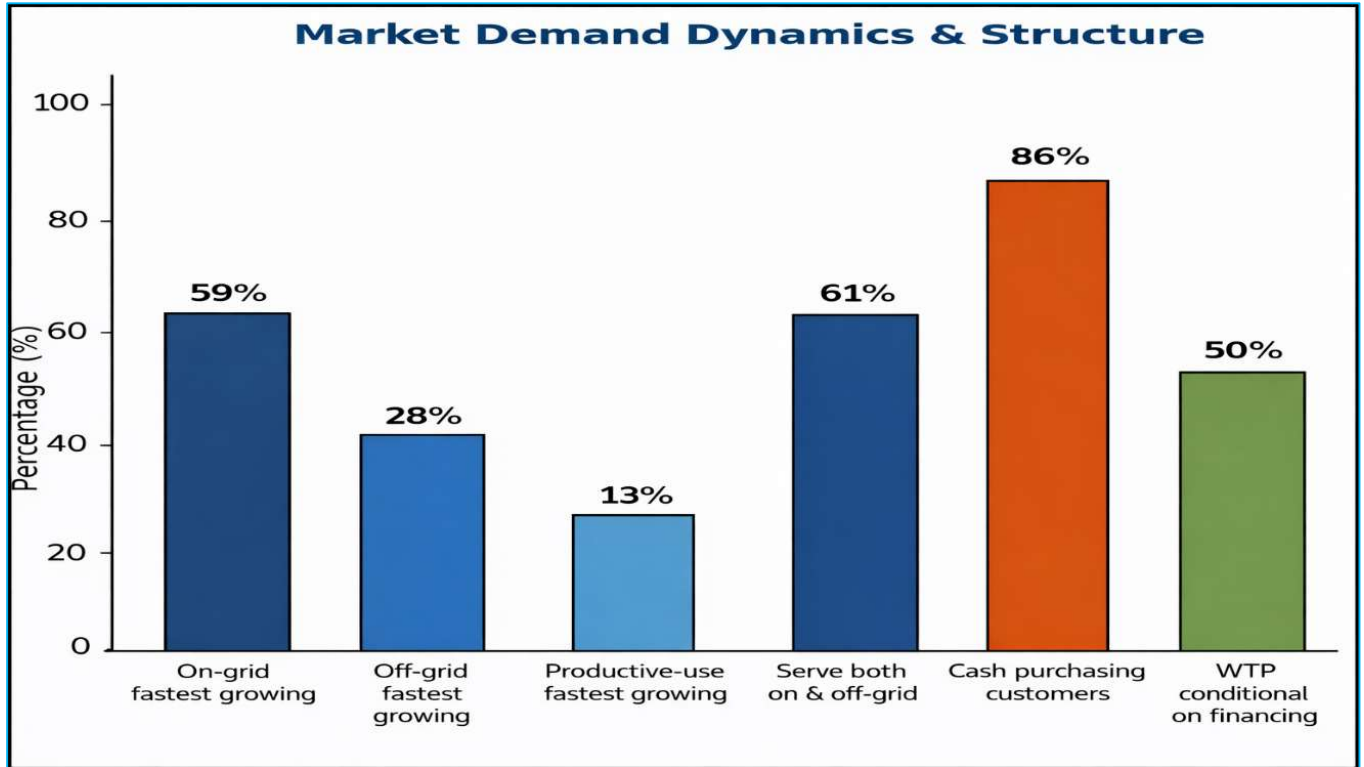


Figure 9: Market Demand Dynamics and Structure

## 4.6 Policy and Regulatory Gaps

The study's regulatory gap analysis, benchmarked against SADC regional standards, identifies five critical gaps that must be addressed in sequence to establish a functioning EE appliance regulatory regime in Zambia:

- **Gap 1 — MEPS:** No minimum energy performance standards in gazetted for any appliance category. ERB has the statutory authority to issue MEPS under the Energy Regulation Act (2019), in collaboration with ZABS, and this presents good ground for EE appliance MEPS uptake. SADC harmonised standards provide ready-made benchmarks for immediate gazettement.
- **Gap 2 — Mandatory Energy Labelling:** No mandatory energy label at point of sale. ZCSA enforces compulsory standards only for solar products; other appliance categories are unregulated at point of import or sale. ZCSA enforcement is not applied to EE appliances.
- **Gap 3 — Import Controls:** No pre-market conformity assessment scheme for energy-using appliances. Customs clearance is not linked to MEPS compliance declarations. Non-compliant products enter the market without restriction.
- **Gap 4 — Testing Infrastructure:** ZABS lacks ISO/IEC 17025 accreditation for appliance energy testing — the foundational technical requirement for any MEPS enforcement regime. Without accredited testing, MEPS compliance cannot be independently verified. There are no ZABS EE standards.
- **Gap 5 — Inter-agency Coordination:** No formal coordination mechanism between the five principal regulatory bodies (Ministry of Energy, ERB, ZABS, ZCSA, ZEMA). Overlapping mandates, no shared enforcement calendar, no data-sharing protocols.

*“Inadequate legal provisions; inadequate technical capacity to develop MEPS; limited institutional capacity to enforce MEPS; and limited institutional capacity to ensure compliance.”*

**KII — EU/IAEREP Project (Ministry of Energy)**

*“No clear mandates on inspection in certain areas by ZABS, ZCSA, ERB and others. There is need to streamline.”*

**KII — Energy Regulation Board (ERB)**

The findings of this study are consistent with the National Quality Policy (NQP) Implementation Plan, which confirms that Zambia is still in the foundational phase of building its quality infrastructure, including testing laboratories, certification systems, and enforcement mechanisms. While the institutional architecture for standards development (ZABS), enforcement (ZCSA), and regulation (ERB) is in place, these systems are not yet fully operationalized for energy efficiency. As a result, the absence of accredited testing capacity, coordinated enforcement, and gazetted MEPS prevents the translation of policy intent into market transformation. This reinforces the conclusion that Zambia is policy-ready but not yet implementation-ready for MEPS.

## 4.7 Gender and Social Inclusion Findings

Gender exclusion is deep, multi-dimensional, and embedded across the value chain. About 67% of surveyed firms have fewer than 20% women in technical roles; 58% have fewer than 20% women in the overall workforce; and 87% do not target women customers. The 1% female enterprise ownership share represents a deep gender exclusion entrepreneurial presence and the 52% joint/mixed (male + female), represent entrepreneurial presence but is concentrated in commercial rather than technical and productive functions. Female-led enterprises remain extremely limited (1%), with participation concentrated in joint ownership structures rather than independent leadership.

Skills gaps, limited training and cultural norms are the dominant identified barriers for women participation in value chains and manufacturing roles. The Gender Equity Act (2015) and the ZGEN programme provide policy intent, but neither is operationalised in sector practice. The 87% of firms not targeting women customers represents an entirely uncaptured market segment with significant commercial and impact potential — particularly for energy-efficient cooking solutions, solar home systems, and productive-use equipment aligned with women's economic activities.

*“Women-led enterprises face higher structural barriers. In finance, we encounter a massive credit gap due to lack of collateral, higher interest rates, and investor bias. Regarding skills, limited access to STEM education and technical training often restricts us to lower-value sectors.”*

**KII — Women-Led Enterprise (Service, Supply and Maintenance)**

*“To boost competitiveness, we need gender-responsive financing — low-interest, collateral-free loans — and more specialised technical training in appliance maintenance and STEM. Targeted procurement quotas in corporate supply chains and subsidised certification programmes are also vital.”*

**KII — Women-Led Enterprise**

### Women’s Participation Barriers

Figure 10 on Barriers to Women’s Participation (Value Chain Participation vs Manufacturing Roles) compares the constraints faced by women across the broader value chain and specifically within manufacturing roles, showing

a largely consistent pattern with some notable differences in intensity. Skills gaps emerge as the most significant barrier in both segments, cited by 69% in value chain participation and 70% in manufacturing, underscoring a widespread deficit in technical capabilities. Cultural norms (46%) affect both segments equally, highlighting persistent socio-cultural constraints across the sector. However, limited training is more pronounced in manufacturing (49%) than in the broader value chain (43%), suggesting greater access or exposure gaps in technical roles. Similarly, workplace conditions are slightly more restrictive in manufacturing (31% vs 29%), pointing to potentially less inclusive or more demanding environments. In contrast, finance is a more significant barrier in the broader value chain (14%) compared to manufacturing (4%), while market access shows minimal variation (11% vs 12%). Overall, the figure demonstrates that while the types of barriers are similar across segments, manufacturing roles tend to intensify structural and workplace-related constraints, reinforcing the need for targeted interventions that address both skills development and inclusive workplace practices.

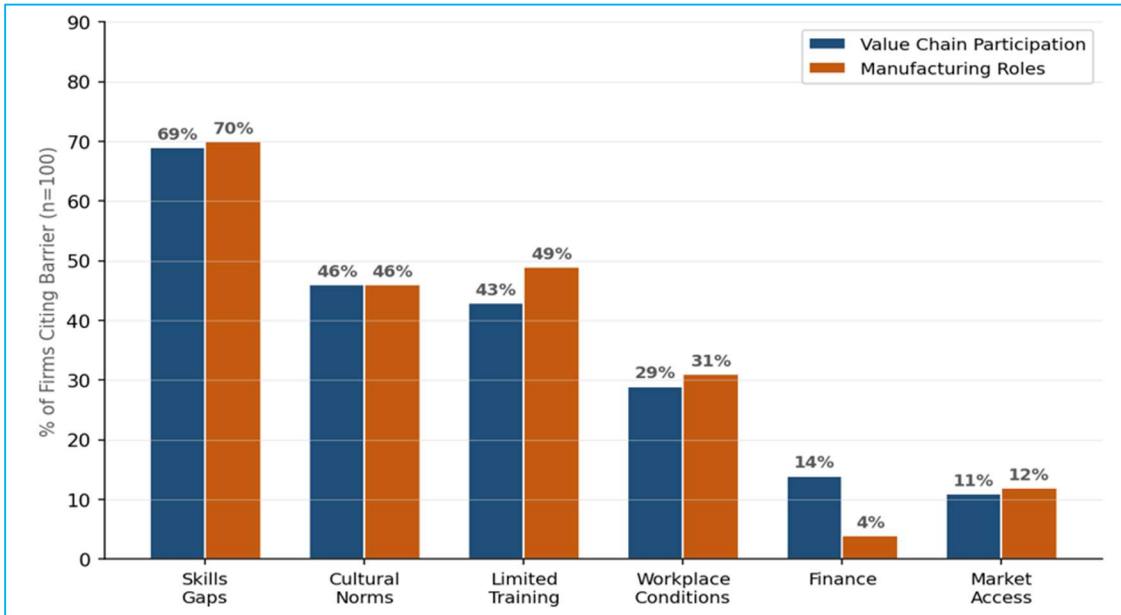
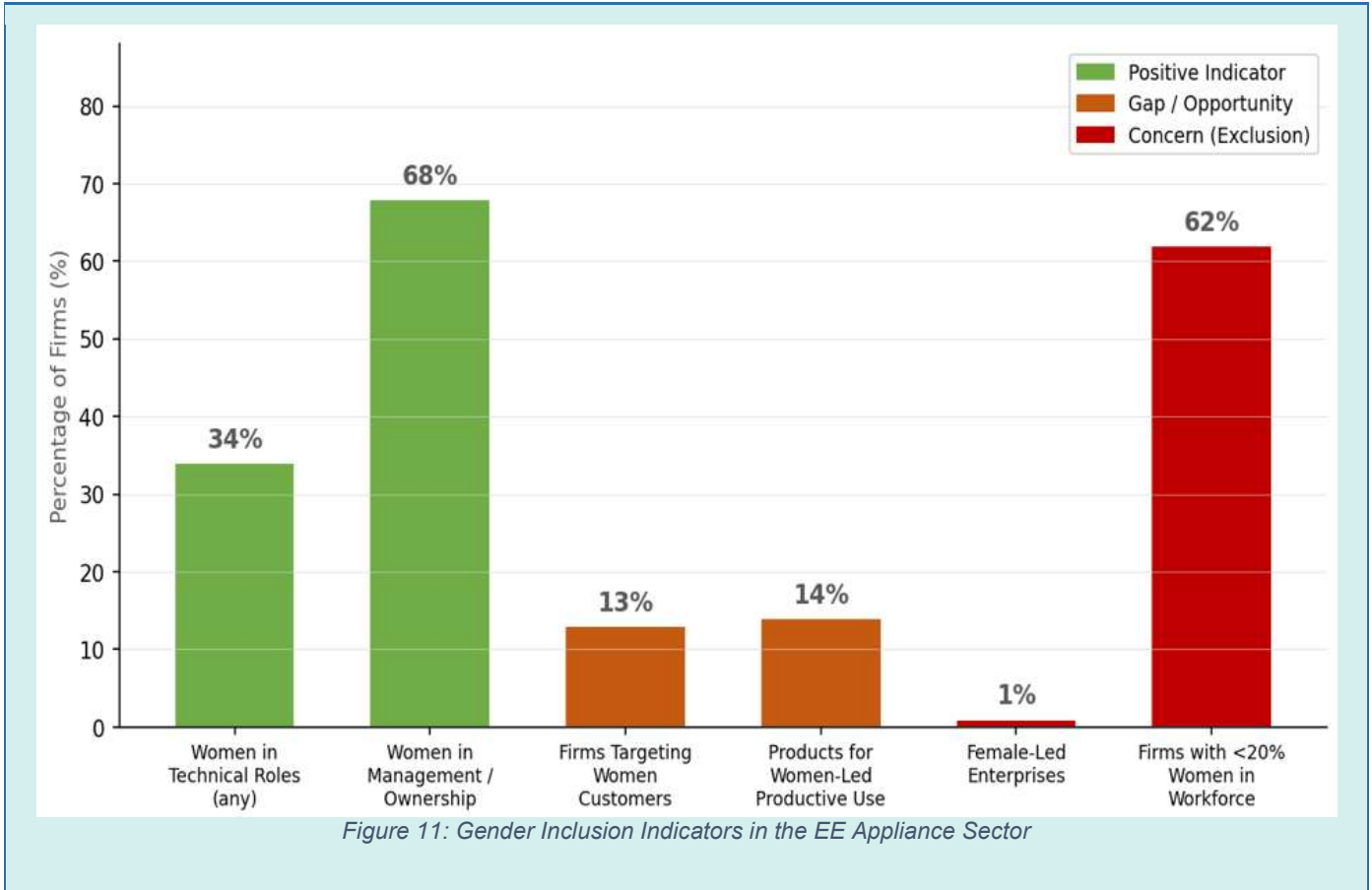


Figure 10: Barriers to Women’s Participation (Value Chain vs Manufacturing)

### KEY GENDER DATA SYNTHESIS

Figure 11 presents a gender inclusion snapshot across firms, highlighting a mix of positive representation indicators alongside significant gaps and exclusion risks. On the positive side, 68% of firms report women in management or ownership roles, and 34% have women in technical roles, suggesting some level of inclusion in leadership and skilled positions. However, market targeting remains limited, with only 13% of firms actively targeting women customers and 14% offering products for women-led productive use, indicating missed opportunities to engage women as a distinct market segment. The most striking concern is the very low presence of female-led enterprises (1%), pointing to substantial barriers to women’s entrepreneurship. Additionally, a large share of firms (62%) report having less than 20% women in their workforce, underscoring widespread underrepresentation. Overall, the figure reveals that while there are pockets of inclusion, particularly in leadership, systemic gaps persist in workforce participation, entrepreneurship, and gender-responsive market engagement, indicating the need for more deliberate and targeted gender inclusion strategies.



## 5. VALUE CHAIN MAPPING FINDINGS (TASK 2)

### 5.1 Structure of the Appliance Value Chain

As shown in Figure 12, Zambia's EE appliance value chain operates across four interconnected tiers, with structural characteristics that vary markedly by product category.

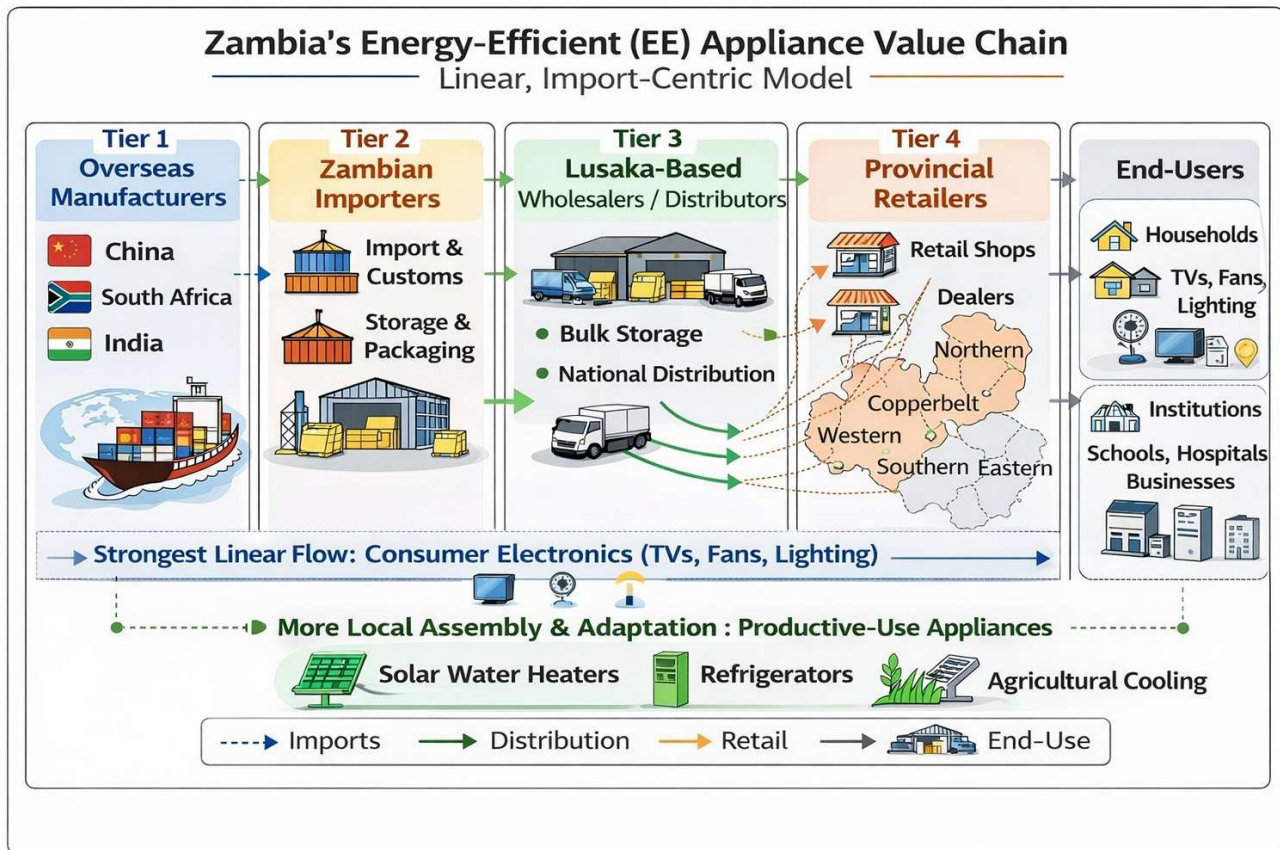


Figure 12: Zambia's EE appliance value chain

The dominant flow is linear and import-centric: overseas manufacturer (primarily China, South Africa, and India) → Zambian importer → Lusaka-based wholesaler/distributor → provincial retailer → household or institutional end-user. This chain structure is most pronounced for consumer electronics (TVs, fans, lighting) and least pronounced for productive-use appliances, where local assembly and adaptation are more prevalent.

Table 3 below, further clarifies the EE appliances value chain using the four-tier approach against market actors, product flows and binding constraints.

Table 3: EE appliance value chain

Tier	Key Actors	Product Flows	Binding Constraints
Tier 1: Inputs & Components	Overseas manufacturers (China, SA, India); limited domestic fabricators	Components → Lusaka importers; some domestic metal fabrication inputs	No local component manufacturing at scale; no accredited testing or certification
Tier 2: Manufacturing & Assembly	17 local manufacturers (17%); 100 importers (finished goods)	Finished products → wholesale / distribution network	Low MEPS compliance certainty; limited design-for-repair; critical skills deficit
Tier 3: Distribution & Retail	25 distributors; 52 retailers; informal traders and mobile agents	Products → urban consumers; informal last-mile → rural households and MSMEs	Lusaka-centric; weak provincial reach; cash-only market; no consumer financing
Tier 4: After-Sales & EoL	Informal repair networks; TEVETA graduates; limited formal recyclers	Repair services → consumers; waste → informal recycling or landfill	No formal take-back; 23.1% unknown EoL pathways; no accredited repair networks

## 5.2 Appliance-Specific Value Chain Disaggregation

This section identifies much clearer appliance-specific value chains including who manufactures, assembles, imports, and where bottlenecks exist providing the product-level analysis needed for targeted ICTP capacity building and MEPS development.

### 5.2.1 Refrigerators and Freezers

Refrigerators are handled by 40 of 100 surveyed firms (40%). The value chain is almost entirely import-dependent: no refrigerator compressor manufacturing exists in Zambia, and assembly is limited to basic housing fabrication at two Copperbelt-based firms. The primary bottleneck is the absence of MEPS as refrigerators are the highest-energy-consuming household appliance category, and South Africa's established MEPS regime for refrigerators creates an immediate displacement risk for non-compliant models into the Zambian market. SADC-harmonised MEPS for household refrigerators provide a ready-made standard for immediate gazetting.

### 5.2.2 Air Conditioners

Air conditioners are handled by 26 firms (primarily in commercial and institutional markets) and represent a technically complex product category with both refrigerant and energy performance implications. SADC-harmonised MEPS exist for air conditioners and are currently voluntary. Awareness of these voluntary standards is limited and no structured awareness program is in place. The household air conditioner market is small but growing; the commercial segment is larger and more regulated-market-ready. ZCSA is best positioned to administer pre-market conformity assessment for this category given its existing compulsory standards enforcement mandate.

### 5.2.3 Lighting

Lighting is the second most widely handled product category (61 firms, 61%). LED technology dominates new imports, driven by commercial incentives rather than regulation. Several Zambian firms engage in light assembly of LED fixtures from imported components. This is the category with the highest immediate scope for MEPS gazetting and compliance LED vs CFL vs incandescent MEPS are technically straightforward, widely used

regionally, and the cost difference between compliant and non-compliant products is modest. Lighting MEPS would also provide the highest-visibility consumer win.

### 5.2.4 Solar Home Systems

Solar home systems (SHS) are handled by 65 firms (65%) — the most widely distributed product category. SHS represents the product category with the highest local assembly activity: several Zambian firms import photovoltaic cells, batteries, and power electronics separately and assemble integrated systems locally, adapting them for local operating conditions (temperature, humidity, voltage stability). ZCSA already enforces compulsory standards for solar products — making this the one product category where Zambia has an existing quality assurance infrastructure that can serve as a model for other categories.

### 5.2.5 Productive-Use Appliances (Home vs Industrial Disaggregation)

Productive-use appliances span both household and industrial/commercial contexts. The full productive-use list from the survey data includes: solar water pumps, solar hair clippers, solar infrared lights, solar refrigerators, solar knapsack sprays, grain mills, printers, microwaves, washing machines, solar coolers, and transformers. Other productive appliances are lights in the context of chicken rearing, and in homes/shops/bar/hotels in the evenings. As are TVs, radios for entertainment. The household vs industrial distinction matters significantly for MEPS development: household productive-use appliances (microwaves, stoves, fridges, washing machines) align with residential MEPS frameworks, while industrial productive-use appliances (pumps, mills, transformers) require sector-specific performance standards developed in consultation with agro-processing industry associations.



Figure 13: Productive-Use Appliances (Home vs Industrial Disaggregation)

As shown in Table 3, productive-use appliances represent the highest local manufacturing potential (41% of firms handling this category are manufacturers, compared to 12–18% for consumer electronics). The agro-processing niche with solar grain mills, water pumps, cold storage, avoids direct cost competition with Chinese consumer

electronics imports and addresses a genuine rural market failure. This niche should be the primary focus of the ICTP's manufacturing development workstream.

Table 4: Manufacturing Opportunity

Indicator	Value / Insight
Share of firms in productive-use category that are manufacturers	41%
Typical share of manufacturers in consumer electronics	12–18%
Strategic manufacturing niches	Solar grain mills, solar water pumps, cold storage
Competitive advantage	Avoids direct price competition with low-cost Chinese consumer electronics
Policy implication	Primary focus area for ICTP manufacturing development workstream

### 5.3 Bottlenecks in Zambia appliances value chains

This section describes the bottlenecks of MEPS, testing, financing, institutional fragmentation, and skills in the appliances value chains. These five bottlenecks are deeply interconnected. MEPS creates the regulatory demand signal, testing enables enforcement, financing unlocks market uptake, institutional coordination ensures implementation, and skills provide the human capacity to sustain the system. Addressing them in isolation will have limited impact; meaningful transformation requires a coordinated, system-wide approach.

#### Minimum Energy Performance Standards (MEPS) Bottleneck

The absence of Minimum Energy Performance Standards (MEPS) is the most fundamental constraint in the energy-efficient appliances market. Despite Zambia having a strong policy framework, there are currently no enforced MEPS or mandatory labelling systems in place. This creates a situation where there is no regulatory signal to guide the market toward energy-efficient products. As a result, suppliers are not incentivised to import or manufacture efficient appliances, and consumers cannot easily distinguish between efficient and inefficient products. The market is therefore driven primarily by price rather than performance, reinforcing the circulation of low-efficiency appliances. Furthermore, without MEPS, there is no mechanism to prevent substandard or energy-inefficient products from entering the country, especially as neighbouring countries tighten their standards, increasing the risk of Zambia becoming a dumping ground.

#### Testing and Quality Assurance Bottleneck

The lack of accredited testing infrastructure severely undermines the credibility and enforcement of any future standards. Zambia currently does not have ISO/IEC 17025-accredited laboratories for appliance energy performance testing. This means that even when products carry labels, compliance is largely based on supplier self-declaration rather than independent verification. Only a small proportion of firms rely on certified test reports, which weakens trust in the market and makes regulatory enforcement practically impossible. Without testing capacity, MEPS cannot be implemented effectively, manufacturers cannot certify products to required standards, and regulators lack the technical basis to enforce compliance. This bottleneck is therefore a critical enabler without resolving it, other interventions such as MEPS and labelling cannot function.

#### Financing Bottleneck

Financial constraints affect all levels of the appliance value chain, from consumers to businesses and institutions. At the consumer level, the market is overwhelmingly cash-based, with affordability identified as the primary barrier to purchasing energy-efficient appliances. Many consumers are only willing to pay for efficient products if financing options are available, indicating significant latent demand that remains untapped. At the firm level,

manufacturers and distributors face high costs of capital, limited access to credit, and challenges in financing inventory or upgrading to energy-efficient technologies. At the institutional level, there is also insufficient funding for critical investments such as testing laboratories and training systems. Without targeted financing mechanisms—such as consumer credit schemes, PAYGO models, or blended finance facilities—the market cannot transition toward energy-efficient appliances at scale.

### **Institutional Fragmentation Bottleneck**

The institutional landscape governing the appliance sector is highly fragmented, with multiple agencies holding overlapping mandates but lacking effective coordination. Key institutions—including the Ministry of Energy, Energy Regulation Board (ERB), Zambia Bureau of Standards (ZABS), Zambia Compulsory Standards Agency (ZCSA), and Zambia Environmental Management Agency (ZEMA)—operate largely in silos. There is no formal coordination platform, shared enforcement mechanism, or integrated data system linking these entities. This fragmentation leads to regulatory gaps, inconsistent enforcement, and confusion within the private sector. Firms often report limited engagement with government institutions and unclear regulatory guidance. As a result, even well-designed policies fail to translate into implementation. Addressing this bottleneck requires establishing a formal coordination mechanism to align roles, streamline enforcement, and provide clear direction to the market.

*“Presence of office at points of entry, with ZEMA only having permanent presence at two border points”*

**KII — ZEMA (Government & Regulators)**

*“Financing of regulatory bodies, limited office and staff presence at entry points (Borders)”*

**KII — MCTI (Government & Regulators)**

### **Skills and Capacity Bottleneck**

There is a significant shortage of technical skills required to support the development, deployment, and maintenance of energy-efficient appliances. While there is an adequate supply of commercial and sales skills, technical competencies particularly in areas such as MEPS compliance, testing, repair, and advanced manufacturing are lacking. A majority of firms report having no staff trained in energy efficiency standards or labelling, and the existing training ecosystem is largely dependent on external support from development partners. This creates a sustainability challenge, as local institutions are not yet fully equipped to provide continuous skills development. Additionally, gaps in training infrastructure and limited exposure to practical, industry-relevant experience further constrain workforce readiness. Without strengthening technical and vocational training systems, including aligning curricula with energy efficiency needs, the sector will struggle to build the human capital required for long-term growth and compliance.

## **5.4 Manufacturing and Supply-Side Capacity**

Only 17 of 100 surveyed firms are manufacturers (17%). Of these, 70.6% use mixed domestic and imported component sourcing, and 29.4% are fully import-dependent for components. True full-cycle domestic manufacturing design, component fabrication, assembly, and quality testing is effectively absent from the formal appliance sector.

Local manufacturing is concentrated in: assembly and light fabrication in Lusaka industrial zones; wiring and electrical assembly for solar home systems; housing and enclosure fabrication (metal and wood work); and component adaptation for local operating conditions. Technology levels are predominantly low-to-medium: manual assembly processes dominate, capital equipment is typically second-hand, and automation is limited to the largest firms.

The absence of MEPS is the primary constraint on manufacturing investment: without market-size certainty from a clear regulatory demand signal, manufacturers cannot justify capital expenditure for EE-compliant production

line upgrades. Local Content Regulations (2025) set 20–40% local content targets, and MFEZ incentives offer tax holidays and duty exemptions — but these instruments generate limited pull in the absence of the fundamental MEPS regulatory signal.

<p><i>“From my understanding there is no 100% manufacturing. What I see is mostly buying of parts and assembly taking place.”</i></p> <p><b>KII — Refrigeration and Air-Conditioning Association of Zambia (RAAZ)</b></p>
<p><i>“Industry itself has little technical, technological, finance, and skill capability to produce high-standard EE appliances. Government is too focused on foreign investors and provides little support to develop local manufacturing.”</i></p> <p><b>KII — Zambia Gender and Energy Network (ZGEN)</b></p>
<p><i>“The market is highly import-dependent, and local manufacturers face high production costs, limited access to advanced manufacturing technologies, and a lack of economies of scale.”</i></p> <p><b>KII — Energy Auditors Section, Engineering Institution of Zambia (EIZ)</b></p>

## 5.5 Skills, Quality Assurance, and Innovation Gaps

The skills landscape is characterised by abundant commercial and sales skills but there is a significant deficit in technical, engineering, and quality assurance competencies. As shown in Figure 14, about 55% of firms have no staff trained in MEPS or energy labelling. The training ecosystem is almost entirely donor-dependent (45% of firms have received some training (internal company programs account for 33%) by development partners), creating a structurally unsustainable situation that the ICTP is specifically designed to address.

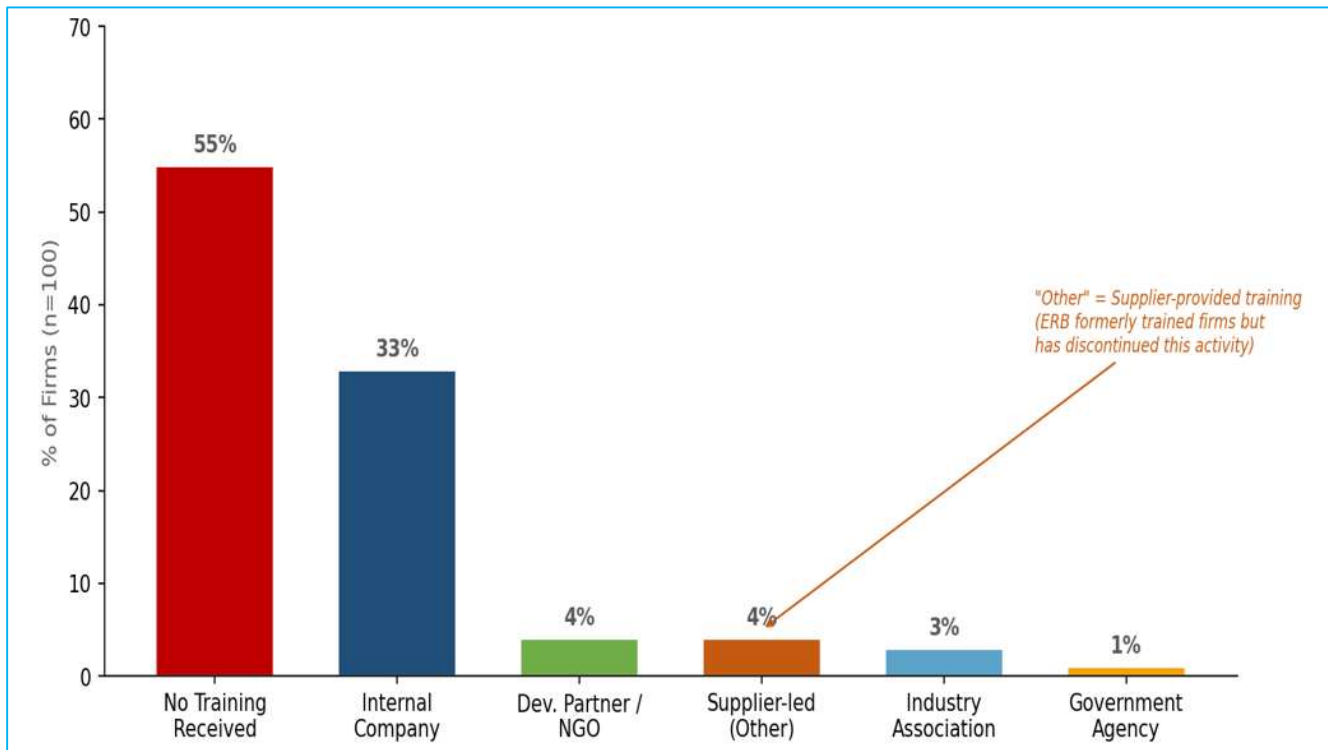


Figure 14: Training Sources for MEPS and Energy Labelling

Internal company training (33%) is the primary capacity-building pathway. Development partners and NGOs (4%), industry associations (3%), and government agencies (1%) provide limited support. Critically, 55% of firms have

received no MEPS or energy labelling training at all. The "Other" category (4 firms) was specified as: supplier-provided training where equipment suppliers train customers on product-specific usage (3 firms); and one firm noted that the ERB previously provided industry training but discontinued this activity. This ERB withdrawal has created a regulatory knowledge vacuum being partially filled by suppliers with product-specific rather than compliance-focused content.

**Key Finding: As noted from the survey of firms (4%),** confirmed that the ERB's withdrawal from active industry training and this created a compliance knowledge vacuum. Nearly 55% of firms have received no training. Supplier-led training (the "Other" response) covers product use, not MEPS compliance – which is a structural risk for enforcement quality that the ICTP skills development workstream must address urgently.

*“Information on MEPS is very limited; training is needed. Interpretation of labels training is also needed. Training is needed on safe handling of some of the latest EE appliances — for example, R600a refrigerant gas coming on domestic fridges is highly flammable and has caused accidents and fatalities.”*

**KII — Refrigeration and Air-Conditioning Association of Zambia (RAAZ)**

*“Mostly, skills gaps exist on the manufacturing part of appliances. Equipment to manufacture EE appliances is also required.”*

**KII — University of Zambia (Academia & Research)**

*“Key skills gaps include expertise in appliance energy efficiency testing and certification, knowledge of smart lighting technologies, and skills in the design and manufacturing of energy-efficient electrical appliances.”*

**KII — Mulungushi University (Academia & Research)**

The quality assurance infrastructure gap is the most critical bottleneck in the entire system: ZABS lacks ISO/IEC 17025 accreditation for appliance energy performance testing. Only 11% of firms use certified test reports. The dominant verification method is supplier self-declaration (48%). Without accredited testing, MEPS cannot be enforced, manufacturers cannot obtain internationally recognised certification, and the 92% label compliance claim cannot be independently validated.

Innovation is limited but present. Local firms have demonstrated capacity for SHS component adaptation; productive-use equipment manufacturers are developing agro-processing solutions; and energy-efficient cooking solutions represent an emerging niche. These innovation seeds require the right enabling conditions accredited testing, technical training, and ICTP coordination to grow into a more dynamic local manufacturing sector.

The capacity and awareness workstream targeting key market players on EE appliances through workshops and knowledge products is directly anchored in the skills and training gap data generated by the Task 1 AMA survey. A striking 55% of market actors surveyed reported no staff trained on MEPS or energy labelling, representing a structural compliance knowledge deficit that national capacity building interventions must urgently address. This finding signals that the problem is not primarily one of demand for training, but of supply: a systematic absence of accessible, affordable, and institutionalised pathways for MEPS and EE standards training across the value chain. The national policy and regulatory framework workstream, which includes developing policy options for appliances, must therefore be matched by equally robust investments in compliance capacity so that regulated actors can meet the standards being gazetted.

Regarding repair and end-of-life treatment, the study's analysis of the Technical Assessment Checklist data (n=91) identifies priority appliances for repair and maintenance as solar home systems (SHS) and solar water pumps. This prioritisation reflects two criteria: the relevance of these products to Zambia's off-grid and productive-use market segments, and the relative availability of spare parts and repair skills compared to other assessed product categories. The findings on the Local Cleantech Value Chain node are likewise grounded in the productive-use appliance value chain analysis, which identifies agro-processing equipment solar grain mills, solar water pumps, cold storage as the highest-potential niche for local manufacturing development, offering Zambian firms a viable pathway into EE appliance supply chains that avoids direct competition with low-cost consumer electronics imports.

Finally, the study’s analysis of testing and quality assurance infrastructure directly informs the capacitation of testing facilities in Zambia with equipment and training, which is a prerequisite for credible MEPS enforcement under Outcome 1. It is important to note that ISO/IEC 17025 accreditation applies to specific laboratories rather than to entire institutions; ZABS as an institution may contain multiple laboratories with different accreditation status. UNIDO has plans to equip ZABS laboratories for industrial motor testing, specifically aligned to the EELA project’s needs for verifying MEPS compliance. This targeted laboratory investment is the foundational technical requirement enabling downstream MEPS enforcement under Outcome 1. The strategic alignment of the study therefore runs from evidence generation through policy design, value chain capacity building, repair system strengthening, and testing infrastructure each level reinforcing the pathway to increased uptake of energy-efficient appliances in Zambia and enhanced skills for their maintenance and responsible end-of-life management.

## 5.6 Circular Economy Considerations

The Technical Assessment Checklist (n=91) reveals a concerning picture of end-of-life management. About 58% of assessed products have a confirmed formal EoL pathway; 19% have a confirmed informal pathway; and 23% have an unknown pathway. Take-back or recycling information is provided to customers by only 21 of 91 assessed firms (23%). Only 35 of 91 products (39%) have design features specifically supporting repair or component replacement as shown in Figure 15.

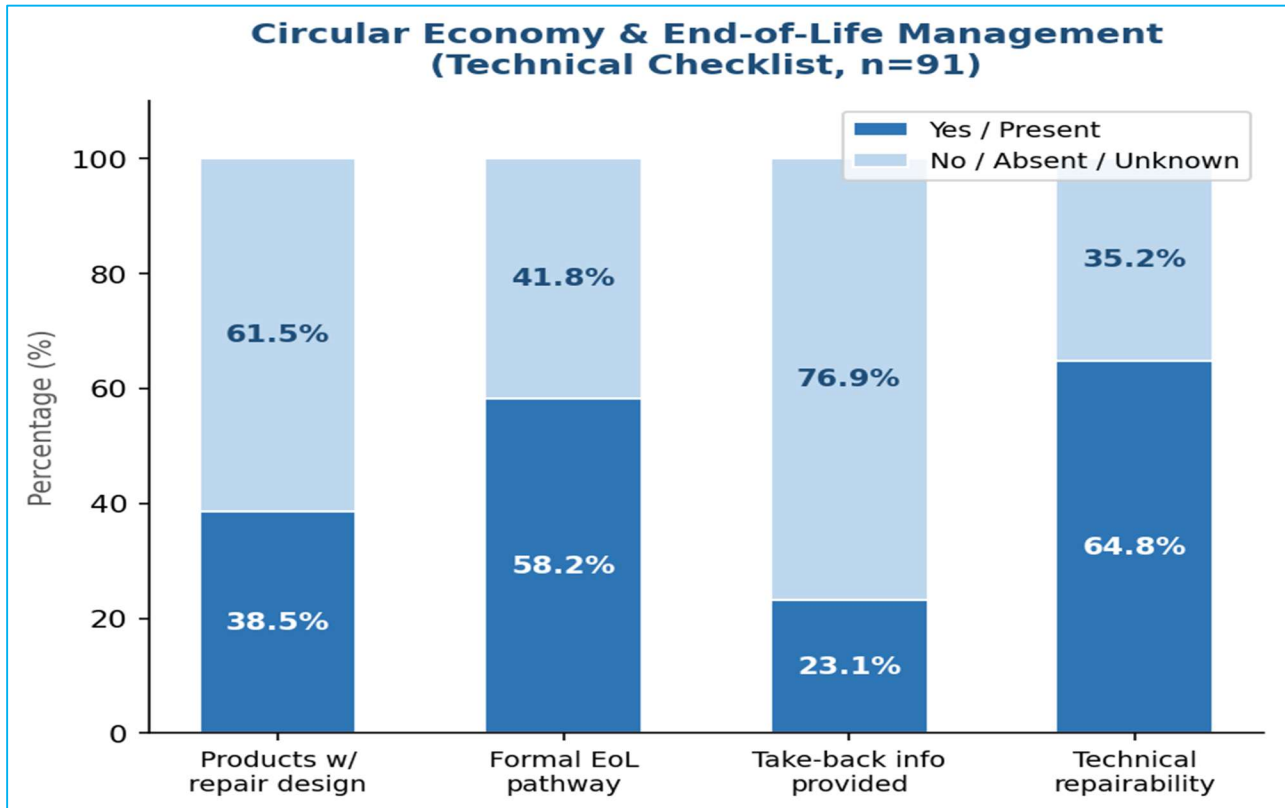


Figure 15: Circular Economy and End-of-Life Management (n=91)

The reparability data are based on physical product inspection not respondent perception covering the presence of repairable components, spare parts availability, manuals, and evidence of component replacement capability. This physical verification basis strengthens the reliability of the finding that while 64.8% of products are technically repairable, engineering for repair is a minority practice.

EPR Regulations (SI No. 65/2018) formally cover appliances but remain un-operationalised. No producer responsibility organisations have been established. ZEMA has the mandate but lacks implementing regulatory

tools. The current moment before appliance market volumes fully scale is the optimal intervention point for EPR operationalisation.

*“ZEMA is the custodian of ‘Extended Producer Responsibility’ and work to incorporate circular economy principles is in progress”*

**KII — ZEMA (Government & Regulators)**

*“The ministry is in the process of adopting circular economy principles which call for review of industrial policy”*

**KII — MCTI (Government & Regulators)**

*“There is no clear system for recycling appliances once they reach end of life. There are few recycling electronics — too much waste is accumulating. Most products are poor quality; there is need to monitor to get long-term life cycle.”*

**KII — ZARENA (Industry Association)**

*“It is currently a loose practice because regulations do not force [industry] to look at end of life of appliances. Disposal of fridges and ACs is not being handled well; recycling can do better but there is little happening.”*

**KII — University of Zambia (Academia )**

*“Distributors of electronic appliances should ensure that they work with ZEMA in formulating guidelines and regulations to ensure safe management of e-waste.”*

**KII — EU/IAEREP Project (Development Partner)**

### Product Quality Indicators (Technical Assessment)

Figure 16 on Product Quality Indicators (Technical Assessment, n=91) highlights a striking paradox: while 91% of firms report selling labelled products, technical assessments show 99% of sampled products display labels. Only 24% of firms have received MEPS training and 23% are aware of national e-waste regulations, indicating limited understanding of the standards they are expected to meet. Product quality and lifecycle considerations are also inconsistent, with reparability and spare parts availability confirmed for just 52% of products, and only 38% of firms aware of end-of-life (EoL) management practices. Additionally, 35% of products exhibited visual quality issues, reinforcing that the presence of labels does not necessarily reflect actual product quality or compliance.

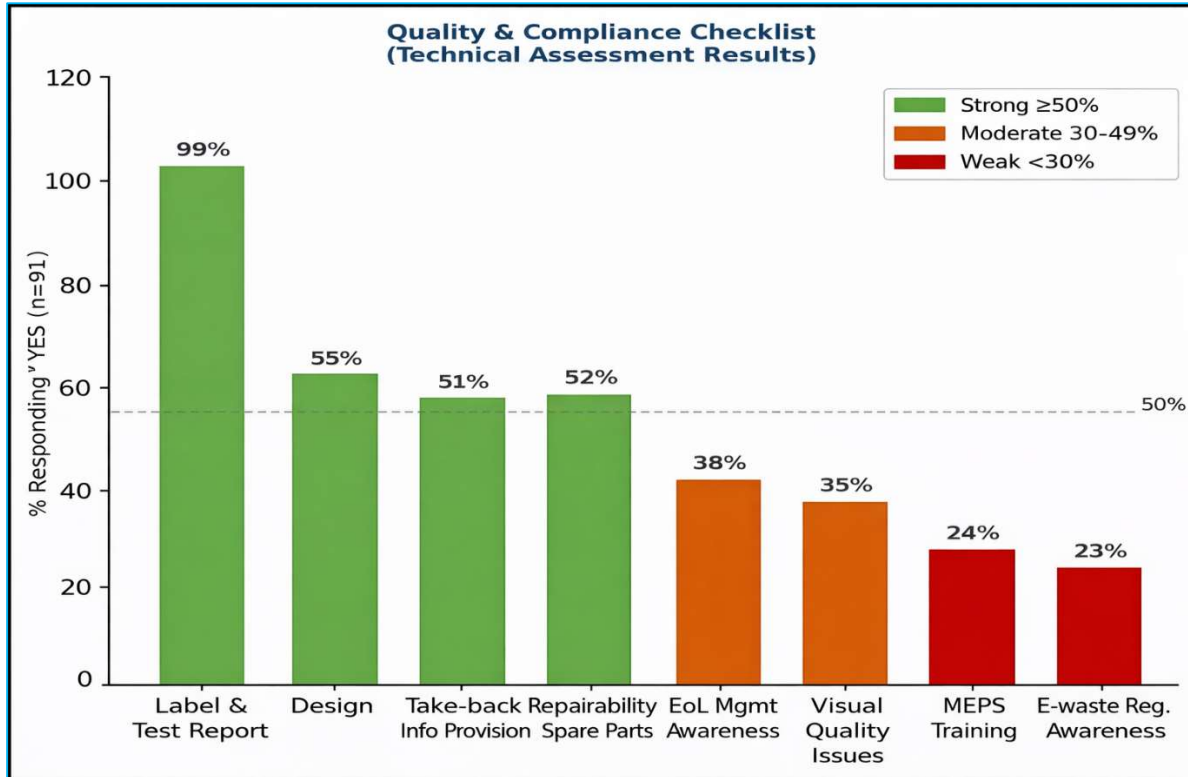


Figure 16: Quality and Compliance checklist

### End-of-life pathways

The end-of-life (EoL) pathways analysis further underscores systemic weaknesses in product lifecycle management. Across business roles, only 42–56% of firms report formal EoL pathways, while a significant share relies on informal systems or lack clarity altogether. See Figure 17. Importers stand out as a key risk group, with the highest rates of unknown pathways (31%) and informal disposal (19%), raising concerns given their central role in introducing products into the market. Overall, across all firms, 21% of EoL pathways are unknown and 17% are informal, meaning that 38% of appliances are likely subject to environmentally unsound disposal practices.

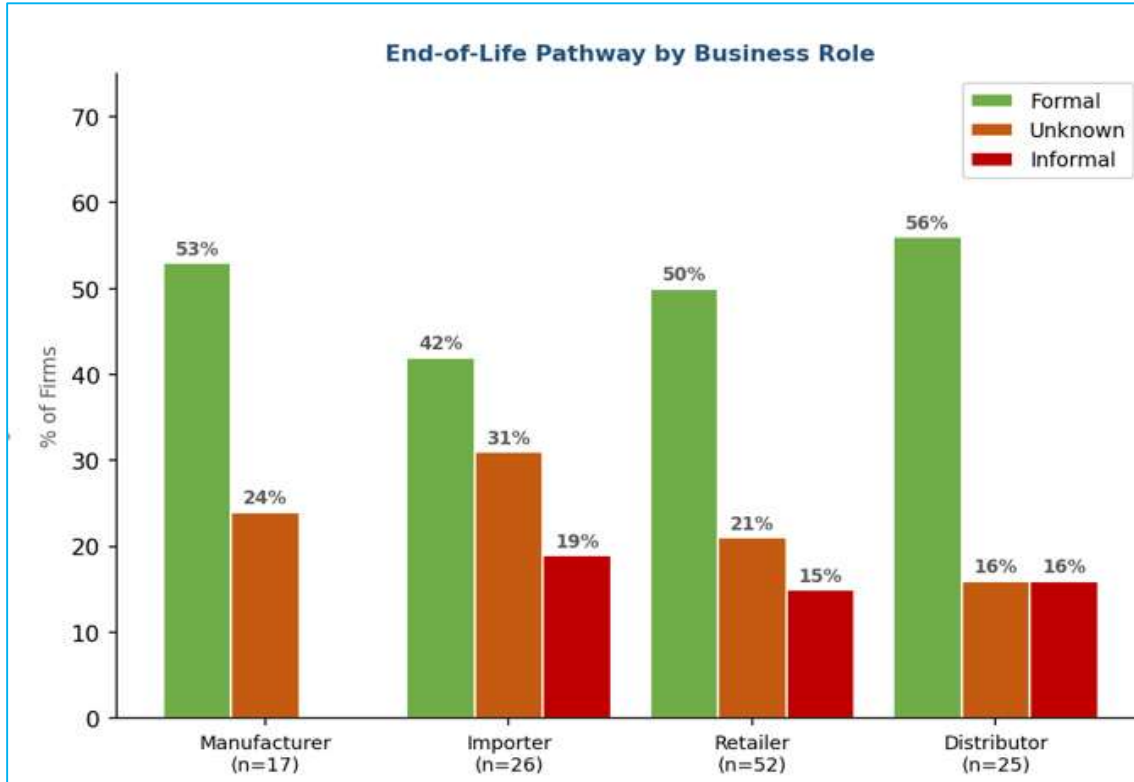


Figure 17: End of Pathway by Business Role

**Key finding:** The near-universal presence of labels conceals substantial compliance gaps in practice, knowledge, and lifecycle management. With only a minority of firms trained on MEPS and aware of e-waste regulations, regulatory oversight must shift from basic label verification to deeper validation of technical understanding and end-of-life management systems to ensure genuine compliance and environmental sustainability.

## 6. CROSS-CUTTING ISSUES

### 6.1 Policy Coherence and Institutional Coordination

The most fundamental cross-cutting issue in Zambia's EE appliance sector is the disconnect between policy intent and implementation capacity. The enabling framework Vision 2030, National Energy Policy (2019), EESAP 2022, Energy Regulation Act (2019) is comprehensive and well-designed. The implementation infrastructure, MEPS instruments, testing laboratories, conformity assessment schemes, inter-agency coordination remains largely underdeveloped or non-operational. This is not a policy design problem; it is an implementation activation problem.

Five regulatory bodies hold relevant mandates: the Ministry of Energy (policy formulation and coordination); ERB (MEPS authority and enforcement); ZABS (standards development and testing); ZCSA (compulsory standards enforcement); and ZEMA (environmental compliance and EPR). These bodies operate in parallel rather than in concert: there is no formal inter-agency EE Appliances Technical Committee, no shared enforcement calendar, no common data platform, and no joint public communication strategy.

The consequence is visible in the market: 70% of firms received no government support, contact, or engagement in the past 12 months. Only 53% find current regulations clear and predictable; 38% find them only partially clear. This institutional opacity allows regulatory gaps to persist unaddressed and reduces private sector confidence in the regulatory process.

The establishment of a formal EE Appliances Technical Committee with ERB as chair, ZABS, ZCSA, and ZEMA as members, and Ministry of Energy as political principal is identified as a foundational prerequisite for all other regulatory actions. Without this coordination mechanism, even well-designed MEPS instruments will be undermined by fragmented enforcement and inconsistent communication.

### 6.2 Financing Constraints and Opportunities

Financing constraints operate at every level of the value chain simultaneously. At the consumer level: 88% cash-purchasing, 67% affordability as primary constraint, 50% WTP conditional on financing. At the firm level: limited access to trade finance, equipment loans, and working capital for manufacturers seeking EE-compliant production upgrades. At the institutional level: no public financing mechanism for ZABS accreditation, TEVETA curriculum development, or ZCSA conformity assessment scheme establishment.

The survey's single-action ranking for accelerating EE uptake places financial incentives for manufacturers and importers first (26%), followed by financial incentives for consumers (19%). Tax incentive data (n=90) reveal significant confusion: multiple incentives nominally exist reduced import duties for EE appliances (41 firms aware), VAT exemptions (58 firms aware), reduced duties for EE manufacturing machinery (36 firms aware) but 14 firms report incentives as unclear or inconsistently applied. This ambiguity in the fiscal incentive landscape is a significant investment deterrent that must be resolved through clear, consistent, and publicly communicated fiscal policy.

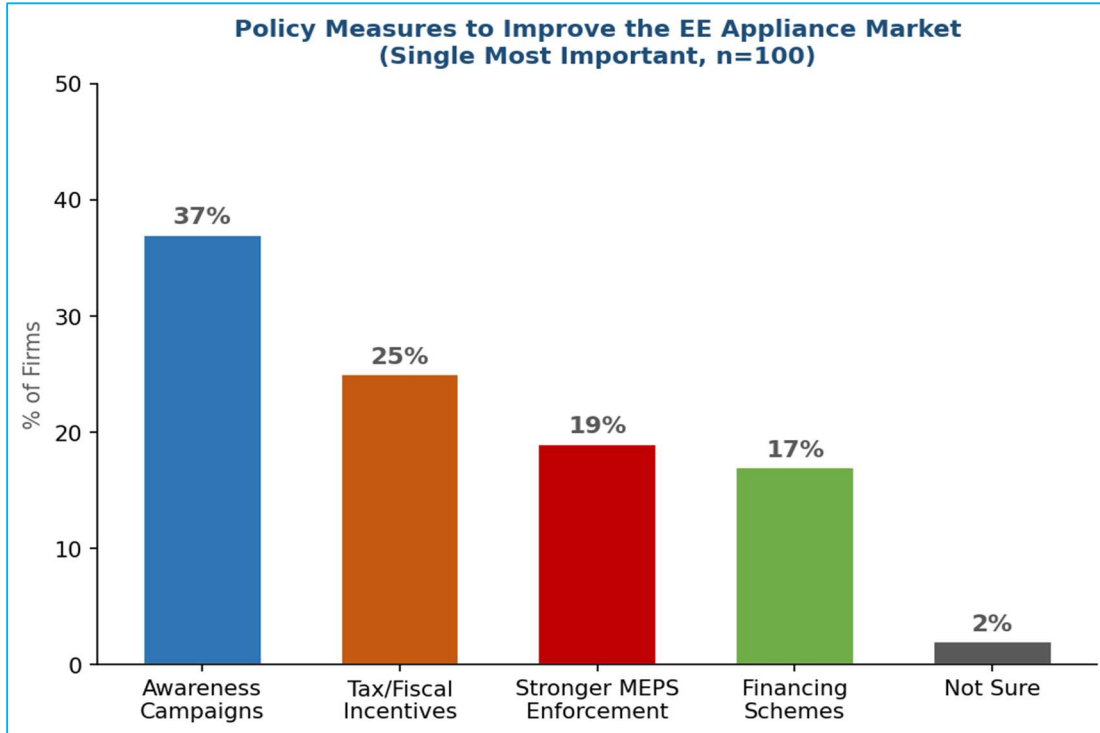


Figure 18: Policy Measures Firms Want Most

The highest-leverage financing intervention is a national EE appliance consumer financing facility. Structured as a blended finance instrument combining local banks participation, and development partner co-financing such a facility could unlock the 50% of conditional WTP that is currently frustrated by the absence of affordable credit. PAYGO models, already operational in the solar home system segment, provide a proven delivery mechanism that could be extended to other EE appliance categories.

### 6.3 Gender-Responsive Market Development

Gender analysis across both tasks reveals a consistent structural pattern: women's participation in Zambia's EE appliance sector is concentrated at the commercial ownership layer and largely excluded from the technical, manufacturing, and productive functions that create the most significant economic value and drive sector innovation. This is not an incidental gap; it is a structural feature of the sector that requires deliberate, targeted intervention.

Three interconnected mechanisms drive this gender exclusion. Skills segregation: 68–70% of firms identify skills gaps as the primary barrier to women's employment in technical roles, reflecting historical under-investment in women's technical and vocational education. Cultural norms: 29–45% of firms identify cultural norms (i.e. socially defined expectations regarding the roles and responsibilities of women and men, including perceptions that women are less suited to technical or industrial work) as a reinforcing barrier, particularly in manufacturing and assembly environments. Workplace conditions: 31–48% identify workplace conditions as a constraint, including physical infrastructure (safety, facilities) and working culture.

The three strategic opportunities for gender-responsive market development are: (1) gender inclusive MEPS where women's technical platform, with dedicated training streams, apprenticeship placement, and peer network creation; (2) women-led productive-use enterprise development, targeting the solar-powered agro-processing niche where women are primary economic agents; and (3) gender-responsive product design, targeting the 87% of firms currently ignoring women customers with energy-efficient cooking solutions, solar home systems, and productive-use equipment aligned with women's productive activities.

## 7. STRATEGIC IMPLICATIONS FOR EELA ZAMBIA

### 7.1 Implications for MEPS and Labelling

The integrated evidence base produces four strategic implications for MEPS and labelling design and implementation. First, priority product categories for initial MEPS gazettement should be selected based on: (a) market volume and growth trajectory (refrigerators, lighting, fans, TVs all in the top 5 product categories by firm prevalence); (b) energy consumption impact (refrigerators are the highest household energy consumer); (c) regional displacement risk (South Africa and Kenya tightening MEPS creates immediate dumping pressure); and (d) testing infrastructure availability (SADC bilateral recognition provides interim testing capacity while ZABS accreditation is pursued). Regional SADC harmonised MEPS texts have since been finalised for lighting (SADC HT 109:2021), air conditioners (SADC HT 110:2023) and household refrigerators (SADC HT 111:2023), and are technically ready for national adoption, but still require national gazettement and enforcement mechanisms in Zambia<sup>5</sup>.

*“For the lighting, refrigerators and air conditioners though still voluntary”*

**KII — ZEMA (Government & Regulators)**

*“Plans are underway, however there is no structured plan for labelling, and quality assurance mechanisms. Currently standards are still voluntary and await implementation of new policies. The incandescent bulbs have been banned in Zambia although there is notable illegal trade.”*

**KII — MCTI (Government & Regulators)**

Second, the MEPS compliance paradox 80% self-reported compliance against 49% SADC standard unawareness means that initial MEPS implementation will require a substantial transition period with comprehensive industry communication, training, and phase-in timelines. A cold regulatory shock without adequate industry preparation will undermine private sector confidence and risk market disruption.

Third, the ICTP must be launched concurrently with MEPS gazettement, not after it. 75% of firms indicate they would participate in the ICTP if MEPS or EE policy context is relevant confirming that MEPS is the demand trigger for ICTP participation. Simultaneous MEPS gazettement and ICTP launch creates the maximum mobilisation effect.

Fourth, the productive-use and off-grid segments require a distinct MEPS development pathway, separate from household appliance MEPS. Productive-use appliances span household and industrial contexts and MEPS for agro-processing equipment (solar pumps, grain mills) should be developed in consultation with the relevant industry associations and aligned with SADC frameworks for these product categories.

<sup>5</sup> [https://united4efficiency.org/resources/harmonized-meps-for-air-conditioners-and-residential-refrigeration-appliances-in-sadc-region/sadc-ht-111-sadc-harmonised-meps-for-refrigerating-appliances-2023\\_v5\\_dec2023/](https://united4efficiency.org/resources/harmonized-meps-for-air-conditioners-and-residential-refrigeration-appliances-in-sadc-region/sadc-ht-111-sadc-harmonised-meps-for-refrigerating-appliances-2023_v5_dec2023/)

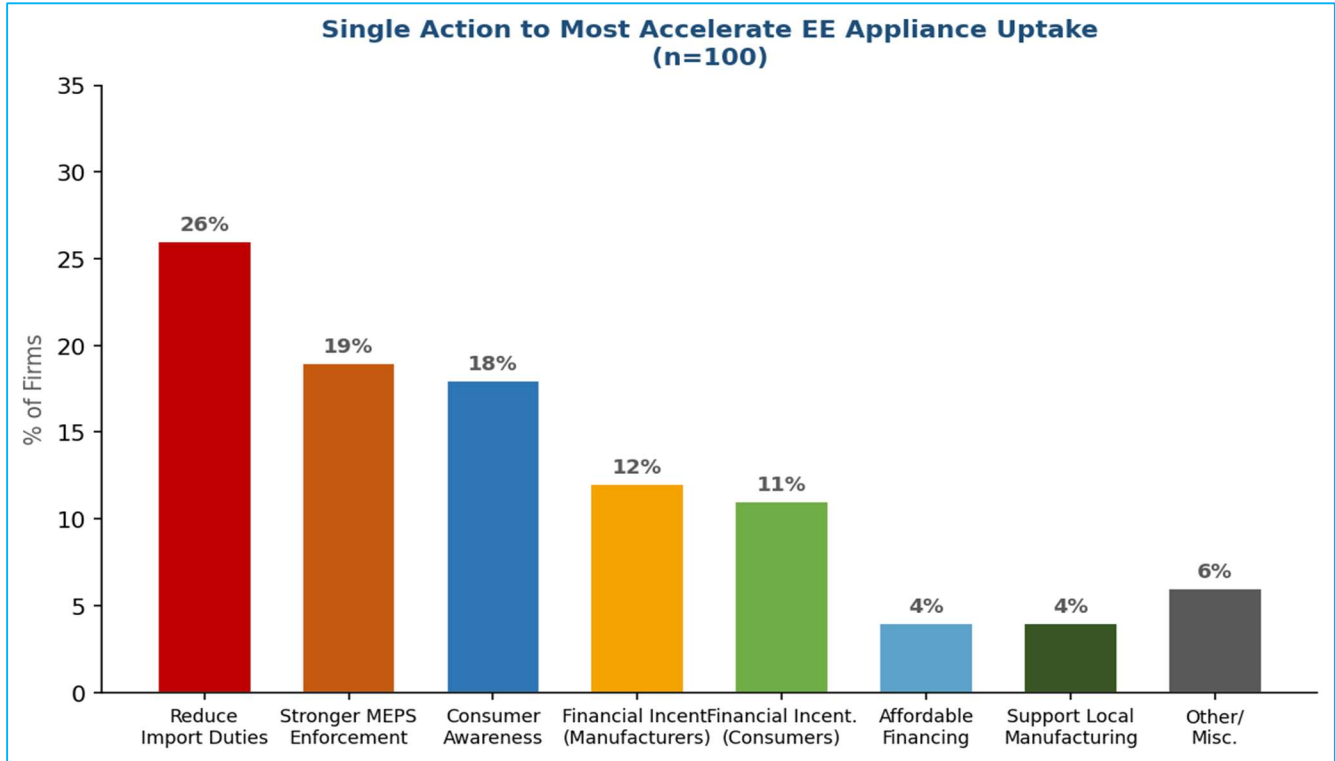


Figure 19: Single Action to Most Accelerate EE Appliance Uptake

- 1) Establish a dual-chaired governance board with public and private sector co-leadership;
- 2) Launch with a strong outreach campaign 82% unawareness means the platform is unknown to the majority of its intended beneficiaries;
- 3) Package Year 1 deliverables as immediately commercially valuable outputs, not just public goods;
- 4) Minimise member burden — keep membership fees and time commitments explicitly low in the first year; and
- 5) Time the ICTP launch to coincide with or immediately follow MEPS gazettement to maximise the relevance signal.

## 7.2 Implications for Investment and Capacity Building

The investment case for Zambia's EE appliance sector is strong but contingent. The contingency is MEPS: without the regulatory demand signal that MEPS creates, no private sector actor has a compelling financial reason to invest in EE-compliant production, import portfolio transition, or testing infrastructure. MEPS is therefore not only a regulatory instrument; it is an investment activation mechanism.

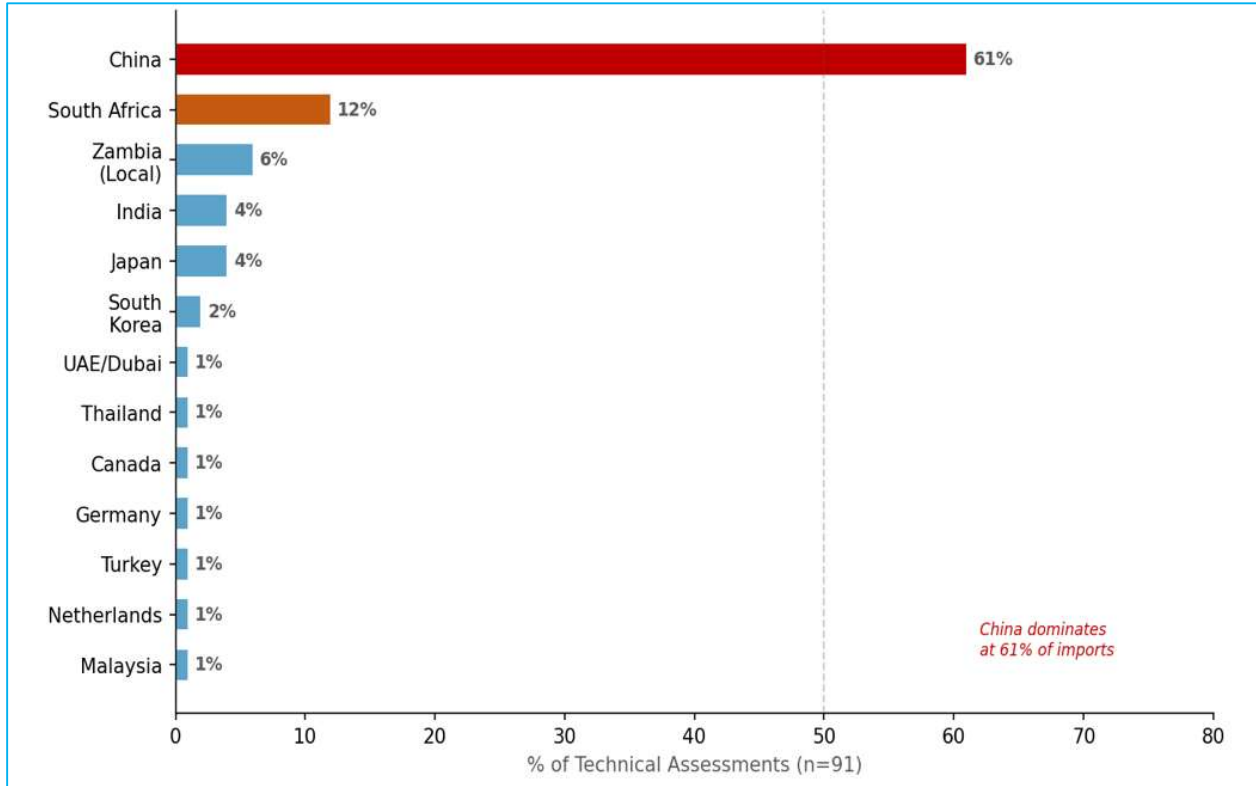


Figure 20: Country of Manufacture of Assessed Appliances (Technical Assessment, n=91)

As shown in Figure 20, China dominates appliance supply, accounting for 61% of all technically-assessed products. South Africa is the second source (12%), reflecting regional supply chains, followed by locally assembled Zambian products (6%). India and Japan each contribute 4% of assessed products. South Korea, UAE/Dubai, and several European countries (Germany, Netherlands, Turkey) account for smaller shares. This concentration creates significant market surveillance risk and has direct implications for MEPS enforcement - the majority of products need to be traced back to Chinese suppliers for certification verification.

**Key Finding:** China supplies 61% of assessed appliances. This concentration justifies targeted bilateral engagement with Chinese appliance exporters and certification bodies as a strategic complement to national MEPS enforcement.

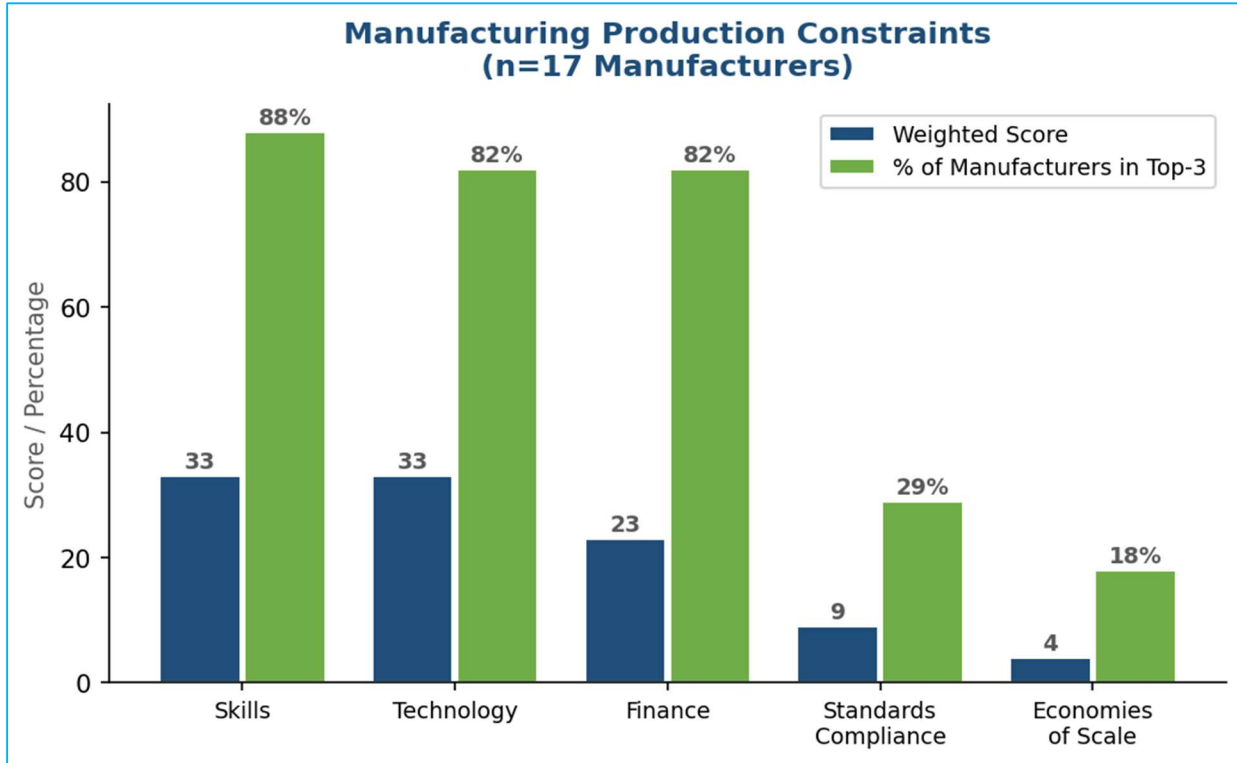


Figure 21: Manufacturing Production Constraints (n=17 Manufacturers)

Five specific investment priorities are identified by the integrated evidence base: (1) ZABS ISO/IEC 17025 accreditation the highest-impact institutional investment, enabling all downstream MEPS enforcement; (2) National EE appliance consumer financing facility the highest-impact demand-side investment, unlocking 50% conditional WTP; (3) Productive-use manufacturing support program the highest-return manufacturing investment, targeting the niche with highest local value-chain potential; (4) TEVETA EE curriculum development the highest-leverage human capital investment, building national technical capacity independently of donor cycles; and (5) EPR operationalisation and take-back infrastructure the most time-sensitive environmental investment, preventative now versus remedial later.

## 8. CONCLUSION

### 8.1 The Strategic Value of the Integrated Evidence Base

This progress report demonstrates the strategic power of integrating market-side and supply-side evidence into a unified analytical framework. Taken alone, the Task 1 market study findings map the regulatory gaps and demand-side constraints that prevent EE appliance adoption at scale. Taken alone, the Task 2 value chain findings map the manufacturing capacity limits, skills deficits, and institutional bottlenecks that constrain supply-side response. Taken together, they reveal the full systemic picture: a market that is policy-ready but implementation-stalled, with a private sector that is more willing than aware, a manufacturing base that is more capable than certified, and a regulatory architecture that is more comprehensive than activated.

This systemic picture has three implications for EELA program design. First, no single regulatory, institutional, or market intervention will transform the sector alone. Transformation requires a coordinated package of regulatory activation (MEPS), institutional strengthening (ZABS, inter-agency coordination), market development (ICTP, consumer financing), and social inclusion (gender, skills). Second, sequencing matters: MEPS is the foundational regulatory instrument from which all other interventions derive their market relevance. Without MEPS, ICTP loses its most powerful participation motivator, manufacturing investment loses its certainty signal, and consumer awareness campaigns lack a regulatory anchor. Third, speed matters: Zambia's window of opportunity before SADC peers further tighten their MEPS regimes and before appliance market volumes generate irreversible e-waste accumulation is open now but will not remain open indefinitely.

### 8.2 Six Overarching Conclusions

- **Conclusion 1** — The regulatory vacuum is the primary enabling constraint underlying broader market failures. Without enforced MEPS, there is no effective quality filter on imports, limited investment signal for manufacturers, no credible verification standard for testing, and a weak informational foundation for consumer decision-making. MEPS gazettement is therefore not one among many priorities it is the enabling condition upon which other market interventions depend.
- **Conclusion 2** — ZABS accreditation is the most critical institutional investment. Without ISO/IEC 17025 accreditation, MEPS cannot be credibly enforced, product testing cannot be independently verified, and Zambia's regulatory regime will remain technically unsupported. The bilateral recognition strategy with SABS and KEBS provides an immediately implementable interim measure.
- **Conclusion 3** — Consumer financing is the highest-leverage demand-side intervention. 50% of willingness-to-pay is conditional on financing availability, and 86% of customers purchase in cash. Financial incentives for manufacturers and importers, combined with PAYGO and revolving credit instruments for consumers, represent the fastest route to transformative EE uptake.
- **Conclusion 4** — Fiscal Incentives must be linked to enforceable MEPS and Labelling. Lessons from the solar home system (SHS) market show that fiscal incentives such as reduced import duties and VAT exemptions can accelerate market growth, but also enable the proliferation of low-quality products if not anchor in enforceable Minimum Energy Performance Standards (MEPS) and robust labelling systems. In the current market, the near-universal presence of labels (99%) masks weak technical understanding, with only 24% of firms trained in MEPS and 23% aware of e-waste regulations. This disconnect underscores that labels alone are insufficient without credible enforcement, verification, and market surveillance. To avoid market distortion and environmental risk, fiscal incentives must be explicitly conditional on verified compliance with MEPS and accurate labelling, supported by strengthened testing capacity and regulatory enforcement mechanisms.
- **Conclusion 5** — Gender exclusion is structural and requires structural intervention. The 87% of firms not targeting women customers and the 70% with fewer than 20% women in technical roles are not marginal statistics; they reflect embedded systemic barriers that will not be addressed by awareness campaigns or voluntary aspirations alone. Binding gender targets, accessible technical training, and women's enterprise financing are the three instruments required.



- **Conclusion 6** — The e-waste prevention window is open but closing. Zambia's growing appliance market will generate a significant, unmanaged waste burden without EPR operationalisation. The current moment — before volumes scale — is the optimal intervention point. The cost of proactive prevention is orders of magnitude lower than the cost of future remediation.

**EELA ZAMBIA: THE OPPORTUNITY STATEMENT**

*Zambia has a credible policy framework, a willing private sector (88% training readiness), a growing market (electrification expanding), and a development program (EELA) with the tools and partnerships to catalyse transformation.*

*The missing elements are specific, known, and addressable: MEPS instruments, accredited testing, consumer financing, coordinated institutions, inclusive skills, and circular economy governance.*

*The tiered intervention roadmap in this progress report provides a sequenced, evidence-grounded path from policy-ready to implementation-ready.*



## 9. RECOMMENDATIONS

The following 17 consolidated recommendations integrate the full evidence base from Tasks 1 and 2. They are organised by implementation horizon and responsible stakeholder. Recommendations are cross-referenced with the tiered intervention roadmap in Section 9.

### 9.1 Short-Term Recommendations (Quick Wins, 0–12 Months)

Ref	Recommendation	Action	Lead
R1	Gazette SADC-Aligned MEPS	Issue MEPS for priority categories (refrigerators, lighting, fans, TVs, solar home systems) using SADC harmonised standards. Assign ERB as the competent MEPS authority. Include a 12-month industry transition period with ICTP-delivered training support.	Ministry of Energy / ERB
R2	Mandatory Energy Labelling	Require energy performance labels at point-of-sale for all regulated appliance categories. Align label format with SADC program to reduce importer compliance cost. Launch concurrent consumer awareness campaign.	Ministry of Energy / ERB
R3	Import Controls & Conformity Assessment	Link customs clearance for energy-using appliances to MEPS compliance declarations. Direct ZCSA to develop pre-market conformity assessment scheme. Begin with priority categories (refrigerators, ACs, lighting).	ZCSA / Ministry of Commerce
R4	Fiscal Incentives must be linked to enforceable standards	Lesson from solar home system (SHS) market is that fiscal incentives including reduced import duties and VAT exemptions can drive rapid market growth while simultaneously enabling the influx of low-quality products if they are not accompanied by enforceable minimum performance standards.	UNIDO / Ministry of Energy/ Ministry of Commerce
R5	Begin ZABS ISO/IEC 17025 Accreditation	Commission a gap assessment for ZABS laboratory accreditation. Negotiate interim bilateral testing recognition agreements with SABS (South Africa) and KEBS (Kenya). Fund technical assistance package through development partners.	ZABS / UNIDO / Development Partners
R6	Mandatory bills supersede voluntary standards being underway under ERB	Introduce mandatory bills supersede voluntary standards being underway under ERB.	ZABS/ERB

## 9.2 Medium-Term Structural Reforms (12–24 Months)

Ref	Recommendation	Action	Lead
R7	Achieve ZABS Accreditation	Complete ISO/IEC 17025 accreditation for appliance energy testing at ZABS. Activate bilateral testing recognition with SABS and KEBS. Establish laboratory fee schedule enabling commercial testing services for industry.	ZABS / Development Partners
R8	Establish Inter-Agency EE Technical Committee	Formalise coordination between ERB, ZABS, ZCSA, ZEMA with quarterly coordination meetings, shared data protocols, and a joint enforcement calendar. Embed as statutory mechanism under the Energy Regulation Act.	ERB / Ministry of Energy
R9	Operationalise EPR Regulations	Gazette implementing regulations under EPR framework (SI No. 65/2018). Assign ZEMA as e-waste lead. Establish national take-back scheme with industry cost-sharing through ICTP platform. Prioritise refrigerant-containing appliances and battery systems.	ZEMA / ICTP
R10	Implement Local Content Regulations with MFEZ Incentives	Actively implement Local Content Regulations (2025) with 20–40% local content targets for the appliance sector. Communicate and consistently apply MFEZ incentives for EE manufacturers. Launch EE manufacturing investment promotion through ZDA.	Ministry of Commerce / ZDA
R11	TEVETA Curriculum Development for EE Competencies	Develop and integrate EE appliance-specific competency units into TEVETA curricula: energy performance testing, solar system certification, MEPS compliance assessment, appliance repair. Establish master-trainer program for national rollout.	TEVETA / ICTP
R12	Productive-Use Appliance Manufacturing Program	Design dedicated support program for productive-use EE appliance manufacturers (solar pumps, agro-processing equipment, cold storage) including equipment finance access, technical assistance, and agro-processor market linkages.	ICTP / Development Partners

### 9.3 Long-Term Systemic Actions (Years 2–4)

Ref	Recommendation	Action	Lead
R13	National EE Appliance Financing Facility	Develop a dedicated consumer financing window including guarantees, PAYGO models, revolving credit, and consumer rebates. Target the 88% cash-purchasing market and the 50% willingness-to-pay (WTP) segment conditional on financing availability. Structure as a blended finance instrument leveraging banks resources and development partner co-financing.	Ministry of Finance / Commercial Banks
R14	EE Integration into Power Sector Planning	Mandate ZESCO and ERB to quantify demand-side savings from MEPS within the Integrated Resource Plan (IRP) and Least-Cost Power Development Plan (LCPDP). Position energy efficiency as a system-level resource with measurable capacity-equivalent value.	ZESCO / ERB
R15	Gender-Disaggregated Targets in EESAP	Integrate gender targets into EESAP implementation, including: women-led enterprise procurement quotas; mandatory gender impact assessments across EE programs; activation of the ZGEN program as the primary delivery vehicle; and a minimum of 40% women's participation in ICTP technical training programs.	Ministry of Energy / MCDSS
R16	ICTP Women's Technical Capacity Stream	Establish a dedicated ICTP workstream focused on women's technical capacity development. Partner with TEVETA for apprenticeship placements and provide targeted support to women-led productive-use enterprises. Institutionalise quarterly reporting of gender-disaggregated participation metrics.	ICTP / TEVETA
R17	Circular Economy Infrastructure	Develop national recycling infrastructure for priority waste streams (refrigerants, batteries, PCBs). Establish Producer Responsibility Organisations (PROs) under the EPR framework. Mandate provision of take-back information at point of sale for all regulated appliance categories.	ZEMA / ICTP / Industry

## 10. ANNEXES

### Annex A: Consolidated Evidence Tables

#### A.1 Market Structure Summary (n=100)

Indicator	Value	Source	Implication
Retailers (share of market)	52%	AMA Survey n=100	Dominant consumer touchpoint; primary EE information intermediary
Importers (share)	26%	AMA Survey n=100	Critical import quality filter point; primary MEPS compliance focus
Manufacturers (share)	17%	AMA Survey n=100	Import-dependent structure; mixed sourcing shows localisation potential
Import market dependence	88%	Desk review	High regional dumping vulnerability without imports controls
Firms operating 6+ years	63%	AMA Survey	Market maturity; structural inertia — regulation needed to shift models
On-grid fastest growing	59%	AMA Survey	Electrification driving demand; MEPS urgency growing
Serve both on-grid and off-grid	61%	AMA Survey	Hybrid market reality; MEPS must address AC and DC appliances
Sell energy-labelled products	92%	AMA Survey / Technical Checklist	Compliance culture present; but voluntary and unverified
Self-reported MEPS compliance	80%	AMA Survey	Overstated — 49% unaware of standards they claim to comply with
Unaware of SADC MEPS/labelling	49%	AMA Survey	Critical knowledge gap; training and ICTP outreach required
Staff with no EE training	55%	AMA Survey	Donor-led training insufficient; ICTP-TEVETA partnership needed
Use certified test reports	11.8%	Technical Checklist n=91	Testing infrastructure gap — most critical institutional bottleneck
Cash-purchasing customers	86%	AMA Survey	Affordability dominates; consumer financing is key intervention
Affordability as top barrier	67%	AMA Survey	Structural demand constraint; financing must parallel regulation

Indicator	Value	Source	Implication
WTP conditional on financing	50%	AMA Survey	High latent demand — financing unlocks significant EE uptake
Unaware of ICTP	82%	AMA Survey	Platform launch requires strong outreach investment
Would join ICTP for training	88%	AMA Survey	High latent demand — supply-side launch challenge, not demand

## A.2 Gender and Inclusion Data Summary (n=100)

Gender Indicator	Value	Strategic Implication
Female-led enterprises	41%	Strong entrepreneurial base — but commercially not technically concentrated
Male-led enterprises	52%	Sector majority; technical/manufacturing functions male-dominated
Women in workforce < 20%	62%	Sector-wide gender gap in employment
Women in technical roles < 20%	70%	Most severe exclusion point — skills gaps as primary barrier
Women targeted as customers	13%	87% market opportunity not being captured
Products for women-led productive use	14%	Significant product development opportunity
Skills gap as barrier to women in technical roles	68–70%	Primary mechanism — tractable via ICTP-TEVETA training
Cultural norms as barrier	29–45%	Reinforcing factor — workplace and training environment design required
Workplace conditions as barrier	31–48%	Physical infrastructure and workplace culture investment needed
National female manufacturing employment	2.6%	Structural gender segregation at productive value chain layer

## A.3 Circular Economy and End-of-Life Data (Technical Checklist, n=91)

Circular Economy Indicator	Value	Implication
Repairability / spare parts available	64.8%	Majority technically repairable but majority not engineered for repair
Design features supporting repair	38.5%	61.5% without repair-facilitating design — systemic design gap

Circular Economy Indicator	Value	Implication
End-of-life management awareness	51.6%	Near-even split: half aware, half not — EPR communication needed
Awareness of national e-waste regulations	49.5%	Half unaware of EPR Regulations — confirms un-operationalised status
Take-back/recycling info provided to customers	23.1%	76.9% not providing EoL guidance — consumer disposal gap
Formal EoL pathway confirmed	58.2%	18.7% informal; 23.1% unknown — significant waste management risk
Products referencing no standards	17.6%	Nearly 1 in 5 with no standards reference — quality assurance black hole

## Annex B: Stakeholder Consultation Summaries

### B.1 Key Informant Interviews — Summary

Forty-One (41) KIIs were completed as of the report date (17 February – 17 March 2026), out of a full target of 41. KIIs were administered across government officials, industry leaders, and development partner representatives. The following themes emerged consistently across the completed interviews:

<p><b>THEME 1 — REGULATORY &amp; STANDARDS ARCHITECTURE</b></p>
<p>Zambia MEPS and labelling framework remains largely voluntary. Progress has been made in developing SADC-harmonised standards for lighting, refrigeration and air conditioning, but enforcement, testing capacity, and inter-institutional coordination remain critical gaps.</p>
<p><b>THEME 2 — MARKET STRUCTURE &amp; LOCAL MANUFACTURING</b></p>
<p>Zambia's appliance market is overwhelmingly import-driven, with most products sourced from China, South Africa, and other Asian markets. Local manufacturing is limited to assembly activities. Multiple structural, financial, and policy barriers constrain the emergence of a domestic manufacturing base.</p>
<p><b>THEME 3 — FINANCING CONSTRAINTS</b></p>
<p>Limited access to affordable financing was repeatedly cited as a major constraint affecting manufacturers, importers, distributors, and end-users. High commercial interest rates, lack of collateral, investor bias, and the absence of tailored green finance products create a significant funding gap across the appliance value chain.</p>
<p><b>THEME 4 — SKILLS GAPS &amp; TECHNICAL CAPACITY</b></p>
<p>Significant technical skills shortages were reported across installation, servicing, manufacturing, and appliance testing. Universities and training institutions lack adequate equipment, while graduates lack exposure to real-life manufacturing environments. Opportunities exist for youth employment and apprenticeships, particularly in servicing and repair.</p>
<p><b>THEME 5 — CIRCULAR ECONOMY &amp; END-OF-LIFE MANAGEMENT</b></p>
<p>The appliance sector currently lacks structured systems for recycling, refurbishment, or end-of-life management. Current practices are informal and unregulated. ZEMA is the designated authority but enforcement is limited. Stakeholders called for Extended Producer Responsibility (EPR) policies, take-back schemes, and circular economy integration into appliance policy.</p>
<p><b>THEME 6 — INDUSTRY CLEAN TECHNOLOGY PLATFORM (ICTP)</b></p>
<p>There is strong and broad-based support for establishing a national ICTP. Stakeholders across all categories expressed willingness to participate and articulated clear expectations: the platform should facilitate investment, enable technology transfer, provide market intelligence, support compliance, and coordinate policy dialogue — not merely serve as an information portal.</p>
<p><b>CROSS-CUTTING — GENDER INCLUSION</b></p>
<p>Women remain significantly underrepresented across the appliance value chain, particularly in technical, manufacturing, and managerial roles. Barriers include limited access to STEM education, finance, and professional networks. Targeted interventions — including gender-responsive financing, apprenticeships, and procurement quotas — were recommended by multiple stakeholders.</p>

## B. 2 Roles of Key Stakeholders

Stakeholder	Primary Roles and Responsibilities
Ministry of Energy / ERB	Policy led for MEPS gazetting (R1); establish inter-agency Technical Committee (R8); integrate EE into power sector planning (R14); embed gender targets in EESAP (R15)
ZABS	Pursue ISO/IEC 17025 accreditation (R5, R7); develop appliance testing fee schedule; negotiate bilateral testing recognition with SABS and KEBS
ZCSA	Develop and administer import conformity assessment scheme (R3); extend compulsory standards enforcement from solar products to all regulated appliance categories
ZEMA	Gazette EPR implementing regulations (R9); establish national take-back scheme; develop circular economy infrastructure (R17)
Ministry of Commerce / ZDA	Implement Local Content Regulations (R10); communicate MFEZ incentives; launch EE manufacturing investment promotion
Ministry of Finance / Local banks	Establish national EE consumer financing facility (R13); clarify and consistently apply fiscal incentives for EE appliances
TEVETA	Develop EE appliance curricula (R11); establish master-trainer programme partner with ICTP for women's technical training (R16)
UNIDO / Development Partners	Fund ZABS accreditation (R5); co-create and finance ICTP establishment (R4); mobilise consumer financing (R13); deliver and transition EE awareness training (R6)
Private Sector (Manufacturers, Importers, Retailers)	Transition product portfolios to MEPS-ready models; engage ICTP as training and compliance partner; implement take-back practices; invest in women's technical capacity