AN ARCHETYPE-BASED INVESTOR PLAYBOOK

FINANCING CLEAN COOKING IN SUB-SAHARAN AFRICA

SEPTEMBER 2026

IDRC · CRDI
Canada

intellecap

ACKNOWLEDGEMENTS

This study was carried out with grant support from the International Development Research Centre (IDRC), Ottawa, Canada, under the action research initiative *"Unlocking Climate Finance for Women and Girls in Africa,"* **implemented by Intellecap Advisory Services (part of the Aavishkaar Group).**

We sincerely thank the clean cooking enterprises, investors, commercial and cooperative banks, development finance institutions, think tanks, and carbon market actors who contributed their time, experience and insights. Their perspectives helped shape our understanding of the barriers to investment, the realities facing enterprises, and the conditions required to mobilize capital on commercial terms. Several stakeholders also supported the research by testing the toolkit, engaging with enterprises and opening their networks across Africa.

We are equally grateful to participants in the validation workshop and Clean Cooking Showcase, whose feedback helped test and refine the findings and tools presented in this report. A summary of stakeholder engagement is provided in Annex A.

We thank IDRC (and in particular Flaubert Mbiekop, Tovo Nere Jose, Erin Tansey, and colleagues) for their support, guidance, and steady encouragement throughout.

We also thank our colleagues in Intellecap's Sankalp Team, George Murage and Margaret Nakunza, for supporting the Clean Cooking Showcase, where the research findings were presented and six enterprises participating in the Carbon Technical Assistance Program were showcased.

Authors

Karnika Yadav, Director, Principal Investigator
Ruchi Sankrit, Co-Principal Investigator
Wambui Kuria, Researcher
Lynn Olendo, Researcher
Kiriinya Violet Nkirote, Researcher
Kaushani Chakrabarti, Researcher
Maureen Masila, Researcher
Kuziva Huni, Advisor

Disclaimer

The views and analyses expressed in this report do not necessarily represent those of IDRC or its Board of Governors. IDRC does not guarantee the accuracy of any data included in this publication, nor does it accept responsibility for the consequences of its use.

This report provides investment guidance and decision support tools based on available evidence. Its benchmarks and recommendations should be applied with investor judgement and transaction-specific due diligence. Given rapidly evolving carbon markets, regulations and sector data, users should verify current conditions when making investment decisions.

Generative AI tools were used to support editing and formatting, source retrieval and cross-checking, and the development of an interactive Excel-based toolkit. Generative AI was not used to generate primary research findings. All figures, claims, and citations were independently verified against their original sources, and AI-assisted outputs were reviewed and approved by qualified members of the research team. The research team retains full responsibility for the accuracy, interpretation, and content of this report and the accompanying toolkit.

About this playbook

This playbook examines how private capital can be mobilized for clean cooking enterprises in Sub-Saharan Africa. It presents the evidence, methodology, and analytical framework underpinning the research, including the barriers to investment, five enterprise archetypes and their investment characteristics, and the enabling conditions required for capital to flow at scale. The report accompanies the **Clean Cooking Investor Toolkit**, an interactive workbook that translates this research into practical tools for investors. The toolkit contains the archetype quick-screen, due diligence checklists, and capital instrument selection tool, while this report provides the evidence and analysis underpinning their design and benchmarks. Readers assessing a live investment should use the toolkit directly, while those seeking to understand or build on the underlying research should refer to this report.

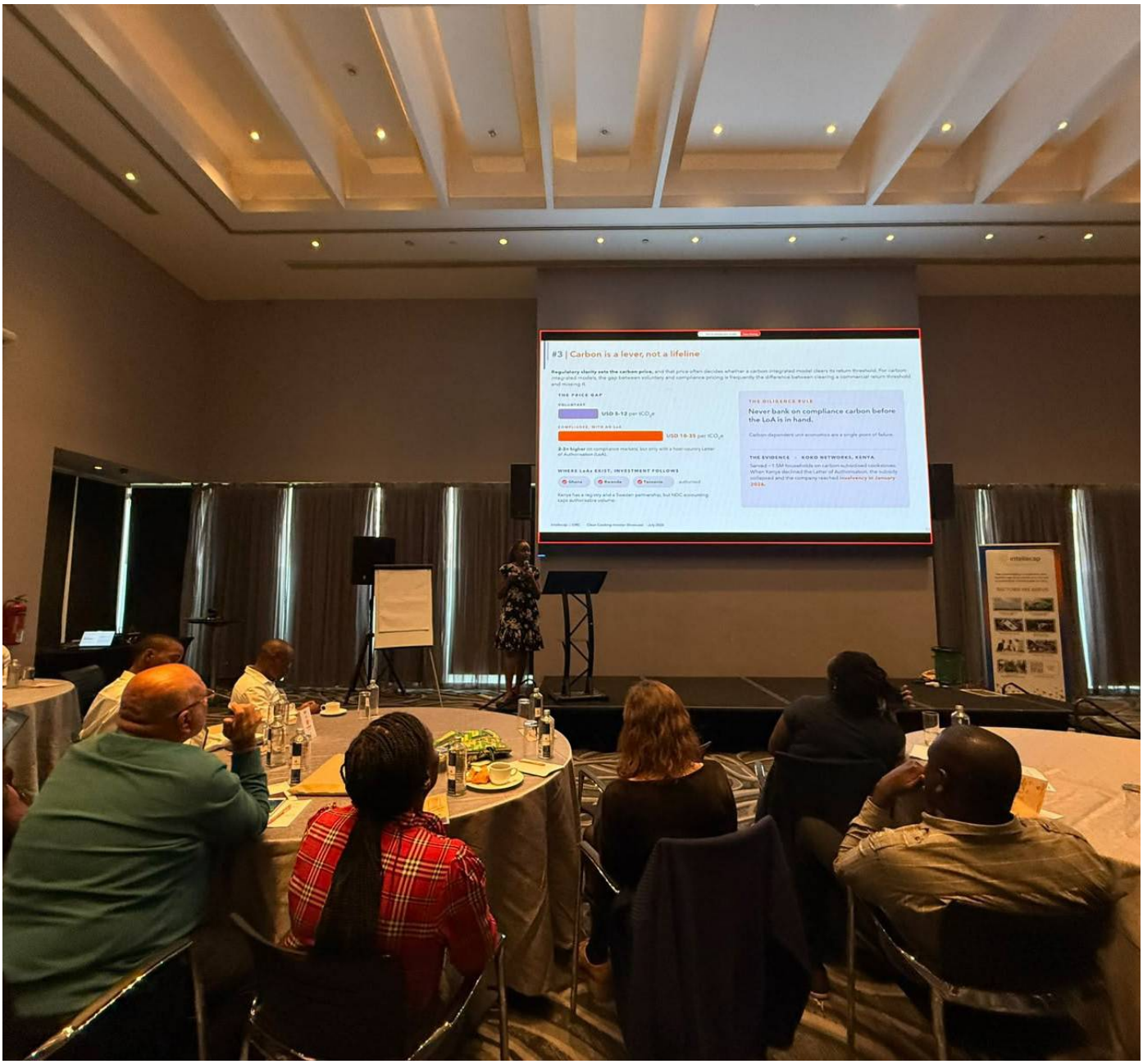

Image Courtesy : Intellecap presentation at the clean cooking showcase

TABLE OF CONTENTS

Acknowledgements 2

About this playbook 3

List of Tables 6

List of Figures 6

List of Acronyms 7

Executive Summary 8

1. Introduction and Rationale 10

1.1 Context: a large market, a persistent gap 11

1.2 Research objectives and questions 13

1.3 This playbook and the Investor Toolkit 13

2. Research Approach and Methodology 15

2.1 Overall design 16

2.2 Phase 1: Landscape Study and Carbon Technical Assistance Program 17

2.3 Phase 2: Deep-dive investor interviews 18

2.4 Phase 3: Co-creation investor engagement workshop 20

2.5 Framework derivation and originality check 22

2.6 Benchmark verification for the Investor Toolkit 22

2.7 Scope and limitations 23

3. Findings I: Why Capital is not Flowing to the Clean Cooking Sector 24

3.1 Barrier 1: Affordability constrains the household market, and enterprises cannot bridge the gap unaided 26

3.2 Barrier 2: Risk is mispriced, not absent 28

3.3 Barrier 3: The analytical framework for assessing clean cooking enterprises remains undeveloped 31

3.4 Barrier 4: Market infrastructure limits the flow of capital 32

4. Findings II: The Five-Archetype Investment Framework 33

4.1 The framework 34

4.2 Archetype profiles: the investment logic of each model 38

4.3 Cross-cutting findings 42

5. From Research to Practice: The Clean Cooking Investor Toolkit 44

5.1 Why the toolkit was created 45

5.2 Design principles 46

5.3 What the toolkit contains 48

5.4 How the toolkit should be used 51

6. Enabling Conditions for Capital to Flow 54

6.1 Regulatory clarity enables bankability of carbon projects 55

6.2 Aggregation makes a fragmented market institutionally accessible 56

6.3 Blended finance addresses specific risks and mobilises commercial capital 56

6.4 Institutional demand changes the risk profile of the entire market 57

6.5 The cross-cutting gender lens 57

6.6 The enabling conditions reinforce one another 58

7. Conclusions and Implications 59

Implications by audience 61

Annex A: Stakeholder Engagement Summary 63

A.1 Phase 1: Landscape study key informant interviews (25 interviews) 64

A.2 Phase 2: Investor archetypes engaged in deep-dive interviews 64

A.3 Phase 3: Co-creation workshop participating organisations (Nairobi, 22 October 2025) 65

Annex B: Evidence base for the Toolkit's Benchmarks 66

Annex C: Literature Review 68

Annex D: Glossary of Key Terms 76

Endnotes 78

List of Tables

Table 1	*Investor Playbook report sections*	**14**
Table 2	*Workshop sessions and the 5 consensus findings*	**20**
Table 3	*The five archetypes at a glance, condensed.*	**36**
Table 4	*Components of the Clean Cooking Investor Toolkit and their research basis.*	**50**
Table 5	*Phase 1 key informant interview stakeholders (Intellecap & IDRC, 2025a).*	**64**
Table 6	*Investor archetypes engaged in Phase 2*	**64**
Table 7	*Workshop participating organisations (18 named participants; Intellecap & IDRC, 2025b)*	**65**
Table 8	*Evidence base for the toolkit's benchmarks*	**67**
Table 9	*Secondary literature reviewed (2017–2026). Grouped by primary analytical focus.*	**74**
Table 10	*Analytical dimension. Highlighted rows are dimensions not addressed in the literature mapped in Table 9*	**75**

List of Figures

Figure 1	*The clean cooking financing gap at a glance (IEA, 2026; Intellecap derivation).*	**8**
Figure 2	*The scale of the unserved market (IEA, 2025, 2026).*	**11**
Figure 3	*Annual sector investment against the annual requirement (IEA, 2026).*	**12**
Figure 4	*The three-phase research design.*	**16**
Figure 5	*Reach and delivery of the Carbon Technical Assistance Program.*	**17**
Figure 6	*Investor segments engaged in Phase 2, by typical ticket size.*	**19**
Figure 7	*Limitations of the research*	**23**
Figure 8	*The four barriers, as reported by investors and validated at the workshop.*	**25**
Figure 9	*The commercially reachable market under IEA affordability thresholds (IEA, 2025; Intellecap derivation).*	**27**
Figure 10	*The five archetypes and their primary value-capture mechanisms.*	**34**
Figure 11	*The five archetypes ranked by capital intensity (Intellecap, 2026).*	**37**
Figure 12	*Carbon integrity metrics (Gill-Wiehl, Kammen & Haya, 2024; ICVCM, 2025).*	**39**
Figure 13	*Cookstove carbon price reference points (MSCI Carbon Markets, 2026; Abatable, 2025).*	**41**
Figure 14	*The toolkit sequence mapped to the investment lifecycle.*	**52**
Figure 15	*The four enabling conditions and the cross-cutting gender lens.*	**55**
Figure 16	*What each actor should do next*	**62**

List of Acronyms

Acronym	Full Name
ABPL	Africa Bioenergy Programs Limited
AECF	Africa Enterprise Challenge Fund
AMDA	Africa Minigrid Developers Association
ARPU	Average Revenue Per User
ATEC	ATEC (clean cooking enterprise)
CAPEX	Capital Expenditure
CATF	Clean Air Task Force
CCA	Clean Cooking Alliance
CCP	Core Carbon Principles
COICOP	Classification of Individual Consumption According to Purpose
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
DAC	Development Assistance Committee
DD	Due Diligence
DFI	Development Finance Institution
EIB	European Investment Bank
ESMAP	Energy Sector Management Assistance Program
fNRB	Fraction of Non-Renewable Biomass
FMCG	Fast-Moving Consumer Goods
FSD	Financial Sector Deepening Africa
GEMs	Global Emerging Markets
GHG	Greenhouse Gas
GI-ROI	Gender-Inclusive Return on Investment
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOGLA	Global Off-Grid Lighting Association
ICRW	International Center for Research on Women
ICVCM	Integrity Council for the Voluntary Carbon Market
IDRC	International Development Research Centre
IEA	International Energy Agency
IFC	International Finance Corporation
IRR	Internal Rate of Return

Acronym	Full Name
ITMO	Internationally Transferable Mitigation Outcome
KES	Kenyan Shilling
KEREA	Kenya Renewable Energy Association
KII	Key Informant Interview
KPI	Key Performance Indicator
LoA	Letter of Authorization
LPG	Liquefied Petroleum Gas
MCFA	Modern Cooking Facility for Africa
MFI	Microfinance Institution
MIGA	Multilateral Investment Guarantee Agency
MoFuSS	Model of Fuelwood Savings and Substitution
MRV	Measurement (Monitoring), Reporting, and Verification
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
OPEX	Operating Expenditure
P4G	Partnering for Green Growth and the Global Goals 2030
PayGo	Pay-As-You-Go
PIDG	Private Infrastructure Development Group
RBF	Results-Based Financing
SaaP	Subscription / Service-as-a-Product
SACCO	Savings and Credit Cooperative Organisation
SDG	Sustainable Development Goal
SEforALL	Sustainable Energy for All
SSA	Sub-Saharan Africa
TA	Technical Assistance
tCO2e	Tonne of Carbon Dioxide Equivalent
UGX	Ugandan Shilling
VCM	Voluntary Carbon Market
VCU	Verified Carbon Unit
WACC	Weighted Average Cost of Capital

Executive Summary

The clean cooking sector in Sub-Saharan Africa faces a significant financing gap. Approximately 970 million people in the region lack access to clean cooking, representing a market with substantial unmet health, gender and climate benefits, yet annual investment of about US$770 million flows into the region against an estimated US$4 billion required, leaving a shortfall of more than US$3.2 billion.[1]

This gap does not reflect a lack of viable enterprises. Commercial debt transactions and growing carbon revenues demonstrate that investable businesses exist. The challenge is that capital is not yet being deployed with sufficient precision to identify viable opportunities, assess their distinct risks and structure financing around how these businesses create value.

Figure 1: The clean cooking financing gap at a glance (IEA, 2026; Intellecap derivation).

This playbook presents the findings of a 24-month action research initiative commissioned by the International Development Research Centre (IDRC) and implemented by Intellecap. It asks a crucial question: given the scale of the opportunity and the presence of viable enterprises, why is capital not flowing to clean cooking at the pace and scale required? The research combined analysis of 166 clean cooking carbon projects, 25 key informant interviews, a Carbon Markets Technical Assistance Program reaching 31 enterprises across 17 African countries, deep-dive investor interviews, a review of 24 sector reports, and an investor co-creation workshop held in Nairobi in October 2025.[2]

The research identifies four barriers to capital mobilization. First, household affordability remains a constraint, but it is shaped by how products are priced, financed, and delivered, rather than simply by willingness to pay. Approximately 84 million households fall within IEA affordability thresholds, yet only 5 to 10 million have been reached at scale.[3] Second, risk is often priced above what available evidence suggests. Across emerging markets, lenders often charge more for risk than actual default rates suggest.[4] Third, investors lack a common framework and benchmarks for assessing different clean cooking business models. Fourth, the market infrastructure needed to mobilize capital at scale remains limited. In 2023, enterprise reported investment raised totaled US$218 million, largely through debt, while equity reached a five-year low and carbon revenues became increasingly concentrated among larger players.[5]

In response, the research introduces an archetype-based investment framework. It identifies five distinct ways in which clean cooking enterprises create and capture value: **Product Seller, Access Provider, Network Distributor, Carbon Integrated, and Infrastructure Utility.** Each has different revenue structures, customer relationships, capital needs and risk profiles. Treating these models as a single investment category can therefore contribute to risk mispricing and make viable opportunities harder to identify. A review of recent literature found no existing framework that segments clean cooking enterprises by revenue model and links them to investor due diligence, financing instruments, and return and exit pathways. This research addresses that gap.

The framework is operationalized through the Clean Cooking Investor Toolkit, an interactive Excel-based decision-support tool. It enables investors to classify enterprises by archetype and maturity stage, conduct archetype-specific due diligence, reach a rules-based investment decision **(GO, HOLD AND STRUCTURE, or NO-GO PENDING RESOLUTION),** identify suitable financing instruments, and provide structured feedback to enterprises. It also includes guidance on returns, exits and failure modes, supported by a benchmark library that distinguishes between published evidence and indicative thresholds informed by investor research.[6] Section 5 explains the toolkit's design, evidence base and application across the investment lifecycle.

The research also identifies four enabling conditions required for capital to flow at scale: carbon-market regulatory clarity, aggregation, blended finance, and institutional demand, supported by a cross-cutting gender lens. These conditions are mutually reinforcing and require coordinated action across investors, governments, DFIs, development partners and market intermediaries. The financing gap is substantial but addressable: investors need better tools to identify and assess opportunities, capital must be structured around how these businesses operate, and the wider market conditions must enable viable enterprises to scale.

IDRC · CRDI
Canada

intellecap

1.

Introduction and Rationale

Introduction and Rationale

1.1 Context: a large market, a persistent gap

Sub-Saharan Africa is home to the world's largest underserved clean cooking market. Approximately 970 million people still cook on open fires or traditional biomass stoves.[1] This contributes close to 0.9 gigatons of CO2-equivalent emissions annually and is associated with an estimated 815,000 premature deaths from household air pollution each year in SSA.[7] Across the continent, women and girls spend an average of 4 hours a day gathering fuel and cooking, limiting their time for education, paid work, enterprise, and other productive activities.[7]

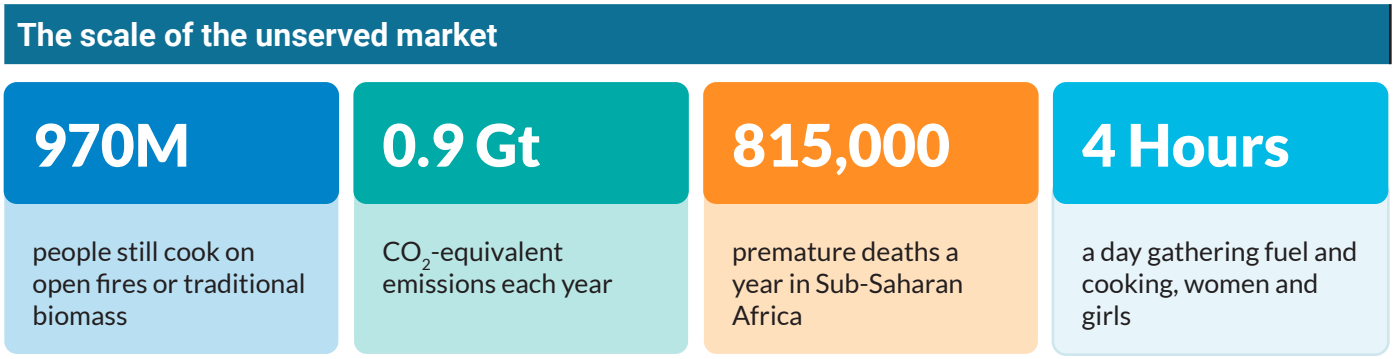

Figure 2: The scale of the unserved market (IEA, 2025, 2026).

Under the International Energy Agency's affordability thresholds, roughly 84 million households are commercially financeable today.[8] Yet annual investment in Sub-Saharan Africa's clean cooking sector stands at about US$770 million compared with an estimated annual requirement of US$4 billion. This leaves a shortfall of more than US$3.2 billion.[1] The persistence of this gap, despite growing awareness, maturing carbon markets, and multiplying proof points, is the puzzle this research set out to explain.

There is already clear evidence that clean cooking can be commercially viable. BURN Manufacturing has sold more than seven million cookstoves, financed much of its growth through forward carbon sales,[9] issued SSA's first clean cooking green bond in October 2023, and secured a US$15 million facility from the European Investment Bank in 2024.[10] The green bond, initially issued at US$5 million, was oversubscribed and closed at double its target, US$10 million.[11] At the sector level, debt had become the dominant source of investment by 2022, accounting for 79 percent of total investment and surpassing grants.[12] Carbon revenues from clean cooking projects in voluntary markets also rose sharply, from US$25 million in 2020 to US$107 million in 2024.[13] Together, these examples show that the sector is moving toward commercial maturity, but capital is still not flowing at the depth, breadth, or pace required to match the opportunity.

The clean cooking financing gap in Sub-Saharan Africa

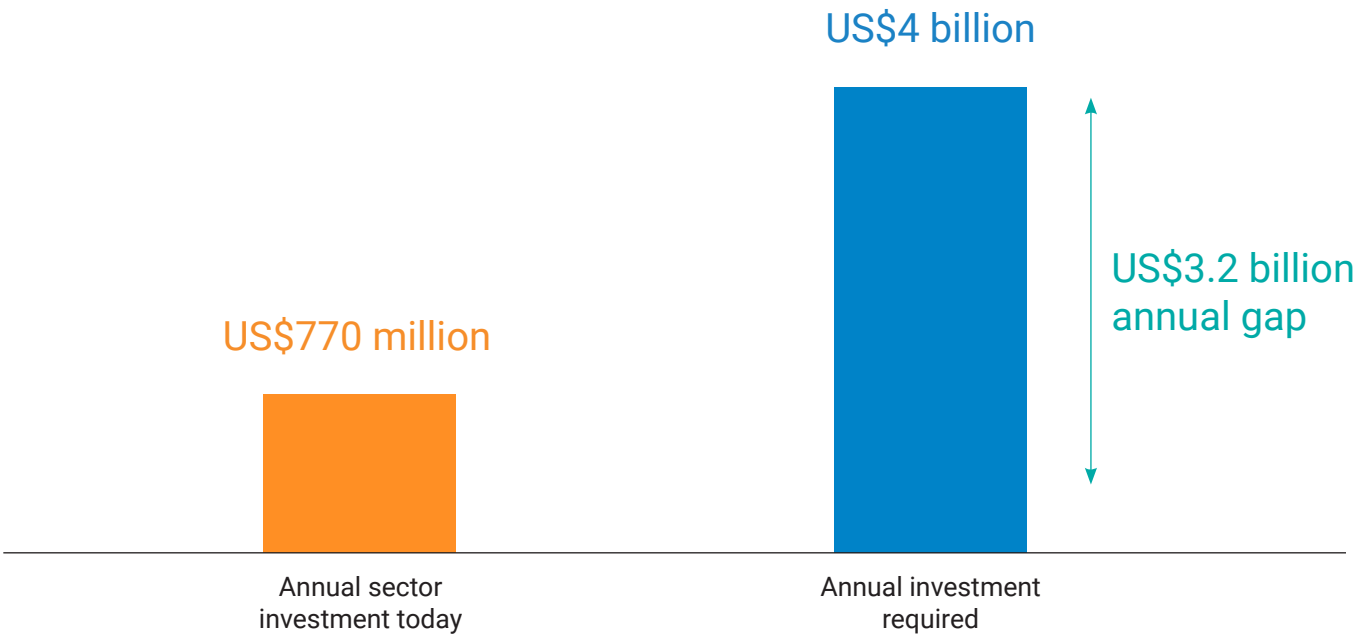

Figure 3: Annual sector investment against the annual requirement (IEA, 2026).

1.2 Research objectives and questions

This research was designed to answer one critical question: why is capital not flowing to clean cooking enterprises in Sub-Saharan Africa at the scale and pace required? It also aimed to translate the evidence into practical instruments that investors can use to assess enterprises more precisely and structure capital more appropriately. Three questions guided the work:

Q1	What specific barriers prevent capital from flowing to clean cooking enterprises, as experienced and described by investors themselves?
Q2	Do clean cooking enterprises constitute a single risk category, or are they structurally distinct business models requiring differentiated assessment, pricing, and instruments? If the latter, what is the appropriate segmentation?
Q3	What analytical tools, benchmarks, and enabling conditions would allow investors to move from cautious interest to confident, well-structured deployment, with particular attention to gender-differentiated market dynamics?

1.3 This playbook and the Investor Toolkit

This **playbook and the Clean Cooking Investor Toolkit** are designed to be used together but serve different purposes. The toolkit is the practical, decision-oriented instrument for assessing live transactions, while this playbook provides the supporting research, methodology, evidence base, benchmark sources and limitations. Section 5 explains the toolkit's design, components and application across the investment lifecycle. Readers assessing a live investment should begin with the toolkit; those seeking to understand the evidence and analytical framework behind it should begin with this playbook.

STRUCTURE OF THE PLAYBOOK

Section	Focus
Section 2	Research approach, methodology, and limitations
Section 3	The four investor-reported barriers
Section 4	The five-archetype framework and cross-cutting findings on carbon, gender, and geography
Section 5	The Investor Toolkit
Section 6	Market-level enabling conditions
Section 7	Conclusions and implications by audience

Table 1: Investor Playbook report sections

Image Courtesy : www.upenergygroup.com

2.

Research Approach and Methodology

Research Approach and Methodology

2.1 Overall design

The research was conducted as a 24-month, three-phase action research initiative. It moved progressively from sector-level analysis to enterprise-level diagnostics to investor-facing co-creation. Each phase generated evidence that informed the next phase and shaped the final outputs, namely: the landscape study,[3] the Investor Playbook, and the Clean Cooking Investor Toolkit. Primary research from interviews, technical assistance needs assessment analysis, and workshop proceedings was triangulated against secondary sources throughout. Workshop quotations were drawn from a verified verbatim transcript. This design allowed the research to connect market evidence, enterprise realities, and investor decision-making into a single cumulative evidence base.

The three-phase research design

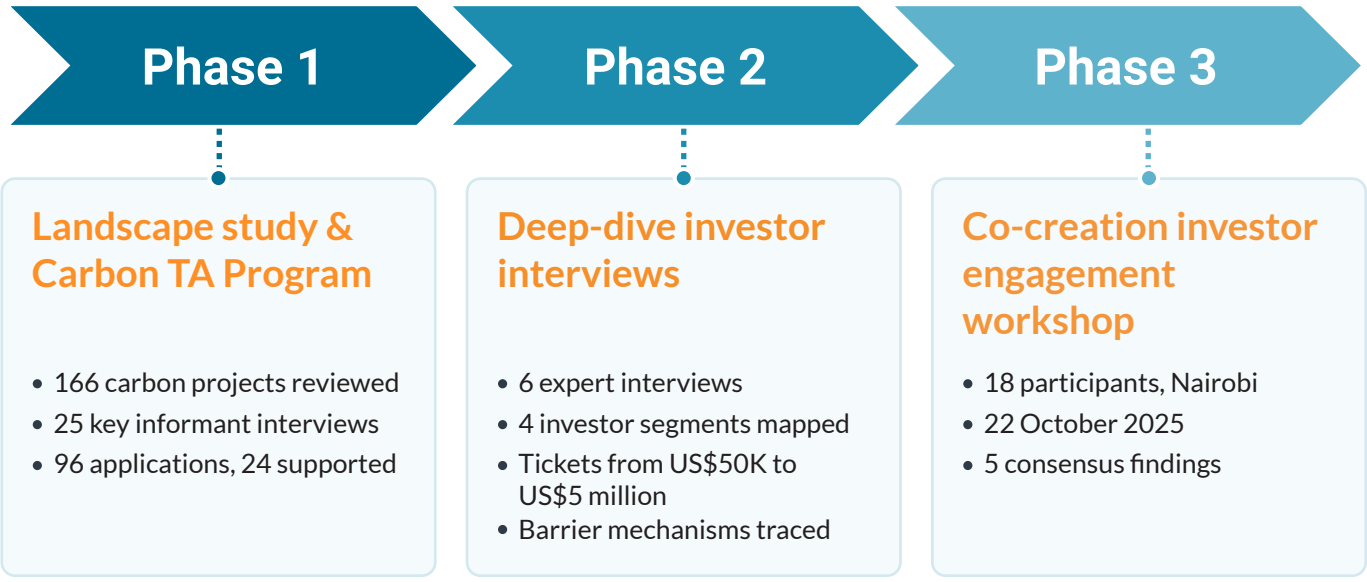

Figure 4: The three-phase research design.

2.2 Phase 1: Landscape study and carbon markets technical assistance program

Phase 1 developed the sector and enterprise evidence base through two complementary workstreams. The first was a landscape study[3] that synthesized the literature on climate finance, carbon markets, and clean cooking investment in Sub-Saharan Africa. Some of the literature that was reviewed included the Clean Cooking Alliance, the Africa Carbon Markets Initiative, the International Energy Agency, SEforALL, and the Berkeley Carbon Trading Project (see Annex C for the detailed list of literature reviewed). The study also analyzed 166 clean cooking carbon projects registered on the Gold Standard and Verra registries, mapped investment trends, and reviewed carbon-finance regulatory frameworks across Sub-Saharan African markets. Desk-based research was complemented by 25 key informant interviews with clean cooking enterprises, investors, development organizations, carbon market actors, think tanks, and sector networks. (see Annex A.1).

The second workstream was the carbon markets technical assistance program, which generated real-time evidence on enterprise-level knowledge gaps, financing bottlenecks, and carbon-market readiness. The program attracted 96 applications from 17 African countries. Thirty-one enterprises were shortlisted across LPG, ethanol, biomass, electric, and biogas solutions, and received tailored advisory support. Each supported enterprise received an average of 6 hours of consultation on emissions-reduction calculations, methodology assessment, project design document review, market penetration strategies and gender and inclusion advisory. More than 52 percent of the shortlisted enterprises were women-led. Between 65 and 70 percent of the enterprises integrated women into their distribution and sales networks. By the end of the program, 17 of the 31 shortlisted enterprises had achieved at least one significant milestone in their carbon projects.[14]

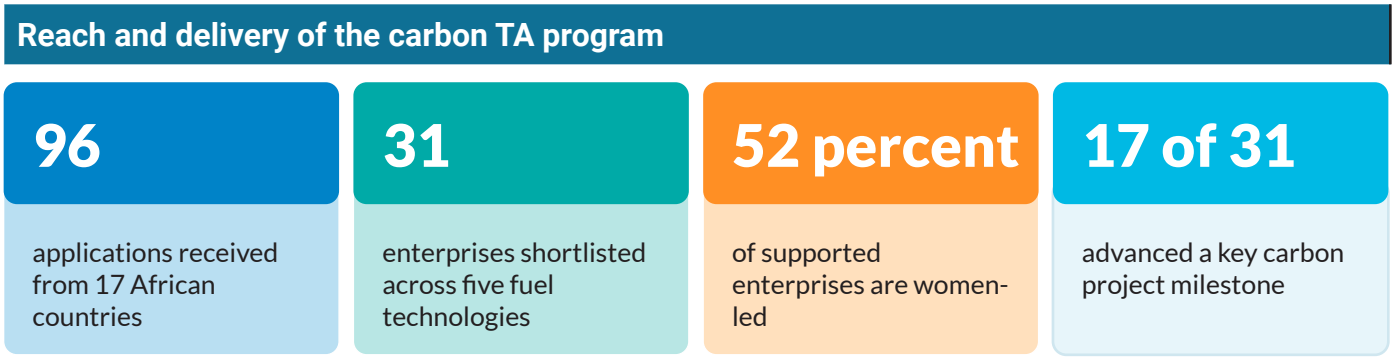

Figure 5: Reach and delivery of the Carbon Technical Assistance Program.

2.3 Phase 2: Deep-dive investor interviews

Phase 2 examined how investors assess clean cooking opportunities and why capital does or does not move. The research team conducted structured, in-depth interviews with investors who were actively considering or deploying capital in energy access. The objective was to identify not only the barriers investors named but also the mechanisms through which those barriers shaped underwriting, pricing, and capital allocation decisions. Interviews were conducted on a named basis, with consent, and anonymized where requested.

Insights generated from these interviews informed the barrier diagnosis presented in Section 3 and the investor segmentation used in the toolkit. Four investor segments were mapped as outlined below:

- Early-stage technology investors, with typical ticket sizes of US$50,000 to US$300,000.
- Venture debt and asset-finance investors, with typical ticket sizes of US$100,000 to US$2 million.
- Blended finance investors, with typical ticket sizes of US$1 million to US$5 million and above.
- Specialist sector investors with typical ticket sizes of US$ 1 to US$ 5 million, which typically deploy approximately 70 percent debt and 30 percent equity.[15]

Investor segments engaged, by typical ticket size

Bars show the upper bound of each segment's typical ticket range

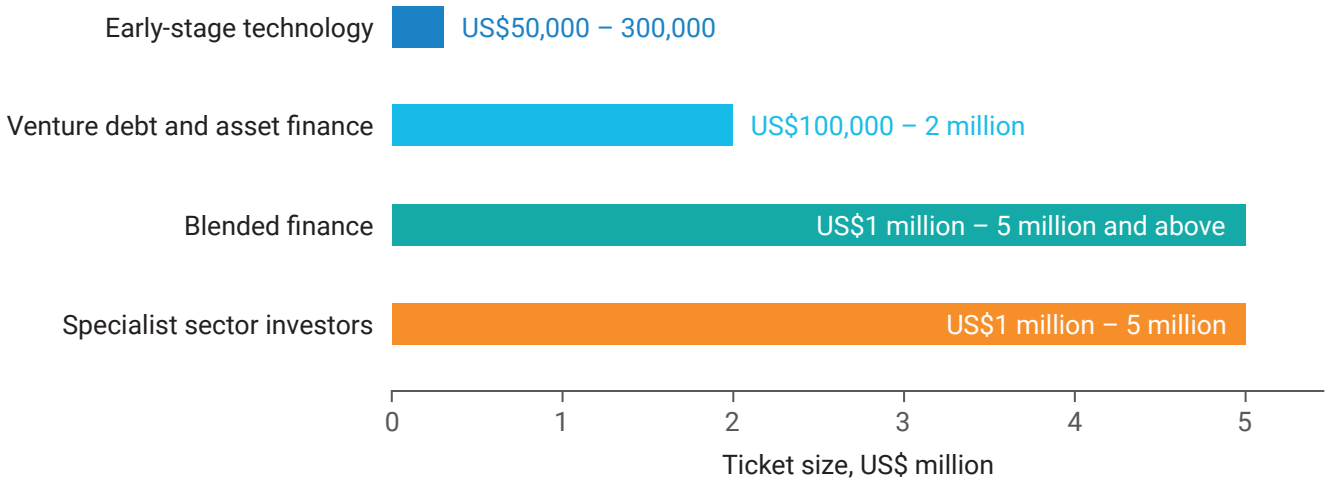

Figure 6: Investor segments engaged in Phase 2, by typical ticket size.

2.4 Phase 3: Co-creation investor engagement workshop

Phase 3 tested and refined the emerging findings through a validation co-creation workshop held in Nairobi on 22 October 2025. The workshop brought together 18 participants from development finance institutions, development agencies, commercial and cooperative banks, impact investors, gender and inclusive finance specialists, industry associations, and clean cooking enterprises (See Annex A.3 for the list of participating organizations). The workshop served three purposes. First, it validated the emerging findings from the Landscape Study, Carbon Technical Assistance Program, and the investor interviews. Second, it tested the proposed business model archetypes against investor experience and sector practice. Third, it co-created practical strategies for improving capital flow to clean cooking enterprises.

The workshop was organized around three sessions as follows:

Session	Focus
Session 1 Emerging findings and validation	Reviewed the scale of the financing gap and confirmed the central barriers identified through the research
Session 2 Business model deep dive	Tested the five archetypes for investability, carbon-finance potential, and gender integration opportunity
Session 3 Strategy co-creation	Developed practical responses across financial innovation, ecosystem collaboration, gender integration, behavior change, policy advocacy, and government mandates.

Five Consensus Findings Across All Sessions

Across the sessions, participants reached five consensus findings

- Investment should be tailored to the enterprise archetype and to the specific characteristics of the clean cooking sector
- Carbon revenue should be treated as an upside mechanism, not as the foundation of financial sustainability
- The sector's main constraint is legibility rather than potential, making shared benchmarks and analytical tools essential
- Gender integration should be treated as a commercial strategy, not only as a compliance and sustainability reporting requirement
- Documenting and learning from failure cases in the clean cooking sector is necessary for building long-term investor confidence

Table 2: Workshop sessions and the 5 consensus findings

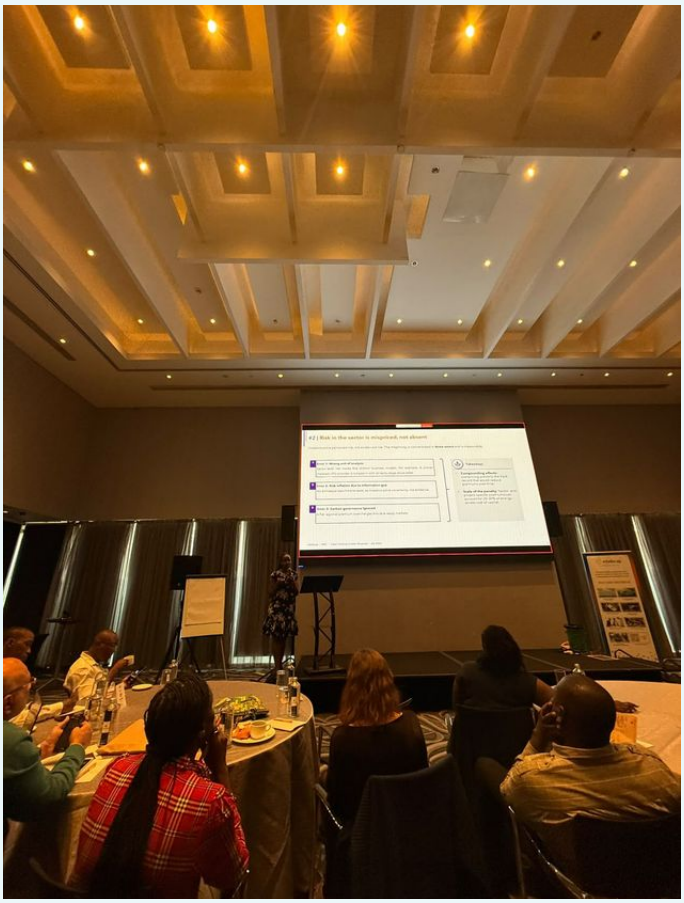

Image Courtesy : Intellecap presentation at the clean cooking showcase

2.5 Framework derivation and originality check

The five-archetype framework was developed through a four-stage process designed to reflect how clean cooking enterprises create and capture value. Rather than imposing a theoretical taxonomy, the research derived the framework from market evidence, enterprise data, investor interviews, and workshop validation.

- The first stage analysed 166 registered clean cooking carbon projects and sector investment data compiled during Phase 1. This work identified distinct value-capture mechanisms across the sector.
- The second stage validated these mechanisms against enterprise-level evidence from 25 key informant interviews, the Carbon Technical Assistance Program, and the investor interviews conducted in Phase 2.
- The third stage tested the framework with investors and sector actors during the October 2025 co-creation workshop, where participants endorsed the need for archetype-specific investment assessment.
- The fourth stage reviewed the framework against recent clean cooking, carbon finance, and energy access literature.

The originality check reviewed 24 relevant reports published between 2017 and 2026. These sources were selected based on recency, authority, and relevance to clean cooking investment, carbon finance, energy access finance, blended finance, and gender in energy access. The review found that existing literature covers market sizing, the financing gap, carbon market integrity, unit economics, gender, and policy in considerable depth. However, none of the reviewed reports segments clean cooking enterprises into investor-facing archetypes based on revenue mechanism, nor maps those archetypes to capital instruments, due diligence benchmarks, return pathways, or exit considerations.

The closest adjacent work is the **Clean Cooking Alliance's Unit Economics Framework,** which analyses cost and revenue drivers in the sector.[16] However, it does not group enterprises into investor archetypes or connect those archetypes to financing instruments. This research therefore adds a practical investment lens that is not yet present in existing literature.

2.6 Benchmark verification for the Investor Toolkit

An additional verification step was undertaken to ensure that the Investor Toolkit translates the research into usable and defensible investment thresholds. Every quantitative benchmark used in the toolkit's due diligence criteria was reviewed against the most recent available source and classified as either "sourced" or "indicative."

"Sourced" benchmarks are anchored in published data, including registry data, sector performance reports, carbon market assessments, methodology reviews, and price data. Examples include GOGLA PAYGo PERFORM, AMDA's Benchmarking Africa's Minigrids, ICVCM Core Carbon Principles assessments, peer-reviewed cookstove over-crediting research, and carbon market price data from MSCI Carbon Markets and Abatable.

"Indicative" benchmarks are used where no published benchmark exists. These were calibrated from key informant interviews, enterprise evidence, and workshop inputs. They should be treated as decision anchors rather than sector standards and should be updated as stronger data becomes available.

This distinction between sourced and indicative is made explicit throughout the toolkit. It allows investment committees to understand the strength of the evidence behind each threshold and to decide how much weight to place on each criterion. Further detail on the evidence base is provided in Annex B.

2.7 Scope and limitations

This research focuses on investment barriers and capital flow constraints affecting private-sector clean cooking enterprises in Sub-Saharan Africa. The findings should be interpreted in light of the five limitations below:

Geographic scope	The evidence base is strongest in East Africa, particularly Kenya, Uganda, Tanzania, and Rwanda, where clean cooking enterprises and investors are more concentrated. West Africa was examined through secondary research and selected interviews, but evidence on the enterprise pipeline and investors is more limited.
Investor sample	The investor interviews and workshop were weighted toward development finance institutions, impact investors, commercial banks, and sector-engaged financiers. Commercial investors with no prior exposure to clean cooking are underrepresented. Their perspectives were inferred through secondary sources and through the barriers reported by active investors.
End-user perspectives	This research phase did not include direct consultation with household end-users. Demand dynamics, affordability thresholds, and adoption behaviors are addressed through secondary research, the GI-ROI methodology,[54] and enterprise-reported data.
Financial data	Unit economics, revenue data, and return figures were obtained from published enterprise disclosures and management accounts, landscape study interviews, and workshop testimony. Some of these figures are indicative, not audited, and should be treated as directional benchmarks.
Temporal context	The research was conducted between 2024 and 2026. Carbon market rules, Article 6 implementation, regulatory frameworks, financing conditions, and enterprise-level data are changing rapidly. Benchmark values in the toolkit should therefore be reviewed regularly and updated after major market or policy developments.

Figure 7: Limitations of the research

3.

Findings I: Why Capital is not Flowing to the Clean Cooking Sector

Findings I: Why Capital is not Flowing to the Clean Cooking Sector

Four barriers emerged from the investor interviews and were validated at the co-creation workshop. They are not independent, as each amplifies the others. This section presents them in the investors' own analytical terms, with supporting evidence.

The four barriers to capital flow

01

Household affordability limits the ability to mobilize end-user capital

Enterprises cannot bridge the gap

02

Risk is not absent; it is mispriced

Investors price perception, not performance

03

The investment evaluation lens for clean cooking remains underdeveloped

04

Weak market infrastructure limits capital mobilization

Figure 8: The four barriers, as reported by investors and validated at the workshop.

3.1 Barrier 1: Affordability constrains the household market, and enterprises cannot bridge the gap unaided

Clean cooking is often described as a demand-constrained sector because low-income households are assumed to be unable or unwilling to pay for modern cooking solutions. The evidence suggests a more nuanced picture. Ability to pay, willingness to pay, and payment structure are distinct constraints. Based on the IEA affordability threshold, approximately 84 million Sub-Saharan African households, or 42 percent of the regional total, are within commercial reach. This includes 20 percent of households for which clean cooking would cost less than 5 percent of household income and a further 22 percent for which it would cost between 5 and 10 percent. Yet only 5–10 million households have been reached at scale.[8]

Existing household expenditure suggests that ability and willingness to pay cannot be assessed solely from clean cooking uptake. Urban households in Uganda that rely on charcoal already spend approximately 6–17 percent of monthly consumption expenditure on cooking fuel, including among lower-income households.[17] The constraint is therefore not simply whether households can or will pay, but whether clean cooking offers sufficient value and whether its costs are structured in a way that matches household cash flows and existing purchasing behavior.

Affordability depends on three factors: the upfront device cost, recurring fuel cost and payment structure. These can be adjusted to better match household cash flows. For example, metered LPG allows customers to purchase fuel in increments as low as KES 50 (US$0.4), while smaller cylinders reduce the initial cost of access. Together, these approaches bring clean cooking expenditure closer to the purchasing patterns households already use for charcoal.[2]

Roughly 42 percent of the market sits within commercial reach today

Figure 9: The commercially reachable market under IEA affordability thresholds (IEA, 2025; Intellecap derivation).

The challenge is that enterprises require capital to make these payment structures commercially viable at scale. Carbon-supported models must finance MRV, registration, and verification for 6–18 months before the first credits are issued. Pay-as-you-go models require working capital to finance customer receivables, while household distribution requires significant expenditure to acquire and serve dispersed customers. Enterprises therefore absorb part of the timing mismatch between what households can pay and when they can pay, as well as the upfront costs required to deliver the solution. Without sufficient capital, enterprises struggle to offer flexible payment structures at scale, build repayment histories, and invest in the systems and distribution networks needed to lower costs.

Institutional demand can help break this cycle. Large, creditworthy buyers provide predictable volumes and reduce the cost of acquiring households individually. Contracted demand can therefore make investment in metering, MRV, and distribution more financeable, while creating volumes and infrastructure that can subsequently support expansion into a household market where ability to pay, willingness to pay, and payment structures vary considerably.

This approach is already emerging in the region. Tanzania requires institutions serving more than 100 people to transition to clean cooking, helping stimulate private investment,[18] and more than 1,400 public **institutions** have adopted clean cooking solutions.[19] Kenya has similarly introduced a Ministry of Education directive, alongside financing of up to 100 percent of project costs at 9.75 percent per annum over five years.[20] The first creates demand through policy; the second helps make that demand financeable. Section 6.4 examines the role of institutional demand in greater detail.

3.2 Barrier 2: Risk is mispriced, not absent

Clean cooking is perceived as a high-risk sector, yet the price of capital does not always correspond with observed risk. This reflects a broader challenge across emerging markets. Between 1994 and 2023, the Global Emerging Markets (GEMs) database recorded an average default rate of 3.6 percent across emerging market portfolios, broadly comparable to that of non-investment-grade B-rated corporates in developed markets.[21] Similarly, emerging market loan defaults exceed those in developed markets by 219 basis points, while the average interest-rate premium charged is substantially higher, at 889 basis points.[4] The same disparity is also evident in Africa's power sector, where the continent-weighted average cost of capital is approximately 15.6 percent, with investor perceptions of risk contributing significantly to the premium.[22]

The issue is not that risk is absent, but that investors may perceive it to be higher than the evidence suggests. For clean cooking, this matters particularly for the components of the required return that are influenced by how investors assess the **sector- and business-specific risk premiums.** The IEA estimates that project- and sector-specific premiums account for approximately **20–30 percent of the overall cost of capital for energy-access projects.** Unlike the risk-free rate or country risk premium, these components can be improved through better information and more precise risk assessment.[4] Three recurring pricing errors are particularly important:

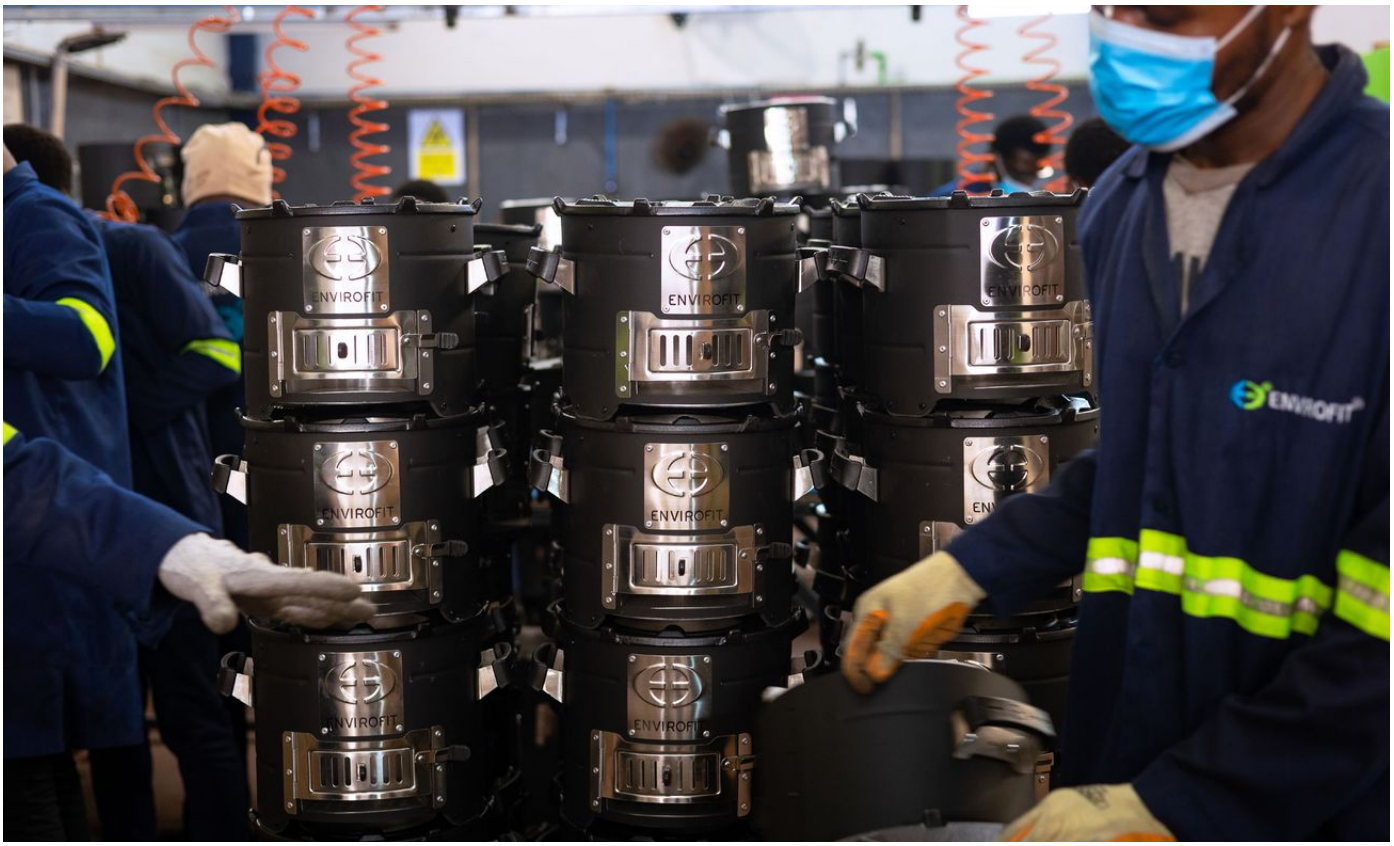

Image Courtesy : www.envirofit.org

Image Courtesy : africabioenergyprograms.org

> **The issue is not that risk is absent, but that investors may perceive it to be higher than the evidence suggests.**

Pricing error	What goes wrong	The correction
Error 1 The sector risk is assessed too broadly	Clean cooking is treated as a single risk category despite significant differences between business model archetypes. For example, a metered LPG provider with verified customer usage and repayment data has a different risk profile from an early-stage biomass stove distributor with no recurring revenue.[23]	Assess the sector risk at the **archetype level**, reflecting differences in revenue models, cash flows and financing needs.
Error 2 The business-specific risk premium is inflated by an information gap	In mature sectors, business-specific premiums are moderated by observable benchmarks such as repayment rates, verified unit economics and exit multiples. Clean cooking lacks established benchmarks for repayment, unit economics and business performance. Investors therefore price uncertainty into their required returns, sometimes relying on inappropriate comparators such as PayGo solar.[2]	Anchor **business-specific risk to archetype-level benchmarks**, supported by the benchmark library in the Clean Cooking Investor Toolkit.[6]
Error 3 The country risk premium does not differentiate carbon market regulatory maturity	Carbon-integrated businesses face materially different regulatory and revenue conditions across countries. Voluntary carbon prices averaged around US$6/tCO2e in 2024, while analysis of high-quality cookstove credits indicates floor prices of approximately US$15/tCO2e, rising to US$38/tCO2e for higher-integrity solutions.[24] Applying a uniform country risk premium overcharges enterprises in countries with functioning Article 6 mechanisms while underpricing regulatory risk where carbon market mechanisms are underdeveloped.[25]	**Apply a country carbon-governance score**. Use higher-integrity or compliance-market carbon prices only where the required regulations and government authorization, including a Letter of Authorization (LoA), are in place.

These errors reinforce one another. Broad sector-level assumptions can exclude viable enterprises before their individual performance is properly assessed, while limited comparable data can further increase the return investors require. The result is a higher cost of capital that can prevent otherwise viable enterprises from building the track record needed to attract future investment. The solution is not to assume that clean cooking is low risk, but to measure and price its risks more precisely.

3.3 Barrier 3: The analytical framework for assessing clean cooking enterprises remains undeveloped

The financing gap in clean cooking is often attributed to a shortage of investable enterprises. Financiers consulted for this study identified a different problem: viable enterprises exist, but investors lack a common framework for assessing and comparing them. This distinction matters. A weak pipeline requires more enterprise development; an assessment gap requires better investor tools.

Off-grid solar provides a useful precedent. As investment in the sector grew, investors developed common metrics for assessing enterprise performance, including repayment rates, portfolio quality, customer ownership, expected credit losses, and peer benchmarks. These metrics made it easier to compare different business models and allowed investors to assess enterprises on their individual performance rather than treating the sector as uniformly risky. This directly addresses Error 1 in Barrier 2: applying the sector risk premium at too broad a level rather than differentiating risk by business model. The lesson for clean cooking is not to adopt solar benchmarks directly, but to develop an equivalent set of archetype-specific metrics that reflect the distinct performance and risk characteristics of clean cooking business models.

The effect of the current gap is visible in how capital is allocated. Business models that resemble familiar investment categories, such as product sales and utility-style models, are easier for investors to assess. Less conventional models, including agent-led distribution, community-based networks and carbon-integrated businesses, can be harder to evaluate because their key performance drivers are not adequately captured by standard investment tools. Women-led distribution networks, for example, often generate advantages through trust-based community relationships and strong last-mile reach, yet these strengths are rarely reflected in conventional appraisal frameworks. Capital can therefore favor business models that are easier to assess rather than necessarily those that perform better.

Past sector performance reinforces this challenge. Investors who have experienced or observed losses reasonably require evidence that newer business models differ from those that previously underperformed. Comparisons with adjacent sectors, such as PayGo solar, are insufficient because the underlying economics, customer behavior, and risks differ. Clean cooking therefore needs archetype-specific benchmarks that allow enterprises to demonstrate performance and investors to assess it consistently. (See Section 5.4 on the evidence base behind the toolkit's benchmarks.)

Image Courtesy : www.upenergygroup.com

3.4 Barrier 4: Market infrastructure limits the flow of capital

Capital tends to flow where the returns are attractive. In practice, however, capital also needs effective channels through which it can be deployed. In the clean cooking sector, these channels remain underdeveloped. As a result, funding in the sector has flowed to enterprises that fit the existing financing structures rather than to all enterprises with strong potential. This challenge is different from the risk-pricing problem discussed in Barrier 2. Barrier 2 reveals how capital is priced, while Barrier 4 reveals how capital reaches the businesses once investors decide to invest in the sector.

Sector financing reached US$218 million in 2023.[26] However, most of this growth came from debt financing, while equity investment fell to a five-year low. Carbon revenues also became concentrated among a small number of large enterprises. Debt and carbon finance generally favor firms that already have scale, established MRV infrastructure, and proven cash flows. By contrast, equity and grant capital, which early-stage enterprises require, constitutes the component that has contracted. The distribution of capital is accordingly determined by the instruments available rather than by the relative merits of the enterprises seeking finance.

Three infrastructure deficiencies account for this pattern.

- **Aggregation.** The majority of clean cooking enterprises require investment below institutional minimum ticket sizes, and few vehicles exist to pool them into portfolios of investable scale. The Spark+ Africa Fund is an exception, being the first impact fund dedicated to clean cooking value chains and anchored by a first-loss tranche from the African Development Bank's Sustainable Energy Fund for Africa. The Clean Cooking Alliance is separately developing aggregation platforms intended to bring smaller enterprises into carbon markets and reduce associated transaction costs.[26]
- **Risk-sharing.** Local currency facilities, first-loss guarantees, and blended structures remain limited in availability. Their function is to enable commercial capital to participate at acceptable risk-adjusted returns rather than to be displaced by concessional providers. In their absence, commercial investors either decline participation or price currency and credit exposure at levels the sector cannot sustain.
- **Regulatory and procurement infrastructure.** Carbon aggregation platforms, standardized offtake agreements, Article 6 implementation processes, and collective procurement mechanisms remain fragmented across African countries. Fragmentation leads to high transaction costs, disproportionately affecting smaller enterprises, for which fixed compliance costs represent a greater proportion of total transaction value.

Overall, these gaps have been reinforced in some cases by concessional capital that was not structured to crowd in private investment, unintentionally signaling that the sector cannot support commercial returns. As Barrier 2 shows, the evidence does not necessarily support this perception. The solution is therefore not simply more capital, but better financing infrastructure: **aggregation vehicles that achieve institutional scale, guarantees and blended structures that share risk, and standardized carbon and procurement processes that reduce transaction costs.** Together, these mechanisms can mobilize private capital while reducing long-term dependence on concessional funding. (See Section 6.2 on aggregation and Section 6.3 on blended finance and risk-sharing instruments.)

4.

Findings II: The Five-Archetype Investment Framework

Findings II: The Five-Archetype Investment Framework

4.1 The framework

The framework is built around one practical investment question: how does the enterprise primarily capture value, and from whom? This identifies five clean cooking enterprise archetypes, each with a distinct revenue model, customer relationship, asset base, capital need and risk profile. The archetypes are defined by how the enterprise generates revenue, rather than by technology. The same technology may therefore appear across several archetypes, but its business model determines the appropriate diligence questions, benchmarks, financing instruments and return expectations.

For hybrid enterprises,[27] **classification follows the primary value-capture mechanism**, identified through a simple commercial viability test: which revenue stream, if removed, would make the business commercially unviable?

Five clean cooking business model archetypes

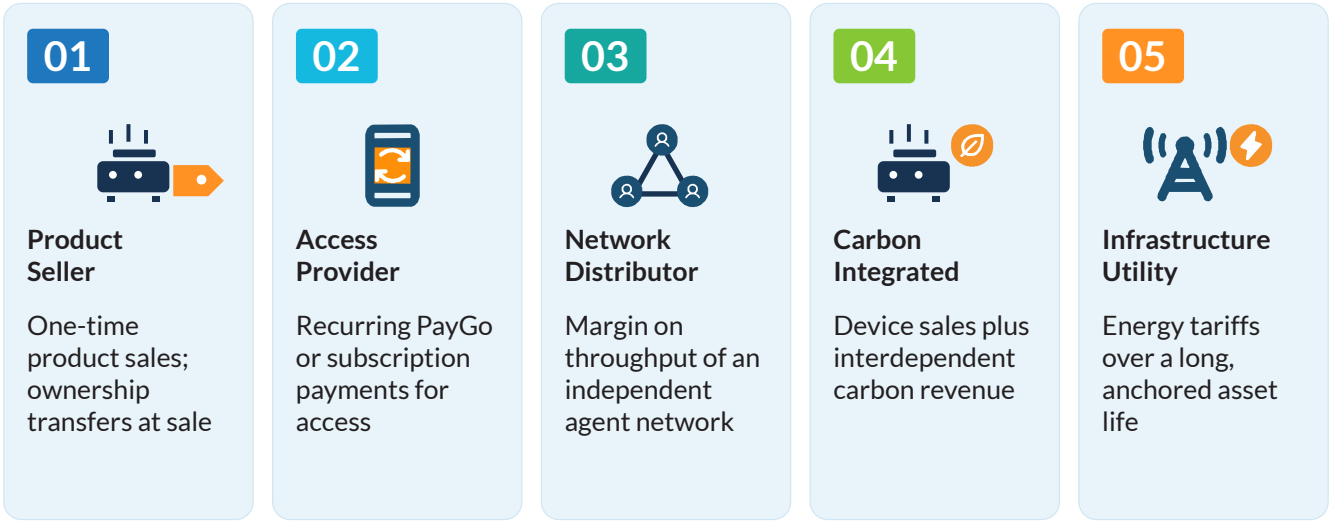

Figure 10: The five archetypes and their primary value-capture mechanisms.

Dimension	01 Product Seller	02 Access Provider	03 Network Distributor	04 Carbon Integrated	05 Infrastructure Utility
Definition	Manufactures or assembles devices and earns revenue at the point of sale. Ownership transfers to the buyer.	Retains ownership of the device or control of fuel supply and charges households on a recurring basis through PayGo or subscription models.	Uses an asset-light model to reach last-mile customers through independent agents and earns a margin on network throughput.	Combines device sales and carbon revenues in a structurally interdependent model, where carbon subsidizes the device price and is commercially essential.	Owns and operates shared community energy infrastructure and sells energy through tariffs over a 15 to 20-year asset life.
Revenue model	One-time product sales through retail, carbon-subsidized, or donor-subsidized channels.	Recurring payments through PayGo receivables, which carry default risk, or subscriptions, which carry churn risk. These should be underwritten separately.	Margin on agent network throughput, with possible secondary income from agent services.	Two revenue streams that must be modeled separately: subsidized device sales and carbon credit sales.	Energy tariffs from institutional anchor tenants, which provide the bankable base, and households, which provide upside.
Capital intensity	Medium: Driven by manufacturing capacity, working-capital cycles, and foreign exchange exposure on imported inputs.	High: Due to front-loaded customer acquisition costs and cohort breakeven periods typically ranging from twelve to thirty-six months.	Low at the enterprise level, although working capital sits with agents. Agent stock finance is usually the binding constraint.	High: Due to a six to eighteen-month verification lag before first carbon credit revenue.	Very high: With fifteen- to twenty-year assets, seven- to fifteen-year paybacks, and a requirement for long-tenor debt.

Dimension	01 Product Seller	02 Access Provider	03 Network Distributor	04 Carbon Integrated	05 Infrastructure Utility
Key investor risks	Subsidy dependence, low lifetime value, warranty exposure, foreign exchange risk, and supply-chain risk.	Churn and repayment risk, which must be assessed at the cohort level rather than in aggregate, together with consumer-finance regulation and weak customer lock-in.	Agent attrition, quality control across independent contractors, and stock-financing gaps at the agent level.	Carbon price volatility, methodology and integrity revisions, Letter of Authorization risk, and the complexity of managing two linked business models.	Overoptimistic eCooking adoption forecasts, under-modeled operations and maintenance costs, and currency mismatch on debt.
Best-suited capital	Growth equity, revolving working-capital debt, trade finance, and revenue-based finance linked to verified unit sales.	Blended equity and patient debt, revenue-based finance linked to verified active users, concessional first-loss capital, and MFI partnerships	Concessional or patient debt, revenue-based finance linked to verified activations, first-loss guarantees for agent stock, and technical assistance grants.	Carbon forward purchases or pre-payments, catalytic equity, MRV grants, and working-capital debt only after first verified issuance.	Long-tenor DFI-led infrastructure debt, concessional first-loss capital, DFI co-investment, and feasibility grants.
Illustrative enterprises	BURN Manufacturing; African Clean Energy; Ecosafi.	Circle Gas; Bboxx; PayGo Energy (acquired by Sun King).	Bidhaa Sasa; Solar Sister.	UpEnergy Group; Envirofit (Ghana); BioLite.	PowerGen + eCook; mini-grid operators integrating cooking load.

Table 3: The five archetypes at a glance, condensed.

The full comparison across fifteen dimensions, including gender lens, geographic nuance, critical enablers, return profiles, and deal precedents, is maintained in the Investor Toolkit, worksheet 2, Archetypes at a glance.

The five archetypes ranked by capital intensity

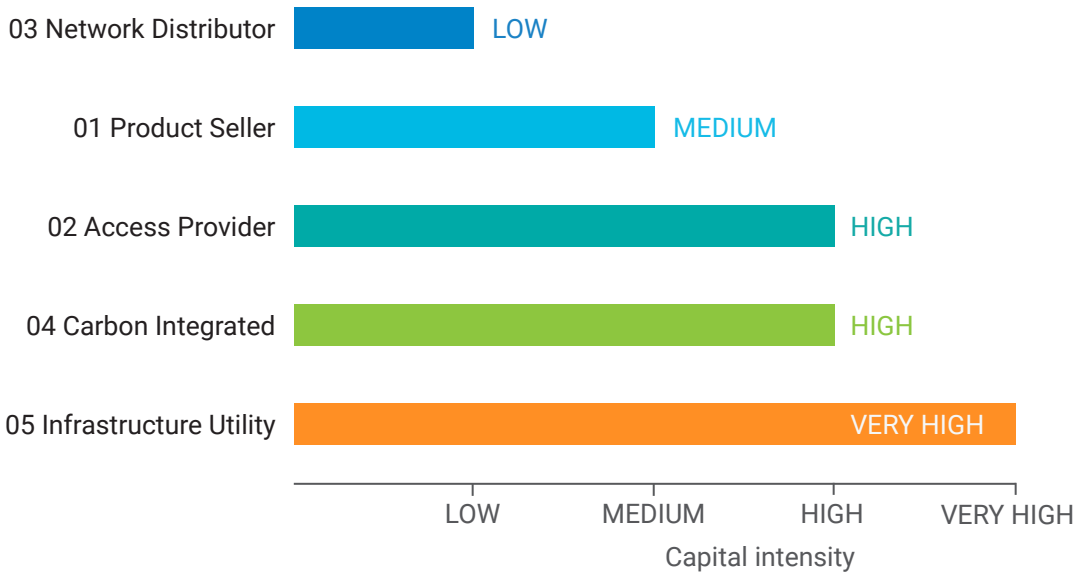

Figure 11: The five archetypes ranked by capital intensity (Intellecap, 2026).

4.2 Archetype profiles: the investment logic of each model

This section summarizes the investment logic of each archetype, based on the research. Full investment profiles, including underwriting metrics, benchmark ranges, and archetype-specific diligence questions, are operationalized in the Investor Toolkit. They are summarized here to explain how each model creates value, what risks investors should underwrite, and which forms of capital are most appropriate.[6]

4.2.1 The product seller

The product seller is the most commercially mature archetype in the clean cooking sector. It operates as a consumer durables manufacturing model, where margins depend on manufacturing efficiency, procurement scale, and distribution reach. Its customers include price-sensitive households and creditworthy institutional buyers, such as ministries, UN agencies, schools, and hospitals. The main investment risks are subsidy dependence, one-time-sale customer economics, warranty exposure, and foreign exchange risk on imported inputs. This archetype has generated some of the sector's strongest precedents in institutional financing. BURN Manufacturing, for example, launched Sub-Saharan Africa's first green bond designated for clean cooking. The bond was launched at US$5 million in 2023 and doubled to US$10 million after oversubscription.[28] Where a carbon program is layered onto a Product Seller model, investors should test whether the device business is profitable without carbon revenue. Carbon should improve affordability and expand reach. It should not be the mechanism that holds the core business model together.

4.2.2 The access provider

The access provider retains ownership of the device or control of the fuel supply and charges households on a recurring basis. It is the clean cooking equivalent of PayGo solar, prepaid telecom, or consumer asset finance. A key diligence distinction is between PayGo and subscription models. PayGo creates a receivables book and carries default risk. Subscription or energy-as-a-service models do not transfer ownership, so churn and average revenue per user are the critical indicators. These models should not be underwritten as if they carry the same risks. The most relevant performance reference is GOGLA's PAYGo PERFORM standard. Its 2026 revision focuses on two indicators which are repayment rate and customer ownership rate.[29] These are off-grid solar indicators and should therefore be used for clean cooking only as calibrated proxies, supported by market-specific evidence.[2] This archetype has produced some of the sector's clearest exit precedents. Circle Gas acquired KopaGas's PayGo LPG technology in January 2020 for US$25 million, then the largest pure private-equity transaction in clean cooking.[30] In 2023, Sun King acquired PayGo Energy and absorbed its Nairobi team as a dedicated clean cooking unit.[31]

4.2.3 The network distributor

The network distributor earns revenue by moving products through a network of independent community agents. It is an FMCG-style micro-distribution model in which network health is the core asset. Revenue depends on the number of active agents and the sales generated by each agent. The model is capital-light at enterprise level, but the working-capital burden often sits with the agents. As a result, agent stock finance and access to productive assets are usually the main constraints to growth. This archetype has the sector's strongest documented gender-related commercial advantage. Female sales representatives are rated more highly by distributors, at 8.5 out of 10 compared with 7.5 for male peers, and female staff remain with the company 19 percent longer on average.[32] Two operating conditions are particularly important for investors. First, agent retention depends on how agents are engaged and is weakest under commission-only structures.[32] Second, mobility is a strong driver of sales, with motorbike access associated with 60 percent higher average sales.[33] These indicators, together with throughput concentration and stock-credit default, tend to deteriorate before revenue declines. They should therefore be treated as early-warning metrics in diligence and portfolio monitoring.

4.2.4 The carbon integrated model

In the carbon integrated model, device sales and carbon revenues are directly linked. In some documented programs, carbon revenue can subsidize the device price by up to 80 percent, while verified use of the device generates carbon credits. Investors should therefore assess the model as **two linked businesses: the underlying device or consumer business and the carbon project development business**. Each revenue stream should be modeled separately, with clear assumptions on timing, carbon prices, verification, and regulatory risk.

Carbon integrity has become increasingly important to the economics of this model. Research across five cookstove methodologies found an average over-crediting of approximately 9.2 times, compared with approximately 1.5 times for the metered methodology.[34] In March 2025, the ICVCM approved three cookstove methodologies for its Core Carbon Principles (CCP) label, subject to stricter requirements, including an fNRB below 0.5 using the MoFuSS model, compared with a market average of approximately 0.86.[35,36] These changes strengthen the case for measured usage and higher-integrity methodologies, which can improve both credit credibility and market access.

9.2×	1.5×	<0.5
average over-crediting across methodologies	over-crediting under the metered methodology	modeled fNRB required for the CCP label (from ~0.86)

Figure 12: Carbon integrity metrics (Gill-Wiehl, Kammen & Haya, 2024; ICVCM, 2025).

Carbon revenue can strengthen a viable business model, but should not compensate for weak business fundamentals. For strong enterprises, it can reduce consumer prices, support expansion and improve returns. Higher-integrity credits can also command materially higher prices. Clean cooking accounts for 40 of the 43 projects eligible for CORSIA Phase I, with eligible credits trading above US$14/tCO2e in 2026, compared with a broader clean cooking average of approximately US$6/tCO2e.[37] Separate modeling estimates that high-quality cookstove projects require approximately US$15.30–38.90/tCO2e to achieve bankability, depending on technology, methodology and monitoring requirements.[25]

However, carbon revenue also introduces regulatory risk that investors must assess separately. Access to higher-value compliance markets may depend on host-country authorization. KOKO Networks illustrates the significance of this risk: despite mobilizing more than US$300 million and securing a US$179.6 million MIGA political risk guarantee covering its Article 6 obligations, the company ceased operations in Kenya on 31 January 2026 and entered administration after the government declined the Letter of Authorization required for its compliance-market model.[38] Carbon can therefore improve enterprise economics significantly, but its value depends on credit integrity, price, verification and regulatory certainty.

Image Courtesy : www.upenergygroup.com

The widening quality spread in cookstove carbon

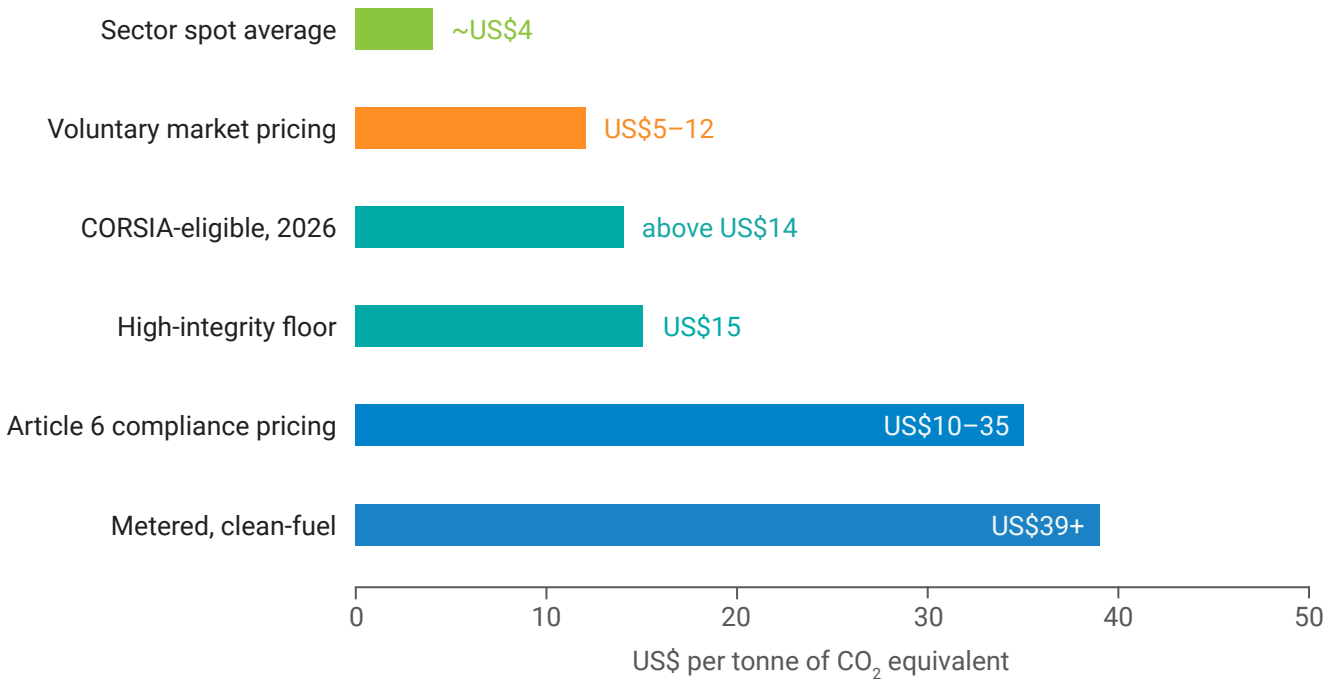

Figure 13: Cookstove carbon price reference points (MSCI Carbon Markets, 2026; Abatable, 2025).

4.2.5 The infrastructure utility

The infrastructure utility owns and operates shared energy infrastructure, such as mini-grids, solar hubs, and multi-service energy centers, with clean cooking provided as one of several energy services. Investors should assess this archetype using an infrastructure project-finance approach, focusing on whether contracted or predictable anchor revenues can support debt service over the asset's life. Due diligence should also assess the adequacy of operations and maintenance reserves and, where debt is denominated in foreign currency, whether local-currency revenues can absorb exchange-rate movements.

Mini-grid benchmarks illustrate both improving economics and the remaining cost challenge. Capital expenditure in Sub-Saharan Africa has declined by approximately 20 percent since 2020, from US$8,500 per kWp to a four-year average (2021–2024) of US$6,824 per kWp.[40] Over the same 2021–2024 period, the global average stood at approximately US$3,000 per kWp,[39] meaning African mini-grid CAPEX remains more than twice the global average. Mini-grids are also increasing in scale: the share of AMDA members' projects serving more than 500 residential connections rose from 8 percent in 2022 to 30 percent in 2024.[40] This trajectory reflects a sector moving from pilot-scale deployment toward a more established commercial asset class.

For clean cooking, however, integration with mini-grids remains proven primarily through pilots rather than across large commercial portfolios. The key investment risk is therefore demand utilization: infrastructure may be built on the assumption that households will adopt and use eCooking at levels that do not materialize. Investors should consequently test adoption, utilization, and anchor-demand assumptions carefully before financing additional capacity.

4.3 Cross-cutting findings

Three findings apply across all five archetypes as highlighted below:

- **Carbon is an upside mechanism, not the foundation of the business case.** Investors should assess whether the enterprise remains commercially viable without carbon revenue. Carbon can improve affordability, expand reach, and strengthen returns, but dependence on it creates exposure to price volatility, methodology changes, verification delays, and regulatory decisions.
- **Gender integration is commercial strategy, not a compliance exercise.** Women strongly influence clean cooking adoption and use, even when household purchasing decisions are made elsewhere. Treating the household as a single economic unit can therefore misrepresent willingness to pay, payment behavior and adoption. The advantages of female agent networks and payment structures aligned with women's access to mobile money should be incorporated into demand assessment and underwriting.[2]
- **Geography affects pipeline depth and risk, but not the investment framework.** East Africa has a deeper pipeline, greater regulatory maturity, and more comparable transactions, although competition can be higher. West and Central Africa offer less-developed but potentially less-contested opportunities for investors with strong origination capacity. Carbon-market readiness adds another layer of differentiation, with markets such as **Ghana**[42] **and Rwanda**[43] more advanced in implementing Article 6.

Carbon is an upside mechanism, not the foundation of the business case.

IDRC · CRDI
Canada

intellecap

5.

From Research to Practice: The Clean Cooking Investor Toolkit

From Research to Practice: The Clean Cooking Investor Toolkit

This section introduces the **Clean Cooking Investor Toolkit**, which translates the research findings into practical tools for investor decision-making. It explains why the toolkit was developed, the principles guiding its design, its key components, and how it should be applied across the investment lifecycle. The toolkit is provided as an interactive **Microsoft Excel workbook** accompanying this playbook.[6]

5.1 Why the toolkit was created

The barriers identified in Section 3 have a clear implication: risk mispricing (Barrier 2) and the absence of a common investor assessment framework (Barrier 3) are partly tooling problems. Investors engaged through this research indicated that clean cooking lacks the common investment data, terminology, benchmarks and assessment frameworks needed to evaluate opportunities consistently.[15]

As a result, clean cooking models are often assessed as a homogeneous group, despite having distinct revenue structures, risks and capital needs. Carbon revenue can also be either heavily discounted or accepted without sufficient assessment of methodology, verification, timing, pricing and regulatory risk. At the same time, sector progress, including scaled enterprises, bond issuances and the growth of carbon revenues, has not yet translated into widely used benchmarks and comparables for underwriting.[1]

The toolkit converts the research into a practical investment process. Investors consulted during its development asked for tools that could be applied to live transactions: a rapid way to classify an enterprise, archetype-specific due diligence questions and thresholds, and guidance on appropriate financing instruments by archetype and maturity stage.[2] The playbook therefore provides the **evidence and analytical framework**, while the toolkit provides the **decision logic and practical tools**. As an interactive workbook, it can also be updated as sector benchmarks and market evidence evolve.

5.2 Design principles

The toolkit is guided by **five principles**, each responding to a key finding from the research.

- **Archetype-specific assessment.** Every screen, checklist, benchmark, and financing recommendation is tailored to the relevant archetype. This operationalizes the correction to Pricing Errors 1 and 2 described in Section 3.2 by ensuring that clean cooking enterprises are not assessed as a single, homogeneous category.
- **A clear assessment sequence.** The tools follow a defined order: **Classify the enterprise, conduct due diligence, then structure the capital.** Each step informs the next. This prevents financing decisions from being made before the enterprise's business model, maturity, and underlying risks are properly understood.
- **Decision-oriented outputs.** The due diligence checklist produces one of three clear outcomes: **GO, HOLD AND STRUCTURE, or NO-GO PENDING RESOLUTION**. Gating questions identify material risks that cannot simply be offset by strengths elsewhere in the business, allowing investors to identify potential deal-breakers early.
- **Transparent evidence.** Quantitative thresholds are identified as either **sourced or indicative**. Sourced thresholds are based on published sector evidence, while indicative thresholds draw on investor interviews where robust published benchmarks are unavailable. This allows investors to understand the strength of evidence behind each benchmark and update thresholds as better data becomes available.
- **Carbon and gender are assessed as part of the commercial case. Carbon** is treated as a distinct revenue stream with methodology, verification, pricing, timing and regulatory risks. Carbon Integrated models therefore undergo deeper carbon-specific diligence, including MRV, methodology and CCP status, fNRB, verification history, offtake, buyer creditworthiness, pricing and Article 6 authorization. For other archetypes, the key test is whether the business remains commercially viable without carbon revenue. **Gender** is assessed where it affects commercial performance, including demand, payment behavior, customer retention and agent productivity. The toolkit examines whether enterprises account for women as primary users and decision-influencers, design payment mechanisms around customer behavior, and track the performance of female agents. These factors contribute to the overall assessment and may support eligibility for 2X or co-benefit-linked capital, but do not independently determine the investment decision.

Image Courtesy : www.burnstoves.com

Classify the enterprise, conduct due diligence, then structure the capital.

5.3 What the toolkit contains

The toolkit comprises eight linked components. Four are interactive instruments while the other four are orientation and reference layers.

Component	What it does	Research basis
1. How to Use *Orientation and reference layer*	Provides orientation on the toolkit's purpose, five-step sequence, supporting automation layer, and mapping to the investment lifecycle: ***pre-investment, investment and structuring, active ownership, and exit***. It also sets out three pipeline-building disciplines to apply before diligence begins. The sheet closes with a caution that using the instrument matrix before applying the archetype and maturity-stage screen risks selecting capital based on sector-level perception rather than business-model evidence.	Validation workshop co-creation session; investor interview finding that tools are less effective when the sequence is left entirely to the user.
2. Archetypes at a Glance *Orientation and reference layer*	Provides a fifteen-dimension comparison of the five archetypes: ***Product Seller, Access Provider, Network Distributor, Carbon Integrated, and Infrastructure Utility***. The comparison covers definition, closest underwriting analog, revenue model, customer segments, capital intensity and timing, carbon role, key investor risks, metrics to underwrite, gender lens, geographic nuance, critical enablers, best-suited capital, return profile and holding period, illustrative companies, and sector maturity and deal precedents.	Four-stage framework derivation in Section 2.5; enterprise validation through deep-dive expert interviews and the Carbon TA Program.
3. Tool 01A: Archetype and Maturity-stage Quick-Screen *Interactive instrument*	Provides two screens, one output, and the only sheet requiring user input. **Part A** routes the enterprise to its primary archetype through five diagnostic questions answered in sequence, with hybrid models resolved through the commercial viability test. Part B places the enterprise at one of three maturity stages using five questions about revenue, commercial operations, available evidence, capital raised, and management depth. The maturity stage is scored through a weighted index that double-weights revenue. Part B can be completed by the investor or used by the enterprise as a self-assessment. The combined result is then published automatically to the three tools that follow.	Correction to pricing Error 1: classify before pricing. The question set was validated during the workshop business-model deep dive.

Component	What it does	Research basis
4. Tool 01B: Archetype-Specific DD Checklist *Interactive instrument*	Loads the screened archetype's critical diligence questions at the screened maturity stage's thresholds, without requiring re-selection. Each question includes Strong (Green), Adequate (Amber), and Concern (Red) criteria calibrated to that stage. Users rate each question through a dropdown and record the supporting evidence. Gating questions are flagged. A running tally drives an automatic rules-based decision: **GO, HOLD AND STRUCTURE, or NO-GO PENDING RESOLUTION.** The decision remains interim until every applicable question is scored. Each archetype section closes with its characteristic red flag and the evidence to request from management. An override mode allows the archetype or stage to be adjusted manually when the screen result is contested.	Correction to pricing Error 2: anchor the business-specific premium to archetype benchmarks rather than to a sector-wide rate. Criteria were verified against published methodology, integrity and performance benchmarks, and carbon price data.
5. Tool 02: Capital Instrument Selection Matrix *Interactive instrument*	Provides a fully automated recommendation, with no additional user selection required. It displays the recommended instruments, typical ticket size, structural rationale, and key de-risking requirements for the screened archetype and maturity stage. These recommendations are drawn from a fifteen-row map covering five archetypes across three stages, together with the revenue band defining each stage. Cross-cutting structuring considerations apply to every deal: currency risk, the mezzanine gap, ticket-size mismatch and aggregation, carbon as collateral, and gender-lens qualification under the 2X Challenge criteria.	Instrument mapping derived from observed transactions and the workshop financial-innovation strategies.
6. Tool 03: Enterprise Feedback *Interactive instrument*	Converts the diligence conclusion into structured feedback for the enterprise. i. The first layer generates an overall message from the archetype, maturity stage, and decision, including the headline message, what the rating reflects at that stage, priority actions, capital-pathway implications, and trigger for re-engagement. ii. The second layer reads each Tool 01B rating question by question and translates it into a diagnosis of what the rating indicates, and the benchmark required for a Green rating at that stage. Forty-five feedback profiles cover every combination of archetype, stage, and decision.	Enterprises cannot close gaps they cannot see. Workshop consensus that well-documented failure cases build investor confidence.

Component	What it does	Research basis
7. Returns, Exits & Failure Modes *Orientation and reference layer*	Provides three panels: i. How returns are generated and exited for each archetype; ii. Realistic return expectations across five capital layers, noting that no audited sector-wide IRR benchmark yet exists, and; iii. Each archetype's characteristic failure mode with its earliest diligence signal, anchored by the KOKO Networks case study.	Financiers' consensus is that failure cases build investor confidence and that investment horizons must match the archetype cash-flow structure. Return evidence from published benchmarks, transaction disclosures, and carbon price data.
8. Benchmarks (reference) *Orientation and reference layer*	Provides the **Green, Amber and Red thresholds** used in Tool 01B and the Archetypes sheet, organised by archetype and metric. Each threshold is labelled **Sourced or Indicative,** with its supporting evidence identified. **Note:** Where published benchmarks are unavailable, thresholds are informed by key informant interviews and marked Indicative.[15] These are intended as reference points for investment decisions, not sector standards, and should be adjusted to the enterprise and market context. (See Annex B)	Benchmark verification protocol in Section 2.6; key informant interviews for indicative bands.

Table 4: Components of the Clean Cooking Investor Toolkit and their research basis.

5.4 How the toolkit should be used

The toolkit follows a **five-step sequence aligned with the investment lifecycle**, with each step informing the next.

1. **Pre-investment: orient and classify.** Investors should first review the *How to Use* and *Archetypes at a Glance* sheets, then organise pipeline development by target archetype and geography. Each opportunity should be screened through *Tool 01A* to determine its archetype and maturity stage before significant diligence resources are committed.
2. **Diligence: assess the enterprise.** *Tool 01B* applies the relevant archetype-specific questions and maturity-stage thresholds. Investors rate each question, record supporting evidence and review the required evidence pack. The tool then generates an interim decision to proceed, restructure or stop, which is finalised once all applicable questions have been assessed. Where necessary, investors can override the initial classification and rerun the assessment.
3. **Structuring: match capital to the model.** *Tool 02* recommends financing instruments, indicative ticket sizes, structural rationale and key de-risking requirements based on the enterprise's archetype and maturity stage. Investors should then consider cross-cutting issues, including currency risk, the mezzanine gap, ticket-size mismatch and aggregation, carbon collateral discipline, and 2X qualification.
4. **Enterprise feedback: close the loop.** *Tool 03* translates the diligence outcome into practical feedback, whether or not the investment proceeds. It identifies priority actions, explains implications for the enterprise's capital pathway, sets conditions for re-engagement, and provides guidance on what would be required to strengthen individual ratings.
5. **Ownership and exit: monitor against the archetype.** During ownership, investors should monitor the performance indicators and value-creation levers relevant to the archetype and align exit expectations with its cash-flow and return profile. Investment horizons should reflect the economics of the business model rather than assumptions imported from other asset classes.

Image Courtesy : www.burnstoves.com

Clean cooking investment toolkit

How it works

Six steps, from first look to exit. Each step feeds the next, so the enterprise is classified once and every later tool uses that result.

Illustrative enterprise

A cookstove company whose carbon revenue subsidises the device price. Revenue US$500,000 to 1 million, selling in two markets, seeking US$3 million.

Step and tool	What the investor/applicant does	What the toolkit returns	What happens in the example
1 **Orient yourself** Archetypes at a Glance	Reviews the five archetypes: how each earns revenue, its main risks and the capital that suits it.	A simple comparison of the five business models, to see which one fits.	**Carbon Integrated looks closest** Carbon revenue subsidises the device price.
2 **Classify** Tool 01A Quick-Screen	Answers five archetype questions and five maturity questions.	The primary archetype and maturity stage of the enterprise, passed automatically to every later tool.	**Carbon Integrated, Growth Stage** Carbon revenue is the commercial viability test.
3 **Diligence** Tool 01B DD Checklist	Rates each archetype question Green, Amber or Red against the thresholds for its stage.	A tally and a rules-based decision. Gating questions cannot be offset by strengths elsewhere.	**9 Green, 1 Amber, 1 Red** The Red is gating: credits sit on a legacy methodology. NO-GO PENDING RESOLUTION
4 **Structure** Tool 02 Instrument Matrix	Nothing to enter.	Recommended instruments, ticket size, structural rationale and the key de-risking requirement.	**Carbon forward purchase, RBF and working capital debt; USD 2M to 15M** Held until diligence clears.
5 **Feedback** Tool 03 Enterprise Feedback	Shares or receives the result, whatever the decision.	Clear feedback: the main message, what to fix first, suitable funding, when to come back, and the gap on each question.	**Migrate to a CCP-approved methodology** Provide grant or working capital for the MRV upgrade, then re-engage after registration.
Re-engagement	Once the methodology is fixed, the enterprise is re-rated. The Red becomes Amber, the decision moves to HOLD AND STRUCTURE and funding can proceed with safeguards.		
6 **Monitor and exit** Returns, Exits and Failure Modes	Tracks the archetype's metrics during ownership and plans the exit.	Return drivers, exit routes, the archetype's typical failure mode and its earliest warning signal.	**Track credit quality, carbon price and verified volumes** Model returns at cautious carbon prices of US$5, 12 and 20.

Decision rules	GO	HOLD AND STRUCTURE	NO-GO PENDING RESOLUTION
	No Red and at most one Amber.	Proceed, with extra safeguards on the weak areas.	Any gating Red, or three or more Ambers.

Figure 14: The toolkit sequence mapped to the investment lifecycle.

Intended users and limits. The toolkit is designed for investment professionals, including DFIs, impact investors, banks, fund managers, and their advisors. It also serves ecosystem actors designing results-based or blended finance facilities. Clean cooking enterprises are also intended users. They can use the maturity-stage screen as a self-assessment and use Tool 03 to understand what each rating at their stage would require. The toolkit is a decision-support instrument. It is not a substitute for full legal, financial, and technical due diligence. Benchmark values reflect the market as of mid-2026 and carry the temporal limitation set out in Section 2.7. Each figure's source is listed on the benchmark sheet. Sourced values should be reviewed annually and after major market events.

Image Courtesy : www.envirofit.org

6.

Enabling Conditions for Capital to Flow

Enabling Conditions for Capital to Flow

A robust investor assessment framework is necessary, but it cannot address all the barriers identified in this study. The **affordability constraint in Barrier 1 and missing market infrastructure in Barrier 4 require action across the wider clean cooking ecosystem**. Governments provide regulatory clarity, DFIs deploy catalytic and risk-sharing capital, development partners support shared infrastructure and capacity, and commercial investors provide market-rate capital where risks can be appropriately assessed and structured. The research identifies four enabling conditions, supported by a cross-cutting gender lens:

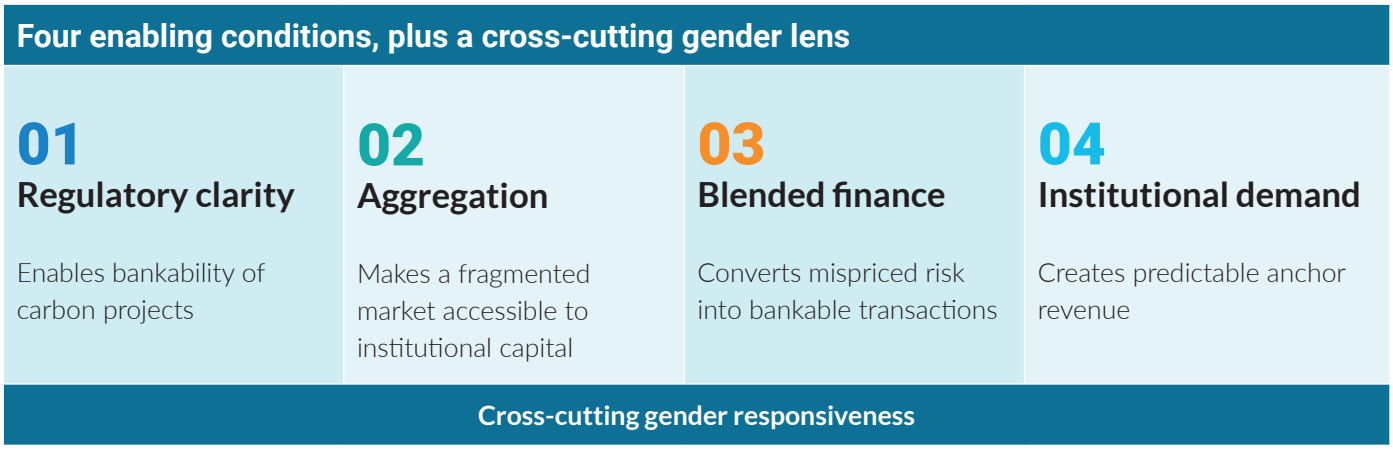

Figure 15: The four enabling conditions and the cross-cutting gender lens.

6.1 Regulatory clarity enables bankability of carbon projects

For Carbon Integrated models, regulatory clarity can materially affect commercial viability. Voluntary carbon prices typically range from US$5–12/tCO2e, compared with approximately US$10–35/tCO2e in Article 6 compliance markets.[41] This difference can determine whether a project meets an investor's required return. The cost of uncertainty is already evident. During the validation workshop, one clean cooking manufacturer reported spending more than two and a half years seeking a Letter of Authorization in one African market, despite having received authorizations elsewhere. Without the LoA, the enterprise remained dependent on lower-priced voluntary markets, where revenues were insufficient to cover project costs.[2] At the same time, progress is emerging: **Ghana**[42]**, Rwanda**[43] **and Tanzania**[44] have established precedents for Article 6-authorized clean cooking activities.

Article 6 precedents

Where the infrastructure exists, the effect is visible:

- Ghana has authorized one of Africa's first Article 6.2 clean cooking activities.
- Rwanda has recognized a clean cooking program under Article 6.2.
- Tanzania has issued an LoA for an Article 6.2-compliant electric cooking project.

Government capacity to authorize credits is also constrained by national NDC accounting, as illustrated by the KOKO case. Investors should therefore assess regulatory readiness rather than assume it, applying a country-level carbon governance score and modeling compliance-market pricing only where the necessary authorization is in place.[2]

6.2 Aggregation makes a fragmented market institutionally accessible

Capital concentration partly reflects missing intermediaries rather than a lack of viable enterprises. Many clean cooking businesses fall below institutional ticket sizes, while institutional investors require scale, diversification and standardised reporting. Aggregation can bridge this gap at three levels.

- **At the fund level**, vehicles such as the Spark+ Africa Fund pool sub-scale enterprises into institutional ticket portfolios, with DFI first-loss tranches improving the risk-return profile.[45]
- **At the market level**, collective procurement, local-currency credit enhancement and securitization can combine predictable cash flows into larger financing opportunities.
- **At the carbon level,** shared MRV and aggregation platforms can pool credits from smaller enterprises, reducing transaction costs and creating volumes suitable for larger offtakers.

Aggregation, however, introduces its own risks. Weak data from one participant can delay verification across an entire portfolio. Effective aggregation therefore requires capable intermediaries, strong governance, reliable data and clear accountability. For DFIs seeking to mobilize private capital, anchoring these structures can be a high-leverage use of catalytic funding.[2]

6.3 Blended finance addresses specific risks and mobilizes commercial capital

Blended finance can address specific risks that otherwise viable transactions face in attracting commercial capital. Concessional capital can absorb or reduce these risks, allowing commercial investors to participate on terms that enterprises can sustain. The objective is not to subsidize the entire investment, but to target the specific binding risk and use the minimum concessional support necessary to mobilize commercial capital.

Three design rules

Design discipline is essential

- Begin with the binding risk of the archetype, rather than with a preferred instrument.
- Use the minimum concessional layer required to crowd in commercial capital.
- Set transition triggers so concessional support retires as the enterprise builds a track record.[46]

Together, these rules reflect the principle of minimum concessionality. The Mirova Gigaton Fund demonstrates this approach at scale, combining catalytic junior capital, senior commercial debt, guarantees and technical assistance, alongside gender objectives under the 2X Challenge framework.[47] Similar structures could combine first-loss capital, guarantees, results-based financing and technical assistance for both clean cooking enterprises and the financial institutions that finance them. This is particularly relevant for local MFIs and SACCOs that finance consumers but may lack the capacity to assess clean cooking business models.[2]

6.4 Institutional demand changes the risk profile of the entire market

Institutional demand provides a route to scale where household acquisition is slow and costly. Schools, hospitals, prisons and other institutions already have fuel budgets, making clean cooking a cost-substitution decision rather than a new discretionary household expense. For investors, institutional buyers offer more predictable volumes, clearer collection points and identifiable counterparties. Digital MRV can further strengthen the model by converting fuel savings into measurable performance.

Institutional procurement improves the investment case in three ways. First, it replaces dispersed household demand with more predictable institutional buyers. Second, two- to five-year contracts can provide revenue visibility that supports debt financing. Third, the MRV, distribution and operational infrastructure established for institutional customers can later support expansion into household markets.

Policy can actively create this demand. Tanzania requires institutions serving more than 100 people to adopt approved clean cooking solutions, an approach financiers consulted noted has helped stimulate private investment.[18] Similar mechanisms have worked in adjacent sectors, where anchor power purchase agreements supported mini-grid financing and predictable transaction volumes helped scale mobile-money networks.

The opportunity is particularly relevant to the **Product Seller**, through institutional and government procurement, and the **Infrastructure Utility**, where multi-year anchor contracts can convert merchant demand into contracted revenue.[6]

6.5 The cross-cutting gender lens

Gender affects the commercial performance of clean cooking because women are typically central to adoption and use, even where purchasing authority sits elsewhere in the household. Treating households as single economic units can therefore misrepresent willingness to pay and adoption behavior. Gender-responsive approaches can improve how investors assess demand and how enterprises design distribution and payment models.

The commercial relevance appears in several areas. Female agent networks can benefit from trusted community relationships and strong last-mile reach.[48] Gender outcomes can also strengthen the co-benefit proposition of carbon credits, while enterprises meeting **2X Challenge criteria** may access dedicated gender-lens capital.[49] Women's savings groups can provide additional channels for demand aggregation and affordability.

The main constraint is data. Demand, usage and agent-performance data are not consistently disaggregated by gender, making these effects difficult to incorporate systematically into underwriting. Investors can help address this gap by requiring relevant gender-disaggregated metrics in investment reporting.

6.6 The enabling conditions reinforce one another

The four enabling conditions are mutually reinforcing. Regulatory clarity without aggregation leaves smaller enterprises unable to access higher-value markets. Aggregation without regulatory clarity pools enterprises but does not resolve underlying carbon-market uncertainty. Blended finance without institutional demand can reduce financing risk without creating predictable revenue. Across all four, weak gender data can result in investors and enterprises misreading the customers who ultimately determine adoption.

The opportunity is also time-sensitive. Article 6 frameworks are becoming operational, procurement policies are emerging, and aggregation vehicles are being developed. Investors who engage while these structures are taking shape can help influence how the market develops and position themselves for its subsequent growth.

IDRC · CRDI
Canada

intellecap

7.

Conclusions and Implications

Conclusions and Implications

This research examined why capital is not flowing at scale into clean cooking despite the size of the market, its significant co-benefits and growing evidence of commercial viability. It also developed practical tools to help investors assess and structure clean cooking investments more effectively. Three conclusions emerge:

1. **The financing gap is partly a problem of how risk is assessed and priced.** The risk of clean cooking is often assessed broadly. Sector-level assumptions can obscure differences between business models, information gaps can increase business-specific risk premiums, and country-level assessments may not adequately reflect differences in carbon-market readiness. Better segmentation, stronger benchmarks, and more precise assessment of carbon governance can improve how investors price these risks.
2. **The archetype is the appropriate unit of investment analysis.** Clean cooking enterprises capture value through structurally distinct models with different revenue structures, risks and financing needs. The archetype, rather than the technology or sector alone, should therefore determine the relevant due diligence questions, performance benchmarks, financing instruments, investment horizons and exit expectations.
3. **Better investor tools and stronger market conditions must develop together.** The Investor Toolkit enables individual investors to classify enterprises, conduct archetype-specific due diligence, and structure appropriate capital. However, investors cannot resolve the broader constraints affecting the market independently. Regulatory clarity, aggregation, blended finance, and institutional demand, supported by a cross-cutting gender lens, are also required to enable capital to flow at scale. Neither investor tools nor market-level interventions will achieve their full potential in isolation.

Implications by audience

1. **For investors: classify before pricing.** Investors should assess enterprises against archetype-specific performance and risk metrics, model carbon revenue separately and conservatively, and identify regulatory prerequisites before assigning value to compliance-market revenues. Gender-disaggregated data should be incorporated where it affects demand, repayment, retention and distribution performance. The toolkit can support this process and help identify material risks early.
2. **For DFIs and development partners: build the infrastructure that mobilizes private capital.** Priority should be given to aggregation vehicles, guarantees and first-loss capital, shared MRV and data infrastructure, and support for Article 6 implementation. Concessional capital should address specific binding risks, follow the principle of minimum concessionality, and include transition triggers that reduce support as markets and enterprises mature.
3. **For governments: create demand through carbon markets and institutional cooking mandates.** Governments should establish clear and predictable compliance market mechanisms and create investment-ready institutional demand through standardized procurement, multi-year contracts and reliable payment arrangements. Institutional clean cooking mandates are most effective when accompanied by financing and procurement mechanisms that enable enterprises to scale up.
4. **For researchers: close the evidence gaps that continue to constrain underwriting.** Priority gaps include clean cooking-specific repayment and churn benchmarks, gender-disaggregated commercial performance data, stronger pipeline evidence from West and Central Africa, and continued tracking of quality and price differences in cookstove carbon markets. As stronger evidence becomes available, indicative thresholds in the toolkit can progressively be replaced by sector benchmarks.

What each actor should do next

01 INVESTORS

Classify before pricing

Underwrite enterprises using archetype-specific metrics and incorporate relevant gender-disaggregated performance data.

02 DFIs AND PARTNERS

Build a shared market infrastructure

Use catalytic capital to support aggregation, risk-sharing, MRV and benchmark data systems that mobilize commercial investment.

03 GOVERNMENTS

Create demand

Provide predictable Article 6 authorization and enable multi-year institutional procurement with reliable payment arrangements.

04 RESEARCHERS

Close the benchmark gaps

Generate clean cooking-specific repayment, commercial and gender-performance evidence that investors can use in underwriting.

Figure 16: What each actor should do next

The financing gap in clean cooking is substantial, but addressable. Closing it requires investors with the right analytical tools to identify and assess opportunities, capital structures that reflect how clean cooking businesses operate, and coordinated action by governments, DFIs, development partners and market intermediaries to create the conditions that no investor can build alone. The framework and toolkit presented in this playbook provide a practical starting point; the enabling conditions define what must happen next.

IDRC · CRDI
Canada

intellecap

Annex A

Stakeholder Engagement Summary

Stakeholder Engagement Summary

A.1 Phase 1: Landscape study key informant interviews (25 interviews)

Stakeholder category	Organisations consulted
Clean cooking enterprises & carbon project developers	ABPL, ATEC, Bidhaa Sasa, Biofranca, BioLite, Biosys, BURN Manufacturing, Circle Gas, Ecobora, Fair Climate Fund, Nyalore Impact, Sistema.bio, Solar Sister, SunBucket, UpEnergy Group, Xpress Gas
Think tanks & research institutions	Clean Cooking Alliance; Modern Energy Cooking Services (Loughborough University); Practical Action; PwC United Kingdom; SD Direct; Strathmore University
Investors and DFIs	AECF, Bix Capital, GIZ Kenya, Kenya Climate Ventures, Kua Ventures, SNV (Uganda & Kenya), Spark+Africa Fund
Carbon market players	BeZero Carbon; Bowmans Law Firm; carbon buyers (names confidential)

Table 5: Phase 1 key informant interview stakeholders (Intellecap & IDRC, 2025a).

A.2 Phase 2: Investor archetypes engaged in deep-dive interviews

Investor segments	Example investors	Primary instrument / ticket	Investment focus
Early-stage tech investors	Katapult; Launch Africa	Equity / convertibles; US$ 50K–US$300K	IoT-driven platforms; early-stage technology-enabled models
Debt investors	Untapped Global; YSB Venture	Venture debt / asset finance; US$100K–US$2M	Recurring-revenue models; asset-backed structures
Blended finance investors	GreenMax; Mirova	Blended / structured debt; US$1M–US$5M+	Post-pilot scale-up with demonstrated traction
Specialist sector investors	Spark+ Africa Fund; MCFA	~70 percent debt / 30 percent equity; US$1M–US$5M	Full clean cooking spectrum; integrated carbon and gender-lens investment

Table 6: Investor archetypes engaged in Phase 2

A.3 Phase 3: Co-creation workshop participating organisations (Nairobi, 22 October 2025)

Category	Organisations
Development finance institutions & research institutions	IDRC (ESA Office); GIZ, SNV; Trade and Development Bank Group
Banks	Co-operative Bank of Kenya
Impact investors & venture capital	P4G Partnerships; Siemens Stiftung
Gender & inclusive finance specialists	FSD Africa
Industry associations & ecosystem enablers	Clean Cooking Alliance, Convergence Blended Finance; KEREA
Clean cooking enterprises & sector players	ATiD; Card Group East Africa Ltd; TotalEnergies

Table 7: *Workshop participating organisations (18 named participants; Intellecap & IDRC, 2025b)*

Image Courtesy : Intellecap presentation at the clean cooking showcase

IDRC · CRDI
Canada

intellecap

Annex B

Evidence base for the Toolkit's Benchmarks

Evidence base for the Toolkit's Benchmarks

The toolkit's benchmarks are based on published evidence and primary investor research. Each benchmark is classified as Sourced or Indicative, distinguishing thresholds supported by published sector data from those informed by investor interviews (KII) where robust benchmarks are not yet available. This enables users to assess the strength of the evidence supporting each threshold and adjust indicative benchmarks as stronger sector data becomes available.

S/No.	Benchmark	Sources
1	**Access Provider repayment and retention**	GOGLA PAYGo PERFORM v3 (2026)[50]; KII[2]
2	**Infrastructure Utility Economics**	AMDA (2020, 2022, 2024)[51]; KII[2]
3	**Carbon Methodology Integrity**	ICVCM Core Carbon Principles Assessment (2025)[36]; Gill-Wiehl, Kammen & Haya (2024)[34]; Veyt / Carbon Market Watch
4	**Carbon Pricing**	MSCI Carbon Markets (2026)[37]; Abatable (2025)[24]; project disclosures; country LoAs; Gold Standard
5	**Cost-of-Capital Decomposition**	IEA (2024)[52]; Clean Air Task Force (2025)[22]; Symbiotics (2024)[4]; IFC GEMs database, as reported in WEF & PIDG (2025)[21]
6	**Gender Performance Evidence**	GI-ROI methodology[54]; ICRW (2018)[32]; Gray, Boyle & Yu (2017)[53]

Table 8: Evidence base for the toolkit's benchmarks

IDRC · CRDI
Canada

intellecap

Annex C

Literature Review

Literature Review

The literature review prioritized recent, authoritative and relevant sources. Sources were selected based on three criteria: recency (2017–2026), authority (recognized sector bodies, multilaterals, carbon standards and registries, rating agencies, and peer-reviewed research), and relevance to clean cooking investment, carbon finance and integrity, energy-access finance, blended finance, or gender. Each source was then mapped against the key analytical dimensions covered by this playbook.

Image Courtesy : www.envirofit.org

Title	What it covers	Source & year
A. Sector landscape, market sizing & financing gap		
Clean Cooking in Africa 2026: Progress Report	Provides the most current tracking of clean cooking finance, policy and access across Africa, including disbursement against the Paris Summit commitments. It is the primary source for sector-level flows in this playbook, but it sizes the opportunity rather than segmenting enterprises by business model.	IEA (2026)
Universal Access to Clean Cooking in Africa	Sets out a country-by-country roadmap to universal access and the first comprehensive tracking of investment in the cooking sector, alongside financing needs and policy progress. It underpins the market-sizing and carbon-revenue baselines used here.	IEA (2025)
Clean Cooking Industry Snapshot	Reports self-declared trends across for-profit enterprises, including capital flows (about US$ 218 million in 2023), revenue growth, and the shift toward debt and carbon finance. It tracks the sector in aggregate rather than by archetype.	Clean Cooking Alliance (2023; 2025)
Unit Economics Framework and Analysis for the Clean Cooking Sector	Is the closest adjacent work to this playbook: a framework for clean cooking unit economics. It analyses cost and revenue drivers but does not group enterprises into investor archetypes or match them to capital instruments.	Clean Cooking Alliance (2024)
A Vision for Clean Cooking Access for All	Estimates the global investment requirement (about US$ 8 billion a year) and examines the role of concessional finance and the technology and fuel mix. It offers a macro view of financing rather than an enterprise- or investor-level lens.	IEA (2023)

Title	What it covers	Source & year
B. Carbon finance, integrity & Article 6		
Clean Cooking Dominates CORSIA, but Premium Faces Pressure	Tracks realised cookstove credit pricing, showing clean cooking at 40 of the 43 projects eligible for CORSIA Phase I and a compliance premium above US$ 14 per tonne against a sector average near US$ 4. It supplies the price bands used in the diligence tool but offers no enterprise-level guidance.	MSCI Carbon Markets (2026)
A New Era for High-Quality Carbon Avoidance: The New Floor Price for Cookstove Carbon Credits	Models the credit price required for cookstove project bankability, giving a floor of US$ 15.30 rising to US$ 38.90 for higher-integrity solutions. It prices integrity rather than structuring capital.	Abatable (2025)
Pervasive Over-crediting from Cookstove Offset Methodologies	Finds that projects across five cookstove methodologies were over-credited by about 9.2 times, with the metered methodology closest to estimated reductions at about 1.5 times. It diagnoses the integrity problem that reshaped the market but does not address investment strategy.	Gill-Wiehl, Kammen & Haya, Nature Sustainability (2024)
Core Carbon Principles and cookstove methodology decisions	Provides the integrity benchmark for the voluntary carbon market, together with the March 2025 cookstove methodology decisions and their fNRB and monitoring conditions. It sets the standard against which methodology risk is assessed here.	ICVCM (2023; 2025)
ICVCM's Cookstove Methodologies Approval Will Not Lead to More CCP-labelled Credits	Assesses the practical effect of the CCP decisions and finds that no cookstove credits then in circulation met the conditions attached to the label. It establishes the transition risk carried by legacy vintages.	Veyt (2025)
Unlocking High-Value Carbon Credits from Clean Cooking: A Guide to Accessing Article 6	Compares seven African markets on NDC commitments, regulatory readiness and Article 6 engagement, including Letters of Authorization and bilateral agreements. It explains the mechanics of compliance-market access that the diligence tool tests for.	MCFA (2025)

Title	What it covers	Source & year
C. Energy-access & mini-grid market and finance (adjacent infrastructure)		
PAYGo PERFORM KPIs and Monitor	Defines the standard cohort metrics for repayment, retention and portfolio quality in pay-as-you-go asset finance, with benchmark distributions across reporting companies. It supplies the Access Provider benchmarks used in the diligence tool, drawn from off-grid solar rather than cooking.	GOGLA (2026)
Benchmarking Africa's Minigrids	Provides benchmarks for minigrid cost, performance and financing, including the role of concessional and blended capital. This infrastructure-finance evidence underpins the playbook's Infrastructure Utility archetype.	AMDA (2020; 2022; 2024)
Mini-grid CAPEX and OPEX Benchmark Study: A Regional Approach	Establishes regional capital and operating cost benchmarks for mini-grids, giving a cost basis for assessing infrastructure-scale cooking propositions. It benchmarks costs rather than matching them to capital instruments.	SEforALL (2024)
Project-finance approach for mini-grids	Explains how to structure long-tenor project finance and aggregation for minigrids. It is a capital-structuring reference for one archetype only.	CrossBoundary Mini-Grid Innovation Lab (2023)

Title	What it covers	Source & year
D. Cost of capital, risk pricing & blended finance		
Misperception of Risk in Emerging Markets	Compares realised default and loss experience against perceived risk in emerging markets and finds the gap systematically overstated. It is the central evidence for the risk-mispricing barrier, though it is not specific to clean cooking.	Symbiotics (2024)
Unlocking Clean Energy Investment in Emerging Markets	Sets out why the cost of capital, rather than project economics, constrains clean energy investment in emerging markets, and what de-risking instruments shift it. It diagnoses the pricing problem across energy rather than within cooking.	WEF & PIDG (2025)
Evaluating the Weighted Average Cost of Capital (WACC) in the Power Sector for African Countries	Builds country-level WACC estimates for African power markets, separating country, currency and project risk components. It provides the build-up components behind the cost-of-capital discussion here.	Clean Air Task Force (2024)
Higher Cost of Finance Exacerbates a Climate Investment Trap in Developing Economies	Shows quantitatively how elevated financing costs suppress climate investment in developing economies, creating a self-reinforcing trap. It provides the peer-reviewed grounding for the mispricing argument.	Ameli et al., Nature Communications (2021)
State of Blended Finance	Provides cross-sector data, structures and trends for the blended-finance market, including deal sizes, concessionality levels and leverage ratios. It is a general blended-finance reference rather than one specific to clean cooking.	Convergence (2024)
OECD DAC Blended Finance Principles	Sets out the principles governing concessional capital deployment, including minimum concessionality and transition to commercial terms. It provides the design discipline applied to the blended structures proposed here.	OECD (2018)

Title	What it covers	Source & year
E. Gender & inclusive energy finance		
Gender Smart Investing: Off-Grid Energy Case Study — BURN	Documents how gender-intentional sales and financing design affected commercial outcomes at a clean cooking manufacturer, including chama-based consumer credit. It is the primary evidence for treating gender as a return driver in this playbook.	ICRW (2018)
Turning on the Lights: Transcending Energy Poverty through the Power of Women Entrepreneurs	Reports comparative sales performance of women entrepreneurs in last-mile energy distribution networks. It supports the Network Distributor gender diligence question but predates the current market.	Gray, Boyle & Yu, Miller Center (2017)
Building Evidence to Unlock Impact Finance: A Field Assessment of Clean Cooking Co-benefits for Climate, Health, and Gender	Field-tests co-benefit measurement methods on a biogas intervention in rural Kenya, so that results-based and impact finance can pay for verified climate, health and gender outcomes alongside emission reductions. It develops the evidence base for valuing co-benefits rather than segmenting enterprises.	ESMAP / World Bank (2023)

Table 9: Secondary literature reviewed (2017–2026). Grouped by primary analytical focus.

The reports reviewed were mapped against the analytical dimensions addressed by this playbook to identify gaps in the existing evidence. The first eight dimensions are well covered in the literature, while the final five remain largely unaddressed. Together, these five dimensions form the investor lens needed to assess and direct capital towards clean cooking enterprises, and represent the playbook's key contribution.

Analytical dimension	In the literature?	Representative sources
Market size & financing gap	Yes	IEA (2023, 2025, 2026); CCA Snapshot (2025)
Household access & demand tracking	Yes	IEA (2026); CCA Snapshot (2025)
Enterprise unit economics	Partial	CCA Unit Economics Framework (2024)
Carbon-market mechanics, integrity & Article 6	Yes	MCFA (2025); ICVCM (2025); Gill-Wiehl et al. (2024); Veyt (2025); MSCI (2026); Abatable (2025)
Policy & regulatory frameworks	Yes	IEA (2026); MCFA (2025)
Gender in energy access	Yes	ICRW (2018); Gray et al. (2017); ESMAP (2023)
Mini-grid / off-grid finance structures	Yes	AMDA (2024); SEforALL (2024); CrossBoundary (2023); GOGLA (2026)
Cost of capital, risk pricing & blended finance	Yes	Symbiotics (2024); WEF & PIDG (2025); CATF (2024); Convergence (2024); OECD (2018)
Investor-facing segmentation of clean cooking by revenue mechanism (archetypes)	No	Not addressed
Archetype-specific due diligence questions & clean cooking benchmarks	No	Not addressed
Capital-instrument matching by archetype & growth stage	No	Not addressed
Return & exit pathway analysis by archetype	No	Not addressed
Integrated investor toolkit (diagnostic – due diligence – structuring)	No	Not addressed

Table 10: Analytical dimension. Highlighted rows are dimensions not addressed in the literature mapped in Table 9

IDRC · CRDI
Canada

intellecap

Annex D:

Glossary of Key Terms

Glossary of Key Terms

Term	Definition
Archetype (this research)	One of five structurally distinct clean cooking business models, segmented by primary value-capture mechanism: Product Seller, Access Provider, Network Distributor, Carbon Integrated, Infrastructure Utility.
Article 6 (Paris Agreement)	Provisions allowing countries to cooperate voluntarily on emission reduction targets; Article 6.2 enables bilateral trading of mitigation outcomes (ITMOs), subject to host-country authorization.
fNRB	Fraction of non-renewable biomass: the share of wood fuel consumption assumed to be harvested unsustainably; a key driver of cookstove credit volumes. The ICVCM's CCP label requires modeled values below 0.5.
Letter of Authorization (LoA)	Host-government authorization required for Article 6.2 transfers of mitigation outcomes; the legal pre-requisite for compliance-market pricing.
MRV	Measurement (or monitoring), reporting, and verification: the systems by which emission reductions and usage are quantified and independently verified.
PayGo / SaaP	Pay-as-you-go asset financing (receivables book; ownership transfers on completion) versus subscription / energy-as-a-service (no ownership transfer; churn and ARPU govern).
RBF	Results-based financing: disbursement against independently verified outputs (e.g. verified stoves in use, verified agent activations).
tCO_2e	Tonne of carbon dioxide equivalent, the standard unit for greenhouse gas accounting and carbon credit denomination.
2X Challenge	DFI-led criteria for gender-lens investment qualification (women in leadership, workforce, or products and services that benefit women).

Endnotes

1 International Energy Agency. (2026). Clean cooking in Africa 2026: Progress report. IEA. Access here

2 Intellecap & IDRC. (2025b). Co-creation investor engagement workshop, Nairobi, 22 October 2025: Proceedings and synthesis report [Internal research document]. Intellecap / Aavishkaar Group.

3 Yadav, K., Sankrit, R., Kuria, L. W., Masila, M., & Chakrabarti, K. (2025). Unlocking climate finance pathways for the clean cooking sector in Africa. Intellecap / International Development Research Centre. Access here

4 Symbiotics. (2024). Misperception of risk in emerging markets. Symbiotics Group. Access here

5 Clean Cooking Alliance. (2025). Clean cooking industry snapshot: Top trends in investment, revenue, and carbon markets (2023 data). Access here

6 Intellecap. (2026). Clean Cooking Investor Toolkit (Version 3.0) [Microsoft Excel workbook]. Intellecap / Aavishkaar Group. Access here

7 International Energy Agency. (2025). Universal access to clean cooking in Africa: Progress update and roadmap to implementation. IEA. Access here

8 Intellecap derivation. The population without access is rounded to 1 billion (from approximately 970 million in 2024, rising by around 14 million annually) and divided by an average household size of 5, giving approximately 200 million households. Applying the IEA's affordability threshold, at which total clean cooking expenditure—device amortised plus fuel—falls below 10 percent of household income, 42 percent of Sub-Saharan African households meet the criterion, yielding approximately 84 million households.

9 BURN Manufacturing KII

10 European Investment Bank. (2024, October 24). Expanding clean cooking in East Africa: US$15 million financing from the European Investment Bank for Kenya-based BURN. Access here

11 FSD Africa. (2025). How a green bond powered clean cooking, better jobs, and climate gains. Access here

12 Clean Cooking Alliance. (2023). Clean Cooking Industry Snapshot, fourth edition. Access here

13 Information extracted from the Berkley Data (2025)

14 Intellecap. (2025). Carbon Technical Assistance Program: enterprise diagnostics [Internal research document]. Intellecap / Aavishkaar Group.

15 Intellecap & IDRC. (2024—2025). Deep-dive investor key informant interviews: Clean cooking sector investment barriers [Unpublished primary research]. Intellecap / Aavishkaar Group.

16 Clean Cooking Alliance. (2024). Unit Economics Framework and Analysis for the Clean Cooking Sector. Access here

17 Derived from UNHS data. UNHS 2023/24 reports mean monthly consumption expenditure per adult equivalent of UGX 167,573 nationally and UGX 302,179 in Kampala, against an average household size of four. Average daily household spend on the main cooking fuel is reported at UGX 2,015 in the wet season and UGX 1,942 in the dry season, or approximately UGX 60,000 per month (Ministry of Energy and Mineral Development, n.d.). Applied to a Kampala household at the mean, this represents roughly 6 percent of consumption; applied to a household at the revised poverty line of UGX 87,000 per person per month, it approaches 17 percent. UNHS reports fuel within the combined housing, water, electricity and gas COICOP category, so a disaggregated cooking fuel share requires analysis of the UNHS microdata.

18 United Republic of Tanzania, Ministry of Energy. (2024). National clean cooking strategy (2024—2034). Access here

19 Daily News Tanzania. (2026). Tanzania bolsters its clean cooking energy campaign at the national level. Access here

20 Kamatye Enterprise Limited. (n.d.). Solar installation for schools institutions in Kenya. Access here

21 World Economic Forum & Private Infrastructure Development Group. (2025, April 21). Unlocking clean energy investment in emerging markets. WEF. Access here

22 Clean Air Task Force. (2024). Evaluating the weighted average cost of capital (WACC) in the power sector for African countries. CATF. Access here

23 International Energy Agency. (2023). A vision for clean cooking access for all. IEA. Access here

24 Abatable. (2025). A new era for high-quality carbon avoidance: The new floor price for cookstove carbon credits. Abatable. Access here

25 Ameli, N., Dessens, O., Winning, M., Cronin, J., Chenet, H., Drummond, P., Calzadilla, A., Anandarajah, G., & Grubb, M. (2021). Higher cost of finance exacerbates a climate investment trap in developing economies. Nature Communications, 12, Article 4046. Access here

26 Clean Cooking Alliance. (2025). New Report: Clean cooking sector reaches inflection point amid record growth and rising carbon revenues. Access here

27 Hybrid enterprises combine two or more archetypes. For example, a Product Seller may also generate carbon revenue from the verified use of its stoves, making it partly Carbon Integrated. Classification follows the revenue stream most critical to commercial viability.

28 FSD Africa. (2023, October 27). BURN Issues USD $10m Green Bond to Support Clean Cooking In Sub-Saharan Africa [Press release]. FSD Africa. Access here

29 GOGLA. (2026). PAYGo PERFORM KPIs: Technical guide. GOGLA. Access here

30 Circle Gas. (2020, January). Circle Gas completes acquisition of KOPAGAS technology [Press release]. Circle Gas. Access here

31 Sun King. (2023). PayGo Energy acquisition marks Sun King's first step towards developing clean cooking solutions. Sun King. Access here

32 International Center for Research on Women. (2018). Gender smart investing: Off-grid energy case study—BURN. ICRW. Access here

33 Mackey, A. (2018). Motorbikes make the sales [Last Mile Learning blog series]. Solar Sister. Access here

34 Gill-Wiehl, A., Kammen, D. M., & Haya, B. K. (2024). Pervasive over-crediting from cookstove offset methodologies. Nature Sustainability, 7, 191—202. Access here

35 Veyt. (2025, April 11). ICVCM's cookstove methodologies approval will not lead to more CCP-labelled credits. Veyt. Access here

36 Integrity Council for the Voluntary Carbon Market. (2025, March 7). Integrity Council approves three cookstove methodologies [Press release]. ICVCM. Access here

37 MSCI. (2026, May 6). Clean cooking dominates CORSIA, but premium faces pressure. MSCI Carbon Markets. Access here

38 Ecofin Agency. (2026, February 12). Koko Networks collapses in Kenya after government blocks carbon credit sales. Ecofin Agency. Access here

39 Sustainable Energy for All. (2024). Mini-grid CAPEX and OPEX benchmark study: A regional approach. SEforALL. Access here

40 Africa Minigrid Developers Association. (2024). Benchmarking Africa's minigrids report 2024. AMDA. Access here

41 MSCI Carbon Markets. (2026). Carbon credit pricing data [Proprietary dataset]. MSCI.

42 KliK Foundation. (2025). Ghana and Switzerland pioneer Africa's first ITMO issuance under the Paris Agreement's Article 6.2 for NDC use. KliK Foundation. Access here

43 Verra. (2023, December 11). Verra announces first application of Article 6 authorized labels to VCUs from a cookstove project in Rwanda [Program notice]. Verra. Access here

44 UpEnergy. (2024). UpEnergy announces Tanzania's first Article 6 authorization for carbon credits from cleaner cookstoves [Press release]. PRWeb. Access here

45 Spark+ Africa Fund. (2022). Fund overview and investment mandate. Spark+ Africa Fund / Enabling Qapital.

46 OECD. (2018). OECD DAC blended finance principles for unlocking commercial finance for the Sustainable Development Goals. OECD Publishing. Access here

47 Mirova. (2024). Mirova Gigaton Fund reaches $282m to accelerate clean energy access and climate action in emerging markets [Press release]. Mirova. Access here

48 See the gender performance evidence cited in Section 5.4: International Center for Research on Women (2018) and Gray, Boyle, & Yu (2017).

49 See Mirova (2024) on the Mirova Gigaton Fund and the 2X Challenge framework, discussed in Section 6.3.

50 GOGLA. (2026). PAYGo PERFORM Monitor (Version 3) [Dataset]. GOGLA. Access here

51 Africa Minigrid Developers Association. (2020, 2022, 2024). Benchmarking Africa's minigrids [Report series]. AMDA. Access here

52 International Energy Agency. (2024). Cost of Capital Observatory [Data tool]. IEA. Access here

53 Gray, L., Boyle, A., & Yu, V. (2017). Turning on the lights: Transcending energy poverty through the power of women entrepreneurs. Miller Center for Social Entrepreneurship, Santa Clara University. Access here

54 GI-ROI methodology. Access here