

ENACT

Enabling African Cities for Transformative Energy Access

Public Finance Mechanisms for Enabling Market-Led Clean Cooking Access in African Urban Informal Settlements

July 2024



Source: Green Lens

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1. Introduction

Distributed energy services, including clean cooking solutions delivered through market-based approaches, present opportunities and challenges for the public sector. This is particularly true in low-income markets, including those represented by informal settlements. To fully recognise the private sector's significant role in contributing to national clean cooking adoption targets, it is essential to revise traditional views of the public sector's role in energy service provision. Broader and more integrated planning approaches must be adopted to address these challenges effectively.

This report aims to delve deeper into the existing clean cooking financing landscape and identify gaps, opportunities and conditions of energy financing for both the private and public sectors. It also aims to provide useful recommendations on financing mechanisms that can be leveraged to implement energy, particularly clean cooking access solutions in urban informal settlements, primarily in African contexts.

One example of this shift is moving from centralised management and control of electricity generation, transmission and distribution to a more adaptive approach that effectively integrates new technologies and business models into the energy distribution system. Small and medium-sized African and international private-sector enterprises offer innovative energy access solutions beyond traditional public-sector methods. These diverse private sector approaches provide opportunities for governments to achieve energy access and climate targets.

However, scaling these solutions, especially in hard-to-reach markets such as informal settlements, requires significant additional financing and targeted incentives. Recent multilateral initiatives increasingly focus on energy access, attracting new concessional and commercial funding, including \$2.2 billion pledged at the Summit on Clean Cooking in Africa (International Energy Agency (IEA), 2023). Establishing specialised entities and capacity-building efforts is crucial to effectively integrate these innovations into national and sub-national energy systems.

Public finance mechanisms have the potential to leverage various funding streams, including international climate finance, domestic budgets and innovative financing instruments to catalyse the scale-up of clean cooking interventions in collaboration with the private sector. For example, the Enabling African Cities for Transformative Energy Access (ENACT) project supports the public sector in enabling private sector-led, market-based approaches to enhance clean cooking access in urban informal settlements. By fostering partnerships between energy enterprises, FIs, and local communities and building public sector capacity in parallel, ENACT aims to overcome barriers to adopting clean cooking. The project emphasises affordability, scalability and sustainability in delivering impactful energy solutions that improve livelihoods and mitigate health and environmental impacts.

Access to clean cooking is a global challenge. An estimated 2.8 billion people worldwide lack access to clean cooking fuels and technologies, with the number rising to four billion when considering access to Modern Energy Cooking Services (MECS) (World Bank Group, 2020). The consequences of inadequate access include significant health burdens from household air

pollution and substantial economic costs related to productivity loss and environmental degradation, including greenhouse gas (GHG) emissions.

National governments predominantly hold the mandate to set energy access strategies and policies, driving the universal energy access agenda within their countries. However, with the emergence of decentralised energy solutions offering new and innovative pathways for energy access and the increasing devolution of governance to local governments in many sub-Saharan African countries, local governments are gradually being positioned to play a pivotal role in contributing to national development strategies. Local governments thus have a valuable role in creating an environment that enables access to clean, affordable and sustainable energy in urban areas, particularly for those living and working in informal settlements. However, limited capacity in energy planning, mobilising finance and partnering with the private sector often hinders nationally scaling up and replicating market-led energy access interventions.

The private sector has proven to be a key facilitator in accelerating energy access through innovative, sustainable, and environmentally and socially impactful approaches. The private sector can support local governments in delivering their mandates related to energy access, job creation, poverty alleviation and improving the well-being of urban dwellers. However, private companies need support, including access to capital, market scoping, community profiling, route-to-market strategies and technical assistance to build locally relevant business and delivery models.

1. Background and Objectives

The report serves as a reference for funders, policymakers and the private sector, focusing on addressing financing needs for clean cooking interventions in urban informal settlements. The recommendations on public financing for clean cooking are drawn from lessons learned during the ENACT project rollout in the Kisenyi informal settlement in Kampala, Uganda, and Susan's Bay in Freetown, Sierra Leone. The report highlights finance mechanisms that address financial and economic barriers to adopting clean cooking technologies, aiming to be broadly relevant to informal settlements.

1.1. Purpose and Scope

The recommendations in this report are intended to align with a broader policy and regulatory support program for clean cooking, particularly in informal settlements. The report is informed by in-depth discussions with national and local governments, funders and private enterprises, from which ENACT has gleaned insights into funding requirements, market coverage, gaps and opportunities. It recommends appropriate public finance mechanisms that best support emerging clean cooking business models in these markets.

1.2. Objectives and Assumptions

The report aims to provide the public sector with proposals and recommendations on how public finance mechanisms can enhance access to clean cooking in informal settlements. This objective is based on the premise that

- (i) governments play a critical role in enabling the diffusion of clean cooking technologies and fuels, and
- (ii) beyond creating an enabling environment, governments can develop and implement strategies that translate policies into practical programs.

1.2.1. Government commitment and knowledge consolidation

The report assumes that governments are committed to fostering the development of resilient human settlements that enhance the well-being of their inhabitants. It aims to consolidate knowledge while offering practical proposals for public finance mechanisms that can realistically be applied to the clean cooking market. The report limits its scope to public finance mechanisms that address barriers to access and viability at the last mile.

1.2.2. Insights from the ENACT project

The proposals for public finance mechanisms are drawn from experiences from the ENACT project in Uganda and Sierra Leone. Many barriers to clean cooking adoption identified through the ENACT project's work align with those in other hard-to-reach contexts, including informal settlements elsewhere. Therefore, the public finance mechanisms presented in the report are intended to illustrate the public sector's potential role in contributing to the viability and scalability of clean cooking access models that address barriers consumers face in these challenging environments across sub-Saharan Africa.

1.2.3. Contribution to global and national targets

The report acknowledges that access to clean cooking improvements is included as a target within global, national and sub-national frameworks. By proposing solutions to the access and viability barriers experienced by market segments within the clean cooking value chain, including consumers, the document aims to contribute to achieving clean cooking, environment and climate targets and ultimately supporting the universal access goals of Sustainable Development Goal 7 (SDG 7).

Definition and role of public finance mechanisms

For this report, a public finance mechanism refers to financial interventions led by the public sector that improve the affordability of clean cooking technologies and fuels. This encompasses financial instruments and strategic approaches the public sector employs to mobilise, allocate and manage resources for clean cooking initiatives.

The ENACT project employs a private sector-led, market-based approach to increase clean cooking access for residents of informal settlements. In this context, public finance mechanisms are defined as external interventions by governments, including donor-supported initiatives, that enhance the affordability and accessibility of clean cooking technologies. This report explores the role of public sector financing in advancing access to clean cooking technologies and fuels in hard-to-reach urban settlements in sub-Saharan Africa.



Kisenyi (Kampala, Uganda) resident using LPG stove (Source: Green Lens)

2. Structure

This report is organised to provide a clear and concise guide for funders, policymakers and the private sector. It is divided into several key sections:

- **Context of clean cooking:** Discusses the scale of the clean cooking challenge, especially in informal settlements, addressing issues of availability, accessibility and current energy access financing.
- **Public finance mechanisms:** Introduces public finance mechanisms, explaining their importance and the roles of the public sector in designing these mechanisms for clean cooking.
- **Market segments and barriers:** Identifies key market segments and barriers, including financial market maturity, regulatory frameworks and political economy influences.
- **Public sector frameworks and policy instruments:** Explores how public sector frameworks and policy instruments can be tailored to market needs, including market assessment and the Multi-Tier Framework (MTF) for Cooking.
- **Linkages to the private sector:** Highlights the role of private enterprises in scaling clean cooking solutions and how public finance mechanisms can support these efforts.
- **Public finance mechanisms for clean cooking:** Examines various public finance mechanisms, including blended finance models, funding sources and specific financial instruments like revolving and guarantee funds.
- **Models for public finance mechanisms:** Presents conceptual frameworks, guiding principles and implementation options for public finance mechanisms, including government-directed and contracted service provider models and subsidy options.

3. Context of clean cooking: The scale of the problem

3.1. Informal Settlements and Service Provision

Globally, informal settlements are home to an estimated one billion people. More than 4.6 billion people live in cities and towns, or 55% of the world's population. This figure is expected to rise to 70% by 2050, with most of the growth projected in Africa and Asia. The urban population in Africa alone is expected to triple between 2015 and 2050, reaching 1.5 billion people, representing two-thirds of Africa's population and 22% of the world's total population.

Sub-Saharan Africa (SSA) is urbanising at lower global domestic product (GDP) per capita levels than other regions, increasing the urban poor population. By 2030, it is estimated that 50% of the region's population will reside in urban areas, with two-thirds living in areas to be considered to be informal settlements (UN-Habitat, 2022). Close to 60% of African urban dwellers live in these underserved areas.

While cities offer opportunities for wealth creation, employment and improved quality of life, these benefits are not equally distributed among urban residents. Informal settlements are often excluded from urban plans and strategies, resulting in inadequate provision of basic services, including access to energy. These areas are typically characterised by insecure tenure, poor-quality housing and a lack of basic services, including access to clean cooking fuels and technologies.

Historically, efforts to upgrade informal settlements have focused on providing shelter, water, sanitation and waste removal, often neglecting the critical need for clean energy solutions. However, there is growing recognition of the importance of energy access for socio-economic development. This has led to the increasing integration of clean cooking solutions and other alternative energy access technologies into development planning for underserved urban areas.

The lack of access to clean cooking energy for the urban poor has numerous detrimental impacts at the household level, including negative health outcomes such as high rates of respiratory and cardiopulmonary illnesses. Additionally, a significant portion of household incomes is spent on cooking fuel, and substantial opportunity costs are associated with the time burden of cooking-related activities. These impacts disproportionately affect women and children, highlighting the gendered dimensions of the problem.

Beyond the household level, reliance on traditional energy sources contributes to broader negative environmental and climate-related impacts, including poor local air quality, significant contributions to GHG emissions, deforestation and related issues like land degradation, soil erosion and increased occurrences of landslides. In densely constructed informal settlements, the unsafe use of cookstoves and other open flames frequently leads to fires, resulting in the loss of assets and livelihoods.

The International Energy Agency (IEA) has developed scenarios for improving access to clean cooking. The most ambitious scenario, "Access for All," aims to increase the number of people with access to clean cooking technologies and fuels in sub-Saharan Africa from about 80 million in 2023 to 1.2 billion by 2030.

Women and girls are often the most adversely affected by traditional cooking methods, as they are typically responsible for collecting fuel. The IEA estimates that switching to clean cooking could save households an average of 1.5 hours per day, which could be redirected to education or income-generating activities. The collective time savings from increasing access to clean cooking for 1.1 billion people in Africa is significant.

Furthermore, 60% of premature deaths in Africa are among women and children due to smoke inhalation and other respiratory illnesses related to traditional cooking methods. The IEA projects that by increasing access to clean cooking for 1.1 billion people in Africa, the number of premature deaths could decrease from 3.5 million in 2023 to 970,000 by 2030.

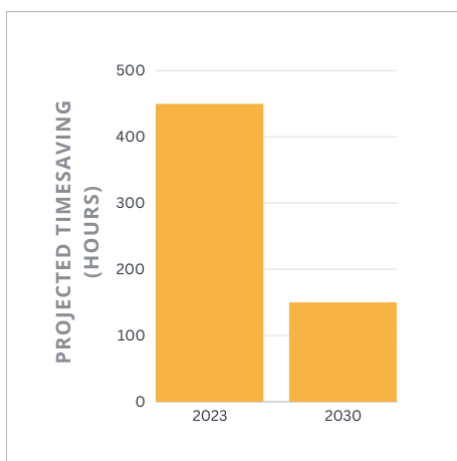


Figure 1: Projected timesaving (hours) in IEA "Access to All" clean cooking scenario (IEA, 2023)

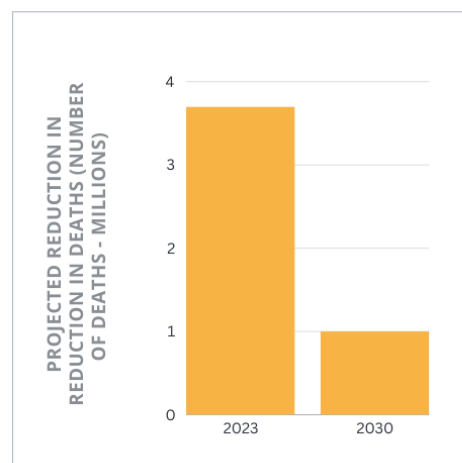


Figure 2: Projected reduction in the number of premature deaths (number of deaths) in IEA "Access to All" clean cooking scenario (IEA, 2023)

The upfront costs for clean cooking technologies and fuels prohibit access, particularly in low-income countries such as Sierra Leone, one of the world's poorest countries. Sierra Leone's GDP per capita was \$433 in 2023, compared to the world average of \$13,138 (World Bank Group, 2023). This necessitates finding more financial capital to fund clean cooking programmes.

3.2. Availability and accessibility

Modern energy sources are often considered available or accessible in the market. However, practical availability and accessibility can be subjective, context-specific and influenced by justice issues. For instance, residents of informal settlements may be classified as having access to grid electricity due to their proximity to grid infrastructure. Yet, they may be unable to obtain formal connections under existing regulatory frameworks, forcing them to rely on informal, inferior connections at a higher per-unit cost.

Similarly, clean cooking options might be technically available in the market, but residents may lack access due to factors such as cost, willingness to pay or lack of awareness about the product or its benefits. Extending access to clean cooking is vital for growth and development and is essential for a fair energy transition. From 2023 to 2030, approximately \$22 billion per year is needed to connect all homes and businesses in Africa to electricity, with an additional \$4 billion annually required to provide clean cooking solutions. These investments represent less than 1% of global energy investment.

3.3. Energy access finance

The landscape of energy access in Africa is evolving alongside innovations in technology and business models. Distributed renewable energy technologies, such as solar photovoltaic (PV) systems and clean cookstoves, are gaining traction, offering scalable solutions for off-grid and underserved communities, including those in informal settlements.

Since 2010, an estimated 180 million off-grid solar systems, including 30 million solar home systems (SHSs), have been deployed globally, showcasing the potential for decentralised energy solutions to address energy poverty. Despite the progress made with SHSs, the global electricity access gap remains significant, with progress being modest and largely driven by Central and Southern Asian countries. By 2030, the IEA estimates that around 660 million people, or 92% of the population, will still lack access to electricity.

When it comes to clean cooking technologies and fuels, global access rates are even lower. While 91% of the world's population has access to electricity (IEA, 2024), only 74% had access to clean cooking fuels and technologies in 2022. In cities across sub-Saharan Africa, just 40% of the population has access to clean cooking technologies and fuels.

Affordability is also a significant barrier; only half of the households without electricity can afford basic energy services without financial support, and even fewer can afford modern cooking solutions. Raising education and awareness about the health, social and environmental benefits of clean cooking – especially for women and girls – is essential to encouraging a shift towards clean cooking, alongside providing financial support.

Public sector initiatives, such as fiscal incentives for the private sector, including subsidies, loans and tax incentives, play a crucial role in enhancing the business viability of private sector actors. These mechanisms can attract increased investment and help address the affordability gap, particularly in sub-Saharan Africa, where rapid urbanisation and the prevalence of informal settlements exacerbate energy access challenges.

4. Public Finance Mechanisms: What are they?

The report defines a public finance mechanism as a financial intervention backed by the government that is applied to the implementation of activities that contribute to a particular *policy objective*. The definition of public sector finance mechanisms used in the report considers that governments can use combinations of funding sources, investment strategies, financial instruments and implementation management approaches to support public sector programmes.

This report refers to policy objectives that focus on improving access to clean cooking, emphasising the so-called "last mile".

■ Definitions

The report makes use of the following definitions:

Public sector	The part of the economy that is controlled and operated by government entities. This includes government services, resources and activities that are funded by public money and aimed at serving the public as a whole. The public sector encompasses various governmental organisations, agencies, and enterprises that are responsible for providing essential services and infrastructure to the general population. For this report, the definition of the public sector includes both the domestic and international public sectors, including those development partners supported by the government that contribute to the attainment of government policy goals.
Public sector finance	<p>The management of financial resources by government entities and public institutions. It involves the processes of budgeting, funding, allocating and overseeing public money to support government functions and public services. Public sector finance aims to ensure efficient and effective use of taxpayer money to achieve economic stability, support public welfare and promote equitable access to services.</p> <p>The scope of public sector finance can include:</p> <p>Domestic revenue collection: This is how governments gather funds through taxes, duties, fees and other sources.</p> <p>External revenue mobilisation: Including Official development assistance (ODA) that represents inflows of funds from foreign governments, international organisations or multilateral institutions.</p> <p>Budgeting: Planning and allocating financial resources for various public programs and services.</p> <p>Expenditure management: Managing the spending of public funds on public services, infrastructure and other government initiatives that are aligned with policy objectives.</p> <p>Financial reporting and accountability: Making sure that there is transparency and accountability in the use of public funds.</p>

Public finance mechanism	A system or method used to mobilise, allocate and manage public financial resources to achieve specific policy goals or support certain programmes. They encompass the structures, processes and tools employed to facilitate financial transactions and investments in public sector projects. Finance mechanisms are used by the public sector to ensure efficient and effective use of financial resources to achieve policy objectives.
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Briketi stove in use (Source: Green Lens)

5. Designing Public Finance Mechanism for clean cooking

The design, applicability and effectiveness of a public finance mechanism for supporting clean cooking access initiatives for informal settlements is dependent on context-specific factors that are interrelated and interdependent. It is useful to consider these factors when developing public finance mechanisms to support clean cooking transitions.

Figure 3 suggests that the relevant factors to be considered are market barriers, market segments, legislative and regulatory frameworks and the maturity of financial markets.

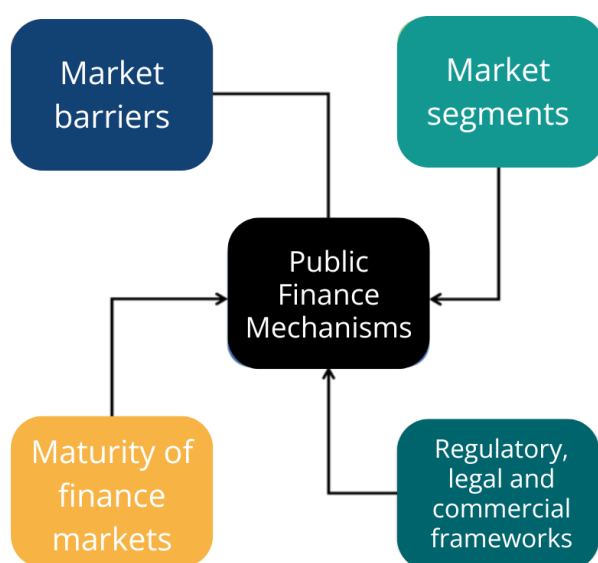


Figure 3: Considerations for the design of public finance mechanisms (adapted from Wang et al., 2023)

5.1. Market Segments

Addressing specific market segments within the clean cooking value chain is crucial when designing public finance mechanisms. These segments are important for improving access in informal settlements and are prioritised in this report based on their impact on last-mile operations. Key market segments to focus on include:

- **Barriers to business viability for distributors and retailers** Distributors and retailers face significant challenges that can affect their ability to effectively provide clean cooking solutions. Addressing these barriers can improve the overall distribution network and market reach.
- **Consumer access barriers:** Consumers in informal settlements often encounter obstacles in accessing clean cooking technologies. Public finance mechanisms should target these barriers to enhance consumer access and adoption.

- **After-sales service and maintenance sector:** The effectiveness of clean cooking solutions also depends on reliable after-sales service and maintenance. Supporting this sector can ensure the sustainability and long-term success of clean cooking initiatives.

Additional market segments, such as supply-side elements, including producers, manufacturers and developers of innovative technologies and fuels, also play a role. However, focusing on the above market segments is suggested as a priority for public finance mechanisms supporting government-backed programs or policies.

Market segment	Example target for public finance mechanism	Details
Distributors and retailers	Distribution networks	Public sector investment in infrastructure, such as household electricity connections, enhances the distribution of clean cookstoves and fuels to underserved communities. Government-backed last-mile delivery services can bridge the gap in accessibility.
	Retail support programmes	Public sector grants from government or donors, and low-interest loans to local retailers and small businesses, can help them stock and promote clean cooking technologies, ensuring widespread availability.
Consumers	Subsidy programmes	Direct subsidies to consumers can significantly lower the upfront cost of clean cookstoves and fuels. Voucher systems and rebate programs can make these technologies affordable for low-income households.
	Government-backed microfinance	Establishing or supporting microfinance institutions with public funds allows for the provision of small, low-interest loans tailored to the financial capacities of low-income consumers.
	Consumer awareness and outreach	Funding educational programs and awareness campaigns helps consumers understand the benefits and proper usage of clean cooking technologies, promoting sustained adoption.
Providers of after-sales services and maintenance	Service and maintenance networks	Public sector investment in training programs for local technicians ensures that maintenance and repair services are available, extending the lifespan and efficiency of clean cookstoves. This can include supporting local service centres and providing technical support for in-warranty technology or building technical capacity within the existing informal economy for affordable repair of technologies as the market matures.

Table 1: Tailoring public finance mechanisms to market segments

5.2. Market Barriers

In urban informal settlements, several challenges make it difficult to adopt clean cooking technologies:

Marker barriers	Description
High upfront costs	Clean cooking technologies often require a significant initial investment, which many residents cannot afford due to limited access to credit.
Distribution and maintenance issues	The crowded and unplanned nature of these settlements complicates the setup of reliable distribution and maintenance networks, especially for technologies like electricity.
Dependence on traditional fuels	Many residents use traditional biomass fuels, which are readily available and can be bought in small quantities despite their health risks.
Cultural resistance	There can be resistance to changing traditional cooking practices and scepticism about the safety and suitability of new technologies for local foods
Economic and political resistance	The informal economy in these areas heavily relies on traditional fuels, which can create resistance to adopting cleaner alternatives.

Table 2: Examples of market barriers for informal settlements

5.3. Maturity of Financial Markets

The state of financial markets affects how public finance mechanisms for clean cooking are designed.

- **Developed financial markets:** Countries with mature financial markets offer many financing options, such as low-interest loans and green bonds, to support clean cooking projects.
- **Less-developed financial markets:** In countries with less-developed financial systems, many people cannot access formal banking or credit. Public finance mechanisms must address these challenges by considering alternative financing approaches accessible to underserved populations.
- **Limited formal banking:** Many people do not have access to traditional bank services.
- **Low financial literacy:** Understanding and using financial products can be challenging for many.

In informal settlements in least developed countries (LDCs), commercial banks and other FIs, including microfinance institutions, can play a role by offering specialised loans for clean cooking technologies, though their reach may be limited.

Agent banking, which uses local agents to extend banking services, can help bridge this gap by providing access to financial services in underserved areas. Mobile money platforms are

particularly impactful, offering a flexible, accessible means for transactions, savings and micro-loans, which can facilitate the adoption of clean cooking technologies.

Thus, integrating these elements – commercial banks, agent banking and mobile money – into public finance mechanisms is a potential strategy for adapting to the lower maturity of financial markets and addressing access barriers for informal settlement markets.

5.4. Regulatory, Legal, and Commercial Frameworks

When designing public finance mechanisms for clean cooking in informal settlements, it is important to consider how different regulatory, legal, and commercial frameworks can support immediate and long-term goals. These frameworks include rules related to clean cooking and climate and regulations for local trade, such as business licenses, trading practices, consumer protection and public space management. Here are some examples of how public sector regulatory, legal and commercial frameworks can support clean cooking initiatives over different timeframes.

Immediate-term	Introduce foundational mechanisms: Quickly implement basic finance mechanisms, like subsidies and grants, to lower the upfront costs of clean cookstoves and fuels. This helps low-income households afford these technologies.
	Simplify regulations: Make it easier to approve and distribute clean cooking technologies. Streamlining these processes can speed up their availability in communities.
	Public awareness: Launch campaigns to inform residents about the benefits of clean cooking. Partner with local organisations and entrepreneurs to reach more people and implement programs effectively.
	Pilot programs: Start small-scale pilot programs to test different approaches. Use the insights gained to improve broader strategies.
Short-term	Solidify mechanisms: Focus on making sure the initial finance mechanisms are working well. Address any logistical issues that come up.
	Streamline processes: Create clear guidelines and simplify approval processes to encourage private sector participation.
	Set quality standards: Ensure that clean cooking technologies meet basic quality standards and are accessible and effective.
	Refine frameworks: Use feedback and new data to adjust policies and finance mechanisms. Support innovative financing models like microfinance and pay-as-you-go systems.
Medium-term	Build capacity: Offer training programs and strengthen partnerships with local stakeholders to address ongoing challenges and expand reach.
Long-term	Integrate with broader policies: Embed clean cooking initiatives into wider energy and environmental policies to create a stable regulatory environment.

	Develop and enforce standards: Set robust standards to encourage ongoing innovation and ensure continuous improvement.
	Monitor and evaluate: Establish mechanisms for regular monitoring and evaluation to adapt to new technologies and changing needs. This helps maintain the effectiveness of finance mechanisms and ensures lasting benefits in health, environment and economic outcomes in informal settlements.

5.4.1. The influence of the political economy

The role of political economy should be noted as a dependency, bottleneck or risk for either the constructive development or effective implementation of any public finance mechanism. The impact of political economy issues may involve linkages between political and economic interests at various levels, ranging from the international level to the very local level of informal settlement communities themselves.

At the international level, the political economy of finance for clean cooking is a dynamic and multifaceted arena shaped by a blend of global initiatives, diverse stakeholders and competing interests. While multilateral institutions, along with bilateral aid from wealthier nations, private sector investments and carbon financiers endeavour to fund or apply finance to clean cooking solutions, national entities with designated responsibility for clean cooking initiatives may be directly or indirectly impacted by interests in the fossil fuel sector.

Advocates of the fossil fuel industry emphasise the economic advantages of continued investment in traditional energy sources, highlighting benefits like job creation and economic growth. While these interests do not always directly conflict with clean cooking initiatives, they can divert attention and resources away from these goals. Policies at both international and national levels, such as those outlined in the Paris Agreement and the SDGs, support the transition to clean energy. However, they must navigate the challenges posed by the deeply rooted interests of the fossil fuel sector.

At the very local level, the political economy of clean cooking may be shaped by the competing interests between the entrenched informal biomass fuel industry and local political and cultural leaders against the entry of improved cookstoves and fuels by formal sector providers. The success of clean cooking initiatives depends on addressing these competing interests through education, financial accessibility, and the creation of new economic opportunities that align with the adoption of improved cooking technologies.

6. Public Sector Frameworks and Policy Instruments

Barriers to accessing clean cooking are more severe in informal settlements. The public sector plays a crucial role in overcoming these barriers. By consistently applying well-designed and complementary public sector frameworks and using appropriate policy instruments, governments can provide the certainty and stability required for an increased level of private sector investment required to finance the clean cooking transition. The public sector is, therefore, in a position to directly contribute to clean cooking access gains for residents of informal settlements.

In informal settlements, where supply and demand-side barriers are usually more significant than adjacent formal settlements, the public sector's role in operationalising these frameworks consistently and cohesively through the use of appropriate policy instruments is critical to a just transition. When aligned with people-centred and inclusive approaches, such public sector interventions can address the specific needs of these communities, ensuring that clean cooking initiatives are both effective and equitable (IEA, 2024).

By linking public sector efforts with community engagement, job creation and skills development in informal settlements, public sector frameworks can help create an enabling environment where clean cooking solutions are available and accessible and contribute to broader social and economic development. This approach is critical to overcoming barriers to clean cooking adoption and making the transition more inclusive, sustainable and successful.

6.1. Public Sector Framework or Policy Instrument?

Public sector frameworks and policy instruments are related but distinct in their roles in shaping and implementing public sector clean cooking programmes. Public sector frameworks are overarching structures or systems that provide a broad guideline or set of principles for developing and implementing policies. In contrast, policy instruments are specific tools or methods used to implement policies and achieve the objectives outlined in a framework.

Aspect	Public sector frameworks	Policy instruments
Definition	Overarching and providing broad guidelines or principles for policy development and implementation	Specific tools or methods used to implement policies and achieve objectives
Purpose	Offer strategic direction and a comprehensive view to guide policy development	Directly influence behaviour, allocate resources and manage processes for policy execution
Scope	High-level, broad and strategic, encompassing multiple aspects of policy areas	Narrower and more focused, dealing with concrete actions and operational details
Examples	<ul style="list-style-type: none"> - National Energy Policy - Sustainable Development Goals (SDGs) framework - Clean Cooking Compacts (SE4All) 	<ul style="list-style-type: none"> - Regulatory standards (e.g., emissions standards for cookstoves) - Economic instruments (e.g., subsidies, tax incentives) - Informational campaigns (e.g., public awareness about clean cooking)

Role	Serve as a blueprint or roadmap, aligning efforts and ensuring coordination with broader objectives	Provide the direct actions and tools needed to operationalise and achieve policy goals
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Table 3: Distinction between public sector frameworks and policy instruments

Policy instruments are essential tools used to achieve specific policy objectives and drive effective implementation of public policies. They translate broad policy goals into actionable steps, using various methods to influence behaviour, allocate resources and manage processes. The successful implementation of policy instruments involves careful planning, coordination and evaluation to ensure that they achieve their intended outcomes.

Public finance mechanisms play a crucial role in supporting the implementation of public and private sector initiatives to achieve specific objectives, including promoting clean cooking solutions. Specifically, public finance mechanisms provide the financial resources and structure necessary for deploying various policy instruments effectively. For example, subsidies and grants funded through public finance mechanisms can reduce the cost of clean cookstoves and fuels, making them more accessible to low-income households.

6.2. Public Sector Frameworks

Policy frameworks outline broad objectives and goals at the strategic level, providing overall direction and setting priorities for government action. They define what needs to be achieved and guide the allocation of resources.

At the operational level, where public sector programmes are practically implemented, the consistent application of regulatory, legal and commercial frameworks can contribute to an enabling environment for clean cooking uptake. These frameworks are structured approaches or guidelines that define how activities, transactions and relationships, including those in the commercial space, are conducted within a particular context. They outline the rules, procedures and standards that govern interactions between the public sector and businesses or between businesses and their customers.

Effective frameworks at the operational level are essential if the public sector is to fulfil its potential to unlock the necessary private sector investment in clean cooking technologies. Beyond strategic-level policy statements and target setting, effective operational-level frameworks have the potential to create certainty in the clean cooking sector and thus build confidence that can lead to increased financial investments in clean cooking from both the public and private sectors.

- **Regulatory frameworks** are derived from policy frameworks, translating policy goals into specific, actionable regulations.
- **Legal frameworks** provide the necessary legal authority for these regulations and policies, ensuring that regulatory actions are enforceable and that there is a legal basis for implementation.
- **Commercial frameworks** align with both regulatory and policy frameworks, ensuring that commercial activities support policy objectives and comply with regulations.

Level	Framework	Scope	Clean cooking examples
Strategic	Policy framework	Broad strategies and plans developed by governments to guide decision-making and achieve specific objectives. Their primary purpose is to set priorities, allocate resources and define the approach for achieving long-term goals. These frameworks include various components such as policy statements, strategic plans, action plans and guidelines.	National policy aimed at promoting the transition to clean cooking solutions to improve public health and environmental outcomes. This policy would outline the government's commitment to supporting clean cooking initiatives, set specific targets for adoption rates and allocate resources to programs that facilitate the distribution and use of clean cooking technologies.
Operational	Regulatory frameworks	Systems of rules and guidelines issued by government agencies or regulatory bodies to manage specific activities, industries or sectors. Their primary purpose is to ensure safety, compliance and standardisation within these areas. These frameworks comprise various components, including regulations, standards, enforcement mechanisms and compliance procedures.	Standards for emissions and efficiency of cookstoves. This ensures that the technologies used are not only safe for household use but also environmentally friendly and effective in reducing indoor air pollution. By setting and enforcing these standards, regulatory frameworks help protect public health and promote the adoption of cleaner, more efficient cooking solutions.
	Legal frameworks	Constitutes the broader system of laws and legal principles that govern the sector and underpin regulatory frameworks. Their primary purpose is to provide the foundational legal basis for enforcing regulations, resolving disputes and ensuring justice. These frameworks are composed of various elements, including statutes, case law, legal codes and judicial interpretations.	A legal framework might include laws mandating the use of clean cooking technologies to reduce indoor air pollution. Such laws provide the necessary authority to implement and enforce standards for clean cooking solutions, ensuring that they meet specific health and safety requirements. By establishing these legal mandates, the framework supports efforts to protect public health, promote environmental sustainability and facilitate the

			adoption of safer cooking practices.
	Commercial frameworks	Consists of structures and guidelines that govern commercial activities, transactions and business relationships. Their primary purpose is to facilitate efficient and fair trade, protect consumer rights and promote market stability. These frameworks encompass various components, including contracts, pricing structures, procurement processes and competition rules.	In the context of clean cooking, a commercial framework might involve contractual agreements between government entities and private companies for the supply of clean cooking technologies. Such agreements ensure that the procurement and distribution of these technologies are conducted fairly and transparently, benefiting both suppliers and consumers.

Table 4: Hierarchy and scope of policy, regulatory, legal and commercial frameworks and links to clean cooking examples

Policy

Sustainable Development Goals (SDGs): Global policy frameworks like the SDGs set targets for clean energy access, which can influence national and local policies on clean cooking.

Climate targets: Targets for GHG abatement (e.g., NDCs) can result in investments in clean cooking carbon projects.

National energy policy: A national energy policy might set overarching goals for increasing clean cooking adoption and reducing reliance on traditional biomass.

Health and environment policies: Addressing health and environmental issues can promote the adoption of clean cooking solutions to reduce indoor air pollution and deforestation.

Regulatory frameworks	Legal frameworks	Commercial frameworks
Product certification requirements: Certification requirements can ensure that products meet specific safety and performance criteria before they can be marketed or sold (e.g., ISO testing).	Contracts and agreements: Contracts and agreements between stakeholders, such as government contracts with suppliers, can establish terms for the provision and support of clean cooking technologies.	Market-based incentives: Commercial incentives could include subsidies, tax breaks or carbon credits for businesses that produce or distribute clean cooking technologies.
Import tariffs or duties: Regulatory measures like	Consumer protection laws: Consumer protection laws	Public-private partnerships: PPPs between governments

import tariffs and duties on stoves and fuels can influence the affordability and availability of clean cooking technologies.	might enforce standards for product quality, warranties and customer service for clean cooking devices.	and private companies can help scale the adoption of clean cooking technologies and create viable business models.
Emission standards: Emission standards could regulate the amount of pollutants that cooking devices can emit, ensuring they meet health and environmental standards (e.g., voluntary performance testing).	Clean cooking laws: Legal frameworks might include laws mandating the sale of certified clean cooking technologies or prohibiting the sale of certain high-emissions stoves or certain fuel types.	Microfinancing and financing options: Commercial frameworks might include microfinance schemes or pay-as-you-go models to make clean cooking solutions more accessible to low-income households.

Table 5: Selection of policy, regulatory, legal and commercial frameworks that could underpin an enabling environment for scaling clean cooking access to informal settlements

7. Tailoring to the market and technology

To effectively enable the adoption and scaling of clean cooking technologies, public finance mechanisms should be flexible enough to be tailored to specific market conditions and the different pathways for clean cooking technology and fuel transitions.

The diversity in clean cooking access levels and financial viability for market-driven clean cooking solutions for informal settlements means that a one-size-fits-all approach to policy or funding strategies is unlikely. This could even be the case at a city scale, where urban authorities might be advised to consider the unique characteristics of individuals, settlements, or even sub-sections individually when designing appropriate mechanisms.

The reason for this is the sheer number of distinct informal settlements in many cities, each often differing significantly from others. As a result, the design of public sector clean cooking initiatives should be partially shaped by each settlement's particular characteristics. This diversity can relate to the nature and security of land tenure, relocation plans, presence of encumbrances to grid electrification, levels of existing service delivery, levels of employment or proximity to formal economic centres, age and gender profile of residents, cultural or political orientations, levels of community organisation or safety considerations etc. Effective design and implementation of successful and sustainable clean cooking access initiatives necessitate the inclusion and proactive participation of local authorities in the planning, resource mobilisation, implementation, monitoring and evaluation of initiatives.

This section provides suggestions for adapting policy instruments and public financing mechanisms to address the unique challenges and opportunities at each tier of market access. By aligning strategies with market conditions and technological needs, policymakers and stakeholders can enhance the effectiveness of interventions, drive technological adoption and ultimately achieve sustainable improvements in clean cooking access and usage.

7.1. Market assessment and barrier analysis

Urban authorities are advised to evaluate various factors to effectively tailor policy instruments and accompanying public financing mechanisms for clean cooking access in informal settlements. While a comprehensive and resource-intensive data-gathering exercise may not be necessary or desirable in all cases, the greater the granularity of the information informing the selection of intervention approaches, the greater the prospects of success.

Domain	What to consider
Market context and demand assessment	Current market landscape: Assess the existing market conditions for clean cooking technologies by analysing factors such as market size, growth trends and the competitive environment. Understand current adoption rates, technology penetration and consumer preferences. Examine the distribution of clean cooking solutions

	<p>across different settlement contexts and identify areas with high potential for market expansion.</p> <p>Demand and supply analysis:</p> <p>Conduct a detailed analysis to understand the dynamics of both demand and supply. Evaluate the current demand for clean cooking technologies, considering demographic trends, economic conditions and cultural factors that influence consumer behaviour. Identify gaps between market needs and available supply, including the availability and accessibility of clean fuels, production capacities and the efficiency of distribution networks, including electricity.</p> <p>Consumer insights:</p> <p>Explore consumer attitudes towards clean cooking technologies. Assess factors such as perceived benefits, affordability and willingness to pay, and other barriers to adoption. Use surveys, focus groups and market research to gather data on consumer preferences and willingness to adopt new technologies.</p>
<p>Technological viability and innovation</p>	<p>Technology assessment:</p> <p>Evaluate the maturity and feasibility of various clean cooking technologies. This includes examining their performance metrics, such as energy efficiency, emissions reductions and durability. Compare these technologies with traditional cooking methods to highlight their advantages and potential for improvement. Assess whether the technologies meet the needs of different consumer segments and environments.</p> <p>Innovation opportunities:</p> <p>Identify areas where technological advancements can enhance clean cooking solutions. Look for opportunities to improve technology performance, reduce costs and increase scalability. This may involve researching technologies being offered by the private sector, enhancing energy efficiency or developing integrated solutions that address multiple barriers simultaneously.</p> <p>Technology readiness level:</p> <p>Determine the readiness level of different technologies by assessing their development stages and commercial viability. Consider factors such as ongoing research and development, pilot projects and market trials to understand the progression of technologies from concept to market-ready solutions.</p>
<p>Barriers to adoption</p>	<p>Consumer barriers:</p> <p>Identify and analyse obstacles that hinder consumer adoption of clean cooking technologies. These barriers may include high initial costs, lack of awareness or understanding of benefits, cultural preferences for traditional cooking methods and perceived inconvenience. Assess the impact of these barriers on different consumer segments and geographic regions.</p>

	<p>Supply-side barriers:</p> <p>Examine issues related to the supply chain and infrastructure that affect the availability of clean cooking technologies. This includes challenges such as limited access to clean fuels, inadequate distribution networks and logistical constraints. Assess the impact of these barriers on the ability to scale up technology deployment and ensure consistent availability.</p>
	<p>Business viability barriers:</p> <p>Understand the challenges faced by businesses in the clean cooking sector, including financial risks, market entry difficulties and operational constraints. Assess the economic viability of different business models and identify factors that impact profitability and sustainability. Consider the role of policy and financing in addressing these challenges and supporting business growth.</p>

Table 6: Scope of considerations which may be factored into such an assessment

By focusing on these aspects, the public sector can develop a comprehensive understanding of the current market dynamics, technological potential and barriers to adoption. This will inform the design of effective policy instruments and financing mechanisms for clean cooking technologies.

Figure 4 on the next page shows how a market assessment and barrier analysis can inform appropriate policy instruments and public finance mechanisms for enhancing clean cooking in informal settlements. The table is based on example assessments of barriers to access for various tiers of clean cooking access and is based on the MTF for Cooking.



Aerial view of Kisenyi (Kampala, Uganda) (Source: Green Lens)

7.1.1. Multi-Tier Framework for Cooking

Under the World Bank’s Energy Sector Management Assistance Programme (ESMAP), the MTF for cooking was developed and has been refined through ongoing consultations with partners and field survey feedback.

The MTF for cooking provides a more nuanced approach than the traditional binary (access/no-access) method, which has been used to track progress toward SDG target 7.1 (By 2030, ensure universal access to affordable, reliable and modern energy services). While the binary approach has been instrumental in highlighting the scale of the issue – showing that 2.8 billion people still lack access to clean cooking solutions – it falls short of capturing the full spectrum of challenges. Many households, even with access to clean stoves and fuels, do not achieve modern cooking practices due to affordability, safety, fuel availability and convenience.

The MTF assesses multiple dimensions of clean cooking access, such as user behaviour, cooking conditions, the use of diverse cooking solutions, convenience and safety. It facilitates both granular and aggregate analyses, providing detailed information across various parameters and indices that enable comparisons over time and across geographic regions. The MTF for cooking evaluates six key attributes: exposure, efficiency, convenience, safety, affordability and fuel availability, with progress measured across six tiers, from 0 to 5.























	STOVE TECHNOLOGY & FUEL	EFFICIENCY	VENTILATION	TIME	COST	IMPACT
TIER 0-1 NO ACCESS	 Open fire, three-stone stove or traditional stove with traditional solid fuel (e.g., firewood, charcoal, dung, agricultural residue).	 Less than 20%	 Poor	 More than 7 hours per week for fuel acquisition and preparation	 Stove cost \$0-\$5  Fuel cost per month \$0-\$30 Fuel is often collected for free or purchased through local market.	 Significant negative health, climate, and gender impacts.
TIER 2-3 IMPROVED	 Improved cookstove (e.g., rocket stove, natural draft gasifier with traditional solid fuel, pellets/briquettes, or kerosene).	 20%-40%	 Improved	 Less than 7 hours per week	 Stove cost \$10-\$30  Fuel cost per month \$0-\$18 Fuel switching is not required. Households save fuel expenditure or time required for collection due to stove efficiency improvement.	 Good climate and gender equality improvement due to reduced fuel usage. Limited health improvement as indoor air can remain polluted.
TIER 4-5 MODERN	 Modern cooking appliance with clean cooking fuel (e.g., biogas, LPG, ethanol, electricity, and natural gas or forced air gasifier with pellets).	 Above 40%	 Good	 Less than 1.5 hours per week	 Stove cost \$40-\$100  Fuel cost per month \$10-\$30  Downstream infrastructure cost per household \$50-\$1,000 Household spends less than 5% of the total expenditure on fuel cost	 Negative health, climate, and gender impacts are significantly mitigated.

Figure 4: MTF for clean cooking (Source: *The State of Access to Modern Energy Cooking Services*, World Bank (2020))

For public sector planning, it is highly relevant to consider MTF. As governments and policymakers strive to meet policy targets, the MTF offers a comprehensive tool that goes beyond simple metrics, allowing for a more strategic approach to planning and implementing clean cooking initiatives. The MTF’s detailed assessment of various attributes enables

policy-makers to identify specific barriers and tailor interventions that address different regions and populations' unique needs. This framework supports the development of targeted public policies and programs that can incrementally improve access to clean cooking solutions, ensuring that progress is measured not just by adopting clean fuels but by improving cooking practices and conditions.

By integrating the MTF into public sector planning, governments can better allocate resources, design effective policy instruments and implement financing mechanisms that reflect the actual needs of the population. The MTF's multi-dimensional perspective reveals the true scale of the challenge, emphasising the need for comprehensive and context-specific strategies to achieve meaningful progress in clean cooking access. This approach ensures that public investments and interventions are more likely to succeed in creating sustainable, long-term improvements in energy access for cooking. (World Bank, 2020)

Access level	Description or definition	Barriers to be addressed	Policy instruments to address barriers	Public finance mechanisms
Tier 2-3 Improved Access (potential financial viability)	Demand and supply-side barriers as well as suppressed demand exist for some stove technology and fuel combinations, but financial viability for investors is subject to barriers to scale.	Consumer affordability gap with respect to upfront cost	Incentives, subsidies and microfinancing	Grants and subsidies for pilot/demonstration projects linked to private sector product research and development (R&D) and/or business model development
	Demand-side barriers can be largely addressed through innovative solutions, but significant concessional financing and grants need to be applied to reach scale. Supply-side barriers related to fuel require similar innovative solutions and effective enforcement of regulation. Technology is, however, economically viable and desirable	Viability gap for businesses with the potential to address this market	Indirect subsidies, including tax exemptions, waivers on duties and carbon financing	Grants or subsidies for market entry phases of projects Concessional financing for scaling up of private-driven sector clean cooking access
		Weak business case for hard-to-reach urban markets leading to businesses favouring entry to more permissive markets	Grants and subsidies for pilot/demonstration projects linked to the implementation and improvement phases of product R&D and business model development processes	Indirect subsidies, including tax exemptions, waivers on duties, carbon financing, grants and subsidies for the private sector

	across a variety of developmental domains.	Improved fuels are not cost-competitive with traditional biomass (e.g., fuelwood and charcoal)	Regulation and enforcement of fuelwood harvesting and charcoal production	Carbon financing to support technology adoption and transition
		Low levels of awareness of clean cooking and its benefits to health, household budgets and environment	Government public awareness campaigns and educational initiatives	Funding for development and delivery of public awareness campaigns and educational programs
Tier 4-5 Modern Access (not yet financially viable)	Technologies in this category are economically viable and justified by their developmental benefits. However, they face significant supply and additional demand-side barriers, including latent demand and supply-side constraints.	Sub-optimal supply-side infrastructure leading to low levels of availability (e.g., grid electricity supply and LPG infrastructure)	- Investments in infrastructure - Connection subsidies - Support for developing supply chains and distribution networks	- Public investment in infrastructure development (e.g., grid expansion, LPG distribution) - Subsidies or targeted financing for infrastructure projects
		Electricity tariff structures that are sub-optimally designed for bottom-of-the-pyramid consumers	Adjustments in electricity tariff structures	Adjustments in electricity tariffs to make clean cooking technologies more affordable

Table 7: Policy instruments and financing mechanisms need to be tailored to technology and market

In markets where transitions to clean cooking access are assessed as economically viable but face barriers to scale, targeted policy instruments such as subsidies, microfinancing and regulatory enforcement are essential. These tools address challenges related to consumer affordability, supply-side constraints and market entry hurdles. For example, subsidies can reduce the upfront cost of clean cookstoves, while regulatory measures can ensure sustainable fuel supply and environmental compliance.

Conversely, comprehensive strategies are needed in markets where clean cooking technologies are still emerging and face significant supply and demand-side barriers. This includes addressing issues such as inadequate infrastructure and sub-optimal tariff structures. Financing mechanisms such as grants for infrastructure development and adjustments in tariff

policies are critical to overcoming these barriers and enabling broader adoption of modern technologies.

7.2. Linkages to the Private Sector

As outlined in the examples in Table 7, public sector policy instruments and finance mechanisms can link to the private sector's activities in the clean cooking market in several ways and are particularly important to scaling access. Public sector finance mechanisms create a bridge between government policies and private sector activities. These links have the potential to ensure that commercial activities align with policy objectives, regulations and societal needs. To support this alignment, governments can employ various financial and non-financial measures that address specific barriers and incentivise private sector involvement.

Financial measures: Governments can contribute to enabling market conditions for the private sector by effectively using regulatory, legal and commercial frameworks. They can do this by addressing barriers to business viability in hard-to-reach markets and through financial interventions, including tax incentives, subsidies and targeted financing schemes that reduce the upfront costs for consumers and businesses.

Non-financial measures: Non-financial measures included within clean cooking frameworks should prioritise safety standards, quality assurance and consumer protection to ensure the widespread adoption and sustainable deployment of clean cooking solutions. Non-financial measures might also include institutional reforms, such as establishing dedicated units or agencies to enhance stakeholder coordination, raising awareness and implementing large-scale programmes, including carbon abatement projects.

8. Public Finance Mechanisms for Clean Cooking

Table 8 outlines specific public finance mechanisms designed to enhance clean cooking initiatives.

The table outlines various examples of public finance mechanisms designed to support and enhance clean cooking projects. Each mechanism is described with its specific purpose. It highlights how these financial tools can address barriers, incentivise private sector participation, and ultimately, drive broader adoption of clean cooking technologies in informal settlements.

Financing mechanism	Description	Purpose
On-tariff financing	Financing customer payments using the utility billing system	Helps customers pay for e-cooking technologies through utility bills, spreading out costs over time
Energy efficiency (EE) funds	Demand side management (DSM) programs supported by public benefit funds	Provides dedicated resources for DSM programs, driving biomass energy savings and efficiency improvements
Dedicated credit lines	Special credit lines extended to banks and financial institutions (FIs) to increase clean cooking project lending	Encourages FIs to lend for energy-clean cooking projects by providing specific credit lines
Risk-sharing programs	Partial risk or credit guarantees to reduce financing risk for banks and FIs	Lowers the perceived risk for lenders, making it easier for them to finance clean cooking projects
Leveraging commercial financing	Facilitating performance contracting through energy service companies (ESCOs)	Utilises commercial finance mechanisms to drive clean cooking access through performance contracting of the private sector
Equity funds	Providing equity financing for clean cooking projects or for ESCOs	Supplies necessary capital for clean cooking projects or for ESCOs, enabling project scaling
Outcomes finance	Results-based financing (RBF) or social impact bonds tied to the achievement of specific outcomes	Links funding to the performance and impact of clean cooking projects, ensuring investments are effective
Connection (access) subsidy	Financial support to reduce the initial cost of connecting to electricity services or accessing clean cookstove technology	Lowers the cost barrier for customers, facilitating access to energy efficiency services

Table 8: Public finance mechanisms for scaling clean cooking initiatives

8.1. Blended Finance for Clean Cooking Initiatives and Public Sector Programs

Blended finance utilises catalytic capital from public or philanthropic sources to attract private sector investment in developing countries, supporting the achievement of policy goals. This approach allows various stakeholders to invest together, pursuing financial returns, social impact or both. Blended finance creates viable opportunities that increase development impact by addressing barriers such as high perceived risk and inadequate returns compared to similar investments. In the context of clean cooking initiatives and public sector programs, blended finance can be a transformative tool for mobilising resources and scaling solutions.

Blended finance is a structuring approach rather than a specific investment strategy, instrument or end solution. It combines different sources of capital to enhance financial attractiveness and impact, making it particularly relevant for clean cooking initiatives and public sector programs.

8.1.1. Common blended finance structures

Below-market capital provision: Public or philanthropic investors provide funds on below-market terms within the capital structure. This reduces the overall cost of capital and offers additional protection for private investors. Subsidising the cost of clean cooking technologies or infrastructure for clean cooking initiatives would make these projects more financially viable for both public sector programs and private partners.

Credit enhancement: Credit enhancement through guarantees or insurance on below-market terms helps reduce perceived risk for private investors. In the context of clean cooking, such guarantees might cover potential financial losses or mitigate risks associated with new technologies or market entry, encouraging private investment in projects that improve cooking efficiency and reduce health hazards in informal settlements.

Grant-funded technical assistance: Grant-funded technical assistance facilities support projects before or after investment. This can strengthen clean cooking projects' commercial viability and developmental impact by providing expertise, capacity building and technological support. Public sector programs can benefit from technical assistance to ensure clean cooking initiatives are effectively designed, implemented, and scaled.

Grant-funded transaction design: Grants used for transaction design or preparation, including feasibility studies and project development, help structure clean cooking projects. This funding ensures that initiatives are well-prepared to attract further investment and achieve impactful outcomes. For public sector programs, such grants can support the development of large-scale initiatives aimed at the widespread adoption of clean cooking technologies.

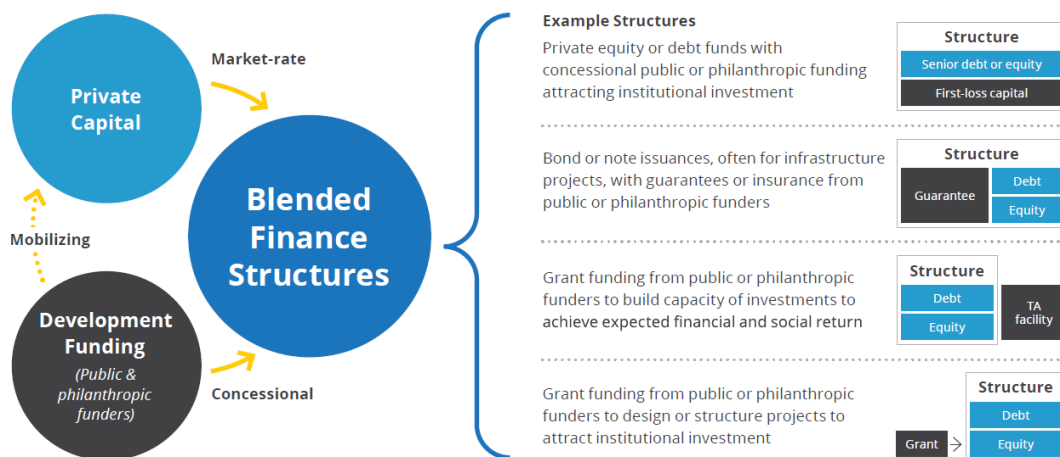


Figure 5: Typical blended finance mechanics and structure (Source: Convergence, 2021)

8.1.2. Application of blended finance to clean cooking initiatives

Blended finance can significantly enhance clean cooking initiatives by overcoming financial barriers and fostering private-sector engagement. By lowering the cost of capital and reducing investment risks, blended finance makes clean cooking solutions more accessible and scalable. This approach helps increase the adoption of clean cooking technologies in informal settlements, improving health, reducing environmental impact and driving sustainable development.

8.1.3. Use of blended finance for public sector programs

Blended finance supports public sector programs by integrating various sources of capital to address funding gaps and enhance programme effectiveness. Specific applications include:

- **Public-private partnerships (PPPs):** Blended finance can facilitate PPPs where public funds are combined with private investment to scale clean cooking projects or infrastructure development. These partnerships can drive large-scale initiatives and achieve a broader impact.
- **Sector-specific funds:** Creating dedicated funds through blended finance combines public subsidies with private investment to finance clean cooking projects and public sector programs. This approach supports large-scale deployment and innovation in clean cooking technologies.
- **Innovation and research:** Blended finance can fund research and innovation in clean cooking by combining grants with private investment. This supports the development and deployment of new technologies that address specific needs in informal settlements.

By leveraging blended finance, public sector-supported can achieve greater impact, address critical challenges, and maximise investment benefits. This approach ensures that resources are effectively utilised to drive sustainable and transformative outcomes.

9. Funding Sources

9.1. Sources of financial flows

There are different ways to classify financial capital. One foundational classification is defining the source of financial capital. Sources of financial capital can be either domestic or international and can come from both public and private sectors, as illustrated in Figure 7.



Figure 6: Sources of financial capital (Author's own)

9.2. Financial capital categorisation

This section provides an overview of the different categories of financial capital and related financial instruments and identifies key providers of each type of financial capital.

9.2.1. Equity finance

Equity finance is financial capital provided to a company by a financier in exchange for shares in the company. Shareholding gives the provider of financial capital economic and voting rights. Economic rights are a return on investment paid to the shareholder as dividends – in other words, a portion of profit paid to shareholders. Dividends are paid proportionately to shareholding. For example, if Person A owns 10% of the company, they will receive 10% of the dividends. Shareholders may choose to sell their shares in a company or have a pre-determined date when they will sell their shares to the company or another provider of financial capital. Shareholders would prefer to sell their shares at a price higher than what they paid for their shares as another form of return on investment. The expected return on investment for financiers is directly related to the level of risk they perceive when providing equity finance.

Shareholders may have voting rights that entitle them to vote on certain company decisions. Companies can choose to source equity finance at the company's inception or at a point where the company needs to finance an expansion or project. The cost of debt finance is typically

lower than equity finance. In other words, the risks associated with debt finance are lower than those associated with equity finance; therefore, the cost of equity finance is usually higher. Companies will choose equity finance as the preferred option when debt finance is not an option – for example, when the company's balance sheet can't take on any more debt financing.

Public equity is financial capital that flows to companies publicly listed on a stock exchange, such as the Financial Times Stock Exchange (FTSE), the London Stock Exchange, or the Johannesburg Stock Exchange. Private equity is financial capital that flows to companies not listed on a stock exchange.

Equity providers include venture capitalists who invest in early-stage, high-risk companies, retail investors (individual investors) and institutional investors (asset managers, pension funds, etc.) who buy shares in listed (public) or unlisted (private) companies on behalf of clients.

9.2.2. Debt finance

Debt finance is financial capital provided to a company or a special purpose vehicle by a financier for a period of time in exchange for interest payments and a repayment of the principal (initial) investment amount. The interest expected by the financier is related to the amount of risk the financier perceives to be taking by providing debt finance. Interest is expressed as a percentage of the principal (initial) investment amount and is repaid at specific intervals – annually, for example. If the initial investment is \$100,000 and the interest rate is 10% per annum and payable annually, then the investor will be paid \$10,000 yearly.

Debt to companies can be provided as corporate finance or off-balance sheet debt.

A common form of corporate debt is a bond. The financial capital raised through the sale of bonds is used to finance specific social or environmental outcomes. Financiers that purchase bonds are paid interest in accordance with a coupon rate. The coupon rate is the interest rate calculated as a percentage of the value of the bond at the date that the bond will be repaid (face value). For example, if the face value of a bond is \$100,000 and the coupon rate is 10%, then the bond purchasers will be paid 10% of the proportion of the bond they own. Bonds can be purchased by one or more financiers.

One of the most common types of off-balance sheet debt is project finance. Project finance is debt used to fund a specific activity or programme. A special purpose vehicle is established, and the debt is provided to it for a specific purpose. The debt is repaid from future revenue generated by the special-purpose vehicle by selling goods or services.

Providers of debt finance include banks, export credit agencies, retail investors, and institutional investors who buy debt instruments on behalf of their clients, governments that provide debt finance to other countries, central banks that purchase debt instruments and multilateral and bilateral development finance institutions.

9.2.3. Subordinated debt finance

Subordinated debt is sometimes referred to as "junior debt". This means that when debt has to be repaid, financiers that hold "senior debt" will be repaid first, and financiers that hold subordinated debt will be paid after senior debt holders. Mezzanine debt is a common subordinated debt with the option to convert a portion of the debt to equity under certain

conditions. Therefore, mezzanine debt assumes many of the characteristics of equity finance, which is why mezzanine debt is sometimes called "quasi-equity".

Subordinated debt is sought by companies that seek finance at a lower cost than the cost of equity and/or whose balance sheets do not allow for more senior debt.

9.2.4. Grant finance

Grant finance is financial capital provided to a country or organisation that does not need to be repaid, nor is there an expected financial return on investment. Grant finance provided by governments or public FIs to other governments or organisations and intended for developmental purposes is categorised as official development assistance. In exchange for official development assistance, a positive developmental outcome is expected in the recipient country.

Grant finance can include conditions attached to the finance. It is in the recipient's best interest to carefully consider the conditions and their impacts. If it is anticipated that one or more conditions could have an adverse effect, the recipient should not receive the grant funding, however attractive "free" money may seem. In the past, structural adjustment programmes imposed by multilateral development banks have adversely impacted recipient countries, as the conditions were generic and did not work in all country contexts.

9.2.5. Credit enhancement finance

Credit enhancement finance is financial capital allocated to minimise risk by transferring the risk of a programme, project or company to another party better placed to manage it. Common credit enhancement finance instruments include first-loss guarantees and risk guarantees.

First-loss guarantees are a credit enhancement instrument that will pay all or a portion of the principal debt if the recipient of the debt is unable to repay some or all of the debt at the time it is due for repayment. These are popular instruments that de-risk a finance opportunity and make it more attractive to providers of financial capital.

Risk guarantees are guarantees against different risks, including credit, political and currency risks. This type of finance is insurance-like in that it will pay all or a portion of the value of the principal debt if the risks guaranteed by the risk guarantee occur. For example, Government A understands that investments in their country are viewed as risky. The Government gives a guarantee to Financier A that if any pre-defined political risks are realised, then Government A will pay Financier A a portion or all of the principal amount that was contingent on political certainty as a risk mitigation measure.

Governments, export credit agencies and multilateral, bilateral and national development finance institutions are providers of credit enhancement finance.

Some providers of credit enhancement instruments provide credit enhancement finance for climate-aligned outcomes.

9.3. Funding sources for Clean Cooking Programmes

9.3.1. Domestically mobilised revenues

The public sector has a variety of traditional means of funding energy access programmes which could potentially be channelled towards clean cooking programmes, including:

- existing budgets;
- national grants extended to sub-national government structures to support policy implementation; and
- cross-subsidisation through electricity tariffs where revenue from electricity consumers can be redirected to fund clean cooking programs.

The following table outlines the pros and cons of utilising domestically mobilised revenues to fund clean cooking programmes, highlighting the opportunities and challenges associated with leveraging existing public finance mechanisms.

Pros	Cons
<ul style="list-style-type: none"> ▪ Leveraging existing institutional infrastructure: Many governments have experience using funds generated at the sub-national level, national budgets, and grants as traditional mechanisms for funding energy access and development programs. This existing infrastructure and experience can be adapted to support clean cooking initiatives, reducing the need for new administrative frameworks. ▪ Integration with broader development goals: By channelling funds through existing budgetary and grant systems, clean cooking programmes can be integrated into broader development agendas, ensuring that these initiatives are part of a comprehensive strategy for improving energy access, public health and environmental sustainability. 	<ul style="list-style-type: none"> ▪ Insufficient funding distribution: Nationally distributed grants, once divided among sub-national governments and allocated across various development priorities, may be insufficient to meet the financial needs of comprehensive clean cooking programs. The risk of underfunding is particularly high in regions with limited fiscal capacity and competing development priorities. ▪ Competing priorities: Both national and sub-national governments often face a multitude of pressing development needs, such as healthcare, education and infrastructure. This competition for limited funds can result in clean cooking programmes being deprioritised or receiving only a small portion of the available budget. ▪ Dependence on external aid: Many countries, especially in the least developed regions, rely heavily on ODA to finance their energy and development programs. This dependence can create vulnerabilities, especially if external funding decreases or becomes unpredictable. Relying on domestically

	mobilised revenues might help reduce this dependence, but it could also strain already limited national resources.
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While domestically mobilised revenues offer a promising avenue for funding clean cooking programs, their effectiveness depends on careful planning, prioritisation and coordination across all levels of government. Balancing the allocation of these funds with other development needs and ensuring that clean cooking programmes receive adequate support would be critical to their success. Moreover, reducing dependence on external aid through stronger domestic revenue mobilisation could enhance the sustainability of these programs, though it requires robust fiscal management and political commitment.

Case study

South Africa Department of Energy Non-Grid Electrification Programme

Government subsidies played a crucial role in extending rural electrification by covering 80% of the capital cost for solar home systems, making the fee-for-service model viable for low-income households. These subsidies were designed to be temporary, with regular evaluations to ensure efficiency. The Free Basic Electricity (FBE) policy, introduced in 2003, further supported low-income households by providing up to 80% of the monthly service fee for off-grid solar systems. Municipalities were responsible for implementing the FBE policy and ensuring eligible households received the necessary subsidies.

9.3.2. Official development assistance (ODA)

ODA financial support from foreign governments, international organisations and development agencies is aimed at supporting public projects in developing countries, including clean cooking initiatives.

Official development assistance (ODA) is a well-established flow of finance from a public sector organisation in one country to another region or country for development purposes. It is typically grant finance, which does not require repayment.

Official development assistance increased from \$218 billion in 2022 to \$224 billion in 2023 (Organisation for Economic Co-operation and Development (OECD), 2024). This trend of increasing official development assistance continues, as illustrated in Figure 8. Official development assistance provided in 2023 was 33% greater than pre-COVID (2019) official development assistance. The United States is the greatest contributor to official development assistance, as illustrated in Figure 9

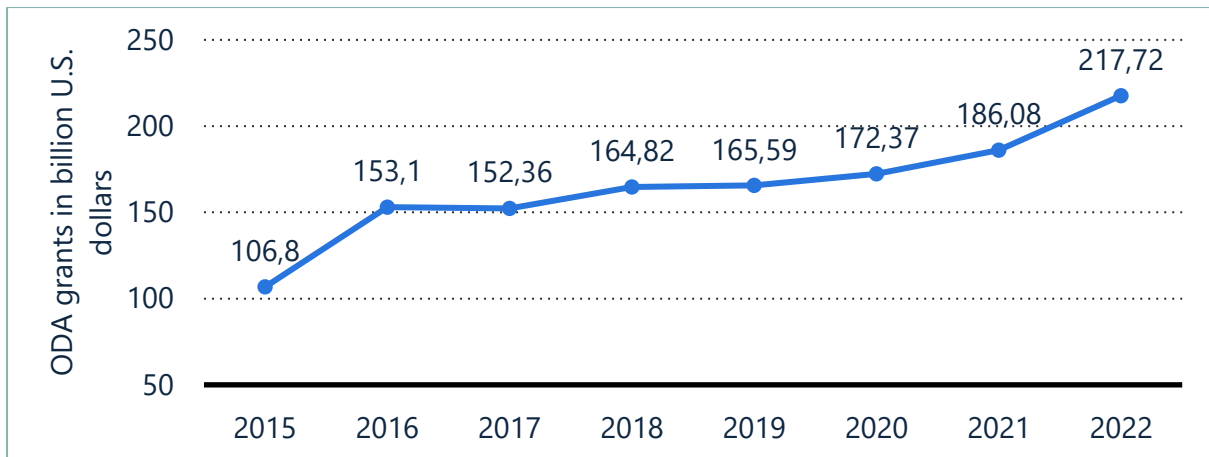


Figure 7: Total value of official development assistance from 2015-2022 in US\$ billion (Author's own based on Statista, 2022)

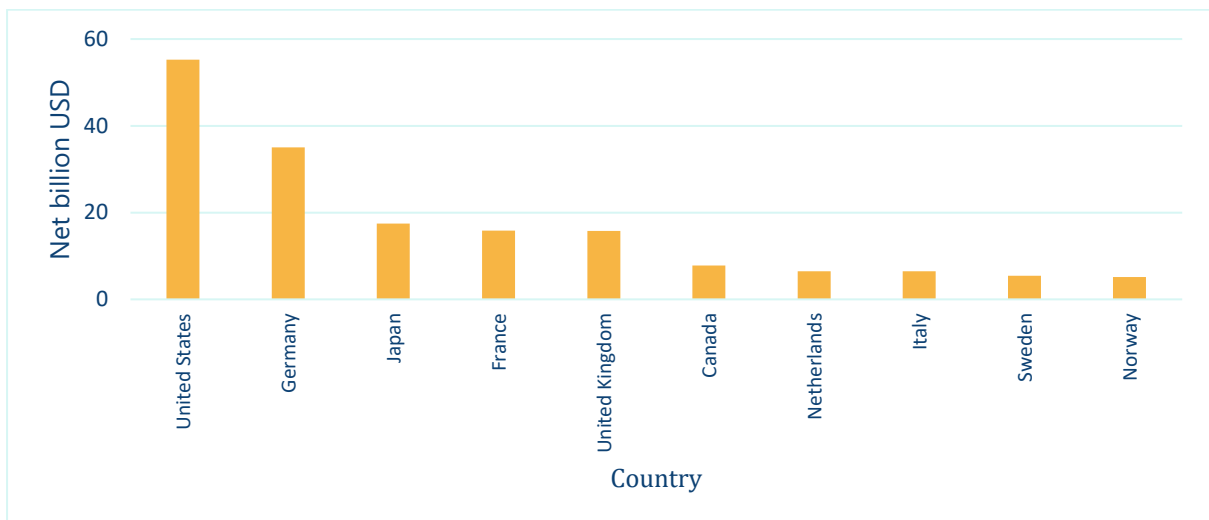


Figure 8: Official development assistance by origin country 2002, net billion US (Author's own based on Statista, 2022)

The majority of official development assistance is directed to social infrastructure and services. This includes health-related programmes with which clean cooking programmes are aligned. Sub-Saharan Africa (SSA) receives the greatest proportion of official development assistance relative to other regions, as illustrated in Figure 10. This means that official development assistance will remain a key source of finance for SSA in the future and should continue to be explored by governments and organisations working in African countries. This is followed by economic infrastructure, services, and energy infrastructure, including clean cooking, which will fit into this categorisation. This makes clean cooking programmes well-positioned for official development assistance.

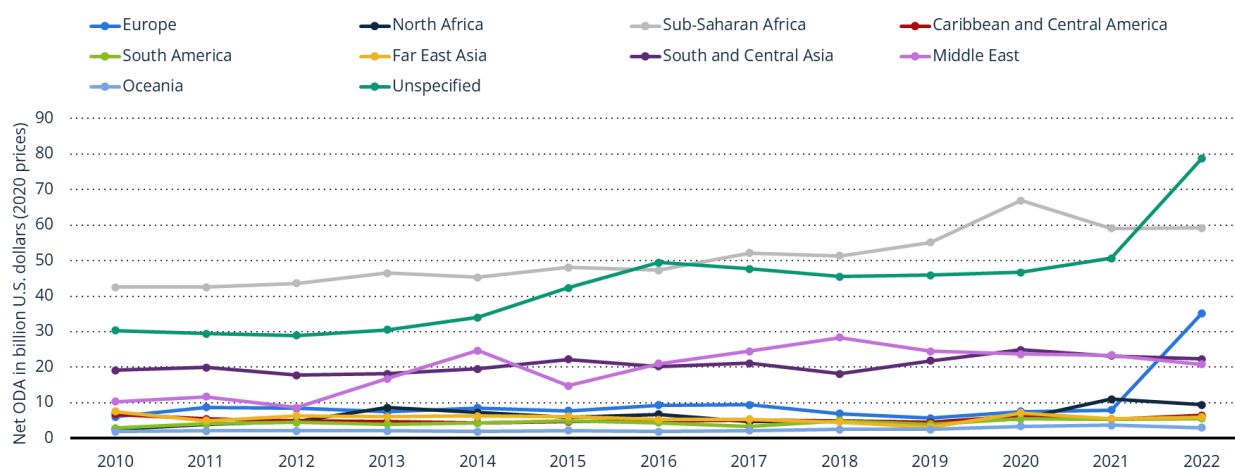


Figure 9: Net official development assistance (ODA) by region in constant 2020 prices (2010–2022) in US\$ billion (Author’s own based on Statista, 2022)

Pros	Cons
<ul style="list-style-type: none"> ▪ The missions of social and environmental benefits align well with the mandates of official development assistance. ▪ Official development assistance is typically grant funding, and therefore, no repayment of the funding is required. ▪ The amount of official development assistance is increasing, which means that there is more finance to tap into. ▪ SSA is a popular destination for official development assistance, and this can be leveraged to illicit further financing. 	<ul style="list-style-type: none"> ▪ Official development assistance may have conditionalities attached to the finance that the recipient may not want to accept but is forced to accept if they need the finance. ▪ Regional or country-specific contexts may make the recipient country or organisation unattractive for providers of official development assistance. ▪ It is highly structured and not sufficiently flexible to be redirected to more impact-bearing activities if there are changes to the programme

Table 9: Pros and cons of ODA as a source of funding for public programmes

Case study

United States Agency for International Development

The United States Agency for International Development (USAID) is a major global provider of official development assistance. USAID has established the Climate Finance for Development Accelerator. USAID has committed \$250 million to this fund to leverage a further \$2.5 billion for countries to access to meet their Paris Agreement Nationally Determined Contribution (Clean Cooking Alliance, 2023c). The design, production and distribution of clean cooking technologies and fuels to communities in African countries fits well with the fund's mandate, as clean cooking can reduce carbon dioxide emissions.

For country-to-country official development assistance, local authorities can work with national governments to assemble a package of support initiatives for more than one local authority. The funding received by the national government would need to be directed to respective local authorities through the national treasury department. Alternatively, local authorities can work with a multilateral organisation like the African Development Bank, which receives about 25% of all official development assistance (Statista, 2022).

9.3.3. Crowdfunding

Crowdfunding is an innovative finance mechanism that uses a digital intermediation platform, like a website or application, to match individuals or businesses seeking funding for personal or commercial projects with those with the financial resources to invest or provide loans. Finance is provided in return for repayment of a loan amount plus interest for debt-based finance or dividends or similar returns for equity-based finance. In some instances, finance is provided as grant funding, where the financier expects no repayment or returns. This is referred to as donations-based crowdfunding.

Crowdfunding platforms can facilitate debt-based, equity-based and/or donations-based finance for a campaign. A campaign is an asset or activity for which funding is sought. An individual, group or business sets a targeted amount of finance to be raised for a campaign. The type of finance facilitated is dependent on the crowdfunding platform. Finance is typically channelled to small businesses and individual or group campaigns.

The amount of finance facilitated by crowdfunding platforms varies but often tends to be relatively small, with an average of \$8,500 (Statista, 2024). The global annual average value of the crowdfunding market from 2017 to 2023 is approximately \$1.2 billion. This is projected to grow to \$1.3 billion by 2028, as illustrated in Figure 10. Africa represents 0.1% of the annual crowdfunding market, an estimated \$1.2 million annually. There are a growing number of campaigns in Africa, and the average value of each campaign is increasing, which is different from that of other parts of the world. This illustrates that crowdfunding remains a viable finance sourcing mechanism for projects in Africa, and there is an opportunity to leverage further finance from crowdfunding platforms for clean cooking programmes.

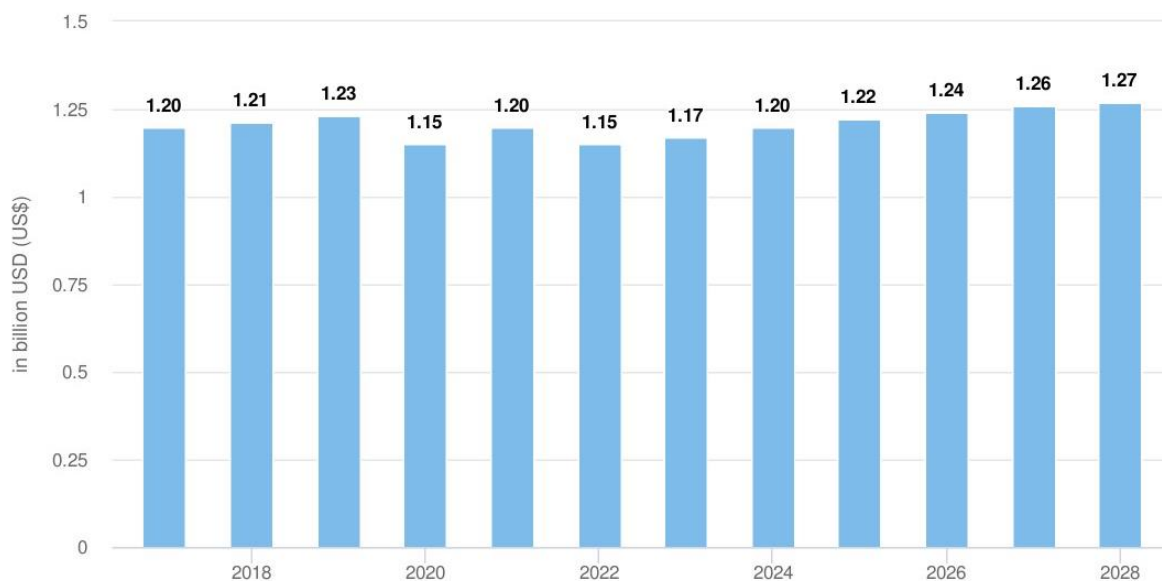


Figure 10: Crowdfunding transaction values actual and projected, 2017-2028, US\$ billions (Source: Statista, 2024)

Clean cooking technologies and fuels for households in Africa could be a good fit for a group crowdfunding campaign. A donations-based, all-or-nothing campaign would be best suited to raise finance for a group of households' clean cooking needs. An all-or-nothing campaign is where the beneficiary receives finance only after reaching their target amount. This differs from a keep-it-all campaign where the beneficiary keeps all finance raised, even if the finance raised is below the targeted amount. This approach would not work for a group of households as each household would receive less than required, or only some households would be able to benefit, and this would be unfair.

Local authorities can be involved by registering households seeking financing for clean cooking technologies and fuels. It is better for a group of households to register a campaign than for individuals to register a campaign and effectively compete against one another for finance. A local authority is a viable mechanism to channel funding to households. It is recommended that the local authority be responsible for determining the finances required for the appliances and fuels for each registered household. This should include the cost of procuring and distributing clean cooking technologies and fuels to registered households. The local authority can register a clean cooking project on a crowdfunding platform, including the targeted amount. It is recommended that a separate bank account be set up to receive finance from the crowdfunding platform and to pay for the procurement and distribution of clean cooking technologies and fuels for registered households.

Pros	Cons
<ul style="list-style-type: none"> ▪ It is a relatively cheap and quick mechanism for accessing finance. ▪ No upfront financial resources are required, but human resources will be required to put together and launch the campaign. 	<ul style="list-style-type: none"> ▪ The success of the campaign is outside of the control of the local authority. ▪ The targeted amount for an all-or-nothing campaign may not be reached, or only a portion of the targeted amount needed is raised in a keep-it-all

<ul style="list-style-type: none"> ▪ Credible platforms are linked to potential financiers who use the platform to finance campaigns aligned with their respective missions. This reduces transaction costs of finding viable financiers. ▪ The local authority can aggregate the beneficiaries into one campaign, as opposed to many small, individual campaigns. 	<p>campaign, and the local authority would need to decide how to distribute the proceeds fairly.</p> <ul style="list-style-type: none"> ▪ There may be scepticism by financiers to give funding to a local authority. ▪ Crowdfunding platforms that facilitate donations-based finance are limited. ▪ It is important to select an appropriate platform to register the campaign, but often, better platforms require a facilitation fee. The facilitation fee could be added to the campaign amount.
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Alternatively, a private sector entity can register a debt-based campaign. The entity can purchase clean cooking technologies and fuels with the finance raised via a crowdfunding platform. The entity would then sell (appliances and fuel) or enter a rent-to-buy agreement or other consumer finance agreement (technologies) with individuals and repay the loan with the income generated from the sale or rental income. This would need to be a large campaign to reach economies of scale that make the campaign viable. A case study of this approach is outlined on the next page.

Case study

Bettervest

Bettervest is a crowdfunding platform that specialises in sustainability-linked debt-finance campaigns. The platform has hosted 11 clean cooking campaigns that have benefitted people in the Democratic Republic of Congo, Ghana, Kenya, Mozambique, Nigeria, Rwanda, Tanzania, Uganda and Zambia countries since 2012. The total amount raised for clean cooking solutions across eleven campaigns is \$3,718,888, with an average campaign amount of \$311,186. Most of these campaigns used finance raised via Bettervest to purchase clean cooking technologies and fuel, sell technologies and fuel, or enter into a rent-to-buy arrangement for appliances with beneficiaries.

The success of previous clean cooking campaigns is the aggregation of procurement and distribution of clean cooking technologies and fuels, which increases economies of scale. It is possible for the local authority to partner with a private sector organisation, where the local authority works with the private sector organisation to identify potential beneficiaries.

9.3.4. Philanthropic finance

Mission-led not-for-profit organisations provide philanthropic finance. Typically, these organisations are founded by high-net-worth individuals, family offices, or charitable foundations of companies, and they tend to have a welfare focus. Finance provided by

philanthropic foundations is usually in the form of donations. Still, increasingly, foundations are providing finance in the form of catalytic capital (further described in the next section), such as first-loss guarantees or mezzanine debt, often to reduce inherent risks in a welfare programme.

According to the Organisation for Economic Co-operation and Development (OECD), the world's largest 40 private philanthropic foundations provided an estimated \$10.4 billion for various programmes in 2022. The amount of finance provided by private philanthropic foundations has increased by about 11% per year over a ten-year period. About 3% (\$319 million) of finance provided by philanthropic foundations was earmarked for various energy-related programmes.

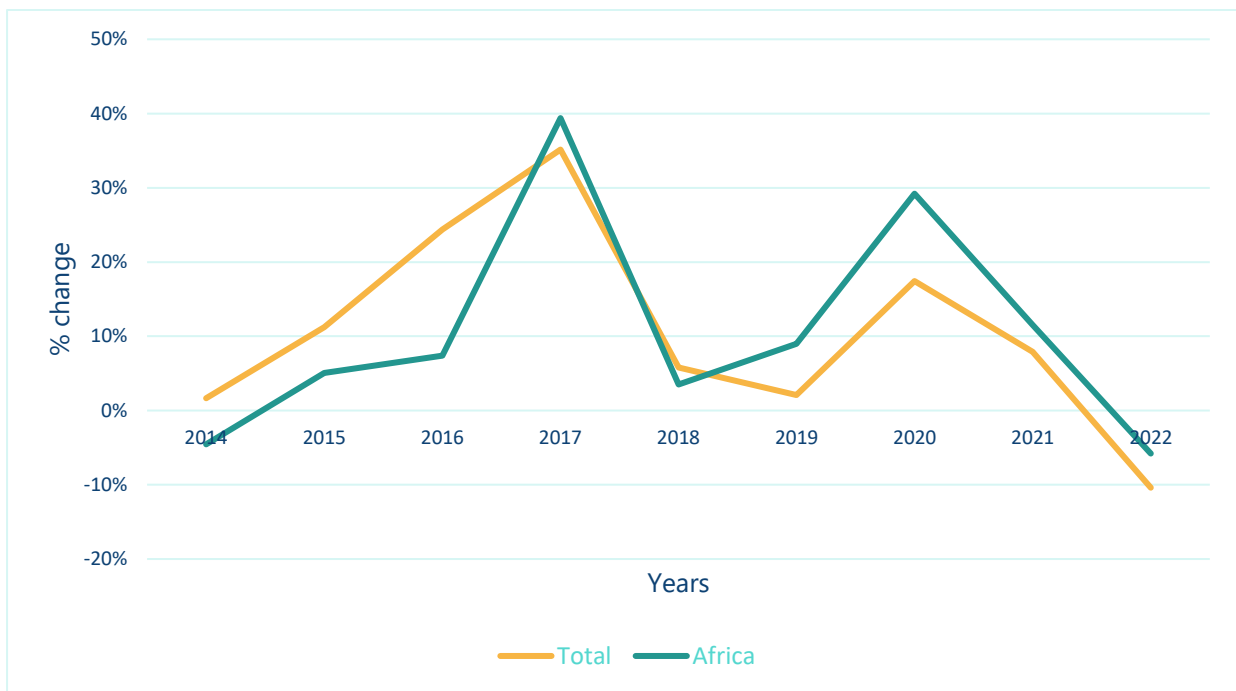


Figure 11: Annual change in philanthropic finance from 2014 to 2022 in per cent (Authors own based on OECD, 2024)

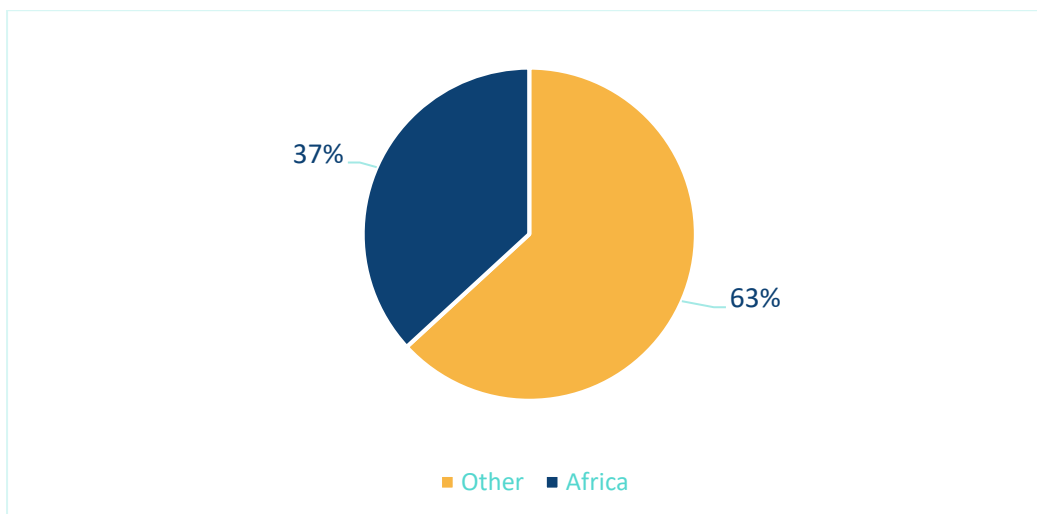


Figure 12: African share of philanthropic finance in 2022 (Authors own based on OCED, 2024)

More than one-third of finance from philanthropic foundations flows to Africa, as illustrated in Figure 12. This equated to \$3.8 billion in 2022. The proportion of finance from philanthropic foundations that have flowed to Africa has increased from 27% of total philanthropic finance in 2018 to 37% of total philanthropic finance in 2022, indicating an increasing willingness of large private philanthropic foundations to finance programmes in Africa. There has been a greater annual increase in philanthropic finance flowing to Africa than the rest of the world, as illustrated in Figure 11.

Pros	Cons
<ul style="list-style-type: none"> ▪ There is an increasing amount of philanthropic finance available, and Africa is an increasingly popular region for this type of finance. ▪ Finance is often donations-based, and therefore, there is no need to repay funding received. ▪ Technical assistance may be included in the support package provided, either as mandatory technical assistance provided by the foundation or finance for technical assistance as part of the funding package. 	<ul style="list-style-type: none"> ▪ Individual applications are required, and different foundations have application processes that can be time-consuming. Local authority officials would need to have the right structures, time and capabilities to develop credible and successful funding applications. ▪ Foundations often have very specific mission mandates, thematic focus areas and funding calls. This means that recipients need to actively search for mission-aligned foundations and their respective calls. ▪ Funding is not always available to local authorities, but it often needs to be channelled directly into a fund management mechanism, a not-for-profit welfare organisation, or an SME. Local authorities can work with these organisations and SMEs to ensure that residents most in need of clean cooking technologies and fuels benefit from philanthropic finance channelled to third parties.

It would be beneficial for local authorities that may wish to apply to one or more philanthropic foundations or at least communicate funding opportunities to their residents and resident organisations to subscribe to or join an organisation such as Clean Cooking Alliance, which publishes calls for funding from different philanthropic foundations and other financiers.

Case studies

BIX Capital

BIX Capital was established in 2016 as a fund management mechanism that provides debt financing for SMEs that produce and distribute clean cooking technologies and water purification systems and products. The Shell Foundation, a philanthropic funder, provides first-loss guarantee funding that reduces the risk for private sector debt finance (Adamkiewicz, 2022). BIX Capital supports recipients in translating their contributions to reducing carbon emissions into tradeable carbon credits. This is further outlined in the subsequent section on carbon credits and C-Quest's case study.

Osprey Foundation

The Osprey Foundation provided philanthropic finance to the Clean Cooking Alliance programme that provides venture capital finance to early-stage producers and distributors of clean cooking technologies and fuels and provides grant funding for education and awareness campaigns for communities in Bangladesh, China, Ghana, India, Kenya, Nigeria and Uganda to promote the health and environmental benefits of clean cooking (Osprey Foundation, 2023). Finance was channelled to the Clean Cooking Alliance, a not-for-profit organisation that has provided \$8.6 million in grants to companies that promote clean cooking in developing countries (Clean Cooking Alliance, n.d.). The Clean Cooking Alliance advocates and lobbies for policy changes in developing countries that promote clean cooking.

Local authorities should engage with fund managers, such as BIX Capital and their fund recipients, to ensure equitable access to clean cooking technologies and fuels across municipal demarcations.

9.3.5. Catalytic capital

Catalytic capital is financing that catalyses or crowds in other finance for social and/or environmental benefit programmes by making certain concessions that make a finance mechanism more attractive for other financiers. This is often in the form of accepting a higher degree of risk and/or a lower return on investment than other financiers would be willing to accept.

Catalytic capital can be provided through debt, equity or guarantees. Concessions can include deferred repayments, longer payback periods, lower interest rates, credit default protection (e.g., first-loss guarantees) or taking a junior debt (mezzanine debt) position in the finance mechanism where debt is required.

Figure 14 illustrates that the most common form of catalytic capital is patient capital; in other words, the financiers provide a longer repayment period for debt, deferred repayments for debt or a longer time horizon for reducing or withdrawing shareholding in the case of equity. The second most common form of catalytic capital is purpose, which refers to financiers accepting non-traditional financing terms in exchange for a positive social and/or

environmental benefit. Price refers to a rate of return lower than what financiers typically would accept for debt or investment finance. Position refers to the provision of credit enhancement finance, such as mezzanine debt, and pledge refers to credit enhancement finance, such as first-loss guarantees.

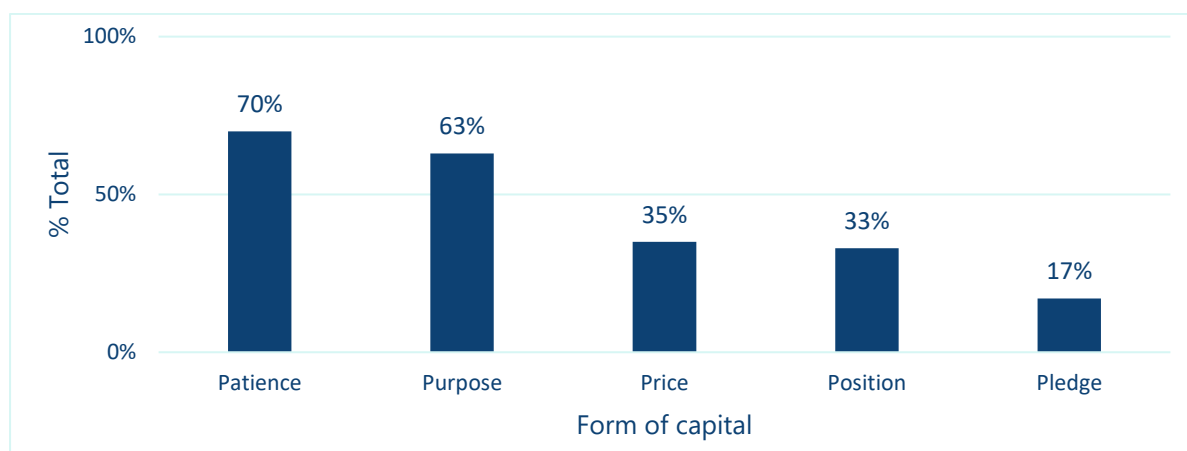


Figure 13: Forms of catalytic capital (Authors own based on Brown, Kadam and Klein, 2023)

The main sources of catalytic capital are family offices, charitable foundations and high-net-worth individuals, collectively called philanthropic finance and development finance institutions.

Pros	Cons
<ul style="list-style-type: none"> ▪ This type of finance enables more finance to flow into the production and distribution of clean cooking technologies and fuels by de-risking private sector finance. ▪ Catalytic capital is sufficiently flexible and can be applied differently to different contexts and programmes, dependent on what is required to attract other finance. ▪ Some portions of catalytic capital may be grant funding, and therefore, not all of the funding provided would need to be repaid, albeit this is a small portion of catalytic capital. 	<ul style="list-style-type: none"> ▪ There is no guarantee that catalytic capital will crowd in additional finance, which would be critical to the success of clean cooking programmes. ▪ Catalytic capital is a growing source of finance, but is currently relatively small and niche, making it difficult to access if not working with an organisation, philanthropic foundation or development finance institution that is familiar with and willing to provide catalytic capital.

The design of catalytic capital finance mechanisms is complex and requires specialised skills to design and manage the finance, which is costly.

Case study

Catalytic Finance Accelerator

The Catalytic Finance Accelerator is a fund that the Clean Cooking Alliance is in the process of designing. The fund is intended to attract catalytic capital to leverage traditional finance for clean cooking in developing countries. The fund aims to raise \$100 million in finance by 2026 (Clean Cooking Alliance, 2023b). The fund will focus on supporting producers and distributors of clean cooking technologies and fuels and increasing education and awareness of the social and environmental benefits of clean cooking in communities.

Local authorities can provide catalytic capital to a clean cooking programme or partner with a provider of catalytic capital, such as a philanthropic foundation or a development finance institution, to design and implement it.

9.3.6. Climate mitigation and adaptation funds and facilities

Climate mitigation and adaptation funds are finance mechanisms established to provide finance for environmentally aligned programmes that seek to reduce GHG emissions, build resilience or adapt to the impacts of climate change. The structure and application of funds differ, and finance can be provided as debt, equity or grant finance, depending on how the fund is structured.

There has been a significant increase in climate finance since 2011, as illustrated in Figure 14. Climate finance is provided more or less equally by the public and private sectors. About 40% of climate finance is for energy systems, which includes clean cooking access (Climate Policy Initiative (CPI), 2023). Sub-Saharan Africa receives about 2.4% of global climate finance, most of which originates from the Middle East, North Africa and sub-Saharan Africa. Globally, only 3% of the total climate finance is allocated to the least developed countries. Development finance institutions administer the majority of climate finance (57%).

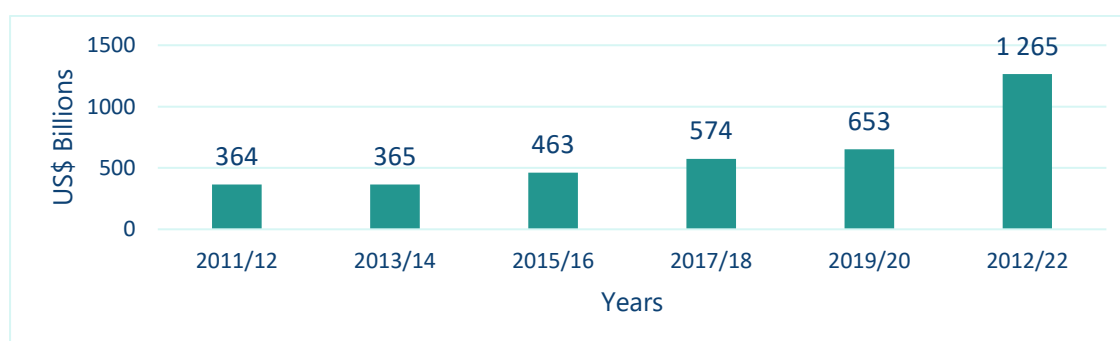


Figure 14: Climate finance from 2011 to 2022 in US\$ billion (Author's own based on Climate Policy Initiative (CPI), 2023)

Case studies

Green Climate Fund

The Green Climate Fund (GCF) and the Global Environment Fund (GEF) are the largest global funds for Paris Agreement-aligned finance for reducing GHG emissions and adapting to climate change.

The GCF is mandated to provide finance to developing countries to support the achievement of their Paris Agreement Nationally Determined Contributions. The GCF provides finance to accredited entities (e.g., the African Development Bank) to administer finance on its behalf. GCF finance is flexible in that it can be provided as grants, concessional debt, credit guarantees, and quasi-equity, which can crowd private sector finance through blended finance mechanisms. The GCF has committed \$13.9 billion and leveraged co-finance of \$39.1 billion to 226 projects predominantly in the Global South, as illustrated in Figure 15.



Figure 15: Geographic Location of GEF commitments in 2024 (Source: Green Climate Fund, 2021)

Global Environment Facility (GEF)

The GEF, administered by the World Bank, pools finance from donor countries (predominantly developed countries) and provides finance to developing countries to achieve environmental targets. The GEF administers several funds, notably the Least Development Countries Fund. This fund focuses on development in response to the adverse impacts of climate change. The fund's mandate is to finance country-level priorities, and this would require that clean cooking be a national priority. Eight funding windows have been announced with cumulative finance of \$30 billion, as illustrated in Figure 14. The current funding window is open until 2026.

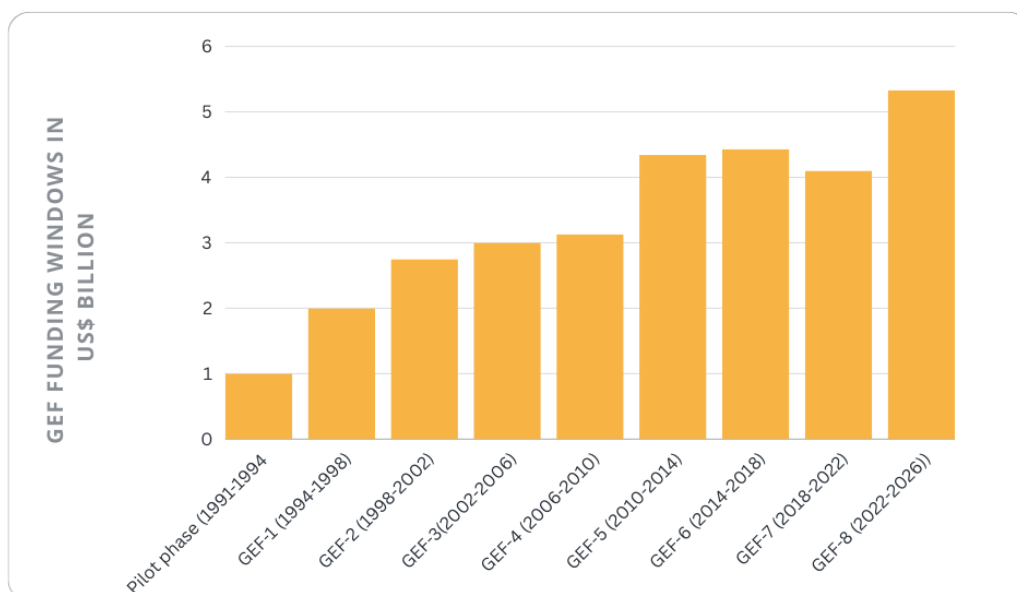


Figure 16: GEF funding windows from 1991 to 2026 in US\$ billion (Global Environment Facility (GEF), 2022)

Pros	Cons
<ul style="list-style-type: none"> ▪ The GCF and GEF have finance mechanisms that focus specifically on the least developed countries, which makes clean cooking programmes in Uganda and Sierra Leone well-positioned to be recipients of finance. ▪ Finance structures are flexible, which means that they can finance different programmes depending on the finance required. 	<ul style="list-style-type: none"> ▪ Application processes and documentation required for due diligence are often lengthy and complex, and a transaction advisor may be necessary to navigate origination and contracting. ▪ Policy uncertainty can be a challenge in the due diligence phase, as financiers want to ensure that national governments remain committed to achieving climate targets.

Local authorities should look at development finance institutions that are accredited GCF and GEF providers, like the African Development Bank (AfDB). The AfDB aims to channel 20% of its annual loan book to clean cooking programmes in Africa (Clean Cooking Alliance, 2023a). Therefore, it is advised that local authorities develop a bilateral relationship with AfDB to understand the GCF and GEF as possible financing structures for clean cooking programmes in Uganda, Sierra Leone and other developing countries in the region.

9.3.7. Carbon financing

These are mechanisms through which governments earn revenue through carbon credits for reducing GHG emissions via clean cooking projects. These credits can be sold or traded in international carbon markets.

A carbon credit represents an amount of carbon dioxide avoided, reduced or removed from the atmosphere. A carbon credit can be a tradeable asset. Carbon assets, often traded as carbon certificates, can be registered on a carbon registry and sold to organisations that require carbon credits to offset their carbon emissions. A carbon registry is responsible for tracking carbon credits, ensuring that the linked carbon reduction project reduces or removes carbon as projected and that the purchasing organisations accurately reflect the amount of carbon dioxide reduction they claim through these credits.

Carbon credits and trading was made possible under the Kyoto Protocol in 1997, and more recently, carbon trading was incorporated in the Paris Agreement (2015), and the Article 6 mechanism for countries to trade carbon credits was adopted at COP26 (2022). This provides a unique opportunity for developing countries to establish programmes to generate carbon credits and sell these credits to developed and other countries. This is a nascent opportunity which many countries have not yet explored. Globally, 35 governments have established a carbon credit mechanism (World Bank, 2024). Revenue from the sale of carbon credits in 2023 was just over \$100 billion, as illustrated in Figure 17.

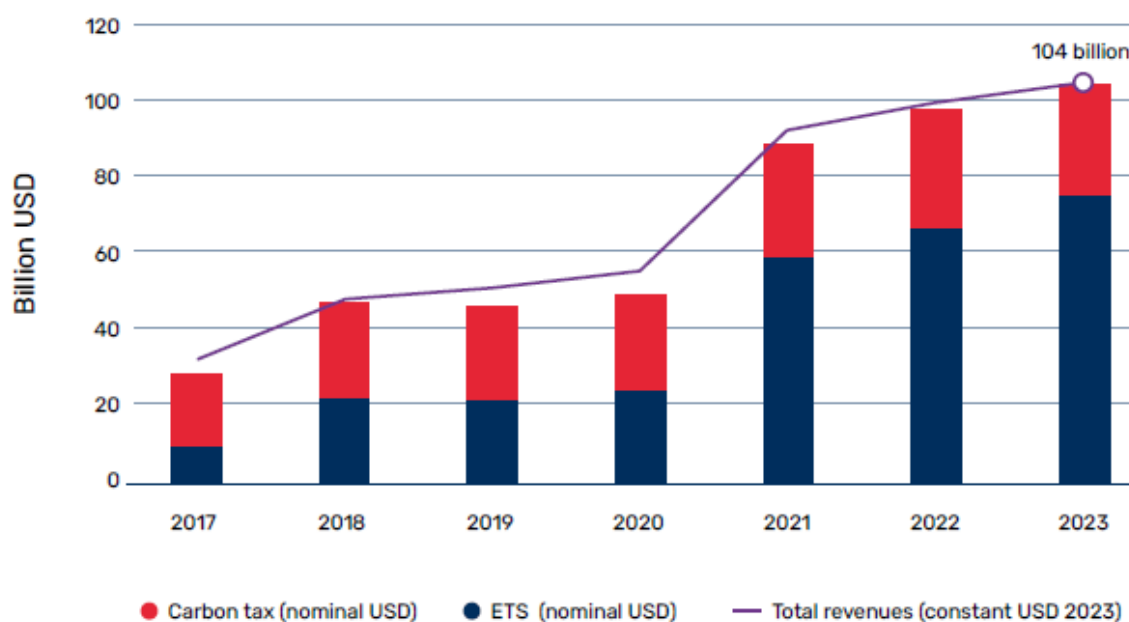


Figure 17: Revenue from carbon trading and carbon tax (World Bank, 2024)

Figure 17 shows the revenue generated from carbon taxes and emissions trading schemes (ETS). The European Union ETS is the largest globally. In Germany, for example, revenue from ETS (the national ETS and the EU ETS) accounted for 4% of public revenue in 2023. This illustrates the potential to generate fiscal revenue from the sale of carbon credits, including those linked to clean cooking programmes.

Case study

C-Quest Capital Clean Cookstove

C-Quest Capital's Clean Cookstove programme sells carbon credits to generate revenue to purchase and distribute clean cooking technologies and fuel to sub-Saharan Africa, Southeast Asia and Central America residents. 7.8 million appliances have been distributed. C-Quest registers carbon credits with the Verified Carbon Standard, a carbon registry, using Verra standards. Data is regularly collected by teams based in communities where clean cooking technologies are deployed and stored on a cloud-based system. C-Quest sources and pools finance from impact investors to develop and implement clean cooking and other social impact programmes. It also sells carbon credits related to the programme to generate a return on investment for investors.

Pros	Cons
<ul style="list-style-type: none">▪ An opportunity for increasing fiscal revenue from carbon credits linked to clean cooking programmes. This can include a national-level mechanism where revenues from clean cooking programmes are allocated to local authorities where the programmes are geographically located.▪ Clean cooking fits well with carbon credits as the calculation of the reduced volume of carbon emissions is well-established and should be relatively simple to determine.	<ul style="list-style-type: none">▪ Registration with carbon registries can be complex, and a transaction advisor may be necessary.▪ There is increasing scrutiny of carbon credits that necessitates a robust and sophisticated measurement, verification and reporting (MVR) mechanism, which can be costly for a programme.▪ There have been recent cases of mismanagement of revenues for carbon credit programmes (i.e., revenue not used for the purpose it was intended), which has resulted in increased scepticism of carbon credit-linked programmes, especially in Africa.

The success of using carbon credit mechanisms to finance clean cooking programmes is dependent on economies of scale, as transaction costs are high. This would mean that more than one local authority would need to partner with one or more local authorities to achieve economies of scale and reduce transaction costs for each local authority. Local authorities would need to work with an organisation that has experience registering and managing carbon credits to ensure that the registry and purchasers consider the carbon credits viable.

9.3.8. Impact bonds

An impact bond is a bond for which the proceeds of the sale of the bonds are defined to achieve an impact. Social impact bonds focus on achieving positive social outcomes, such as health or education, and development impact bonds focus on achieving positive and sustainable development outcomes, such as employment and poverty reduction. Some impact bonds are designed as a results-based finance mechanism. This means that the rate of return on investment for the impact bond depends on achieving the defined social or developmental outcomes.

Typically, a philanthropic foundation and/or other financiers provide upfront finance to fund the development and delivery of an impact programme. Governments or other outcome payers pay for the achievement of the outcomes. These payments include repayment of the initial capital invested by the philanthropic foundation and/or other financiers, plus an interest portion.

Globally, 292 impact bonds have been issued. Most of the bonds have been issued for social and/or development outcomes in Europe and the United Kingdom. In Africa, 17 impact bonds have been issued for social and/or development outcomes. In addition, 17% of impact bonds are health-focussed. The value of the 51 health-focused social impact bonds issued is \$102 million. Eight of the health-focused impact bonds issued are for social impact in Africa (Cameroon, Kenya, the Democratic Republic of the Congo, Ethiopia, Nigeria and South Africa). The value of these bonds is \$42 million.

Case study

The Clean Impact Bond

The Clean Impact Bond is designed and financed by Cardano Development, the International Finance Corporation, BIX Capital, the Osprey Foundation and the Sistema.bio. It was issued in 2022 to raise finance to fund the production and distribution of clean cooking technologies and fuels to lower-income households in Kenya. The bond was structured as a development bond seeking health and women's empowerment outcomes. The health and women's empowerment outcomes were independently verified and certified. The outcomes payer, the Osprey Foundation, paid BIX Capital, the upfront investor, who had sourced finance from the International Finance Corporation. The bond, valued at \$500,000, resulted in positive health and women's empowerment outcomes (International Finance Corporation (IFC), 2023).

Pros	Cons
<ul style="list-style-type: none"> ▪ An impact bond can raise a large amount of finance for positive social and/or developmental outcomes. ▪ One impact bond has been issued for the benefit of people in Uganda. The focus of this bond was poverty reduction. The local authority can partner with the 	<ul style="list-style-type: none"> ▪ Governments typically are the outcomes payers, and this would require that the Ugandan national government have public finance to fund the clean cooking programme for which a bond is issued. ▪ Some government departments and agencies do not have a sufficiently

<p>outcomes payers for this bond (USAID and the Foreign, Commonwealth and Development Office, UK) to develop a social impact bond for clean cooking and can learn lessons from the design and implementation of this bond.</p> <ul style="list-style-type: none"> ▪ There is an opportunity to partner with one or more philanthropic foundations in a structured finance mechanism. 	<p>attractive credit rating to issue impact bonds.</p> <ul style="list-style-type: none"> ▪ The issuance of social impact bonds is complex and may require expertise to structure the bonds and provide transaction advisor services. It will also require an independent agency to verify that the social outcomes have been achieved. This is costly and needs to be incorporated into the value of the bond.
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If a government department, agency or local authority does not have a sufficiently attractive credit rating but is projected to have the finance available in the future to fund clean cooking programmes, it can partner with a financial institution that is better placed to issue a bond. This would require that the government department, agency or local authority ensure sufficient fiscal resources are available during or at the end of the programme period (dependent on when the bond repayments are due) to cover the bond's capital cost and interest payments.

9.3.9. Debt-for-climate swap

A debt-for-climate swap is a finance mechanism whereby a portion of public debt is restructured. A debt swap is an arrangement where a portion of a nation's debt is converted to a grant ringfenced for a specific purpose. In the case of a debt-for-climate swap, the converted portion of the debt is earmarked for climate outcomes in the country for which the debt was restructured. The climate outcomes are articulated in terms of the debtor country's climate commitments in terms of a recognised global agreement such as the Paris Agreement.

A debt-for-climate swap is negotiated at a national level. A creditor country or countries that hold another country's debt can opt to convert the debt to a grant for climate-related interventions in the debtor country. The debtor country is responsible for monitoring and reporting that the proceeds of the reduced debt are used to achieve national climate commitments. A national clean cooking programme could be viable for a debt-for-climate swap mechanism.

This would necessitate that the national government negotiate the debt swap and agree to the terms of the national debt reduction. The finance that would have been used to repay the debt can be channelled to local authorities to produce and distribute clean cooking technologies and fuels to deserving households.

Pros	Cons
<ul style="list-style-type: none"> ▪ Debt can be reduced from a country's national debt. The value of this reduction can be used to finance climate-positive action in the country where the debt was reduced. ▪ This type of finance mechanism can raise a large amount of money for clean cooking and other climate-positive interventions. 	<ul style="list-style-type: none"> ▪ The nascency of this finance mechanism means that transaction costs are high, as best practices related to how to structure negotiations and measurement of climate-positive interventions have not yet been established. ▪ Local authorities cannot enter into debt-for-climate swaps without the national government, and this may require local authorities to convince the national government of the benefits of debt-for-climate swaps. ▪ The origination of this finance mechanism typically is creditor countries, and thus, debtor countries are at the mercy of the country to which they owe money.

A debt-for-climate swap is a nascent development finance concept, and no examples of this arrangement exist. A similar arrangement is a debt-for-nature swap, presented as a case study for this finance mechanism.

Case study

Belize debt-for-nature swap

The government of Belize partnered with The Nature Conservancy to design and implement a debt-for-nature swap. \$364 million in debt was converted to finance for marine conservation in line with commitments made under the Montreal-Kunming Biodiversity Framework. The Nature Conservancy, an international conservation organisation, partnered with the government of Belize to design, implement, monitor and report on the debt swap. The mechanism resulted in a reduction of 10% of Belize's external debt to GDP. The International Development Finance Corporation provided a credit enhancement mechanism that enabled Belize to repurchase bonds for defined marine conservation. Marine conservation is critical to tourism, a key contributing sector for the Belize economy (United Nations Development Programme (UNNP), 2023).

A debt-for-climate swap finance mechanism is nascent and would require engagement at a national level with international debt holders. Local authorities can lobby the national government to consider this finance mechanism. A reduction in national debt may result in more funding for local authorities in the long term.

9.4. Summary of Funding and Financing Sources

Table A of the Annexures summarises the different finance mechanisms that local authorities can consider for clean cooking programmes. Local authorities are encouraged to explore at least one short-term option for immediate implementation and one or two medium-term options for implementation in the future. Local authorities can lobby the national government for long-term options, such as debt-for-climate swaps, which would need to be considered and negotiated at a national level.

Whatever options are selected, key considerations for local authorities are good governance, raising awareness and education of the benefits of clean cooking for communities and creating an enabling environment for SMEs that manufacture and distribute clean cooking technologies and fuels. The latter includes seamless registration for new SMEs and swift resolution of municipal issues like zoning and issuing permits for operations.

9.5. Summary and Conclusion

Acknowledging that public funding is limited, municipalities and other public sector entities have several approaches available to facilitate the flow of finance to clean cooking programmes that involve limited catalytic capital or no public finance.

Catalytic capital is finance provided on a concessionary basis and/or assumes more risk than traditional financial capital for programmes or projects intended to yield positive societal impacts. The public sector, including development finance institutions and philanthropists, are often the main catalytic capital providers. Catalytic capital is intended to attract private sector capital by assuming a higher degree of risk than the private sector capital is required to assume. Catalytic capital can be provided as grant, debt or equity finance. Catalytic capital is typically a small proportion of the total financial capital required for a programme, between 5% and 10%.

The provision of catalytic capital is not the only way that municipalities and other public sector authorities can support the financing of clean cooking programmes. Public sector entities can facilitate the flow of finance to clean cooking programmes by creating crowdfunding campaigns for beneficiaries in their city, engaging philanthropists that focus on climate-and/or health-related themes, applying for finance from climate mitigation and adaptation funds, and registering carbon credits related to clean cooking programmes with a credible carbon credit trading entities. These interventions require capable officials in the municipality or public sector entity to dedicate time and resources to engagements and the preparation of funding proposals for credible clean cooking programmes. It is recommended that the municipality partners with companies or non-governmental organisations leading clean cooking initiatives to develop programs, engage with financial stakeholders and apply for funding.

- **Crowdfunding** is an innovative finance mechanism that uses a digital intermediation platform, like a website or application, to match individuals or businesses that require funding for personal or commercial projects with individuals or organisations with

finance available to invest in or loan to individuals or businesses. For crowdfunding campaigns, municipalities should seek out credible African-based crowdfunding platforms that have a global reach.

- **Philanthropic finance** is financial capital provided by mission-led, not-for-profit organisations, usually in the form of donations. However, foundations increasingly provide finance through catalytic capital, such as first-loss guarantees or mezzanine debt, to reduce inherent risks in a welfare programme.
- **Climate mitigation and adaptation funds** are finance mechanisms established to provide finance for environmentally aligned programmes that seek to reduce GHG emissions, including carbon dioxide. Examples include the GFC and the GEF.
- A **carbon credit** represents an amount of carbon dioxide avoided, reduced or removed from the atmosphere. It can be a tradeable asset. Carbon assets, often traded as carbon certificates, can be registered on a carbon registry and sold to organisations that require carbon credits to offset their carbon emissions.

Municipalities can issue impact bonds where the use of proceeds is predetermined, and funding raised is channelled to clean cooking programmes. An impact bond is a bond for which the sale proceeds are defined to achieve a positive social (e.g., education or health) or development (e.g., entrepreneurship or poverty reduction) impact.

Municipalities can lobby the national government for long-term options, like debt-for-climate swaps, which would need to be considered and negotiated at a national level. A debt-for-climate swap is a finance mechanism whereby a portion of public debt is converted to a grant ringfenced for positive climate outcomes in the country for which the debt was restructured.

Whatever finance approaches are selected, key considerations for local authorities are good governance, raising awareness and education of the benefits of clean cooking for communities and creating an enabling environment for small and medium enterprises (SMEs) that manufacture and distribute clean cooking technologies and fuels. The latter includes seamless registration for new SMEs and swift resolution of municipal issues like zoning and issuing permits for operations.

10. Recommendations

The public sector can provide public finance for programmes and projects, or public sector institutions can enable financial flows to organisations in a country. Public sector institutions can enable financial flows in various ways, including maintaining policy certainty in areas where organisations seek financing from domestic or international, public or private sector institutions. They also promote good governance in the public sector, particularly if a public financial institution is the intended recipient or channel of funds. Additionally, they identify sources of finance and negotiate with financial capital providers, among other roles.

The role of the public sector can differ depending on the tier of government that is involved. National governments can establish enabling policies, while local governments can apply for or facilitate funding through crowdfunding campaigns or by registering carbon credits with credible carbon trading companies. They can also support small businesses in registration and access to funding, as well as share information about financing sources with businesses registered with their local authorities and communities.

Public finance institutions, such as national development banks, can be the recipients of international and domestic private and public sector finance and facilitate access to finance to the intended beneficiaries in accordance with domestic financial regulations and norms.

It is recommended that municipalities follow several approaches, as not every approach may necessarily yield significant success.

The annexures present Table B with specific roles that different tiers of government can play in enabling financial flows for clean cooking programmes.

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12. ANNEXURES

Table A: Summary of finance mechanisms for clean cooking programmes

Finance mechanism	Type of finance	Description	Short term	Medium-term	Long term
Crowdfunding	Debt, equity or grant	An innovative finance mechanism that uses a digital intermediation platform, like a website or application, to match individuals or businesses that require funding for personal or commercial projects with individuals or organisations that have finance available to invest in or loan to individuals or businesses.	X		
Philanthropic finance	Debt, equity or grant (including credit enhancements)	Finance is provided by mission-led, not-for-profit organisations, usually in the form of donations, but increasingly, foundations are providing finance in the form of catalytic capital such as first-loss guarantees or mezzanine debt to reduce inherent risks in a welfare programme.	X		
Catalytic capital	Debt, equity or grant (including credit enhancements)	Catalytic capital is financing that catalyses or crowds in other finance for social and/or environmental benefit programmes by making certain concessions that make a finance mechanism more attractive for other financiers.		X	
Official development assistance	Grant	Official development assistance is a well-established flow of finance from a public sector organisation in one country to another region or country for development purposes.		X	

Finance mechanism	Type of finance	Description	Short term	Medium-term	Long term
Climate mitigation and adaptation funds and facilities	Debt, equity or grant (including credit enhancements)	Climate mitigation and adaptation funds are finance mechanisms that are established to provide finance for environmentally-aligned programmes that seek to reduce GHG, including carbon dioxide emissions.		X	
Carbon credits	Debt, equity or grant	A carbon credit is a representation of an amount of carbon dioxide avoided, reduced or removed from the atmosphere. A carbon credit can be a tradeable asset. Carbon assets, often traded as carbon certificates, can be registered on a carbon registry and sold to organisations that require carbon credits to offset their carbon emissions.		X	
Impact bonds	Debt	An impact bond is a bond for which the proceeds of the sale of the bonds are defined to achieve a positive social (e.g., education of health) or development (e.g., entrepreneurship or poverty reduction) impact.		X	
Climate for debt swap	Debt	A debt-for-climate swap is a finance mechanism whereby a portion of public debt is converted to a grant that is ringfenced for positive climate outcomes in the country for which the debt was restructured.			X

Table B: Summary of the role of the public sector in sourcing funding for clean cooking programmes

Finance mechanism	Type of finance	Description	Local authority roles	Short term	Medium-term	Long term
Crowdfunding	Debt, equity or grant	An innovative finance mechanism that uses a digital intermediation platform, like a website or application, to match individuals or businesses that require funding for personal or commercial projects with individuals or organisations that have finance available to invest in or loan to individuals or businesses.	Registering as a beneficiary on existing platforms and disbursing finance to clean cooking production and distribution SMEs or households	X		
			Raising awareness of platforms for organisations and/or households			
			Provision of Wi-Fi facilities for communities to access platforms			
Philanthropic finance	Debt, equity or grant (including credit enhancements)	Finance is provided by mission-led, not-for-profit organisations, usually in the form of donations, but increasingly, foundations are providing finance in the form of catalytic capital such as first-loss guarantees or mezzanine debt to reduce inherent risks in a welfare programme.	Preparing and submitting applications and disbursing finance to clean cooking production and distribution SMEs or households	X		
Catalytic capital	Debt, equity or grant (including credit enhancements)	Catalytic capital is financing that catalyses or crowds in other finance for social and/or environmental benefit programmes by making certain concessions that make a finance mechanism more attractive for other financiers.	Provide catalytic capital to crowd in private sector finance		X	
			Partner with a catalytic capital provider to design and implement clean cooking programmes			
Official development assistance	Grant	Official development assistance is a well-established flow of finance from a public sector organisation in one country to another region or country for development purposes.	Engage the national treasury department to channel ODA to local authority		X	

Finance mechanism	Type of finance	Description	Local authority roles	Short term	Medium-term	Long term
Climate mitigation and adaptation funds and facilities	Debt, equity or grant (including credit enhancements)	Climate mitigation and adaptation funds are finance mechanisms that are established to provide finance for environmentally-aligned programmes that seek to reduce GHG, including carbon dioxide emissions.	Preparing and submitting applications and disbursing finance to clean cooking production and distribution SMEs or households		X	
			Lobby national government for climate policies and policy coherency and consistency			
Carbon credits	Debt, equity or grant	A carbon credit is a representation of an amount of carbon dioxide avoided, reduced or removed from the atmosphere. A carbon credit can be a tradeable asset. Carbon assets, often traded as carbon certificates, can be registered on a carbon registry and sold to organisations that require carbon credits to offset their carbon emissions.	Partner with a carbon credit registry or transaction advisor to convert clean cooking solutions into carbon credits		X	
Impact bonds	Debt	An impact bond is a bond for which the proceeds of the sale of the bonds are defined to achieve a positive social (e.g., education or health) or development (e.g., entrepreneurship or poverty reduction) impact.	Work with national departments that have experience in designing and implementing impact bonds to design and implement a clean cooking impact bond		X	
Climate for debt swap	Debt	A debt-for-climate swap is a finance mechanism whereby a portion of public debt is converted to a grant that is ringfenced for positive climate outcomes in the country for which the debt was restructured.	Lobby national government for debt for climate swap			X

Source: Authors's own