



Ministry of Energy and Petroleum
State Department for Energy



National Road Map on Scaling Up Productive Use of Renewable Energy



Powering Agriculture and Enterprise with Climate-Smart Technologies



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Executive Summary

The emergence of productive uses of renewable energy (PURE) solutions provides new and diverse opportunities to power agricultural, commercial, or industrial activities that drive economic growth. However, the pace of adoption in Kenya remains slow, despite evidence of the potential for PURE to address challenges and exploit opportunities in agriculture, livestock, dairy, poultry, and fisheries value chains, and to support commercial activities in rural areas.

While the productive use of energy subsector has potential to scale, suitable market conditions and an enabling policy environment will be necessary to achieve this. Deliberate organized action is therefore required by the private sector, government, and other key actors to identify industry enablers, address core barriers and drive adoption of productive use of renewable energy. It is in this context that Kenya Renewable Energy Association (KEREAA) and the GOGLA (the global association for the off-grid solar energy industry) initiated a project to develop a roadmap to scale the adoption of Productive Uses of Renewable Energy (PURE) in Kenya.

While many studies focus on the use of PURE in off-grid areas (i.e., applications powered by standalone systems or by mini-grids), this roadmap additionally considers the use of productive use of energy on the grid. This approach is an acknowledgement that the grid in Kenya is predominantly powered by renewable energy and that there are untapped opportunities for PURE on the grid as well as with standalone and mini-grid solutions. This is especially true in rural areas where potential users are yet to adopt a wide range of super-efficient appliances for productive use.

The project undertook a series of consultative engagements with key actors in the PURE sector to identify barriers to scaling PURE, and determine suitable policy, regulatory, and market support interventions. The interventions identified are summarized below under the following categories: (1) Policies and Regulation, (2) Finance and Investment, (3) Market Growth and Technology Adoption, (4) Capacity Building and (5) Sustainable and Responsible PURE Businesses.

1 Policies and regulation

1.1 Drive inter-agency coordination. PURE operates in ecosystems of non-energy related fields e.g., water and irrigation, and value chains for agriculture, livestock, poultry, and fisheries. Scaling up PURE will therefore require effective coordination between government ministries and agencies with different mandate in energy and non-energy related fields¹, as well as coordination between initiatives (e.g., programs and projects) that support or complement PURE.

1.2 Develop a national policy and strategy to increase the use of energy for economic activities. While Kenya's 2018 Kenya National Electrification Strategy (KNES) was developed as the roadmap to achieving universal access to electricity. There is no explicit strategy that focuses on maximizing the economic opportunities created by providing increased access to electricity, which is a logical next step. There is need to embed the above objective into a specific policy and strategy that provides the basis for mobilizing and allocating the resources required to increase the use of energy for economic activities. For example, by micro-enterprises including individuals/households involved in commercial agriculture, livestock, poultry, and fisheries.

1.3 Develop a national policy and strategy for sustainable irrigation i.e., to increase the uptake and use of precision irrigation systems, eliminate inefficient irrigation methods, and exploit alternative water resources (e.g., through harvesting rainwater and desalination). While policies to reduce dependence on rainfed agriculture will increase food security and agricultural productivity, it is important that they are complemented with policies to ensure the sustainable use of water resources for irrigation to mitigate the risk of depleting the water resources available for irrigation. Precision irrigation systems complement solar water pumping systems as they reduce the water pumping requirements and as a result, the size and cost of the required.

¹ E.g., the Ministry of Energy – responsible for development and implementation of energy sector policies, the Energy and Petroleum Regulatory Authority – responsible for the technical and economic regulation of inter alia the electricity, and renewable energy subsectors, the Rural Electrification and Renewable Energy Corporation – responsible for implementing rural electrification projects, the Kenya Bureau of Standards – responsible for standards development and enforcement, the National Treasury – responsible for fiscal policy, the Ministry of Agriculture & Livestock Development, the State Dept. Blue Economy and Fisheries, the State Dept. for Irrigation, and the of the Ministry of Roads and Transport, Road Transport division – responsible for policy and regulations development on the road transport operations.

Executive Summary

1.4 Provide tax incentives for PURE. With innovation, the efficiency and effectiveness of PURE solutions is continuously improving. If well structured, import duty and VAT exemptions can be an effective way of incentivizing innovation by supporting the adoption of cutting-edge PURE solutions. This would require the development of a tax incentive framework that is based on a set of defined performance criteria and characteristics for PURE solutions, and that incorporates an evaluation process to identify the PURE solutions that qualify (as opposed to a rigid approach based on product descriptions and tariff codes). This would mitigate the risk of conventional appliances also benefiting from the exemption and enable new PURE solutions to benefit from tax incentives without having to go through a lengthy lobbying process. Specific technologies that should be considered for tax incentives include:

1.4.1 Solar water pumps and precision irrigation systems. Using exemptions to reduce the cost and increase the uptake of solar water pumping and irrigation solutions can be an effective way to increase food security by reducing overreliance on rain fed agriculture. However, to mitigate the risk of increased irrigation depleting water reservoirs, this should be coupled with incentives that support the adoption of precision irrigation systems.

1.4.2 Modern small commercial productive use appliances. Modern productive use appliances are often significantly more expensive than conventional appliances used for the same application. Reasons for this include the fact that they are developed for niche markets and therefore have not yet achieved the economies of scale of conventional appliances, and that they incorporate innovations that increase their efficiency, reliability and suitability for off-grid and weak grid applications.

1.5 Develop, adopt, and enforce internationally aligned, mandatory standards for mature PURE technologies. Solar water pumping systems and off-grid refrigerators² are mature technologies, and the variety of products indicates that the market is ready

for mandatory standards. The work done by CLASP/Verasol to develop test methods and test a wide range of solar water pumping systems and off-grid refrigerators provides a good foundation for the development and enforcement of mandatory standards for these products in Kenya.

1.6 Standardize common components across different electric vehicles to enhance interoperability. Amongst other things, these include charging platforms with wide voltage ranges and battery connectors.

2 Finance and investment

2.1 Provide grant funded programs to develop and establish synergy between providers of PURE solutions and the value chains where these solutions are required. Funding would be aimed at (1) supporting the establishment of partnerships between providers of PURE solutions and off-takers of agricultural, livestock, dairy, poultry, and fisheries produce, or (2) extending the involvement/participation of providers of PURE solutions in the value chains they support i.e., to address significant gaps or weaknesses in these value chains such as market linkage, absence of extension services. This is in acknowledgement of (a) the role that off-takers can play in providing a market entry point for PURE solutions i.e., through aggregation of potential users, and (b) the need for additional support to enable users of PURE solutions to secure the increased returns from using PURE e.g., to boost production, add value, or extend the shelf life of their produce, which would then enable them to pay for the PURE solutions and create greater income.

2.2 Create grant funded programs to subsidize end user interest payments on PURE products. Due to the high upfront price of most PURE solutions, the loans required to finance these are large, this and longer repayment periods result in high interest payments. Since interest rates are partly dependent of perceived risk, subsidizing interest payments could partly address affordability with minimal market distortion and provide increased incentive for financing institutions and suppliers who provide consumers financing.

² Refrigerators intended for use on, and/or compatible with, off-grid energy systems (e.g., low-voltage DC systems, solar energy kits systems, and AC or DC mini-grids). Scope includes standalone solar refrigerators and refrigerators that are packaged and sold with solar energy systems under 350 Wp.

Executive Summary

2.3 Create grant funded programs to subsidize the price of solar water pumping and irrigation systems. Some suppliers estimate that subsidies of 30-50% of the price of solar water pumping and irrigation systems are required to significantly scale the uptake of these systems. The level of subsidy proposed means that questions regarding the sustainability of the subsidy and risk of market distortion will also need to be addressed in the design of such a program.

2.4 Facilitate access to debt finance. Develop and deploy suitable financing instruments to address access to finance gaps for PURE companies. Significant levels of investment are required for both working capital and consumer credit and commercially available facilities are currently not suited to early-stage PURE business models. Concessional financing combined with risk protection instruments for the institutions lending to PURE companies will therefore be required to support PURE companies to expand.

3 Market growth and technology adoption

3.1 Implement a National Consumer Awareness campaign on PURE applications. A broad campaign which aims at capturing new users i.e., getting existing micro-enterprises to take up modern productive use appliances (as applicable) and stimulating the establishment of new micro-enterprises based on modern productive use appliances. Modern productive use appliances provide new opportunities to use electricity for economic activities. Furthermore, the high pace of grid and off-grid electrification (through rural electrification, last mile electrification, mini-grid development, and uptake of solar systems) creates a perfect environment for the uptake of modern productive use appliances. As most modern productive use appliances are new to consumers, awareness is still very low and the benefits they have over conventional productive use appliances and conventional practices are little known. To ensure that only products that meet minimum safety and performance standards are promoted, the campaign should be linked to a voluntary quality assurance program. The campaign would be implemented in collaboration with specialized PURE hardware suppliers (who

would exhibit and promote their products during the campaign) and could be linked to follow-on upskilling and mentorship support activities for the enterprises that take up PURE products after the awareness campaign.

3.2 Undertake studies to address PURE market information gaps.

Studies could include:

3.2.1 A baseline survey on the use of energy for economic activities. The survey's focus would be on micro-enterprises in rural areas, including individuals involved in commercial agriculture, livestock, dairy, poultry, and fisheries. The survey would seek to determine the percentage of micro enterprises using productive use appliances for economic activities, the types and spread of productive use appliances, the economic benefits arising from different types of productive use appliances, the percentage of productive use appliances used that are modern, and the barriers to the uptake of modern productive use appliances. The survey would help identify the barriers to uptake and the development of suitable interventions. It would also guide the setting of realistic policy targets for the uptake of modern productive use appliances.

3.2.2 A database and map of off-takers of agricultural, livestock, dairy, poultry, and fisheries produce in Kenya. The database will enable providers of PURE solutions to identify the off-takers that they can develop partnerships with.

3.2.3 Collecting and collating data on the commercial performance of end user loans for productive use products. The limited knowledge of and experience with financing PURE products is a barrier to investment from debt and equity investors. These financiers would like to have information from a large and wide sample on the performance of loans provided for different types of PURE products. With the market still nascent, this will require the consolidation of data from different companies. For example, PURE product suppliers who also extend finance to their customers and financing institutions offering loans for productive use products.

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3.2.4 Mapping irrigation in Kenya to identify where irrigation is being used and the location of water sources. These maps can (1) enable suppliers of solar water pumping and irrigation systems to identify where there are large aggregations of irrigation activities and (2) identify where there is irrigation potential, but additional support is required to realize it.

3.2.5 A scoping study on status of the small wind turbine market in Kenya (and its potential). The study would seek to collect information on e.g., the companies marketing small wind systems, the number of systems sold annually, the competitiveness of small wind systems for water pumping compared to other technologies (e.g., how does their cost, applicability, O&M compare with other alternatives).

4 Capacity building

4.1 Develop and institutionalise a solar water pumping and irrigation course in Kenya. This would entail (1) developing curriculum and incorporating them into related courses offered by technical training institutions and (2) building the capacity of these institutions to offer the courses. In the interim the course could be developed and offered as short course i.e., a skill upgrading course for existing solar PV technicians, with the theory component of the course delivered online. The objective is to make solar water pumping training courses for technical sales personnel and installers more accessible, affordable, and available country wide.

4.2 Develop and institutionalise an e-mobility course in Kenya. Being a nascent industry there are currently no technical training courses specifically focused on e-mobility. The growth of the industry and increased uptake of e-vehicles will increase the need for personnel with specialized e-mobility knowledge and skills.

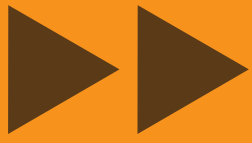
4.3 Develop capacity building programs for government ministries and agencies, and financing institutions. The objective is to build knowledge and share up to date information on PURE solutions, quality assurance frameworks, and deployment of financing for PURE solutions. Most PURE solutions are still novel and support, in the form of training or technical assistance, is required to enable government ministries and agencies, and financing institutions to develop and deliver suitable PURE policy and financing solutions.

5 Sustainable and responsible pure businesses³

5.1 Support gender mainstreaming. Support PURE companies to (1) increase opportunities for women to occupy technical and management positions, and (2) become more intentional with regard to designing PURE solutions that meet the needs of women.

5.2 Drive consumer protection. Ensure that companies have a clear focus on consumer protection, creating an environment where customers understand how to use and maintain PURE equipment, can quickly and easily access aftersales services, and understand the repayment terms they are entering into if they purchase their product using consumer finance, and are able to meet them.

5.3 Enable responsible e-waste management. Volumes of waste from PURE products are expected to increase significantly once PURE technologies reach market maturity. It is therefore important to start designing and implementing streamlined QA programs to improve product durability, support capacity to repair, refurbish, and repurpose PURE equipment, and build country-level e-waste strategies.



Introduction



Introduction

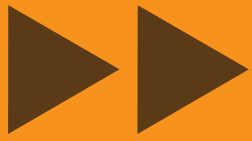
In recent years, the off-grid industry has seen the emergence and growth of productive uses of renewable energy (PURE) to power agricultural, commercial, or industrial activities that drive economic growth. However, the pace of adoption remains slow, despite a growing body of evidence on the potential for PURE to address challenges and exploit opportunities in agriculture, livestock, poultry, and fisheries value chains, and to support commercial activities in rural areas sector.

In the same way off-grid solar home systems' commercialization was realized, resulting in access to electricity for hundreds of millions of users, there is similar potential for the productive use of energy

sub-sector to scale. However, suitable market conditions and an enabling policy environment will be necessary to achieve this. Deliberate organized action is therefore required by the private sector, government, and other key actors to identify industry enablers, address core barriers and drive adoption of the productive use of renewable energy.

It is in the above context that Kenya Renewable Energy Association (KERECA) and GOGLA (the global association for the off-grid solar energy industry) initiated a project to develop a roadmap to scale the adoption of productive uses of renewable energy (PURE) in Kenya.





Definitions and Methodology



Definitions and Methodology

Productive uses of renewable energy (PURE) has slightly different definitions across the industry, development partners and other sector stakeholders. Sometimes, they are referred to as productive uses of energy (PUE), or productive use leveraging solar energy (PULSE).⁴

For this roadmap the **definition of PURE** is borrowed from the 2022 GET.transform study,⁵ which defines PURE as, ‘...**agricultural, commercial, and industrial activities that use electricity generated where possible from renewable energy sources...**’ PURE is looked at as an energy-use application with the objective of boosting production, adding value to products or services, or extending the shelf life of goods thus increasing the returns from sales. Due to the majority use of renewable energy to power Kenya’s electricity grid,⁶ this definition allows for the scope of PURE energy sources to go beyond off-grid technologies such as mini-grids and standalone systems and additionally consider energy from grid extension projects and captive power plants (hybrid systems that combine energy from a renewable energy source, the grid, and in some cases energy storage).

As such, **the Kenya PURE Roadmap additionally considers the use of productive use of energy on the grid.** This approach is an acknowledgement that the market for productive use of energy goes beyond standalone and mini-grid applications; that there are untapped opportunities on the grid as well, especially in rural areas where potential users are yet to adopt a wide range of super-efficient appliances for productive use. When on-grid PURE applications are considered,

it is important to make a **distinction between conventional productive use appliances and modern productive appliances.** Modern productive use appliances have new features that e.g., enable them to be used both on-grid, off-grid and on weak grids, and that make them significantly more efficient than conventional productive use appliances.

The approach to develop a road map to scale productive uses of renewable energy was based on the following activities.

- i. A review of studies that have been conducted on the market for PURE in sub-Saharan Africa and in Kenya that provide an overview of its status (see Section 3).
- ii. Categorization of PURE to facilitate targeted grouping of key actors and stakeholders during engagements for the development of the roadmap. This was in acknowledgment of the broad scope of PURE and the need to have a more targeted approach to identify the barriers affecting different types of PURE.
- iii. Meeting with KEREA’s PURE steering committee – KEREA has established several working groups to facilitate engagements among private sector on productive use of energy. The different working groups are based on the source of energy used for productive use. A joint meeting was held with the convenors of the different PURE working groups to present and discuss the methodology for developing the PURE roadmap.
- iv. Engagement with Africa E-Mobility Alliance⁷

Category	Scope
a) Pumping and irrigation applications	Solar water pumping and irrigation applications
b) Small commercial applications	General applications: small refrigerators, freezers, hair clippers, charging services, IT services Specific applications (linked to specific value chains): grain mills, thresher, chaff cutter, solar dryers, night fishing lights, egg incubators, and knapsack sprayers
c) Cold storage – medium to large applications	Cold storage, ice-making, cold chain logistics
d) E-mobility	E-mobility space for 2-, 3- and 4-wheel electric vehicles, and electric boat motors

4 Powering Lives and Livelihoods: Scaling Productive Uses of Renewable Energy (PURE) Handbook for Governments and Development Partners (GOGLA 2023)

5 https://www.get-transform.eu/wp-content/uploads/2022/08/Productive-Use-of-Energy-2-0_GET.transform2022.pdf

6 Kenya_Africa_RE_SP.pdf (irena.org)

7 <https://www.linkedin.com/pulse/afema-june-newsletter-africaemobilityalliance>

Definitions and Methodology

- (AFEMA) – AFEMA is an industry platform to support and accelerate the e-mobility transition. As e-mobility is AFEMA’s area of focus, the engagement was aimed at discussing with AFEMA how to coordinate on the PURE scope that falls under e-mobility, and to identify barriers and interventions that can be addressed under the proposed PURE roadmap.
- v. Engagement with Africa Mini-Grid Developers Association⁸ (AMDA) – AMDA is the industry association representing private utilities developing small, renewable, localized power grids. PURE applications play a key role in stimulating economic activity and increasing electricity consumption (and by extension revenues) on mini grids. The engagement was aimed at discussing with AMDA how to coordinate on the PURE scope that falls under mini grids and to identify barriers and interventions that can be addressed under the proposed PURE roadmap.
 - vi. Engagement with companies active in the Kenyan PURE sector – This was based on three half-day physical meetings, with each meeting focused on identifying specific barriers and interventions required for three PURE categories i.e., pumping and irrigation, small commercial, and cold storage.
 - vii. Engagement with organizations implementing programs or projects supporting the Kenyan PURE sector, and lenders with interest in financing PURE – A half-day workshop to discuss and map ongoing and future interventions, and financing opportunities to support PURE.
 - viii. Engagement with government ministries to identify ongoing and planned government initiatives that overlap with the proposed recommendations – Meetings with representatives from the Ministry of Energy and the Ministry of Agriculture
 - ix. Development of a PURE roadmap for Kenya based on inputs from the above activities.



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Literature Review – Findings from Productive Use of Energy Studies



Literature Review – Findings from Productive Use of Energy Studies

Several studies have been conducted on the market for Productive Use of Renewable Energy in sub-Saharan Africa and in Kenya that provide a good overview of its status and potential. The sections below provide a summary of the findings from some of these studies.

3.1 The Market Opportunity for Productive Use Leveraging Solar Energy in Sub-Saharan Africa

The 2019 study commissioned by Lighting Global on 'the Market Opportunity for Productive Use Leveraging Solar Energy (PULSE) in Sub-Saharan Africa,'⁹ explored the emerging market for small-scale solar applications of 1kW and below in sub-Saharan Africa and identified PULSE as the next frontier in providing livelihoods and income-enhancing opportunities for off-grid households.

'Productive use' is a broad category with diverse applications across agricultural, industrial, commercial, and public sectors, which encompass a wide range of use cases. The study therefore

limited its focus to standalone DC systems <1kW that would typically be used by households, sole trader, and micro-enterprises, and defined PULSE as 'any agricultural, commercial, or industrial activity that uses solar energy as a direct input to the production of goods or provision of services'.

The study focused on agriculture (primarily irrigation), refrigeration and cooling, and processing use cases. It estimates there are >100 firms developing PULSE technology for the African market and hundreds more distributing solar products. Water pumps and refrigerators powered by solar DC systems were found to be the most common in the market.

Figure 1 - Universe of productive uses relevant for off-grid markets in sub-Saharan Africa (non-exhaustive)



9 <https://www.lightingglobal.org/wp-content/uploads/2022/04/PULSE-Report.pdf>

Literature Review – Findings from Productive Use of Energy Studies

While firms distributing solar home systems recognized the potential for PULSE appliances to drive sales and deepen customer value, they acknowledged the need for business models that were better adapted to more expensive and complex products.

Solar irrigation was identified as most ready to scale given the comparative performance of solar water pumps versus alternatives and the relatively affordable cost of small-scale systems. The value proposition for solar irrigation is also clear to farmers. Solar refrigeration and cooling appliances were found to still be relatively expensive with the business case sensitive to utilization of the unit. Solar refrigerators were found to gain the most traction for lower-volume higher-value applications, such as milk chilling and fish freezing, as opposed to the cooling of bulkier fresh fruit and vegetables. Applications are for processing activities, such as milling, threshing, and grating were found to be the least mature. These activities are more energy-intensive than pumping and cooling, and the business case is heavily dependent on utilization. In addition, the limited mobility of processors constrains farmers' ability to increase utilization by renting them out to others.

A whole set of value chain issues, which vary in severity by produce, prevent users from being able to reap the full benefits of productive appliances e.g., failure to realize the full income benefit from increased yields due to inability to access markets or fair market prices, or diminished yields due to poor agronomic practices prevents the achievement of the minimum utilization of the productive appliance required to make a return on the investment.

Affordability significantly constrains uptake. With small-scale solar water pumps or DC cooling units ranging in price from US\$ 600-2,000, even with asset financing (which is rarely available), monthly repayments can reach between US\$ 20-75, which is unaffordable for most potential users. However, it is anticipated that affordability will improve in the medium term as technology improves the relative cost per unit of performance, and as economies of scale in manufacturing and distribution improve with increasing sales. The study concludes that given its complexity, the PULSE sector requires policy action, market development, concessional financing, and greater coordination between

energy and agriculture. Governments can do more to incorporate PULSE appliances into their electrification and agricultural transformation strategies and revise the tax regime to incentivize uptake. Donors and impact investors can play a role in subsidizing R&D to drive the performance/efficiency gains required to make the technology more viable, and providing financing to help manufacturers and distributors reach their rural markets.

PULSE cuts across both energy and agriculture, but donors and policymakers tend to organize in verticals that emphasize one or the other. Greater coordination between the two can ensure that PULSE technology is rolled out successfully and integrated into wider agricultural programs that provide both aggregation and market linkages.

3.2 The Off-Grid Productive Use of Energy 2020 Catalog – Kenya

The USAID Power Africa Off-grid Project developed a catalog of PURE products available in the Kenyan market in 2020, with the objective of increasing the awareness and uptake of the off-grid PURE appliances available in the market. The catalog provides stakeholders, including manufacturers, suppliers, nongovernment and community organizations, and government policymakers, with insight into PURE products and innovations.

The catalog includes technical and financial information for a range of 49 PURE technologies with a focus on the economic activities of agriculture, fishing, livestock, and poultry. The information provided includes:

- i. An overview of local companies supplying PURE products in Kenya including their contact information and product offerings. Companies are classified into four categories: manufacturer, distributor, brand representative, and reseller/retailer.
- ii. Detailed technical information on PURE products (i.e., quality certification, product description, and technical specifications). Products are categorized as follows:
 - Agro-Processing – mills (rice and maize), hullers, threshers, and chaff cutters.
 - Cooling – cold rooms, freezers, ice-making machines, milk tanks, and refrigerators.
 - Food Dryers – thermal and ventilation-based solutions.

Literature Review – Findings from Productive Use of Energy Studies

- Aquaculture, Livestock, and Poultry – fishing lights and egg incubators.
- Pumping – surface pumps and submersible pumps.
- Sprayers – animal medical treatments, disinfectants, fungicides, herbicides, insecticides, and pesticides.
- The existing terms of sale for PURE products and their PAYGo integration capabilities.

chaff cutter, fishing lights, solar dryer, knapsack sprayer, e-vehicle, barber kit, e-cooker, electric fence etc.

- **End use/application:** production, processing, cold storage, small commerce, light industry, hospitality
- **Value chain application:** agriculture (e.g., horticulture, rice, maize), dairy, poultry, livestock, fisheries
- **Business model:** cash/over-the-counter sale, product rental/lease, lease-to-own/PAYGo, service provision etc.
- **Value proposition:** mechanization (to increase productivity and improve quality), expenditure saving (e.g., on fuel or electricity costs for existing appliance), extending the shelf life of goods, and the ability to establish a new business activity or add value to an existing business activity.

3.3 The Market for Productive Uses of Solar Energy in Kenya

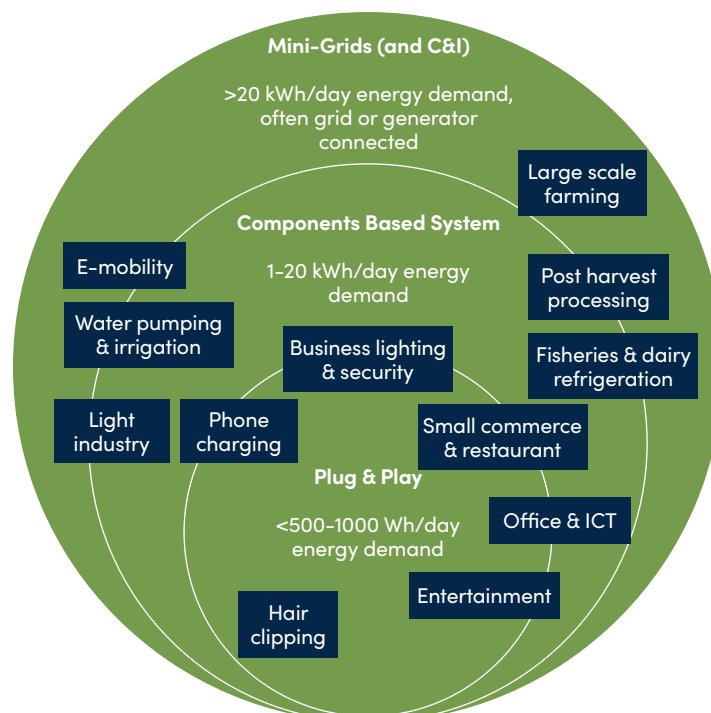
The 2021 Status Report and Policy Action Plan commissioned by EnDev Kenya¹⁰ aimed at providing an up-to-date view of the space and recommendations to support its growth. The study's focus was productive electric applications powered by off-grid solar (either standalone or on a solar mini-grid).

The study considers the following lenses as an approach to understand and categorize Productive Use of Energy:

- **The power source for the application:** Options include a plug and play system, a component-based system, and a mini-grid system.
- **The type of appliance:** water pump, mill, refrigerator/freezer/icemaker, egg incubator,

The EnDev study found about 100 specialist companies on Kenya marketing >40 types of solar powered productive use appliances. The study also mapped key stakeholders in the Kenyan PURE market (illustrated in the figure below). However, it identified that the business models used for

Figure 2 - Illustration of the categorization of PURE by power source



10 <https://www.snv.org/update/new-endev-reports-launched-productive-use-energy-kenya>

Literature Review – Findings from Productive Use of Energy Studies

PURE are difficult to scale, and that the market is characterised by low-volume niche appliances.

Plug and Play systems, with PAYGo end user financing, were found to be mostly for basic small scale PURE applications; their applications were limited by the size of the system. While component-based solar PURE systems had the largest market share and captured more value for suppliers and end users, their sales were constrained by lack of consumer financing.

Solar mini-grid operators were in the early stages of testing PURE demand stimulation approaches. These approaches include (i) mini-grid operators procuring PURE appliances to sell to their mini-grid customers to increase electricity usage and sales, (ii) mini-grid operators partnering with appliance suppliers to facilitate sale of PURE products or services to their mini-grid customers, (iii) mini-grid operators investing, owning, and operating productive use appliances (and charging fees from the services provided), and (iv) mini-grid operators facilitating market linkages for, or entering into off-take arrangements with producers using their electricity services.

Referencing the Global Off-Grid Solar Market Report (a market intelligence series on sales and impact of off-grid solar lighting products and appliances), 2020 sales for fridges and solar water pumps in Kenya were estimated at 2,722 and 5,246 units respectively (NB: 2022 sales figures reported by GOGLA for fridges and solar pumps are 456 and 13,463 units respectively). Since GOGLA's only reports sales by GOGLA affiliates,¹¹ sales figures only represent a portion of the total sales.

To support the scale up of PURE in Kenya, the EnDev PURE Kenya Status Report makes the following key recommendations:

- Engaging key actors and stakeholders (e.g., through public-private dialogue) to identify, elaborate and agree on priority actions to grow and scale PURE and to identify supporting organizations.
- Addressing the consumer financing gap for component-based solar PURE systems.
- Alignment with initiatives and planning at county level and ministerial level.
- Development and implementation of quality assurance frameworks (where required).

Figure 3 - Kenyan PURE stakeholders

Government	Financial institutions	NGOs & Programmes	Donors & Foundations	Industry Groups	Training & Research
<ul style="list-style-type: none"> • Ministry of Energy: Broadly supportive incl. promoting renewables, petitioning Treasury for tax exemptions. • EPRA: Regulates products, technicians, tariffs • KEBS: Setting product standards in response to market need • Ministry of Agriculture: focused on mechanization, improving yields, climate resilience • Treasury: Reinstated tax exemptions (2021) • KRA: Improved but still inconsistent implementation of tax exemptions at ports of entry 	<ul style="list-style-type: none"> • Impact investors: Some concessional lending into the sector - SIMA, CBEA, KCV, SunFunder • Equity / venture capital: Some seed VC, waiting to see exits • Factor(e), Acumen, Persistent, KawiSafi • Commercial banks: Largely absent, unfavorable terms • MFIs: Limited to agribusiness, high collateral requirements • SACCOs, VSLAs: Ad hoc for smaller PURE • Solar companies: In-house credit & PAYGo • Fintech companies: filling gaps with AI-based loan products 	<p>Convening stakeholders, gathering data on last-mile / BoP / women, funding innovation</p> <ul style="list-style-type: none"> • SNV, Practical Action • CLASP: Wide-ranging efforts promoting efficient appliances • Power Africa, EnDev (+ Learning & Innovation Community of Practice on PURE), EEP • Efficiency for Access, LEIA, Global LEAP grants + RBF, GDC - Multi-stakeholder mandate-specific initiatives • AECF RBF • VeraSol: quality standards managed by CLASP 	<p>Grants supporting innovation, piloting, data collection, open-source modelling, standards, reaching vulnerable populations</p> <ul style="list-style-type: none"> • GIZ, World Bank, GCF, SIDA, FCDO, USAID, BMZ, EU, AfDB + others • IKEA, Shell, Rockefeller Foundations 	<ul style="list-style-type: none"> • KEREA: newly mobilized PURE Working Group • KEPSA, KAAA • GOGLA, AMDA, AEMDA, GDC 	<ul style="list-style-type: none"> • JKUAT: Farmer training, mechanisation outreach • SERC: research, consultancy • CrossBoundary Mini-grid Innovation Lab <p style="text-align: center;">↔ Mobilising research, sharing data, guiding best practices</p>

¹¹ Affiliates include GOGLA members, companies selling products that meet Lighting Global Quality Standards, and appliance companies of the Global LEAP Awards or the Low Energy Inclusive Appliances (LEIA) program. Affiliates are estimated to represent 28% of the global off-grid solar market.

Literature Review – Findings from Productive Use of Energy Studies

- Consumer awareness campaigns.
- Funding the testing of business models addressing key barriers to uptake of PURE

The status report is accompanied by Policy Action Plan which provides an overview of the institutional, policy and regulatory framework that would influence and guide the PURE sector in Kenya. The action plan also makes recommendations for government action, highlighting where support would be required from the private sector, and development organizations. The following six priority actions are recommended:

- Convene stakeholders for an inter-ministerial public-private dialogue to capitalise on current momentum in the PURE sector to mobilise decision-makers to address key constraints to PURE sector growth.
- Implement PURE features of the 2020 National Energy Efficiency and Conservation Strategy to drive high-value agriculture and e-mobility PURE through an existing policy mechanism.
- Clarify and improve the tax environment for PURE solar, components and appliances to provide stability and predictability regarding tax obligations for PURE companies.
- Maintain and enforce the quality frameworks governing the PURE sector to protect consumers and companies from market spoilage.
- Implement the 2021 extended Producer Responsibility Regulations (2021) to pre-emptively mitigate the negative environmental impact of a surge in appliance and battery sales.
- Engage county officials regarding inclusion of PURE in County Energy to share information and provide financial resources and technical support on PURE at the county level.

3.4 Energy for Rural Industrialisation – Productive Use of Energy 2.0

The 2022 GET.transform study¹² analyses the changing nature of the PURE landscape. It looks at the innovations and models emerging in the market and discusses the challenges hindering the deployment of large-scale PURE promotion, especially in off-grid areas.

The study proposes that the time has come when energy practitioners must pivot from a position where the overarching goal was access to electricity to one where more emphasis is put into figuring out what the consumers will do with the power i.e., where PURE is viewed as the objective of electrification; activities focus on supporting SMEs to access power and use it for economic activities.

For the study, PURE is defined as agricultural, commercial, and industrial activities that use electricity generated where possible from renewable energy sources. PURE is looked at as an energy-use application with the objective of boosting production, adding value to products or services, or extending the shelf life of goods thus increasing the returns from sales, which in turn drives economic growth.

Based on a review of the stakeholder landscape, two private sector delivery models were identified as promising approaches to scaling up PURE promotion – the hardware supplier model and the service provider model as described below:

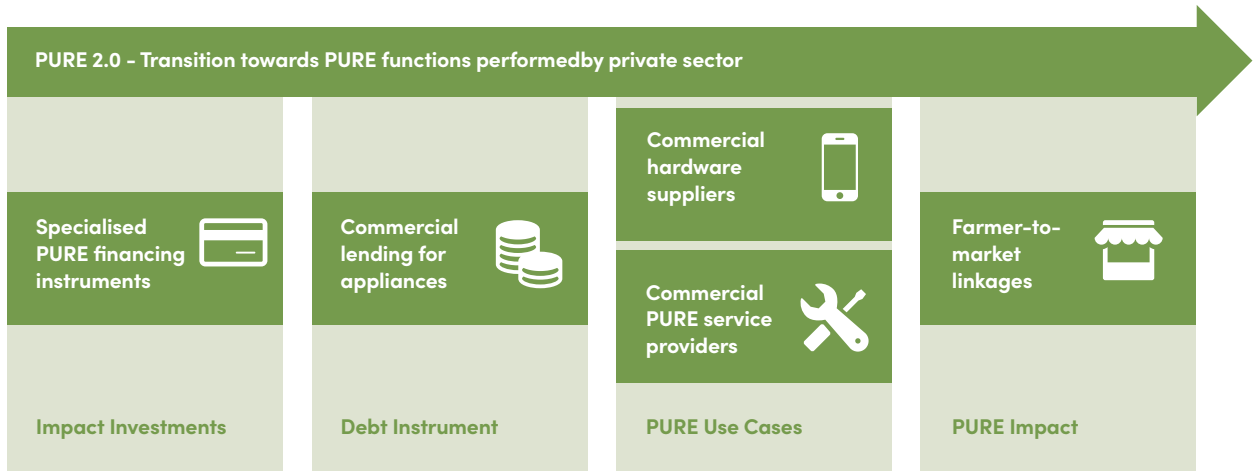
- **Hardware Supplier** – A company (e.g., specialized PURE hardware suppliers, vendors or DESCOS) which sells PURE equipment to end-users (through a cash or consumer financing transaction). This PURE requires power, which will either come with an integrated source or require the end-user to plug in (main grid, mini-grid etc.) e.g., power tools, agricultural machinery, solar-powered appliances. Distributors need to have local presence (sales/after-sales) in areas it wants to service. The model builds on lessons from the SHS market – the company seeks to build market share by providing reasonably priced, reliable equipment to end-users in a somewhat captive market. EnerGrow¹³ is a good example of such a company. It is an asset financing company providing productive energy assets

¹² https://www.get-transform.eu/wp-content/uploads/2022/08/Productive-Use-of-Energy-2-0_GET.transform2022.pdf

¹³ <https://ener-grow.com/>

Literature Review – Findings from Productive Use of Energy Studies

Figure 4: The vision for private sector driven PURE promotion



as well as financial literacy and business support training to rural and peri-urban businesses in Uganda.

- **Service Provider** – A company which sells a service or leases equipment to end users that e.g., boosts production, reduces operational costs, adds value, or extends the shelf life of goods. The model suits the trend of farmers and end-users preferring to rent equipment than buy it themselves. It works well near markets (e.g., cooling as a service), but can also be adapted for operation near production sites. Examples of other services are milling, milk chilling, threshing and crop drying, which may be connected to a dedicated power source or operate alongside main/mini grids. ColdHubs¹⁴ in Nigeria implements this model, they operate solar-powered cool rooms where retailers can rent space to store their produce near markets, which enables retailers to extend the freshness of their goods from around 2 days to 21 days.

GET.transform envisions that a small but growing number of private operators implementing the business models described above can enable the private sector to play a greater role in scaling PURE and mobilize private capital. This future vision is illustrated in the diagram below.

The study highlights the following barriers to scaling PURE that were mentioned by stakeholders interviewed for the study.

- Underdeveloped value chains – Securing the increased returns from using PURE (to e.g., boost production, add value, or extend shelf

life) is necessary to enable end users to pay for PURE products and services.

- Inadequate cross-sectoral engagement – PURE businesses need to interact with stakeholders and operate in ecosystems of non-energy related fields (e.g., value chains for agriculture, livestock, poultry, and fisheries) to have better access to markets for their products and services.
- The challenge of aggregation – In rural areas with low population density, aggregation of customers is necessary for the viability of delivering PURE services (e.g., provision of cold storage and milling services), and makes the marketing of PURE products and the provision of after sales services cost effective.
- Unavailability of PURE machinery, tools, and equipment, as well as ancillary services (e.g., spares and after sales services) outside cities and large towns
- Commercial working capital facilities not suited to early-stage PURE business models – concessional financing will be required to support PURE companies expand into the last mile.
- High upfront equipment costs, and limited access to credit and affordable interest rates (PURE financing requirements outside the scope of existing end-user and rural SME financing models and instruments)

Literature Review – Findings from Productive Use of Energy Studies

- Insufficient benchmark data for lenders and investors to make credit assessments (i.e., data on level of uptake, and loan repayment rates for PURE products) hinders debt and equity investments.
- Matching PURE solutions to end-user needs and context – The limited range, flexibility, and availability of PURE solutions sometimes results in PURE businesses pushing products and services that are not a good match for the end-user's requirements, or not being able to provide a solution.
- Capacity challenges – Unlike pre-designed, pre-packaged plug-and-play SHS kits which require little technical skills for installation, the design and installation of some PURE systems (e.g., for water pumping and irrigation) requires customization and installation by qualified technicians.
- Upskilling of end users required – End user training (business and technical) to enable them to appreciate the value proposition and to optimize the use and revenue generation (or cost saving) potential of the PURE solution.
- Performance standards for most PURE systems yet to be developed, adopted, or implemented.



3.5 Barriers to Electric Mobility in Kenya – Market Survey Report

The 'Barriers to Electric Mobility in Kenya'¹⁵ is a based on a 2021 industry survey undertaken by the Association for Electric Mobility & Development in Africa (AEMDA) to understand the state of Kenya's e-mobility market.

The study indicates that there are about 18 e-mobility companies in Kenya. E-mobility business is categorised based on the type of vehicle (i.e., 2 & 3-wheeler, 4 wheelers and larger vehicles, and electric outboard engines), and further segmented by the type of business model i.e., sales, battery swap/charging station, leasing, manufacturing/assembly, fleet management. Most businesses in the e-mobility space are in 2 & 3-wheeler market segment. The survey also found that that nearly two-thirds of respondents had invested in local assembly.

In its 2022 e-mobility country profile for Kenya, AEMDA estimates that Kenya's electric vehicle fleet is made up of 300+ two and three wheelers, 200+ four wheelers, and less than 10 buses.¹⁶ In comparison, Kenya's internal combustion engine vehicle fleet is made up of about 1.3 million two and three wheelers, 1.17 million four wheelers, and 113,000 buses.

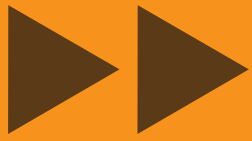
The 2019 Finance Act reduced excise duty on 100% battery powered e-vehicles from 20% to 10%. In addition, EV businesses with an assembler's license can benefit from lower import duty (25% to 10% upon meeting localization requirements), and from duty remission, which enables them to defer the payment of import duty until their goods are released from a customs bonded warehouse. Kenya's 2020 National Energy Efficiency and Conservation Strategy has an ambitious target of increasing the number of new vehicles registered as e-vehicles by 5% every year. The 2023 Finance Act introduced additional incentives by zero-rating the purchase of electric vehicles.

The survey identified the following key barriers to e-mobility in Kenya:

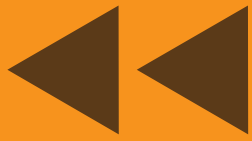
- **Technical Capacity** – There are currently no technical training courses specifically focused on e-mobility. E-mobility companies are currently addressing this gap by tapping into transferrable skills for automotive and electrical courses.
- **Standards** – While a number e-mobility standards were adopted in 2019 to regulate the importation of e-vehicles and parts, there is low awareness and knowledge of these standards amongst market players. Effective implementation (through incentives and/or enforcement) is required to prevent market spoilage.
- **Standardization** – Standardization of common components across different vehicles (e.g., charging platforms with wide voltage ranges and battery connectors) would be valuable in enhancing interoperability.
- **Delays in registration of e-vehicles** – Resulting from the reference database used for registration of vehicles missing EV models. Collaboration between KRA and e-mobility companies is therefore required to ensure the database is continuously updated as new EV models are imported.
- **The need to grow EV charging and battery swap infrastructure** to enable convenient and affordable charging of e-vehicles.
- **Consumer awareness** – This is to address concerns and perceptions amongst consumers regarding the value proposition of e-vehicles (i.e., based on comparing upfront and running costs between e-vehicles and ICE vehicles), the range of EVs, and the availability of charging or battery swap infrastructure in the country.

¹⁵ <https://aemda.org/knowledge-hub/>

¹⁶ Data from the Kenya National Bureau of Statistics (KNBS) and National Transport Safety Authority (NTSA) indicate that EVs accounted for 0.19% of all vehicles in 2020. Three-wheelers had a slightly higher share at 1.78%, while motorcycles and other motor vehicles were at 0.13% and 0.14%, respectively.



Mapping PURE related initiatives in Kenya

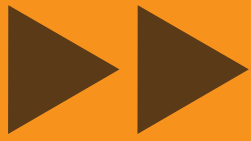


Mapping PURE related initiatives in Kenya

The table below lists key PURE related initiatives in Kenya.

Organization	Program/Project Description	Description of PURE related Initiative
Sustainable Energy Technical Assistance program (SETA)	Project of the Ministry of Energy with funding from the EU to provide institutional capacity development support for the identification, planning and implementation of renewable energy, energy access and energy efficiency projects. SETA is implemented through a team of consultants led by Innovation Energie et Développement (IED) in partnership with Loughborough University, ACTS, Practical Action and IIED.	<ul style="list-style-type: none"> In the process of supporting counties to develop county energy plans, SETA looks at energy as an enabler and works with the counties it is supporting to identify the county's priority sectors and develop energy solutions for those sectors.
Productive Use Appliance Financing Facility Resources ¹⁷	A USD \$6.5 million financing facility to catalyze uptake of productive use appliances in DRC, Ethiopia, Kenya, Nigeria, Sierra Leone and Uganda. It is supported by the Global Energy Alliance for People and Planet (GEAPP) and implemented by CLASP and Nithio. The facility aims to lower appliance costs for end-users by discounting the price of bulk solar appliance procurements and providing financing for distributors to enable them to sell their products on credit.	<ul style="list-style-type: none"> The Productive Use Appliance Financing Facility aims to reduce the risk associated with productive use appliance (PUA) procurement and sales, accelerating both the scale and timeline of PUA sales for participating companies. The facility includes (1) subsidies that lower costs associated with PUA procurement (up to 25% of the cost), (2) a consumer financing fund for PUA distributors designed explicitly to mitigate the unique credit risks associated with PUA sales (US\$500K – 2.5M), (3) capacity building grants, (US\$20–30K), and (4) advisory support focused on credit systems development for productive use appliance distributors. The Facility supports companies operating cross the off-grid solar, mini-grid, and grid connected sectors that procure large quantities of high-quality and energy-efficient PUAs in target markets. To receive subsidies, all PUAs must undergo third-party testing to ensure and verify energy performance, quality, and safety. The list of PUAs eligible for procurement subsidies are: electric pressure cookers, fans, refrigerators, solar water pumps, solar powered mills, and walk-in cold storage units. Facility operations will also generate a foundational data set on appliance market activity and the developmental impacts of appliances, to improve the collective knowledge base on appliance performance, national markets, and consumer experience and satisfaction.
World Food Programme	WFP supports resilient food system by supporting smallholder farmers in arid and semi-arid lands to access markets, agricultural inputs, credit, and technologies, and works with traders and retailers to address inefficiencies in food supply chains.	<ul style="list-style-type: none"> WFP has implemented different PURE pilots in ASALs (e.g., Garissa, Wajir, and Turkana) to e.g., support smallholder farmers establish solar powered irrigation schemes, and local communities and markets with cold storage solutions.
Mercy Corp and Energy 4 Impact	Mercy Corps merged with Energy4Impact to create more opportunities to increase energy access and use for the communities that need them most, and to integrate energy into sectors such as agricultural development, economic growth, youth employment, humanitarian recovery, and climate resilience.	<ul style="list-style-type: none"> Developing initiatives to incorporate productive use of energy into its resilience, agriculture, and WASH (water, sanitation, and health) programming.
CLASP	Through its VeraSol program, CLASP builds on the foundation laid by Lighting Global Quality Assurance Program (which focused on pico-PV and solar home system kits) and expands its services to encompass appliances, productive uses, and component-based solar systems.	<ul style="list-style-type: none"> VeraSol's services include standards development, product testing, quality verification, and technical assistance. VeraSol also maintains an online database¹⁸ that provides comparable product data for productive use appliances (e.g., egg incubators, electric pressure cookers, refrigerators, and solar water pumping systems). CLASP also undertakes a variety of studies and surveys to provide in depth information on markets. With support from IKEA, CLASP is currently undertaking a study to map off takers of agricultural products in Kenya
Equity Bank	Through its Energy Department, and its Food and Agriculture Department, Equity bank is developing and delivering financing solutions for PURE supply chains.	<ul style="list-style-type: none"> Equity Bank aimed for the Food and Agriculture sector to represent 30% of its total banking portfolio (from an initial 3%). To achieve this Equity has built the capacity of its Food and Agriculture department by recruiting agriculture and equipment sub-sector specialists to develop and deliver suitable finance solutions across the range of different food and agriculture value chains. Equity bank has also structured its lending facilities to fit farming timelines, to make it easier for farmers to access and repay loans for inputs.

¹⁷ <https://www.clasp.ngo/appliance-financing/>



Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya



Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

5.1 Overview of Interventions that can help to accelerate the use of solar water pumps and irrigation systems

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Policies and Regulation	Addressing affordability	Exempting VAT and Import Duty on solar water pumps and precision irrigation systems.	<ul style="list-style-type: none"> Introducing exemptions for solar water pumping systems i.e., complete water pumping systems that incorporate solar PV to supply all or part of the energy for the system (for import duty exemptions, this may require regional initiative to revise the EAC Customs Management Act). Approach provides for both DC and AC water pumping systems if solar PV is part of the energy source. Introducing exemptions for precision irrigation systems that ensure efficient use of water. Introducing exemptions for solar irrigation systems (i.e., systems comprising of a solar water pumping system sold with a precision irrigation system). This is an approach used in Uganda. However, the approach implies that only those purchasing a water pumping and irrigation system at the same time would benefit from the exemption. 	<ul style="list-style-type: none"> While solar panels and solar pump controllers are exempt from duty and VAT, pumps attract duty and VAT. There is some ambiguity on what components of the solar pumping system are exempt under the current framework. Using exemptions to reduce the cost and increase the uptake of solar water pumping and irrigation solutions can be an effective way to increase food security by reducing overreliance on rain fed agriculture. However, to mitigate the risk of increased irrigation depleting water reservoirs, this should be coupled with supporting the adoption of precision irrigation systems (e.g., drip irrigation and micro sprinkler systems). 	Kenyan Treasury	<ul style="list-style-type: none"> Ministry of Energy KEREA Development Organizations (technical and financial support for advocacy)

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Policies and Regulation	Standards and regulation	Development, adoption, and enforcement of internationally aligned, mandatory standards for solar water pumping systems in Kenya.	<ul style="list-style-type: none"> Collaborating with KEBS, CLASP and EPRA to develop, adopt, and enforce mandatory standards for solar water pumping systems in Kenya. 	<ul style="list-style-type: none"> There are currently no mandatory performance-based standards for solar water pumping systems in Kenya. However, the work done by CLASP/Verasol (i.e., to (1) develop test methods for solar water pumping systems and (2) to test 50 different solar water pumping systems) provides a good foundation for the enforcement of standards for solar water pumping systems in Kenya. Solar water pumping systems are a mature technology, and the variety of products indicates that the market is ready for mandatory standards. With the type incentives being considered for solar water pumping systems (e.g., tax and duty exemptions) it is important that these are only provided for good quality products. 	<ul style="list-style-type: none"> Kenya Bureau of Standards 	<ul style="list-style-type: none"> CLASP/Verasol PURE companies (participation in technical committees to adopt standards)
Policies and Regulation	Policy	Developing a national policy and strategy for sustainable irrigation.	<ul style="list-style-type: none"> The development of strategies to increase the uptake and use of precision irrigation systems, eliminate inefficient irrigation methods, and exploit alternative water resources (e.g., through harvesting rainwater and desalination). 	<ul style="list-style-type: none"> While policies to reduce dependence on rainfed agriculture will increase food security and agricultural productivity, it is important that this is complemented with policies to ensure the sustainable use of water resources for irrigation (to mitigate the risk of depleting the water resources available for irrigation). The use of precision irrigation system reduces the water pumping requirements and as a result, the size and cost of the solar water pumping system required. 	<ul style="list-style-type: none"> Ministry of Water - State Department for Irrigation 	<ul style="list-style-type: none"> PURE companies involved in pumping and irrigation Development Organizations (technical and financial support for policy development)

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Capacity Building	Capacity Building	Making solar water pumping training courses for technical sales personnel and installers more accessible (i.e., affordable, and available country wide).	<ul style="list-style-type: none"> Institutionalizing solar water pumping and irrigation courses i.e., developing curriculum and incorporating them into existing related courses offered by technical training institutions. Building capacity of technical training institutions to offer solar water pumping and irrigation courses as short courses i.e., skills upgrading courses. This could build on the experiences and contributions from institutions and companies offering or developing solar water pumping courses (e.g., Strathmore University, Jomo Kenyatta University of Agriculture and Technology, and Ennos). The option of offering online courses for the theory component of the training should be considered to increase affordability and accessibility. 	<ul style="list-style-type: none"> There is limited availability of solar water pumping (and irrigation) training courses. Aside from in-house training provided by specialized PURE hardware suppliers, the only publicly available short course is one offered by Strathmore University in Nairobi. A number of factors determine the most suitable solar water pumping (and irrigation) solution for each end user e.g., pumping head, source of water, quality of water, size/availability of water storage, water delivery mechanism (for irrigation applications), agronomy related requirements (e.g., type of soil, type of crop), and quantity of water (determined by some of the above). A high level of knowledge and understanding is therefore required to sell the right product to each customer. Some companies have tried to standardize solar water pumping and irrigation solutions through predesigned plug and play pumping systems for a specific type of customer, e.g., based on a defined range of pumping head and volume. However, while this approach reduces the need for technical capacity for design, it limits the scope of pumping applications. The Draft Energy (Solar Photovoltaic Systems) Regulations, introduce licensing requirements for solar PV workers who design, install, test, commission, maintain, and repair solar water pumping systems, as well as manufacturers, importers, vendors, and contractors who import and sell solar water pumping systems. Proof of relevant training will be one of the requirements for licensing. The regulations consider the following categories of solar pumping systems: $\leq 3kW$, $>3kW - \leq 50kW$, and $50kW$. 	<ul style="list-style-type: none"> KEREA 	<ul style="list-style-type: none"> Technical and Vocational Education and Training Authority Technical and Vocational Training Institutions, and Universities PURE companies involved in pumping and irrigation National Industrial Training Authority

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Finance and Investment	Addressing affordability	Grant funded program to subsidize interest payments on solar water pumping and irrigation systems.	<ul style="list-style-type: none"> A demand side subsidy program aimed at reducing the price of solar water pumping systems by subsidizing the interest rate payments on loans or PAYGo financing that would be charged to farmers. The program should be designed to encompass different end user financing models e.g., bank loans and PAYGo provided by the hardware supplier. 	<ul style="list-style-type: none"> Due to the price of solar water pumping systems, the loans required to finance these are large, this and longer repayment periods result in high interest payments. Since interest rates are partly dependent of perceived risk, subsidizing interest payment could partly address affordability with minimal market distortion and provide increased incentive for financing institutions and suppliers who provide consumers financing. Interest rate subsidies could be coupled with first loss guarantees as a risk mitigation measure. GreenMax Capital have developed a first loss guarantee facility for local financial institutions which is set to be piloted in Kenya. 	<ul style="list-style-type: none"> Development Organization(s) interested in providing grant funding support 	<ul style="list-style-type: none"> PURE companies Financing Institutions
Finance and Investment	Addressing affordability	Grant funded program to subsidize the price of solar water pumping and irrigation systems.	<ul style="list-style-type: none"> A demand side subsidy program aimed at reducing the price of solar water pumping system by 30-50% was implemented over a 5-year period. Applications for participation in the program are to be received and reviewed on a rolling basis. The level of subsidy proposed means that questions regarding the sustainability of the subsidy and risk of market distortion will also need to be addressed in the program design. 	<ul style="list-style-type: none"> Some suppliers estimate that subsidies of 30-50% of the price of solar water pumping and irrigation systems are required to significantly scale the uptake of these systems. The adoption of solar water pumping systems can result in carbon emission reductions e.g., where the baseline is fossil fueled powered pumps. Revenues from the sale of these emission reductions can be used to reduce the price of the pumps. GOGA's off-grid solar sales and impact reports indicate that 13,463 solar water pumps ($\leq 3kWp$) were sold in 2022, compared to 6,649 in 2021, which represents an increase of >100%. The volume and sales increase can be used to determine a suitable target for a demand side subsidy program. 	<ul style="list-style-type: none"> Development Organization(s) interested in providing grant funding support 	<ul style="list-style-type: none"> PURE companies

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Finance and Investment	Market Development Support	Grant funded programs to (1) support the establishment of partnerships between suppliers of solar water pumping and irrigation systems and off-takers of agricultural produce and/or, (2) to extend the involvement/participation of suppliers of solar water pumping and irrigation systems in agricultural value chains e.g., as market intermediaries.	<ul style="list-style-type: none"> Agribusiness off-takers can provide an effective market entry point for suppliers of solar water pumping and irrigation systems. These off-takers already have an established network of farmers with whom they have developed long term relationships. They purchase agricultural produce from these farmers and in some instances also provide farm inputs and agricultural extension services. They therefore provide an avenue through which equipment suppliers can access aggregations of farmers with similar needs, interact with farmers in these networks (e.g., to create awareness and provide training), develop and deliver suitable pumping and irrigation, and facilitate end user finance and collection of repayments (e.g., from sale of produce). Grant funding can be used to co-finance the investment required to identify, develop, and establish effective partnerships between suppliers of solar water pumping and irrigation systems and off-takers of agricultural produce. Where suppliers of solar water pumping and irrigation systems are working with farmers in specific value chains, they may need to extend their involvement in the agricultural value chain to ensure that farmers are securing the increased returns from using irrigation to boost production (e.g., by connecting them with buyers for their produce). Grant funding can be used to co-finance the investment required for this. 	<ul style="list-style-type: none"> Aggregation of customers can help to increase the viability of delivering solar water pumps and irrigation products and drive scale. In addition, securing increased returns from using irrigation to boost production is necessary to enable farmers to pay for PURE products or services. Off takers provide a route through which the above can be achieved. To ensure that farmers are securing the increased returns from using irrigation to boost production (which would enable them to pay for their systems), suppliers of solar water pumping and irrigation systems may need to extend their involvement in the agricultural value chains (e.g., as market intermediaries, and/or providers of farm inputs and extension services). 	<ul style="list-style-type: none"> Development Organization(s) interested in providing grant funding support 	<ul style="list-style-type: none"> PURE companies Ministry of Agriculture & Livestock Development

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Market Growth and Technology Adoption	Addressing information gaps	Undertaking studies to provide information that enables suppliers of solar water pumping and irrigation systems to have a better understanding of the market to enable better targeting and market development.	<ul style="list-style-type: none"> Mapping of irrigation in Kenya to identify where irrigation is being done and where the water sources are. The maps can (1) enable suppliers of solar water pumping and irrigation systems to identify where there are large aggregations of irrigation activities (low hanging fruits), and (2) identify where there is irrigation potential, but additional support is required to realize it. Developing a database and map of agribusiness off-takers in Kenya. The database will enable suppliers of solar water pumping and irrigation systems to identify the off-takers that they can develop partnerships with. 	<ul style="list-style-type: none"> Columbia University have undertaken GIS mapping of irrigation in Ethiopia and Uganda. The approach is based on GIS images to identify areas of greenery during the dry season, which indicate that irrigation is being done, and further analysis to determine the source of water being used for irrigation. KALRO are in the process of developing a detailed mapping tool that shows where different types of crops are grown. The objective is to help farmers to identify what crops are best suited for their location. 	<ul style="list-style-type: none"> Ministry of Water – State Department for Irrigation 	<ul style="list-style-type: none"> Development Organizations (technical and financial support) CLASP
Market Growth and Technology Adoption	Addressing information gaps	Undertaking a study on status of the small wind turbine market in Kenya (and its potential).	<ul style="list-style-type: none"> A scoping study to collect information on e.g., the companies marketing small wind systems, the number of systems sold annually, the competitiveness of small wind systems for water pumping compared to other technologies (e.g., how does their cost, applicability, O&M compare with other alternatives). 	<ul style="list-style-type: none"> Considering that the uptake is relatively low and that there is a need to have a more up to date picture of the small wind turbine market in Kenya. 	<ul style="list-style-type: none"> KEREA 	<ul style="list-style-type: none"> Development Organizations (technical and financial support)

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

5.2 Overview of Interventions that can help expand the use of PURE by small commercial enterprises

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Policy and Regulation	Policy	Developing a national strategy to increase the use of PURE for economic activities.	<ul style="list-style-type: none"> The development of a national strategy to increase the use of PURE for economic activities, which details the objectives of the strategy, and how it will be implemented and financed. Since approaches will vary based on the size and type of business, adequate categorization will be required. One approach could be to base it on the size of enterprises (e.g., (micro (<10 employees), small (10-49 employees), medium (50-99 employees), and large (>100 employees) and their location (urban, peri-urban, or rural). 	<ul style="list-style-type: none"> Kenya's National Energy Policy aims to ensure affordable, competitive, sustainable, and reliable supply of energy at the least cost to achieve the national and county development needs, while protecting and conserving the environment for inter-generational benefits. The 2018 Kenya National Electrification Strategy (KNES) was developed to achieve this objective; it details Kenya's roadmap to achieving universal access to electricity. There is no explicit strategy that focuses on maximizing the economic opportunities created by providing increased access to electricity. There is need to embed the above objective into a specific policy and/or strategy that provides the basis for mobilizing and allocating the resources required to increase the use of energy for economic activities e.g., micro-enterprises, commercial agriculture, livestock, and fisheries. 	<ul style="list-style-type: none"> Ministry of Energy 	<ul style="list-style-type: none"> Rural Electrification and Renewable Energy Corporation Ministry of Agriculture and Livestock Development Ministry of Mining, Blue Economy & Maritime Affairs – State Department Blue Economy and Fisheries PURE companies Development Organizations (technical and financial support for policy development)

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Policy and Regulation	Addressing affordability	Exempting VAT and Import Duty on small commercial PURE appliances.	<ul style="list-style-type: none"> Introducing targeted VAT and Import Duty exemptions for modern small commercial PURE appliances. Effective targeting is proposed to mitigate the risk of leakage i.e., conventional appliances also benefiting from the exemption. Effective targeting could be based on developing criteria for defining modern small commercial PURE appliances, an accompanying verification process, and a product registration system (this could be operationalized by EPRA, with the registration system then used by KRA to determine which appliances receive an exemption). 	<ul style="list-style-type: none"> Modern PURE appliances are often significantly more expensive than conventional appliances used for the same application. The reasons for this include: the fact that they are developed for niche markets and therefore haven't yet achieved the economies of scale of conventional appliances, and that they incorporate innovations that increase their efficiency, reliability and suitability for off-grid and weak grid applications. 	<ul style="list-style-type: none"> Treasury 	<ul style="list-style-type: none"> Ministry of Energy KEREA Development Organizations (technical and financial support for advocacy)
Policy and Regulation	Standards and regulation	Development, adoption, and implementation of internationally aligned standards for off-grid refrigerators ¹⁹ in Kenya.	<ul style="list-style-type: none"> Collaborating with KEBS, CLASP and EPRA to develop, adopt, and implement standards for off-grid refrigerators. 	<ul style="list-style-type: none"> There are currently no standards for off-grid refrigerators in Kenya. However, the work done by CLASP/Verasol (i.e., to (1) develop test methods and requirements²⁰ for off-grid refrigerators and (2) to test 96 different off-grid refrigerators) provides a good foundation for the implementation of standards for off-grid refrigerators in Kenya. 	<ul style="list-style-type: none"> Kenya Bureau of Standards 	<ul style="list-style-type: none"> CLASP/Verasol PURE companies (participation in technical committees to adopt standards)

19 Refrigerators intended for use on, and/or compatible with, off-grid energy systems (e.g., low-voltage DC systems, solar energy kits systems, and AC or DC mini-grids). Scope includes standalone solar refrigerators and refrigerators that are packaged and sold with solar energy systems under 350 Wp.

20 These requirements do not cover solar direct drive refrigerators, though the VeraSol team is considering expanding the scope to include these devices. Additionally, though AC-powered refrigerators may be certified as standalone devices, any refrigerators included with solar energy system kits must be powered by a DC input. The VeraSol team is also considering expansion to enable certification of SHS kits with inverters and AC appliances, but currently only supports SHS kits with DC outputs and appliances. Devices with ice-makers and automatic defrosters are also outside the scope of these requirements.

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Finance and Investment	Addressing affordability	Grant funded program to subsidize interest payments on small commercial productive use appliances.	<ul style="list-style-type: none"> A demand side subsidy program aimed at reducing the price of small commercial PURE appliances by subsidizing the interest rate payments on loans or PAYGo financing that would be charged to the entrepreneurs purchasing the appliances. The program should be designed to encompass different end user financing models e.g., bank loans and PAYGo provided by the hardware supplier. 	<ul style="list-style-type: none"> Due to the price of some commercial PURE appliances, such as solar generators and fridges (US\$500 – 1,000), the loans required to finance these are large. This results in longer repayment periods and large interest payments. Anecdotal evidence suggests that buyers of these PURE appliances are reluctant to take loans from commercial banks, indicating preference for SACCOs or PAYGo financing. Commercial PURE applications are typically linked to regular revenue (e.g., provision of milling services, hair clipping services, sale of cold drinks) and are therefore better suited to typical end user financing models (than e.g., solar water pumping, where revenues are linked to the timelines for harvesting and sale of agricultural produce). Since interest rates are partly dependent of perceived risk, subsidizing interest payment could partly address affordability with minimal market distortion and provide increased incentive for financing institutions and suppliers who provide consumers financing. Interest rate subsidies could be coupled with first loss guarantees as a risk mitigation measure. GreenMax Capital have developed a first loss guarantee facility for local financial institutions which is set to be piloted in Kenya. 	<ul style="list-style-type: none"> Development Organization(s) interested in providing grant funding support 	<ul style="list-style-type: none"> PURE companies Financing Institutions

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Market Growth and Technology Adoption	Market Development Support	Implementing a National Consumer Awareness campaign on Small Commercial PURE applications.	<ul style="list-style-type: none"> Develop an awareness campaign on small commercial PURE applications targeting markets/trading centres and beaches (estimated at 9,756 on-grid and 5,706 off-grid as defined by REREC). The national awareness campaign would be primarily funded by development organizations and government (i.e., covering logistics costs) and implemented in collaboration with specialized PURE hardware suppliers who would exhibit and promote their products during the campaign. The campaign could be linked to follow-on upskilling and mentorship support activities for the enterprises that take up PURE products after the awareness campaign. This borrows from an approach used in Tanzania under the Productive Use of Energy Component of the Rural Electrification Densification Project (REDP) Phase 2. To ensure that only products that meet minimum safety and performance standards are promoted, the campaign will be linked to a voluntary quality assurance program i.e., which will develop test methods and quality requirements and undertake tests of the products to be included in the campaign (an approach similar to one undertaken in the IFC/World Bank Lighting Africa market development program for off-grid lighting products). 	<ul style="list-style-type: none"> Modern PURE appliances provide new opportunities to use electricity for economic activities. Furthermore, the high pace of grid and off-grid electrification (through rural electrification, last mile electrification, mini-grid development, and uptake of solar systems) creates a perfect environment for the uptake of modern PURE appliances. As most of these PURE appliances are novel, awareness is still very low about the benefits they have over conventional productive use appliances and conventional practices Modern PURE appliances provide new opportunities to use electricity for economic activities. Furthermore, the high pace of grid and off-grid electrification (through rural electrification, last mile electrification, mini-grid development, and uptake of solar systems) creates a perfect environment for the uptake of modern PURE appliances. As most of these PURE appliances are novel, awareness is still very low about the benefits they have over conventional productive use appliances and conventional practices. Acknowledging that not everyone will take up productive use appliances (and that this is not the objective), approaches to effectively target awareness campaigns need to be considered. Key considerations for targeting include: Categorizing small commercial PURE applications to enable targeted marketing. Two broad categories that can be considered are (1) General/widespread applications that don't require specific inputs or markets e.g., small refrigerators, freezers, hair clippers, charging services, 	<ul style="list-style-type: none"> Ministry of Energy 	<ul style="list-style-type: none"> PURE companies Development Organization(s) interested in providing grant funding support. Rural Electrification and Renewable Energy Corporation Organizations implementing PURE related initiatives in Kenya Ministry of Agriculture and Livestock Development Ministry of Mining, Blue Economy & Maritime Affairs – State Department Blue Economy and Fisheries

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
				<p>IT services, and (2) Specific/targeted applications that are linked to specific value chains and/or require specific inputs or markets e.g., grain mills, solar dryers, night fishing lights, egg incubators, and knapsack sprayers.</p> <ul style="list-style-type: none"> • Targeting existing users i.e., micro-enterprises where there is the opportunity to substitute a conventional PURE appliance with a novel one (e.g., substituting a diesel-powered grain mill with a solar powered one, or a conventional 3-phase grid powered mill with a more efficient mill that can be powered on a single-phase connection). 		
Market Growth and Technology Adoption	Addressing information gaps	Baseline survey on use of energy for economic activities	<ul style="list-style-type: none"> • A baseline survey focused on micro-enterprises (including individuals involved in commercial agriculture, livestock, and fisheries) in rural areas. • The survey would seek to determine e.g., the percentage of micro enterprises using PURE appliances for economic activities, the types and spread of PURE appliances, the economic benefits arising from different types of PURE appliances, percentage of PURE appliances used that are modern, and the barriers to the uptake of modern PURE appliances. 	<ul style="list-style-type: none"> • While surveys have been undertaken to determine access levels for electricity and cooking (e.g., the 2016 Energy Access Diagnostic Report based on the MTF), information is lacking on the productive use of renewable energy. • A baseline survey would help identify the barriers to uptake and the development of suitable interventions. It would also help establish realistic targets for the uptake of modern PURE appliances. 	<ul style="list-style-type: none"> • Ministry of Energy 	<ul style="list-style-type: none"> • Development Organization(s) interested in providing grant funding support. • Rural Electrification and Renewable Energy Corporation

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Market Growth and Technology Adoption	Addressing information gaps	Collecting and collating data on the commercial performance of end user loans for productive use products.	<ul style="list-style-type: none"> Consolidating data from different providers of financing for PURE products. This can be done using software tools (e.g., Prospect, Odyssey and Nithio) that can be remotely linked to the back-end systems of participating companies to collect raw source data e.g., of customer repayments over time. Companies would need to voluntarily participate in such an initiative i.e., to achieve the collective objective of generating enough data to facilitate debt and equity investments to finance productive use. An alternative approach would be to integrate this into a PURE market development program where provision of the above data is a requirement for companies to participate. 	<ul style="list-style-type: none"> The limited knowledge of and experience with financing productive use products is a barrier to investment from debt and equity investors who would like to have information from a large and wide sample on the performance of loans provided for different types of productive use products. With the market still nascent, this will require the consolidation of data from different companies (i.e., PURE product suppliers who also extend finance to their customers and financing institutions offering loans for productive use products). There has been experience (e.g., in the Beyond the Grid Fund for Zambia program, and Nigeria's Electrification Program) of using remote monitoring via an Application Program Interface (API) link to the Customer Relationship Management (CRM) system of participating companies to remotely access information on e.g., system purchase, system activation, progress with repayments, and the performance of installed systems. This anonymized raw source data can be used for tracking commercial performance and risk e.g., analysis of customer payment data over time in the BGFZ program enabled determination of default and delinquency rates, and the effect of currency fluctuations on revenues. However, it is unclear whether companies would be willing to voluntarily share this information (in the above examples it was a requirement for companies to participate in a program that was providing grant support for market development). 	<ul style="list-style-type: none"> Development Organizations (interested in providing technical and financial support) 	<ul style="list-style-type: none"> PURE companies KEREA GOGLA PURE data service providers Institutions financing PURE

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

5.3 Overview of Interventions that can help to accelerate the use of cold storage

Category of Intervention	Type of Intervention	Intervention	Approach	Challenges and Opportunities	Proposed Lead Organization	Proposed Supporting Organizations
Finance and Investment	Market Development Support	Grant funded programs to support (1) the involvement of suppliers of cold storage systems in agriculture, livestock, dairy, poultry, and fisheries cold chains and/or, (2) to extend the involvement/participation of suppliers of cold storage systems in these value chains (e.g., as market intermediaries).	<ul style="list-style-type: none"> Grant funding can be used to co-finance the investment required to (1) identify, develop, and establish opportunities for the involvement of suppliers of cold storage systems in cold chains for agriculture, livestock, dairy, poultry, and fisheries produce, and/or (2) extend the involvement of suppliers of cold storage systems in the value chains to ensure that users of the cold storage services are maximizing the benefit of extending the shelf life of their products. 	<ul style="list-style-type: none"> Agriculture, livestock, dairy, poultry, and fisheries cold chains can provide a market entry point for suppliers of cold storage systems. Where suppliers of cold storage systems are working in value chains that require cold storage and where off takers are limited or absent, they may need to extend their involvement in the value chain to ensure that users of the cold storage services are maximizing the benefit of extending the shelf life of their products. 	<ul style="list-style-type: none"> Development Organization(s) interested in providing grant funding support 	<ul style="list-style-type: none"> PURE companies Ministry of Agriculture & Livestock Development Ministry of Mining, Blue Economy & Maritime Affairs – State Department Blue Economy and Fisheries
Market Growth and Technology Adoption	Addressing information gaps	Undertaking studies to provide information that enables suppliers of cold storage systems to have a better understanding of the market to enable better targeting and market development.	<ul style="list-style-type: none"> Developing a database and map of agriculture, livestock, dairy, poultry, and fisheries value chains in Kenya with cold storage requirements. 	<ul style="list-style-type: none"> The database will enable suppliers of cold storage systems to identify the opportunities and gaps in value chains with cold storage requirements (i.e., where they can provide solutions) and the inter-dependencies between different cold storage, or other interventions, at different parts of the value chain. 	<ul style="list-style-type: none"> Ministry of Energy 	<ul style="list-style-type: none"> Development Organizations (technical and financial support) Ministry of Agriculture and Livestock Development Ministry of Mining, Blue Economy & Maritime Affairs – State Department Blue Economy and Fisheries CLASP

Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

5.4 Overview of recommended cross-cutting PURE Interventions²¹

Category of Intervention	Type of Intervention	Intervention	Approach	Premise	Proposed Lead Organization	Proposed Supporting Organizations
Sustainable and Responsible PURE Businesses	Gender Mainstreaming		<ul style="list-style-type: none"> Encourage PURE companies to (1) increase opportunities for women to occupy technical and management positions, and (2) be more intentional in designing PURE solutions that meet the needs of women. 	<ul style="list-style-type: none"> Gender is not yet mainstreamed in existing PURE companies. Women tend to be hired for sales and marketing departments, while men occupy leading positions and are usually employed as technicians. Men also have more chances of accessing technical and managerial trainings. 	<ul style="list-style-type: none"> PURE companies 	
	Consumer Protection		<ul style="list-style-type: none"> Ensure that customers understand how to use and maintain their PURE equipment, can quickly and easily access after-sales services, and that they understand the repayment terms (if purchasing their system with consumer financing) and are able to meet them. 	<ul style="list-style-type: none"> While PURE solutions can have a significant impact on consumer's lives and livelihoods, they may also introduce product, financial and service risks. Good standards of consumer protection are therefore critical to mitigate these risks. 	<ul style="list-style-type: none"> PURE companies 	<ul style="list-style-type: none"> GOGLA
	E-Waste Management		<ul style="list-style-type: none"> Design and implement streamlined quality assurance programs to improve product durability, support capacity to repair, refurbish, and repurpose PURE equipment, and build country-level e-waste strategies. 	<ul style="list-style-type: none"> Volumes of waste from PURE products are expected to increase significantly once PURE technologies reach market maturity. 	<ul style="list-style-type: none"> National Environmental Management Authority 	<ul style="list-style-type: none"> KEREA PURE companies Kenya Bureau of Standards CLASP E-Waste facilities
Finance and Investment	Access to debt finance	Facilitating access to debt finance.	<ul style="list-style-type: none"> Developing and deploying suitable financing instruments to address access to finance gaps for PURE companies. 	<ul style="list-style-type: none"> Significant levels of investment are required for both working capital and consumer credit and commercially available facilities are currently not suited to early-stage PURE business models. Concessional financing combined with risk protection instruments (for the institutions lending to PURE companies) is therefore required to support PURE companies to expand 	<ul style="list-style-type: none"> Development Organizations (interested in providing financial support e.g., concessional debt finance and risk guarantees) 	<ul style="list-style-type: none"> Financing institutions PURE companies

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Proposed Interventions to Scale Productive Use of Renewable Energy in Kenya

Category of Intervention	Type of Intervention	Intervention	Approach	Premise	Proposed Lead Organization	Proposed Supporting Organizations
Capacity Building	Training and Technical Assistance	Capacity building programs for government ministries and agencies, and financing institutions.	<ul style="list-style-type: none"> The objective is to build knowledge and share up to date information on PURE solutions, quality assurance frameworks, and deployment of financing for PURE solutions. 	<ul style="list-style-type: none"> Most PURE solutions are still novel and support, in the form of training or technical assistance, is required to enable government ministries and agencies, and financing institutions to develop and deliver suitable PURE policy and financing solutions. 	<ul style="list-style-type: none"> Development Organizations (interested in providing technical and financial support) 	<ul style="list-style-type: none"> Ministry of Agriculture and Livestock Development Ministry of Mining, Blue Economy & Maritime Affairs – State Department Blue Economy and Fisheries Ministry of Water – State Department for Irrigation Financing Institutions



Annexes



Annexes

6.1 List of Organizations in the Pumping and Irrigation PURE Category

	Name of Organization
1	Omnivoltaic Energy Solutions (Kenya) Company Limited
2	Hubble Power Engineering Contractors
3	Eximis Engineering Ltd
4	Biogas International Ltd
5	Renewable Energy Engineering Contractors (REECON)
6	Primefix synergy ltd
7	ENGIE Energy Access Kenya
8	E3 Capital (formerly EAV)
9	SunCulture
10	Institute of Energy and Environmental Technology (IEET) of the Jomo Kenyatta University of Agriculture and Technology (JKUAT)
11	Solafrique Limited
12	L.G. dealer
13	Solafrique Limited
14	Glovo
15	Kijani Testing Limited
16	Eastlands College of Technology Enterprise Services (ECTES) LTD
17	Kerry Energy
18	Chloride Exide Kenya Ltd
19	Rafiki Solar / AEPEA
20	Anvil System limited
21	TransAfrica Water Systems Ltd
22	HDC
23	Davis Shirtliff Ltd.
24	Jasiri
25	Solargen Technologies Limited
26	Dedan Kimathi University of Technology
27	Lorentz
28	Epicenter Africa
29	Future Pump
30	Center for Alternative Technologies
31	Ennos

6.2 List of Organizations in the Small Commercial PURE Category

	Name of Organization
1	Agsol
2	Omnivoltaic Energy Solutions (Kenya) Company Limited
3	Hubble Power Engineering Contractors
4	Biogas International Ltd
5	Renewable Energy Engineering Contractors (REECON)
6	Primefix synergy ltd
7	ENGIE Energy Access Kenya
8	E3 Capital (formerly EAV)
9	Institute of Energy and Environmental Technology (IEET) of the Jomo Kenyatta University of Agriculture and Technology (JKUAT)
10	L.G. dealer
11	Glovo
12	Sistema.bio
13	Kijani Testing Limited
14	DASE LIMITED
15	Kerry Energy
16	Chloride Exide Kenya Ltd
17	SunPoynt Ltd
18	GivePower
19	HDC
20	Energy Enthusiasts
21	Davis Shirtliff Ltd.
22	Roam Electric Limited
23	INAVITAS
24	Jasiri
25	Dedan Kimathi University of Technology

Annexes

6.3 List of Organizations in the Cold Storage PURE Category

	Name of Organization
1	Omnivoltaic Energy Solutions (Kenya) Company Limited
2	Biogas International Ltd
3	Renewable Energy Engineering Contractors (REECON)
4	Primefix synergy ltd
5	E3 Capital (formerly EAV)
6	Institute of Energy and Environmental Technology (IEET) of the Jomo Kenyatta University of Agriculture and Technology (JKUAT)
7	Solafrique Limited
8	L.G. dealer
9	Solafrique Limited
10	Kijani Testing Limited
11	Kerry Energy
12	Ecozen Solutions
13	Chloride Exide Kenya Ltd
14	SunPoynt Ltd
15	Davis & Shirtliff Ltd.
16	Roam Electric Ltd
17	Jasiri
18	Koolboks Kenya Limited
19	Dedan Kimathi University of Technology
20	Tree_Sea.mals Ltd. (Baridi)
21	Soko Fresh
22	Sure Chill

6.4 List of Organizations implementing initiatives to support Kenya's PURE sector, and Lenders with interest in financing PURE

	Name of Organization
1	WFP
2	Nithio
3	One Acre Fund
4	SIDA
5	Green Max Capital
6	Power Africa Off-grid Project
7	World Bank
8	SNV
9	CLASP
10	GIZ-WE4F
11	Mercy Corps/E4I
12	Equity Bank
13	Coop Bank
14	Africa Enterprise Challenge Fund
15	The Global Energy Alliance for People and Planet (GEAPP)
16	HIVOS
17	WWF
18	SE4ALL
19	Practical Action
20	MESPT
21	Kenya Power

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