Productive Uses of Solar Energy in Kenya: Policy Action Plan

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SNV

Report written by:
Olerai Advisory Ltd. (Karin Sosis, Jessica Gogo and Mark Hankins).
Contact: T: +254 707823166
E: karin@oleraiadvisory.com

Commissioned by SNV Kenya
E: snvendevkenya@snv.org

Graphics design by Blue Antelope
hello@blueantelope.co.ke

EnDev

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH
Registered offices Bonn and Eschborn, Germany

Dag-Hammarskjöld-Weg 1-5
5760 Eschborn, Germany
E endev@giz.de
I www.endev.info

SNV

SNV-Kenya Country Office
Ngong Lane, Off Ngong Road
P.O Box 30776-00100 Nairobi, Kenya
Tel: +254 724 463355
Email: Kenya@snv.org

This document presents an analysis of the current Kenyan productive use of solar energy (PUE) enabling environment, focused on the political framework and areas for government action. It is aimed at guiding advocacy efforts.

Executive Summary

Kenya is a vibrant hub to more than 100 companies selling solar-powered appliances that are being used across the national economy to generate value and income. **Productive Uses of Energy (PUE)** is an umbrella term for various ways of using off-grid solar photovoltaic (PV) electricity to power electric appliances that help in running a business or an income-generating activity.

The government is interested in promoting and facilitating PUE for the following reasons:

- Solar-powered appliances can generate major cost savings and additional earnings in the agriculture sector, which is particularly relevant as COVID-19 has threatened earnings and food security for so many.
- In reducing carbon emissions by replacing fuel-based power with clean solar electricity, PUE directly contributes to Kenya's Nationally Determined Contribution (NDC) and has potential to attract climate finance to the country.
- A more favourable PUE business environment will encourage Kenyan entrepreneurs, attract foreign companies to the country, boost employment and skills, and strengthen Kenya's reputation as a global leader in the sector.

The enabling environment is broadly conducive to development of the PUE market(s), with technical standards in place, vibrant mobile money and Pay-As-You-Go (PAYGo) solar sectors, mini-grid regulations to guide developers, and a long-standing pro-business approach that reassures both foreign and local investors. PUE aligns easily with **Vision 2030**, the **2010 Constitution**, and the Sustainable Development Goals.

In particular, the National Energy Efficiency and Conservation Strategy (NEECS) (2020) promotes solar-based appliances and electric vehicles; an Implementation Plan is currently under consideration with the Cabinet Secretary. This notwithstanding, concrete action has been limited, and PUE is missing from other important documents across the energy, agriculture, environment and economic development sectors.

In recognition of the economic importance of the PUE sector in Kenya, the Netherlands Development Organisation (SNV), as part of the Energising Development (EnDev) programme and in cooperation with the Kenya Renewable Energy Association (KEREA) PUE Working Group, commissioned a study of the Kenyan PUE market.

Drawing on the study findings, **six key recommendations are made to the government** to support sector growth:

1. Convene stakeholders for an inter-ministerial public-private dialogue
2. Implement PUE features of the National Energy Efficiency and Conservation Strategy (2020)
3. Clarify and improve the tax environment for PUE solar, components and appliances
4. Maintain and enforce the quality frameworks governing the PUE sector
5. Implement the Extended Producer Responsibility (EPR) Regulations (2021)
6. Engage county officials regarding inclusion of PUE in County Energy Plans

Senior sector leaders, partners and organisations in the PUE ecosystem are ready to mobilise in response to government action.

1 The PUE market in Kenya

Productive uses of energy is an umbrella term for various ways of using off-grid solar PV electricity to power electric appliances that help in running a business or an income-generating activity. Appliances could be an electric water pump for irrigating farm land or an electric hair clipper for a *kinyozi*; there are approximately 40 other examples.

Customers might be interested in buying a solar appliance to:

- Mechanise an activity previously done manually (where the value is in time savings and reduced drudgery).
- Replace a fuel-based appliance with an electric one (value is cost savings and reduced pollution).
- Start a new activity made possible with a solar-powered appliance (value is income generation and diversification).

The government is interested in promoting and facilitating PUE for the following reasons:

- Solar-powered appliances can generate major cost savings and additional earnings in the agriculture sector.
- In reducing carbon emissions by replacing fuel-based power with clean solar electricity, PUE directly contributes to Kenya's NDC and has potential to attract climate finance to the country.
- Kenya is already a vibrant hub, and a more favourable PUE business environment will encourage Kenyan entrepreneurs, attract foreign companies to the country, boost employment and skills, and strengthen Kenya's reputation as a global leader.

About 100 specialist companies (see Figure 1) are active in the Kenyan solar PUE space, and many more electrical supply and hardware traders sell component-based systems with less visibility. The market is characterised by low-volume, niche appliances around which it has been difficult to build scalable business models, but opportunities are rich for companies to partner, consolidate and specialise.

Solar water pumping and irrigation, cooling (efficient refrigerators, freezers and ice makers) and electric mobility (e-bodas) are gaining attention and investment. Eighty-two per cent of specialist PUE companies in Kenya are working with one or more of these technologies (see Figure 2).

These companies can be categorised in three segments, according to the size of the solar product or service they sell:

1. *Plug and play* (P&P) PUE 'kits' are supplier-financed, offering important entry technologies but with limited value-addition.
2. *Component-based solar* PUE dominate the market and capture more value for Kenyan suppliers and end users, but sales are severely constrained by lack of consumer financing.
3. *Mini-grid* operators are actively testing PUE demand stimulation approaches,[1] with the verdict still out on which business models will succeed.

[1] For a mini-grid operator, much like for Kenya Power, the business model is to sell electricity – so encouraging customers to use more power ('demand stimulation') is important to the bottom line.

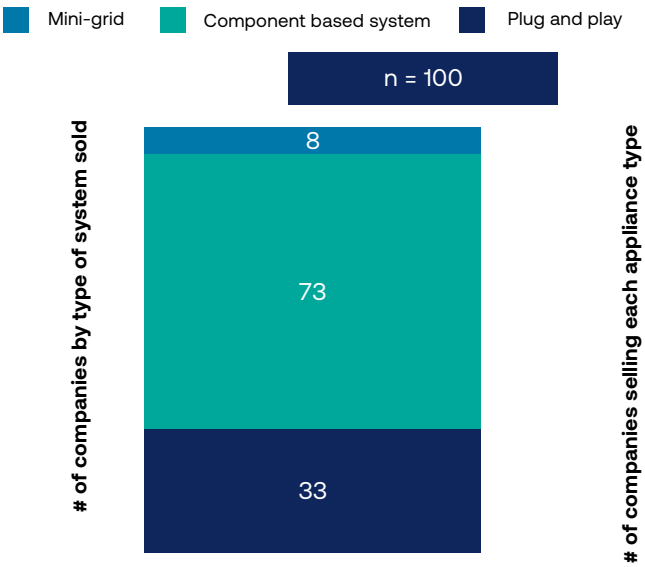


Figure 1: Companies active in the Kenyan PUE space.

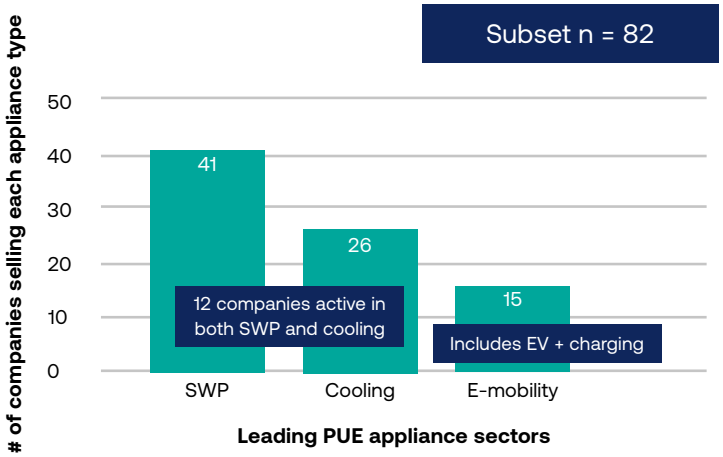


Figure 2: Subset of companies supplying three major PUE appliances.

N.B. Where companies are involved with more than one type of system/appliance, they are counted twice. As such, the totals are >n.

The PUE 'ecosystem' in Kenya is active (see Figure 3). Market applications span a range of economic sub-sectors, including agriculture, dairy, livestock, poultry, fisheries, light ('cottage') industry, small commerce, restaurants and hospitality. PUE appliances are being used by household micro-enterprises and large off-grid businesses alike.

Some Kenyan companies have accessed impact debt and early-stage equity, but more is needed, including for non-PAYGo and component-based solar manufacturers and last-mile distributors. Climate financing may become available for companies (or other actors) reducing carbon emissions, for example, by replacing fuel with solar electricity or by irrigating using soil-preserving solar-drip technology.

Consumer financing for mid-sized component-based PUE systems is a major gap, and most customers pay cash up front. Enterprising fintech lenders may bypass traditional micro-finance institutions to reach these clients, but there remains a need for dedicated asset financing to the sector.

Improved business practices as a consequence of the COVID-19 pandemic are strengthening companies' sophistication and evidence-based decision-making in ways that will enhance their attractiveness to investors. This includes an unprecedented level of digitisation.

As business models evolve, promising potential exists in:

- Expansion through non-solar sales channels. Though some last-mile distributors sell through both solar and agricultural equipment supply chains, many do not.
- Service or rental business models, by which

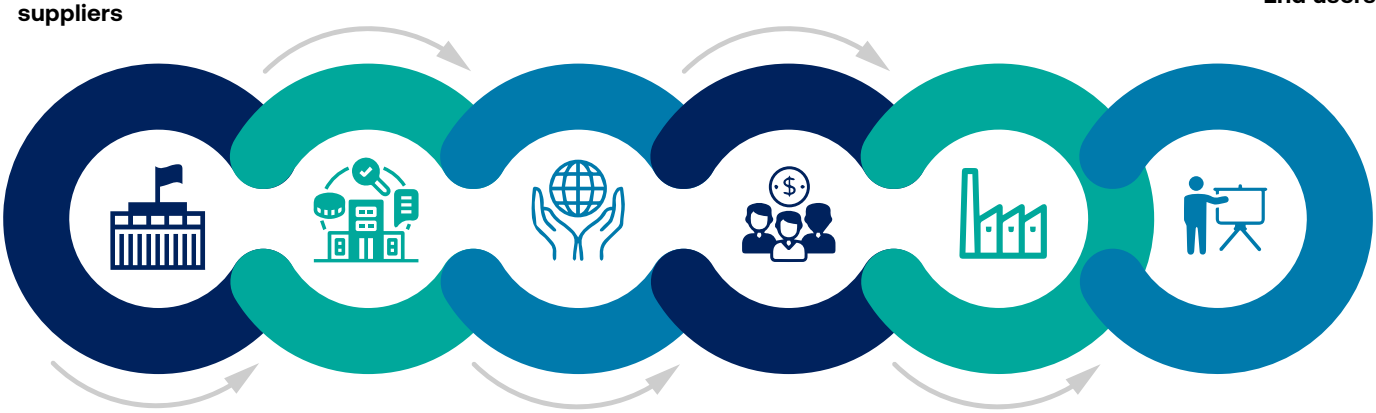
customers do not buy PUE appliances but rent them, or purchase the solar-powered service only. These address high equipment costs and can benefit from global lessons on sharing or rental economies.

- Horizontal consolidation, by which companies solve for more than one constraint in their customers' value chain, for example, selling farmers cold storage and cold transport.

Kenya is heading into an election year in 2022, and the government needs to show proactive support to a population reeling from COVID-19-related uncertainty, restrictions and job losses. This is a strategic moment to invest in high-potential PUE interventions. Senior sector leaders are calling for a convening of stakeholders to trade knowledge and chart a coordinated way forward.

PUE suppliers

End users



Government

- **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 mechanisation, improving yields, climate resilience
- **Treasury** - Reinstated tax exemptions (2021)
- **KRA** - Improved but still inconsistent implementation of tax exemptions at ports of entry

Financial Institutions

- **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 PUE
- **Solar companies** - In-house credit & PAYGo
- **Fintech companies** – filling gaps with AI-based loan products

NGOs & Programmes

Convening stakeholders, gathering data on last-mile / BoP / women, funding innovation

- **SNV, Practical Action**
- **CLASP** – Wide-ranging efforts promoting efficient appliances
- **Power Africa, EnDev** (+ Learning & Innovation Community of Practice on PUE), **EEP**
- **Efficiency for Access, LEIA, Global LEAP** grants + RBF, **GDC** – Multi-stakeholder mandate-specific initiatives
- **AECF RBF**
- **VeraSol** – quality standards managed by CLASP

Donors & Foundations

Grants supporting innovation, piloting, data collection, open-source modelling, standards, reaching vulnerable populations

- **GIZ, World Bank, GCF, SIDA, FCDO, USAID, BMZ, EU, AfDB + others**
- **IKEA, Shell, Rockefeller Foundations**

Industry Groups

- **KEREA** - newly mobilized PUE Working Group
- **KEPSA, KAAA**
- **GOGLA, AMDA, AEMDA, GDC**

Training & Research

- **JKUAT** - Farmer training, mechanisation outreach
- **SERC** - research, consultancy
- **CrossBoundary Mini-grid Innovation Lab**

Mobilising research, sharing data, guiding best practice

Figure 3: Kenyan PUE stakeholders.

2 Snapshot of the Kenyan PUE policy and regulatory framework

PUE aligns easily with the goals laid out in **Vision 2030** and the **2010 Constitution**, and a thriving sector would boost Kenya's progress toward the Sustainable Development Goals. Several ministries have interests in the sector's development – primarily energy, agriculture, economic development and environment.

The enabling environment is broadly conducive to development of the PUE market(s), with technical standards in place, vibrant mobile money and PAYGo sectors, mini-grid regulations to guide developers, and a long-standing pro-business approach that reassures both foreign and local investors.

The Kenyan government is supportive of PUE, in particular through the new (2020) NEECS which ties together a range of ideas on promoting solar-based appliances and electric vehicles. This notwithstanding, concrete action has been limited. There is little mention of it in major energy and agriculture documents, and little cross-sector coordination.

This section outlines the political framework for PUE. Section 4 provides analysis of areas where reform and action could reap benefits for the sector.

2.1 Institutional framework

Table 1 provides a summary of the institutions and documents guiding the sector.

Table 1: Summary of the institutions and documents guiding the PUE sector.

Government institution	Document	Comments
Ministry of Energy (MoE)	National Energy Policy 2019 Kenya National Electrification Strategy 2018 (KNES) National Energy Efficiency and Conservation Strategy (2020)	Existing energy policy documents are mainly roadmaps and strategies to reaching universal energy access, among other objectives. The Energy Policy mentions stand-alone solar, as well as challenges facing energy efficient appliances such as lack of tax rebates, insufficient standards and low uptake, and a need to promote local manufacture. KNES recognises a role for stand-alone solar to electrify 1.9 million households by 2022. Neither document specifically mentions PUE. The NEECS is the main government document to address PUE, positioning the replacement of fuel with solar as a matter of national importance. It promotes energy efficiency (EE) across five pillars, including agriculture and electric transport, offering a range of specific recommendations (discussed further below). An Implementation Plan is awaiting signature by the Cabinet Secretary.

Government institution	Document	Comments
Energy and Petroleum Regulatory Authority (EPRA)	Draft Energy (Solar Photovoltaic Systems) Regulations 2020 Energy (Appliances Energy Performance and Labelling) Regulations 2016 Draft Energy (Mini-grid) Regulations 2021	Existing regulatory documents govern the off-grid solar and mini-grid sectors, including electric appliances and equipment. They enforce quality and minimum energy performance standards for both P&P and designed solar PV systems; certification of solar PV technicians. See Table 2 for more detailed information.
Ministry of Agriculture (MoA)	National Agricultural Mechanisation Policy 2021 Draft National Mechanisation Bill and General Regulations 2021	The new policy, bill and draft regulations promote mechanisation of the sector. The policy has been approved and bill/regulations are in draft form pending approval. The policy promotes the use of equipment to intensify production, enhance value addition, reduce costs and reduce drudgery. It does not explicitly mention how the equipment should be powered, through there is acknowledgement that the government has the responsibility of promoting the use of renewable energy sources. The bill provides for the establishment of an Agricultural Mechanisation Board.
	Irrigation Act No. 14 of 2019	The National Irrigation Authority was established as a successor to the National Irrigation Board. This act touches on community-based smallholder irrigation and drainage schemes, but not on the energy source to be used.
Ministry of Industry, Trade and Economic Development (MoITED)	Micro and Small Enterprises Act 2012 Micro and Small Enterprises Strategic Plan 2020-2024 – 3rd Draft	Both documents promote small industry, including manufacturing, agribusiness, trade and service sectors. The act mandates collaboration with relevant actors in Information and Communications Technology, Mining and Energy. The draft plan does not explicitly mention solar but acknowledges renewable energy broadly with regards to sensitising small and medium-sized enterprises (MSMEs) on its benefits.

Government institution	Document	Comments
Kenya Bureau of Standards (KEBS)	Various standards (see Table 2)	KEBS sits under MoITED. Its electrotechnical unit develops standards in cooperation with regulators from relevant line ministries. The KEBS mandate is to improve the quality of what is available in the market, protect consumer safety (>35V on electric equipment), address market spoilage, and ensure that businesses are playing by the same rules. Its goal is to keep up with innovation but avoid stifling the market. In the energy sector, KEBS typically borrows from International Organisation for Standardisation (ISO) and International Electrotechnical Commission (IEC) standards. Some are formally adopted; others are adapted for Kenyan use. Developing and enforcing standards is resource-intensive; for one to be developed, there needs to be a decent volume of product in the market and a determination of whether self-regulation by local companies could work in lieu of formal regulation.
National Treasury	Finance Act 2021	In 2020, the Treasury reintroduced 14 per cent VAT on solar equipment, including batteries. This increased to 16 per cent in January 2021 as the temporary COVID-19-related 2 per cent VAT relief expired. The most recent budget has reinstated VAT exemption, effective 1 July 2021, on 'specialised equipment for the development and generation of solar... energy, including photovoltaic modules, DC charge controllers, DC inverters and deep cycle batteries that use or store solar power.' This mirrors the language of import duty exemption in the East African Community (EAC) Customs Management Act.
Ministry of Environment and Forestry (MoEF)	Updated Kenya NDC 2020 National Climate Change Action Plan (NCCAP) 2 (2018-2022) EPR Regulations 2021 National E-Waste Management Strategy 2020	In 2020, Kenya submitted an updated NDC to the United Nations Framework Convention on Climate Change. The document outlines Kenya's greenhouse gas mitigation plans and priorities, including renewables and energy efficiency, with no specific mention of PUE except 'low carbon and efficient transport systems.' Though it does not include specific transport-related mitigation targets, the NDC refers to the NCCAP 2, which mentions piloting electric vehicles as part of national greenhouse gas emissions reductions.[2] **EPR** Regulations place responsibility on 'producers' – any entities introducing a product into the Kenyan market whether by manufacture or import – for the full life cycle of their products, including end of life disposal or recycling. Products regulated include batteries, electrical and electronic equipment, and vehicles. In January 2021, the MoEF launched the Kenya Extended Producer Responsibility Organization (KEPRO) to accelerate the growth of Kenya's recycling ecosystem.[3] The **National E-Waste Management Strategy** is a five-year plan (2019/20 to 2023/24) that acknowledges both formal and informal e-waste, suggests incentives for waste electrical and electronic equipment refurbishment or takeback, and proposes data collection on waste flows.

Government institution	Document	Comments
Central Bank of Kenya (CBK)	Draft Central Bank of Kenya (Amendment) Act 2021 Draft Financial Markets Conduct Bill 2018 National Payment Systems Regulations 2014 Microfinance Act 2006	The CBK oversees all entities in the banking sector, with relevance to PUE in terms of the regulation of mobile money and digital lending, as they pertain to the PAYGo business model and/or availability of micro-loans to purchase PUE appliances. Neither the original **Central Bank of Kenya Act** nor the **Microfinance Act 2006** covered credit-only lenders (that is, non-deposit-taking institutions); a **Draft Financial Markets Conduct Bill** developed to regulate consumer credit providers has never been passed. With the rapid growth in digital lending in the last couple of years, and concern over their practices targeting the very poor, the CBK has drafted the **Central Bank of Kenya (Amendment) Act 2021**, which will give CBK power to license and supervise all digital lenders. The amendment is awaiting Parliamentary approval. There is no consideration of PAYGo providers as lenders within current regulations. The **National Payment Systems Regulations** provide a legal framework for mobile money, including for risk management, inter-operability and safeguarding of customer funds.

2.2 Regulatory framework

The PUE space in Kenya is affected primarily by the following regulations in the energy sector:

- Quality or minimum performance **standards** for solar and appliances
- **Certification** requirements for solar technicians
- **Tariff-setting rules** for mini-grids
- **Taxation** of imported equipment

There are no national standards for designed (component-based) productive use systems, nor for DC appliances. It is not a priority right now. Efficiency (minimum energy performance) standards exist for several appliances as outlined in Table 2; KEBS additionally has received requests to develop standards for solar refrigerators (which, because their component parts are not new, will remain self-regulated) and solar thermal dryers. There are 21 standards in place for the electric mobility sector.[4]

VeraSol, an evolution of the Lighting Global Quality Assurance programme, plays a major role globally in quality certification for the off-grid solar sector.[5] Both VeraSol and KEBS use the IEC TS 62257-9-8 standard for solar systems under 350W, so EPRA accepts VeraSol quality assurance certification in lieu of doing their own permitting for these products. VeraSol has also developed quality test methods for solar water pumping (SWP) and electric pressure cookers.[6]

Minimum energy performance standards enforcement happens through:

- Approval and permitting of every product model, a requirement for import to Kenya
- PVOC managed by KEBS, which has agents in countries of origin who check compliance and EPRA permits prior to export
- Border checks to ensure goods meet standards, done online through approved importation permits
- Spot checks in the market, to check conformity to how standards compliance is displayed to customers – the correct label, on the correct appliance, displayed in the correct place
- Ad hoc lab testing in response to complaints of low-standard equipment (which has not yet been necessary)


MWEZI SOLAR

Table 2: PUE energy regulations.

Regulatory document	Technology/ topic	Description/comments
Kenya Bureau of Standards (KEBS)	Various standards (see Table 2)	The regulations include six MEPS that are technology-specific. For lighting, for example, they are specific to fluorescent bulbs and LED bulbs. KEBS has more recently developed one MEPS for all lighting technologies (technology agnostic). This revised lighting MEPS is one of three new standards approved but not yet enforced (the others are for LED TVs and computer monitors). To do so requires a regulatory impact assessment, which consists of a baseline study of existing appliance performance in the country, then simulation of the economic, social and environmental impacts of adopting the standards.
Draft Energy (Solar Photovoltaic Systems) Regulations 2020	Stand-alone solar	The new regulations, gazetted in January 2021, build on the Energy (Solar Photovoltaic Systems) Regulations 2012. They are based on the standard IEC TS IEC 62257-9-8 for <350Wp P&P systems, which replaces the old KS 2542 standard. If a product is registered with VeraSol, no re-approval in Kenya is required.
	Solar technicians	The regulations requires solar technicians to be certified. The 2020 Draft proposes transitioning from the old certifications of Class es Technician (T) 1-3 to new categories Solar PV Worker (SPW) 1-4. One feature of the shift is to amend the maximum permitted system size for T1 and T2 upwards, to reflect market changes. Additionally, the regulations also create new classes for manufacturers, importers, vendors and contractors [from Classes Vendor (V) 1 and 2 and Contractor (C) 1 to Solar PV Contractor 1-4 and Solar PV Manufacturer] – with the idea of clarifying overlaps and confusion in the 2012 Regulations.
Draft Energy (Mini-grid) Regulations 2021	Mini-grids	The 2019 Energy Policy stipulated provisions for mini-grid regulations (Section 169), which are in advanced draft form. A final participatory public consultation was held in July 2021, and they are expected to be gazetted. In the interim, the Energy Policy provides principles sufficient as guidelines for EPRA to act on.

The tax obligations on PUE appliances consist of import duty, which is set at a regional level by the EAC Customs Union, and value-added tax (VAT), which is set annually by the Kenyan Treasury. In the past it has been common in the solar sector for the VAT status to mirror import duty status, though this is not always the case (e.g. it appears that currently an electric mill is exempt from import duty but not VAT). See Table 3.

[2] See https://changing-transport.org/ndc-update-kenya/ for more details.
[3] http://www.environment.go.ke/?p=8362.
[4] https://renewableenergy.go.ke/electric-mobility/.
[5] In collaboration with VeraSol, Efficiency for Access has piloted a quality assurance framework for off-grid TVs and fans. While not specifically 'productive' these are relevant as part of a growing effort to protect off-grid consumers and quality product manufacturers.
[6] Test methods available for SWP here and electric pressure cookers here.

Table 3: Tax status of PUE components.

Product	Import duty	VAT
Solar home system	Exempt	Exempt
Solar home system appliance (TV, clippers)	Non-exempt	Non-exempt
Solar panel	Exempt	Exempt
Balance of system components (inverter, battery, charge controller)	Exempt	Exempt
Solar water pump	Non-exempt	Non-exempt
Electric mill	Exempt	Non-exempt
DC appliance	Non-exempt	Non-exempt
Refrigerator (efficient)	Non-exempt	Non-exempt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MP KANJRA
2017
JUBEE TUKINUA

3 Gap analysis and action plan

This section makes six recommendations for government action, with support needed from the private sector, development partners, academia and more.

3.1 Priority actions

The following actions are noted as high priority for their scope, timing and potential impact:

1: Convene stakeholders for an inter-ministerial public-private dialogue	
Objective	Capitalise on current momentum in the PUE sector to mobilise decision-makers to address key constraints to PUE sector growth.
Rationale	Senior sector leaders[7] are calling for a convening of stakeholders and an identification of a solar PUE 'champion' to move the market forward. The government should initiate a forum in which this can happen. Currently, PUE is siloed within ministries. The MoE views PUE through the lenses of energy access and demand stimulation. MoA does not currently recommend any solar solutions, despite the potential for solar-powered pumping and irrigation and post-harvest cooling to add considerable value in the sector. The just-approved National Agricultural Mechanisation Policy (2021), for example, acknowledges the role of renewable energy in mechanisation but lack specifics on solar. MoITED oversees micro, small and medium-sized enterprises (MSMEs) – which include non-agriculture PUE such as in small commerce and light industry – but lacks tangible ideas on the opportunities of off-grid solar for small traders, restaurants and light industries. The MoE oversees Kenya's climate change mitigation and adaptation plans, to which PUE can contribute through replacement of diesel with solar, improved farming practices associated with solar irrigation, and diversification of income among the more vulnerable. With some exceptions, the four ministries are not communicating on PUE. MoA is eager to engage energy stakeholders in a cross-sector forum. These ideas are echoed by members of the KEREA PUE working group and KEPSA leadership. Other organisations in the PUE investment, development and civil society spaces would undoubtedly value a forum in which to raise concerns and opportunities. There is momentum for a gathering of interested parties to exchange information, identify roles and articulate priorities. A meeting in Nairobi would set the stage for cooperation going forward. Development partners should offer strategic support.
Outputs	- Share information - Create a working inter-ministerial committee - Identify a champion - Provide initial recommendations for priority action - Identify supporting organisations

[7] Interviews with MoE, MoA, AECF, IFC, KEPSA, GOGLA

Action area	Lead	Support	Timeframe
Coordination	MoE	SNV/EnDev Kenya KEREA	January 2022

2: Implement PUE features of the National Energy Efficiency and Conservation Strategy (2020)	
Objective	Drive high-value agriculture and e-mobility PUE through an existing policy mechanism.
Rationale	The NEECS promotes energy efficiency in five pillars, two of which are particularly relevant here:[8] • Agriculture[9] – four key activities outlined with a budget of KES 150 million ($1.4 million): o Five projects (including for demonstration) in renewable energy-based SWP, cold chains and grain mills o Market Analysis Needs Report to map agricultural value chains where off-grid solutions will be utilised o Capacity-building programmes by county governments o Financing through credit schemes, concessional loans and improved RBF • E-mobility – regulatory actions and financial mechanisms to increase the ownership of electric vehicles in Kenya, with a budget of KES 1 billion ($9.4 million): o Increased number of electric of hybrid vehicles imported into Kenya – target 5 per cent of total vehicles o Revised building code incorporating charging stations in public buildings and new estates o Regulations (not specified) o Incentives through lower import duty for electric cars, bicycles and tuk-tuks and lower vehicle road taxes o Awareness-raising on EE in vehicles and e-mobility This document serves as an 'anchor' within the government for PUE, and offers a firm starting point for integrating solar into these two pillars of the economy. An Implementation Plan and Matrix are currently awaiting signature from the Cabinet Secretary and are not yet publicly available. They may offer more detail on the above interventions. These activities have neither budget allocation nor sponsor, and will be for interested parties to take up. Stakeholders at the inter-ministerial forum (Action 1) should consider how to prioritise, fund and coordinate action within the remit of the strategy. They should take into close consideration recommended actions in relevant government and industry documents, for example (but not limited to) the new National Agriculture Mechanisation Policy (2021), the NCCAP and the recently published African Electric Mobility Developers Association report on the e-transport sector in Kenya.
Outputs	A Market Analysis Needs Report covering specific agricultural and e-mobility value chains would be an important first step to gather more information on specific market needs, actors and sizing to prioritise follow-on actions accordingly.

Action area	Lead	Support	Timeframe
Implementation	MoE Department of Energy Efficiency and Conservation	MoA SNV	March–October 2022


ALL
ACCESS

3: Clarify and improve the tax environment for PUE solar, components and appliances	
Objective	Provide stability and predictability regarding tax obligations for PUE companies.
Rationale	The Kenyan Treasury recently re-instituted VAT exemptions on solar panels and system components. Earlier exemptions had been rescinded, then the government temporarily reduced VAT from 16 per cent to 14 per cent in reaction to COVID-19, returning to 16 per cent in early 2021. The private sector has long maintained that the additional costs of taxes, passed on to low-income customers whose demand for PUE products is highly elastic, are a central obstacle to market growth. Whether and how this is borne out in practice is not always clear; while some companies have the flexibility to adjust prices based on their costs, others – particularly those offering PAYGo products for which the price is pre-determined – do not have that flexibility. Advocacy from industry regarding tax exemptions is balanced by the Treasury's legitimate need for tax revenue. It is relevant to note that higher-priced PUE products may depress PUE uptake among poorer customers, and in doing so hinder progress in meeting other objectives, such as universal energy access or local economic development. Subsidies for grid connection, grid electricity and/or diesel also must be acknowledged if the government recognises the similarly important role for PUE products in the economy. The debate continues over taxation of 'off-grid' (highly efficient) AC appliances that are meant for use with solar power but could also be used on the Kenya Power grid. DC appliances also still attract duty and tax, but as one stakeholder noted, 'It's one thing written down, another thing in practice.' Implementation at customs is unpredictable and dependent on the interpretation of the officer on duty. One PUE importer has been charged between 0 per cent and 25 per cent on different consignments of the same DC refrigerator. Efforts by the Kenya Revenue Authority (KRA), KEPSA, KEREA and development partners to clarify processes have resulted in genuine improvements. However, the industry still suffers from the government's lack of predictability both in the annual budget list of exemptions and in the application of exemptions at customs. The tax status of agricultural inputs varies, and there does not seem to be a specific strategy for implementing fiscal incentives associated with agricultural mechanisation or energy efficient agricultural PUE.
Outputs	- Provide the private sector with predictability around exemptions for the next five years. - Evaluate new tax exemptions on solar-powered agricultural equipment.

Action area	Lead	Support	Timeframe
Implementation and planning	KEREA KRA	KEPSA MoA MoE	2022–23

[8] The others are household energy, industry, buildings and power utilities. In addition to specific recommendations listed here, the document also proposes a range of cross-cutting actions to strengthen institutions, enhance professional competence, mainstream EE in the educational system, increase financing opportunities, integrate EE into county planning, enhance gender mainstreaming, and build linkages between MoE and academic and industry organisations.

[9] The document gives a long list of relevant solar PUE technology applications: solar hydroponics; solar-powered irrigation (drip and pumping); solar- or biogas-powered cold storage and dryers; micro-grids providing decentralised power for fish hatcheries, irrigation, and other agri-businesses; solar-thermal passive aeration systems for aquaculture; and various hybrid systems, including hybrid-powered tractors.

3.2 Support actions

The actions below are key to the health and growth of the PUE sector:

4: Maintain and enforce the quality frameworks governing the PUE sector		Lead/support	Timeframe
Objective	Protect consumers and companies from market spoilage.	EPRA KEBS	Ongoing
Rationale	KEBS and EPRA are tasked with protecting both consumers (physically and financially) and the market (avoiding spoilage from low-quality product/service and preserving a level playing field for companies). Quality control also reduces e-waste.		
Outputs	- Undertake a Regulatory Impact Assessment baseline study required for gazetting of three standards that are pending enforcement (lighting, LED TV, computer monitors). - Work with KEREA, technical and vocational institutions and solar companies to communicate recent revisions to solar technician certification requirements, and facilitate recruitment of artisans currently working outside the system to engage with it.		

5: Implement the EPR Regulations (2021)		Lead/support	Timeframe
Objective	Pre-emptively mitigate the negative environmental impact of a surge in appliance and battery sales.	KEREA MoEF KEPRO	2022–23
Rationale	Cold rooms and refrigerators use insulation and refrigerants; used batteries are toxic if not properly handled. Well-designed refurbishment, recycling, takeback or waste disposal schemes – including pooled efforts within specialised segments of the PUE industry – are essential for the future health of Kenya's land and waterways. A circular waste reduction system can also preserve value within the national economy.		
Outputs	- Enforce used lead acid battery guidelines. - Implement the National E-waste Strategy. - Support KEPRO to recruit partners and participants, and commence activities around safe treatment of appliances and lithium-ion batteries. - Share and fund global best practices.		

6: Engage county officials regarding inclusion of PUE in County Energy Plans		Lead/support	Timeframe
Objective	Share information, budget and technical support on PUE at the county level.	MoE County Energy Officers KEREA SNV	2022–2025
Rationale	The Kenyan Constitution devolves some energy and agriculture responsibilities to county governments. These officials are sometimes under-resourced and under-informed on specific issues but have the great benefit of living and working close to many people – such as farmers and small-scale traders – for whom PUE might be of interest.		
Outputs	- Integration of PUE to five County Energy Plans - Training and demonstration of PUE solutions		

EnDev

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ)
GmbH Registered offices Bonn and
Eschborn, Germany

Dag-Hammarskjöld-Weg
1-5 65760 Eschborn, Germany
E endev@giz.de
I www.endev.info

SNV

SNV-Kenya Country Office
Ngong Lane, Off Ngong Road
P.O Box 30776-00100 Nairobi, Kenya
Tel: +254 724 463355
Email: Kenya@snv.org

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