DRAFT REPORT: VERSION 2

Urban Briquette Making Pilot

Review of legal frameworks related to briquette production in Kenya (part 1 of 5)

Document title: **Urban Briquette Making Pilot- Review of legal frameworks related to briquette production in Kenya**

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1 Introduction

1.1 State of Cooking in Kenya

The Ministry of Energy (MoE) (2019), *Kenya Household Cooking Sector Study* estimates that 75% of all households in Kenya still use solid biomass as their *primary* cooking fuel – 38% and 93% in urban and rural households respectively as shown in Figure 1 below[1]. The definition of primary cooking fuel being the cooking solution that is most frequently used.

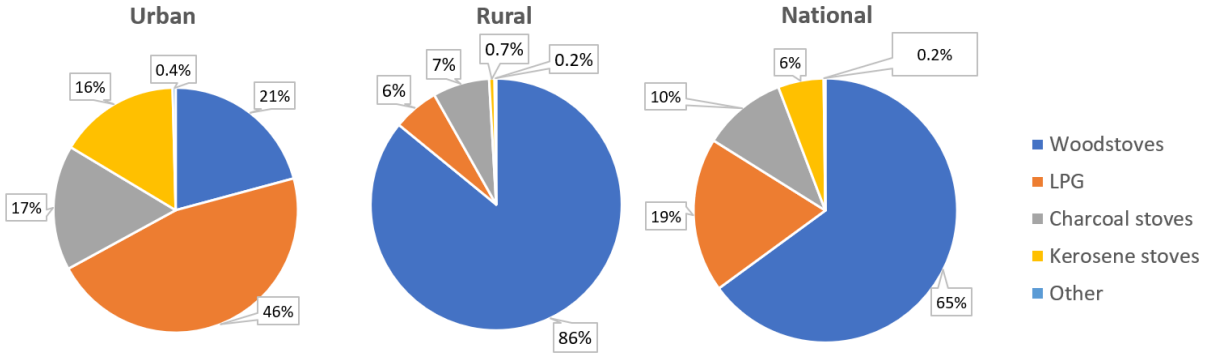

Figure 1: Household level primary cooking fuels – urban, rural and national (Data from MoE, 2019)

As shown in Figure 1 above, the choice of cooking solution varies greatly between urban and rural households. The use of traditional non-commercial solutions is prevalent in rural areas as expected. Urban users depending more on cooking solutions that use charcoal, LPG and kerosene. It is for this reason, that urban households are seen as a potentially significant market for briquettes which could supplement or substitute fuels such as charcoal. **Error! Reference source not found.** below highlights the main cooking fuels used by households within Kenya's largest urban areas (population of more than 250,000) as reported in the 2019 census[2]. The data is reported at the sub-county level for some urban areas. As seen, LPG, paraffin, firewood and charcoal are the primary cooking fuels in Kenya's urban areas.

Table 1:Main types of cooking fuels in Kenya's largest urban areas

Urban Area	Sub-county	Urban Population	# of HH	Electricity	Paraffin	Gas (LPG)	Biogas	Firewood	Charcoal	Solar
Nairobi City	All Sub-counties	4,397,073	1,494,676	2.3	26.5	67.2	0.6	0.7	2.7	0.0
Mombasa County	All Sub-counties	1,208,333	376,295	1.4	32.1	37.6	1.1	4.7	23.2	0.0
Nakuru		570,674								
	Nakuru East		60,066	0.9	8.9	61.1	0.5	3.6	25.0	0.0
	Nakuru West		64,429	1.0	14.1	43.3	0.6	7.7	33.2	0.0
Ruiru	Ruiru Sub-county	490,120	127,910	1.2	15.1	79.2	0.5	2.3	1.6	
Eldoret		475,716								
	Soy		53,758	0.6	5.2	13.0	0.3	65.3	15.2	0.3
	Turbo		71,587	1.2	10.0	28.2	0.4	35.8	24.3	0.1

[1] Ministry of Energy (2019), Kenya Household Cooking Sector Study
[2] Kenya National Bureau of Statistics (2019), Kenya Population and Housing Census Volume IV: Distribution of Population by Socio-Economic Characteristics

	Moiben		46,602	1.0	3.4	29.5	0.3	48.3	17.3	0.1
Kisumu	Kisumu Central	397,957								
Kikuyu	Kikuyu	323,881	60,619	0.7	7.5	61.0	0.4	18.1	12.2	0.0
Thika	Thika West	251,407	89,089	0.8	17.6	76.3	0.5	2.6	2.3	0.0

Further, stacking of cooking solutions is a common practice among Kenyan households. Practiced by 51% of households (MoE, 2019), stacking refers to the use of multiple devices and fuels to meet and optimize a household's cooking energy needs. The MoE, 2019 report notes that most of households using LPG as their primary cooking fuel also use traditional cooking fuels like wood (17%), kerosene (18%) and charcoal (47%). 53% of households in urban areas practice cookstove stacking. Among these, 34% and 7% use charcoal and wood stoves respectively. As such, the use of biomass stoves is more prevalent than the 38% that report using these as their primary stoves (MoE, 2019). It is therefore imperative to look beyond primary cooking behaviour for any intervention that seeks to displace use of solid biomass in cooking. The MoE, 2019 Report estimates that 9.6 Mton of fuelwood and 2.0 Mton of charcoal are consumed by Kenyan households annually, with urban areas responsible for 1.3Mton and 0.7Mton of fuelwood and charcoal respectively. While urban households are seen as the obvious market for briquettes and other charcoal substitutes, these statistics demonstrate that up to 65% of charcoal consumed in households is consumed in rural areas. Comparing the cost per unit mass of fuels across the four main cooking fuels in Kenya can be illusive. As such we also consider cost per energy output as shown in Figure 2 below (the asterisk on charcoal indicate statistically significant differences between rural and urban areas with 95% confidence). In terms of cost per kg, firewood is the least costly fuel followed by charcoal[3]. Additionally, LPG is the costliest fuel of the four types of fuels and is closely followed by kerosene. However, if you consider energy content, kerosene is the least costly fuel followed by LPG. There is a slight difference in the price of fuels in rural and urban areas.

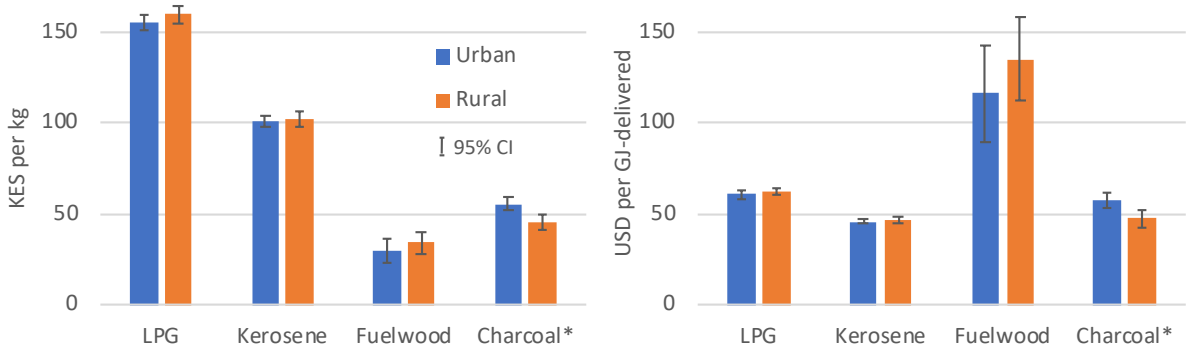

Figure 2:Fuel price per unit mass (left) and energy delivered (right) for major commercial fuels

1.2 Urbanization and Demand for Cooking Fuels

Kenya has recorded rapid population growth, with the total population having expanded more than four times over the last 50 years; from 10.9 million in 1969 to 47.6 million in 2019[4]. Further, Kenya is characterized by rapid urbanization and urban population growth though this rate is not as high as much of the rest of Africa, with the World Bank noting that this pace of urbanization may be

[3] Ministry of Energy (2019), Kenya Household Cooking Sector Study
[4] KNBS (2019), Kenya population and housing census results, Kenya National Bureau of Statistics, Ministry of Planning, Kenya

considered manageable[5]. Basing their definition of urban population as the 'core urban' population, Figure 3 summarizes the growth in share of urban population in total population as reported by the World Bank. For comparison, the 2019 Kenya census data has the rate of urban population at 31.2% (14.8 million people) where urban centres are those that have a population of 2,000 and above[6].

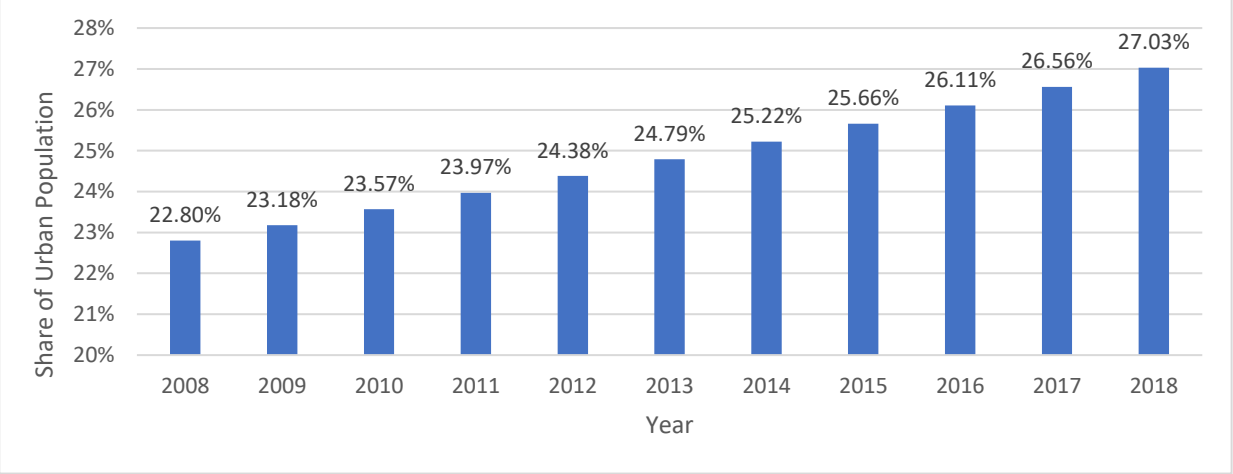

Figure 3: Share of urban population in total population (Source: World Bank Data)

A review of Kenya's GDP growth shows Kenya's urbanization being driven more by a rural push than by an industry pull – while the urban population has been growing, the share in GDP of industry and services has remained quite stable[7]. Consequently, the urban economy is increasingly informal as jobs within the formal sector remain limited compared to demand.

In these dynamics are two key impacts on the energy sector. First is that the growing population is a major contributing factor to the increase in demand for cooking fuels. As presented in the previous section, solid biomass represents a significant source of energy for both rural and urban Kenyan households and unless a fundamental shift is realized, the use of these fuels will remain prevalent over the coming years. Second, the informality of most jobs within urban areas coupled with high unemployment rates translate to low income levels for most urban dwellers. Consequently, the cost of fuel (aggregate costs per volume, but more so, ability to pay in small quantities) becomes a key consideration in selecting cooking solutions.

In this population growth, however, is a potential energy resource – municipal solid waste. Municipal waste (such as paper and organic waste), agricultural and forestry residue have been used as potential sources of energy through various approaches such as the briquetting technology. Increase in population results into an increase in the amount of waste generated in the urban areas. In Nakuru County for instance, a 2017 feasibility report by the World Bank[8] found that the county generates an average of 523 tonnes of waste per day of which 80% is biodegradable material (e.g. organic food, paper, cardboard, textile). Nairobi County on the other hand is estimated to produce about 2,400 tonnes of waste per day; Kisumu county produces and estimated 500 tonnes of waste per day Kisumu County; Mombasa County produces 875 tonnes of municipal solid waste per day[9].

[5] The World Bank (2016), Republic of Kenya: Kenya Urbanization Review
[6] KNBS (2019), 2019 Kenya Population and Housing Census Volume II: Distribution of Population by Administrative Units
[7] The World Bank (2016), Republic of Kenya: Kenya Urbanization Review
[8] World Bank (2017), Nakuru Integrated Solid Waste Management PPP Project: Feasibility Study Report and PPP Implementation Plan
[9] Oyake-Onbis, Leah (2017), Awareness on Environmentally Sound Solid Waste Management by Communities and Municipalities in Kenya

Recognizing that most urban areas are limited in their capacity to collect waste[10], this is a resource that could be utilized to address the increasing energy demand driven by population growth. From a feedstock perspective there seem to be the potential to use the waste generated as input into fuel production. Briquetting is one of the options that can utilize this potential.

The term "briquette" is a composite term used to identify a wide range of biomass-based cooking fuels that vary in terms of processing, raw materials, shape, size, energy density and price. There are several ways of classifying briquettes but the most common distinguishes those that have undergone pyrolysis and those that have not. Carbonized briquettes have undergone pyrolysis, after which they are compacted using a binding element. Non-carbonized briquettes are processed using different methods but mainly by casting and pressing processes also known as compaction or solidification as shown in Figure 4.

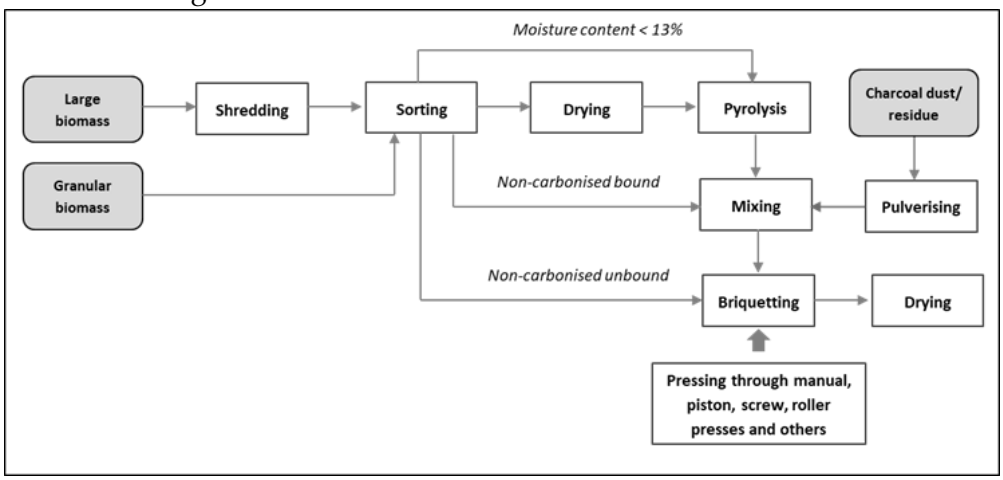

Figure 4: Summary of the typical briquette production processes (adapted from MoE, 2019)

There have been multiple studies and initiatives targeted at promoting briquettes in Kenya over the years. Among key studies is a 2013 assessment by GVEP (now Energy 4 Impact) titled *Assessment of the Briquette: Market in Kenya* that targeted 70 briquette entrepreneurs in the country. *Analysing briquette markers in Tanzania, Kenya and Uganda (2012)* by Energy and Environment Partnership (EEP), *Kenya Briquette Industry Study* (2010) by GVEP (now Energy 4 Impact), *Briquette making in Kenya: Nairobi and peri-urban areas (2014) a peer reviewed journal under* Renewable and Sustainable Energy Reviews. Among the initiatives promoting production and use of briquettes have been: The briquette commercialisation project by Practical Action titled Capital Access for Renewable Energy Enterprises (CARE2) project; the SNV project on improved charcoaling technologies and briquetting using agricultural waste; fuel from waste network by Middlesex University, Kenyatta University and Terra Nuov; the National Biomass Briquettes Programme (NBBP) by Hivos in partnership with the Greening Kenya Initiative Trust Kenya, among others.

Even with the years of experience and demonstrated technical potential and appropriateness, perennial barriers still hinder the uptake of briquettes as a mainstream cooking solution within households. Key among these are the relative high cost of the fuel, constrained feedstock supply, disjointed or non-existent supply and distribution networks, and competition from alternative sources of cooking fuels[11].

[10] ibid

[11] Ministry of Energy (2019), Kenya Household Cooking Sector Study

1.3 Purpose of this Study

It is within this context that Kenya, through its National Designated Entity (NDE), has sought technical assistance from CTCN to support the development of the briquetting sector as part of its objectives under the NDC and NCCAP. Production of briquettes is viewed as an opportunity to sustainably address the increase in demand for energy and the need to effectively manage solid biomass waste from the growing urban populations. This request requires an evaluation of the sector with a focus on charcoal dust, saw dust and organic municipal solid waste and their potential as viable feedstock options to produce briquettes. Based on the *Technical Assistance Response Plan – Terms of Reference* submitted by the NDE, this assignment also aims to assess the briquetting value chain ranging from sourcing of raw materials, briquette production technologies, supply chains and the policy environment in the sector. For each of these tasks, the output is a standalone report. This report is part 1 of a series of 5 reports as shown in the Table 2 below and focuses on reviewing of legal frameworks related to briquette production in Kenya.

Table 2: Series of reports

#	Report	Title
1	Part 1	Review of legal frameworks related to briquette production in Kenya
2	Part 2	Identification of biomass waste-based briquettes making technologies
3	Part 3	Analysis of the supply chain of the briquette making processes
4	Part 4	Development of a training manual
5	Part 5	Inventory of raw materials that can be used for making biomass briquettes

2 Assessment of the Policy Framework for Briquette Production in Kenya

2.1 Introduction

The discussion on policies that govern briquette production in the country has been structured such that it begins from a broad perspective and narrows down to the specific policies and standards for the sector. This is achieved by discussing policy, legal and institutions framework that influence the briquettes subsector, cascading from the international, to regional, to national and finally to the sub-national level. Policy, legal and institutional frameworks discusses are those that can have direct impact in the production of briquettes such as those that affect availability of feedstock by limiting their generation and transportation or indirectly such as those that promote the general use of alternative fuel sources. These are reviewed to identify gaps and opportunities that can be recommended to encourage investment in and/or uptake of briquettes making and use. Policy and regulation experts for example, government officials from the Ministry of Energy, Energy and Petroleum Regulatory Authority and Kenya Bureau of Standards were interviewed to gather opinions on how briquette production can be fostered and regulated. Other key stakeholders including program implementers such as SNV, Energy 4 Impact and the Clean Association of Kenya were consulted on their experience with the briquette sector. A full list Key Informants interviewed has been provided in the annex.

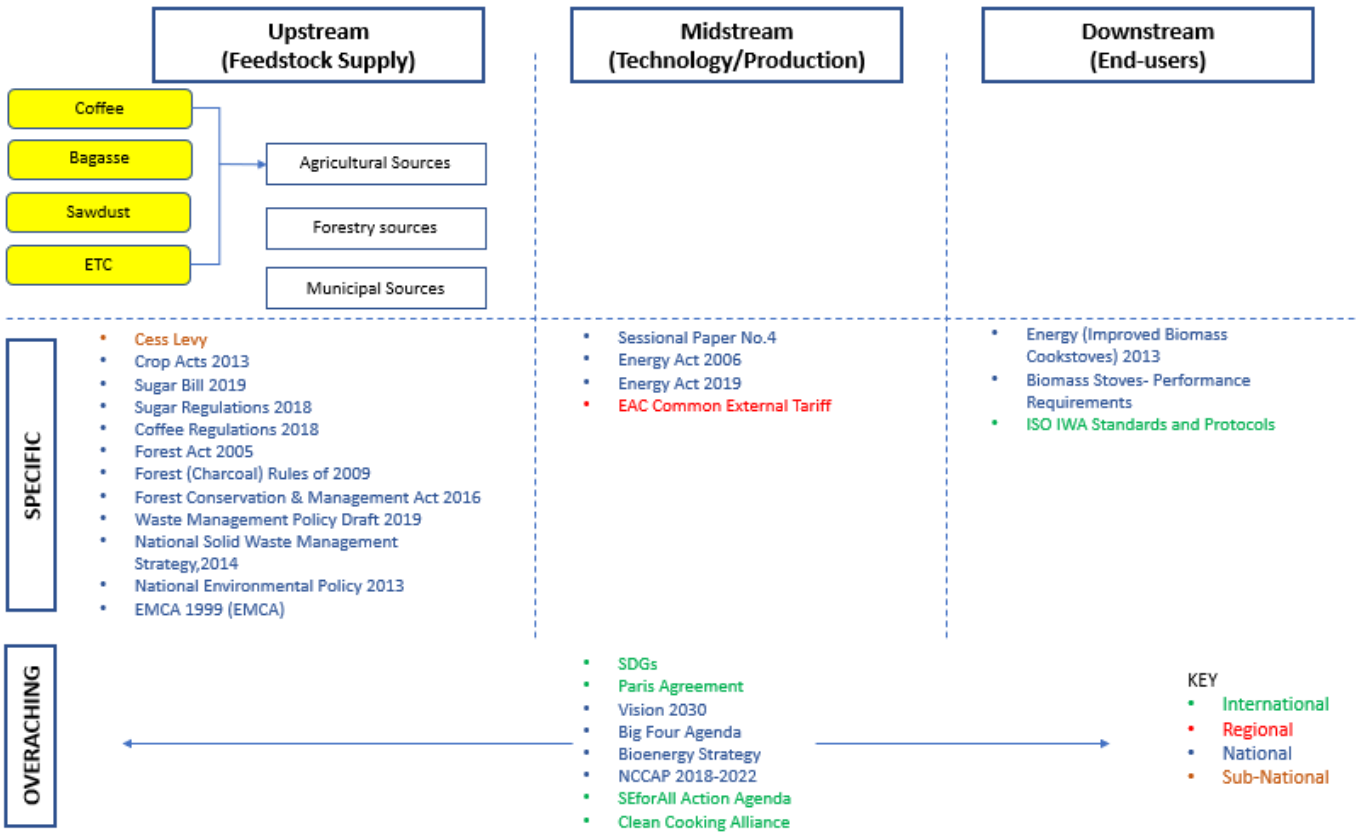

Figure 5: Summary of Polices and Frameworks Governing Briquette Production and Use in Kenya

2.2 International Frameworks

2.2.1 Sustainable Development Frameworks (SDGs)

The Sustainable Development Goals is a universal call of action to end poverty, protect the planet and ensure that all people enjoy peace by 2030. SDG 7 goal recognizes the importance of access to energy in both economic development and in improved leaving standards. This goal aims to ensure access to affordable, reliable, sustainable and modern energy for all. Upon this basis countries have developed the Sustainable Energy for All Action Agenda, detailing the transition to clean energy for lighting and cooking and subsequent investments that would be required. For instance, Kenya under its SEforALL Action Agenda has set a target of achieving a 100% access to modern cooking solutions by 2030 with 2013 as the baseline year. This target will be achieved partly through increased adoption of improved clean cookstoves and fuels and through reviewing and developing the biomass strategies[12].

2.2.2 Paris Agreement

Adopted in 2015, this environmental accord provides a framework to address the impacts of climate change by substantially reducing greenhouse gas emissions while limiting the global temperature increase in this century to below 2°C. Ratified by 189[13] countries, the agreement provides for individual commitments by countries in reducing GHG emissions in the form of nationally determined contributions (NDC). Kenya submitted its INDC in 2015 with an ambitious target of abating its GHG emissions by 30% by 2030 relative to the business as usual scenario of 143 MtCO2eq . Moreover, under its Climate Change Action Plan, the government has identified the energy sector as one of the most important sectors in meeting this target. Within the energy sector, transition to clean cooking has been highlighted as a priority action with great environmental and health benefits. The plan also promotes green manufacturing for waste management and resource efficiency including sustainable briquette production.

2.2.3 Clean Cooking Alliance

The Clean Cooking Alliance is a global network of partners that was established in 2010 with a mandate to promote the development of clean cooking markets for the three billion people still using traditional cooking technologies[14]. The partners are from governments, private sector, Non-Governmental Organization (NGOs), donors, humanitarian organizations, multilateral, civil society, and academic institutions. The Alliance's work is centred around the following three pillars[15]:

i. Driving consumer demand for cleaner cooking solutions (stoves and fuels) by supporting behavior change and raising consumer awareness;
ii. Mobilizing investment to build a pipeline of scalable businesses capable of delivering affordable, appropriate, high-quality clean cooking technologies and;

[12] Ministry of Energy and Petroleum. 2016. Sustainable Energy for All (SEforALL) Kenya Action Agenda. Retrieved from https://www.seforall.org/sites/default/files/Kenya_AA_EN_Released.pdf
[13] United Nations Framework Convention on Climate Change (n.d) Paris Agreement-Status of Ratification retrieved from https://unfccc.int/process/the-paris-agreement/status-of-ratification
[14] The Clean Cooking Alliance. About Us. Retrieved from https://www.cleancookingalliance.org/about/
[15] Ibid

iii. Promoting an enabling environment for industry growth by advocating for effective and predictable policies, providing trusted, relevant data, and serving as the convener and champion of the clean cooking sector.

Under the practice line of technology and fuels, the Alliance; strengthens national policies that support the standards and testing protocols for stoves and fuels to foster innovation; provides information on testing protocols for the different stoves and fuels; provides support to the Regional Testing and Knowledge Centers (RKTC) and; provide information on the cookstove designs, prices, manufacturers and stove performance on an on-line clean cooking catalogue. Under research and evaluation, the Alliance provides evidence to demonstrate that uptake of clean cooking solutions impacts on the health of the population[16].

2.2.4 ISO Standards and Test Protocols

The international Organization for Standardization (ISO) which is a worldwide federation of national standards and bodies has developed several standards on fuels and technologies. In particular ISO developed ISO 17225 (Solid biofuels — Fuel specifications and classes) series in 2014 to provide unambiguous and clear classification principles for solid biofuels. Divided into seven parts, the series covers both pellets and briquettes. Part 3 is specific to non-carbonized briquettes from graded wood including forest, plantation and other virgin wood; by-products and residues from wood processing industry and chemically untreated used wood while Part 7 is on non-carbonized briquettes from graded non-woody including herbaceous biomass-which is biomass from plants that have non-woody stems such as grains and or seeds crops from food production and their by-products such as cereals; fruit biomass, aquatic biomass or biomass blends and mixtures .

International Standards Organization (ISO) International Workshop Agreement (IWA) on Cookstoves in 2012 led to several resolutions on cookstove testing including using multiple options from a set of internationally-recognized laboratory protocols most appropriate for the stove and performance indicator being tested rather than using a single test. Additionally, IWA established tiers of ranking stove performance based on four criteria: efficiency, total emissions, indoor emissions and safety. To measure and monitor these parameters, ISO developed the *ISO 19867-1:2018- Clean cookstoves and clean cooking solutions — Harmonized laboratory test protocols — Part 1: Standard test sequence for emissions and performance, safety and durability* which Kenya has adopted and uses as the basis for carrying out performance tests for biomass cookstoves in the country.

Table 3:ISO-IWA Five tiers of stoves

#	Tier	Description
1	Tier 0	No improvement over open Fire/Baseline
2	Tier 1	Measurable improvement over Baseline
3	Tier 2	Substantial Improvement over Baseline
4	Tier 3	Currently achievable technology for Biomass stoves
5	Tier 4	Stretch goals for Targeting Ambitious Health and Environmental Outcomes

[16] The Clean Cooking Alliance. Retrieved from https://www.cleancookingalliance.org/resources/463.html

2.3 Regional Policies and Frameworks

East African Community regional bloc is keen on promoting economic development among its member countries and operate across four integration pillars: customs union, common market, monetary union and political federation. The Common Markets Integration pillar provides freedoms and rights for movement of all factors of production within the EAC. EAC acknowledges that Energy is at the center of economic development and has set it up as one of the sectors under the common market pillar. To this effect, the EAC has, among other things developed the **Regional Strategy on Scaling Up Access to Modern Energy Services**. Adopted by EAC Council of Ministers in November 2016, promotes adoption of high impact, low cost scalable approaches. Among other things, the plan targets to increase access to modern cooking practices for 50% of traditional biomass users. Though well intended, the strategy proved to be limited in terms of enforcement and funding and it also failed to provide a clear roadmap on how implement the strategy for member states. EAC also established **East African Centre for Renewable Energy and Energy Efficiency (EACREEE**) in 2016 (legally registered in March 2018) which develops and promotes adoption of policies, legal and incentive frameworks, capacity development, and mobilization and implementation of infrastructure that promotes renewable energy and energy efficiency.

Under the Customs Union Integration Pillar which establishes free trade on goods and services within the bloc, EAC amended custom duties and the custom external tariff (CET) with the new tariffs coming into effect from 1 July 2018. Relevant to the cooking sector was the zero-rating (0% import duty) of inputs and raw materials for use in the manufacture of energy saving stoves imported by gazetted users in all EAC Parties except Tanzania. Additionally, the policy includes country specific CET duty rates effective for one-year period starting from 1 July 2018 that have been approved to address country specific economic needs. Among these duty rates is the imposition of a 35% import duty on complete sets of non-electric cooking appliances including stoves for Kenya. This change in tax policies revised the government's 2016 decision to reduce import tax on complete stoves and parts from 25% to 10%. Tax on parts for manufacturing stoves was, however, maintained at 10%. These revisions have significant effect on the adoption of the cooking appliances in question.

2.4 National Policies and Frameworks

These have been broadly categorized into three groups: (i) Development Initiatives, which focuses on strategies that promote sustainable economic development within the country; (ii) Policies and regulations that govern feedstock supply such as policies on waste management, agriculture and forestry; energy access and development and (iii) Regulations of fuels and cooking technologies including standards for briquette production and for biomass cookstoves. These are further discussed below.

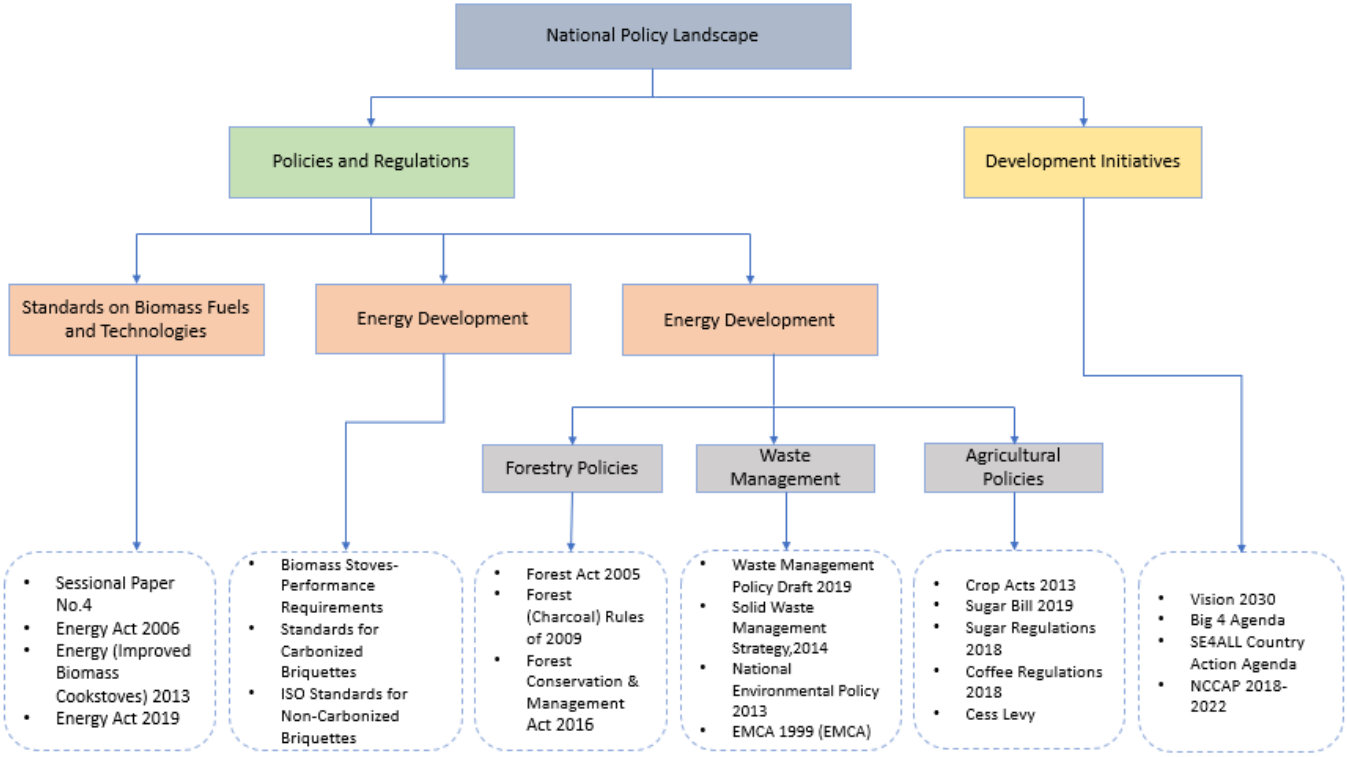

Figure 6: Summary of National Policies Governing Briquette Production in Kenya

2.4.1 Development Initiatives

Vision 2030

Kenya's blueprint for development, Vision 2030 aims to transform the country a middle-income industrialized country by 2030. Under its economic pillar it identifies agriculture as one of the sectors to drive economic growth in the country. Expanding land under irrigation is one of the initiatives to increase agricultural output in the country. According to the Plan, at least 404,800 hectares were to be put under irrigation by 2017 especially in the Arid and Semi-Arid areas. Data on progress from the Medium-Term Plan III, indicates that an additional 51,600 hectares of land is under irrigation through the Galana-Kulalu flagship project; National Expanded Irrigation Programme (NEIP); and Community Based Smallholder Irrigation Projects[17].

Additionally, the Development Plan also seeks to create a manufacturing sector that is robust, diversified and competitive with the main objective of increasing the contribution of the sector to the GDP by 10% per annum. It underscores the importance of the Small and Medium Enterprises (SMEs) subsector in the country's industrial transformation agenda and is keen on developing SME industrial parks to promote local manufacturing.

This Plan further takes into consideration the need of a clean, secure and sustainable environments as necessity even as the country industrializes. Under its flagship projects it included the development of Solid Waste Management systems in five major cities: Mombasa, Kisumu, Eldoret, Nakuru and Thika. As of 2018, a national framework for solid waste management had been

[17] Government of Kenya, The National Treasury and Planning: Third Medium Term Plan (2018-2022). Retrieved from https://planning.go.ke/wp-content/uploads/2018/12/THIRD-MEDIUM-TERM-PLAN-2018-2022.pdf

developed and county governments are using this as the basis for developing their environmental laws. Moreover, at least three waste management and pollution control plans have been developed at the county level and their implementation is ongoing.
These projects are expected to increase the feedstock supply from agro-based sources and from municipal waste for briquette production and also support growth of the enterprises within the sector through the provisions to promote the SME subsector.

National Climate Change Action Plan, 2018-2022

The MoE, 2019 report estimates that total annual greenhouse gas (GHG) emissions from residential cooking fuels is 13.6 MtCO2e (excluding black carbon, organic carbon and nitrogen oxides). In line with Kenya's Nationally Determined Contributions (NDCs) which aims to reduce greenhouse gas (GHG) emissions by 30% by 2030 relative to the business as usual (BAU) scenario of 143 MtCO2e, the National Climate Change Action Plan 2018-2022 (NCCAP) prioritizes clean cooking as high potential GHG abatement source. Strategic Objective 4 of the NCCAP on increasing forest/tree cover to 10% of total land areas highlights a key challenge to be reliance on biomass for cooking which contributes to deforestation and forest degradation. Among its actions to address this challenge, the NCCAP aims at "developing alternative technologies to reduce demand for biomass, such as clean cooking, briquetting and efficient charcoal production." Clean Cooking is also prioritized under Climate Change Priority 7 which aims to support a "transition to clean cooking through uptake of LPG, ethanol, and other alternative fuels in urban areas, and uptake of briquettes…" The cooking sector is therefore a significant sector in meeting Kenya's NDCs, and the place for briquettes is clearly outlined in the country's strategic documents. The Action Plan further highlights the potential benefits of using briquettes including cost saving on energy expenditures by households. It estimates that to cook a meal of maize and beans for a family of five, it would require charcoal briquettes worth KES 3 compared to KES 26 and KES 45 for charcoal and kerosene respectively.

In addition to the energy sector, the Action Plan also identifies waste sector as a contributor of the national greenhouse gas emissions (GHG) and projects that about 3% of Kenya's GHG emissions from 2015 to 2030 will be from the waste sector, mostly as a result of methane generation from solid waste dumpsites, sewage and wastewater disposal. This represents an increase in GHG emissions from the waste sector from 2 MtCO2e per year in 2010 to 4 MtCO2e in 2030. The Plan aims to achieve reductions of up to 0.72 MtCO2 e by 2022 through mitigation actions to reduce and recycle solid waste, green buildings, and exploring options for methane capture and power generation. The use or conversion of this waste has the potential of significantly reducing the GHG attributed to this sector. The manufacturing of briquettes is one way of utilising this resource.

Big Four Agenda and Medium-Term Plan (MTP) III (2018-2022)

The Big Four Agenda, which is President Uhuru Kenyatta's development blueprint covers four priority areas: manufacturing, food security, housing which have been highlighted and frontloaded under the vision 2030. Under the food and nutrition security, the government targets to achieve universal food security by 2022. To achieve that, several strategies will be employed including enhancing large scale agricultural production, advancing small holder productivity and reducing the cost of food.

As part of expanding large scale production, an additional 700,000 acres of land through public private partnership (including idle arable land) will be put under maize, potato, rice, cotton, aquaculture and animal feed production. This will be completed by strengthening of the value chain through increasing the number of SMEs that could add valued to the primary product. The plan targets to set up about 100 enterprises in this regard[18]. Specific attention has been given to staple food crops such as rice, potatoes and maize. The government targets to increase production of maize from 40 million bags annually to 67 million bags; rice from around 125,000 metric tonnes currently to 400,000 metric tonnes and potatoes from the current 1.6 million tonnes to about 2.5 million by 2022[19].

The Agenda also recognizes the role of SMEs in *providing goods and services, value addition, enhancing competition, fostering innovation and generating employment leading to alleviation of poverty*[20]. To support the development of this sector, the agenda proposes three strategies, two of which are[21]:

- Facilitating business compliance with regulations to formalize the informal economy by
  - Promoting simplification of business startup procedures;
  - Encouraging informal industries and associations to register with Micro and Small Enterprise Authority (MSEA) and use this body to voice the concerns and ideas of the sub-sector;
  - Establishing incubation centers for SMEs in all 47 counties in order to resolve issues such as product design, access to technology, production innovation and patenting;
  - Reducing barriers to registration through formulation of a policy that simplifies and spells out the registration process; and provide
  - Corporate tax relief for start-up SMEs for the first three years of operation
- Enhancing credit and market access to SMEs by
  - Rethinking and updating risk assessment tools, especially when assessing SMEs;
  - Offer loan guarantees to SMEs;
  - Incentivize commercial banks to provide low interest rate loans targeting manufacturers and SMEs;
  - Encourage Kenya Credit Reference bureaus to work closely with manufacturers in determining credit worthiness.

[18] Government of Kenya. 2017. "The Big Four"-Immediate Priorities and Actions

The Medium-Term Plan III (2018-2022) which builds on the achievements of the first and second MTPs, has been designed to serve as the conduit for achieving the Big Four initiatives. The plan targets to irrigate 1.2 million acres to increase the area under crop production.

The planned agricultural expansion will ultimately result in increased generation of feedstock from the scheduled crops i.e. rice, maize and potatoes that could be used in briquette production. Further, the strategies to promote SMES's outlined above could also be instrumental in formalizing businesses in the briquette sector which are mostly informal and small scale.

SEforALL Country Action Agenda

In response to the SE4ALL initiative launched in 2011, Kenya through the Ministry of Energy and in consultation with a wide range of stakeholders developed the SE4ALL Action Agenda that, among others, set energy sector under the three core areas: Energy Access, Renewable Energy and Energy Efficiency. Under this Action Agenda, Kenya aims to achieve universal access to modern energy for cooking by 2030. To achieve this the government is advocating for increased uptake and use of improved technologies and cleaner fuels in the country as has been highlighted under the National Climate Change Action Plan (2018-2022). Some of the relevant initiatives that were put forth in the Action Agenda in growing the cooking sector include[22]:

- Improving coordination across agencies, private sector, CSOs and NGOs with the aim of fostering an enabling environment by promoting standards and rigorous testing protocols; promoting industry standards for efficiency, safety, and emission reduction, based on testing and certification for clean cooking appliances, such as ICS and supporting continuous research on consumer use and demand for efficient stoves and on the design of products that meet user needs.
- Human and institutional capacity development for cookstoves including conduct awareness campaigns on the benefits of clean cooking appliances and fuels for remote/isolated populations and raising general awareness to the public about the available clean cooking technologies
- Innovative finance, to support financial closure and financing access to energy services and clean cookstoves such as developing financing schemes to provide credit to households that cannot afford the upfront costs of access to modern energy services and providing regulatory support for scalable and sustainable business and financial models.

Some of these initiatives are already being implemented such those touching on testing protocols and standards but there's room to do more especially awareness creation which has been cited as a major hurdle in the uptake of briquettes by households in Kenya.

[19] Parliamentary Service Commission: Eye on the 'Big Four', Budget Watch for 2018/2019 and the Medium Term. Retrieved from http://www.parliament.go.ke/sites/default/files/2018-09/Budget%20Watch%202018.pdf

[20] Kenya Association of Manufacturers. 2018. Manufacturing Priority Agenda 2018. Retrieved from https://kam.co.ke/kam/wp-content/uploads/2018/02/2018-Manufacturing-Priority-Agenda.pdf

[21] Ibid

[22] Ministry of Energy and Petroleum. 2016. Sustainable Energy for All (SEforALL) Kenya Action Agenda

2.4.2 Policies and Regulations

Feedstock Supply

These are regulations and polices that directly or indirectly affects the availability, supply and quality of feedstock suitable for briquette production, and the transportation of inputs and finished products.

Waste Management Laws and Policies

Over the years there has been a remarkable evolution in the laws governing solid waste management in Kenya; from the initial Penal code of 1948 to more structured and devolved laws such as the draft National Sustainable Waste Management Policy, 2019. These national policies and frameworks have been supported by other by-laws and sectoral laws in governing the environment. Table 4 below summarizes the relevant policies and outlines their impacts on briquette production.

Table 4: Summary of Waste Management Policies and their impact on briquette production

Policy	Highlights	Impact
Environmental Management and Coordination Act 1999 (EMCA)	– Provides a framework for environmental governance. – Established the National Environmental Management Authority (NEMA) – Provides guidelines on the transportation and re-use of solid waste (Section 87 part (2)	– Encourages waste minimization and recycling
National Environmental Policy 2013	– Formulated by the Ministry of Environment, Water, and Natural Resources – Seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. – Proposes three ways in which the government can deal with the growing solid waste in the country: i) developing an integrated national waste management strategy, ii) promoting use of economic incentives to manage waste and, iii) promoting establishment of facilities and incentives for cleaner production, waste recovery, recycling and re-use.	– Provides an opportunity for briquette production as a way of recycling
National Solid Waste Management Strategy, 2014	– Developed by NEMA – The long-term goal of the strategy is to achieve approximately 80% waste recovery (recycling, composting, and waste to energy and 20% landfilling in a Sanitary landfill (inert material) by 2030. – Establishes the preferred order of solid waste management alternatives as follows: waste reduction, reuse, recycling, resource recovery, incineration, and landfilling.	– Puts emphasis on waste reduction creating opportunity for recycling

Waste Management Policy Draft 2019	– The draft policy also acknowledges the: o need to minimize waste at the source to reduce the amounts to be disposed o roles and the contribution of county governments in waste management in the country o benefits of economic incentives in waste management. – Under the re-cycling policy measures, it requires the national government to 'initiate a mechanism for exempting recycling business and materials recovery sector from presumptive tax, turnover tax and recycled materials from VAT'.	– Tax exemptions can spur more recycling for businesses that manufacture briquettes.

Agricultural Law and Policies

These regulations, policy and legal instruments, and strategies are all directed towards increasing agricultural production and in turn they determine the amounts of feedstock that can be generated from the agricultural sector.

Table 5: Summary of Agricultural Policies and their impact on briquette production

Policy/Regulation	Highlights	Impact
Agricultural Sector Transformation and Growth Strategy, 2019-2029	– Provides a road map in realizing the objectives on food security set forth under vision 2030, Big Four Agenda and Medium-Term III Plan. – Under its flagship projects it aims to have an additional 40,000 acres under irrigation for small scale farmers and 150,000 for large private farms. – It also plans to unlock 50 new large-scale private firms with land sizes greater than 2,500 and to set up least six large scale agro-processing hubs through Public Private Partnerships – It gives prominence to Maize as a significant crop given its role as a staple food in the country	– Increase in available feedstock due to increased food production and processing.
Agriculture, Fisheries and Food Authority Act and Crops Act 2013	– Provide the legal framework for the agricultural sector – The Agriculture, Fisheries and Food Authority Act of 2013 under section 3 established the Agriculture and Food Authority (AFA) – Agricultural Food Authority (AFA) oversees the sector and among other things is in charge of promotion and regulation of scheduled crops which include barley, wheat, maize, rice, sugarcane among others – Crops Act 2013 provide for the growth and development of agricultural crops and for connected purposes	– Agriculture and Food Authority (AFA) can give directives to increase production of a particular crop hence affecting the amount of waste/feedstock available.

Crops (Sugar) (General) Regulations, 2018	–	Outlines the functions of the sugar directorate created through the Crops Act 2013 The directorate is charged with responsibilities that include but not limited to: o regulating, developing and promoting the industry; o formulating and implementing overall policies and plans for the development of the industry; o regulating the export and import of sugar and the by-products of sugar into the country.	–	Increased importation of sugar could lead to decrease in the amounts of bagasse available for briquette production and the other uses.
Sugar Bill 2019	– –	Reinstates the Sugar Board that had been repealed and transformed into a directorate under the Agriculture and Food Authority by the Crops Act 2013 and proposes that the board should act independent of AFA; It re-introduces the sugar development levy on both domestic and imported sugar and gives growers a right to management of the sugar factories- 51% shareholding of all privatized sugar factories.	–	The Bill could lead to a revival of the sugar industry hence increasing production with a resultant effect of increased feedstock for possible briquette production
Crops (Coffee) (General) Regulations, 2018	– –	Provides regulation for coffee industry in Kenya The Food and Agriculture Authority and the county government are 'to develop and promote strategies for the coffee industry'	–	Increased production of coffee could lead to more coffee husks which is already being used as a feedstock in production of briquettes.

Forest Management Laws and Policies

These policy and legal instruments are geared towards sustainable management of forests and to a great extent defines the amount of logging and harvesting activities from both public and private forests, and therefore the quantities of residues from wood processing. Charcoal production is also governed by these policies.

Table 6: Summary of Forest Management Policies and their impact on briquette production

Policy/Regulation	Provisions	Impact
Forest Conservation and Management Act 2016	– This policy promotes sustainable management of forests. – Among other things the Act regulates the production, transportation and marketing of charcoal. – According to the Act, anyone who "makes or is found in possession of charcoal in a national, county or provisional forest; or in community forest, private forest or farmlands without a license or permit of the owner" commits an offence. – Other campaigns such as use of woodmizers by sawmillers imposed by KFS and the ongoing logging ban are some of the strategies in place to meet the objectives of the Act.	– Charcoal ban has led to reduction in the quantities of charcoal produced and subsequently charcoal dust – Use of efficient wood processing technologies has also led to reduction in the quantities of available sawdust.
The Forest (Charcoal) Rules of 2009 and revised in 2012	– The Kenya Forest Service shall be the authority responsible for the issuance of licences for the production and transportation of charcoal – The regulations further require all commercial charcoal producers to organize themselves in charcoal producer associations – Advocates for sustainable production of charcoal through efficient kilns and woodland management/reforestation – Charcoal wholesalers or retailers should not trade with unlicensed producers and should keep records of their sources of charcoal; charcoal producers are prohibited from use of endangered or threatened plant species in charcoal production	– The associations are to ensure sustainable production of charcoal – KFS currently requires permits for transportation of more than 3 bags of briquette
Forest Act 2005	– This has been replaced by the Forest Conservation and Management Act 2016 – Provides for the establishment, development and sustainable management, including conservation and rational utilization of forest resources for the socio-economic development of the country – Makes provision for the conservation and management of public and private forests and areas of forest land that require special protection.	– Regulates forest utilization thus determining availability of waste such as wood waste and sawdust.

Energy Development

Several energy policies and laws remain supportive of renewable energy development including biomass sources and promote cleaner sources of fuel for cooking in Kenya. These are highlighted in Table 7 below:

Table 7: Summary of Energy Policies and their impact on briquette production

Policy/Regulation	Highlights	Impact
Sessional Paper No.4 on Energy, 2004	– It acknowledges the need to promote sustainable biomass harvesting using innovative technologies – It also acknowledges the potential that exists in the use of forestry residue, agricultural waste and municipal waste to generate electricity that can be fed into the grid – Proposes adoption of waste to energy management strategies as a means for waste management. – Promote private sector participation in energy production, distribution and marketing	– Though the focus is on generation of electricity, it provides a basis for utilization of biomass for cooking through innovative technologies.
Energy Act 2006	– Established the Rural Electrification Authority (now Rural Electrification and Renewable Energy Corporation) whose mandate is to promote the use of renewable energy such as biomass, wind, solar, hydro among others – Mandates minister for energy to provide an enabling framework for the efficient and sustainable production, distribution and marketing of biomass. – This has been replaced by the Energy Act 2019 (below)	– REREC could promote research on briquettes as alternative fuels for households
Energy (Improved Biomass Cookstoves) Regulations 2013	– The regulations are intended for manufacturers, importers, distributors, technicians, and contractors of improved Biomass Cookstoves, and institutions using biomass fuels for cooking and heating purposes. – It makes provision in regulating: ○ Licensing of manufacturers, importers, distributors, technicians, and contractors of improved biomass cookstoves, ○ Warranties to customers and ○ Disposal of stoves following other prevailing national environmental laws	–

Energy Act 2019	– Provides for the use of renewable energy such as biomass and provides for an enabling framework for the efficient and sustainable production, distribution and marketing of biomass. – It also establishes the Rural Electrification and Energy Corporation and tasks it to develop, promote and manage the use of renewable energy and technologies, including biomass-biodiesel, bio-ethanol, charcoal, fuel-wood, biogas – It also outlines the functions of county governments which include: o Developing and submitting a county energy plan of its energy requirements; o Regulating and licensing of biomass production o Transport and distribution and regulating and licensing of charcoal production, transportation and distribution.	– REREC could promote research on briquettes as alternative fuels for households – County governments have the opportunity to identify and suitable energy sources for cooking in collaboration with REREC.
Bio-energy Strategy 2019 (Still under development)	– The strategy aims to support the country in meeting its NDC under the Paris Agreement – Provides renewable energy priority and action to deliver modern energy solutions at the National and County governments – Briquettes are part of the technologies to be promoted – Outlines 4 main areas of interventions which are Bioenergy supply and demand management; Bioenergy policy and regulatory framework and Financing for bioenergy programmes and projects – Acknowledges the need for collaborative actions by various actors including National and County Governments. – Covers communication and knowledge management for the sector	– Communication will help create awareness for the briquettes – Collaboration with the different actors in the sector will enable address the different barriers across the value chain

Fuels and Technology

Kenya is making strides to regulate the cooking sector to ensure quality products are sold to the consumers while stimulating market growth and transformation. While the focus is on briquette fuels, this report also reviews standards on biomass cookstoves given most households burn their briquettes in these stoves. The current regulations on briquettes and related cooking technologies are discussed below:

Biomass stoves – Performance Requirements-DKS 1814:2019 (Third Edition)

Though still under development this standard provides specifications for production of both domestic and institutional biomass stoves. The specifications speak to the various components of a biomass stove including the cladding, the ceramic liners, the size of the pots that can be supported, and the insulation material between the liner and the cladding among others.

The standards further specify thermal and emission performance requirements for stoves. When tested according to ISO 19867-1, the thermal efficiency requirement for domestic stoves natural draft biomass stoves is at least 30% for charcoal ceramic stoves and 35% for other stoves. For institutional stoves, the standard requires that thermal efficiency should be at least 45% for all designs and sizes A minimum of 45% efficiency is expected from forced draft domestic biomass stoves and all types of institutional biomass stoves. Regarding emissions, the performance requirement charcoal stoves are 137 mg/MJd and 25g/MJd for $PM_{2.5}$ and CO respectively.

The standard also touches on packaging and branding of stoves including information on the manufacturer, product name, manufacture date, serial number, thermal efficiency and the KEBS standardization mark. Stove delivery to the customer should include an instruction manual, packing list and warranty.

Briquette Standards

Kenya Bureau of Standards is currently developing regulations to guide briquette production in the country: *DKS 2912:2020 Solid biofuel — Sustainable Charcoal and carbonized briquettes for household and commercial use — Specification*. The standard specifies requirements for sustainable production of charcoal and carbonized briquettes from a range of feedstock including wood and by-products of wood processing, agricultural waste and solid waste.

From the standard some of quality requirements for the briquettes include

- Moisture content of sustainable charcoal and carbonized briquettes shall not exceed 10%;
- The volatile matter content shall not exceed 20% in the case of sustainable charcoal, and in the case of carbonized briquettes shall not exceed 25%;
- The ash content of sustainable charcoal shall not exceed 5% in the case of charcoal, and in the case of carbonized briquettes shall not exceed 27%;
- Fixed carbon content of sustainable charcoal shall not be less than 75 % in the case of charcoal, and 44% in the case of carbonized briquettes;
- The proportion of the contents that passes through a test sieve of aperture size 9.5 mm shall not exceed 5 % (by mass);
- The proportion of the contents that passes through a test sieve of aperture size 9.5 mm shall not exceed 7.5 % (by mass).

In addition to this, Kenya Bureau of standards adopted the ISO standards on solid biofuels Part 1-7 in 2015 to provide additional guidelines covering the non-carbonized briquettes from both wood and non-wood based feedstocks. These have been discussed under the ISO standards in section 2.2.4.

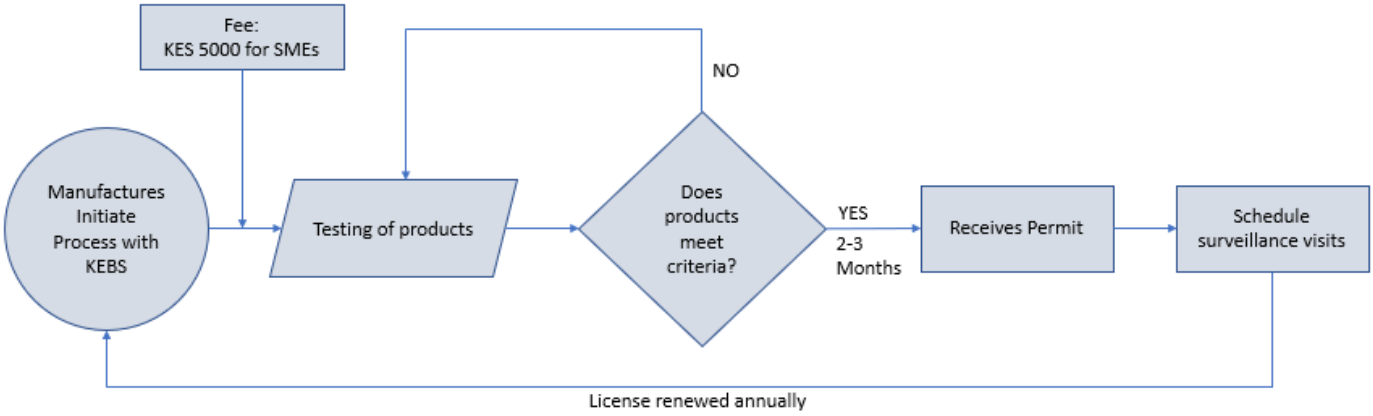

Figure 7: Process of obtaining KEBS Certification

2.5 Sub-National Frameworks

Chapter eleven (11) of the constitution of Kenya creates a decentralized system of governance with the creation of 47 counties. The county governments constitute of a county assembly and county executive with the former having the following responsibilities:

- Exercising the powers of enacting laws at the county level;
- Acting as an oversight instrument on the county executive;
- Approval of plans and policies for smooth operation and management of resources and county institutions;

Devolution is further exemplified in laws and policies as can be seen from the Energy Act 2019, where among other things, the county governments are mandated with developing and submitting a county energy plan to the Ministry of Energy as part of the bottoms-up approach in national energy planning; regulating and licensing of biomass production; regulating and licensing of charcoal production, transportation and distribution. Additionally, the Waste Management Policy 2019, stipulates that among other things, county governments will: provide well managed central collection centres for materials that can be harvested from waste that can be reused; support waste management initiatives of the formalized groups through County Waste Funds; put in place mechanisms to ensure and enhance the participation of the youth and vulnerable groups in sustainable waste management. Through the County Integrated Development Plans, counties can advocate for preferred sources of energy that are readily available or matches their need.

Besides devolution, the constitution also gives directives on environmental management and conservation. Article 42 of the 2010 constitution states that 'every person has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures. This is further amplified under Article 70, which provides an enforcement of the right where it is being or is likely to be, denied, violated, infringed or threatened. Part 2 of the fourth schedule also explicitly provides that the County Governments shall be responsible for; refuse removal, refuse dumps and solid waste

disposal. These efforts are all geared towards achieving a clean and healthy environment that is a target under the Vision 2030.

The County government is also in-charge of Cess levy which is a form of tax charged on movement of agricultural produce by local authorities. It was set under the Local Government Act cap of 1977 as a source of revenue for maintaining roads and other services related to the sector from which the Cess monies were levied[23] Though well intentioned, the levy is administered arbitrarily, and the rate varies from one locality to another. Moreover, county governments are taking advantage and are charging Cess levy not only on agricultural produce transported across counties but on all commodities as a general source of revenue. The result is increased cost of transportation of feedstock for briquette manufacturing

2.7 Gender perspectives

Women and men have different energy needs and demands; they have different access and control and play different roles in the energy sector. To ensure equitable and inclusive energy outcomes, gendered differences need to be mainstreamed in energy policies and programmes. Women as primary stakeholders in the energy sector need to be involved to guide project design, so that their interests are considered in a sector which has been skewed more towards the needs of their male counterparts. To reach the hard-to-reach households with modern energy solutions, we need to tap into their different networks. In this section we review gender gaps and opportunities in energy policies and other international organisations.

2.7.1 Sessional Paper No 4 on Energy 2004

The sessional paper No 4 on Energy 2004 recognized the role of women, men and children in the production and use of biomass energy, while acknowledging the fact that men got involved only if it was commercialized. Women and children are noted to spend more time fetching fuelwood and other biomass fuels with little time for other productive activities; leading to limited study-time particularly for the girl child and health risk due to indoor pollution. In addition, structural barriers such as the land tenure system inhibit women's access to biomass fuels. Also, men dominated the management positions in the energy sector. Recommendations were to; mainstream gender issues in policy formulation - focus on production and use, provide public education and awareness on how social norms hinder women access to biomass fuel resources, public health education on appropriate use of biomass fuels, promote the use of fuel efficient biomass cook stoves and redress in balance in energy management. Here women, men and children were considered more as users and beneficiaries and not change agents.

[23] Kenya Markets Trust (2016) The Burden of Produce Cess and Other Market Charges in Kenya: Retrieved from https://www.kenyamarkets.org/wp-content/uploads/2019/10/Agri-Summary-Report-The-Burden-of-Produce-Cess-and-Other-Market-Charges-in-Kenya.pdf

2.7.2 Energy Act 2006 and Energy Act 2019

The Kenya energy Act No.12 of 2006 sought to promote energy efficiency and conservation, upgrade existing infrastructures, mobilize financial resources to meet service demands and diversify sources of supply in a cost-effective manner, so all can have access to energy. This has since been replaced by the Energy Act of 2019. The new act has a grand objective of meeting universal electrification by 2030 and is keen on promoting renewable energy; exploration, recovery and commercialization of geothermal energy; petroleum regulation and coal activities; regulation, production, supply and use of electricity and other energy forms. This Act is gender neutral, and only mentions gender balance, regional and ethnic diversity which is required only for the management positions of the nuclear power and energy agency. The government being cognisant of this challenge set out to address the gender gaps in the energy sector by formulating the gender policy in the energy sector and is currently developing the bioenergy strategy which incorporates gender issues into the energy initiatives. The implementation of the gender policy and the bioenergy strategy will complement the current energy act as the country gears towards universal access to clean, sustainable, affordable, and reliable energy services by2022 (SDG 7). The gender policy and bio-energy strategy are discussed below.

2.7.3 Draft Bioenergy Strategy 2019

The Bioenergy strategy acknowledges the fact that men and women have different roles and responsibilities within the household and community and so are impacted differently by energy interventions. Also, that men and women have different access, use and control of energy as a result of socio-cultural norms; where women have low decision-making power and are underrepresented in projects activities. Though women are important actors in the bioenergy sector, their interests are hardly considered even in cases where cook stoves are manufactured, leading to low adoption. Targets and data are not represented across the genders but often provided in aggregate terms and thereby fails to capture the disparities across the genders. Women often face the adverse effects of unsustainable harvesting of bioenergy more than their male counterparts. In Kenya, like other developing countries the production and use of biomass fuels is the responsibility of women and children. The role of men is heightened in cases where the energy product is commercialized including charcoal and sold firewood. In some instances, women and children have experienced gender-based violence when collecting firewood (IUCN 2017; Winther et al., 2020[24]). Additionally, the use of firewood and other traditional biomass affects their health as a result of air pollution.
Unequal access to large assets and resources, was also noted due to structural barriers and cultural norms. Where men own trees and women need permission to access and cannot possibly sell it; and decision making is mainly the due of the man who is the head of the household and so control energy use and access (Winther et al., 2020)[25]. Thus, improved access to modern energy can reduce time and create spaces for women to do more productive activities (starting an enterprise), which would contribute to increase income, empowerment and social economic development and environmental

[24] Winther, T., Ulsrud, K., Matinga, M., Govindan, M., Gill, B., Saini, A., Brahmachari, D., Palit, D. and Murali, R., 2020. In the light of what we cannot see: Exploring the interconnections between gender and electricity access. *Energy Research & Social Science*, *60*, p.101334.
[25] Ibid

sustainability. Providing equal opportunities for men and women would reduce gender inequalities as more women participate in trainings and acquire information to guide their access to and use of energy. To be able to identify gaps and opportunities, a gender analysis must be conducted to consider all the necessary information to make an informed choice.

This strategy proposes a social relational analysis, where data is collected on gendered production, use, market access of the bioenergy value chain for gaps and opportunities identified and a policy framework developed to support the gender agenda.

2.7.4 National gender policy in the energy sector

The development of the gender policy comes at a time when energy is considered the central factor in poverty reduction as per vision 2030 and the enactment of new energy policy – Energy Act 2019. In addition, this policy enactment also meets the country's commitment to meet the Sustainable Development Goals (SDGs) and Constitution of Kenya to advance gender equality and empowerment of women; through gender awareness and attitude change that would engender energy sector's work culture. The Gender Policy provides a framework to mainstream gender in all segments, projects and programs in the Ministry and by all partners linked to the energy sector. It was developed with the State Department for Gender and the Ministerial Gender Committee and funded by Energia-International, KENGEN and Practical Action.

Access to modern energy is the key enabler for women empowerment. It would also reduce the drudgery for women, giving them more time to carry out productive activities that can generate income. In addition, provide better health and wellbeing of the family. Using clean cooking energy would also curb Green House Gas Emissions (GHG), contributing to climate change (UNDP 2015)[26]. Women make most decisions in the choice of cooking technology to use and so their input is needed in the design of these technologies. Men should also be included because they are often the main decision makers in most households and sometimes provide the money to purchase the technologies and fuel (Winther et al., 2020)[27]. Even though women understand the cultural context in which they operate the power holders are men in the households and communities, and they hold the position that can change behaviours and attitudes of the people (Senay Habtezion et al 2016). An aspect mentioned in this policy to achieve gender equality is gender budgeting which is not mentioned in the other policies and strategies, but very important. In addition, there is need to sideline all gender-neutral projects in order to move towards gender responsive energy sector, where gender is integrated in all energy related projects.

To mainstream gender in the energy, sector the government has undertaken various initiatives with development partners, non-governmental organisations, academia and research institutions including Energia, KOSAP, EnDev, SEforALL, Hivos, SNV, Practical Action, Power Africa to increase access to modern energy services, thereby reducing carbon emissions, indoor air pollution, clean cooking solutions, and industrial output for all.

[26] UNDP. 2015. Gender, Policy and Energy: A review of energy policies in east and Southern Africa. UNDP, USA

[27] Winther, T., Ulsrud, K., Matinga, M., Govindan, M., Gill, B., Saini, A., Brahmachari, D., Palit, D. and Murali, R., 2020.

3 Policy Related Gaps, Barriers and Recommendations

3.1 Gaps and Barriers

3.1.1 Lack of an overarching institutional framework

Even though biomass remains the leading source of fuel used at the household level, this policy analysis reveals that there is no overarching institutional framework that could anchor and direct the sector's development. Recognizing this, the Ministry of Energy is currently developing an all-encompassing Bioenergy Strategy that will form the basis for transformation change within the sector moving from the incremental initiatives of the past. Briquettes and pellets are some of the cooking fuels covered under this strategy. A perennial challenge that complicates coordination of efforts is the disjointed institutional framework which disseminates functions across various public institutions. For example, and for briquettes specifically, feedstock supply falls under the Ministry of Forestry and Environment and Ministry of Agriculture depending on the source, while promotion of technologies falls under Ministry of Energy and Ministry of Industrialization, Trade, and Enterprise Development. Transportation of charcoal, which is the main source of charcoal dust used in briquette production falls under the Ministry of Forestry and Environment while the sale of briquettes could be influenced by the local County governments or Ministry of Finance. While such distribution of roles across institutions is not unique to the biomass energy sector, the institutional structure is particularly disjointed in this sector. This situation is compounded by the fact that biomass energy is a suite of energy options with varied value chains rather than a singular solution.

3.1.2 Predominance of informal and dissimilar players

The briquette sector constitutes of numerous and diverse players along the value chain with different motivations and incentives structures. Upstream players include the producers or collectors of feedstock sources, to midstream players including transporters and manufacturers of briquettes and finally downstream players who deliver the product across the last mile. Sources of feedstock vary greatly in terms of type, seasonality and geographic location. The same applies to the process of manufacturing. What is common is that most of the players are informal, itinerant and sometimes opportunistic. 82% of all cookstove manufacturers in the sector are sole proprietors running informal enterprises[28]. The spectrum of potential stakeholders and stakeholder types makes the process of consultation, formulation and enforcement extremely difficult. Even with robust policy and legal instruments, the process of ensuring compliance will remain a challenge. Many of the entrepreneurs do not have registered businesses, official physical addresses or formal bank accounts. Their engagement in the briquette processing, manufacturing, or sale of briquettes is complementary to other income generating activities. The landscape of players is a major barrier to creating a replicable or standardized approach to promoting the sector. The informal and dissimilar players produce equally diverse products that in many instances require bespoke policy solutions and approaches. The creation of interventions to promote the manufacture of briquettes or pellets will inevitably have to content with this barrier.

[28] Kenya Climate Innovation Center. 2016 (KCIC). Sector Mapping and Market Assessment on the Improved Cookstoves (ICS) Sector in Kenya. Retrieved from https://www.kenyacic.org/sites/default/files/publications/KCIC%20ICS-3.pdf

3.1.3 Lack of enforceability

As mentioned above, there exist policy instruments, legal instruments and standards to guide the briquette and pellets sector. The briquette sector has been in existence for at least 40 years in Kenya and discussions on improving quality of end products and reducing market spoilage has been in place for at least 30 years. One of the cyclic challenges that has been encountered is institutional and technical limitations in enforcement. This is based on two main factors. The first is that the agencies mandated to enforce these regulations or standards do not have the capacity to do this effectively due to limited resources. However, this is a secondary reason. Primarily, the incentive to rigorously enforce these regulations especially in artisanal setting such as among low-earning entrepreneurs in urban informal settlements is not socially appealing. Trying to enforce standards on manufacturing and charging penalties among, for example, women groups creating briquettes from charcoal dust in Kibera is morally challenging. The second reason is that for the regulations or standard to truly achieve the intended purpose, there needs to be basic infrastructure that supports its operationalization. For example, the sieve analysis as required in the charcoal and carbonized briquettes *s*standards cannot be carried out because the associate equipment is not readily available in the Kenyan market. There are few testing centers in Nairobi which makes it difficult for entrepreneurs scattered across the country, many of whom are in the informal sector, to access these facilities. The agencies charged with enforcement acknowledge this and therefore and not as strict when ensuring compliance. Further, cost of compliance including licensing and permitting are often too high and restricts the proportion of entrepreneurs that can meet these requirements. This creates a self-supporting cyclical loop since most regulations are not enforceable, many entrepreneurs do not comply meaning that the incentive to comply are further eroded since most entrepreneurs know that they competitors are also non-compliant.

3.1.4 Lack of awareness

Literature review and interviews with key actors reveal that lack of awareness continues to be a hurdle to growth of the briquette sector. Lack of awareness manifests itself at two levels: awareness of existing standards by the manufacturers, distributors and program implementers and, awareness of briquette products by end users. The former, has a negative impact on the quality of products in the market while the latter affects demand and perceptions of users. From literature it is evident that consumers are not aware of the existence of the types of briquettes in the market and the associated benefits relative to other cooking solution[29,30]. This made worse by the fact that briquettes do not exist in standardized categories and they vary greatly within and across groups. Even carbonized briquettes vary in the carbon and ash content from vendor to vendor and sometimes, products from the same vendors are different. The lack of consistency is a major deterrent to potential repeat clients. There are hardly any quick and easy ways of determining the quality of briquettes in the market, especially in the informal markets which form the largest segment.

[29] Energy 4 Impact.2013. Assessment of the Briquette Market in Kenya. Nairobi Kenya

[30] Ngusale, G., K., Luo, Y., Kiplagat, J., K.2014. Briquette making in Kenya: Nairobi and peri-urban areas. Renewable and Sustainable Energy Reviews (750-756). Retrieved from http://dx.doi.org/10.1016/j.rser.2014.07.206

3.1.5 Limited fiscal incentives for entrepreneurs

There are very limited fiscal incentives to attract substantial private sector investments in the briquette sector, especially to produce briquettes for household consumers. Briquettes and pellets manufacturing and distribution often require additional incentives beyond the expected profit margins which are typically quite low. Apart from a few grant making competitions, there are hardly any sector wide fiscal incentives to promote the sector. Unlike other upcoming fuels such as ethanol that benefit from zero-rating or a reduction in taxes for the raw materials, end-product or associate technology for manufacturing or use, the sector has not benefitted from such. Commercial financial institutions are also averse to providing various financial services to entrepreneurs in the sector. This is due to a limited understanding of the sector, limited understanding of the risk profiles of projects and projects, lack of positive precedence and lack of viable scaleable business models. A key risk is the unpredictability and exposure to the feedstock supply fluctuation and changing prices. Since this is key input to the business and many manufacturers are not the producers of the feedstock the risk exposure is perceived to be high and, in some cases, unacceptable for providers of financial services.

3.1.6 Competing alternatives and uses

Briquettes must content with competing uses of feedstock. For example, coffee husks are predominantly used as manure by the same coffee farmers. Rice husks are a target for large thermal energy consumers such are edible oil manufactures and cement processors. They are also raw materials to animal feed. Flower cutting are increasingly used for biogas production limiting availability. Macadamia nuts are uses for construction purposes making them very expensive for briquette manufacturing. This is on the raw material side. From the end product, briquettes and pellets have to compete with other, cheaper and readily available energy fuels including charcoal and firewood. The viability of the sector is constrained by these two factors.

3.1.7 Inadequate Gender Mainstream in Energy Policies and Processes

The government of Kenya has made some strides in developing gender responsive energy policies in the country especially with the development of the National Gender Policy which provides a framework to mainstream gender in energy projects and programs. Besides the draft Bioenergy strategy that has taken into consideration gender concerns, most energy policies do not explicitly address gender issues in access to energy for clean cooking. As indicated in the Bioenergy strategy, women have not in the past been actively involved in design of energy interventions hence limiting uptake of new technologies. They have also not been included in most public awareness and sensitization related to energy issues. In the context of clean cooking, this to a given extent would limit their awareness on existing alternative fuels and cooking technologies and eventually the choice of the same. If briquette is to find its way into households as an alternative fuel, there is need for a conscious and deliberate effort in ensuring the key agents for change who are women and children are integrated into the briquette production value chain.

3.2 Recommendations

3.2.1 Voluntary approach for standards and labels

The significance of standards and labels for any industry cannot be understated. When designed appropriately and implemented effectively, standards and labels have the potential of strengthening domestic markets by advancing product differentiation, spurring innovation and diversity of products, conveying lifetime costs, and creating a criterion for allocating fiscal support e.g. through subsidy programs[31]. to the current set of standards and labels in the cooking sector are mandatory where failure to comply attracts a penalty which can be in the form of withdrawal of products from the market, seizing of products or prosecution in a court of law. Mandatory approaches have the advantage of ensuring compliance but may not be ideal for marginally used products such as the briquette and pellets that are largely based on informal value chains. Such approaches work more effectively in formal, mature and competitive markets that support enforceability. Based on lessons from market transformation programs such as the World Bank Lighting Africa/Global and considering the reality of the current landscape of players this report recommends the initial adoption of voluntary self-regulating light-touch approaches as a testbed before implementing mandatory measures. This recommendation aligns with those presented by CLASP in the *Transforming the Cookstoves Market through Standards & Labeling in Kenya* report[32].

In Kenya, successful implementation of voluntary program has been demonstrated in the solar sector, particularly Pico solar products under Lighting Global program led by the World Bank Group. Since its inception in 2009, the program reports that over 42 million quality verified products have been sold since in Africa, Asia and Pacific region[33]. This program has valuable lessons that can be borrowed when designing a voluntary program. Its success has been attributed to the quality assurance framework adopted for the implementation of the program which was designed around three main elements as is discussed below[34];

(i) Development of a minimum standard and test methods

This element determines the metrics (e.g. durability, lumen maintenance etc.) and the testing methods that will be used to measure the stipulated metrics. The Minimum Quality Standards (IEC/TS 62257-9-5) stipulates the metrics that the energy products are required to meet and the test methods to be applied for testing compliance of the products to the set standards[35]. These metrics include truth-in-advertising, durability, quality, lumen maintenance, and warranty terms. For instance, under lumen maintenance after using the energy product for 2,000 hours the light output

[31] Global Alliance for Clean Cookstoves .2013. ISO International Workshop Agreement Guidance for Clean Cookstoves. Retrieved from http://ethoscon.com/pdf/ETHOS/ETHOS2013/LectureHall/SaturdayAM/Review_ISO_International_WorkshopAgreement_CookstoveGuidance.pdf

[32] CLASP. 2014. Transforming the Cookstoves Market through Standards & Labeling in Kenya. Retrieved from https://clasp.ngo/publications/transforming-the-cookstoves-market-through-standards-labeling-in-kenya

[33] Lighting Global website. n.d. About. Retrieved from https://www.lightingglobal.org/about/

[34] Lighting Global. 2014. Lighting Global Quality Assurance Framework Past, Present, and Future Support for the Off-Grid Energy Market. Retrieved from https://www.lightingglobal.org/wp content/uploads/2013/12/LightingGlobal-QualityAssurance-Roadmap_Feb2014-v4.pdf

[35] Lighting Global. n.d. Quality Assurance Program. Retrieved from https://www.lightingglobal.org/quality-assurance-program/our-standards/

must not drop below 85% of the initial value[36]. These specifications were designed after an extensive market study that aimed to establish the minimum standard that end-users look out for when seeking to purchase the lighting products[37].

(ii) Testing and verification of the products

This second element prescribed a simple and clear method to be used by the manufacturers when applying for certification of their products. This also included the monitoring approach to ensure that the manufacturers adhere to the quality standards. To effectively implement this process the program created a network of testing laboratories located in Nairobi Kenya, United States of America (USA), China, Hong Kong and India[38]. The laboratories were accredited by Lighting Global before participating in the program[39]. The manufacturers are expected to contact the test laboratories, negotiate a fee and sign a contract that among other things addresses any potential conflict of interest. Products that meet the minimum requirements are then published on the Lighting Global website. Lighting Global supports manufacturers whose products do not meet the minimum requirement to improve their offering. All applicants are issued with reports clearly indicating the performance for the products whether they qualify or not. During the formative stages of the program, manufacturers were offered Quality Test Method (QTM) testing at a discounted cost. However, this has gradually been reduced over time from a discount of 90% to 10%[40] with the eventual aim of eliminating the subsidy[41].

(iii) Communication and marketing of the standard

The program has divided the different actors in the value chain into four main categories and developed targeted methods of disseminating information on products that meet the minimum criteria.

Table 8: Key Stakeholders along the value chain and the proposed Communication Strategy

#	Stakeholders	Communication Strategy
1	Consumers	- Advertising campaigns - Consumer education conducted by regional programs - Standardized Specification Sheets and website in cases where consumers have access
2	Manufacturers	- Test reports - Standardized Specification Sheets - Direct outreach by personnel associated with the Lighting Global
3	Distributors, Finance and Microfinance, Retailers, Bulk Purchasers, NGOs	- Standardized Specification Sheet - Website

[36] Lighting Global. 2014. Lighting Global Quality Assurance Framework Past, Present, and Future Support for the Off-Grid Energy Market. Retrieved from https://www.lightingglobal.org/wp content/uploads/2013/12/LightingGlobal-QualityAssurance-Roadmap_Feb2014-v4.pdf

[37] Key Informant Interview with a representative from Lighting Global

[38] Lighting Global. n.d. Testing Laboratory Network. Retrieved from https://www.lightingglobal.org/quality-assurance-program/test-laboratory-network/

[39] Lighting Global. 2018. Lighting Global Product Testing and Laboratory Eligibility Policy. Retrieved from https://www.lightingglobal.org/wp-content/uploads/2018/08/LG_Product-Testing-and-Lab-Eligibility-Policy_v3.1.pdf

[40] Key Informant Interview with a representative from Lighting Global

[41] Lighting Global. 2014. Lighting Global Quality Assurance Framework Past, Present, and Future Support for the Off-Grid Energy Market. Retrieved from https://www.lightingglobal.org/wp

Additionally, the issuance and publication of standardized specification sheets and verification letters on the Lighting Global website builds consumer confidence on the products which in turn builds demand for verified products. This provides a self-regulating market where low-quality products are excluded from the mainstream market. The aim is to promote brands that have a good reputation among consumers. This has significantly reduced market spoilage as consumers who do not purchase certified products implicitly accept the risk associated with their choice thus creating a separation between high quality products and the grey market. Although commendable gains have been achieved, wide use of uncertified products remains but the unpredictable performance of these products does not impact the entire market. Other incentives under the program include the availability of networking platforms where manufacturers, distributors, financiers and consumer groups can interact. These forums also provide market intelligence, support to business planning and technical designs, and access to finance[42]. These incentives crowd-in manufacturers and products at the commencement stages with the aim of gradually withdrawing the incentives as the market matures and eventually adopting mandatory approaches.

Based on these lessons and demonstrated transformation this report recommends the i) formation of briquette/pellets manufacturing groups especially for the informal players, iii) development of sector approved minimum standards indicating the particular performance parameters to be monitored and tested for, the appropriate testing methods for each parameter and iii) development of a strategy to create awareness of these standards.

3.2.2 Strategic awareness creation

Awareness creation across the sector should happen at least at two levels: i) awareness of products targeting end-users and ii) on standards and regulations for manufacturers, distributors, and implementers of programs and consumers. Briquettes end-users can be broadly grouped into domestic (households), commercial-institutional (small/medium businesses, educational and health institutions) and industrial consumers (large thermal energy users including tea factories). A consumer education program would need to be developed with a clear strategy on how to reach the different types of the end-users. The program objectives would be to; (i) create awareness of different briquettes types ass alternative or supplemental cooking fuels, (ii) highlight the benefits of briquettes relative to other fuels and, (iii) demonstrate how briquettes are best used.

It is also necessary to develop a communication strategy targeting different stakeholders in the supply chain to ensure that the standard is known and accepted widely to ensure long-term effectiveness[43]. Creation of awareness implemented as an independent intervention will not necessarily result in market transformation. This will always remain a complementary approach to other measures. For instance, before creation of consumer awareness the products in the market must be of good quality, affordable and available to the end-users (i.e. developed supply chains creation of awareness). There is therefore a need to design a program that is coordinated, for example, by the Clean Cooking Association of Kenya (CCAK) or the Ministry of Energy that would address the different barriers and gaps in the supply chain. A similar approach to that of Lighting

[42] Lighting Africa Kenya. 2018. A Thriving Off-Grid Market – With a New Focus on Underserved Areas Retrieved from https://www.lightingafrica.org/country/kenya/

[43] Wiel, S. and Mcmahon, J., E. 2005. Energy-Efficiency Labels and Standards: A Guidebook for Appliances, Equipment, and Lighting, 2nd Edition. CLASP Washington D.C USA

Global discussed above would be effective. Under this scenario, creation of awareness becomes part of a broader program that is addressing the different barriers in the sector.

It has been urged that existence of quality products with no consumer awareness[44] or development of a standard without communication to the manufacturers will have minimal impact in the sector. Creation of awareness of the benefits of certified products should be done together educating end-users of the risk associated with uncertified products in order to differentiate the products empowering the consumers to make informed choices[45]. This has been reported by some producers where briquettes from some producers are of low quality leading to bad reputation of briquettes among end-users. To this effect accurate information and verified products should be the center of the awareness creation program.

The type of method to apply for the awareness creation is determined by the target group. For example, in rural areas radio advertisement would be effective as opposed to websites or television advertisement. A study on quality communication carried out in Kenya indicated that 48% of the respondents reported that radio advertisements in the local language was the most effective means of advertising, followed by road shows (24%), television advertisements (18%), and fliers (10%)[46]. In rural areas, awareness campaigns can be held in the Community-Based Organizations (CBOs), women groups and youth groups. During their monthly meeting sessions, information dissemination and demonstrations can be carried out.

The approach to reach the different manufacturers/distributors would be informed by the type of manufacturer. For example, large-scale manufacturers have websites which have contact information while small scale manufacturers are scattered across the different counties and do not have an online visibility. Program implementors would need to come up with innovative ways of reaching these producers. They can leverage on the different initiates under development agencies (Practical Action, Energy 4 Impact etc.), the recently formed United Briquette Producers Association (UBPA), television and radio advertisement, roadshows, fliers and brochures. Through these platforms they can be invited for workshops aimed to raise awareness of the standard and trainings on how to attain the specification under the standard. Reports on the performance of their products after testing should be made available and suggestions on how to improve their production process if their products do not meet the requirements of the standard communicated. Other actors such as NGOs, government officials can be reached through direct engagements by the program officials, invitation to training and awareness creation workshop.

An example of a successful consumer awareness campaign is the *'Songa Mbele na Solar (move ahead with solar)"* under the Lighting Africa Kenya program that started in 2010[47]. The campaign was only for products that had passed the quality check. Activities included direct campaigns through road shows where there was dramatization and demonstration of how to use the solar products, quizzes and dances to attract participants, posters and billboards. Another unique tool applied was through

[44]Lighting Global. 2017.Building Awareness is Critical to Building Markets Retrieved from https://www.lightingglobal.org/news/change-minds-activate-markets/

[45] Lighting Global. 2015. Quality Communication Quality assurance in Kenya's off-grid lighting market. Retrieved from https://www.lightingglobal.org/wp-content/uploads/2015/09/Quality_Communication_09282015.pdf

[46] Ibid

[47] Lighting Africa. Songa Mbele na Solar. Retrieved from https://www.lightingafrica.org/wp-content/uploads/2014/03/Songa-Mbele-Na-Solar_Daily-Nation_2011.pdf

local TV programs (Makutano Junction) and radio talk shows. Also, leveraging on the penetration of the use of mobile phones, through a text message, consumers could access information on the available quality solar products in the market. Information was also provided on how manufacturers would get in touch with the Lighting Africa team implementing the program for participation in the program. It was reported that by 2013, 29 million Kenyans had been reached by the campaign[48].

3.2.3 Regulation requiring public institutions to use briquettes for at least 10% of their thermal applications

The push and pull theories have often been used in most context to explain how technological changes occur in a market. The technology-push occurs when there is discovery of new scientific ideas leading to innovation or invention of new products. The demand-pull on the other hand is driven by the societal needs and hence products are designed to address these specific needs. Over time researchers have discovered that these two theories are not as linear as they appear but rather there are several factors interacting at the market level that influences technology uptake. According to Christiansen (2001), it's becoming increasingly evident that the choice of technology is not only being determined by its technical or economic performance measures but also by other factors such as the prevailing socio-political cultural norms, rules and preferences[49]. For example, the existing legal structures in a sector have the capacity to promote or hinder the development and adoption of new technologies. Bringing this to the briquette sector, it is evident that the drive is mostly technology-push, as demand remain quite low among households. There is need to develop and implement policies and strategies that would combine both the technology-push and the demand-pull. These can typically be in three forms-regulations, economic instruments or information[50]. Regulations are restrictive and ensures a behavior is observed or a pattern is maintained; economic instruments can include tax and import duty exemptions, tax holidays or even direct funding for research and development and information can be in the form of persuasion and reasoned arguments to motivate certain patterns of behavior or behavioral change. In addition to the ongoing conversation on tax exemption for briquettes and related technologies, we propose that the Government should come up with a policy that requires public institutions to use briquettes towards providing 10% of their thermal requirements for a start and gradually increasing this share based on the observed performance. Institutions in this case include hospitals, schools, training institutions and prisons. This policy should target briquettes that meet a prescribed minimum standard which will send a strong signal to the market players. The success of this strategy, however, will be dependent on effective enforcement of standards to ensure availability of quality briquettes in market.

3.2.4 Fiscal Incentives for Briquette Manufacturers

One way to ensure quality briquette production in Kenya is in eliminating costs associated with importation of manufacturing equipment and parts/components. The impact of such actions by the

[48] Lighting Africa Kenya. 2018. A Thriving Off-Grid Market – With a New Focus on Underserved Areas Retrieved from https://www.lightingafrica.org/country/kenya/

[49] Christiansen, A. C. 2001. Technological change and the role of public policy: An analytical framework for dynamic efficiency assessments. *Report of the Fridtjof Nansen Institute*. Retrieved from https://www.files.ethz.ch/isn/96626/01-4-acc.pdf

[50] Ibid

government is evident in the solar sector which has greatly benefitted from the VAT exemption as from 2014. As it were, tax exemptions are applied to "specialized equipment for the development and generation of solar and wind energy, including deep cycle batteries which use or store solar power upon the recommendation of the Cabinet Secretary responsible for matters relating to energy"[51]. The resultant effect was a reduction in the price of solar equipment leading to increased affordability and uptake of solar products by consumers. The tax exemption has seen the country become a market leader in pico solar products with total number of products sold by the second quarter of 2019 coming close to 1 million (944, 511)[52] and being the highest in Sub-Saharan Africa.

The cooking sector has to some extent also benefited from incentives including tax exemptions/zero rating on[53]:

- "Taxable goods locally purchased or imported by manufacturers or importers of clean cooking stoves for direct and exclusive use in the assembly, manufacture or repair of clean cook stoves"
- "Inputs or raw materials locally purchased or imported by manufacturers of clean cook stoves approved by the Cabinet Secretary upon recommendation by the Cabinet Secretary for the time being responsible for energy" from tax exemption.
- "Plastic bag biogas digesters.; Biogas.; Leasing of biogas producing equipment."
- "The supply of liquefied petroleum gas including propane."

The Financial Bill of 2020 however, had several amendments including introducing 14% VAT on all the above products. Active lobbying spearheaded by the Clean Cooking Alliance of Kenya has ensured that these products continue to benefit from tax exemptions. Tax reductions on manufacturing components has the benefit of increasing the profitability of the organizations without necessarily increasing prices for consumers. There's need to continually engage Treasury to make them understand the value of such incentives towards achieving the objectives of Big Four Agenda and Vision 2030 on transforming the manufacturing sector; creating employment and reducing the environmental health impact as a result of clean cooking.

Long-term approaches in addressing barriers to financial access for private sector would be in testing out new financing models. The renewable sector has made a remarkable progress in bridging the financial gap for investors by creating facilities that not only provide technical assistance but extend financial services to actors in the sector. Some of these facilities include KawiSafi Ventures Technical Assistance Facility, Green Mini-Grids Technical Assistance Facility and African Clean Energy Technical Assistance Facility. There are several lessons that the sector can learn in designing appropriate programs to enhance access to finance to briquette manufacturers.

3.2.5 Energy centers for promoting briquette

Energy Centres (sixteen in number) were established in 1980s as the technical outreach arm of the Ministry of Energy[54]. With the new Energy Act 2019, however, they have been transferred to the newly established Rural Electrification and Renewable Energy Corporation (REREC). With this

[51] Government of Kenya, Finance Act 2018. Retrieved from https://www.kra.go.ke/images/publications/Finance-Act-2018.pdf
[52] GOGLA (2019) Global Off-Grid Solar Market Report Semi-Annual Sales and Impact Data. July to December
[53] Government of Kenya, Finance Bill 2018. Retrieved from http://kenyalaw.org/kl/fileadmin/pdfdownloads/bills/2018/TaxLawsAmendmentBill2018.pdf
[54] Philip Mwakio (2019, June 25). REREC now eyes partnerships with counties to establish energy centers. Standard Media. Retrieved fromhttps://www.standardmedia.co.ke/article/2001331392/rerec-now-eyes-partnership-with-counties-to-establish-energy-centres

mandate, the energy centers have now been transferred to REREC and they are to establish more energy centers across the other 31 counties. According to the Act, they are to "develop, promote and manage in collaboration with other agencies, the use of renewable energy and technologies, including but not limited to biomass (biodiesel, bio-ethanol, charcoal, fuel-wood, biogas) municipal waste, solar, wind, tidal waves, small hydropower and co-generation but excluding geothermal". This role aligns well with the functions of the energy centers which include:

- Development of Renewable Energy (RE) & Energy Efficiency (EE) county energy plans
- Training, demonstration and extension on RE & EE technologies;
- Research and trials on agro-forestry systems;
- Dissemination of RE & EE technologies;
- Establishment and maintenance of database on renewable energy technologies in the country;
- Monitoring and evaluation of renewable energy projects in collaboration with the technical divisions of the directorate;
- Undertaking Research and development activities

From the discussions with key informants, it is clear that most households are not aware of briquettes and neither do they understand their benefits. The Ministry of Energy can use these centers as resource houses to educate the public on alternative fuels and technologies for cooking through demonstrations. These centers should also be open to schools for visits and for education forums as they are vital channels in propagating information and influencing choice of fuels for cooking.

3.2.6 *Mainstreaming gender in Energy Policies*

The downside of having gender neutral energy policies is a sector that discriminates on women differentiated energy needs and may fail to incorporate their experience, expertise and capacity which is essential in the development of the sector. Women as primary stakeholders in the energy sector need to be involved to guide project design, so that their interests are considered in a sector which has been skewed more towards the needs of their male counterparts. To reach the hard-to-reach households with modern energy solutions, we need to tap into their different networks. Mainstreaming gender in energy policies requires a paradigm shift that recognizes women's contributions as agents and not only beneficiaries of energy products. The first step towards formulating energy policies that are more gender aware is to conduct a gender analysis on the existing energy policies (like the one conducted in this study). This would aim to understand how existing policies and practices within the energy sector reinforce gender inequalities, stereotypes, and what can be done to enable gender equality. The analysis would also provide information on critical gender gaps in existing energy policy formulation and implementation; allowing for development of a more gender-aware policy. The policies should ensure that the following considerations are made in the energy sector to ensure gender equality;

- A dual approach is adopted in reducing the equality gaps in the energy sector through gender mainstreaming and, specific gender targeted interventions.

- Data collected in the energy sector (national studies on demand side assessment for energy for cooking and lighting) should be disaggregated by sex and age at the bureau of statistics, ministries of finance and energy institutions and agencies, and gender indicators monitored, tracked and recommendations proposed for further refinement of existing policies or development of new ones.
- Gender responsive budgeting is critical to make sure activities are carried out and results generated
- Gender quota should be instituted when hiring in the sector energy and increasing the number of women in leadership positions especially in the energy management boards, expert panels and advisory groups
- Women should also be involved in the design of energy project and implementations; where evidence is used to develop inclusive gender energy policies
- Train personnel of energy related institutions and partners on the importance of integrating gender in the energy sector
- Train women and youths on the development, production, use and marketing of low-carbon energy technologies like briquettes
- Build the capacity of women to establish and run clean energy business initiatives
- Engage with financial service providers to ease access to credit for women energy entrepreneurs to grow their businesses or start up new ones to increase economic empowerment.

ANNEXES

ANNEX 1: LIST OF KEY INFORMANTS INTERVIEWED

#	Name	Title	Gender	Organization
1.	Dan Kithinji	Director Renewable Energy	Male	Ministry of Energy
2.	Alex Mboa	Standards Officer	Male	Kenya Bureau of Standards (KEBs)
3.	Mary Ngotho	Standards Officer	Female	Kenya Bureau of Standards (KEBs)
4.	Fenwicks Musonye	Senior Energy Efficiency Officer	Male	Energy and Petroleum Regulatory Authority (EPRA)
5.	David Njugi	Chief Executive Officer	Male	Clean Cooking Association of Kenya (CCAK)
6.	Godfrey Sanga	Director	Male	Energy 4 Impact
7.	Daniel Wanjohi	Regional Manager	Male	The Clean Cooking Association
8.	Sylvia Herzog	Director	Female	The Charcoal Project
9.	Béatrice Despioch	Co-Founder	Female	Eco-charcoal
10.	Jechoniah Kitala	Head of Technical and Consulting Unit	Male	Practical Action
11.	Victor Gathogo	Renewable Energy and Climate Change Advocacy Advisor	Male	SNV Netherlands Development Organization
12.	Itotia Njagi	Off-grid Lighting products Expert	Male	World Bank, Lighting Africa Global
13.	Myra Mukulu	Technical Advisor Cookstoves	Female	Kenya Off Grid Solar Access Project