REPUBLIC OF KENYA

MINISTRY OF ENERGY
AND PETROLEUM





BIOENERGY STRATEGY ACTION PLAN

2023







Energy crop-Jatropha



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FOREWORD



Bioenergy is an important form of energy for Kenya, contributing 68% of the country's final energy demand for diverse needs, especially cooking and heating. As a renewable energy source, it can contribute to energy security in the country as espoused in the national Energy Policy, 2018 and Energy Act, 2019 and to meeting the country's other national goals covered under Vision 2030—such as agriculture, health and commerce—for which energy is an enabler.

The government's commitment to the development of modern Bioenergy services includes among others: to modernize and commercialize charcoal value chains, specifically the adoption of modern kilns; to decriminalize the charcoal trade; support scaling up of clean cooking technologies and best practices; to promote youth owned and operated briquetting enterprises where agricultural waste is available in commercially viable quantities. Further, the Government of Kenya is committed to achieving the target of its population enjoying access to modern bioenergy services, including 100% access to modern cooking services by 2028, two years ahead of the schedule set out in Kenya's Sustainable Energy for All (SEforAll) Action Agenda.

The Bioenergy Strategy 2020-2027 was launched in 2020 to guide the development of the bioenergy sub-sector in the country. To implement the strategy the government has developed this comprehensive Action Plan which will accelerate the achievement of the aspiration of Kenyans of having modern bioenergy solutions by 2030.The Action plan, therefore, aims to promote the sustainable production, distribution and utilization of bioenergy as a clean source of energy. I therefore invite participation of all stakeholders to support the government in the realization of the aspiration of the Bioenergy Strategy 2020-2027.



Davis Chirchir

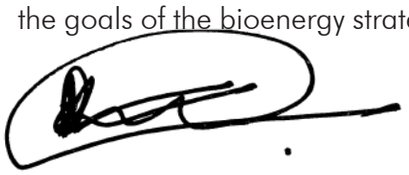
Cabinet Secretary, Ministry of Energy and Petroleum

PREFACE



The development of this bioenergy strategy action plan is a clear indication of the Ministry's commitment to ensuring effective implementation of the Bioenergy Strategy 2020-2027. The action plan makes solid contributions towards achieving Vision 2030 and Sustainable Development Goals and the ambition is to achieve universal access to modern bioenergy services by the year 2028. Implementation of the action plan will be anchored on innovation platforms. This will involve stakeholders interested in various bioenergy solutions working together to promote sustainable production and consumption of the clean energy technologies.

To fully implement this action plan, that will have a lasting impact on various energy nexus sectors such as health, climate, gender, industry, finance, and social protection, about KES 10.4 billion will be required. Furthermore, its success will depend on the participation of stakeholders and close collaboration between government Ministries, Departments and Agencies (MDAs), County Governments, development partners, private sector, and institutions of higher learning, research and non-governmental organizations. Ministry will consequently provide the necessary support to create an enabling environment for the realization of this plan. I call upon all stakeholders to mobilize requisite resources to achieve the goals of the bioenergy strategy.



Alex Wachira

Principal Secretary, Ministry of Energy and Petroleum

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Acronyms and Abbreviations

BIONET	Biogas Network-Kenya
CBO	Community Based Organization
CBD	Convention on Biological Diversity
CCAK	Clean Cooking Association of Kenya
CHEST	Clean Household Energy Solutions Toolkit
CoG	Council of Governors
CPA	Charcoal Producers' Association
CSOs	Civil Society Organisations
eCooking	Electric Cooking
ECF	Ethanol Cooking Fuel
GCF	Green Climate Fund
GEF	Global Environment Facility
GIZ	Germany Agency for International cooperation
ICRAF	International Council for Research in Agroforestry
INEP	Integrated National Energy Planning
IPs	Innovation Platforms
IRENA	International Renewable Energy Agency
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KAM	Kenya Association of Manufacturers
KEBS	Kenya Bureau of Standards
KEFRI	Kenya Forestry Research Institute
KEPSA	Kenya Private Sector Alliance
KEPSHA	Kenya Primary School Head Teachers Association
KEREA	Kenya Renewable Energy Association
KESSHA	Kenya Secondary Schools Heads Association
KFS	Kenya Forestry Service
KIRDI	Kenya Industrial Research and Development Institute
KTDA	Kenya Tea Development Agency
LPG	Liquid Petroleum Gas

MDAs	Ministries Departments and Agencies
ME&L	Monitoring, Evaluation and Learning
MoEP	Ministry of Energy and Petroleum
MoU	Memorandum of Understanding
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
PPPs	Public Private Partnerships
REREC	Rural Electrification and Renewable Energy Corporation
SDGs	Sustainable Development Goals
SEforAll	Sustainable Energy for All
TOR	Terms of Reference
TSOF	Three Stone Open Fires
TVET	Technical Vocational Entrepreneurship Training
UNCCD	United Nations Convention to Combat Desertification
UNECA	United Nations Economic Commission for Africa.
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests
UNIDO	United Nations Industrial Development Organization.
VAT	Value Added Tax
WHO	World Health Organisation
WTO	World Trade Organisation



Woodlot



Efficient charcoal production using by portable metal kiln

1.0 INTRODUCTION

Kenya's ***Bioenergy Strategy 2020-2027*** was launched in November, 2020 with the objective of promoting the sustainable production, distribution and utilization of bioenergy as a clean source of energy.

Implementation of this Strategy takes into account the strengths, gaps, opportunities as well as the foreseen challenges to enhance sustainable exploitation of bioenergy. In this regard, this ***Bioenergy Strategy Action Plan***—hereinafter referred to as the Action Plan—spells out the specific activities to be implemented towards realizing the Vision of *"Sustainable Bioenergy for all by 2028."*

The formulation of this Action Plan constitutes a key input to comprehensive planning in the energy sector which will be achieved through the Integrated National Energy Planning (INEP) framework envisaged by the Energy Act, 2019. It also recognizes that universal access to modern energy asstipulated under the Kenya Sustainable *Energy for All Action Agenda* encompasses access to electricity aswell as clean energy for cooking and lighting.

The development of this Plan, therefore, directly contributes to the achievement of the specific objectives of the bioenergy strategy which include:

- promoting sustainable production and consumption of bioenergy;
- accelerating the transition to clean
- cooking technologies and fuels;
- providing potential investors with requisite information on viable
- opportunities for bioenergy development; and
- serving as a framework for regional and internationalcooperation and trade in bioenergy and related feedstock.

An important feature of the Bioenergy Strategy Action Plan is the use of Innovation Platforms (IPs) to identify and scale up as well as resolve specific issues relating to bioenergy development.

The Action Plan identifies four (4) focal areas around which priority IPs could be developed with policy and advisory support by the National Bioenergy Committee established and domiciled at the Department of Bioenergy at the Ministry of Energy and Petroleum (MoEP). Consequently, the plan is founded on the close collaboration among the relevant government ministries, departments and agencies (MDAs), the private sector, development partners, academia and civil society among others.

The Action Plan will guide bioenergy development in the short to medium term. Focal areas for the short term (immediate) include:

- enhancing policy, regulatory and institutional frameworks for effective delivery and coordination of bioenergy programmes;
- comprehensive mapping of the country's bioenergyresources with potential for development;
- enhancing sustainable bioenergy feedstock production in urban, peri-urban and rural spaces; and evaluating the viability of reviving bioethanol blending with gasoline for transport sector consumption.

Focus areas for the Short to Medium Term (2023-2027) include:

- strengthening bioenergy research capacity to better inform policy and support sector development;
- sustaining transition efforts to clean cooking fuels and technologies;
- mobilizing financial resources for local bioenergy development;
- strengthening cooperation between the health and energy sectors with respect to clean cooking;
- promoting awareness and communication; supporting and facilitating private sector involvement in bioenergy development; and strengthening the learning culture—which is at the heart of any successful innovation platform.

The Action Plan elaborates specific activities to be implemented under each focal area and provides budget estimates to guide planners, decision makers and interested impact investors. Monitoring, evaluation and learning is an important element of this Action Plan and will be undertaken in conformity with the monitoring process of the INEP framework.



Biogas-Powered Chaff cutter-Kiambu County

2.0 DELIVERY AND COORDINATION THROUGH INNOVATION PLATFORMS

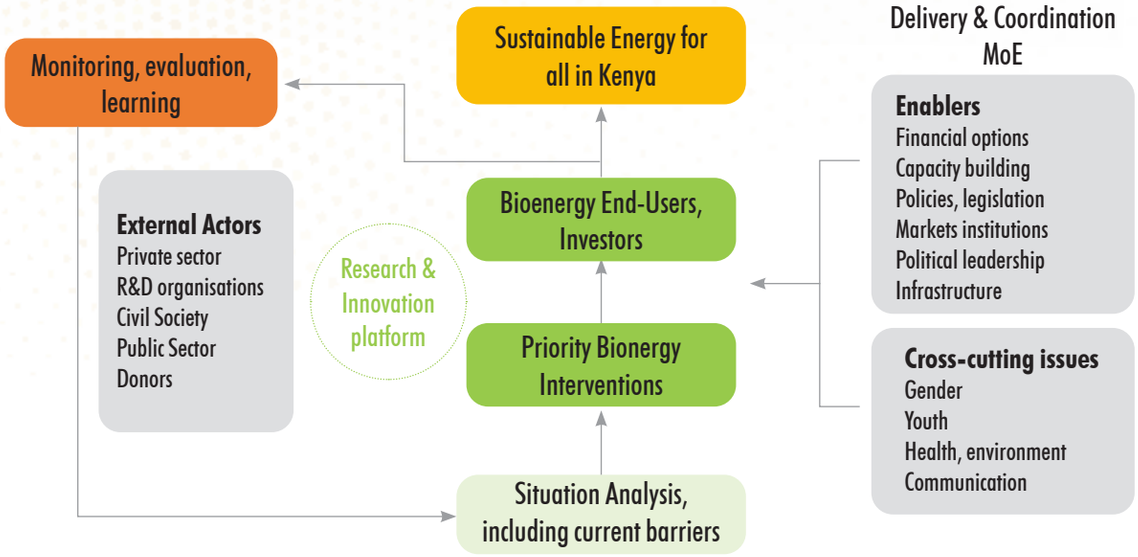
The National Energy Policy 2018 identified and put in place responses to a wide range of challenges that for long hampered integrated energy planning in the country. These included: inadequate technical capacity; inadequate databases for all energy forms; weak linkages with other sectors of the economy; and a lack of coordination between national and sub-national levels of government. Similarly, the Energy Act of 2019 introduced the INEP framework that consolidates all County Energy Plans (CEPs) and which framework is to be reviewed every three years. The ***innovation platforms*** that have been proposed to underpin the ***Bioenergy Strategy 2020-2027*** implementation provide a timely opportunity for operationalizing these policy and legal aspirations.

Innovation platforms (IPs) are safe spaces for stakeholder learning and change. The achievement of a strategic bioenergy output will require input and engagement of a targeted multi-stakeholder IP deliberately established to champion the up-scaling of a tested and proven bioenergy intervention.

The individuals on the platforms (who often represent organizations) with different backgrounds and interests will come together to diagnose problems, identify opportunities and find appropriate ways to achieve their goals. They may design and implement activities as a platform, or simply provide oversight and coordination of activities by individual members. Figure 1 is a conceptual framework showing the envisaged role of IPs in sustainable bioenergy development in Kenya.

The IPs will provide an opportunity for planning, execution and building of consensus on projects guiding by case-specific theories of change, highlighting clear outcomes and success indicators in each case. On these platforms, "external" stakeholders (MDAs, NGOs, private sector actors, academia, donors) bring on board technical and specialized knowledge on bioenergy as well as strategic insights to support sustainable production and consumption of a given bioenergy resource.

Figure 1: The envisaged role of IPs in sustainable bioenergy development in Kenya



On the other hand, the "internal" stakeholder—the bioenergy end-user or impact investor acting on their behalf—brings on board local knowledge of the bioenergy system context.

Each IP will be led by **a champion** who will convene meetings and lead discussions on a proposed bioenergy challenge or project. The champion—an individual who may self-nominate or proposed by stakeholders for endorsement by the Ministry of Energy's Bioenergy Strategy coordination desk—should be a player in their own right with passion and experience in the bioenergy space, or a representative of an institution with strategic interests in the bioenergy resource under consideration by the IP. Due to the highly dynamic nature of IPs—membership expanding and shrinking as issues get resolved or others emerge—membership will be voluntary.

The Bioenergy Strategy 2020-2027 identifies four priority bioenergy resource areas or themes around which inaugural IPs may be established, while remaining flexible to accommodate any additional platforms that may arise spontaneously. These themes are presented in Table 1, alongside potential institutions from which champions could come from.

Table 1.1: Examples of themes around which innovation platforms may be organized

	Themes	Possible champion
1	Enabling environment - policy, regulations, standards	MoEP
2	Solid biomass	
	a. Firewood	CCAK
	b. Charcoal	KFS
	c. Briquettes	Briquettes Association
	d. Pellets	KEFRI
	e. Bioenergy waste	MoEP
3	Gaseous fuels (biogas)	BIONET
4	Liquid Fuels (bioethanol)	CCAK, KOKO

A more detailed presentation of priority IPs identified and validated by stakeholders is in Appendix 1.

Any IPs established around these priority areas will maintain their links to the knowledge management system to be set up and maintained by the Bioenergy Strategy 2020-2027 Delivery and Coordination Desk at the Bioenergy Department, Ministry of Energy & Petroleum headquarters. This Desk will at the inaugural level, prepare clear TORs for an innovation platform, clarify its governance of IPs vertically (with county level units and actors) and horizontally (with national level efforts and actors) and develop its policy guiding documents e.g. Communication Strategy, Knowledge Management Plan, and Monitoring Evaluation & Learning Plan.

Other tools expected to be in place before the formal launch and operationalization of the Desk and the IP initiative are:

- Guidance on IP formation and operationalization;
- Standard orientation programme for IP champions; and
- Open invitation for potential champions to package and present viable ideas for consideration for new IPs. Such an invitation should be open ended, receiving expressions of interest (EOIs) on an ongoing basis.



Sugar Bargasse

3.0 MONITORING, REPORTING AND VERIFICATION

A monitoring, reporting and verification (MRV) system is a key element to guarantee transparency, precision and comparability on IP operations and performance. These include understanding and tracking progress with individual or collective IP commitments, providing confidence and enhancing accountability in quantified information measured and reported, and providing background information on the scope and ambition of IP responses. Each IP will submit the following to the Strategy's Delivery and Coordination Desk that will operate under the overall supervision of the National Bioenergy

Committee of the MoEP:

- proposed theory of change, which will later guide its monitoring, evaluation and learning events;
- quarterly or half-year progress reports; and
- technical reports on any innovations, technologies and best-practices developed and promoted.

Similarly, the **Coordination Desk** will:

- convene annual learning forums and—in collaboration with other institutional partners--convene the annual Sustainable Bioenergy Conference and Exhibition, during which all IPs from around the country will participate;
- publish online an annual IP performance analysis report; and
- publish a quarterly IP newsletter that will also be accessible on the Ministry's website.

These reports will inform the overall Bioenergy Strategy effectiveness, point out gaps and update theaction plans on an ongoing basis.

They will also update the online knowledge management platform andany key lessons documented and used to adapt the Strategy and action plans.

The Coordination Desk willalso publish a communication strategy for the IP initiative, which will clearly spell out key messages for pre-mapped audiences and identify the appropriate media and frequency of dissemination.

A key element of this communication plan will be to expose the media and TVET students in journalism to bioenergy issues, for instance, through practical attachments in organizations that promote bioenergy.

The Coordination Desk will also regularly monitor the impact of the messages on bioenergy production and consumption patterns.



Capacity building Improved earth kilns Mirangine EC

4.0 STRATEGY ACTIONS AND BUDGET ESTIMATES

The interventions to be undertaken through the IPs are classified into short-term and short-to-medium term. Short-term activities are those implementable immediately while short-to-medium-term activities run for more than one year but until 2027, in keeping with the Strategy's timeframe.

SHORT TERM

4.1 Enhance policy, regulatory and institutional frameworks for effective delivery and coordination of bioenergy programmes.

The Bioenergy Strategy 2020-2027 is aligned with various national, regional and international legislative frameworks. Key among these is the Constitution of Kenya, 2010 which devolved the roles of energy planning and development to the County Governments. Similarly, the National Energy Policy 2018 recognizes biomass fuels as the largest source of primary energy in the country while the Energy Act, 2019 sets forth the implementation framework for sustainable energy solutions that includes bioenergy.

Furthermore, the National Climate Change Action Plan (NCCAP) 2018-2022 emphasizes the need to adopt renewable energy towards achieving low-carbon development.The Vision 2030 also identifies energy as a critical enabler of its success. The Strategy recognizes that a weak enabling environment has slowed down past efforts towards realizing sustainability in the energy sector envisaged under the SE4All framework.

The key intervention proposed towards establishing the requisite enabling environment will be to enhance policies and regulatory frameworks necessary to deliver bioenergy programmes as well as establishing priority innovation platforms for the bioenergy sector. Table 4.1 details the activities and related estimated costs.

Table 4.1: Activities for enhancing policy, regulatory and institutional frameworks

Activities	Sub-Activities	Cost (KES-Millions)
Review and formulate policies, legal and institutional frameworks	• Perform needs assessment studies for policies,standards and regulations for biomass cookstoves; • Formulate a policy on growing energy crops for ethanol production, marketing and utilization; • Strengthening the National Bioenergy Committee for improved oversight; • Establish and operationalize the IP delivery and coordination desks at DRE. • To document policy & regulatory gaps and resolve with reference to biogas, briquettes, pellets biodiesel & bioethanol, • To support development of biogas & biomass fuel policies, reviews and standards.	67
Facilitate transition of all public institutions (schools, hospitals and prisons) to clean cooking)	• Formulation of policies, standards and/or regulations for the institutional cookstoves value chain; • Formulate policies, regulations governing sourcing of grants to public institution to invest in institutional stoves and supporting infrastructure.	5,000
Build capacity for national and county governments, and other key stakeholders (IP champions).	• Conduct meetings and inter-county IP benchmarking missions; • Establish and maintain a data base of bioenergy sector actors and active IPs; • Strengthen existing bioenergy industry associations; • Strengthen County Government capacity for Integrated National Energy Planning (INEP); • Enhance the role of local TVET institutions through CBET curriculum development (for biogas, wood fuel cookstoves, briquettes, pellets and biofuel craft persons) to support the bioenergy sector; • Formation of National and County Energy Planning Committees (NEPC and CEPCs); and • Capacity building of NEPC and CEPCs in bioenergy planning, communication; knowledge management and effective stakeholders' engagement.	600
Establish priority IPs for bioenergy development	• Formation and operationalization of innovation platforms for priority bioenergy technologies.	25
Total		**5,692**

4.2. Comprehensive mapping of the country's bioenergy resources with potential for development

In addition to an effective enabling environment, the successful development and growth of the bioenergy sector in Kenya will aptly depend on our knowledge of the national biomass resource base.

This refers to qualitative (type and diversity of bio-resources or feedstock), quantitative (how much of the feedstock is available in sustainable amounts), spatial (geographical) and temporal (availability into the foreseeable future) distribution of these resources.

These elements point to the sustainability of the resources, a major consideration when developing the products and their markets.

Kenya does not have such a database of its bioenergy resources to which enterprises may refer for planning investments. This Action Plan provides a timely opportunity for the country to develop bioenergy resource inventory anchored on an easy-to-access knowledge management infrastructure and support studies aimed at determining supply and demand gaps, as well as environmental and social impact assessments associated with bioenergy production, marketing and use. The prioritized activities and supporting budget under this category are listed in Table 4.2 below.

Table 4.2: Comprehensive mapping of the country's bioenergy resources

Activities	Sub-Activities	Cost (KES-Millions)
Establish inventories covering different bioenergy resources	• Conduct fuelwood and charcoal resource assessment and documentation; • Undertake invasive tree and shrub species assessment with focus on those with potential for bioenergy generation such as Prosopis; • Undertake biodiesel and bioethanol resource assessment; • Conduct agricultural and industrial, medical, forest and municipal wastes resource assessment;	97
Establish a bioenergy knowledge management system	• Establish an online-based bioenergy inventory with continuous update features; • Develop data and information sharing protocols and guidelines; and • Establish, launch and disseminate physical and online bioenergy portals.	15
Conduct bioenergy sector-specific studies	• Undertake bioenergy sector studies and disseminate findings including on the following: • National bioenergy supply and demand surveys to establish gaps and propose strategies to address the gaps; • Market readiness assessment for accelerated production, distribution and consumption of clean cooking solutions. • Environmental and social impact of bioethanol and biodiesel production, marketing and use.	15
Total		**127**

4.3. Enhance sustainable bioenergy feedstock production in urban, peri-urban and rural spaces.

The exercise aims at establishing sustainable bioenergy feedstock by enhancing their production across the country. It will also explore the possibility of utilizing the abundant invasive tree/shrub species such as Prosopis for bioenergy development.

Furthermore, the intervention aims to harness waste-to-energy potential for bioenergy deployment. This exercise will be rolled out through stakeholder mobilization around pilot projects, carrying out feasibility studies, capacity building initiatives among others.

Another area for potential feedstock production attention is domestic zero grazed livestock (pigs, poultry, cows etc.) for biogas production from bio slurry utilization. Proposed feedstock related activities and attendant budgets are proposed in Table 4.3 below.



Biodiesel production from cotton seeds-Makueni

Table 4.3: Proposed actions for sustainable bioenergy feedstock production

Activities	Sub-Activities	Cost (mill. KES)
Initiate the production of energy trees and crops	• Establish nurseries, woodlot plantations for energy crops in counties in peri-urban areas by public and private actors; • Promote production and use of forest and non-forest biomass fuels by working with community groups and business enterprises; and • Develop a framework for energy crops usage in fuel production.	55
Utilize tested invasive trees and shrubs species for sustainable biomass energy supply.	• Promote PPPs and private sector investment for use of invasive trees and shrubs for bioenergy generation; and • Perform Environmental Impact Assessment (EIA) of large scale use of invasive trees and shrubs as biomass energy feedstock.	5
Promote waste-to-energy initiatives for bioenergy development	• Harness agricultural waste for bioenergy production; • Utilize municipal waste for energy generation; • Promote the use of municipal waste, agricultural waste, industrial and medical waste for energy generation, and clean cooking; • Undertake a national assessment of the potential in municipal landfills to produce bioenergy; and • Carry out assessment of the co-benefits of enhanced bioenergy feedstock production and waste management.	27
Total		**87**

4.4. Evaluate the viability of reviving bioethanol blending with gasoline for the transport sector

In the late 1980s to early 1990s, Kenya was among the few African countries consuming Gasohol (ethanol/gasoline blend) to power its transport sector. Others in the region included Malawi and Zimbabwe. The bioethanol was produced from molasses—a byproduct from cane sugar processing—and transported by road to the refinery in Mombasa. Owing to the production economics and inefficiencies around the refining technology, this blending was discontinued and replaced with gasoline imports.

With the push towards climate-friendly energy consumption, there is renewed interest to re-integrate biofuels in the transportation sector, key among these being the revival of ethanol-gasoline blending considering recent advances in blending technology.

To guide Kenya along this path, expert studies to ascertain the technical and economic viability as well as the requisite enabling environment for sustainably reviving the gasohol industry will be necessary. A consideration of the role the AfCFTA may potentially play in expanding the gasohol markets beyond East Africa needs to be explored. The proposed activities and budget are presented in Table 4.4 below.

Table 4.4: Viability of reviving bioethanol blending with gasoline.

Activities	Sub-Activities	Cost (mill. KES)
Review policy and regulatory environment for reviving the gasohol blending industry	• Conduct a policy and regulatory impact assessment on ethanol blending for transport in Kenya; • Assess economic viability of ethanol blending for transport; and • Review the blending mandate and provide recommendations.	20
Assess sustainable bioethanol production options	• Assess potential business models for ethanol production; • Evaluate the available technologies and innovations for ethanol production—including cost/benefit analyses; • Undertake detailed land use planning for sustainable ethanol production; • Review sugar industry plans for ethanol production and recommend optimization options; and • Assess other energy crops that could be harnessed for ethanol production such as cassava and sugar beets.	20
Total		**20**

MEDIUM-TO-LONG TERM

4.5 Strengthen research capacity in bioenergy to better inform policy and support sector development

The role of research in bioenergy development cannot be overemphasized. With feedstock conversion technologies advancing so fast and the growing push towards adopting low-carbon solutions, sustained research capability is critical. Currently, research capacities for bioenergy research at local R&D organisations are insufficient to meet the needs. This can be resolved through promoting skills-building among early career researchers, building strategic partnerships between local research agencies and the private sector among other options.

Creating an innovation hub for bioenergy has similarly been mooted by industry players such as the eco-industrial park in Kibos. If well-structured and supported, research can be a continuous process that will help identify gaps and opportunities in the bioenergy sector. The detailed activities and budget proposed are in Table 4.5 below.

Table 4.5: Strengthening bioenergy research capacity.

Activities	Sub-Activities	Cost (mill. KES)
Promote research and development in bioenergy	• Establish and maintain a digital library on bioenergy publications; • Regularly update database on bioenergy projects and their research findings; • Establish and maintain database of bioenergy professionals; • Promote research on (a.) waste-to-energy (b.) indoor air quality in rural and urban areas (c.) biogas-related bioenergy technologies; • Formulate policy on research in bioenergy; and • Support research and development on sustainable production, marketing and consumption of biodiesel and bioethanol.	23
Coordinate strategic partnerships between relevant research agencies and bioenergy developers for technology and capacity development.	• Organize an annual flagship sector event for bioenergy e.g. bioenergy conference; • Establish a bioenergy research coordination and collaboration platform linking industry, academia and R&D communities; • Participate in local, regional and international scientific conferences, Conferences of Parties to the UNFCCC, CBD, UNCCD, UNECA, IRENA.	22
Establish an innovation hub for bioenergy	• Establish a bioenergy innovation Centre to incubate viable technologies; • Undertake exhibitions on bioenergy innovations-including schools and colleges and R&D entities; • Organize annual awards in bioenergy innovation; • Collaborate with KIRDI as the National Designated Entity (NDE) for Climate Technology Centre and Network (CTCN) for UNFCCC to support commercial deployment of viable proposals for funding	211
Total		**256**

4.6 Transition to clean cooking fuels and technologies

The potential in clean cooking solutions to contribute towards low-carbon, climate resilient development in Kenya is enormous and the MoEP aims to achieve universal access to clean cooking in Kenya by 2028.

Clean cooking solutions include LPG, biogas, biofuels, electricity-based cooking solutions. The country is highly dependent on biomass energy, contributing 68% of the country's final demand for diverse needs, especially cooking and heating. Figure 2 categorizes cooking solutions in Kenya by percentage of households.

The transition from traditional cooking (three stones open fires (TSOF), metallic charcoal stoves and kerosene wick stoves) to clean cooking solutions expects the improved biomass cooking solutions (improved charcoal and woodstoves) to play a significant role. About 55% of biomass is derived from farmlands in the form of woody biomass, crop residue and animal waste while the remaining 45% is derived from government and communal forests. MoEP projections for achieving universal access to clean cooking by 2028 through the promotion of clean cooking solutions as shown in the Table 4.6.1:

The country is highly dependent on biomass energy, contributing

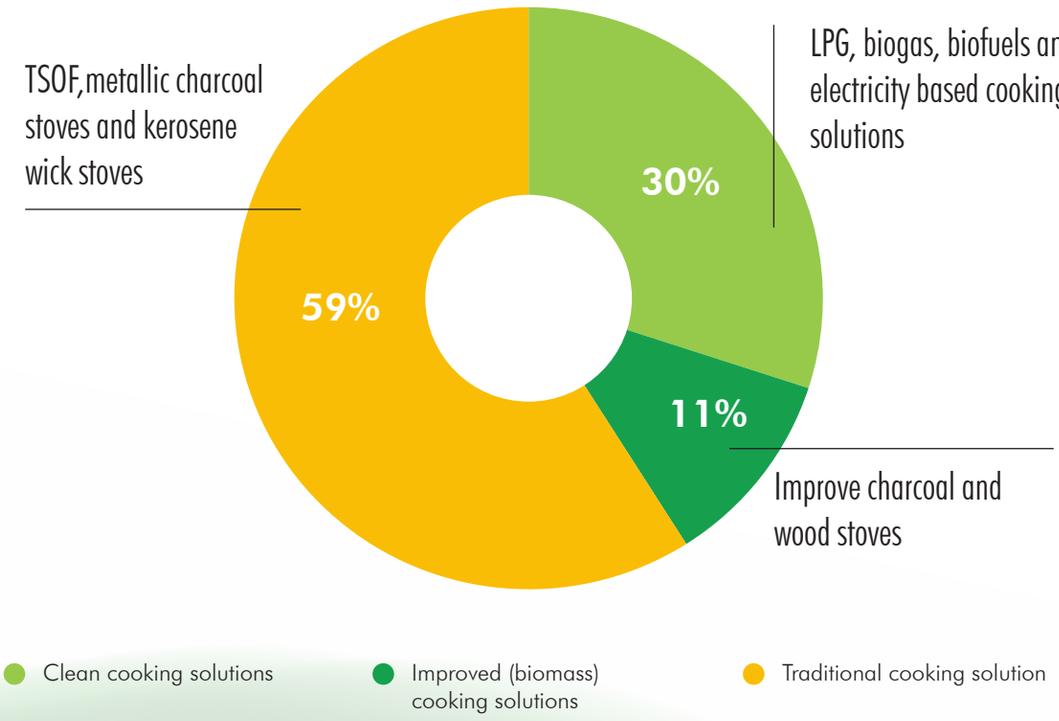
68%

of the country's final demand for diverse needs,

55%

of biomass is derived from farmlands in the form of woody biomass, crop residue and animal waste

Figure 2: Categorization of cooking solutions in Kenya by percentage of households





Non-carbonized briquettes

Table 4.6.1: Projections for attainment of universal clean cooking by 2028

Category	Description	Baseline (%)	Target (%)			
		2019	2022	2024	2026	2028
Clean cooking solutions	LPG	23.9	30	37.3	38	44
	Biogas	0.5	1	2	2.5	3
	Bioethanol	2	6	7.5	20.2	22
	eCooking	0.9	1	3	3	4
	Other clean solutions	2.7	3	3.2	3.3	3.4
Improved (biomass) cooking solution	Improved charcoal and wood stoves	11	12	22	23	23.6
Traditional cooking solution	TSOF, metallic charcoal stoves and kerosene wick stoves	59	47	25	10	0
	Total	**100**	**100**	**100**		**100**

The projections are not informed by empirical data from the ground but rather on current market trends.

The projected figures will be validated by the ongoing studies on biogas, LPG, eCooking, alternative fuels,institutions and small and micro enterprises, and consumer and enterprise financing. These will provide the baseline from which realistic projections. Other clean solutions include solar and biomethane among others.

If successfully executed, the transition will lead to development impacts which include improved respiratory health and well-being (SDG-3), reduced GHG emissions from stoves (SDG-13) and improved forest cover, contributing towards the 30% threshold set by the government. The proposed activities are budget estimates are presented in Table 4.6 below.



HAP-prone inefficient cooking with raw firewood

Table 4.6.2: Activities transitioning households towards clean solutions

Activities	Sub-Activities	Cost (mill. KES)
Review the enabling environment for adoption of clean cookstoves and fuels.	• Engage with the National Treasury and Parliament on VAT, import duty and other fiscal incentives in favour of clean cooking; • Undertake impact studies on the taxation regime on clean cooking sector; • Engage stakeholders through advocacy on taxation for bioenergy products and services; • Facilitate the Inter-Ministerial Committee to review gaps in the forest (charcoal) rules of 2012; • Formulation of overarching clean cooking strategy and other related sector studies; • Conduct status studies for biogas, LPG, biofuel,electric cooking in Kenya; • Study to assess the extent to which social institutions and businesses in Kenya have embraced clean cooking; • Evaluate existing financing models for private sector and consumers; • National scoping of support required by different consumer segments (businesses, institutions and individuals) for promoting and uptake of clean cooking solutions; and • Resource assessment (supply and demand) study for alternative cooking fuels and technologies (fuelwood, charcoal, biodiesel, briquettes, pellets,agricultural waste, municipal waste).	22
Capacity development and awareness creation on clean cooking	• Carry out training needs assessment and trainings on clean cooking fuels and technologies; • Promote appropriate designs and standardization of products and promote local manufacturing; and • Undertake public awareness campaigns on clean cooking (Prepare awareness materials on clean cooking; prioritize awareness on health, climate change; gender nexus issues on clean cooking)	83
Last mile initiatives in clean cooking	• Review and document cooking behavior among Kenyan households, regional disparities, gender disparities, vulnerable and poor households; • Develop a plan for reaching the vulnerable and poor households; • Distribution of improved and clean cook stoves to the vulnerable and poor households; and • Professionalization of cookstoves value chain	2150
Policy impact assessment	• Assess the co-benefits accruing from bioenergy interventions (e.g. human health, urban air quality, forestry conservation etc); and • Strengthening sectoral collaborations between bioenergy and health, transport and agriculture	4.25
Promotion of ethanol for clean cooking	• Implementation of the Ethanol for cooking Masterplan; • Aggressive promotion of Ethanol Cooking Fuel (ECF); • Development of innovative consumer financing mechanisms for ethanol stove acquisition; and • Expand cane, sweet sorghum and cassava growing zones in high yielding areas for ECF production.	19

Promotion of fuelwood and charcoal	• Promote efficient charcoal production technologies and value chain coordination; • Promote improved efficiency cook stoves for charcoal and fuelwood; and • Coordinate and maintain database of fuelwood and charcoal programmes, activities, projects and practitioners	17.6
Promotion of Briquettes and pellets	• Promote briquetting and pelleting from sustainable feedstock; • Promote local low-cost production of non-carbonized and carbonized briquettes for household as well as industrial use; • Support local fabrication of briquetting machines; • Coordinate and maintain data bases of fuelwood and charcoal programmes, activities, projects and practitioners; • Support the fabrication of appropriate and efficient cookstoves that use pellets/briquettes; and • Conduct consumer acceptability survey for briquettes and pellets	32
Promotion of Biogas	• Promote biogas technology by construction of 6500 units per year; • Promote biogas awareness creation; • Coordinate and maintain databases of biogas programmes, activities, projects and practitioners; • Undertake studies on impacts of biogas technology adoption to communities and environment; and • Promote training of biogas technology practitioners in TVET institutions	1645 (370 from-MoEP and-1275 from private sector)
Total		**3972.85**

4.7 Mobilizing financial resources for local bioenergy development

Access to finance remains a major challenge to realizing widespread adoption of energy technologies.

Evidence, however, exists on innovative forms of financing that have succeeded in many pilot level initiatives and which could help realize impact at scale. The MoEP will develop a resource mobilization strategy to help finance the implementation of the bioenergy strategic interventions.

One option will involve sustained engagement with multilateral and bilateral partners, financial institutions and potential investors. Other options will include the development of bankable proposals to global financing mechanisms such as GEF, GCF among others. The strategy will also support feasibility studies for the development of large bioenergy projects. The proposed activities are budget estimates are presented in Table 4.7 below.

Table 4.7: Mobilizing bioenergy financial resources

Activities	Sub-Activities	Cost (mill. KES)
Solicit development partner support	• Establish and coordinate development partners bioenergy forum; • Develop partnership with international agencies for technology and knowledge transfer; • Prepare bankable proposals targeting inter alia the global green funds (e.g. GEF.GCF, Clean cooking fund etc.); • Research on and develop innovative funding models; and • Seek technical assistance for national and county bioenergy programmes.	22

Mobilize private sector finance	• Provide incentives for private sector participation in the bioenergy sector; • Organize annual bioenergy shows, exhibitions and demonstration where private sector can share business cases and experiences in financing models for bioenergy technology dissemination; • Encourage and mobilize private sector investment in bioenergy development; and • Promote PPPs, FiTs and energy auctions.	3
Total		**25**

4.8. Strengthen the cooperation between the health and energy sectors for clean cooking

The health and energy nexus presents an opportunity for strengthening joint planning and collaboration at local and national level as demonstrated through global initiatives such as the Health and Energy Platform of Action (HEPA). A key objective will be to improve the coordination of national and county level initiatives on clean cooking achieved through dedicated planning innovation platforms.


Biogas Institutional cooker

Key outcomes include county status reports on clean cooking, widespread adoption of clean cooking standards, monitoring the impact of clean cooking on human health at national and county levels, and a stronger nexus between the health and energy sectors. The budgetary implications are presented in Table 4.8 below.

Table 4.8: Health and energy sectors for clean cooking

Activities	Sub-Activities	Cost (mill. KES)
Strengthen national health and energy joint planning initiatives	• Strengthen Energy, Environment and Healt Technical Working Group through stronger MoEP participation. MoH already actively represented by Directorate of Public Health; • Pursue stronger collaboration with the Ministry of Health under the HEPA initiative; • Prioritize development of a portfolio of bankable health for clean cooking projects; • Apply information generated from the Clean Household Energy Solutions Toolkit (CHEST) to inform strategy and planning; and • Implement WHO-Indoor Air Quality guidelines on household fuel combustion	5
Establish national and county governments' coordination in energy and health issues.	• Strengthen county departments on energy and health to play an active role in collaboration with the national-level CCEH TWG; • Provide technical support to county governments on policies and strategies that address energy and health nexus.	3
Total		**8**



Stakeholder engagement bioenergy strategy development

4.9. Promote awareness and communication

A robust communication strategy is at the heart of successful bioenergy project implementation and all innovation platforms will have these. These will identify key target audiences, identify their befitting messages focusing on behavioral change and most appropriate means of communicating these messages to them to ensure bioenergy technology uptake at scale. There will be a robust communication network within and across the various established Innovation Platforms for the delivery of the strategy. The proposed activities are budget estimates are presented in Table 4.9 below.

Table 4.9: Awareness and Communication

Activities	Sub-Activities	Cost (mill. KES)
Develop communication strategy for the bioenergy strategy 2020-2027	• Map stakeholders, information needs and means of effective communication; • Establish a robust, digitized knowledge management platform accessible by national and county level innovation platforms; • Develop information, educational and communication campaign materials; and • Conduct behaviour change campaigns on bioenergy	5
Enhance awareness and communication campaigns on bioenergy	• Undertake awareness creation campaigns including social marketing for bioenergy innovations.	10
Support the annual flagship events	• In collaboration with industry association on clean cooking, plan the annual national and county clean cooking weeks; and • Convene the annual bioenergy conference and exhibition	20
Total		**35**

4.10. Support and facilitate private sector involvement in bioenergy development

The private sector is a critical actor in advancing community development initiatives. It brings onboard technical knowledge, skills and finances to bear on development processes. To effectively deliver, the private sector requires an enabling environment which the government must strive to have in place.

Towards this end, the MoEP will continuously review and improve the ease of doing business. Forexample, standards and regulations for bioenergy technologies will be developed and low-interest loans for local bioenergy producers catalyzed.

Furthermore, fiscal and investment incentives will be developed and implemented to spur the sector through, for example, potential investors being encouraged to use the one-stop-shop within the Kenya Investment Authority (KIA).

The activities and budget estimates are presented in the Table 4.10 below.

Table 4.10: Support for private sector involvement in bioenergy development

Activities	Sub-Activities	Cost (mill. KES)
Strengthen private sector participation in bioenergy development	• Review and continually improve the ease of doing business; • Organize investor information conferences; • Negotiate low interest loans for bioenergy producers; and • Strengthen industry associations such as CCAK, KEREA and hold regular forums with them.	9
Total		**9**

4.11 Monitoring, Evaluation and knowledge management platform

The bioenergy projects will be monitored with clear indicators obtained from their respective theories of change. The purpose will be to assess success levels and emerging issues, challenges and lessons learnt to inform proper reporting and decision making.

The reporting process will track feedback from various Innovation Platforms which are key delivery units of the strategy. The activities (which should be read alongside Section 3 of this report) are as indicated in the Table 4.11 below:

Table 4.11: Monitoring, evaluation and knowledge management

Activities	Sub-Activities	Cost (mill. KES)
Develop monitoring, evaluation and learning framework for bioenergy projects	• Develop a comprehensive programme-level theory of change and extract the monitoring indicators; • Develop a monitoring, evaluation and learning (MEL) plan; Set up an ICT Infrastructure for knowledge management among partners; • Conducting a knowledge audit and identifying information gaps and technical challenges; • Develop knowledge management strategy/plan; and • Conduct a stakeholder annual learning review workshop	25
Total		**25**

4.12 Gender Mainstreaming in Bioenergy

Women and children under five are more affected by household air pollution compared to other family members. Similarly, women and girls are the main firewood collectors and determinants of how fireplaces are managed while cooking food, hence influence the emission levels from fireplaces. There is hence the need to apply a gender lens while implementing clean cooking solutions. The proposed activities and budget estimates are presented in Table 4.12 below.



Capacity building-efficient charcoal production

Table 4.12: Proposed activities for gender mainstreaming in bioenergy

Activities	Sub-Activities	Cost (mill. KES)
Conduct assessments/ studies to elucidate the interaction between gender and bioenergy technologies	• Undertake county level gender disaggregated studies on the preferences for the various options for clean cooking fuels and technologies; and • Evaluate the use of cooking solutions across gender and age groups at the household level to aid the understanding of the impacts of technologies and fuels in use	12
Promote gender mainstreaming in clean cooking activities	• Gainfully engage men, women and youth in entrepreneurial clean cooking activities; • Identify and engage champions for under-represented groups such as men and women in clean cooking activities; and • Create awareness on change of mind set on various technologies for sustainability and uptake.	10
Sector network on gender and clean cooking	• Establish a sector gender and clean cooking work group.	7
Total		**29**

4.13 Energy, climate change and green growth

The conversion of fuels into energy emits GHGs into the atmosphere which contributes to climatic change. By applying green or sustainability principles, the conversion of such fuels may be achieved more efficiently with reduced GHG emissions. Alternatively, where applicable, such energy sources may be substituted with non-polluting fuels such as solar home systems for heating and lighting.

It is envisaged that a substantial percentage of the renewable energy will be in the form of bioenergy. The proposed activities and associated budget estimates are presented in Table 4.13 below.

Table 4.13: Activities linking energy climate change and green growth

Activities	Sub-Activities	Cost (mill. KES)
Monitoring GHG emissions from bioenergy sources	• Review and promote the existing emission standards; and • Monitor and report on emissions from bioenergy sources	20
Build capacity of bioenergy value chains on industrial symbiosis	• Assessment of industries that have implemented industrial symbiosis concept; • Build capacity of four sugar factories to uptake industrial symbiosis concept; and • Develop incentives for closed loop industries.	24
Promote carbon credit trading in bioenergy processes	• Create awareness on carbon trading in the bioenergy sector; • Develop programs in bioenergy carbon trading; and • Develop capacity in carbon asset development	27
Total		**71**



Institutional Biogas

Appendices

Appendix 1: Suggested Innovation Platform (IP) themes, activities, actors and geographical scope

Suggested Theme/ objective	Suggested actors	Suggested activities	Geographical Scope
To advocate for a conducive environment for bioenergy.	**Champion:** MoEP **Others:** BIONET, KEREA, KEBS, KIRDI, KEPSA, GIZ,CCAK, National Treasury, REREC,KAM MoEd, KCSPOG, MoH, SNV, MoEF, COG, MoA	The target activities for the IP: • to document gaps and resolve with reference to the identified bioenergy types. • To develop policies, legal, institutional, standards and regulations on bioenergy.	National
To promote sustainable charcoal production.	**Champion:** KFS **Others:** MoEP, MoH, MoEd, KEFRI, CCAK, GIZ, ICRAF, KALRO, REREC, CBOs, KEPSA	• Promotion of sustainable charcoal production and utilization, • initiate national dialogue around charcoal regulations, • incentivize sustainable charcoal production, including through financing	National
	Champion: KFS **Others:** KEFRI, Federation of Charcoal Producers Association (CPA), NEMA, CCAK, Kenya alliance of community forest association, University of Eldoret.	• Biomass production for charcoal; • Capacity needs assessment; • Conduct a study on supply and demand for fuelwood); • Capacity on efficient charcoal production; and • Promotion of appropriate end-user technologies.	Narok, Kitui and Kwale (Pilots) include all charcoal hotspots-KFS. KEFRI
	Champion: Federation of Charcoal Producers Association (CPA) **Others:** Chiefs, County energy department, NEMA, County commissioner, CBOS, Community groups, KFS, KEFRI.	• Strengthening capacity on efficient charcoal production, • Promotion of appropriate end-use technologies, • Address enabling environment gaps, including clear rules/ regulations. • Biomass production for charcoal, and • Training/sensitization of producers.	Narok and Kitui and Kwale

To promote sustainable charcoal production	**Champion:** Federation of Charcoal Producers Association (CPA) **Others:** Local Chief, County energy, department, NEMA, County commissioner, CBOS, Community groups, Head teachers' association.	• Projects on sustainable charcoal production and consumption for household and institutional use.	Local level (Village)
To enhance sustainable supply of firewood.	**Champion:** MoEP **Others:** MoEd, KFS, KEFRI, CCAK, MoA, CoG, KEPSA, KAM, KTDA, ICRAF, JKUAT, KESSHA, KEPSHA, Kenya alliance of community forest association, University of Eldoret, CBOs	• Undertake a baseline study of biomass feedstock availability (volumes, types etc.) disaggregated by county to inform the direction we will take with respect to the development of firewood supply, • To promote sustainable firewood production from fast growing trees including utilization of invasive species such as prosopis, • Convene national meetings to assess status and volume of fuelwood production, • Compile and share information with stakeholders on status of fuelwood production, • Utilise available manuals to establish fuelwood lots. If available, disseminate the same among stakeholders, and • Professionalization of supply chain for cooking technologies/fuels while supporting innovation.	Country wide
	Champion: County Department of Energy. **Others:**County Department of Agriculture, of Gender and Youth, County department of environment & Forestry, KFS, CPAs, TVETs, Learning institutions, CBOs, CFA, indigenous forest peoples	• Train stakeholders on establishing fuelwood lots, • Train county departments and other stakeholders on tracking status of fuelwood production, • Convene regional meetings to assess status and volume of fuelwood production, and • Promote fast growing tree species for fuelwood production among stakeholders	County

	Champion: CBOs **Others:** Women groups, Youth groups, Learning institutions, Local administration, CFA, indigenous forest peoples	• Promote tree planting for fuelwood lots by training stakeholders on planting trees for fuelwood, • Training stakeholders on tracking status of fuelwood production, • Collect and analyze data on fuelwood production, and • Report on status of fuelwood production in the sub-location.	Sub-location
Promote production and consumption of briquettes	**Champion:** Briquettes Association KIRDI, CCAK, GIZ, KEFRI, Practical Action, ICRAF, MOE, KEPSA, JKUAT, UNIDO, REREC, MoEd	• Promotion of briquettes from sustainable feedstock • Identify and debate on high level barriers to adoption • Promotion of production technologies and standards	Country wide
Promoting the production and consumption of pellets.	**Champion:** Private sector players **Others:** KIRDI, CCAK, GIZ, KEFRI, Practical Action, ICRAF, MoEP, KEPSA, JKUAT, UNIDO, REREC, CBOs, MoEd.	• Promotion of pellets from sustainable feedstock; and • Promotion of production technologies and standards	Countrywide
Promoting the utilization of bioenergy waste	**Champion:** MoEP **Others:** KFS, MoA, MoEF, Saw millers, CoG, sugar millers, Private waste collectors, NEMA, KEREA, BIONET, UNIDO, KIRDI, CBOs, MoEd, MoH.	• Generate energy from bioenergy waste, and • Promotion of waste to energy technologies.	Countrywide
Scaling up the use of biogas for both domestic and household and institutions.	**Champion:** BIONET **Others:** MoEP, KEREA, HIVOS, ENAFF, KIRDI, KEBS, REREC National Biogas Steering Committee, SNV, MoEd, MoA, CBOs, African biodigesters component.	• Stakeholder awareness creation, • Engagement of contractors on quality control and other industry issues, • Lobby for removal of barriers to adoption of biogas technology, and • Promoting biogas technologies in general.	National
	Champion: Energy centers **Others:** Biogas contractors, prefabricated biogas promoters, farmers' dairy associations.	• Assessment or mapping of production potential, • Construction and installation of biogas digesters, and • Removal of local barriers to large scale adoption.	County

To increase the use of bio-ethanol for cooking	**Champion:** CCAK **Others:** SouthSouthNorth, KEPSA, Koko Networks, MoEP, ethanol players, UNIDO, CCAK, Strathmore, KIRDI, MoEd, NACOSTI, Natural resource forum.	• Create awareness about the benefits of using bioethanol, • Removal of barriers to wider adoption of ethanol for cooking, • Deliberate on prerequisites for up scaling local production of bioethanol, • Promotion of gasohol for transport, • Promotion of ethanol and stoves for cooking, and • A national study on the viability of growing energy crops for the production of bioethanol and developing a strategy on the same.	National
To raise awareness of the fuel and the stove technology (Market development)	**Champion:** Local ethanol enterprises and cooperatives **Others:** CCAK Private Sector Players, women groups, CBOs, energy centers, TVETS, County Governments	• Cascade the county bioethanol strategy from the national one, • Increase the number of Households using ethanol for cooking, • Identify and resolve local barriers, • A study on the viability of growing energy crops for the production of ethanol for each county, and • Increase in businesses dealing in ethanol.	County

Appendix 2: Bioenergy action plan implementation matrix

Strategic Objective	Focus Area/ Key Activities	Key Activities	KPI	Output Target					Responsibility	Expected Budget(KES-Millions)					Notes
				Y1	Y2	Y3	Y4	Y5		Y1	Y2	Y3	Y4	Y5	
Enhance policy, regulatory and institutional frameworks for effective delivery and coordination of bioenergy programmes.	Review and formulate policies, legal and institutional frameworks		Number of policies, legal and institutional frameworks	2	2	2			MOEP, Counties, REREC, Development partners and CSOs, KIRDI, CoG, private sector, MDAs	10.4	10.4	10.4	10.4	10.4	
	Facilitate transition of all public institutions (schools, hospitals and prisons) to clean cooking)		No of public institutions transitioned to clean cooking	7,500	7,500	7,500	7,500	7,500	MOEP, Counties, REREC, MOH, MoEd, Development partners and CSOs	1000	1000	1000	1000	1000	
	Build capacity for national and county governments, and other key stakeholders to implement bioenergy programs		No. of capacity building meetings at the National and County levels	3 INEP training workshops held in 5 county clusters, 1 CBET curricula and OHS standards developed, energy plans produced.	3 INEP training workshops held in 5 county clusters, 1 CBET curricula & OHS standards developed , energy plans produced.	3 INEP training workshops held in 5 county clusters, 1 CBET curricula & OHS standards developed.	3 INEP training workshops held in 5 county clusters, 1 CBET curricula & OHS standards	3 INEP training workshop held in 5 county clusters,, 1 CBET curricula& occupational standards, Bioenergy database created.	MOEP, Counties, CoG, TVET, REREC, development partners and CSOs, CBOs, KIRDI	120	120	120	120	120	The first 3 years an additional 6 mill per year is from the SETA Programme,
	Enabling environment		Number of policies or regulations	2	2	2			MOEP, Counties, REREC, Development partners and CSOs.	3	3	3	3	3	
	Establishment of Innovation Platforms for bioenergy.	IPs Stakeholders engagement	No. of IPs established	2	2	2	2	2		5	5	5	5	5	

Strategic Objective	Focus Area/ Key Activities	Key Activities	KPI	Output Target					Responsibility	Expected Budget(KES-Millions)					Notes
Comprehensive mapping of the country's bioenergy resources with potential for development	Develop Inventories covering wood fuel, biogas and biofuels resources		No. of inventories developed	2	2				MOEP ,COG, counties, MoEF, MOA, KEFRI, KFS, NEMA Private sector, CSOs, KIRDI	0	25	24	24	24	
	Establish a bioenergy knowledge management system		Bioenergy knowledge management system established	Knowledge management system established						7.5	7.5				
	Conduct bioenergy sector-specific studies.		No. of bioenergy studies conducted.	1	1	1	1		MOEP, CoG relevant MDAs, private sector, CSOs, KIRDI.	5	5	2.5	2.5		
Enhance sustainable bioenergy feedstock production in urban, peri-urban and rural spaces.	Initiate the production of energy trees and crops.		Acreage under production of energy trees and crops	3 counties selected, 48,000 seedlings planted	3 counties selected, 48,000 seedlings planted	3 counties selected, 48,000 seedlings planted	3 counties selected, 48,000 seedlings planted	3 counties selected, 48,000 seedlings planted	MOEP, CoG, counties, relevant ministries and agencies ,private sector, CSOs	11	11	11	11	11	
	Utilizeinvasive trees and shrubs species for sustainable biomass supply		No of PPP initiated	1	1	1	1	1	MOEP ,CoG, counties, MoEF, MOA ,KEFRI, KFS, NEMA ,Private sector, CSOs	1	1	1	1	1	
Promote waste to energy for Bioenergy development										5.4	5.4	5.4	5.4	5.4	
Evaluate the viability of reviving bioethanol and biodiesel and Promote research and development in bioenergy blending with gasohol for transport sector consumption	Assess economic viability of ethanol and biodiesel blending for transport		Assessment report ethanol blending for transport	Bioethanol assessment report	Biodiesel assessment report				MoEP ,COG, MOA, MoT, Treasury, Private sector, EPRA, KIRDI	4	4	4	4	4	

Strategic Objective	Focus Area/ Key Activities	Key Activities	KPI	Output Target					Responsibility	Expected Budget(KES-Millions)					Notes
Promote bioenergy Sustainable Aviation Fuels(SAFs)	Asses feasibility of developing and promoting Biofuels SAFs		Assessment report on developing and promoting Biofuels SAFs	SAFs assessment report	SAFs assessment report	SAFs assessment report SAF Promotion report	SAF Promotion report	SAF Promotion report	MOEP, counties, MoEF, MOA, CCAAI, KFS, NEMA,Private sector, CSOs	4	4	4	4	4	
Promote research and development in bioenergy	Establish an innovation hub for bioenergy established and nurtured		Bioenergy innovation centre established	1 bankable proposal	Bioenergy innovation centre	1 bankable proposal	1 bankable proposal	1 bankable proposal	MoEP. KNBS, private sector, EPRA, KIRDI, NACSOTI	118.4	62.4	37.4	31.4	6.4	
Transition to clean cooking fuels and technologies	Incentivize adoption of clean cooking fuels and technologies		Reports on fiscal and non-fiscal incentives for bioenergy granted	1 report	1 report	1 report	1 report	1 report	MoEP, COG ,counties, MoEF, MOA ,KEFRI, KFS, NEMA ,Private sector, CSOs	4.4	4.4	4.4	4.4	4.4	Funding from GCF on clean cooking sector studies
	Capacity development and awareness creation on clean cooking technologies, woodfuel, briquettes, pellets and liquid biofuels		No. of public awareness campaigns carried out	3	3	3	3	3	MoEP ,COG, counties, MoEF ,MOA ,KEFRI,KFS, NEMA, Private sector, CSOs, KIRDI	31.6	30	30	30	30	
	Policy impact assessment		Assessment reports						MOE, MOH	2.25	2				
	Last mile initiatives in clean cooking		No. of clean cookstoves distributed to the vulnerable groups No. of artisans trained	100,000 200	100,000 200	100,000	100,000 200	100,000 200	MoEP, MOH, Development partners, COG	430	430	430	430	430	
	Promotion of Biogas		Number of demonstration bio-digesters built.	400 domestic units, 10 institutional units	400 domestic units, 10 institutional units	400 domestic units, 10 institutional units	400 domestic units, 10 institutional units	400 domestic units, 10 institutional units	MoEP ,COG, counties, MoEF, MOA, Private sector, CSOs, KIRDII	329	329	329	329	329	

Strategic Objective	Focus Area/ Key Activities	Key Activities	KPI	Output Target					Responsibility	Expected Budget(KES-Millions)					Notes
Mobilizing financial resources for local bioenergy development	Carryout engagements with development partners and tapping into global financing mechanisms		No of meetings No of bankable proposals developed	2 Coordination meetings; 1 proposal developed	2 Coordination meetings; 2 Proposals developed	2 Coordination meetings; 2 Proposals developed	3 exchange meetings; 2 Proposals developed	3 exchange meetings; 2 Proposals developed	MoEP ,COG, MoEF, MOA, Private sector, Treasury, Development partners, CSOs, MoE-TVET	9.3	6.8	5.3	2.4	1.2	More funding from GCF
Strengthen the cooperation between the health and energy sectors for clean cooking	Strengthening health-energy nexus at National and County level		No of coordination meetings	4	4	4	4	4	MoEP ,Private sector, Treasury, Development partners, CSOs ,MoH	3	2	1	1	1	
Promote awareness and communication	Develop a bioenergy communication plan and conduct behavior change communication		Bioenergy communication strategy developed	Bioenergy communic ation plan developed	1 awareness campaign	1 awareness campaign	1 awareness campaign	1 awareness campaign	MoEP, Counties, REREC	7	3.5	1.5	1.5	1.5	
	Conduct annual Clean cooking week		Clean cooking event conducted	1	1	1	1	1	MoEP, Counties, CCAK REREC, Development partners and CSOs	4	4	4	4	4	
Support and facilitate private sector involveme nt in bioenergy development	Strengthen private sector participation in bioenergy development		No. of private sector engagements on bio energy development	2	2	2	2	2	MoEP, Counties, REREC, Development partners and CSOs	32	1	1	1		
Monitoring and Evaluation and knowledge management platform	Develop Monitoring and Evaluation Framework for Bioenergy projects		Monitoring and evaluation framework developed No. of site visits	Monitoring and evaluation framework	2 visits	2 visits	2 visits	2 visits	MoEP, GIZ/GCF	13	3	3	3	3	
Gender Mainstreaming in Bioenergy	Conduct a survey on the preference for clean cooking solutions Conduct gender impact assessment		Study undertaken	Study initiated	Study finalized				MoEP, Counties, Development partners and CSOs	14	9	2	2	2	

Strategic Objective	Focus Area/ Key Activities	Key Activities	KPI	Output Target					Responsibility	Expected Budget(KES-Millions)					Notes
Energy and climate change	Monitoring GHG emissions from bioenergy sources	Review and promote the existing emission standards	Reports	Emission standards promotion reports Emission standards	Emission standards promotion reports Emission standards	Emission standards promotion reports Emission standards	Emission standards promotion reports Emission standards	Emission standards promotion reports Emission standards	MoEP, Counties, NEMA, Development partners and CSOs KIRDI, Industries, min of industrialization	2	2	2	2	2	
		Monitor and report on emissions from bioenergy sources	reports	Monitoring of the manufacturing and transport sector Emission reports	Monitoring of the manufacturing and transport sector Emission reports	Monitoring of the manufacturing and transport sector Emission reports	Monitoring of the manufacturing and transport sector Emission reports	Monitoring of the manufacturing and transport sector Emission reports	Counties, REREC, Development partners and CSOs	2	2	2	2	2	
	Build capacity of bioenergy value chains on industrial symbiosis	Carryout a national study on the industries that have achieved industrial symbiosis.	No of Studies carried out	Carry out 1 study sugar industry	Carry out 1 study sugar industry				MoEP, Counties, REREC, Development partners and CSOs, KIRDI	5	5				
		Build capacity of 4 sugar factories to achieve industrial symbiosis	no of sugar factories capacity build	Roll out to 4 other factories (Workshops, meetings ,seminars)	Roll out to 4 other factories (Workshops, meetings ,seminars)				MoEP, Counties, REREC, Development partners and CSOs, KIRDI	4	4				
		Develop incentives for closed loop industries	no of companies selected	TOR developed,					MoEP, Counties, REREC, Development partners and CSOs	2	1.5	1.5	1		
	Promote carbon credit trading in bioenergy processes	create awareness in carbon trading in the bioenergy sector.							MoEP, Counties, Development partners, CSOs, REREC	4	4	4	4	4	
		Develop program s in the bioenerg y carbon trading							MoEP, Counties, Developmen t partners, CSOs, REREC	2	2	1	1	1	
Grand Total										**Ksh 10396.85**					

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