



# 100% Renewables Cities & Regions Roadmap

## Workshop Report: Serious Games, Policy Dialogue and Clean Cooking

09-11 May 2023

Kisumu County





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# 1. Background to the project and objectives of the workshop

## 1.1. About the 100%RE Project

The '100% Renewables Cities and Regions Roadmap Project' or '100% RE Project' is funded by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) through the International Climate Initiative (IKI). Commencing from May 2019 until December 2023, it is implemented by ICLEI – Local Governments for Sustainability in three countries i.e. Argentina, Kenya and Indonesia. The 100% RE project works with cities and regions in the three focal countries to build pathways for global south cities to access finance and implement renewable energy (RE) solutions.

In Kenya, the project is endorsed by the Ministry of Energy and Petroleum (MoEP), and is being implemented in three counties: - Kisumu County as the 'deep dive', and the County Governments of Nakuru and Mombasa as the network regions. The 100% RE project provides extensive support for the deep-dive county, Kisumu County, to lay out its roadmap towards a fully renewable energy mix in three sectors (electricity, transport and cooking), with the networking cities benefiting from peer exchange and capacity building opportunities. By working closely with the Kenyan national government and relevant sub-national authorities over a period of 4 years, ICLEI Africa is assisting in the development of policies and action plans (implementation mechanisms), including developing a roadmap (local strategies) for renewable energy implementation (Kisumu county), County Energy Plans (CEPs), and getting strategic renewable energy project proposals to bankable stage. This project is well aligned to Kenya's ambitious energy and climate plans, as outlined in Vision 2030 and the country's Nationally Determined Contribution (NDC), amongst other policies and international and domestic commitments. As the only African country in the 100% RE project, Kenya has the unique opportunity to lead African cities and towns in the transition toward renewable energy, and to benefit from the project's global linkages.

## 1.2. Purpose of the Workshop

One of the main outcomes of the project is to develop a 100% Renewable Energy Roadmap for Kisumu County which will describe the overall strategy along with pathways and implementation mechanisms for Kisumu County to pursue renewable energy in the electricity, cooking and transport sectors. The aim of the first two days of the workshop was to encourage dialogue and solicit inputs from the various groups of stakeholders on the strategy for the transition, as well as the necessary policies and actions required to achieve it, which will ultimately inform the 100% RE Roadmap for Kisumu County. The aim of the last day was to undertake a capacity building exercise on clean cooking, based on lessons learned from other African cities through the



[Enabling African Cities for Transformative Energy Access \(ENACT\) project](#). The specific objectives of the workshop are to:

### **Day 1: The Sustainable Energy Transition Strategy Game**

- Bring together project counties along with key stakeholders such as national government, private sector, academic and civil society and use a 'Serious Games' methodology to foster joint visioning, dialogue, collaboration and explore the various perspectives and considerations that are required to enable a 100% RE transition at Kisumu County.

### **Day 2: Policy dialogue and roadmap implementation mechanisms**

- To build on previously identified policy gaps and challenges for the local 100% RE transition, and explore tangible actions and implementation mechanisms that will inform the 100% RE Roadmap for Kisumu County, and contribute to the implementation. These contributions towards the implementation will also complement the local County Energy Plan (CEP), the national RE policy landscape and Kenya's Nationally Determined Contributions (NDC) towards the Paris Agreement plan, as well as targets towards achieving the Sustainable Development Goals (SDGs), especially SDG 7 (affordable and clean energy).
- To create a mutual understanding of the policies, mandates and partnerships that are required at the national and local levels to promote renewable energy projects.

### **Day 3: Clean cooking training**

- To share lessons learnt from conducting similar training workshops through the [Enabling African Cities for Transformative Energy Access \(ENACT\) project](#) in other African cities on advancing clean cooking.
- To explore the intricacies of a transition to clean cooking, the status quo in Kisumu County and the role of local government in pursuing modern forms of cooking.

## **2. Workshop notes**

### **2.1. Day 1: The Sustainable Energy Transition Strategy Game**

#### **2.1.1. Welcome and Opening**

***By Ms Sayuri Chetty***

Ms Sayuri Chetty, Senior Professional Officer for Climate, Energy and Resilience at ICLEI Africa (AS) facilitated the first day of the workshop, and opened by welcoming all participants and



providing an overview of the objectives of the 3-day workshop. She stated that this first day will focus on the Sustainable Energy Transition Strategy Game during which participants will undertake a joint visioning and dialogue session using the element of “play”, to explore the various perspectives and considerations of different stakeholders in order to build a 100%RE strategy for Kisumu County. This exercise builds off the visioning workshops and the [energy system modelling](#) that was done for the County.

### 2.1.2. Official opening by the County Government of Kisumu

#### ***By Mr Salmon Orimba, County Government of Kisumu***

Mr Salmon Orimba, County Executive Member for the Department of Infrastructure, Energy and Public Works at the County Government of Kisumu (CGK) welcomed participants to Kisumu and the workshop. He explained that Kenya is determined and on track to achieve the full transition to clean energy by the year 2030, and clean cooking by 2028. He acknowledged proudly that Kenya is the only African country chosen as part of the 100% RE project, and that they are ready to lead.

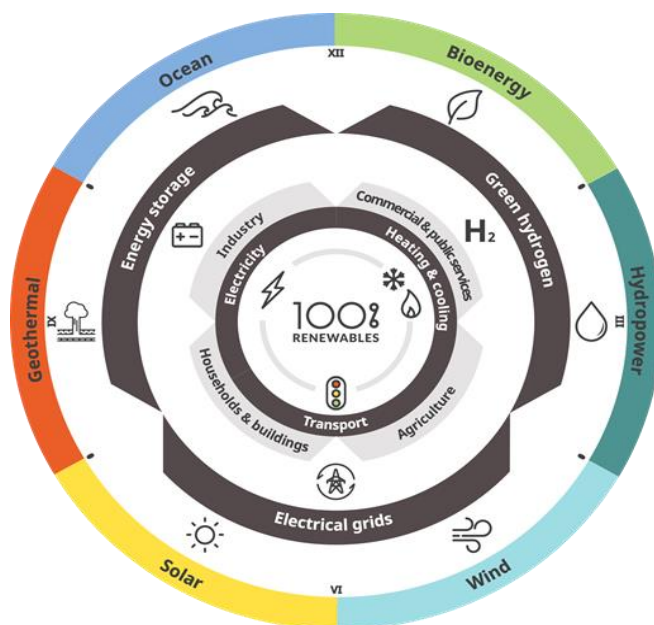


Mr Orimba also mentioned the various activities the County has undertaken to support their climate action. A Sustainable Energy Action Plan (SEACAP) was developed in 2022 with support from Expertise France, through the Covenant of Mayors in Sub-Saharan Africa (CoM SSA) programme, where a Baseline Energy Access Assessment, Greenhouse Gas Emissions Inventory and Risk and Vulnerability Assessment were completed to inform the Action Plan. He also made mention of the County’s plan to open up an energy centre where they wish to host training sessions and demonstrations. He concluded by wishing everyone a good workshop.

### 2.1.3. Introduction to the 100% RE project

#### ***By Ms Carine Buma, ICLEI Africa***

Ms Carine Buma, Senior Specialist for Climate Change, Energy and Resilience at ICLEI Africa, provided an introduction to the 100% RE project as well as its objectives and activities. For the purposes of the project, the definition of 100% RE was outlined as follows:



Renewable energy encompasses all renewable resources, including **bioenergy, geothermal, hydropower, ocean, solar and wind energy**. One hundred percent renewable energy means that all sources of energy to meet all end-use energy needs in a certain location, region or country are derived from renewable energy resources **24 hours per day, every day of the year**. Renewable energy can either be produced locally to meet all local end-use energy needs (power, heating and cooling, and transport) or can be imported from outside of the region using supportive technologies and installations such as **electrical grids, hydrogen or heated water**. Any **storage facilities** to help balance the energy supply must also use energy derived only from renewable resources.”

-IRENA Coalition for Action

The project objectives were described as follows:

- Promote multi-level governance policy dialogues and strengthen capacities of key stakeholders through various workshops;
- Encourage the development of enabling frameworks at national, regional and local level to unlock RE and energy efficiency potential;
- Support development of a RE Roadmap in Kisumu county towards achieving 100% renewable energy and effectively implement local climate actions, in line with Vision 2030;
- Enable the counties to develop both their County Energy Plans and financially viable and bankable RE projects, as well as explore access to public and private investment;
- Contribute to achieve the respective national climate and energy targets, as reflected in Kenya’s policy landscape – The Energy Act (2019), Nationally Determined Contributions (NDCs), Kenya’s Climate Change Act (2016), and other relevant climate change strategies;



In terms of the national local benefits of pursuing a 100%RE transition, Ms Buma explained that there are many economic, social, environmental and governance benefits, such as those listed in Figure 1 below:

#### Economic co-benefits:

- Increase opportunities for sustainable economic growth by setting up **Energy Service Companies (ESCOs)** or other business models
- Stimulate opportunities for **technological development** and potential technology transfer
- Enable **locally generated**, secure and affordable energy for communities
- **Generate revenue** from sales of local RE
- Keep capital in the country or region **by reducing energy imports**
- **Raise awareness** on the business potential of RE and EE

#### Social co-benefits:

- **Increase livelihood opportunities** for local communities by stimulating demand for RE and EE related industry and business
- Reduce dependence on (imported) fossil fuels
- **Reduce air pollution** and related health hazards by switching to clean fuels
- **Build capacity** in the community and create new or improved skills related to RE
- **Protect local trees** and forests by encouraging the use of RE, reducing deforestation

#### Environmental co-benefits:

- **Reduce harmful greenhouse gas** emissions (GHGs)
- Improve local environmental conditions through clean, sustainable energy
- **Reduce pollution**-related adverse impacts on ecosystems
- **Increase environmental awareness** among local and regional governments, communities and other key stakeholders

#### Good Governance co-benefits:

- **Decentralize RE generation** to enhance resilience of the energy supply system
- Build trust in the local administration by sharing information and engaging with local stakeholders
- **Monitor developments**, evaluate progress and report to the community
- **Publicly report targets and progress** to help highlight achievements globally
- Map the local contributions to the NDC

Figure 1. Benefits of 100% RE

There are five work packages in the project, namely:

- WP1: Multi-stakeholder engagement at the national level (MLG)
- WP2: Capacity building and stakeholder engagement at the County level
- WP3: Develop RE strategies and Action Plans for Kisumu
- WP4: Support the development of priority projects into financeable projects
- WP5: Consolidating methodologies, guidance and resources, with widespread dissemination





The timelines of the core activities were presented, as well as some of the project milestones achieved to date.

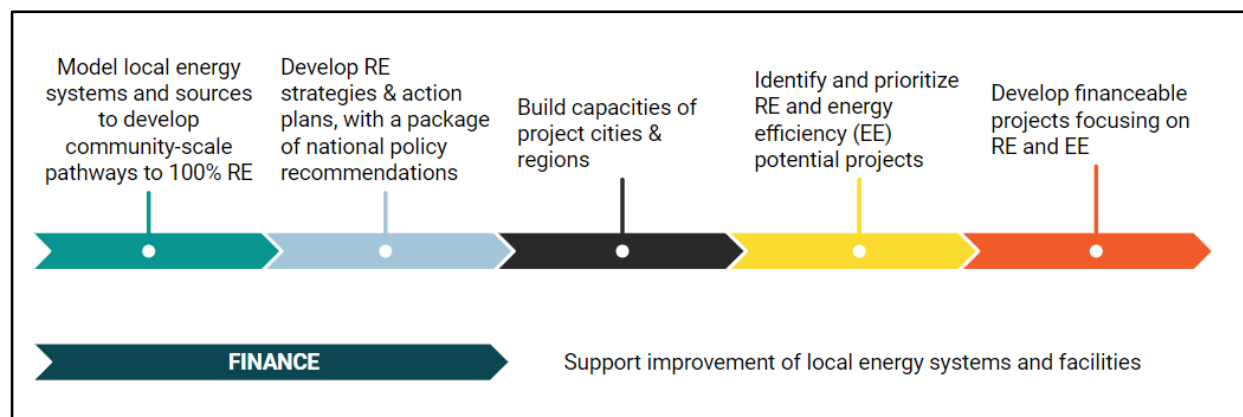


Figure 2. Overview of core activities and timelines

#### 2.1.4. Setting the scene and serious games rules of engagement

**By Ms Sayuri Chetty, ICLEI Africa**

Ms Chetty explained that “serious games” is a methodology primarily for learning, using gaming and/or simulation approaches or technologies. The element of ‘play’ and interactivity can bring about new, creative insights and can help simulate the potential impacts of planning decisions - critical for the multi-stakeholder process that is the energy transition, especially for local governments. Participants adopting different roles than their current everyday roles can lead to interesting interactions and an understanding and appreciation of different perspectives.

ICLEI and Generation.Energy developed the Sustainable Energy Transition Strategy game using a “serious games” methodology, with the aim to bring together local government officials, and other key stakeholders to develop a collective strategy for a region’s energy transition.

The objective of the game is for players to collaborate on designing a sustainable energy system for Kisumu County to be achieved by 2050. Each player is assigned a role that they must adopt for the game, encompassing the various stakeholders involved in the energy transition. The game has three rounds i.e. 1) Introduction of assigned roles, 2) Examining the map and 3) Building the ideal energy system for Kisumu County.



### 2.1.5. Serious Games Round 1: Introduction of assigned roles

For the first round, all participants were invited to briefly introduce themselves as their assigned role/character for the game. As part of this, participants had to answer the following questions:

- Who have you been assigned?
- What technologies are you supportive of?
- What 'powers' do you possess (e.g. land, policy action, money).



### 2.1.6. Serious Games Round 2: Examining the Kisumu County map

For the second round, participants had to get familiar with the Kisumu County map and understand the zoning of land, identify any misrepresentations, and identify some preliminary ideal locations for renewable energy development, and those which are completely no-go areas e.g. any protected sites.



### 2.1.7. Serious games Round 3.1: Building your ideal energy system (individual attempt)

The third round had two sub-rounds. Ms Chetty informed participants that they could work individually or in pairs to build the ideal energy system for Kisumu County from the perspective of their assigned character/role.

From the list of technologies presented on the demand cards, participants were asked to choose as many technologies as they would like to see and indicate how much it would contribute towards achieving the demand for fuel, heat and electricity. The total demand was pre-filled and based on the energy system modelling report that was done for Kisumu County.



### 2.1.8. Serious games Round 3.2: Building the ideal energy system for Kisumu County (joint, facilitated discussion)



Table 2 provides a summary of the technologies that were agreed to jointly by the participants in order to fulfil the fuel, heat and electricity demand of the County. The outcome of the discussions, captured below, was rooted in lived experiences and reality which supported discussions during the second day of the workshop.

**Table 2. Summary of technology mix as part of the joint strategy**

Demand Sector	Fuel demand
<b>Total (transportation, etc.)</b>  <b>3500 GWh</b>	Biofuels (short term)
	Solar PV to power cars and trains (short-long term)
	Green hydrogen (as the long-term strategy)

Demand Sector	Heat demand
<b>Household and commercial cooking</b> <b>350 GWh</b>	Promote options that support livelihood opportunities such as briquetting, improved cook stoves (not included as part of the technology options).
	E-stoves
	Ethanol stoves
	Biogas stoves



	Liquefied Petroleum Gas (LPG) as a short-term solution (not included as part of the technology options)
<b>Household and commercial heating</b> 50 GWh	Biomass boilers
	Heat pumps
<b>Industrial heating</b> 50 GWh	Industrial heat pumps
	Biomass/Waste CHP

Demand Sector	Electricity demand
<b>Household, commerce, industry and transport</b>	Solar PV on fields
	Solar PV on roofs
	Solar home systems (not included as part of the technology options)
	Geothermal
	Mini-grids with solar, wind and batteries (not included as part of the technology options)
	Hydropower
	Geothermal

## Discussion

### *Fuel demand*

The participants were accepting of using green hydrogen, however, they felt it was more feasible in the long term than the short term due to the required technology and cost implications. It was also noted that all vehicles will have to be retrofitted in order to use hydrogen. Hence, the equipment needs to come before hydrogen is introduced.

Participants reported that there is almost a surplus generation of electricity in the country; hence this can be leveraged for use in the transport sector. As such, in the short term, they proposed



alternate fuels that may be available in the market such as biofuels, as well as electrification of the sector through solar PV. Linked to this, they stated the importance of energy efficiency as well.

### *Heat demand*

With regards to heat demand and clean cooking, one participant suggested prioritising technologies that empower the county, to improve the livelihoods of residents. Ethanol stoves were also proposed as another alternative as there is already sugar production taking place in the county, with ethanol as a by-product.

Another suggestion was to explore the use of biogas stoves for cooking and compressing biogas into canisters to distribute it, instead of pipes which may be expensive for now. Wood stoves were outright discouraged as they reduce forest cover.

In the end however, e-cooking took priority (around 200 out of 350 GWh) due to the high efficiency rating. It was also stated that the cost of electricity is high and power blackouts are another challenge, which must be taken into consideration when adopting this technology. Awareness raising was suggested as a must for any new cooking technologies in order to sensitise citizens and support the uptake of such new technologies.

Heat pumps and biomass boilers were proposed to provide household and commercial heating.

Waste-to-energy from agricultural residues and methane generated from landfill sites was also suggested. This could be a long-term solution due to the piped biogas network that is required.

### *Electricity demand*

Kenya has a high amount of electricity supply, especially due to the availability of geothermal and hydro power resources. It might not be cost-effective for Kisumu to produce its own power given that electricity from these power plants are cheaper to produce.

Solar was also mentioned, and some technologies suggested included solar home systems, roof-top and free-field PV for electricity generation. It was also stated that solar can support reliability of electricity from the grid. Wheeling as a regulation was also mentioned to enable renewable energy. Hybrid mini-grids consisting of solar, wind and battery systems were also proposed.

### **2.1.9. Reflections from participants**

The feedback from participants on the exercise was positive, and participants appreciated that they were given different roles as they acknowledged it prevented tension. They mentioned the



importance of doing this exercise with other Counties to support their energy planning and engagement with stakeholders around it.

Mr Ondiek also acknowledged that the learning lab methodology style of the workshop supported the achievement of the objectives and provided a good space for learning and exchange. He also appreciated that the private sector was represented in the room.

Participants relayed that while there was a variety of stakeholders represented in the room, some of the missing groups were donor agents, community members who are specifically representing youth, community-based organisations, and even faith-based organisations.

#### **2.1.10. Closing remarks**

***By Eng. George Nyongayo, Ministry of Energy & Petroleum***

Eng Nyongayo expressed his gratitude to the County Government of Kisumu, ICLEI Africa for hosting this workshop and thanked the County Governments of Nakuru and Mombasa for their participation. He also appreciated the participation of the wide range of stakeholders in the room and reminded the participants to keep the network and partnership going towards the 100% renewable energy transition.

## **2.2. Day 2: Policy Dialogue**

### **2.2.1. Welcome and objectives of day 2**

***By Ms Sayuri Chetty, ICLEI Africa***

Ms Chetty explained that the objectives for this session was to build on previously identified policy gaps and challenges for the local 100% RE transition, and to explore tangible actions and implementation mechanisms that will inform the 100% RE Roadmap for Kisumu County. In addition, she explained the objective of enabling mutual understanding of the policies, mandates and partnerships that are required at the national and local levels to promote renewable energy projects.

### **2.2.2. Group exercise 1: Mandate mapping for the local energy transition**

***By Ms Sayuri Chetty, ICLEI Africa***

As part of the mandate mapping exercise, participants were asked to briefly describe the mandate of local government for each policy, as well as write down where financing for implementation comes from. During this exercise, the participants were divided into groups where they discussed



the existing policies, mandate of the local governments and how implementation of the policies are funded. Table 3 captures the responses for each policy discussed.

**Table 3. Summary of responses**

Name of policy	Mandate/role of the county in executing this policy	Where does financing for implementation come from?
National Electrification Strategy	<ul style="list-style-type: none"> <li>Rural electrification progress (REREC, high masts and streetlights)</li> <li>Coordination with national agencies (MoEP, REREC, EPRA, IPPs)</li> </ul>	Own source revenue (taxes), government agencies
Climate Change Act	<ul style="list-style-type: none"> <li>Domestication of the policy</li> </ul>	World Bank
Green Economy Strategy and Implementation Plan	<ul style="list-style-type: none"> <li>Sensitization of citizens</li> <li>Review of the plan</li> <li>Develop strategies, monitoring and evaluation</li> </ul>	UN agencies, international funders, NGO, private sector
Least Cost Power Development Plan	<ul style="list-style-type: none"> <li>Develop strategies for implementation</li> <li>County Energy Plan with defined projects and potential generation sources</li> <li>Designation of locations for energy plants and physical planning</li> </ul>	County resources, UN agencies, NGOs
Vision 2023	Develop implementation plan	UN agencies, NGOs, World Bank
National Energy Policy	<ul style="list-style-type: none"> <li>County Energy Plan Development</li> <li>Building codes</li> <li>Regulate citizens utilisation of charcoal, biomass in the county</li> </ul>	County collections/revenue, development partners, national government allowances
Energy regulations for electricity licensing	<ul style="list-style-type: none"> <li>Setting prices and procedures for PPPs for safety and standardisation can only be done by the national government because this cannot be delegated.</li> </ul>	National government, taxes



Name of policy	Mandate/role of the county in executing this policy	Where does financing for implementation come from?
Energy regulations for appliances' energy performance and labelling	<ul style="list-style-type: none"> <li>Regulations for appliances under IDRA</li> </ul>	Taxes
Energy Act	Specific functions outlined in the Act for counties: <ul style="list-style-type: none"> <li>Planning and development</li> <li>Gas reticulation</li> <li>Electricity reticulation</li> <li>Permits for trade</li> <li>Inspections</li> </ul>	Taxes
The Constitution of Kenya	Access, equity, resource sharing	Taxes
Energy gender policy	<ul style="list-style-type: none"> <li>Gender mainstreaming and developing strategies for gender equality</li> </ul>	Taxes
Bioenergy Strategy	<ul style="list-style-type: none"> <li>Sensitization of the public</li> <li>Regulation of bioenergy technologies</li> <li>Bioenergy policy development</li> </ul>	National government, own source revenue, local and international partners
Energy regulations for energy management	Preparing policy directions, reviewing existing policies, supervising projects and designing energy management projects	Donor funding, national treasury, own source revenues, taxes
Energy efficiency conservation strategy	<ul style="list-style-type: none"> <li>Mainstreaming energy efficiency</li> <li>Energy audits and recommendations</li> <li>Policies and regulations – domestication</li> </ul>	Own source revenues, taxes, partnerships, grants, national government

The discussion is captured below.

**Discussion: Which policies are missing? What mandate gaps at the local level do we have?**





- The County Government of Kisumu mentioned that they know their functions and mandates well, but raised a question about how to implement them. An exercise replaced the SWOT analysis session to tackle this. In addition, functions go with resources, and Counties cannot do much if they are not well resourced. Devolution started ten years ago (2012); however, there is limited capacity building at the county level to support the additional functions and mandates that came with devolution
  - Nakuru County mentioned that they are well capacitated, however Mombasa reported that they still have a lot to do.
  - Gas and electricity reticulation have been devolved 'cosmetically' as counties are not capacitated to undertake this. National government undertakes licensing for IPPs, development of mini-grids, and reticulation.
- Carbon credits:
  - It was reported that some work is already being undertaken with carbon credits in the country, for example, the County Government of Kisumu are exploring this, and KenGen geothermal projects have benefitted from the carbon credits already.
  - It was also noted that carbon trading is not regulated locally.
  - The time and amount of documentation needed is sometimes an issue.
  - Request for training on this topic and how clean cooking can support this.
- The participants were informed that the Rural Electrification and Renewable Energy Corporation (REREC) is currently in charge of the energy centres whereas the Energy Act says REREC shall support counties in developing energy centres and that the counties should have a direct control of them.
- Participants reported that projects in the clean cooking sector are hardly supported by the National and County Governments, but rather by the development partners, NGOs, etc. However, the County did respond that they are doing some work in clean cooking and that concepts are developed with partners for implementation, and the County is open to MoUs with partners for clean cooking initiatives.
- With regards to performance and efficiency testing for improved cooking stoves, the cost of the test is too expensive (50 000 KSH per test). Even testing of portable lighting lamps has been an issue. The Ministry of Energy and Petroleum has been working with the Kenya Association of Manufacturers to test these lamps. Technocrats in the room requested that the government needs to provide more support on research and development, proposed a need for incentives for individuals or companies delivering innovations for clean energy, e.g. tax relief, and to set up innovation hubs to demonstrate technologies. It was added that there is a clean cooking hub in Kakamega County.



- There was also a request for a policy to be developed for using renewable energy at prisons for lighting and clean cooking.

### 2.2.3. National vision and policy directives for a 100% RE, and implications for local government

**By Eng. George Nyongayo, Ministry of Energy & Petroleum**

Eng. Nyongayo informed the participants that energy is a key source of economic growth because many production and consumption activities involve energy as a basic input. Kenya’s Vision 2030, the government’s development blueprint which seeks to transform Kenya into a newly industrialising middle-income country providing a high quality of life to its citizens, recognizes energy as an enabler of the development projects required to realise the vision.



Kenya’s energy mix is strongly dominated by traditional biomass, which accounts for 68% of the country’s total energy consumption. The high traditional biomass consumption is mainly due to household use of wood fuel for cooking and heating. Petroleum accounts for 22%, electricity 9% and others 1%.

#### National Vision

Kenya’s successive climate change impacts over the past 10 years have resulted in socio-economic losses estimated at 3 – 5% of the Gross Domestic Product (GDP) annually, despite having negligible global greenhouse gas (GHG) emissions. Kenya has put up ambitious policies and measures to pursue a low emissions and climate resilient development pathway to realise Vision 2030. In the updated Nationally Determined Contributions (NDCs), Kenya has committed to abating GHG emissions by 32% by 2030 relative to the business as usual (BAU) scenario of 143 MtCO<sub>2</sub>eq, in line with the sustainable development agenda and national circumstances.

Priority mitigation activities include increasing renewables in the electricity generation mix of the national grid. Kenya has immense renewable energy potential that is yet to be fully utilised. These include hydropower sources, geothermal resources (estimated at 10 GW), wind and solar power potentials and biomass-based energy such as biogas, biodiesel and power generation from bagasse.



Africa and Kenya in particular, have the opportunity to lead the world in renewable energy transition due to the immense potential for renewable energy and reducing costs of renewable energy technologies. Transition to 100% renewable energy is envisaged to increase job creation, grow local economies and lead to sustainable industrialization.

## Policy Directives

**The Session Paper No. 4 on Energy of 2004** laid the policy framework upon which cost-effective, affordable and adequate quality energy services shall be made available to the domestic economy on a sustainable basis over the period 2004-2023. The paper sought to enhance the role of renewable energy in the country's energy mix. The government committed to design incentive packages to promote private sector investments in renewable energy and other off-grid generation technologies.

**The Kenya Constitution 2010** provides for the Government's obligation to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits.

**The Action Agenda** provides for the formation of the SE4All engagement framework, proposed to coordinate the smooth flow of information on matters of energy among the stakeholders at both national and county level. The key stakeholders in the engagement framework are national government, county government, and county SE4All technical committee, community (research institutions, civil society, financial institutions, and private sector and donor agencies).

### **Kenya National Energy Efficiency and Conservation strategy 2020; aims**

- To reduce the national energy intensity by 2.8% per year;
- To promote the use of technology that requires minimum energy to perform the same function

### **Bioenergy Strategy 2020; aims**

- To promote sustainable production and consumption of bioenergy;
- To accelerate the transition to clean cooking technologies and fuels;
- To provide requisite information to potential investors on relevant opportunities for bioenergy development in Kenya; and,
- To serve as an appropriate framework for regional and international cooperation and trade, specific to bioenergy and related feedstock

Counties have the mandate to:

- Promote sustainable production and consumption of bioenergy;



- Accelerate the transition to clean cooking technologies and fuels;
- Provide requisite information to potential investors on relevant opportunities for bioenergy development in Kenya; and,
- Serve as an appropriate framework for regional and international cooperation and trade, specific to bioenergy and related technologies.

**Feed-in Tariff Policy** adopted in 2008 and revised in 2010 and 2012, is an instrument for promoting generation of electricity from renewable energy sources. The feed-in-tariff allows power producers to sell renewable energy generated electricity to an off-taker at a predetermined tariff for a given period of time.

**The National Climate Change Action Plan (NCCAP) 2018-2022** requires the government to develop five-year National Climate Change Action Plans (NCCAP) to guide the mainstreaming of adaptation and mitigation actions into sector functions of the national and county governments. The NCCAP 2018-2022 aims to further Kenya's development goals by providing mechanisms and measures to achieve low carbon climate-resilient development in a manner that prioritises adaptation.

**County governments** have the mandate to implement the action plan in partnership with the Ministry of Environment and Forestry under the Directorate of Climate Change.

#### 2.2.4. Discussion on gaps and how we can move towards implementation (replaced the SWOT analysis)

*By Justus M. Munyoki*

The objectives of this session were to assess the implementation potential at the local level by:

- Identifying any gaps that may exist in mandates and functions in order to provide insights into strategic partnerships, and
- Understanding some of the internal and external factors that may include influence mandates and functions.

The summary of the discussion is captured below and in Table 3.

**Table 3. Summary of discussion**

Challenges, gaps and factors that influence mandates	Recommendations/Potential solutions
Corruption	Increased accountability and transparency required



Lack of political goodwill	Monetise decarbonisation
Lack of enforcement for implementation	
Access to finance	
Lack of reliable data to guide implementation, and a lack of monitoring and evaluation	
Devolving functions without resources	Training and capacity building for counties
Decision makers not involved in these capacity building and training activities	
Minimal synergy from departments - it is required if we want to mainstream RE	Creation of County Climate and renewable energy task teams with representatives from each department.
Most CEPs are copy-pasted and developed very quickly. We need to make these plans work.	Training and capacity building for counties
Limited uptake of new technologies such as clean cooking due to cultural norms	<ul style="list-style-type: none"> <li>Increased sensitization and getting people to understand GHG and CC impacts. Demonstration centres for innovative technologies, sensitization, social marketing, awareness creation, radio campaigns.</li> <li>KIRDI has open days every quarter for marketing of products and outreach. Good to partner with faith-based organisations for increased community involvement.</li> </ul>
Innovation is not rewarded. For example, there is a patenting issue with solar fridges, it takes too long. Those supporting actualisation are not getting support and the opportunity to work.	County awards for innovation and good practices in renewable energy.

### 2.2.5. The Kisumu County 100% RE Roadmap actions and implementation mechanisms

**By Ms Sayuri Chetty, ICLEI Africa**

The Roadmap charts the strategic direction for the County on their 100% renewable energy journey towards the agreed vision which is:



***“To achieve universal access to reliable and affordable 100% RE for sustainable development in Kisumu County by 2050”***

Ms Chetty mentioned the sources which contributed to the development of the roadmap as below;

- Initial Energy Status Report (baseline information)
- National Situational Analysis (baseline information)
- GIS mapping (RE potential)
- Modelling report (RE potential, 100% RE scenarios)
- Outcomes of Visioning workshop (vision, actions)
- Various County policies

Under the action pillars, Kisumu County has focused on the three areas for the Roadmap:

1. Electricity supply and access
2. Transport and
3. Clean cooking

During the presentation, Ms Chetty took the participants through the pillar objectives, SMART goals, intermediate goals, the indicators and the percentage share as proposed in the Roadmap. In summary, the actions for each of the action pillars that were presented are captured below.

### **Electricity supply and access**

- Adopt pay-as-you-go (PAYG) options for electricity generation (off-grid systems and embedded/captive generation for households, businesses and large facilities)
- Increase the uptake of efficient/solar lighting for street, highway and municipal own buildings
- Develop a PPP strategy for Waste-to-Energy Projects
- Adopt solarisation of water pumping systems



## Transport

- Promote one car-free day in a month
- Designate car-free areas in 5 streets
- Form and implement policies and regulations
- Improve of infrastructure to support NMT from 50 km to 200 km
- Increase installations of LED/ energy-saving street lights from 25 km to 100km
- Expand greening and ecological infrastructure

## Clean cooking

- Promote the use of cleaner cook stoves
- Adopt LPG and sensitise potential users on its benefits

It was also noted that the proposed Roadmap needs to be aligned with the Integrated Kisumu County Climate Change and Action Plan (KCCCAP) 2022-2027 on electricity access, transport and clean cooking targets.

### Questions & Discussion

Considering the Serious Games workshop that took place the previous day, participants were able to discuss further actions that may be needed to align with the vision and the modelled scenario to 100% renewable energy by 2050, as well as the specific actions needed to implement the ideal energy system for Kisumu County. Considering the policy dialogue, participants suggested policy implementation mechanisms needed and highlighted the missing policies that are necessary to achieve 100% RE.

Participants also discussed what might be missing from what already exists in the Roadmap and how the team can better align the actions to the KCCCAP, and which actions need to be strengthened. They also touched on other mechanisms that may be required for the transition to unfold for example, capacity building, political will, good governance, etc.

The following paragraph captures the discussions from the participants per pillar.

### Electricity supply

- With regards to energy efficiency improvement, the government has set a target of 3% increase per annum. A question was asked whether this refers to the supply or demand side.



- When we talk about energy access, is it specific to usage by end users or just making it available to the end user? There is a difference we need to be aware of.
- Energy access should be split to electricity and clean cooking.
- About 96% of Kenya has access to electricity, part from the grid and the rest from solar home systems.

### **Transport (and streetscapes)**

- Action to be added to promote e-mobility and recharging stations (e-motorcycles and tuk-tuks).
- The current state in the county is that there is often no provision for bicycle lanes, only walk paths. The current design of most roads does not support use of non-motorised transport (NMT). In addition, walk paths are often designed on top of drainage systems on the road, which needs to be improved.
- It is positive that most of the goals such as car-free days, NMT provision and electric boda-bodas have been adopted. However, vehicles sometimes partially block NMT pathways, thus there is a need for improved enforcement.
- There is a need to phase out old (and polluting) vehicles and mandate regulation of vehicles and checking road worthiness.
- Urban tree planting must be increased; however, we must be cognisant of persons with disabilities and how they navigate their surroundings should tree branches be in their way. It was also suggested that dumpsites/landfills could have increased tree planting.
- A survey was done to understand the factors for NMT usage which revealed usage is mostly driven by the cost. mostly relates to the cost. Therefore, as this is used quite often and it needs to be made safe for people.
- The County should work with technocrats to assess battery technologies to ensure they are of a good quality. Second-hand battery life should also be explored.
- Some of the roads in Kisumu County are not County roads (some are central government, Kenya highway). e.g. the road near the stadium at the county needs to be upgraded as a lot of accidents are currently happening there.

### **Clean cooking**

- Explore the use of bamboo as feedstock to make briquettes.
- Need to make the target presented from the roadmap more specific e.g., by including figures
- Include an action to train users of the stove technologies on proper usage.





## 2.2.6. Mapping of actions, implementation mechanisms, stakeholders & milestones

The participants were asked to draw a timeline on a piece of paper and map out the actions and milestones necessary to achieve the vision of Kisumu County. They were asked to capture the actions and stakeholders and note down any foreseeable risks/challenges they may face.

During the session, participants were able to deliberate on the actions, risks or challenges and stakeholders as plotted in table 3 below.





Timeline	Action	Milestones	Challenges	Role players
<p><b>Group 2</b></p> <p><b>2023-2030</b></p>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Enhance access to electricity through awareness creation</li> <li>Promote uptake of solar home systems in off-grid areas</li> </ul> <p><b>Clean cooking</b></p> <ul style="list-style-type: none"> <li>Promote the uptake of modern cooking services</li> <li>Retrofit biomass boilers in public institutions owned by the county with LPG, biogas, briquettes</li> <li>Awareness creation on the use of E-stoves</li> </ul> <p><b>Transport</b></p> <ul style="list-style-type: none"> <li>Promote Non-Motorized Transport by designing specific lanes</li> </ul>	<ul style="list-style-type: none"> <li>20,000 households connected to national grid</li> <li>10,000 household connected to Solar Home Systems</li> <li>50 hospitals retrofitted with LPG boilers</li> <li>100km of lanes</li> <li>50 community meetings for capacity building for county ward administration</li> </ul>		<ul style="list-style-type: none"> <li>Department of energy</li> <li>Department of finance</li> <li>Kenya Power Limited</li> <li>Development partners</li> <li>Department of transport</li> <li>NGOs</li> </ul>



Timeline	Action	Milestones	Challenges	Role players
	<ul style="list-style-type: none"> <li>Awareness creation on use on the use of NMT</li> </ul>			
<b>Group 3</b> <b>2023-2030</b>	<ul style="list-style-type: none"> <li>Development of energy centres</li> <li>Capacity building for the citizens on Renewable Energy</li> <li>Development of relevant policies</li> <li>Awareness creation of RE technology</li> <li>Development of energy biodata</li> <li>Monitoring and evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Construction of energy centres</li> <li>Capacity building</li> <li>Developed policies e.g. County Energy Plan, county energy policy</li> </ul>	<ul style="list-style-type: none"> <li>Insufficient RE data</li> <li>Inefficient capital to enhance the infrastructure development</li> </ul>	<ul style="list-style-type: none"> <li>Ministry of energy</li> <li>County governments</li> <li>General public</li> <li>Research institutes</li> <li>Multilateral banks</li> <li>NGOs</li> <li>CSOs</li> </ul>
<b>Group 4</b> <b>2023-2050</b>	<p><b>Clean Cooking</b></p> <ul style="list-style-type: none"> <li>Sensitization on the Res</li> <li>Stakeholders mapping</li> <li>Identification of technologies</li> <li>Training and capacity building</li> </ul>	<ul style="list-style-type: none"> <li>Efficiency in clean cooking</li> <li>Accessible clean cooking technologies</li> <li>Affordable clean cooking technologies</li> </ul>	<ul style="list-style-type: none"> <li>Inadequate resources</li> <li>Cultural barriers</li> <li>Attitude/age/income</li> <li>Lack of good will</li> <li>Lack of sustainability in some technologies</li> </ul>	



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Timeline	Action	Milestones	Challenges	Role players
	<ul style="list-style-type: none"> <li>Monitoring and evaluation</li> <li>Policing</li> </ul>			



### 2.2.7. Closing remarks

**By Mr. Brian Ondiek, County Government of Kisumu**

Mr Ondiek extended his thanks for the 100% RE initiative and for Kisumu County being the deep-dive county. He also stated the importance for the County to not remain at the policy level, but to move towards actualisation. He added that in the past 2 years, a lot of work has been done to increase remote access to electricity, solar lantern distribution and clean cooking.

## 2.3. Day 3: Clean cooking training

### 2.3.1. Welcome and objectives of the workshop

**By Ms Carine Buma, ICLEI Africa**

Day 3 was facilitated by Ms Carine Buma who welcomed the participants and presented a recap of days 1 and 2 of the workshop. The objectives of day 3 were then introduced, which were to enable participants gain a better understanding of the following:

- The status quo & trends in the cooking sector and impacts of cooking with inefficient/traditional biomass technologies;
- Definition of clean cooking and its relation to modern energy cooking services;
- The Multi-Tier Framework (MTF) for cooking and its application (through scenario exercises);
- Factors affecting uptake of clean cooking technologies.

### 2.3.2. Opening remarks

**Mr Salmon Orimba, CECM, Infrastructure, Energy and Public Works, County Government of Kisumu.**

Mr Orimba welcomed participants to the County Government Department of Infrastructure, Energy and Public Works and stated that he was happy to host participants for the third day of the workshop focusing on clean cooking. He mentioned that there are biogas pilot projects at three schools in Kisumu. The County also has access to baseline data on clean cooking which supports scientific decision making. He emphasised the need to increase access to clean cooking in the County, with a special focus on informal settlements and rural citizens, as this will not only ensure the reduction of carbon emissions, but ensure access to safe and affordable methods of cooking.



**Additional remarks**

**Mr John Awiti, County Government of Kisumu**

Mr Awiti, County Executive Member for Education, Technical Training, Innovation and Social Services also joined the project for the last day of the workshop and provided some opening remarks. He emphasised that young minds should be the target for the best impact when it comes to clean cooking, especially children in schools.

Mr Awiti informed participants that there are 248 schools in Kisumu, and the day-schools have a feeding scheme. "The cooks don't sleep, as they are constantly busy because they use firewood

to cook. Schools are a good target because children are change agents." He added that further impact can be created by including clean cooking in curriculums. Ms Buma also added the example of the Ghana Clean Cooking Association where they used schools as a forum to talk to parents and children together about the benefits of clean cooking. She also suggested having feeding programmes that include clean cooking demonstrations, or including clean cooking in mathematics





exercises for example would be beneficial. Mr Awiti concluded by saying that as much as workshops take place in boardrooms, the work should be taken to the grassroots level.

### 2.3.4. Status quo in the cooking sector in SSA, Kenya and Kisumu

#### **Mr Nickson Bukachi, EPRA**



Mr Bukachi, Senior Renewable Energy Specialist from the Energy and Petroleum Regulatory Authority (EPRA) provided a presentation on the status quo of the cooking sector in Kenya in order to set the scene for the day. He started with looking at Sub-Saharan Africa, Kenya and then zoomed into Kisumu County.

2.4 billion people globally, and 1 billion people in sub Saharan Africa rely on biomass, kerosene and coal for cooking. The World Health Organization (WHO) estimates that over 3.8 million premature deaths occur globally because of the air pollution associated with traditional cooking fuels and methods. In line with SDG 7, Kenya has an ambitious target of achieving universal access to modern cooking solutions by 2028, which include LPG, electricity, biogas, bioethanol and improved solid fuel

cookstoves. Mr Bukachi quoted that “if we want this transition to happen faster, we need to push more men into the kitchen”. A study recently conducted in Kenya shows that more men are ready to cook if they cook with modern forms of cooking. Kenya undertook a [household cooking study](#) in 2019 which showed that 64.7% of households in Kenya still use firewood as their primary source of cooking fuel, followed by LPG at 19% and charcoal at 10%.

Mr Bukachi also mentioned that while access to electricity is high, people do not use electricity for cooking. Only 3% of households own an electric cooking appliance, acquired through upfront cash payment, which demonstrates the high cost and limited access to financial services. Other barriers include limited or non-existent distribution channels, lack of awareness and inappropriate technological designs.

He concluded by stating that national, county government and development partners have a key role in enhancing access to modern energy cooking service. Public education, funding, legislation and fiscal incentives (Results Based Financing (RBF)Fs, tax holidays, exemptions, etc.) may be required to promote the uptake. The market is currently unregulated and dominated by the





private sector. County governments have a role to play with the regulation and licensing of biomass production, transport and distribution; the regulation and licensing of biogas systems; the regulation and licensing of charcoal production, transportation and distribution; as well as the establishment of energy centres for promotion of renewable energy technologies, energy efficiency and conservation.

### 2.3.5. Negative impacts of traditional cooking and the cost of inaction

Cooking is a vital activity for all, yet there is little thought given to the challenges faced by many households carrying out this fundamental activity. The main sectors affected by traditional cooking methods include health, gender, climate and the environment.

#### Health impacts of traditional cooking methods

##### *Mr George Juma, County Government of Kisumu, Health Department*



Mr Juma explained that traditional cooking in open or partially closed stoves with biomass fuels and using kerosene lamps contributes to household air pollution (HAP), which negatively affects its occupants. He added that up to 90% of our time is indoors, especially for newborns, the elderly, disabled people, sick people, pregnant and breast-feeding mothers. Inhalation of smoke goes into the lungs which feeds into the rest of the body through the blood vessels. and once blood supply is affected, all organs are affected. It therefore has toxicity effects

on every part of the body, and causes immediate and long-term damage. Smoke narrows the arteries and can compromise brain function while poor supply of oxygen can lead to strokes.

He added that lengthy exposure to heat is also not good for the human body even though warm air is good, hot air is dangerous. One of the traditional ways to avoid malaria is to burn fires which also has other health impacts as well. He also indicated that epilepsy is an example of another health condition that can be triggered by smoke.

He further emphasised that about 2.4 billion people worldwide cook with inefficient cooking methods, and air pollution is recognised as a silent killer. In 2020 alone, it was reported that HAP



was responsible for 3,2 million deaths and a significant amount of those were children under the age of five. Women and children are disproportionately affected because they are typically responsible for household chores such as cooking and collecting firewood. Mr Juma mentioned that the number one health condition that children under five experience in Kisumu County is upper respiratory tract infections, which can be attributed to traditional cooking. This is also the third most common disease in children over five in Kisumu County.

In summary, Mr Juma reported that HAP is a major problem especially in LMICs (Low- or middle-income countries), and is at heart, a development issue, closely linked to poverty, health and gender. Progress towards reduction of the health impacts of HAP has been made, albeit slowly. Efforts to increase access to clean and sustainable energy especially among the poor and vulnerable populations need to be urgently accelerated. Mr Kennedy from Nakuru County added that though health takes the largest budget, a lot of it is spent on treatment, rather than prevention of illnesses. Raising public awareness and providing information to the public about the fuel sources' nature and level of risks of traditional cooking methods and its disadvantages in comparison with the use of renewable energy sources will be of great benefit to their health.

He concluded by indicating the need to use a multi-sectoral approach to address clean cooking issues, as it is deeply ingrained in cultural norms and practises e.g. married women must prove they can cook with firewood. Lastly, he provided a mnemonic to summarise the impacts of traditional clean cooking, "POINTS" where:

**P – pain control**  
**O – oxygen supply**  
**I – infection prevention**  
**N- nutritional aspects**  
**T - temperature**  
**S – safe environment**

## Discussion

- Employment is prioritised more than safety and the environment. For example, a factory in Kisumu that deals with scrap metal is an emitter. Issue of zoning is important.
- A standard/policy is required for ventilation in households – either vents on the floor and an extractor in chimneys, so the air is cleaned before it is released. Kitchens could be modified to make them safer.
- There should be fixed carbon tests for briquettes, as there have been cases where people have died from carbon monoxide poisoning from burning this in spaces with poor ventilation.



- Users value taste more than the impacts of traditional cooking fuels on health. Traditional vegetables and legumes take a long time to cook. Residents need to introduce other vegetables into their diets such as cowpeas, broccoli and cabbage which are all good for nutrition. "Githeri" is one of the most common meals. There is a need to change mindsets for food production and diets.
- The private sector is supporting with driving the transition, but how can Kisumu encourage innovation and research and development?
- Dependent relationship between stoves and fuels, and house structure and ventilation.
- Make use of the fresh vegetable markets for social marketing.

### **Gender inequality**

Ms Buma explained that women, especially in the developing world are disproportionately affected by the adverse impacts of traditional biomass cooking as they are often tasked with most of the household cooking responsibility. Time poverty, health and safety and missed opportunities are some of the main challenges they face. Due to the significant amount of time that women and girls spend collecting fuel and cooking over polluting stoves, this reduces the time they have for other activities, including education, leisure and income generation. Women's aggregate time loss across fuel collection, cooking with traditional biomass cookstoves, and related fuel-preparation and food-processing activities translates into 2–8 hours of effort per day or about 5 hours a day on average.

She added that women and girls are also particularly vulnerable to the health impacts of indoor HAP, and are more exposed to the risk of respiratory diseases, burns, eye irritation, etc. as they spend a significant amount of time cooking and caring for family members. They also have a heightened risk of injury and physical and sexual violence while collecting wood. Young children, who tend to stay close to their mothers indoors, also suffer a disproportionate share of the negative health risks. The lack of access to clean cooking fuels and technologies can limit women's economic opportunities and increase their poverty. Many children, especially girls, in households without access to clean cooking are often taken out of school to help collect fuel and support other cooking-related activities.

### **Climate and the environment**

Traditional cooking methods are often inefficient and waste energy, leading to higher levels of emissions and decreased energy security for communities. Large scale consumption of wood & charcoal produces GHG emissions including carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), contributing to global warming and climate change. Globally, emissions from non-renewable wood fuel consumption amount to 1.9 - 2.3% of global CO<sub>2</sub> emissions.



Black carbon (BC), and other particles of incomplete combustion from cooking with non-clean fuels, play a more significant role than CO<sub>2</sub> in anthropogenic global warming. The burning of residential solid fuels accounts for up to 58% of global BC emissions. Reducing BC emissions could act as a near-term lever to address global warming and the health benefits of their removal from household environments. The pollutants and emissions from use of traditional wood and charcoal for cooking contributes to global warming, and hence climate change, which then causes water and heat stress, drought, flooding, unpredictable rainfall patterns, reduced agricultural production, etc.

Effects on the environment come in mainly two forms i.e. deforestation and forest degradation. Increased demand for firewood for cooking contributes to deforestation, which not only exacerbates climate change but also affects the livelihoods of local communities and the ecosystems they depend on.

Continued extraction of wood from the forest leaves once closed forest systems turned into shrub lands. In Africa, wood collection and the charcoal supply chain are the principal drivers of regional forest degradation, jointly accounting for 48%. Inefficient cookstoves produce toxic smoke (pollutants) that pollute the air and are harmful to both the environment and human health.

Incomplete combustion produces gases that contribute to global warming and there remains less trees to absorb the toxic substance that pollute the air.

Biodiversity loss is an attendant result of removal of wood species for use as fuel. There is a reduction in the variety of wood species composition in the forest cover. The habitat of fauna (animals) is eventually disturbed and leads to loss or extinction of particular animals. Biodiversity loss further denudes the land cover through exposure to the wind, sun and fire and affects agriculture.

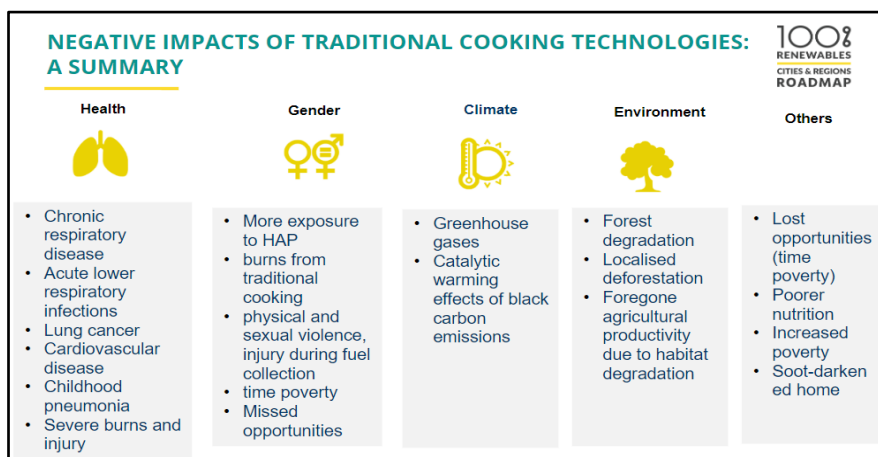


Figure 3. Summary of the health impacts of traditional cooking methods



The cost of inaction is enormous. Driven by negative externalities for health, gender and climate, the cost comes to US\$2.4 trillion per year. The health-impact portion results from quantifying the deaths and disability-adjusted life years (DALYs) linked to household air pollution (HAP) produced by stoves and fuels. The gender cost assumes that women may spend up to six hours per day performing cooking-related tasks. The climate-impact cost is driven by the dollar value of carbon prices and the social cost of carbon.

### 2.3.6. Understanding clean and modern energy cooking services (MECS) and the Multi-Tier Framework

*By Ms Carine Buma, ICLEI Africa*



Over the past decade, much attention has focused on expanding access to “clean” cooking solutions, defined by the technical attributes of combustion and heat-transfer efficiency and emissions. When it comes to definitions of clean cooking, the Energy Progress Report for tracking SDG 7 defines clean fuels and technologies as “electricity, LPG, natural gas, biogas, solar, and alcohol fuels”, however clean fuels can also be defined as fuels that do not cause household air pollution (HAP)

in homes. The Regulatory Indicators for Sustainable Energy (RISE) policy report defines clean cooking solutions as “the combination of stove technologies and fuels that have higher efficiency and/or produce lower particulate and carbon emissions levels than the current baseline in a given country”. Processed biomass (e.g., wood pellets) has shown promise as a clean fuel when burned in a highly efficient stove, under correct user operation, and with a sufficiently low pellet moisture content. Unlike the definition in the Tracking SDG 7 report, the RISE report definition also considers improvements in efficiency for cooking solutions that use solid fuels.

Historically, clean cooking has been defined by the technical attributes from the point of view of the environment (exposure) and efficiency of the stoves and from a binary approach of having access or not having access, solid or non-solid, clean or dirty. To date, the SDG 7.1.2 indicator - access to clean fuels and technologies for cooking - has been measured using a proxy of whether households cook primarily with “clean” fuels. The International Standards Organisation (ISO), goes beyond the efficiency and emissions attributes of the WHO’s guidelines focus on indoor air quality, providing guidelines for cookstove safety and durability.



The binary approach does not: cater for the context of the environment where cooking is taking place; accommodate progression to better technologies; enhance identifying where the most challenge is. It presumes that all non-solid fuels are clean and efficient and that all solid fuels are harmful. It also overlooks aspects of the context of the household. Cooking is not a binary activity, even at the household level. An important challenge in measuring access to cooking solutions is the phenomenon of “fuel stacking”. Emphasis on binary definitions has sometimes overlooked effective and sustainable, improved cooking solutions that fit local contexts.

The World Bank’s ESMAP program, in collaboration with Loughborough University (and multiple development partners), have developed and applied a comprehensive way of measuring progress toward access to modern cooking energy. Its broadened, contextual definition of access, termed Modern Energy Cooking Services (MECS), draws on the approach of the World Bank’s Multi-Tier Framework (MTF) for cooking. The MTF approach goes beyond the traditional binary measurement of energy access (using or not using clean fuels in cooking).

A multidimensional, tiered approach to measuring household access to cooking solutions across six technical and contextual attributes with detailed indicators, and six thresholds of access, ranging from Tier 0 (no access) to Tier 5 (full access).

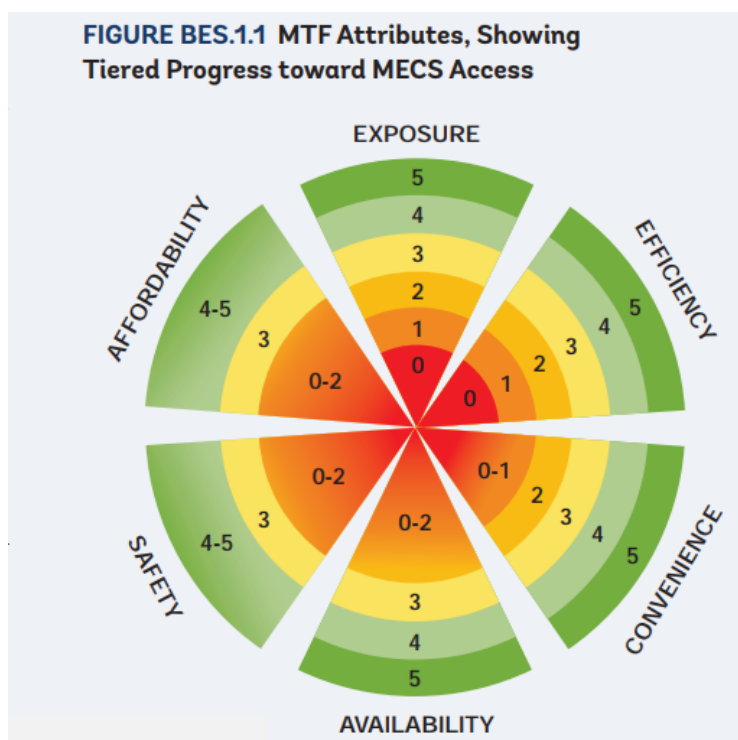


Figure 4. The multi-tier framework and its attributes for assessing access to clean cooking



Ms Buma explained that it provides a comprehensive and standardised way of categorising and measuring access to energy across different populations and geographic regions. It further enables policymakers, researchers, and other stakeholders to compare and track progress towards universal energy access goals more accurately, as well as supports understanding contextual household level impacts.

<b>Exposure</b>	<b>Exposure refers to personal exposure to pollutants, which depends on stove emissions and ventilation</b>
<b>Fuel Efficiency</b>	<b>Fuel efficiency refers to product of combustion efficiency and heat transfer efficiency</b>
<b>Safety</b>	<b>Safety refers to severity of injuries caused by the fuel</b>
<b>Convenience</b>	<b>Convenience refers to time spent in collecting or purchasing fuel and preparing the stove</b>
<b>Affordability</b>	<b>Affordability refers to share of household budget spent on the fuel</b>
<b>Availability</b>	<b>Availability refers to readiness of the fuel when needed by the user</b>

Figure 5. Descriptions of each attribute of the multi-tier framework

### 2.3.7. Group Activity 1: Understanding the different attributes of the multi-tier framework

Participants were given the Multitier Framework (MTF) attributes and corresponding meanings on separate cards. They worked in groups to match the attributes with their corresponding definitions.

### 2.3.8. Group activity 2: Scenario exercise on modern energy cooking attributes and tiers

Based on the scenario provided, referred to as "Abuya's story", participants were asked to evaluate whether she had access to clean cooking using the 6 dimensions of the MTF. Participants worked in groups, and presented their answers.

In summary, Ms Buma explained that Abuya's household has access to improved cooking services because her household cooking scenario meets at least tier 2 across all six attributes, but not tier 4 across all six attributes. If she had met at least tier 4 across all six attributes, her household would have been considered to have access to modern energy cooking services.



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### 2.3.9. Demonstration of clean cooking technologies

The private sector was invited to demonstrate some of the clean cooking technologies they are working on. Four technology solutions were showcased i.e. biogas, electric pressure cookers, ethanol stoves and improved cook stoves.

#### **Biogas, Mr Dominic Wanjihia and Mr Enock Okiri, [Flexi biogas](#)**

Mr Wanjihia enlightened participants on the waste volume requirements and sorting process needed to produce biogas from organic waste from the Ngong town market in Kenya. 3.5 tonnes of waste per day from the market is processed by recyclers once this volume is reached. He explained that the key to waste management is waste separation. Some waste types are difficult to process (such as banana waste) - this is difficult for the digester to process so it is used for composting. Clothes are also a big problem.

There is a drip incinerator prototype on-site where ash is a by-product, which can be used to make bricks. The heat is also recovered which can have many applications.





### ***Electric pressure cookers, Mr Danson Ligare***

Mr Danson Ligare demonstrated the use of electric pressure cookers to participants at the mini-exhibition. This included showcasing the pot that was customised with typical Kenya foods and their cooking times. He emphasised the quicker cooking times with the use of electric cookers and cooked some corn for the participants to taste.





### Ethanol gas, Koko Networks



Representatives of Koko Networks marketed their clean cooking stoves and demonstrated the use of ethanol for use with the stove. Participants had the opportunity to ask questions about the technology, and see how quickly eggs could be boiled using the stove.

### Improved cookstoves, Mr Nicholas Agoro



Mr Nicholas Agoro presented his innovation - the single-burner improved "Jiko" cookstoves and demonstrated its use. These stoves are locally fabricated and use pellets, amongst other fuels to power the stove.



### 2.3.10. Closing remarks

**By Mr Collins Otieno**

Mr Otieno from the Department of Infrastructure, Energy and Public Works of the County Government of Kisumu thanked all participants for attending the 3-day workshop, and gave special thanks to the CECMs - Mr Salmon Orimba and Mr John Awiti, the Ministry of Energy and Petroleum, County Government of Mombasa, County Government of Nakuru, representatives from other departments at Kisumu County, members of the private sector and ICLEI Africa.



### 3. Annexures

#### Annex 3.1: Agenda

**DAY ONE: 9 May 2023, The Sustainable Energy Transition Strategy Game**

**Facilitated by:** ICLEI Africa (Sayuri Chetty)

**Venue:** Grand Royal Swiss Hotel

Time	Item	Facilitator
08:30 - 09:00	Arrival and Registration	All, ICLEI Africa
09:00 - 09:30	Welcome and objectives of the workshop	ICLEI Africa
09:30 – 09:45	Opening remarks by the County Government of Kisumu	Salmon Orimba, CECM, CGK
09:45 – 10:15	Setting the scene and rules of engagement	ICLEI Africa
10:15 – 10:45	Serious games Round 1: Introduction of roles	ICLEI Africa



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<b>10:45 – 11:00</b>	<b>Tea break</b>	
11:00 – 11:30	Serious games Round 2: Examining the Kisumu County location map	Facilitated by ICLEI Africa
11:30 – 12:45	Serious games Round 3.1: Building your ideal energy system (individual attempt)	All
<b>12:45 -13:45</b>	<b>Lunch break</b>	
13:45 -15:30	Serious games Round 3.2: Building the ideal energy system for Kisumu County (joint, facilitated discussion)	Facilitated by ICLEI Africa
<b>15:30 -15:45</b>	<b>Tea break</b>	
15:45 -16:15	Reflections	ICLEI Africa, All
16:15 -16:30	Closing	All

**DAY TWO: 10 May 2023 Implementation mechanisms for 100% RE at Kisumu County (Policy dialogue and roadmap actions)**

**Facilitated by:** ICLEI AS (Sayuri Chetty)

**Venue:** Grand Royal Swiss Hotel



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Time	Item	Facilitator
08:30 – 09:00	Arrival and registration	ICLEI Africa
09:00 - 09:15	Welcome and objectives of day 2	ICLEI Africa
09:15 – 10:00	National vision and policy directives for a 100% RE transition and implications for local government	Mr George Nyongayo, MoEP
10:00 – 10:15	Q&A and Discussion: Mandates and gaps	ICLEI Africa, All
10:15 -10:45	Group exercise 1: SWOT analysis	ICLEI Africa, All
<b>10:45 - 11:00</b>	<b>Tea break</b>	
11:00 - 12:00	Group exercise 2: Design Kisumu County's Time's magazine cover	All
12:00 -12:45	Plenary: Present covers	All
<b>12:45-13:45</b>	<b>Lunch break</b>	



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13:45 – 14:15	Presentation of the 100% RE roadmap actions and implementations mechanisms	ICLE Africa
14:15 – 15:15	Group discussion session 3: Mapping of actions, implementation mechanisms, stakeholders and milestones	All
<b>15:15 -15:30</b>	<b>Tea break</b>	
15:30 – 16:15	Plenary	All
16:15-16:30	Wrap - up and closing	ICLEI Africa; Mr Brian Ondiek, CGK

**DAY THREE: 11 May 2023, Capacity building workshop on clean cooking/Clean cooking learning lab**

**Facilitated by:** ICLEI AS (Carine Buma)

**Venue:** Kisumu County Government Offices, Department of Infrastructure, Energy and Public Works boardroom

Time	Item	Facilitator
09:00 – 09:20	Welcome & introductions	Ms Carine Buma



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09:20 – 09:30	Opening remarks	Mr Salmon Orimba, CECM, CGK
<b>SESSION 1: SETTING THE SCENE</b>		
09:30 – 09:50	Status quo in the cooking sector in SSA, Kenya and Kisumu	Ministry of Energy
09:50 – 10:30	Negative impacts of traditional cooking & the cost of inaction	Ms Carine Buma & Health personnel
10:30 – 10:40	Activity 1: What are some of your lived experiences?	Ms Carine Buma (ICLEI Africa)
<b>10:40– 10:50</b>	<b>Tea Break</b>	
<b>SESSION 2: WHAT IS CLEAN COOKING?</b>		
10:50 – 11:10	Understanding clean and modern energy cooking services (MECS) and the Multi-Tier Framework	Ms Carine Buma





11:10 – 11:30	Activity 2: Scenario exercise on modern energy cooking attributes and tiers	Ms Carine Buma
11:30 – 12:00	Demonstration of clean cooking technologies	Clean cooking companies (TBC)
<b>12:00 – 13:00</b>	<b>Lunch</b>	
<b>SESSION 3: FACTORS AFFECTING UPTAKE OF CLEAN COOKING AND THE ROLE OF LOCAL GOVERNMENT</b>		
13:00 – 13:30	Factors affecting the uptake of clean cooking technologies	Ms Sayuri Chetty, Mr Justus Munyoki
13:30 – 14:00	Activity 3: Role of Local government in driving the clean cooking transition	Ms Sayuri Chetty, Mr Justus Munyoki
14:00 – 14:15	Wrap-up and closure	Ms Carine Buma
14:15 – 14:30	Closing remarks	Mr Collins Otieno, CKG



### Annex 3.2: Participants List

NAME	DESIGNATION	ORGANISATION
George Nyongayo	Renewable Energy Officer	National Ministry of Energy and Petroleum
Kerich Daniel	Senior Researcher	KIRDI
Salmon Orimba	County Executive Member	County Government of Kisumu
John Awiti	County Executive Member	County Government of Kisumu
Brian Ondiek	Chief Officer Energy and Industrialisation	County Government of Kisumu
Collins Otieno	Director	County Government of Kisumu
Mathews Onyango	Deputy Director	County Government of Kisumu
Felix Akello	Energy Planning Officer	County Government of Kisumu
Adah Omedi	Acting Director: Gender	County Government of Kisumu
Sarah Oguya	Energy Operations	County Government of Kisumu
Kennedy Mungai	Chief Officer Energy	County Government of Nakuru
Victor Odenda	Renewable Energy Officer	County Government of Mombasa



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NAME	DESIGNATION	ORGANISATION
Justus Munyoki	Expert: Environmental Management, Renewable Energy, Climate Change and Community Development	Independent Consultant
Mike Joseph	Project Officer	SusWatch
Erick Ochieng	Regional Manager	KAM
Emily Lubwa	Admin Officer	Tamuwa Limited
Dominic Wanjihia	CEO	Biogas International Ltd
Enock Okiri	Plant Supervisor	Biogas International Ltd
Charles Ayoma	Innovator	Greentrack Energy
Mark Omondi	Energy Developer	Uhai Lake Forum
Concepta Ojwang	Founder	KEYO Technovation Limited
Nicholas Agoro	Principal Trainer	KEYO Technovation Limited
Danson Ligare	Clean cooking expert/Director	EPSP Ltd
Damaris Nekesa	Assistant	EPSP Ltd
John W. Juma	Communications officer	County Government of Kisumu



NAME	DESIGNATION	ORGANISATION
David	Photographer	County Government of Kisumu
George Juma	SCPHO, Kisumu Central	County Government of Kisumu, Health
Mercy Opondo	SCLPO	County Government of Kisumu, Agriculture
Nickson Bukachi	Senior Renewable Energy Officer	Energy and Petroleum Regulatory Authority
Daniel Onudi	REO	County Government of Kisumu
James Moya		County Government of Kisumu
Job Wansala		County Government of Kisumu, Road Engineering and Public Works
Alex Odhiambo		County Government of Kisumu
Abraham Koching		County Government of Kisumu
Gica Okeich		County Government of Kisumu
Beatrice Okello	Adaptation and Mitigation	County Government of Kisumu, Climate Change Directorate
James Nyagol	Monitoring, Evaluation, and Safeguards	County Government of Kisumu, Climate Change Directorate



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NAME	DESIGNATION	ORGANISATION
Otieno Evance	Demonstration assistant	Kisumu National Polytech
Akinyi Ouma	Demonstration assistant	Kisumu National Polytech
Orwa Oluoch	Demonstration assistant	Kisumu National Polytech
Yvonne Okeyo	Agent relationship manager	Koko Networks
Wanakacha Reinhard	Regulatory and Public policy manager	Koko Networks
Justus Munyoki	Environmental Management Expert	Sus Watch
Carine Buma	Senior Specialist: Climate Change, Energy & Resilience	ICLEI Africa
Sayuri Chetty	Senior Professional Officer: Climate Change, Energy & Resilience	ICLEI Africa