REPUBLIC OF KENYA

NGEC
National Gender and Equality Commission

THE NATIONAL GENDER AND EQUALITY COMMISSION

MAINSTREAMING EQUALITY AND INCLUSION IN GREEN ENERGY (MEIGE) - AN ASSESSMENT ON THE UPTAKE OF GREEN ENERGY BY SPECIAL INTEREST GROUP (SIGS) IN KENYA

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Kenya VISION 2030

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KENYA VISION 2030

TOWARDS A GLOBALLY COMPETITIVE AND PROSPEROUS NATION

NGEC National Gender and Equality Commission

REPUBLIC OF KENYA

VISION

An inclusive society free from gender inequality and all forms of discrimination

MISSION

To promote and protect gender equality and freedom from all forms of discrimination in Kenya, especially for Special Interest Groups through ensuring compliance with policies, laws and practice

CORE VALUES

- Dignity
- Equality
- Teamwork
- Integrity
- Inclusivity

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FOREWORD

As the world transitions towards a greener future, this shift must not only be environmentally sustainable but also socially just. Mainstreaming Equality and Inclusion in Green Energy , (MEIGE) in Kenya is an assessment conducted by the National Gender and Equality Commission (NGEC) in accordance with the Commission's mandate of coordinating and facilitating the mainstreaming of issues of gender, persons with disabilities, and other marginalized groups in national development, as well as advising the government on all related matters.

The MEIGE assessment focuses on the uptake of green energy solutions among Special Interest Groups (SIGs), including the elderly, women, youth, people with disabilities, and marginalized communities. These groups face unique challenges in accessing resources and opportunities, making them particularly vulnerable to the negative impacts of energy poverty.

The adoption of green energy solutions can offer significant benefits to SIGs. Green energy can empower these groups and enhance their quality of life by reducing energy costs, improving health through cleaner cooking solutions, and creating economic opportunities.

The report emphasizes the importance of integrating equality and inclusion in green energy technologies. By doing so, we can ensure that the benefits of clean energy reach all segments of society, particularly those who are often marginalized.

I am confident that this report will serve as a valuable resource for policymakers, development partners, and civil society organizations in closing the gaps on adoption and use of household clean solutions among SIGs. Most important is for all actors to ensure that such solutions are affordable, easy-to-use, easy-to repair, and generally efficient for use by SIGs.

HON. REHEMA DIDA JALDESA

CHAIRPERSON

ACKNOWLEDGMENT

I would like to express sincere gratitude to the Chairperson and Commissioners of NGEC for overseeing the research project from conceptualization to the implementation of the project.

I would also like to thank all the NGEC staff especially the technical committee comprising of Winfred Mutindi, Tabitha Nyambura, Carolyn Munyua, the late Fredrick Lumiti, Dr. Anyango Ochieng', Josephine Kagucia, Goretty Osur, George Kimani, Beatrice Owino, Daniel Waitere, Beatrice Cheruiyot, George Wanyonyi, Joseph Mulei, John Munene, Desire Njamwea, Math ew Musau and John Nzioka who spearheaded the entire research process under the leadership of the Director of Programmes and Research Paul Kuria, OGW.

We extend heartfelt appreciation to all respondents who participated in this study from the eight counties, households, businesses, and institutions from private and government agencies. Their contributions were integral to the success of this research. Thank you for being an essential part of this endeavour.

I also extend my appreciation to Mary Mbenge and Brian Obiero from the Kenya School of Government for their technical support offered in the data analysis and report writing. This research would not have been complete without the support offered by the Ministry of Energy through Eng. Stephen Nzioka, the Ministry of Environment, Climate Change and Forestry, through Michael Okumu of the Climate Change Directorate for their technical support in the research project. Additionally, the Commission appreciates the various organizations whose input contributed to this report and are listed at the end of the report.

Finally, I would like to appreciate the Government of Kenya through the National Treasury and Economic Planning for providing the financial resources for conducting this research.

PURITY NGINA, PhD, MBS,

COMMISSION SECRETARY / CHIEF EXECUTIVE OFFICER

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ACRONYMS AND ABBREVIATIONS

ASALS	Arid and Semi-Arid Lands
EDE	Ending Drought Emergencies
ECOSOC	Economic and Social Cultural Rights
EMCA	Environment Management and Coordination Act
EMS	Environment Management System
COP	Conference of Parties
ERC	Energy Regulatory Commission
ESIA	Environmental Social Impact Assessment
GHC	Green House Gas
Gok	Government of Kenya
IEC	Information Education and Communication materials
IRENA	International Renewable Energy Agency
KSG	Kenya School of Government
LPG	Liquefied Petroleum Gas
MDG	Millennium Development Goals
NCCAP	National Climate Change Action Plan
NGEC	National Gender and Equality Commission
NEMA	National Environment Management Authority
PWD	Persons with Disability
SDG	Sustainable Development Goals
SIGs	Special Interest Groups
SSA	Sub-Saharan Africa
UN	United Nations
UNFCCC	United Nation Framework Convention Climate Change
WHO	World Health Organization

DEFINITION OF TERMS

Renewable Energy: This is energy derived from sources that are continuous or naturally replenished making them sustainable over the long term such as solar power, wind power, and hydropower.

Non-renewable Energy: Energy derived from finite resources that cannot be replenished and will eventually be depleted, with time once these resources are consumed such as fossil fuels e.g. coal, oil, and natural gas.

Clean Energy: Energy derived from sources that produce no emissions and have a low environmental impact compared to conventional sources, particularly in terms of air and water pollution such as natural gas with carbon capture and storage, and nuclear energy.

Environmental and Social Impact Assessment (ESIA): This is a process used to identify and evaluate the potential environmental and social impacts of a proposed project or development. ESIA is often required by regulatory authorities such as NEMA before a project can proceed, and it involves a comprehensive analysis of how the project may affect the surrounding environment and communities.

Green energy initiatives: These are projects generated from renewable and natural resources, such as sunlight, wind, or water.

Greenhouse gases: These are gases in the atmosphere that contribute to the greenhouse effect by absorbing infrared radiation thereby raising the surface temperature of the planet.

Fossil fuels: A non-renewable energy source formed in the Earth's crust from decayed organic material or biomass such as petroleum, coal, and natural gas.

Biomass: In ecological terms, biomass refers to the various types of living organisms in a particular environment or ecosystem. It is the sum mass of living organisms such as plants, animals, in a specific unit of area or volume of habitat.

Geothermal Energy: Geothermal energy is a renewable energy source in which heat energy is emitted from within Earth's core and is captured and harnessed for heating, cooling, and generating electricity.

Climate change: Climate change refers to long-term shifts in temperatures and weather patterns naturally or through human-induced activities primarily due to the burning of fossil fuels (like coal, oil, and gas), which produces heat-trapping Greenhouse gases.

Climate mitigation: Climate change mitigation is the actions that limit climate change persistence. These actions either prevents, reduces emissions of greenhouse gases, or removes those gases from the atmosphere.

Climate adaptation: These are individual decision such as individuals using less water, and farmers planting crops that are drought resistant.

EXECUTIVE SUMMARY

BACKGROUND

There is an inextricable link between energy production, consumption, and climate change. Energy is the single most dominant accelerator of climate change, contributing to more than 75 percent of the total global greenhouse emissions.[2] Kenya is committed to 'ensuring access to affordable, reliable, sustainable, and modern energy for all by 2030, as envisioned in the Sustainable Development Goal (SDG) 7. Target 7.2 of the goal puts obligations on Kenya to increase substantially the share of renewable energy in the country's energy mix and at the same time, facilitate access to clean energy.

With human action and or inaction exacerbating climate change and its variability, a shift from fossil fuels consumption to a green and or clean energy mix has been a policy issue all over the globe. The ravaging impacts of climate change may also jeopardize economies' quest to realize up to 15 of the 17 UN 2030 Agenda for Sustainable Development. SDGs; (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reduced inequalities, and (13) climate action are highly likely to be derailed by the negative effects of climate change. The world's poorest and most vulnerable in developing countries are the ones bearing the greatest brunt of the unprecedented negative impacts of climate change.[3]

Every year, an estimated 6.7 million people die due to exposure to ambient and household air pollution.[4]. Unconstrained access to green energy especially at the household level is closely tied to better health, education, and economic prosperity, which is an indispensable multiplier to realize every Sustainable Development Goals (SDGs) including SDG 5 on gender equality.

On gender and green energy nexus, women can be a vulnerable group and at the same time, a core team in the category of consumers, producers, distributors and policymakers in the green energy value chain. Women and girls undertake the majority of unpaid care and domestic work at the household level. As such policy mix should be all-encompassing to identify entry points for gender equality and women's empowerment by widening women participation and leadership in the transition to green energy and also have equality in access to and control over sustainable energy products and services.

A wider access to clean energy by women has the potential to increase labour force participation rates which comes with it; reduced women's time put on unpaid domestic work and increase women's decision-making ability, financial independence, better sexual and reproductive health outcomes and social participation.

The National Gender and Equality Commission therefore embarked on a study to assess the uptake of selected forms of green energy among the Special Interest Groups (SIGs) including women, youth, older members of society and Persons with Disability (PWDs) to inform policy and programmatic interventions in line with national, regional, and international plans.

---

[2] World | Total including LUCF | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)

[3] For the Poorest Countries, Climate Action is Development in Action (worldbank.org)

[4] Household air pollution (who.int

METHODOLOGY

The research eployed a mixed-method approach to comprehensively explore the dynamics of uptake of green energy among Special Interest Groups across selected counties. The study utilized a combination of quantitative and qualitative data collection methods. The qualitative method involved data collection through household and facility-based surveys using a largely closed questionnaire. The quantitative methods consisted of policy-level interviews and case studies.

The target population was drawn from Kiambu, Murang'a, Kajiado, Machakos, Garissa, Kakamega, Uasin Gishu, and Nyamira counties, the government ministries and agencies with a mandate on developing policies related to energy and gender, the regulators within the energy sector, and private institutions largely involved in clean energy solutions development, marketing, and distributions.

Quantitative data from the questionnaires was analyzed using statistical tools, while qualitative data from interviews and case studies was analyzed through theme-content methods. The combination of these approaches allowed for a holistic understanding of the status and factors influencing the uptake of green energy among Special Interest Groups in Kenya.

FINDINGS AND DISCUSSIONS

The awareness level of the different types of green energy was dependent on the commonly found sources of energy in a particular locality. In Kiambu County, for example, respondents were more aware of biogas, while solar energy was mentioned more in Uasin Gishu compared to wind energy in Kajiado and Garissa. As regards the general forms of energy used, respondents mentioned charcoal, electricity, firewood, kerosene, solar, LPG, ethanol, biogas, and geothermal energy, inter alia. Firewood was the most used, at nearly 20 percent. This was followed by charcoal, electricity and solar at 17.7 percent, 16.3 percent, and 13.6 percent, respectively. Biogas is the least energy type mentioned, at 0.2 percent.

Peri-urban and urban usage of green energy in the sampled counties was at 81.4 percent and 75.3 percent, respectively compared to the rural areas at 73.8 percent. Further, institutions had the highest usage of green energy in the last 12 months, 85.7 percent. This was followed by households and businesses. In terms of awareness of the different types of green energy solutions, the majority of the respondents spontaneously cited the following sources of energy: solar, Liquid Petroleum Gas (LPG), hydroelectricity, biogas, briquettes, geothermal and ethanol. Ethanol and geothermal were featured least in the responses.

With reference to the specific usage of green energy, biogas was predominantly used for cooking and lighting, wind energy albeit through rudimentary mechanisms was used for security and lighting, solar energy for lighting and running electrical appliances and/ or machines, LPG was mostly used for cooking and heating, electricity was used for cooking and running electrical appliances and/ or machines, briquettes were mostly -used for cooking and heating.

In terms of challenges that SIGs face when using green energy, the majority of respondents reported that green energy is expensive, at 32 percent. This was followed by not being reliable and not being available at 25 percent and 16.9 percent respectively. As a result of these challenges, respondents (SIGs) reported to switching from renewable to non-renewable energy.

When probed about why they made such a switch, they reported unavailability, unaffordability, unreliability of green energy solutions. Additionally, they indicated green energy is 'not able to meet their needs', and 'not able to perform some functions of interest to them'. The respondents reported green energy solutions as not always available as the highest reason at 25.1 percent and unaffordability at 24 percent, not being preferred by marital partners and household members is the least at 0.7 percent. Due to these, some respondents reported they don't intend to use green energy in the future.

Respondents also had gender specific perceptions on green energy. When asked if green energy is not suitable for use by women, 61.9 percent of the respondents strongly disagreed with the proposition. Meaning that a few hold the undesired perceptions. Another 56.4 percent also disagreed with the proposition that green energy is not socially accepted in their community , meaning that some supported the undesired perception.

CONCLUSIONS AND RECOMMENDATIONS

Kenya has made significant strides in recent years towards adopting green energy solutions like solar, wind, and geothermal power. However, ensuring equitable access to and benefits from this transition for all Kenyans, including Special Interest Groups (SIGs), remains a challenge. This assessment has examined the current state of uptake of green energy among SIGs in Kenya and identified potential strategies for mainstreaming equality and inclusion in the green energy agenda. Mainstreaming equality and inclusion in Kenya's green energy transition is not just an ethical imperative but also a strategic necessity for ensuring sustainable and inclusive development.

The study recommends a policy shift to make green energy affordable and reliable. In a special sense, the policy mix should be all-encompassing to identify entry points for gender equality and women's empowerment by widening women's participation and leadership in the transition to green energy and also having equality in access to and control over sustainable energy products and services. To further enhance access to green energy by various categories of SIGs like women, and youth, gender statistics and fully disaggregated data are needed to inform inclusive energy value chains, which not only explains variances in energy access but also strengthens access for underrepresented groups.

To increase access to, and widen economic opportunities for women and other SIGs in green energy, the government has the opportunity to reduce inequalities in employment in the energy sector. This shall guarantee women and men equal chance to serve in the sector. Gender- responsive sustainable energy investments should remain a priority for the National and County governments. Further recommendations for mainstreaming equality and inclusion in green energy (MEIGE) include: implementation of programs that empower women and young people to actively participate in and benefit from green energy initiatives, fostering gender and generational equality than spin communities to adoption of the emerging green energy solutions, and greater involve of women and youth in troubleshooting for energy solutions deployed at households, businesses and facilities. Lastly, the study recommends that policy shift should promote equal access, representation, and participation in green energy programs and projects ; and tailor green energy solutions to align with local customs, traditions, and lifestyles, ensuring that the transition to sustainable energy is culturally sensitive.

CHAPTER 1

INTRODUCTION

1.1. BACKGROUND

Energy production and use are intricately connected to climate change. Energy is the primary driver of climate change, responsible for over 75 percent of the total global greenhouse gas emissions[5]. Kenya is committed to 'ensuring access to affordable, reliable, sustainable, and 5 modern energy for all' by 2030, as envisioned in the Sustainable Development Goal (SDG) 7.[6] The 6goal also has target 7.2, which puts obligations on Kenya to increase substantially the share of renewable energy in the country's energy mix and at the same time, facilitate access to clean energy.[7]

With human action and/inaction exacerbating climate change and its variability, a shift from fossil fuels consumption to a green and/clean energy mix has been a policy issue all over the globe[8],[9]. The ravaging impacts of climate change may also jeopardize economies' quest to realize up to 15 of the 17 UN 2030 Agenda for Sustainable Development. SDGs; (1) no poverty, (2) zero hunger, (3) good health and well-being, (4) quality education, (5) gender equality, (6) clean water and sanitation, (7) affordable and clean energy, (8) decent work and economic growth, (9) industry, innovation and infrastructure, (10) reduced inequalities, and (13) climate action are highly likely to be derailed by the negative effects of climate change. The world's poorest and most vulnerable in developing countries bear the greatest brunt of the unprecedented negative effects of using dirty energy and impacts of climate change.

1.1.1 Mandate of the National Gender and Equality Commission (NGEC)

The National Gender and Equality Commission (NGEC) is a Constitutional Commission established by the National Gender and Equality Commission Act CAP 7K Laws of Kenya, pursuant to Article 59 (4) & (5) of the Constitution of Kenya, 2010. The Commission's mandate is to promote gender equality and freedom from discrimination for all people in Kenya, with a focus on Special Interest Groups (SIGs), which include Women, Children, Youth, Persons with Disabilities (PWDs), Older Members of Society, Minorities and Marginalized groups.

Section 8(b) of the National Gender and Equality Commission Act mandates the Commission to monitor, facilitate, and advise on the integration of the principles of equality and freedom from discrimination in all national and county policies, laws, and administrative regulations in all public and private institutions.

Section (d) requires the Commission to coordinate and facilitate mainstreaming of issues of gender, persons with disabilities and other marginalized groups in national development and to advise the Government on all aspects thereof. Section 8 (i) of the Act mandates the Commission to conduct and co-ordinate research activities on matters relating to equality and freedom from discrimination as contemplated under Article 27 of the Constitution, while section (e) mandates the Commission to monitor, facilitate, and advise on the development of affirmative action implementation policies as contemplated in the Constitution. Section

5 https://www.unwomen.org/sites/default/files/2023-05/Gender-equality-in-the-sustainable-energy-transition- en.pdf

6 https://sdgs.un.org/goals/goal7

7 Ibid

8 https://ncse.ngo/how-much-does-human-activity-affect-climate-change

9 https://link.springer.com/article/10.1007/s11356-022-19718-6

(h) requires the Commission to coordinate and advice on public education programmes for the creation of a culture of respect for the principles of equality and freedom from discrimination.

In the Financial Year 2019/2020, NGEC received funding from the government of Kenya to assess the uptake of green energy solutions on SIGs in Kenya. The project will inform national and county government policy and programs aimed at increasing adoption, and use of the clean energy solutions with a focus to most vulnerable populations

The Commission designed and executed the project through a sequence of activities including conceptualization of the study, design of communications strategy and materials, development of the data collection tools, training of staff on data collection, pilot testing of the tools, and data collection. In addition to the research component, the project involved the following:

> Mainstreaming of issues of SIGs in green energy policies and programs. The effort is aimed at economic empowerment and increased participation of SIGs in decision-making on energy solutions; Assessing the uptake of selected forms of energy by SIGs including, women, youth, PWDs and marginalized communities.
>
> The actions also involved promoting the adoption of clean cooking solutions (modern cooking appliances and fuels); Sensitizing SIGs on avai lable opportunities (access and efficiency) in green energy initiatives in Kenya.

1.2 Global Energy Mix

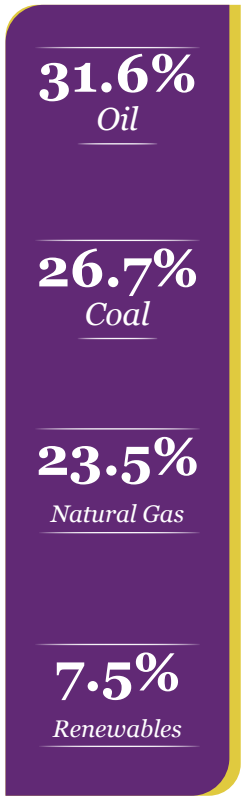
Currently, the global energy mix is mainly composed of non-green energy that includes; Oil, Coal, Natural gas, and renewables. Oil is still the largest source of energy powering the global economy at 31.6%.

This is followed by Coal and Natural gas 26.7 percent and 23.5 percent. Renewables have a share of 7.5 percent in the global energy mix. The world continues to advance towards sustainable energy targets albeit not fast enough. At the current pace, about 660 million people will still lack access to electricity, and close to 2 billion people will still rely on polluting fuels and technologies for cooking by 2030.[10]

With the close link between climate change escalations and 10 non-renewable energy consumption, it is imperative that transition to green energy is prioritised especially among the SIGs.

The transition to green energy will require a colossal number of resources. It is estimated that the transition to a green global economy with net zero emissions requires an investment of USD 50 trillion by 2050.[11] At the same time, many livelihoods and job 11 opportunities are likely to be created.

International Renewable Energy Agency (IRENA) estimates that by 2050, there will be over 29 million jobs created in the renewable energy sector.[12]



[10] https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf.

[11] https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020

[12] Ibid

Table 1: Sources of Energy

1.	Renewable	Non-Renewable
	Replenished naturally over a short period e.g - Solar Energy (energy from the sun) - Wind Energy - Hydro Power - Biomass Energy - Geothermal	Limited supply, takes millions of years to form e.g - Fossil Fuels (coal, oil, natural gas)
2.	**Primary Energy**	**Secondary Energy:**
	Directly harnessed from natural resources (coal in the ground, sunlight)	Derived from primary energy sources E.g.: Electricity (often generated from fossil fuels, wind, solar, etc.)
3.	**Conventional Energy:**	**Non-Conventional Energy:**
	These sources of energy have a long history of use and widespread adoption E.g. Fossil fuels, large-scale hydropower	These are often renewable and more sustainable Energy sources that are newer or less widely used such as Solar, wind, geothermal, biomass, small-scale hydropower

ILO estimates that by 2030, about 20 million jobs will be created.[13] However, a huge share of these job opportunities will be largely in mid-skill occupations and other sectors that are men- dominated.[14] Figure 1 depicts the global energy mix in 2022.

[13] https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_895772.pdf

[14] Ibid

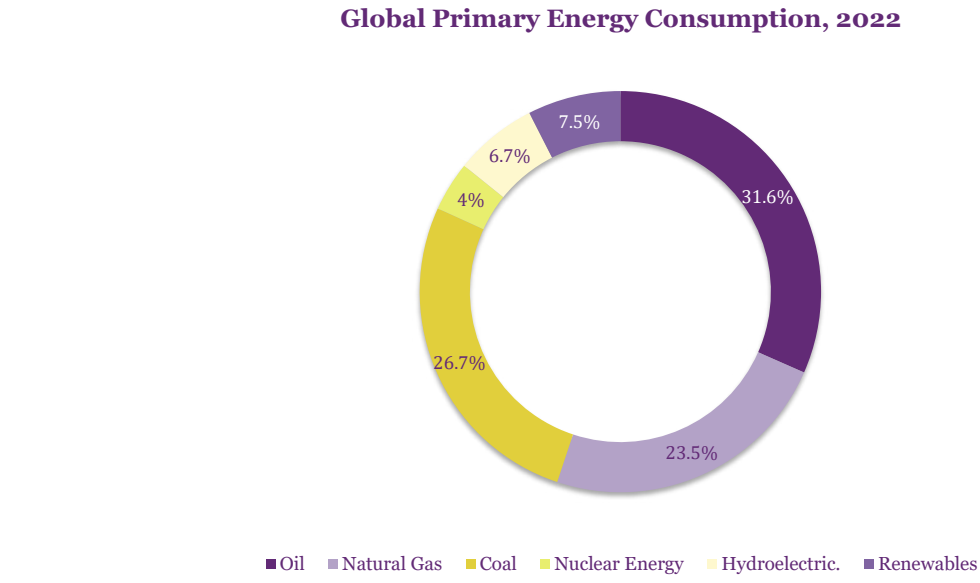


Figure 1: Global Primary Energy Consumption, 2022

Source: BP Statistical Review of World Energy, 2023

Clean energy use especially at the household level should be an integral component of strategies to realize targets specified in the Nationally Determined Contributions (NCDs) under the Paris Agreement on climate change. [15] Accelerating access to and utilization of clean energy for use at the household level like cooking has greater benefits to contribute to better health outcomes, and livelihoods.[16] Therefore, facilitating transition to clean cooking fuels such as electricity, LPG, ethanol, and biogas is an important implementable action to enable Kenya mitigate and adapt to the effects of climate change.

In 2021, about 2.3 billion of the world's population relied on inefficient and polluting fuels at the household level thus putting their health at risk and worsening climate change negative impacts.[17] Sub-Saharan Africa (SSA) where Kenya falls has the lowest growth rate of access to clean fuels at the household level compared to their population growth rate and the number of people without access to clean fuels in the SSA is expected to be more than 1.1 billion by 2030.[18, 19.] This portends that billions of people will remain exposed to the negative effects of polluting fuels in the region as the majority in the region rely heavily on biomass fuels. Dirty fuels are closely tied to household air pollution which leads to more than 3.2 million annual deaths.[20]

15 https://trackingsdg7.esmap.org/data/files/download-documents/sdg7-report2022-ch2-access_to_clean_cooking.pdf.
16 Ibid.
17 https://unstats.un.org/sdgs/report/2023/.
18 Ibid.
19 https://trackingsdg7.esmap.org/data/files/download-documents/sdg7-report2023-ch2._access_to_clean_cooking.pdf.
20 Ibid.

Figure 2 highlights the global populations with access to clean energy

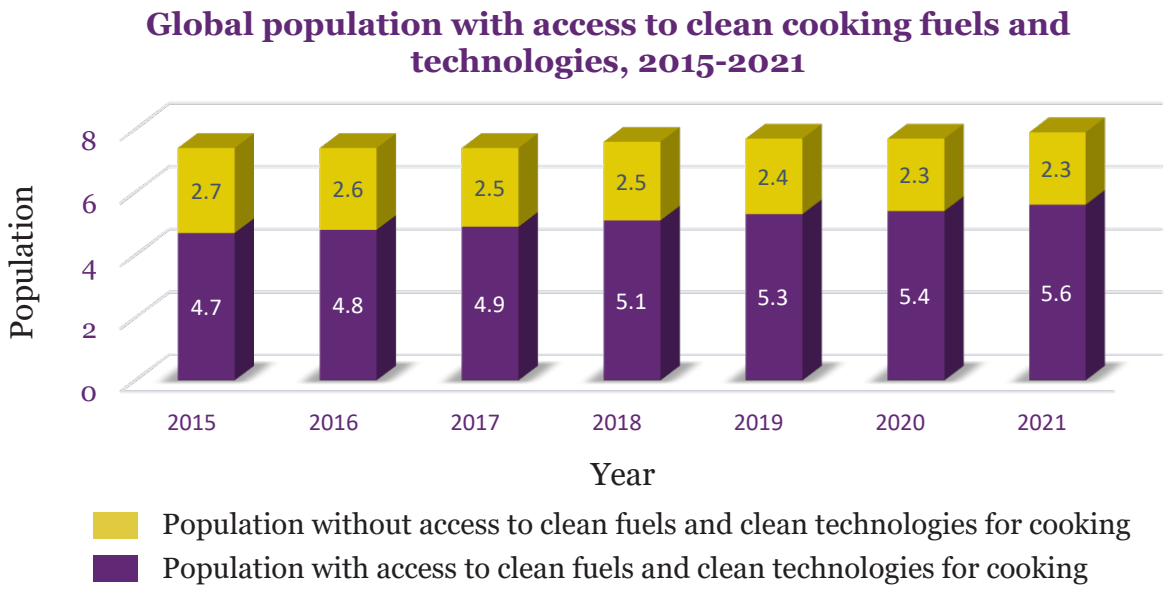


Figure 2: Global population in billions with access to clean cooking fuels

Source: UN, 2023.

According to WHO, nearly all the global population (99 percent) is under exposure to air pollution beyond the recommended levels and hence are exposed to higher risks for non-communicable diseases (NCDs) such as cancer, pneumonia, and a host of respiratory illnesses.[21]

Every year, an estimated 6.7 million people die due to exposure to ambient and household air pollution. In 2021, 2.3 billion of the world's population relied heavily on polluting fuels and technologies for household cooking.[22]

[21] https://www.who.int/data/gho/data/themes/air-pollution.

[22] Ibid

Figure 3 presents a delineation of cooking fuels as clean and or polluting.

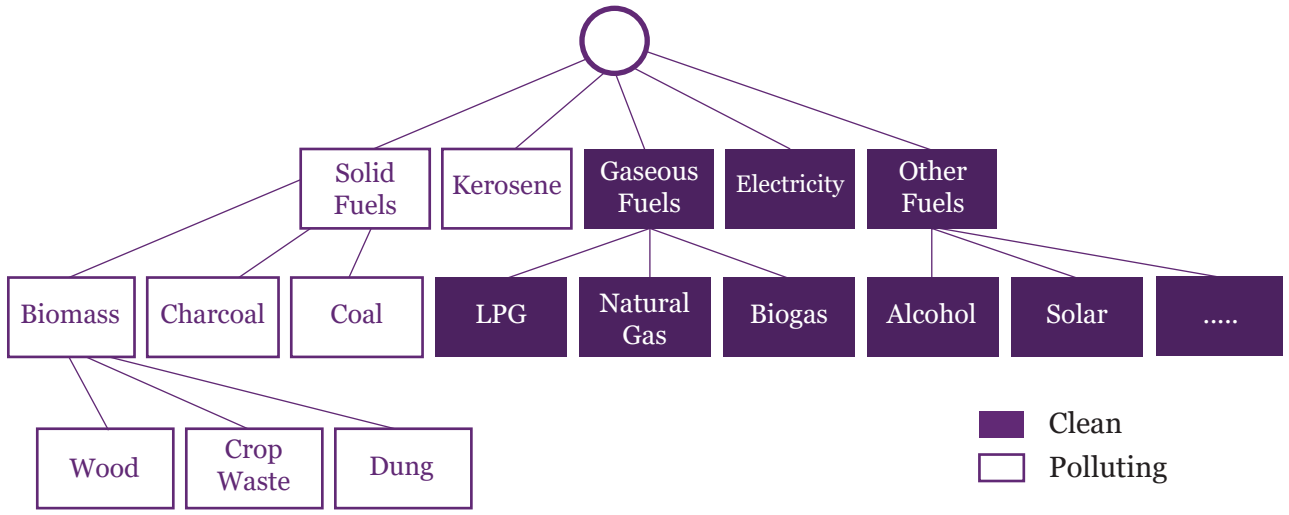


Figure 3: Classification of cooking fuels as clean or polluting

Source:

WHO household energy database, 2022

1.3 Situation Analysis of Energy in Kenya

Kenya's energy mix at the national level is mainly composed of geothermal, thermal, hydroelectric, and wind. The national energy mix predominantly consists of green energy with geothermal, hydro, wind, and solar accounting for 87.5percent of electricity generation in 2023.[23] The remainder is filled by thermal, biomass, and imports. Geothermal will continue to grow as more investments are put toward weaning off expensive, non-clean, and non-renewable sources. The country is also slowly shifting from reliance on hydropower as it is susceptible to the vagaries of weather patterns such as droughts and excessive floods.

Figure 4 depicts the country's energy mix which shows the country has considerably increased the share of renewables (green energy) in its energy mix (electricity mix)

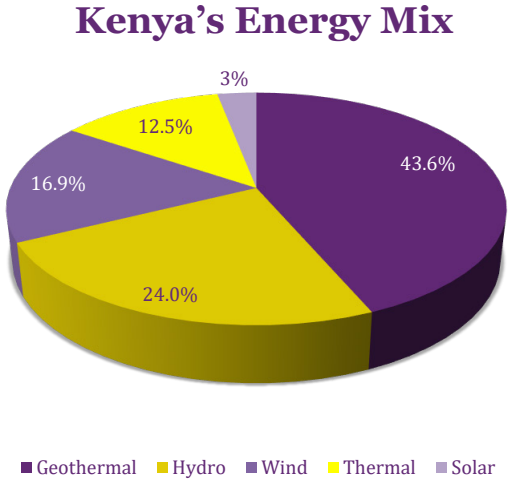


Figure 4:Kenya's Energy Mix

[23] https://www.trade.gov/country-commercial-guides/kenya-energy-electrical-power-systems 6

Source: KNBS, 2023

In Kenya's households, wood (firewood) has a share of 55.1 percent of the total fuels used for cooking. This is followed by LPG and charcoal at 23.9 per cent and 11.6 percent respectively. Biogas and electricity are each less than 1percent. When firewood and charcoal are combined, the share of dirty fuels in household cooking in Kenya is 66.7percent. A continued use of such inefficient and unsafe energy sources is expected to hasten the depletion of forests, increase global warming, cause many deaths of women and children and rob women many productive labour hours.

Figure 5 presents sources of energy for household cooking in Kenya.

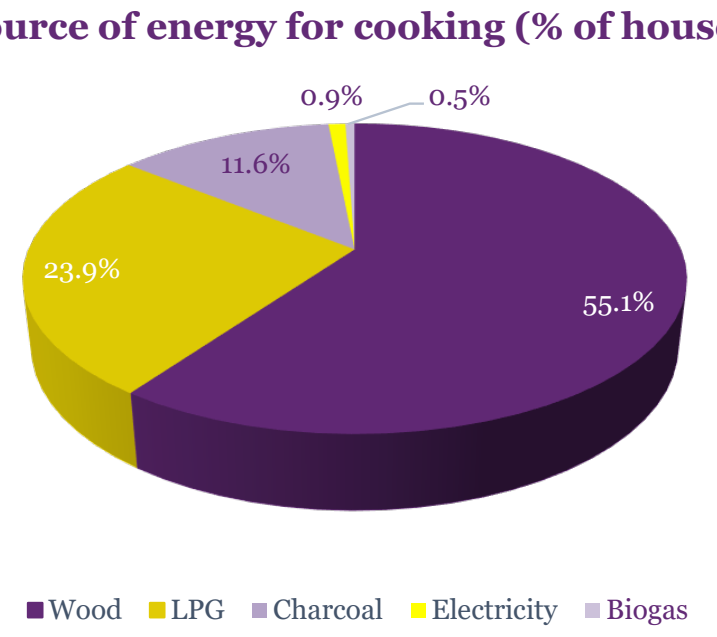


Figure 5: Main source of energy for household Cooking (% of households)

Source: KNBS KPHC Vol. IV, 2019.

Further analysis by counties with the highest consumption of dirty fuels (firewood and charcoal) for household cooking is presented in Figure 7. Wajir (89.5percent), Bomet (88.4percent), Mandera (86percent), Nyamira (84.3percent), and Vihiga (83.8percent) Counties have the highest consumption of firewood for cooking.

For charcoal, Kwale (15.5percent), Mandera (10.4percent), and Kitui (8.6percent) have the highest usage. The two, firewood and charcoal constitute dirty fuels and are associated with indoor air pollution, which puts the lives of many women and children at risk of fatal respiratory illnesses.

To ensure access to energy for all by 2030, Kenya must accelerate electrification, increase investments in renewable energy, improve energy efficiency, and develop enabling policies and regulatory frameworks.[24]

[24] https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf.

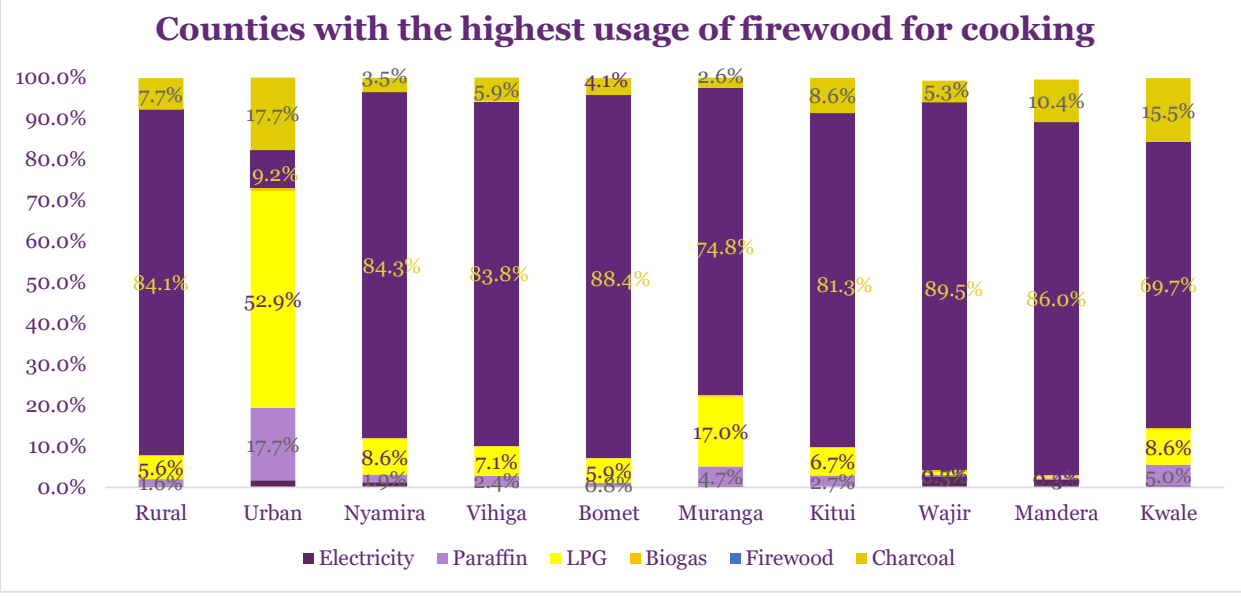


Figure 6: Counties with the highest usage of firewood for cooking (% of households)

Source: KNBS KPHC Vol. IV, 2019.

1.4 Gender and Green Energy

Unconstrained access to green energy, especially at the household level, is closely tied to better health, education, and economic prosperity, which is an indispensable multiplier to realize every Sustainable Development Goal including SDG 5 on gender equality. [25] Women can be a vulnerable group and, at the same time, a core team in the category of consumers, producers, distributors, and policymakers in the green energy value chain. Women and girls undertake the majority of unpaid care and domestic work at the household level.[26, 27] This mainly consists of cooking and other chores, such as cleaning, that need energy to run. In Sub Saharan Africa, the cooking sector heavily relies on biomass.[28] fuels.

Women spend up to 18 hours a week collecting fuel for cooking.[29] Such tasks have contributed to the massive time poverty of women and girls and restrict their prospects of engaging in income generation, educational pursuit, and or recreational activities.[30] In 2021, 4 out 10 people were without access to clean energy at the household level in Africa.[31] A further 8 out of 10 people in the SSA and 6 in 10 people in Central and Southern Asia still use polluting open fires and or stoves fueled by kerosene, biomass, or coal.[32] Energy poverty exhibited by the use of dirty, inefficient fuels and technologies for cooking disproportionately affects women, children and PWDs due to higher exposure to indoor air pollution and contributes to more than 3.2 million deaths annually.[33,34,35.]

[28] Ibid
[29] https://www.undp.org/energy/our-work-areas/energy-and-gender-equality
[30] Ibid
[31] https://trackingsdg7.esmap.org/
[32] https://www.climateneutralgroup.com/en/news/un-women-clean-cooking/
[33] Ibid
[34] https://access-coalition.org/access-coalition-calls-for-new-approaches-to-unlock-clean-cooking-progress/
[35] https://www.unwomen.org/sites/default/files/2023-05/Gender-equality-in-the-sustainable-energy-transition- en.pdf

Therefore, the policy mix should be all encompassing to identify entry points for gender equality and women empowerment by widening women participation and leadership in the transition to green energy and ensuring equality in access to and control over sustainable energy products and services. A wider access to clean energy by women has the potential to increase labour force participation rates, which comes with; reduced women's time spent on unpaid domestic work, and increased women's decision-making ability, financial independence, better sexual and reproductive health outcomes, and social participation.[36] Kenya has made great strides in removing bottlenecks that hinder women's access to clean energy as users and earners. The country's long-term development blueprint, Vision 2030, which is aimed at transforming Kenya into a newly-industrialized economy and offering quality life to its citizens, recognizes energy as a key enabler to fight poverty and promote shared prosperity.[37]

In 2019, the country developed and began implementing the National Policy on Gender and Development. The policy has identified energy as a driver for closing gender gaps. It provides for mainstreaming gender in policies, programmes and projects in the energy sector. It also captures commitments on promoting gender equality in the energy sector for instance adoption of clean cooking solutions ,environmental sustainability and increasing awareness on gender in the energy sector, inter alia.[38]

1.5 Problem Statement

Sustainable Development Goals (SDG), Goal 7 call on all world economies to 'ensure access to affordable, reliable, sustainable, and modern energy for all' by 2030.[39] In the goal, Kenya is to facilitate access to clean energy by different groups including the SIGs.[40] Kenya aims to achieve decarbonisation of its energy sector to realize 100percent clean energy on the Kenyan grid by 2030, 100percent access to clean cooking by 2028 and enable the country achieve a goal of Net Zero greenhouse emissions by 2050.[41]

Having Kenya transition to clean energy is aimed at enabling the country to realize universal energy access, including clean cooking, fast-tracking renewable energy deployment, providing sustainable heat and power to key industries and sectors for Kenya's socio-economic transformation, and maximizing energy efficiency. At the same time, Kenya's Renewable Energy Integration (REI) program aims at promoting gender equality in the sector as well as voice and representation in major energy sector institutions and the identification of key gender gaps to be addressed.[42,43] In particular, it emphasizes improving human endowments, removing constraints on increased female participation in the labour market including in Science, Technology, Engineering, and Mathematics (STEM) fields, and enhancing women's voice through strategically supporting female participation in leadership and decision-making positions in the energy sector. [44]

[36] https://www.unwomen.org/en/digital-library/publications/2022/09/progress-on-the-sustainable- development-goals-the-gender-snapshot-2022
[37] https://vision2030.go.ke/
[38] https://energy.go.ke/downloads
[39] https://sdgs.un.org/goals/goal7.
[40] Ibid
[41] https://energy.go.ke/sites/default/files/KAWI/Other%20Downloads/CLIMATE%20INVESTMENT%20FUNDS%2 0D
[42] https://www.afdb.org/sites/default/files/afdb_cif_annual_report_2021_-_renewable_energy_integration.pdf
[43] https://energy.go.ke/sites/default/files/KAWI/Other%20Downloads/CLIMATE%20INVESTMENT%20FUNDS%2 0D
[44] Ibid

Women and girls are impacted negatively by continued use of dirty fuels. Women and girls spend a lot of time gathering dirty fuels such as firewood and charcoal. The long hours spent robs them of productive labour hours and time to be spent with family indoor pollution.[45,46] Further, use of dirty fuels leads to indoor pollution which are closely tied to serious health complications such as upper respiratory infections, stillbirth, asthma, TB, and laryngeal cancers.[47,48,49,50,51,52]. Deaths out of these diseases are likely to worsen the welfare of women, girls, children and PWDs. It is on this premise that NGEC embarked on a study to assess the uptake of selected forms of green energy on Special Interest Groups (SIGs).

1.6 Study Justification

Sustainable energy supply is a prerequisite for regional growth and poverty reduction in Kenya. SIGs are among those who depend on small-scale agriculture and locally available resources to support their livelihoods and fulfil their household obligations.

Energy poverty leads to drudgery, greater health risks, and a lack of time to focus on income generating, educational, or other self-nurturing activities.

Employment and income-generating opportunities for both women and men are often enhanced when access to modern energy services is increased. Access to affordable modern energy services can reduce both time and effort spent in reproductive and productive roles; hence energy interventions are likely to impact women, men, and other SIGs differently. It is therefore fundamental that the uptake of green energy by SIGs is examined for evidenced policymaking.

45 https://asiapacific.unwomen.org/sites/default/files/Field%20Office%20ESEAsia/Docs/Publications/2017/01/Unp aid-Care-and-Domestic-Work-EN.pdf

46 https://cleancooking.org/the-issues/women-and-clean-cooking/

47 https://www.who.int/teams/environment-climate-change-and-health/air-quality-energy-and-health/sectoral- interventions/household-air-pollution/health-risks

48 https://asiapacific.unwomen.org/sites/default/files/Field%20Office%20ESEAsia/Docs/Publications/2017/01/Unp aid-Care-and-Domestic-Work-EN.pdf

49 https://cleancooking.org/the-issues/women-and-clean-cooking/

50 https://www.undp.org/energy/our-work-areas/energy-and-gender-equality

51 Ibid

52 Ibid

1.7 Study Objectives

1.7.1 General Objectives

The general objective of the study is to examine the uptake of green energy solutions by special interest groups (SIGs) in Kenya. Precisely, the study sought to realize the following specific objectives:

1.7.2 Specific Objectives

I.	To assess the uptake of selected forms of green energy solutions by special interest groups especially women, youth, PWDs and marginalized communities.
II.	To examine the effects of uptake of clean energy solutions among SIGs with a focus on their experiences.
III.	To promote awareness to SIGs on available opportunities (access and efficiency) in green energy initiatives in Kenya.
IV.	To assess legal and policy framework promoting the uptake of green energy among SIGs in Kenya.
V.	To document barriers and challenges to affordable and reliable clean energy from SIGs.

CHAPTER 2

LEGAL AND REGULATORY FRAMEWORKS

2.1 Introduction

The policy and legal frameworks regulating Kenya's energy sector include international, regional and national commitments. These regulatory frameworks are intended to achieve higher electrification rates in the country and at the same time decarbonize the country's energy mix. In this section, we take a dive some of the international, regional and national commitments that drives inclusive green energy generation, transmission and consumption.

2.2 International Frameworks

2.2.1 Sustainable Development Goals

The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. SDG 7 in particular calls on world economies to "ensure access to affordable, reliable, sustainable and modern energy for all."[53]

2.2.2 Vienna Convention 1985

The Montreal Protocol of 1987, promotes intergovernmental cooperation on research, ozone layer monitoring, and information exchange, aiming to revise phase-out schedules based on scientific assessments.[54] While the Convention does not explicitly mention green energy, it indirectly encourages the adoption of environmentally sustainable policies, particularly the advancement of alternate energy sources

2.2.3 KYOTO Protocol

The Kyoto Protocol, came into force in 2005. It calls on developed countries to reduce greenhouse gas emissions.[55] The Protocol encouraged the adoption of renewable energy sources (like solar, wind, and hydroelectric power) as a strategy to meet emission reduction targets.

2.2.4 Paris Agreement

The agreement sets out a global framework limiting global warming to well below 2 degrees centigrade and strengthening countries' ability to deal with climate change and support them in their efforts.[56] Under the Paris Agreement, countries submit Nationally Determined Contributions (NDCs), outlining their climate actions and goals. Countries are transitioning to green energy to meet their emissions reduction targets and obligations under the Agreement.

[53] https://www.globalgoals.org/goals/7-affordable-and-clean-energy/
[54] https://legal.un.org/avl/ha/vcpol/vcpol.html
[55] https://unfccc.int/kyoto_protocol
[56] https://unfccc.int/process-and-meetings/the-paris-agreement

2.2.5 Convention to Combat Desertification, UNCCD

Adopted in 1994 and came into force in 1996 to address the problem of land degradation by desertification and the impact of drought especially in the ASALs.[57]

2.3 African Union Agenda 2063

The Agenda lays out the aspirations for the continent and positions renewable energy as a critical driver for Africa's sustainable development and economic growth. It envisions harnessing all African energy resources to ensure modern, efficient, reliable, cost-effective, renewable and environmentally friendly energy to all African households, businesses, industries and institutions.

2.4 National Legal, Policy and Programmatic Framework

Kenya has a plethora of policies and legal frameworks anchoring and guiding the energy sector. At the heart of it are key institutions that guide and shape the energy sector. The key public-sector institutions involved in managing and regulating the Kenya's energy sector are the Ministry responsible for Energy and Petroleum, the Energy and Petroleum Regulatory Authority (EPRA), Kenya Power and Lighting Company Limited (the sole power distributor), Kenya Electricity Generation Company (KenGen), the Geothermal Development Company, the Kenya Electricity Transmission Company (KETRACO), the Rural Electrification and Renewable Energy Corporation and Nuclear Power and Energy Agency (NuPEA).

The main legal, policies and programmes aimed at achieving the clean energy access are: The Constitution of Kenya 2010, the Energy Act CAP 314, the Petroleum Act, 2019 and the National Energy Policy (2018), the Kenya National Electrification Strategy (2018), Sustainable Energy for All - Kenya Action Agenda, the Last-Mile connectivity programme for lighting and other uses of electricity, Kenya Off-grid Solar Access Program (KOSAP), the Gender Policy in Energy (2019), and the Kenya National Climate Change Action Plan, 2018-2022.

2.4.1 Constitution of Kenya, 2010

In the Preamble, the people of Kenya shall be respectful of the environment which they recognize as their heritage with determination to sustain it for the benefit of future generations. Article 10 (2) recognizes sustainable development in the list of national values and principles of governance;

Article 42 of the constitution of Kenya provides for a clean and healthy environment, which includes the right—(a) to have the environment protected for the benefit of present and future generations through legislative and other measures. Clean and healthy environment encompass transition to clean energy both at the household level and in the aggregate economy.

[57] https://www.unwomen.org/en/how-we-work/intergovernmental-support/climate-change- and-the-environment/unite

2.4.2 Kenya Vision 2030

Kenya Vision 2030 is the long-term development blueprint. It aims to transform Kenya into "a newly-industrializing, middle income country providing a high quality of life to all its citizens in a clean and secure environment." The Vision 2030 is organized into Medium Term Plans (MTP). Kenya is currently implementing the Fourth Medium Term Plan (MTP IV) 2023-2027 which in essence implements current government manifesto and revolutionary agenda dubbed the Bottom-Up Economic Transformation Agenda (BETA). The BETA is geared towards economic turnaround and inclusive growth through a value chain approach. BETA targets sectors with high impact to drive economic recovery. The BETA objectives are: bringing down the cost of living, eradicating hunger, creating jobs, expanding the tax base, improving foreign exchange balances and inclusive growth. This will be achieved through targeted investments in five core pillars, namely: Agriculture; Micro, Small and Medium Enterprise (MSME) Economy; Housing and Settlement; Healthcare; Digital Superhighway and Creative Economy. BETA will be implemented through five MTP IV sectors, namely: Finance and Production; Infrastructure; Social; Environment and Natural Resources; and Governance and Public Administration.[58]

Through operationalization of BETA, Kenya aims to attain universal electricity connections by 2030. So far efforts are in place to sustain grid connectivity and 75% of households in Kenya to remain connected to electricity. The Energy and Petroleum Regulatory Authority, improved in 2023 its energy mix to over 90 percent dependency on renewable energy sources, even though challenges remain on reaching universal access to clean energy.[59]

2.4.3 The Energy Act, 2019

The Act consolidates the laws relating to energy, to properly delineate the functions of the national and devolved levels of government in relation to energy, to provide for the exploitation of renewable energy sources, to regulate midstream and downstream petroleum and coal activity and for the supply and use of electricity and other forms of electricity. The Energy Act established several new energy sector entities including:

a) Energy and Petroleum Regulatory Authority (EPRA)

The EPRA is the successor to the Energy Regulatory Commission (ERC), which exercised regulatory control over the energy sector. The objects and functions specified for EPRA are fundamentally the same as those of the ERC.

b) The Energy and Petroleum Tribunal (EPT)

The EPT is the successor to the Energy Tribunal. The Energy Tribunal was a quasi-judicial body whose mandate was to hear appeals that may be made to decisions made by the ERC in accordance with the repealed Energy Act. The EPTs jurisdiction is wider; it may hear and determine disputes and appeals relating to energy and petroleum that may arise under the Energy Act and any other written laws. The Act provides a clearer legislative framework, to guide the EPTs conduct its business especially so far as its procedures are concerned.

[58] Government of Kenya. State Department for Economic Planning, 2024

[59] Parliamentary Service Commission, Parliamentary Budget Office, Budget Watch for FY 2023/24. Operationalizing the Bottom-up Economic Transformation Agenda and the Medium Term September 2023 | Edition No.16

c) Rural Electrification and Renewable Energy Corporation (REREC)/ Renewable Energy Resource Advisory Committee (RERAC).

The Energy Act established REREC and RERAC. REREC is the successor to the Rural Electrification Authority (REA). REREC will, in addition to rural electrification, have an expanded mandate in relation to renewable energy that will put it at the centre of policy formulation, research and development, international cooperation and the promotion of renewable energy use amongst the local population. RERAC on the other hand is an inter-ministerial committee intended to advise the responsible cabinet secretary on matters concerning the allocation of renewable energy resources, the licensing of renewable energy resource areas, the management of water towers and catchment areas, the development of multi-purpose projects such as dams and reservoirs and the management and development of renewable energy resources.

d) Nuclear Power and Energy Agency (NUPEA)

The NUPEA is the successor to the Kenya Nuclear Electricity Board a state corporation established pursuant to the Kenya Nuclear Electricity Board Order No. 131 of 2012. The NUPEA will continue the Board's mandate to develop and implement Kenya's nuclear energy programme.

e) Vesting of Rights over Renewable Energy Resources

The Energy Act provides for all renewable and geothermal energy resources vested in the national government to clarify which level of government has the right to manage these resources. As resources are not evenly distributed across the country, it is considered best to have them vested by the national government who can develop them for the benefit of all Kenyan people and not just the regional county governments and communities where the resources are located. These county governments and communities are however compensated by receiving a part of the royalties between the three main stakeholders i.e. the communities and county governments from the areas the resources are located and the national government.

f) Preparation of Renewable Energy Resource Inventory and Resource Map

The Act has provisions relating to the creation of an inventory and resource map for renewable energy resources by the government through the Ministry of Energy & Petroleum. This inventory and map are aimed at reducing the burden on prospective investors of conducting exploratory and feasibility studies.

g) The Renewable Energy Feed-in-Tariff-System (FiT)

The Renewable Energy Feed in Tariff System is anchored in the Energy Act providing further legislative backing the 'Feed-In-Tariffs Policy on Wind, Biomass, Small-Hydro, Geothermal, Biogas and Solar Resource Generated Electricity' (FiT Policy) developed by the Ministry of Energy in 2008. The FiT is intended to encourage the generation of energy from renewable sources and its supply through localised distribution networks. It is also intended to encourage the uptake and innovation of renewable energy technology and in sum to help reduce the greenhouse gas emissions and Kenya's reliance on non-

renewable energy sources.

2.4.4 Gender Policy in Energy, 2019

The policy provides a framework for mainstreaming gender in policies, programmes and projects in energy, and commits to: Strengthening institutional frameworks for the employment of women in energy, ensuring compliance with the Constitution of Kenya on gender: such as by engendering all energy policies, plans, budgets, strategies and programmes, increasing awareness on gender in the energy sector, integrating gender in programmes, and in monitoring and evaluation, promoting clean cooking solutions and environmental sustainability.

2.4.5 Kenya's National Climate Change Action Plan (2018-2022)

The action plan acknowledges gender inequality as a climate change vulnerability and it contains gender mainstreaming in all aspects of climate change responses as one of its objectives.

CHAPTER 3

METHODOLOGY

3.1 Research Design

The research employed a mixed-methods approach to comprehensively explore the dynamics of green energy uptake within special interest groups across selected counties. The study utilized a combination of quantitative and qualitative data collection methods.

3.2 Quantitative Techniques

3.2.1 Survey

This involved developing a data collection tool to gather key information on green energy access by Special Interest Groups (SIGs) at both the household and in their business enterprises. The main data was collected through the use of a questionnaire that was developed in line with each study objective. The questionnaire was administered to households, businesses and institutions such as hospitals, TVET institutions, Schools, Churches etc. Most of the questions were closed- ended.

3.3 Qualitative Techniques

3.3.1 Policy Level Interviews

Two policy level interviews were conducted in each county, involving key stakeholders and policymakers. These interviews aimed to provide a deeper understanding of the regulatory landscape, government initiatives, and challenges faced at the policy level regarding the promotion and adoption of green energy. The policy level interviews were administered to National Government agencies and those in the private sector responsible for promoting, distribution and uptake of green energy in Kenya. In total, 26 interviews were conducted, 22 from the counties and 4 at the national level.

3.3.2 Case Studies

Two in-depth case studies were carried out in each county of study to delve into specific instances of successful green energy adoption or barriers faced by special interest groups. The case studies provided qualitative insights, allowing for a nuanced understanding of the factors influencing the uptake of green energy in diverse contexts. In total 16 case studies were documented.

3.4 Data Collection Instruments

3.4.1 Questionnaires

A total of 754 questionnaires were distributed among households and businesses within the specified counties. The questionnaires were designed to gather quantitative data on the status, challenges, and opportunities related to the uptake of green energy. Questions were carefully crafted to capture the perspectives of different Special Interest Groups, considering the unique characteristics of each county.

3.5 Population and Sampling

3.5.1 Target Population

The primary focus of this research was Special Interest Groups in Kenya actively engaged in various sectors, in institutions, businesses and households, within the selected counties. The target population for the study included relevant ministries and private actors who have the mandate of developing policies, private institutions, regulators, and the communities as summarized in Table 2 and 3. Although data was to be gathered from 11 counties, the study reached 8 counties owing to financial constraints

Table 2: Key Actors in the Sector

Government Ministries, Department and Agencies, and private actors	Independent Power Producers (IPPs)
1. Ministry of Energy 2. Ministry of Environment- Directorate of Climate Change 3. Energy and Petroleum Regulatory Authority 4. Energy Tribunal 5. Kenya Power and Lighting Company Limited (KPLC) 6. Kenya Electricity Generating Company Limited (KenGen) 7. Rural Electrification Authority (REA) 8. Geothermal Development Company Limited (GDC) 9. Kenya Electricity Transmission Company Limited (KETRACO) 10. Kenya Nuclear Electricity Board (KNEB) 11. Centre for Energy Efficiency and Conservation (CEEC)-Representing private sector.	1. Iberafrica Power (E.A.) Company Limited (thermal power plant). 2. Tsavo Power Company Limited (thermal power plant). 3. Mumias Sugar Company Limited (co-generation). 4. Orpower 4 Inc. (geothermal power plant). 5. Rabai Power Company Limited (thermal power plant). 6. Imenti Tea Factory Company Limited (mini-hydro). 7. Gikira Hydro (mini-hydro). 8. Thika Power Limited (thermal power plant). 9. Gulf Power Limited (thermal power plant). 10. KTDA (various plants) (hydro power plants) 11. Lake Turkana Wind Power (LTWP) (wind power plant) 12. Strathmore Solar (solar power plant) 13. Regen-Terem (hydro power plant) 14. Biojoule Kenya Ltd (biogas power plant)
Community	
Youth, Women, PWDs, Minority and Marginalized, Older Members of Society, Public and Private Institutions, Business Enterprises	

[62] IPPs are private companies which generate power and sell electricity in bulk to KPLC

Table 3:County and Institutions Mapping

No.	County	Type of Energy	Sites Proposed	State, Non- State and Private Institutions
1.	Garissa	Solar	Garissa 54MW Solar Power Plant	1. Ministry of Energy, Directorate of Renewable Energy
2.	Kwale	Biofuel	Kwale International Sugar Company 10MW power plant at Ramis	2. Ministry of Environment- Directorate of Climate Change
3.	Kisii	Solar	To be identified	3. The Energy and Petroleum Regulatory Authority (EPRA)
4.	Kisumu	Hydro	Sondu Miriu Hydroelectric Power Station	4. Kenya Power and Lighting Company Limited (KPLC)
5.	Kajiado	Wind	Ol-Ndanyat Power Limited 10MW wind power plant at Kona Baridi	5. Kenya Electricity Generating Company Limited (KenGen)
6.	Machakos	Hydro	Masinga Hydroelectric Power Station	6. Rural Electrification and Renewable Corporation (REREC)
7.	Uasin Gishu	Biogas	Eldosol Solar Power Station Alten Solar Power Station	7. Geothermal Development Company Limited (GDC)
8.	Kakamega	Biofuel	Mumias Sugar Company	8. Kenya Electricity Transmission Company Limited (KETRACO)
9.	Marsabit	Wind	300MW Lake Turkana Wind Plant	9. Centre for Energy Efficiency and Conservation (CEEC)
10.	Kirinyaga	Biogas	To be identified	10. Clean Cooking Association of Kenya (CCAK)
11	Nakuru	Geothermal	Olkaria	

3.5.2 Sampling Technique

A purposive sampling technique was employed to ensure representation from diverse sectors and geographic locations as well as ensure targeted actors and communities living at proximity to large sources of green energy. This consideration sought to reduce the net effect of the function of 'availability' in the analysis. The selected counties were Kiambu, Murang'a, Kajiado, Machakos, Garissa, Kakamega, Uasin Gishu, and Nyamira.**3.6 Data**

3.6 Data Collection Procedure

3.6.1 Questionnaire Administration

Trained enumerators administered the questionnaires to households and businesses across the selected counties. The process ensured consistency and reliability in data collection. Respondents were briefed on the purpose of the study, and their consent was obtained before participation.

3.6.2 Policy Level Interviews

Policy level interviews were conducted with key stakeholders identified through a purposive sampling strategy. Semi-structured interviews were employed to facilitate a comprehensive exploration of policy-related aspects influencing the adoption of green energy.

3.6.3 Case Study

Case studies involved on-site visits and in-depth interviews with representatives of special interest groups. Data from case studies were triangulated with questionnaire responses and policy level interview findings to enrich the overall analysis.

3.7 Data Analysis

Quantitative data from the questionnaires was analyzed using statistical tools, while qualitative data from interviews and case studies were analyzed through theme- content data reduction and interpretation. The combination of these approaches allowed for a holistic understanding of the factors influencing the uptake of green energy among special interest groups in Kenya. In the following chapters, the findings from the data analysis will be presented, providing valuable insights into the current state of green energy adoption, and offering recommendations for further enhancement and policy development.

3.8 Summary of the Parameters of Focus

The assessment focused on Special Interest Groups' awareness about green energy, forms of green energy used, frequency of using green energy, and barriers to the use of green energy.

3.8.1 Project Implementation

The project was implemented in Four phases. This is illustrated in Table 3.

Table 4: Project Phases

Phases	Description
Phase 1:	Conceptualization of the project. This entailed building the capacity of the Commission to effectively conduct the assessment
Phase 2:	Execution phase. This involved the development of a communication strategy, design of data collection tools, mapping of study sites, and data collection. The Commission together with the Climate Change Directorate and the Ministry of Energy formulated and aired various messages which were disseminated through radio, social media, and institutional mechanisms. The strategic use of community and national radio stations ensured that the messages were accessible to a wide audience, promoting inclusivity and empowering special interest groups to engage with green energy opportunities. The radio activation campaign utilized nine radio stations to disseminate key messages on green energy, reaching an estimated audience of 59.5 million over the course of one week. A total of 441 messages were aired across the stations, contributing to increased awareness and understanding of green energy initiatives, particularly among SIGs.
Phase 3:	Report writing. This included data analysis, writing of the zero draft of the report and finalization of the report.
Phase 4:	Dissemination. This phase will be conducted last and shall involve dissemination of the findings and follow up on the recommendations

3.8.3 Actual Data Collection

This was conducted in the 10 select counties between September 2020 and December 2021. The team comprised of NGEC team, and technical officers from Ministry of Energy, Ministry of Environment who administered the tools.

3.9 Data Analysis and Report Writing

The quantitative data was coded, cleaned and transformation before analysis. The study employed SPSS and Excel to analyse the quantitative data and the results presented in form of tables, graphs and text.

For the qualitative data, the information was organized in related themes and result drawn for each theme and related content.

Patterns arising from the themes were identified and the summary presented in a narrative form. The narratives expounded on qualitative data, offered alternative explanations, brought to the fore emerging issues or in other cases summarized key drivers and barriers to uptake of green energy solutions among Special Interest Groups

CHAPTER 4

FINDINGS AND DISCUSSIONS

4.1 Demographics

4.1.1 Distribution by Sex, Ability, and Minority Status

Females were the majority of respondents at 54.8%, compared to the males stood at 45.2%. Youth and older members of society comprised 32.6% and 17.1% respectively of the respondents. PWDs and minority groups represented 5% and 1.3% of the respondents respectively.

54.8%	45.2%	32.6%	17.1%	5%	1.3%
Females	*Males*	*Youth*	*Older Members*	*PWDs*	*Minority Groups*

4.1.2 Distribution by Education level

Of the total respondents, those who had attended basic/primary education were 33.8 percent while those with secondary level of education were 31.8 percent; Respondents with post - secondary certificate and degree levels of education were 6.9 percent and 7.7 percent respectively. Presentation of respondents' education levels is presented in Figure 7.

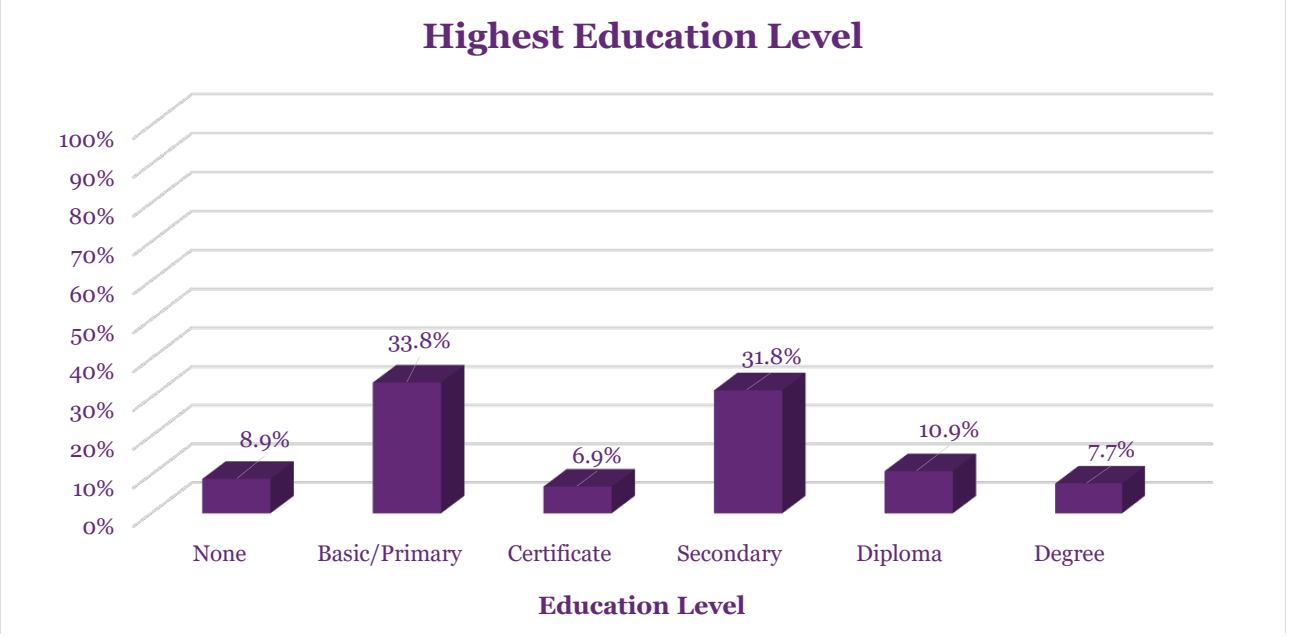


Figure 7: Education level

4.1.3 Distribution of Respondents by County

Kiambu County had the highest number of respondents (153), followed by Uasin Gishu County at 111 respondents. The counties with the least respondents were Machakos and Nyamira with 71 and 72 respondents respectively as summarized in Figure 8.

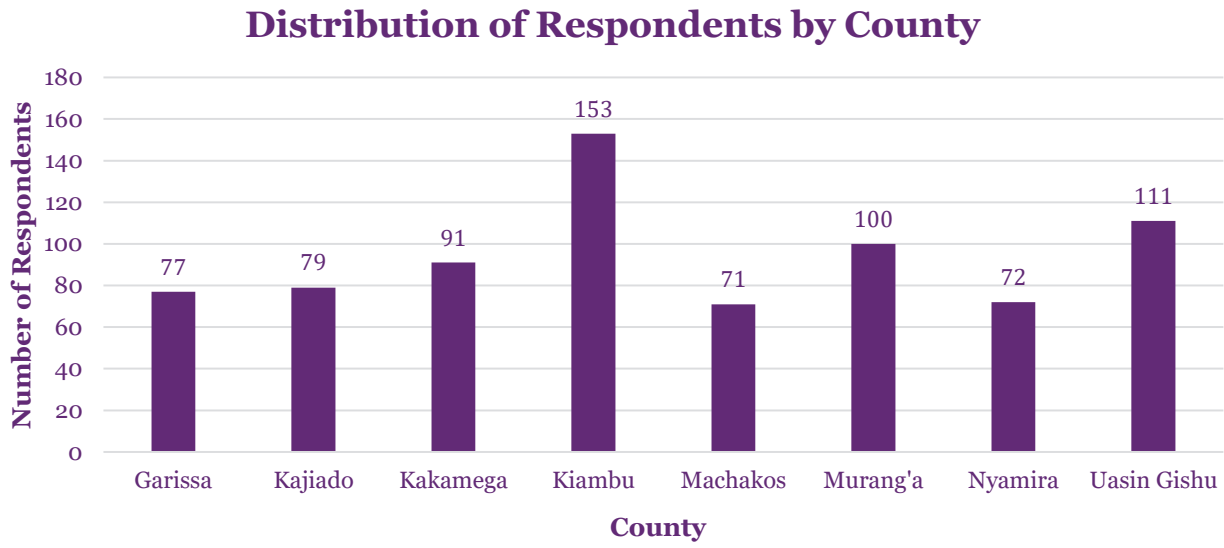


Figure 8: Respondent's County

4.1.4 Distribution of Respondents by Place of Residence

Slightly over half of the respondents (51. 9 percent) lived in rural areas, whereas 24. 4 percent lived in peri-urban areas, and 23.7 percent lived in urban areas.

4.1.5 Usage of Green Energy and Place of Residence in the last 12 months

Respondents in the peri urban areas reported highest usage of green energy in their energy mix at 81.4%; followed by urban areas (75.3%) and rural areas (73.8%). This means one quarter of rural population did not use green energy in the last 12 months. This is shown in Figure 9.

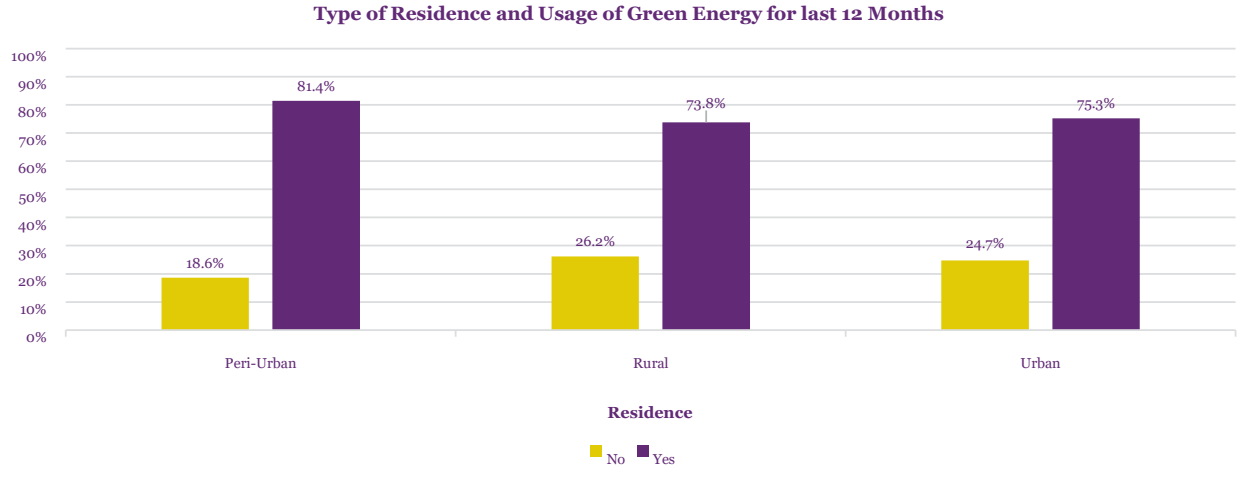


Figure 9: Use of Green Energy in the last 12 months by place of residence.

4.1.6 Distribution of Respondents by Facility Type

The majority of respondents were drawn from households 61%, 38.4% represented business outlets, and 5.6% institutions. This is presented in Figure 10.

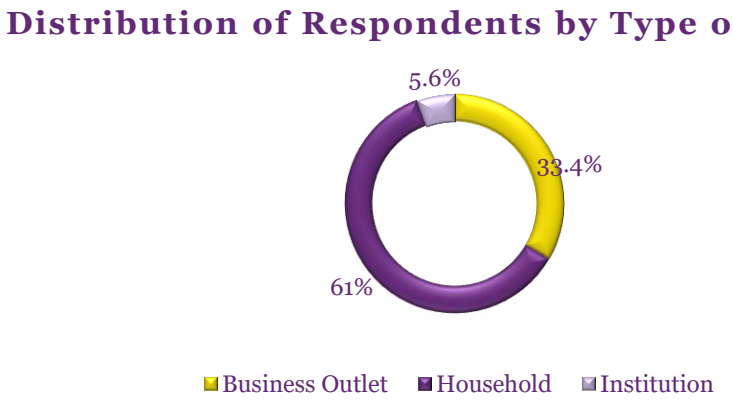


Figure 10: Distribution of Respondents by Facility Type.

4.2 Awareness about Green Energy

Majority of the respondents (84 percent) reported having ever heard about green energy. Figure 11 highlights these findings.

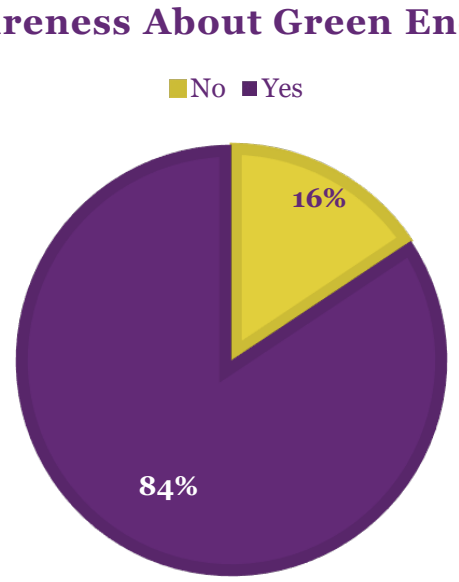


Figure 11: Awareness about green Energy

4.2.1 Nature of Awareness about Green Energy

A majority of the respondents spontaneously cited; solar, LPG, hydroelectricity, biogas, Briquette, Geothermal and ethanol as common forms of green energy.Solar energy was the highest mentioned green energy followed by LPG at 22 percent and 18 percent respectively. Geothermal and ethanol were the least cited green energy forms at 7 percent and 4 percent.

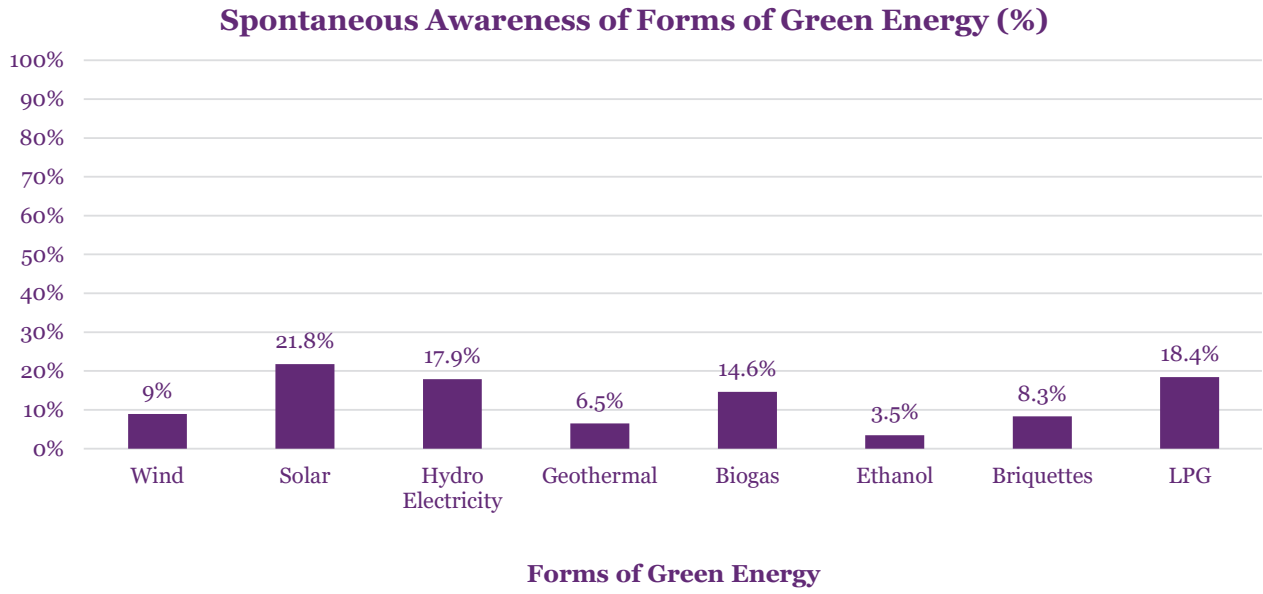


Figure 12: Awareness of different types of green energy

4.2.2 Awareness of Green Energy by Education Level

A cross-tabulation of education level vis-à-vis awareness of green energy showed that degree holders and those with diploma levels of education had the highest awareness level at 97 percent and 93 percent respectively. Those with no education had the lowest level of awareness 25.4percent. This is presented in table 5

Table 5: Correlation between Education level and Green Energy Awareness

	None	Basic/Primary Education	Certificate	Secondary	Diploma	Degree
Frequency	17	54	3	36	6	2
Percentage	25.4%	21.2%	5.8%	14.8%	7.3%	3.4%
Frequency	50	201	49	204	76	56
Percentage	74.6%	78.8%	94.2%	83.6%	92.7%	96.6%

4.2.3 Awareness of Green Energy by Counties

The awareness of green energy by County shows Kiambu County had the highest number of respondents who indicated they are aware of green energy. This was followed by, Kakamega (80), Uasin Gishu (79), and Kajiado (76). On the other hand, Machakos (3) and Kajiado (3) had the lowest number of respondents who mentioned they are not aware about green energy. The analysis is as shown in Figure 13.

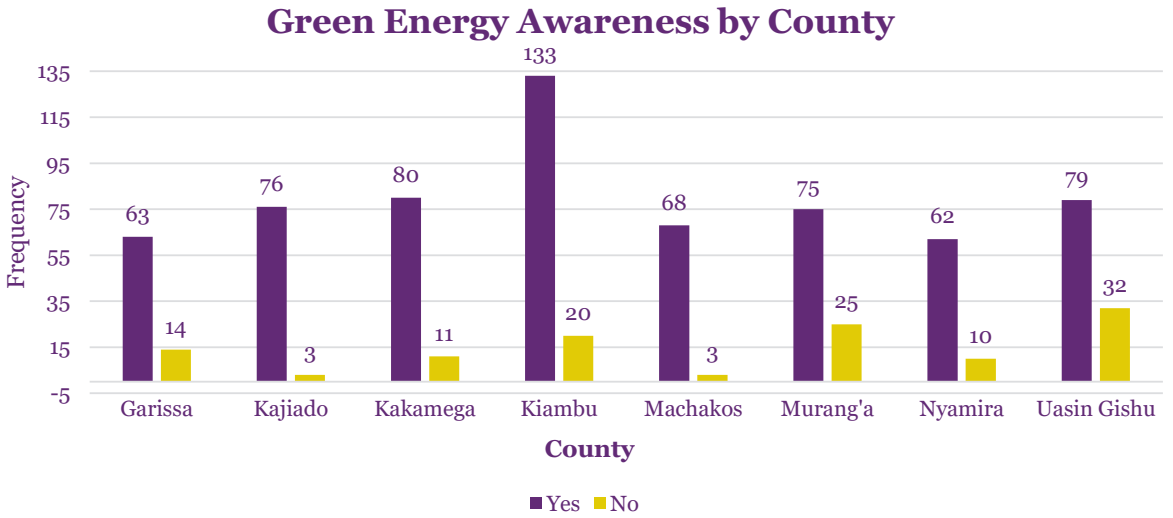


Figure 13: Awareness of Green Energy by County

4.2.4 Sources of Information on Green Energy

Radio is the main source of information on green energy (22%), followed by social networks like friends and chamas (18%), TV (16%), and business/promotions (10%). Print media like newspapers were the least cited (4%) medium of information about green energy as Shown in Figure 14.

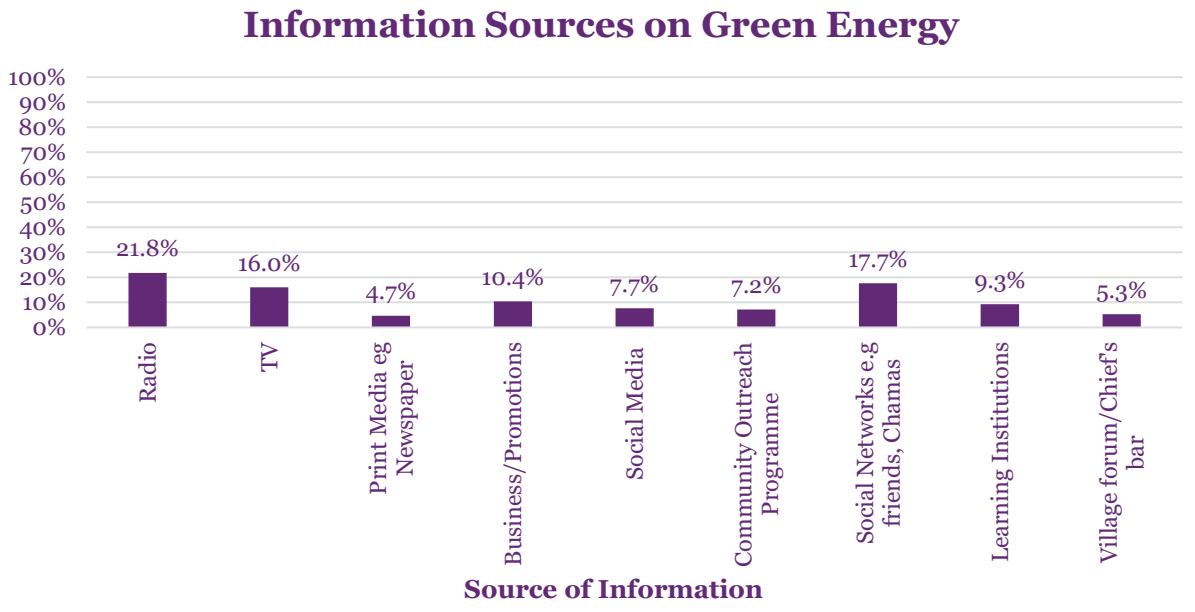


Figure 14: Sources of information on Green Energy

4.3. Forms of Energy Used

Firewood usage was at 20 percent. This was followed by charcoal, electricity, solar at 17.7 percent, 16 percent and 13 percent respectively. Biogas is the least energy type used at 0.2 percent. Figure 15 depicts these findings.

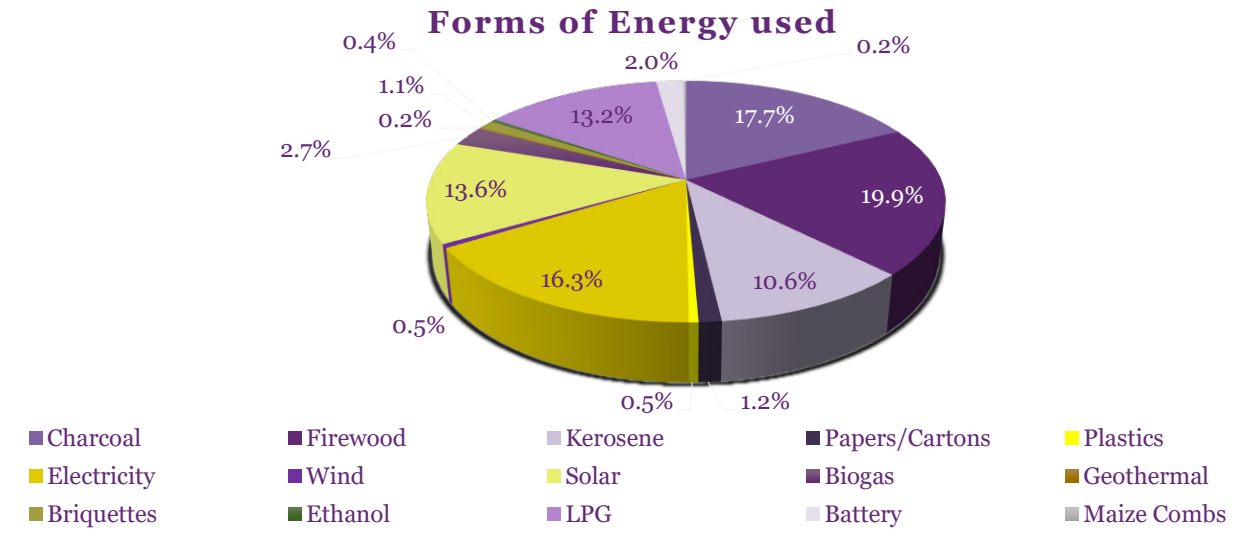


Figure 15: Forms of Energy used in the locality

4.4 Business Ever Used of Any Form of Green Energy

Three-quarter of business entities (76%) respondents stated they ever used green energy solutions

4.4.1 Use and Facility Type

Institutions had the highest usage of green energy in the last 12 months 86%; households 77%, and business outlets 73%. This means nearly one fifth (23%) of households and one quarter (27%) of business outlets were not using green energy. Figure 16 presents these findings.

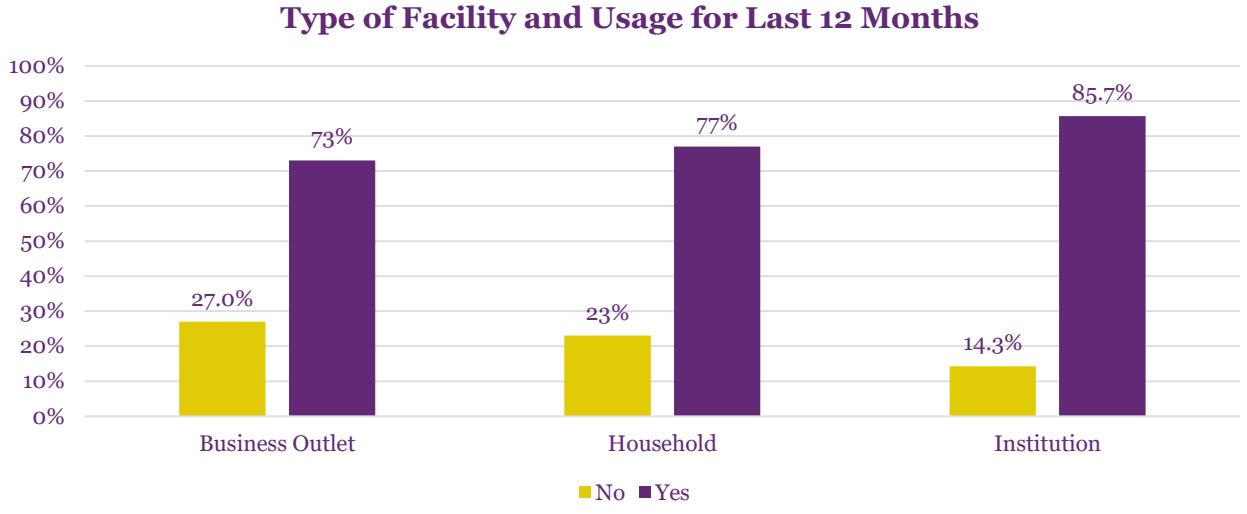


Figure 16: Green Energy usage in the last 12 months and facility type

4.4.2 Use of Green Energy by Special Interest Groups

The use of green energy by SIGs in the last 12 months was at 74% as shown in figure 17. Out of the total number of users of green energy in the in the last 12 months prior to the research, women formed 37% while the youth, Older members of society, Persons with Disabilities and Minority and Marginalized communities were at 25%, 11%, 3% and 1% respectively. Among all the youth interviewed, 77% were users of green energy in the last 12 months prior to the research, while the older members of society, women, Persons with Disabilities and Minority and Marginalized Communities were 67%, 72%, 81% and 90% respectively.

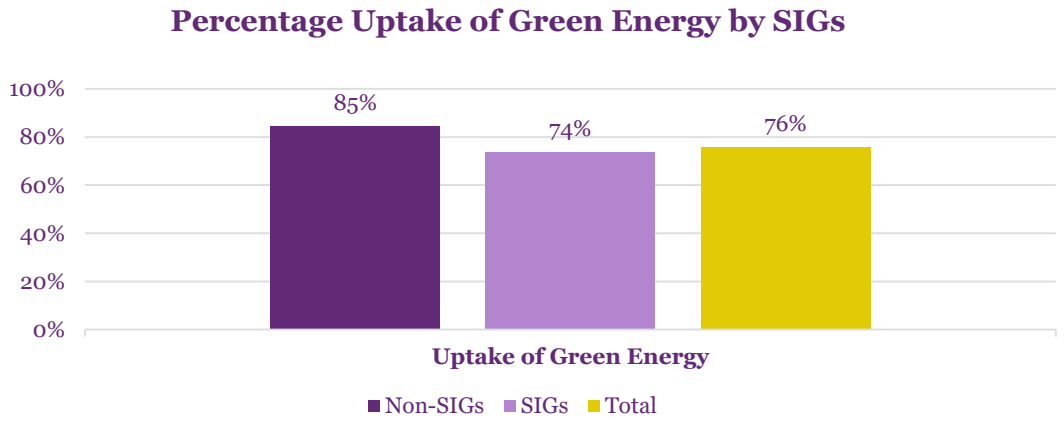


Figure 17: Uptake of Green Energy by SIGs

4.5 Use of Different types of Green Energy

4.5.1 Biogas

The most common use for biogas is cooking 36%, lighting (19%), lighting for security (14%), heating and cooling (10%) respectively. This is illustrated in Figure 18.

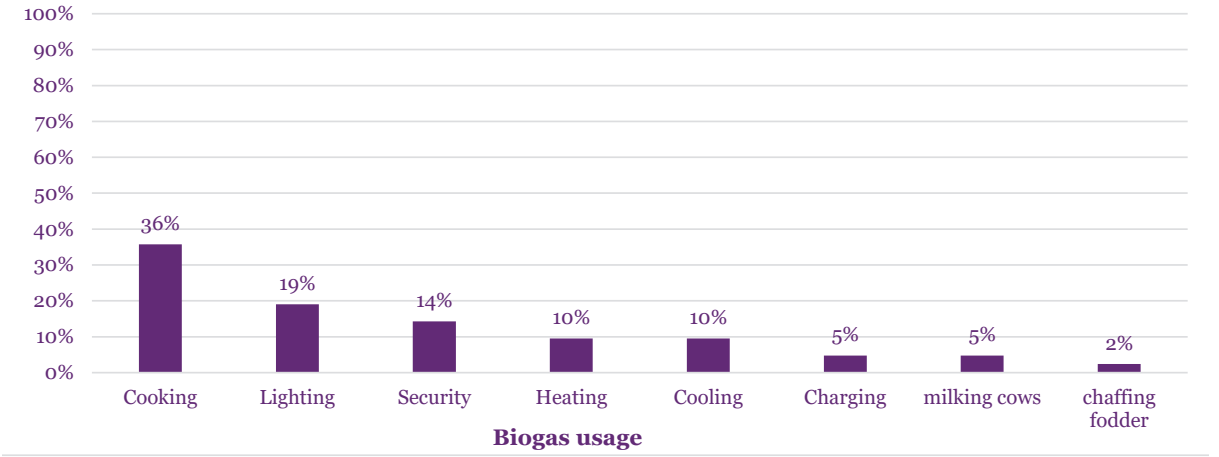


Figure 18: Biogas usage

4.5.2 Wind

Wind is mostly used for lighting and specifically lighting for security 31% each. The least common use of wind energy is heating, 8%. This is shown in Figure 19.

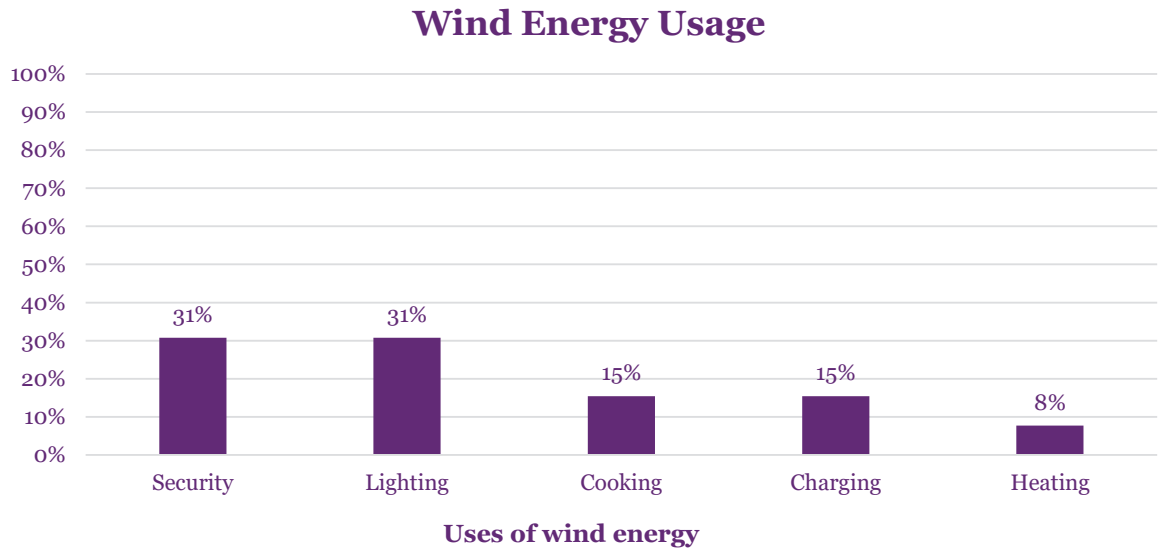


Figure 19: Wind Energy Usage

4.5.3 Solar

Solar energy is mostly used for lighting 51%; followed by running appliances/machines (19%), charging (17%), and security lighting purposes,7%. This is shown in Figure 20.

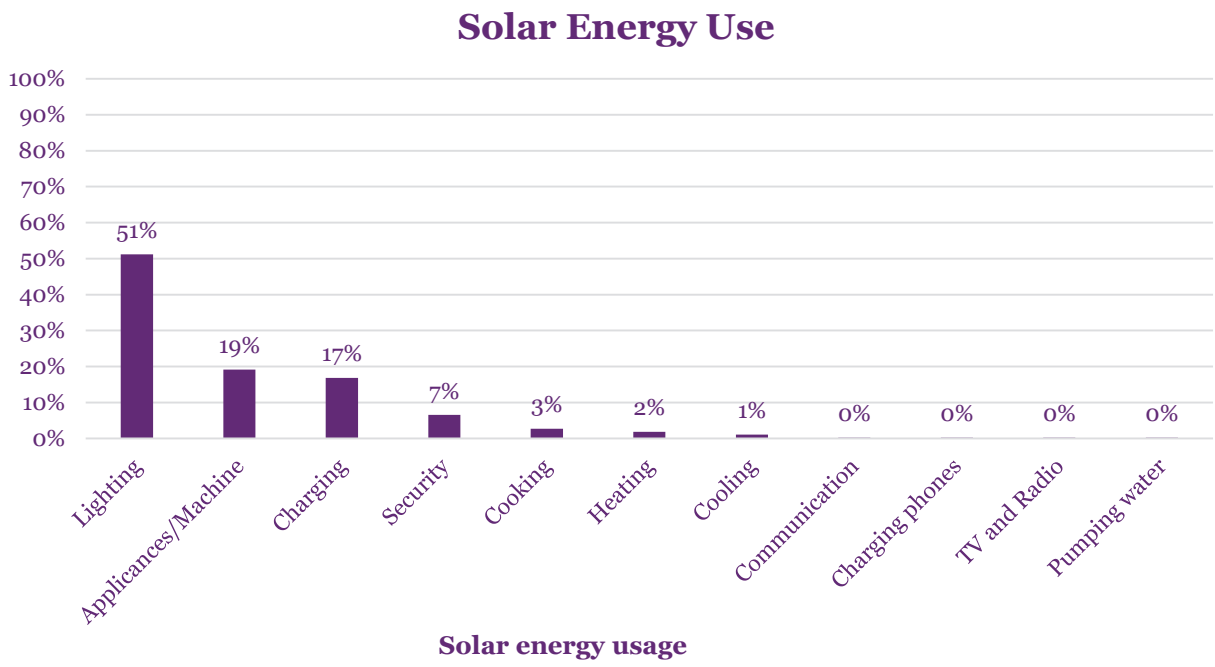


Figure 20: Solar Energy Usage

4.5.4 Liquefied Petroleum Gas (LPG)

LPG is primarily used for cooking (85%), followed by heating (11%). Appliances/machine use, lighting, and cooling each accounted for 1%. Figure 21 depicts the scenario.

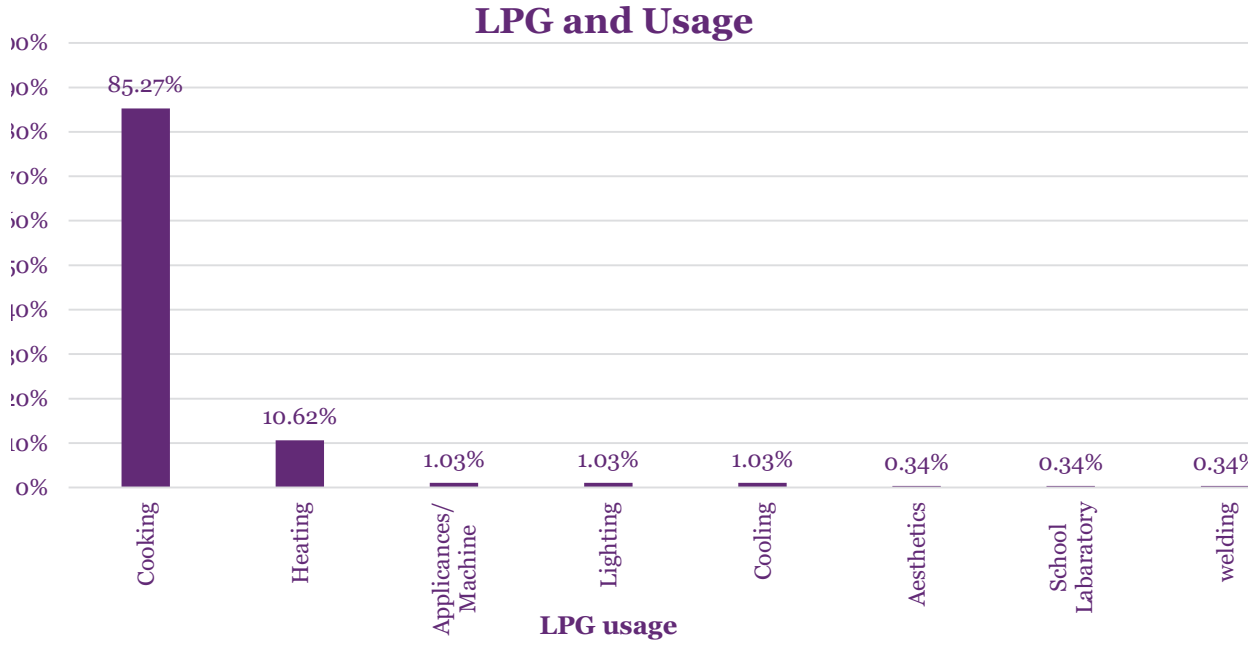


Figure 21: LPG Usage

4.5.5 Electricity

Electricity is mostly used for lighting at 37 percent. This is followed by Appliances/machine use and charging at 22 percent and 14 percent respectively. Figure 22 highlights the results.

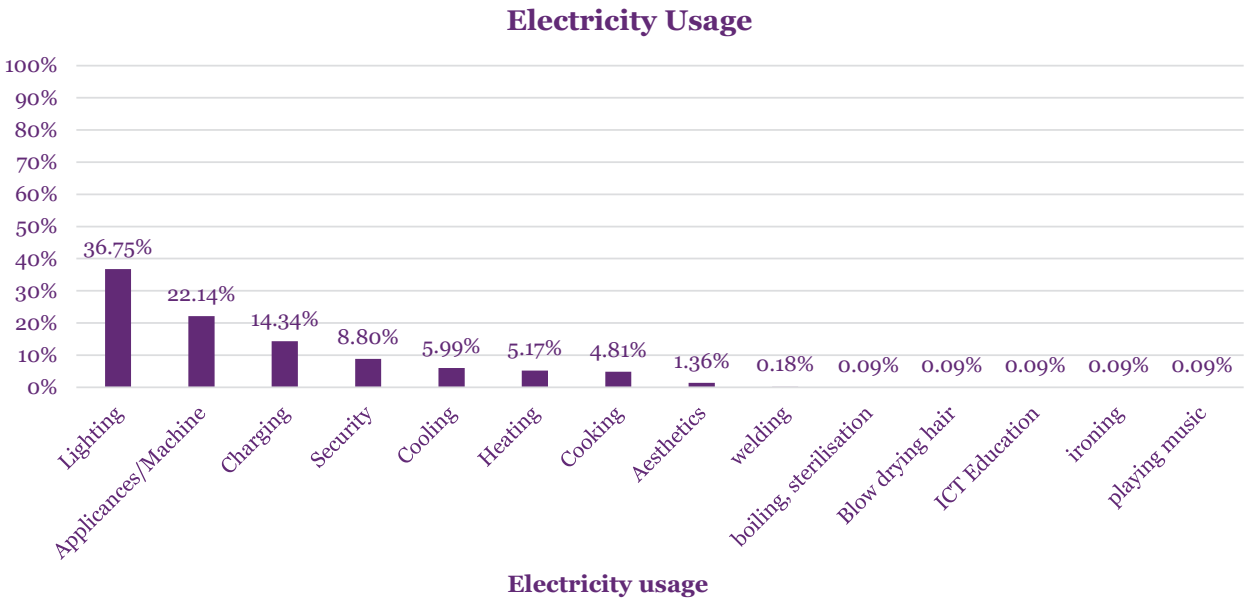


Figure 22: Electricity Usage

4.5.6 Briquette

For Briquette energy, this form of energy is commonly used for cooking at 72 percent. This was followed by heating at 22 percent. Drying is the least usage at 6 percent. Figure 23 shows the results.

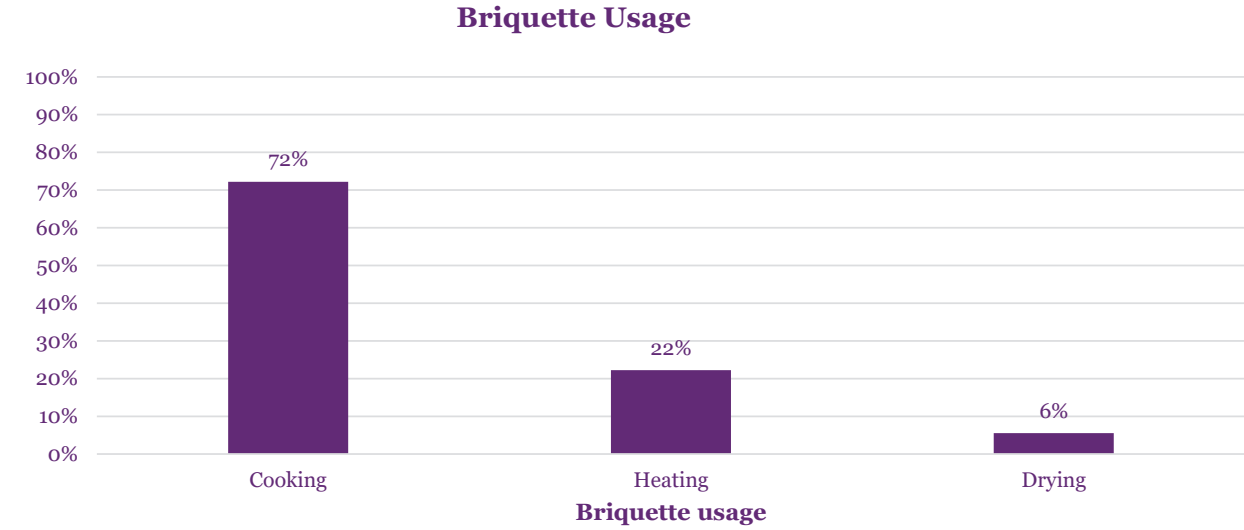


Figure 23: Briquette Usage

4.6 How often Green Energy is used

Irrespective of type of use, 79% of respondents reported using green energy all the time within available energy mix to them, 19% sometimes and 2% rarely used it.

4.7 Challenges Faced When Using Green Energy

Reliability (42%) was the primary barrier to green energy adoption, followed by affordability (41%). Other challenges cited included: the solution requires training to use (8%), unavailability in sufficient amounts that is needed (5%), unsatisfactory results (2.7%), and inappropriate for children/women (1%). This is shown in Figure 24.

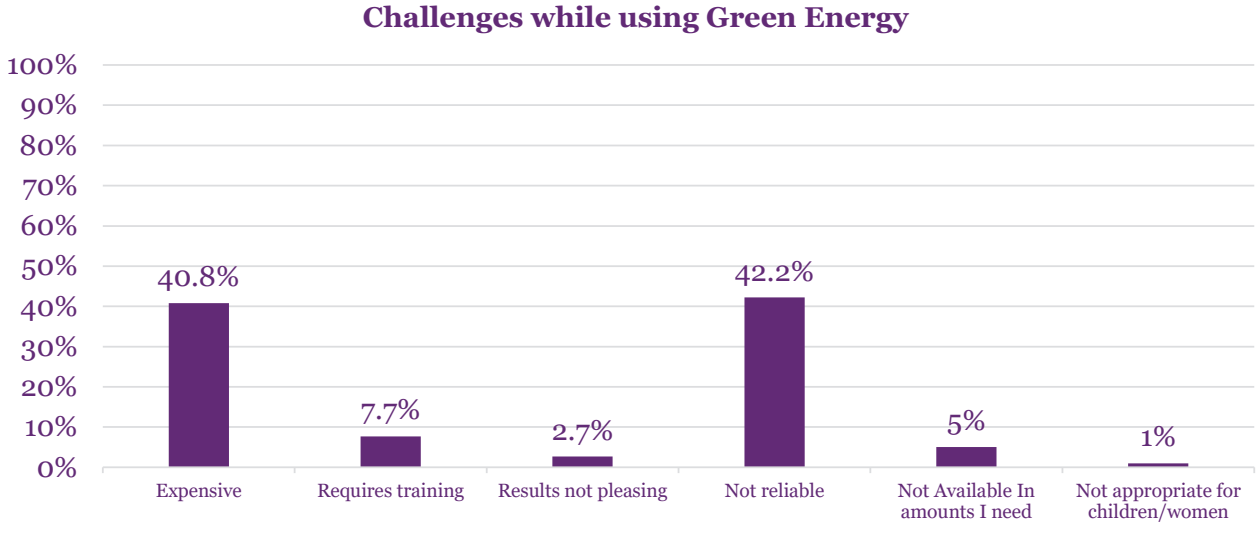


Figure 24: Challenges in using Green Energy

To triangulate the results obtained from the survey, the Commission also conducted Key Informant Interviews (KII), case studies of successful green energy initiatives and interviews with policymakers.

During these interviews, the respondents presented the following barriers SIGs face in their attempt to access and use green energy (Text box 1).

Text Box 1: Barriers (challenges) hampering the usage of Green Energy by SIGs

Case Studies

- Limited access to finance: High upfront costs of green energy solutions can be prohibitive for low-income households and communities.
- Lack of awareness and information: Many SIGs lack knowledge about the benefits and available options for green energy.
- Inadequate infrastructure: Rural areas often lack the necessary infrastructure, such as electricity grids, to support the use of renewable energy sources.
- Limited capacity building and training: SIGs may require training and support to install, operate, and maintain green energy technologies effectively.
- Sociocultural barriers: Traditional gender roles and social norms can hinder women's and other marginalized groups' participation in the green energy sector
- Lengthy government regulation environment.

Policy Interviews

- The initial cost of installing green energy can be very expensive for many households.
- Many households lack the financing mechanisms to purchase green energy.
- Many SIGs have no proper information/ awareness on green energy.
- Restrictive policy environment that curtails access and investments in green energy by households.
- Negative cultural perceptions, like older generations being sceptical about green energy.

To surmount these challenges/barriers and widen access to use of green energy by SIGS, case studies and policy interviews recommended the following:

Text Box 2: Recommendations to overcome Barriers (challenges) hampering the usage of Green Energy

Case Studies

- Government to subsidize poor households to acquire green energy equipment.
- Review of government policy environment and removal of red tapes hampering investments in green energy by households.
- Active private sector participation to ensure affordable solar panels and other green energy kits.
- Deliberate government action to promote uptake of green energy by households like reduced taxation, provision of technical expertise during installations and access to affordable credit to guarantee investment in green energy.
- Awareness campaigns by government and the private sector to enable households have the

Policy Interviews

- Support to women in accessing credit to improve investment in green energy.
- Government needs to subsidize green energy to enable wider access by SIGS.
- Government to reduce taxes on green energy so that as many households can afford.
- There is need to involve SIGs in policy making when it comes to green energy.
- Need to strengthen and enhance partnerships with organizations in the green energy space especially at the county level.

4.8 Ever Switch from Green Energy to non-renewable

Just about three-quarters (72%) of respondents reported ever switching from green energy to non-renewable energy. Only 28% have consistently used green energy

4.9 Why respondents switch from Green Energy to non-renewable

Respondents cited several reasons for switching from green energy to non-renewable sources, including unavailability, unaffordability, unreliability, inability to meet their needs, and limited functionality. Twenty-five percent of respondents identified the unavailability of green energy as the main reason, while 24% cited unaffordability. Only 0.7% mentioned that their partner or household members did not prefer green energy. Figure 25 illustrates these findings.

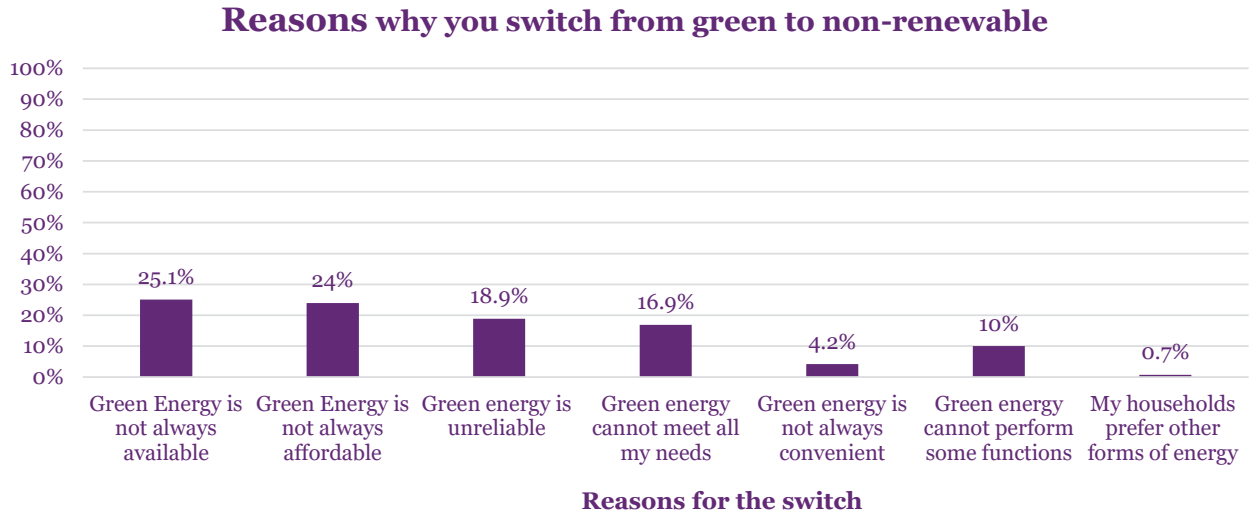


Figure 25: Reasons for the switch from green energy to non-renewable

4.9.1 Intend to use Green Energy in the future

Most respondents (93%) said they intend to use green energy in the future, while only 7% did not. Figure 26 highlights these results.

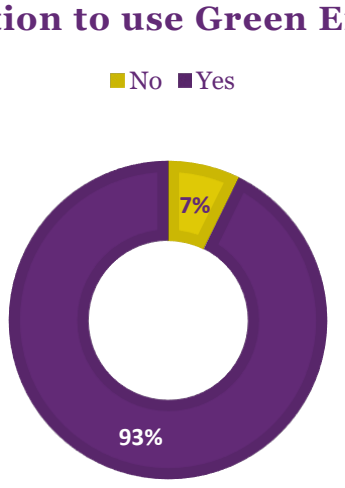


Figure 26: Intention to use green energy in the future

The results on the intention to use green energy were also corroborated by Key Informant Interviews- Case studies and Policy Interviews. The respondents enumerated the following as their motivation to adopt green energy and also the interventions needed to increase the uptake of green energy. Their sentiments are herein captured in Text Box 3.

Text Box 3: Interventions to increase green energy usage

Case Studies

1. Motivations for adoption of green energy:

» Use of green energy creates employment opportunities- like businesses operating for longer and youths doing installations inter alia.

» Low cost/ are affordable.

» Green energy doesn't pollute/ are environmentally friendly.

» Green energy is efficient and reliable.

» County government support to households.

2. Benefits attributable to adoption and use of Green Energy

» Green energy creates job opportunities

» Green energy is affordable and hence households are able to enjoy energy at lower cost.

» Green energy has minimal maintenance cost.

» Green energy brings improved health outcomes due to no pollution hence reduction in respiratory diseases.

» Green energy is easy to use.

Policy Interviews

1. Interventions to increase Green Energy

» Government needs to subsidize green energy such as LPGs to ensure environmental deforestation is low.

» Robust awareness campaigns targeting groups such PWDs.

» Policy reforms and allowing the private sector to venture into green energy business.

» Government needs to promote investments in green energy.

1. Interventions to increase Green Energy

» Inclusion of PWDs DPOs in sensitization programmes.

» Financial grant to PWDs to venture into green energy.

» Youth, Women and rural population have been involved in the development of policies, regulations, and standards.

» The youth, women and rural population have also been involved in production and promotion of green energy solutions.

4.9.2 Why Respondents Would Not Intend to use Green Energy

Figure 27 presents the reasons as why the respondents indicated they have no intention to use green energy. We have delineated them in terms of common reasons and other reasons. Based on the analysis, common reasons for not using green energy (not safe, not readily available, expensive, and not dependable) accounted for 81%. On the other hand, other reasons (not) convenient, time consuming, requires skills and technical know-how, breaks down easily, not easy to use by women and children, and not accepted in my household) accounted for 19%. This is as shown in Figure 27.

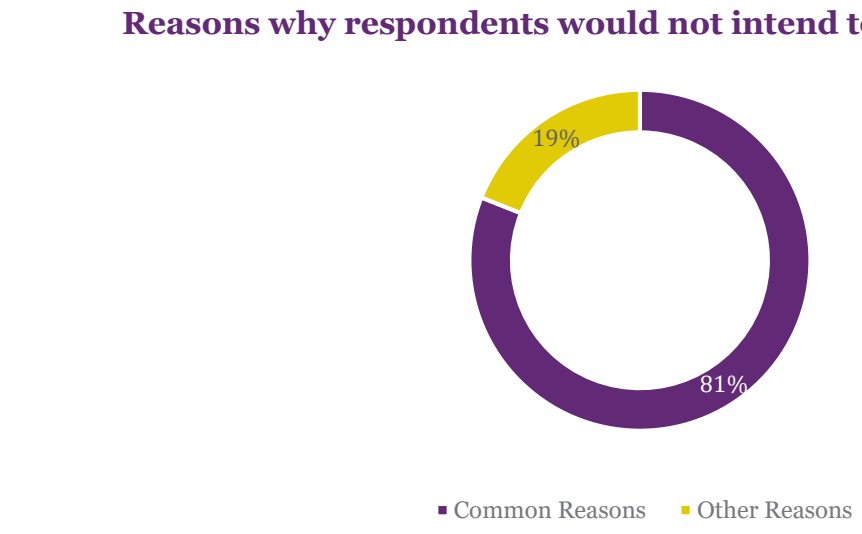


Figure 27: Reasons for not intending to use green energy

4.9.3 Heard about Green Energy Projects/programs by governments and other actors

When asked about green energy projects or programs by governments, NGOs, or other actors in their area, 52% of respondents said they were aware, while 48% said they had not heard of such projects.

4.9.4 Programmes Heard about Green Energy

When asked about green energy efforts or programs in their area, 25% of respondents most frequently mentioned the provision of subsidies. This was followed by payment in instalments and the connection of community facilities like schools and health centers, each at 18%. The least mentioned were local innovations at 1% and plans to generate green energy in the area at 3%. Figure 28 depicts these results.

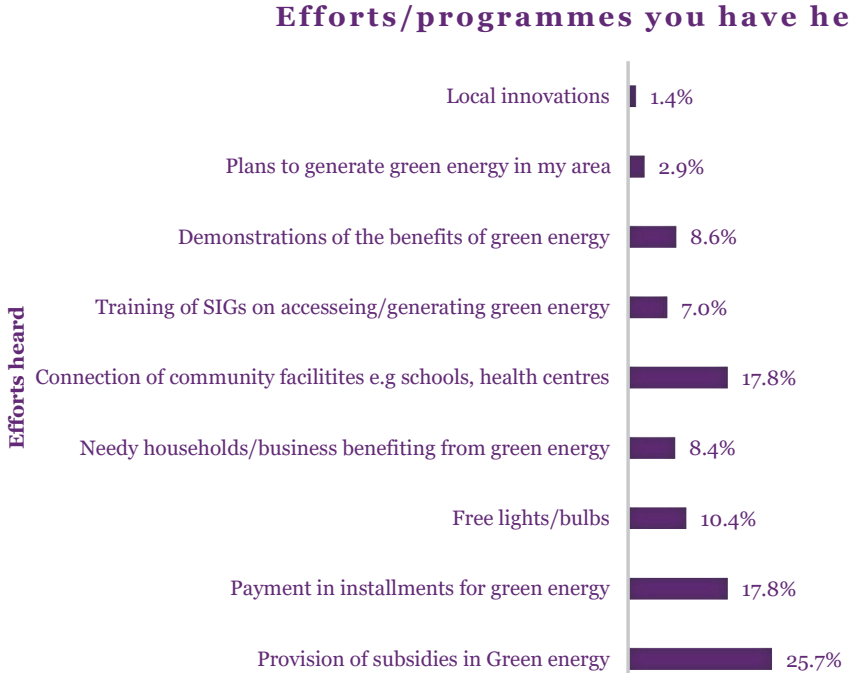


Figure 28: Heard about green energy in their area

4.9.5 Perceptions on Green Energy

Forty-two percent of respondents cited saving money as the most common perception about green energy. Thirty-one percent strongly agreed that green energy is expensive, while 32% agreed. On the other hand, 45% strongly agreed that green energy can improve the standard of living, compared to 37% who agreed.

Regarding gendered perceptions, 62% of respondents strongly disagreed that green energy is unsuitable for women. Additionally, 56% disagreed with the idea that green energy is not socially accepted in their community. Respondents also expressed confidence in their ability to use green energy, with 38% strongly disagreeing and 36.5% agreeing with the statement that they feel incapable. Figure 29 shows other perceptions.

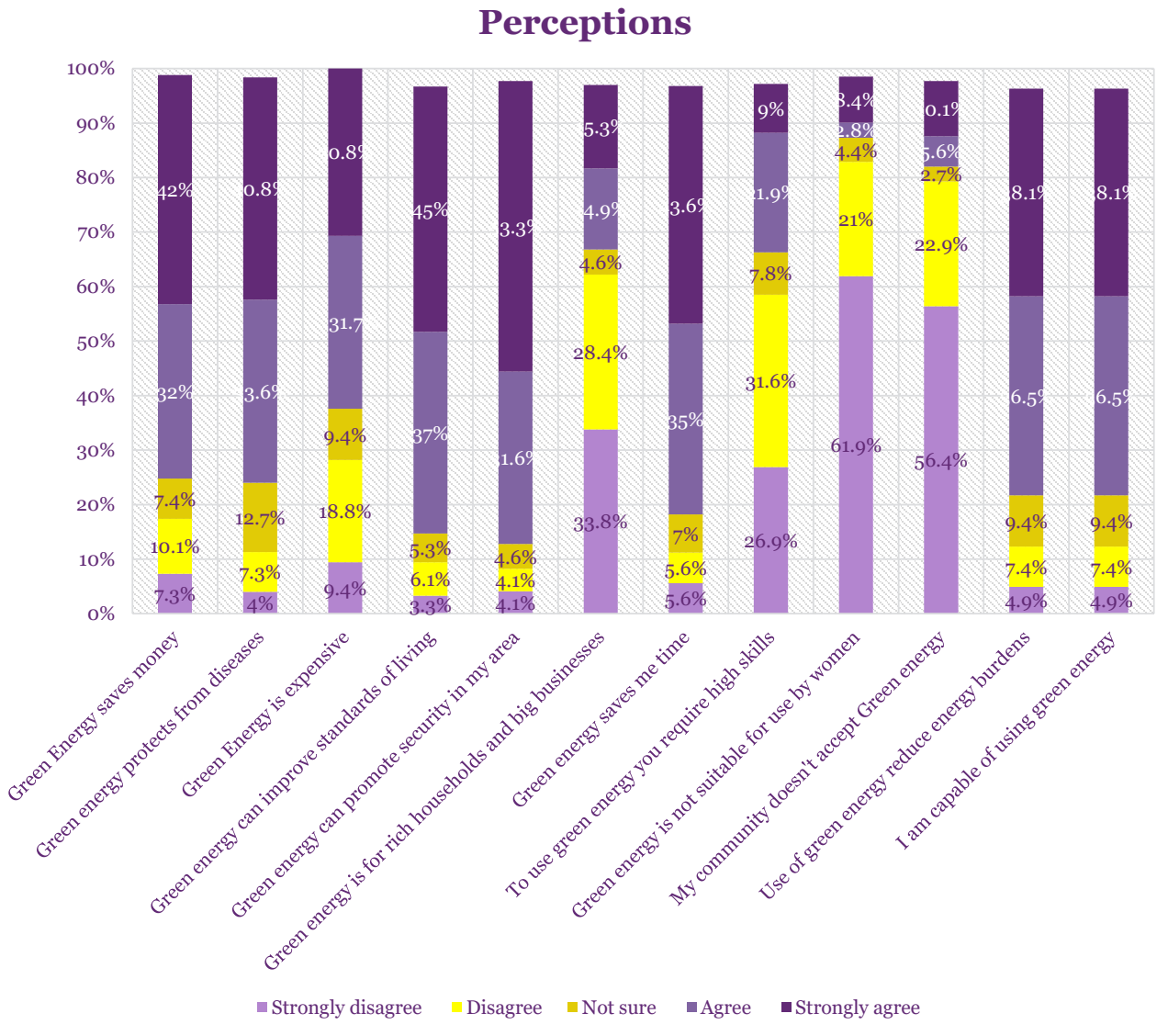


Figure 29:Perceptions on Green Energy

CHAPTER 5

CHAPTER FIVE | DISCUSSIONS

With the energy sector being a significant source of environmental impact, it is natural to expect that a variety of interest groups would be involved in energy-related environmental issues. Classic environmental groups would be concerned with the ecological impacts of energy production and try to steer the energy mix to options that are less damaging to the environment. Consumer groups may be concerned about the affordability of energy, while various industry groups will be concerned with how energy policies affect their members in the energy sector. This study focuses on a specific type of group, those that are themselves engaged in energy production, and attempts to assess the impact of their involvement on the prospects for "green energy" in Kiambu, Murang'a, Kajiado, Machakos, Garissa, Kakamega, Uasin Gishu, and Nyamira counties.

The primary objective for deploying renewable energy in Kenya is to advance economic development, improve energy security, improve access to energy, and mitigate climate change. Economic considerations can sometimes be more immediate and pressing for individuals with lower income and education levels than those individuals with higher education. Lower-income individuals may be more motivated by the economic benefits of green energy. For example, installing solar panels or adopting energy-efficient practices can lead to cost savings on energy bills. In some cases, government and private entities incentives and subsidies for green energy adoption may make these technologies more accessible to individuals with lower income levels. These incentives can include rebates, or other financial support programs locally termed *'malipo pole pole,'* making green energy options more appealing and feasible for those with limited financial resources especially in rural areas.

Green energy often involves complex challenges. Individuals with a higher education level, probably having higher incomes and staying in the urban and or peri urban areas may be better equipped to analyze, solve these problems, and afford them. The results of this study showed that green energy adoption was highest in the peri urban. This is followed by those in the urban areas, while those who stayed in the rural areas had the lowest adoption rate. Those residing in the rural areas may lack the necessary knowledge and information on, and the financial muscles required to invest in, green energy.

It is important to point that rural areas, may have more abundant natural resources, such as open land for solar installations and accessibility to fuel wood biomass for bioenergy and cattle dung for biogas production. This makes green energy solutions practically feasible in these locations. Further, in many cases, rural areas have higher dependence on agriculture and natural resources for the local economy. Thus, adopting green energy practices, such as solar or wind power, provided an increase in economic benefits and energy independence for rural communities' livelihoods and businesses. In an effort to improve the plight of the rural poor in Kenya, the government has made progress in efforts to decentralize energy delivery through various policy and legislative acts to guarantee green energy access by the rural poor.

An intermediate and appropriate step forward is the development of mini-grids, which can bridge the gap between the expensive-to-extend national grid and stand-alone home systems. Step-wise, all of these efforts are aiming to provide energy access to the rural poor. However, the energy sector is liberalizing, and it can be said that the full impact of these initiatives on special interest groups, s pecifically the rural poor, is yet to be fully realized. To achieve this, access to clean, reliable, and affordable energy should be at the core of rural transformation in Kenya. Energy is key to driving economic development and improving

human welfare. It greatly affects productivity, education, and health, and is essential for overall poverty reduction. Currently, energy access in rural Kenya is largely unsustainable. The rural poor are disadvantaged, paying high prices for low-quality forms of energy. This is due to the situation that marginalized areas are often not connected to the national grid and forming off-grid communities that energy providers are unwilling to invest in due to low anticipated returns.

Rural communities often have close-knit social structures, and decisions related to energy adoption and other local roles. Village groups sensitization would promote better and efficient awareness and education although there might be specific outreach programs and channels used targeting these communities to raise awareness about the benefits of green energy hence a higher response rate from rural residents in this research study. If there is a collective interest in sustainable living, it led to a higher percentage of respondents adopting green energy practices in rural areas. This was aided by communication strategies prevailing in these areas such as women groups or 'merry-go-round' groups, *'chamas,'* church groups compounded by announcements in local meetings *'barazas,'* church, market days and announcements in schools.

Urban and peri-urban areas may face infrastructure challenges that can affect the adoption of certain green technologies (Gómez-Villarino, 2020). For example, installing solar panels might be more straightforward in areas with less dense infrastructure and fewer regulatory hurdles from Government agencies like EPRA. Rural areas may prioritize energy independence, and green energy solutions like solar panels or small-scale water turbines to offer more self-sufficiency. This motivation might be less pronounced in urban areas where centralized energy grids are more prevalent and promoted by private agencies and businesses promoting their products in- difficult to- reach areas and self-help groups/women groups. This is also evident with Government agencies such as the Ministry/Department of agriculture that promotes seed distribution through incentivizing or subsidies; farmers with a solar lamp or spray pump.

Kenya has been making efforts to diversify its energy mix and increase its share of renewable energy in recent years. Government policies and incentives can significantly affect the adoption of different energy sources. In some cases, there may be more support or incentives for mainstream electricity generation methods other than wind or ethanol. Ethanol and wind energy infrastructure might require significant investment and development, and their accessibility may be limited in certain areas. The initial setup costs and ongoing maintenance of ethanol and wind energy facilities can be higher than that of electricity, which is produced by the national government grid, which may make it less economically viable in the long term. Wind and solar can be intermittent, depending on weather conditions, posing a challenge for their storage; hence some areas may prefer to rely more on continuous power sources like electricity.

Innovation and advancements in technology play a significant role in the adoption of different energy sources if they are efficient technologies that could influence their use. The availability of raw materials for ethanol production or suitable locations for wind farms might vary depending on resource availability that could limit the widespread adoption of these energy sources.

The choice between electricity for lighting and charcoal or firewood for cooking and heating in Kenya, is influenced by various factors, including economic, cultural, and infrastructural considerations. Economically, the cost of electricity can be relatively expensive, especially for daily cooking and heating needs. Charcoal and firewood, on the other hand, may be more affordable options for many households and businesses because it is readily available

in many parts of Kenya. Local forests and sustainable harvesting practices often make these wood fuel accessible to many local communities. In contrast, the availability of electricity may be limited in certain areas. In addition, the initial cost of setting up an electricity connection and the ongoing electricity bills can be a significant factor in people's decision-making on their choice of energy utilization.

In some regions of Kenya, there may be limited access to electricity, particularly in rural areas. In such cases, people rely on traditional sources of energy like charcoal and firewood, which are more readily available. Expanding electricity infrastructure to remote areas can be a slow process, and until then, people continue to use traditional fuel wood. Culturally, many traditional cooking methods using open fires or stoves fuelled by charcoal or firewood are deeply ingrained in many Kenyan cultures. These methods have been passed down through generations and are often associated with cultural practices, rituals, and certain foods such as 'Nyama choma, mshikaki, and mahindi choma.' Switching to electricity may require a change in long-standing cultural habits and practices. In some cases, the lack of appropriate cooking appliances that utilize electricity may be a barrier. The market for electric stoves, for example, may not be as developed or accessible in certain regions while in other remote locations the electricity supply may be unreliable and intermittent with frequent power outages or fluctuations. This can make people hesitant to fully rely on electricity for cooking and heating, leading them to use non-renewable fuels such as kerosene and ethanol as a backup or alternative.

An overwhelming 46 percent of respondents cited unaffordability as the primary reason for their hesitancy to embrace green energy solutions. While those who mentioned green energy not being available were second at 19 percent and not being dependable stood at 13 percent. Given the significance of the obstacle cited of unaffordability and unavailability, it would be paramount to strategize and collaborate to develop targeted solutions that address the affordability and availability concerns specific to the Kenyan context through engaging with relevant government bodies to explore the possibility of introducing incentives, subsidies, or tax breaks for individuals and businesses investing in green energy. Subsequently, aligning with government initiatives in various sectors can significantly alleviate financial burdens by collaborating with financial institutions to design localized financing programs tailored to the economic conditions in Kenya. This could involve low-interest loans, flexible payment plans, or partnerships with local banks to facilitate easier access to financing MSMEs. To achieve this, it would be key to develop community-focused initiatives.

Respondents who said they intend to use green energy in the future were the majority at 93 percent. This is an encouraging insight that green energy in Kenya indicates a strong willingness to transition towards environmentally friendly energy solutions. This could have been due to enablers such as inclusive policies and regulations that support and incentivize the adoption of green energy creating an enabling environment, with the aspirations of the majority who expressed a desire for green energy. Another reason was education and awareness campaigns to reinforce the benefits of green energy adoption. Providing information on the positive environmental impact, potential cost savings, and the accessibility of green technologies can further solidify the intention to transition.

To capitalize on this enthusiasm and facilitate the actualization of these intentions, this study developed and implemented target green energy infrastructure to make it more accessible to the majority. This could involve expanding renewable energy projects, improving grid connectivity, and facilitating community-based initiatives that empower individuals to embrace sustainable energy sources with industry stakeholders, including green energy providers, to establish partnerships that can bring innovative and affordable solutions

to the market. Collaborations can enhance the variety and accessibility of green energy options available to the eco-friendly consumers.

The awareness level on existing efforts and initiatives on green energy knowledge was attributed to programs that not only raised awareness but also built the capacity of community members to actively participate in and benefit from green energy projects. This could involve training sessions, skill development programs, and capacity-building workshops and events about ongoing green energy projects. These sessions served as platforms for dialogue, answering queries, and addressing any misconceptions. However, there is need for investing in communication channels such as community outreach, social media, and local newspapers and more radio programs especially the vernacular ones to disseminate information about green energy initiatives actively and reach a wider audience. Also, establish feedback mechanisms to gauge community perceptions and concerns regarding existing green energy initiatives. This two-way communication can help refine and improve programs based on community feedback. It will not only raise awareness but also build the capacity of community members to actively participate in and benefit from green energy projects. By strategically addressing awareness levels, this can foster a more informed and engaged community that actively participates in and supports green energy initiatives.

A significant number of respondents (40 percent) reported being aware of local innovations related to green energy, making it the most recognized category among the options provided. This insight emphasizes the importance of acknowledging and supporting grassroots initiatives that contribute to sustainable and eco-friendly practices within the community. To leverage this positive awareness and encourage further participation, the study recommends acknowledgement and celebrating local green energy innovators through public recognition events, awards, or features in local media. Highlighting their contributions can inspire others and create a positive narrative around green energy. Additionally, facilitate networking opportunities between local innovators, relevant stakeholders, and organizations working in the green energy sector. This can foster collaboration, resource sharing, and the scaling up of successful initiatives. In the meantime, provide support for capacity building, training, and skill development for local innovators to enhance the impact and sustainability of their initiatives and encourage the replication of successful local innovations in neighboring communities. Sharing best practices and lessons learned can accelerate the adoption of green energy practices across the region. It is important to note that these perceptions may vary among different segments of the population, can change over time and ongoing communication, education and community engagement efforts play a role in shaping public attitudes, maintaining and enhancing positive perceptions toward green energy in Kenya.

The study also recognized the importance of renewable energy in addressing environmental challenges, such as climate change and air pollution. The country's significant investment in renewable energy projects, such as geothermal and wind power, was viewed positively. There is support for large-scale renewable energy projects, such as geothermal and wind power initiatives. These projects are seen as contributing to a cleaner and more sustainable energy future for the country. There is an understanding that investments in green energy can stimulate economic growth by creating job opportunities and attracting investments in the renewable energy sector. Green energy initiatives, particularly those focused on off-grid solar power solutions, are contributing to increased access to electricity in rural areas. This is generally well-received as it improves the quality of life for those who previously lacked reliable power sources. Some perceptions emphasize the importance of community involvement and empowerment in renewable energy projects. Local

communities are increasingly being involved in decision-making processes and benefiting from the projects in terms of jobs and infrastructure development.

While there is support for green energy, challenges such as intermittent power supply and the need for energy storage solutions are acknowledged. Affordability remains a concern for some individuals, and there may be perceptions that renewable energy technologies are expensive, although this is changing with decreasing costs over time. Public perceptions are influenced by the government's commitment to green energy, as reflected in policies, targets, and investments in renewable energy projects. Many people in Kenya appreciate the role of green energy in environmental conservation. This includes reducing reliance on fossil fuels and mitigating the impact of climate change. Perceptions are often shaped by education and awareness campaigns that highlight the benefits of green energy and the importance of sustainable practices. Positive perceptions are often associated with technological advancements in renewable energy, such as the use of innovative solutions like solar home systems and mini-grids. Innovation hubs and incubators fosters the development of new and innovative green technologies. These centers support start-ups and entrepreneurs working on sustainable solutions. Upgrading and modernizing the power grid to accommodate renewable energy sources is essential. Smart grid technologies help manage and integrate variable renewable energy inputs more efficiently. Kenya's commitment to international agreements and goals related to clean energy, such as the Paris Agreement, can positively influence public perceptions as it aligns with broader international efforts to combat climate change.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.0 Conclusion

Kenya has made significant strides in recent years towards adopting green energy sources like solar, wind, and geothermal power. However, ensuring equitable access and benefits from this transition for all Kenyans, including special interest groups (SIGs), remains a challenge. This assessment has examined the current state of green energy uptake among SIGs in Kenya and identified potential strategies for mainstreaming equality and inclusion in the MEIGE agenda. Mainstreaming equality and inclusion in Kenya's green energy transition is not just an ethical imperative but also a strategic necessity for ensuring sustainable and inclusive development.

By addressing the unique challenges faced by SIGs and implementing targeted interventions, Kenya can harness the full potential of green energy to create a more equitable and prosperous future for all its citizens. This study identifies some discrepancies in access to resources and support services among different groups which has led to unequal opportunities for adopting green energy technologies. Variations in policy implementation and enforcement in the counties could result in disparities in the availability and affordability of sustainable energy solutions for women, youth, PWDs, and marginalized communities.

Targeted thematic interventions and policies to promote inclusive and equitable access to green energy technologies for all segments of the population in Kenya were developed to gain a more comprehensive understanding of the challenges and opportunities faced by these groups in accessing and adopting sustainable energy solutions.

1.	Access to Information and lack of awareness about green energy technologies may hinder uptake among women, youth, PWDs, and marginalized communities.
2.	Affordability, financial constraints and the high upfront costs of green energy technologies can be a barrier to adoption for these groups.
3.	Limited infrastructure and access to energy services in rural and underserved areas may impact the uptake of green energy technologies.
4.	Gender norms, social perceptions, and sociocultural practices can influence the willingness of women, youth, PWDs, and marginalized communities to adopt green energy solutions.

In summary women and youth may face specific barriers related to access to education, decision- making power, and economic resources that affect their ability to adopt green energy technologies. Persons with disabilities may encounter challenges related to physical accessibility, affordability, and the availability of inclusive energy solutions.

While the marginalized communities may have unique needs and preferences that should be considered in the design and implementation of green energy programs. Thus, to promote inclusive and equitable access to green energy technologies and for sustainable interventions and policies, the following recommendations were made.

6.1 Recommendations

6.1.1 National Government

1. Usage of green energy remains low in rural households. Biomass fuels, particularly charcoal and firewood, remain the most widely used forms of energy by Special Interest Groups. To address this, it is essential to develop and implement targeted programs that focus on removing barriers such as socio-cultural norms that inhibit adoption of green energy solutions to the adoption of clean cooking solutions. For instance, address the belief that certain foods can only be cooked using a particular form of energy for it to be flavourful and encourage total adoption of green energy by households and institutions for all their energy needs.
2. The government should implement policies aimed at expanding access to green energy across the country, with a particular focus on the most vulnerable populations who may lack the financial resources to afford green energy sources.
3. Green energy usage in the households is low as compared to institutions. Green energy requires an initial investment capital that households may not have as compared to institutions thus there is need to come up with interventions that target households in the transition to clean energy.
4. The government needs to put in place policy measures to ensure green energy and clean cooking fuels and technologies are affordable, of good quality, and have the highest efficiency for sustainable use of clean fuels to cure the issues of unreliability and unaffordability. Further there is need to enhance and expand subsidies for green energy adoption to ensure they are commensurate with household and business incomes. This could involve scaling subsidies to match income levels, providing targeted financial support for low-income groups, and introducing innovative financing models.
5. Nearly half of the respondents were unaware of green energy projects/programmes whether by government or non-governmental organizations. As such there is a need to create awareness about green energy solutions/projects to Special Interest Groups namely; the youth, the elderly, women, persons with disabilities, and minority and marginalized communities. Uneducated Special Interest Groups (SIGs) should receive special attention. Additionally, the SIGs should be involved in green energy project cycles to ensure their; needs are catered for, contributions incorporated, and that they benefit from such initiatives. The national government should enhance the strategies for mainstreaming equality and inclusion in the existing programmes.
6. The results indicate widespread energy stacking among households, businesses, and institutions. To address this, it is essential to develop comprehensive programs that promote a complete transition to green energy solutions. These programs should focus on increasing affordability, accessibility, and awareness of sustainable energy options while addressing the specific needs and preferences of diverse energy users.
7. The study reveals unfavourable regulatory framework that prohibit off-grid power producers from distributing to their neighbours without a license. There is need to review the regulatory framework, particularly Section 139 (3) of the Energy Act, 2019, to allow producers of green energy to distribute excess energy to their neighbours. This adjustment will enable energy distribution in areas smaller than the current threshold of one-quarter of a square kilometre, thereby promoting greater uptake

of green energy solutions and encouraging localized energy sharing for sustainable development.

8. Mainstream the needs for Special Interest Groups in energy initiatives ranging from policies, plans, budgets and programmes.
9. Design affirmative action programmes in the energy sector to increase uptake of green energy among Special Interest Groups.
10. Enhance the collection of disaggregated data for furtherance of access to green energy by various categories of SIGs in national green energy programmes.
11. Provide incentives such as grants, scholarships, or job opportunities in the green energy field to motivate the youth to adopt and promote sustainable energy solutions.
12. Partner with disability organizations and advocacy groups to ensure that green energy initiatives are inclusive and address the unique requirements of PWDs.
13. Consider the needs of nomadic communities whose access to energy may be inconsistent due to their mobility in the rollout of green energy solutions.
14. Develop mechanisms for recognizing innovations in green energy solutions.

6.1.2 County Government

1. Mainstream the needs for Special Interest Groups in energy initiatives ranging from policies, plans, budgets and programmes.
2. Design county specific affirmative action programmes in the energy sector to increase uptake of green energy among Special Interest Groups.
3. Create awareness on context viable green energy solutions amongst SIGs. Emphasis should be made on forms of green energy that have low uptake amongst SIGs such as briquettes.
4. Keep a database of green energy technicians who offer services on installation, repair maintenance, and consumer education to streamline efforts on addressing the challenge of unreliability.
5. Collaborate with state and non-state actors in promoting uptake of green energy solutions.
6. Develop and implement capacity-building programs to equip special interest groups with the skills to install, maintain, and effectively use green energy solutions, empowering them to champion sustainable practices locally. Complement this with targeted education and awareness campaigns that emphasize the benefits of green energy, such as cost savings, better health outcomes, and environmental sustainability. Ensure the information is accessible in diverse languages and formats to engage all segments of the population effectively.

6.1.3 Private Sector/CSO

1. Design and implement programmes that empower SIGs to actively participate in and benefit from green energy initiatives, fostering gender and generational equality.

2. Advocate for policies that promote the inclusion of SIGs in green energy programs and ensure that their rights and needs are prioritized in the transition to sustainable energy sources.
3. Offer financial assistance, subsidies, or grants to make green energy solutions more affordable and accessible to SIGs.
4. Offer capacity-building training programs and skill development opportunities that equip SIGs with the knowledge and expertise to install, maintain, and utilize green energy solutions effectively.
5. Work with state agencies concerned with issues of SIGs and local leadership for concerted efforts in mainstreaming equality and inclusion in green energy solutions.
6. Ensure that green energy technologies and infrastructure are designed with accessibility features to accommodate the needs of PWDs, such as tactile indicators, and audio cues. Develop customized green energy solutions that cater to the individual needs and preferences of PWDs, considering factors such as mobility, sensory impairments, and communication barriers.
7. Provide specialized training and support programs tailored to the specific needs of PWDs, including hands-on demonstrations, assistive technology, and accessible educational materials.
8. Invest in Research and Development to improve green energy solutions.

6.1.4 National Gender and Equality Commission

1. Conduct periodic assessments to track progress, identify areas for improvement in MEIGE initiatives, and advise the government accordingly.
2. Partner with state and non-state actors to coordinate public education on green energy solutions among SIGs.
3. Facilitate Mainstreaming of issues of SIGs in green energy policies and programs.

ANNEX 1.

List of Institutions that provided input to this report

Stakeholders in Nairobi

1. State Department for Petroleum
2. State Department for Mining
3. State Department for Gender and Affirmative Action
4. National Environment Management Authority
5. Geothermal Development Corporation
6. State Department of Energy
7. Kenya National Commission for UNESCO
8. Pan African Climate Justice Alliance (PACJA)
9. RE-INVENT
10. National Council for Population and Development
11. Strathmore University -Energy Research Centre
12. SDG Kenya Forum
13. Green Belt Movement

Stakeholders in Kericho County

1. State Department for Youth Affairs
2. County Department for Gender and Affirmative Action
3. Ministry of Health
4. Citro Kenya
5. Sparkle Again Foundation
6. Immanuel AGC
7. Transfer Green World
8. National Agricultural Value Chain Development Project (NAVCDP)
9. Umoja Disabled
10. Maskani ya Taifa
11. Kericho Human rights WEB
12. Samogi Community Development Program
13. Bireti Women Enterprise
14. South Rift Community Empowerment Programme
15. Linda Msichana Organization
16. SDA
17. 8 individuals not affiliated with any institution

Stakeholders in Siaya County

1. Clean Energy Siaya
2. AWEPON Siaya
3. Young Women's Christian Association (YWCA)
4. Siaya Disability People's forum (SIDIPO)
5. State Department of Gender and Affirmative Action
6. 6. Maendeleo ya Wanawake
7. Siaya Muungano Network
8. Reproductive Health Accountability & Response Kenya (RHARK) 49
9. Stawisha Africa Initiative
10. Paralegal
11. Kenya Medical Research Institute (KEMRI)
12. Mikayi FM
13. Siaya County Young Generation Alliance
14. Youth Enterprise Development Fund
15. Globcom
16. Siaya County Government
17. National Council for Persons with Disabilities
18. State Department for Youth and Creative Economy
19. Ugunja Development Initiative
20. FAWE Kenya
21. Lake Regional Economic Block
22. Rona Foundation
23. County Government of Siaya
24. Ministry of Interior
25. Tembea Youth Center for Sustainable Development

REFERENCES

Al-Zu'bi, M., Dejene, S.W., Hounkpè, J., Mbenge et al. 2022. African perspectives on climate change research. Nat. Clim. Chang. 12, 1078–1084.

https://doi.org/10.1038/s41558-022-01519- x

Gómez-Villarino, María Teresa, Miguel Gómez Villarino, and Luis Ruiz-Garcia, 2021. "Implementation of Urban Green Infrastructures in Peri-Urban Areas: A Case Study of climate change, Mitigation in Madrid" Agronomy 11, no. 1: 31.

https://doi.org/10.3390/agronomy11010031

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