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EXPLORING FRAMEWORKS FOR THE AGGREGATION OF SUBNATIONAL ENERGY PLANS IN KENYA (EFSEP – K)

Exploring Frameworks for the Aggregation of Sub-National Energy Plans in Kenya (EFSEP-K)

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EED Advisory Limited

Ikigai, 90 James Gichuru, Nairobi – Kenya

P.O. Box 66053-00800, Nairobi | T: +254 (20) 2574927

E: contact@eedadvisory.com | W: www.eedadvisory.com

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List of Acronyms

CEPs	County Energy Plans
CIDPs	County Integrated Development Plans
CRA	Commission for Revenue Allocation
EPRA	Energy and Petroleum Regulation Authority
EU	European Union
GEBCO	General Bathymetric Chart of the Oceans
GIS,	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IIED	International Institute for Environment and Development
INEP	Integrated National Energy Plan
IRENA	International Renewable Energy Agency
KenGen	Kenya Electricity Generating Company
KENHA	Kenya National Highways Authority
KETRACO	Kenya Electricity Transmission Company
KNBS	Kenya National Bureau of Statistics
KODI	Kenya Open Data Initiative
KPC	Kenya Pipeline Corporation
KPLC	Kenya Power and Lighting Company
KURA	Kenya Urban Roads Authority
LPG	Liquid Petroleum Gas
MOE	Ministry of Energy
NEONET	National Online Energy Network
NGDC	National Geophysical Data Center
NOAA	National Oceanic and Atmospheric Administration
NOCK	National Oil Corporation of Kenya
NuPEA	Nuclear Power and Energy Agency
OnSSET	Open-Source Spatial Electrification Tool
REREC	Rural Electrification and Renewable Energy Commission
SETA	Sustainable Energy Technical Assistance
UK	United Kingdom

Executive Summary

Introduction

In Sub-Saharan Africa, Kenya has exponentially increased its energy access rate over the past two decades. Several well-documented government measures including favourable fiscal policy and investments, regulations for renewable energy, among others, have led to the increase of the country's electrification rate from 16% in 2003 to 71% in 2020. For clean cooking, the proportion of households switching from biomass to liquid petroleum gas (LPG) increased from 8% in 2001 to 30% in 2019 – of which 19% use LPG as their primary fuel. Despite the progress, the country has, and will, experience barriers to achieving universal access to electricity by 2022 and universal access to clean cooking by 2028. The barriers can largely be categorised into either energy equity and energy security. Although, there are historical and economic factors at play, inequality to electricity access between urban and rural populations is at a 31%-point difference. The same phenomenon is observed with access to clean cooking solutions, as 93.2% of rural households use wood fuel for cooking compared to only 37.3% of urban households. With the new constitution and a devolved system of governance, these historical inequalities are now magnified at the subnational level of governance, commonly referred to as the Counties. For instance, counties in the country's North, such as Turkana and Marsabit historically remote and rural, have extremely low energy access rates (8.6% and 21.3% respectively). In contrast, counties, that are densely populated and urban, like Nairobi, Kiambu, and Mombasa, have a near 100% access rate to electricity.

The 2010 Constitution provides an opportunity to address these imbalances through devolving some energy functions to the County Governments. Key of these functions is the mandate for each County to develop its own energy plan. This report provides detailed insights into the current state, strengths and weaknesses, and feasible options for enhancing the current practice of sub-national energy planning in the country.

Study findings

The study employed a purely qualitative research design involving collecting qualitative data to achieve the objectives and was guided using a three-phase methodological approach. Qualitative data was obtained through 10 key informants Interviews (KIIs) with key stakeholders in the energy sector and a consultative workshop with over 12 stakeholders. The phases were inception, data collection and analysis, synthesis, and prototyping. These steps are further discussed in Chapter 2

State of Current Practice

Following the 2010 Constitution, the County Governments were operationalised through the County Government Act of 2012 and commenced functions in 2013. In order to bring the energy industry into compliance with the Kenyan Constitution of 2010, the Kenyan government adopted a new Energy Act in 2019. The Energy Act (2019) clarifies the roles of the national government and the 47 county governments with regard to energy while putting into practice the legal and regulatory provisions of the Constitution. According to the Act, counties must create County Energy Plans (CEP) and submit them to the Ministry of Energy (MOE) for fusion into the Integrated National Energy Plan (INEP), a national plan overseen by the national government.

To date, despite the requirement to create County Energy Plans (CEPs), just six counties have developed a CEP since 2010. Three counties—Narok, Nakuru, and Kitui—have made plans available to the public. Fifteen (15) additional counties are working on finishing their plans. In addition, through the research, it was established that county energy plans differ in process, scope, methodologies, and time taken to develop them. The INEP Framework integrates the functions of the counties as listed in both the Constitution 2010 and the Energy Act 2019 to develop an outline for the CEP reporting.

The proportion of households switching from biomass to liquid petroleum gas (LPG) climbed from ***8%*** *in 2001 to* ***30%*** *in 2019.*

The reporting framework focuses on five thematic areas: Resource Assessment, Energy Access, Energy Efficiency, Bio-Energy and Electricity.

It was established that one or two counties achieved completeness (e.g., on energy access, Narok was considered complete – meeting all the INEP requirements). No chapter recorded a 100% completeness in all the four thematic areas. On methodologies used to develop the CEPs, Kitui developed the CEP through a five-step process, and Nakuru did it in three steps. A baseline survey of consumers from both household and institutional sources was one of the data collection techniques used. They also conducted interactive workshops across the wards to gather data for Kitui County. Both Kitui and Narok counties employed the Open-Source Spatial Electrification Tool (OnSSET), while Nakuru used the Low Emissions Analysis platform to forecast future energy demand and supply.

In the opinion of the stakeholders, the biggest obstacle towards the development of CEPs is the lack of data to support the formulation of strategies and budgetary restrictions. Kitui took more than two years to develop its plan, Turkana took a year, and Nakuru took roughly six months.

The current state of energy planning has significant strengths and weaknesses. The strengths include:

- The regulatory mandate for the County to plan provides an opportunity to prioritise their energy needs;
- Flexibility in the methodologies for data collection and energy modelling, and
- A clear directive on the timelines.

Weaknesses include:

- Lack of in-house experience and capacity to undertake county energy planning;
- CEPs have been drafted through external support, which is often financially unsustainable given the challenges these counties face in service provision, and
- Counties also lack the necessary data and information to support the process of preparing and updating CEP sufficiently.

Options for Enhancing the Current Practise

The consultative workshop organised as part of this study produced insightful data on ways to enhance the nation's current practice of energy planning. The key takeaways from stakeholder meetings were divided into five categories: minimal reporting standards; capacity support and development; alignment of report schedules and templates; and integration, and analysis of CEP results. A key solution to overcoming the challanges around county-level energy planning, put forward by the stakeholders, is the development of the National Energy Online Network (NEONET)

This proposed framework model is a web-based data platform where counties could submit their CEP outputs. On the platform, County governments will contribute two outputs. The first is a CEP form, which is transmitted via the platform to the Ministry of Energy every three years. As new information becomes available, this form may be dynamically updated. The second output is the CEP report, which may be presented every ten years in line with the national census. All facets of the INEP framework will be included in the CEP report. Both inputs will help with the integration of different CEPs. Counties will be able to go into greater depth in the full CEP report about matters like long-term energy goals, county-level projects and efforts, and difficulties faced. Beyond the data supplied, this report would help with gaining more profound insights into the County. More information on the proposed framework model is discussed in section 4.5.

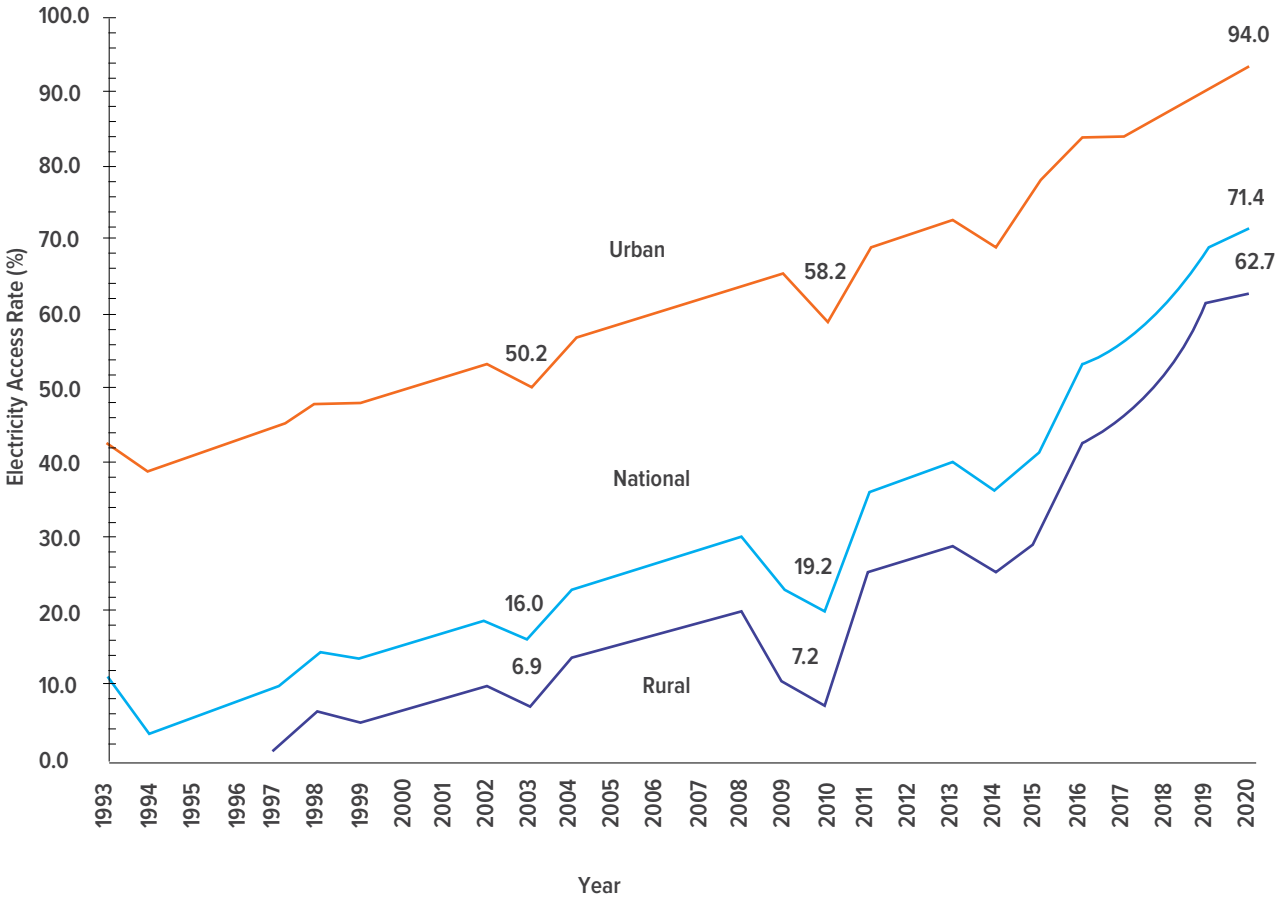
1. Introduction

1.1 Historical Energy Access Trends in Kenya

Kenya's energy sector has experienced steady growth over the last two decades. The national electricity access rate increased from 16% in 2003 to 71% in 2020[1], primarily through government-led electrification efforts (Figure 1)[2]. For clean cooking solutions, the number of households transitioning to cleaner cooking solutions from biomass to Liquid Petroleum Gas (LPG) increased from 8% in 2001 to 30% in 2019—with 19% using it as their primary fuel[3].

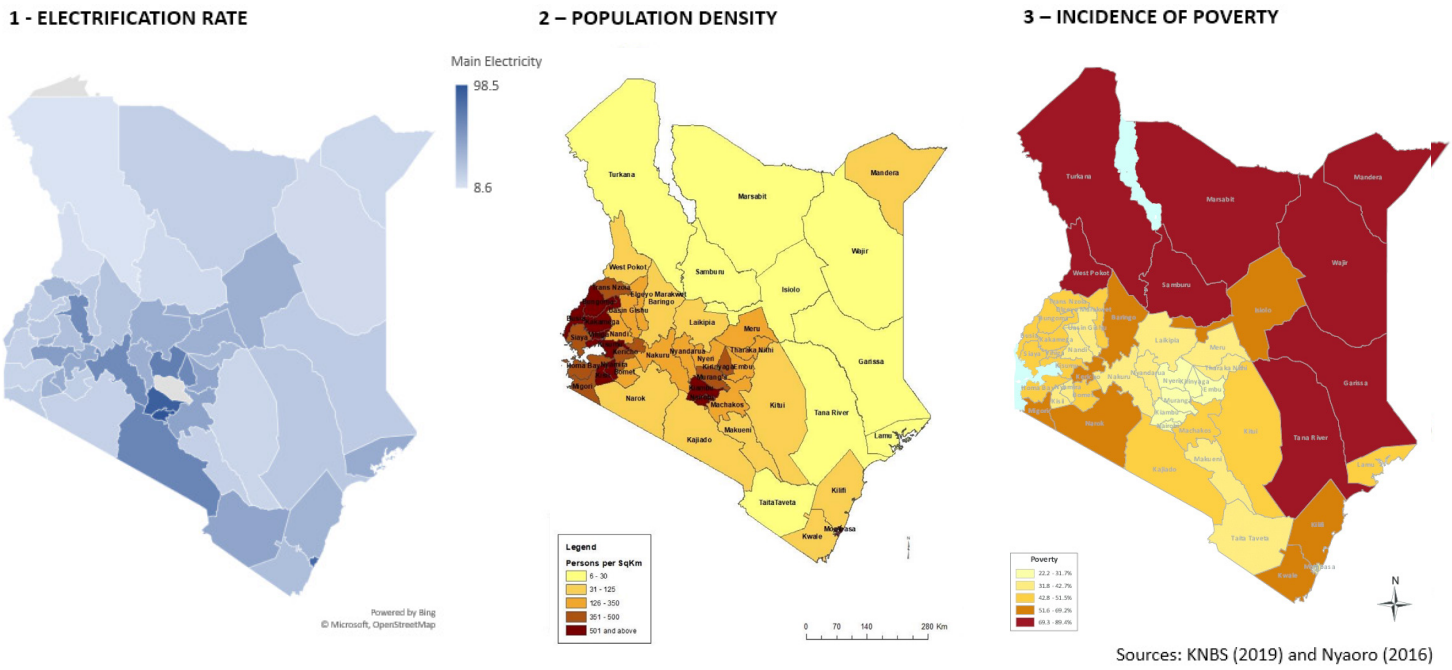
Underpinning the progress achieved was both a strong regulatory framework and an increase in financial investment. On the regulatory framework, the Energy Act 2019 was central to improving the sector. The Act amended the Energy Act 2006, Kenya Nuclear Electricity Board Order 2013, and the Geothermal Resources Act 1982, consolidating various energy-related laws. Public and private investment in energy within the same period increased exponentially. For example, the State Department of Energy increased its expenditure by 43% over a period of 3 years (2014-2017). Around US $1.14 billion in private-sector financing was mobilised in 2018 alone to develop renewable energy from wind, geothermal and small-scale solar.

Figure 1: Percentage of population with access to electricity in Kenya (1993 – 2020). Data retrieved from the World Bank[4].



However, despite the progress made, the sector faces persistent challenges that can broadly be categorised as either energy equity or energy security issues[5]. Energy equity is acute when comparing access between urban and rural populations, as indicated in Figure 1, with rates differing by 31%. This disparity is also reflected in the use of traditional energy sources, with 93.2% of rural households relying on firewood and charcoal for cooking compared to 37.3% of urban households[6].

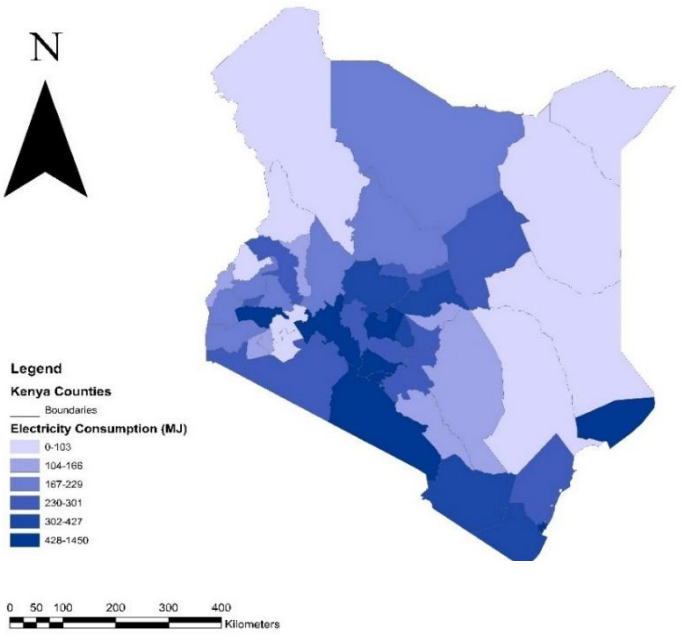
Figure 2: Comparing electricity access in Kenya per County correlated to the population density and incidence rate of poverty (Source: KNBS 2019)[7].



Historically, the underdevelopment of more remote regions in Kenya was primarily due to the higher cost of connectivity and infrastructure development in these areas and higher poverty levels, as shown in Figure 2. This has led to disparities at the county level. For example, counties in the northern part of the country, such as Turkana and Marsabit, have very low energy access rates. In contrast, counties in the Nairobi Metropolitan Region and Coastal regions, such as Kajiado, Nairobi, Kiambu and Mombasa, have higher access rates. These disparities are also present when considering the energy consumption per county (Figure 3).

To address imbalances in development, the Constitution of Kenya, 2010 introduced a decentralised system of government through which the Legislature and the Executive were devolved into 47 administrative counties. According to Article 174 of the Constitution of Kenya, one of the objectives of devolution is to facilitate the decentralisation of State organs, their functions, and services to promote economic and social development at the local levels[8].

Figure 3: Energy consumption in Kenya per County (Mbaka, 2022)



1.2 Rationale of the Study

The Fourth Schedule of the Constitution of Kenya 2010 stipulates the distribution of functions between the National and the County Governments. Among the functions and powers of the county governments is county planning and development, which includes electricity and gas reticulation and energy regulation. The Energy Act 2019 further entrenches the role of energy planning to the counties, requiring them to develop a county energy master plan which should be used by the Cabinet Secretary of the Ministry of Energy (MOE) to develop a national energy master plan.

To date, only 6 of the 47 counties have developed county energy plans (CEPs)[9]. This may be attributed to various reasons, including limited capacity and understanding within which county energy planning should occur, unclear conceptualisation and framing of the process, and infant county structures that limit the implementation of energy projects and programmes[10]. County energy planning differs in form, scope, timeframes, and methodologies. While differentiation based on developmental needs is expected and encouraged, there is need for coordination and standardisation to enable the aggregation of the CEPs into a national plan, as is intended by the Energy Act.

This project seeks to characterise the current state of the county energy planning process, identify weaknesses and opportunities, and suggest frameworks for coordinating, synchronising and aggregating county energy planning, including coordination between County and national governments. The development of the framework model (NEONET) allows county energy plans to be synchronised and aggregated into a unified national plan.

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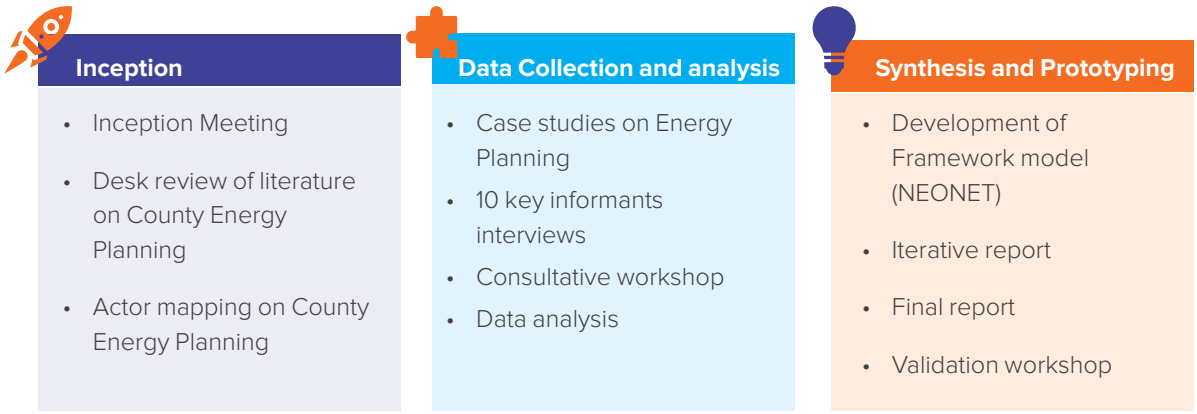
2. Methodology

The project was guided by a three-step methodology (Figure 4). The first step was the inception phase which involved a desk review of literature on county energy planning and mapping key stakeholders involved. The second step was the data collection and analysis phase. Here, case studies, key informant interviews, and a stakeholder workshop were carried out to gain valuable insights into the status of energy planning in Kenya. Data collected from key informant interviews and the stakeholder workshop was analysed, and relevant insights were incorporated into the development of the framework model and, by extension, the final report. distribution coverage.

Figure 4: Summary of the approach for this study



2.1 Inception

2.1.1 Desk review

The desk review sought to understand the energy planning process in Kenya by taking into account the various laws and regulations related to energy planning, including the rationale given, if any, for planning. A non-exhaustive list of regulations examined includes the Energy Act 2019, National Energy Policy 2018, Least Cost Power Development Plan, County Integrated Development Plans (CIDPs), and the Constitution of Kenya, 2010.

2.1.2 Actor Mapping

This activity involved mapping the actors involved in the energy planning processes with the aim of understanding their motivations or directives for involvement in the process. This included donors who have funded the county energy planning processes, research institutions and organisations who offer capacity to counties during the county energy planning processes, and staff at the county and national levels involved in the process. This included entities and semi-autonomous agencies in the energy sector, such as the Kenya Power and Lighting Company (KPLC), Kenya Electricity Generating Company (KenGen) and the Rural Electrification and Renewable Energy Commission (REREC).

2.2 Data collection and analysis

2.2.1 Case studies on energy planning

Two case studies were carried out with the aim of assessing countries with experience in energy planning processes across various levels of government. These cases provided insights into the measures, structures, and procedures, if any, that have enabled coordination across the different levels of government. The two countries were India and Uganda. They were selected as they are at similar levels of development as Kenya. This comparison helped to draw lessons that can be adopted and implemented by countries at similar levels of development, with similar resources and aspirations.

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2.2.2 Key Informant Interviews

Under this activity, interviews with relevant stakeholders at the national and at the county level were conducted. Purposive sampling was used to select the participants based on the stakeholder mapping exercise at the inception phase. At the national level, interviews were conducted with officials from the Ministry of Energy (MOE), which is mandated to develop the national energy master plan. These interviews aimed to understand the current efforts by the ministry in relation to county energy planning, including if and how efforts are coordinated horizontally across the ministries and vertically across the two levels of government (national and sub-national governments). Semi-structured interviews were used to get as much information as possible from the respondents, and key informant interview guides were developed before the interviews.

2.2.3 Consultative Workshop

Following the development of the draft framework model, a consultative workshop was held to present the findings of the research and the proposed framework model. Over 15 stakeholders from various organisations such as GIZ, Kenya Power, and KEREA attend the workshop. Through this workshop, stakeholders gave their views, opinions, and feedback on the proposed framework. The workshop provided an opportunity for any questions concerning the framework to be clarified and to gain feedback from the stakeholders. Through the consultative workshop, the framework model was revised and adjusted based on the stakeholders' views and feedback. This activity was conducted to promote stakeholder buy-in to the framework model.

2.3 Synthesis and Prototyping

2.3.1 Development of the framework model (NEONET)

This stage involved the development of the final framework model called NEONET- The National Energy Online Network. The framework model was developed based on stakeholder consultations, feedback, and data collected from key informant interviews and broader consultations with industry players.

2.3.2 Synthesis

This stage involved amalgamating findings from the various phases into a report. The report aims to provide detailed findings on the state of energy planning in Kenya, options for enhancing the current practice, strengths, and weaknesses as well as provide in-depth details on the NEONET framework.

3. State of Current Practice

3.1 Overview of National Energy Planning

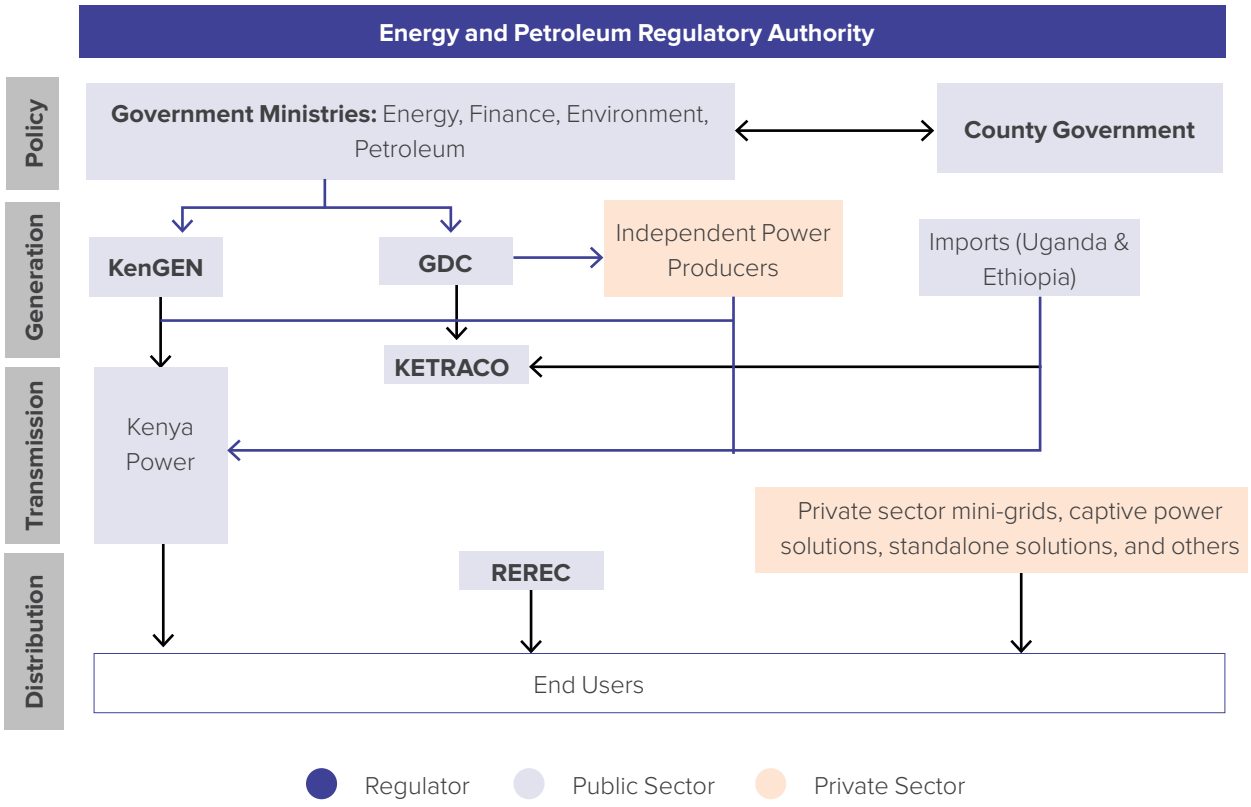
3.1.1 Institutional Framework for Energy Planning

Institutions in Kenya's energy sector are disproportionately focused on electricity generation, transmission, and distribution with marginal institutional focus on other forms of energy, especially biomass energy for thermal applications (see Figure 5 below). Energy sector institutions include the Nuclear Power and Energy Agency (NuPEA), National Oil Corporation of Kenya (NOCK), Kenya Pipeline Corporation (KPC), Ministry of Agriculture (agro-based bioenergy sources), Ministry of Environment, Climate Change and Forestry (forestry-based bioenergy sources). At the national level, the Ministry of Energy governs the energy sector. The MOE plays a pivotal role in developing and implementing energy sector policies. The MOE is also responsible for energy planning and resource mobilisation. As shall be elaborated below, certain functions are devolved at the county level, including the development of County Energy Plans (CEPs).

The mandates of some of the institutional agencies in the electricity sector are summarised below.

1. **Regulation of Tariffs and Licensing of Energy Service Providers.** The Energy and Petroleum Authority (EPRA) is responsible for ensuring that energy service providers are transparent and competitive and that consumers receive reliable and affordable energy services. EPRA also regulates electricity and petroleum products tariffs and oversees licensing and compliance for energy service providers in conjunction with the Kenya Bureau of Standards and County governments.

Figure 5: Kenya's energy institutional framework (adapted from the Least Cost Energy Plan 2021-2030).



2. **Transmission and Distribution of Electricity:** The Kenya Electricity Transmission Company (KETRACO) is the designated system operator responsible for planning, designing, constructing, operating and maintaining, electrical power systems per the requirements of section 138 of the Energy Act 2019. It also facilitates regional power trade through the development and ownership of regional power interconnectors. KPLC purchases bulk power from producers and distributes it to retail consumers.

3. **Power Generation:** KenGen is the lead power generator in Kenya while the Geothermal Development Company (GDC) also generates power by developing geothermal steam fields and sells the energy to KenGen. Both KenGen and GDC are majorly state-owned. Independent Power Producers also generate bulk power to sell to KPLC.

4. **Rural Electrification:** Enacted under Section 43 of the Energy Act 2019, the Rural Electrification and Renewable Energy Corporation (REREC) is a state corporation tasked with promoting and implementing rural electrification programmes in Kenya and developing alternative renewable resources.

It plays a critical role in energy planning for the thematic areas of energy access, bio-energy and developing master plans in consultation with county governments[11].

3.1.2 Legal Framework for Energy Planning

As described previously, the 2010 Constitution and the Energy Act of 2019 are the main anchors of national and sub-national planning. Following the 2010 constitution, the county Governments were operationalised through the County Government Act of 2012 and commenced function in 2013. The government of Kenya ratified a new Energy Act in 2019 to align the energy sector with the Constitution of Kenya (2010). The Energy Act (2019) operationalises the legal and regulations of the Constitution while clarifying the roles of the national government and the 47 county governments concerning energy. The Act mandates counties to develop energy plans and submit them to the national government through the MOE for amalgamation into a national plan, referred to as the Integrated National Energy Plan (INEP). A summary of the laws are provided in Table 1.

TABLE 1: Policies and Regulations Governing the Energy Sector in Kenya

Policy name	Key contents governing the energy sector
Constitution 2010	● Fourth Schedule: Gives the national and County governments the mandate to create energy policies and to oversee national energy and gas reticulation and regulation[12].
County Government Act 2012	● Reiterates the Constitution's Fourth Schedule on County Plans. ● Articulates means through which county and national plans should be integrated. ● States the need for Counties to create sectoral plans of which energy is a part of their mandate. ● Requires Counties to create detailed integrated plans which combine all their sectoral plans.[13]
Energy Act 2019	**FUNCTIONS OF THE NATIONAL GOVERNMENT** ● **Policy Formulation and Integrated National Energy Planning:** Stipulates the development of a National Energy Policy that outlines petroleum, coal, renewable energy, and electricity distribution to ensure delivery of reliable energy services at the least cost. ● **Energy Regulation:** Preparation of consumer, investor and other stakeholder interests, formulation of national codes for energy efficiency and conservation, regulation of renewable and bio-energy. ● **Energy Operations and Development** **FUNCTION OF THE COUNTY GOVERNMENT** ● **County Energy Planning:** The Act also requires each County Government to develop and submit a county energy plan to the Cabinet Secretary in respect of its energy requirements. The MOE should then consolidate these plans to create a national energy policy for the whole country[14].

	● Part II, Section 5 (5) paragraph a-d outlines the four requirements of a CEP: » Take into account national energy policy. » Serve as a guide for energy infrastructure development. » Take into account all viable energy supply options. » Guide the selection the appropriate technologies to meet demand.
Energy (Integrated National Energy Plan) Regulations 2021	● These Regulations provide guidelines on the preparation, content, timelines, publication and monitoring of Energy Plans and the Integrated National Energy Plan.[15]

3.2 Overview of the County Energy Planning

Despite the mandate to develop County Energy Plans (CEPs), only six counties have completed a CEP since 2010. Three of these counties – that is, Narok, Nakuru and Kitui – have made their plans public. Fifteen (15) other counties have ongoing efforts to complete their plans. Many programmes and organisations are supporting this effort; the largest and most wide-reaching of these is the Sustainable Energy Technical Assistance (SETA) programme. The MOE in collaboration with the European Union set-up SETA with a core mandate to support county governments with the necessary skills required to develop their energy plans. SETA is supporting the development of CEPs in Bomet, Garissa, Kakamega, Kiambu, Kilifi, Kisii, Laikipia, Makueni, Meru, Nyandarua, Taita Taveta, Vihiga. A summary of the ongoing initiatives is provided in Table 2.

TABLE 2: Progress towards developing CEPs across the counties[16].

#	County	CEP Status	Year	Funder
1	Marsabit	Complete	2015	GIZ
2	Nairobi City	Complete	2016	UK
3	Turkana	Complete	2016	GIZ
4	Kitui	Complete	2022	UK
5	Narok	Complete	2022	UK
6	Nakuru	Complete	2022	GIZ, EU
7	Baringo	Ongoing	N/A	UK
8	Bomet	Ongoing	N/A	EU
9	Garissa	Ongoing	N/A	EU
10	Kakamega	Ongoing	N/A	EU
11	Kiambu	Ongoing	N/A	EU
12	Kilifi	Ongoing	N/A	EU
13	Kisii	Ongoing	N/A	EU
14	Laikipia	Ongoing	N/A	EU
15	Makueni	Ongoing	N/A	EU
16	Meru	Ongoing	N/A	EU
17	Migori	Ongoing	N/A	UK
18	Nyandarua	Ongoing	N/A	EU
19	Taita Taveta	Ongoing	N/A	EU
20	Tana River	Ongoing	N/A	UK
21	Vihiga	Ongoing	N/A	EU

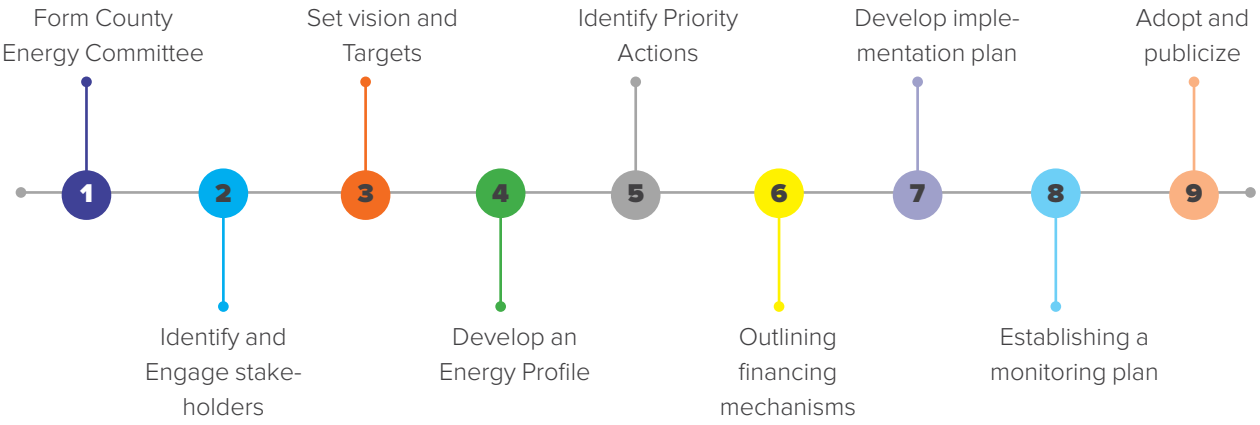
3.3 Analysis of Overall Development Process, Scope, Methodologies and Timelines

3.3.1 CEP Development Process

As mentioned earlier, county energy planning in Kenya is guided by the Integrated National Energy Planning (INEP) framework. The framework stipulates the CEP development process, the expected outline for the resulting report (detailed in Section 3.3.2), and the roles of various actors in that process as listed in the Energy Act 2019.

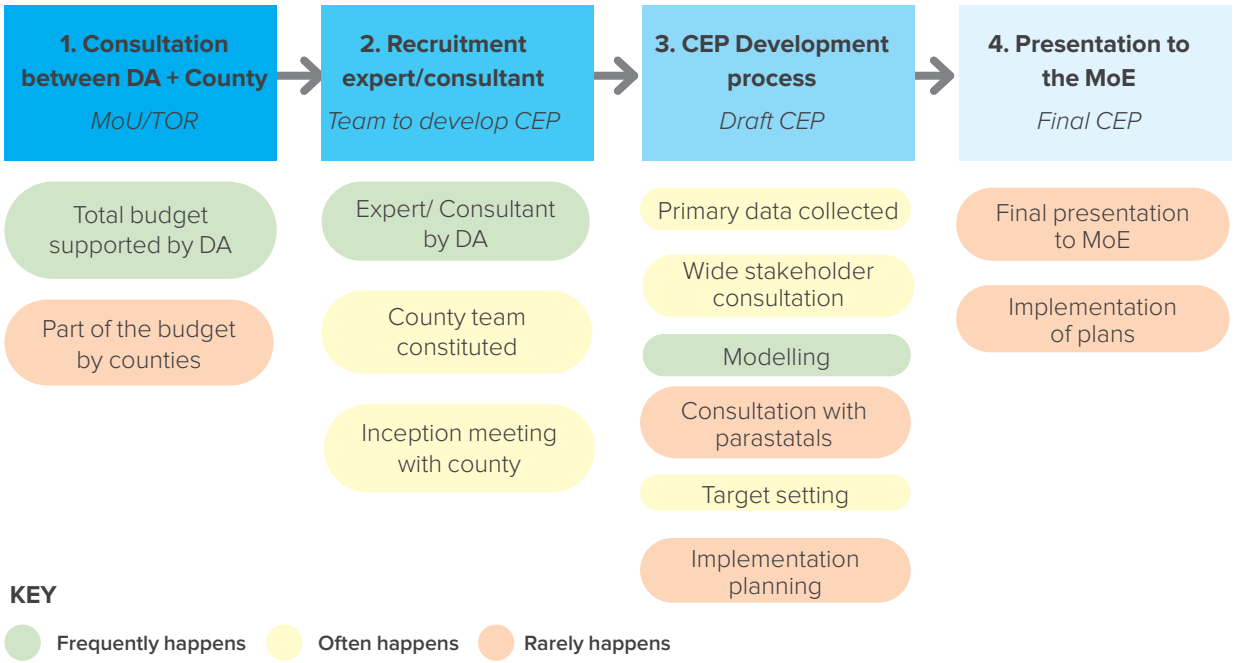
According to schedule 2 of the draft INEP regulations, the county energy planning process should comprise of sequential stages shown in Figure 6. The process is consultative and iterative feedback is expected between steps 4 and 5 as the County develops its energy profile, priority actions, and financing mechanisms.

Figure 6: Steps in the county energy planning process



Although the law mandates counties to develop CEPs, it is unclear how these efforts are to be funded. It is implicit – considering similar processes such as the development of the CIDPs – that counties will set aside resources to meet this obligation. However, in practice, the majority of CEPs have been funded by external sources, primarily development partners with modest financial input from the counties. This is further discussed in Section 3.3. The technical capacity for the majority of CEPs has also been provided by an external party or expert with feed-in details from the County as each County develops specific targets (e.g., around energy access rates at the household, institution, and commercial levels). In consultation with the County, the external partner develops the energy profile (through a data collection and modelling process). The expert also provides a list of priorities, which the County Government reviews and prioritises, finalising the process by outlining the financing mechanisms and implementation plans. The plans are meant to be presented to the MOE; however, in practice, this rarely happens. A summary of the CEP process in practice is presented below.

Figure 7: Flowchart of current practice in the county energy planning process



Considering the novelty of the CEP process, unique county-level circumstances regarding energy demand and supply, availability of technical and financial resources, and the interest from partners (especially development agencies), current CEP versions vary in terms of scope, methodologies, approaches, and timelines. This is further discussed in Sections 3.3.2-3.3.4.

3.3.2 CEP Scope

The INEP Framework integrates the functions of the counties as listed in both the Constitution 2010 and the Energy Act 2019 to develop an outline for the CEP reporting. The reporting framework focuses on five thematic areas: Resource Assessment, Energy Access, Energy Efficiency, Bio-Energy, Electricity. INEP also requires the CEP to include a chapter each for introduction, programmes and projects, and implementation and monitoring.

To understand how these requirements are adequately addressed, the three CEPs which were publicly available were assessed through a study by Mwendwa *et al.*[17] The main aim of the review was to gauge the completeness of the CEPs against the INEP requirements. From the scores there is a variation in completeness across the chapters.

The authors found that one or two counties achieved completeness (e.g., on energy access, Narok was considered complete meeting all the INEP requirements) no chapter recorded 100% completeness across the three counties. Furthermore, from the ranking, only four chapters (i.e., introduction, resource assessment, programmes and projects, and energy access) indicated a completeness score of 65% or higher across the three counties (highlighted in green). The chapter on bio-energy assessment had the lowest score (highlighted in red) when compared across the three counties. Topically, the chapter should provide an overview of the bio-energy initiatives, challenges, key stakeholders, future bio-energy outlook and proposed interventions.

These findings were further corroborated through the Regulations Impact Assessment of INEP commissioned by EPRA. Key stakeholders of the INEP, including the National Energy Providers (17 agency representatives including the MOE and EPRA), the County Governments (14 county representatives) and Development Partners, were queried on their awareness of the draft regulations and the thematic areas. The study indicated that these organisations are most concerned about the thematic areas of Energy Access, Energy Efficiency and Resource Planning (over 77%) and 75% of the organisations are also engaged in Energy Planning. In contrast, Bio-Energy Planning was the least explored thematic area. The latter is an indication of a lower prioritisation of bio-energy planning across organisations.

While the INEP framework tries to provide uniformity across the planning process, it runs the challenge of being over-prescriptive in its provision of the scope and thematic areas.

TABLE 3: Completeness of CEPs compared to INEPs Reporting Requirements[21].

Chapter	Nakuru	Kitui	Narok	Average Score across the 3 counties
Introduction	71	100	100	90
Resource Assessment	80	80	100	87
Energy Access	69	75	100	81
Energy Efficiency	20	80	90	63
Bio- Energy	15	15	90	40
Electricity	50	86	86	74
Programs and Projects	75	100	75	85
Implementation and Monitoring	100	33	100	78

Fully complete Partially complete Not complete

There is room to reduce the scope to highlight the most crucial data points.

3.3.3 Methodologies

As noted in Section 3.2, due to different teams supporting the process, the methodologies adopted across different counties vary (elaborated in Table 4). For example, Nakuru used a three-step approach, whilst Kitui used a five-step approach to develop the CEP content. The data collection methods used included a baseline survey across domestic and institutional consumers. For Kitui County, they also collected data through participatory workshops across the wards. To model future demand and supply of energy, all three counties used various tools; Nakuru used the Low Emissions Analysis platform, whilst Narok and Kitui used the Open-Source Spatial Electrification Tool (OnSSET).

One energy planning method of particular note is the Energy Delivery Model (EDM), developed by the International Institute for Environment and Development (IIED). Initially deployed in Kitui county, this approach is now being rolled out across all counties supported by the SETA programme. It can be used to identify community needs within the County and further break them down into energy and non-energy components.[18] The six-step EDM problem-solving process allows counties to develop energy plans based on community needs. It is different from many other energy planning tools because it starts with the needs of communities and prioritises these throughout an iterative design process.

SETA has used the EDM approach in its initial Basic Training Program (BTP), which targeted all 47 counties in Kenya and introduced counties to the energy policy framework and the energy planning process.[19] SETA then initially implemented the Advanced Training Program (ATP) with a cohort of twelve (12) counties, providing more in-depth capacity building on theoretical and practical aspects of energy planning. Practical capacity building was provided by selecting a model county and using their data to develop an energy plan. Counties participating in the advanced training program were expected to mirror the process in their own localities. In addition, through the Energy Delivery Model, 18 selected counties based on geographical clusters are receiving or will receive more hands-on support on tools and approaches required to review and optimise[20] their plans. Ultimately, the methodologies adopted are influenced by the budget and supporting team.

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TABLE 4: Comparison of Narok, Nakuru and Kitui CEP methodologies[17,18].

	Nakuru	Kitui	Narok
Steps of approach	1. In-depth review of national and sub-national laws and data 2. Data Collection 3. Modelling	1. Baseline Survey 2. Participatory workshops at the ward level 3. Identify and rank priority needs. 4. Identifying gaps, barriers, and opportunities 5. Modelling	1. Stakeholder mapping and engagement 2. Develop a data wish list, primary and secondary data collection. 3. Modelling 4. Visualise and analyse high-priority areas using energy explorer
Primary Data Collection	1. Survey through CAPI (420 households, 197 health facilities, 128 learning institutions and 384 commercial enterprises) 2. 11 Key Informant Interviews with government agencies, the private sector, non-governmental organisations and other development partners	1. Baseline Survey (96 households) 2. Interviews with the County administrators on primary demographic and socioeconomic data, road infrastructure, levels of access to electricity and information on priority development needs 3. Participatory workshops at the Ward Level	1. Survey through Kobo Collect (665 households, 58 educational institutions, 27 healthcare facilities, 790 micro and small-scale enterprises and three cottage industries).
Modelling	Low Emissions Analysis Platform (LEAP) for energy demand under three scenarios – business-as-usual, SDG 7, and high economic growth.	Open-Source Spatial Electrification Tool (OnSSET) was used to model the demand and supply of electricity to households	OnSSET and Energy Access Explorer
Technical Consultant	EED Advisory	IIED	WRI

3.3.4 Timelines

Counties are yet to align with the stipulated timelines of INEP. The regulations specify that each County is required to provide a CEP with an outlook of 20 years with a detailed implementation plan for the first five and a review of the plan every three years. The review is to be submitted to the Cabinet Secretary of the MOE. Counties are also required to prepare and submit an annual report on the implementation of the CEP within a month after the end of each financial year.

According to stakeholders, budgetary constraints and limited data to support the development of plans pose the most significant challenge.[22] While Nakuru took about six months to develop, Kitui took more than two years, and Turkana took one year.

Instead of report-style CEPs can be up to 150 pages long, we propose that only relevant data and information specific to the County should be submitted. This is because aggregating 48 county energy plans differing in length and scope is quite difficult. The complexity of aggregating the CEPs will be minimised by requesting counties to only submit relevant data. Most counties have different needs, and the CEPs should reflect this. We propose a 'bare minimum plus' approach whereby counties submit data around three data points (energy access rates, renewable energy and energy priorities within the County), as will be discussed in Section 4.1.

A bear minimum plus approach should not be restrictive and counties will need the flexibility to respond to their respective needs. For example, the County government of Kiambu has different needs to the County government of Turkana. One County is a net-energy importer, and the other is a net-energy exporter. Turkana county government's CEP will provide more information on the available resources, such as solar and wind energy, whilst the Kiambu will provide information centred towards improving supply of electricity within the County. The CEPs should also align procedurally with the development of the CIDP to allocate resources towards the implementation of the plans.

3.3.5 Resourcing

Presently, CEPs are under-resourced through national and county-level governmental channels, leading to a reliance on external stakeholders for human, technical, and financial capital. These will be discussed in detail next. Figure 8 is presents a summary of the industry stakeholders involved in rge CEP development process

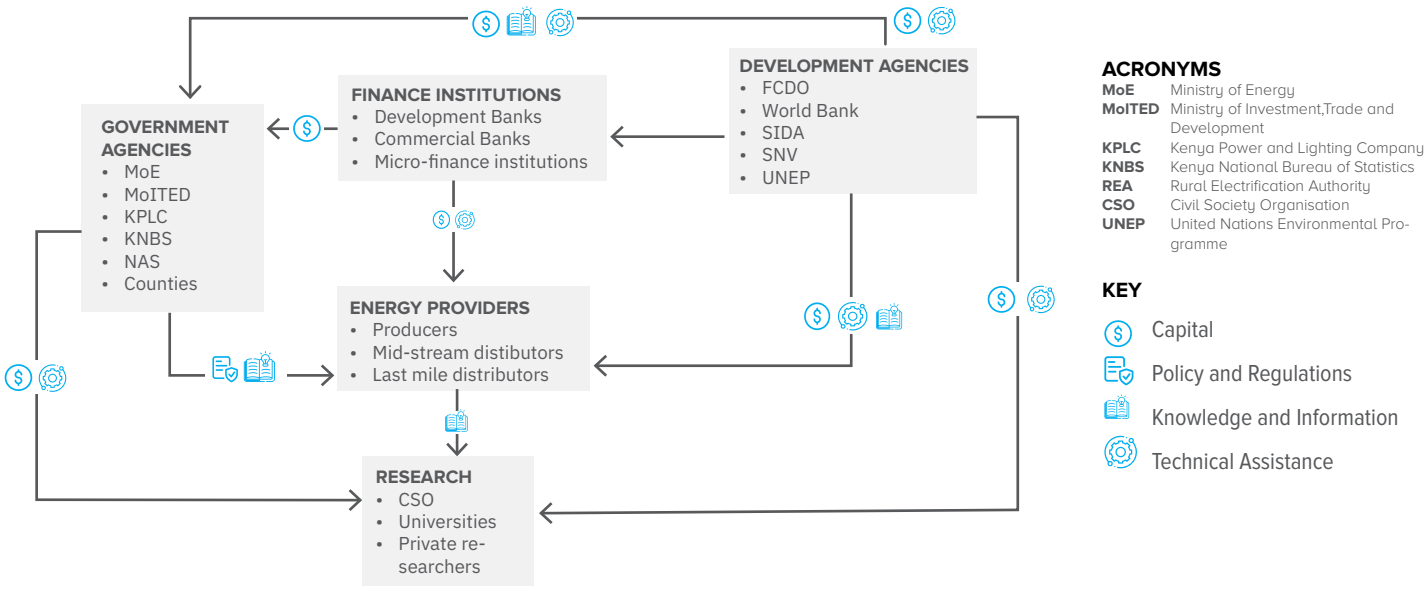
a. Capital

CEP development is mainly donor-driven and donor-catalysed. Commonly, counties are hesitant to develop policies and legislation without donor funds. This is primarily due to the fact that counties do not view energy planning as a priority, and without being incentivised to develop the plans, the process of energy planning becomes undesirable to the counties. Based on conversations with county actors, budgetary allocations to energy planning is minuscule. For example, in the Nairobi county budget estimates for the year 2022-2023, the Ministry responsible for Environment, Water, Energy and Natural resource had an approved budget of KSH 53,606,355 or USD 396,496, which was lower than allocations to other ministries. The bulk of the budget would be allocated to water, based on the perennial water issues faced within the County and, by extension, the country.[23] While county energy planning is a legal requirement, this is not a sufficient motivator for counties to actually invest their own time and resources to make a CEP. Indeed, most CEPs developed or currently being developed have been spearheaded and funded by development organisations such as GIZ, UK PACT, and IIED.

That said, funding from development organisations requires county actors to show a willingness to developing CEPs. This must not only be verbal but requires counties to develop strategies and plans on how to develop the CEP. Failing to do so, counties do not receive support from development organisations. Counties should, therefore, be required to submit detailed proposals. The proposals should include the proposed methodology to be used to develop the CEPs, the technical and human resource capacity within the counties to develop the CEPs and the implementation schedule. This information will aid development organisations in assessing the county's capability to develop CEPs.

With CEP development being donor-catalysed, county governments have developed a lethargic approach to sourcing funds for the CEP process. In the consultative workshop undertaken as part of this project, faciliated by EED Advisory and CCG, one stakeholder stated, "For the majority of counties, if they don't have money, they will not develop the CEP." The stakeholder further stated that "There's a lot of money within the county, but they don't put it where it's important."

Figure 8: Relationships between energy sector stakeholders, considering capital, policy, knowledge, and assistance flows



Private sector actors could fill in the financing gap that will aid counties in developing the CEPs. The private sector can support counties during the process of data collection and analysis. This would be attractive to the private sector actors within the energy sector. For example, by funding CEP development, private sector actors can identify areas with low electrification rates and regions with low access to clean cooking solutions and tailor products/services that can aid in improving access in these areas. These products could range from mini-grids to clean cooking solutions such as solar-powered cook stoves.

b. Human Resource

County governments are heavily understaffed and inadequately resourced. County energy departments are not stand-alone units. There are different portfolios/functions within the departments; for instance, the department responsible for energy-related matters is also typically responsible for environment, water, food, natural resources, and so on. Given the bureaucratic nature of some counties, any new initiatives, such as energy planning, will have to go through the County Executive Committee Member (CEC), who is also handling five or six other functions within their department. This makes it difficult for top county officials to coordinate the CEP development process there are competing needs within their own departments fighting for their attention.

In addition, changes in county governments can affect the development of CEPs. For example, from consultations with county actors, it was established that once a new administration took over, priorities shifted and plans to develop CEPs were affected. The right structures should be in place, such that a transition in power due to a change in administration should not impact the department/(s) responsible for energy planning and certainly should not halt or reverse CEP progress.

Another major issue within the counties is a lack of experts who are well-versed in energy planning in positions of decision-making. In the consultative workshop held by EED Advisory and CCG, stakeholders indicated that in some counties, those who have a technical background relating to energy are frustrated as they do not have the political power to get things done. They are fully reliant on the CEC and, by extension, the governor. In addition, an energy expert who has worked with different counties stated that *"In some counties, the energy-responsible department aims to pay the bills for the other departments within the county government"*. Furthermore, in some counties, work is given to consultants even when there are competent staff within the County who can aid in the development of the CEPs.

c. Technical Capacity

There is consensus among county actors that there is a lack of clarity on what data is essential in the CEPs to feed into the wider national planning process. This subsequently means that individuals working at the county level have the perception that they may be collecting "useless data".[24] Without clear direction from the MOE as to what data from CEPs will feed into the wider national plan, counties are hesitant to use financial resources to collect data only for it to be useless.

Based on discussions with various stakeholders, counties faced capacity issues when aiming to collect the amount and detail of data required by the draft INEP framework. Regardless of the methodology used to develop the CEP, counties must adhere to the requirements set out in the INEP framework. The level of data collection required to satisfy the requirements set in the framework make it difficult to carry out the process of data collection within county departments. This is coupled with inadequate finances to carry out the data collection process.

There is a strong correlation between inadequate financing, a lack of human resource capacity, and a lack of technical capacity in developing CEPs. Inadequate financing negatively impacts the two other variables, which can be detrimental to the development of CEPs.

3.4 Weaknesses of County Energy Planning in Kenya

This section provides in-depth insights on the strengths and weaknesses associated with county energy planning in Kenya.

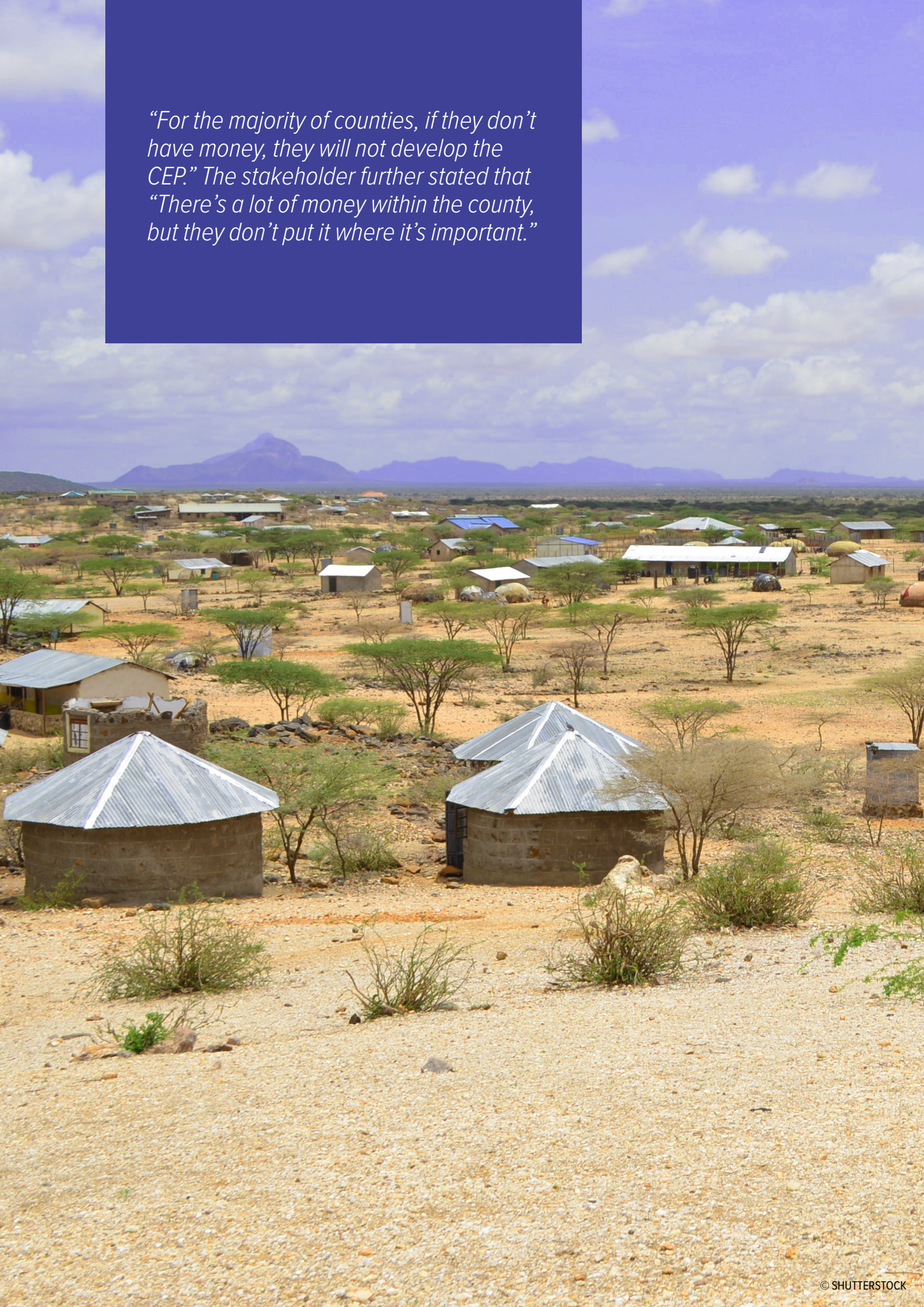
Before devolution, one of the main criticisms of centralised energy planning was the top-down approach which inadvertently focused on large-scale energy consumers, often with little emphasis on the household sector, even though the latter accounted for most of the country's energy demand. A direct result of this was the prioritisation of urban areas and commercial hubs. The INEP framework aims to address this limitation through bottom-up energy planning.

County energy planning in Kenya has numerous strengths. These include:

i. The regulatory mandate for the County to plan provides an opportunity for the Counties to prioritise their energy needs;

ii. Flexibility in the methodologies for data collection and energy modelling, and

"For the majority of counties, if they don't have money, they will not develop the CEP." The stakeholder further stated that "There's a lot of money within the county, but they don't put it where it's important."



iii. A clear directive on the timelines;

iv. Stakeholders such as SETA, UKPACT, GIZ and WRI support counties with financial and technical assistance which is critical in aiding counties to develop CEPs.

Despite these strenghts, the study identified significant weaknesses associated with energy planning in Kenya. Major weaknesses lie within the technical and financial capacity of counties to undertake county energy planning unilaterally. **Most county governments lack the in-house experience and capacity to undertake county energy planning.** As discussed in Section 3.3.5 (b) energy departments at the county level are under-staffed and under-resourced. Most current CEPs have been drafted through external support, which is often financially unsustainable given the challenges these counties face in service provision. The counties also lack the necessary data and information to sufficiently support the process of preparing and updating CEPs. Counties commonly lack data around grid connectivity, grid infrastructure and electricity access rates. Accessing such data requires county governments to engage a myriad of stakeholders. These stakeholders range from governmental bodies such as KPLC, Kenya National Bureau of Statistics (KNBS), and industry associations. However, these interactions have complexities that are mainly driven by delays in getting the requisite data and the bureaucratic nature of some of these organisations.

The bureaucratic nature of state agencies makes it difficult for counties to obtain necessary data needed for the development of robust CEPs. An impact report by the UK PACT in 2022 highlighted some of these complexities. Through the interviews carried out with county actors, several interviewees indicated that there was a lot of back and forth and letters which had to be written to obtain access. It was inferred that bilateral agreements are arranged between KPLC and each County seeking data. No standard practice or data access point seems to be established for this process. It was further noted that one-off agreements between county energy planning organisations and national agencies seem to be the norm. In addition, the INEP framework mandates national agencies to make this data available[25]. Often, county officials have to wait long periods for approvals by top agency officials, a process which slows down the county energy planning process and invariably could affect the momentum built by the County towards the process. This creates a stop-start approach to developing the CEPs, which is not ideal, especially with counties having a cacophony of shifting priorities. In the same report by the UK Pact, it was noted that organisations such as KPLC have been reported to want instructions from a higher national level (e.g., MOE) to make data available to the County and are unwilling to share their data unless directed to do so.

As discussed in Section 3.3.5, **counties rely heavily on donor funding to develop the CEPs; without this funding, counties tend not to allocate funds towards the process.** Additionally, the funding allocated to counties for this process is minimal. This is a major weakness associated with energy planning in Kenya. The MOE, in collaboration with the council of governors and other relevant government actors, should aim to develop mechanisms that will incentivise counties to develop CEPs. For example, they could hold back on disbursing a portion of funds to the counties until they develop CEPs or reward counties who have developed CEPs with additional funding. A stakeholder who represented one of the counties at the consultative workshop held by EED Advisory and CCG stated that *"We want to do county energy plans, but we only get 4 million Kenyan shillings (USD 28,762.12). What do you do with 4 million? It's not even enough for capacity building"*. The representative further stated that *"If the law is intended to be the main motivating factor to produce a CEP, surely the legal framework should also resource/staff CEP production"*. If counties were legally motivated and adequately resourced, they would produce their own CEPs without donor funding and would subsequently approach donors post-CEP production to support them to update their CEPs after the stipulated three-year period.

As discussed in Section 3.3.2, CEPs are currently **not standardised and differ in scope, implementation timeframe, methodologies, and presentation format.** At present, reducing the scope will make it difficult to aggregate the CEPs into one unified national document.

Requesting counties to update the CEPs every three years is not practical, and neither is it financially feasible, especially for cash-strapped counties. The MOE should revise this provision to account for counties that do not have the ability to update the CEPs. Instead, counties should be permitted to update CEPs after 5-10 years.

The format CEPs are developed in could be problematic when aggregating them into the wider national energy plan. The data produced in CEPs are not easy to access. CEPs are delivered and written in PDF format, with CEPs being as long as 150 pages. There is no entry portal for key quantitative results and no database to submit the data.

One stakeholder who was present at the workshop suggested that CEPs should have less of a narrative report and more of a data-driven report. He stated, *"The narrative is good, yes, but we need data"*. In addition, once counties develop the CEPs, it is very rare for the counties to get audience with the MOE in order to present their CEPs. This poses a two-pronged challenge. Firstly, without feedback, counties cannot identify necessary gaps in their CEPs that might later be required by the MOE. Secondly, the implementation of the CEPs could be affected due to the lack of engagement with the ministry.

"If Counties were legally motivated and adequately resourced, they would produce their own CEPs without donor funding and would subsequently approach donors post-CEP production to support them to update their CEPs after the stipulated three-year period."

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4. Recommendations: Options for Enhancing the Current Practice

County energy planning is an ever-evolving process. Currently, it has significant weaknesses, as highlighted in Chapter 3. These weaknesses can be addressed as the process evolves and by involving relevant stakeholders through consultative forums. The forums are aimed at developing mechanisms to improve the energy planning process in the country.

The consultative workshop held as part of this work yielded valuable information on how to improve the current practice of energy planning in the country. The insights from stakeholder discussions were categorised into five groups:

i. **minimum reporting requirements,**

ii. **capacity support and development,**

iii. **aligning report schedules and templates,**

iv. **integrating, and**

v. **analysing CEP outputs.**

In addition, case studies on Uganda and India were also reviewed as part of this work and informed the recommendations provided in this section of the report. The recommendations are discussed in the sections that follow.

TABLE 5: Summary of the current practise and measures proposed to enhance the CEP development process

	1. Technical & Financial support	2. Methods & Tools	3. Scope/Focus	4. Timelines
current	• Development agencies (eg. GIZ) • National Programs (eg. SETA) • Research driven initiatives (eg. CCG)	• Representative household surveys • Focus Group Discussions and Key informant Interviews • Intergrated planning tools (eg.Energy Delivery Models-EDM) • Modelling tools including LEAP,OSeMOSYS,OnSSET	• Productive uses of energy • Household energy • Household energy +	• Typically, 5 years • Start and end date determined by source & availability of funding • Often misaligned or unrelated to the CIDP process
proposed	• National and sub-national budgetary allocation • REREC empowered to work with counties on developing the CEP process • National coordination through frameworks such as SETA	• Adopt the INEP toolkit recommendations • Two part submission: 1. CEP form and a 2. Detailed CEP	• Household energy • Institutional energy • Commercial and productive uses of energy • Provide guideline and not be prescriptive	• Done in parallel with the CIDP • Align with the INEP cycle • Align with the electioneering cycle

4.1 Minimum reporting requirements

While the MOE has outlined the development process and structure of the CEPs in the INEP framework, the only formalised legal stipulations dictating the scope of county energy planning are those under Energy Act Section 5 (5). These stipulations are quite broad and overarching; they do not translate directly to the entire CEP development process being done exactly as envisaged in the INEP framework. Indeed, they leave room for many different interpretations and options for undertaking energy planning at county level.

The INEP CEP report outline is quite extensive, and this poses budgetary and capacity issues for counties. During the consultative workshop, there was common consensus amongst the stakeholders that the INEP requirements do not align with the needs of the counties. Therefore, it was suggested that counties should have minimum reporting requirements. This could be information around:

i. energy access rates,

ii. renewable energy, and

iii. energy priorities/ needs within the County.

This will aid counties as they can focus on the most important data points that will feed into their CEPs.

Table 6 illustrates how counties could report on three of the '**bare minimum plus**' requirements. Information on energy access rates is divided into two categories:

i. the proportion of the population with access to electricity and

ii. the proportion of the population with access to clean cooking solutions.

The Counties will be required to submit data on household and social institutions access rates. For the requirement on energy priorities, counties can submit detailed information on proposed projects in place to electrify health centres, schools, or communities.

TABLE 6: Proposed 'bare minimum plus' data inputs for county energy planning

Data Point	Definition	Example of Input Information
Electricity Access Rates	What proportion of households and social institutions have access to electricity (centralised and decentralised systems)	Household Access Rates (%)
		Social Institutions (Schools and Health Care Facilities) Access Rates (%)
Access to clean cooking solutions	What proportion of households and social institutions have access to clean cooking solutions (LPG, Biomass, Electricity etc.)	Household Access Rates (%)
		Social Institutions (%)
Renewable Energy	Renewable Energy Projects within the County	Solar (# and size of projects)
		Wind (# and size of projects)
		Geothermal (# and size of projects)
Energy priorities and needs within the County	Plans to electrify specific health facilities, schools, etc.	Brief description of plan and allocated resources (KSH) *e.g., A Level 4 hospital in Kuresoi that is not connected to the grid that needs to be electrified. The County has allocated (X) to electrifying the hospital.*
		Brief description of plan and allocated resources (KSH) *e.g. A Community in Bahati that is 50 km from the nearest transformer and has a high population density that requires a mini-grid. The County has allocated (X) to develop a mini-grid.*

4.2 Capacity Support and Development

One of the biggest obstacles that counties face when looking to develop CEPs is getting technical and financial capacity support. There is a heavy reliance on organisations and programmes such as SETA to aid the counties. Two approaches can be considered in improving the capacity of counties to develop CEPs.

1. With external support:

a. Institutionalise the support of the Ministry through the SETA programme to enhance sustainability. SETA would be permanently embedded into the Ministry, and the Ministry would be mandated to allocate a portion of funds to SETA. In the recent 2022-2023 budgetary allocation, the Ministry was allocated 95 billion. If proper planning is done, a portion of these funds could be provided to SETA[26]. The ministry is also at liberty to mobilise resources from external sources.

b. Integrate the training provided by SETA on the preparation of CEPs with other forms of training, such as budgeting and monitoring. The proposed training could be cost-effective for SETA through leveraging funds from other funding pools such as development organisations or through counties contributing a percentage of the training costs.

c. Incentivise the planning process by linking implementation plans to funds. In this context, the counties would be required to provide the plans before the provision of that year's budget. Additionally, the Ministry could offer additional funding to execute some of the resources required to develop new energy sources. The INEP framework has safeguards in place to ensure that counties cannot submit false or inaccurate information in order to get funding. Under Schedule Six (r.24(2)) regulations 21 (8) & 22, the penalty for failing to submit relevant information or false information is **a fine not exceeding 10 million shillings (USD 71,908.893) or imprisonment for a term not exceeding five years or both. The penalty for providing inaccurate information is a fine of not less than one hundred thousand shillings.**

d. Rely on REREC, which is mandated by the Energy Act 2019 to provide assistance to the counties for rural electrification. However, this is dependent on state actors enforcing the laws mandating REREC to provide this support.

2. Without external support:

a. Replicate the methods used by a nearby or more advanced County.

b. The National Government can provide clear incentives or financial resources for the implementation of the plans.

CEP development tends to be affected by changes in county governments resulting from general elections. As highlighted in Chapter 3, the priorities of the previous administration could significantly differ from the newly elected administration. Stakeholders highlighted the importance of continuity when developing CEPs despite changes in county governance. It was suggested that technical working committees are needed to ensure continuity across political cycles. Civil society organisations (CSOs) can play an important role in supporting county energy planning, particularly in data collection. Some CSOs have extensive experience in large-scale data collection, and counties could leverage their expertise and capacity.

Stakeholders suggested that the CSO which county governments select for data collection purposes may have good relationship with entities under the national government, such as KNBS and KPLC, and these links could expedite the process of data access and aid in the improved quality of data the counties can get from these entities. Other stakeholders that can play a role in providing expertise are the local/government research institutions.

This is exemplified through the example provided in Box 1. Here, Kasese District, in Uganda through support from the Worldwide Fund for Nature Conservation (WWF), developed the Kasese District energy strategy. The strategy scope was wide and consisted of formulating policies, providing incentives for the use of renewable energy, and implementing renewable energy projects on municipal-owned land, amongst others. Key to this engagement was Kasese District receiving technical assistance from national research institutions, namely, The Centre for Research in Energy and Energy Conservation; Centre for Integrated Research; Community Development Uganda; Uganda National Renewable Energy; and Energy Efficiency Alliance.

BOX 1

CASE STUDY: UGANDA'S DISTRICT PLANNING: UTILISATION OF LOCAL CAPACITIES TO ENHANCE DISTRICT ENERGY PLANNING

This section aims to provide an exploration of district level energy planning, capture capacity and integration in Uganda. Since its inception in March 2007, the National Renewable Energy Policy sought to increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017. The policy provides for the establishment of a National Energy Committee at the National level and District Energy Committee and District Energy Offices at the local Governments which have not been fully realised. The main targets were to be achieved through these distinct programmes, i.e., Power generation, Rural electrification and Urban access, Modern Energy Services for households, Biofuels, Energy efficiency.

In line with district planning, Kasese District, through support from the Worldwide Fund for Nature Conservation (WWF) under the Champion District Initiative (CDI) developed the Kasese district energy strategy. The strategy's scope consists of formulating policies and strategies for renewable energy development; initiating and maintaining programme relations with third party non-governmental organisations; providing incentives for adoption of renewable energy technologies; making by-laws, which if well designed would promote renewable energy; owning and procuring, by deploying renewable energy projects on municipally owned land, for instance, solar streetlights. In addition, the enabling environment in Uganda has been favourable as there are district-level financial and regulatory incentives to support the use of renewable energy.

For technical capacity, the district involved national research institutions in the collection of data and provision of analysis for key institutions. It also developed local financial incentives for example, implementing tax breaks/ waivers on business license costs and abolished taxes dealing with Renewable Energy Test Centres. It also promoted local consumer financing by relying on SACCOs and Community based organisations as local mechanisms to finance home-based renewable energy systems.

4.3 Aligning Report Schedules and Templates

CEP reports are quite lengthy, and often important information is missed due to their density. Therefore, stakeholders suggested that CEP reports can be developed after the County Integrated Development Plans (CIDPs) such that counties can use the development needs highlighted in the CIDP as a reference tool. Furthermore, developing the CEPs after the CIPDs will help avoid duplication of efforts (i.e., counties will not have to collect the same data that was already collected during CIDP development).

4.4 Integrating and Analysing CEP Outputs

A major pitfall of the county energy planning process is there is no platform to integrate, aggregate, and analyse the various CEP outputs under the MOE. At the consultative workshop, a two-way mechanism for top-down and bottom-up data sharing for CEPs was suggested. This is a web-based data platform where counties could submit their CEP outputs. A two-part submission platform called National Energy Online Network (NEONET) was suggested.

In the proposed NEONET (See Figure 9), counties will submit two outputs. The first is a CEP form that is submitted every three years to the MOE through the platform. This form can be dynamically updated as data becomes available. The second output is the CEP report which may be submitted every ten years in line with the national census. The CEP report will focus on all aspects of the INEP framework. Both submissions will aid in integrating the various CEPs. The full CEP report will allow counties to provide more detail on issues such as long-term energy goals, projects and initiatives within the counties and challenges faced. This report would aid in getting deeper insights on the County beyond the data provided.

Stakeholders further suggested that KNBS could play a critical role in the data verification process. KNBS will be able to identify data duplications and data integrity issues as most of the data used to develop the CEPs is attained through KNBS.

One stakeholder suggested that the NEONET platform could be linked directly to the KNBS databases to ensure that data imputed by the counties is accurate.

An example of the integration platform in India is provided in Box 2. Here, The Saubhagya Scheme was set up in 2017 to provide electricity to all households by Dec 2018. An online dashboard was used as a critical tool for monitoring the progress of providing last-mile connectivity to households. The dashboard was used to present key information on the number of electrified and non-electrified households, villages, and districts.

Further recommendations on the integration of the data onto one accessible platform are outlined in Chapter 4.5.

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Figure 9: Proposed two-part CEP submission process, including a data-driven form and narrative plan

County Government

1. County Energy Planning Form

- Submitted every 3 years
- Inputs linked to a national integration portal
- Focuses on a) energy access rates-sub-county level, b) proposals for electrification

2. County Energy Plan

- Submitted every 10 years
- Uses data from the inter-decadal national census
- Focuses on all aspects of the current INEP framework

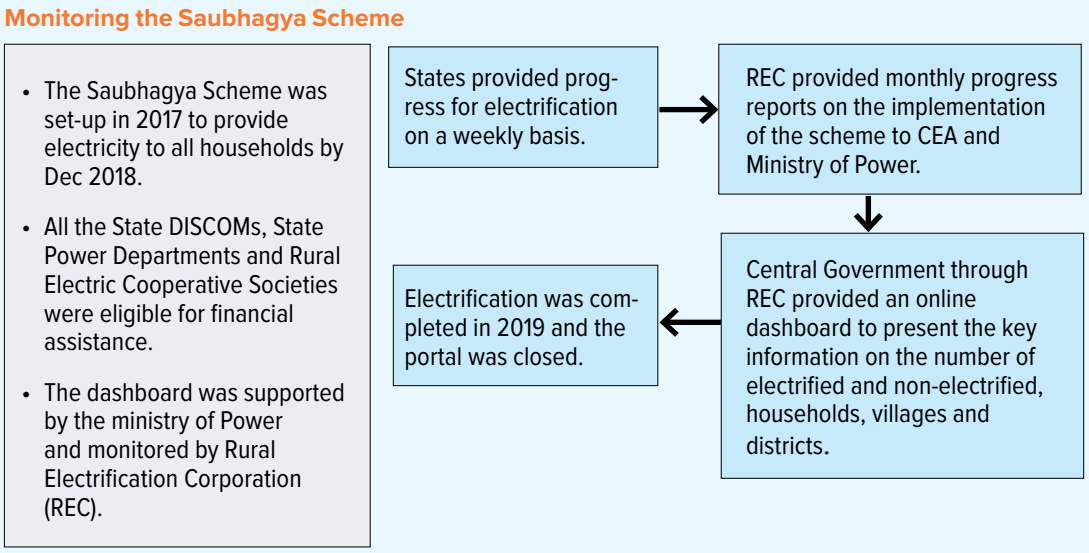
BOX 2.

CASE STUDY OF INTEGRATION PROCESS: INDIA'S UNIVERSAL ELECTRICITY ACCESS BY 2018

The institutional framework for energy policy in India is initiated by key national actors, led by the Prime Minister. The National actors include the Ministry of Statistics and Programme Implementation (MoSPI), the Ministry of Science and Technology (MoST), the Ministry of Railways and the Ministry of Finance. Other actors include central level agencies and ministries who contributed to the steering committee stakeholder-driven analysis on the opportunities and barriers to 'India's Renewable Electricity Roadmap 2030'. The state actors include 28 state governments, utilities, and distribution companies and 9 union territories in India.

As part of the Saubhagya scheme – electrifying all households – an online dashboard was utilised as a critical tool for monitoring the progress of providing last mile connectivity to households. The Saubhagya Scheme was set-up in 2017 to provide electricity to all households by Dec 2018. All the State utilities and distribution companies, State Power Departments and Rural Electric Cooperative Societies were eligible for financial assistance. The dashboard was supported by the ministry of Power and monitored by Rural Electrification Corporation (REC). Electrification was completed in 2019 and the online dashboard was closed.

Figure 10: Summary of Monitoring and Reporting on the Saubhgya Scheme



Central Government through REC provided an online dashboard to present the key information on the number of electrified and non-electrified, households, villages, and districts. REC provided monthly progress reports on the implementation of the scheme to CEA and Ministry of Power. State governments would provide progress for electrification on a weekly basis, allowing for real-time dissemination of data.

Moreover, the India Energy Dashboards (IED) were developed in 2017 (version 1.0) and in 2021 (version 2.0) aggregates single-window access to the energy data for the country. The data obtained is then published by Coal Controller's Organisation, CEA as well as the Ministry of Petroleum and Natural Gas. This online platform provides data at sub-yearly frequencies, including monthly data and an Application Programming Interface (API) linked data from other portals maintained by the government agencies. Time series data between the financial year of 2005-2006 and 2019-2020.

4.5 National Energy Online Network: A Unified CEP Reporting Framework

4.5.1 Mapping CEP Challenges to NEONET Solutions

Due to implementation challenges while developing the CEPs, it is foreseen that challenges, if unchecked, will compound and aggregate during the formulation of the INEP — as the CEPs feed directly into the INEP. The universe of communication flows during CEP formulation shows that there are three primary data flows which include horizontal and vertical data flows comprising of top-down and bottom-up communication, as shown in Figure 11. To ensure focus on issues regarding aggregating CEPs into the INEP, NEONET only considers vertical data flows.

To strengthen vertical communication capacity, the NEONET framework proposes a reduced scope within reporting activities only after the inaugural CEP documents have been developed. This reduced scope is shown in Figure 12 and focuses primarily on county energy planning through data collected that affect country operations and development plans. The reporting suggested primarily covers county street lighting, energy supply, and demand data, as well as electrification projects. The NEONET scope allows for easier reporting from counties as the data is available from the steering, such as KPLC, REREC, and KNBS.

To allow simplified reporting, the NEONET data collection form may be provided to the counties as an excel workbook with macros for user validation. The use of workbooks in data collection is the de-facto method for the assessment of yearly tax returns in Kenya by both citizens and institutions to the Kenya Revenue Authority (KRA). The implementation of this self-assessment system built on excel workbooks with validation macros[27] has allowed the public to provide self-assessment of tax returns by uploading filled excel workbooks. By mimicking the processes involved, NEONET may reduce learning time due to user familiarity with the process.

Figure 11: Top-down, bottom-up and horizontal data flows involved in energy planning in Kenya

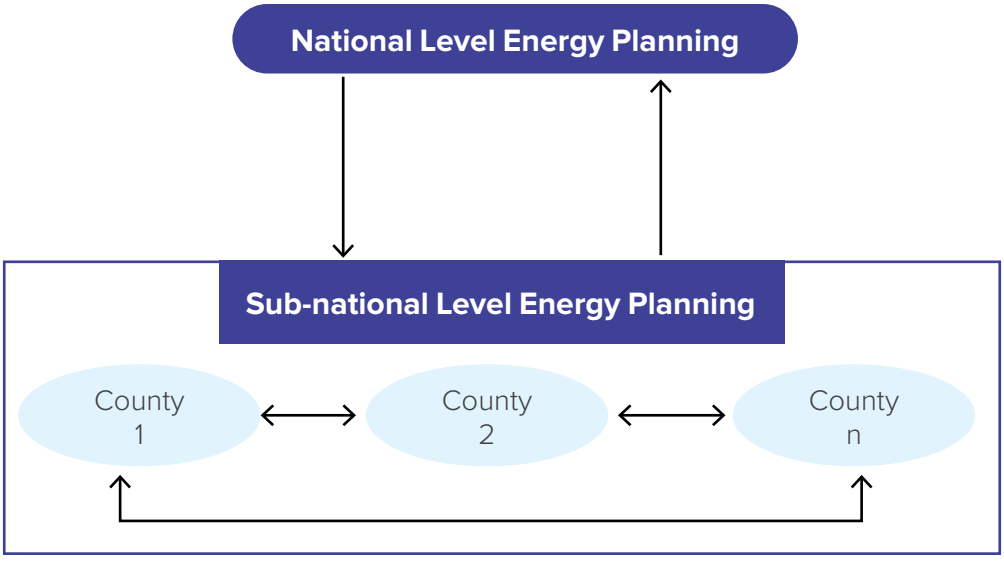


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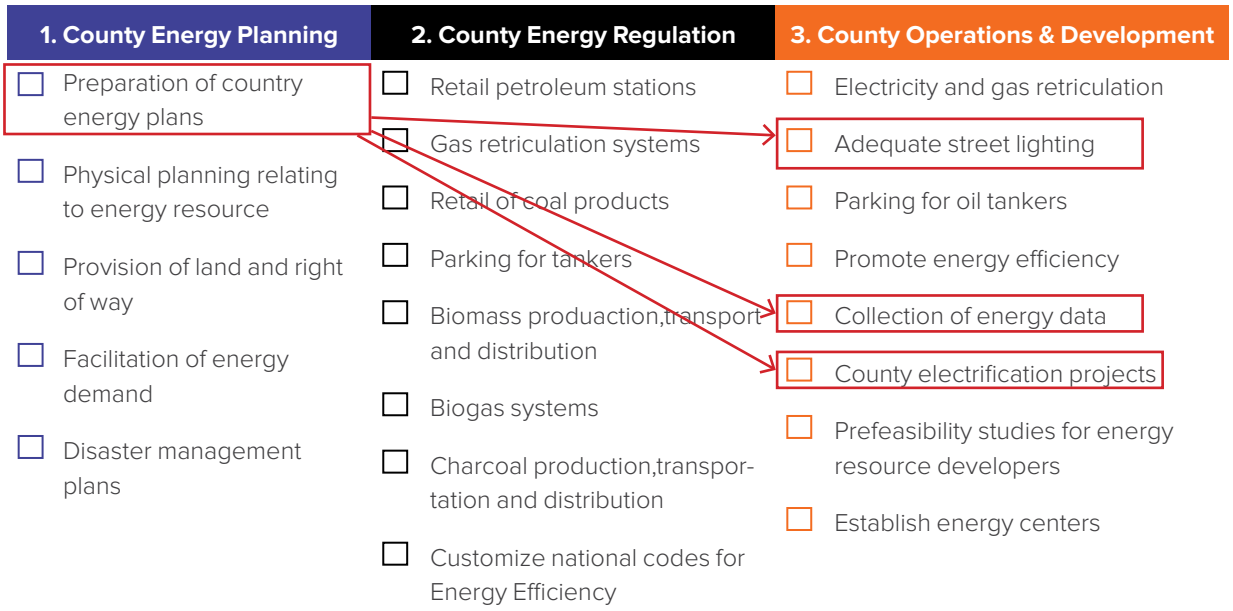
Figure 12: Scope of the NEONET reporting framework.



To enable feasible data collection across the three priority areas in the scope of NEONET, county street lighting, energy supply and demand data, and electrification projects may be mapped further into individual data points, as shown in Table 7. The table shows an example set of data with details on how the data is collected and the variables by which it can be disaggregated. As some data may be known, constants and limited choices may be employed per County. These constants and choices may include projected population, land area, biomass types in scope, et cetera. However, in order not to aggressively limit the choices that can be selected, some choices, such as available biomass types, may be derived from the inaugural CEP reports. This will mitigate misreporting for variables such as biomass, whose availability may differ widely by County.

TABLE 7: An example of NEONET data inputs

Data category	Data point	Disaggregation/ category	Potential data source	Inputs for aggregation
Aggregation constants	-	-	-	1. Land area per County 2. Projected population 3. Biomass types 4. Base datasets (e.g., landcover maps, building maps - Open buildings) 5. Energy source categories 6. Outcome categories
Street lighting		Road classes – A, B, C, D, E, F	Communications Authority Geoportal, KURA, KNBS, KENHA	1. Quantity of existing streetlights 2. Length per road class within County 3. Street lighting energy cost per month/year 4. Number of streetlights per road class
Energy data	Energy resources	Wind	Global Solar Atlas, SolarGIS, ESRI, GEBCO, NOAA, NGDC, literature, Global Wind Atlas, IRENA, EPRA(KE), KenGen(KE), KPLC, KNBS	1. Potential capacity (For power density-based energies, i.e., solar, wind) 2. Potential capacity at top 10 sites (For point-based energies, i.e., Geothermal, hydro) 3. Potential energy capacity vs land area in County in max 20 bins (For power density-based energies, i.e., solar, wind) 4. Current generated energy per category 5. Landcover type (biomass type) by area 6. Biomass energy balance by biomass type
		Solar		
		Geothermal		
		Hydropower		
		Waste to Energy		
		Others		
	Energy access	Households	Surveys where no data is available, extrapolations otherwise. Enterprise business permit records	1. Number per category in the county 2. Survey sample size per category 3. Average kWh per month, per category 4. Frequency of energy sources by category
		Health facilities		
		Education facilities		
		Enterprises		
	County electrification projects	Timelines	County and national government	1. Households, institution types covered 2. Timelines 3. Progress by Households, institution types covered
		Outcomes		

The determination of the national priority needs may be derived through the aggregation of the county data forms, as shown in Figure 13. As a result, the nature of the form can be changed depending on national energy planning requirements. Each year by January 1st, the Commission for Revenue Allocation (CRA) publishes its recommendations on the sharing of national tax revenue across the counties whose deadline for consideration is March 15th, before publication of the national budget estimates between 1st to 30th May[28] . As data forms are submitted to NEONET every three years, this may allow enough time to translate the energy priority needs into budgetary allocations for the CRA and to allow the completion of monitoring activities within the 3-year implementation period.

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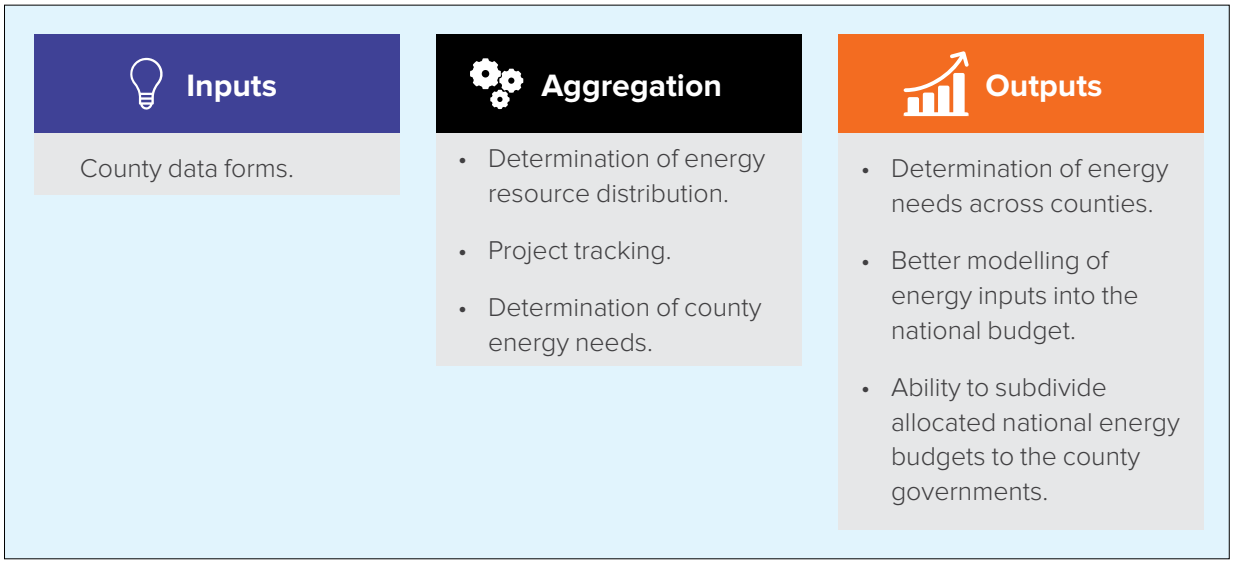
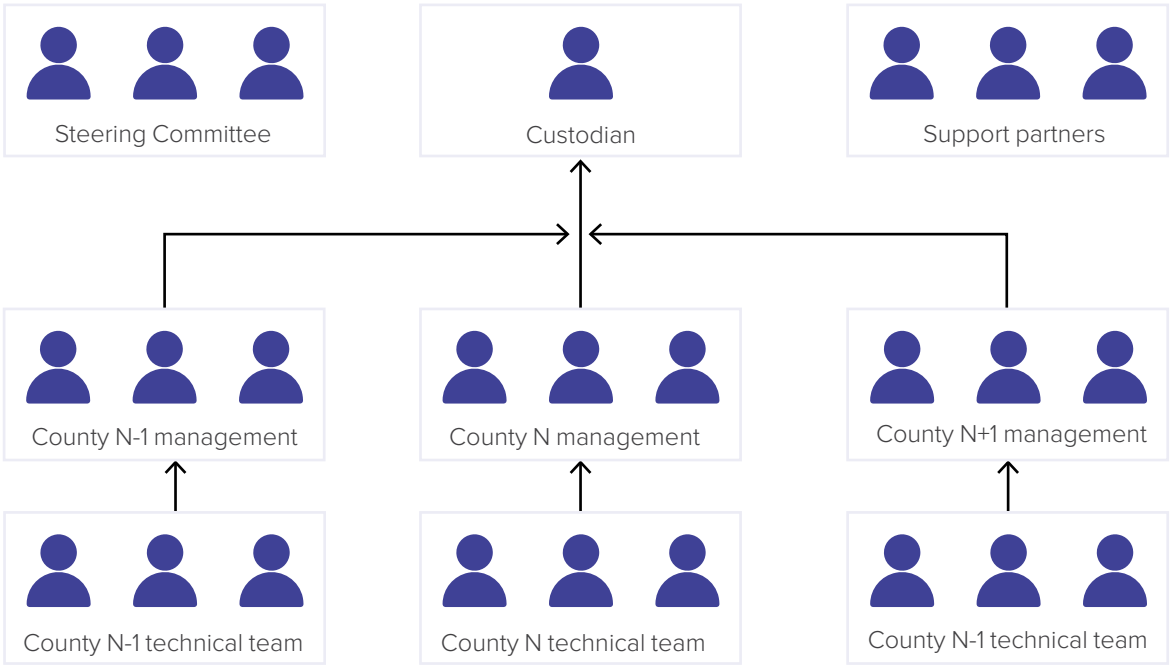
Figure 13: Aggregation and outputs of the collected NEONET data



4.5.2 Proposed Stakeholder Mapping in the NEONET Framework

The NEONET framework borrows heavily from current data management practices to allow the separation of concerns and data in a multi-stakeholder environment. Based on data collected from workshop events carried out that identified the bottlenecks surrounding the development of the CEPs, an implementation of the NEONET framework may classify the various stakeholders into distinct groups. As an example, an implementation may categorise stakeholders into four types: namely, **custodians, management stakeholders** (key people at the county level), **technical stakeholders** (county technical teams) and **support partners**. This is further described below to provide context for future stakeholder mapping.

Figure 14: Stakeholder map of actors within the NEONET framework implementation



4.5.3 The custodian

In this example, implementation, the custodian of the NEONET system is the owner of the data collection system at the national level and may include actors such as the MOE. To ensure efficiency, the system may be domiciled together with other government data collection systems that support breaking up the data silos currently present in government. For instance, a notable government system that supported the decentralisation of interactions with government and data sharing is the E-citizen platform and the now inactive Kenya Open Data Initiative. It is, however, important that motivations are in place to allow uptake of the NEONET framework to prevent the sustainability struggles faced within the Kenya Open Data Initiative (KODI) due to a lack of stakeholder engagement.[29] Due to the impacts of the collected data on investment initiatives in energy, the custodian may integrate the platform outputs with other government agencies, such as the CRA, to harmonise energy reporting and justifications for energy budgeting in the national budget.

4.5.4 The steering committee

The steering committee is responsible for the implementation of the NEONET framework. It may comprise the custodian and selects management and technical officials from the counties and government support partners such as KNBS, REREC, and KPLC. Due to the relationship between energy and economic activities, the Ministry of Industrialisation, Trade, and Enterprise Development is also considered a key contributor in the discussions at the steering committee. The steering committee activities may also be supported by development partners and technical support partners.

4.5.5 The county management

The management and oversight stakeholders are key at the county level. This may include the Council of Governors and high-level management at the county offices. It is advised that these stakeholders should be engaged early in the process and made aware of the data collection activities and their purposes. They are also responsible for communicating concerns to the custodian through the available communication methods between the national and county governments. As a result, these stakeholders do not directly interact with the NEONET system but are aware of its implementation and serve as a strong link between the County's technical stakeholders and the national government. The NEONET county steering committee is a section of the management stakeholders and may include select members of the management and technical stakeholders that guide the implementation of the NEONET framework at the county level.

4.5.6 The county technical teams

Technical stakeholders are a key piece to the functioning of this implementation of the NEONET framework. The technical stakeholders are the hands on the ground – they collect the required data and give feedback to the management stakeholders. The technical stakeholders also interact with the various parties at the county level and are important within the feedback process to improve the NEONET framework as it evolves to suit the reporting needs of the County.

4.5.7 Support partners

Support partners provide both technical and financial support to the implementation of the NEONET framework. The structure of the NEONET framework allows for both top-down and bottom-up support. Current support mechanisms provided in the absence of a CEP reporting framework have mostly been grassroots support, with a handful of organisations achieving an actionable CEP. The NEONET framework, therefore, allows the transformation of current grass root support activities, such as technical assistance, to have more impact through end-to-end support by targeting the top (custodian) and the bottom (counties).

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Annexes

ANNEX 1: WORKSHOP SUMMARY

In collaboration with Climate Compatible Growth (CCG), EED Advisory carried out a consultative workshop on the **14th of February 2022 at Lake Naivasha Resort from 9 AM- 1:30 PM**. The workshop provided valuable insights on county energy planning in Kenya. A range of stakeholders attended the workshop. They represented public sector organisations such as KPLC, county governments, industry associations and development organisations. The workshop was structured along three key thematic areas as described below:

- **The current state of energy planning in Kenya:** This discussion provided insights on the current state of energy planning. Stakeholders provided information on the pitfalls of energy planning based on prior experience developing CEPs or through interacting with various county governments. There was common consensus amongst stakeholders that the energy planning process in Kenya requires significant improvement.
- **Options for enhancing the current practice:** The EED team presented a two-part CEP-style submission to the stakeholders. Stakeholders provided feedback on this structure and ways to enhance the effectiveness and sustainability of the proposed CEP submission process. The feedback provided helped in the development of the national online energy platform (NEONET), which is discussed in detail in chapter four of this report. Case studies on India and Uganda were provided as countries perfecting the energy planning process.
- **Recommendations:** The EED team provided recommendations on ways to improve the energy planning process. Suggestions ranged from revising the current CEP format to devising ways in which public sector bodies such as REREC can support counties. In addition, the recommendations provided guided the design of the NEONET platform.

Stakeholders that attended the workshop filled in a satisfaction survey, and over 98 per cent of stakeholders were satisfied with the organisation, venue, and content presented at the workshop.

The names of the stakeholders present and the organisations they represent is shown in the table below:

TABLE 8: List of Stakeholders Present

Name	Organisation
Murefu Barasa	EED Advisory
Alycia Leonard	Climate Compatible Growth
Bijou Mwaura	EED Advisory
Antony Kamaua representing Grace Kamau	Nakuru County Government
Abel Omanga	GIZ
John Kioli	Kenya National Climate Change Council
Andrew Amadi	KEREA
Mariam Karanja	GIZ
Daniel Mutia	Oxford/ Climate Compatible Growth
Carl Ngaira	EED Advisory
Joyce Irungu	EED Advisory
Adrian Onsare	Kenya Power and Lighting Company
Martin Mutembei	Strathmore Energy Research Centre
Elizabeth Tennyson	Climate Compatible Growth
Kirsty Mackinlay	Climate Compatible Growth

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