

OPEN ENERGY DATA ASSESSMENT NAIROBI, KENYA

November 1st, 2015



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Acknowledgement

The Open Energy Data Assessment for Nairobi has been prepared as part of the World Bank Negawatt Challenge for Energy Efficiency activity.

The principal author of the report is Pierre Chrzanowski (Open Data Consultant, World Bank) who worked under the supervision of Anna Lerner (ICT and Energy Specialist, World Bank) and Oleg Petrov (Senior Program Officer, World Bank).

The Task Team would like to thank Kenyan counterparts for agreeing to take part in the field interviews and for providing inputs, sharing insights and materials that made a significant contribution to this report. Their names, titles, and organizations are listed in Annex 2.

Disclaimer

The analysis and recommendations in this Open Energy Data Readiness Assessment are based on the information and opinions collected from the interviews undertaken and materials provided by the government and other stakeholders during this study.

The findings, interpretations, and conclusions expressed in this report are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent

This Open Energy Data Readiness Assessment is not based on detailed, legal due diligence and does not constitute legal advice. It is recommended that prior to undertaking any action to address any policy, legal or regulatory issue raised herein, the responsible stakeholders ensure that a competent, locally qualified, legal counsel undertake the legal due diligence that it deems appropriate.

Glossary

- Energy sector** this methodology considers the energy sector in a broad sense, including all the stakeholders involved in the production, transmission, distribution, regulation, management and planning of energy on a given territory.
- Energy statistics** refers to statistics on energy stocks and flows, energy infrastructure, performance of the energy industries and the availability of energy resources within the national territory of a given country during a reference period¹.
- Energy data** refers to any data that may be useful for the development of the energy sector. This definition of energy data extends the definition of energy statistics as it includes data which is not usually collected within the National Statistics System.
- Open data** data is considered to be “open” if anyone can freely use, reuse and redistribute it, for any purpose, without restrictions. To be considered “open,” the data must be reusable meaning they can be downloaded in open formats and read by software and users have a legal right to reuse the data.
- Open energy data** is any energy data considered “open”. Open energy data can be data produced by any entity representing public sector, private companies, researchers, NGOs or media.

For a comprehensive glossary of terms used in the energy sector please refer to the International Energy Agency Glossary.²

¹ United Nation Statistics Division, International Recommendations for Energy Statistics (IRES), 2011

² <http://www.iea.org/aboutus/glossary/>

Acronyms or abbreviations

CIF	Climate Investment Fund
DLR	Deutsches Zentrum für Luft und Raumfahrt
EITI	Extractive Industries Transparency Initiative
ERC	Energy Regulatory Commission
GDC	Geothermal Development Company
GIS	Geographic Information System
ICTA	Kenya ICT Authority
ILRI	The International Livestock Research Institute
IPP	Independent Power Producer
KCSPOG	The Kenya Civil Society Platform on Oil and Gas
KenGen	Kenya Electricity Generating Company
KETRACO	Kenya Electricity Transmission Company
KGBS	The Kenya Green Building Society
KNBS	Kenya National Bureau of Statistics
KODI	Kenya Open Data Initiative
KTCIP	Kenya Transparency and Communications Infrastructure Project
MoIC	Ministry of Information and Communication
NCC	Nairobi City County
REA	Rural Electrification Authority
SREP	Renewable Energy in Low Income Countries Program
WRMA	Water Resources Management Authority

Executive summary

The development of a sustainable energy sector will be key for achieving the Kenya's Vision 2030, the country strategy to move Kenya into a middle-income economy. As its capital city and a regional hub, Nairobi, which currently contributes around 63% to the national GDP, will have a major role to play.

Access to reliable energy data is essential for the development of sustainable and efficient energy policy for the city. Energy entrepreneurs and policy makers are requesting more granular and localized data, from disaggregated macro statistics to real-time local energy usage data.

With support from the Kenya Open Data Initiative (KODI), the Nairobi City County (NCC) and other key energy sector stakeholders such as ERC and Kenya Power can improve the sector performance and support emerging energy entrepreneurship by opening their energy datasets using open data principles and encouraging others do to so. Open energy data refers to the concept that any data that may be useful for the development of the energy sector should be available online in a structured machine-readable format for anyone to use or redistribute with any purpose, including commercial one.

As a first step towards developing a policy direction on energy data, the energy sector participated in the first version of the Open Energy Data Assessment, designed and implemented by the Global ICT Practice of the World Bank Group. The assessment was conducted in January and February 2015 and was carried out under the framework of the Negawatt Challenge for Energy Efficiency, a World Bank activity supporting innovation in the energy sector, with funding from the Trust Fund for Statistical Capacity Building.

The overall objective of the Open Energy Data Assessment was to assess the readiness of Nairobi and Kenya energy sector to implement or reinforce open data and to prioritize key actions for open energy data policy making.

The result of the assessment is that the electricity sub-sector may be in a favorable position to move forward on open data and achieve tangible results within Nairobi area if appropriate and targeted actions are taken. In particular, this study recommends to KODI, NCC and the main energy stakeholders to consider the following measures to introduce and mainstream the principles of open data within the energy sector: 1. Organize an Open Energy Data workshop to raise awareness about open data in the energy sector; 2. Expand the inventory of energy datasets to energy utilities and non-government data producers; 3. Set up an open energy data working group; 4. Start the release of energy datasets as open data; 5. Identify and address open energy data projects; 6. Integrate open energy data principles as part of future energy policies at national and county level. Some expected outcomes of the implementation of such measures would be: i) the release of key energy data as open data. These datasets could include electricity consumption at the most detailed level (personal data excluded), real-time and planned power outages, electricity transmission and distribution network map, power

stations and their characteristics, energy audit results, land register, statistics on renewable energy; ii) the reuse of open energy data for the benefits of upcoming energy development plans such as the Kenya Power electricity modernization project; iii) the reuse of open energy data by startups and new businesses working on innovative solution for energy audits, energy savings or power outages.

Regarding the key dimensions of the assessment, the study found that:

The Kenya Open Data Initiative, launched in 2011 with support from the World Bank, is still considered as a leading example in Africa. Even though the decentralization process, which started in 2013, may have slowed down the project during the period 2013 – 2014, the KODI team has been since then committed to reinforce and secure the sustainability of the initiative. This includes a recent revamp of the open data catalog, the adoption of better data management processes, the inclusion of data from the 2-years old counties and the wish to also host non-governmental data. Furthermore, the ICT Authority is confident that the long awaited Data Protection and Access to Information Acts will be passed in the coming Months. However, KODI is facing challenges in the adoption of the open data principles by all public bodies. For now, only 26 out of 83 government departments are releasing open data and the content is not always meeting the technical open data criteria required by re-users. In that regard, the Open Data policy that the ICT Authority is currently working on will be an important component to lay the ground for an ambitious open data program across all the Government. In that regard, the new fellowship program seems to be a good opportunity to address the missing key data producers. Furthermore, the program would benefit from a sectorial approach, which means going beyond government data owners and engaging with all data producers and users within a specific sector to ensure key datasets, the most needed for the development of the sector, can be effectively released and reused. It is recommended here to work on the integration of open data into existing or forthcoming strategic development projects for the country, such as in health, agriculture or the energy sector. Such an approach may help to get more external traction by new sectorial stakeholders, but also funding and tangible outcomes, all beneficial for the development of open data in the country.

The country is expecting a dramatic increase in electricity demand in the next decades. It has been estimated that the installed capacity should be upgraded from a current 1,797 MW to 19,200 MW by 2030 to cope with peak demand. However, there are challenges in terms of infrastructures. The current main issues are weak transmission and distribution networks, low countrywide electricity access and over-reliance on hydropower which is vulnerable to the annual level of rains. To address the challenges, the Government of Kenya has formulated a number of plans whose objectives are to rapidly increase installed electricity capacity, expand and upgrade the transmission and distribution networks, and develop renewable sources of energy: geothermal, solar, wind, biomass and small hydropower. Kenya is therefore at an opportune time to develop open energy data.

Even though the Energy Regulatory Commission (ERC) has the legal mandate to collect and maintain energy data, the legal framework appears to be weak in regard to open energy data's

main objective, which is to enable everyone to access, share and use data from the sector. The legal framework would first benefit from the implementation of the Data Protection and Access to Information laws. Secondly, the mandate of ERC regarding data management could be strengthened by adding the dissemination of energy data, in open data standards, as an additional mission.

The main stakeholders of the energy sector in Kenya are not aware of open data and its potential benefits and therefore not supportive of the idea. This is one of the main barriers to the streaming of open energy data in the country. Nevertheless, the development of the energy sector is a key priority for the Government of Kenya, and there are many incentives that could convince key energy stakeholders to adopt open data principles, one of them being that access to information will favor innovation in the renewable energy sectors.

Overall, there are very few energy data available as open data and there is no integrated data management approach in the sector. This may be explained for two reasons: on one hand, Kenya Power operates as a monopoly for electricity distribution and for this reason collects and holds a large amount of key energy data, without the incentive or legal obligation to proactively releasing it. On the other hand, even though the mandate of ERC specifically includes the collection and maintenance of energy data, it does not address effective data dissemination and reuse within the energy sector and beyond. The growing number of energy stakeholders in the country, as well as the focus on renewable energy, may be seen as opportunities to improve data management within the energy sector by the implementation of open data principles.

There is evidence that the demand for energy data is high and large, both inside and outside of the energy sector, from public administrations, private entities, and academics. However, there is also evidence that the energy data holders does react to data requests in a consistent way and with the most efficient processes. The main outcome is that the energy data producers and energy data users do not engage sufficiently enough with each other, refraining the development of both sides.

The level of ICT infrastructure in the energy sector is continuously increasing with important investments realized in the recent years, in particular from Kenya Power. Kenya is also home to some prominent ICT innovations in the energy area with M-KOPA as one of its success stories. Lastly the growing use of websites, mobile applications, SMS-based applications and social media show that the energy sector is more and more engaging with users online. Altogether, these are favorable conditions for the introduction and development of open energy data.

From the World Bank to private investors, Kenya benefits from the support of various international donors for the development of its energy sectors, and there are signs that these investments should continue to expand in the next years. This is an opportunity to finance open energy data, especially as these funding often see ICT as a leveraging factor. In return, the development of open data in the energy sector, and, therefore, the growth of information accessible to investors, may help to seek further funding for energy projects.

Methodology

This report was prepared following the Open Energy Data Assessment methodology, an energy sector-specific version of the Open Data Readiness Assessment (ODRA) which defines key dimensions where actions are needed to be taken in order to develop an open data program.

This methodology relies on an “ecosystem” approach whereby both the “supply” and “demand” sides of open energy data are analyzed going beyond a mere analysis of the data collection and publishing function of government institutions. It analyzes the environment in which supply of data takes place and demand for it emerges to ensure that the government is well informed as to which policies or measures it has to implement to stimulate open energy data and its active reuse by various user communities.

The dimensions of the Open Energy Data Assessment are: Policy, regulation and structure of the energy sector; Legal framework components within the energy sector related to data management; Leadership, responsibilities and capabilities within the energy sector; Data management within the energy sector; Key energy datasets availability; Use and demand for energy data; ICT use and infrastructure in the energy sector; and Funding an open energy data program within the energy sector.

In addition, a specific section covering basic and essential evidence for the background framework of open data in Kenya and Nairobi has been added to the report. This section uses a lightweight version of the standard Open Data Readiness Assessment.

Evidence

The Assessment framework suggests some hard evidence - existing documents or facts - which are relevant to the dimension, though these are intended to be illustrative only and do not present an exhaustive list.

Individual items of evidence are marked “+” for evidence of a higher level of readiness and “-“ for evidence of a lower level of readiness. The “o” sign indicates that evidence has mixed implications or neither favors nor weighs against readiness.

Assessment

The qualitative assessment of the degree of readiness for each dimension uses the following color scale:

- **Green** means there is clear evidence of readiness
- **Yellow** means that evidence of readiness is less clear
- **Red** means there is an absence of evidence for readiness
- **Grey** means insufficient information to assess readiness

1. Open Data Readiness Assessment for Kenya

Importance Very High

The existence of a National or local Open Data Initiative or basic components for the establishment of an open data program at national and city level are essential to the success of open data within the energy sector.

Evidence

1.1 Leadership on national and city-level open data **Green**

- + The Kenya Open Data Initiative (KODI) was launched in July 2011 by the former President Mwai Kibaki. The initiative was globally acclaimed and led other African governments to take an interest in open data.
- + The current President Uhuru Kenyatta, elected in March 2013, has called for more transparency to tackle corruption and improve procurement process accountability. Kenya also joined the Open Government Partnership (OGP) and hosted a regional meeting in May 2013.

1.2 Legal framework **Yellow**

- o The right to access information is enshrined in the Article 35 of the recent constitution³, which states that every citizen has the right of access to information held by the State. The Access to Information Bill is currently in its second reading at the National Assembly and, according to the ICT Authority, should be fast tracked for a rapid adoption.⁴ The implementation of a right to information legislation is one of the recommendations of the current National ICT Master Plan.⁵
- o The current draft Access to Information Bill does not provide for a per default open data regime, which would state that public data, personal data and others sensible data excepted, should be released online in open data standards. However, it contains a section entitled proactive disclosure, mandating the public entities to facilitate access to information and to provide sufficient information for

³ The Constitution of Kenya, 2010 <https://www.kenyaembassy.com/pdfs/The%20Constitution%20of%20Kenya.pdf>

⁴ See <https://twitter.com/ICTAuthorityKE/status/633533576345190400>

⁵ Ministry of Information, Communication and Technology, National ICT Master Plan, Table 4: Legal Gaps and Recommended Action, <http://www.icta.go.ke/national-ict-masterplan/>

anyone to be able to identify information held by the public entity.

- + Per default, all datasets available on the Kenya Open Data portal are available under CC0 legal term, which means that the data producers waived all of his rights to the datasets worldwide. CC0 is conformant to open data legal standards.
- The right to privacy is registered in the constitution (Article 31), but as for the Access to Information, the Data Protection Act still has to be implemented. A draft Data Protection Bill was approved by the Government's Cabinet and is now discussed at the National Assembly.⁶

1.3 Institutional structures on national and city-level open data Green

- + When launched in 2011, KODI was driven by an Open Data Task Force led by the former Permanent Secretary of the Ministry of Information and Communication, and made up of computer programmers, data experts, legal experts, Statistics Bureau employees, and World Bank officers. The group was then reduced for a time to a team of three civil servants. The KODI team is now composed of 5 people, including a project manager, a project coordinator, an open data and GIS specialist, a statistician, in charge of data collection, and a data analyst.
- o In 2010, the country voted a new constitution which changed the governance regime of the country quite extensively. Following in March 2013 was the election of a new President and the start of the decentralization process, which, ultimately, will give more power to the local governments. The reorganization of competencies among public bodies will likely also impact the responsibilities over public data production and collection.
- + There is currently no open data initiative driven by city or county. However, the national open data catalog contains open datasets provided by the counties of Nairobi, Machakos and Kiambu such as on health or transport facilities.⁷ Furthermore, in the context of the devolution process, the Open Institute, a Kenya-based NGO working on open data, has launched the Open County program to collaborate with County Governments to promote transparency at local level. The program seeks to promote Open Government policy, build tools for Open Government and support citizen engagement.⁸

⁶ See draft of the Data Protection Bill

http://www.cickenya.org/index.php/legislation/item/download/299_b3de9506b20338b03674eacd497a6f3a

⁷ See for instance the datasets for the county of Nairobi <https://opendata.go.ke/county/nairobi>

⁸ See <http://www.opencounty.org/>

1.4 Data management and availability **Yellow**

- o As of August 21st, 2015, the Kenyan open data portal opendata.go.ke contains 263 distinct datasets from 26 Government Departments (out of 83). The most popular datasets are primary schools, examination results, census results and health facilities. Some key datasets such as detailed map, cadastral data, and company register are still missing from the catalog.⁹
- + A new version of the data catalog opendata.go.ke was launched on the 17th August, 2015, enabling for a better exploration of the data available. The new version of the website came with interesting new features such as the possibility to suggest new datasets and an application enabling citizen to explore budget data.¹⁰
- + As part of its plans to strengthen the Open Data Initiative, the Kenya ICT Authority (ICTA) started in June 2015 a fellowship program in selected government and institutions. Fellows have been deployed in 4 institutions. The purpose of the fellowship program is to strengthen the capacity of the host institutions to generate and publish datasets of public interest.¹¹ Additionally, the KODI team is currently conducting a survey of available datasets within the ministries.

1.5 Demand for open data **Yellow**

- + There is a vibrant tech scene in Kenya with a number of innovation hubs regularly promoting open data. Among them are iHub, an innovation hub and coworking space in Nairobi founded in 2010; iLab / iBiz a tech research and incubator program founded in 2011 and affiliated with Strathmore University; and NaiLab, a startups accelerator founded in 2011 which received in 2014 a grant of \$1.6 million from ICTA to promote technological innovations beyond Nairobi.¹²
- + Kenya is also home to successful tech companies that have put open data at the core of their model. The most famous one is probably Ushahidi, a software company which develops a free and open-source software for information collection and interactive mapping.¹³

⁹ See <https://opendata.go.ke/browse>

¹⁰ See <http://budget.opendata.go.ke/>

¹¹ See fellows vacancies announcement on ICTA website, <http://www.icta.go.ke/recruitment-of-fellows/>

¹² For a good overview of the tech scene in Kenya, see Julia Manske, "The Emergence, Challenges and Potential of the Kenyan Tech Ecosystem", Vodafone Institute, May 2014, http://whiteafrican.com/wp-content/uploads/2014/05/1404_VFI_Report_Innovations_out_of_Africa.pdf

¹³ See www.usahidi.com

- Despite the clear need for data expressed by local tech companies and CSOs, a number of studies have evidenced the lack of awareness of the population and poor data quality as limiting the demand for open data. A 2014 iHub Research study found that citizens do access and use government data but know little about KODI and open data applications.¹⁴ Moreover, the report indicates that low quality of the available data hinders its usage and limits its value. In terms of data quality, people interviewed for the study also raised some important issues, such as the prevalence of irrelevant information, outdated datasets, and poorly structured data.

1.6 Civic engagement **Yellow**

- + Since the launch of the open data initiative, there have been some civil-society-led efforts to strengthen open data in the country. This includes Code4Kenya, an initiative co-funded by the World Bank and the Africa Media Initiative which send fellows with data skills into media and CSOs to raise work on specific open data applications.¹⁵ In relation with Code4Kenya, a number of events were organized to promote open data as a way to empower citizens. As an example, a 4-days training event - named data bootcamp - to explore Kenya's budget data was organized in November 2014.¹⁶
- Despite efforts made by organizations such as Code4Kenya and tech spaces to engage with citizens, most of them still do not know about KODI and open data principles. The iHub Research study found that only 7% of respondents of its survey had heard about open data.¹⁷

1.7 Funding **Green**

- + Since its launch in 2011, KODI has been benefiting from a financial and technical support from the World Bank through the Kenya Transparency and Communications Infrastructure Project (KTCIP). Additional credits have been granted to the project in 2012, including a \$6.61 million loan in support to the expansion of the open data initiative.¹⁸
- + The initiative has also attracted financial investment into the private and civil society sectors. Among the investors are Omidyar Network and the African

¹⁴ See <http://www.opendataresearch.org/content/2014/731/understanding-impacts-kenya-open-data-applications-and-services>

¹⁵ See <http://www.code4kenya.org/>

¹⁶ See <http://nairobi.dbootcamp.org/>

¹⁷ Respondents were all inhabitants of Nairobi with an access to Internet. *Ibid.* 10

¹⁸ See <http://www.worldbank.org/projects/P127380/kenya-ktcipadditional-financing-rcip-1?lang=en>

Media Initiative.

1.8 ICT infrastructure **Green**

- + A little more than 43% of the population in Kenya uses Internet, which is the highest rate in East-Africa,¹⁹ and the number of mobile subscriptions is equivalent to 74% of the population. Regarding Internet speed, the country has an average download speed of 7.8 Mbps, one of the best in Africa.²⁰
- + Overall, the country is often considered one of the main ICT Hub in Africa, or at least East-Africa. The country is ranked 4th of all African countries in the last Networked Readiness Index.²¹ It has also attracted ICT world leaders, such as IBM which selected the country to host its IBM Research - Africa.²²
- + The country is a leader in mobile money thanks to the launch in 2007 of M-PESA, an SMS-based service introduced by Safaricom and Vodacom allowing mobile owners to send and receive money from their M-PESA account. The service has around 20 million subscribers²³ (almost half the total population of the country).
- + The Government of Kenya has started the implementation of the Konza Techno City. Dubbed as the "silicon savannah", the project will be located in Makueni County, 64km south of Nairobi, and will host business process outsourcing (BPO) ventures, a science park, a convention centre, shopping malls, hotels, international schools, and health facility project. It is expected that the Konza project will create 100000 IT jobs by 2030.²⁴

¹⁹ ITU Statistics, 2014, <http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

²⁰ NetIndex, <http://www.netindex.com/download/2,128/Kenya/>

²¹ The World Economic Forum's Networked Readiness Index measures the propensity for countries to exploit the opportunities offered by information and communications technology (ICT). See Networked Readiness Index 2014, http://www3.weforum.org/docs/GITR/2014/GITR_OverallRanking_2014.pdf

²² IBM Research – Africa, 2013, <http://www.research.ibm.com/labs/africa/index.shtml>

²³ Quartz Africa, Kenya's Safaricom might have to spin off M-Pesa, the world's largest mobile money business, 6 July 2015, <http://qz.com/445114/dominating-mobile-money-could-lead-to-the-break-up-of-kenyas-biggest-mobile-network/>

²⁴ Konza Techno City website, <http://www.konzacity.go.ke/>

Assessment

The Kenya Open Data Initiative, launched in 2011 with support from the World Bank, is still considered as a leading example in Africa. Even though the decentralization process, which started in 2013, may have slowed down the project during the period 2013 – 2014, the KODI team has been since then committed to reinforce and secure the sustainability of the initiative. This includes a recent revamp of the open data catalog, the adoption of better data management processes, the inclusion of data from the 2-years old counties and the wish to also host non-governmental data. Furthermore, the ICT Authority is confident that the long awaited Data Protection and Access to Information Acts will be passed in the coming Months. However, KODI is facing challenges in the adoption of the open data principles by all public bodies. For now, only 26 out of 83 government departments are releasing open data and the content is not always meeting the technical open data criteria required by re-users. In that regard, the Open Data policy that the ICT Authority is currently working on will be an important component to lay the ground for an ambitious open data program across all the Government. In that regard, the new fellowship program seems to be a good opportunity to address the missing key data producers. Furthermore, the program would benefit from a sectorial approach, which means going beyond government data owners and engaging with all data producers and users within a specific sector to ensure key datasets, the most needed for the development of the sector, can be effectively released and reused. It is recommended here to work on the integration of open data into existing or forthcoming strategic development projects for the country, such as in health, agriculture or the energy sector. Such an approach may help to get more external traction by new sectorial stakeholders, but also funding and tangible outcomes, all beneficial for the development of open data in the country.

Sub dimensions	Assessment
Leadership	Green
Legal framework	Yellow
Institutional structures	Green
Data management	Yellow
Demand for open data	Yellow
Civic engagement	Yellow
Funding	Green
ICT Infrastructure	Green
Overall	Green

2. Policy, regulation and structure of the energy sector

Importance Very-High

The way the energy sector is structured and regulated has an impact on how easily open data principles can be integrated into it and how the sector can benefit from open data. For instance, the incentives for a public monopoly to release its energy data as open data would not be the same as for a private utility operating in a free market. Understanding how the energy industry is organized and regulated is therefore key to identifying the structural barriers as well as surfacing opportunities for open data.

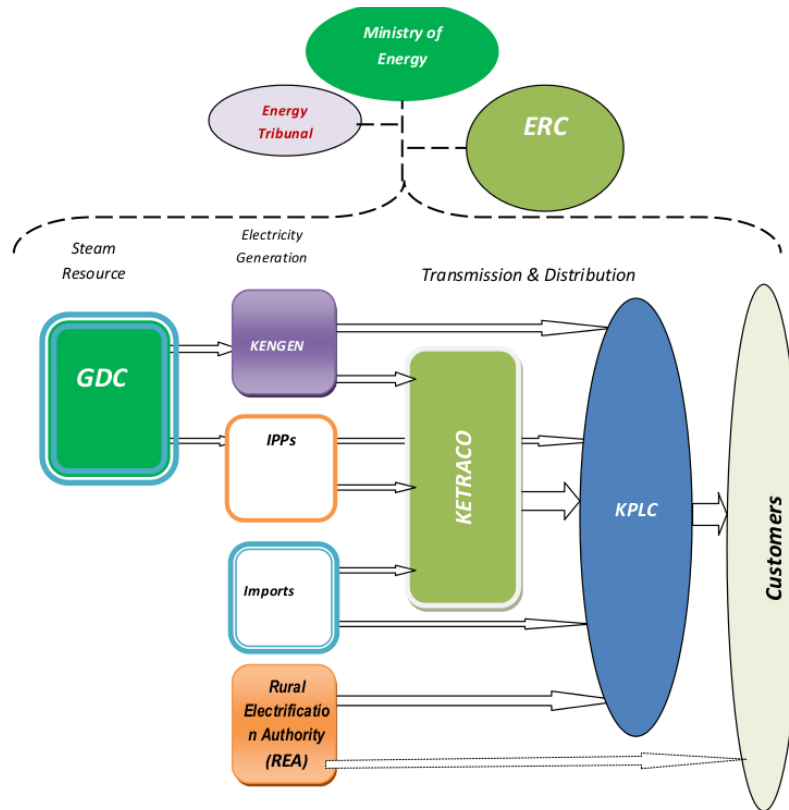
Evidence

2.1 What is the current structure of the energy sector (its main policies, regulations, actors) and how could it benefit from open data? **Yellow**

- o In 1994, the Government of Kenya initiated liberalization reforms in the electricity supply industry which led to the separation of electricity generation from transmission and distribution. Another round of reforms followed in 2006 with the Energy Act No.12.²⁵ As a result, Kenya Power Electrification Company (KPLC) has now split into three distinct entities: Kenya Power which is responsible for distribution and supply function and operates in a market monopoly; Kenya Generating Company (KenGen) which took over all publicly owned generation assets and is responsible for electricity generation; Kenya Electricity Transmission Company (KETRACO) which is responsible for electricity transmission lines and fiber optic cables. The other main institutions in the electricity sector comprise the Ministry of Energy and Petroleum, the Energy Regulatory Commission (ERC), the Rural Electrification Authority (REA), the Geothermal Development Company (GDC) and a number of Independent Power Producers (IPPs).

²⁵ Energy Act No.12, 2006, <http://www.erc.go.ke/images/Regulations/energy.pdf>

Figure 1: Organization of the electricity sub-sector in Kenya
Source: Republic of Kenya, Scaling-Up Renewable Energy Program (SREP)



- o The Electric Power Act of 1997²⁶ is the principal Act governing the operation of the electricity supply industry in Kenya. Neither the Act nor the Electricity Grid Code,²⁷ the primary technical document of the electricity supply industry, provides regulation clearly favoring or hindering the release of data to the public.

- o The draft National Energy and Petroleum Policy recognizes that the lack of an integrated mechanism for data collection, management and dissemination is a challenge for the energy sector.²⁸ The policy therefore recommends to enhance the capacity of the central planning unit at the ministry to collect, maintain and disseminate energy and petroleum data and ensure that the energy and petroleum data is disseminated through the website of the ministry on a quarterly basis. Although these are good recommendation with regard to open data principles, the policy could have gone a step further in specifying the responsibility of the primary energy data producers over energy data

²⁶ Electric Power Act No. 11, 1997, <https://www.scribd.com/doc/140005439/Electrical-Power-Act-1997-kenyan-laws>

²⁷ Electricity Grid Code, 2008, <http://www.erc.go.ke/images/docs/Kenya%20Grid%20Code.pdf>

²⁸ Draft National Energy and Petroleum Policy, January 20, 2015, <http://www.energy.go.ke/downloads/The%20National%20Energy%20and%20Petroleum%20Policy,%202015.pdf>

management and dissemination, and indicating which kind of data should be collected, disseminated, under which format and license.

- + The proposed Petroleum (Exploration, Development & Production) Bill provides for the establishment of an Upstream Petroleum Regulatory Authority. This authority would have, among its missions, to collect, maintain and manage upstream petroleum data through a National Data Center.²⁹

2.2 To what extent are key indicators of the energy sector conducive to an energy sector specific open data program? **Green**

- o Electricity in the country is mainly generated from hydro and geothermal power plants. Combined, they account for more than 60% of electricity generation while fossil sources contribute for 36.4%.
- + The country is expecting a dramatic increase in electricity demand in the next decades. It has been estimated that the installed capacity should be upgraded from a current 1,797 MW to 19,200 MW by 2030 to cope with peak demand. However, there are challenges in terms of infrastructures. The current main issues are weak transmission and distribution networks, low countrywide electricity access and over-reliance on hydropower which is vulnerable to the annual level of rains. To address the challenges, the Government has formulated a number of plans whose objectives are to rapidly expand installed electricity capacity, expand and upgrade the transmission and distribution networks, and develop renewable sources of energy: geothermal, solar, wind, biomass and small hydropower.³⁰ These reforms are opportunities to diffuse and take advantage of open data in the electricity sub sector.
- o The current electricity consumption for the Nairobi City County (NCC), which comprises the capital and its surrounding area, accounts for about 53% of all electricity use in the country.³¹

2.3 What is the dynamic of the energy market, in particular regarding development of Independent Power Producers (IPPs) and Small and Medium-sized Enterprises (SMEs); and to what extent does it rely on the energy broker system and broker companies? **Yellow**

- + Between 1996 and 2013, Kenya Power signed Power Purchase Agreements

²⁹ Petroleum (Exploration, Development and Production) Bill, 2015, [http://www.energy.go.ke/downloads/Petroleum%20\(Exploration,%20Development%20&%20Production\)%20Bill,%202015.pdf](http://www.energy.go.ke/downloads/Petroleum%20(Exploration,%20Development%20&%20Production)%20Bill,%202015.pdf)

³⁰ For further details on the plans, see Republic of Kenya, Scaling-Up Renewable Energy Program (SREP), Draft, May 2011, http://www.renewableenergy.go.ke/downloads/policy-docs/Updated_SREP_Draft_Investment_Plan_May_2011.pdf

³¹ Source: Kenya Power, Annual Report, 2014, <http://www.kplc.co.ke/category/view/39>

(PPAs) with twelve independent power producers (IPPs) for a combined capacity of 1,194 MW from a portfolio of different technologies and fuels, including diesel engines, gas turbines and geothermal. Of these IPPs, 8 plants with a total capacity of 492 MW (27% of effective power capacity of the country) are currently in operation while others are at various stages of development.³²

2.4 How are the Government of Kenya and the Nairobi City County supportive of renewable energy solutions and what are the current or foreseen reforms in this area? **Yellow**

- + As part of its Kenya Vision 2030 strategy, the Government of Kenya recognizes that national energy costs are higher than those of her competitors and that the country must, therefore, generate more energy at a lower cost and increase efficiency in energy consumption. Moreover, the Government is committed to continue institutional reforms in the energy sector, including a strong regulatory framework, encouraging more private generators of power, and separating generation from distribution. New sources of energy will be found through exploitation of geothermal power, coal, renewable energy sources, and connecting Kenya to energy-surplus countries in the region.
- o The NCC Energy Policy is working since 2014 with UN-Habitat to define its Energy Policy which is seeking to ensure affordable, sustainable and reliable supply of energy to meet the county's development needs. However, there is no evidence that the policy has been completed.³³
- + In 2014, the World Bank conducted a study to assist the NCC in the formulation of a long-term sustainable urban energy efficiency strategy.³⁴ The study, based on the World Bank's TRACE methodology (Tool for Rapid Assessment of City Energy), identified street lighting, municipal buildings and solid waste as priority sectors for the development of sustainable energy.

Assessment

There is no explicit barrier in the policies, regulations and overall structure of the energy sector for the development of open data, but there is no element favoring it neither. Kenya is yet at an opportune time to develop open energy data. The Government made a clear commitment to develop renewable energy, which include the support of newcomers and attraction of

³² World Bank, Kenya - Private Sector Power Generation Support Project. Washington, 2014, <http://documents.worldbank.org/curated/en/2014/03/19251727/kenya-private-sector-power-generation-support-project>

³³ Un-Habitat, Draft Energy Policy for Nairobi City County, April 2014, http://www.unep.org/energy/portals/50177/City%20Experiences%20on%20District%20Energy-%20Nairobi_City_County.pptx

³⁴ World Bank, Development of Energy Efficiency – Nairobi, 2014

investments. As such, a better access to energy data could be a key success factors for the country to meet its energy plans.

Sub dimensions	Assessment
Structure of the energy sector	Yellow
Key indicators	Green
Dynamic of the energy market	Yellow
Government is supportive of renewable energy	Yellow
Overall	Yellow

3. Energy sector legal framework provisions relevant to open data

Importance High

The long-term success and sustainability of an open data program is greatly impacted by the policy and legal framework. When addressing open data for the energy sector, the legal framework regulating the energy sector is of equal importance as the more general legal framework.

At an early stage of an open data initiative it is important to identify existing policies, laws and regulations with respect to a core set of issues and to identify actual or perceived obstacles to the release of data in order to have the necessary policy or legal change initiated early enough.

Evidence

3.1 Does the legal and policy framework of the energy sector contain specific components related to the protection of personal data? **Red**

- o There is no evidence of elements related to the protection of personal data could be found in the different acts or code regulating the electricity sub-sector. Moreover, the country does not have a general data protection framework (see 1.2 Legal framework).

3.2 Is there any provision or exception applied to the energy sector with regard to the right of access to information? **Red**

- There is still no Access to Information legal framework in Kenya (see 1.2 Legal framework). This is one of the main stumbling block to energy data access for the citizen.

3.3 What are the components related to data management, archiving and data security within the legal and policy framework of the energy sector? **Yellow**

- + ERC is by law the principal entity responsible for the collection and dissemination of energy data. As stated in the Energy Act, 2016, the commission has the following responsibility regarding energy data management: i) maintain a list of accredited energy auditors as may be prescribed; ii) monitor, ensure implementation of, and the observance of the principles of fair competition in the energy sector, in coordination with other statutory authorities, (and) provide such information and statistics to the Minister as he may from time to time require; iii) collect and maintain energy data.

- o ERC, through the Energy Act 2006, is requiring for all industrial, commercial and institutional users of electricity consuming more than 180 MWh to conduct energy audits once in three years. The Commission is maintaining a database of buildings and their audit status but it is not publicly available, and there is no legal provision regarding the communication of audit results to the public. In practice, an energy audit company will generally sign a nondisclosure agreement with the building owner.

Assessment

Even though ERC has the legal mandate to collect and maintain energy data, the legal framework appears to be weak in regard to open energy data's main objective, which is to enable everyone to access, share and use data from the sector. The legal framework would first benefit from the implementation of the Data Protection and Access to Information laws (See Section 1.2). Secondly, the mandate of ERC regarding data management could be strengthened by adding the dissemination of energy data, in open data standards, as an additional mission.

Sub dimensions	Assessment
Data protection within the energy sector	Red
Right of access to information within the energy sector	Red
Framework for data management, archiving and data security	Yellow
Overall	Red

4. Leadership, responsibilities and capabilities within the energy sector

Importance High

Open data often requires the implementation of changes - including legal, institutional, technological and cultural changes - affecting stakeholders both inside and outside the energy sector. Leadership is therefore critical to lead the changes and ensure appropriate coordination between main stakeholders.

At the same time, open data requires strong commitment and capacity from stakeholders in the energy sector to ensure management of processes for data gathering, security, quality control and publishing.

Evidence

4.1 To what extent is the energy sector aware of open data and its potential benefits? **Red**

- Stakeholders from Kenya Power and ERC were not aware of open data and its potential benefits for the sector. Moreover, most of the energy stakeholders interviewed for this assessment did not know about the national Open Data Initiative.

4.2 To what extent are the lead stakeholders within the energy sector (Government, Energy Regulatory Authority, energy utilities) supportive of open data/open government/access to information? **Yellow**

- + The current President has expressed its public commitment towards more transparency in the energy sector, in particular in the oil industry. He also announced that the country will soon join the Extractive Industries Transparency Initiative (EITI).³⁵
- Despite efforts from ERC, in particular with the Renewable Energy Portal, to make more energy data available, there is very few evidence, if any, of support towards open data or access to information from the main energy stakeholders.

4.3 Which stakeholders within the energy sector are primarily responsible for data or statistics production, collection, and management? **Yellow**

- + As stated in Section 3.3, ERC is by law the principal entity responsible for the

³⁵ Oxfam, "Absolutely" – Kenya President backs full oil contract disclosure, August 27, 2014, <http://politicsofpoverty.oxfamamerica.org/2014/08/absolutely-kenya-president-backs-full-oil-contract-disclosure/>

collection and dissemination of energy data.

- o The Kenya National Bureau of Statistics (KNBS) does not have a specific mandate regarding energy data but it does use and analyze some energy sector statistics produced or collected by ERC and the energy stakeholders, mainly for its annual publications: the Economic Survey and the Statistical Abstract.³⁶

Assessment

The main stakeholders of the energy sector in Kenya are not aware of open data and its potential benefits and therefore not supportive of the idea. This is one of the main barriers to the streaming of open energy data in the country. Nevertheless, the development of the energy sector is a key priority for the Government of Kenya, and there are many incentives that could convince key energy stakeholders to adopt open data principles, one of them being that access to information will favor innovation in the renewable energy sectors.

Sub dimensions	Assessment
Energy sector aware of open data	Red
Stakeholders within the energy sector supportive of open data	Yellow
Responsibility for data or statistics production, collection and management	Yellow
Overall	Yellow

³⁶ KNBS website, www.knbs.or.ke/

5. Data management and availability within the energy sector

Importance High

Open energy data can build on established digital data sources and information management procedures within government where they already exist.

For a comprehensive examination of key datasets availability, please refer to the Annex 1: Assessment Key energy-related datasets.

Evidence

5.1 What are the current practices and procedures for data sharing among the main energy stakeholders and between the energy sector and others? **Red**

- There is no evidence of effective collaboration, or existence of a specific working group within the energy sector, whose aim would be to improve energy data collection and management in the sector. An example of such a working group can be found in Ghana with the Energy Access Data Task Force coordinated by the Energy Commission of Ghana.³⁷
- Data sharing within the energy sector seems to be mainly considered as a “one to one” request process - one entity needs to request information to another to access the data - and not as a proactive disclosure process - one entity deliberately open up its data to everyone without waiting for specific data request.
- One of the main outcomes from the World Bank’s study on energy efficiency for Nairobi is that data collection in this sector was a challenge. The study noted that this was due to a lack of publicly available data and the logistical issues around data being held across various city departments, energy companies, and other stakeholders. Moreover, the quality of data on the current energy profile of the city is not considered satisfactory for providing a rigorous and accurate benchmarking exercise. The study ends by stating that the data access issue may have hindered the quality of the analysis.³⁸
- Kenya Power ICT department gets a daily report from power producers in the form of word documents. There is no evidence of integrated data management system between power producers and Kenya Power, the sole power distributors in the

³⁷ See <http://energycom.gov.gh/GhEAdatabase/>

³⁸ *Ibid.* 22

country.

5.2 Which data management policies and standards have been implemented to improve quality and diffusion of data within the energy sector? **Red**

- No evidence of data management policy or standard specific to the energy sector could be found.

5.3 Which energy data is made available outside the energy sector - either free or for a fee - and on what conditions? **Yellow**

- + ERC Renewable Energy Portal is publishing a range of information including policy and legal documents related to the renewable energy sector, energy plans, maps of energy resources in Kenya, licensed renewable energy practitioners. However, most of this information is contained in PDF documents, or viewable on online maps, but not available as open data (no open format, no open license) for easy download and reuse.³⁹
- o Kenya Power is collecting and managing a large amount of data related to the electricity sub-sector. This includes data on substations, energy consumption, appliances, staff, power lines, customers. According to Kenya Power, most of non-personal can be made available upon request, and subject to specifying the purpose of data reuse. However, there is evidence that not all data requests attempts were fulfilled by the company and that granular level data were difficult to obtain. Lastly, the terms of use attached to data released are unknown.
- + The energy category on the Kenya Open Data portal returns 5 datasets, all of them extracted from the 2009 census.⁴⁰ These datasets are available for download in CSV and other open data formats. However, as stated in Section 1.2, the legal openness of the datasets is unclear.

5.4 To what extent and how does the energy sector communicate to the population about the status of the energy system (capacity level, power outages, construction plan, etc.)? **Yellow**

- + Kenya Power has set up a dedicated online service, Power Alert,⁴¹ to communicate about power outages. The website is providing scheduled and real-time status of known power outages. It can send SMS, twitter, or email notifications to users based on their location. Interestingly, the portal also includes a map showing real-time power outages inferred from twitter feed. However, the website does not provide any option to download the data as open data.

³⁹ ERC Renewable Energy Portal, <http://www.renewableenergy.go.ke/>

⁴⁰ See <https://opendata.go.ke/browse?limitTo=datasets&q=energy>

⁴¹ Kenya Power, Power Alerts website, <http://poweralerts.kenyapower.co.ke/>

5.5 Which agencies with established capabilities could give leadership to drive open data in the energy sector? **Yellow**

- o While ERC has the legal mandate to collect energy data, there is no provision in the Energy Act, 2006, regarding the proactive release of energy data. Kenya Power may have the best technical capabilities to drive an open data initiative in the electricity sub-sector. Nevertheless, none of these entities have expressed interest, nor showed commitment, to move forward on open data in the energy sector.
- o KODI is the main driver for open data in the country and has the responsibility to raise awareness on the topic in strategic sectors such as energy. However, the team will not be able to advance in the sector with the support of at least some of the main energy stakeholders, namely Kenya Power, ERC, and the Ministry of Energy and Petroleum.

Assessment

Overall, there are very few energy data available as open data and there is no integrated data management approach in the sector. This may be explained for two reasons: on one hand, Kenya Power operates as a monopoly for electricity distribution and for this reason collects and holds a large amount of key energy data, without the incentive or legal obligation to proactively releasing it. On the other hand, even though the mandate of ERC specifically includes the collection and maintenance of energy data, it does not address effective data dissemination and reuse within the energy sector and beyond. The growing number of energy stakeholders in the country, as well as the focus on renewable energy, may be seen as opportunities to improve data management within the energy sector by the implementation of open data principles.

Sub sections	Assessment
Practices and procedures for data sharing among the main energy stakeholders	Red
Management policies and standards	Red
Energy data available outside the energy sector	Yellow
Communication of the energy sector to the public	Yellow
Agencies with established capabilities for leadership in open data	Yellow
Overall	Red

6. Use and demand for energy data

Importance Very High

The value of energy data is in its use. A strong demand-side “pull” of data is important not only in creating and maintaining pressure on the government to release data but also in ensuring that the wider open energy data ecosystem matures, and that open data turns into economically or socially valuable services for citizens. The “pull” can come from civil society, the private sector, international organizations, donors, and individual citizens. The capacity of data users to perform effective data analysis is also essential to ensuring that a greater availability of data will lead to greater data usability and data-informed actions.

Evidence

6.1 What is the level and nature of actual demand and latent demand for energy data from MDAs and local government outside the energy sector? **Yellow**

- + Although this study did not assess demand for energy data in the administrations outside of the energy sector, it is to be noted that both the Government of Kenya and NCC are currently working on the design of energy policies. Therefore, the access to accurate and up to date energy data for administrations inside and outside of the energy sector is of high relevance. Moreover, energy data is also particularly important for urban and land development, another strategic area for the country.

6.2 What is the level and nature of actual demand and latent demand for energy data outside the government from businesses/the private sector, development partners, academics, civic tech organizations, and media? **Green**

- + There is a strong need for energy data from consultancy companies, academics and other energy policy experts capable of providing insights for the development of the energy sector. Unfortunately, there is converging evidence that these stakeholders are facing important challenges to access accurate and granular energy data from the main energy data producers.
- + IBM Research-Africa, based in Nairobi, is developing a software application to model rural electrification strategies and predict potential economic and social benefits. This decision-making tool could be of great help for local governments and donors to decide which villages to prioritize, and then identify the best methods for connecting them. The effectiveness of IBM's application depends on the availability of data. This is the reason why IBM researchers are particularly interested in open energy data.
- + The African Urban Metabolism Research Network, a collaboration between the MIT and the Stellenbosch University in South Africa, aims to assess resources and flows of physical elements within cities (energy, water, material, etc.) in order to better

define resource intensity typology for African cities and provide better recommendations for more energy efficient and sustainable territories.⁴² One of the main deliverables of the project will be an open data platform including data gathered on physical resources, along with a Geographic Information System (GIS) layers. The project could, therefore, be used as an external driver for open energy data for Kenya and Nairobi.

- + Nairobi is one of the 4 cities selected to host the Negawatt Challenge, a year-long competition organized by The World Bank to surface innovation in energy efficiency.⁴³ The program, which started in February 2015, convened during a one-day workshop entrepreneur, academics, CSOs, development organizations and energy stakeholders to define the main energy efficiency issues for the city, and identify related data to tackle them. This activity enabled the participants to express their needs in terms of energy data and compile a list of key energy datasets for the sector (see Annex 3). The themes retained for the challenge are Energy audits and targeted recommendations for energy savings; Demand reduction through behavioral change; and Lack of electricity and power outages.
- + There is an important demand for energy data in the real estate area, in particular regarding the development of building energy audit. The Kenya Green Building Society (KGBS), launched in April 2015, aims to drive the development of energy efficiency for buildings in the country. The institution sees access to energy data as a key component for its mission. Among the datasets that should be opened according to KGBS are the list of existing buildings and their audit status, the list of building projects, and the policy targets on energy efficiency at county level.
- + CSOs are requesting more transparency and accountability in the oil and gas sector. The Kenya Civil Society Platform on Oil and Gas (KCSPOG) is doing an important advocacy work in this area and regularly publishes report on the state of transparency and accountability in the sector. They are, however, not advocating for open data per se.⁴⁴

6.3 How do the energy sector data holders react to these requests and engage with energy data users? Red

- The responses to formal data requests to the main energy data producers seem largely dependent on the entity requiring the data. Moreover, there is no evidence of specific procedures to deal with requests for information on the main energy data

⁴² For an introduction to the Urban Metabolism Network, see <http://mitsloan.mit.edu/sustainability/profile/john-fernandez>

⁴³ Negawatt Challenge website, <http://www.negawattchallenge.com/challenges/#/nairobi-challenges/>

⁴⁴ KCSPOG, Setting The Agenda for the Development of Kenya's Oil and Gas Resources – The Perspectives of Civil Society, July 2014, http://kcspog.org/wp-content/uploads/2014/08/KCSPOG_Agenda_Setting_Report.pdf

producer's websites.

6.4 To what extent can energy consumers access their own consumption data through their contracted utility company, or through third-party services, thanks to specific agreements or mechanisms such as the Green Button? **Yellow**

- + Kenya Power rolled-out in January 2015 a smart meter pilot project in Nairobi to equip 5000 of its customers whose monthly power bills exceed Sh100000. These customers, mainly businesses, will be able to get online access to their actual power consumption. The project is planned for 2 years. For all the other Kenya Power's clients (2.9 million in total), the only way to access their energy consumption data will remain the annual energy bill.

6.5 To what extent - if it exists - has the Open Data Initiative engaged with the energy sector and facilitated the interaction between data producers and users in this area? **Red**

- KODI participated in the recent World Bank Negawatt Challenge and has started to facilitating interaction between data producers and data users. However, this engagement into the energy sector is quite new and has not been transformed into specific energy data release or activities with the energy sector yet. Moreover, most of the energy data producers still do not know about KODI and open data principles.

Assessment

There is evidence that the demand for energy data is high and large, both inside and outside of the energy sector, from public administrations, private entities, and academics. However, there is also evidence that the energy data holders does react to data requests in a consistent way and with the most efficient processes. The main outcome is that the energy data producers and energy data users do not engage sufficiently enough with each other, refraining the development of both sides.

Sub sections	Assessment
Demand for energy data from MDAs and local government outside the energy sector	Yellow
Demand for energy data from business/the private sector, development partners, academics, civic tech organizations and the media	Green
Energy sector data holders reactions to the demand	Red
Access to consumer's consumption data	Yellow

Does the Open Data Initiative engage with the energy sector	Red
Overall	Yellow

7. ICT use and infrastructure in the energy sector

Importance High

In very practical ways, open data programs normally rely for their success, at least partly, on the state of the national technology infrastructure, which is understood as availability of technology and information and communications services as well as the quality of existing ICT skills among officials, intermediaries and the general public. The same applies to open data within the energy sector. The level of ICT and infrastructure and related skills for people in the energy sector is an indicator of the possibility to see energy data effectively collected, used and shared.

Evidence

7.1 What is the level of ICT infrastructure within the energy sector? **Yellow**

- o Overall, all the main energy utility such as Kenya Power and Ketraco benefit from good ICT infrastructure including data management systems for power production, transmission, and distribution. However, the level of integration between these systems seems to be low.
- + Kenya Power is conducting a digital mapping of its customers which will be integrated to its GIS and linked to its System Control and Data Acquisition (SCADA) power management system to ease location of faults along its grid network. Data will include customer premises, meters, meter boards, power lines, transformers, substations.⁴⁵ The digital map should be implemented by October 2015.

7.2 What is the level of web and mobile applications used within the traditional energy sector (website, social network, SMS)? **Yellow**

- + Kenya Power uses its website along with social media (Facebook, Twitter) and SMS to engage with its customers and inform them on power outages.⁴⁶ Other energy stakeholders, such as the Ministry of Energy and Petroleum or ERC, do have social media accounts but very few people follow them (less than 1000). Overall, the level of online presence of the principal energy stakeholders is good but could be improved with specific mobile and SMS-based applications.
- + The Ministry of Energy and Petroleum and the energy sector of Kenya launched in October 2014 an Electricity Requirements Platform, hosted by Kenya Power, to

⁴⁵ See <http://allafrica.com/stories/201504301382.html>

⁴⁶ See for instance Kenya Power Facebook page <https://www.facebook.com/KenyaPowerLtd?fref=ts>

collect requests in terms of electricity needs from existing and future.⁴⁷

7.3 What is the extent of ICT-based innovations within the energy sector? **Green**

- + Kenya is home to some world-class ICT-based innovations within the energy sector. The most famous one being M-KOPA Solar, a company offering pay-as-you-go solar energy services for off-grid customers. Customers acquire solar systems for a small deposit and then purchase daily usage “credits” (less than \$0.50 per day) via their mobile money system such as M-PESA. The company provides its services to more than 200 000 homes in Kenya and it also operating in Uganda and Tanzania.⁴⁸

Assessment

The level of ICT infrastructure in the energy sector is continuously increasing with important investments realized in the recent years, in particular from Kenya Power. Kenya is also home to some prominent ICT innovations in the energy area with M-KOPA as one of its success stories. Lastly the growing use of websites, mobile applications, SMS-based applications and social media show that the energy sector is more and more engaging with users online. Altogether, these are favorable conditions for the introduction and development of open energy data.

Sub dimensions	Assessment
ICT infrastructure within the energy sector	Yellow
Web and mobile applications used within the energy sector	Yellow
ICT sector contribution to the energy sector	Green
Overall	Yellow

⁴⁷ Electricity Requirement Platform, <http://www.kplc.co.ke/investorpowerplan/public/index.php/home/index>

⁴⁸ M-KOPA Solar website, <http://solar.m-kopa.com/about/company-overview/>

8. Funding an open data initiative within the energy sector

Importance Medium High

Funding with respect to both the “supply side” and “demand side” of open data is important to ensure that the objectives of the open data initiative are met within the energy sector.

Evidence

8.1 What funding is available to support open data in the energy sector from the government (from the energy sector itself or from funding for eGovernment, Open Data Initiative, statistical capacity or ICT in Government)? **Yellow**

- + A \$457.5 million World Bank-supported electricity modernization project was approved in March 2015. The project seeks to scale-up electricity access, strengthen Kenya Power’s finances and improve service delivery. Its implementation and impact could benefit from the integration of an open data component.⁴⁹
- + Kenya is one of the pilot countries selected to benefit from the Scaling Up Renewable Energy in Low Income Countries Program (SREP) from the Climate Investment Fund (CIF). The program has secured \$50 million to co-finance a geothermal power projects in Menengai, and energy access from mini-grid systems.⁵⁰
- + Some important investments have been made during the last decade to enhance information availability for the development of renewable energy. The Solar and Wind Energy Resource Assessment (SWERA) project, which started in 2001 and was managed by the Division of Technology, Industry and Economics (DTIE) of the United Nations Environment Programme (UNEP), aimed to increase the availability and accessibility of high-quality solar and wind resource information and also provide the tools for analysis and application in promoting renewable energy investments. The project was conducted in 13 developing countries, including Kenya and benefited from a financing of \$ 9.1 million overall, including 6.8 million from the Global Environment Facility (GEF).⁵¹

⁴⁹ See <http://www.worldbank.org/projects/P120014/electricity-modernization-project?lang=en>

⁵⁰ See <https://www.climateinvestmentfunds.org/cifnet/?q=country/kenya>

⁵¹ UNEP, Terminal Evaluation of UNEP GEF Project Solar and Wind Energy Resource Assessment – SWERA, 2011, http://www.thegef.org/gef/sites/thegef.org/files/gef_prj_docs/GEFProjectDocuments/M&E/TE/FY2011/UNEP/G001281/1281-2011_TE_UNEP_GLOBAL_CC_FSP_SWERA.docx

8.2 To what extent are energy industries investing in information management capacity and infrastructure? **Green**

- + Kenya Power is making significant investments in ICT. In 2014, the company announced it had selected IBM to be equipped with a central data repository and real-time data analytics tool. This should enable the company to better manage the implementation of its expansion plans and improve its business intelligence by producing more accurate and granular customers' insights.⁵²

8.3 To what extent are there funding mechanisms for innovation in the energy and ICT sector? **Yellow**

- Overall, many SMEs, including in the energy sector, face significant challenges in access to finance. Most SMEs rely on banks and financial institutions as their primary source of capital for operations and expansion, yet banks consider them highly risky and do not easily lend to them.⁵³
- + The Kenya Climate Innovation Center (KCIC), an initiative of the World Bank and its global entrepreneurship program infoDev, has launched in February 2015 a support program for crowdfunding in East Africa. In its pilot phase, the program has helped six clean-tech companies design, develop, and launch their online crowdfunding campaigns.
- + There are positive signs showing that foreign investors are interested in supporting the Kenya green energy sector. In July 2015, ahead of the Global Entrepreneur Meeting to be held in Kenya later in the year, a delegation of international investors met with President Uhuru Kenyatta to discuss potential investments in clean and efficient energy sources, such as mini-grids in rural areas.⁵⁴

Assessment

From the World Bank to private investors, Kenya benefits from the support of various international donors for the development of its energy sectors, and there are signs that these investments should continue to expand in the next years. This is an opportunity to finance open data in the energy sector, especially as these funding often see ICT as a leveraging factor. In

⁵² IBM, Kenya Power Taps IBM Real Time Data Solutions To Improve Business Performance, 12 November 2014, <http://www-03.ibm.com/press/us/en/pressrelease/45375.wss>

⁵³ See World Bank, Bank financing of SMEs in five Sub-Saharan African countries : the role of competition, innovation, and the government, Policy Research working paper, 2013, <http://documents.worldbank.org/curated/en/2013/08/18091735/bank-financing-smes-five-sub-saharan-african-countries-role-competition-innovation-government>

⁵⁴ Capital FM, Billionaires meet Uhuru, seek to pump cash into energy, July 11, 2015, <http://www.capitalfm.co.ke/news/2015/07/billionaires-meet-uhuru-see-to-pump-cash-into-energy/>

return, the development of open data in the energy sector, and, therefore, the growth of information accessible to investors, may help to seek further funding for energy projects.

Sub dimensions	Assessment
Funding available to support open data in the energy sector	Yellow
Investment in information management capacity and infrastructure	Green
Funding mechanisms for innovation in the energy and ICT sector	Yellow
Overall	Yellow

Summary of the Open Energy Data Assessment for Nairobi

Overall	Importance	Assessment
1. Open Data Readiness Assessment for Kenya	Very-high	Green
2. Policy, regulation and structure of the energy sector	Very-high	Yellow
3. Legal framework components within the energy sector related to data	High	Red
4. Leadership, responsibilities and capabilities within the energy sector	High	Yellow
5. Data management and availability within the energy sector	High	Red
6. Use and demand of energy data	Very-high	Yellow
7. ICT use and infrastructure in the energy sector	High	Yellow
8. Funding open data within the energy sector	Medium-high	Yellow

Recommendations for an action plan

The proposed action plan is based on the findings of the Open Energy Data Assessment for Nairobi and aligned with a one-year timescale.

Action	Description	Responsible	Timescale
1. Organize an Open Energy Data workshop	Convene the energy sector for a 1-day workshop to raise awareness about open energy data. It is recommended to include national energy data producers and users as well as city-level government and development partners. The workshop could introduce example of international use cases of open energy data as well as potential national, and city-level open energy data projects. Other open energy data events may follow.	KODI, Ministry of Energy and Petroleum	Q1
2. Expand the inventory of energy datasets to energy utilities and non-government data producers	KODI is currently assessing the availability of government datasets within the ministries. This is a necessary step to move forward on open data. Yet, many relevant energy datasets are produced outside of the government by energy utilities or research centers. In order to progress on open energy data it is therefore recommended to expand the inventory of datasets to the energy sector as a whole.	KODI	Q1
3. Set up an open energy data working group	The development of open energy data should be primarily driven by energy stakeholders themselves. It is therefore recommended to set up an open energy data working group to discuss data management and the adoption of open data principles and standards within the sector. ERC could play a role of coordinator and KODI could offer technical support.	ERC, KODI	Q2

4. Start the release of energy datasets as open data	The main energy data producers start the release of key energy datasets, as identified during the inventory of energy data, and release them on the national open data portal opendata.go.ke .	Ministry of Energy and Petroleum, ERC, Kenya Power, KenGen, Ketraco, ERA, GDC, the IPPs, NCC, etc.	Q2
	In the same time, non-government and non-traditional energy data producers also start publishing their energy data, and index or host them on the national open data portal as well.	UN-Habitat, IBM Research – Africa, Kenya Green Building Society, Research Centers, etc.	Q2
5. Identify and support open energy data projects	In order to further develop and secure open data within the energy sector, it is recommended to identify and support potential projects where open energy data could rapidly lead to tangible (documented) outcomes.	KODI	Q1 – Q4
6. Integrate open energy data principles as part of future energy policies at national and city level	It is recommended to adopt open energy data per default principles for the energy sector. This means to mandate every energy stakeholder to release its data as open data whenever possible (data available for free in machine-readable format and open license). This provision could be outlined in the proposed Energy Policy of the Ministry of Energy and Petroleum, but also in the future energy policy of the NCC and integrated to the Kenya Vision 2030 plans.	Ministry of Energy and Petroleum, NCC	Q1 – Q4

Annex 1: Assessment of key energy-related datasets

Starting next page is a list of key energy datasets covering the City of Nairobi or spanning beyond it; the largest number of the datasets pertain to the electricity sub-sector. This list was established based on the identified demand for energy data from local and international actors such as the World Bank's Negawatt Challenge participants, etc. The datasets were assessed along two dimensions: their technical and legal openness.

Energy is closely linked to other sectors such as mining and extractive industries, water, transport, environmental protection. The list also includes key datasets in some of these sectors, which, as international experience has shown, are relevant to energy data innovators.⁵⁵

⁵⁵ The technical openness assessment is a slightly modified version of the Tim Berners-Lee five star open data view. In this case, the first star refers to having data available online but does not require an open license (Tim Berners-Lee, *Linked Data*, <http://www.w3.org/DesignIssues/LinkedData.html>, July 27, 2006).

N/E	No evidence that data exists
N/A	Dataset not available online
★	Data available online in any form
★★	Data available online as machine-readable data (such as Excel)
★★★	Data available online, in machine readable form, non-proprietary formats (such as CSV)
★★★★	Data available as above and using open standards (such as RDF or SPARQL)
★★★★★	Data available as above and linked to other data to provide context

Data	Data producer	Technically open	Legally open	Remark	Source
Detailed electricity consumption	Kenya Power	N/A	No	Kenya Power only releases consumption data at province and city level in its annual report. Though, it is possible to request and obtain data at a more detailed level.	
Power stations	ERC	★	No	Online map of current power stations in the country, including their installed and effective capacity. No dataset available for download.	Link
Electricity transmission and distribution network map	KETRACO, Kenya Power	★	No	ERC publishes electricity grid network map (existing and proposed lines). Data is in PDF or PNG format. No geospatial format available.	Link
Statistics on renewable energy	ERC	★	No	ERC provides statistics on generation of renewable energy per type of energy source (See power stations)	
Power outages	Kenya Power	★	No	Kenya Power provides online information on scheduled and real-time power outages.	Link
Energy audit (Certificate)	ERC	N/A	No	ERC collects the information regarding energy audit status for each facility that must comply with the regulation.	
Land register (cadastral) parcels	NCC	N/A	No	Land registry has been fully digitized and citizen can now search for land information online on www.ecitizen.go.ke . However, there is no evidence that the underlying dataset is available to the public.	
Household survey (Census)	KNBS	★★	Yes	The datasets available contain socio-economic indicators as well as information related to assets ownerships and housing for the whole country. However, the breakdown is at the level of districts only (4 distinct districts for Nairobi: West, East, North, Westlands).	Link
Air Quality		N/E		There is no city-wide system in place to collect air quality data on a regular basis and released historical or real-time data. Historical data can only be found in research articles, often enclosed in paid scientific journals ⁵⁶ .	

⁵⁶ <http://www.sciencedirect.com/science/article/pii/S1462901111000189>

Wind: wind speed and wind power density GIS data at 50m above ground and 5km resolution for Kenya from RisoeDTU	Risø DTU National Laboratory for Sustainable Energy	★★★	YES (ODC-BY)	Geospatial data of wind capacity on the territory. These data are results from the KAMM/WASP studies for Kenya. Data is available in ASC, a GIS compatible format.	Link
Solar: monthly and annual average direct normal (DNI) GIS data at 10km resolution for Ghana from DLR	DLR	★★★	YES (ODC-BY)	Data of high resolution (10kmx10km) Global Horizontal Irradiance (GHI) for Kenya for the years 2000, 2001 and 2002. The data are available for monthly and annual sums stored in an ESRI-Shapefile.	Link
Solar: hourly global horizontal (GHI) and direct normal (DNI) data for selected stations in Kenya from DLR	DLR	★★★	YES (ODC-BY)	Hourly time series of GHI and DNI for the years 2000, 2001 and 2002 for selected sites in Kenya. The hourly data are stored in ASCII files for each station. For the selected sites, the hourly time series can be used for the simulation of Photovoltaic (PV)-systems or Concentrating Solar Power (CSP)-systems.	Link
Solar: monthly and annual average global horizontal (GHI) GIS data at 10km resolution for Kenya from DLR	DLR	★★★	YES (ODC-BY)	Data of high resolution (10kmx10km) Global Horizontal Irradiance (GHI) for Kenya for the years 2000, 2001 and 2002. The data are available for monthly and annual sums stored in an ESRI-Shapefile. The data are helpful for the assessment of the solar potential of the country and can give project developer a first impression of the solar resource of the country.	Link
Lakes, Rivers, Wetlands and Waterpoints in Kenya	The International Livestock Research Institute (ILRI)	★★★	Unknown	GIS data including Contains Lakes, Rivers, Wetlands and Waterpoints in Kenya and available in MPK format.	Link
Groundwater	Water Resources Management Authority (WRMA)	N/E		Water Resources Management Authority (WRMA) is preparing a country groundwater map which depict boreholes being monitored and classification of the aquifers. ⁵⁷	
Biomass		N/E		No data could be found regarding statistics on waste collected.	

⁵⁷ See <http://www.wrma.or.ke/index.php/about-us/departments-79/technical-coordination/ground-water.html>

				However, KNBS releases as part of its 2009 census survey data on main mode of human waste disposal per district.	
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Annex 2: List of stakeholders

Below is the list of stakeholders interviewed for this assessment:

- CAMCO Clean Energy
- Energy Regulatory Commission of Kenya (ERC)
- Energy Simulation Africa
- IBM Research - Africa
- iHub Nairobi
- iLab Africa
- Kenya Green Building Society (KGBS)
- Kenya ICT Authority (ICTA)
- Kenya Open Data Initiative (KODI)
- Kenya Power
- The African Urban Metabolism Research Network
- UN-Habitat
- Web Limited

Annex 3: Data requirements from the participants of the Negawatt Challenge Nairobi

These datasets were identified as high value in relation to the energy efficiency themes such as:

- List of large buildings in Nairobi
- List of hotels
- Energy market data
- Asset ownerships (TV-set, mobile phone, cars, etc.)
- Meter metric data
- Real and planned power outages
- Grid health in real time (capacity level for each production facility)
- States of transmission lines, distribution lines
- List of backup systems (generators)
- Air quality
- Prepaid meters
- Detailed consumption data
- Information on investments, bidding process, awarded contracts, and company eligible for bidding
- Census data
- Net metering sensors
- Tax exemptions for energy technologies