Chain Effect Industrial energy policy in Africa in an era of captive power







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Abbreviations & Acronyms

1D1F	One District One Factory
BFA	Big Four Agenda
BPA	Bui Power Authority
C&I	Commercial and Industrial
ECG	Electricity Company of Ghana
EPC	Engineering, Procurement, and Construction
EPRA	Energy and Petroleum Regulatory Commission
EPZ	Export Processing Zone
ERC	Electricity Regulatory Commission
ESCOs	Energy Service Companies
ESMAP	Energy Sector Management Assistance Program
GADP	Ghana Automotive Development Policy
GDP	Gross Domestic Product
GIP	Ghana Industrial Policy.
GIPC	Ghana Investment Promotion Centre
GoG	Government of Ghana
GoK	Government of Kenya
GRIDCo	Ghana Grid Company Ltd
GSS	Ghana Statistical Service
IEA	International Energy Agency
IEE	Industrial Energy Efficiency
IPP	Independent Power Producer
ISI	Import Substitution Industrialization
ISIC	International Standard Industrial Classification
ISSP	Industrial Sector Support Programme
КАМ	Kenya Association of Manufacturers

KenGen	Kenya Generation Company
KETRACO	Kenya Electricity Transmission Company Limited
KIPC	Kenya Industrial Transformation Program
KNBS	Kenya National Bureau of Statistics
KLPC	Kenya Power and Lighting Company
kWh	Kilowatt hour
LCOE	Levelized cost of electricity
MITED	Ministry of Industrialization, Trade, and Enterprise Development
MOTI	Ministry of Trade and Industry
MTF	Multi-Tier Framework
MTP	Medium Term Plan
MW	Megawatts
MWp	Megawatts peak
NIP	National Industrialization Plan
NDC	Nationally Determined Contribution
PPA	Power Purchase Agreement
PURC	Public Utilities Regulatory Commission
PV	Solar photovoltaic
RET	Renewable Energy Technologies
SE4All	Sustainable Energy for All
SDGs	Sustainable Development Goals
SEZ	Special Economic Zone
SSA	Sub-Saharan Africa
UNIDO	United Nations Industrial Development Organization
UNCITRAL	United Nations Commission on International Trade Law
VRA	Volta River Authority

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Foreword

Friends and colleagues,

As you know, EnergyNet has been active in Africa's energy space for twenty-six years now. We have met pretty much every credible player and chosen a responsible path by which to manage our business; investing some £500k+ into our Student Engagement Initiative, our Arts:Energy Partnership and also into physical infrastructure projects including co-financing the first containerised solar IPP in South Africa. Our business is here to support the development of electricity and energy infrastructure across the continent (as well as throughout Latin America & the Caribbean) and we are delighted to continue to invest in value-adding initiatives that support these goals.

Over the next two years we will be investing significantly in industrial insights, the first of which you are about to read. We recognise the role industry will play creating jobs and building wealth for the wider population and we're pleased to continue to research and create investor led continent in this way. Should you wish to collaborate with us we would be delighted to explore what research will be important to your business development teams in order to further support Africa's private sector industrial development goals.

Our door is open....



Simon Gosling Managing Director, EnergyNet



Commissioning editor's note

In our discussions with companies and the public sector in Africa, we found a recurring theme coming up; how can industry grow, predictably and rapidly, when electricity supply and demand is too often an unknown quantity?

And with that, how can utilities plan and deliver when industry isn't growing at an expected pace, or takes its demand off-grid?

With some utilities already facing sizeable losses, how can governments square this with the SDG 7 goal on household access? What we've uncovered in this research is that policy needs to be considered at a national and international scale if Africa is to navigate its way through the challenge of powering both industry and households.

We titled this piece 'Chain Effect' because investments and policy decisions are having both intended and unintended consequences. The first step to building confidence is to get the issues on the agenda and start meaningful conversations between utilities, private sector and government.



John Whiting Head of Digital, EnergyNet



Executive Summary

Industrial manufacturing has an unparalleled potential to transform developing economies by making goods available to consumers at cheaper costs, diversifying and consolidating production and exports, increasing employment, incomes, and export earnings, while strengthening the micro and macroeconomic outlook of the country. These have been the goals of industrial policies adopted by Ghana and Kenya. This report presents a diagnostic study of the nexus between industrial and energy policies in Ghana and Kenya, highlighting policy issues affecting industrial energy access, and making proposals for bridging the gap between industrial and energy policies.

While industrial policies in Ghana and Kenya identify high tariffs and unreliable electricity supply as roadblocks to industrial growth, policymakers have not responded by creating energy policies to address these challenges. This has created a gap between industrial and energy policies in both countries. In addition, policy efforts to expand energy access in line with SDG 7 (Energy Access) have focused primarily on providing electricity to households. To date, this focus has meant that less consideration is given to enhancing energy access for industries and other productive sectors. As a result, the efficiency and productivity of industries in Ghana and Kenya are hampered by high tariffs and unreliable electricity access. A pattern is also emerging where newly established industries are unable to fully operate due to lack of access to reliable electricity.

High tariffs and unreliable supply are driving commercial and industrial (C&I) entities towards captive solar generation with the objective to reduce electricity expenditure and improve reliability of supply. A continuous surge in captive generation is likely to lead to negative fiscal and liquidity consequences for Ghana and Kenya, given the already stressed financial viability of their utilities. Nonetheless, considering that there is a lot of scope for industrial growth in developing economies, the emergence of captive generation among industrial entities provides an opportunity for policymakers and the utilities to prioritize industrial energy planning. This will ensure that the current and future energy needs of industries are adequately met. As noted by Eric Mwangi, Economic Advisor to the Cabinet Secretary of Kenya's Ministry of Energy, "captive C&I solar can give the utilities breathing room as they struggle to bring more baseload power on stream. The notion that C&I solar will threaten the viability of the utilities cannot just be taken at face value, you would have to do a bit more dynamic modelling and analysis to understand what that would mean in practical terms for the utilities".

Solving the industrial energy access dilemma through improved energy planning could drive sustainable development in both countries, as well as provide a model for development elsewhere in Africa and beyond. This report proposes some policy recommendations to address the challenge of industrial energy access and to help stimulate further discussions on the subject.





Section 1

Introduction

Industrialization is one of the key pillars of sustainable economic growth. Due to the capacity of industries¹ to create jobs, enhance structural economic transformations, and further spur the growth of other sectors through linkage, industrialization has become a development priority for Sub-Saharan African (SSA) countries (Addo 2017; Haraguchi et al., 2019). Electricity is a key input for various production processes in all industrial sectors. Empirical evidence abounds that a cost effective and reliable supply of electricity is an important determinant and driver of industrial performance, both in developed and developing economies (Ellahi, 2011; Ateba 2019, Heffron et al. 2020).

However, energy access² for the industrial sector has been a persistent development challenge in SSA. Industries in some SSA countries are hampered by unreliable power supply, high utility grid tariffs, and high costs of diesel back-up power, leading to reductions in their competitiveness and efficiency (IEA, 2019). Closing the gap between reliable and cost-effective electrification and industrial planning is therefore considered an important element to sustainable industrialization in SSA.

This report seeks to uncover the gap between industrial development policies and energy plans in SSA with a broader aim of disseminating knowledge to facilitate an intersectoral partnership and dialogue on how the energy needs of industries can be fully secured by governments of developing economies. Through a review of the literature and industrial policies in Ghana and Kenya, this report argues that for industries to become competitive to drive the desired socio-economic growth in SSA, energy plans must be aligned with industrial development goals. By this, explicit energy plans must be developed in response to and aligned with industrial policies. Such a plan, labelled in this report as an industrial energy policy, is to provide a macro level roadmap, centralized course of action, financing, clarity, and accountability on strategies to provide cost competitive tariffs and reliable supply of electricity to both existing and new industrial firms.

Empirical evidence abounds that a cost effective and reliable supply of electricity is an important determinant and driver of industrial performance, both in developed and developing economies //

¹ Industry or industries as used in this report refers to all companies involved in manufacturing or mass production of physical goods. It excludes the construction, mining, agriculture, forestry, and fishing sectors.

² In this report, industrial energy access or energy access for industries is defined as the provision of cost competitive tariffs and reliable supply of electricity to industries.



Importantly, a key element of this report is studying how the energy transition and global efforts to mitigate the dire consequences of climate change present diverse opportunities for African countries to leapfrog carbon intensive energy technologies utilized by developed economies for industrialization. The case study of the growth of solar generation by industries in Ghana and Kenya provides lessons for sustainable industrial energy policy design. This paper also argues that the discourse on affordable energy access envisioned by Sustainable Development Goal (SDG) 7 should be broadened to place industries in parallel to households. By tackling both household and industrial energy access in tandem in energy policy design and practice, developing economies could generate fuller benefits of energy as a major contributor to economic growth.

This introductory section is followed by Section 2 which reviews Ghana's industrial sector and recent industrial policies. Section 3 presents an overview of Kenya's industrial sector and recent industrial policies. Section 4 advances the case for aligning energy plans with industrial development goals. Concluding remarks and implications are presented in Section 5.

By tackling both household and industrial energy access in tandem in energy policy design and practice, developing economies could generate fuller benefits of energy as a major contributor to economic growth

Section 2

Review of Ghana's Industrial Landscape and Policies

2.1. Overview of Industrial Manufacturing in Ghana

Ghana is a lower middle-income country, and its economy consists of three main sectors: agriculture, services, and industry. Manufacturing is a subsector of industry which consists of four other subsectors: construction, mining and quarrying, electricity, and water and sewerage. Manufacturing represents about 92 percent of establishments in the industrial sector (GSS, 2015; GIPC 2020). Ghana's manufacturing base is somewhat limited and includes production of food and beverages, tobacco, textiles, petroleum refinery, pharmaceuticals, and cement. The sector also includes car and electronics manufacturing, aluminum smelting, small commercial ship building, and in recent times, vehicle assembly and automotive components manufacturing (Ackah et al., 2014; Addo, 2017; MOTI, 2021).

Industries in Ghana are mainly dominated by micro, small, and privately owned firms mainly located within urban areas in the form of industrial clusters. Patterns of labor productivity and wages indicate that the food processing subsector, foreign owned, and older firms are the most productive (Ackah et al, 2016). Ghana also operates a free zones scheme designed to promote the processing and manufacturing of goods through the establishment of Export Processing Zones (EPZs).



2.2. Contribution to GDP

Industry as an economic sector is the second largest contributor to GDP as seen in Figure 1. Provisional estimates by the Ghana Statistical Service (GSS) indicate that industry constituted 33.6 percent of GDP in 2020. The contribution of manufacturing to GDP has however been stagnant since 2014, hovering between 10 and 12 percent. This indicates a sluggish growth of Ghana's manufacturing sector as reflected by its fluctuating GDP growth rates (see Figure 2).



Source: GSS, 2021. *Provisional Estimates

Figure 2: Ghana's Manufacturing Growth Rate and Contribution to GDP (2014-2020)



Source: Author with data from GSS *Provisional Estimates

2.3. Industrial Development Policies

Ghana has long recognized the importance of the nexus between industry and economic growth. Across the vision of successive governments, industrialization has been highly regarded as a vehicle for the transformation of the Ghanaian economy. Successive governments have pursued different industrial strategies classified in the literature under three broad policy frameworks. These are the Import Substitution Industrialization (ISI) strategy³ (1965 - 83), the Outward Liberalization Strategy⁴ (1984-2000), and since 2000, an industrial architecture based on value-added processing of Ghana's natural resource endowments through a private sector-led accelerated strategy.

Despite the policy ambitions to position industrialization as the pillar of economic growth, Figure 3 shows that the total employment in the services and agriculture sectors far outweighs that of industry. Employment in the industrial sector has fluctuated since 2009, representing an average of 16.8% of Ghana's labor force. With services as the leading sector for job creation, followed by agriculture, industry has not succeeded in providing the engine of growth for Ghana's economy as desired.

Figure 3: Distribution of Employment in Ghana by Economic Sector (2009 to 2019)

Source: Statistica

Ghana has long recognized the importance of the nexus between industry and economic growth.^{//}

³ ISI involved the development of large-scale public sector investments as the leading edge in Ghana's industrial development.

⁴ Industrial policies under this strategy sought to develop a more internationally competitive industrial sector through a shift from government as the main vehicle for industrial development to the private sector as the prime mover of industrialization.

2.4. Key Industrial Policies and Programs

2.4.1 Ghana Industrial Policy

In 2013, the Ministry of Trade and Industry (MOTI) adopted the Ghana Industrial Policy (GIP). The GIP was developed within the context of Ghana's long-term strategic vision of achieving a middle-income status by 2020. It focuses on the growth, diversification, and the elevation of the competitiveness of Ghana's manufacturing sector. Among others, the key objective of the GIP includes expanding productive employment and technological capacity in the manufacturing sector, promoting agro-based industrial development, and promoting spatial distribution of industries to realize a reduction in poverty and income inequalities. To achieve the goals of the GIP, 21 thematic policy areas are to be implemented. The thematic areas were developed based on an array of actual, perceived, or empirical challenges hindering the growth of the manufacturing sector.

The provision of adequate, efficient, and cost-competitive electricity to industries is one of the 21 thematic areas. Implementation of the GIP is to be carried out through the Industrial Sector Support Programme (ISSP). Under the ISSP, the Government of Ghana (GoG) is to ensure that industry's requirements of electricity are met at competitive prices and in an environmentally sustainable manner. This is to be achieved through the involvement of the private sector in the supply of electricity and the implementation of industrial energy efficiency programmes. However, the policy objectives of affordable electricity prices and expanded private sector participation have not been met. Electricity tariffs for industries remain high in Ghana as discussed in Section 4. In addition, the generation, transmission, and distribution of electricity are dominated by state-owned companies.

2.4.2. One District One Factory (1D1F)

The most recent policy framework driving manufacturing in Ghana is the One District One Factory (1D1F) program. 1D1F is part of a 'Ten Points Policy Agenda' introduced by MOTI to improve the performance of manufacturing in Ghana in 2017. The vision of 1D1F is to change the nature of Ghana's economy from import dependent to one focused on manufacturing and the export of processed goods. At the heart of the program is the decentralization of industrial development through the creation of a conducive business environment to attract manufacturing investments. 1D1F aims at establishing 1 medium to large scale manufacturing company in each of the 216 administrative districts of Ghana.

2.4.3. Ghana Automotive Development Policy (GADP)

Determined to transform the Ghanaian economy through industrialization, Ghana adopted the Automotive Development Policy (GADP) in 2019. The GADP provides a comprehensive package of incentives and policy measures to support the establishment of an automotive assembly and component manufacturing sector in Ghana. Ten thematic areas are to be implemented to ensure that the vision of the policy is achieved. These include investment incentives and tax benefits for auto-assemblers, market development and facilitation of trade of assembled vehicles, access to infrastructure (land), and institutional structures to coordinate GADP's implementation, among others. The provision of cost competitive and reliable supply of energy is not listed as a priority or thematic area in the GADP.

2.5. Summary

The performance of Ghana's manufacturing sector has been lethargic, despite the adoption and implementation of policy programs to transform the Ghanaian economy through industrialization. Ghana's industrial policies have focused primarily on creating an enabling and predictable investment environment, strengthening institutional capacity, and creating market opportunities for manufactured goods. The Ghana Industrial Policy (GIP) recognizes high tariffs and unreliable supply as roadblocks to industrial performance. This is affirmed by Nti (2015) and the Energy Sector Recovery Program (2019) which provides a comprehensive roadmap to restore and sustain financial viability of Ghana's energy sector⁵. Given that energy prices and reliability have an overbearing influence on industry's competitiveness, the apparent challenge of Ghana's industrial energy access⁶ can rightly be attributed as a major contributing factor to the slow performance of the manufacturing sector.

The GIP envisions the involvement of private entities in the supply of electricity and the implementation of industrial energy efficiency as policy measures to solve this challenge. Although Independent Power Producers (IPPs) play an important role in electricity generation in Ghana, generation, transmission, and distribution of electricity are dominated by state-owned companies (See Appendix A). In addition, no clear plan or strategy for industrial energy efficiency exists. The Energy Foundation reports that United Nation Industrial Development Organization (UNIDO) is currently supporting the GoG to develop a policy framework for industrial energy efficiency, as part of the country's Nationally Determined Contribution (NDC) targets.

While limited studies have examined the slow performance of Ghana's industrial growth, Nkechi and Page (2017) suggest that the lack of long-term industrial policies and the volatile relationship between government and the private sector are major contributors to the slow pace of industrialization in Ghana. Other factors identified by Nti (2015) include competition from imported goods, access to finance and high interest rates, and excessive taxes, levies, and fees.

⁵ Ghana's energy landscape and policies are reviewed in Appendix A.

⁶ Discussed in detail Section 4

Section 3

Review of Kenya's Industrial Landscape and Policies

3.1. Overview of Industrial Manufacturing in Kenya

Industry as an economic sector in Kenya consists of mining and quarrying, manufacturing, energy supply, and water and sewage management. Manufacturing is the dominant of the industrial sector and reflects a relatively diversified landscape, comprising different classes of companies including micro, small, medium, and large companies. This classification is based on employment levels and capital investments. The medium and large industries constitute less than 5 percent of the total number of entities in the sector but accounts for over 60 percent of the manufacturing sector's GDP contribution (Sessional Paper No.9 on NIP, 2012; KNBS Economic Survey, 2020)

Manufacturing activities in Kenya includes the production of food and beverages, agro processing, production of plastics, chemicals, metals, leather, textiles, and apparels. Others include vehicle production and assembling, timber and wood processing, refinery of edible oils, and the production of cement, pharmaceuticals, and electronics. However, the sector is dominated by the production of food and beverages which constitutes about 43 percent of manufacturing firms in Kenya (KAM, 2018; KNBS Economic Survey, 2020). Kenya also operates a free zones scheme aimed at promoting and facilitating export manufacturing investments at designated EPZs.

3.2. Contribution to GDP

The contribution of the manufacturing sector to GDP has been relatively stagnant for many years. The sector has recorded minimal increases in the last three decades. It contributed an average of 10 percent from 1964-73, rising marginally to 13.6% from 1990-2007. In recent years, the contribution of manufacturing to GDP has been on a decline, plummeting every year from 10.7 percent in 2013 to 7.5 percent in 2019 as seen in Figure 4. This indicates that Kenya is deindustrializing within the context of the government's policy objectives of making Kenya an industrialized economy as presented in Section 3.3.

This indicates that Kenya is deindustrializing within the context of the government's policy objectives of making Kenya an industrialized economy as presented in Section 3.3¹¹

Figure 4: Manufacturing Growth Rate and Contribution to GDP (2013-2019)

Source: Author with data from KNBS Economic Survey (2019); KNBS Economic Survey (2020)

3.3. Industrial Development Policies

Industrial policies in Kenya have evolved through three distinct policy orientations, namely, Import Substitution Industrialization (ISI), Structural Adjustment Programmes (SAPs), and Export-Led Policy Orientation. Like Ghana, and many other developing countries, Kenya in the early years after independence pursued an ISI strategy where government provided both direct support and tariff protection for the sector. Policies developed through SAPs focused on the elimination of administrative controls, decontrolling of prices, rationalizing import tariffs, restructuring state corporations, and liberalizing Kenya's exchange rate. Export-oriented policies pursued in the early 90s were designed to stimulate private industrial investments. The export-led policy orientation has continued to date. Kenya has tried to respond to global trends to create employment and wealth through industrialization by making the country a regional industrial hub. Nonetheless, the share of industrial employment of Kenya's total workforce has remained extremely low and stagnant since 2011 as seen in Figure 5. Kenya is also deindustrializing as noted in Section 3.2.

Figure 5: Distribution of Employment in Kenya by Economic Sector (2011 to 2020)

Source: Statistica

3.3. Key Industrial Policies and Programs

3.3.1 Vision 2030

In 2008, Kenya launched Vision 2030, a long-term development blueprint to serve as a vehicle for transforming Kenya into an industrialized middle-income nation by 2030. This vision is built on three pillars: economic, social, and political. The economic pillar aims at creating a robust, diversified, and competitive manufacturing sector to create employment and wealth for the nation. Vision 2030 is being implemented through successive five-year Medium-Term Plans (MTP). With MTP I (2008-2012) and MTP II (2013-2017) elapsing, MTP III (2018-2022) currently provides the roadmap to pursue the goals of Vision 2030.

Although industrial energy access and the overall energy demand of industries are not explicitly prioritized in all three MTP, electricity is broadly considered as an infrastructural enabler for the success of achieving the goals of Vision 2030. Both MTP II and III capture plans for new energy investments to increase Kenya's generation capacity for cheaper and adequate electricity. Investment plans for the expansion of the national power transmission network are also captured by MTP II and MTP III. Specifically on industries, MTP II envisioned a manufacturing energy mapping survey to be conducted with the view of increasing peak energy surplus and reducing waiting period for industrial power connection.

3.3.2. National Industrialization Policy (NIP)

Informed by Vision 2030, the NIP was developed in 2012. The vision of the NIP is to position Kenya as a leading industrialized nation in Africa with a robust, diversified, and globally competitive manufacturing sector. The NIP recognizes high costs of infrastructural services including electricity as a major weakness affecting Kenya's industrial sector. To address this challenge, the NIP envisions the provision of a preferential but cost-effective electricity and tariffs for heavy industrial consumers. However, none of the ten policy interventions prioritized under the policy focused on addressing the high costs of electricity services to industries.

3.3.3. Kenya Industrial Transformation Program (KITP)

In 2015, the KITP was developed with the goal of revitalizing the industrial sector. To realize this goal, six major challenges were identified to be addressed through a five-point strategy. The six challenges include infrastructure and land availability, skills and capabilities in priority sectors, quality of inputs, cost of operation, access to markets and investor-friendly policies. Although industrial energy access is recognized as an important infrastructure need, no clear strategy was proposed to address this challenge through the five-point strategy to meet the goals of the program as seen Figure 4.

Source: MITED (2015)

3.3.4. Special Economic Zones Act

To further advance the implementation of Vision 2030, the Special Economic Zones Act (2015) was adopted as law. This law provides for the establishment of special economic zones (SEZs) to facilitate local and foreign investments by promoting an enabling environment for new manufacturing investments. Areas to be designated as SEZs include industrial parks.

3.3.5. The Big Four Agenda (BFA)

Currently, the key manufacturing policy in place to advance the aspirations of Vision 2030 is the Big Four Agenda (BFA) launched in 2017. As a blueprint to foster economic development, the BFA identifies four priority areas to be implemented over a period of five years (2018-2022). These include manufacturing, affordable housing, universal health coverage, and food security. Under manufacturing, the key objective and target of the BFA is to create one million new manufacturing jobs and to increase the sector's contribution to GDP to 15% by 2022. MTP III is the implementation framework for the BFA.

3.5. Summary

Kenya is deindustrializing. The continuous decline of the sector's contribution to GDP reduces the prospects of achieving the 15% GDP target by 2022, as envisioned by the Big Four Agenda. Like Ghana, Kenya's industrial policies have largely focused on creating an enabling environment and predictable regulatory framework to attract manufacturing investments.

Industrial energy access is documented narrowly in Kenya's industrial policies as an infrastructural challenge hampering the growth of Kenyan industries. While MTP II and III capture plans for new investments for generation and transmission⁷, explicit plans are not prioritized to rectify the challenge of industrial energy access. Thus, high grid tariffs and unreliable electricity supply continue to hamper the competitive disposition of Kenya's industrial growth, as discussed in Section 4. Other contributing factors to Kenya's slow industrial growth include high costs of capital financing, poor state of automation and technology, shortage of skilled workforce, and lack of market for manufactured goods (Were, 2016; Syspro, 2019).

The continuous decline of the sector's contribution to GDP reduces the prospects of achieving the 15% GDP target by 2022, as envisioned by the Big Four Agenda¹¹

Section 4

Aligning Energy Policies with Industrial Development Goals

This section of the report examines energy planning in Ghana and Kenya and identifies a gap in the level of coordination between the industrial and energy sector policymakers to ensure that energy plans are designed and implemented to meet industrial development goals. As will be discussed, both countries' energy policies fail to respond to the energy challenges of both existing and new industries as identified in planned industrial policies.

Firstly, grid tariffs for industrial consumers remain relatively high in Ghana and Kenya when compared to tariffs in other developing countries (see Table 1). Based on an interview with an official from the Electricity Company of Ghana (ECG), we found that industrial customers in Ghana are constantly seeking opportunities to negotiate the cost of electricity to levels that will not burden their operating expenditure.

Table 1: Tariff for Industrial Users, Comparison of Selected Developing Countries (December 2020)						
Country	Ghana	Kenya	South Africa	India	China	Indonesia
US cents/ kWh	0.135	0.176	0.074	0.116	0.104	0.072

Source: Global Petrol Prices

Secondly, industrial customers require reliable and stable electricity supply which cannot always be guaranteed by the utilities in Ghana and Kenya. In Ghana, reliability of supply has vastly improved from 24 hours of power outage every 36 hours during the 2013-2016 power crisis to 12 hours every 48 hours in recent times⁸. Due to the availability of excess installed capacity (see Appendix A), power outages are now caused by planned maintenance and upgrade of the transmission and distribution network. Maintenance work and its ensuing power outages are communicated to consumers in advance. Nonetheless, due to the dilapidated state of the transmission and distribution infrastructure (IFC, 2017; Energy Commission, 2021), work on emergency maintenance arises intermittently. This leads to blackouts and periodic load shedding⁹, hence reliability cannot always be guaranteed for C&I consumers.

While data on Kenya's electricity reliability is limited, there is a general dissatisfaction among industrial consumers on reliable supply (Mutiso and Tanega, 2018). Notification of interruption of supply is a

⁹ Ibid

⁸ Interview with ECG official

common public notice from the Kenya Power and Lighting Company (KPLC). The reason given for such interruptions mostly includes the maintenance and upgrade of power lines. We also found through interviews that large industrial customers are periodically told to reduce consumption as there isn't enough power in the system to be supplied.

Currently, high tariffs and unguaranteed reliable supply are driving industries in both countries to captive electricity generation¹⁰ (or self-generation) to reduce electricity expenditure and also improve reliability of supply (Reuters 2010, BNEF, 2019; Bhamidipati and Gregersen, 2020).

4.1. Elevating Electricity in Industrial Policies

Industrial energy access remains a barrier to the ambitious industrial goals envisioned by Ghana's 1D1F and Kenya's Big Four Agenda. Not only is there a deficit of affordable and reliable electricity supply to existing industries, but a pattern has also emerged where newly established industries operate sub-optimally due to lack of access to reliable electricity. In Ghana, some new companies onboarded through 1D1F are operating at less than half capacity due to either unavailability or erratic electricity supply. This is the case of B5 Plus Limited, an offshoot of 1D1F with an operational capacity to be the largest iron steel manufacturer in West Africa. After failed public appeals to the GoG for reliable supply of electricity, B5 Limited resorted to providing a loan of \$8 million to the Ghana Grid Company (GRIDCo)¹¹ and the Volta River Authority (VRA)¹² for a dedicated power line from the utilities to aid its production (Awusah, 2021). B5 is to finance this loan from the company's resources as capital expenditure. This further reflects the failure of energy planning to anticipate and adequately respond to industrial development goals.

The process of industrial policymaking is important to successful industrialization (UNIDO, 2012). Thus, industrial energy access must be elevated as a major feature in industrial policy formation. This means prioritizing consultations and inputs from all relevant energy stakeholders in the policymaking process of industrial policies and programs. Stakeholders may include but should not be limited to energy officials from government and the utilities, industries, Independent Power Producers (IPPs), project developers, Engineering, Procurement, and Construction (EPC) firms, Energy Service Companies (ESCOs), private energy financiers and investors, local banks, Development Finance Institutions (DFIs), think tanks, and all relevant players within the demand and supply chain of industrial electricity access. The consultation processes must aim at reaching a consensus for the targets of the policy. This will ensure that the energy stakeholders leave the policymaking process with a clear roadmap on risk sharing and their respective actions needed to support the policy goals to fruition.

¹⁰ Captive generation is defined in this report as the generation of electricity for the purpose of consumption by the generator. In this case, generation of electricity is procured and financed by industries for their own consumption.

¹¹ GRIDCo is responsible for the transmission of electricity in Ghana.

¹² VRA is a state-owned generation company with a current generation portfolio of 2519 MW.

4.2. Industrial Energy Policy

To consolidate the gains from the consultation process, strategies must be developed to align energy policies with industrial development goals. Ideally, such energy strategies should be laid out in an industrial energy plan, policy, or document which provides a centralized course of action, strategies, and accountability for cost competitive and reliable electricity supply to both existing and new industrial firms. There are four reasons such an industrial energy policy is crucial¹³.

First, there is a vast difference between electricity use and demand by industries and households. As is the case in both Ghana and Kenya, commercial and industrial (C&I) customers are the largest consumers of electricity. A general approach for energy planning without sifting out the use and demand projections of the various electricity consumers may lead to supply challenges to one or more groups of consumers. An industrial energy policy will enable SSA countries benefit greatly from a better understanding of industrial electricity demand and also help manage growth of future electricity generation and time of day pricing and supply.

Second, electricity costs make up about 20-30 percent of operating expenses of industries in Kenya¹⁴. The increased deployment of renewable energy technologies (RET) and their cost competitive LCOE present opportunities for energy costs of industries to be reduced to about 10-15 percent. Operating expenditure saved through the reduction of energy costs can be reinvested into production. In turn, this will enhance industrial productivity, create more jobs, and make industries more competitive. The effectiveness and increased productivity of industries can potentially attract new investments into the industrial sector. An industrial energy plan designed to stimulate this chain effect becomes important to meet the goals of industrial policies.

Third, both Ghana and Kenya's industrial policies seek to attract investments in industries built around industrial parks, EPZs, and SEZs. A centralized industrial energy planning targeted at these industrial hubs can lead to the generation of resources for investments in modern transmission and distribution networks to secure electricity supply for both existing and new industries.

Finally, huge financial resources are being invested in electricity infrastructure to expand energy access. Energy access in developing economies focus primarily on providing electricity to households in pursuit of SDG 7, as energy access is measured based on the percentage of the population with electricity. To date, this focus has meant that less consideration is given to enhancing energy access for industries and other productive sectors. Industrial energy planning can fill this gap to ensure that the expansion of energy access to households is not detrimental to the energy needs of industries.

¹³ An industrial energy plan can complement or consolidate energy efficiency and other existing programs targeted at industrial energy access. Energy efficiency and conservation are a component of Kenya's National Energy Policy, but no specific national plan or targets exist for energy efficiency. In Ghana, UNIDO is supporting government to develop a policy framework for industrial energy efficiency, as part of the country's Nationally Determined Contribution (NDC) targets. With C&I consumers still burdened with high costs, the potential of energy efficiency improvement is not enough for sustainable industrial energy access.

¹⁴ Interview with Astonfield Solar.

4.3. Opportunities for Industrial Energy Policies

Several opportunities and strategies exist for industrial energy plans to secure the energy needs of industries based on country specific contexts. In this report, we emphasize that the energy transition and global efforts to mitigate the dire consequences of climate change present diverse opportunities for African countries to leapfrog carbon intensive energy technologies utilized by western countries for industrialization. As Kitetu et al. (2021) posit, African countries can make far greater use of renewables and energy storage, and more quickly relegate natural gas and other fossil fuels to a peripheral role in maintaining the stability of electricity grids.

4.3.1 Existing Industries

The prospects exhibited by C&I captive generation provide one of the several pathways on how industrial energy plans can address issues of affordability and stability of industrial energy supply. As already noted in this report, high tariffs and unguaranteed reliable supply are pushing industries to captive electricity generation. Industrial captive generation in Ghana and Kenya utilizes a mix of both renewable and non-renewable sources. Recent findings by BNEF (2019) indicate that there is a surge in solar-based captive generation by C&I entities across SSA. Installed capacity stood at 74MW as of January 2019 (excluding South Africa). This represents about 15% of the 494MW solar projects commissioned in SSA as of January 2019 (excluding South Africa).

Albeit a small market, nearly 80% of this capacity was added between 2017 and 2019. Installed capacity was expected to double by the end of 2019 and continue to surge in 2020 and beyond. As of mid-2020,

Figure 7: Cumulative Captive Solar PV Installations in Kenya

Source: Bhamidipati and Gregersen, 2020

the total C&I solar installed capacity in Kenya had increased from 15MW in October 2018 to 40MW (Bhamidipati and Gregersen, 2020). Total C&I captive solar capacity in Ghana stood at 7MW as of January 2019, expected to increase to 39 MW by mid 2021 based on pipeline projects identified by BNEF (2019).

According to BNEF (2019), the surge in the C&I solar sector is not a result of regulatory or policy support but because of "economics", although policy and regulations have played a peripheral supporting role. This is corroborated by Bhamidipati and Gregersen (2020) in their extensive study on the growth of captive solar in Kenya. Solar electricity tariffs remain extremely competitive compared to higher grid derived sales in Ghana and Kenya. Currently, the benchmark cost of C&I solar in Kenya ranges from \$0.04 to \$0.07/kWh, less than half of the average industrial grid electricity cost of \$0.15 to \$0.18 /kWh¹⁵. In Ghana, the cost of C&I solar is projected to decline from \$0.11/kWh in 2019 to \$0.05/kWh by 2030 as seen in Figure 8.

Figure 8: Ghana's Cost of C&I Solar Forecast versus 2018 Electricity Tariffs

Captive solar generation has become an emerging viable source for industries to complement the grid, reduce energy cost, switch from diesel generation, or adopt fully off-grid solutions complemented by battery storage. If SSA governments are to commit to realizing industrial goals, consideration must be given to policy strategies to spur industrial energy access through affordable and reliable energy

Source: Bloomberg NEF, 2019

¹⁵ Interview with Astonfield Solar.

supply. The growth of captive solar generation provides one of the pathways for such an industrial energy strategy. As rightly noted by Kawahara (2019), for countries in SSA to be industrialized and attain economic prosperity, there is a need for C&I consumers to have access to cheap and reliable power. As such, it is imperative for African governments to (i) implement an operating and legal framework to do so; and (ii) put in place favorable policies and incentives that encourage private sector investment in captive solar solutions.

4.3.2. New Industries

As the prices of renewable electricity and electric equipment continue to drop, new industrial companies can capture cost-saving and carbon-emission-reduction opportunities by holistically planning the electrification of their operations. Beyond electricity generated by renewables, McKinsey (2021) estimates that about 50 percent of fuel used by industrial entities as feedstock and for the generation of heat for industrial processes can be replaced with electricity, using technologies available today. This can lower capital costs and increase the energy efficiency of industries.

Ghana and Kenya are both seeking investments for new industries to occupy designated areas for industrial parks, SEZs, and EPZs. As rightly noted by IRENA (2014), suitable policies could help the industrial sector increase its share of renewable energy. Industrial energy policies can lay the foundation for new industries to adopt electric technologies to replace the use of fossil dominated fuels. Additionally, industrial energy policies can provide a framework for new industries to plan their electricity supply without resorting to the grid.

4.4. Energy Trends and Impact of Captive Generation on Utilities

The growth of captive generation by C&I consumers threatens the viability of the utilities in Ghana and Kenya. This may obstruct any policy consideration to facilitate the growth of affordable and reliable electricity for C&I consumers through captive generation. The Electricity Company of Ghana (ECG) and the Kenya Lighting and Power Company (KLPC) are both tied to expensive long-term take or pay power purchase agreements (PPAs). These PPAs have resulted in excess capacity and unused power generation¹⁶, leading to substantial fiscal deficits in both countries. In 2018, excess capacity cost the GoG \$320 million in capacity charges, estimated to increase to \$620 million annually beginning 2019. Between 2017 and 2020, the GoG has paid \$937.5 million to three Independent Power Producers (IPPs) for excess capacity charges (Daily Graphic, 2021). In Kenya, more than half of the \$809 million cost of sales incurred by KLPC in the 2019/20 fiscal year was capacity charges paid to power producers (Reuters, 2021).

This financial strain forced the GoG to review the fiscal and legal implications of PPAs, resulting in the renegotiation of some PPAs and the termination of 11 others (MoE, 2019; Ackah et al, 2021). The termination of an emergency power agreement with the Ghana Power Generation Company (GPGC) has, however, cost the GoG a judgement debt of \$170 million after GPCC dragged Ghana to a UNCITRAL arbitration demanding compensation for breach of contract. Similarly, a presidential task force has been instituted in Kenya in March 2021 to review all PPAs. Both countries have placed a hold on the signing of new PPAs. Nonetheless, the expensive cost of signed PPAs will continue to be passed on to consumers in the form of high tariffs.

In Kenya, industrial entities constitute about 70 percent of KLPC's customers (KPLC, 2020). The industrial sector also remains the largest electricity consumers in Ghana (USAID, 2017). Any direct policy plan to accelerate C&I solar or other forms of cheaper C&I self-generation may lead to fiscal and liquidity consequences for both countries. In view of this, scaling C&I captive generation through policy may unlikely be prioritized on the energy agenda in Ghana and Kenya.

4.4.1. Opportunity or Threat

According to Eric Mwangi, Economic Advisor to the Cabinet Secretary of Kenya's Ministry of Energy, interviewed for this report, although captive generation threatens the utilities in the short-term as they struggle to find consumers for generated electricity, it also provides a breathing room for long-term planning by the utilities. To him, there is a lot of scope for baseload generation particularly for heavy industries. Given that baseload generation takes a long time to come on-stream, captive generation by C&I consumers provides an opportunity for the utilities to 'play catch-up' and onboard reliable, sustainable baseload generation and supply. In his view, a key factor driving the growth for captive PV generation is reliability of supply. Once the utilities are able to provide C&I consumers with reliable supply, captive generation will no longer be as attractive for C&I consumers.

Section 5

Conclusion and Policy Implications

The aim of this report has been to identify the extent to which industrial policies in SSA prioritize the energy needs of industries. Recent industrial policies guiding Ghana and Kenya towards industrialization have been reviewed. This report finds that industrial policies in the two countries identify high electricity tariffs and unreliable supply as a major challenge to industries. Nonetheless, policymakers have not responded by creating energy policies that address this challenge. High tariffs and unreliable supply are driving industries towards captive generation. In a peculiar case in Ghana, a new industrial entity resorted to providing a loan of \$8 million to the utilities for a dedicated generation and transmission network to facilitate its electricity supply. These suggest an existing gap between industrial policies and energy plans.

To bridge this gap, three potential lessons and policy recommendations can be drawn from the findings of this report. First, industrial energy access is an important industrial input and a key determinant of industrial success. Whereas operating expenditure saved through the reduction of energy costs can be reinvested into production, reliable electricity supply will ensure industries operate at full capacity. These can make industries more completive to mitigate other factors contributing to the slow performance of industries in Ghana and Kenya, as discussed in Sections 2.5 and 3.5. The next phase of energy planning in both countries must prioritize industrial energy access. This will lead to a more concrete understanding of industrial energy demand to inform the generation and supply of the least cost electricity for industries, either through the grid, captive generation, or a combination of both.

Second, policymakers in Ghana and Kenya must commit to assessing the implications of the growth of captive generation on their respective energy markets. Given that both countries are already strained with technical and commercial losses¹⁷ as well as fiscal deficits as a result of long-term PPAs and excess capacity, any acceleration in captive generation by C&I consumers may have a long-term financial effect on the utilities in both countries. In addition, the innovative growth of renewable energy technologies and their plunging costs are shifting electricity generation from the utilities to consumers. This continues to threaten the viability of utilities globally. A comprehensive assessment of the impacts of captive generation will be a useful exercise to strategize for the long-term sustainability of the utilities. Furthermore, it will ensure that the utilities are well-prepared to drive their energy markets through the provision of affordable and reliable electricity to industries.

Finally, industrial plans must not be developed in a vacuum. As rightly espoused by UNIDO (2012), the process of industrial policymaking is important to successful industrialization. Industrial policymakers in both countries must endeavor to expand their consultative policymaking processes to include energy sector players. This will strengthen the level of dialogue and collaboration between policymakers from both sectors to ensure that energy plans are well laid out in response to industrial targets. Furthermore, energy sector players will be well-informed about the prospects for risk sharing and investment opportunities for the energy infrastructure needed to facilitate the desired industrialization.

For the international community, the need to broaden the discourse and targets on access to affordable and clean energy as envisioned by SDG 7 has never been more crucial. Although there is no consensus definition of energy access (see Appendix C), global definitions and descriptions of energy access only emphasize the use of energy at the level of households. To date, this focus has meant that less consideration is given to enhancing energy access for industries and other productive sectors in developing economies. A paradigm shift in the global drive for SDG 7 that places industries and other productive sectors in parallel to households would be helpful to ensure that industries in developing countries are not deprived of investments and policy targets for the expansion of clean and affordable energy. The UN, SE4All, World Bank, and other international organizations working in this space would be instrumental in setting this agenda.

¹⁷ Losses in Ghana's power sector were 23% in 2018, costing USD 400 million annually (MoE, 2019). Losses in Kenya's power sector for 2019/20 fiscal year stood at 23.46% (KLPC 2020).

The key takeaways and recommendations from this report include:

- High costs and unreliable electricity supply are major drivers of the slow growth of industrialization in Ghana and Kenya. This reflects a gap between industrial development policies and energy planning. Closing this gap would be instrumental for the success of sustainable industrialization in both countries and Africa as a whole. To do this, countries must have a better understanding of industrial energy demand to help manage the growth of future electricity generation and time of day pricing and supply. Industrial energy plans must therefore be developed in response to industrial development policies to bridge this gap.
- 2. High costs and unreliable electricity supply are driving industrial entities towards captive solar generation (self-generation). The continuous surge in industrial self-generation can lead to financial deficits for both Ghana and Kenya, as the utilities struggle to find consumers for generated electricity. This will compound the financial burden on the utilities as a result of commercial and technical losses and excess capacity charges. A comprehensive assessment and modelling to understand the practical impact of captive generation would be crucial for the long-term sustainability of the utilities.
- 3. The global focus of universal energy access on the provision of electricity to households as envisaged by SDG 7 has enabled the expansion of electricity connections to many households, increasing the energy access rates of Ghana and Kenya. This focus, however, has meant that less consideration is given to enhancing energy access for industries and other productive sectors. A paradigm shift in the global drive for SDG 7 that places industries and other productive sectors in parallel to households would ensure that the expansion of energy infrastructure to households is not detrimental to the energy needs of industries.
- 4. The process of industrial policymaking is important to successful industrialization. Developing economies must prioritize industrial energy access as a major feature in industrial policy formation. This means that energy sector players must be comprehensively consulted in the policymaking process of industrial policies. The consultation processes must aim at reaching a consensus for the targets of the policy. This will ensure that the energy sector players are well-informed about the prospects for risk sharing and investment opportunities for the energy infrastructure needed to facilitate the desired industrialization.

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Appendix A

Overview of Ghana's Energy Sector and Relevant Policies

Electrification rates¹⁸ in Ghana have gradually increased over the past 20 years, reaching almost 83.5 percent in 2017. Power generation is carried out by three major groups: the Volta River Authority (VRA), Bui Power Authority (BPA), and Independent Power Producers (IPPs). Ghana's diversified sources of generation from VRA, BPA, and IPPs include hydro power, thermal plants, and solar PV. Installed generation capacity increased from 3,795 MW in 2016 to 5,288 MW in 2020, representing a 39.3 percent increase. Dependable capacity also increased from 3,521MW in 2016 to 4,842 MW in 2020 (Energy Commission, 2021).

Source: Author with data from Energy Commission (2021)

Installed capacity currently outstrips peak demand. Ghana's peak demand has increased at an annual growth rate of 10.3 percent over the past five years. The system peak demand in 2020 was 3,090 MW, creating a reserve margin and an excess capacity of 1752MW in 2020. If demand continues to increase at the average rate 10.3 percent, excess capacity is likely to remain until 2027.

Electricity transmission in Ghana is done through the National Interconnected Transmission System (NITS) owned and operated by the state-owned Ghana Grid Company Ltd (GRIDCo). Distribution of

¹⁸ Measured in terms of population

electricity to final consumers including industries is the responsibility of two state-owned companies, the Electricity Company of Ghana (ECG) and the Northern Electricity Distribution Company (NEDCo). However, GRIDCo sells power directly to the mines and other bulk customers including manufacturing companies. ECG distributes electricity in the southern sector of Ghana whiles NEDCo distributes electricity to Ghana's northern sector.

Enclave Power Company is the only privately-owned power distribution company in Ghana. Enclave distributes about 45MW of power purchased from the VRA to over 80 multinational and local manufacturing companies in the Tema Free Zones Enclave and in the Dawa Industrial Zone, Ghana's new ultra-modern industrial park commissioned in 2019.

Governance and Regulation

The Public Utilities Regulatory Commission (PURC) and the Energy Commission (EC) are responsible for regulating the activities of the power sector. Whereas the PURC is an independent regulatory agency responsible for economic regulation of the power sector including approving rates for electricity sold by distribution utilities to end users, the Energy Commission oversees the technical regulation of the sector, including licensing of operators and advising the Minister of Energy on matters relating to energy policy and planning.

The Ministry of Energy is responsible for formulating, monitoring, and evaluating policies, programmes, and projects for the power sector in Ghana with financial support from the Ministry of Finance and Economic Planning.

RELEVANT ENERGY SECTOR POLICIES, LAWS, & PROGRAMS			
POLICY	YEAR	HIGHLIGHTS	
Renewable Energy Master Plan (REMP)	2019	 The REMP aims to achieve the following by 2030: Increase the proportion of RET in the national energy generation mix from 42.5 MW in 2015 to 1363 MW. Reduce the dependence on biomass as the main fuel for thermal energy generation. Provide RET base decentralized electricity options for 1000 off grid communities. Promote local content and local participation in the RET industry. 	
Energy Sector Recovery Program (ESRP)	2019	 The ESRP provides a clear and comprehensive roadmap to restore and sustain financial viability of the energy sector through strategic actions to be implemented in 3 phases from 2019-2023. Phase I includes action items identified as quick wins to have instantaneous positive financial impact on the power sector - reducing expenses and increasing revenue. Phase II action items will seek to resolve the difficulties posed by take or pay generation PPAs to contribute to a reduction in the sector shortfall or prevent future increases in the sector shortfall. Phase III action items will include additional reforms, policy actions, and associated funding options for the GoG to continue closing the financial gap in the ESRP timeline. 	
Renewable Energy Act	2011	 The Act provides for the deployment, management, and utilization of renewable energy sources for the production of heat and power in an efficient and environmentally sustainable manner. Among others, the Act: Provides an enabling environment to attract investments in renewable energy sources. Encourages the promotion of renewable energy resources. Promotes the diversification of energy supplies to safeguard energy security. 	
National Energy Policy	2010	 The vision of this policy is to develop an "Energy Economy" that would ensure a secured and reliable supply of high-quality energy services for all sectors of the Ghanaian economy, and to become a net exporter of oil and power by 2012 and 2015, respectively. Among others, objectives of the policy include to: Secure long term fuel supplies for thermal power plants. Reduce technical and commercial losses in power supply. Minimize the environmental impacts of energy supply and consumption through increased production and use of renewable energy and make energy delivery efficient. Ensure cost recovery for energy supply and delivery. Ensure the productive and efficient use of energy. Diversify the national energy mix by promoting renewable energy sources, nuclear and coal. 	
Strategic National Energy Plan (SNEP)	2006	 SNEP provides a roadmap on how Ghana's energy sources and resources can be tapped in an economical and timely manner to ensure a secure and adequate energy supply for sustainable economic growth. For the industrial sector, the policy seeks to ensure sufficient, cost effective but affordable high-quality energy supply to meet the increasing demand of Ghana's expanding industrial sector. Specific targets include: Achieving high quality and reliable (95% uninterrupted) electricity supply to the industrial sector per annum by 2015 and improving reliability to 98% by 2020. Providing a competitive bulk electricity price to all primary industries. 	

Appendix B

Overview of Kenya's Energy Sector and Relevant Policies

Kenya has the highest electricity access rate in East Africa. According to a 2018 Multi-Tier Framework (MTF) Report¹⁹, total electricity access stands at 75%, from both grid and off-grid solutions (World Bank, 2018). Kenya has also become the epicenter of Africa's energy transition. The country has SSA's largest wind farm and is the world's 9th largest geothermal power producer (REN 21, 2020). Until recently, Kenya was the only SSA country with an operational geothermal station (IRENA, 2020). Power generation is carried out by the state-owned Kenya Generation Company (KenGen) and IPPs with a generation mix including hydro, geothermal, wind, biomass, thermal, and solar. Total installed capacity increased from 2712 MW in 2019 to 2840 MW as at June 2020 (KLPC, 2020). Currently, installed capacity outstrips peak demand. Peak demand as of June 2020 stood at 1926MW, creating a reserve margin and an excess capacity of about 914 MW.

Source: Author with data from KLPC (2020)

Kenya Power and Lighting Company (KPLC) is the wholesale buyer of electricity from KenGen, IPPs, and also from Uganda, Ethiopia, and Tanzania on the basis of negotiated PPAs. KPLC is responsible for onward transmission and distribution from the national grid to households and industrial consumers. Large power consumers, mostly C&I customers account for over 70% of Kenya Power's revenue from

¹⁹ The MTF Energy Access framework is discussed in Appendix C

sale of electricity (Kenya Power, 2020). KETRACO operates its own high voltage (132kVand above) electricity transmission infrastructure and regional inter-connections that form the backbone of Kenya's national transmission grid.

Governance and Regulation

The Energy and Petroleum Regulatory Commission (EPRA)²⁰ oversees all regulatory functions of the energy sector including the coordination of energy planning, tariff setting and oversight, monitoring and the enforcement of sector regulations. The Ministry of Energy (MoE) is responsible for policy and overall guidance of the sector. The granting and revocation of generation and distribution licenses rest with MoE on the recommendation of the EPRA. A unique feature of Kenya's power sector is the existence of an Energy Tribunal which serves as the sector's dispute resolution body. The tribunal is largely involved in settling disputes arising from decisions made by the EPRA.

RELEVANT ENERGY SECTOR POLICIES, LAWS, & PROGRAMS				
POLICY	YEAR	HIGHLIGHTS		
The Energy Act	2019	 The 2019 Energy Act which replaces Kenya's 2006 Energy Act aims at establishing properly functioning energy sector entities to promote the use of local energy resources including geothermal and other renewables, to create an enabling environment for economic development. Among others, The Act gives legal backing to Kenya's FiT Policy to help promote private sector investment and distributed RET generation to stimulate economic development. It introduces a penal system for electricity suppliers and compensates consumers for unwarranted power outages or for the provision of poor-quality electricity. It provides a legal backing for the introduction and implementation of a netmetering system. It mandates EPRA to establish energy consumption benchmarks for C&I consumers and to promote energy conservation and efficiency measures. 		
National Energy Policy	2018	 The National Energy Policy provides the overarching policy framework that guides Kenya's power sector. Among others, the policy seeks to: Ensure a sustainable, adequate, affordable, competitive, secured, and reliable supply of energy at the least cost. Increase nationwide access to electricity. Improve the efficiency of power distribution and supply geared towards meeting national needs while protecting and conserving the environment. 		

A unique feature of Kenya's power sector is the existence of an Energy Tribunal which serves as the sector's dispute resolution body.

²⁰ The EPRA was established as the successor to the Energy Regulatory Commission (ERC) under the Energy Act, 2019 with an expanded mandate of inter alia regulation of upstream petroleum and coal.

RELEVANT ENERGY SECTOR POLICIES, LAWS, & PROGRAMS				
Kenya Off-Grid Access Project	2017	 This project aims at providing electricity to 1.3 million households in Kenya's underserved regions that are not served by the national grid through 4 components. The first component involves electrification of areas where electricity supply through mini-grids represents the least-cost option. The second component involves the provision of stand-alone solar systems and clean cooking solutions for households. The third involves the provision of stand-alone solar systems and solar water pumps for community facilities. The final component involves consumer education and citizen engagement, implementation support and capacity building of energy sector officials. 		
Last Mile Connectivity Program	2014	 This is a GoK program aimed at facilitating and connecting Kenyan households to the national grid. This is geared towards achieving a national electricity access rate of 70% by 2017, as part of the GoK's goal of universal access to electricity by 2020. The program is to be implemented in three phases. Phase I involves connecting those households lying within 600 metres of the earmarked transformers to the national grid. Low-voltage network and service cables will be extended to reach 314,200 households (1.5 million Kenyans). Phases II and III involves installing new transformers, and extending the low-voltage network to 500,000 households (2.5 million Kenyans) 		
Feed-In Tariff Policy	2012	 Kenya's FiT Policy was first introduced in 2008, and later revised in 2010 and 2012. The policy seeks to promote investment in RET technologies including wind, biomass, small hydro, geothermal, biogas, and solar. The objectives of the policy are to: Facilitate resource mobilization by providing investment security and market stability for investors in electricity generation from renewable energy sources. Reduce transaction and administrative costs and delays associated with the FiT procurement processes. Encourage private investors to operate their power plants prudently and efficiently so as to maximize returns. 		
Vision 2030	2008	 Kenya Vision 2030 is the country's development blueprint which aims at transforming Kenya into a newly industrialized middle-income country by 2030. Recognizing that development projects recommended under Vision 2030 will increase demand on Kenya's energy supply Kenya is to: Generate more energy at a lower cost and increase efficiency in energy consumption. Initiate institutional reforms in the energy sector, including building a strong regulatory framework, encouraging more private generators of power, and separating generation from distribution. Explore new sources of power including geothermal and coal and connecting Kenya to energy-surplus countries in the East African region. 		

Appendix C

SDG 7 (Access to Clean Energy)²¹

The inclusion of energy in the 2015 Global Goals for Sustainable Development Goals (SDGs) marked a new level of global and political recognition of the importance of energy to socio-economic development. SDG 7 provides a global framework for governments to ensure access to affordable, reliable, sustainable, and modern energy for all. However, there is no consensus definition of energy access. Definitions and descriptions of energy access in both academic and grey literature only emphasize the use of energy at the level of households. Until recently, an initial threshold of 250 kWh per year for rural households and 500 kWh per year for urban households remained an influential benchmark for energy access²² (IEA, 2012). More recently, the World Bank/ESMAP under the SE4ALL initiative developed the Multi-tier Framework (MTF) to monitor and evaluate energy access. The MTF measures energy access in a tiered spectrum, from Tier 0 (no access) to Tier 5 (the highest level of access) as presented in the figure below.

Source: Owusu-Mante, 2021

²¹ Appendix C is adapted from author's previous work: 'Policy Strategy for Sustainable Energy Access in Africa: A Comparative Study of Morocco & Ethiopia' (2021).

²² This benchmark constitutes less than 5% of energy consumed by an average American household, that is, 10,649 kWh/year (EIA, 2020).

In 2019, the IEA revised its initial threshold to an annual consumption of 1250 kWh per household with standard appliances, and 420 kWh per household with efficient appliances. Although the MTF tier levels and IEA's benchmark are intended to serve as descriptive tools and not prescriptive, they have become the framework that guides policies for energy access in developing economies. To thought leaders like Bazilian and Pielke (2013), these have resulted in modest and lesser policy ambitions for energy access and a primary focus on expanding electricity to households under the premise that those without access will require modest amount of electricity to be classified as having access²³.

Conceivably, this may be a driving factor for the limited direct policies to secure and scale up electricity access to industries in developing economies. Sokona et al (2012) suggest that placing the productive sector instead of households as the lever to address the energy access dilemma would provide a more informed policy approach for reaping the benefits of electricity as a pillar for socio-economic development in developing economies.

Given the fundamental importance of affordable and effective supply of electricity in making industries competitive to drive industrialization, the SE4All, World Bank, IEA and all global institutions working to ensure that the targets of SDG 7 are achieved must reframe the energy access agenda to place productive sectors parallel to households. Inspired by Bazilian and Pielke (2013), reframing the energy access discourse should be done with due consideration to the question: how much energy is actually needed to enable poverty alleviation; providing a solar home system to last mile households, or providing electricity to ensure the cost-effective consistent operation of industries, or both? This should be the first step for a better understanding of energy access.

²³ Available data shows that 36% of the households in Kenya with an installed off-grid solar system ramped up their average income by \$35 per month (Willuhn, 2018).

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