



Energy Usage by Businesses in Africa

A special energy policy report
based on AFREC data

African Energy Commission (AFREC)
March 2022

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The African Energy Commission (AFREC) is a specialised energy agency of the African Union (AU), mandated to develop the African energy sector by facilitating the coordination, harmonisation, protection, conservation, development and promotion of rational exploitation, commercialization and integration of energy resources in Africa. Working with an extensive network of partners and experts drawn from the 55 AU member states, we have the capacity and expertise to ensure all energy initiatives across the geographies of the AU respond to the future development of the African energy sector, in accordance with the AU's Agenda 2063 and the fundamental pursuit of building 'The Africa We Want'.

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Foreword



Energy is one of the essential inputs to all business activities. For some industries, energy is the highest input cost. For all, energy is vital - it powers machines, provides heating and cooling, and increasingly runs the technology on which many businesses rely. It is therefore essential for policymakers to understand how businesses use energy.

Many countries implement energy efficiency policies as part of their energy transition and their responses to global climate change actions. Countries often target household energy use, but policies to improve energy use efficiency in business are critical. Effective policies can help reduce energy use and lower costs, thus increasing profits for businesses.

For Africa, enhancing access to energy, specifically electricity is one of the key challenges that our continent is facing. The Commission's bigger picture in transforming Africa's energy sector as part of our priorities for achieving Agenda 2063, is to transform the lives of millions of households and free many women and children from the daily drudgery of collecting firewood and cooking on inefficient wood stoves. Access to energy also has the potential to increase the available economic output.

Data on business energy use across Africa is still incomplete in many countries. Together with our member states, enhancing data availability for business energy use via newly-developed initiatives such as the African Energy Information System (AEIS), aligning data questionnaires, providing training and support to all African Union member states are some of the initiatives which the Commission is implementing and are targeted to improve Africa's energy integration and development agenda. However, for the Commission to achieve a prosperous and flourish energy industry which addresses the needs of our people, support and commitment from all African Union Member states is imperative.

For example, our 2018 data reveals that, of the total energy use by the industrial sector, which currently stands at 64%, is not allocated to any specific industry, and compared to 21% globally. For individual fuels, the share of fuels that can't be allocated to any specific sector was 66% for oil products, 55% for gas, 53% for electricity and 39% for coal. This shows that the specific industry use of fuels by African industry remains largely unknown.

This ascertains that data reporting on energy remains a crucial challenge to most of our member states, with evidence from 2018 revealing that only 30 countries report energy usage in the commercial sector, Nine (9) countries reporting on the industrial usage of energy, while only 2 countries reported energy usage for the agriculture sector from Biomass. Nevertheless, these challenges represent an opportunity to Africa, to improve energy usage reporting so policy makers are able to make informed decisions on the energy development required for the energy sector in Africa in general.

This report therefore presents an opportunity to understand risks and potential benefits of boosting electricity supply for business in Africa in relation to energy usage. It also shows how policies for enhancing the supply and use of Africa's universal energy supply and renewable energy can help boost business in Africa and contribute to Africa's commitment to global action on climate change.

H.E. Dr. AMANI Abou-Zeid

Commissioner for Infrastructure and Energy
African Union Commission

Executive Director's Statement



Lack of complete and credible data on energy use in Africa remains one of the challenges hampering the development and transformation of Africa's energy sector necessary for business to thrive. The establishment of the African Energy Information System (AEIS) by AFREC is one of the remarkable milestones which position our continent to implement its development agenda, to assess energy development space and the business environment of its 55 AU member states.

We are all aware that energy is a critical part of all economic activities across the globe. The availability of fuel drives the choices of which type of energy a business can use and many African countries have a limited choice of fuel. They are dependent on the fuel produced or imported from neighbouring countries and Africa imports nearly all of its oil products.

With the profound energy transition, and yet untapped energy resources to be exploited on the African continent, tackling climate change, adopting technology and the cost of energy supply, its uses vis-à-vis economic growth presents huge challenges for our continent. Tough choices faces policy makers as the weigh up economic benefits and environmental costs.

Some of these choices are/were revealed during the course of the pandemic. We have witnessed how energy supply and accessibility impacted households and businesses. Generating, transmission, and even distribution of energy to all sectors i.e industry, commercial, agriculture and/or residential continue to face energy supply shortages and higher losses. Our responsibility as a continental energy institution together with our member states, is to ensure Africa's energy needs are addressed at all levels of the economy and geographical scope, and prices in countries are within local control.

This report provides insightful policy recommendations based on credible and analytical energy data from our member states. It focuses on the use of energy by the business sector including the industrial, commercial and agriculture sectors. As countries develop more detailed energy statistics, the report offers opportunities to look at individual industries on how energy use varies. "The best energy policies are based on a comprehensive understanding of the current situation upon which possible actions and their impact can be assessed". That assessment requires comprehensive energy data as the foundation for energy policies.

While complete data on the use of energy in business in Africa is still being developed, important insights can be made from existing data shown in this report, attesting to how business energy use in Africa is growing - it has increased by more than 50% over the past 20 years. In order to meet the African Union's Agenda 2063, and the United Nations Sustainable Development Goals (SDGs) on energy, quality and credible data for this sector is essential.

Mr Rashid Ali Abdallah

Executive Director

African Energy Commission (AFRE)

Acknowledgement

The analysis presented in this report was made possible by the support and input of energy statisticians in AU member states aimed at producing comprehensive energy statistics. Robust and comprehensive data is essential to understanding the situation in Africa and helping with the development of suitable policies. While supply data is generally widely available, all countries need to develop more comprehensive data on energy demand.

This report has been compiled to help member states better understand the energy landscape and possibly assist them in taking action. Please note this is a summary report and a more detailed analysis will be required at country level for each member state. The report contained here used freely available data and sources to assist with country-level analysis.

The report uses AFREC's Africa Energy Database (AED) as the primary source of information for Africa. This reflects the work underway across the continent to enhance energy data. This work needs to continue under AFREC's African Energy Information System (AEIS) programme. Support from governments is vital to ensure that all African countries have the data to plan and respond to national and international events.

This report has been produced for AFREC by Mr. Duncan Millard, international energy adviser, and coordinated by Mr. Yagouba Traore, Head of Policy Strategy and Support at AFREC. Contributions were also made by Ms Ndahafa Nakwafila, Communication and Information Specialist at AFREC; Mr. Anthony Monganeli Mehlwana, Economic Affairs Officer in the Energy Infrastructure & Services Section at the United Nations Economic Commission for Africa (UNECA); Mr Fred Kabanda, Division Manager at the African Natural Resources Centre of the African Development Bank (AfDB); Dr. Krishna Heeramun, team leader EU ISM Support to AU and Ms Marorisang Makututsa, statistician from the Department of Energy for the Kingdom of Lesotho.

We are also grateful to the statisticians in AU member states who are working tirelessly to produce the energy data and provides valuable information for this report.

List of Abbreviations

AFREC	African Energy Commission
IEA	International Energy Agency
RECs	Regional Economic Communities
AEIS	African Energy Information System
AU	African Union
TJ	TeraJoules
SDG	Sustainable Development Goals
GDP	Gross Domestic Product
COVID-19	Corona Virus Disease 2019
NEIS	National Energy Information Systems
AESQ	Annual Energy Statistic Questionnaire
NSI	National Statistics Institute

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Executive Summary

Understanding how and why the business sector uses energy is essential for planning and forming sound policies. This kind of knowledge comes from the analysis of comprehensive energy statistics.

Many African countries are developing energy data supported by AFREC, but information on energy users is still insufficient. This situation is not unique to Africa, as the cost and time required to collect data on energy use is much greater than for energy supply. As a result, many countries lack complete data on energy use.

However, the challenge for African countries is far greater than elsewhere in the world. For example, of the total energy use by the industrial sector, which currently stands at 64%, is not allocated to any specific industry, compared to 21% globally. For individual fuels, the share of fuels that can't be allocated to any specific sector was 66% for oil products, 55% for gas, 53% for electricity and 39% for coal. This shows that the specific industry use of fuels by African industry remains largely unknown.

Biomass (mainly wood and charcoal) remains the primary fuel in many African countries with only 9 countries reporting the industrial use of biomass in their energy balances. In the latest AFREC data covering 2018 around 30 countries reported data on the commercial sector energy use, and only 2 countries reported biomass use for the agriculture sector. AFREC is working with the African Union member states to improve data collection and reporting. The suggestions made in Section 5 of this report to improve data collection on business use may help countries. The use of fuels by African countries is more limited than in many regions of the world. A great deal of economic activity in the commercial sector relies on biomass, whilst the agriculture sector is more reliant on oil products than other regions. While complete data on the business energy use in Africa is still being developed, important insights can be made from the existing data shown in this report. Business energy use in Africa is growing – with an increase of more than 50% over the past 20 years.

Fuel use by the business sector is often concentrated in the 4 largest economies in Africa: Nigeria, South Africa, Egypt and Algeria and the regions they are located in, with limited use of fuels for the business sector in other regions, most notably Central Africa. There is a great deal of evidence to suggest that there is a strong correlation between the supply of energy and economic growth. Where electricity supply to the business sector has grown and where there has been political stability, economic output has also increased. In addition, there is also evidence of the reverse - a reduction in power correlates with significant reductions in output.

Energy is therefore vital for the growth of African businesses and as such it needs to be available to all countries at prices that are within local control. At the same time, all African countries need to take appropriate actions in the global effort to address climate change. With this in view, countries that look to maximising their renewable energy outputs will see more energy available to support growth, less reliance on international price variations and demonstrate their commitment to the global cause dedicated to preventing devastating change to the planet.

This report is an initial overview of business energy use in Africa. As countries develop more detailed energy statistics it will be possible to look at individual industries to gain further insights into how energy changes African business activity and to properly inform policy decisions for the future. The type of analysis presented in this report is only possible through the work of energy statisticians in the AU member states and the support provided by AFREC in producing comprehensive energy statistics. Robust and comprehensive data is essential to understanding the situation and helping develop suitable policies. While supply data is generally widely available, all countries need to develop more comprehensive data on energy demand.

¹ In this report the term business sector is used covers all main economic sectors eg Industry, Commercial and Agriculture. References to specific sectors use the specific sector name.

² Source: IEA energy balance for Africa 2017

1. INTRODUCTION

The best energy policies are based on a comprehensive understanding of the current situation upon which possible actions and their impact can be assessed. That assessment needs to be based on the analysis of comprehensive energy data. The African Energy Commission (AFREC) is a specialised agency of the African Union with a core mandate of coordinating, harmonising, developing and integrating energy resources on the African continent. In particular, AFREC is responsible for designing, creating, and setting up a continent-wide energy database and facilitating rapid dissemination of information among AU member states, Africa's Regional Economic Communities (RECs), investors, academia, and other stakeholders. Since 2012, AFREC has put in place and maintained the African Energy Information System (AEIS), which allows for the collection of African energy statistics by each country, and the dissemination this data through publications and datasets available online on the AFREC website (<https://au-afrec.org>).

AFREC works with all AU countries to assist them in the compilation of a compressive energy database to inform policy-making at the national, regional and continental levels. This work has included:

- ▶ Development of a new data collection system in collaboration with member states over the past 18 months;
- ▶ Training statisticians to build their capability, knowledge and skills dissemination through the AFREC 'Training of Trainers' programme;
- ▶ Demonstration of the value of energy data to policymakers and African governments, among others.

This report, is the second in a series of 4 reports. The first one was procuded in 2021 and the three remaining will be produced in 2022. They aim at shedding light on the energy situation of Africa, using data collected by AFREC from all AU member states. The reports also aim to enhance understanding of specific fuels, their production processes, trade and use, while serving as a framework instrument to policymakers across African countries.

This report focuses on the use of energy by the business sector, covering the industrial, commercial and agriculture sectors . It starts with an overview of business energy use across Africa and globally and then goes on to explore the specific use of each primary fuel type in Section 3. Section 4 focuses on electricity to explore the links between electricity use and economic output and finally, section 5 explores options for enhancing data collection on business energy use.

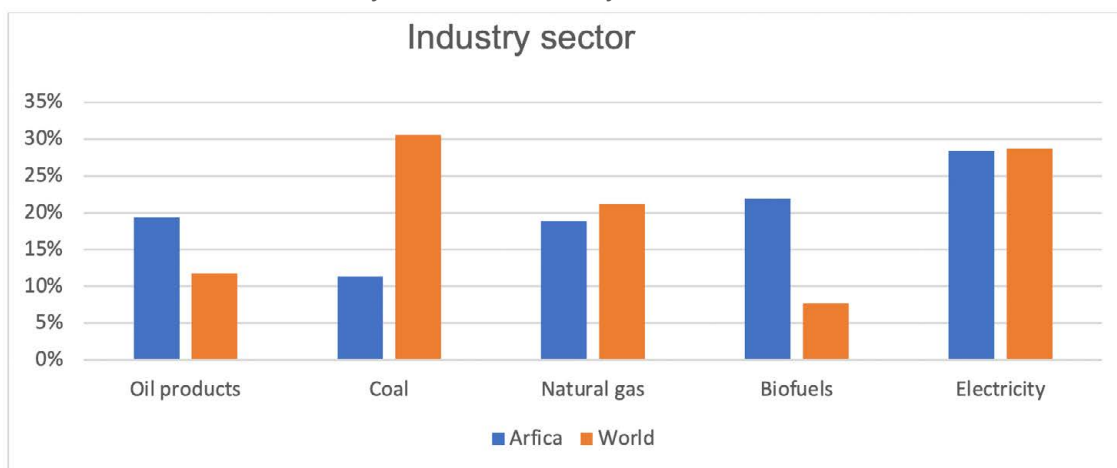
The report is based on AFREC's data, made available to all for free in the AEIS, which currently covers 2000 to 2018. However, there are some inconsistencies and gaps in data for 2018, so and in some instances, the report has had to rely on data up until and including 2017. Africa's energy data is still developing and with the necessary support of AFREC, positive, productive use of data and support provided to statisticians, energy statistics can be improved to help create effective policies. Some additional data from various sources has been used and referenced where relevant to provide a global and economic perspective.

2. AFRICA'S BUSINESS USE OF ENERGY IN THE GLOBAL CONTEXT

Energy is a vital part of all economic activities, but the availability of fuels drives the choice of energy a business can use. Many African countries have a limited choice of fuels, as they are dependent on the fuels produced or imported from neighbouring countries and oil products that nearly all African countries import. As such, the energy available in Africa is different from other parts of the world. In Africa, over half of the final energy used (54%) is biomass such as wood and charcoal compared to just over 10% of the entire world average.

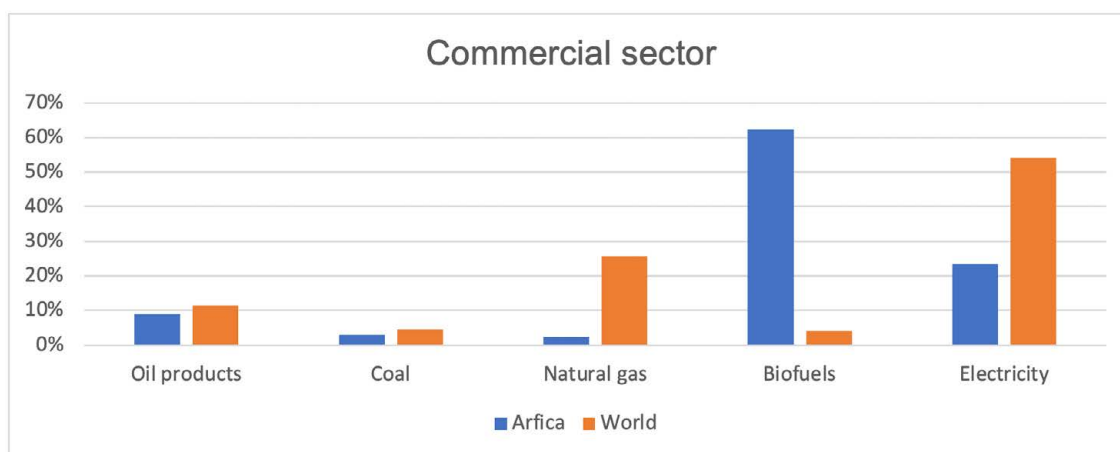
³ When looking at business energy use in energy balances, it is important to recall that all energy used for transport services, including where owned by the business, should be reported in the transport sector. As such this report does not specifically look at transport use of fuels by and for business.

Chart 2.1 Share of fuels used by the African industry sector in 2017



Data source: AFREC, IEA World Energy Balance highlights

Charts 2.2 Share of fuels used by the African commercial sectors in 2017



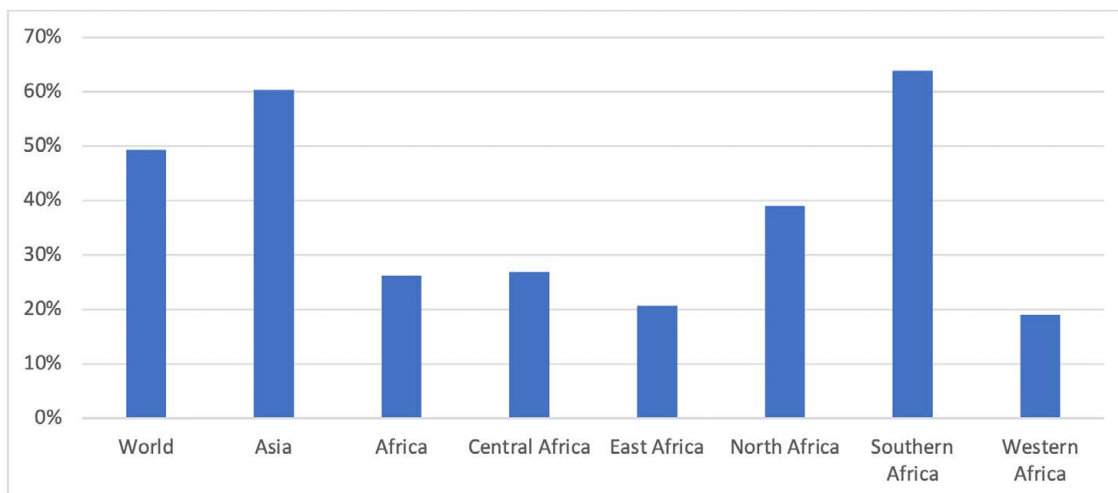
Data source: AFREC, IEA World Energy Balance highlights

This difference in fuel use is reflected in charts 2.1 and 2.2 which show the shares of fuels used by the industrial and commercial sectors in Africa vs globally. For the industry sector, the shares are relatively similar between Africa and the world totals, with Africa using less coal but more biofuel and oil products. However, for the commercial sector, the difference is stark, where globally gas and electricity are the main sources of fuels, in Africa it is biofuels.

The types of fuel available also determine how much energy is available for business. As noted previously, many African countries do not have a wide range of fuels to choose from. A lot of fuel is collected as needed by households, which represent around half of all final consumption of energy in Africa, compared to just over 20% globally. As such, relative to the global situation, African businesses have a lower share (28%) of total final energy than seen across the whole world (just under 50%). This figure varies across the continent depending on the region, ranging from around 20% in West and East Africa to over 60% in Southern Africa (see chart 2.3). However, the Southern Africa figure is dominated by South Africa, which accounts for 70% of final energy use in that region. As described below, a lot of that is coal used by industry.

⁴ Africa data from AFREC, World data IEA World Energy Balances 2019 edition, both refer to 2017.

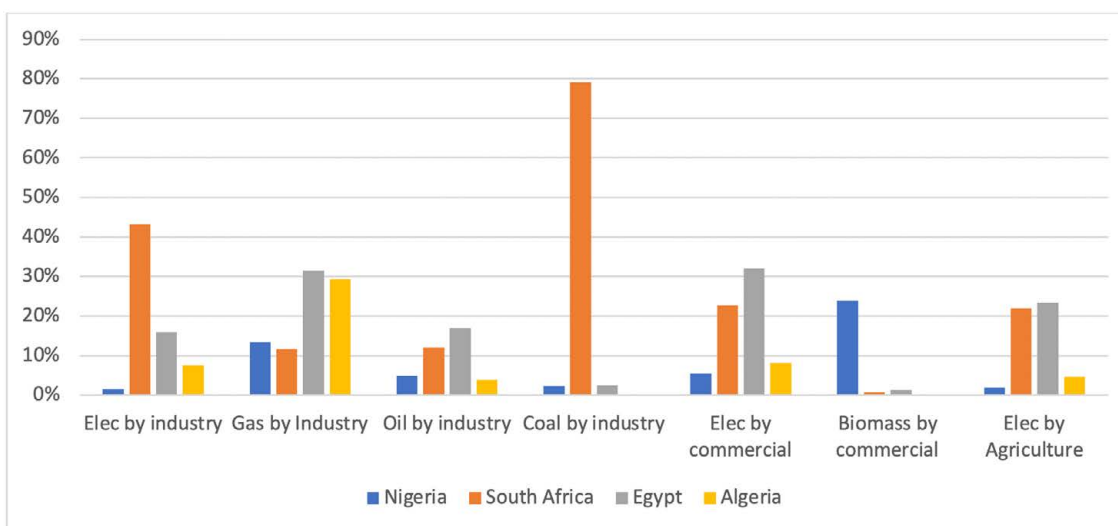
Chart 2.3 Total business sector share of Total Final Consumption 2017



Data source: AFREC, IEA World Energy Balance highlights

The importance of South Africa to Southern Africa data, highlights the impact of the most prominent African economies when looking at business energy use across Africa. Chart 2.4 shows the shares of each fuel used by the business sector in the four largest African economies: Nigeria, South Africa, Egypt and Algeria. – each significant energy producers (oil and gas, coal, and gas, respectively). Together these four countries consume around 85% of the gas and coal used by industry across Africa. Nearly 70% of the electricity used by both the industrial and commercial sectors and just over 50% of the electricity used by the agriculture sector. It is only oil products which are imported and used by industry in all countries often as a substitute for fuels like gas. Other African countries consume biomass for more than half of Africa's business use.

Chart 2.4: Share of African business energy use by fuel and sector for the largest African economies, 2017



Data source: AFREC

⁵ In the report businesses use will likely exclude many of the small businesses run from households in many developing African countries, as information to separate fuel used for economic activity from household activity is not available at this time in most countries.

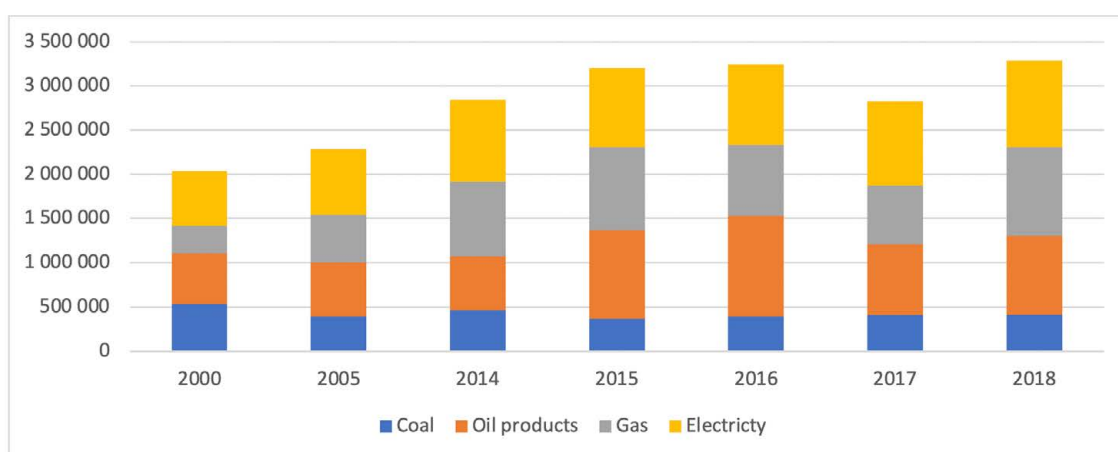
Table 2.1 Share of African business energy use by fuel and sector for the largest African economies, 2017

	Nigeria	South Africa	Egypt	Algeria	Combined share of all Africa use
Electricity by industry	2%	43%	16%	8%	68%
Gas by Industry	13%	12%	31%	29%	86%
Oil by industry	5%	12%	17%	4%	38%
Coal by industry	2%	79%	2%	0%	84%
Electricity by commercial	6%	23%	32%	8%	68%
Biomass by commercial	24%	1%	1%	0%	26%
Electricity by Agriculture	2%	22%	23%	5%	52%

Data source: AFREC

The following section looks at individual fuels used by businesses and several notable data issues relating to them. This is important when trying to understand how energy use is changing. One specific issue is the lack of data on the industrial sector's use of biomass (see Section 3.4). Charts 2.5 and 2.6 below only consider the consumption of gas, coal, oil products and electricity.

Chart 2.5 African industry consumption of gas, coal, oil products and electricity, TJ.

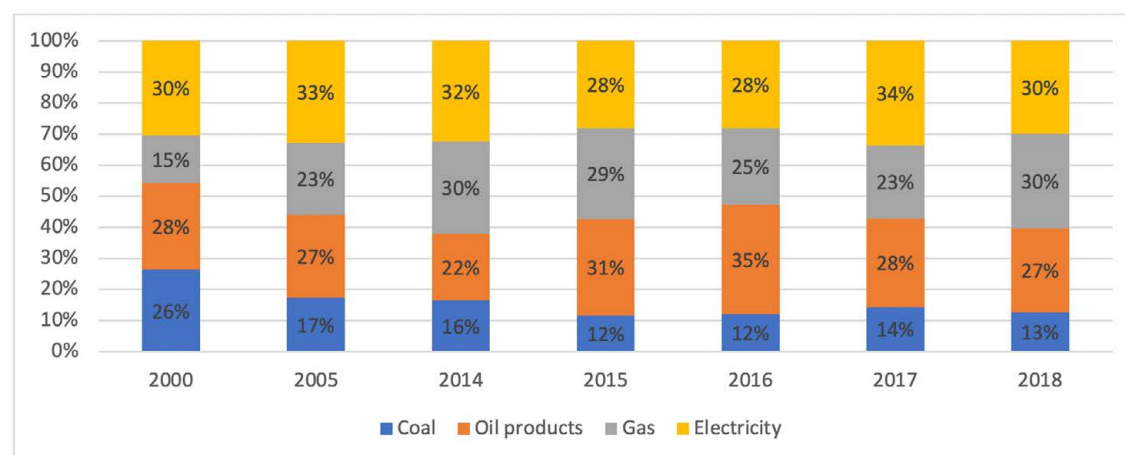


Data source: AFREC

Overall, African's industry consumption of coal, oil products, gas and electricity has grown steadily since 2000, from over 2 million TJ in 2000 to 3.2 million TJ in 2016. Consumption, especially of oil products in Northern and Southern Africa and gas in Northern and West Africa), fell in 2017 to 2.8 million TJ before increasing to 3.2 million TJ in 2018.

As chart 2.6 shows, the share of electricity consumption has stayed broadly constant at around 30%, whilst oil products have shown more variation ranging from 22% to 35%. The share of coal has declined from 30% in 2000 to 13%, whilst gas has witnessed almost the inverse, going from 15% to 30% in 2018. In part, these changes are related to changes in the size of economies and economic outputs as well as changes in the availability of fuel, for example greater production and in a country's use of gas.

Chart 2.6 Share of use of gas, coal, oil products and electricity by African industry



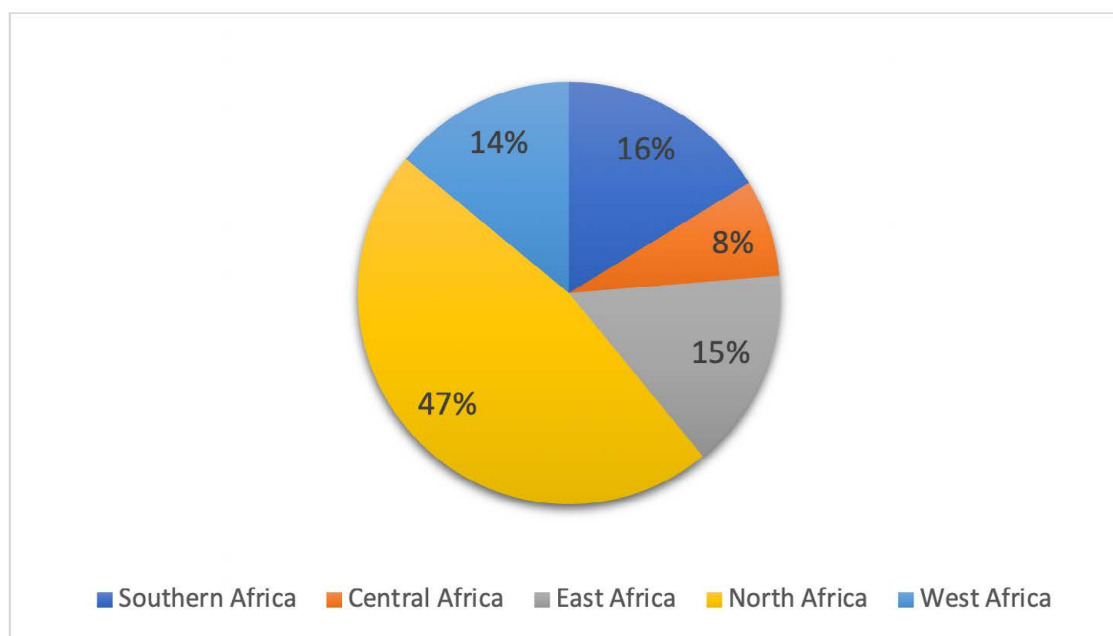
Data source: AFREC

3. AFRICA BUSINESS USE OF FUELS

3.1 Oil Products

Oil products such as diesel and fuel oil, are widely used by businesses across Africa, with their use being reported in all countries. North African countries account for the largest share or almost a half of all consumption, with the rest split pretty evenly across the other four regions, though with a lower share in Central Africa (chart 3.1).

Chart 3.1 Share of industrial sector use of oil products by region, 2017



Data source: AFREC

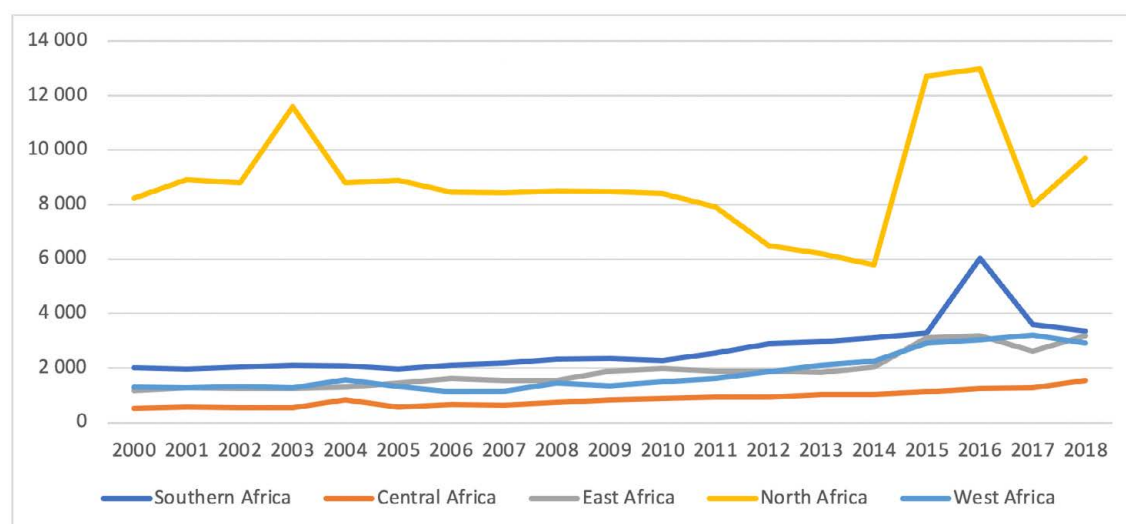
Table 3.1: Share of percentages of business sector use of oil products by African regions, all Africa and the World, 2017

	Central Africa	East Africa	North Africa	Southern Africa	West Africa	Africa	World
Industry	20	18	32	12	21	19	12
Commercial and public	14	2	12	2	10	9	11
Agriculture/forestry	100	69	76	60	73	72	54
Non energy use	100	100	97	68	51	56	73
All business sectors use	18	14	37	18	23	23	25

Data source: AFREC, World data from IEA Energy Balances

Table 3.1 shows that business use of oil products in Africa matches the global situation, with oil products representing about a quarter of energy use. However, the agricultural sector in Africa has a much greater dependency on oil products than the rest of the globe. Oil products account for over 60% of fuel inputs to agriculture in all of the Africa regions and 72% across Africa, compared to 54% globally. This indicates a greater risk to the African agricultural sector of any supply constraints or significant upward pressure in the cost of oil products.

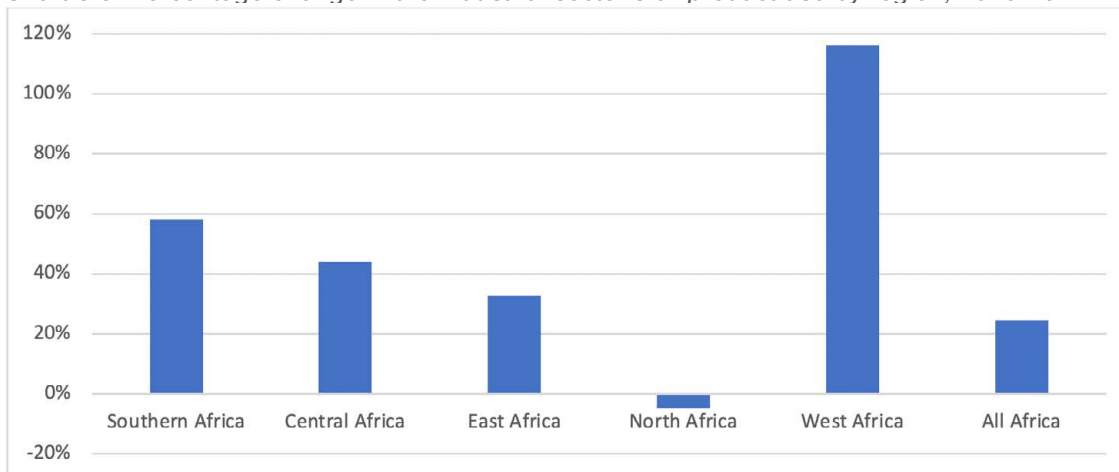
Chart 3.2: Industrial consumption of oil products by region, 1000 tonnes



Data source: AFREC

Oil used in North Africa has been on a general downward trend since 2000, reflecting an increase in gas use in the region, falling from just over 8 million tonnes a year to just under 6 million in 2014. However in 2013, following the Arab Spring and, in part, reflecting lower natural gas availability, its use grew across all North African states reaching a new peak of 13 million tonnes in 2016 before falling back to 8 million tonnes in 2017. In contrast, as shown in charts 3.2 and 3.3, all other African regions have had consistent increases in oil product use since 2010. Countries reporting significant growth include Ethiopia, Kenya, Angola, South Africa, and Nigeria.

Chart 3.3: Percentage change in the industrial sector's oil product use by region, 2010-2017



Data source: AFREC

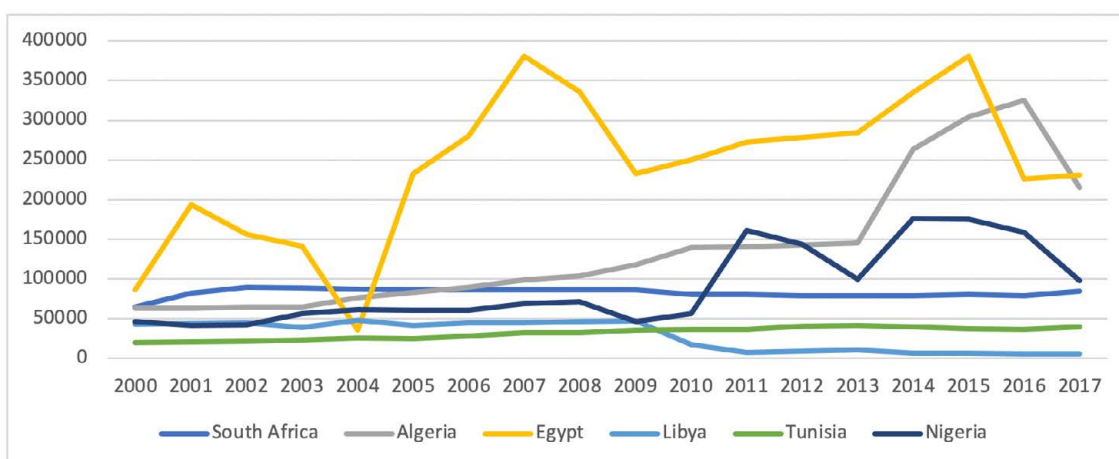
3.2 Natural gas

Business use of natural gas in Africa is dominated by industrial use in North African countries. In Africa, final consumption by industry constitutes 40% of all final consumption, and a further 10% of final consumption is used for non-energy purposes (mainly industrial processes). Gas consumption by the commercial sector represents 4% of all final consumption, with negligible use (less than 1%) in the agricultural sector. However, a quarter of the remaining gas is allocated to other non-specified sectors, so the actual use per sector is unknown.

By region, North Africa represents about 70% of all consumption of natural gas by industry, followed by West Africa (largely Nigeria) at 15% and Southern Africa (mainly South Africa) at 12%. In North Africa, gas consumption by industry is driven by Algeria and Egypt, accounting for nearly 60% of all gas used across Africa (Chart 3.4a).

In the first part of this century, natural gas consumption by industry grew in all major consuming countries except South Africa, where it was broadly stable. However from 2010, reported natural gas consumption by the industrial sector has been more variable. In Libya, natural gas consumption started to fall in 2010 and in 2017 consumption was 65% lower than the 2010 figure. Other North African countries saw a fall or stabilisation in gas use from around 2010/11, reflecting the Arab Spring and production issues in Egypt rather than a significant move away from the use of gas.

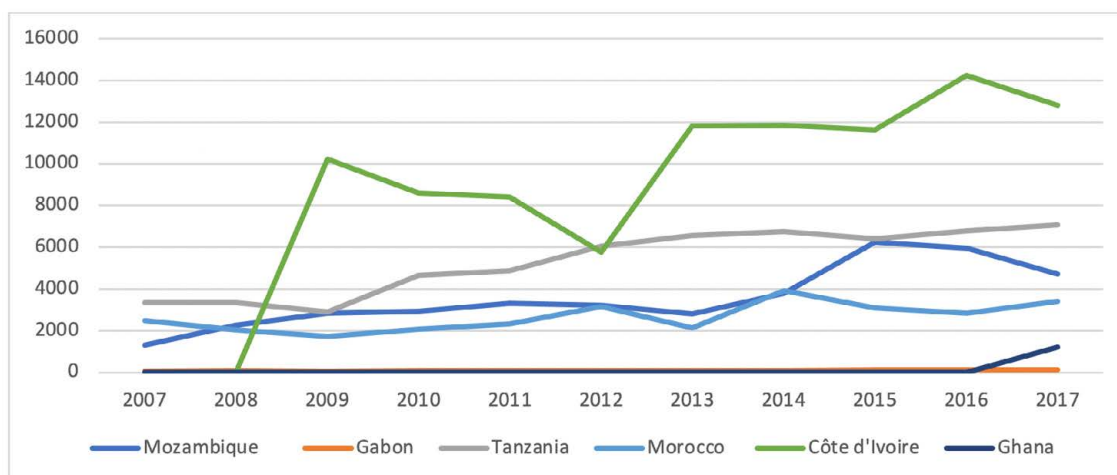
Chart 3.4 Industry sector natural gas consumption, large consumers, TJ



Data source: AFREC

The six countries shown in chart 3.4 account for 92% of natural gas consumption by the industrial sector across Africa. However, a different trend is perhaps emerging in other countries, where industry uses gas (chart 3.5). In these countries there is more evidence of steady growth. For example, since 2010, both Morocco and Mozambique have witnessed a growth in demand of over 60%, with industrial use in Tanzania increasing by 52%.

Chart 3.5 Industry sector natural gas consumption, other consumers, TJ



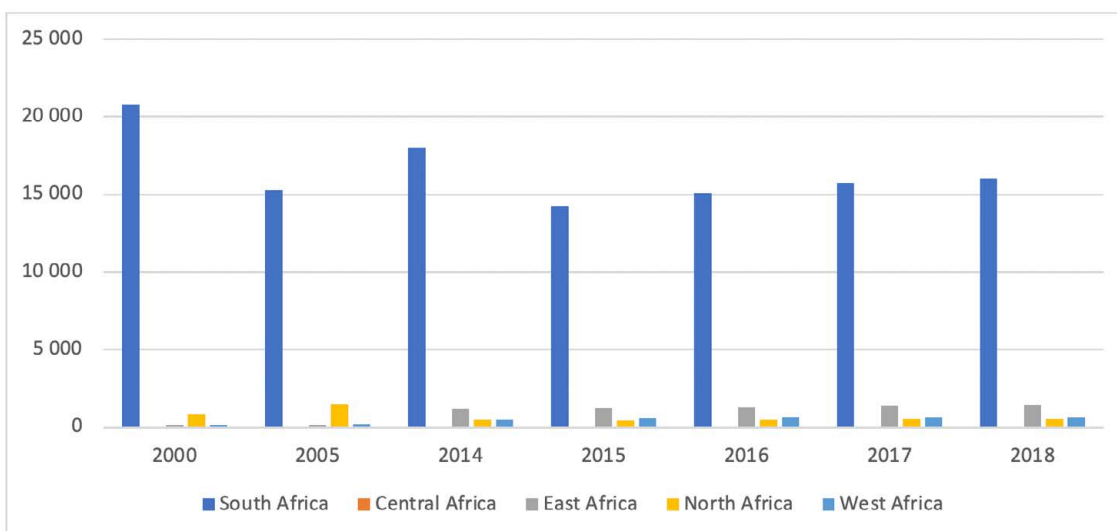
Data source: AFREC

Reported gas use by the commercial and agriculture sectors is small and is only reported by North African countries. However in the future, data enhancements by other countries may reduce the size of non-specified consumers and may show that actual consumption in these sectors is higher.

3.3 Coal

Southern Africa is the primary coal user across Africa, mainly because of its use in South Africa. The region consumes 86% of coal used by industry in Africa, with 79% of it by South Africa (14 million tonnes of the 19 million consumed). South Africa is also the only African country reporting use of coal for non-energy purposes, with over 2 million tonnes being used.

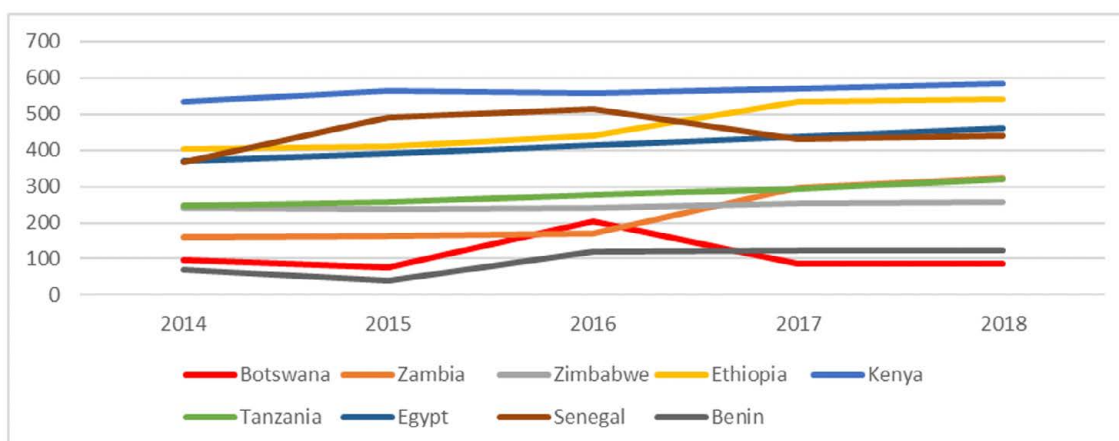
Chart 3.6 Industrial coal use by African region, 1000 tonnes



Data source: AFREC

Outside South Africa, industrial use of coal mainly occurs in the nine countries shown in chart 3.7. Consumption in these countries has grown over the past five years. It increased from 2.5 million tonnes in 2014 to 3.1 million tonnes in 2018, with increased use in Zambia and Ethiopia driving this growth.

Chart 3.7 Industrial sector coal use, smaller consuming countries, 1000 tonnes



Data source: AFREC

3.4 Biomass

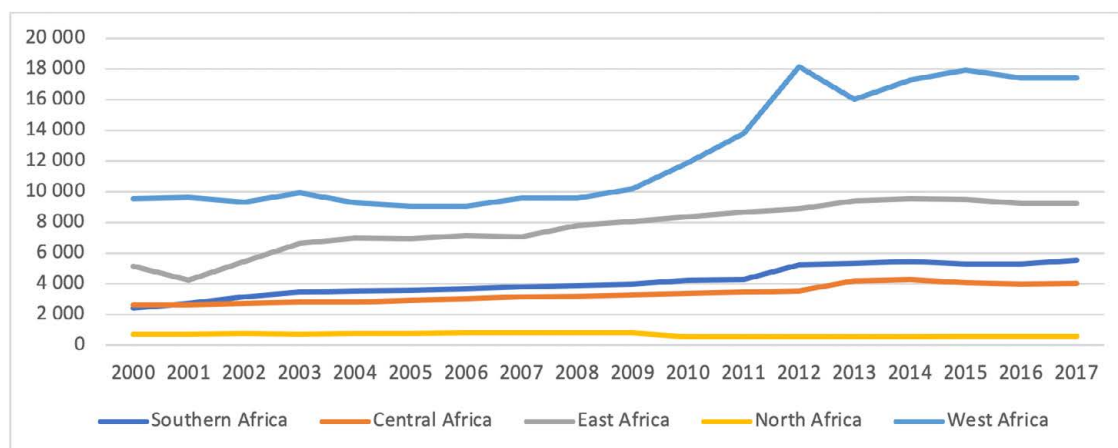
Biomass still dominates energy use in many African countries, especially those with limited access to other fuels. All African countries report the use of biomass in the commercial sector, but only 9 have reported use in the industrial sector and 2 in the agriculture sector.

However, producing statistics on the use of biomass is challenging. Unlike other fuels, its supply is very diverse, with much being collected or produced (specifically in the form of charcoal) locally. Additionally, across Africa, many businesses are run out of homes, and this can be very challenging to separate fuels for business activity from that for household use. This means that understanding the use of biomass requires detailed energy surveys that currently many African countries are not able to run (this topic is addressed in more detail in Section 5). As such, the reporting of biomass as a final fuel for business is more uncertain than other fuels, which needs to be kept in mind when reviewing the following analysis.

Wood and charcoal are the primary forms of biomass used by business for final use (other types of biomass such as bagasse are used to generate electricity which is then consumed as a final energy source). Wood and charcoal are generally used to provide heat for cooking and heating water but can also be used for industrial activities requiring lower temperature heat.

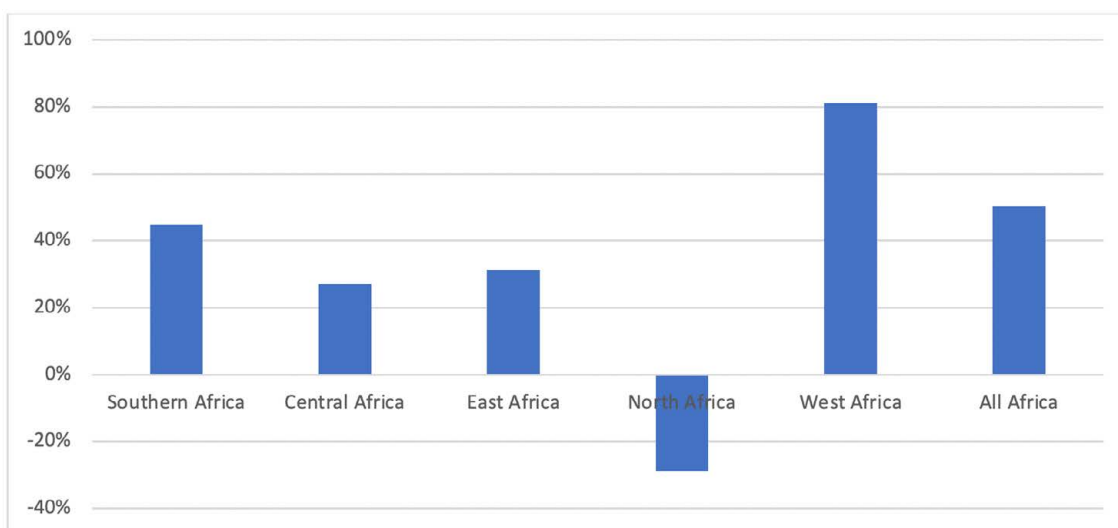
The use of biomass by the commercial sector has grown in all regions, apart from North Africa, since 2000 (chart 3.8), with considerable growth in the past 10 years (chart 3.9). In the latest full energy balance data produced by AFREC, for 2017, biomass accounted for 62% of the commercial sector's energy use. In part, the growth may be due to increased reporting of use, but it will also be driven by population growth and can increase when there are disruptions to the supply of other fuels or if prices of those fuels increase.

Chart 3.8: Commercial sector use of biomass, 1000 tonnes



Data source: AFREC

Chart 3.9 Percentage change in the commercial sector use of biomass 2007-2017

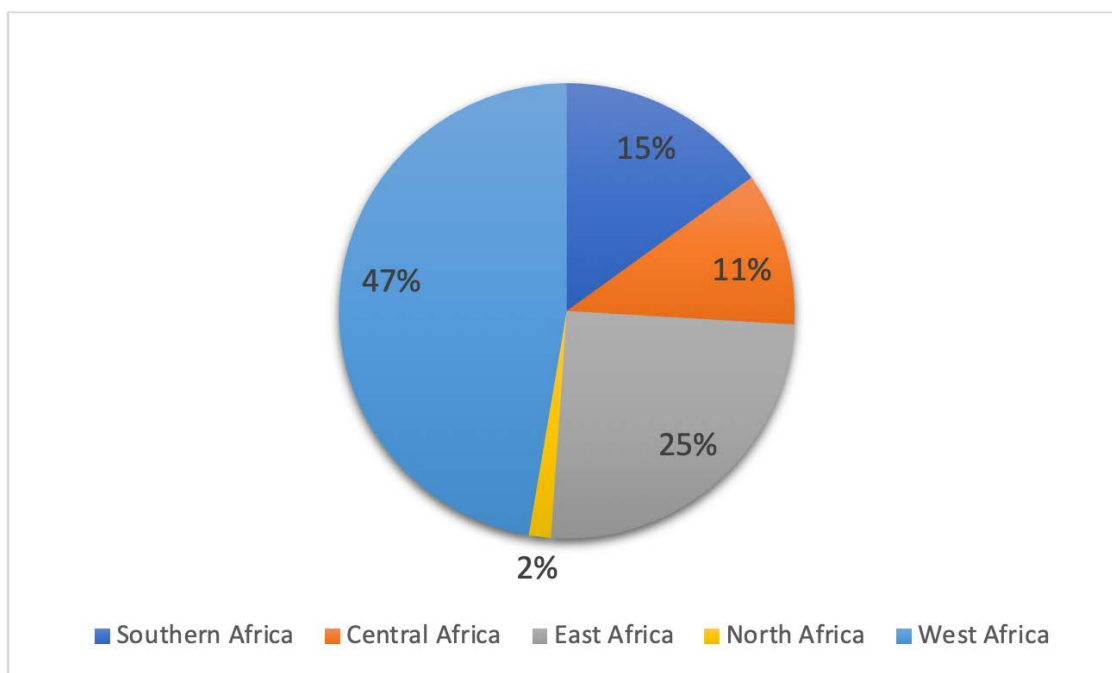


Data source: AFREC

In 2000, over 20 million tonnes of biomass were consumed by Africa's commercial sector. This increased to 24.4 million tonnes by 2007 and then to 36.8 million tonnes in 2017. A significant factor in this increase is revealed from data reported from Nigeria, which shows an increase from over 4 million tonnes in 2007 to 8-9 million per year from 2012 onwards. Other countries reporting significant growth include Uganda 36% growth, Burkina Faso, 18% and Madagascar, 17% from 2007 to 2017.

Across Africa, the countries reporting the most significant shares of all biomass use by the commercial sector are Nigeria at 24% in 2017, Uganda at 7%, Burkina Faso and Kenya at 6% and Madagascar at 6%. This is reflected in the overall regional shares, which, although less concentrated than gas and coal, show that West Africa is the largest consumer of biomass in the commercial sector, followed by East Africa (chart 3.10).

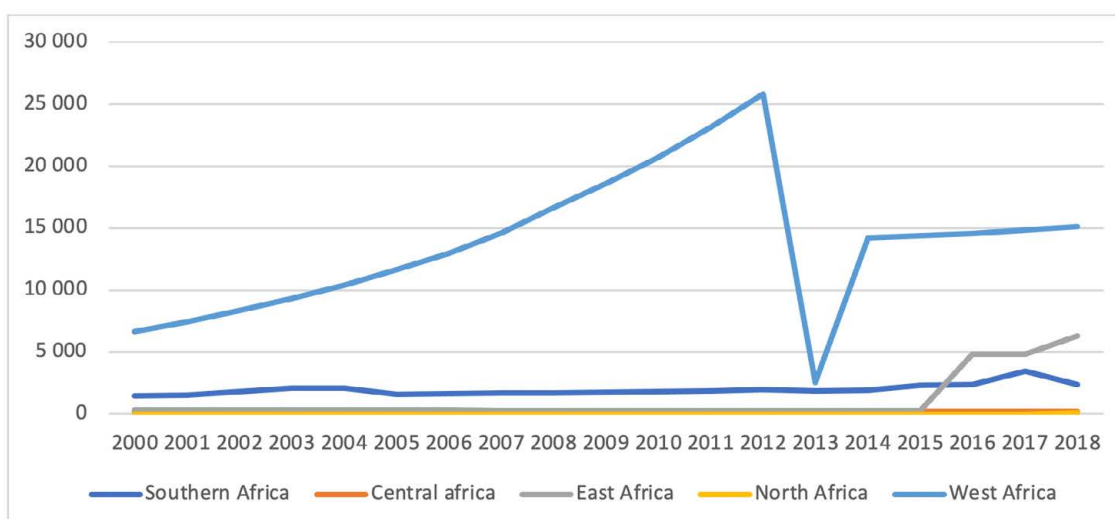
Chart 3.10: Regional shares of commercial sector use of biomass, 2017



Data source: AFREC

Understanding the use of biomass in the industrial sector is challenging, as very few countries report on it. The reported data is dominated by use in Nigeria which accounted for 63% of all reported use in 2017, but the data is unclear. Nigeria's data shows growth from 6.5 million tonnes in 2000 to 25.7 in 2011, before falling to 14 million tonnes in 2013 and then increasing to 15.2 million tonnes in 2017. Limited use will likely be made of biomass in North Africa due to the availability of other fuels, but the levels, as shown in Chart 3.11, may be influenced more by reporting gaps than actual differences between regions.

Chart 3.11: Industrial sector consumption of biomass by region, 1000 tonnes

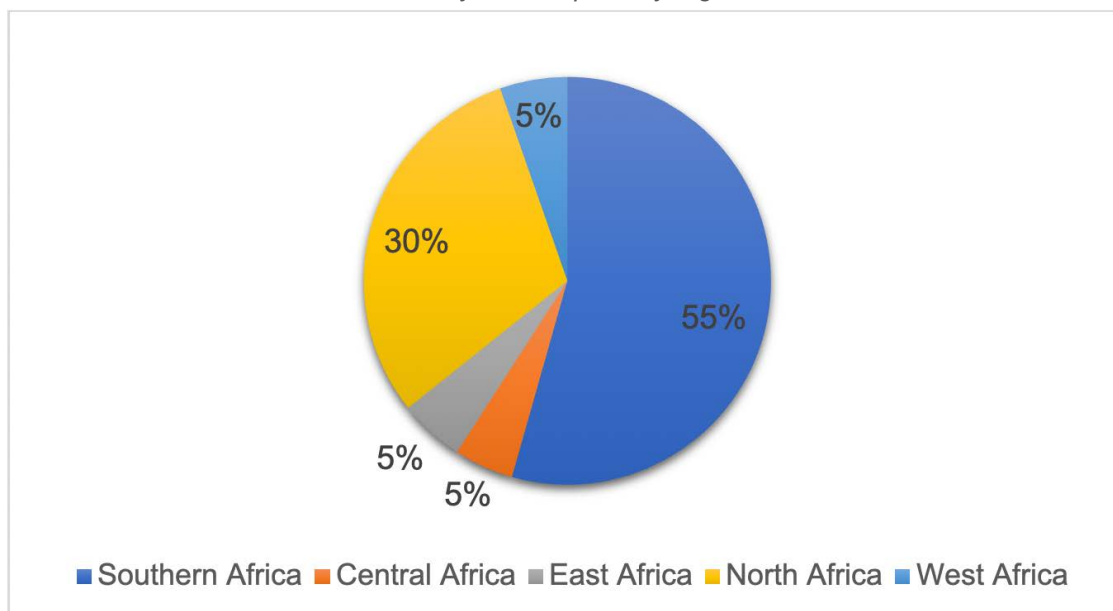


Data source: AFREC

3.5 Electricity

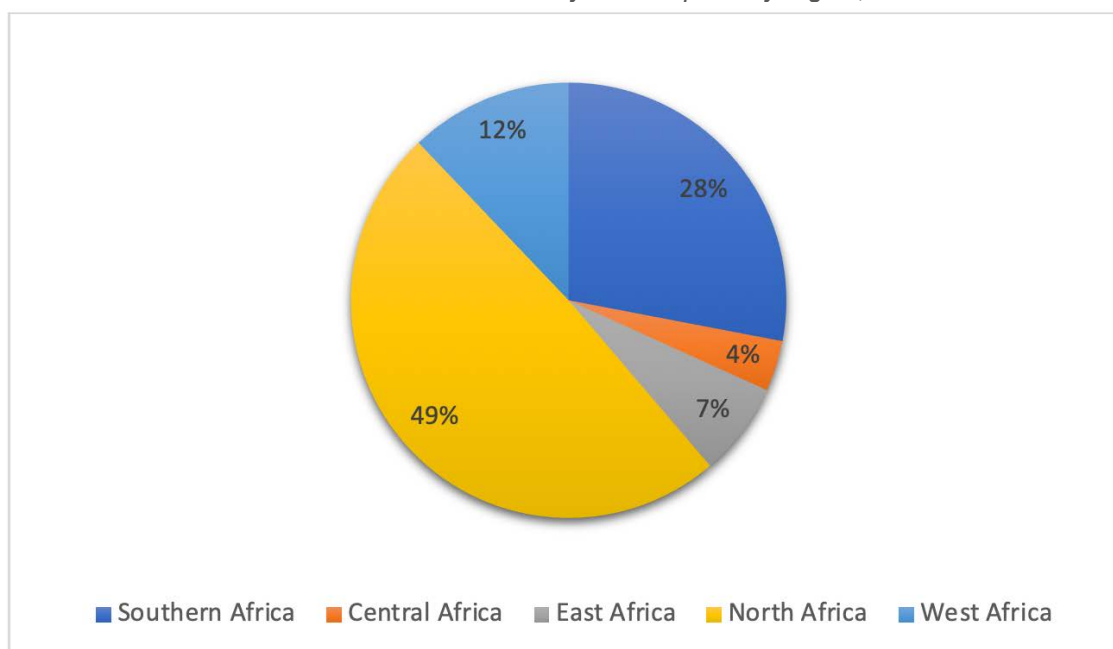
Electricity is the most widely used source of energy by businesses across all economic sectors in Africa. It is used by industry and commercial business in all African countries and its use in agriculture is reported in around two-thirds of African countries. As reported in section 2 and highlighted by charts 3.12 and 3.13, electricity consumption by the industrial and commercial sectors is concentrated in North and Southern Africa - chiefly South Africa, Algeria and Egypt.

Chart 3.12: Share of industrial electricity consumption by region, 2018



Data source: AFREC

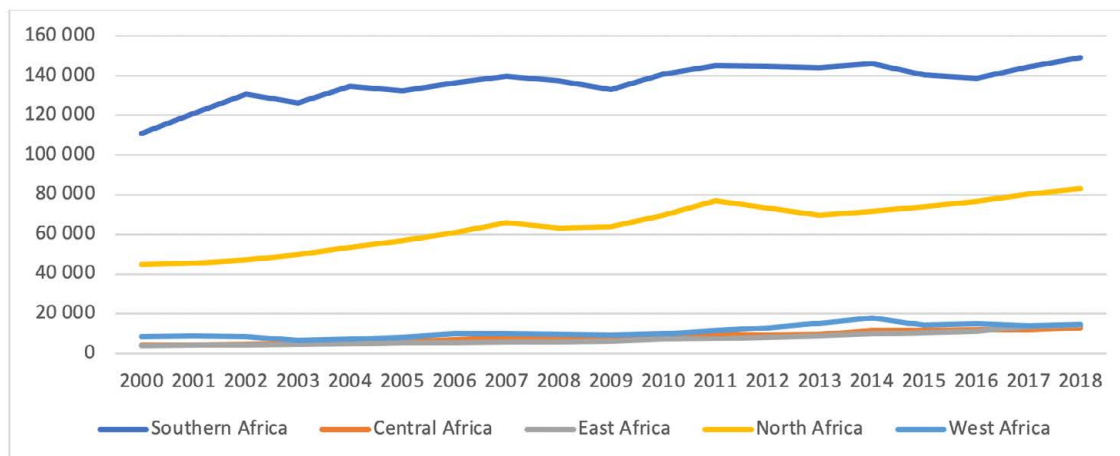
Chart 3.13: Share of commercial sector electricity consumption by region, 2018



Data source: AFREC

South Africa consumes 43% of all the electricity used by industry across Africa, considerably ahead of Egypt at 16% and Algeria at 8%. Egypt is the largest consumer for commercial activities at 32%, followed by South Africa at 23% and Algeria at 8%. In contrast, Nigeria accounts for a relatively small percentage of overall use at 2% of industrial electricity and 6% of commercial, partly reflecting the electricity supply situation in the country. Data for Nigeria is based on a grid-based supply, however significant amounts of electricity are generated from small generators across Nigeria, which are currently not shown in electricity consumption.

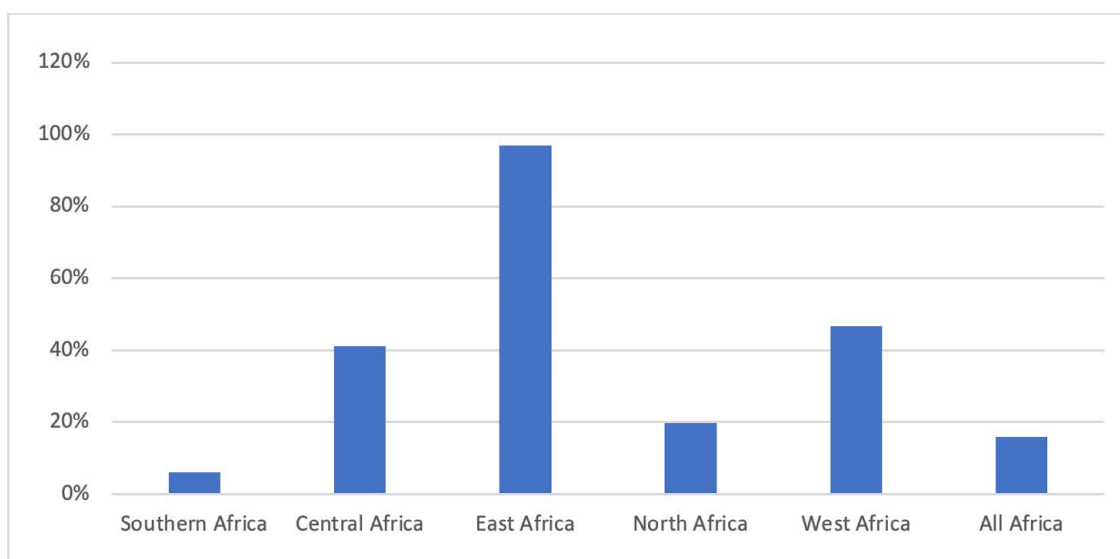
Chart 3.14 Industry sector electricity consumption by region, GWh



Data source: AFREC

Chart 3.14 further illustrates the difference in electricity consumption across African regions and the steady growth in usage seen in North and Southern Africa. As noted, Southern Africa is dominated by South Africa, however other regions in Africa have seen the biggest growth in industrial use since 2010. Significant growth occurred in Kenya, Ethiopia and Sudan in East Africa, Cameroon in Central Africa, and Mali and Côte d'Ivoire in West Africa. However, whilst consumption has been steady in Southern Africa, South Africa and other Southern African countries saw strong growth between 2010 and 2018 of 48%, with more than 50% seen in Zambia, Malawi, Mozambique and Madagascar.

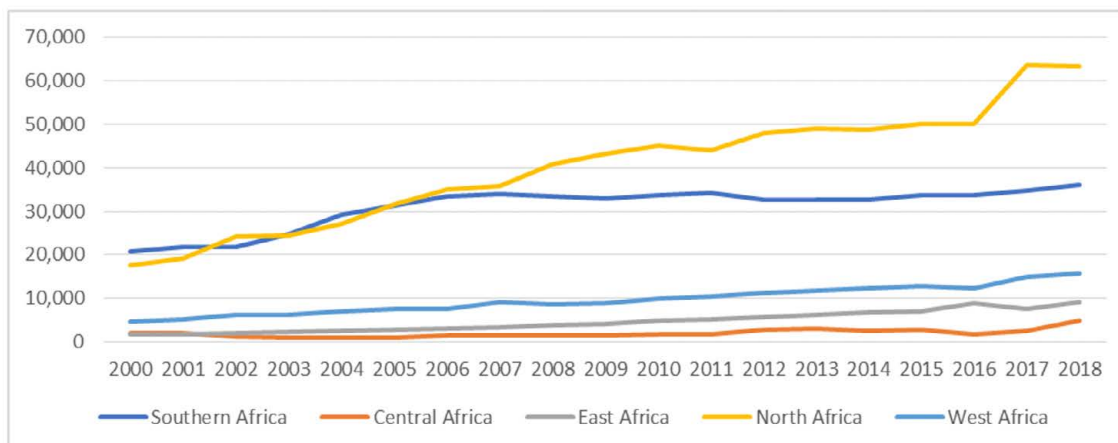
Chart 3.15 Change in electricity used by industry 2010-2018



Data source: AFREC

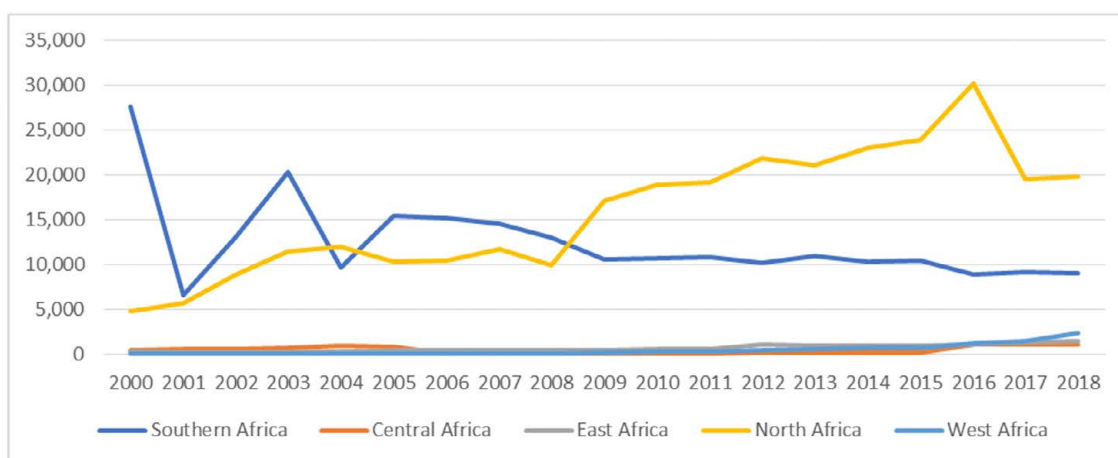
The commercial sector's electricity consumption (Chart 3.16) has the most significant percentage increases since 2010 in the smaller consuming regions, with growth occurring in Kenya, Ethiopia, Côte d'Ivoire and Ghana. Like industrial consumption in Southern Africa, the region has seen very little growth from 2010. However, in contrast to this, commercial electricity use has grown considerably in North Africa, from Egypt and Morocco and most likely Algeria, although their data only starts in 2017, which explains the significant jump in the data for that year.

Chart 3.16 Commercial sector electricity consumption by region, GWh



Data source: AFREC

Chart 3.17 Agricultural sector electricity consumption by region, GWh



Data source: AFREC

Data on electricity use by the agricultural sector (chart 3.17) is less robust than other sectors, so results need to be treated with some caution. However, some notable trends are apparent. Firstly, North and Southern Africa are the most dominant regions, accounting for 60% and 28% respectively of all electricity use by the sector. The second key point is that in contrast to other sectors in other regions, electricity use by the agricultural sector has been falling in Southern Africa due to reduced use in both South Africa and Zimbabwe. The consequences of this are explored in more detail in the following section.

4. THE ECONOMIC IMPACT OF ENERGY ON BUSINESS

The previous sections showed the evolving use of energy in Africa and how it differs from the global perspective. This analysis helps to understand how energy access, availability and use can influence economic development. Many factors drive economic growth, and energy availability and its use is just one. Other critical factors include the stability of government, access to other raw materials, the skills of the workforce and the ability to attract investment. To properly analyse the importance of energy in economic growth requires a detailed analysis of data and would encompass looking at issues such as energy use by size of business, the impact of grid-supplied electricity and more. These are beyond this initial report's scope and current data availability. However, some insights can be drawn from available data. This section sets out some initial analysis on combining AFREC energy data with economic data from the World Bank . It focuses on electricity, where data is the most robust since 2000.

4.1 Electricity use and economic growth

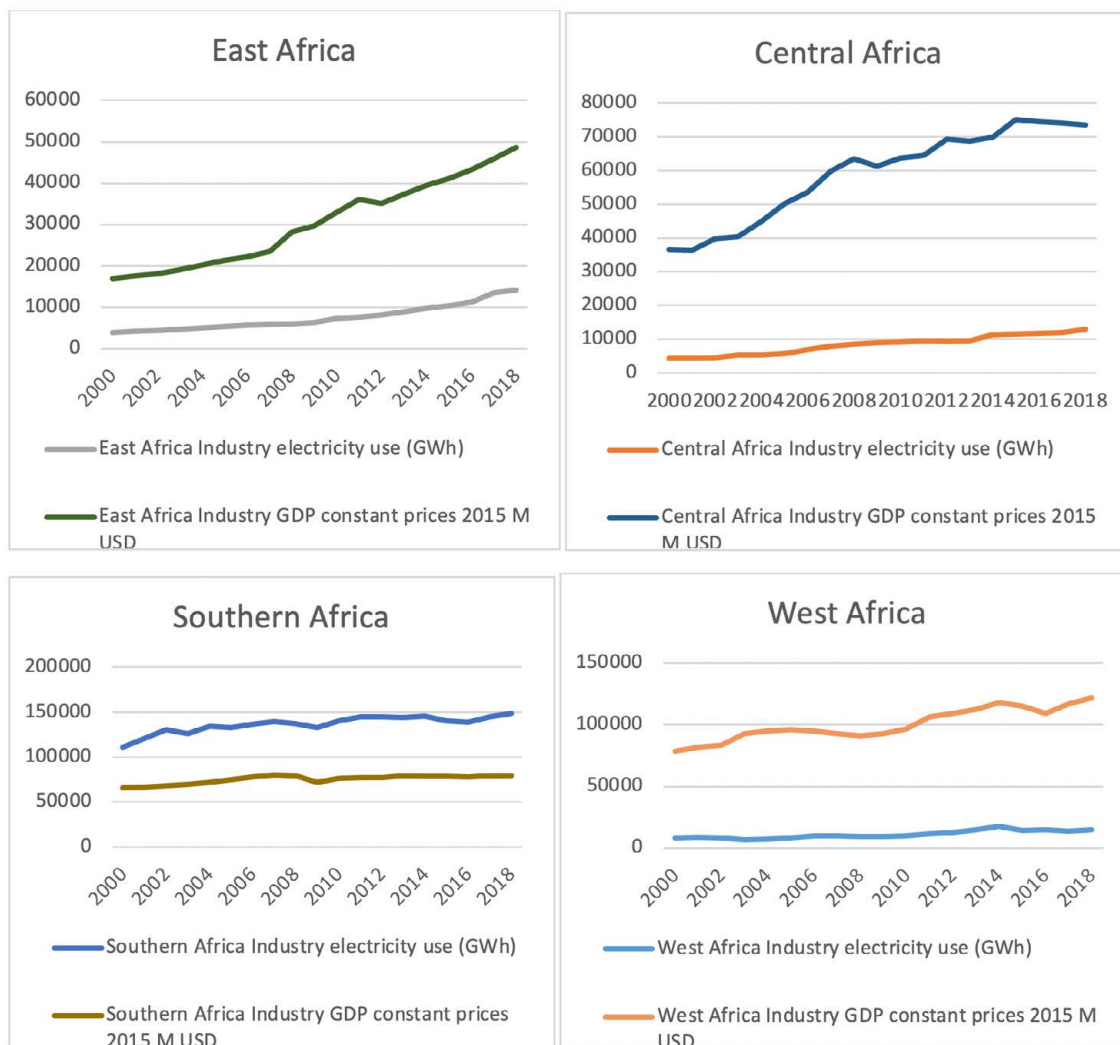
Increasing access to energy, especially electricity, is a primary SDG 7 target and a priority in Africa. Many African countries need more electricity than is currently produced to allow their economies to grow and to provide universal electricity access to all their people. Enhancing access to electricity can transform the lives of millions of households and free many women and children from the daily tasks of collecting firewood and cooking on inefficient wood stoves. Access to electricity also has the potential to increase economic output.

The chart 4.1 below shows electricity use by industry and constant price GDP for the industrial sector for four African regions.

⁶ datacatalog.worldbank.org

⁷ Covering Mining, Manufacturing, Utilities (ISIC C-E)

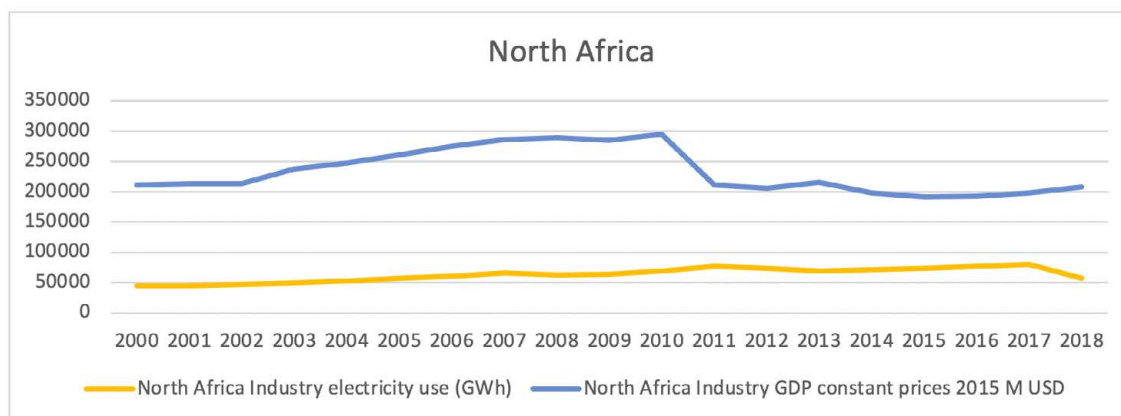
Chart 4.1 Industrial electricity consumption and real term GDP



Data source: AFREC, World Bank

Visually the charts indicate a link between the increased supply of electricity and real-term economic growth, which seem to be growing together (although many other factors are involved). This view is supported by looking at the correlation between the variables. Correlations show how linked the variables are, with 1 meaning completely linked and -1 meaning an inverse link, a fall in one variable is linked to a rise in the other. For East and Central Africa, the significant correlation coefficient is 0.96, and it is also high for Southern Africa at 0.89 and West Africa, 0.86. These values indicate a strong link between growth in electricity use and growth in industrial value-add. Correlation is however not the same as causation. In other words, the one does not necessarily make the other happen. This is illustrated by the same chart for North Africa shown in chart 4.2.

Chart 4.2 Industrial electricity consumption and real term GDP in North Africa

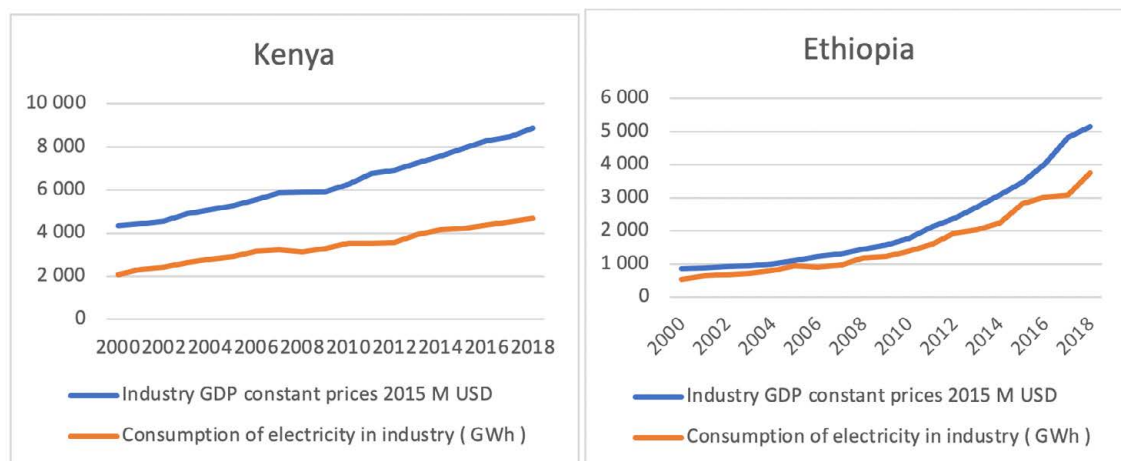


Data source: AFREC, World Bank

North Africa until 2010 showed the same picture as other regions with growth in electricity consumption and real-term GDP. This changed however from 2011 onwards, when although electricity supply mainly continued to grow, other events, including the Arab Spring, saw a fall followed by only a nominal growth in GDP. The correlation for the whole period is -0.16, essentially showing no link, compared to 0.98 for 2000 to 2010.

Extending this analysis to a country level may help understand the implications through additional research looking at each country individually. The data for four countries are shown below in charts 4.3 and 4.4.

Chart 4.3 Industrial electricity consumption and real-term GDP in Kenya and Ethiopia

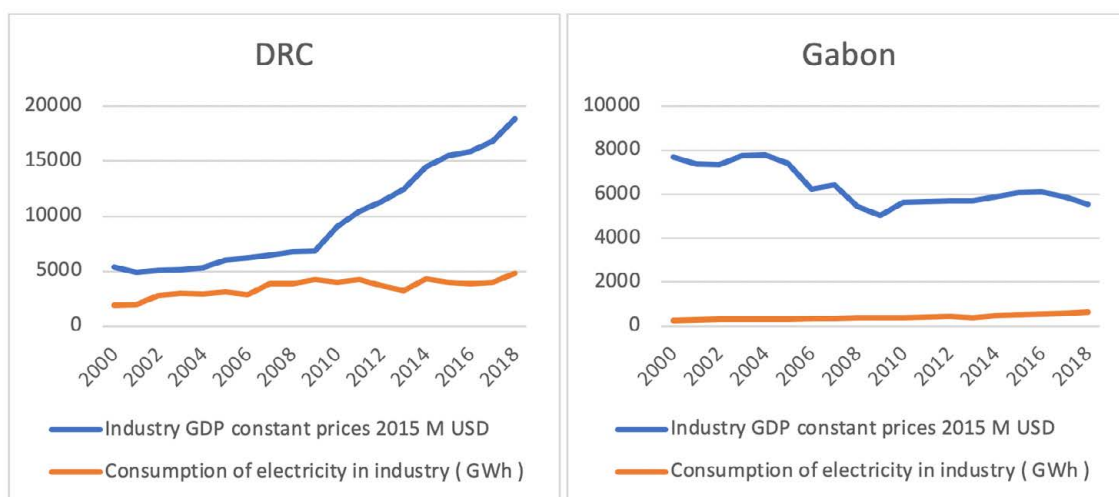


Data source: AFREC, World Bank

There is a very strong correlation of 0.99 between electricity consumption and real-term economic growth for Kenya and Ethiopia. But for the DRC, it is 0.69 for 2000 to 2018 and just 0.26 for 2010-2018. These differences may be due to local factors. The economy of DRC started to grow quickly after 2010 due to increased stability after periods of conflict, which allowed increased exports of minerals such as cobalt which boosted GDP, but electricity supply to industry remained broadly unchanged.

In Gabon, the situation is different again. The overall GDP for the country has been increasing for much of the past two decades. Still, it has primarily been based on oil production which in international business classification is not included in the industry sector. The actual term value of industrial GDP in Gabon fell sharply during the last decade, and whilst it has grown since 2012, it is around 75% of its prior level. During this period, electricity supply to industry has increased, but broader issues have been affecting industrial output. The correlations between electricity consumption and GDP show a value of -0.62 for 2000-2018, -0.88 for 2000-2010 and 0.2 for 2010-2018.

Chart 4.4 Industrial electricity consumption and real term GDP in the DRC and Gabon



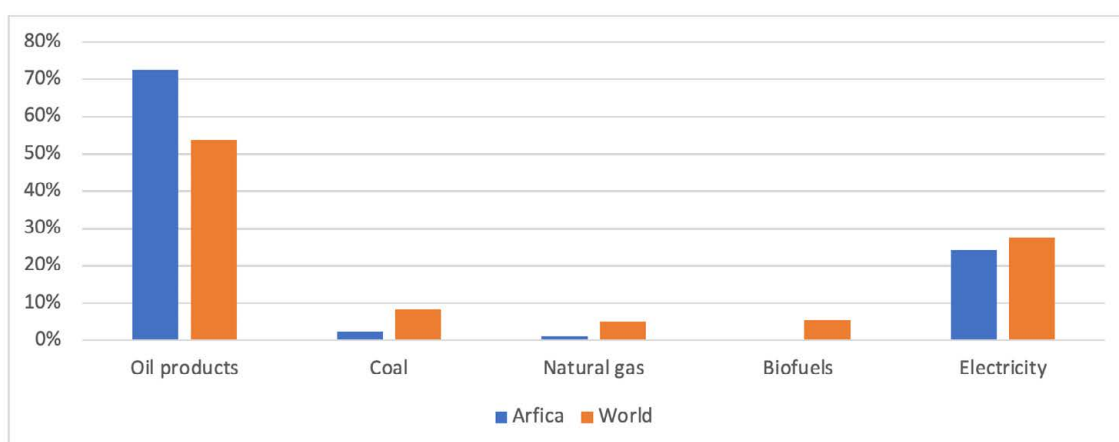
Data source: AFREC, World Bank

Taken together, the analysis at the regional and country-level indicates that increased electricity supply can be a significant factor in helping economic growth.

4.24.2 Electricity in agriculture

Section 3.1 highlighted the much greater use of oil products in the agricultural sector in Africa than seen globally. However, the current data shows that higher oil product use means lower use of other fuels, including electricity. It should be noted that agricultural energy consumption by fuel in Africa is an area that needs additional work, especially given the deficient reported use of biomass.

Chart 4.5 Share of energy use in agriculture, Africa and the world, 2017

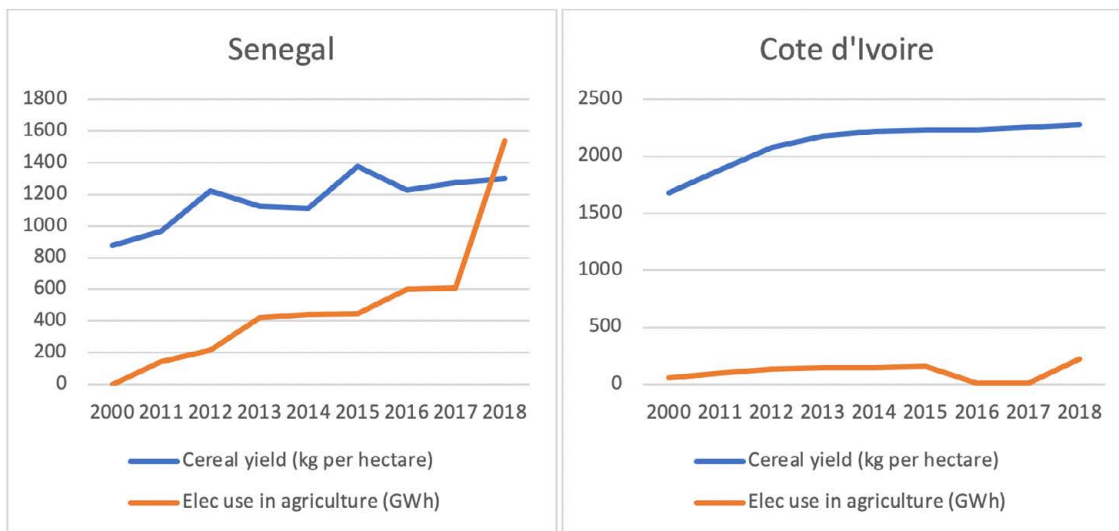


Data source: AFREC, IEA World Energy Balances

One use of electricity in agriculture is linked to irrigation. Given the importance of water to agriculture, water shortages may be far more significant than energy supply in some African countries. Initial analysis has been undertaken to see evidence of increased electricity supply linked to greater agricultural output.

Chart 4.6 below shows electricity consumption by the agricultural sector and cereal yield (measured in kg per hectare), as an example of agricultural output for Senegal and Cote d'Ivoire. These countries were chosen for the availability of electricity data, not because they represent specific aspects of African agriculture.

Chart 4.6 Agriculture electricity consumption and cereal yield



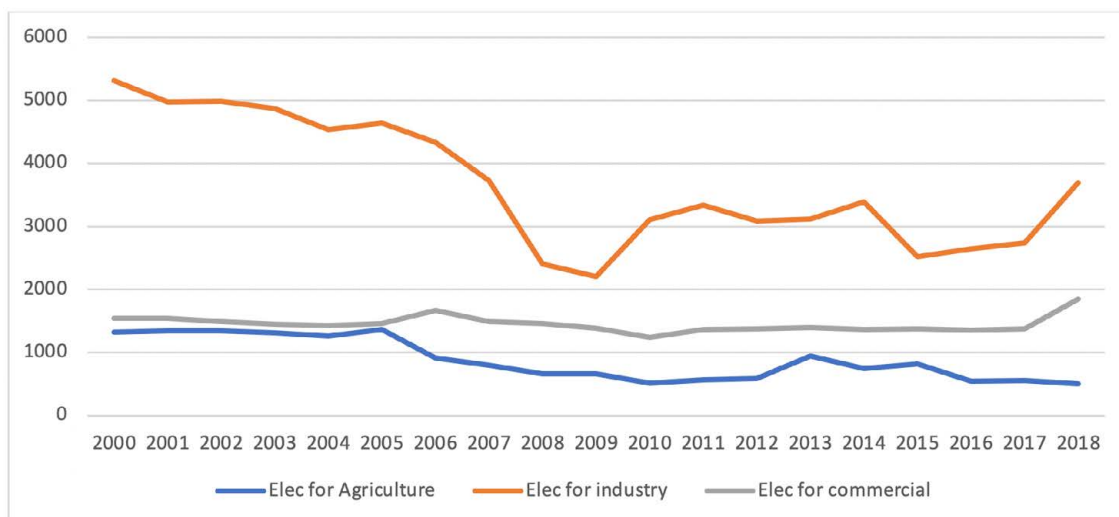
Data source: AFREC, World Bank

Exploring the correlation between electricity consumption and cereal yield for these countries is inconclusive, showing a correlation coefficient of 0.5 for Senegal and 0.27 for Cote d'Ivoire. This implies a link between the variables of electricity use and output but not as strong as that in industry in section 4.1.

However, while agriculture is essential to all economies, it plays a more significant role in some countries. One such country, certainly historically, is Zimbabwe. The past 20-30 years have seen much social and political issues in Zimbabwe, which are interlinked. So while many factors are at play, analysis of electricity use and agricultural output can be informative.

Since 2005 the availability of electricity for business consumers has been falling (chart 4.7), specifically for the agricultural sector. Between 2005 and 2017, electricity use by the agriculture sector fell by 59%, by 41% in the industrial sector and 6% in the commercial sector, with initial data for 2018 showing an increase in 2017 for the commercial and industrial sectors. These changes mean that in 2017 the agricultural sector consumed around half the electricity it did in 2000 and a third of the level of 1990.

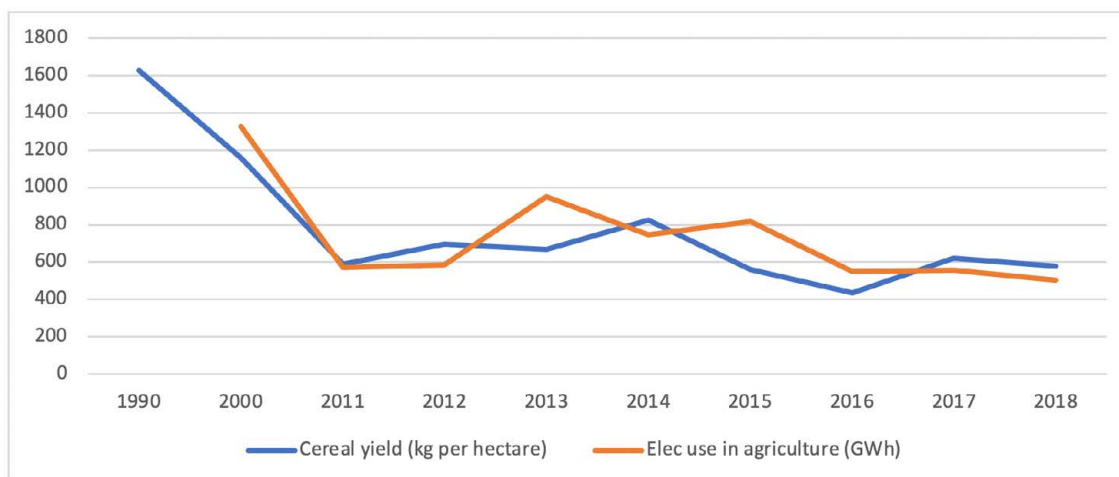
Chart 4.7 Business use of electricity, Zimbabwe GWh



Data source: AFREC

Chart 4.8 shows data on electricity consumption by Zimbabwe's agriculture sector and crop yield. However, in contrast to the countries shown in chart 4.6, there appears to be a strong link between electricity supply and output. Since 2000 both have fallen by almost similar amounts, 62% for electricity consumption and 50% for output per hectare. The correlation between the variables is also strong at 0.82. So, while many factors are at play in Zimbabwe, this analysis supports the importance of access to energy (in this case electricity) for economic growth.

Chart 4.8 Agricultural electricity consumption and cereal yield



Data source: AFREC, World Bank

5. ENHANCING BUSINESS ENERGY USE STATISTICS

AFREC's core mandate is to design, create and establish an energy continental database to facilitate rapid dissemination of information among AU member states, RECs, investors, academia and other stakeholders.

AFREC fully understands the need for comprehensive energy data to support policy and the reality of what is possible in many African countries. Matching these factors meant we started with a very high-level data request of our members supported by regional workshops to share the knowledge of international experts. This provided the start to allow the release of initial energy data on Africa, such as the Africa Energy Balances, the Africa Energy Database and the online database, and showed how this data could be used. For example, "The impact of COVID-19 on the African Oil Sector."

However, AFREC knows that additional data is needed to inform policy. That is why we initiated a consultative process with member states to expand on and add to new questionnaires aimed at providing a comprehensive view of energy in Africa. Completing energy questionnaires requires access to relevant data, understanding the technologies and the principles of energy statistics and a sound knowledge of energy statistics methodology. To support that, AFREC has launched a Train the Trainers programme to support the development of African energy statistics through the transfer of knowledge between African countries, coupled with specific and focused support to enhance our own National Energy Information Systems (NEIS).

One of the main changes AFREC have made to the countries' annual energy statistics questionnaire (AESQ) is to add the option for countries to provide a full breakdown of energy use by the economic sector. Such data is invaluable in understanding how individual industrial sectors as well as the commercial and agricultural sectors use energy, and will mean focused policies on business energy efficiency can be established supported by AFREC's Energy Efficiency questionnaire. However, for many countries (over half at a recent AFREC workshop), the challenge has been gathering the data to report back to AFREC.

To properly understand business energy use means running a survey of businesses and collecting data on the use of all fuels and any electricity they generate. Some countries do this, Lesotho, Morocco and Algeria being notable examples. Running business surveys is not easy. A survey form can be relatively quickly designed or adapted from one used by a neighbouring country. However, running a survey needs a sample frame (a list of businesses), trained staff to analyse the results and often to collect the data by phone or in-person and processes to analyse the data and produce results. All this costs money.

Surveys also need the cooperation of businesses to complete the forms. Statistical legislation can help by mandating responses. What can be equally valuable is a dialogue with business and business forums to show the importance and use of the data. This takes time to build up and again requires significant staff time, but it will be beneficial. In addition to the logistical challenges, is the issue of trust - does business trust the government enough to supply it with data? This is a very local question, but again outreach to business, a robust statistical framework and absolute assurances on confidentiality can help.

⁸ <https://au-afrec.org/>

⁹ AFREC REPORT- COVID-19 and its impact on African Oil Markets- Final 27-05-2020.pdf (au-afrec.org)

Many countries have very few staff working on energy statistics, and often they have limited experience of running surveys. However, cooperation with the National Statistics Institute (NSI) in each country may prove beneficial. The NSIs are likely to be running some business surveys and in some cases may already be collecting some energy use data. In the best case in terms of cost, adding questions on energy use to an existing survey may be possible. If not, the NSIs (or perhaps the Finance Ministries, for example, from VAT reporting) will have business lists that could be used by the NSIs to run an energy-use survey if funds are available.

While running complete business surveys will always provide the best data, there are alternatives to information on business energy use. The second best source of data is from energy suppliers. Energy suppliers will have some information on their customers, especially the bigger ones. At a minimum, this will be their addresses but it could extend to knowing its business sector. Energy suppliers also have (or should have) a greater understanding of the need for comprehensive energy data to help improve government policy and thus their operating framework. When a country has no information on business energy use, talking to the energy suppliers is vital. The discussion can focus on what information is held, if and how it can be used, and what information (statistics) would be used for the supplier.

It may be unlikely for suppliers to fully break down energy use by business sector but they may be able to help with the largest consumers. For example, address-matching between supplier data and any form of the business register is complex. But if there are relatively few large consumers, matching is a viable possibility. There may be additional help from the load profile maximum demand users are on for electricity.

There may be particular energy users who have specific energy supply routes. Mozal, the aluminium company in Mozambique, is one example - the power they use is imported directly from South Africa. In these cases, there should be a way to identify the energy flow. In this example via Motraco, the business that imports the power, so that its use can be directly allocated to the sector.

Any discussions with business or energy suppliers should reinforce that only the volume of energy used or supplied is needed for energy statistics. Businesses are often understandably concerned about financial data, so explaining that it is the volumes or mass or electrons, can help secure cooperation. In circumstances where the NSI may collect expenditure data, prices can be used to convert to volume. This can work well where prices are regulated.

Collecting data on business energy use is more complex than energy supply data. Complete business surveys cost money, but understanding how and why energy is used and how policies can be shaped to improve use efficiency, reinforce supply, and plan a country's energy transition, make the expenditure very worthwhile. Where direct surveys cannot be conducted, or at least in the short term, energy statisticians should reach out to suppliers and any trade associations to explore what data might exist and how it can be used. Most importantly, energy statisticians need to work with their NSIs to explore the use of existing data and to identify options for the future. The goal should be to steadily reduce the amount of energy not allocated to a sector.

6. CONCLUSION

The analysis presented in Sections 2 to 4 above gives an indication of the type of analysis that can be extracted from statistics on the use of energy by business. As demonstrated in this report, statistics can for example, illustrate the differences in fuel use in Africa compared to the global situation, and the risks of that which give further push to African countries in developing their own energy sources, particularly renewable energy. The analysis has also shown the importance of the largest economies in Africa and how they can dominate regional analysis, highlighting the need to look at countries individually. From the initial analysis provided here, insights can be drawn on the way energy can help business grow in economic terms and the inverse, when energy is not available.

However, to properly understand business use, an analysis of individual industrial and commercial sectors as well as complete data on agricultural use is required. That is why AFREC's work to both expand the data being collected and to support countries in the provision of that data, is so critical. The ideas presented in Section 5 of this report can help and need to be supported at a country level.

This data is just the beginning. To properly understand the links between business growth and energy consumption and to make informed policy decisions, will require much more extensive data. Understanding businesses' use of energy in Africa needs enhanced data on small business, the economic activities run out of homes, more data on how grid and off-grid electricity is changing the way businesses are being run, more information on the use of small generators, as well as more information on the use of biomass, agricultural waste and data to track the development and use of other biofuels.

In some ways the challenge for Africa is greater than in many other regions in the world. African people have always been innovators, finding a solution to provide energy. At times this has come at a great health cost, for example the collection and use of biomass. This means that all forms of fuel are being used across African businesses probably more diversely than in other regions. Understanding the use of those fuels is vital for the successful economic development of Africa.

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