

INTEGRATE TO ZERO: THE ROLE OF AFRICA'S ESCO MARKET



INTEGRATE
TO ZERO



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ABOUT THIS PAPER:

KEY INSIGHTS

1. The ESCO market in Africa is nascent and the playing field is uneven.
2. There is an array of services and contracts but they are disaggregated.
3. Conditions and needs in some African countries offer a great opportunity for the ESCO Market.

GLOSSARY OF TERMS

ESCO: Energy Service Company

FiT: Feed-in-tariffs

Tax Benefits: In the context of this report, it is a rule or provision that would allow a company such as an ESCO to be taxed differently or not at all. The impact of which would be positive if ESCO is providing clean energy or negative rules are designed to support fossil fuels. The design of such rules incentivizes certain types of business practices and behaviour or to provide relief to individuals or businesses facing difficulties such as start-ups and SMEs.

Prosumer: Customer/producer in the context of energy. It is a person/entity which usually generates their own electricity (e.g., solar panels) and then consumes as part of it themselves, while at the same time also selling excess energy back to the grid.



EXECUTIVE SUMMARY

Global clean energy investment topped USD 1.1 trillion for the first time in 2022, with China alone accounting for 50% of this investment. However, the distribution of clean energy investment and climate finance is not equal. Only 2.5% of this global investment flows to Africa. The private sector contributes on average a yearly USD 4.2 billion of total climate finance in Africa, which is a much lower percentage than in other regions. The overwhelming lack of investment in clean energy in Africa is substantial and cannot be ignored, with investments at their lowest since 2011.

For many countries in Africa, governments, public institutions, and businesses are facing various obstacles to scaling clean energy, such as regulatory gaps, lack of adequate financing mechanisms, technology availability, and a lack of local technological capabilities.

At the same time, it is urgent for Africa to implement technological solutions that will enable it to combat climate change, adapt to its effects and simultaneously allow it to have sustainable and resilient economic growth and development. Africa requires USD 2.8 trillion from 2020-2030 (USD 277 billion annually) to implement its Nationally Determined Contributions under the Paris Agreement, however contrastingly the investment flows are estimated at USD 30 billion per year.

Failure to act will have negative economic and social consequences for the African continent and around the world. As the figures indicate, it is urgent to support African countries more proactively.

The adoption of clean energy and technologies offers many African regions the chance to leapfrog traditional fossil fuel-based electricity generation and technologies and improve energy access.

Energy Service Companies (ESCOs) have been instrumental in the deployment of clean technology and solutions in developed economies.

These companies have streamlined and innovated their services to make clean energy solutions more accessible and affordable for various market segments. In 2020, the size of the global ESCO market increased by 6% to USD 33 billion. For example, just in Germany alone, the ESCO market is estimated to be worth USD 9 billion.

ESCOs have implemented and offered a range of services and contracts to their consumers to reduce the perceived risks or cope with the upfront investment requirements of these technology solutions.

ESCOs have been key in developing and facilitating the market penetration of clean technologies. Therefore, to identify a clearer definition of what it is to be an ESCO and for the purposes of this study, an ESCO has been defined as a company or entity that provides energy services and assumes some level of financial or performance risk.

Africa currently has a nascent market of ESCOs that could play an important role in supporting the development and growth of the clean technology market if certain barriers are overcome.

The ESCO market in Africa displays signs of future potential. ESCOs can offer a one-stop solution by having an integrated system and even though consumers are not aware of the technicalities of such solutions, it can be said that consumers prefer convenience and simplicity. For the most part, consumers are typically offered siloed solutions.

For example, solar photovoltaic systems are offered separately from other technologies such as high-efficiency cooling systems or electric vehicles and most of them do not offer finance or long-term contracts. In summary, companies are failing to provide end-to-end solutions for integrated clean energy systems.

Besides a lack of knowledge and capacity of consumers to integrate technology solutions and providers, there is significant disarticulation from providers. An integrated value proposition to consumers is rarely offered.

High-electricity demanding systems, energy storage solutions and electric mobility technologies (on-road) can be paired with on-site and on-grid clean energy generation technologies.

Such consumer-driven integrated clean energy systems present a viable and competitive business opportunity for consumers and facilitate their decision making.



EXECUTIVE SUMMARY

Integrated energy service offerings can result in carbon and pollution reduction, cost savings, and increased availability of clean energy services.

The research in this report endorses the soundness of the business case for offerings that integrate clean energy technologies acting as a one-stop-shop for consumers. It analyses the existing ESCOs in Africa and their services to understand what is needed for the energy services to become integrated. It also describes the regulatory and economic environment under which they operate.

This research aims to analyse the existing ESCOs in six African countries (Morocco, Kenya, Ghana, Nigeria, South Africa, and Rwanda) to understand the maturity and needs of this sector to provide integrated energy services.

This included an analysis of the services and types of contracts offered to consumers, and a comparative cost benefit analysis for each of the 6 countries, considering aspects such as cost of energy, cost of fuel, financing costs, tax incentives, among others.

The numbers shown in Figure 1 are based on the research and interviews conducted and are indicative figures to highlight the nascent ESCO market in Africa.

The lower number of ESCOs in these six sample African countries, compared to the number of ESCO per country in the UK for example (estimated as 194) suggests there is a huge capacity and financial gap in Africa.

There are significant disparity and financial constraints limiting market growth in Africa when compared to the EU, UK, or USA.

#1 INSIGHT: THE ESCO MARKET IN AFRICA IS NASCENT AND THE PLAYING FIELD IS UNEVEN.

Typical consumer usage patterns for power generation or e-mobility are very country-specific and dependent on factors such as availability, cost, and subsidies. The study mapped out 103 entities to determine the extent to which ESCOs and enabling companies are operating in Africa.

From this mapping exercise in the selected 6 major African countries, 48 entities were identified as ESCOs or ESCO enablers, 25 only offered short term EPCs, and 15 were identified as consultancies or energy efficiency auditors.

Many of the companies found offered renewable energy services specific to sales and distribution, consultancy, and project development.

The numbers shown in figure 1 are based on the research and interviews conducted and are indicative figures to highlight the nascent ESCO market in Africa. The lower number of ESCOs in these 6 sample African countries, compared to the number of ESCO per country in the UK for example (estimated as 194) suggests there is a huge capacity and financial gap in Africa.

There are significant disparity and financial constraints limiting market growth in Africa when compared to the EU, UK, or USA.



EXECUTIVE SUMMARY

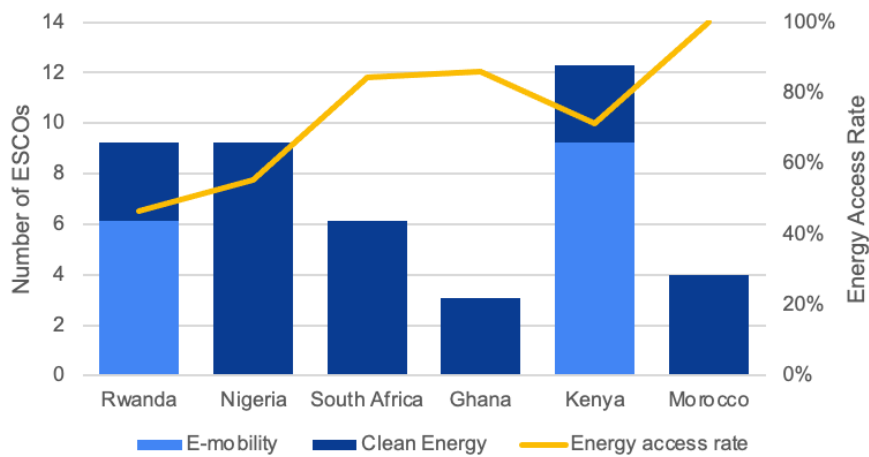


Figure 1: The number of identified E-mobility ESCOs and Clean Energy ESCOs (matching the specific criteria) and the yellow line shows energy access in the 6 countries.

	Rwanda	Nigeria	South Africa	Ghana	Kenya	Morocco
Market Enabling Parameters						
Law/Policy	✓	✓	✓	✓	✓	✓
Technical Regulation and guidelines	✓	✓	✓	✓	✓	✓
Targets	✓	✓	✓	✓	✓	✓
Incentives	✓	✓	✓	✓	✓	✓

Table 1: The regulatory and policy environment for clean energy in the 6 countries.

	Rwanda	Nigeria	South Africa	Ghana	Kenya	Morocco
Market Enabling Parameters						
Law/Policy	✓	✗	✓	✗	✓	✗
Technical Regulation and guidelines	✗	✗	✓	✗	✗	✗
Targets	✓	✗	✓	✓	✓	✗
Incentives	✓	✗	✓	✗	✓	✓

Table 2: The regulatory and policy environment for mobility in the 6 countries.



EXECUTIVE SUMMARY

#2 INSIGHT: THERE IS AN ARRAY OF SERVICES AND CONTRACTS BUT THEY ARE DISAGGREGATED*

Globally there are different definitions of what an ESCO company does. According to the definition provided, some of these 'ESCOs' take the form of an 'enabler' rather than providing the entire technical and financial solution. Enablers include entities that provide separately financial or technical service in the clean energy sector. This is showcased in mapping of the 6 countries in Africa.

Global "energy-as-a-service" (EaaS) market stands at USD 64.7 billion and is growing at an annual growth rate of 10.3%. It can be assumed that the ESCO market provides energy-as-a-service (EaaS) in order to compare it to a larger global market. The X-as-a-service (XaaS) model is becoming increasingly popular for many international investors and shareholders. However, most of this growth is occurring in the USA, China and Europe. These markets tend to be more mature in developed economics vs. the offerings found in Africa. The offerings are more developed in terms of options, technologies covered, financing and payment options as well as faster contract generation and approval, overall providing a streamlined signing process for the consumer. In the review of offerings in the 6 indicated African countries, the market was limited in terms of end-to-end offerings.

As noted, there is an array of services and contracts on offer in Africa but innovative financing mechanisms and full one stop shop service is missing. The offerings found can be improved and expanded.

The mapping uncovered 103 companies in these six African countries that could potentially be included under the ESCO umbrella. However approximately 37% were financial or technological enablers, 15% consultants or energy efficiency auditors and 48% were ESCOs according to the definition. Of the ESCOs 66%, were focused on clean energy and 34% were focused on e-mobility.

The market shows a growing interest in business models that facilitate financing or de-risking mechanisms for consumers, such as energy performance contracting, servitisation or lease financing. The investigation identified only 23% provided performance based contracts (>5 years) and the remaining focused on short term, lease-based contracts. Vendor financing examples found include the company provides a short-term financing (6-12 months) on the solar systems and up to 20 months of financing for electric vehicles. The most popular solutions include pay-as-you-go (PAYGO) solar systems and e-motorcycles on a lease-to-own model. The E-mobility ESCOs found offer a combination of lease-to-own financial mechanisms and some companies offer a charging-as-a-service (not a battery swapping model) model. It was also found that companies utilise different models such as Build-Operate-Own (BOO) and prepaid smart metres to provide grid-based electricity and power purchase agreements (PPAs) for commercial and industrial consumers.



Figure 2: The differentiation of services offered by mapped ESCOs.

* Note that an array of services and contracts were found in the 6 identified countries, but they are disaggregated, whereas in the USA, the EU and the UK market is moving towards more end-to-end offerings.



EXECUTIVE SUMMARY

#3 INSIGHT: CONDITIONS AND NEEDS IN SOME AFRICAN COUNTRIES OFFER A GREAT OPPORTUNITY FOR THE ESCO MARKET.

This study found that opportunities exist in the region due to a combination of reasons such as the high cost of energy, the lack of quality and reliability of energy sources and the willingness of some regional and local governments to support clean energy. Further to this, the technological development of solutions is leading to changes in consumption patterns such as electric mobility moving towards mobility-as-a-service offers. While most ESCOs are open to having different types of consumers, many tend to prefer industrial and commercial clients, such as taxi or delivery fleets.

After exploring the challenges and opportunities facing the African cleantech market, it is clear that ESCOs can play a key role in enabling consumers to access on-grid, on-site and on-road technology solutions. This is achieved by offering business models that facilitate financing and reduce the risk of integrated cleantech solutions for consumers, while contributing to the growth and strengthening of the cleantech market in Africa. However, scaling up the ESCO market in Africa will require a significant amount of investment in resources and capacity building to meet the potential demand for clean energy in a sustainable and growing manner.

From a cost-benefit analysis, Rwanda showed promising results in terms of the financial performance as Rwanda was found to have a short payback on EVs and relatively short payback time on Solar PV. The results also show an excellent rate of return. Integrating both Solar PV and EVs was found to leverage each other by moving the costs to whichever technology performs better over a certain period. The same can be said in terms of reducing CO2. The potential for reduction was much higher with the integrated option.

However, in the case of Nigeria our model found no return on investment for solar nor e-mobility nor when both are combined. This is expected to be because Nigeria is a large producer of fossil fuels and has significantly lower electricity tariffs and associated costs. Contrastingly, the potential still exists since Nigeria has comparatively more ESCOs.

However, many of the companies were created to directly tackle the problem of electricity access.

The table below ranks the presence of market enabling parameters, investment opportunity, and environmental benefits*.

	Rwanda	Nigeria	South Africa	Ghana	Kenya	Morocco
Market Enabling Parameters						
Ranking Renewable Energy	High	Low	Medium	High	High	Medium
Ranking E-mobility	Medium	Medium	Medium	High	High	High
Investment Opportunity						
Ranking Renewable Energy	Medium	Low	High	Low	Low	Low
Ranking E-mobility	High	Low	Low	High	High	High
CO2 Reduction potential						
Ranking Renewable Energy	Medium	Low	High	Low	Low	Medium
Ranking E-mobility	Medium	High	Low	High	High	Medium

High
Medium
Low

Table 3: Comparative table showcasing the market conditions in the 6 African countries.

* In order to analyse the differences between countries, BASE carried out a quantitative comparison to further understand the in-country capacity, policy environment as well as the economic benefit and emission reduction potential of transitioning to e-vehicles and renewable energy (based on Solar PV). The table above shows the potential for each country in terms of market and policy enabling parameters, investment opportunity and CO2 reduction potential.



EXECUTIVE SUMMARY

BARRIERS AND OPPORTUNITIES

ESCOs were found to encounter various other obstacles at both macro and micro levels in the six countries examined. Macro-level constraints included country-specific economic conditions, as well as the lack of policies and regulations favouring clean technologies. Micro-level constraints were found to be linked to supply and demand dynamics, market competition, as well as the lack of parodied sources of finance.

From the study, the four main barriers that limit clean energy deployment are common to many African nations were found to be (1) lack of appropriate policy framework that allows the clean energy technology to compete with conventional energy, (2) stakeholder market disarticulation and lack of trust, (3) lack of appropriate financial sources for clean energy and ESCOs, and (4) lack of knowledge and capacity on business models and financing mechanisms that can integrate cleantech solutions. Figure 3 is a solutions tree showing the identified barriers and recommended actions to overcome these barriers*.

In conclusion, the African ESCO market has the potential to offer integrated clean technology solutions that meet the growing demand for energy and solutions with services and contracts that respond to the consumers' needs and characteristics. While the ESCO market is highly valued globally, it is not yet well-established in Africa. Our research investigated the size of the market and the extent to which ESCOs are taking an integrated approach to energy systems. We found 44 ESCOs and 59 facilitators in the six countries analysed. These ESCOs provide different types of contracts. We also found that there is a strong need to address barriers such as lack of trust and disarticulation of stakeholders, as well as to take actions that help to build capacity of stakeholders, aggregate projects, facilitate access to financing mechanisms and to reduce the risks faced by clients, ESCOs and financiers are key to growing the integrated clean energy market in Africa. To address these barriers, we recommend specific actions that governments, banks/financiers, suppliers, and philanthropy can take. Additionally, there are emerging business opportunities

for digitalization, e-mobility sharing, renewable energy, and green initiatives that can be supported by renewables and electric charging infrastructure development.

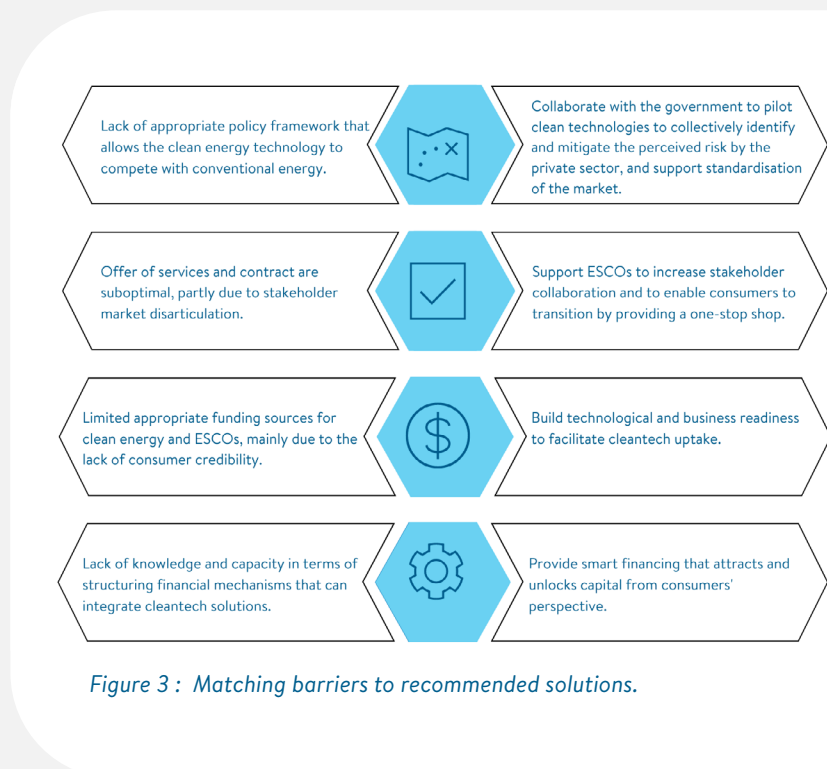


Figure 3: Matching barriers to recommended solutions.

Establishing technological partnerships with existing ESCOs from the EU or US can also help build capacity and attract direct international investment.

By unlocking the potential of consumer-driven integrated systems and overcoming barriers, the ESCO market in Africa can help reduce emissions and provide cleaner, more efficient energy solutions - a one stop shop for consumers.

*The interviews were used to gather information to identify barriers and challenges faced by consumers and suppliers and to determine their priorities. The flowchart is a summary of the key points found.



INTRODUCTION

Climate change is a major global challenge requiring cooperation from governments, private sector, and society to reduce emissions and adapt. Clean energy technology is crucial for addressing this challenge, replacing polluting practices and providing eco-friendly infrastructure. In developing countries, access and finance to clean energy technology is a greater challenge. Urgent action is needed to combat climate change, promote sustainable growth and avoid negative consequences.

The financing gap in Africa is significant. While clean energy investment is increasing in other parts of the world, it is not in Africa. Africa will need USD 2.8 trillion to fulfil its Nationally Determined Contributions (NDCs) under the Paris Agreement (2023-2030). Currently, annual climate finance flows on the continent are around USD 30 billion.

The investment trends in energy transition are significantly and disproportionately low in African regions where it is desperately needed. This is linked to the fact that Africa faces many obstacles, including regulatory gaps, limited financing, lack of technology availability and local expertise.

Clean energy presents an opportunity for Africa to leapfrog traditional fossil fuel generation and improve energy access. The required clean energy technology exists and considering the adoption of renewable energy sources for on-site, on-road and on-grid is necessary.

However, the simultaneous deployment of these systems has lagged. Integrated sustainable energy solutions that include on-grid, on-site and on-road systems refer to the use of a combination of technologies to deliver energy in an efficient and environmentally sustainable manner.

These solutions typically involve the use of renewable energy sources, such as solar, as well as energy storage technologies, energy efficiency measures or electric mobility.

There are numerous benefits to integrating sustainable energy solutions, such as on-site generation and consumption of electricity and improved e-mobility vehicle charging. This integration can lead to increased efficiency and stability in the system, making it more accessible to consumers. Customised solutions (provided by ESCO's) can be tailored to meet the specific needs of consumers, locations, or cities by combining different technologies and approaches.

Examples of integrated sustainable energy solutions include E-mobility using Solar PV for battery charging, using Solar PV for cooling and heating or directly using them to work electric cookers or other appliances.

Together these can create an economically competitive, energy efficient, and sustainable system.





OBJECTIVE

The objective of this study was to evaluate the current ESCOs in Africa, gather information from 6 countries with varying conditions, highlight obstacles and challenges, and offer solutions and business prospects. The primary goal was to identify novel models and financial tools to boost investment in clean energy in the region.

Why Africa? Why these six countries? Why the urgency?

Climate change is disproportionately negatively impacting Africa. A structural economic transformation is required to resolve many of these challenges and clean energy must play a key role in this to reduce structural, technological, and single commodity trade related dependencies¹⁰. Africa is a diverse continent and countries have different political, economic, and social conditions that mould the market and rate of clean energy uptake. For this reason, the study has focused on 6 countries with different conditions: Morocco, Kenya, Ghana, Nigeria, South Africa, and Rwanda.

These countries were chosen as representative examples of the region. The market perspective and opportunity were considered. The countries were identified as having growing market, with different levels of market maturity. For example, considering the business case for e-mobility, a country's low electricity tariffs and universal electricity access, was considered a clear incentive for businesses to consider adopting electric mobility solutions.

Moreover, as the penetration of renewables increases in Africa, a major opportunity arises in electrifying the transportation sector, if the continent-wide average growth rate continues (2010–2017) Africa's emissions will have risen by $\approx 30\%$ by 2030 (to 1545 MtCO₂), fuel being a key part of that. A study by McKinsey and Company estimated that two-wheeler electric vehicles sales will reach 50% of total vehicle sales in sub-Saharan Africa by 2040¹¹. Within Africa, different country-dependent political, economic, and social factors greatly affect the implementation of clean technology projects and their success. The study, in addition to analysing the ESCOs in these countries, considered these differences and aimed to describe the regulatory and economic environment of each country.

With the objective of explaining the effects such factors have on the context of their business, a cost benefit analysis of the same project in each of the six countries was also carried out. This aimed to provide a context of the market state of play, considering factors such as the cost of energy, the cost of fuel, financing costs and tax incentives.

Africa is facing two critical challenges that hinder its development: limited energy access and high vulnerability to climate change. On the energy access front, currently around 600 million Africans still lack access to electricity. While on the climate change front, the IEA 2022 Africa Energy Outlook Report notes: "Africans are already disproportionately experiencing the negative effects of climate change, including water stress, reduced food production, increased frequency of extreme weather events and lower economic growth – all of which are fuelling mass migration and regional instability".

The ability of integrated clean energy systems to serve multiple applications makes it a promising technological concept to enable the sustainable energy transition. However, for many African regions the challenge is even greater to finance, access and deploy these technological solutions. This report not only presents the barriers and challenges found but also aims to highlight and guide the way towards possible solutions and opportunities in the region.

Why ESCOs?

ESCOs have been key in deploying clean energy solutions in developed economies. They are in a unique position to offer consumers a one-stop shop on integrated generation and consumption solutions (on-site, on-grid and on-road) under agreements that reduce consumer investment risk and the need for upfront investment in technology solutions. Essentially, the integration and provision of clean technology solutions through ESCOs has the potential to facilitate access and increase affordability for consumers.

In Africa, ESCOs are a nascent market with potential to support the growth of clean energy technology and solutions.



OBJECTIVE

Apart from a significant lack of knowledge and capacity of consumers to integrate technology solutions and providers, there is a significant disarticulation from providers and a lack of an integrated value proposition to consumers.

Why integration of clean energy systems (generation and consumption)?

Access to affordable clean energy is necessary to halve emissions by 2030 and such solutions can no longer be thought of in silos. Renewable energy uptake does not match the urgency of the climate crisis and it varies between sectors. Regardless of the rate of uptake, challenges related to its integration into existing energy systems remain¹³.

The system must change systematically, and this can be achieved following the concept of Clean Energy Systems Integration (CESI)¹⁴.

CESI or Energy System Integration considers all levels of integration (such as coordinating the planning, installation, operation, and monitoring) of energy systems. Different geographical regions influence a system's ability to deliver clean, reliable, accessible, and cost-effective energy services.

For CESI to become a reality the provision of renewable energy opportunities must be provided to the end user. This can be via the traditional method of simply selling or via the concept of servitisation or energy as-a-service.

There are several examples for future applications of integrated concepts. This could include cookstoves, solar water pumps, cooling, dryers, solar collectors for steam/water heaters (pre-heating for industrial/residential), solar induction stoves etc.

Other examples to consider are drying-as-a-service, solar-water-heaters and solar-for-irrigation offered as a service.

ENERGY SERVICE COMPANIES (ESCOS)

Definition: For this report, different perspectives were collected to answer, 'Who provides the energy supply service?'. In the case of servitisation, an ESCO provides this service. An ESCO in this sense, is a company or an entity that delivers energy services or other energy efficiency improvements on an energy user's premises and accepts some degree of financial risk in doing so.

In this project, we define ESCO as any company that offers energy or e-mobility as a service to enterprises. This broad definition includes companies offering business models such as PAYGO, lease-to-own, and e-vehicles rental. Companies that offer enabling services (such battery swapping, charging stations development, and consultancy services) are considered as enablers and are also included in the mapping analysis for this project.



INSIGHTS

The study focused on the Energy Service Companies (ESCOs) in Africa and aimed to provide insights into their role, operations, and challenges. To achieve this, the study conducted 21 interviews with key players in the industry and consulted other relevant sources. From the gathered information, three main insights or takeaways were identified. These insights provide valuable information for understanding the current state of ESCOs in Africa and their potential for growth and development.

INSIGHT 1: THE ESCO MARKET IN AFRICA IS NASCENT AND THE PLAYING FIELD IS UNEVEN.

The lack of robust market data has been a significant issue for business development and start-ups in Africa. Several sectors are lacking detailed information in terms of the available product and the range of services offered. Therefore, an initial mapping was carried out - collecting a list of 103 potential players.

Size and Evolution of Market

ESCOs and the ESCO model can be instrumental in deploying clean energy solutions and can offer a solution under agreements that reduce the need for upfront investment in technology solutions. The global ESCOs market is expected to hit 49.6 billion by 2030 (growing CAGR of 6.5% from 2021 to 2030)¹⁵. However, there are a limited number of companies in Africa acting as ESCOs.

Most companies that offer renewable energy as a service are PAYGO companies that primarily focus on energy access applications (but also have larger systems that are suitable for enterprises; <1kW solar capacity). The mapping revealed that the ESCO sector in Africa is not well-developed but is emerging.

In terms of e-mobility services the market is growing (e.g., rental of e-motorcycles, pay-as-you-ride, battery swapping) in South Africa, Rwanda, Kenya, and Ghana. In Rwanda, as an example, Ampersand secured USD 3.5 million from the Ecosystem Integrity Fund (EIF) - the largest e-mobility investment by a venture capital fund in sub-Saharan Africa¹⁶. South Africa ranks 5th globally in the ratio of public EV chargers to vehicles¹⁷.

A strong regulatory framework that provides certainty and a strong financial ecosystem is needed to meet the clean energy demand and investments required. Many different initiatives are running in parallel to create trust and create collaboration among public and private stakeholders. This is exemplified by the 'Platform on Investment and Productive Transformation' in Africa, an initiative involving multiple stakeholders, managed by the OECD Development Centre and the African Union Commission¹⁸. Other platforms include Energy Transition Accelerator Financing Platform (ETAf), area, AREli, Africa Clean Energy Corridor (ACEC), Africa Green Hydrogen Alliance.

An uneven playing field

African countries face an uneven playing field when it comes to investment in clean energy and the regulatory environment that supports it. Inadequate policies and enforcement are limiting investment opportunities¹⁹. Linked to climate and energy goals is energy access, which is still a limiting factor in the region. The World Bank estimates that nearly USD 20 billion is required for universal electrification across Sub-Saharan Africa, with about USD 10 billion annually needed for West and Central Africa²⁰.

Several factors contribute to the disparity, including lack of political stability and government support, insufficient infrastructure, financial constraints, lack of technical capacity, and market barriers such as high import duties and taxes. In some cases, governments or local authorities may discourage investment in clean energy and hinder investment. Some specific areas lack the necessary infrastructure to support clean energy systems, making investment more expensive and difficult overall. Market barriers, such as high import duties and taxes, also make it more difficult for ESCOs to enter the market, further limiting investment and visibility of business opportunities.

However, according to the analysis carried out in this study, only Nigeria had significant regulatory and policy barriers which are directly impeding the rapid deployment of RE and e-mobility solutions. This barrier takes the form of fossil fuel subsidies.



INSIGHTS

During the study, a qualitative analysis highlighted the socio-economic factors and geographical factors which dictate the existence of favourable market and policy instruments and incentives. The most widely used policies for renewable energy incentives discussed in the interviews were tax incentives. Apart from a combination of these factors, there are several incentives which may signal favourable business conditions not only for ESCOs but also for investors. It was found that long-term

favourable financing options, direct support of R&D and scale-up via grants, tax incentives, and reduced import duties for components/machinery of low-carbon systems were key.

Based on this study, Rwanda and Kenya were identified as the countries having the highest market potential. The market therefore is considered attractive for implementing distributed clean energy projects because of the high electricity tariffs (as compared to other countries analysed), the presence of a supportive regulatory framework (policies, targets, and some incentives), moderate or no energy subsidies. These countries also have more experience when it comes to the clean energy development finance projects/funds.

It was found that in Rwanda, currently there are favourable market conditions, driven by declining equipment prices, government support, and international ESCO collaboration. An indicator which can be indirectly used to consider if a market ecosystem is not developed, is the presence of hybrid business models where there is a close degree of cooperation between the public and the private sectors. This was found to a certain extent in Rwanda. However, integrated multi-level cooperation is still lacking.

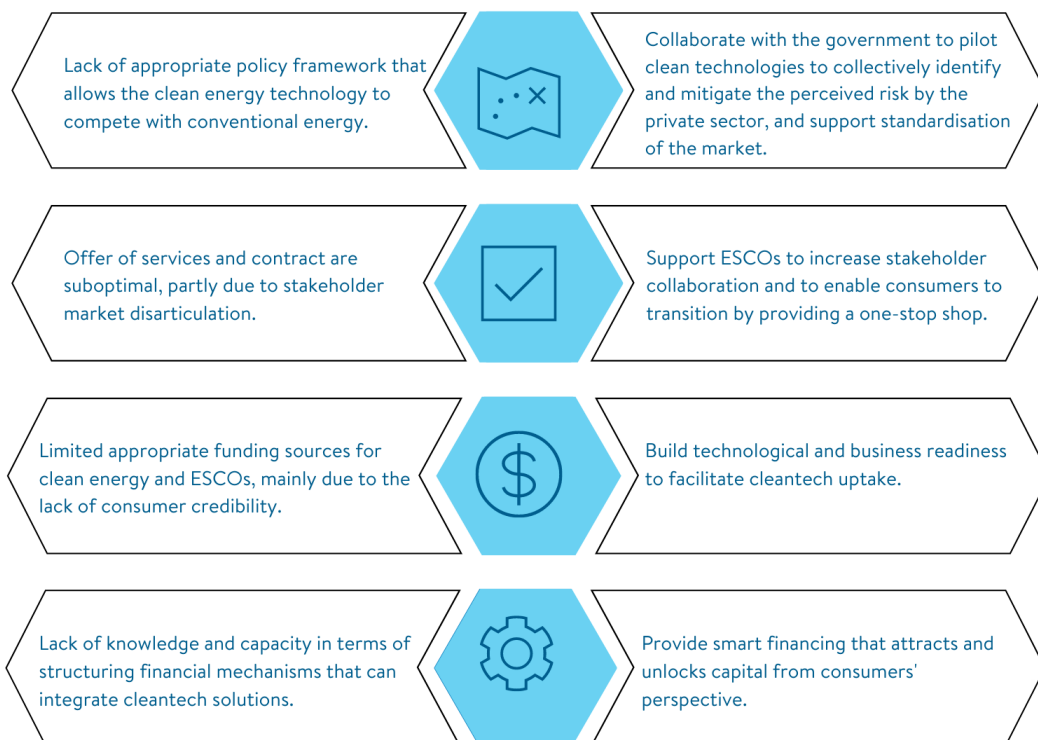


Figure 4: Factors influencing different sectors of the business feasibility 'pyramid' solutions.



INSIGHTS

There is a noticeable disparity between North Africa and other parts of Africa. In Morocco, the market for ESCO's (offering energy efficiency services) is quite big with over 200 companies operating. In some markets, the government(s) are investigating the implementation of a super ESCO (although the focus is on energy efficiency) such is the case for Morocco. The mapping showed the prevalence of enablers companies in Morocco such as enabling financial institutions or companies that would like to become ESCOs in the future. In Morocco and Rwanda, the government is investigating the implementation supporting policies related to Feed-in Tariffs (FiTs). It was also found that several South African and Kenyan e-mobility brands offer services beyond their borders (outbound) within the Southern Africa Development Community region.

There is a more significant disparity between the ESCO market in the EU and USA compared to Africa. The global "energy-as-a-service" (EaaS) market stands at USD 64.7 billion²¹, concentrated in developed countries. In Europe, SME and start-ups supplying renewable energy are on the rise, specifically XaaS (Anything-as-a-Service) and related renewable energy platform-based business models. The sectors with most growth include Solar PV and Microgrid alongside Energy Efficiency and Management²².

In comparison, financial constraints (e.g., access to capital) are limiting market growth in the sector in Africa.

INSIGHT 2: THERE IS AN ARRAY OF SERVICES AND CONTRACTS BUT THEY ARE DISAGGREGATED

ESCOs are employing several different business models, with different services and contracts on offer such as PPA, EPC and similar. In the study, the focus was on business models that offer the use of clean energy solutions and related services (even though some of these companies are still selling the service outright). The desk research and mapping support the insights provided by the interviewed companies during this study. Overall, growth and trends were identified explaining why demand is shifting to ESCOs given coun-

try conditions. However, we note that the market is still limited in terms of options provided to the consumer. The options are limited in terms of technology as well as payment and financing options. Overall, in terms of contract period for a PPA Solar Project, the service providers tend to prefer a long period contract. They usually start the negotiation regarding the contract period from 15 years onwards and minimum they tend to accept 10 years as a contract period.*

They rarely agree to below this range because 7 – 9 years is difficult for the contractor. In special cases, the service provider can accept this period. The KW/h price is an important factor to determine the suitability of a specific project. The average of the sold KWh according to an PPA agreement is less than the national grid price (REG) (approximately by 15% in the case of Rwanda). This information was provided by a company called (Emining & IT Ltd.) in Rwanda.

In terms of financing, commercial bank loans are a commonly employed method. The interest rate for this type of "Renewable energy loan" is around 12.5%. In order for this loan model to be accepted the commercial banks request a high guarantee and the collateral (usually an asset building, land etc.) Additionally in many cases after the collateral is provided, a type of "goods insurance" should be obtained from any insurance company (which increases the overall cost).

Given the noted requirements for commercial loans, most local companies turn to private investors for financing through a profit-sharing agreement. In this scenario, only a business plan and some restrictions on the company's bank account to control cash flow are required to access finance. However, in some cases, the investor may want to manage and control the entire company, disregarding the owner. As a result, both parties may eventually want to break the agreement**.

In Nigeria, it was also mentioned that consumer adoption has improved as the knowledge of the products has also improved, especially of solar solutions. This in turn has led to increased adoption of solar solutions. Having increased residential solar capacities, also leads to more and more people becoming prosumers.

*The KW/h price is an important factor to determine the suitability of a specific project. The average of the sold KWh according to an PPA agreement is less than the national grid price (REG) (approximately by 15% in the case of Rwanda). This information was provided by a company called (Emining & IT Ltd.) in Rwanda.

** This information was confirmed by a company called (Emining & IT Ltd.) in Rwanda.



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Nearly all the interviewees noted that there has been less grid reliance, given the increased diversity of the mix of electricity generation. Another ESCO in South Africa (WiSolar) mentioned that the reason for delayed growth and varied service offering was the lack of access to low-cost funding for solar projects which slows down the uptake of solar power.

This lack of access to funds puts a strain on smaller, local companies with limited capacity to absorb transaction costs. Overall, many of these systems are perceived to require a large consumer base to achieve economies of scale.

Another interviewee (Energy Partners Group (EPG) South Africa) noted that the increasing growth of the market was driven by energy security issues linked to the state-owned utility (ESKOM). Energy security has become more pressing in part due to the massive load shedding by ESKOM. Load shedding, temporarily switching off the distribution of energy to areas, greatly impacts energy access²³.

In turn, this causes service-oriented businesses to find ways to alleviate the load shedding impact in the commercial and industrial (C&I sector). For example, businesses are turning to embedded generation projects like solar and wind, as well as battery energy storage solutions (BESS). ESKOM and municipalities are supporting this move to alleviate load shedding across the country by incentivising embedded generation for self-consumption, as well as feeding excess energy back into the grid. Furthermore, it was found that lease to own financial mechanisms is offered in the market by some companies to their consumers. For the E-mobility market, some companies are offering a combination of lease-to-own financial mechanisms to facilitate the sale to the consumers, and few interviewees mentioned that there are some companies offering charging-as-a-service model (not swapping) to facilitate electric vehicle owners to charge their vehicle batteries. Vendor financing was as well mentioned, where the company provides a short-term financing (6-12 months) on the solar systems and up to 20 months of financing for electric vehicles.

Overall, there is interest to reduce reliance on larger utilities companies and move towards alternative providers that offer services that can provide electricity. For example, integrating solar power generation to the grid and complementing this with battery storage.

However, there is some level of resistance to concede market share to companies replacing the services provided by the distributor and the generators. Local governments have a strong influence as they don't want to lose the distribution business and do not facilitate companies like ESCOS enter the market.

INSIGHT 3: CONDITIONS & NEEDS IN SOME AFRICAN COUNTRIES OFFER A GREAT OPPORTUNITY FOR THE ESCO MARKET.

Africa has the potential to yield growth for private sector investment, technological innovation, and cross-sector and cross-border collaborations. There is a significant potential for growth. The ESCO model is a very attractive model for providing renewable energy electricity and e-mobility services since it allows these projects to be financed off the consumer's balance sheet.

Historically, the term "ESCOs" has been limited to companies offering energy performance contracts and implementing energy efficiency solutions. In these companies, the project is developed entirely by the ESCO, and this includes financing and O&M. Consumers enter a long-term contract (5-10/15 years) with the ESCO, where they pay based on each unit of energy saved. Africa's energy challenges can't be met alone with energy efficiency ESCOs, and hence there is a need and an opportunity for ESCOs to offer RE and e-mobility solutions.

The selected countries all have excellent renewable energy resources, a supportive regulatory environment, and a sizable grid-connected population. An assessment was conducted considering the ESCO's clients, business models and main clients. The consensus from all the interviewees was that they felt like the market of energy service companies has been growing. From the ESCO's perspectives, depending on the sector, the following types of contracts and services were commonly identified.

In Nigeria, the increase in the ESCO market share was found to be linked to the unstable supply of power and the increasing cost of petrol and diesel. One of the ESCO's interviewed (Creed) mentioned these are the main two reasons behind the increase of the market in Nigeria. Another ESCO (Arnergy) said it was slowly



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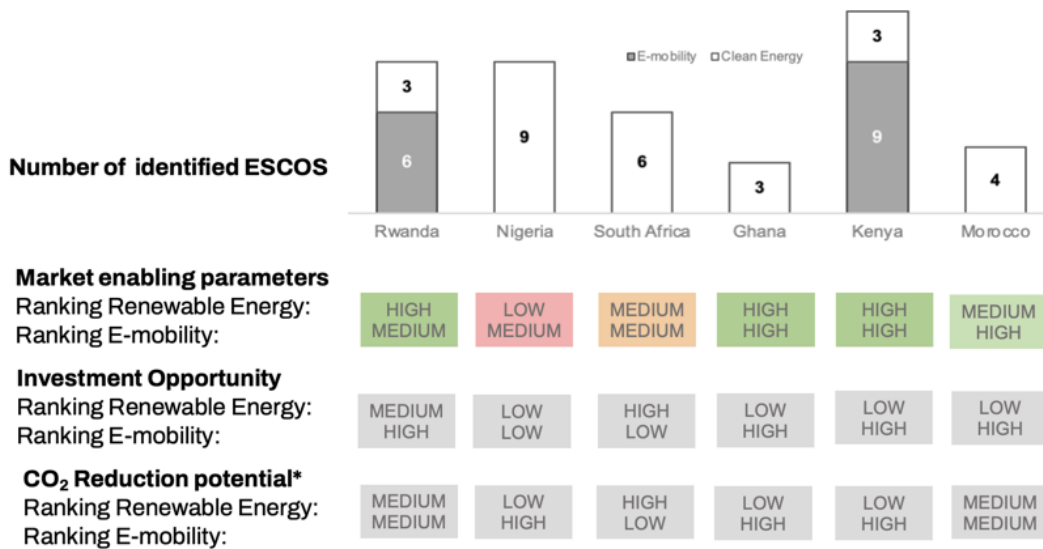


Figure 5: The results of the assessment of the attractiveness of each country for RE and E-mobility services.

increasing over time, but also mentioned that renewable energy cost has been decreasing, although there has been a slight increase in costs linked to the recent 2022 and on-going inflation.

From the interviews, it was found that some companies were integrating digital applications as part of their business services. These apps and platforms can provide key functionalities such as geolocation, battery charging control and can serve as strong risk mitigation tools. For example, Mazi Mobility in Kenya is offering a service that guarantees 99% uptime for battery swapping in Nairobi, and consumers can easily identify the nearest swap stations through a mobile app. Another example in Kenya, is e-Zuri.

They use a smart back-end control system and mobile app for the user to find the batteries and provide services such as navigation support, ride statistics, and vehicle and battery diagnostics to drive optimal performance and safety standards. Their sister company Equator Energy, is a solar power provider in East Africa, servicing clients in five countries.

Other examples include Mana App (Ghana) linked to Cargo Bikes Africa which is a German-Ghanaian enterprise²⁴ and Solar Taxi has an EV ride-hailing platform in Ghana, partnering with companies such as Bolt,

which is an Estonian mobility company that offers vehicle-for-hire, micro-mobility, car-sharing, and food delivery services²⁵. In addition, a significant increase was observed in the adoption of mobile banking services across various industries, which could be potentially integrated with energy services.

Africa's digital economy is also experiencing rapid development with people attaining more mobile digital bank accounts. The 2021 figure stands at an impressive 300 million mobile money accounts, the highest number of this type of account globally.²⁶

As shown by the examples found above, there has been a rise in franchises offering servitisation type models, linked by an application (Phone App) which allows for easy payments vehicle or charging tracking. With the acceptance of these types of Apps and easy payment services, the benefits of these services can be enjoyed by more people.



BARRIERS AND CHALLENGES

As identified and echoed by market data²⁷, the 3 main barriers that limit clean energy deployment are common to many African nations are (1) lack of consistent clean power procurement practices, (2) poor planning around electricity access and grid expansion efforts and (3) lack of knowledge of clean energy opportunities from domestic investors.

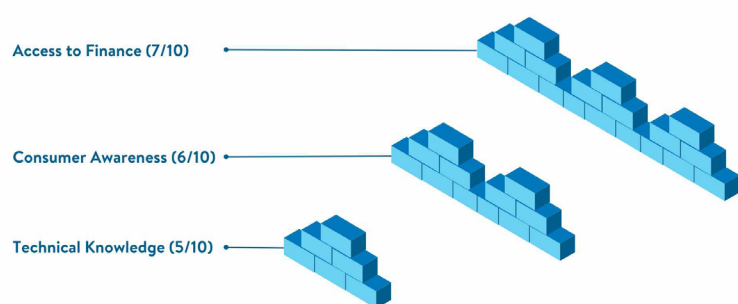


Figure 6 Interviews barriers ranking

There are several barriers which were shared during interviews with ESCOs as well as provided by Energy Private Developers (EPD) and energy sector industry associations. As shown in Figure 6, access to finance was the major barrier to increased uptake of clean energy solutions. 100% of the ESCOs interviewed agree risk perception is the underlying reason behind this. The combination of these issues makes it difficult for ESCOs to grow and expand their services. A key factor identified was weak creditworthiness, directly tied to lack of knowledge on different financial mechanisms and the fact that most local financing sources priorities are elsewhere. Figure 6 shows the average of the results from interviews when asked to rank the importance of the barrier from 1-10 (1= not a barrier and 10= a very significant barrier).

- > Financing gap: There is a lack of adequate financing packages from banks or specialised funds to support ESCOs. The minimum investment tickets of some funds (national and international) are often too high for the size of projects in Africa for many ESCOs. Most opportunities for ESCOs

on-site, on-grid and on-road projects in Africa can range on average from USD 50,000 to USD 2 million.

- > Consumer awareness linked to lack of knowledge and capacity linked: For consumers there is limited awareness of clean tech alternatives and for ESCOs it's linked to on business models and financing mechanisms that can integrate cleantech solutions.
- > Lack of knowledge and capacity linked also to stakeholder disarticulation: There is a disarticulation of suppliers and solutions in the market that hinders the transition of consumers to clean and efficient energy solutions. For example, in Africa, there are providers of solar systems as well as providers of high-efficiency cooling systems, but it is the consumer who must look for their integration. There are few consumer-based offerings that provide an integrated solution to the consumer. From the consumer perspective it is directly related to the interaction and trust between the consumer and the ESCO. Many interviewees pointed out that stakeholder market disarticulation is a large barrier. This is especially important for consumers who must deal with different providers and financial institutions in order to have an integrated solution.

The opportunities arise in part from the fact that traditional grid connections in several African countries can be unreliable and uncompetitive for many.

This leads consumers to look to alternatives such as diesel generators that require low upfront costs (CapEx), but ultimately result in more expensive operating costs due to their high energy and maintenance costs (OpEx) when compared to clean technology solutions. Offering a one-stop-shop for clean energy services through ESCOs simplifies the process for consumers, especially those in rural areas with limited access to such services.

However, the lack of awareness about renewable energy solutions and the limited number of ESCOs in the market pose a significant challenge.



BARRIERS AND CHALLENGES

LACK OF APPROPRIATE POLICY ENVIRONMENT

The presence or absence of a national policy, regulation, supportive policy instruments/incentives (e.g. customs exemptions, preferential charging tariff, FiTs and net-metering) directly influence market maturity, market readiness, energy access rate as well as the presence of ESCOs in the market. Such policies directly influence energy and fuel costs which in turn directly impact the feasibility of the business case.

In the countries identified in this study, the availability of both energy and clean energy is primarily impacted by whether or not there are supporting policies in place. These policies impact economic factors such as subsidies, tax exemptions or/and energy prices. Depending on whether or not there are subsidies in place either for or against renewables, greatly impacts cost effectiveness and therefore also the feasibility of the business case. An ESCO (ICONO) supported this during the interview noting that challenges were linked to energy management regulation and fiscal regulation.

In Ghana, according to the interviewees, the market that has been developed so far is marginal mostly due the weak regulatory environment. They have implemented a feed-in tariff and as well a net metering programme. This programme has not been able to gain traction in the market to motivate individuals and companies to invest in solar PV. The solar PV market has been growing marginally. Upon further investigation, it was also found that the responsible authorities and insurance companies do not have or share information about why this has been the case. This makes it difficult to estimate the market growth and demand. One ESCO, Sunpower Innovations, confirmed that net metering could allow surplus supply to be injected to the grid to offset or earn extra revenue. Without net metering, installations are expensive because most companies need to have hybrid (battery storage and solar) installations. As expected, having lower (or no) import duties and taxes on RE equipment was also mentioned as a way to support the market. For Ghana, some exemptions exist but overall solar installations in Ghana are still expensive relative to the cost reduction which has been seen globally.

In Nigeria, the motivation or business case for ESCOs is different. It is linked to consumer demand wanting to have energy availability guaranteed. It is influenced by the cost of electricity units on the grid and the cost of fueling generators. Also the challenges are different in Nigeria. The biggest challenge has been FX transactions for purchasing specific equipment or parts from OEMs. The unstable conversion rates greatly impact profitability.

Another issue that was highlighted regarding South Africa was in regards to the utility ESKOM. ESKOM's massive load shedding is causing businesses to find ways to alleviate the load shedding impact in the C&I sector. The solar system and use of battery storage have become a plausible alternative. The REIPPP which is aimed at bringing additional megawatts onto the country's electricity system through private sector investment in wind, biomass, and small hydro, among others has resulted in over 6 000 MW of generation capacity being allocated to bidders across a variety of technologies, principally in wind and solar. Additionally, municipalities are investing in their own generation assets. The combined effect of all these factors is that they are driving a rapid change in the energy services market, and this is what connects the three points.

STAKEHOLDER MARKET DISARTICULATION

Firstly, the renewable energy market is quite open. There are a large number of players or stakeholders. For example, you can have 100 companies in general involved in the supply/value with 40 specialised in specific parts or sectors specific to Solar energy (residential, mini-grids, hydro mini-grids, productive use technologies companies, and providers companies). In terms of the companies themselves, most companies are mainly focusing on mini-grids and home standalone systems. Most companies provide the pay-as-you-go model because of the affordability aspect. consumer purchasing power is weak. Another reason is that most companies focusing on renewables are small and have limited working capital, and hence are unable to offer 'financially demanding' business models. The suppliers and manufacturers also have a key role to play in providing high quality products (less maintenance and demand) as well as competitive pricing. Having a strong supplier base is key to ensuring reliability.



BARRIERS AND CHALLENGES

Market growth was found to be more positive for e-mobility solutions. There is a growing market for e-mobility services (such as rental of e-motorcycles, pay-as-you-ride, battery swapping etc) in South Africa, Rwanda, Kenya, and Ghana. However, stakeholder market disarticulation is a key challenge.

FINANCING GAP

A unifying factor across the region is that it is urgent to unlock the financing necessary to achieve their climate and energy goals - which is simply not happening at the moment. Unfortunately, there is a massive finance gap in Africa, estimated to be approximately USD 247 billion annually²⁸.

Global energy transition investment reached USD 1.1 trillion in 2022 which is 31% more than in 2021. In terms of total numbers, investment in clean energy remains the biggest sector at USD 495 billion. However, the electrified transport sector is growing at an impressively faster rate since it was up 54% in 2022 (USD 466 billion)²⁹. Africa requires USD 2.8 trillion between 2020-2030 to implement its Nationally Determined Contributions under the Paris Agreement. Investment is lacking with the Southern African region having the largest financing gap in absolute terms³⁰.

Looking at financing estimates to achieve the transition to clean energy, an investment of USD 126 billion year is needed (2026-2030)³¹. Annual investments in clean energy reached an all-time-high in 2018 (USD 10.3 billion) driven by large investments in solar photovoltaic (PV), solar thermal and wind and further accelerated by renewable energy procurement programmes. It then dropped to annual average of USD 3.1 billion (2019-2020)³². The situation worsened with clean energy generating assets attracting only 0.6% of the global investment in 2021³³.

Looking at climate finance, the private sector contributed USD 4.2 billion of total climate finance in Africa, which is a much lower percentage than in other regions³⁴. The overwhelming lack of investment in clean energy in Africa is substantial and cannot be ignored, with investments at their lowest since 2011³⁵.

In addition to the lack of funds itself, other obstacles were found in the design of some donor-funded programs. For example, sometimes a significant portion of a grant may be reserved or withheld for specific after-sales services, potentially causing complex require-

ments for accessing the funds, or limited availability of the RE services offered. Of equal importance is the access to finance component as the minimum investment eligibility criteria for some international funds and banks are beyond the capabilities of many of the ESCO or similar companies identified in Africa.

It was concluded that the market is economically attractive for some regions or projects, but this is often due to international grants and funding. Financial incentives have been put in place through grants by the World Bank and Rwanda Development Bank in the case of Rwanda to support businesses, and to electrify rural areas. The environment is only beginning to become more supportive, but financial programs are making some progress to encourage these sectors. More so in Rwanda and Kenya.

One of the companies that were interviewed (Powergen) noted that for them a key requirement is getting proper technical support on concessionary financing. This presents a limitation especially for companies looking to expand (and/or integrate with other ESCOs). The high upfront costs often deter businesses from pursuing innovative or unconventional business models, leading them to instead opt for more traditional routes. It is important to consider the dependency of legal regulations being connected to the fear of negative outcomes resulting from new business models, which is also linked to the reluctance to take risks.

This in turn strengthens the preference for well-known, traditional solutions. Though traditional models can be more attractive to commercial investors, it is important to also consider how these traditional models may not always be the most effective or sustainable in the long term. Increasing the availability of capital that can support and encourage more innovative business models may help to overcome this bottleneck.

Tools to hedge foreign exchange, inflation, and insurance are lacking.

In conclusion, the upfront costs are a limiting factor not only for consumers but also for many businesses, as they require a significant investment before any revenue is generated. As a result, many businesses follow conventional business models (sale only) as it is the easier, more financially stable option. Direct selling (high CapEx) allows the ESCO to recoup its initial investments faster.



BARRIERS AND CHALLENGES

Weak creditworthiness

Having weak creditworthiness can be an issue both at a consumer level but also for the ESCO itself and is linked to risk perception. It was found that a key issue is that there is high risk associated with the ESCO model in Africa and this is enforced by other factors surrounding the credibility of some ESCOs. The risk profile, decided by the lender, of an ESCO impacts their ability to acquire finance. For example, an ESCO, considered an offtaker, is a company who has contracts via Power Purchase Agreements (PPA). There is a risk that the offtaker stops paying and defaults on the loan. This is perceived as a high-risk scenario by the lender. Many lenders carry out credit checks and appraisals, usually having a minimum standard credit rating. There is limited market data available in terms of standardised credit ratings in Africa. In some cases, and more than likely in CESI or similar types of integrated technology options there is also a high-risk perception of some technologies. Though not normally the case for solar on its own, integrated systems using various hybrid sources or/ and powering various appliances for example are more likely to be perceived as high risk in terms of achieved savings and performance.

Local financing sources prioritise elsewhere

The allocation of funding is also driven by other factors such as demographic pressures, the challenge of climate change, infrastructure renewal, fighting crime etc³⁶. The local priorities encompass unique characteristics for each local municipality. Progress on uptake to CESI has been hindered by several factors including, but not limited to insufficient resources, inadequate prioritisation of investments and finance access and a wide variation in quality and outcomes of international funding programs.

From the study, it became clear that a key risk is that investors may not fund different parts of the supply chain. This was found to be especially relevant for the 'assembly' part of the supply chain. This is a significant limiting factor to the transition or uptake of CESI as all players need to have the resources and financing to ensure the product is affordable to the ESCO itself and therefore that the service provided is affordable to the end consumer.

Also, it was found that there are preferred ways of credit such as providing a guarantee to equity investors. Sharing and trading finance costs between suppliers and the project market at favourable rates is also beneficial. From the interviews conducted it was found that the preferred rate is 4-5% local current and 6-7% for forex.

LACK OF KNOWLEDGE AND CAPACITY IN TERMS OF STRUCTURING FINANCIAL MECHANISMS THAT CAN INTEGRATE CLEANTECH SOLUTIONS

Knowledge barriers such as lack of knowledge on financial innovation, lack of qualified employees, were found to be an important challenge for the ESCO market in Africa. Specific to the ESCOs there is a lack of knowledge of financial innovation and in some parts of the supply chain (e.g., OEM) there is reluctance to change or innovate. A greater understanding of the dependency relationships between the indicated barriers can be achieved by considering the lack of proper sources of information, as well as lack of adequate promotional information on financial innovations opportunities. This then leads to a knowledge gap on the potential application of financial innovation which then in turn can result in limited trust and reluctance to use or integrate unknown solutions³⁷.

An interviewee (Powergen), noted that in their opinion the eligibility criteria of most international funds are beyond the capabilities of most companies. Additionally, companies cannot rely completely on grants only, they should have a working capital with the investment. The limited working capital of ESCOs is hindering the development of RE projects and financial support. This is aggravated by the overall limited awareness among banks about clean energy focused investments. Preparing and drafting funding proposal documents is a main challenge for ESCOs that aim to access a fund or grant. Mazi Mobility, a Kenyan mobility-as-a-service (Maas) start-up, noted that they were lacking talent and needed investment in all parts of the process.

In terms of infrastructure, Rwanda has some issues linked to geography and has challenges based on RE infrastructure. Rwanda's hilly terrain makes developing grid infrastructure challenging, hence smaller projects are usually preferred³⁸.



BARRIERS AND CHALLENGES

From the research, it was discovered, there are limited zones allocated by the government for mini-grid developers. This is aggravated by limited technical know-how and capacity-building issues. There is a need to align the programs of vocational training schools with the market needs.

It is important to note that this is not the case for all players as the Energy sector industry association in Rwanda noted that the banks' financial products are suitable for business models in Rwanda. However, more capacity training is needed in order for them to reach a wider number of people.

One of the companies interviewed (Emining & IT Ltd) explained that the lack of finance linked to know-how overall was a big barrier. They explained that most of the local companies which have a good business plan can't access to commercial bank loans due to the complicated process and the unavailability of the collateral, so they waste the time looking for a strong partner from the private sector to finance them and this usually results in a lot of losses due to the poor agreement between parties. They also explained that high interest rates estimated at 12.5% which is considered a high rate compared to the other countries was also contributing to this challenge.

Most companies also struggle in managing their working capital and loans. There is limited knowledge about reputable component brands in the RE sector. As a specific example we found these challenges experienced with the World Bank RBF program, which secures funds for local companies based on Result (RBF)³⁹. The funding ticket sizes were fixed in the local currency without accounting for inflation – this had an immense impact on companies' profit margins. Also, 20% of the total program funds were withheld for after-sales services – this resulted in companies making a minimum profit margin of 2-3% at most. The target of this program is to connect more than 200,000 houses and insure the minimum power needs (lights, small appliances, and chargers etc).

The local companies have been working for this program for 3 years and the price has not changed so it was noted that the cost almost equals the granted price for the end-user, which means that eventually the local companies will drop off and leave the sector. It was also noted that approximately 20% of the subsidy is bonded for 3 years as a grantee for after sales services. From the interviews, it was noted that this is considered a high percentage. If it could be between 5 – 7% (as part

of the financial mechanism for the study) that will encourage the local companies to connect more areas.

In Morocco, similar issues were found linked to access to finance, awareness, and lengthy administrative processes. A stakeholder interviewed was SIE as they are an ESCO enabler. They mentioned that access to finance was a pressing concern as local banks in their opinion do not have the capabilities to conduct a good technical due diligence. The provision of guarantees for loans (for local banks) is not a challenge in Morocco.

They also highlighted the capacity building of companies, especially in business models and business planning and contracts preparation. Overall, technical skills of local ESCOs are limited and they are not equipped to implement large/complex projects. A large street light energy services project was recently commissioned by SIE and implemented by a Spanish ESCO, Enertica. Part of this collaboration is an energetic management platform W-Manager which includes option to integrate the city buildings consumption, connected with e-vehicles and charging stations⁴⁰.



SOLUTION AND OPPORTUNITIES

The global market is expected to reach 105.6 billion by 2027. As it stands in 2022, the utilities market is worth an impressive USD 64.7 billion⁴¹. Growing at an annual growth rate of 10.3%, the X-as-a-service (XaaS) model is becoming increasingly popular for many international investors and shareholders. Most of this growth is focused on the USA, China and Europe. In Europe, SME and start-ups supplying renewable energy are on the rise, specifically XaaS and related renewable energy platform-based business models⁴².

However, as noted in several African countries, widespread deployment of clean energy solutions is still limited. The adoption of innovative business models that remove the barriers could help increase the uptake of renewable energy solutions in Africa. The Middle East & Africa (MEA) region has been showing growth (CAGR 10.54%). Looking specifically at MEA, the renewable energy-as-a-service (EaaS) market is estimated to reach USD 1805,91 million of revenue by 2028⁴³. The adoption of innovative business models and financing instruments, such as servitisation, performance contracting, risk hedging instruments, will help to reduce the various barriers that these projects present in terms of financing, upfront investment, or risk perception.

INCREASED STAKEHOLDER COLLABORATION

The integration and provision of clean technology solutions through new business models has the potential to facilitate access and increase affordability for consumers. The energy-as-a-service model is only a part of the solution. However, as noted it has enormous potential as ESCOs are in a unique position to offer consumers a one-stop shop on integrated generation and consumption solutions (on-site, on-grid and on-road).

Collaboration with the government to pilot clean technologies to collectively identify and mitigate the perceived risk by the private sector. This will also support the standardisation of the market. Connecting and building trust of key stakeholders (ESCOs, consumers, FI, Enablers, insurance companies, among others) to encourage adoption. The first objective found of many ESCOs was to establish a basis of trust with their consumers.

EXISTING CASE STUDY: AMPERSAND/BBOX

Bboxx and Ampersand have partnered to provide e-mobility options in Rwanda, starting with the launch of an e-mobility scheme in Kigali. Together, they are financing electric taxi motorcycles for local drivers, with mobile payments managed using Bboxx Pulse®⁴⁴. Using e-motorbikes instead of petrol vehicles could increase drivers' profits by 40% and significantly reduce carbon emissions, helping Rwanda achieve its goals of reducing CO2 emissions and becoming a carbon neutral economy. Two contract options exist - shared mobility style, where e-bikes are hired for short periods and users are charged over time, or a model where the consumer owns the e-bike without the battery and uses another ESCO for maintenance.

Bboxx and Ampersand, both offer lease-to-own contracts for e-motorcycles. For Bboxx Pulse® for example they offer Pay-as-you-go plans that allow consumers to pay only for the energy they use.

In 2022, Bboxx launched its latest product, an e-mobility business line. They are still experimenting to identify the optimal contract duration, but their initial results indicate that 20 months is the optimum duration (from the consumer's perspective)- with a 5-7% down payment. Financers, on the other hand, prefer a high up-front payment and a contract duration of 1 year or less. Bboxx reports that their consumers have an appreciation for the Bboxx "brand value" and it is an influencing parameter in the decision to invest.

Bboxx targets consumers being commercial motorcycle drivers. Bboxx's strategy is to prioritise productive e-mobility solutions, and hence they don't offer their e-motorcycles to non-commercial motorcycle drivers. Currently, Bboxx only offers lease-to-own for two-wheelers.



SOLUTION AND OPPORTUNITIES

As the next step, Bboxx is focused on deploying electric vehicles for taxicab drivers in Kigali to make transport more profitable for drivers, and also safer. They will launch a platform (mobile app) in the future which will allow the user to access the wide range of Bboxx products including booking a ride.

Bboxx, however, cautioned from shocking the market with new business models, without a well-designed strategy. They reported that introducing electric motorcycles, on its own, is a shock to the market. The government in Rwanda is supporting the e-mobility market immensely (and compared to the region) is driving the market growth. They would like to see lower or no taxes on imported components would be nice to have (although not critical, since the current business model already works). Another key thing mentioned is lower cost for charging. Bboxx reported that the government has a preferential tariff for charging stations.

Ampersand works with Bboxx, with the aim to provide a network of motorcycles using a 'Pay-as-you-drive' system in regard to energy consumers, accessible via mobile money. BODA BODA was the most attractive option for their business model. They typically charge using the grid. They focus on battery swapping. They offer lease contracts that are 18 months. However, they pointed out that a key limitation was that commercial banks require collateral and are not used (or accepting) to work with new products like batteries.

From this and similar interviews, it was highlighted that ultimately uncollateralized debt, as well as government incentives around taxes/duties/VAT (rather than direct subsidies) are going to be key to assist this sector to grow. Beyond that equity capital will be the toughest to acquire compared to debt (few private equity firms in Africa). Mechanisms for de-risking capital investment as well as investing in local manufacturing is going to be critical.

ESCO DEVELOPMENT

Support ESCOs to increase stakeholder collaboration and to enable consumers to transition by providing a one-stop shop. ESCOs have the capacity to offer a complete package of solutions and services, which may include the provision of on-site clean energy generation technologies, as well as energy-consuming, highly efficient, and environmentally friendly solutions used to carry out productive activities, such as electric mobility, machinery, cooling systems and efficient heating and cooling systems. This in addition to the provision of financing and after sales services. This reduces the barriers of high investment costs.

THE IMPORTANCE OF OPEX - SERVITISATION MODEL

Servitisation models often have lower capital expenditure (CapEX) costs because they involve providing a service. Generally, it means that a

company does not need to invest a lot on upfront costs like inventory. For ESCOs there can still be significant upfront costs such as the infrastructure to provide services such as battery-as-a-service or a lease-to-own model. However, in this model the assets still belong to the ESCO.

The ESCO focuses on generating revenue through the service fees received from its clients, while keeping the assets (rather than selling them off, sale by sale). Understanding OpEx, or operational expenditure, refers to the ongoing costs of running a business, such as salaries, utilities, and maintenance. OpEx costs are important for a business because they can have a significant impact on profitability and cash flow.

It is important for a business to carefully manage and control its OpEx costs in order to remain competitive and financially viable. We note that the OpEx servitisation model is noted as the innovative energy service most likely to have the adaptability that is required.



SOLUTION AND OPPORTUNITIES

READINESS

Building technological and business models' readiness will facilitate cleantech uptake. It is important to undertake actions that help strengthen the market and build trust among the key stakeholders. For example, in most of the countries there is a strong market to finance vehicles because there are procedures that allow cars to be used as collateral to financiers, as well there are well established mechanisms to recover the vehicle in case the client default payments and allow the borrower to sell the vehicle in a secondary market allowing them to recover the credit. There is a standard practice to evaluate the cost of second-hand cars that facilitates discussions and negotiations between client, consumers and financing entities.

For cleantech integrated solutions and ESCOs it is important to standardise practices such as contractual arrangements, technology quality control, monitoring, reporting and verification systems, and financing practices. This will help to mainstream the ESCOs role, the integrated solutions and build trust between key stakeholders. Furthermore, this would help to facilitate access to finance to ESCOs and bring financing institutions to support these types of projects and enterprises. At the moment there are no standardised practices and every clean integrated project and ESCOs are evaluated by clients and financiers as something "sophisticated" and "complicated" which may result in preventing them from participating in these types of businesses.

Some of the aspects that can be standardised to support the market may include standardising contracts to help clients and ESCOs and financiers to negotiate a cleantech integrated project. As well the contracts may help to define the roles, responsibilities of each stakeholder. As well, non-financial risk mitigation mechanisms can be developed that can help reduce risks related to the ESCO's revenue streams in a way that creates a scalable scheme and builds creditworthiness in this type of enterprises and projects.

As well, incorporating digitalisation technologies that help to streamline processes and information exchange (e.g., use mobile banking, automate monitoring, reporting and verification, information flow, etc.) between key stakeholders and consumers to reduce costs and build trust, which can help to advance the market.

SMART BUSINESS MODELS AND FINANCING

Provide smart financing that attracts and unlocks capital from the consumers perspective. Innovative business models and ESCOs can offer consumers clean technology solutions that integrate technology solutions that meet their needs, as well as financing options to pay for the system over time, often with no upfront costs and thus overcome the high initial investment. Thus, increasing access to finance for ESCOs, and connecting to local and international funding sources.

Moving from selling products to selling services is becoming an increasingly important business model for renewable energy companies. We found that beyond social or environmental concerns, it is also a way for a company to differentiate itself from its competitors. An ESCO can differentiate itself from competitors such as traditional utility companies by providing a unique tailored service to its consumers. Providing renewable energy-as-a-service tends to require collaboration, especially the more complex and attractive service.

ESCOs can use this as a way to differentiate themselves in a crowded market, as is the energy or electricity supply market. Having an ESCO business model also allows businesses to generate recurring revenue streams, rather than just a one-off sale. As this model has the long term in mind, it also requires building longer consumer relationships. As is the case with interconnected systems, these types of business models require different stakeholders to become interdependent and influence the success of each other's businesses.

Financing mechanisms that are directed to build capacities, unlock access to finance and reduce risks are needed to develop the ESCOs and allow the deployment of cleantech integrated solutions.

This might include junior positions in a syndicated loan that is able to take the lead in financing and absorb the first losses in case these occur. A credit guarantee and a payment guarantee can be a very powerful mechanism to unlock financing to ESCOs from financial institutions and investors by reducing the risk of defaults from ESCOs and/or consumers.



SOLUTION AND OPPORTUNITIES

Another smart financing mechanism that can be implemented is the reimbursable grant that can be provided to ESCOs to cover transaction costs (e.g., energy audits, due diligence of customers, contractual arrangements, permits, etc) and reimburse the grant if the project is successfully executed. Another example is to implement a payment guarantee that covers the default in payment from the clients to the ESCO. These mechanisms can be used to strengthen the PAYGO model and facilitate access to credit to ESCOs.

Tied into these financial strategies another role at play are aggregated portfolios which allow access to innovative and competitive financial structures, facilitate economies of scale and thus reduce costs. In the interview with Mazi Mobility (Kenya), it was mentioned that manufacturing companies that supply e-bikes need to be financed too so that they can produce parts at lower costs compared to import costs in China. This helps stimulate local markets. However, it was also mentioned that it is not clear for mobility ESCOs how these funds can be channelled or structured. It was suggested that the said manufacturing companies should be those that directly supply e-mobility ESCOs.

For e-mobility development, there is a need for more investment and more players to be involved in the market. Having a specific policy centred around integrated options would likely improve this. However, as noted, there are no such policies which allow for this. From the consultation, it became clear that some energy service providers or developers were not currently taking any or limited risks but were very interested in the topic.

For example, Energy Private Developers (EPD) noted their interest in expanding their service offers. The growing market trend was echoed by the Energy sector industry association in Rwanda. This information was collected from the interview process following the prompt, “What are your recommendations for international funding agencies to promote the growth of the ESCO market and stimulate innovation?”.

Overall, the recurring answers were:

- > Implement more grant funding opportunities.
- > Tailor the funds ticket sizes to the inflation rate.
- > Review or reduce eligibility criteria, while at the same time also working towards improving the investment readiness of the grant awardees.

In summary, addressing these by the following methods will unlock significant renewable energy investment flows, build capacity, develop tools and processes that standardise market practices, connect stakeholders, increase collaboration. Provide smart financing that attracts and unlocks capital.



CONCLUSION

A significant amount of investment is required in Africa to meet the needs of growth in a sustainable way and meet the challenges of climate change. ESCOs and the integration of clean tech can be a part of the solution, but the market needs support to develop and scale up. This would require a significant amount of flows of capital to spark the market transformation.

This report served to provide an initial analysis and evaluation of the current and future state of the ESCO market in Africa, and their capability to offer cleantech integrated solutions - renewable energy and e-mobility - in the market. The ESCO model provides capex solutions to meet the urgent demand for clean energy in an inclusive way.

The report found that there is a nascent market of ESCOs that face substantial challenges but also opportunities, and it is important to address these if they want to be positioned to offer consumers with affordable and reliable cleantech integrated solutions. ESCOs are in a very good position to scale up cleantech integrated solutions - renewable energy and e-mobility - in Africa, and overcome some of the barriers that consumers face.

To mobilise capital to ESCOs and cleantech solutions it is fundamental to address market barriers specific to each stakeholder - consumer, ESCOs, financiers. A common barrier found in all the identified countries is related to the stakeholder disarticulation. There is a persistent lack of trust and misalignment of priorities. As well, there is a lack of capacities and knowledge on the different types of business models and financial structuring that can help to build trust between ESCOs, consumers, and financiers. This would be a way to enable collaboration between cleantech providers and key stakeholders.

ESCOs require support to incorporate smart business models and financial strategies to be able to overcome the barriers and challenges faced. Business models and financial strategies can help consumers and financiers as well to overcome the barriers and risks they perceive and are preventing them from investing in cleantech integrated solutions.

A clear and incentivising regulatory and policy framework, that allows cleantech to compete with fossil fuel solutions, play a key role in facilitating ESCOs and cleantech solutions to scale up in Africa. Currently policy and regulation related to cleantech solutions in Af-

rica changes from country to country, and this has an effect on the types of technology solutions that are financially feasible. In some countries, fossil fuels are still subsidised or cleantech solutions present fiscal burdens that difficult their competitiveness. This influences the type of business models and financing strategies that are required in each market to overcome the challenges and take advantage of the opportunities. Digitalisation and data integration platforms could also facilitate more collaboration. It can also help to address the finance financing barriers.

A unifying factor across the region is that it is urgent to unlock the financing necessary to achieve their climate and energy goals, leapfrogging traditional fossil fuel-based electricity generation all together and at the same time facilitating access to affordable, reliable and clean energy. This could be made possible through smart business models and financial strategies that position ESCOs to offer consumers integrated cleantech solutions.



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ABOUT INTEGRATE TO ZERO

Integrate to Zero (I2Z) is a global philanthropic initiative that provides insights, supports deployment and advocates for scaling consumer-generated energy systems, 'on-site, on-road, on-grid', so that integration happens more quickly and inclusively. We work collaboratively, linking global expertise with local implementers. Together, we are changing what's possible. I2Z is an initiative supported by the Climate Emergency Collaboration Group – a philanthropic collaboration focused on climate multilateralism.

ABOUT BASE

Established in 2001, BASE is a Swiss not-for-profit foundation and a Specialised Partner of the United Nations Environment Programme.

BASE combines expertise in technology, markets, economics, finance and business development to deliver effective solutions for every project. BASE builds bridges between sectors and actors at the nexus between climate solutions, finance and international development. BASE seeks deeper solutions beyond the low hanging fruit, including markets that are challenging and underserved. The actionable solutions that we design, develop and implement seek to be disruptive, self-sustaining and replicable.

