

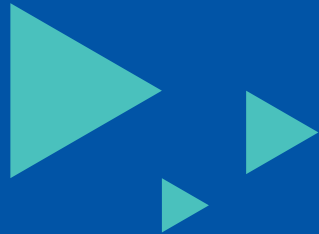


International
Labour
Organization

► Market Systems Analysis for Skills in the Renewable Energy and Energy Efficiency Sub-sectors in Zambia

Final Report
April 2020





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First published March 2020

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ISBN: 9789220328057 (print)
9789220328040 (web pdf)

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Printed in Zambia

Acknowledgments

AGORA GLOBAL undertook the study, developed, and facilitated the draft Market Systems Analysis report. The study undertaken was part of the Skills Development for the Renewable Energy Sector (SKIDRES) Pilot project, for use by the Government of the Republic of Zambia, the International Labour Organization, Kafue Gorge Regional Training Centre, the Embassy of Sweden Lusaka, Zambia and other Institutions in promoting skills development in the Renewable Energy and Energy Efficiency sectors in Zambia and the SADC region.

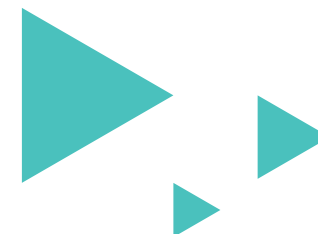
The various stakeholders within the renewable energy, energy efficiency, skills development and related sectors who participated in the assessment are hereby recognized. Acknowledgment is made of the technical support made by Gun Margareth Eriksson, Steve Hartrich, Laura Brewer and Jens Dyring Christensen. Further acknowledgement is made of assistance and reviews provided by Musoli Kashinga, and Mpulu Makayi of the pilot SKIDRES project, Gerald Tembo and the overall guidance of George Okutho, Country Director, ILO Country Office Lusaka.

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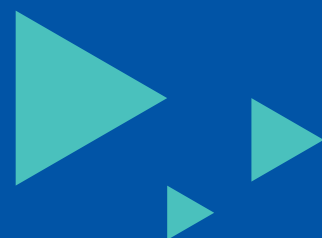
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► ACRONYMS

CEC -	Copperbelt Energy Corporation
CBU -	Copperbelt University
EE -	Energy Efficiency
ERB -	Energy Regulation Board
ICH -	International Centre for Hydropower
ILO -	International Labour Organization
IPP -	Independent Power Producer
KGRTC -	Kafue Gorge Regional Training Centre
MSA -	Market systems assessment
PV -	Photovoltaics
RE -	Renewable Energy
SAPP -	Southern Africa Power Pool
SDF -	Skills Development Fund
TEVETA -	Technical Education, Vocation & Entrepreneurship Authority
UNZA -	University of Zambia
ZARENA -	Zambia Renewable Energy Association
ZFE -	Zambia Federation of Employers
ZCTU -	Zambia Congress of Trade Unions



► EXECUTIVE SUMMARY

The International Labour Organization (ILO) with funding from the Swedish International Development Cooperation Agency (Sida) is supporting the Kafue Gorge Regional Training Centre (KGRTC) to implement a pilot project for skills development for the Renewable Energy (RE) and Energy Efficiency (EE) sub-sectors in Zambia. It is thought that KGRTC, with its existing experience and expertise in hydropower and existing private sector engagement portfolio, has the potential to become a key player in skills development for RE and EE technologies. In addition, KGRTC could be well placed to address and build knowledge in EE, especially in areas such as metering and analysis, grid optimization, smart grids and energy audits within the industry. Under the pilot project, the ILO contracted Agora Global to undertake a market assessment in order to develop a better understanding of the market systems for RE & EE and especially with regards to the opportunities and constraints for current and future skills development that are imperative for growing the sector.

Hydropower is the dominant energy source in Zambia, providing most of Zambia's electricity supply (84%), while solar photovoltaics (PV) is the fastest growing technology.

The growth in solar comes from a range of installations, from small solar home systems, to mini- and micro-grids, as well as some commercial scale solar parks. Other sources with some potential in Zambia include wind, geothermal and biomass energy. ZESCO Ltd, is the state-owned utility which owns and operates 90% of the generation, transmission and distribution of electricity in Zambia and works closely with the Ministry of Energy who has overall responsibility for the sector. The pivotal role of ZESCO Ltd cannot be ignored when looking at power in Zambia. Severe underinvestment in and by ZESCO Ltd. is another major, and probably the most significant challenge of Zambia's electricity sector. Concerns around mis-management as well as broader macroeconomic challenges - with high and unsustainable sovereign debt levels being the most important one - means that ZESCO is not investing sufficiently in new hydropower, is not providing the government capital or guarantees in consortia with

international power developers entering the country and is not seen as a credible offtaker for power purchase agreements - the cornerstone of agreements with private investors. The result of this, in addition to the non-cost reflective tariff currently in place, is that investments are not forthcoming, and thus the twin problems of load shedding and energy poverty are likely to continue for some time.

In consultations carried out with the private sector, a shortage of skills was not identified as a fundamental constraint for expansion of renewable energy. Lack of funding and the regulatory environment, were more pressing concerns. This is as a result of the countries' reliance on hydropower over several decades, a consequence of which has led to Zambia developing a relatively strong base of engineers and related skills to build on which presents a significant opportunity going forward for upskilling and looking at how existing skills in the market can be transferred to new areas. This in turn could help to address the skills gap that is likely to develop as the country moves into an energy future with a more diverse supply and new ways of connecting and producing power.



Renewable energy and energy efficiency are complex sectors that both require a wide range of specialist skills across the respective supply chains. These skills include but are not limited to; basic electrical skills, tariff negotiation and contracting, technology development relating to renewable energy, power station design and construction, power systems and trading, metering and analysis, grid optimization, smart grids and energy audits, financial analysis and feasibility studies as well as broader entrepreneurship, business management & salesmanship skills. Skills delivery in all of these areas is critical to supporting the country's ability to fulfil the growth potential across the renewable energy and energy efficiency sectors.

It is important to note that these skills span across a wide range of skills levels, from TEVET, to University level, and beyond this to highly specialist expertise for people who are in-work and can build off years of practical experience already. Whilst

skills delivery, and specifically TEVET in Zambia has received significant attention and investment in recent years with the introduction of initiatives such as the Skills Development Fund (SDF) as one example of a new mechanism implemented to improve efficiency and effectiveness of the TEVET system, skills delivery is expensive, especially in sectors such as RE & EE where it requires large-scale investment in equipment and specialist trainers to deliver practical and realistic training that is relevant to the private sector.

Using a demand-driven model for skills delivery is critical in ensuring relevance to the needs of the private sector that in turn can ultimately drive growth, but also in ensuring that there is a sustainable mechanism for delivery (e.g. that companies want and will pay for training). Currently in Zambia, and specifically within KGRTC, the foundations of demand-driven skills delivery are in place, with positive examples of private sector

engagement in curriculum development and participation in targeted trainings. Despite this, core mechanisms that could drive coordination and collaboration are not in place and this is impacting the financial viability of training institutions such as KGRTC as they struggle to market their courses and truly meet market demand. Conversely, private sector companies are struggling to meet recruitment needs and find relevant expertise locally. Many as a result rely on importing skills or international support.

If KGRTC, with support from other skills development providers and relevant stakeholders can address the critical constraints that are currently preventing them from being able to respond fully to market demand, they will be able to apply a proactive approach to addressing future skills gaps and support the development of a capable and skilled workforce that in turn supports the growth of the RE & EE sectors in Zambia.

Four key principles are applied when looking at potential interventions to overcome the challenges relating to skills delivery and skills gaps. These are; **sustainability** (especially of actors such as KGRTC), ensuring that training is **demand-driven**, and increasing **coordination** and **collaboration** between stakeholders to reduce duplication, improve efficiency and leverage new opportunities.

This report is structured to first analyse the broader constraints within the renewable energy and energy efficiency sectors, before then looking at specific constraints relating to skills delivery and skills gaps within the sectors (Section 4). In Section 5 we explore specific skills gaps as were identified by stakeholders interviewed as part of the analysis. Section 6 provides conclusions as a result of the analysis as well as proposing four intervention areas that could be carried forward by the SkiDRES project with the specific objective of addressing opportunities and constraints for current and future skills development that are imperative for growing the renewable energy and energy efficiency sectors. These four interventions are based on the following four hypotheses:

- ▶ Improved access to information through greater coordination and collaboration between renewable energy and energy efficiency market actors and the skills delivery system would enable access to information that could lead to more demand-driven training offerings.
- ▶ Improving relationships with and engagement of private sector companies in skills delivery will enable more innovative and demand-driven business models for training and result in greater likelihood of employment.

- ▶ Increased coordination between skills delivery institutions and private sector will improve the likelihood of sustained employment and bridge the gap between skills delivery and jobs
- ▶ Improving the capacity of KGRTC and other training institutions will enable them to respond to opportunities and develop appropriate and relevant training courses

Importantly to note, there are already a number of existing initiatives within the renewable energy and energy efficiency sectors in Zambia and these provide a solid foundation from which SkiDRES can build and, or identify opportunities for future collaboration and coordination. With regards to the ongoing initiatives with KGRTC, it is critical that SkiDRES leverages the opportunities outlined above to ensure that a more demand-driven approach is adopted and to reduce the overall reliance on subsidies for training delivery both in the remaining timeframe of the project and beyond. Good headway towards this goal is already being made and solid learnings have already started to be produced. KGRTC have big ambitions but also recognise the need to focus so that they can improve the overall sustainability of their business model and position themselves well within the region. The four interventions outlined above could assist in building focus and ultimately driving sustainability with the KGRTC business model.



► OVERVIEW OF THE ASSIGNMENT

The International Labour Organization (ILO) with funding from the Swedish International Development Cooperation Agency (Sida) is supporting the Kafue Gorge Regional Training Centre (KGRTC) to implement a pilot project for skills development for the Renewable Energy (RE) and Energy Efficiency (EE) sub-sectors in Zambia. It is thought that KGRTC, with its existing experience and expertise in hydropower and existing private sector engagement portfolio, has the potential to become a key player in skills development for RE and EE technologies. In addition, KGRTC could be well placed to address and build knowledge in EE, especially in areas such as metering and analysis, grid optimization, smart grids and energy audits within the industry. Stronger partnerships with the private sector could enhance the institutional capacity development of KGRTC through increased outreach, impact, diversification, good governance and financial sustainability.

01

Under the pilot project, the ILO contracted Agora Global to undertake a market assessment in order to develop a better understanding of the market systems for RE & EE and especially with to the opportunities and constraints for current and future skills development that are imperative for growing the sector.

The demand for RE & EE skills is a function of the current demand for renewable energy and energy efficiency and current limitations to market development. Whereas the skills gap is one of the key constraints to development of the RE & EE sector there may be other constraints including political, social, environmental, legal and economic, which are equally important to understand in order to develop an overview of the market system for RE & EE.

This market system analysis (MSA) assesses the broader market for renewable energy generation and distribution as well as energy efficiency to better understand the potential growth in these sectors, but with a key focus on the skills needed to facilitate this growth. This analysis covers the following two key elements:

- ▶ An overview of the market systems for renewable energy and energy efficiency focussing on the basic value chain and the supporting functions and the rules and regulations with a specific focus zooming in on the supply of and demand for current and future skills needs that are required to further grow and improve the performance of the RE&EE sector
- ▶ The identification of the root causes and constraints with regards to current and future skills development that must be addressed as a basis for pinpointing where the project should target its interventions.

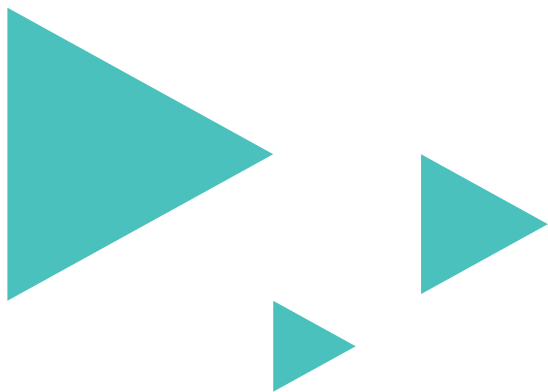
The MSA commenced in November 2019 and in-person consultations took place in December 2019 and January 2020. An internal review workshop also took place in January 2020 where the key findings of the MSA were presented and discussed and Agora worked with the SkiDRES team to start looking at potential intervention areas that could be carried forward over the next nine months and beyond.

1.1 Fieldwork methodology

Prior to the fieldwork commencing, Agora Global identified major stakeholders who should be consulted as part of the assessment and developed a fieldwork plan to help guide the initial. The fieldwork dates aligned with the SkiDRES supported “Skills for Green Jobs” event held in collaboration with Kafue Gorge Regional Training Centre (KGRTC). This event served as an excellent foundation through which to engage with a number of stakeholders and be signposted to others who would be relevant to meet during the second week of the fieldwork.

Given the limited timeframe for this project we prioritised stakeholders based around Kafue Gorge, within the Copperbelt Province and within Lusaka. The market assessment included a wide range of stakeholders from private and public sectors and included dialogue with individuals in C-Level positions, HR personnel, skilled workers (e.g. engineers) and lower-skilled workers. A full list of stakeholders met with during the fieldwork is shared in Annex 1 and meeting notes from all stakeholder meetings are included in Annex 2.

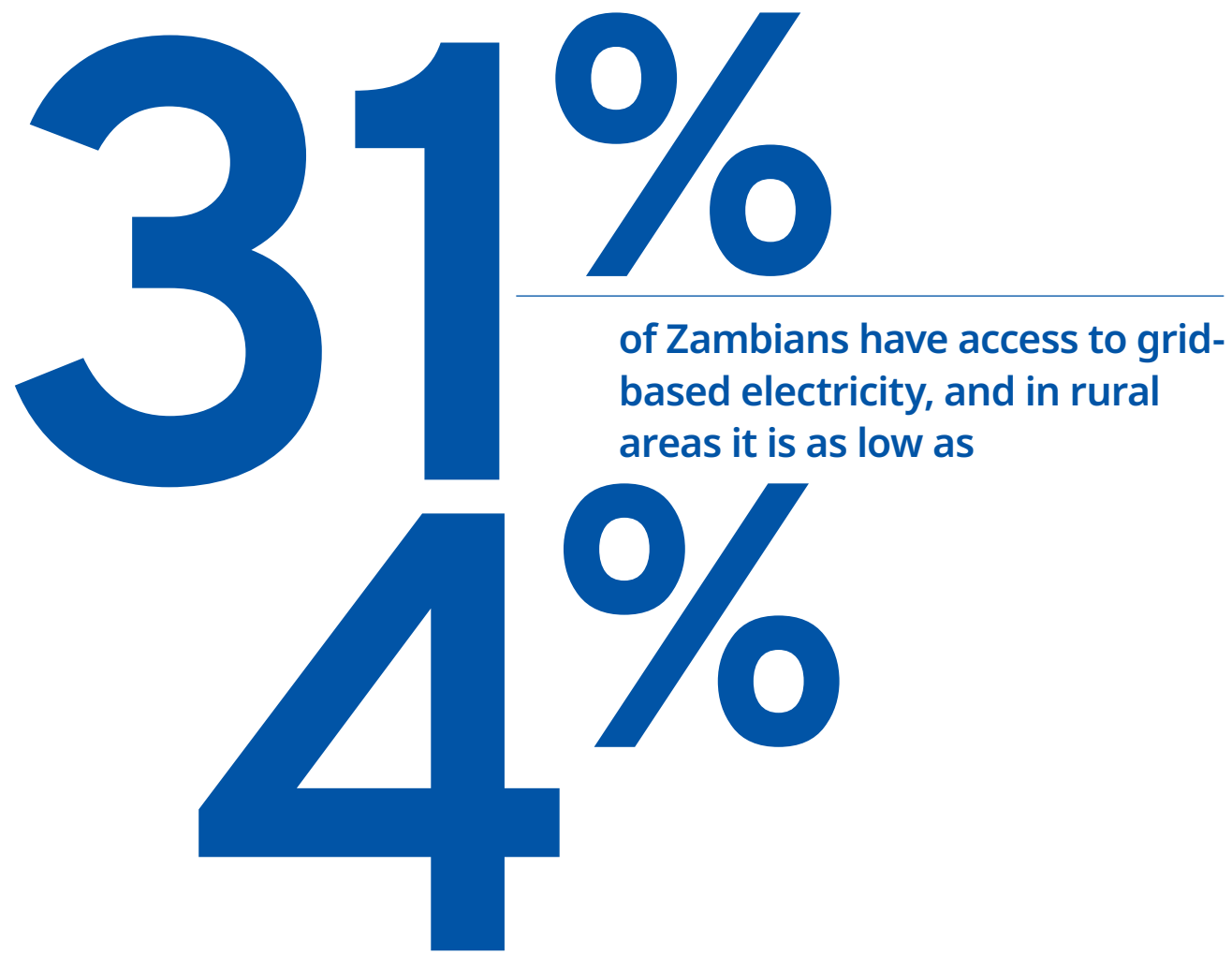
The fieldwork format involved using key informant interviews (KII) with all stakeholders for which a series of question guides were developed. We held a focus group discussion (FGD) in a rural community to gain an understanding of rural perceptions relating to on-grid access and the rate of utilisation of solar home systems (SHS).



► CONTEXT AND OVERVIEW OF THE SYSTEMS ANALYSED

02

Only



Only 31% of Zambians have access to grid-based electricity, and in rural areas it is as low as 4%¹. Whilst connecting more of the population to the national grid is a national ambition, it is recognised that many consumers will rely on off-grid sources. Currently, the country's energy consumption is mainly wood fuel (i.e., firewood and charcoal), which accounts for over 70% of total primary energy supply. Zambia, although having abundant natural supply of hydropower, has not managed to increase production in pace with demand. As a result, power shortages (load shedding) are frequent. In 2015, an energy deficit of close to 700MW occurred (with demand standing at 1,949MW while supply only stood at 1,281 MW) which was largely due to the drought resulting in a shortage of water supply, despite capacity within the hydropower stations being present. Hydropower is the dominant energy source in Zambia, providing most of Zambia's

electricity supply (84%), while solar photovoltaics (PV) is the fastest growing technology. The growth in solar comes from a range of installations, from small solar home systems, to mini- and micro-grids, as well as some commercial scale solar parks. Other sources with some potential in Zambia include wind, geothermal and biomass energy. Of these, the latter is likely to present the greatest opportunity in the short to medium term². The increased use of solar PV has many benefits, not least the fact that installations are scalable, flexible and quick to install. Despite this, integration of solar PV also introduces some challenges. Perhaps the most important is that, because of the intermittent nature of solar, backup, in the form of batteries or baseload power is required. With the connection of solar to the grid, the challenge becomes one of how to integrate solar as a source so that the power system is balanced. Despite attempts by

¹ These and further figures in this section are taken from the following source, unless otherwise indicated: Zambia Ministry of Energy 'Scaling up renewable energy in low-income countries: investment plan for Zambia', available at: <https://www.moe.gov.zm/wp-content/uploads/2019/02/Zambia-SREP-IP.pdf>

² Source: stakeholder consultations in Lusaka, January 2020.

the government to manage the situation – by regulating the introduction of new intermittent sources of supply and simultaneously increasing the baseload capacity of the grid – this will continue to be an ongoing challenge in the Zambian power sector (as it is in most other countries where renewables are coming online).

ZESCO Ltd, the state-owned utility which owns and operates 90% of the generation, transmission and distribution of electricity in Zambia and has overall responsibility for the sector (together with the Energy Regulatory Board (ERB)) is at the helm of this development and the new energy policy – which was yet to be officially released at the time of the MSA – is likely to lay out a strategy for grid integration. The pivotal role of ZESCO Ltd cannot be ignored when looking at power in Zambia. Severe underinvestment in and by ZESCO Ltd is another major, and probably the most significant challenge of Zambia's electricity sector. Concerns around mis-management as well as broader macroeconomic challenges – with high and unsustainable sovereign debt levels being the most important one – means that ZESCO is not investing sufficiently in new hydropower, is not providing the government capital or guarantees in consortia with international power developers entering the country and is not seen as a credible offtaker for power purchase agreements – the cornerstone of agreements with private investors. The result is that investments are not forthcoming, and thus the twin problems of load shedding and energy poverty are likely to continue for some time. From this perspective, the emergence of initiatives such as Africa Green Co – which aims to provide intermediary offtaker agreements – is positive but it remains too early to say whether such initiatives will be successful.

Two other aspects of the Zambian electricity sector warrant a brief comment in the context of this analysis. One is the existence of the Southern Africa Power Pool (SAPP), which was developed to enable countries in Southern Africa to trade electricity across borders and thus counter some of the challenges related to supply and intermittency. Due to both general production shortages in the region as well technical barriers related to the transport of electricity across Zimbabwe, SAPP is currently an underutilised resource from a Zambian perspective. The second issue relates to the potential for energy efficiency to reduce some of the load shedding as well as baseload capacity needs of the country. Energy efficiency is an under-explored issue in the Zambian context, but one which has stimulated interest for both ZESCO and ERB. Broadly speaking, the greatest potential for energy efficiency is currently two-fold: on the one hand increase the availability of products and knowledge about energy efficient consumer products and public infrastructure (e.g. street

lighting) and on the other hand create incentives (or a change of mind set) amongst large industrial consumers to increase the efficiency of their production and operations (e.g. in the sugar and mining industries).

Whilst specific statistics on the number of job opportunities available or number of people employed in the RE & EE sectors in Zambia are not available, a 2018 report by the International Renewable Energy Agency (IRENA) cited a number of global trends that can likely be applied to the Zambian context. The report said that there had been a 5.3% increase in the total number of global renewable energy employment opportunities from 2016 to 2017 and that the PV industry is the largest employer with almost 3.4 million jobs, up 9% from 2016. It also stated that that biofuels employment also expanded by 12% and that 63% of people employed in hydropower were employed in operations and maintenance. Finally the report highlighted that employment opportunities remained limited in Africa, but the potential for off-grid jobs is high, particularly as energy access improves and domestic supply-chain capacities are developed.

Skills delivery is critical to supporting the country's ability to fill these job opportunities as they arise and as such the third system to be analysed is the skills delivery system in Zambia. Skills delivery, and specifically TEVET in Zambia has received significant attention and investment in recent years with the introduction of initiatives such as the Skills Development Fund (SDF) as one example of a new mechanism implemented to improve efficiency and effectiveness of the TEVET System and address the country's chronic unemployment situation. The Technical Education, Vocation & Entrepreneurship Training Authority (TEVETA) closely govern the skills delivery system and are responsible for curriculum development, certification and standards, quality assurance, assessment and teacher training amongst others. TEVETA works closely with the private sector and Zambia Federation of Employers to ensure that training is demand-driven and to try and increase employment opportunities available to young graduates. Whilst unemployment in Zambia is at its lowest point since 1993, currently standing at 13.2% unemployed according to the Labour Force Survey (CSO) of 2019, the existing institutions that provide technical education and vocational training and those that promote the generation of employment do not have the ability and resources to adequately offer skills to the large number of unemployed to enable them to enter productive employment.

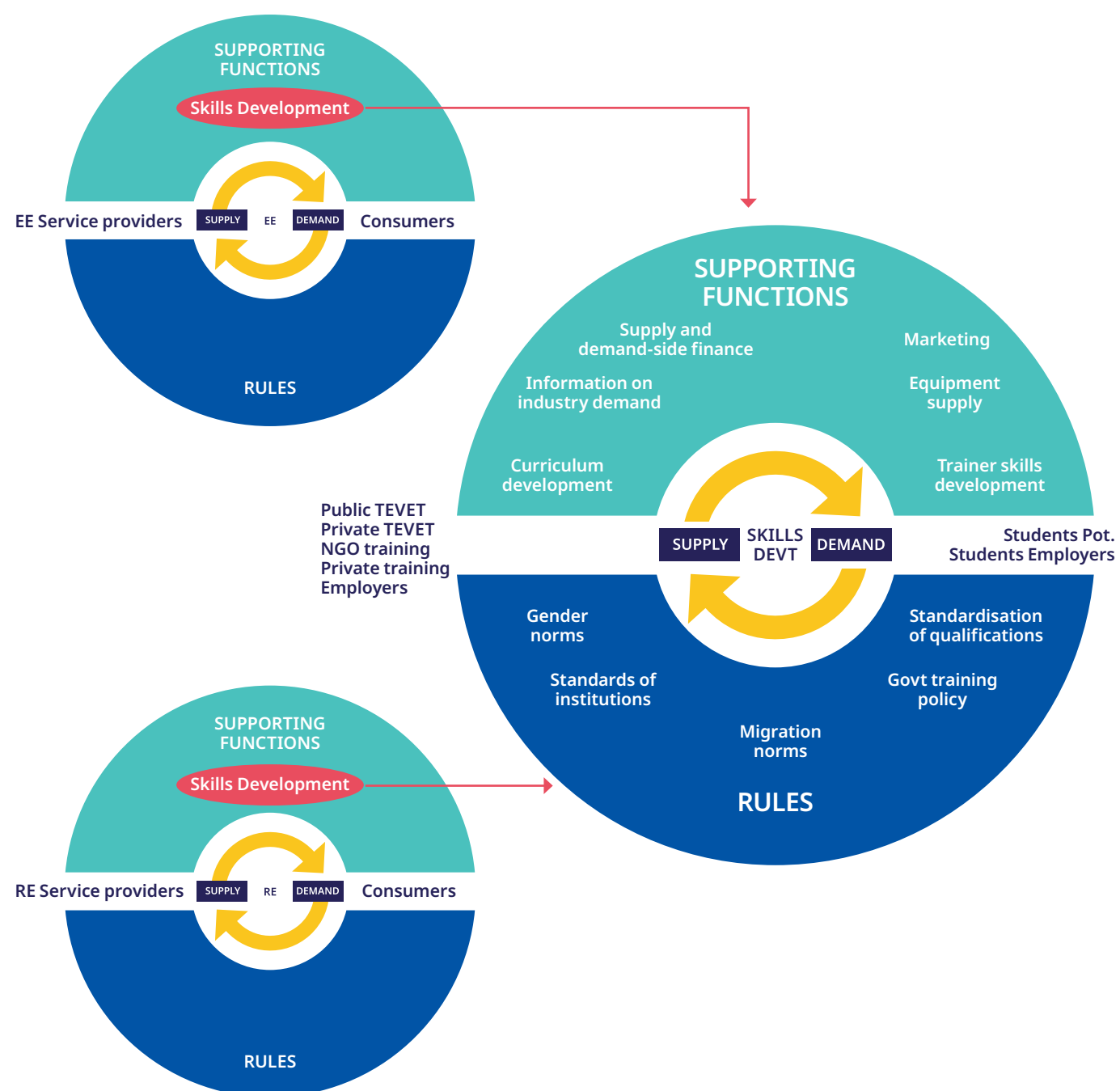
► ANALYSIS AND FINDINGS

The following section looks at the three identified market systems; renewable energy, energy efficiency and skills development.

03

Skills development is a supporting function of both renewable energy and energy efficiency so for the purposes of the MSA we look at skills development as a separate market system as illustrated in Figure 1. For each system we provide an overview of the core functions and rules of each system, the key symptoms of underperformance for each system, as well as in-depth analysis of critical constraints. Each section ends with a brief summary of key areas of opportunity within each system which form the foundations of the proposed interventions in Section 5. The images in Figure 1 are market systems diagrams. These diagrams are institutional frameworks that depict transactions together with the supporting functions and the rules which dictate how effectively those transactions work. The supporting functions and rules in turn comprise their own transactions with their own supporting functions and rules and, together, these transactions comprise the market system.

► Figure 1: Skills development as a supporting system of renewable energy and energy efficiency.

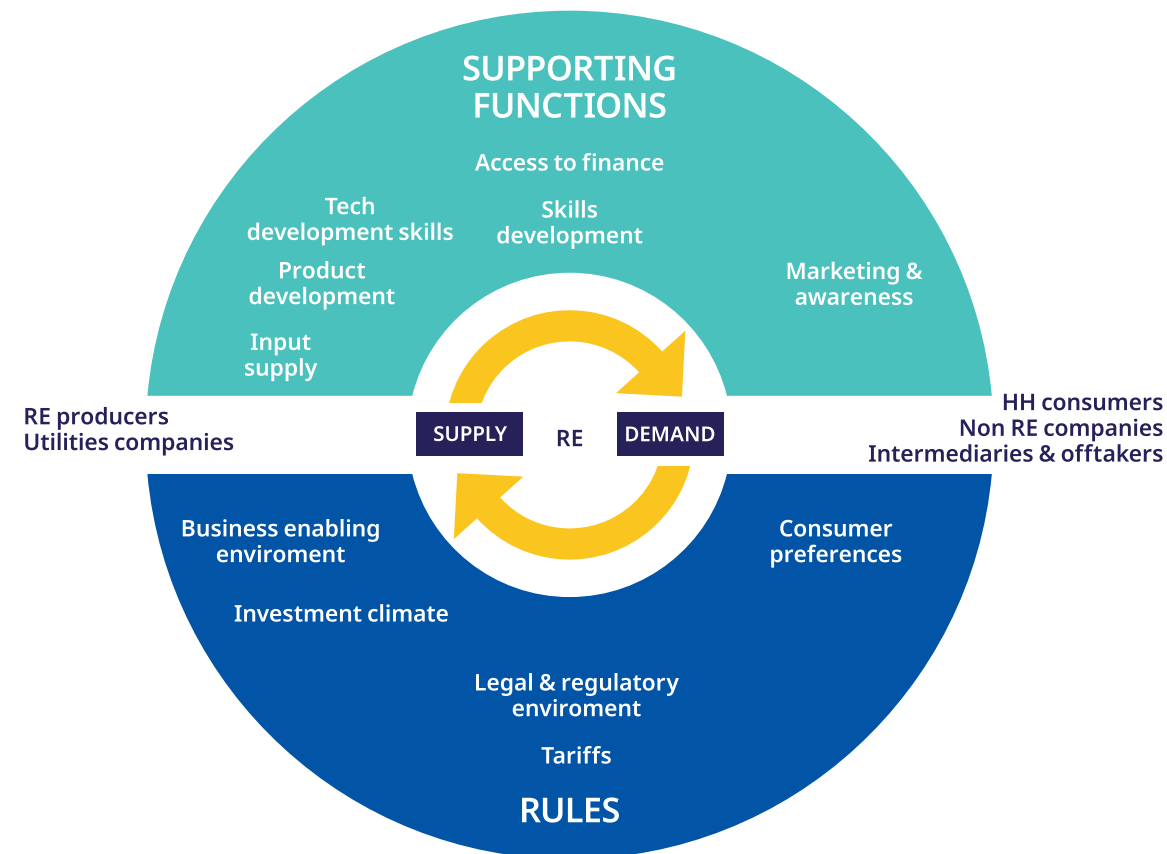


► RENEWABLE ENERGY

04

4.1 Nature and Mapping of the system

► Figure 2: Renewable energy market system



4.2 How the system works – a summary of supporting functions and rules

Renewable energy is the main source of power in Zambia with only 15% coming from non-renewable sources (coal, heavy fuel oil)³. The renewable energy market is dominated by ZESCO Ltd, the state-owned utility which owns and operates 90%

of the generation, transmission and distribution of electricity in Zambia and has overall responsibility for the sector (together with the Energy Regulatory Board (ERB)). Other utility companies exist although these are limited in number and are dependent on utilising the infrastructure owned and operated by ZESCO. Whilst independent power providers (IPPs) operate independently and have autonomy over most aspects of the business, they are subjected to the tariffs set by ERB and have limited capacity to influence them and limited alternatives currently in terms of offtakers to whom they can sell to.

Renewable energy companies are influenced by a range of factors, most importantly by **availability**

³ Source: USAID (<https://www.usaid.gov/powerafrica/zambia>) and Zambia Ministry of Energy 'Scaling up renewable energy in low-income countries: investment plan for Zambia', available at: <https://www.moe.gov.zm/wp-content/uploads/2019/02/Zambia-SREP-IP.pdf>

4.3 How the system is failing – symptoms of underperformance

of and access to natural resource inputs such as water, wind, solar, geothermal and biomass (inputs). Beyond these natural resource inputs, they also need **access to highly specialised machinery and equipment** to develop the required infrastructure, the majority of which is currently imported to Zambia.

Renewable energy provision also requires specialised skills at all levels, from generation, transmission and distribution of energy, to infrastructure planning and development and core business management and operations skills. Importantly, and somewhat uniquely to the renewable energy sector, renewable energy companies often require workers with **blended expertise** – largely because most renewable energy companies are small-scale and require employees to cover broader areas in order to reduce operating costs. These skills can be hard to find and as such creates a high level of competition for staff within the market.

Renewable energy generation and provision requires significant upfront investments, primarily in infrastructure development meaning that **access to finance**, whether through loans, government support or from international investors plays a hugely important factor in supporting growth of the RE sector.

The investment climate and business enabling environment are also critical for renewable energy companies seeking to attract investment or invest directly in start-up companies in Zambia as restrictive processes can delay projects from getting started or in some cases prevent them from going ahead at all. **The regulatory environment** also impacts the ability for companies to develop bankable business plans, as restrictive tariffs can prevent profitability and affect the overall bankability of businesses.

Consumer awareness and preferences are also key, particularly in the off-grid market where consumers are faced with a greater choice in terms of the type of energy sources they can choose to use. Often, and understandably, consumers, particularly poorer consumers will opt for the option with lowest upfront costs. However, energy solutions based on renewable fuels require greater upfront investment but once installed have very low running costs (because fuel costs are zero). Solutions relying on diesel or oil fuel may have low upfront costs to access but high running costs. Lack of understanding of these cost aspects thus to some extent hamper the rollout of small-scale renewables.

The most obvious indicators of underperformance of the sector is on the one hand the low rate of electrification (% of households connected to the grid) and on the other the country's inability to produce enough electricity to satisfy current demand. The fact that only 31% of the population have access to the grid, however, masks two underlying and contradictory forces: the number of connections to the grid (as well as offgrid installations) is continuously increasing, however, not enough to keep pace with population growth. Hence, it isn't so much that the Government of Zambia isn't successful in increasing connections as it is that they are not able to expand in pace with the demand. The country's energy deficit (of approximately 700MW) is in part due to several years of drought affecting production in hydro power installations. It is also, however, a result of underinvestment in current and new capacity – by the government and the private sector- investments which should have been made as a reasonable response to the increased variability of current production facilities as well as continued increasing demand from a growing population.

Both symptoms suggest that there is a need for more companies to enter the market (and for existing companies to expand) and increase energy production to meet current demand. Whilst some new companies are entering the market, there are also very obvious and public challenges that would-be investors face. Fundamentally this includes the financial instability of Zesco currently as the sole offtaker in Zambia. Without guarantees of payment from Zesco, and with such widespread press about Zesco's current inability to pay existing IPPs, Zambia doesn't present an attractive investment climate for new investors. This information was repeated by a number of companies who have entered the market, and was triangulated with IDC. This to some extent explains (although there are other reasons as well) why a lot of solar PV expansion comes from IPPs operating in off-grid solar solutions where they sell directly to the consumer (and not to Zesco). Larger-scale solutions, who would need to rely on Zesco for offtake agreements, are less common.

Whilst broadly speaking Zambia has access to a skilled workforce with two reputable Universities offering higher education courses in renewable energy (Copperbelt University and The University

of Zambia) and multiple TEVET colleges providing quality training in engineering and other relevant trade areas, there is still evidence of a strong reliance by renewable energy companies on international experts to support core components of their business. There is also a sizeable challenge with the retention of workers, with many companies complaining of skilled workers being poached by competitor companies and in some cases internationally. This would suggest that there is the need for a greater number of skilled workers to support growth of the sector.

4.4 Critical constraints to improving renewable energy

Changing access to natural resource inputs

Zambia is blessed with a natural geography which has allowed a strong hydropower sector to develop over the decades and there still is abundant potential⁴ but more recently companies have looked to alternatives such as wind, solar, geothermal and biomass as a means to diversify energy sources and help reduce the current deficit and increase overall supply. This in part is a natural development of the energy sector, with companies looking at alternatives that meet consumer demand without necessarily relying on the traditional grid-based model and large scale assets (such as hydropower plants).

It has also occurred as a result of necessity however, with variable weather patterns in recent years (as a result of climate change) resulting in less rainfall and reduced availability of hydropower assets. These weather patterns have resulted in many rivers drying up and water levels in areas such as Kariba Dam going down meaning that hydropower stations are having to limit or reduce operations. In late December 2019, Kariba Dam stood at its lowest level since at least 1996 and currently the levels are 8.36 percent of what is needed for power generation⁵. Beyond climatic factors, the dependency of critical sectors such as agriculture on water access has also led in some regions to farm blocks taking water for their own use. The potential for continued hydropower growth is reportedly in the north of the country, where weather patterns have been more favourable.



⁴ 6000 MW was a figure that was mentioned by stakeholders

⁵ Earthobservatory.nasa.gov

Beyond hydropower, Zambia has greatest potential in solar energy and this is evidenced by the “solar boom” that Zambia is currently experiencing in terms of new actors in the market. Some companies are exploring opportunities in wind, geothermal and biomass solutions but it is not known to what extent these will be able to scale in the next few years and for the most part are at early stages in terms of testing and exploration in Zambia.

A challenging regulatory and enabling environment and investment climate

The Energy Regulatory Board (ERB) in Zambia has supported the development and implementation of a number of new policies and frameworks in recent years in support of enabling new market actors to enter the market. These include the regulatory framework for minigrids and revisions to the country’s new Energy Policy that is soon to be launched. Whilst these initiatives have opened up the market, particularly for minigrid operators as a result of the increased ease of accessing permits and licenses and ability to import and export power, one major challenge remains; that of the tariffs that are set by ERB. The tariffs are not sufficient to provide cost-recovery for Zesco, yet higher rates may be unaffordable for large sections of the population. This is a well-known challenge (and indeed common in many developing countries) and ERB has recently hired a UK-based firm to carry out a cost of service study in 2020. This study has already been delayed for over six months however and is likely to take another 12 months to completion. In the interim, the government (and ERB) intend to increase tariffs further without waiting for the findings of the study in order to keep Zesco operating as its costs mount (and debt increases).

Beyond the tariff issue, one of the other biggest constraints in the renewable energy sector is the low creditworthiness of Zesco as the sole off-taker for on-grid projects. Investors are not able to commit funds, and banks are unable to consider business plans as bankable given the huge risk of default by Zesco. There are a number of known public cases in Zambia currently where Zesco has been unable to pay utility companies or IPPs and this is having a huge negative impact on the investment climate and ability of investors to commit.

Limited options for accessing finance and prohibitive rates for borrowing

Total lending in Zambia has increased steadily in the past decade and the World Bank Ease of Doing

Business Surveys ranking Zambia as the 8th best country in the world for access to credit. The reality however is not so positive with most bank financing providing prohibitively high interest rates as high as 22% and nearly all commercial lending going to large companies with only 4% going to MSMEs⁶. Furthermore, many small or medium enterprises face challenges meeting the requirements put in place by banks such as the need to present audited accounts, multiple registration documents, or healthy revenue projections – this is particularly challenging for renewable energy companies who are reliant on receiving revenues from Zesco (as was highlighted above).

In Zambia, these challenges are being addressed to an extent by donor-funded initiatives who are providing loan guarantees or SME finance support but there are inherent challenges relating to the sustainability of such initiatives and even with concessional debt, the financing required is often too high for energy projects in Zambia. One current effort to overcome this constraint is being developed by Africa Green Co. an intermediary off-taker with the aim of encouraging new investments in the energy sector by mitigating the credit risk associated with the lack of creditworthy off-takers (Zesco). They will do this by providing guarantees for off-taking energy from IPPs and they will then sell to Zesco or individual large-scale consumers domestically and internationally. To do this, Africa Green Co has raised finance from the World Bank, the African Development Bank and private and philanthropic funders to pilot this initiative in 2020.

Limited access to relevant, demand-driven skills development opportunities

Skills development plays a critical role in supporting the growth of the renewable energy sector. These skills can range from highly specialised technical and engineering skills relating to power generation, transmission and distribution, to core business skills needed for the operations and management of renewable energy companies. Whilst most companies consulted during the analysis didn’t refer to the lack of skills as the biggest constraint they faced, there were several companies who made reference to specific areas where skills gaps exist or the fact that they were either having to seek international skills training solutions abroad, or fly in specialised consultants to support staff capacity building. These challenges are explored further in Section 4.3 where we look at the skills delivery system.

⁶ Inclusivebusiness.net



Limited access to technology & equipment (inputs)

Currently in Zambia, most technology and equipment input supplies are imported from Europe or China with very limited, if any local production. The need to rely on imports presents multiple challenges, from higher costs for transportation and duties, to time delays as items have to first be shipped, then clear customs before finally being transported to the end destination. It also means that companies have to liaise with foreign input suppliers, based overseas which can also create challenges with language, relationship building and limited ability to test the product prior to purchase.

For many companies it also means that they are reliant on technical or mechanical experts from the country of origin of the inputs having to fly to Zambia to provide technical support of for maintenance and repairs. Some input suppliers provide training to company employees on the products purchased but there is always a risk that these skills are lost with employee turnover and can only cover a limited spectrum of challenges that may occur.

Relying on international suppliers for inputs also means that companies need skilled workers who are able to understand the market to identify the appropriate inputs and input supplier, and beyond identification who are able to negotiate competitive prices and manage the importation and logistics of actually receiving the inputs.

- ▶ IPPs will continue to have an interest in investing in Zambia due to its geographical positioning, availability of natural resources, large hydro baseload resource and regional potential for trading but improvements to the regulatory and enabling environment would need to happen to encourage higher levels of investment.
- ▶ The new energy policy to be introduced in 2020 and the introduction of an intermediary to mitigate the financial risks currently presented by Zesco provide an opportunity to reduce risks, increase the profitability of the RE sector and potentially encourage more investments
- ▶ Localised production and reduced reliance on imports could create employment opportunities

Skills specific opportunities within the renewable energy sector

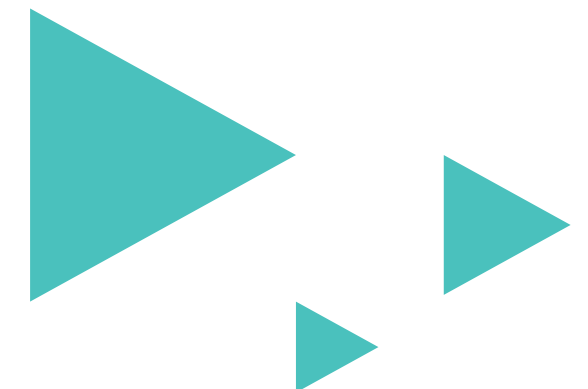
- ▶ There is a foundation of lower skilled or less experienced workers (engineers, electricians) who could adapt their existing skills base to new growth areas (e.g. solar)
- ▶ Demonstrated success of on-the-job training models in the mining sector could be replicated within the RE sector
- ▶ Qualified training institutions and trainers exist and are already engaging in skills relevant to RE but need support to be more demand-driven.

4.5 Opportunities for growth

The following section outlines key areas of opportunity within the renewable energy sector based on the findings of the MSA. These are developed further in section 5 where we look at intervention areas that cut across the three market systems.

Broader opportunities for growth within the sector

- ▶ The potential for solar in Zambia is huge, particularly in serving off grid communities, meanwhile hydropower remains important

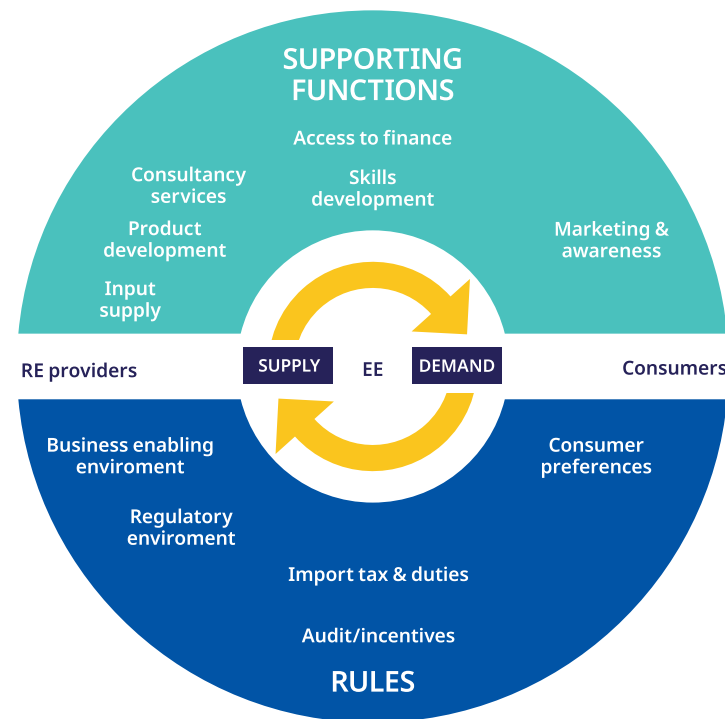


► ENERGY EFFICIENCY

05

5.1 Nature and Mapping of the system

► Figure 3: Energy efficiency market system



5.2 How the system works – a summary of supporting functions and rules

Given the limited number of companies operating solely with a focus on energy efficiency it is hard to breakdown the key functions and rules in the same way as we did for renewable energy. In many ways, the market system for energy efficiency can be said to be very similar to that of renewable energy and many of the **core functions are the same in terms of access to inputs, product and technology development, skills development, access to finance and consumer awareness**. Energy efficiency providers are also impacted in the same way as RE companies by the **business enabling environment, investment climate and legal and regulatory environment**, although as the below

will explain, there are currently **far fewer rules and regulations relating to energy efficiency** than those that govern the broader renewable energy sector.

Currently, The Ministry of Energy is mandated to oversee policy formulation and facilitate implementation of all energy programs including Energy Efficiency. There are currently no laws relating to Energy Efficiency in Zambia, nor is there a dedicated Energy Efficiency Agency, however existing legislation including the Electricity Act, Energy Regulation Act, and Rural Electrification Act do make reference to energy efficiency. It is anticipated that the new National Energy Policy will provide further guidance relating to energy efficiency and that further policies and frameworks will be developed going forward.

ERB is currently leading efforts related to energy efficiency labelling, standards and building codes and has set out the following areas as priority areas to be targeted. **Construction (public and private)** and specifically efficient lighting and solar water heating systems, **appliances & equipment** with tax waivers on importation of energy efficient

equipment, **industry** through incentives for power correction equipment and energy audits and power factor surcharges, **households** through the promotion of efficient use and production of charcoal, improved cook stoves and LPG for cooking and heating, and **transport** through high import duty on vehicles with high engine capacity, the introduction of carbon tax, and surcharges for vehicle imports older than 5 years. Despite these efforts, there are still currently no set Energy Efficiency targets in Zambia.

5.3 How the system is failing – symptoms of underperformance

There are very few energy efficiency providers for both products and services in Zambia. Whilst some companies may have a focus on energy efficiency within their core operations this is often limited to few dedicated personnel and often is more of a tick box initiative than anything meaningful. The potential for energy efficiency and the adoption of energy efficient products and services has not yet been maximised in Zambia despite recognition that it could be a critical way to address Zambia's energy challenges, including addressing the deficit. There are currently few incentives in place to encourage greater uptake of energy efficient products and services and whilst there are known benefits for businesses that could be achieved in terms of cost savings, there are very few companies in the market that are able to provide the required services to help companies transition. Similarly, companies may struggle to find appropriate skills in-house and lack finances to invest in larger-scale EE projects.

Awareness on energy efficiency at both the household consumer level as well as with larger-scale industrial consumers is also currently poor. Energy efficiency is not something that is widely talked about and is largely not well understood as a concept. This is understandable given that the country still has such huge challenges with wider energy access and the use of campaigns and marketing to increase EE uptake has not yet been fully tested with only a few promotions having taken place to date.

Some companies are also exploring self-generation as a means of overcoming the challenges of intermittent and expensive power and have

identified components of their operations such as water pumping or office operations that could be met during daylight hours by solar PV generation. The combination of falling solar costs and rising electricity tariffs are making this increasingly attractive. Greater investment into lower-cost credit for energy-efficiency projects could help increase the speed at which companies and individuals undertake such projects.

Finally, understanding the skills required to support greater shifts towards energy efficiency could open up opportunities related to skills delivery as well as consultancy and business opportunities in areas such as energy audits and metering amongst others.

5.4 Critical constraints to improving energy efficiency

Lack of awareness on cost benefits of using energy efficient products

At the household level, consumers are often driven by price, opting for the cheaper solution or product, which is often a standard product that doesn't look at energy efficiency in any way. This is typical of basic products such as light bulbs where the energy efficient option can be up to 10 times more expensive than a standard product. Despite the increased efficiency and often longer lifespan of EE products (and therefore greater overall cost benefits), the majority of consumers are cash poor and so are forced to opt for the cheaper product.

For larger industrial companies and specifically those who are the largest consumers of energy, such as mines, increasing energy efficiency could drastically reduce their electricity bill and they would be less exposed to the price of electricity as a result. In turn, the government would need to provide less power from the most expensive generators, since the most expensive generators tend to be the last to be dispatched, and ZESCO could move closer to cost recovery. In general, larger companies appear enthusiastic about looking at energy efficiency but it is not clear to what extent it is fully understood within companies and how significant the cost savings could be.

Limited options for accessing finance and prohibitive rates for borrowing

When interviewed, a number of companies said that they have already identified numerous potential projects that could reduce energy demand and improve efficiency. The major challenge they face however is finding capital to deliver such projects (due to technology or equipment requirements). Whilst borrowing rates remain prohibitively high (see Section 3.1) and other operational challenges remain such as high tariffs and intermittent power access, it is unlikely that energy efficiency will become a priority without government intervention (incentives or information).

Lack of government incentives relating to energy efficiency

There are currently few incentives in place in Zambia to encourage companies to invest in energy efficient products or services. Even if ERB does introduce new standards, for example on the construction of buildings, it is likely to be a long period of time before they can enforce such rules and regulations. The fastest way to support the transition of more companies to adopting energy efficient products and services would be through programmes that provide a (sufficient) financial incentive for companies to improve EE performance ratings. This type of initiative could be multi-faceted in that it would also address the country's energy deficit challenges whilst also promoting more environmentally friendly practices and alleviating the potential reliance on non-renewable energy sources. Concessional financing of equipment could also be considered as a tool to increase energy efficiency.

Limited access to relevant, demand-driven skills development opportunities

There are currently very few courses that focus on energy efficiency in Zambia. This is in part due to the presence of other stakeholders in the region, such as the Southern African Centre for Renewable Energy & Energy Efficiency in Namibia who already play a leading role in the development of skills relating to energy efficiency, but also because there has been limited demand to date.

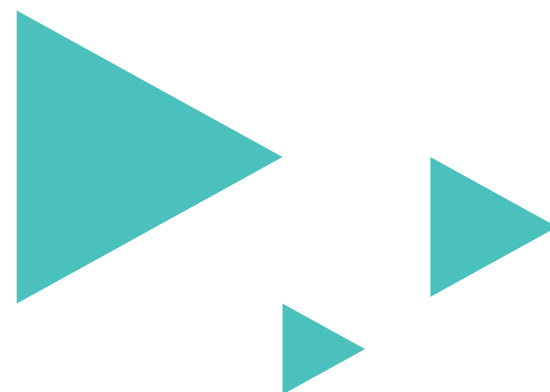
5.5 Opportunities for growth

Broader opportunities for growth within this section

- ▶ There is unexplored potential to incentivise businesses to increase their energy efficiency
- ▶ Improving energy efficiency could help reduce the country's energy deficit, improve the financial performance of Zesco (by bringing them closer to cost of service) and ultimately reduce cost of electricity
- ▶ Increasing demand for EE products and services will present new business opportunities for consultancy services, energy auditors, metering and technical specialists
- ▶ Some donor funded programmes (E.g. EU funded EAREP) are already looking at energy efficiency within their programmes which could present partnership and collaboration opportunities

Skills specific opportunities within the energy efficiency sector

- ▶ As companies transition towards energy efficiency there will be greater demand for specialised skills training relating to EE both for in-house staff and for supporting functions

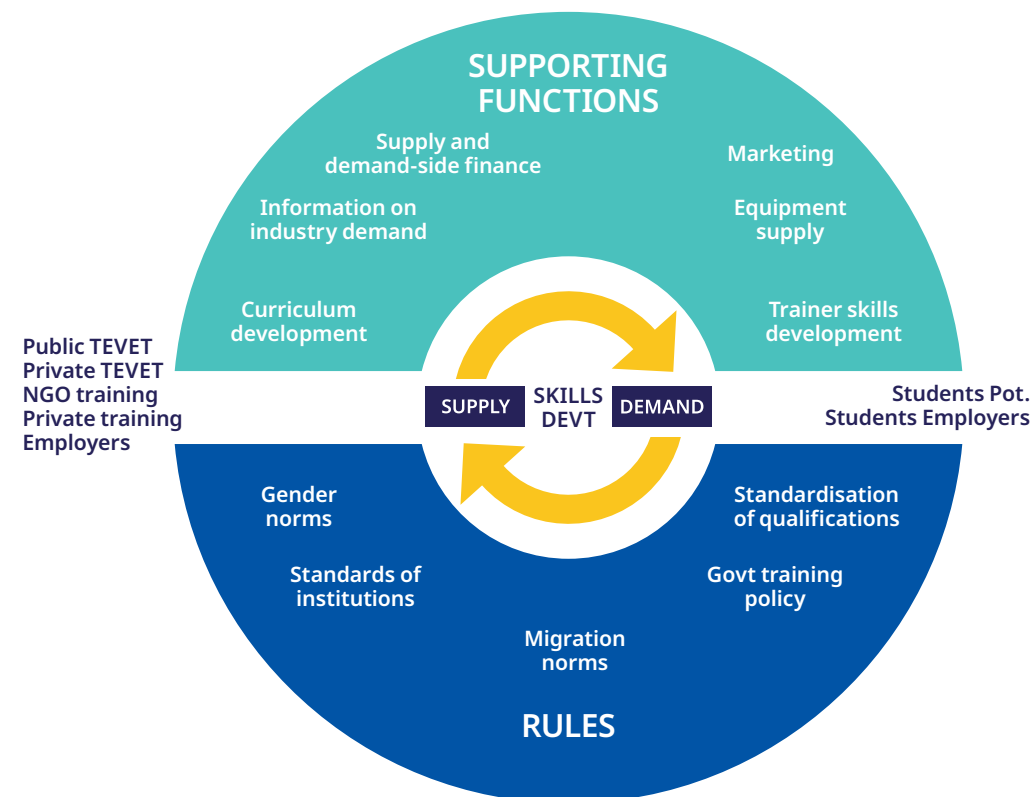


► SKILLS DEVELOPMENT

06

6.1 Nature and Mapping of the system

► Figure 4: Skills development market system



6.2 How the system works – a summary of supporting functions and rules

TEVETA is responsible for **overseeing the quality and provision (standards of qualifications) of all skills development** in Zambia. TEVETA was set up to address the challenges of quality within the TEVET sector and respond to employers' continued dissatisfaction at the poor quality of trained manpower available for the various operations in the industries that require vocational skills. A

key factor was the **lack of adequate resources available (equipment supply)** in institutions that offer vocational training to sustain high-level training and meet the expected standards of the employment sector.

The Government therefore identified the need to formulate a broader **national policy on technical education and vocational training (government training policy)**. The aim of the policy is to improve technical education and vocational training and link it to the requirements of the employment sector. The new policy covers three broad aspects. First, it incorporates entrepreneurship development. For this reason, the Policy is known as the technical Education, Vocational and Entrepreneurship Training (TEVET) policy. Second, it encompasses all types of technical education and vocational training like nursing, agriculture, community development and engineering. Third, it covers training being conducted at all levels in both the formal and

informal sector, including at TEVET level and at private training institutions including KGRTC.

TEVETA is also responsible for supporting and approving **curriculum development** and **qualification frameworks** and works closely with the private sector and curriculum development specialists to co-develop curriculum and qualifications that respond to the needs of employers. Curriculum development can be a relatively slow process meaning that training institutions are not always able to respond rapidly to changing needs of the private sector. Despite the challenges, the existence of such frameworks and the availability of resources within TEVETA to support these areas of skills delivery is critical and presents a solid foundation for skills delivery in Zambia. To ensure quality, TEVETA works closely with Zambia Qualifications Authority.

Accessing information on market demand presents challenges. Within the renewable energy specifically, there is currently no formal sector working group under the Zambia Federation of Employers so organising companies can be difficult. The Zambia Renewable Energy Association has a mandate to focus on skills development within the RE sector but the agency is largely under resourced and fails to bring companies together regularly due to time constraints and availability of key personnel. As such there is no formal or central mechanism to gather information on changing market needs, specifically relating to skills development and training.

A lot of TEVET level training is subsidised by the government, or through **funding initiatives such as SDF** but the number of places available are limited meaning that often only those students who are able to self-fund are able to access training. Similarly, for the training institutions themselves, **accessing finance** can present a challenge, especially to purchase the highly specialised equipment they may need for training delivery within the RE sector. Some colleges and training centres look to private sector partnerships where equipment is sponsored as an alternative but these relationships take time to establish and can be difficult to solidify. The SDF does also provide supply-side finance to training centres through partnerships between private sector and training institutions and this is proving to have relative success in addressing specific skills constraints. A challenge remains however in the time taken to be able to respond to opportunities and the time taken to receive funding and delivery training. In trying to respond to this challenge, and to formalise partnerships, the Ministry of Higher Education developed the Work Based

Learning Framework to facilitate internships and apprenticeships.

Marketing of TEVET and training opportunities is always an important factor, especially in male dominated sectors such as energy. Within the renewable energy sector it is considered that there is less male dominance but there still remains a lack of targeted campaigns that will attract women and girls to undertake trainings specific to RE and sociocultural perceptions suggest that engineering jobs are still male dominated. Training institutions use a number of methods to promote training courses, whether online, through brochures or radio campaigns. A challenge they face however is being able to **raise awareness about the links between training opportunities and jobs** that exist in the market. Many youth sign up to generic engineering courses but have no real understanding of what job opportunities exist beyond training. This is particularly relevant to the renewable energy sector where new trends are emerging (e.g. solar) and new opportunities are being created but these are not being marketed to youth.

Finally, within the renewable energy and energy efficiency sectors in Zambia there a wide range of different models utilised for **staff training and skills development**. These include; companies providing **in-house training, companies receiving free or subsidised trainings from corporate partners** or suppliers as part of their service contract or conditions of purchase, companies providing no training and expecting workers to already have the requisite skills and qualifications to qualify for the position, companies having allocated but limited budget for training and staff capacity building or companies receiving free or subsidised training from donors or donor funded programmes. Currently there is **no real data or evidence available on which of these is the preferred method**, which is being utilised through necessity and which is the most viable from both the supply and demand side. There is **no coordinating mechanism** for this and this results in a **lack of understanding of the scale of demand and profitability for skills delivery within the RE & EE sectors**.

6.3 How the system is failing – symptoms of underperformance

Whilst overall the quality of TEVET provision in Zambia is good, there is still a mismatch between the high number of people graduating from TEVET colleges and the number of youth that remain unemployed after training each year (approx. 200,000). This is the same across multiple trade areas but is particularly relevant to trades such as engineering where there is often over 300 students per intake. The reasons for these employment gaps is in part due to the low pass marks or qualifications youth leave college with, but also as a result of a lack of employability skills and, or a lack of knowledge and awareness on how to find employment. TEVET colleges do engage with companies to try and bridge this gap but the number of opportunities available within these companies are limited and many companies have opted to have their own training institutions in place to support their recruitment needs due to frustrations with poor quality of graduates coming from TEVET colleges.

At more senior levels, poaching and retention of staff members was cited as a challenge by a number of renewable energy companies. This suggests that there is currently insufficient supply of skilled workers which in turn is driving competitiveness and resulting in skills poaching. The knock-on effect of poaching is that employers are less willing to invest in skills development, given the risk that their workers will be poached, and this in turn reduces the motivation of workers who are always seeking to improve their skills. Throughout the skills development and employment / promotion cycle, incentives are misaligned and this is prohibiting skills development as a result.

Beyond the TEVET level, enrolment rates at the Higher Education Level, for both the Copperbelt University and the University of Zambia are the highest they have been for courses relating to Renewable Energy, there remains a challenge with graduates finding employment post studies. The main reason for this is that the courses lack a specialised focus and provide limited practical experience meaning that students, whilst they receive a broad set of knowledge and skills are not able to easily apply this to mid or senior level positions within renewable energy companies.

KGRTC, whilst well regarded by a number of stakeholders within the renewable energy sector in Zambia, is not as widely known as one might think, especially amongst newer actors in the market (e.g. solar companies). This is because KGRTC has not focused its efforts sufficiently on targeting new actors but rather has focused on maintaining relationships and engagement with long-term supporters of their training who predominantly operate in hydropower. KGRTC also recognise that their current marketing efforts do not attract the right audiences, often resorting to using old and outdated course brochures and marketing materials that do not capture their full course offering. This lack of engagement not only prevents their ability to tap into the full market potential, but also inhibits them from fully understanding what the market needs and where the current skills gaps are.



In many cases, companies suggested that at the lower levels skills are available, for example engineers or electricians but that a major challenge is the ability to adapt these skills to newer areas within renewable energy such as solar PV installation for example.

Finally, a number of companies consulted during the analysis phase mentioned that they send staff overseas for training, or look to bring in international experts to support their training needs. From a business development perspective this can make sense as employees are exposed to international best practices and provided with networking opportunities for skill share and knowledge expansion. It would be interesting however to understand how Zambia, and specifically KGRTC could better position itself as a location that could host these trainings and become known globally as a go-to location for specialised trainings. In Section 4 we look more closely at other potential reasons for this whilst also discussing specific skills gaps that were identified through the MSA.

6.4 Critical constraints to improving skills development

Curriculum is not sufficiently demand driven and leads to a mismatch with employer needs

Skills providers are utilising nationally approved curricula based on industry standards developed by TEVETA with close engagement with the private sector but they are not currently adapting these materials to the changing needs of the market. An example would be the abundance of electrical engineers graduating from TEVET colleges with generic qualifications who are not able to translate these skills to niche areas such as solar PV installation – an area where there is currently huge demand. This results in a large number of people graduating with skills but not being able to find relevant employment opportunities.

The main constraint underpinning this challenge is the lack of any formal mechanism for skills providers to gather information on private sector demand, but also the lack of resources to be able to adapt curricula and respond accordingly. Furthermore, this would require a coordinated

effort with TEVETA who are mandated to develop curricula.

Curriculum is primarily technical and lacks on the job experience

Employers within the renewable energy sector stated that a key challenge they face is the lack of practical experience that graduates have when entering employment. The major constraint here is the limited availability of equipment at skills training institutions and the current lack of work-based learning opportunities available. Even at NORTEC training centre in the Copperbelt where successful relationships have been established with companies including Volvo who donated equipment to the centre for training, there are over 300 students in one intake meaning that the ability to provide proper hands-on training is limited. World-class training institutions such as the International Centre for Hydropower (ICH) run courses with limited class sizes for this very reason and there is a wealth of global research to suggest that smaller and more practical training are more effective.

There are examples, such as that of Mopani Copper Mine where they have developed their own world-class training centre where they provide comprehensive two-year training programmes during which students receive practical, theoretical and on-the-job training. During the two-year programme students are also given exposure to all aspects of the business opening their minds to the types of opportunity available and supporting them to develop specific interests in areas they can then seek to pursue as a career. These hybrid models, whilst costly to initiate, offer the greatest opportunity to translate skills to practical experience and result in sustained employment opportunities.

Lack of coordination, collaboration and joined up thinking between training providers and private sector companies

Currently, each individual training provider is responsible for developing relationships with the private sector, a task that is hugely time consuming can often be a drain on valuable resources. Whilst there are many good examples of collaboration between private sector companies and training institutions, there is no formal mechanism that supports these collaborations. The Skills Development Fund (SDF) has gone some way to promoting collaborations with industry and skills development stakeholders with a number of successful projects launched in 2019 but there is limited or little guidance provided in terms of targeting specific skills gaps within

different industries. A more joined up approach to the design of SDF windows could help address critical skills gaps within various industries and ensure greater coordination and collaboration of existing efforts and new initiatives. This could also be extended to Universities such as UNZA or CBU where innovative ideas and research could be supported to enhance sector growth and innovation.

Perception that women are not able to pursue training opportunities or careers in RE & EE

As with most sectors, the energy sector in Zambia is largely male dominated. This is as a result of longstanding socio-cultural norms that suggest that being an engineer is a role for men, largely relating back to when most engineering jobs were in the mines and were much more manual and physically demanding and as such considered unsuitable for women. Whilst these perceptions are shifting over time, and in fact global studies show that the renewable energy sector perhaps shows that gender discrimination is less pronounced than in other sectors, there are still clear barriers that prevent women and girls from seeking opportunities. These are typically common across the workplace and skills delivery institutions and include; the lack of flexibility in the workplace or in skills delivery, including the timing and location of training programmes and places of work. The lack of female or child friendly facilities such as toilet facilities, nurseries, nursing rooms and in some cases accommodation. The lack of female mentorship and role models across industries also means that perceptions don't shift as quickly as they could, despite there being a good number of women in leadership positions within the RE sector in Zambia. Finally, the lack of equal pay and targets for diversity means that gender is not a priority for companies and so recruitment or enrolment processes don't seek to overcome any gender gaps and are likely to be biased towards attracting male candidates.

Despite these challenges, some companies met with during the analysis explained that they proactively seek out women (E.g. Standard Microgrid) for managerial roles, particularly in rural areas as they have found that women in these roles are able to provide a more effective and efficient service and often have higher retention levels than men in similar roles.

Lack of supply and demand side financing

We highlighted earlier how SDF funding is supporting greater collaborations between

industry and skills development stakeholders but this funding is limited and is skewed to supporting those organisations who make the greatest contributions to the SDF (through the skills levy). This means that those institutions who lack funding or are less profitable, and therefore contribute less to the levy, also receive less support from the SDF. They are likely in turn to have fewer funds available to invest in employee capacity building and training.

Some training institutions have utilised corporate partnerships (such as NORTEC through the UNIDO supported Volvo collaboration, and KGRTC with partners such as SIEMENS and MERTAM) to leverage in kind support through donations of equipment and capacity building but these partnerships are often based on one-off engagements and are not sustainable beyond the initial commitment. As such they don't tend to unlock long-term funding solutions.

On the demand side, many students are unable to access funding to pay basic tuition fees or, where they are supported by government with tuition fees, are not able to obtain the funds for the certification on completion of the course and therefore complete the training but never receive formal certification.

We also highlighted above how many employers are reluctant to invest in skills development due to risks and concerns over poaching and some opt for in-house training on a case by case needs basis as a cheaper and lower risk alternative. This model however doesn't provide the same motivation to employees who are eager to improve their skills at renowned institutions.

Poor marketing and lack of awareness of available opportunities:

Many training providers don't currently provide sufficient or appropriate information on their available courses and content or fail to present this information in a way that helps individuals and companies understand the benefits of the training. This mismatch also comes about as a result of the lack of adequate marketing resources available within training providers. In KGRTC for example, a lot of the marketing is done by the trainers themselves, who are predominantly from an engineering background. Whilst they are well-versed in the technicalities of the courses being offered, they are not perhaps best placed to pitch the training to the HR or workforce development personnel that are likely to be responsible for the training budget allocation.

The same can also be said at the TEVET level, where the courses offered and promoted are generic in nature. A student applying for an engineering course may be doing so with no real understanding of the types of job available to them beyond training.

Lack of coordination, collaboration and joined up thinking between training providers and donors

In recent years, significant investment has been made in improving skills delivery in the renewable energy sector in Zambia at all levels. A number of donor funded programmes have provided varying types of support to training institutions in the form of equipment donation, capacity building, or curriculum development. Currently however there is little coordination between the different training providers and donors and this can result in a duplication of efforts or resources as each training institution seeks to develop its own practical training opportunities for example (at high cost). Furthermore, a number of donor programmes that focus on skills development are investing resources in capacity building of the same actors, or are failing to utilise existing actors in the market to support their own skills delivery and instead invest resources in building new capacity unnecessarily.

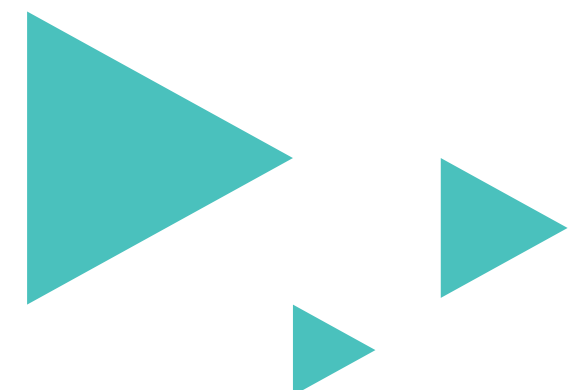
- ▶ KGRTC has good relationships with key stakeholders and could offer a number of complementary services that have not yet been fully explored
- ▶ KGRTC is well positioned (reputationally and geographically) to provide skills training within the region
- ▶ There is growing demand and need from industry for relevant skills training but the right modes of delivery have not yet been identified (due to lack of coordination, access to information and understanding of willingness and ability to pay)

A formal skills gap survey was not carried out as part of the MSA however skills, skills gaps and training were all key areas of discussion throughout the stakeholder interviews and analysis. The previous sections have provided an overview of why the respective systems are failing to perform, and specifically, why skills delivery institutions are failing to provide demand-driven trainings that can support sector growth. Annex 4 provides specific details on skills gaps as identified during the analysis. There are a number of common trends and gaps that arise and these are then summarised as part of the Conclusions in Section 6.

6.5 Opportunities for growth

Broader opportunities for growth within the skills development sector

- ▶ The Government willingness to improve Zambia's position with regards to energy production and regional trading means they have the right incentives to invest in skills development and the SDF is one example of this.
- ▶ Core skills delivery functions exist and the quality of training is good but with small modifications and greater coordination could respond better to market demand



► CONCLUSIONS

07



As was outlined earlier in this report, identifying specific skills gaps within the RE & EE sector only goes some way to addressing the problem of demand driven skills delivery. The previous section outlined some of the system level constraints currently faced within the wider skills delivery system that are preventing training providers from responding directly to skills gaps as they are identified. Without addressing these constraints it is impossible for any training provider to respond to four critical questions that influence the development of demand-driven training. Those are; the **scale of demand for training**, the **preferred mode of training** the willingness of companies to pay for training, and the **areas of demand of for training**.

As the SKiDRES project is ultimately seeking to support KGRTC to become more sustainable through being able to respond to the above questions in a way that provides affordable, relevant and profitable training it would therefore be recommended that a critical next step would be to support the development of sustainable interventions that seek to respond to these four questions. The means for doing this are outlined in Section 5 where we have presented four potential intervention areas that not only seek to address the constraints identified in the skills delivery system, but also take into consideration broader constraints in the RE & EE sectors.

It is also important to note that in the consultations carried out with the private sector, a shortage

of skills was not identified as a fundamental constraint for expansion of renewable energy. Lack of funding and the regulatory environment were more pressing concerns. Despite this, after several decades of hydropower expansion, Zambia has a relatively strong base of engineers and related skills to build on which presents a significant opportunity going forward for upskilling and looking at how existing skills in the market can be transferred to new areas. This in turn could help to address the skills gap that is likely to develop as the country moves into an energy future with a more diverse supply and new ways of connecting and producing power.

If KGRTC, with support from other skills development providers and relevant stakeholders can address the critical constraints that are preventing them currently from being able to respond fully to market demand, they will be able to apply a proactive approach to addressing future skills gaps and support the development of a capable and skilled workforce that in turn supports the growth of the RE & EE sectors in Zambia.

In what follows, we outline the feedback we received in terms of what these skills needs are likely to be however it is important to note that this list would need to be more rigorously and robustly tested to fully determine viability and feasibility. It is also not a static list but should rather be kept 'live' and continuously updated in collaboration with the private sector, ideally with KGRTC or other permanent market actors taking the lead.

invest, or transition to self-generation in the future.

- ▶ **Basic electrical skills.** A solid skills base was identified as a priority by private sector representatives, donors and other experts, particularly with the rapid growth of solar PV. Within this context the following skills were identified as being in short supply; high quality basic electrician skills (with certification), electrician skills focused on safety and hazards, electricians with solar PV experience and skills. Whilst these skills are often considered lower-level, there are huge health & safety implications associated with the lack of these skills and it is in the best interest of Zambia government and companies to seek solutions to address these skills gaps. It is also where there is some of the highest growth potential in terms of numbers of workers.
- ▶ **Energy efficiency.** As the country takes a more rigorous approach to addressing energy efficiency, new skills may be needed to support in areas such as energy audits, and to support the transition to more energy efficient technologies. This was not raised specifically by many companies but it can be assumed that there might be greater need. This assumption would need to be tested.
- ▶ **Power systems and trading.** As Zambia continues to look at regional power trading, new skills will be required. These include data scientists people with skills related to forecasting (of weather patterns and power availability), grid optimisation and grid stability (as renewable sources are integrated). Similarly to others, it is difficult to determine exactly how many people with these skills will be needed but some companies did make reference to the fact that these skills, if developed well could actually be offered remotely. This could mean that Zambia could look to establish specialised centres that are providing these skills to other countries in sub-Saharan Africa
- ▶ **Economic analysis.** This refers to people who are able to assess the viability of new projects in the renewable energy sector in a national context (what Zambia needs, as opposed to what is motivated by individual companies). Currently this role sits within the Industrial Development Corporation in Zambia and within banks and other financial institutions but the skills are weak and it is widely recognised as a core skills gap within these institutions.
- ▶ **General entrepreneurship, business management & salesmanship.** Finding mid-level and senior people who can support the core management, operations and growth of renewable energy companies is challenging. The types of skills required include the ability to identify new growth opportunities (e.g. Solar) and develop products and services that can respond to these, financial management and modelling expertise, and sales skills amongst others. Currently a number of new market entrants are foreign-owned and partly this is as a result of the lack of these skills. Companies referred to the potential for a mini-MBA type programme that specialised in RE as a means to grow local skills and encourage greater ownership within Zambia.
- ▶ **Power station design and self-generation.** These skills are highly specialised and may not be full time resources required by companies. As such, finding skilled consultants who can provide support in these areas could present both a unique business opportunity as well as a solution for existing companies looking to

► POTENTIAL INTERVENTION AREAS FOR CURRENT AND FUTURE PROGRAMMING

08

This section consolidates the combined findings from the three systems analysed to identify four key intervention areas that would support the improved development of skills delivery relating to the renewable energy and energy efficiency sectors, and ultimately improve performance of the sector. Underpinning these intervention areas are four key principles; **sustainability** (especially of actors such as KGRTC), ensuring that training is **demand-driven**, and increasing **coordination** and **collaboration** between stakeholders to reduce duplication, improve efficiency and leverage new opportunities.

The intervention areas that we propose are based on the following hypotheses:

- ▶ Improved access to information through greater coordination and collaboration between renewable energy and energy efficiency market actors and the skills delivery system would enable access to information that could lead to more demand-driven training offerings.
- ▶ Improving relationships with and engagement of private sector companies in skills delivery will enable more innovative and demand-driven business models for training and result in greater likelihood of employment.
- ▶ Increased coordination between skills delivery institutions at all levels and private sector will improve the likelihood of sustained employment and bridge the gap between skills delivery and jobs within the private sector.
- ▶ Improving the capacity of KGRTC and other training institutions will enable them to respond to opportunities and develop appropriate and relevant training courses

INT 001: IMPROVED ACCESS TO INFORMATION THROUGH GREATER COORDINATION AND COLLABORATION BETWEEN RENEWABLE ENERGY AND ENERGY EFFICIENCY MARKET ACTORS AND THE SKILLS DELIVERY SYSTEM WOULD ENABLE MORE DEMAND-DRIVEN TRAINING OFFERINGS.

Potential activity area(s):

- Support development of a sector working group (under ZFE / ZARENA) both for Zambia but also within the region (through SAPP / APU)
- Support regular roundtables / meetings to discuss skills gaps specific to RE & EE
- Carry out a skills gap analysis of major market actors in the region, including scale of demand and frequency / need for training (incl. budget availability)

INT 002: IMPROVED RELATIONSHIPS WITH AND ENGAGEMENT OF PRIVATE SECTOR COMPANIES (RELATED TO RE AND NON-RE) IN SKILLS DELIVERY WILL ENABLE MORE INNOVATIVE AND DEMAND-DRIVEN BUSINESS MODELS FOR TRAINING.

Potential activity area(s):

- Determine companies that can offer support to skills delivery
- Develop tailored packages of support (e.g. equipment donations, co-development of training and curriculum, co-delivery of training) and pilot packages
- Understand in-house capacity of companies to deliver trainings and determine which trainings are best delivered in-house vs through training institutions

INT003: INCREASED COORDINATION BETWEEN SKILLS DELIVERY INSTITUTIONS AT ALL LEVELS AND PRIVATE SECTOR WILL IMPROVE THE LIKELIHOOD OF SUSTAINED EMPLOYMENT AND BRIDGE THE GAP BETWEEN SKILLS DELIVERY AND JOBS WITHIN THE PRIVATE SECTOR.

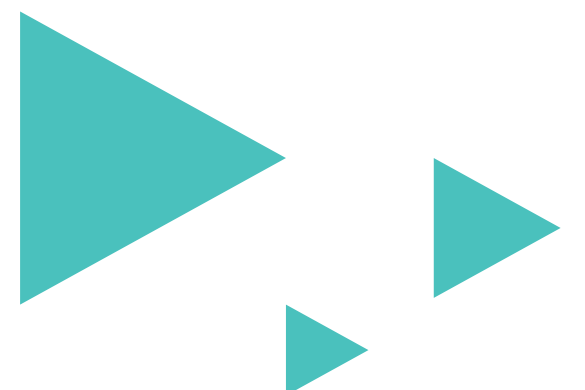
Potential activity area(s):

- Support the development of coordinated career guidance plans that show the links between different levels of skills training and employment opportunities
- Support TEVETA, through SDF to continue to promote work-based learning opportunities and design more targeted windows under SDF that address specific skills gaps
- Expand KGRTC consultancy offering to support improved work-based learning opportunities and capacity of companies to deliver in-house training (that focuses on transition from TEVET to employment)
- Identify areas of complementarity between KGRTC and TEVET colleges and Universities and develop new training opportunities (e.g. University attachments to KGRTC, weeklong site visits for TEVET students)

INT004: IMPROVING THE CAPACITY OF KGRTC AND OTHER TRAINING INSTITUTIONS WILL ENABLE THEM TO RESPOND TO OPPORTUNITIES

Potential activity area(s):

- Use the findings from the KGRTC capacity assessment to increase their capacity to respond to market opportunities
- Use the findings from the KGRTC capacity assessment to review the feasibility of their proposed business plan and prioritise growth areas
- Support the business development of KGRTC through an embedded advisor model bringing in specialised expertise in business development
- Support KGRTC to develop new business models that respond to private sector needs (INT001 and INT002) e.g. subscription or membership models OR remote / online training courses
- Improve the coordination and collaboration of KGRTC with other major stakeholders in the region (e.g. SAPP and SACREE) to broaden their offering and widen their marketing
- Develop more targeted marketing campaigns that address new audiences
- Develop more targeted marketing campaigns that address new audiences



▶ ANNEXURES

09

Annex 1: A Market Systems Analysis Study Terms of Reference

1. Country Context

Access to affordable, reliable and sustainable energy is one of the main drivers for social and economic development, resulting in better living conditions and access to new employment opportunities and enterprise development.

However, only 31% of Zambians have access to electricity, of which 67% are in the urban areas and 4% in the rural areas.

Hydropower is the dominant energy source in Zambia, providing most of the Zambia's energy supply (93%), followed by diesel and coal fuelled energy plants (3%). Apart from hydro power, Renewable Energy (RE) such as solar, although having a huge potential to complement existing energy sources, are currently underexploited only providing limited amounts of energy to the Zambian population and the market penetration

is very low. In 2015, an energy deficit of close to 700MW occurred, with demand standing at 1,949MW while supply only stood at 1,281 MW.

The importance of energy in Zambia's Vision 2030 and the Seventh National Development Plan (7NDP), takes a central stage, as energy is seen as an enabler for sustained economic growth. The Government of Zambia, through the 7th National Development Plan, stipulates to grow and diversify significantly its power generation and transmission capacities relying on new Renewable Energy sources such as solar, geothermal, wind, biomass, with the aim to ensure universal access to clean, safe, reliable and affordable energy, in line with national development priorities.

In addition, the Government has recognized Energy Efficiency (EE) as a priority issue because it can result in economic benefits, energy security, environmental protection and climate change mitigation. Enforcement of minimum efficiency standards for appliances, equipment and buildings can result in energy savings which could offer a unique opportunity to reconcile economic competitiveness with sustainable development and provide the added benefits of reducing the cost of energy and increasing energy productivity. Furthermore, improving EE in industry and manufacturing processes is important for firms to more sustainably use energy inputs and improve on their bottom line while limiting greenhouse gas and especially CO2 emissions thereby contributing to Zambia's transition to a low carbon economy.

However, although the market is open for private sector investment in the RE&EE arena in Southern Africa, an important impediment is the lack of national capacities to generate and distribute RE as well as lack of capacity to implement EE measures and cleaner production in industry. On the supply side, graduates from technical vocational and education training (TVET) institutions are not equipped with the appropriate competencies and skills to meet the demand of the RE&EE sector. The mismatch between skills currently offered and the skills required by the private sector in the emerging areas of RE&EE is a critical bottleneck for the transformation to renewable energy. Skills are critical to ensure a smooth

transition and diversification of the energy mix, while contributing to economic growth, jobs and opportunities for development of enterprises along RE and EE related value chains.

2. The SkiDRES Project

Only 4% of the rural population is grid-connected and increasing access to energy is of crucial importance to improve economic, social and human development in Zambia. Only part of the increased access will come from extending the national grid and decentralised electricity supply through mini-grids and individual solar home systems will represent a large share of future connections in rural areas. Engaging the private sector as energy service providers is crucial for expanding energy access in rural Zambia. This will require new and different skills. A large share of the new and intermittent power sources (solar, wind) to be integrated into the national grid will put new requirements on existing infrastructure (hydropower and grid management). For efficient integration, new technology and new skills are needed. In addition, these new power sources are expected to be operated by Independent Power Producers (IPPs) which, aside from technical aspects – such as RE installation and maintenance, software development, geothermal and geophysical skills, grid integration skills - will also require skilled people in financial modelling, business planning and development for RE investments.

Against this background the International Labour Organization (ILO) with funding from the Swedish International Development Cooperation Agency (Sida) is supporting the Kafue Gorge Regional Training Centre (KGRTC) implement a pilot project for skills development for the Renewable Energy (RE) and Energy Efficiency (EE) sub-sectors in Zambia. KGRTC, with its existing experience and expertise in hydropower and existing private sector engagement portfolio, has the potential to become a key player in skills development for RE and EE technologies. In addition, KGRTC is well placed to address and build knowledge in EE, especially in areas such as metering and analysis, grid optimization, smart grids and energy audits within the industry. Partnership with the private sector will enhance the institutional capacity development of KGRTC through increased outreach, impact, diversification, good governance and financial sustainability.

Public Private Development Partnership (PPDP) is an emerging development approach that enables the private sector to partner effectively with government institutions and international development partners as in this case to allow the KGRTC to contribute sustainably to socio-economic

development in an environmentally sustainable fashion. This in turn will be pivotal in the development of the demand and supply side of renewable energy as well as energy efficient technologies. It will also provide a model for financial sustainability and replication within other training institutions and help promote achievement of inclusive green growth and development in Zambia.

The PPDP seeks to address the demand for technical and core work skills while also promoting stronger gender equality in the sector and in particular create increased employment opportunities for women, including young women in the energy sector.

This one-year pilot project will test and prepare for skills development in the renewable energy and energy efficiency areas and will be driven by current and future private sector and labour market needs. The immediate objective is to lay a foundation for a three-year PPDP that is anticipated to follow based on lessons learned during the implementation of the pilot. With strong engagement by the private sector the project aims to contribute to Zambia having a work force with skills demanded by especially the private sector for increased investments in renewable energy and energy efficiency measures thereby being able to tap into the rapid development of energy technology.

The intervention will, firstly, capacitate the KGRTC to offer skills for green jobs demanded by the energy sector (as well as private sector actors' part of the upcoming Public Private Development Partnership) and, secondly, contribute to creating a pool of renewable energy and energy efficiency technicians with skills demanded by the sector both in Zambia and within the sub-region. Ultimately, this will increase the access to affordable, clean, reliable and sustainable energy in rural areas, which in turn will contribute to economic development, improved livelihoods and poverty reduction. Over time, this will help create an enabling environment that allow for growth and job creation in the energy sector.

3. Objective of the Assignment

The ILO is contracting a consultant/service provider to undertake this market assessment in order to develop a better understanding of the market system for RE&EE and especially with regards to the opportunities and constraints for current and future skills development that is imperative for growing the sector. The demand for RE&EE skills is a function of the current demand for renewable energy and energy efficiency and current limitations to market development. Whereas the skills gap is one of the key constraints to development of the RE&EE sector there may be other constraints including political, social, environmental, legal and economic, which are equally important to understand in order to develop an overview of the market system for RE&EE.

This market system analysis (MSA) will therefore assess the broader market for renewable energy generation and distribution as well as energy efficiency to better understand the potential growth and job creation opportunities in this sector, but with a key focus on the skills needed to facilitate growth and employment creation. This analysis includes answering the following two key aspects:

- An overview of the market systems for renewable energy and energy efficiency focussing on the basic value chain and the supporting functions and the rules and regulations with a specific focus zooming in on the supply of and demand for current and future skills needs that are required to further grow and improve the performance of the RE&EE sector 1
- The identification of the key root causes and constraints with regards to current and future skills development that must be addressed as a basis for pinpointing where the project should target its interventions.
- In order to get more in-depth information on the market system and the current and future need for skills to meet demand and grow this sector, the assessment should address, but not be limited to, the following questions:

- | | |
|---------|--|
| 3.1 | Demand side |
| 3.1.1 | What private sector companies and public institutions are currently operating in renewable power generation and power distribution as well as improving Energy Efficiency? ² |
| | <ul style="list-style-type: none"> ► This analysis requires the consultant/service provider to be familiar with the Market Systems Development (MSD) approach and in particular the ILO methodology for analyzing market systems, i.e. the “doughnut” approach ► It is important to distinguish throughout the analysis between RE power and distribution and EE in industry and manufacturing firms |
| 3.1.2 | What kinds of skilled workers are these companies and public bodies looking to recruit? What level of certification? Which type of jobs and occupations are needed? |
| 3.1.3 | From where are the private sector companies and public bodies recruiting qualified workers? |
| 1.1.3.1 | Local training providers (public and private)? |
| 1.1.3.2 | Other geographic areas of Zambia? |
| 1.1.3.3 | From outside Zambia? |
| 3.1.4 | Are the employers providing work based training (apprenticeships, internships, industry attachments)? |
| 3.1.5 | Are employers aware of work based training modalities? Are they interested? |
| 3.1.6 | Which soft skills do employers require? |
| 3.1.7 | What types of contracts do the employers offer: Part-time? Fulltime? Long term? Short term? Temporary? Seasonal? Remote locations? Are the contracts complying with national labour laws and basic conditions of employment? |
| 3.1.8 | Are young women and men interested in setting up entrepreneurial activities in the generation and distribution of renewable energy? |
| 3.1.9 | What other constraints are companies in this sector facing? Political? Social? Legislative? Regulatory? |
| 3.2 | Supply Side |
| | For each of the occupational categories identified in the demand analysis (Q1.1.2 above), the consultant/service will address the following: |

- | | | | |
|---------|--|------|---|
| 3.2.1. | Are training providers (KGRTC, vocational training centres and private training providers) offering programs that are in demand by private sector companies? | 4.2. | Develop comprehensive and relevant instruments for data collection to gather information on the proposed questions (above) taking into account the ILO MSA methodology; |
| 3.2.2. | What relevant programs do KGRTC, vocational training centres and private training providers offer? | 4.3. | Apply the data collection instruments to conduct in-depth research, including but not limited to, focus group discussions, key informant interviews, to identify the skills that are required by the private sector and the supply of these skills by vocational training centres and private training providers. |
| 3.2.3. | What is the level of certification offered at the end of each training program? | 4.4. | Analyse collected data to establish the demand driven skills requirements by the private and public sector in the immediate term, as well as skills demand projections in the medium (1-3 years) and long (3-5 years) term. |
| 3.2.4. | What is the duration/length of time required for each training program? | 4.5. | Establish the level of awareness of and interest in enrolling for technical, vocational and education training among youth and women, especially in the RE/EE sector |
| 3.2.5. | What is the cost for each program? | 4.6. | Establish the level of awareness of and interest in entrepreneurship along the RE/EE value chain among youth and women. |
| 3.2.6. | How many students enrol in these programs each year, paying attention to sex disaggregated data? | 4.7. | Identify entry points for work-based training opportunities with the private sector companies and vocational training centres through which students can acquire hands on training. |
| 3.2.7. | Are funding opportunities available for students to access these programs? What are these funding opportunities? | 4.8. | Establish recruitment practices of private sector companies in the RE/EE sector. |
| 3.2.8. | What are the challenges preventing or discouraging women from enrolling in the programs at KGRTC, vocational training centres or private training providers? | 4.9. | Establish opportunities and willingness of private sector companies and public energy bodies to partner with KGRTC, vocational and training centres and/or private training providers through a structured engagement modality/ approach which can be pursued i.e. through formal partnership agreements/MOUs. |
| 3.2.9. | Are there relevant entrepreneurial training programs offered in KGRTC, the vocational training centres and/or private training providers? Which ones? | | |
| 3.2.10. | What are the main challenges that face KGRTC and vocational training centres in offering relevant training programs? | | |
| 3.2.11. | What rules and regulations govern the provision of technical and vocational training to existing and start-up companies in the sector? | | |

4. Description of Tasks

The Consultant/Service provide is expected to undertake the following tasks during the assignment with a focus on RE&EE:

- 4.1. Distinguish between renewable energy power generation and

- 4.10. Identify funding opportunities at provincial and national level through which students can apply to enable them access technical and vocational training.
- 4.11. Through consultation, identify practical communication channels through which access to information (such as programs offered by KGRTC, vocational training centres and private training providers, funding opportunities available) can be used.
- 4.12. Make recommendations for how to increase women's and youth's participation in technical training for the RE/EE sectors
- 4.13. Make recommendations on potential quick wins through which the project can leverage in the immediate, medium (1-3 years) and long term (3-5 years).

5. Methodological Approach

The methodological approach may be adjusted by the Consultant/Service provider in consultation with the SkidRES project team, provided the purpose of the assessment is maintained and the expected outputs produced are of the required quality.

The methodology should include:

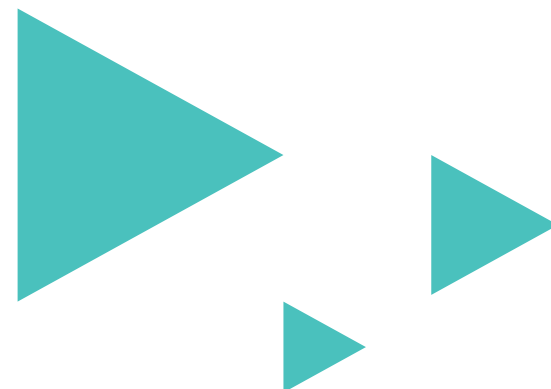
- ▶ Framing of the assignment within the overall Market System Development (MSD) approach of Sida and the ILO (the "Doughnut" for understanding markets)
- ▶ A desk review of project documents, national policies, regulations influencing the sectors, and other relevant literature and documentation.
- ▶ Access other relevant information sources such as national and provincial statistics to identify existing skills demand and supply gaps in these sectors.
- ▶ Design an effective and comprehensive data collection tool and methodology for the skills demand and supply analysis to be used.

- ▶ Conduct both qualitative and quantitative analysis of collected data on skills demand and supply aspects.
- ▶ Consultations and interviews with relevant stakeholders / organizations including Project team.

6. Project Support

The project team shall provide technical support to the Consultant/Service provider. This support shall include:-

- ▶ Make available relevant documents such as the Project document and other relevant documents produced by the ILO for similar assignments
- ▶ Introduce the consultant to KGRTC and other TVET institutions, the national private sector companies and Swedish MNEs, key implementation partners and other relevant stakeholders
- ▶ Organize the MSA inception report validation workshop
- ▶ Distribute the MSA draft report for review and consolidation of comments to be sent to the Consultant/Service provider
- ▶ Quality control of reports submitted
- ▶ Providing clarity and/or guidance during this assignment.



Annex 2: Stakeholders interviewed

ORGANISATION TYPE	ORGANISATION CONSULTED
Private sector Renewable Energy / Energy Efficiency companyactors in the region, including scale of demand and frequency / need for training (incl. budget availability)	- Smart Village - YouGo Ltd. - Timbuktu - Africa Green Co. - Standard Microgrid - ENGIE - Neoen - ZESCO - Lusemfwahydropower
Private Sector – non RE /EE	- Zambia Sugar - Lubambe Mine - Zambian Federation of Employers
Donor / Donor funded programme	- SIDA - Cities & Infrastructure for Growth Programme DFID funded programme - Increased Access to Electricity and Renewable Energy Production (IAERP) – EU funded programme
Government	- Electricity Regulation Board - TEVETA - IDC - Ministry of Energy - OPPPI - SDF Manager - Ministry of Labour
Skills Development Institution	- KGRTC - Southern Africa Centre for Renewable Energy and Energy Efficiency - NORTEC - Copperbelt University - Mopani Copper Mine Training Centre
Consultancies, Regional & International organisations	- Norconsult - International Centre for Hydropower - Multiconsult (manager of Get-FIT) - SIEMENS
Organisations contacted but with no response or refusal to speak	- MERTRAM - SAPP (although spoke to founder Lovemore Chilensu) - Association of Power Utilities for Africa

Annex 3: Fieldwork Schedule

DATE(S)	ORGANISATION	CONTACT DETAILS	LOCATION
Sunday 24th November	Arrived in Lusaka		
Monday 25th November	Kick-off meeting with SIDA SkiDRES Project	Magdalena Svensson Martin Clemmensson	Lusaka
Tuesday 26th November	KGRTC Director Technical Education Vocational and Entrepreneurship Training Authority (TEVETA) Cities & Infrastructure for Growth IDC Ministry of Energy	Mr. Kaela Siame Mr. Stan Muwowo Mr. Michael Tarney DFID Adviser: Magdalena Johansson Mr. Chitalu Chisanga, Senior Investments Analyst. Mr. Arnold Simwaba	Kafue Gorge Regional Training Centre
Wednesday 27th November	OPPPI SDF Manager KGRTC: Head of Training and Consultancy	Clement Sasa Christopher Nyirenda Mr. Brian Makungo	Kafue Gorge Regional Training Centre
Thursday 28th November	Ministry of Labour ZESCO HR	Ms. Kunda Chinungi Mr. Milimo Richard Malambo	Kafue Gorge Regional Training Centre
Friday 29th November	Zambia Sugar	Mr. Needmore Basera Mr. Chinyembo Kanyanta	Mazabuka

DATE(S)	ORGANISATION	CONTACT DETAILS	LOCATION
Saturday 30th November	Heifer Foundation Focus Group Discussion (rural) KGRTC Consultant – Training & Research	Mr. Mataa Nyambe Eng. Mpezilwe Simukoko	Mazabuka
Sunday 1st December	Travel to Kabwe		
Monday 2nd December	Lusemfwa Hydropower NORTEC/UNIDO	Mr. Justin Loongo Mr. MOYO Nephias	Kabwe Ndola
Tuesday 3rd December	Copperbelt University Mopani Copper Training Centre Lubambe Mine	Dr. Dickson Chembe Ms. Charity Musonda Mr. Elliems Chikatulo Mr. Rodgers Kayombo Mr. James Kasanda	Kitwe Mufulira
Thursday 5th December	EU Business Club Roundtable on Energy Sector: ENGIE Concept Pro Inc. Africa Green Co Africa Green CO SAPP Founding Member	Ms. Mukabanju Mutanuka Ms. Patricia Mukuka Ana Hajduka / Johannes Baake Mr. Lovemore Chilimanzi	Lusaka
Friday 6th December	SIDA ILO debrief Neoen	Ms. Magdalena Svensson Mr. Inès Duclairoir	Lusaka
Monday 13th January	CIG	Mr. Michael Tarney	Lusaka

DATE(S)	ORGANISATION	CONTACT DETAILS	LOCATION
Monday 13th January	IAREP	Mr. Alexander Filippov	Lusaka
Monday 13th January	DFID	Ms. Magdalena Johansson	Lusaka
Tuesday 14th January	You Go	Mr. Willie Vermeulen	Lusaka
Tuesday 14th January	Timbuktu	Mr. Nicole Marais	Lusaka
Tuesday 14th January	NorConsult	Mr. Boyd Simposya	Lusaka
Wednesday 15th January	SIDA	Ms. Magdalena Svensson	Call
Wednesday 15th January	Africa Green Co	Ms. Ana Hajduka/Mr. Johannes Baake	Lusaka
Wednesday 15th January	Standard Microgrid	Mr. Caleb Cunningham	Lusaka
Thursday 16th January	Zambian Federation for Employers	Mr. Hilary Hazele	Lusaka
Friday 17th January	Electricity Regulatory Board	Mr. Maka Sikazwe	Lusaka
Friday 17th January	ZESCO	Ms. Tina Sampa	Lusaka
Friday 17th January	KGRTC	As above	Lusaka
Friday 17th January	REA	Mr. Michael Tarney	Lusaka
Monday 20th January	ICH	Ms. Carole Rosenlund	Skype call
February	SIEMENS SACREEE	Mr. Lekamere Kiwara Mr. Kuda Ndhlukula	Skype call



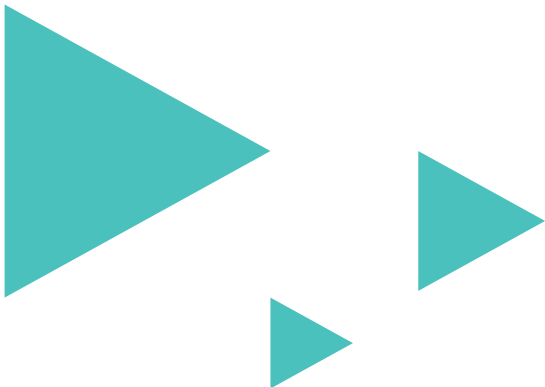
Annex 4: Mapping of analysis against terms of reference objectives

In the Terms of Reference there was a series of discrete questions relating to the various market systems that addressed both the demand side and the supply side. These questions were discussed and analysed as part of the MSA for which comprehensive analysis is provided in Section 4. The table below signposts the reader to the relevant analysis and provides additional comments where appropriate as well as indicating which of the four proposed interventions, or which combination of more than one intervention might help to provide a more sustainable and systemic response to the question raised beyond the life of SkiDRES and this MSA.

TOR OBJECTIVE NUMBERING	TOR QUESTION	REPORT SIGNPOSTING	ADDITIONAL COMMENTS
DEMAND SIDE			
3.1.1	What private sector companies and public institutions are currently operating in renewable power generation and power distribution as well as improving Energy Efficiency?	See Stakeholder Table on Pg. 7	The list is not exhaustive however it shows the major companies. Closer engagement with the Renewable Energy Association, IDC, and other donor programmes would enable continuous oversight. INT001 provides a systemic solution aimed at responding to this question
3.1.2	What kinds of skilled workers are these companies and public bodies looking to recruit? What level of certification? Which type of jobs and occupations are needed?	See section 4.3 and section 5.	The list is not exhaustive however it shows the major companies. Closer engagement with the Renewable Energy Association, IDC, and other donor programmes would enable continuous oversight. INT001 provides a systemic solution aimed at responding to this question
3.1.3	From where are the private sector companies and public bodies recruiting qualified workers? - Local training providers (public and private)? - Other geographic areas of Zambia? - From outside Zambia?	See section 4.1.3 and 4.3	The response is varied. As per 3.1.1 above, INT001 provides a systemic solution aimed at responding to this question
3.1.4	Are the employers providing work based training (apprenticeships, internships, industry attachments)?	See section 4.3.4	The Skills Development Fund (SDF) is playing a significant role in supporting these initiatives. INT003 provides a systemic solution aimed at further addressing this.
3.1.5	Are employers aware of work based training modalities? Are they interested?	See section 4.3.4	As above, SDF is having a significant impact in this area – further engagement would benefit as the latest funding rounds are still early stage.
3.1.6	Which soft skills do employers require?	See Section 5	The issue of soft skills and broader employability skills was raised by a number of companies, specifically relating to lower skilled positions and TEVET graduates. The need for more practical on-the-job training and experience was also raised on several occasions. INT003 provides systemic solutions aimed at responding to this question

3.1.7	What types of contracts do the employers offer: Part-time? Fulltime? Long term? Short term? Temporary? Seasonal? Remote locations? Are the contracts complying with national labour laws and basic conditions of employment?	Not covered in-depth in report – Section 5 makes some reference	Through discussion with the Ministry of Labour it was indicated that companies are largely compliant and in some cases even pay above minimum wage. There are however challenges with downstream suppliers and this is hard for them to track. Furthermore, most companies provide full time employment however load shedding has forced a number of companies to make redundancies as a result of reduced productivity. INT002 and INT003 provide systemic solutions aimed at responding to this question
3.1.8	Are young women and men interested in setting up entrepreneurial activities in the generation and distribution of renewable energy?	See Section 5 for broad reference	As part of the MSA we were not able to meet with many young women and men however reference to the lack of entrepreneurial skills was raised on several occasions by stakeholders and there is clearly opportunity within the market. A common recommendation was that all skills delivery relating to RE and EE should include entrepreneurship modules.
3.1.9	What other constraints are companies in this sector facing? Political? Social? Legislative? Regulatory?	See sections 4.1.3 and 4.1.4, 4.2.3 and 4.2.4, 4.3.3 and 4.3.4	This is covered comprehensively in the report. INT001 provides a systemic solution aimed at responding to skills specifically however it could be assumed that the same fora, or at least same stakeholders could be utilised to identify constraints on an ongoing basis.
SUPPLY SIDE			
3.2.1	Are training providers (KGRTC, vocational training centres and private training providers) offering programs that are in demand by private sector companies?	See section 4.3.4	Whilst the MSA addressed this question through the analysis in this report, SkiDRES as a programme also has an abundance of information that can help to respond to this question in more depth. Key indicators to consider would be: - Enrolment rates - Participant feedback - PS engagement and feedback INT001, INT002 and INT004 provide a range of systemic solutions aimed at addressing this further.
3.2.2	What relevant programs do KGRTC, vocational training centres and private training providers offer?	Not covered in-depth in report	See above response and KGRTC course brochure
3.3.3	What is the level of certification offered at the end of each training program?	See section 4.3 for several references to certification	The MSA covered TEVET, University and post-graduate level certifications. KGRTC specifically targets in-work participants and works with TEVETA to certify their courses on a modular basis.
3.3.4	What is the duration/length of time required for each training program?	Not covered in-depth in report	These two questions cannot be responded to collectively. It varies drastically depending on the course content. More important is the understanding of what it takes to develop courses that will meet private sector demand, this includes, the length of time they can release participants (employees) for and how much they are willing to pay. One key finding is that currently the lead time given to private sector companies to sign up for new courses is not sufficient and as such they often don't have resources (e.g. training budget) available to send people on courses at short notice. INT001, INT002 and INT004 provide a range of systemic solutions

TOR OBJECTIVE NUMBERING	TOR QUESTION	REPORT SIGNPOSTING	ADDITIONAL COMMENTS
DEMAND SIDE			
3.3.6	How many students enrol in these programs each year, paying attention to sex disaggregated data?	Not covered in-depth in report	This is very institution specific and SkiDRES has detailed information relating to KGRTC that could be referenced here. From interviews: Nortec enrolls 3,000 students per year (13% female) just on electrical engineering KGRTC trains 500 participants per year and on average <25% participants are female
3.3.7	Are funding opportunities available for students to access these programs? What are these funding opportunities?	See section 4.3 and Section 5	SDF is the major source of funding and this is discussed and analysed in depth.
3.3.8	What are the challenges preventing or discouraging women from enrolling in the programs at KGRTC, vocational training centres or private training providers?	See Section 4.3	Socio-cultural perceptions do impact on women enrolling for training relating to RE or EE although there is evidence of increasing numbers of female participation. At the TEVET colleges, the lack of infrastructure (e.g. washroom facilities) are also a challenge.
3.3.9	Are there relevant entrepreneurial training programs offered in KGRTC, the vocational training centres and/or private training providers? Which ones?	See sections 5 and 6	Not currently. This is a big gap and therefore opportunity in the market and there is a willingness from multiple stakeholders for more Zambian led start-ups to enter the market.
3.3.10	What are the main challenges that face KGRTC and vocational training centres in offering relevant training programs?	See Section 4.3, 5 and 6	This is covered comprehensively in the analysis. Main challenges are lack of information, lack of lead time for PS to sign up and high costs of training courses as well as weak marketing streams
3.3.11	What rules and regulations govern the provision of technical and vocational training to existing and start-up companies in the sector?	See Section 4.3	TEVETA is the main governing body in this space but they are very supportive of introducing new certifications and work closely with KGRTC in this area





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