THE INTERNATIONAL REC STANDARD

Country Assessment Report

Country/Region name:
Zambia is a landlocked country situated in South – Central Africa. Zambia is bordered by the Democratic Republic of Congo (DRC) to the North, Tanzania, Malawi, and Mozambique to the East, Zimbabwe and Botswana to the South, and Namibia and Angola to the West.

Zambia's population is approx 18 million with a large percentage of its population living in Rural settings.

Zambia's GDP as of 2021 was USD$21.7 billion with a growth rate of 1.8%. A gradual recovery is expected between 2021-2023 of up to 2.8%. Zambia main export is Copper which accounts for 70%. Other exports include, Sugar, Tobacco, Gemstones and Cotton.

Economic Structure and Activity

Zambia has a mixed economy in which there is a variety of private freedom, combined with centralized economic planning and government regulation. Zambia is a member of the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC).

After 15 years of significant socio-economic progress and achieving middle income status is 2011, Zambia's economic performance has stalled in recent years, mainly due to falling copper prices and declines in Agricultural output and hydro-electric power generation due to poor rainfall. This was compounded by an insufficient policy adjustment towards these exogenous shocks.

However, a gradual recovery is expected in 2022 driven by higher copper prices, commissioning of a new hydro-power station, and an impetus from the current government to diversify power production through several new Solar Photovoltaic plants that are in the pipeline for commissioning including Wind and Geothermal. A return to normal rainfall pattern is also expected that will support agricultural and electricity output.

Zambia is considered a politically stable country with successful democratic elections held every five years. The current president is his excellency Mr Hakainde Hichilema of the United Party for National Development (UPND), who was elected in August 2021, after defeating then-incumbent President Edgar Lungu of the Patriotic Front. The next election will be held on August 12 2026

Generation and demand: (type, MW, TWh)

In 2020, Zambia's Installed capacity was 3011.28MW compared to 2981.28MW in 2019. The installed capacity breakdown in 2020 is as follows:

- Hydroelectric – 79.65%
- Solar PV – 2.96%
- Other Non-Renewable – 17.39%

In 2020 the power generation was 15,159GWh of which 13,002.24GWh was from Renewable means.

- Renewable energy – 85.7%
- HFO / Diesel and Coal – 14.3%

The Generation matrix was comprised of:

- 12,852.35GWh (98.88%) – Hydroelectric Power and
- 150GWh (1.12%) - Solar PV

Total consumption in 2020 was 11,481GWh across all sectors.

RE Market Potential:

Zambia has an abundance of sunlight almost all year round making it an attractive location for the implementation of Solar PV plants. The Scaling Solar programme run in 2016 in partnership with the World Bank saw the construction and commissioning of 2 x 50MW Solar PV plants on the outskirts of the capital city Lusaka.

Notable Hydropower projects. Kafue Gorge Lower Hydropower station was partly commissioned in Q3 2021 with an installed capacity of 750Mw. Currently it is producing 300Mw with full capacity expected to be generated in 2022.

Batoka Gorge Hydropower station has 2 surface power plants one on either side of the Zambezi river each having a capacity of 1200Mw with a combined capacity of 2400Mw, 6 x 200Mw turbines in each power plant. Target commissioning 2024.

Below is the expected RE projects to be completed in the next 10 years. The total expected capacity is 6400Mw of which 5799Mw would be Hydropower, 200Mw Solar, 100Mw Biomass, 130Mw Wind and 71Mw combined Wind-Solar.

No.	NAME	CAPACITY (MW)	Resource	Location	STAGE / STATUS OF SITE
1	Kabompo Gorge	40	Hydro	Kabompo	Pre-Construction
2	Kabwelume Falls	96	Hydro	Kalungwishi	Pre-implementation
3	Kundabwika Falls	151	Hydro	Kalungwishi	Pre-implementation
4	Chavuma Falls	14	Hydro	Zambezi	Feasibility/IA signed
5	Ngonye Falls	180	Hydro	Zambezi	Feasibility/IA signed
6	Muchinga	230	Hydro	Lunsemfwa	Feasibility/IA Negotiation
7	Lufubu	163 (326)	Hydro	Lufubu	Feasibility/IA signed
8	Luchenene	34	Hydro	Luchenene	Feasibility/IA Negotiation
9	Mutinondo	43	Hydro	Mutinondo	Feasibility/IA Negotiation
10	Mulembo/Lelya	330	Hydro	Mulembo	Feasibility/IA Negotiation
11	Mwambwa	85	Hydro	Mwambwa	Pre-feasibility
12	Mambilima Falls I	126	Hydro	Luapula	Feasibility/IGMOU Signed
13	Mambilima Falls Ii	202	Hydro	Luapula	Feasibility/IGMOU Signed
14	Mambilima Falls V	372	Hydro	Luapula	Feasibility/IGMOU Signed
15	Mumbotuta Falls	490	Hydro	Luapula	Feasibility/IGMOU Signed
16	Batoka Gorge	1,600 (2,400)	Hydro	Zambezi	Feasibility/Contracts Signed
17	Devil's Gorge	1,000	Hydro	Zambezi	Pre-feasibility
18	Mpata Gorge	543	Hydro	Zambezi	Pre-feasibility
19	Kafue Gorge Lower	750	Hydro	Kafue	Commissioning
20	Afri Energy Biomass	100	Biomass	Mansa	Feasibility/IA signed
21	Pensulo Access Wind	130	Wind	Pensulo – Serenje	Feasibility/IA signed
22	Gigawatt Global	71	Solar-Wind	Chisamba	Feasibility/IA signed
23	Ultra Green Solar	200	Solar	Serenje	Feasibility/IA signed
24	Unika 1 Wind	200	Wind	Katete	Feasibility/IA signed

An environmental impact assessment is currently in progress for a 200Mw Geothermal plant; commissioning of the plant is planned to be completed by Q4 2022.

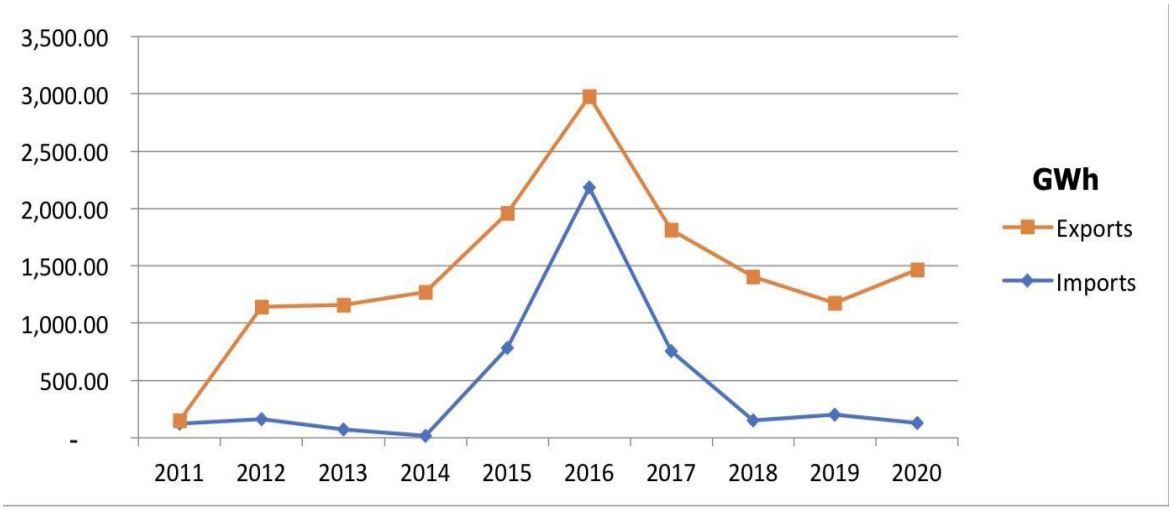
Electrical interconnection and import/export:

The Southern African Power Pool (SAPP) was established in August 1995 through the signing of the inter-Governmental Memorandum of Understanding (MOU) as a regional power trading block in Southern Africa. SAPP comprises of 17 state power utilities in the Southern African Development Community (SADC) region. It exists to optimise the use of available energy resources in the region and support one another during emergencies. The vision of the SAPP market is to:

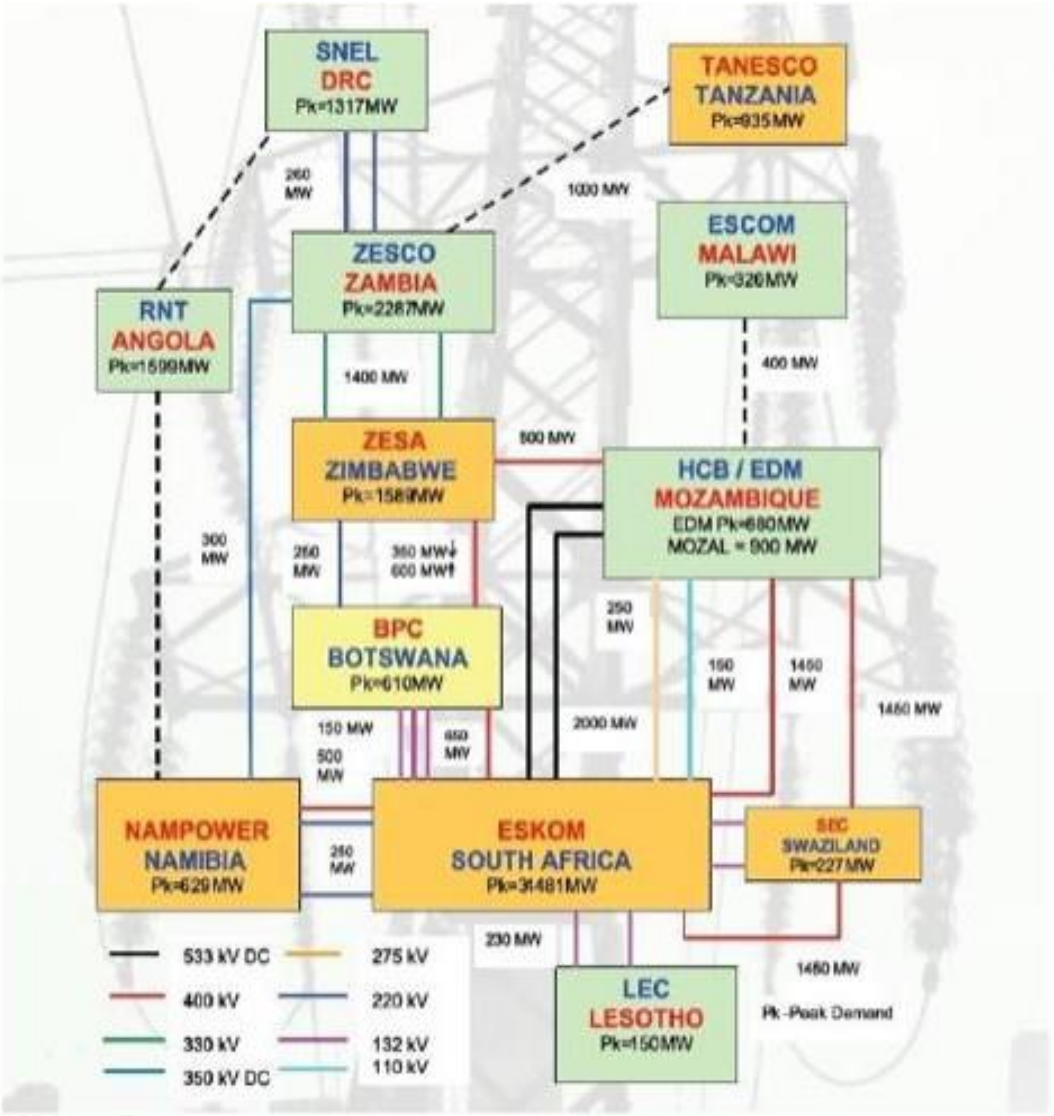
I. Facilitate the development of a competitive electricity market in the Southern African region.
II. Give the end user a choice of electricity supply
III. Ensure that the Southern African Region is the region of choice for investment by energy intensive users; and
IV. Ensure sustainable energy developments through sound economic, environmental & social practices.

The total traded volumes of energy on the SAPP market reduced by 28 percent from 2,132.42 GWh in 2019 to 1,527 GWh in 2020 due to power generation constraints from a number of SAPP member utilities

In order to balance the supply and demand of electricity on its network, the Zambian state utility ZESCO engages in power trading as a member of the SAPP through its various trade protocols. During 2020, ZESCO recorded a 7% increase in exports from 1250.4GWh in 2019 to 1339.53GWh in 2020. However, ZESCO imports decreased by 34.4% from 198.2GWh in 2019 to 129.94GWh in 2020. Below is the historical Import and Export Data by ZESCO from 2011-2020



Below is a diagram that presents the current status of members' interconnector limits.



Source: SAPP Annual Report

Energy demand in Sub-Saharan Africa grew by 45% between 2000 and 2012 and given the population growth and industrialisation in the region is expected to continue to grow. Despite having 13% of the world's population the region only accounted for 4% of the world's total energy demand.

More than 620 million people in Sub-Saharan Africa remain without access to electricity and nearly 730 million people rely on the traditional use of solid biomass for cooking. Electricity consumption per capita is on average less than that needed to power a 50-watt light bulb continuously. This low level of access to power is expected to deteriorate further as the number of people living without electricity is outpacing the positive efforts to provide access.

Being a long-term sustainable generation source, hydropower has a key role to play within the energy mix of the SAPP. Currently hydropower remains an under-represented contributor to the SAPP accounting for c. 21% of the overall generation capacity with the Zambezi River basin operations accounting for c. 50% of this figure.

Historical support or development of renewables in the country/region:

In 2016 the World Bank ran the Scaling Solar programme. This resulted in the award of 2 x 50Mw Solar projects to NEOEN S.A / First Solar Inc and ENEL GREEN POWER (EGP). The Solar plants were commissioned in 2019.

Various Independent Power Producers (IPP's) exist within Zambia, operating in the hydropower space. Below is a list of the various IPP's:

- Itezhi-tezhi – TATA Africa / ZESCO
- Lunsemfwa Hyrdo Power Company
- Ndola Energy Company
- Bangweulu - NEOEN S.A / First Solar Inc
- Ngonye - ENEL GREEN POWER (EGP).

Electricity market structure:

The electricity Market in Zambia comprises of three different activities: Generation, Transmission and Distribution. These activities are mainly undertaken by the State-owned utility ZESCO. ZESCO has entered into Power Purchase Agreements (PPA's) with the IPP's and is the sole buyer of this Generation.

The Copperbelt Energy Corporation (CEC) is the only other independent company to have infrastructure for the Generation, Transmission and Distribution. CEC has a small 2Mw Solar PV plant for Generation that was done to support Renewable Energy education at the Copperbelt University. CEC's mainly buy's (under a Bulk service agreement) power generated by ZESCO and then sells it to the main Mine consumers.

The Energy Regulation Board (ERB) is the government body that regulates all the Countries power from Petroleum importation and distribution to the importation of electricity generating products, Transmission and Distribution Licencing and Tariffs.

The Rural Electrification Authority (REA) is the government body that is responsible for the implementation of the Rural Electrification Master Plan. This framework was developed in order to increase access to electricity for the significant Rural population in Zambia. The aim is to achieve this in line with the UN SDG 7 – Affordable and Clean Energy by 2030.

The Ministry of Energy (MOE) is the government ministry that oversees the activities of various sub-government bodies. The MOE is also responsible for the implementation of all Energy related legislation.

The Ministry of Green Economy and Environment is a newly appointed ministry under the new administration and is responsible for the promotion of Green energy for economic activities and the protection of natural environmental resources such as Forestry and Water catchment areas.

Description of renewables support mechanism:

The government has created a new ministry to support Green Economy & Environment. This new ministry is specifically tasked to promote renewable energies and green projects into Zambia. The president of Zambia attended COP 26 in 2021 and has indicated to the world at large his intention to support environmentally friendly projects and establish Zambia as an environmentally friendly economy. Renewable energies are core to the manifesto of the new administration and are fully supported by the Minister of Energy and his counterpart in the Ministry of Green Economy & Environment.

Responsible government department: ([redacted])

The Ministry of Energy – [redacted]
The Ministry of Green Economy & Environment – [redacted]
MPThe Energy Regulation Board ([redacted]) – [redacted]
The Rural Electrification Authority CEO – [redacted]
ZESCO Managing Director – [redacted]

Existing/Planned energy legislation: (is there a CPO)

The Energy Regulation Act 2019 is the current Statutory Instrument which serves as a guideline and framework for all participants in the Energy sector. This document is a constantly evolving document that provides for legislation, regulation, taxation, and compliance within the Energy Sector.

https://www.parliament.gov.zm/sites/default/files/documents/acts/The%20Energy%20Regulation%20Act%20No.%2012%20of%202019.pdf

The National Energy policy 2019 outlines the Energy policies applicable in Zambia.

https://www.moe.gov.zm/?wpfb_dl=51

Environmental legislation for RE:

The Zambia Environment Management Agency (ZEMA) is mandated to ensure private and public compliance with Environmental management policy.

Environment Impact Assessment Regulations & Environment Management Licencing Regulations

https://www.zema.org.zm/index.php/publications/environmental-legislation/environmental-regulations/

Existing/Planned energy certificate systems: (purpose, extent)

There is currently no existing certificate system in place in Zambia. The I-REC standard will be implemented to operate without restrictions and in line with policy. Ecostar Energy Solutions have been mandated as the Local Issuer in country selected by the Ministry of Energy (MOE) of Zambia to independently verify and submit all generation data.

Extent of engagement with government:

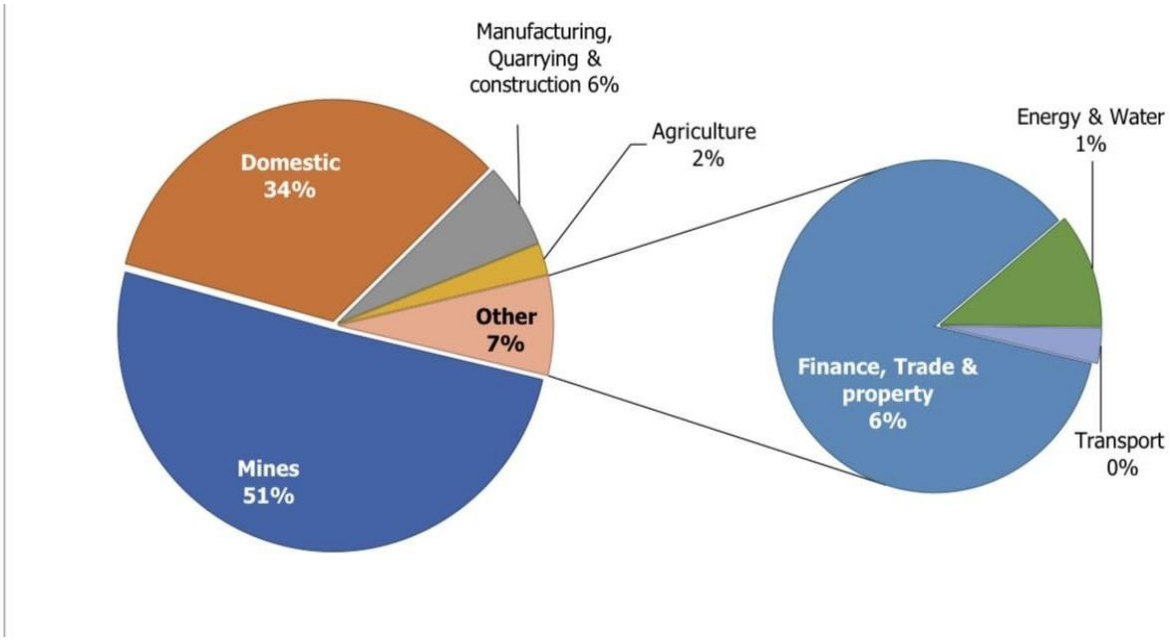
Ecostar Energy Solutions have held several high-level meetings with the Ministry of Energy and the State-owned utility (ZESCO). Both parties have welcomed and endorsed contracts for the implementation of the I-REC standard in Zambia.

Response from Government in relation to attribute tracking systems:
The Ministry of Energy welcomes the introduction of I-RECs in the country.

Demand-side market potential or strategic nature of market development:

Power consumption for 2020 was 11,481GWh. The Mining sector attributed for 51%, followed by Domestic customers who accounted for 34%. Manufacturing and Construction attributed 6%, Agriculture 2%, and 7% split amongst finance, trade, water, and transport sectors.

Below is a graphical representation of this split.



With a newly elected government bringing about economic stability it is expected that there will be significant growth in all sectors. Fiscal policy stability and economic interventions are expected to drive this growth over the next 5 years. The administration is aggressively tackling all inefficiencies with government policies and legislation to ensure the growth is nurtured within all sectors. Increase in Copper prices within the international market is expected to bring about an increase in production that will drive demand.

With a growing population both locally and regionally, it is expected that the demand requirements for power will also increase.

Analysis of political disruptions or market risks:

A new administration was democratically elected on the 12th August 2021 for a 5-year term. The elections were widely praised as a beacon of democracy for the region by several international monitoring agencies.

The new administration has been aggressively tackling all existing issues within the country in all sectors from Agriculture to Rural Development & youth unemployment, Mining, National Debt and Local Tax, and attractive Economic investment from Private companies and external Government bodies.

Regarding the Energy Sector a newly appointed Minister at the Ministry of Energy (MOE) and the creation of a new Ministry of Green Economy & Environment demonstrates the intentions to significantly develop the Sector in Zambia to enable the country to become a "powerhouse" for the region.

There are limited market risks given that this is a growing economy and there is a forecasted deficit in the supply of power in both Zambia and regionally. In place is legislation which supports the establishment of Independent Power Producers (IPP's) that have the option of either supplying to a closed Grid (selected private customers) or into the main Grid, hence this enables new generation projects to be developed by private developers with various options for income streams to be generated.

There is a robust judicial system which is based on English common law principles that are widely accepted as an effect means of contract enforcement even against Government bodies.

Analysis of regulatory risks including linkages with carbon markets and support systems:

There are currently no statutory constraints regarding the implementation of I-RECs in the country. There is no existing EAC scheme and there are no plans for the development of one.

Stakeholders have a good understanding of the difference between REC systems and carbon markets and see no risks of double counting of attributes between carbon instruments and electricity instruments (I-RECs). The Issuer will also have the tools to ensure this wil not happen, consistent with the I-REC Code for electricity.

Finally, current support systems in the country have no effect on the ability to determine ownership of energy attributes and will therefore not interfere with the implementation of I-RECs in the country.

Current environmental reporting in energy:

The Zambia Environmental management Agency (ZEMA) have been issued strict powers to regulate and police all proposed projects in Zambia. All new projects (including Energy projects) must get clearances from ZEMA prior to construction. ZEMA report to the new ministry of Green Economy & Environment. ZEMA regulations are based on World Bank guidelines.

Mechanisms in place to support the reliable verification and issuance of I-RECs:
The State-owned utility (ZESCO) manages its generation data in a way that will allow for robust verification for the purpose of I-REC issuance. Ecostar Energy Solutions will work closely with ZESCO which results in the availability of the required data. Historical data will also be available which will allow for analyses to identify any anomalies in future generation data.

Local organizations of importance and their opinion on local I-REC market development: The implementation of the I-REC standard in Zambia has been welcomed by all Local Stakeholders. Funding generated through this implementation has been utilized for the development of the country through a variety of initiatives. These initiatives have been endorsed by the government whose ultimate aim is documented in the current party manifesto.
Any other relevant information:

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