

ENERGY
CATALYST

Country Guide: Zambia

June 2020



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Zambia is a landlocked country in Southern Africa. Its neighbours are the Democratic Republic of the Congo to the north, Tanzania to the north-east, Malawi to the east, Mozambique to the southeast, Zimbabwe and Botswana to the south, Namibia to the southwest, and Angola to the west. The capital city is Lusaka, located in the south-central part of Zambia. The population is concentrated mainly around Lusaka in the south and the Copperbelt Province to the northwest, the core economic hubs of the country. Most of the country is classified as humid subtropical or tropical wet and dry, with small stretches of semi-arid steppe climate in the southwest and along the Zambezi valley.



Figure 1 Map of Zambia. Source: d-maps

Real GDP growth slowed to an estimated 2% in 2019, down from 4% in 2018. Zambia's economy was hit by drought in the south and west that lowered 2018/19 agricultural production and hydropower electricity generation considerably. Severe electricity rationing followed, and long periods of electricity load shedding dampened activity in almost all economic sectors. Zambia also faces slower mining, with reduced output and lower copper prices. Economic activity is expected to remain weak, with growth rebounding moderately to 2.4% in 2020 and 2.9% in 2021.

Table 1: Zambia at a glance

Capital	Lusaka
Total Area	752 618 km ²
Population	17.35 million (2019)
Official languages	English
Rural Population	56.48% (2018)
GDP	US \$ 26.72 M (2018)
GDP Per Capita	US \$ 4 100 (2018)
Currency	Kwacha (ZMW)
Exchange rate 01/03/2020	1 GBP = 19.55 ZMW
Exchange rate 01/03/2018	1 GBP = 13.49 ZMW
Access to Electricity	40.3% (2017)
Urban electricity access	75.2%
Rural electricity access	14.0%

Zambia is a member of the African, Caribbean and Pacific Group of States, African Union, Common Market for Eastern and Southern Africa (COMESA), Non-Aligned Movement, Southern African Development Community (SADC), United Nations and World Trade Organization. Zambia hosts the headquarters of COMESA in Lusaka.

In the yearly World Bank survey on "Doing Business", a comparison of business regulation in 190 economies, Zambia scores higher than the regional average for Sub-Saharan Africa. The 2020 edition of Doing Business ranks Zambia as 117 out of the 190 with a score of 84.9 out of 100 for the ease of starting a business. Figure 2 provides a comparison of Zambia to similar economies for starting a business.

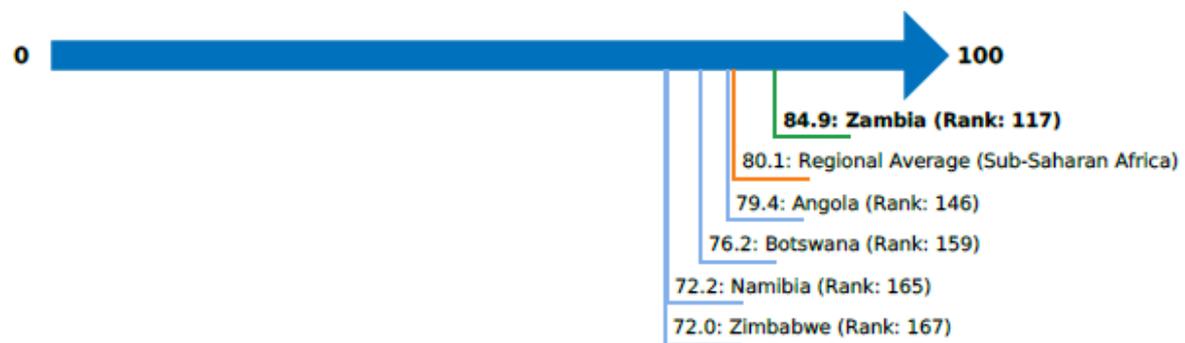


Figure 1 Doing Business 2020 score for starting a business. Data from: World Bank Group, 2020

The Zambian energy sector

The Zambian electricity power system is operated as part of an interconnected power system linking South Africa, Zimbabwe, and Democratic Republic of Congo (DRC). The Zambia Electricity Supply Industry was predominantly a market run by a single state-owned company, the Zambia Electricity Supply Corporation, prior to the liberalisation of the sector through an Act of Parliament in 1995, to attract private sector companies to participate in the generation, transmission and distribution of electricity. In order to promote this policy, the Government set up two new institutions: the Energy Regulation Board (ERB) to regulate operations and pricing, and the Office for the Promotion of Private Power Investors (OPPI), to promote new players in the electricity market.

Currently there are three major players in the ESI: ZESCO Limited, a vertically integrated company which generates, transmits, distributes and supplies electricity throughout Zambia; Copperbelt Energy Corporation (CEC), based in Kitwe, which is a net transmitter of electricity purchased from ZESCO at high voltage and distributed to the mining industry based on the Copperbelt; and Lunsemfwa Hydro Power Company, based in Kabwe, an independent power producer that it sells power to ZESCO Limited under a Power Purchase Agreement. There is also the Rural Electrification Authority (REA), which deals with the cause of increasing access to electricity in rural areas, and the Energy Regulation Board, which is the regulator of the energy sector in Zambia. Other participants in the industry include small-scale generators and solar based energy services companies supplying power to rural areas.

In 2018, the latest year of which data is available, Zambia's electricity generation mix continued to significantly rely on hydropower, which accounted for 82.76% of total installed generation capacity. The remainder of the generation mix was made up of coal (10.35%), HFO (3.80%), diesel (3.06%), and solar (0.04%). The hydro generation mix comprised of large, small and mini power generation stations. National utility ZESCO owned the bulk of the generation stations, while the rest were owned by IPPs. New additions to the generation mix in 2018 were the new CEC's Kitwe-Riverside 1 MW grid-connected plant, Muhanya Solar's Sinda Village 0.03 MW (Sinda District), Vero Grid's 0.1 MW site in Gumbi village and Standard Micro Grid's Mugurameno Village 0.01 MW (Chirundu District) solar mini grids.

Table 2: Active programmes in Zambia

Programme	Main activities
GETFit Zambia	<p>The programme aims to increase private sector involvement in Zambia's power sector, and diversify the country's power mix through solar PV and hydropower. Specific focus is grid connected independent power producers (IPPs).</p> <p>Programme targets are procurement of up to 100 MW of solar PV capacity (concluded in 2019), and 100 MW of small hydro (tender still ongoing).</p> <p>Other components of the programme include:</p> <ul style="list-style-type: none"> • Performance-based tariff support to support entry of early movers in the private sector • Standardising legal documents and processes for IPPs • A grid facility, and technical assistance to all stakeholders
Scaling Up Renewable Energy Program (SREP)	<p>The SREP is facilitating the development of an Investment Plan (IP) for projects and programmes on Renewable Energy in Zambia. Under the SREP programme, a total amount of up to \$40 million will be made available for Zambia through the World Bank, to assist private sector power project financing.</p>
The Electricity Service Access Project	<p>The World Bank has committed \$26.5 million to support the increase in electricity access in rural areas in Zambia. This project has three main components: 1) on-grid electricity expansion by financing critical distribution network reinforcements and extensions; 2) off-grid electricity extension by financing upstream activities to enable private sector involvement in rural off-grid electrification (site identification and scoping, designing financing mechanisms, addressing regulatory gaps); and 3) capacity building and project implementation support.</p>
Bioenergy and Food Security Assessment and Capacity Building in Zambia	<p>The project will develop the evidence to define which specific bioenergy pathways can be viable. The results will show if and to what degree the identified pathways can assist in meeting the bioenergy targets. The project will use the Bioenergy and Food Security (BEFS) approach and tools to build capacity in the country and develop the evidence to support the policy process.</p>
Zambia South to South Project on Technology Transfer	<p>The project is being implemented through the United Nations Development Programme (UNDP) and is aimed at transferring knowledge and technologies on Solar and Small-hydro. One of the key outcomes of the project is to establish two centres of excellence: one focusing on solar energy at the University of Zambia, and the other focusing on small hydropower plants at the Kafue Gorge Training Centre.</p>
Scaling-Up Solar Programme	<p>With support from the World Bank, Zambia is implementing a scaling up solar programme to address the current power shortages. It intends to develop at least 600 MW of solar power. So far the government through IDC has awarded the first 100 MW of 50 MW each to two companies.</p>
Sustainable Energy for All (SE4ALL) initiative	<p>Zambia is implementing a Sustainable Energy for All Initiative (SE4ALL) with three inter-linked objectives to be achieved by 2030: ensuring universal access to modern energy services, doubling the rate of improvements in energy efficiency, and doubling the share of renewable energy in the energy mix.</p>
Beyond the Grid Fund for Zambia (BGFZ)	<p>The core of the BGFZ is a EUR 20 M results-based "social impact procurement" fund that will contribute to Zambia's rural energy access goals through an innovative public partnership approach, which aims to bring electricity to 1 million Zambians by 2021, while supporting the long-term growth of sustainable energy markets in the country.</p>
ElectriFI Zambia window	<p>This is a EUR 40 million country window dedicated to the Zambian renewable energy market. ElectriFI aims to support the national strategy by empowering investors and entrepreneurs active in the renewable energy market as well as catalysing new sources of funding.</p>

Table 3: Overview of actors in the energy sector

Institution	Role
Ministry of Energy and Water Development (MEWD)	Responsible for the formulation and implementation of the national energy policy, coordination of stakeholders in the sector, the development of a national energy strategy and plan, the monitoring and evaluation of current policies, and the development of new energy programmes.
Office for Promoting Private Sector Power Investment (OPPPI)	The OPPPI is a unit in the Ministry of Energy whose role is to promote private sector involvement in the development of power projects in Zambia. In its undertakings, the OPPPI identifies projects, conducts feasibility studies, develops an appropriate solicitation strategy and documents for developers, procures developers and facilitates negotiations for Implementation Agreements on behalf of the government.
Energy Regulation Board (ERB)	The ERB is responsible for the licensing of Independent Power Producers (IPPs), setting of petrol prices and electricity tariffs, development of technical standards, investigation of customer complaints, arbitration of conflicts among sector stakeholders, and the promotion of new grid connections with a focus on low-income households.
Rural Electrification Authority (REA)	The REA carries out all public activities in connection with rural electrification, including management of the rural electrification fund; undertakes the development, implementation and revision of the Rural Electrification Master Plan (REMP); promotes of the use of available energy sources in rural areas; manages tenders for rural electrification projects; develops of models for the operation of rural grids, and develops proposals to the government concerning rural electrification.
Zambia Development Agency (ZDA)	The Zambia Development Agency is an important contact point for foreign investors. Its mandate includes the promotion of trade and investments, and the agency acts as a platform connecting investors with information and services supporting market entry. The agency supports investors in the acquisition of land, the subscription to and procurement of water, electricity and communication as well as transportation, application for legal immigration status, and application for sector-specific licenses.
Zambia Industrial Development Corporation (IDC)	The Industrial Development Corporation of Zambia is an investment company majority-owned by the Zambian government. IDC's mandate is to play a catalytic role in Zambia's industrialisation through the promotion of job creation and domestic wealth formation in key sectors. The IDC facilitates provision and raising of long term finance for industrial projects, including the Scaling Solar initiative.

Small hydropower

Zambia has a number of potential sites on small rivers suitable for local small-scale power generation. Suitable sites have been identified through studies on rivers with sufficient perennial flows. The Rural Electrification Master Plan (REMP) considers the development of mini/micro hydros to enhance rural electrification in some remote locations. Some mini hydro sites have already been developed with total installed capacity of just below 40 MW. The government, through ZESCO and REA, is undertaking feasibility studies to develop additional mini-hydropower plants. A total of 16 sites have been identified with a combined capacity of 99 MW.

Table 4: Overview of existing small hydro stations

Project	Size (MW)	Remarks
Mutanda	0.0025	
Mporokoso	0.005	
Sachibundu	0.015	
Mangango	0.017	
Mayukwayukwa	0.028	
Lwawu	0.05	
Nyangombe	0.073	
Zengamina	0.70	
Shiwangandu	1	
Musonda	5	Being upgraded (10 MW)
Chishimba	6	To be upgraded (10 MW)
Lusiwasi	12	To be upgraded (84 MW)
Lunzua	14.8	
Katibunga	N/A	
Total	39.6905	

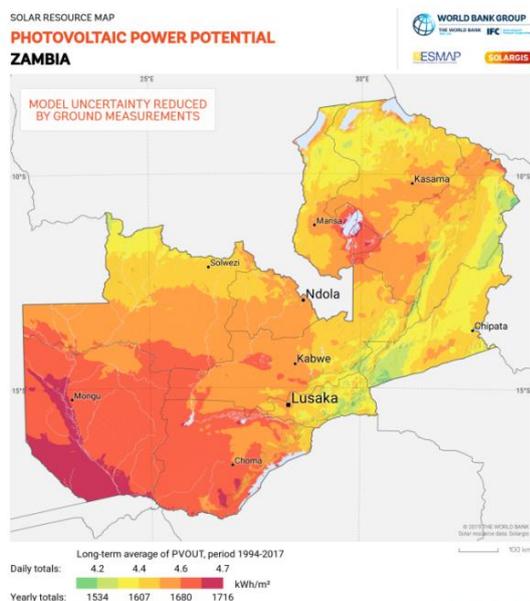


Figure 3: Solar resource Zambia. (2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

Solar energy

The country has an average 2,000-3,000 hours of sunshine per year. Average irradiation is 5.5 kWh/m²/day, with northern areas recording the highest global solar irradiation, of 2,300 kWh/m²/year.

Zambia aims to develop 600 MW of on-grid solar generation. The first two projects procured through the Scaling Solar programme are expected to create opportunities for subsequent expansion of renewable energy generating capacity in Zambia. The winning bids of the first round were announced in June 2016 and showed the lowest PV pricing ever seen in Africa at the time. The first bid was USD \$6.02 cent/kWh for a 45 MW project by a consortium of NEON S.A.S./First Solar, while the second was USD \$7.84 cent/kWh for a 34 MW tracking project by ENEL Green Power (EGP). The second round of auction is currently put on hold due to financial difficulties of ZESCO's which limits its capacity to meet power purchase payments.

Biomass energy

Zambia has a total biomass resource of approximately 2.15 million tons and economic bioenergy potential 498 MW. The largest feedstock contributions are from agricultural and forest waste. The government sees bioenergy as a viable option for electricity production, which is considered in public energy expansion plans. With regard to household cooking energy, nearly 60% of the country's households rely on fuelwood for cooking. SNV has developed a feasibility study for biogas applications on the basis of animal waste, identifying strong technical potential in the livestock and dairy sectors, and ERB has developed a draft Code Of Practice for biogas installations.

Wind energy

Wind energy potential in Zambia is relatively limited. Wind data collected at 10 meters above the ground indicate speeds of between 0.1 to 3.5 meters per second with an annual average of 2.5 m/s. These wind speeds are not particularly suitable for electricity generation, but may be suited for water pumping for household use and irrigation purposes. There are specific areas in the Western Province where wind regimes are estimated to be as high as 6 m/s.

Geothermal

Of 80 hot springs in Zambia, 35 are rated highly in terms of surface temperature, flow rate, and proximity to power lines, indicating ease of access and relative energy potential. These springs have not been tapped for industrial or energy provision purposes. At present, there is one geothermal generation plant in the country. The plant was installed following an initiative by the Italian Government in the mid 1980s. Two 120-kW turbines were installed at Kapisya Hot Springs in 1987. Recent estimates indicate that the plant can be upgraded to produce 2 MW of electricity. Efforts are now being made by ZESCO to revive the plant. At least one private developer, Kalahari Geo-Energy, is exploring geothermal resources in the country.

Mini grid sector development

Zambia's SEforALL goal is to have 50.6% electricity access in rural areas by 2030. The Rural Electrification Master Plan (REMP) identifies over 1,000 un-electrified Rural Growth Centres that need to be electrified by 2030, representing about 40% of the rural population. This means about 75,000 rural households would need to be electrified each year between 2016 and 2030. The REMP recognises the role of the private sector in reaching this target. An estimated 106 mini grids would need to be deployed between 2016 and 2030.

Since the electricity sector was liberalised in the late 1990s to early 2000s, Zambia has seen a rise in private sector involvement in both on-grid and off-grid electrification initiatives. This has been paired by consistent institutional and policy reforms over the past two decades to encourage more investment in the off-grid energy space. For example, the formation of the Energy Regulatory Body (ERB) and the Rural Electrification Authority (REA) in 2003 was a pivotal point for energy sector reforms in the country.

With the REA came the Rural Electrification Fund, set up to provide financial support to on-grid and off-grid rural electrification projects. Shortly after, the government developed the Power Sector Development Master Plan, which acts as a roadmap for power sector development up to 2030. The government then developed the distribution grid code to standardise design, installation and maintenance of distribution networks in Zambia. The Renewable Energy Feed-in Tariff Strategy was developed in 2017 to attract more private sector investment in small and medium renewable energy generation plants of up to 20MW.

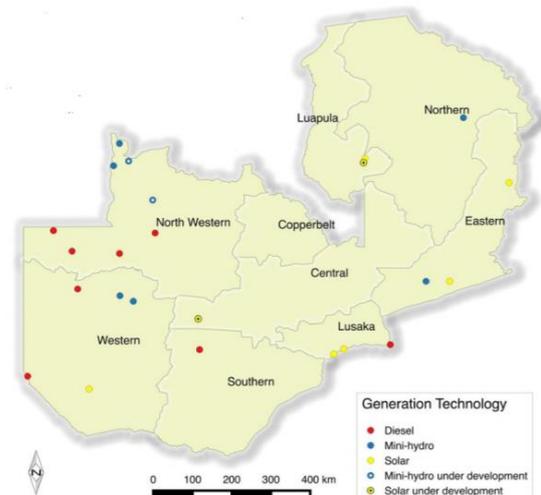


Figure 4: Map of existing mini grids in Zambia. Source: GET.Invest, 2019

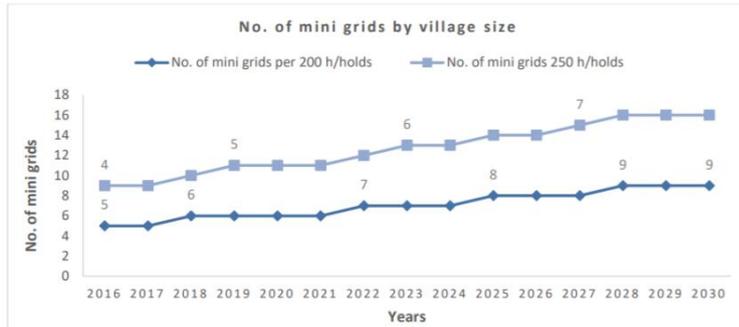


Figure 5: Estimated mini grids to be deployed in Zambia between 2016 and 2030

ERB approved a regulatory framework for mini grids in 2018 which, among other things, sets out guidelines for licensing, tariff structuring and technical requirements for mini grids based on their capacity categorisations. The framework also has provisions for arrival of the main grid, which centre on getting supply exclusivity for a given period.

Aside from the revised policies and regulations highlighted, the government is in the process of further streamlining strategies to increase private sector involvement electrification. This includes developing a methodology for setting cost-reflective tariffs in line with the objectives of the Southern African Development Community (SADC), and developing a comprehensive strategy for mini grid and standalone solar system roll out.

There are about 26 public, private and non-profit mini grids in operation or under development in Zambia, with capacities ranging from 10 kW to over 1 MW. However, five of these mini grids are being decommissioned due to grid arrival, and one, developed by UNHCR for a refugee camp, has not been in operation for over three years.

The following companies and organisations are developing mini grids in Zambia:

- Church Mission
- Entiba Energy
- Kafita Cooperative Society
- Muhanya Solar Ltd.
- REA
- Standard Microgrid
- Vero Grid
- Zengamina Power Company Ltd.
- ZESCO.
- PowerCorner
- Sigora Zambia

Industry associations

The **Zambia Renewable Energy Agency (ZARENA)** is an interest group for renewable energy stakeholders in Zambia. The mission of ZARENA is to promote and advocate for the increased use of renewable energy by developing an effective network of members and stakeholders, emphasising the need for quality and best practice throughout the sector.

References and further reading

Zambia Renewable Energy Resource Mapping

<https://www.moe.gov.zm/renewable-energy-resource-mapping/>

Doing Business - World Bank

<https://www.doingbusiness.org/en/data/exploreconomies/zambia>

Green Mini Grid Helpdesk Zambia pages

<https://greenminigrd.afdb.org/country/zambia>

GET-Invest Stand-Alone Solar Businesses in Zambia – A Guide for Venture Developers and Investors

[https://www.get-invest.eu/wp-content/uploads/2019/06/GETinvest-Market-Insights_ZMB_SHS - Guide 2019.pdf](https://www.get-invest.eu/wp-content/uploads/2019/06/GETinvest-Market-Insights_ZMB_SHS-Guide_2019.pdf)

Energy Regulation Board Zambia

<http://www.erb.org.zm/viewpage.php?page=news>

Official UK Government travel advice for Zambia

<https://www.gov.uk/foreign-travel-advice/zambia>

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