

ENERGY
CATALYST

Country Guide: Rwanda

June 2020



Country guide: Rwanda



Rwanda is located in East Africa and one of the smallest countries on the African mainland. Located a few degrees south of the Equator, Rwanda is bordered by Uganda, Tanzania, Burundi, and the Democratic Republic of the Congo. Rwanda is in the African Great Lakes region and is highly elevated; its geography is dominated by mountains in the west and savanna to the east, with numerous lakes throughout the country. The climate is temperate to subtropical, with two rainy seasons (Feb-Jun and Sept-Dec) and two dry seasons each year.

Rwanda has guarded its political stability since the 1994 genocide. In the parliamentary elections of September 2018, women filled 64% of the seats, the Rwandan Patriotic Front maintained an absolute majority in the Chamber of Deputies and, for the first time, two opposition parties, the Democratic Green Party of Rwanda and Social Party Imberakuri, won two seats each in parliament. President Paul Kagame was re-elected to a seven-year term in August 2018, following an amendment to the constitution in December 2015 allowing him to serve a third term.

Economy

Rwanda now aspires to reach Middle Income Country (MIC) and High-Income Country (HIC) status by 2035 and 2050, respectively. Its growth averaged 7.5% over the decade to 2018, while per capita growth domestic product (GDP) grew at 5% annually.

Rwanda is a member of the African Union, the United Nations, the Commonwealth of Nations, COMESA, L'Organisation Internationale de la Francophonie (OIF) and the East African Community.

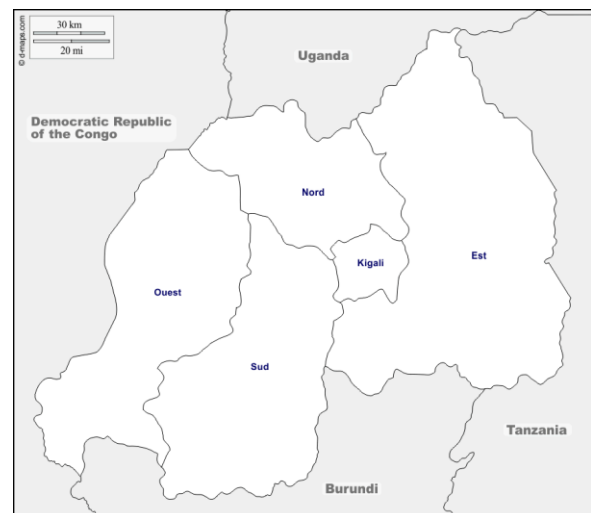


Figure 1 Map of Rwanda. Source: d-maps

Rwanda's strong economic growth has been accompanied by substantial improvements in living standards, with a two-thirds drop in child mortality and near-universal primary school enrolment. A strong focus on home-grown policies and initiatives has contributed to significant improvement in access to services and human development indicators. Measured by the national poverty line, poverty declined from 59% to 39% of the population below the poverty line between 2001 and 2014, but was almost stagnant between 2014 and 2017. The official inequality measure, the Gini index, declined from 0.52 in 2006 to 0.43 in 2017 (the lower the index, the more equal the country's income distribution).

In the yearly World Bank survey on "Doing Business", a comparison of business regulation in 190 economies, Rwanda is scoring very high. The 2020 edition of Doing Business ranks Rwanda as 35 out of the 190 with a score of 93.2 out of 100 for the ease of starting a business. Figure 2 provides a comparison of Rwanda to similar economies for starting a business.

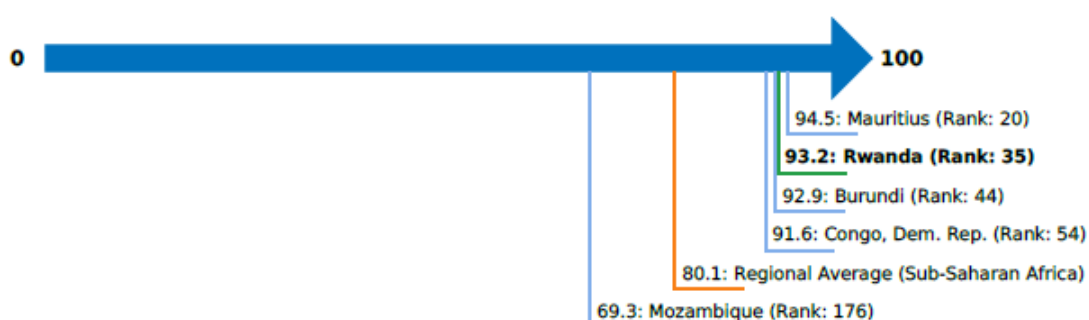


Figure 1 Doing Business 2020 score for starting a business. Data from: World Bank Group, 2020

The energy sector in Rwanda

As of mid-2019, the installed electricity generation capacity in Rwanda was 221.9 MW. This is made up of 100 MW of thermal power either using oil, peat or methane as fuel source, 103 MW from hydropower, 12 MW solar and 0.07 MW of biomass.

As of December 2019, the nationwide electrification rate reached nearly 53%, with 38.5% of households connected to the national grid and 14.3% having access through off-grid systems (mainly solar). However, the electrification rate also varies significantly across regions: from 97% in Kicukiro District to 27% in Nyamagabe District. The Government has set a target to reach universal access by 2024 and to provide 100% electrification to productive users by 2022. To achieve this goal, it plans to add 500,000 new connections every year, consisting of 200,000 on-grid and 300,000 off-grid connections. The Government particularly focuses on the off-grid connections, encouraging households located far from the planned national grid coverage to be connected through mini-grids and solar PV options.

Although the Rwanda energy sector still faces challenges, such as a lack of sufficient investments and high cost of electricity, the government has set out motivations for investors interested in the sector through:

Table 1: Rwanda at a glance

Capital	Kigali
Total Area	26,340 km ²
Population	12,3 million (2018)
Official languages	English French Kinyarwanda Swahili
Rural Population	83% (2018)
GDP	US \$ 9,508M (2018)
GDP Per Capita	US \$ 772.94 (2018)
Currency	Rwandan Franc (RWF)
Exchange rate 01/03/2020	1 GBP = 1190.4 RWF
Exchange rate 01/03/2018	1 GBP = 1169.6 RWF
Access to Electricity	52.8% (2019)
On grid electricity access	38.5%
Off grid electricity access	14.3%

- Provision of transmission access to all power projects at the government's cost
- Authorised road access, water service and all infrastructure needed during energy projects development
- Tax exemptions on power equipment during energy projects development
- Provision of land on power projects by the government or compensation to private developers for the cost of land

Small hydropower

Current installed SHP capacity represents approximately 25% of the county's total hydropower capacity, the majority of which is privately owned.

The most significant resource assessment conducted to date is the Rwandan Hydropower Atlas. This was conducted in 2010 and it found that the majority of potentially feasible sites would be rated between 50 kW and 1 MW in capacity. The study estimated a potential capacity of 96 MW from micro hydro projects alone. Feasibility studies have been completed or are under way for a number of sites, representing at least 32 MW of technically viable new capacity. In addition, over 192 sites have been identified for pico-hydropower plants with capacities below 50 kW.

Currently, there are 55 SHP projects in various stages of development, 32 projects with finished feasibility studies and eight further potential sites. The combined capacity of these is 86.38 MW.

Table 2: Overview of the main stakeholders in the energy sector in Rwanda

Institution	Role
MININFRA	Policy and strategy formulation Granting both concessions and MoUs
Rwanda Energy Group Ltd, EDCL and EUCL	Operation and maintenance of electricity transmission, distribution and supply network REG: Implementing Company, providing both technical assessment, and Power Purchase Agreements EDCL: Development of new energy generation projects and transmission structures EUCL: Generation, bulk transmission and distribution and retailing functions on a commercial basis
Rwanda Development Board (RDB)	Investment process, guidance, facilitation, leading negotiations for strategic projects, issuing Environmental Impact Assessment (EIA) certificates
Ministry of Finance and Economic Planning (MINECOFIN)	Fiduciary framework to manage grants, loans, and other concessional finance from development partners into the sector
Rwanda Utilities Regulatory Authority (RURA)	Setting tariffs, regulate the sector, and provision of licenses in the sector
Rwanda Environment Management Authority (REMA)	Responsible for the EIA procedures (while RDB issues the certificates) Responsible for monitoring implementation of environmental protection measures recommended by EIA studies and the conduct of Environmental Audits Approvals of national climate finance projects
National Fund for Environment and Climate Change (FONERWA)	Mobilising and harmonising funds across various areas and sectors to support Rwanda's green growth and sustainable development

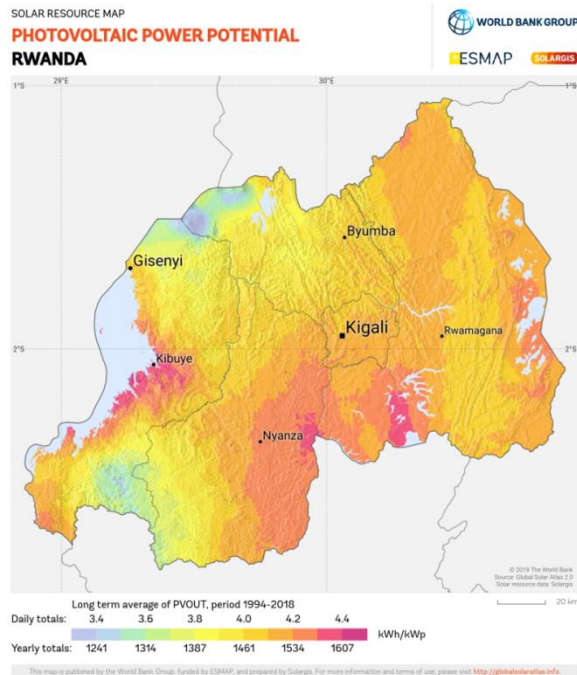


Figure 3: Solar resource Rwanda (2019 The World Bank, Source: Global Solar Atlas 2.0, Solar resource data: Solargis)

Solar power

Rwanda is endowed with a solar radiation intensity of approximately $5\text{kWh/m}^2/\text{day}$ and peak sun hours of approximately five hours per day. Rwanda's total on-grid installed solar energy is 12.08 MW. Households far away from the planned national grid coverage are encouraged to use standalone solar PV to reduce the cost of access to electricity. In June 2016, the Rural Electrification Strategy in Rwanda approved outline strategies through which Rwandan households could "have access to electricity through the most cost-effective means by developing programmes that will facilitate end users' access to less costly technologies and increase private sector participation in the provision of these solutions". The energy sector's strategic plan underscores the goal of universal access to electricity by 2024 with 48% of the households connected through off-grid power systems.

Three major solar PV projects are currently operational in Rwanda: the Mount Jali plant in Kigali (250 kWp), the Rwamagana Solar Power Plant (8.3 MW) by Gigawatt Global, and the 3.3 MW Nasho Solar plant, which powers an irrigation system with

surplus energy to light up homes in the area.

Biomass

Rwanda heavily relies on traditional biomass, like wood, charcoal, dung, with more than 83% of households using firewood. Increase in demand for cooking fuel has exerted immense pressure on forestry resources and the country aims to reach a potential net reduction in wood use to 5,770,000t by 2030 through a number of measures, including developing a modern and efficient charcoal value chain.

By 2024, the government aims to reduce the reliance on wood fuel for cooking from 83% of households to 42%.

A recent project with FAO assistance, the "Bioenergy and Food Security Assessment and Capacity Building for Rwanda" project, will analyse and identify potential bioenergy feedstock and technologies that can be developed in Rwanda for both decentralised energy production and cooking purposes.

The potential biogas market in Rwanda is estimated at 150,000 households, among predominantly rural customers. Since 2007, the government has put in place an elaborate programme for disseminating biodigesters in households, schools and prisons to reduce demand for wood and charcoal and improve people's health—the National Domestic Biogas Programme (NDBP). The NDBP's initial focus was on capacity development, training technicians and entrepreneurs, and social marketing.

In the past, improved cookstoves have been supported by the Rwandan Government through a number of public sector led initiatives, while currently a number of private sector players are active. Some of these have been able to reach sustainable operations, but the innovative business model by Inyenyeri, for example, did not manage to attract the required funding.

Wind

Wind power potential was evaluated in a rapid wind energy assessment carried out in five locations in Rwanda in 2011, with the conclusion that most areas are not highly suitable for wind energy. The Eastern province showed the most promising potential; however, more feasibility studies and assessments are needed for this to be precisely determined. Another study noted that the potential of the Gisenyi area was promising both with regard to wind speed and power density, and that in areas such as Kigali, Butare, and Kamembe, there is sufficient potential for windmills or water pumping for agricultural and institutional needs.

Geothermal

Potential geothermal resources have been categorised into four main prospect areas, all within the belt along Lake Kivu: Karisimbi, Kinigi, Gisenyi and Bugarama. Exploration studies have estimated the potential for commercial power generation to be in the range of 170 to 340 MW. Two preliminary drilling projects have not provided proof of this potential, but as geothermal exploration is a relatively long-term process, more studies are needed to assess and confirm potential.

Mini grid sector development

By mid-2018, about 300,000 households in off-grid areas had access to electricity through mini grids and solar home systems. There still remains much room for off-grid electrification through mini grids, due to Rwanda's high population density and ambitious electrification plans.

A SEFA-funded study in 2018 identified 200 potential sites for mini grids in Rwanda. The 2018 National Electrification Plan identifies the potential for the electrification of at least 300,000 more households by mini grids. Subsequently, the Government of Rwanda, through its national agencies and international partners, is making strides to improve the enabling environment to accelerate the process of electrification in a bid to reach universal electricity access by 2024. As of 2018, there were about 80 private mini grids operating in Rwanda.

Rwanda is one of the few countries in Africa developing mini grid specific regulations that support private sector investment. The 2018/19 – 2023/24 Energy Sector Strategic Plan and National Electrification Plan have provisions for off-grid connections as part of the government's aim to electrify 100% households by 2024. Some of the plans include:

- Universal electricity access, with 48% dedicated to off-grid projects
- Encouraging power generation through independent power producers (IPPs) through power purchase agreements (PPAs)
- Mobilising about \$370 million of private investment to support off-grid electrification

These strategies are backed by clear regulations to allow for smooth coordination between the public and private sectors. For example, the National Energy Plan released in 2018 demarcates areas for on-grid and off-grid development. The government also clearly defines thresholds for mini grid sizes to allow for licensing exemptions for mini grids below 50 kW, simplified processes for mini grids of 100 kW and below, and de-regulated tariffs for certain mini grid capacities. Note, however, that given the centralised nature of governance in Rwanda, these regulations are often subject to frequent revisions, jurisdictional overlaps (both geographic and in terms of regulatory oversight), and delays in enforcement.

Some of Rwanda's mini grid specific policies and regulations include:

- Exclusive distribution rights for large mini grids (1 MW and above) for 5-25 years in an area predetermined by the government.
- Provisions for the arrival of the main grid
- Various levels licensing regulations depending on the mini grid size

- Clear procedures for mini grid development outlined in the ministerial guidelines for mini grid development
- Tariff regulation and cost recovery strategies
- Taxation and fiscal incentives for environmental protection
- Provisions for public-private partnerships (PPPs)

Despite these inclusive policies, Rwanda still needs to address the gap of access to finance to cover CAPEX for developers. Power Africa estimates a 40-70% of CAPEX subsidy for a mini grid to be commercially viable.

Key mini grid and off-grid energy programmes in Rwanda are highlighted in the table below.

Some of the active mini grid companies in Rwanda include:

- Absolute Energy (Solar)
- Arc Power (Solar)
- East Africa Power (Hydro)
- ECOS (Hydro)
- Huboka (Hydro)
- Kabrud (Hydro)
- Mesh Power (Solar)
- NESELTEC (Solar)
- RENERG (Solar)

Table 3: Active support programmes in Rwanda

Programme	Main activities
Scaling Up Renewable Energy Program (SREP)	About \$50 million for access to finance for off-grid electrification. This includes a Renewable Energy Fund that provides credit to local financial institutions to on-lend local private companies and to end users, e.g. households and enterprises.
EnDev Results Based Financing (RBF) scheme	Provides up to 70% CAPEX grants for solar and hydropower mini grids after commissioning. Grants are payable upon reaching certain connection milestones.
World Bank's REF	A loan facility for mini grids that covers at least 75% of costs of construction through local currency. The loan can be used either for long-term financing or as bridge financing for existing RBF arrangements.
The Green Mini Grid Help Desk	Funded by the Africa Development Bank as part of the Green Mini Grid Market Development Programme (GMG MDP), and managed by Energy 4 Impact in partnership with INENSUS. Mini grid developers receive technical assistance, from support on demand assessments to technical sizing, capital raising, procurement and installation support, commissioning, and optimisation of operations.
Renewable Energy 4 Refugees (RE4R)	A 3.5 year project to improve energy access in three refugee camps in Rwanda. Partnership between Practical Action and Energy 4 Impact. Involves provision of solar-powered electricity to the refugee communities and developing livelihoods by promoting productive use of electricity.
Solar Irrigation in Rwanda	A \$ 1 million OFID funded project and managed by Energy 4 Impact. The project aims to develop small scale solar irrigation in Rwanda. Key activities include market linkages between suppliers, farmers and lenders, design and implementation of financing mechanisms to increase affordability of solar irrigation technologies, and technical assistance to farmers.

Industry associations

Energy Private Developers (EPD) is a legal professional association for all private companies operating in the energy sector in Rwanda. EPD focuses on advocacy of its members, encouraging collaboration and partnership for the development of the energy sector in Rwanda. EPD has very close relationships with the Government of Rwanda and organises the yearly "Renewable Energy for Sustainable Growth" conference (typically in Q4 of the calendar year) that brings together all stakeholders in the sector.

References and further reading

Rwanda Energy Sector Review and Action Plan

https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Rwanda_-_Energy_Sector_Review_and_Action_Plan.pdf

Rwanda Least Cost Power Development Plan (LCPDP) 2019 – 2040

http://www.reg.rw/fileadmin/user_upload/LCPDP_REPORT_June_2019.pdf

Rwanda Nationally Determined Contributions (NDC)

https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Rwanda/1/INDC_Rwanda_Nov.2015.pdf

Rwanda Rural Electrification Strategy

https://www.mininfra.gov.rw/fileadmin/user_upload/aircraft/Rural_Electrification_Strategy.pdf

SEforAll - Rapid Assessment Gap Analysis (RAGA) Rwanda

https://www.seforall.org/sites/default/files/Rwanda_RAGA_EN_Released.pdf

EEP Africa - Innovative Business Models – Nuru energy

https://eepafrica.org/bfd_download/nuru-energy/

Doing Business - World Bank

<https://www.doingbusiness.org/content/dam/doingBusiness/country/r/rwanda/RWA.pdf>

Official UK Government travel advice for Rwanda

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

Useful contacts

British High Commission

Parcelle No 1131
Boulevard de l'Umuganda
Kacyiru-Sud
Kigali
+250 25 255 6000
BHC.Kigali@fco.gov.uk

Rwandan High Commission

120-122 Seymour Place
W1H 1NR London
+44 207 224 9832
<http://uk.embassy.gov.rw>
uk@rwandahc.org

Ministry of Infrastructure

Kimihurura
KG 4 Ave
Kigali
+250 25 258 5503
<https://www.mininfra.gov.rw/>
info@mininfra.gov.rw

Rwanda Utilities Regulatory Authority (RURA)

P.O.Box 7289
Kigali
+250 25 258 4562
<https://www.rura.rw/>
info@rura.rw

Energy Private Developers (EPD)

KG 566 St
Kigali
+250 78 831 0434
<https://www.epdrwanda.com/>
info@epdrwanda.com

Rwanda Energy Group (REG)

KN82 ST3
Nyarugenge District
Kigali
+250 78 818 1224
<https://www.reg.rw/>
info@reg.rw

Please contact your Client Relationship Manager if you want help with introductions to specific individuals with these institutions.