

Stand Alone Solar (SAS)

MARKET UPDATE

Rwanda

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Tetra Tech International Development

This report was authored by the Africa Clean Energy Technical Assistance Facility with contributions from Selen Kesrelioglu, Collin Gumbu, Karin Sosis and Esther Kahinga.

Prosperity House, Westlands Road,
P.O. Box 4320, 00100, Nairobi, Kenya.
Tel: +254 (0)20 271 0485

Cover page: Solar home systems will benefit women and children in rural communities of Rwanda.
Photo courtesy of Ignite Rwanda

The Rwanda Stand-Alone Solar Market Update is one of a series of 14 national briefings published by the Africa Clean Energy (ACE) Technical Assistance Facility (TAF) to give stakeholders a snapshot of recent developments in the stand-alone solar sector, including those arising from the COVID-19 pandemic.

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition
AfDB	African Development Bank
BNR	National Bank of Rwanda
BDR	Development Bank of Rwanda
DFID	Department for International Development
E4I	Energy 4 Impact
EAC	East African Community
EPD	Energy Private Developers
EPR	Extended Producer Responsibility
EU	European Union
EUCL	Energy Utility Corporation Limited
EUR	Euro
FCDO	Foreign, Commonwealth & Development Office
FY	Financial Year
GDP	Gross Domestic Product
IDA	International Development Association
MFIs	Microfinance Institutions
MININFRA	Ministry of Infrastructure
MTF	Multi-Tier Framework
NEP	National Electrification Plan
NST1	National Strategy for Transformation
OMIS	Off-grid Monitoring Information System
PAYG	Pay-As-You-Go
PUE	Productive Use of Energy
RAB	Rwanda Agricultural Board
RBF	Results-Based Financing
REF	Renewable Energy Fund
REG	Rwanda Energy Group
RICA	Rwanda Inspectorate, Competition, and Consumer Protection Authority
RSB	Rwanda Standards Board
RURA	Rwanda Utilities Regulatory Authority
RWF	Rwandan Franc
SACCO	Savings and Credit Cooperative
SAS	Stand-Alone Solar
SIDA	Swedish International Development Cooperation Agency
SIR	Solar Irrigation in Rwanda
SHS	Solar Home System
SSIT	Small Scale Irrigation Technology
USADF	U.S. African Development Foundation
USD	United States Dollar
VAT	Value Added Tax



EXECUTIVE SUMMARY

Prior to the pandemic, Rwanda enjoyed impressive economic growth, exceeding 8 per cent Gross Domestic Product (GDP) growth in 2018 and 2019 that was driven by strong public investment. During the pandemic, Rwanda implemented well-coordinated preventive measures, including lockdowns, and has largely successfully controlled the spread of the virus. Nevertheless, serious economic challenges lie ahead, with significant slowdown of core economic sectors such as services and industry. The government has responded with an economic stimulus package and instructed commercial banks to ease loan repayment conditions (see Section 1).

Rwanda has made impressive progress toward its energy access targets, from less than 10 per cent with access to electricity in 2009 up to 56 per cent in 2020 (of which 15 per cent are off-grid connections). The government has committed to electrifying 48 per cent of the population through off-grid solutions and 52 per cent through on-grid connections by 2024.¹ In 2019, it published the National Electrification Plan (NEP) and the Ministerial Guidelines for Minimum Standards for Solar Home Systems (SHS). While both documents caused uncertainties in the sector (see Section 4), the government has now provided further clarification on which SHS systems are eligible and in which off-grid areas they may be sold. The Off-Grid Monitoring Information System (OMIS), which is in the final stages of development, will track all SHS deployed in the country. The system will be managed by the Energy Development Corporation Limited (EDCL).

SHS sales witnessed a slowdown in the last two fiscal years. Off-grid market sales witnessed a gradual decline from about 86,000 systems sold in 2017/2018 to 83,000 in 2018/2019 and 62,000 in 2019/2020. This is primarily attributed to the COVID-19 pandemic, affordability constraints and the uncertainty and delays in the development of the Minimum Standards for SHS. During the lockdown between March and April, stand-alone solar (SAS) companies were largely unable to operate, other than provide after-sales support, and imports came to a halt.

Affordability continues to remain the major challenge for the sector, exacerbated by an increase in prices of eligible products. Subsidies will continue to be instrumental in addressing affordability. Endeavor's Solar Lighting Results-Based Financing Program (2014-2019) and subsequent Pro-Poor (2019-2020), have provided subsidies to the sector. Following this model, a result-based financing (RBF) subsidy scheme, capitalised by USD30 million, was recently approved by the government and the World Bank (Window 5) – it will provide targeted incentives to low-income households and it's also expected to be the major driver of sales in the coming years.



Rwanda has made impressive progress toward its energy access targets, from less than **10 per cent with access to electricity** in 2009 up to 56 per cent in 2020 (of which **15 per cent are off-grid connections**).

1. Rwanda Energy Group.



Figure 1: Rwanda at a glance

i. International Energy Agency (2019)
 ii. World Bank (2018)
 iii. World Bank (2019)
 iv. ESMAP (2019)
 v. World Bank (2020)

1 NATIONAL OVERVIEW

1.1 Current Context

Rwanda, a small landlocked country with a population of roughly 12.66 million,² is considered one of the safest and most politically stable countries in Africa. This reflects the remarkable progress the country has made in the 25 years since the genocide against the Tutsi. President Paul Kagame was re-elected to serve a seven-year term in August 2018. In the parliamentary elections in the same year, women made up 64 per cent of the legislature. Rwanda has experienced remarkable economic growth over the last decade, with per capita Gross Domestic Product (GDP) increasing from USD219 in 2010 to USD801 2019.³

The country is ranked number 38 out of 190 in the World Bank's Ease of Doing Business Ranking 2020⁴ and aspires to reach Middle Income Country (MIC) status by 2035 and High Income Country (HIC) status by 2050 through its 7-year First National Strategy for Transformation (NST1). To achieve this, it is estimated that 10 per cent growth per capita will be required.⁵

Prior to the COVID-19 pandemic, Rwanda was experiencing strong economic growth, at 8.5 per cent in 2018 and 9.4 per cent in 2019,⁶ and GDP growth per capita averaging 5 per cent from 2006 to 2016, the second highest on the continent.⁷ Similarly strong projections for 2020 and 2021 had been forecast prior to the pandemic.

Rwanda rapidly implemented strict domestic measures to contain the spread of the virus, including a nationwide lockdown between March 20 and April 30, 2020. Restrictions included: stay at home orders, banning

of inter-province travel and motor taxi services until June 1, halting of commercial flights until August 1, and compulsory use of masks.

The government has been cautious in easing the lockdown restrictions. A curfew (starting times ranging from 6pm–10pm) has been in place since May 2020, and office restrictions continue to encourage people to work from home. These and other measures are reviewed bimonthly. As of December 31, 2020 there were 8,383 confirmed cases of COVID-19 in Rwanda – 1,749 are yet to recover and 92 people have died (0.8 per cent of total cases).⁸ Following a surge in cases in January 2021, the government imposed a two-week lockdown on January 18.⁹

The economic impact of the pandemic on Rwanda has been substantial, including a significant slowdown in the services and industry sectors (contributing to 48 per cent and 19 per cent of GDP respectively¹⁰), with exports and tourism hit especially hard. The National Bank of Rwanda (BNR) reported a growth rate of just 2.3 per cent for the financial year (FY) 2019/2020 compared to 8.9 per cent in the previous FY.¹¹ FY 2019/2020 saw inflation rise to 6.3 per cent, largely attributed to the economic impacts of the pandemic¹²; average inflation between 2010 and 2019 was 4.24 per cent.¹³

To mitigate these impacts, the government and BNR took a series of monetary measures, which included: reducing the BNR rate from 5 per cent to 4.5 per cent (April 2020); implementing a RWF50 billion lending facility to banks; establishing an Economic Recovery Fund to support businesses affected by COVID-19; and application of zero charges on mobile payments.¹⁴

2. National Institute for Statistics (2014). Fourth population and housing census, 2012.

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The Rwandan fiscal year is July to June, hence the slight difference from World Bank growth figures cited further above, which refer to the calendar year.

12. *ibid.*

13. World Bank (2020). Inflation, consumer prices (annual %) – Rwanda.

The International Monetary Fund (IMF) also provided a credit of USD109.4 million to Rwanda.¹⁵

1.2 Energy Access

The government has set an ambitious target of achieving universal electricity access by 2024 through the provision of off-grid connections (48 per cent) and on-grid connections (52 per cent). Currently, total access stands at 56.7 per cent, of which 41.3 per cent are grid connections and 15.4 per cent are off-grid.¹⁶

The current total target for off-grid connections by 2024 is roughly 1.7 million.¹⁷ Of these, the Energy Development Corporation Limited (EDCL) has recorded 418,502, primarily SHS.¹⁸ The government defines off-grid access via solar home systems (SHS) according to a minimum level of service and system performance requirements and mini-grid connections. According to EDCL, off-grid connections for 2019/2020 fell short of the 250,000 connections per year needed in order to reach the 48 per cent target.¹⁹

As part of the commitment to monitor the off-grid targets, EDCL has signed a memorandum of understanding with over 20 solar suppliers²⁰ that provide monthly sales figures, including repossessions. Data collection has proved challenging – there is a lack of consistent and complete data and a paucity of means or capacity to verify data submitted by companies. Therefore, EDCL, with the technical and financial support of Power Africa and Energising Development (EnDev), has recently developed a user friendly Off-Grid Monitoring Information System (OMIS) to track off-grid product sales.

Rwanda’s retail tariff for household customers is one of the highest in the region at USD0.22/kWh (for a 15-50kWh/month consumption block). To support low-income households and reduce industry tariffs (to attract foreign investment), government has revised the electricity tariff several times between 2012 and 2020.

Table 1: Electricity access

Grid connections (# / %)	1,132,522 (41%) ²¹
Off-grid connections (# / %)	418,502 (15%) ²²
Current off-grid population	44% of the population is unelectrified ²³
Grid tariff per kWh ²⁴	Residential: 0-50 kWh/month: RWF89-212/kWh (USD 0.09-0.22/kWh) ²⁵ (VAT exclusive) >50kWh/month: RWF 249 (USD 0.26/kWh) Non-residential (including telecom towers, hotels, health facilities, water treatment, broadcasters and commercial data centers): RWF 126-255/kWh (USD0.13-0.26/kWh) (VAT exclusive)
Average customer kWh usage	Rural areas: 9.9 kWh/month Urban areas: 29.2 kWh/month ²⁶

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16.

17. Assuming 3.7 million households in Rwanda in FY 2023/2024 as outlined in the Energy Sector Strategic Plan (2018/2019 – 2023/2024).

18. MININFRA (2020). Energy sector performance report backward looking joint sector review report for FY 2019/2020.

19. EDCL (2020). Annual performance report 2019–2020.

20. EDCL (2018). Annual performance report 2017–2018.

21. MININFRA (2020). Energy sector performance report backward looking joint sector review report for FY 2019/2020.

22. *ibid.*

23. *ibid.*

24.

25. Exchange rate USD1 = RWF968

26. World Bank (2018). Rwanda: Energy access diagnostic results based on multi-tier framework.

2 DEMAND-SIDE: CONSUMER INSIGHTS

In 2020, roughly 44 per cent of the Rwandan population (about 1.2 million households) did not have access to electricity. The current unelectrified population that is to be served through off-grid solutions by the government is about 915,000 households; up to 1.3 million by 2024.

2.1 Willingness and Ability to Pay

Although no specific study has quantified demand for SHS, consumer spending on alternative lighting and energy services offers an indicative proxy of willingness and ability to pay. Data from Rwanda's most extensive surveys on poverty²⁷ (last conducted in 2016/17) found that 75 per cent of the unelectrified population spent less than USD1.67 per month on energy expenses (batteries, candles, kerosene and phone charging).²⁸

The 2018 Multi-Tier Framework (MTF) survey also noted that only 5 per cent of households without electricity access spent more than USD3 per month on lighting and mobile phone charging, 91 per cent spent less than USD1.8 per month and 78 per cent spend less than USD1 per month.²⁹ Rwanda has been transitioning away from kerosene, with rural consumers increasingly adopting technological alternatives such as batteries for lighting³⁰. However, the potential for appliances remains limited primarily to lighting, mobile phones and radios.

There remains a striking disparity between rural household expenditure on lighting and SHS prices. For example, lighting expenditure on average does not exceed USD1.8 per month, but because the minimum standards require larger, high-quality systems, the lowest-priced pay-as-you-go (PAYG) SHS currently available in Rwanda costs USD3.9 per month.

Affordability remains a key hindrance to the adoption of stand-alone solar (SAS) products.

Today, the market for products meeting the government's minimum standards for SHS has been largely saturated – households that can afford SHS have now been covered. Therefore, the poorest are primarily expected to acquire products through subsidy schemes, such as EnDev's Pro Poor Results-Based Financing Programme (Pro Poor RBF) and the recently launched Renewable Energy Fund RBF subsidy.³¹

2.2 Impact of COVID-19

COVID-19's impact has been considerable, particularly due to the strict six-week lockdown from mid-March that brought to a halt almost all economic activity. Households reported significant impact, including loss of income and food security, with 68 per cent reporting a negative impact on their financial wellbeing and 60 per cent reporting a reduction in food consumption. Approximately 60 per cent of households reported using their savings, 30 per cent borrowed money and 11 per cent had stopped their loan repayments after the pandemic broke out.³²

Ultimately, poverty in Rwanda is likely to worsen due to COVID-19, with more households likely to fall into poverty, and marginalisation and social immobility becoming worse. Those likely to be hit the hardest are informal workers, followed by women and youth.³³ COVID-19 has also impacted the agriculture sector, which employs roughly 62 per cent of the country³⁴, due to increased movement and export restrictions and reduced purchasing power, which have impacted the ability of farmers to sell product.³⁵

27. *The Rwanda EICV is a standardised income and expenditure survey with a periodicity of five years designed to monitor poverty and living conditions in Rwanda.*

28. *NISR (2019). The fifth integrated household living conditions survey 2016/17: Main indicators report.*

29. *World Bank (2018). Energy access diagnostic report based on the multi-tier framework.*

30. *Dropped from 12.7% in 2005/06 to 1.4% in 2015/16 as the main source of household lighting.*

31. *The Rwandan government has categorized households under the Ubudehe system, by which Ubudehe 1 are the poorest households and 4 are the richest.*

32. <https://60decibels.com/>

33. *United Nations. (2020). The socio-economic impact of COVID-19 in Rwanda.*

34.

35.

3 SUPPLY-SIDE: STAND-ALONE SOLAR COMPANIES

3.1 Solar Home Systems (SHS)

The SAS market has slowed in the past two years (see Figure 1). A decrease in 2019 is partially due to uncertainty companies faced during the development of the Ministerial Guidelines on Minimum Standards Requirements for SHS, which made many

companies delay or completely halt imports. This also meant that some of the existing, smaller, affordable products were phased out of the market, resulting in a slow-down of sales. In addition, the distribution of 24,000 systems to households by the government in July 2019 comprised roughly 30% of the 2019/2020 FY sales.

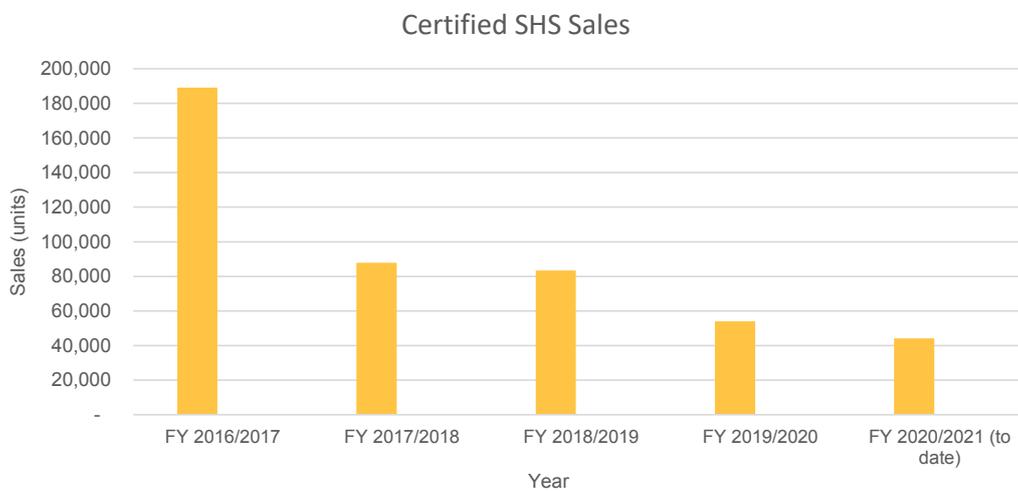


Figure 2: Certified SHS sales by fiscal year (July-June) (Source: EDCL, 2021)

In 2020, COVID-19 has driven sales down further, with many companies reporting a decrease while some smaller companies have had no sales at all. During the lockdown, the government did not designate SAS companies as essential service providers, which meant they could not distribute products or access customers. They maintained a certain level of operations through their call centres and were permitted one technician to service SHS.

In an April 2020 survey, 5 of the 16 businesses reported a drop in revenue of more than 90 per cent and more than half of the businesses expected over 50 per cent reduction in revenues. Companies reported financial difficulties such as reduced turnover and difficulties

in paying staff, while over 50 per cent reported defaulting with debtors/creditors.³⁶ About 71 per cent of companies reported defaulting debtors/creditors during the pandemic³⁷ and witnessed decreased utilisation rates among customers. Some PAYG companies restructured loans during this time. In a follow up survey, with 14 participating companies, 5 companies reported staff layoffs.³⁸ Most companies have reported difficulties and delays in importing products. Only one of the 14 companies surveyed reported it was able to access economic relief funds.³⁹

A few SAS companies have recently gone bankrupt; others diversified into new areas or adapted their distribution channels. Several new companies, including

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38. *ibid.*

39. *ibid.*

Spotico, Solektra, BUIM and Hello Renewables, entered the SHS market. Established local small and medium enterprises (SMEs), such as Neseltec, Dassy and Serve & Smile continue to sell SHS and also offer other off-grid energy products such as productive use of energy (PUE) systems.

While about 20 companies are active in the SAS sector,⁴⁰ the majority of sales in the past two years have been by BBOXX, Ignite, One Acre Fund and Mobisol. Large multinational PAYG companies continue to dominate the market, having set up the infrastructure to distribute nationwide and being well equipped to follow-up on customer payments/maintenance of systems through call centres and a network of technicians. They also do not face the barriers in accessing supply chain finance as smaller companies do. A good portion of the sales in the past couple of years can be attributed to subsidies provided under the EnDev Results Based Financing (RBF) Solar Lighting Programme, which successfully

concluded in June 2020, and the more recent Pro Poor RBF.

The range of SHS product in the Rwandan market has changed noticeably with the introduction of the Minimum Standards for SHS. The Sun King Home 60 was one of the most popular products in 2018, with more than 40 per cent of the market share⁴¹ and an affordable monthly PAYG price (about USD3/month) – but it is no longer eligible for sale in the country. Eligible SHS prices currently range from USD85 to over USD1,000. Monthly PAYG payments range from RWF3,750/month (USD3.9) to RWF40,000/month (USD30), and can go higher with supplementary appliances such as televisions, radios and hair clippers. Companies continue to identify affordability as the primary challenge for the sector, exacerbated by the increase in prices of new eligible products (ranging from a 10 to 100 per cent increase compared to previous products).

Table 2: Products and business models of major SAS companies

Company	Business model	Brand/product focus	Recent developments
Bboxx	PAYG	bPower50 bPower20	Newly introduced the bPower20, an entry-level plug and play SHS better suited for households with basic appliance needs.
Ignite	PAYG	Sun King Home 60. Currently procuring new product that meets Minimum Standards for SHS	Identifying new product to replace SKH60. Selling solar irrigation systems.
One Acre Fund	Uses existing farmer supply chain model with seasonal payments. SHS is not its core business.	Biolite (3 lights, embedded radio, USB port)	Introduced new product, continuing sales through existing distribution model. Has entered new markets in Rwanda.
Mobisol	PAYG	40W-200W SHS products	Planning to introduce new more affordable products.

The final publication of the Minimum Standards for SHS in June 2019 and the development of tools to support its interpretation, together with the recent launch of the Renewable Energy Fund's (REF's) Window 5 RBF subsidy (see Section 5), has led to cautious optimism of sales recovery in 2021. But moving forward, challenges related to access to finance, increased competition and

consumer ability to pay could potentially push out SMEs and local entrepreneurs.

Plans to build Rwanda's first SHS assembly factory, through an agreement between GoR and NOTS Solar Lamps, have been cancelled. They had aimed to supply 900,000 units in four years.

40. BBOXX, BELECOM, Dassy, Dynamic Energy, Elerai, ERE, GDG, GLAS, Hello Renewable Energy, Ignite Power, INNOTECH, INTERTECH, Mobisol, MTS Ltd, Neseltec, Nots, One Acre Fund, Safer Rwanda, Serve and Smile, Solektra, Spotico, Zola Electric, 3N Engineering.

41. EnDev (2019). Off-grid sector status report, 2018.

3.2 Productive Use Systems

In Rwanda the market for agricultural and other PUE systems is still nascent – business models and financing are not yet developed. The major potential areas are solar irrigation, post-harvest processing and cold storage, although there is need to better understand and pilot the full range of applications relevant to farmers, cooperatives and SMEs. Some sales are ongoing with InspiraFarms (cold storage), Davis & Shirliff (solar water pumps and water heaters), Dassy Enterprises

(solar cooling), and Centennial (various business-to-business).

Even as 53 per cent of the population are independent smallholder farmers⁴² who rely mostly on rain fed irrigation, only 1 per cent of land is mechanically irrigated. Due to high investment, operational and maintenance costs, and lack of access to affordable capital, the market for solar irrigation systems remains largely untapped.⁴³ There are efforts to build the market, however – see Box 1.

Box 1: Support for solar irrigation in Rwanda

The market for small-scale solar irrigation is growing, with support from government and donors to address the affordability gap. Currently, Ignite Power is trialling a product with PAYG remote monitoring. Other companies, such as Entreprise de Construction Mixte (ECM), STES Group, Futurepump and Bunga Energy are also suppliers of solar irrigation systems, ranging from small scale plug and play portable kits to large water pumping stations.⁴⁴

- ❖ The Rwanda Agricultural Board (RAB) Small Scale Irrigation Technology (SSIT) programme provides a 50 per cent subsidy to farmers who adopt SSIT. The programme is more successful with diesel powered systems, which cost almost a fifth of the price of solar irrigation systems (the latter sell for RWF800,000-2,000,000 (USD826-2,066)).
- ❖ From 2018 to November 2020, Energy 4 Impact (E4I) implemented a sustainable small-scale solar irrigation programme “Solar Irrigation in Rwanda (SIR)” in 10 districts.⁴⁵
 - It built upon the existing RAB subsidy with a further 20 per cent, resulting in a total 70 per cent subsidy to farmers. The project reached 1,278 farmers – in existing cooperatives or aggregated groups for the project – through the sale of 72 solar irrigation systems (mostly supplied by Ignite).
 - SIR additionally worked with Urwego Bank, which developed a loan product that allows farmers to repay on a seasonal basis. The product has not yet been launched, partly due to the COVID-19 disruption and the conclusion of the SIR programme.
 - SIR also introduced financing for the solar irrigation equipment suppliers to cover the RAB subsidy as it can take up to six months for RAB to make payments, which has resulted in companies marking up their product prices by up to 75 per cent.
 - In response to the pandemic, districts in the Southern Province increased the RAB subsidy up to 75 per cent for Ubudehe 1 and 2 categories, which increased demand for systems under the SIR programme.
- ❖ The Hinga Weze programme funded by the United States Agency for International Development (USAID) is also providing support in solar irrigation.

3.3 Energy Private Developers (EPD)

EPD is a trade association and advocacy group for energy companies and is one of the five associations comprising the Chamber of Industry under the Private Sector Federation (PSF) of Rwanda. It has 112 members, including most SAS companies. EPD has been supported recently by USAID and the Foreign, Commonwealth and Development Office (FCDO) through the Shell Foundation and BFZ.⁴⁶ EPD is a member of the Global Off-Grid Lighting Association (GOGLA) and has seven full-time staff, two of which were recently hired to support data management.⁴⁷

EPD also acts as a training institution and, prior to the pandemic, had started holding industry events. It also released its first energy sector publication in 2019 and has conducted two surveys during the COVID-19 pandemic, with plans to provide more market data in future. EPD has in recent times, especially during the pandemic, increased its advocacy efforts, acting as an intermediary between the private sector and government. During the lockdown, while SAS companies were not designated as essential services, EPD successfully supported efforts to obtain clearances for companies to be able to keep their call centres open and technicians working.

42. NISR. (2019). *The fifth integrated household living conditions survey 2016/17: Main indicators report*.

43. International Growth Center (2018). *Impacts and sustainability of irrigation in Rwanda*.

44. World Bank Group/Enclude BV (2019). *Re-energizing agriculture through solar power in Rwanda*.

45.

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47. EPD (2020). *Annual report 2019: Rwanda energy sector*.

4 POLITICAL FRAMEWORK

4.1 Government Institutions

The most significant recent change to the institutional environment governing the energy sector was the creation of a new agency – the Rwanda Inspectorate, Competition, and Consumer Protection Authority (RICA). Although established by law in 2017,⁴⁸ it became active

in 2020. Even though RICA has assumed responsibility for the implementation of the Minimum Standards for SHS, it will not replace the Rwanda Standards Board (RSB). Table 3 summarises recent activity by government bodies involved in the SAS sector.

Table 3: Government institutions in the SAS sector

Institution	Description and recent activity
Ministry of Infrastructure (MININFRA)	Oversees the energy sector. Developed Ministerial Guidelines on Minimum Standards Requirements for SHS. In 2018, Claver Gatete, the former Minister of Finance and Economic Planning, was appointed as the Minister of Infrastructure (therefore overseeing the energy sector), replacing James Musoni. ⁴⁹
Rwanda Energy Group (REG) and its subsidiaries Energy Development Corporation Limited (EDCL) & Energy Utility Corporation Limited (EUCL)	Development of National Electrification Plan (June 2019) and its current modifications.
Rwanda Standards Bureau (RSB)	Developed, together with REG and MININFRA, Ministerial Guidelines on Minimum Standard Requirements for SHS.
Rwanda Revenue Authority (RRA)	Follows the East African Community (EAC) common agreement to exempt solar equipment from domestic VAT (18%) and import duty (25% ⁵⁰) since 2015. Spare parts, accessories and appliances are not exempt from taxes.
Rwanda Development Board (RDB)	No recent activity targeting the SAS sector.
Rwanda Inspectorate, Competition, and Consumer Protection Authority (RICA)	Has been put in charge of consumer protection and implementing and enforcing the Ministerial Guidelines on Minimum Standards Requirements for SHS.

4.2 Policy and Regulation

Rwanda’s off-grid policy is guided by the NST1 (2017–2024), which targets universal access to electricity by 2024. To achieve this goal, government has recently implemented:

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50. As part of the EAC, Rwanda uses a four band duty structure for imports from outside of the EAC. Goods are generally subject to import duty of 0% for raw materials and capital goods, 10% for intermediate goods and 25% for finished goods.

- The Ministerial Guidelines on Minimum Standards Requirements for SHS, first published in August 2018. Following sector-wide consultations, a second iteration was validated in June 2019. The goal of the standards is to ensure quality of products and services to end-users. The development of the standards resulted in a period of uncertainty for SAS companies as they stalled imports and tried to clear the stocks they were holding. The standards initially restricted systems based on size, but the second iteration focused on service level requirements – for example, requiring systems to have a minimum of three lamps operating for at least four hours a day, mobile phone charging supply for two hours a day and radio charging for at least five hours a day.⁵¹ Due to the difficulty in deciphering which products were eligible under the service-level requirements, the government, with the support of Lighting Global, developed an Excel calculation tool for the private sector.⁵²
- The National Electrification Plan (NEP), validated in June 2019, developed to ensure efficient planning of electrification targets by dividing the country into on-grid and off-grid areas⁵³ using ground data, calculated assumptions and strategic decision making.⁵⁴ It has proven a complex exercise, requiring modifications and ground truthing of sites. As a result, EDCL is currently in the process of updating the existing map to provide an updated NEP version in early 2021. The NEP has an additional demarcation distinction within the off-grid areas, distinguishing between where mini-grids and SAS are eligible for subsidy, which some stakeholders see as limiting the SAS sector. This is because the SAS market has experienced far higher penetration than mini-grids.

Despite these measures, balancing policy targets, consumer protection and a healthy competitive private sector with market realities has proved challenging.

E-waste

Management of e-waste in Rwanda is covered under MININFRA's National Sanitation Policy⁵⁵ and the Law

on Environment.⁵⁶ The government also published a National E-Waste Management Policy (2015), though it has not yet been adopted, and has issued a complimentary regulation – Government E-Waste Management (2018) – based on the extended producer responsibility (EPR) principle, which was put in place by the Rwanda Utilities Regulatory Authority (RURA).⁵⁷

An e-waste take-back and recycling system, with an associated EPR financing mechanism, has not yet been established in Rwanda. Nevertheless, the government established an e-waste dismantling facility in 2018, currently operated under a public-private partnership (PPP) model in partnership with Enviroserve Rwanda. In 2019, RURA granted Enviroserve a license for e-waste management. The facility has the capacity to dispose of 7,000 to 10,000 tonnes of waste per annum but currently disposes of 3,000 tonnes, 400 to 500 tonnes of which comprises SHS. It works actively with five SAS companies and has 18 collection points found in all provinces. Considering the growing number of SHS in circulation, and the increased promotion of SHS to reach off-grid electrification targets in Rwanda, sustainable end-of-life SHS management is likely to become an increasingly prominent issue in the coming years.

Financial and Mobile Payment

Over the past decade, the government has undertaken a series of policy reforms intended to improve the investment climate and stimulate investment for investors. Financial inclusion remains a strong priority for the government and 93 per cent of the population is now financially included. However, while most Rwandans indicate a high level of consumer empowerment, there is still a need for increased transparency from the financial sector.⁵⁸

Gender and Social Inclusion Mainstreaming

MININFRA developed the Infrastructure Gender Mainstreaming Strategy (IGMS) in 2017. Currently, REG is establishing a gender mainstreaming programme in the energy sector, where only 18 per cent of staff are women.⁵⁹

51. Ministry of Infrastructure (2019). Ministerial Guidelines on Minimum Standards Requirements for Solar Home Systems.

52.

53. Developed jointly with the Massachusetts Institute of Technology and Universidad Pontifical Comillas Institute for Research in Technology (IIT).

54. REG (2019). The National Electrification Plan: Report on definition of technologies (on-grid and off-grid) at village level.

55. MININFRA (2016). National Sanitation Policy.

56. Government of Rwanda (2018). Official Gazette no. Special of 21/09/2018, Law N°48/2018 OF 13/08/2018 on Environment.

57. Government of Rwanda (2018). Official Gazette no.31 of 30/07/2018.

58.

59.

5 FINANCING

5.1 Supply Chain Financing

Two high-ticket solar loans were injected into the sector between 2017 and 2019. Since then, however, only one commercial bank outside of Development Bank Rwanda's (BRD) Renewable Energy Fund (REF) is lending to an SAS company – in July 2019, Ignite Power signed another finance agreement with I&M Bank.⁶⁰

The REF, managed by BRD⁶¹ and launched in 2017, is the primary source of local-currency credit and direct company funding in Rwanda.⁶² To date, the fund has disbursed 12 per cent of total funds available in its initial three funding windows.⁶³ In mid-2020, the fund approved some structural adjustments to address low disbursement rates.

Window 2 was developed to finance SAS companies by on-lending through banks (commercial and microfinance) and has qualified five commercial banks⁶⁴ and four microfinance institutions (MFIs).⁶⁵ As of 2020, there has been no on-lending through this window via commercial banks to OSC, highlighting the continued reluctance of local commercial banks to lend to the sector.

Early in 2019, the REF launched Window 4, which provides direct financing to locally registered SAS companies. As of mid-2020, the Window was providing a line of credit to BBOX and Ignite of approximately USD7.5 million at 8 per cent interest. The companies are covered by a complementary USD20 million

Swedish International Development Cooperation Agency (SIDA) guarantee fund.⁶⁶ One company has been able to draw on the line of credit to date.

The REF Window 5 subsidy is also expected to further stimulate the sector and relieve issues relating to affordability by lowering the cost of eligible systems (see Section 6.1).

5.2 Consumer Financing

PAYG is the most common mechanism for consumer financing of SAS in Rwanda. The REF is an alternative, enabling consumer borrowing for SAS through Window 1 and Window 2:

- **Window 1** – On-lending through savings and credit cooperatives (SACCOs) to households and microenterprises. To date, Window 1 has signed agreements with 55 Umurenge SACCOs⁶⁷ with 42 receiving funds. However, on-lending to end-beneficiaries stands at only USD78,000, which is 0.16 per cent of total project funds.⁶⁸
- **Window 2** – As noted above, is on-lending through to households and SMEs.

Both windows face capacity-related challenges – SACCOs have limited capacity to promote SAS and MFIs need support to understand the value proposition in lending to the sector. The REF is providing technical assistance to participating SACCOs and MFIs. COVID-19 has been a further stress as it's strained consumer repayments and prompted savings withdrawals.⁶⁹

60. Ignite Power (2019). Ignite Power secures additional financing from I&M Bank to expand offering.

61. The Government of Rwanda and the World Bank signed a USD50 million SREP financing agreement in June 2017 to accelerate off-grid electricity access through SAS systems and renewable energy-based mini-grids through the establishment of the REF.

62. The project was approved by the World Bank's Board on June 20, 2017 and became effective on November 3, 2017. The current closing date is September 30, 2023. The fund was capitalised with SREP Trust Fund financing (56 per cent credit, 44 per cent grant).

63. Window 1: On-lending through SACCOs to households and microenterprises; Window 2: On-lending through banks (commercial and microfinance) to households and SMEs; Window 3: Direct lending to mini-grid developers.

64. I&M Bank, Bank of Kigali, Bank of Africa, Access Bank, Zigama.

65. RIM, Axxon Tunga, Umutanguha Finance, Sager Ganza.

66. The USD20 million guarantee facility covers up to 50% for qualified buyers (but up to 70% for female borrowers).

67. Umurenge SACCOs, which were formed in 2009 as a part of the government's strategy to provide unbanked people access to financial services, are pool savings from members. There are over 416 Umurenge SACCOs in Rwanda.

68. World Bank (2020). Renewable Energy Fund (P160699): Restructuring paper on a proposed restructuring of the Renewable Energy Fund project approved on June 20, 2017.

69. AFR (2020). Impact of COVID-19 on the microfinance sector in Rwanda.

Mobile money networks

Two telecommunications operators run mobile money services: MTN Rwanda and Airtel Rwanda.⁷⁰ In 2019 about 87 per cent of adults in Rwanda had access to a mobile phone and 61 per cent used mobile money. Active mobile phone subscriptions were approximately nine million, representing a 75 per cent mobile penetration rate.⁷¹

Mobile money plays a significant role in financial inclusion in Rwanda, and on the back of this the PAYG model has spread rapidly, with established players such as BBOXX, Ignite, Mobisol and Zola Electric offering PAYG systems.

During the national lockdown, BNR agreed with banks and mobile money service providers to temporarily waive service fees on digital financial transactions.⁷²



70. RURA (2020). Annual report 2019-2020.

71. RURA (2019). Annual report 2018-2019.

72.

6 MARKET SUPPORT

There is active donor support for the SAS sector in Rwanda. The main have been EnDev's Results Based Financing (RBF) programmes, the SREP-funded REF, SIDA's portfolio guarantee facility to support the REF and technical assistance from Power Africa. Of these, two programmes provide subsidies in an effort to directly address affordability challenges of SHS for the poorest:

- **EnDev's RBF programmes** – EnDev concluded its RBF Solar Lighting Programme in June 2020. It subsequently launched the Pro Poor RBF (November 2019-March 2021). The Pro Poor RBF has adjusted subsidy levels from the previous programmes so as to target the poorest (Ubudehe 1, 2 and 3). By the end of December 2020, EnDev had verified and disbursed funds for 14,000 units under the Pro Poor RBF. This RBF served as a pilot and model for REF's Window 5 RBF and is supported by the Foreign, Commonwealth and

Development Office (FCDO) and Power Africa Off-grid Program (PAOP). Had sold 14,000 units as of December 2020.

- **REF Window 5 RBF** – The REF launched Window 5 in 2020 in reaction to continued unaffordability of Tier 1+ SHS by the poorest. The subsidy scheme is capitalised by USD15 million from the REF and USD15 million from the World Bank's Energy Access and Quality Improvement Project (EAQUIP).⁷³ It is expected that the Window 5 fund will subsidise over 300,000 off-grid household connections.⁷⁴ As of early 2021, 10 companies had applied to participate. The REF will closely follow the uptake of subsidies and may need to adjust given the potential decrease in purchasing power due to COVID-19 and the increase in product costs because of the Minimum Standards for SHS.

Other relevant support is noted in Table 4.



The Pro Poor RBF adjusted subsidy levels from the previous programmes so as to target the poorest (Ubudehe 1, 2 and 3). By the end of December 2020, EnDev had **verified and disbursed funds for 14,000 units**.



Window 5 of the Results Based Financing will subsidise over **300,000 off-grid household connections**. As of early 2021, 10 companies had applied to participate.

73. World Bank (2020). Rwanda – Energy access and quality improvement project (P172594).

74. *ibid.*

Table 4: Development partners in the SAS sector

Development partner: programme	Type of assistance	Comments
African Development Bank (AfDB): Scaling Up Electricity Access Program Phase II (SEAP II)	Loan	(2018/19–2020/21) targeting 124,800 off-grid connections.
Energy and Environment Partnership (EEP) Africa	Grants	Supporting OffGridBox (solar-powered batteries & purified water, EUR 441,000).
European Union (EU)	Technical assistance	TA and capacity building support for MININFRA. Feasibility study for the upgrade of the Bugesera e-waste plant.
FCDO: Africa Clean Energy (ACE) Technical Assistance Facility (TAF)	Technical assistance	Catalysing SAS markets with support to the enabling environment. ACE TAF will also provide support in further clarifying the tax regime for the off-grid sector, including SAS.
Swedish International Development Cooperation Agency (SIDA)	Loan guarantee	USD20 million guarantee available to all REF financial intermediaries.
United States Agency for International Development (USAID)/Power Africa, implemented by Women in Rwandan Energy (WIRE): East Africa Energy Program	Grant Technical assistance	Promoting women's and girls' participation and social inclusion across the energy sector in Rwanda.
USAID/Power Africa: Power Africa Off-grid Program (PAOP)	Grant Loan guarantee	<ul style="list-style-type: none"> • SHS RBF subsidy (Pro Poor RBF). • OMIS and Eligibility Tool software for REF Window 5. • Support to private sector, PUE and electricity access for refugees. • Supporting implementation of off-grid policy, programmes and regulations. • Development Credit Authority (DCA) partial loan portfolio guarantee for risk mitigation and to catalyse up to USD5 million in loans by Banque Populaire du Rwanda (BPR) to the off-grid sector.
USAID/Power Africa via US African Development Foundation (USADF)	Grant	Has funded five off-grid energy projects in Rwanda through the Off-Grid Energy Challenge Initiative, three of which are ongoing.
World Bank: REF and EAQUIP	Loan/Grant	<p>USD48.94 million REF managed by BRD (June 2017–September 2023).</p> <p>Energy Access and Quality Improvement Project (EAQUIP) USD \$15 for REF Window 5 (Sept 2020 – Dec 2026)</p>

Finally, the Off-grid Monitoring System (OMIS) is an off-grid monitoring and verification system that will allow the government, particularly MININFRA and REG/EDCL, to track off-grid electrification targets. The system is in final stages of development. It will be managed by EDCL, which collects data from off-grid companies. OMIS links to the Local Administrative Entities Development Agency's (LODA) Monitoring and

Evaluation Information System (MEIS), which provides information on all citizens in Rwanda, including their IDs and Ubudehe categories.⁷⁶ A web-based Eligibility Tool links to OMIS and checks for customer eligibility based on their Ubudehe category and whether they're in an SHS designated area. It also allows for companies to register a sale once a product is installed, ensuring that households only benefit from one subsidised product.

75. In 2021, we're contracting 9 new SAS grant projects in Kenya, Rwanda, Tanzania, Uganda and Zimbabwe.

76. World Bank (2020). Rwanda – Energy access and quality improvement project (P172594).



ACE TAF PARTNERS INCLUDE:



STRATEGIC PARTNER:



Tetra Tech International Development

Fourth Floor, Prosperity House, Westlands Road |
PO Box 19084 – 00100 | Nairobi, Kenya.