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ENERGIZING FINANCE:
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CHAPTER

3

IMPACT OF POLICIES ON
ELECTRICITY FINANCING:
A LOOK AT RWANDA

CONTEXT

Achieving SDG7 and meeting the goals of the Paris Agreement requires sound domestic policies and regulations to scale up public finance and mobilize private sector investment. Ambitious national targets and strengthening and adapting policies to evolving market conditions have historically led to progress on sustainable energy outcomes (Foster et al. 2018).

This case study explores how robust domestic policies have contributed to increased electricity access in Rwanda, by measuring electricity sector commitments against Rwanda's performance in the World Bank's Regulatory Indicators for Sustainable Energy (RISE) index. RISE is a benchmarking tool designed to quantify and compare national policy frameworks against three pillars: electricity access, renewable energy and energy efficiency.

Rwanda, despite not being a high-impact country (HIC), has shown significant energy sector transformation with accompanying increases in energy access and investment, which can help inform smart policymaking in the HICs. In fact, Rwanda was one of the top three fast movers globally in electricity access between 2010 and 2017, where electrification rates even outpaced population growth. Following changes in its energy sector policies and regulatory frameworks, Rwanda scored higher than the average of other low-income Sub-Saharan African (SSA) countries in 20 out of 28 RISE indicators.

In Rwanda, strengthening frameworks for on-grid and off-grid electrification, establishing cost-effective tariff structures, and ensuring the creditworthiness of utilities have all been instrumental in sending a strong signal to investors. Launched in 2016, the national SEforALL Action Agenda set out to bring the renewable energy mix to 60 percent of the population by 2030 (REG 2019 and ESSP 2018). This coincided with Rwanda's plan to ensure universal electricity access by 2024, with a strong focus on policies and regulations, encouraging private sector participation by securing long-term funding for projects and expanding the existing feed-in tariff regime (Rwanda Energy Group 2019).

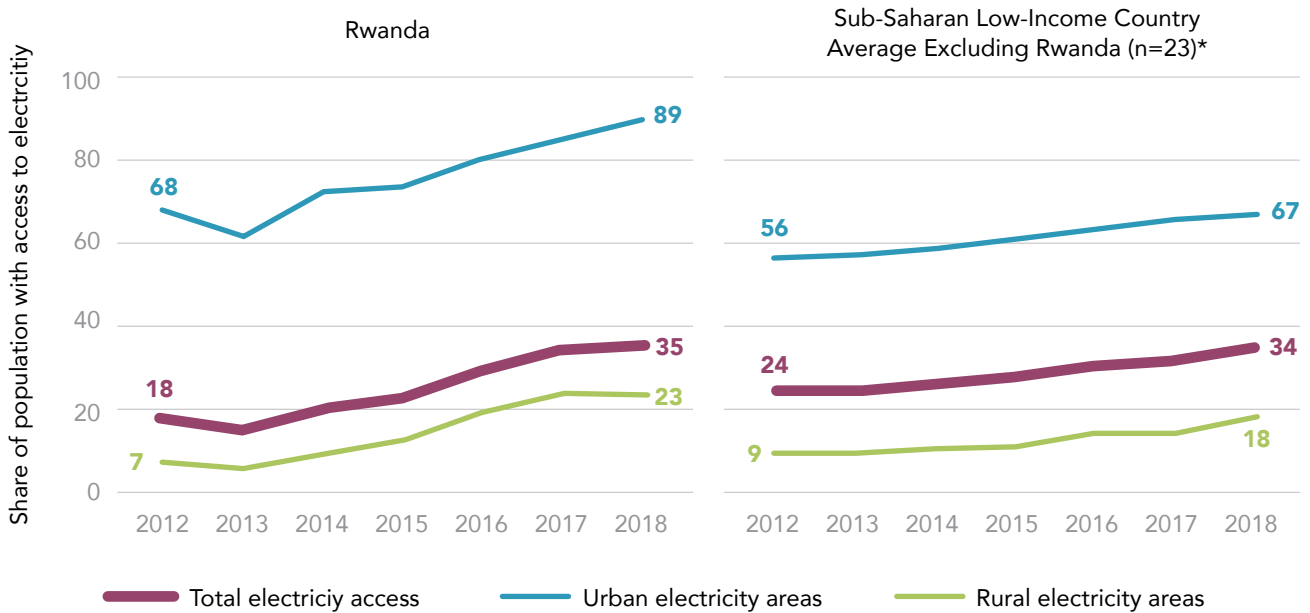
Rwanda's strong policy frameworks for on-grid and off-grid electrification, cost-effective tariff structures, and restructuring of utilities have been instrumental in increasing electricity access.

It is important to acknowledge the presence of external factors, resulting in a complex link between cause and effect, i.e. the RISE index and electricity sector investment in Rwanda, which is not explored in this case study. More in-depth analysis of trends in policy and financing variables will provide strong indications of key underlying factors that result in progress and help identify areas for future reform.

STATUS OF ELECTRICITY ACCESS IN RWANDA

In 2018, 65 percent of Rwanda's population lacked access to electricity. This predominantly affects people in rural areas where the electrification rate is 23 percent, while 89 percent of people living in urban areas have access. Electrification in Rwanda has progressed significantly in the last decade, from under 10 percent in total in 2010 to 35 percent in 2018. Other low-income SSA countries have exhibited an overall similar trend with substantial rural-urban variations (Figure 17).

FIGURE 17
Electrification rates in Rwanda and other low-income Sub-Saharan countries

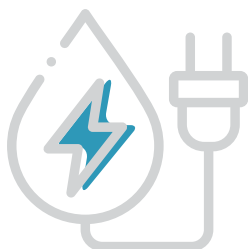


Source: The World Bank 2019.

Note *As per the available RISE data, the 23 countries representing Sub-Saharan low-income countries in this study are Benin, Burkina Faso, Burundi, Central African Republic, Chad, Congo (DR), Eritrea, Ethiopia, Guinea, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Senegal, Sierra Leone, Somalia, South Sudan, Tanzania, Togo, Uganda and Zimbabwe.

Historically, cheaper hydropower has dominated Rwanda’s energy mix, accounting for 47 percent of its energy-generation capacity for more than a decade (Rwanda Energy Group). The country has utilized its abundant rivers and waterways to such an extent that the renewable energy share of total final energy consumption throughout Rwanda has increased more than 86 percent²³ since 1995. This is a higher share than many OECD countries (World Bank 2020). However,

some regions are increasingly relying on existing diesel fuel plants (currently 27 percent of the energy mix²⁴) to fill the peak demand gap created by hydropower plants failing due to the increasing intensity and length of dry seasons. At peak times, diesel use increases generation cost and relays this effect onto the electricity tariff, making electricity less affordable to consumers (REG 2019).



Hydropower has dominated Rwanda’s energy mix, but Rwanda increasingly relies on diesel fuel generators to meet peak demand.

²³ This large difference between energy generation mix and energy consumption from hydropower is attributed to grid losses (22 percent in Rwanda), variation in hydropower production and consumption due to droughts and energy production costs where utilities aim to use the cheapest electricity at peak times (discussed in next section).

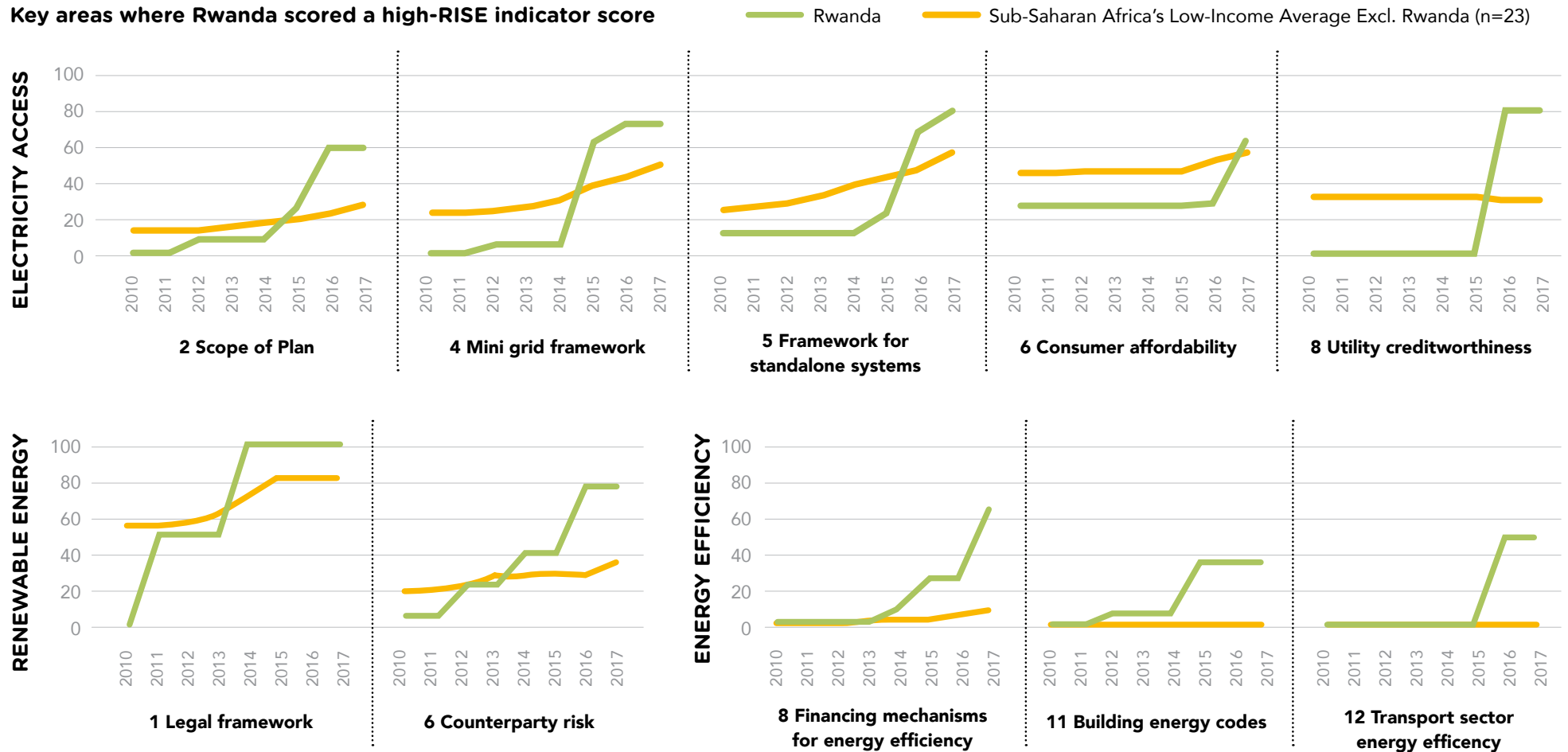
²⁴ This is split between government-owned diesel-power plants (27.8 MW) and other privately-owned diesel-power plants (10 MW).

KEY FINDINGS

Unlike other SSA countries, Rwanda has increased its electricity access RISE score from low²⁵ to high in just three years. This is mainly attributable to it expanding the scope and strength of its national electrification plan to encompass off-grid solutions, service level targets, and electricity access-related incentives, while pursuing its ambition to become middle-income country status by 2035 and becoming a high-income country by 2050. While a comprehensive assessment of all the policy indicators and sub-indicators is beyond the scope of this report, the report discusses the key policies and regulations and their implications for electricity sector financing (See Figure 18).

FIGURE 18

Key areas where Rwanda scored a high-RISE indicator score



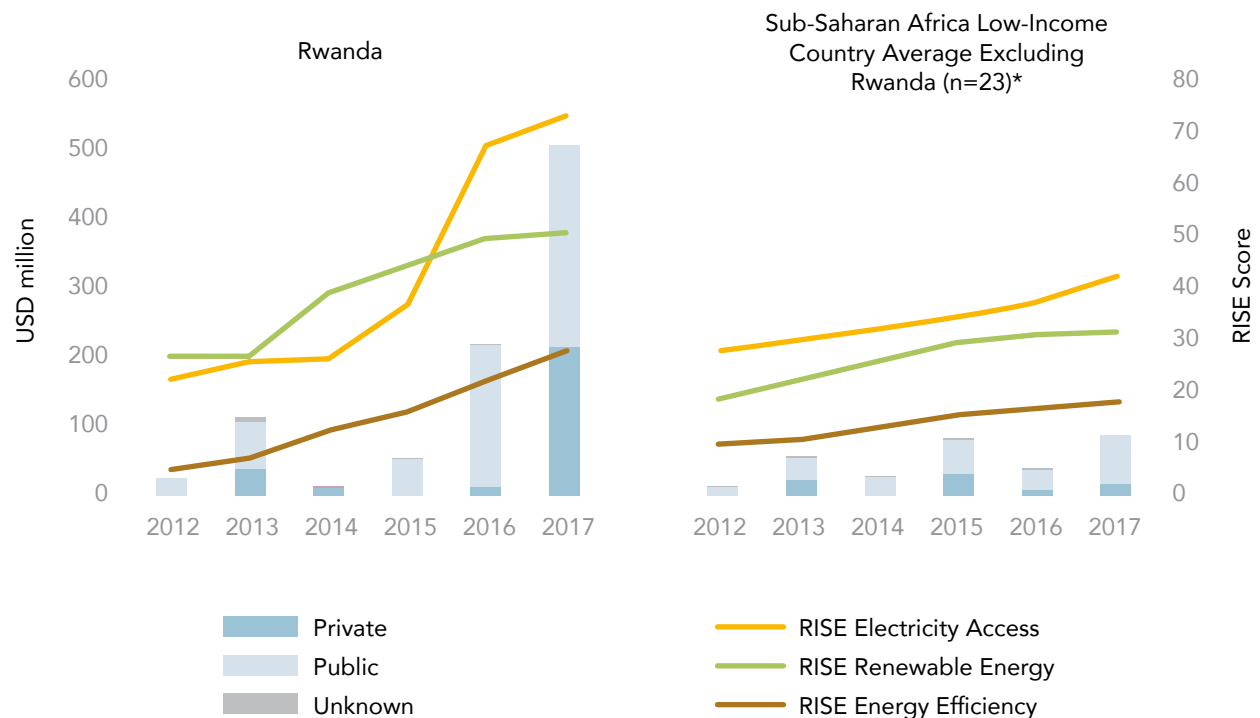
²⁵ RISE — which comprises 28 main indicators across the three energy pillars — divides into three equal categories, grouping the scores into low (red), medium (amber) and high (green), corresponding to the countries' regulatory environment in the energy context.

Institutions setting targets and formulating action plans: State institutions can be instrumental in driving changes in a sector (Müller et al. 2020). In the case of Rwanda, the Ministry of Infrastructure (MININFRA), which is responsible for developing energy policies and strategies, received its first set of responsibilities from the Central Government in February 2015. These included drafting, formulating and implementing policies, projects, and programmes in the energy sector, developing institutional capacity and supporting decentralized entities – all instrumental in Rwanda achieving its increased RISE score after 2015.

energy sector were substantially in line with other low-income countries in SSA. As per Figure 17, Rwanda saw an investment boost in 2016 when public funds poured into transmission and distribution systems. The increase was likely due to the ‘Electricity Sector Strategic Plan (ESSP)’, which targeted the installation of low- and medium-voltage lines and service connections across the country (EUCL 2019). For instance, in 2017, 744 km of high voltage (HV) transmission lines were installed by the end of June, compared to 462 km in the whole of 2014 (EESP 2018). However, MININFRA estimates that universal electricity access will require additional investment per annum of USD 510 million for on-grid and USD 78 million for off-grid power (ESSP 2018).

Prior to 2015, investment commitments in Rwanda’s

FIGURE 19
RISE pillar scores vs. electricity sector investment (by source) in Rwanda and other low-income countries in Sub-Saharan Africa



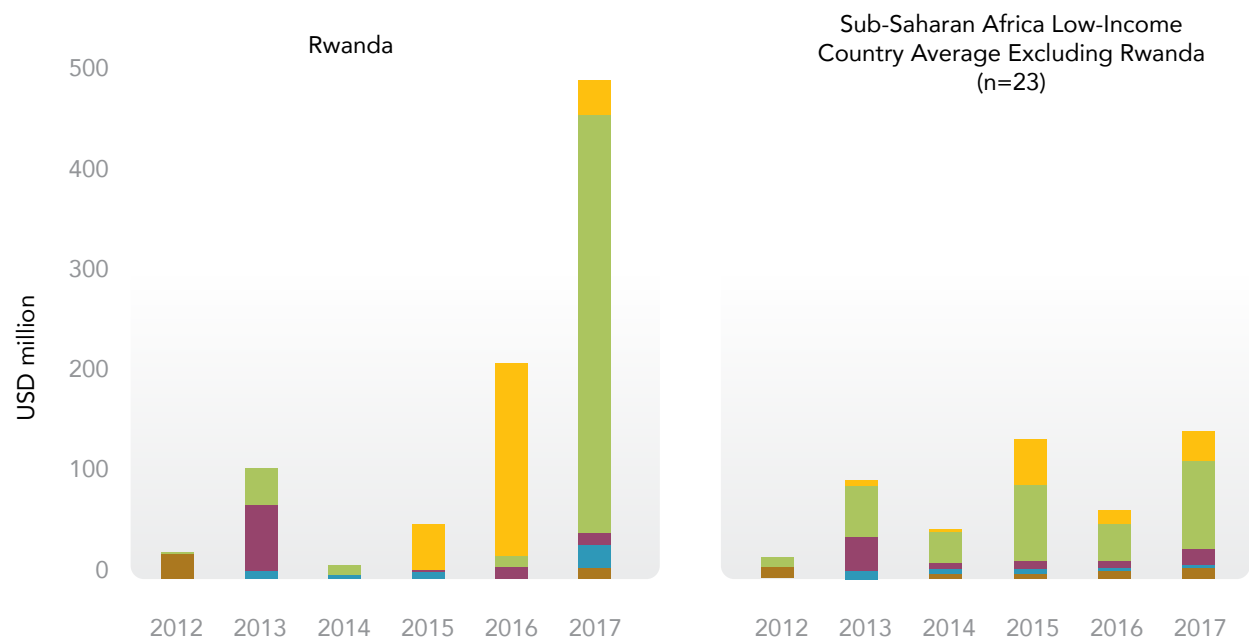
Note: The left axis measures stacked bars, grouped by source of investment, the right axis denotes the score of each respective RISE pillar. The tracked investment includes the following categories: Energy efficiency; Infrastructure, energy and other built environment; Policy and national budget support & capacity building; Renewable energy generation; Transmission & distribution systems (CPI analysis; World Bank 2018). The analysis of the electricity access RISE score and electricity sector investment in Rwanda returned a correlation coefficient of 0.88.

Rwanda’s Rural Electrification Strategy (June 2016) and ‘Simplified Licensing Procedure’ (2015), which established requirements for small-scale off-grid renewable energy developers, has been key to attracting private investment and off-grid electricity companies to Rwanda. These regulations helped address many of the typical concerns involving mini-grids, such as licensing requirements, tariff regulations, and provisions for grid arrival (USAID 2019). This report estimates a total investment of USD 15.8 million in Rwanda in 2017²⁶. As of 2018, off-grid solar solutions served 11 percent of the rural population, supplying approximately 300,000 households using mainly solar home systems (Rwanda – Ministry of Infrastructure 2018). Also, government support to commercial financing structures (lease or on-hire purchase) and risk mitigation facilities for off-grid

developers have increased private sector participation in Rwanda’s electricity sector. For instance, over 20 of off-grid companies are currently operating in the country under both government initiatives and independently.

In 2017, investment in electricity generation capacity more than doubled from the previous year but was primarily driven by a USD 350 million 80 MW peat-fueled biomass plant, two thirds of which was privately funded. Currently under construction, it is set to become the largest such facility in Africa, increasing Rwanda’s generation capacity by 40 percent while using 100 percent domestic fuel (Rwanda Energy Group 2018). Even after excluding this large project, total energy sector investment in Rwanda amounted to USD 154 million in 2017, almost double the SSA average in the same year.

FIGURE 20
Energy sector finance commitments (by sub-sector) in Rwanda and other low-income countries in Sub-Saharan Africa



Source: CPI Analysis

- Renewable energy generation
- Infrastructure, energy and other built environment
- Transmission and distribution systems
- Policy and national budget support and capacity building
- Energy efficiency

²⁶ These are estimates based on GOGLA data.

Focus on consumer affordability while ensuring utility's financial sustainability: Transmission and distribution (T&D) losses²⁷ in Rwanda were as high as 22 percent in 2017, compared to the international benchmark of 6–8 percent. Rwanda's electricity sector not only has the highest cost of service²⁸ but also the highest tariff, which is contributing to making electricity unaffordable for more than 75 percent of the population (World Bank 2017). To address this, Rwanda, through its various policies, has focused on ensuring that electricity remains affordable to consumers. For instance, under the revised “Electricity Access Roll-out Program” in 2017, upfront consumer payment for on-grid connection was eliminated and could be paid over time. Several other electricity tariff-related reforms were introduced between 2016 and 2018, the key one being the ‘lifeline tariff.’ This reduced the electricity tariff by half and increased connections for low-income households, while maintaining the electric utility's revenue base. Under the World Bank's Development Policy Operation (DPO), further initiatives were developed and implemented to keep costs down for consumers by introducing reduced off-peak tariffs to promote load shifting (REG 2019).

Rwanda has benefitted from a clear demarcation of policies and institutional roles, such as the government providing support to low-income households, the private sector leading the off-grid and mini-grid sector, and large-scale generation led by IPPs funded from various public and private sources.

On the utility side, several policies and plans were put in place to ensure regulatory independence and financial sustainability, and to increase private sector participation in Rwanda's energy sector. For instance, in 2014 the government restructured its Electricity, Water, and Sanitation Authority (EWSA) into separate entities (World Bank 2017). The Rwanda Energy Group (REG) was formed to undertake its electricity utility functions separately, with a clear division into subsidiaries of energy development (non-revenue) and utility operations (revenue-generating). With these reforms in place, 52 percent of Rwanda's generation capacity was under private ownership in 2017, and more than 17 independent power producers (IPPs) currently supply power to REG (the World Bank 2018) – an indication of policy impact on private sector investment.

Furthermore, Rwanda's energy policy framework over the years has comprised numerous direct policies such as tariff subsidies, rural electrification, and an off-grid initiative. This was complemented with integrated and enabling policies including feed-in-tariffs (introduced in 2012), competitive auctions (2015) and the National Fund for Environment and Climate Change. The latter has granted credit lines to projects twice a year since 2013 to improve consumer affordability via local lending and co-financing (BloombergNEF 2020). In fact, in a recent assessment of renewable energy policies in 34 African countries, Rwanda was found to be one of 18 countries using auction instruments, and one of 14 countries with feed-in tariffs (Müller et al. 2020). These initiatives have the potential to encourage competition, consequently reducing subsidy costs and saving public money.

Rwanda, by strategically applying cost-reflective tariff structures (in 2017) for residential and commercial users, has targeted the use of public funding for poor households while ensuring the financial sustainability of its electricity providers. Despite relative improvements in several indicators pertaining to energy efficiency, limited information on energy efficiency investments in Rwanda hinders the ability to provide analysis of policy impact.

²⁷ The ESSP (2018) set a target to decrease this to 15 percent by 2024.

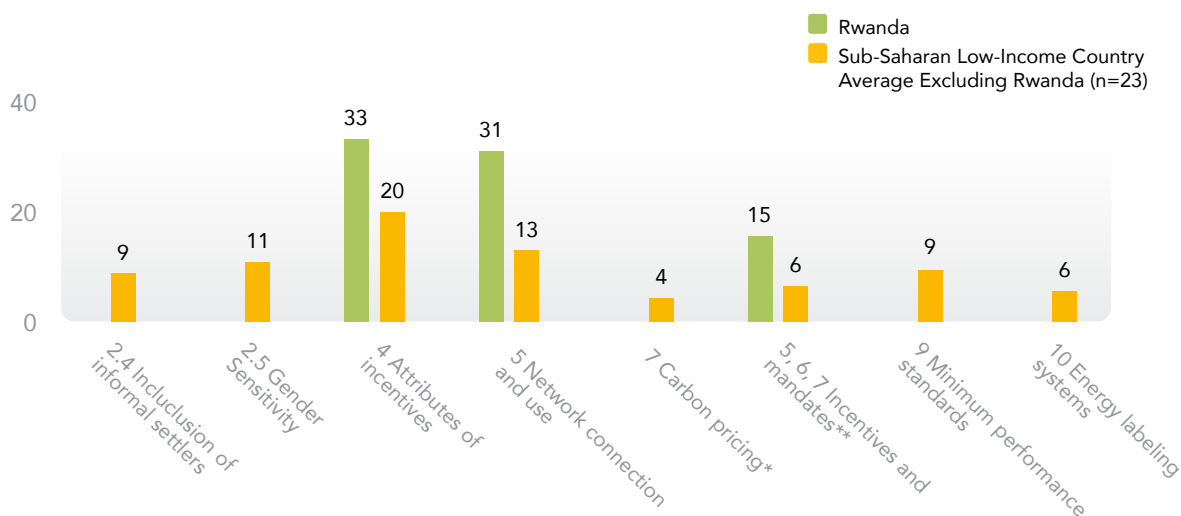
²⁸ This is attributed to limited domestic energy resources and non-competitively-procured generation capacity.

AREAS FOR POTENTIAL IMPROVEMENT

Through the analysis in this report, it became evident that there are certain areas that have shown little to no progress in Rwanda and across SSA. Figure 21 shows

some of the poorest performing indicators across all low-income countries in SSA, including Rwanda, where the RISE score fell below 33, and in many cases down to zero. It is important to note that while continuing to strengthen its policy frameworks, Rwanda should also consider focusing on these areas.

FIGURE 21
Lowest RISE scores (below 33) in Rwanda compared to other low-income countries in Sub-Saharan Africa



Note: The absence of a bar indicates a zero RISE score. The numbers in the Electricity Access pillar labels denote indicator and sub-indicator. *Carbon pricing features twice in RISE, once under Renewable Energy, once under Energy Efficiency. **Incentives & Mandates in this figure show an average of three sub-categories: industrial and commercial end users, public sector and utilities.



ENERGY EFFICIENCY: Energy efficiency is key to reducing the high T&D losses in Rwanda along with meeting its nationally determined contributions (NDCs). This needs to be initiated through various demand-side measures, such as setting polices and standards for appliances, and supply-side transmission and distribution loss reductions through operational improvements. More initiatives like the Kigali Cooling Efficiency Program²⁹ (K-CEP) need to be undertaken to develop, implement, and scale energy efficiency projects in Rwanda (this topic will be addressed in an upcoming brief on cooling investment by SEforALL and CPI).



MAINSTREAMING GENDER CONSIDERATIONS INTO ALL POLICIES AND PROGRAMMES: The low gender sensitivity indicator highlights weak gender considerations in planning across SSA including Rwanda, but also points to limited data gathering on gender indicators, impacts and outcomes of energy projects (See Chapter 6 for more details). There is a clear need to better integrate various gender aspects into individual project consultations to enhance women’s participation in village committees and energy-related activities, as well as to strengthen data and research on gender.

²⁹ Kigali Cooling Efficiency Program (K-CEP) is a philanthropic collaborative that works in tandem with the Kigali Amendment of the Montreal Protocol by helping developing countries transition to energy-efficient, climate-friendly, and affordable cooling solutions.



INCLUSION OF OR PROVISION FOR INFORMALLY SETTLED PEOPLE IN ELECTRIFICATION

PLANS: Informally settled people living predominantly in rural areas are not included in the electrification plans of most SSA countries. There are geographical difficulties in delivering affordable electricity to scattered rural populations (Corfee-Morlot et al. 2018) but even in Kigali, Rwanda’s capital, three in five people live in informal settlements (Baffoe et al. 2020). Often, these groups are faced with several financial barriers including limited access to financial institutions and lack of collateral, limiting their access to electricity. Also, there are no short- or- mid-term plans to connect them to the grid (Rwanda – Ministry of Infrastructure 2015). An additional hindrance may be that conventional electricity connections require adhering to minimum building standards, which many houses do not meet. A joint effort from the housing and electricity sectors is required to ensure compliance, for example, using ready boards, which allow for connecting even substandard houses (Blimpo et al. 2019).



TARIFF EXEMPTIONS: Rwanda is subject to the East African Community Secretariat’s Customs Management Act, 2004, which sets out import duties and exemptions for the region. The Act introduced exemptions on solar power in 2006 and applied an amendment to include wind equipment in 2010. However, a recent amendment on “solar accessories and spare parts” left the category open to interpretation, resulting in inconsistent enforcement across the region, and even within the same country. This affected the private sector’s participation in the off-grid solar market as imports of certain items came to a halt, leaving businesses stranded and consumers deprived of entry-level products such as multi-light systems and solar lanterns (GOGLA 2020).



CARBON PRICING: Used as an incentive to deploy renewables, carbon pricing is most effective where electricity is traded on a wholesale market before being delivered to end use consumers (Butner et al. 2020). However, like most other African economies, Rwanda currently has limited³⁰ carbon pricing mechanisms and formal Monitoring, Reporting and Verification (MRV) systems in place to support NDC implementation (Konrad Adenauer Stiftung 2020). Through Rwanda’s Green Growth and Climate Resilience National Strategy for Climate Change and Low Carbon (2011), the Government of Rwanda has been exploring building carbon trading capacity for the past decade, with the aim of tapping private investments in the voluntary market. The United Nations Framework Convention on Climate Change (UNFCCC) has recommended that carbon pricing in SSA be introduced gradually through a carbon tax to give industry time to adapt. Rwanda is a member of the Vulnerable 20 Group — countries committed to introduce domestic carbon pricing by 2025 — and likely to benefit from such associations in the long term (UNFCCC 2019).

NEXT STEPS AND CONCLUSION

More thorough analysis is required to uncover the effect of each RISE policy indicator on the finance commitments and disbursements made to each energy sub-sector. However, assessing the results of Rwanda’s rapid progress in energy policy reform hints that creating enabling policy environments is key to increasing finance commitments and delivering electricity access. Rwanda’s policy frameworks have contributed to making it one of the top three fast-moving countries globally in electricity access between 2010 and 2018.

However, it is equally important to acknowledge that actual investments in Rwanda still fall short of those required. It is estimated that increasing electricity access to 100 percent will require a total per annum of USD 510 million in the on-grid sector and USD 78 million in the off-grid sector between 2018 to 2024 (ESSP 2018). Therefore, it is important for Rwanda to continue its progress, while also focusing on other areas such as energy efficiency, carbon finance, and mainstreaming gender considerations, to provide an all-encompassing approach to electricity access.

³⁰ Four carbon finance projects were recorded in the project registry of the UNFCCC and Gold Standard. Two projects focused on Compact Fluorescent Lamp (CFL) distribution and Solar PV while two other projects targeted ICS.

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