REPUBLIC OF RWANDA



MINISTRY OF INFRASTRUCTURE

FORWARD LOOKING JSR REPORT

FOR FY 2021/22

ENERGY SECTOR

July 2021

KIGALI, RWANDA

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Abbreviations	
AfDB	African Development Bank
EDCL	Energy Development Corporation Limited
ESSP	Energy Sector Strategic Plan
EU	European Union
FL	Forward Looking
FY	Financial Year
GOR	Government of Rwanda
HH	Household
HPP	Hydro Power Plant
HV	High Voltage
IAEA	International Atomic Energy Agency
ICS	Improved Cook Stoves
JSR	Joint Sector Review
LCPDP	Least Cost Power Development Plan
LV	Low Voltage
MEPS	Minimum Energy Performance Standards
MOE	Ministry of Environment
МНРР	Micro Hydropower Plant
MININFRA	Ministry of Infrastructure
MTF	Multi-Tier Framework
MV	Medium Voltage
NEP	National Electrification Plan
NST	National Strategy for Transformation
OSCs	Off grid Solar Companies
PAPs	Persons Affected by Project
PV	Photovoltaic
RBF	Result Based Financing
REG	Rwanda Energy Group
RSB	Rwanda Standards Board
RTDA	Rwanda Transport Development Agency
RURA	Rwanda Utilities Regulatory Authority
TL	Transmission lines
SE4ALL	Sustainable Energy for ALL
SDGs	Sustainable Development Goals
SHS	Solar Home Systems
SWH	Solar Water Heaters
UNEP	United Nations Environment Programme
WB	World Bank

1. INTRODUCTION

Energy plays a crucial role in supporting socio-economic transformation and has an inherently systemic link to the growth of other sectors of the economy, since energy is a critical input to other key economic sectors, such as manufacturing, construction, and mining and quarrying, agro-processing, transport and tourism. Given the effects of the Covid-19 pandemic that affected the entire economic system, energy is thus critical also in the rebuilding and re-catalyzing economic growth.

The Forward Looking Joint Sector Review report focuses on the FY 2021/22 targets for the different energy sector strategic interventions to be implemented to enable achieve sector goals and objectives as outlined in the National Strategy for Transformation (NST1), Energy Policy and Strategic plans.

This year's FLJSR report was developed based on a sector wide approach where consultations were done through review of institutional plans and technical working group meetings. This involves different stakeholders including ministries, agencies, development partners as well as the private sector and civil society in order to galvanize all interventions in the energy sector by the different actors to achieve common goals. The report has also been discussed with the wider sector-working group to validate the targets.

1.1 Objectives of the Forward Looking Joint Sector Review

The 2021/22 Forward Looking Joint Sector Review has the following objectives:

- i. To present and discuss areas prioritized during the planning and budgeting process
- ii. To discuss and validate the 2021/22 sector targets and related policy actions
- iii. To select policy related studies to be conducted in 2021/22 fiscal year
- iv. To assess progress towards implementation of the fiscal year 2020/21 policy actions
- v. To provide the latest status on SDGs indicators already monitored by sectors and review the progress against the implementation of the plans and strategies to monitor the additional SDG indicators currently having clear computation methodologies

1.2 Energy Sector Strategic objectives 2018-2024¹

i. Generation capacity increased to ensure that all demand is met and a $15\%\,$ reserve margin is maintained

¹ Energy Sector Strategic Plan 2018-2024

- ii. Reliability of electricity supply improved: average number of power interruptions per year reduced to 14.2 and average number of hours without power to 91.7
- iii. Household access to electricity increased to 100%
- iv. Productive user access to electricity increased to 100%
- v. Existing, new major national and urban roads provided with street lighting
- vi. Losses in the transmission, distribution networks and commercial reduced to 15%
- vii. Halve the number of HH using traditional cooking technologies to achieve a sustainable balance between supply and demand of biomass through promotion of most energy efficient technologies
- viii. Petroleum strategic reserves increased to cover three months' supply

2. ENERGY SECTOR PRIORITIES FOR THE FISCAL YEAR 2021/22

2.1 Areas prioritized during planning and budgeting process

The key priority areas considered during planning and budgeting for the 2021/22 FY include the following:

- i. Scale up electricity access from 63% to 70% with focus on low performing districts as well as promoting affordability of off grid solutions in areas far from the grid.
- ii. Implementation of on-going generation projects: committed generation projects in micro hydropower plants, methane, peat and regional hydro power plants will be monitored for timely implementation to add 107.6MW to the grid.
- iii. Promotion of improved and clean cooking solutions to ensure that the percentage of households using traditional cooking technologies is reduced from 79.9% to 66.6% through the promotion of biomass alternatives in partnership with private sector and other stakeholders.
- iv. National grid network strengthening and expansion: The Government will also focus on network upgrade initiatives, transmission system expansion and protection to reduce losses to 18.9% of the total losses.
- v. Street Lighting: complete installation of streetlights on 631.85km of existing major national and urban roads with street lighting in partnership with RTDA and Districts.

Table 1: Linking Priority Areas for FY 2021/22 and NST-1

NST1	/	Sector	Sector priority/ outputs
outcome	e indi	cators	
Economic Transformation Pillar			

NS ou	T1 / Sector tcome indicators	Sector priority/ outputs
1.	Increase generation capacity to ensure that all demand is met and a 15% reserve margin is maintained.	 Increased electricity generation installed capacity from 238.052 MW to 345.752MW by June 2022. Projects to be completed by 2021/22 FY Hakan Peat to Power Plant (80 MW) Rukarara V & Mushishito Phase II Hydro Power Plant (3MW) Shema methane gas-to-power Project (56MW); Commissioning of Phase I (28MW) Decommission So Energy 30MW Rusumo Falls HPP (80 MW with 26.7 MW as Rwanda share)
		 Shema methane gas-to-power Project (56MW); Commissioning of 28MW (Phase II) 43.5MW Nyabarongo II Hydro Power Plant constructed. Expropriation phase II completed at 30% and designs completed at 30% Rusizi III (145 MW with 48 MW share for Rwanda); Finalisation of Geo-technical studies and site selection Ntaruka HPP (11.25 MW) rehabilitation; EPC contractor hired and designs approved Micro hydro projects to be completed beyond 2021/22 Development of new MHPPs (approx 20.8 MW) Nyirahindwe I (909kW) &II HPPs (359kW)
		 Kavumu 334 kW Nyundo III (4.5MW) Base I&II 2X2.9MW Rwondo 2.3MW Ngororero 2.7MW Ntaruka A 2.0MW Rucanzogera (1.9MW)
		 <u>Rehabilitation plans</u> Nyabarongo I HPP retaining wall to be rebuilt
2.	Halve the number of HHs using traditional cooking technologies to achieve a sustainable balance between supply and demand of biomass	 Dissemination of 128,010 improved cook stoves; 60,000 ICS to be disseminated under the Clean Cooking Program funded by World Bank and implemented in partnership with BRD and EDCL 40,000 improved cook stoves through the Reduced Climate Impact of Cooking (ReCIC) in Rwanda, implemented in partnership with EnDev and EDCL 26,010 disseminated under the Ministry of Environment [FONERWA Green Gicumbi 11,000, REMA Green Mayaga 10,000, Rwanda Water Resources Board (RWB) 3,010, Rwanda Forest Authority (RFA) - FLR (Forest Land Scape restoration) 2,000] 1,000 ICS to be disseminated by Energy for Impact and 1,000 ICS to be disseminated by KOKO Networks under the electricity and ethanol cooking technology pilot projects respectively.

NST1 / Sector outcome indicators	Sector priority/ outputs			
	 Inspection of 8,664 biogas plants and support districts to rehabilitate defected plants. Carry out technical inspection of 6,000 stoves disseminated Carry out awareness campaigns to reduce the use of charcoal and firewood for cooking and other uses. 			
3. Improve energy efficiency and reduce losses	 Loss reduction projects Reinforcement of Kigali Distribution Network. Construction of 8 cabins currently at 65% and 37km distribution network currently at 55%. Improvement of Substations and Distribution Network (JICA-III, Upgrade of Gasogi s/s construction to be completed at 70%) Eastern Province Distribution Network upgraded from single phase to three phase in Easter province of Rwamagana, Kayonza and Ngoma districts works completed at 100%. Upgrade of transformers at Nyabarongo I, 110/30kV 20MVA and replacement of 6.6/110kV Switchgears, 15MVA, 6.6/110kV Mukungwa, 6 MVA and 110/30kV Kirinda substations. Installation of the Distribution Management System (DMS) Other Energy Efficiency Initiatives Develop national energy efficiency labels in partnership with stakeholders Develop nergy efficiency indicators and database Implement the national cooling strategy in partnership with the Ministry of Environment and other stakeholders Establish the Africa Centre of Excellence in Sustainable Cooling and Cold chain (ACES) in partnership with the University of Rwanda Development of the products registration systems to control entry into the country of cooling products Development of financing mechanisms for energy efficacy appliances 			
4. Petroleum strategic reserves increased to cover three months' supply.	 Construction of addition 6million litres Jet A1 fuel strategic stocks facility. This will increase the storage capacity from the current 111.2 million litres to 117.2 million litres. Construction of LPG strategic storage reserves with a capacity of 17,100 m³ in Rusororo. 			
Social Transformatio	Social Transformation Pillar			
5. Increase access to grid electricity and connect new productive use areas	 Increase electricity access by adding 146,238 connections and 360 productive use areas to the grid. Priorities 2021/22 FY Construct 216.3km HV transmission lines (interconnectors & Domestic lines) Construct new 889.86km MV and 2,243.18 LV lines to connect new households with more focus to districts with low access rates Connect socio and economic productive use areas: administrative 			

NST1 / Sector outcome indicators	Sector priority/ outputs
	offices, health centers, milk collection centers, water pumping stations, coffee washing stations, schools (preprimary, primary, secondary and vocational training centers), markets, telecom towers, tea factories and IDP model villages.
	 Key HV-TL projects to be completed by FY 2021/22 220kV HV TL Rusumo-Bugesera-Shango (119 km) and associated substations 220kV HV TL Kigoma (Rwanda)–Gitega (Burundi) (63.5 km) Transmission lines and associated substations 110kV Mukungwa-Nyabihu (29 Km) and Nyabihu substation 220kV 4.8Km TL to evacuate power from Shema (Symbion) substation Key HV-TL and Substations projects to be completed beyond 2021/22 FY 75km Bwishyura-Kigoma-Rwabusoro 220KV Line completed at 40% 220kV Interconnector (Rwanda-DRC) Three 220 kV Substations (Rubavu, Bwishyura and Kibuye).
 6. Increase access to electricity through off grid solutions 7. Street Lights installed on existing, major national (new) and urban roads 	 Provide 60,000 households with access to electricity through Solar PV systems and mini grids in partnership with solar private companies and development partners Carry out awareness campaign and monitor private companies involved in dissemination of solar home systems. Implementation of the 631.85Km street lights project completed at 65%

The detailed energy sector targets and policy actions for FY 2021/22 highlighted above are provided for in **Annex 2** and NST 1 core indicator targets are in **Annex 3**.

2.2 Budget allocated to energy sector for FY 2021/22

The budget allocation for the energy sector for the FY 2021/22 amounts to Frw 101.8Bn indicating a decline of 17.2% from the previous 123Bn allocated for the previous FY 2020/21. The reduction in budget is largely due to the effect of the Covid-19 pandemic and the fact that expenditure especially on the new Rwanda Energy Access Programme is still low as the programme has just started.

53% of the 2021/22 budget will be financed by the Government of Rwanda whereas the remaining 47% is from external financing including Loans and Grants from different development partners.

Out of the 101.8 Bn, electricity transmission and distribution subprogram takes 67% of the total budget while administration, generation, energy efficiency and security of

supply subprograms represent 14%, 7% and 12% of the total budget respectively (Details are in **Annex 1.).** The budget for transmission continues to take a larger share due to the government prioritization of network improvement and expansion to improve power supply and reliability as well as evacuating power from power plants under development including Rusumo, Shema Power Ltd, Nyabarongo among others. In addition, the distribution expansion will enable increased access to electricity.

2.3 Sector Policy-related studies selected in 2021/22 FY

During FY 2020/21, there are ongoing studies that will be completed as well as new ones to be initiated in FY 2021/22. The purpose of these studies is to either provide baseline situation or guidance for the implementation of the Energy Policy, the ESSP and NST1. These studies include the following:

2.3.1 Ongoing Studies/ Analytical works²

- Finalize evaluation of the national biogas program
- Finalize the development of energy efficiency indicators and database to provide framework of measuring progress on implementation of the energy efficiency strategy
- Update the Least Cost Power Development Plan
- Contribution to the review of the Lake Kivu Management Prescriptions
- > Review of the National Electrification Plan

2.3. 2 New Studies/analytical works

- Review the Ministerial Guidelines on Standards Requirements for SHS to align it with the newly approved IEC Standards
- Update the Energy Policy 2015
- Review of the Energy Law

Details on studies to be conducted and their associated source of funds are in **Annex 4** while the progress on ongoing studies is in **Annex 5**.

3. PROGRESS ON 2020/21 SECTOR TARGETS AND POLICY ACTIONS

This section highlights the current progress towards implementation of the 2020/21 sector priorities and summarized in **Annex 6** as progress against 2020/21 key sector policy actions and targets.

3.1 Electricity Generation

Electricity generation installed capacity has increased from 228.102MW in June 2020 to 238.052 MW in May 2021 against the planned 307.58 MW by June 2021. This indicates

² Refer to Annex 5 on progress of studies conducted in 2020/21 FY

an increase of 9.95MW resulting from the commissioning of Giciye 9.8MW and upgrade of Nyirabuhombohombo micro hydropower plant from 0.5MW to 0.65MW. The under performance is largely attributed to the continued delays of completion and commissioning of 80MW Hakan Peat-to-Power Plant and Rukarara V Mushishito 3MW whose completion and commissioning were affected by the Covid-19 pandemic.

3.2 Access to electricity

During the period July 2020-May 2021, 146,079 new connections were added to the grid against the planned 118,657 new connections bringing the total households connected to the grid to 1,278,601 from the 1,132,522 connected as of end June 2020.

55,242 households connected through off grid solutions (standalone solar home systems and mini grids) during the same period against the planned 50,000 connections increasing the total number of households connected through off grid from 418,502 households registered in 2020/21 to 473,744 households.

The total number of households connected through both off grid and grid connection increased from 1,560,699 connections registered in the previous year to 1,752,345 indicating an addition of 201,321 connections during the period July 2020- May 2021.

In addition, 1,000 social and economic productive use areas were connected to electricity between July 2020 and May 2021 against the planned 260. These include; commercial centers, coffee washing stations, milk collection centers, water pumping stations, schools, health centers among others. This year's increase in connection of productive users is largely attributed to the increase in the number of new schools (preprimary, primary and secondary schools) constructed under the classrooms expansion programme implemented by the Ministry of education.

The national electricity grid has continued to expand with 671.48 Km of MV and 1,214.3 km of LV distribution lines constructed across the country against the planned 603.92 km MV and 1835.18km of LV. The high voltage transmission lines are still under construction with some TL planned to be completed in the FY 2021/22.

Note: The number of households and productive use areas connected as well as grid extension figures are expected to increase by end June 2021.

3.3 Street Light Provision

During the period July 2020 to May 2021, installation of 631.85km streetlights on both major and national roads begun with works currently estimated at 35%. Construction is expected to be completed in 2023 increasing the total streetlight network from the current 1,455.3km to 2,087.15km.

3.4 Sustainable use of biomass energy solutions

During the period July 2019 to April 2020, REG conducted awareness campaigns country wide to promote clean cooking technologies in both urban and rural areas.

These included live television and radio shows as well as print media. Physical campaigns have been conducted in some areas like Rulindo but have been limited due to the Covid-19 prevention measures.

During the same period, 29,999 improved cook stoves have been distributed in partnership with different stakeholders including MoE, FONERWA, REMA, REDO and private sector and other stakeholders.

Inspections were conducted on 541 biogas plants and technical assistance was provided on rehabilitation of 132 defected plants. However, inspection activities have also been affected by travel and meeting restrictions due to the pandemic.

In addition to the above, the Government of Rwanda has mobilized funds to promote clean cooking in Rwanda. The 5-year project to be implemented through BRD and EDCL is a result based framework facility expected to provide subsidies targeting vulnerable households to enable them access clean cooking solutions.

3.5 Energy Efficiency and Security of Supply

3.5.1 Electricity Loss Reduction

The number of losses both technical and commercial has been reduced from 19.4 % recorded in 2018/19 to 19.1% registered in June 2020^3 .

The reduction reflected above is a result of a number of ongoing investment projects in network improvement including network upgrades in the city of Kigali including cabins and distribution network, upgrade of the Rubavu Distribution Network from 6.6 to 30kV, upgrade of substations in the Northern and Western Province including completion of Camp Belge and Rubavu substations and upgrade of distribution network from single phase to 3 phase in different parts of the country.

3.5.2 Other Ongoing Energy Efficiency Initiatives

Rwanda Standards Board (RSB) in partnership with the Ministry of Environment and support from Nordic Fund and World Bank completed the construction and establishment of the cook stoves testing lab. This will reduce the dependence on regional and outside the country labs for testing of cook stoves and will improve energy efficient cook stoves.

3.5.3 Petroleum storage reserves

The national petroleum storage reserves continue to stand at 111.2 -Million-liter capacity operated partly in partnership with private sector. During the period starting July 2020, construction of an additional 6 Million Liter storage facility for JAT 1 fuel storage started and expected to be completed in the FY 2021/22 in partnership with the private sector.

³ The 2020/21 status to be provided in the end of the financial year report

In addition, 22% of the total expropriation for the Rusororo Storage buffer zone has been completed against the targeted 20% planned to be completed before end June 2021. The buffer zone is expected to improve security of the population surrounding the storage facility.

LPG strategic storage reserves with a capacity of 17,100 m³ will be constructed in Rusororo under a PPP framework. The feasibility study is under final review and the project is due to start during 2021/22 FY.

4. CROSS-CUTTING AREAS

4.1 Capacity building

There are a number of ongoing initiatives aimed at improving the capacities of the sector through technical assistance and trainings with the support of different partners. These included the following;

- During the period July 2019-May 2020, over 183 REG staff were trained in different fields including; occupational health and safety policies and tools; GPS usage, environmental management system survey, initialing and planning projects, Integrated Business Management System and Customer Management System Operation.
- ✤ 31 graduates young women engineers enrolled for 6 month apprenticeship with the Rwanda Energy Group.

4.2 Environment and Gender

Awareness campaigns for the use of more efficient clean cooking technologies coupled with the dissemination of improved cook stoves continued countrywide. In addition GoR has secured funding from World Bank for the promotion of a result based financing clean cooking programme and carbon trading program in partnership with BRD and REG/EDCL.

The Rwanda Energy Group in partnership with Power Africa plans to fund apprenticeship of 31 female graduate engineers with a possibility of retaining them after completing their apprenticeship.

5. STATUS ON SDGs INDICATORS MONITORED BY ENERGY SECTOR⁴

5.1 Population with access to electricity

As indicated above, the current population with access to electricity is estimated at 63% of households accessing electricity through grid and off grid connections as of end May 20215. Grid connections contribute 46% of households connected to electricity where as 17% are connected to off grid solutions.

⁴ Detailed status of SDG implementation in Annex 7.1 and 7.2

⁵ This figure is expected to increase with the addition of June 2021 connections

5.2 Population with primary reliance on clean fuels and technology

The Multi-Tier Framework survey conducted in 2017, about 30% of the population relied on clean fuels and technology especially for cooking needs. However, there is still need for periodic surveys to have real time data on this indicator.

5.3 Renewable Energy share in the total final energy consumption (proxy indicator)

Rwanda uses the share of renewable electricity in the generation mix as the proxy indicator to measure this indicator. During the reporting period July 2020-April 2021, the renewable energy share in the generation mix stood at 62.3 % of the total electricity generated.

There are two indicators under investigation on how to measure; 7.3.1 Energy intensity measured in terms of primary energy and GDP, 7.b.1 Investments in energy efficiency as a proportion of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services.

The Ministry, with collaboration with stakeholders, plans to develop a framework of generating the required data such as energy balance required to compute 7.3.1 and also establishing mechanism of working with different institutions such as Ministry of Finance, National Bank of Rwanda and the National Institute of Statistics for Rwanda to ensure availability of data for indicator 7.b.1.

6. CONCLUSION

Despite challenges mostly associated to the Covid-19 pandemic, the energy sector outlook remains positive towards achievement of the overall target of universal access to electricity. However, more concerted efforts are require to systematically reduce the number of households using traditional cooking methods to at least 42% by 2024. Deployment of off-grid solutions is also an area of focus to further promote rural electrification to areas far from the grid.

Signed, on 12 July 2021

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