REPUBLIC OF RWANDA

MINISTRY OF INFRASTRUCTURE

ENERGY SECTOR

FORWARD LOOKING JOINT SECTOR REVIEW REPORT FOR FY 2022/23

June 2022

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I. List of abbreviations

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
IEA	International 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
MHPP	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
RICA	Rwanda Inspectorate, Competition and Consumer Protection Authority
RSB	Rwanda Standards Board
RURA	Rwanda Utilities Regulatory Authority
TLs	Transmission Lines
SE4ALL	Sustainable Energy for All
SDGs	Sustainable Energy Goals
SHS	Solar Home Systems
UNEP	United Nations Environmental Programme
WB	World Bank

1. INTRODUCTION

Energy plays a pivotal role in supporting socio-economic transformation and has an inherently systemic link to the growth of other sectors of the economy since it is a critical input to other key economic sectors, such as manufacturing, construction, mining, quarrying, agro-processing, transport and tourism.

Given the effects of the Covid-19 that affected the entire economic ecosystem since early 2020, energy is considered a critical factor in enhancing government efforts of economic recovery by facilitating programs such as "Manufacture and Build to Recover" Program designed to fast-track private sector investments in manufacturing and construction and boost the efforts of economic recovery.

The Forward Looking Joint Sector Review report draws focus on the energy sector strategic interventions that will be implemented in order to achieve FY 2022/23 targets as outlined in the National Strategy for Transformation (NST1), Energy Policy and Strategic plans.

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

1.1. Objectives of the Backward Looking Joint Sector Review.

The 2022/23 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 2022/23 sector targets and related policy actions

iii. To select policy related studies to be conducted in 2022/23 fiscal year

iv. To assess progress towards implementation of the fiscal year 2021/22 policy actions

v. To provide the latest status on SDGs indicators already monitored by sectors and review the progress on the implementation of the plans and strategies to monitor the additional SDG indicators currently having clear computation methodologies.

2. ENERGY SECTOR PRIORITIES FOR THE FISCAL YEAR 2022/23

2.1 Areas prioritized during planning and budgeting process

I. Scale up electricity access with focus on low performing districts, productive use areas 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.
III. Promotion of clean cooking solutions to ensure households using traditional cooking methods switch to cleaner cooking technologies. This will be done in partnership with the private sector and other stakeholders.
IV. National grid network strengthening and expansion: focus will be on network upgrade initiatives, transmission system expansion and protection to reduce losses.
V. Street Lighting: Complete the installation of streetlights on existing major national and urban roads in partnership with RTDA and Districts

Table 1: Sector Performance against NST1/ESSP

SN	Year		2021-2022		2022-2023	2023-2024	Aggregated Priority Actions to reach Targets
	NST / ESSP High Level Objective		Target	Current Status	Target	Target	
1	Generation capacity increased to ensure that all demand is met, and a 15% reserve margin is maintained.		15%	27%	15%	15%	Commissioning of 147MW (Hakan, Rusumo, Shema Power, and Ntaruka A)
2	Reliability of electricity supply improved:	Average number of power interruptions per year (SAIFI) reduced to 35.5	43.8	44.1	39.4	35.5	- Improve outages management - Regular inspections and effective maintenance - Introduction of Distribution Management System (SCADA/DMS)
		Average number of hours without power (SAIDI) reduced to 14.6	18.02	18.2	16.22	14.60	
3	Household access to electricity	69.1% of households connected to grid electricity	39.8%	50.61%	55%	69.1%	Connect 1,311,450 new households to the national grid

	increased to 100%	30.9% off-grid electricity access	17.2%	21.31%	24%	30.9%	Connect 670,000 new households to the Off-grid Solutions
4	Productive users access to electricity increased to 100%		100%	96%	100%	100%	Connecting all remaining 306 Productive Users
5	Existing, new major national and urban roads provided with street lighting		1,467km (74.2%)	1,615	1,966 km (99.5 %)	1,970km (100%)	Providing Street Lights to the remaining 355km of major roads
6	Losses in the transmission, distribution networks and commercial losses reduced to 15%		17%	19.26% (12.94% T, 6.32% NT)	18%	15%	- Installation of DMS - Installation of Smart meters - Rehabilitation of old distribution network
7	Halve the number of HH using traditional cooking technologies and fuels to 42%		58.4%	77.6%	72.4 %	42%	- Prioritize clean cooking technologies for large institutions - Increase awareness campaigns for urban households to transition to clean cooking technologies - Disseminate more 646,000/1,800,000 efficient cook stoves in rural areas
8	Petroleum strategic reserves increased to cover three months' supply		170 mlt	117.2 mlt	183 mlt	198mlt	- Tender out for construction of additional 80M liters petroleum reserves through PPP framework - Encourage full private investment in the construction of the petroleum reserves

Table 2: Linking Priority Areas for FY 2022/23 and NST/ESSP

NST1 / Sector outcome indicators	Sector priority/ outputs
Economic Transformation Pillar	
1. Increase generation capacity to ensure that all demand is met and a 15% reserve margin is maintained.	Increased electricity generation installed capacity from 273.36 MW to 302.16 MW by adding Rusumo Falls HPP (80 MW with 26.7 MW as share of Rwanda) and Ntaruka A-2.1MW. **<u>Ongoing Key Generation Projects to be completed beyond 2022/23</u>** - Shema (Symbion) Methane Project (56MW) - 43.5MW Nyabarongo II Hydro Power Plant constructed. Expropriation phase II completed at 7% and designs completed at 70% and phase II land acquisition completed at 65% - Rusizi III (206 MW with 68.688 MW share for Rwanda) - Rehabilitation of Ntaruka HPP (11.25M) **<u>Micro hydro projects to be completed beyond 2022/23</u>**

NST1 / Sector outcome indicators	Sector priority/ outputs
	Development of new MHPPs by IPPs: - Nyirahindwe I (909kW) &II HPPs (359kW) - Kavumu 334 kW - Nyundo III (4.5MW) - Base I&II- 2X2.9MW - Rwondo 2.3MW - Ngororero 2.7MW, and - Rucanzogera 1.9MW
2. Halve the number of HH using traditional cooking technologies to achieve a sustainable balance between supply and demand of biomass	- Disseminate 110,026 improved cooking stoves: o 100,000 ICS disseminated under the Clean Cooking Fund through EDCL and BRD o 10,026 disseminated under the Ministry of Environment [FONERWA-Green Gicumbi Project and other clean cooking projects hosted under Rwanda Forest Authority and Forest Land Scape Restoration] - Inspect 12,000 disseminated improved cooking technologies - Promote efficient cooking technologies through promotion campaigns for behavior change - Provide market development support to investors in the dissemination of improved cooking technologies - Installation of clean cooking systems in 284 schools across the country - Expropriation for the buffer zone on 17,100m3 LPG storage facility at Rusororo completed
3. Improve energy efficiency and reduce losses	**Loss reduction projects** - Improvement of the Substations and Distribution Network - Upgrade of Gasogi Substation to be completed at 100% - Transformers upgrade/replacement 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; and add smart meters - Installation of the Distribution Management System (DMS) - Continued reinforcement of the Kigali Distribution Network **Other Energy Efficiency Activities** - Develop national energy efficiency labels for motors in partnership with stakeholders - Develop energy efficiency indicators and database - Implement the National Cooling Strategy in partnership with the Ministry of Environment and other stakeholders
4. Petroleum strategic reserves increased to cover three months' supply	- Expropriation of the buffer zone completed at 100%

NST1 / Sector outcome indicators	Sector priority/ outputs
Social Transformation Pillar	
5. Increase access to grid electricity and connect new productive use areas	Increase electricity access by adding 240,000 connections and 300 productive use areas to the grid. **<u>Priorities for 2022/23 FY</u>** - Construct HV transmission lines (interconnectors and domestic lines) - Construct MV and LV lines to connect new households with more focus to districts with low access rate - Connect social and economic productive use areas: Administrative Offices, Health Centers, Milk Collection Centers, Water Pumping Stations, Coffee Washing Stations, Schools (preprimary, primary, secondary and vocation training centers), Markets, Telecom Towers, Tea Factories and IDP model villages **<u>Key HV TL Projects to be completed by FY 2022/23</u>** - 220kV HV TL Rusumo-Bugesera-Shango (119 km) and associated susbstations completed - 220kV HV TL Kigoma (Rwanda) – Gitega (Burundi) (63.5 km) and associated substation completed - 220kV 4.8Km TL to evacuate Shema power and construction of the temporary substation completed - 220kV Rwanda- DRC Interconnection and associated substations (Rubavu, Bwishyura and Kibuye) completed **<u>Key HV TL Projects to be completed beyond FY2022/23</u>** - 220kV Bwishyura - Kigoma- Rwabusoro 75km Transmission Line and Symbion Substation - Bugesera Industrial Park substation (3*30 MVA) &110kV TL Bugesera Industrial Park to Bugesera International Airport - 110kV Rwinkwavu-Kirehe TL and associated substations - 110kV Rukarara-Huye-Gisagara TL and associated substations - 110kV Gabiro–Nyagatare TL and associated substations - 110kV D/C Rulindo–Gicumbi TL (cut in-cut out) and associated substations - 110kV Nyabarongo I-Nyabihu TL and extension of the two existing substations - 110kV Rwabusoro-Bugesera Industrial Park (IP) and extension of Rwabusoro/Bugesera IP substations - 110kV Nyabihu-Rubavu and extension of Nyabihu/Rubavu substations - 220kV Mamba-Gisagara and extension of Mamba/Gisagara substations - 110kV Bugesera-Gasogi and extension of Gasogi/Bugesera substations

NST1 / Sector outcome indicators	Sector priority/ outputs
6. Increase access to electricity through off grid solutions	- Provide 100,000 households with access to electricity through Solar PV systems and mini grids in partnership with solar private companies and development partners - Carry out awareness campaigns and monitor private companies involved in dissemination of solar home systems
7. Streetlights installed on existing, major national (new) and urban roads	- Implementation of the 631Km street lights project completed at 100%

Note: 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 2022/23

The energy sector budget allocation for the FY 2022/23 amounts to FRW 231.7Bn indicating an increase of 89% from the previous 122.5Bn allocated for the FY 2021/22. The increase in budget is largely attributed to the expenditure towards implementation of the new Rwanda Universal Energy Access Programme (RUEAP) whose activities were largely still under procurement during the FY 2021/22.

Table 3: Energy Sector Budget for FY 2022/23 by Funding Source

SN	Program	Domestic	External		Sub Total	%
			Grants	Loans		
1	**Administration and Support**					
1.1	Administration and Support	17,632,844,323			17,632,844,323	7.61%
2	**Fuel and Energy**					
2.1	Electricity Generation	4,850,000,000	49,611,000	14,652,919,450	19,552,530,450	8.44%
2.2	Electricity Transmission and Distribution	39,013,195,210	50,793,537,103	90,157,931,418	179,964,663,731	77.67%
2.3	Alternative Energy Sources Promotion		344,036,340		344,036,340	0.15%
2.4	Energy Efficiency and Security of supply	14,222,794,692			14,222,794,692	6.14%
	Total	**75,718,834,225**	**51,187,184,443**	**104,810,850,868**	**231,716,869,536**	**100%**

As indicated in the table above, under the development budget, transmission and distribution takes the largest share of the budget with 77.67% of the total budget allocation followed by electricity generation, energy efficiency and security of supply, promotion of alternative energy sources respectively. The large budget allocation to transmission and distribution expansion is attributable to the Government's commitment to accelerate electrification in order to achieve universal access to electricity by 2024. (**See Annex 1 for further details)**

2.3 Sector Policy-related studies selected for FY 2022/23

During FY 2021/22, there are ongoing studies that will be completed as well as new ones to be initiated in FY 2022/23. The purpose of these studies is to either provide baseline situation or guidance for the implementation of the Energy Sector Strategic Plan, Energy Policy and NST1.

2.3.1 Ongoing Studies/ Analytical works[1]/ Legal and regulatory frameworks

- Evaluation of the National Domestic Biogas Program
- Update the Least Cost Power Development Plan
- Finalize the Energy Sector Multi-Tier Framework Survey
- Review of Energy Efficiency Strategy and EE market assessment

2.3. 2 New Studies/analytical works/Legal and regulatory frameworks to be conducted

- Develop Ministerial Guidelines on minimum standards requirements for Clean Cooking Stoves.
- Development of energy efficiency indicators and database to provide framework of measuring progress on implementation of the Energy Efficiency Strategy.

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

3. PROGRESS ON 2021/22 SECTOR TARGETS AND POLICY ACTIONS

This section highlights the current progress towards implementation of the 2021/22 sector priorities and also 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 238.052 MW in June 2021 to 273.36 MW against the planned 345.752 MW by June 2022. This indicates an increase of 33.016 MW resulting from the commissioning of 30 MW Phase 1 of Hakan Peat to power plant and 3 MW of Rukarara V Mushishito MHPP.

3.2 Access to electricity

During the period July 2021- May 2022, 104,227 new households were connected to the grid against the planned 146,238 new connections bringing the total households connected to the grid to 1,375,192 from the 1,270,965 connected as of end June 2021. The slowdown in the

[1] Refer to Annex 5 on progress of studies and analytical works completed in 2021/22FY

number of grid connections has been impacted by the delayed start of the new program where most of the projects under RUEAP begun procurement of EPCs during this fiscal year.

During the same period, 101,711 HHs were connected through off grid solutions (Standalone solar home Systems and Minigrids) during the same period against the planned 60,000 connections. This increases the total number of households connected through off grid from 477,184 households connected by end June 2021 to 578,895 households. In a bid to increase off-grid solar systems uptake, BRD in partnership with REG-EDCL and other stakeholders are conducting country wide awareness and promotional campaigns.

The total number of households connected through both off grid and grid supply increased from 1,748,149 connections in the previous year to 1,954,087 indicating an addition of 205,938 connections during the period July 2021- May 2022.

In addition, 376 social and economic productive use areas were connected to electricity between July 2021 and May 2022 against the planned 360 PUA. These include; commercial centers, coffee washing stations, milk collection centers, water pumping stations, schools, health centers among others.

The national electricity grid has extended distribution lines across the country as well as construction of high voltage transmission lines for regional interconnection and power evacuation.

Note: The number of households and productive use areas connected as well as grid extension figures are expected to increase by end June 2022.

3.3 Street Light Provision

During the period July 2021 to May 2022, implementation of the 631.85 km streetlights installation on both major and national roads is ongoing with overall performance estimated at 65.6% against the planned target of 65% by end June 2022. 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

In the period between July 2021 and May 2022, REG conducted awareness campaigns country wide to promote clean cooking technologies in both urban and rural areas. These included broadcast (television and radio shows) as well as print media.

In the same period over 114,359 improved cook stoves have been distributed against the planned 128,010 ICS in partnership with different stakeholders including the Ministry of Environment, FONERWA, REMA, private sector and others.

During the same period, inspection was conducted on 10,647 biogas plants. Data assessment is ongoing to determine the status on the biogas plants across the country.

In addition to the above, the Government of Rwanda has signed cooperation agreements for the dissemination of improved cooking technologies with 12 companies to participate in the 5 year result based financing project to be implemented through BRD and EDCL.

3.5 Energy efficiency and increase security of supply

3.5.1 Electricity Loss Reduction

The number of losses both technical and commercial has increased from 19.1% recorded in 2019/20 to 19.26% recorded in June 2021[2]. Though the status report is expected by end June 2022, It is expected that the losses will reduce with the completion of various ongoing loss reduction projects such as network upgrades in the City of Kigali including cabins and distribution network, upgrade of Eastern Province network, upgrade of substations in the Northern and Western Provinces including completion of Nyabihu substations and upgrade of distribution networks from single phase to 3 phase in different parts of the country.

3.5.2 Other Ongoing Energy Efficiency Initiatives

The Ministry of Infrastructure in partnership with Rwanda Standards Board (RSB), Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA) and other stakeholders developed labels and MEPS for households, street lighting and refrigeration.

RSB in partnership with EnDev and the WB are upgrading the testing lab for clean cooking stoves to facilitate companies participating in the clean cooking RBF project. The support includes training of staff and provision of additional lab equipment.

The Ministry of Infrastructure in partnership with WB is conducting a study with the purpose of reviewing and updating the Energy Efficiency Strategy of 2018, conducting market assessment for energy efficiency in Rwanda as well as capacity building of the subsector players.

3.5.3 Petroleum storage reserves

The national petroleum storage reserves installed capacity stand at 117.2 Million-liter capacity operated partly in partnership with private sector. This after the completion of the construction of an additional 6 Million Liter storage facility for JAT 1 fuel storage sin September 2021.

In addition, 74% of the total expropriation for the Rusororo storage reserves buffer zone has been completed against the targeted 20% planned to be completed before end June 2022. The buffer zone is expected to improve security of the population surrounding the storage facility.

[2] The 2021/22 status to be provided at the end of the financial year report

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 2021-May 2022, over 90 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 customer management system operation, LEAP model.
- In Partnership with International Energy Agency, over 20 sector staff from MININFRA, REG and RURA were trained in Energy Statistics and Modelling.
- The Ministry of Infrastructure is developing the Energy Sector Management Information System (EMIS) which will facilitate with the knowledge and data management.

4.2 Environment

Awareness campaigns for the use of more efficient clean cooking technologies coupled with the dissemination of improved cook stoves continued countrywide and some of the programs being implemented with the aim to reduce the pressure on forests. In addition, GoR has secured funding from World Bank for promotion of a result based financed clean cooking programme and carbon trading program in partnership with BRD and REG/EDCL.

4.3 Gender

Rwanda Energy Group in partnership with Power Africa developed a database for Women and various initiatives in the energy sector.

Out of the 90 staff trained by REG in different domains, 58 are male and 32 female representing 35.6% of the total trained staff.

5. STATUS ON SDGS INDICATORS MONITORED BY ENERGY SECTOR[3]

5.1 Proportion of population with access to electricity

As indicated above, the current population accessing electricity is estimated at 71.92% of households accessing electricity through grid and off grid connections as of end May 2021[4]. Grid connections contribute 50.61% of households connected to electricity whereas 21.31% are connected to off grid solutions.

[3] Detailed status of SDG implementation in Annex 7.1

[4] This figure is expected to increase with the addition of full picture of June 2022 connections

5.2 Proportion of population with primary reliance on clean fuels and technology

According to the MTF survey conducted in 2017, about 30% of the population relied on clean fuels and technologies especially for cooking needs. Updated statistics will be available once the 2022 MTF survey is finalized.

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 2021-May 2022, the share of renewable energy in the generation mix stood at 55% of the total electricity generated.

Signed, on ……. /July 2022

Chair of the SWG

Digitally signed by
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