ENERGY DEVELOPMENT CORPORATION LIMITED

STRATEGIC ENVIRONMENTAL ASSESSMENT

FOR

RWANDA UNIVERSAL ENERGY ACCESS PROGRAM (RUEAP)

June 2021

EXECUTIVE SUMMARY

The Government of Rwanda (GoR) through the Ministry of Infrastructure (MININFRA), with the funding from the World Bank/International Development Association (IDA) and other Development Partners (DP) namely African Development Bank (AfDB), European Investment Bank (EIB), OPEC Fund for International Development (OFID), Saudi Fund for Development, Korean Economic Development Cooperation Fund (EDCF) and Agence Française de Développement (AFD) , has developed a program titled "**Rwanda Universal Energy Access Program** which comprises two projects namely Rwanda Energy Access and Quality Improvement Project (EAQIP)" financed by World Bank and co-financed by AFD (joint co-financing), the OFID (parallel co-financing), SFD (parallel), and the Korean Fund for International Development (parallel); Rwanda Transmission System Reinforcement and Last Mile Connectivity to be financed by AfDB which will be financed by EIB under parallel financing. This multi-donor energy sector investment financing program will support the Government of Rwanda's energy access objectives during this period of the National Strategy for Transformation (NST1; 2017-2024).

The **RUEAP Program Development Objective** is to improve access to energy and efficiency of energy service delivery to households, businesses, and public institutions in Rwanda.

The program has four main components:

Component 1: Increasing access to grid electricity.

Component 2: Improving grid reliability and operational efficiency.

Component 3: Catalyzing private investment in off-grid electricity access and clean cooking.

Component 4: Technical assistance, institutional capacity building, and implementation support.

The nature of the RUEAP activities give rise to environmental and social concerns during the preparation and implementation as the program activities are located throughout Rwanda. RUEAP falls under the Program which requires the Strategic Environment Assessment (SEA) prior to implementation. The RUEAP Program is classified as Substantial according to the WB's Environmental and Social Assessment Procedures. This classification requires carrying out an Environmental and Social Assessment and preparing the associated Environmental and Social Management and Monitoring Plan.

In Rwanda, legislative and policy framework for environmental assessment is clearly highlighted the most of the laws, policies and guidelines such as: Constitution of the Republic of Rwanda

revised in 2015, Rwanda Vision 2050, Law on Environmental, Strategic Environmental Impact Assessment Regulations, Ministerial order N°001/2019 of 15/04/2019 relating to the requirements and procedures for Environmental Impact Assessment, General guidelines and Procedures for SEA of 2011.

In compliance with the above requirements, RUEAP being a program, SEA was found to be a long term and sustainable tool for all RUEAP activities. EDCL team managed to update the SEA conducted for EARP and approved by REMA in 2012 in accordance with the guidelines and procedures for SEA in Rwanda to enable policymakers, macro or strategic planners, and programs formulators to assess for and implement mechanisms to support environmental sustainability, while supporting their effectiveness for economic and social development.

Considering the SEA conducted in 2012 for EARP, it was realized that the key environmental impacts, mitigation measures, alternatives and SEA for EARP recommendations remain applicable to RUEAP during all phases of program activities to inform decision makers for the new program and ensure environmental concerns are appropriately integrated in each project and sub-project of the program. The EDCL Team has also examined the possible alternatives for delivering the goals and objectives of the program. Under this program, some options have been considered. In seeking the best alternative, the “status quo” or “do nothing” option and the actual on grid electrification and off grid were considered and the alternatives analysis indicated that the RUEAP implementation as a continuation of EARP emerged as the best alternative as enshrined in this entire SEA.

ACRONYMS

AfDB	African Development Bank
BADEA	Banque Arabe de Développement Economique en Afrique
BP	Bank Policies
CAS	Country Assistance Strategy
CFL	Compact Fluorescent Lamp
CEPGL	Economic Community of the Great Lakes Countries
COMESA	Common Market for Eastern and Southern Africa
CSP	Country Strategy Paper
DDP	District Development Plan
EA	Environmental Assessment
EAC	East African Community
EARP	Electricity Access Roll out Programme
EDPRS	Economic Development and Poverty Reduction Strategy
EIA	Environmental Impact Assessment
EPC	Engineering Procurement Construction
ERP	Economic Recovery Plan
ESA	Environmental Security Assessment
SEA	Environmental and Social Management Framework
EWSA	Energy Water and Sanitation
FDG	Focus Discussion Group
GEF	Global Environment Facility
GDP	Growth Domestic Product
GoR	Government of Rwanda
HH	Household
IBA	Important Bird Area
IDA	International Development Agency
IMCE	Integrated Management of Critical Ecosystem
IWRS	Integrated Water Resources Management
MDG	Millennium Development Goal
MINAGRI	Ministry of Agriculture
MINALOC	Ministry of Local Government
MINEAC	Ministry for East African Community

MINECOFIN	Ministry of Finance and Economic Planning
MININFRA	Ministry of Infrastructure
MOE	Ministry of Environment
RFA	Rwanda Forestry Authority
OPEC	Funds for International Development
OF	Operational Facility
OUA	Organisation de l'Union Africaine
PCB	PolyChloroBiphenyle
PPE	Personal Protective Equipment
PPP	Policy, Plan, or Program
PRSP	Poverty Reduction Strategy Plan
RAP	Resettlement Action Plan
REMA	Rwanda Environment Management Authority
RETF	Recipient-executed trust funds
RPF	Resettlement Plan Framework
RUEAP	Rwanda Universal Energy Access program
SEA	Strategic Environmental Assessment
SWAp	Sector Wide Approach
UNCBD	UN Convention on Biological Diversity
UNCCD	UN Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
WBG	World Bank Group
WHO	World Health Organization

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1. INTRODUCTION

1.1. Strategic context

1.1.1. Country Context

Rwanda is recognized as a leading reformer in Sub-Saharan Africa but remains one of the least developed countries in the world and still requires significant infrastructure investments for its socioeconomic development. Rwanda has been a frontrunner among African economies in the Doing Business indicators, moving from a global rank of 148 in 2008 to 38 in 2020, which is second in Sub-Saharan Africa after Mauritius.[1] Although Rwanda's annual gross domestic product (GDP) growth has averaged 7.2 percent in the last decade, Rwanda remains one of the poorest countries in the world. Infrastructure gaps, including in electricity, remain substantial. Indeed, Rwanda ranks 111 in the world when it comes to infrastructure quality according to the 2019 Global Competitiveness Report (World Economic Forum 2008).[2]

Poverty has declined substantially in the past two decades but remains high in rural areas, where access to public services such as electricity is still low. According to the latest Integrated Household Living Conditions Survey (the fifth Enquête Intégrale sur les Conditions de Vie des menages, EICV5), between 2001 and 2017, poverty as measured by the international poverty line fell from 77.2 percent to 55.5 percent, and by the national poverty line fell from 58.9 percent to 38.2 percent. Poverty has also become less severe, with a shrinking gap between average consumption of the poor and the poverty line. However, despite Rwanda's good record in poverty reduction, EICV5 showed that poverty reduction stagnated between 2014 and 2017 owing to droughts, a slowing down of the structural transformation and rural to urban transition, and a weakening of the job-creating potential of Rwanda's recent growth. Over 90 percent of the poor in Rwanda live in rural areas (mainly in the Southern, Western, and Eastern provinces). There is a high correlation between poverty and the lack of access to public services, including electricity. Even though electricity access increased from 9 percent to 15 percent within rural households between 2013/14 and 2016/17, it remains far too low for Rwanda's development ambitions.

[1] https://www.doingbusiness.org/en/rankings?region=sub-saharan-africa.
[2] http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

Rwanda's development strategy is laid out in its latest seven-year plan, the National Strategy for Transformation (NST1) for 2017–2024, prioritized by the three pillars of economic transformation, social transformation, and transformational governance. The NST1 aims to lay the foundation for achieving upper-middle-income country status by 2035 and high-income status by 2050. It is guided by the Sustainable Development Goals (SDGs), the Africa Union Agenda 2063 and its first 10-year Implementation Plan 2014–2023, and the East African Community Vision 2050. Electricity is a cross-cutting area of focus under both the economic transformer pillar and the social transformation pillar, where targets in generation, electricity quality and reliability, and access are outlined.[3]

Before the coronavirus disease 2019 (COVID-19) pandemic, Rwanda was in the midst of an economic boom. In 2019, the economy expanded by 9.4 percent, the highest growth rate on the continent and well above Rwanda's average growth of the past 10 years. Investments were the main driver of growth, expanding by 23.3 percent and supported by strong public investments. Private consumption also grew by 9 percent. The contribution of net exports to growth was negative because the growth had been led by domestic demand. Fiscal transfers to the electricity sector remained below 2 percent of GDP, with over 90 percent taking the form of grants for public investment, mainly for electrification. As of December 2019, public and publicly guaranteed debt reached 58.5 percent of GDP. Rwanda's debt remains sustainable but the risk of debt distress shifted from low to moderate as a result of the COVID-19 pandemic (Debt Sustainability Analysis of June 2020).

The Government of Rwanda (GoR) has put together an economic recovery plan (ERP) to respond to the COVID-19 pandemic, which includes a doubling down on electrification investments to accelerate digitization of the economy and integration of rural households into the modern economy. Because of the COVID-19 pandemic, Rwanda's economic growth rate for 2020 is expected to decelerate to about 2 percent, with significant downside risks depending on the extent of COVID-19's spread in Rwanda and any delays in recovery of international flow of goods, services and people. The GoR has taken prompt actions to mitigate the impact of the pandemic, including launching an ERP, which provides a blueprint for recovery in the hardest hit sectors, resumption of productive activity, and safeguarding of employment (see box 1). The

[3] NST1 (2017–2024): Economic Transformation Pillar, Priority Area 2, No. 11, "…public lighting will be installed on all major national and district roads…"; Economic Transformation Pillar, Priority Area 4, No. 23, "…scale up electricity generation and improve quality, affordability and reliability"; Social Transformation Pillar, Priority Area 5, No. 69, "…access to electricity will be scaled up to all from 34.5% (estimation in 2017) to 100% in 2024".

ERP takes infrastructure development as a critical sector that could catalyze broader economic recovery through boosting productivity and has the potential to contribute significantly to creation of immediate jobs. The ERP includes a strong focus on further investment in energy access including connecting 350,000 households to grid electricity during the FY2020/21, more than double the recent rate of connections, and connecting 100,000 households using off-grid solutions. The ERP cost is estimated at around US$900 million additional financing needs in 2020 and 2021.

Box 1. Rwanda's Economic Recovery Plan

The ERP, covering the period May 2020–December 2021, aims at guiding the Government on required key interventions across sectors that would provide support to households and boost employment and growth toward recovery. The priorities for economic recovery are the following:

(a) Priority 1: Contain the pandemic and strengthen the health system (infrastructure, human resources, and information technology systems).

(b) Priority 2: Mitigate the impact of the COVID-19 economic crisis on households' income by scaling up social protection.

(c) Priority 3: Ensure food self-sufficiency by increasing agricultural production.

(d) Priority 4: Support businesses and protect jobs.

(e) Priority 5: Ensure a coordinated multisectoral response of the Government to quickly start and boost economic activity.

Source: Ministry of Finance and Economic Planning (MINECOFIN).

1.1.2. Sectoral and Institutional Context

1.1.2.1. Recent Progress in Electricity Access and Electricity Service Delivery

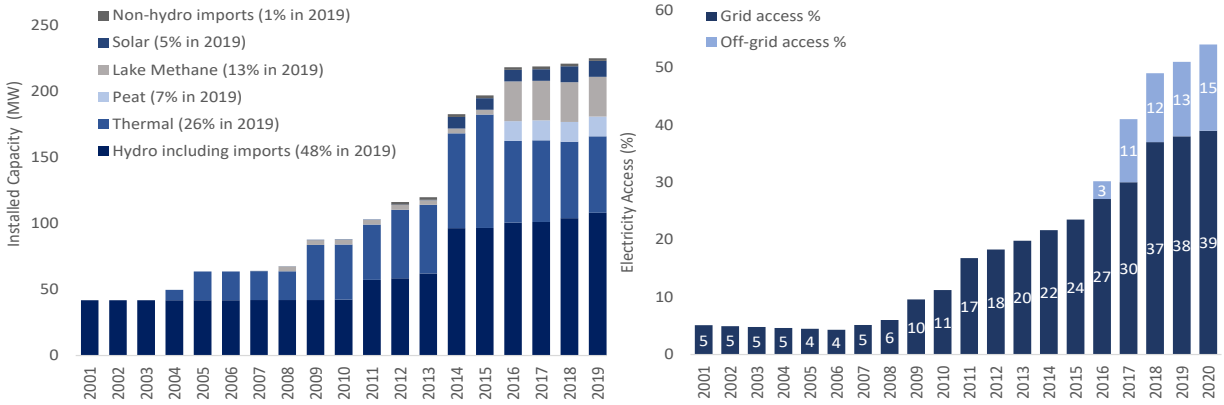
Rwanda has electrified its population at one of the fastest rates in the world over the past decade, with access to electricity rising from 6 percent in 2009 to an estimated 54 percent in March 2020. Rwanda's progress in electrification during 2010–2016 ranked 11th globally and 3rd in Africa. Among the 20 least-electrified countries, none made more progress than Rwanda during that period.[4] Investments in grid extension have increased grid connections from 6 percent in 2009 to 39 percent in 2020; while off-grid access has more than doubled since 2016 and is estimated at 15 percent in 2020 . Grid access of public institutions is remarkably high, reaching, as of March 2019, 100 percent of

[4] The World Bank. 2018. *Tracking SDG7: The Energy Progress Report*. http://trackingsdg7.esmap.org/data/files/download-documents/tracking_sdg7-the_energy_progress_report_full_report.pdf.

hospitals, 93 percent of health centers (compared to only a third on average in Sub-Saharan Africa), and 80 percent of primary and secondary schools (compared to a quarter for Sub-Saharan Africa on average). Rwanda's strong performance is reflected in the World Bank's Regulatory Indicators for Sustainable Energy (RISE) Framework, where Rwanda is among the top performers in East Africa and has particularly high scores in indicators associated with renewable energy and energy access.[5]

Rwanda's power generation capacity tripled from 76 MW in 2010 to 225 MW in 2020 and the country has successfully reduced its reliance on oil-fired generation through investments in zero-carbon resources, halving the greenhouse gas (GHG) emissions intensity of electricity. The share of oil-fueled power in Rwanda's power generation mix has declined from about 45 percent in 2013 to less than 20 percent in 2018 having been replaced by hydropower, lake methane-based power,[6] and to a smaller extent by solar power and peat-fueled power. As a result, the GHG intensity of power generation, which is largely driven by the share of oil in the fuel mix in Rwanda, has declined from about 308 gCO_2 per kWh in the first quarter (Q1) of 2013 to 134 gCO_2 per kWh in the final quarter (Q4) of 2018. As most of the future least-cost power generation is expected to be from clean sources of power, the GHG intensity is expected to improve further. Rwanda has also managed to attract direct investment of over 17 IPPs, and the capacity expansion over the past decade has been largely financed by the private sector. As of 2018, 52 percent of capacity is under private ownership, one of the highest shares in Sub-Saharan Africa.

Figure 1. Progress in Generation Capacity and Electricity Access Expansion during 2001–2020



Source: Rwanda Energy Group (REG); Ministry of Infrastructure (MININFRA) 2019

Rwanda is also among the top performers in East Africa in terms of quality of electricity service delivery. This has been achieved by investments in infrastructure improvements, financed by the

[5] Developed by the World Bank Group, RISE is a tool for policy makers to compare national policy frameworks for sustainable energy and identify opportunities to attract investment. RISE assesses countries' policy support for each of the three pillars of sustainable energy—access to modern energy, energy efficiency, and renewable energy. See http://rise.worldbank.org/.

[6] Lake methane, which is the naturally occurring methane in Lake Kivu, is considered as a zero-carbon source of energy because, if not burned, the methane would gradually emit into the atmosphere.

Government, other development partners, and the World Bank (under the Rwanda Energy Sector Strengthening Project [RESSP]; P150634). System losses have also resumed their declining trajectory, after a period of increase because of the rapid expansion of low-voltage (LV) and medium-voltage (MV) lines (which are associated with higher losses) under the electrification program, and in 2018 dipped below 20 percent for the first time since 2010. The decline in system losses can be attributed to the measures undertaken by the utility to strengthen the grid and to reduce electricity theft, including the RESSP-financed Revenue Protection Program (RPP), which financed advanced metering infrastructure and systems to the medium and large customers of the Energy Utility Corporation Limited (EUCL) (who account for less than three percent of the total customer base but represent around 50 percent of total sales), to protect EUCL's revenues. The utility is now able to provide accurate, reliable, and timely billing information, thus promoting greater billing transparency to these customers, resulting in fewer consumption disputes, while also reducing network theft.

1.1.2.2. Institutional Modernization of the Power Sector

Rwanda has undertaken several waves of institutional reforms over the last decade, the most recent of which was supported by a programmatic energy Development Policy Operation (DPO) series. The most recent set of reforms during 2017–2019 were supported by the World Bank through an energy DPO series (Rwanda Energy Sector Development Policy Loan [P162671]; Second Rwanda Energy Sector Development Policy Operation [P166458]; Third Rwanda Energy Sector Development Policy Operation [P169040]), to ensure that the further expansion of electricity services remains fiscally sustainable. Key reforms included (a) tariff and connection pricing reforms; (b) multiyear fiscal planning for the energy sector; (c) institutionalization of least-cost planning for generation and transmission investments; (d) a new legal and regulatory framework for public-private partnerships in the energy sector; (e) institutionalization of least-cost, geospatial electrification planning; and (f) a new framework of regulations and investment procedures for off-grid solar power and mini-grids.

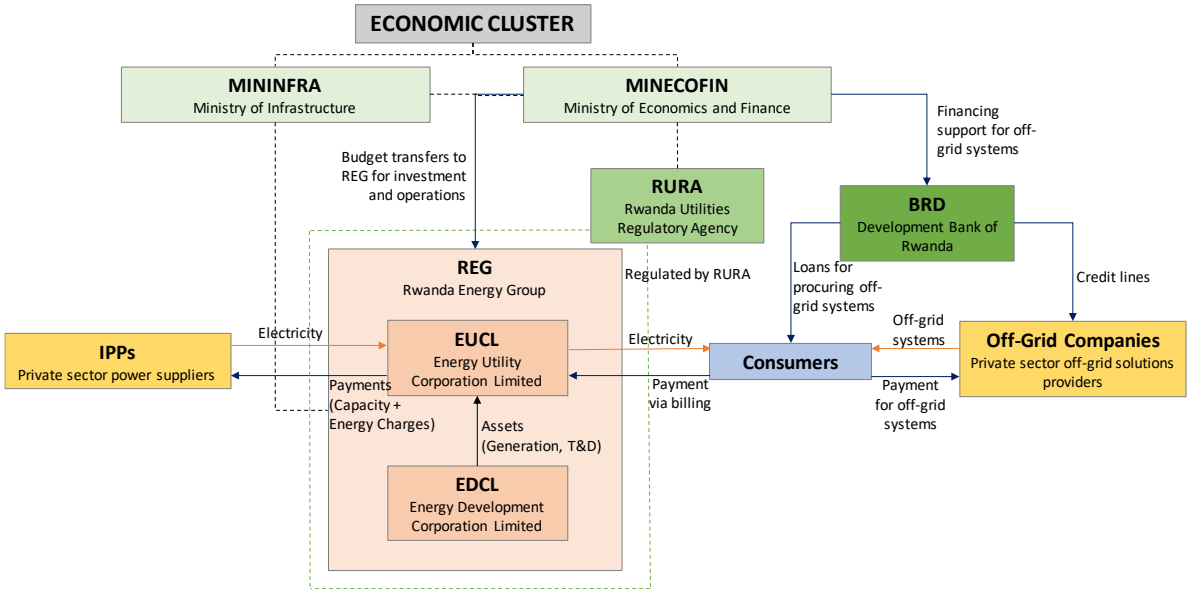
A decade ago, the GoR pursued a new systematic mechanism to expand access, called Energy Access Rollout Program (EARP) underpinned by a sector wide approach (SWAp), to coalesce donor support around a common framework. Such an approach, adopted in many sectors, including energy, provided the GoR with a vehicle to steer away from fragmented development fund delivery. Both the framework and the process were anchored by national priorities, alignment, harmonization, and joint accountability in managing results. Sector working groups (SWGs), which include government departments, development partners, private sector, nongovernmental organizations, and civil society organizations, were set up in each sector to implement their respective SWAps. The EARP in the energy sector, which pooled a total of around US$360 million between 2009 and 2018 from the Arab

Bank for Economic Development in Africa, the Government of Japan, the Government of Netherlands, the OPEC[7] Fund for International Development (the OPEC Fund), the Saudi Fund for Development (SFD), the World Bank, the Belgian Government, and the African Development Bank (AfDB). It was under this arrangement that Rwanda's success in its access agenda was achieved. The EARP's robust design and implementation has facilitated the recent success in electrification and is being highlighted as best practice globally by the World Bank's Independent Evaluation Group (IEG) (The World Bank and IEG 2014).[8]

Rwanda's state-owned energy company, REG, is a commercially operated, well-governed state-owned enterprise, with a mandate to develop and operate all public sector energy sector infrastructure and be the interface of all private investments in the sector. The most recent organizational restructuring in 2014 separated the electric utility from the water utility, forming the REG and its two independent subsidiaries, EUCL and the Energy Development Corporation Limited (EDCL). The separation allowed for better governance and clear financial accountability between revenue-generating service functions (EUCL) and nonrevenue-generating infrastructure development (EDCL). The Government retains ownership of the utility holding company, while its affiliated companies are governed under company law as opposed to public service law, which entails stricter requirements in terms of transparency and management accountability. REG is overseen by MININFRA and regulated by the Rwanda Utilities Regulatory Agency (RURA), an independent regulator. RURA evaluates the revenue requirements of REG and proposes electricity tariffs accounting for affordability constraints. The cash deficit of REG for both investment and operational purposes is provided through electricity sector subsidies by MINECOFIN. The Development Bank of Rwanda (Banque Rwandaise de Développement, BRD) provides financing support to the off-grid sector through the Renewable Energy Fund (REF), which is the Government's main vehicle to promote private investment in off-grid energy. The REF offers loans and results-based grants to households and small businesses for procuring off-grid solar devices, as well as credit lines to private sector off-grid solution providers. MINECOFIN governs budget transfers to the energy sector, while the Economic Cluster of the Cabinet has oversight over higher-level sector policy decisions. The Economic Cluster is a subgroup of the Cabinet formed for the effective implementation and monitoring of the Government's priorities.

[7] OPEC = Organization of the Petroleum Export Countries.
[8] The World Bank and IEG. 2014. *World Bank Group Support to Electricity Access, FY2000-2014: An Independent Evaluation*. Washington, DC: World Bank. https://ieg.worldbankgroup.org/sites/default/files/Data/reports/Electricity_Access.pdf.

Figure 2. Institutional Setup of the Electricity Sector in Rwanda



Note: T&D = Transmission and Distribution.

The capacity of REG has been strengthened to enable the company to support the required continued improvements in sector performance. Following the formation of REG, the company embarked on improving the capacity of the newly created sector institutions. REG revamped the organization by strengthening the human resource and technical capacity of EUCL and EDCL, led by their common Board of Directors. In addition, the World Bank-funded RESSP financed a management information system to support the company's critical business processes, including (a) enterprise resource planning to support management of corporate resources, (b) a commercial management system (CMS) for all commercial functions, (c) an incidents recording and management system (IRMS) for management and resolution of outages and other incidents in electricity supply to EUCL's customers, and (d) a geographic information system (GIS) to build and keep permanently updated reliable customers and network assets databases. The Integrated Business Management Solution (IBMS) is now fully implemented and includes the ability to directly produce comprehensive and reliable utility financial reports, full integration of the CMS and IRMS to the GIS, and development of the interface between the meter data management software of advanced metering infrastructure system and the CMS.

The GoR has put in place, a strong policy and regulatory framework for off-grid electricity access delivered through the private sector, and about a dozen companies are active in the market for quality-certified solar home systems (SHSs), selling close to 100,000 systems per year on average. Off-grid solutions are promoted as transitionary solution in areas where extending the grid is not financially viable in the short term, and the Government has laid the foundation for the off-grid solar sector to

grow by creating financing mechanisms, enforcing quality standards, and establishing an enabling policy framework. Solar companies operating in Rwanda have enjoyed tax exemptions on solar energy equipment and appliances since 2015.

The BRD has created credit lines for off-grid solar financing in local currency, both directly to companies as well as indirectly through financial institutions for purposes of promoting off-grid electrification. Strong barriers to entry in the form of quality standards enforced at customs have significantly reduced the number of counterfeit products in the Rwandan market. This has resulted in a higher market concentration of Lighting Global-certified products than in the rest of East Africa. As a result, the Rwandan market has not been saturated by low-performance products and counterfeits. The commitment of the Government to high quality off-grid solutions, of Tier 1[9] and above, was also manifested in the development and adoption of the Ministerial Guidelines on Minimum Standards Requirement for Solar Home Systems in June 2019.

The guidelines establish quality and minimum service-level requirements for products imported into Rwanda. Lighting Global has followed the adoption of the guidelines with the design of a tool for the identification of off-grid technologies complying with the requirements outlined in Article 5, to assist the GoR, private sector companies, and development partners, in their implementation. Lastly, there is robust demographic data available which will aid the design of future concessional finance programs.

1.1.2.3. Remaining Challenges: Providing Electricity Access to Lower-Income Households

Grid electricity access remains concentrated in higher income quintiles**.** According to Rwanda's latest national household income survey (EICV5) conducted in 2016–2017, about 26 percent of households across Rwanda used electricity from EUCL as the main source of lighting. This was an improvement from the 17.7 percent that used electricity as their main source of lighting in 2013–2014. Between 2013 and 2017, connections almost doubled for rural households (from 9 percent to 15 percent) and for the bottom 40 percent (from 3 percent to 5 percent for Q1 and from 7 percent to 10 percent for Q2). Nonetheless, connectivity[10] has remain higher in urban and rich areas. During 2016–2017 up to 76 percent of urban households had access to the grid, compared to 71 percent in 2013–2014. Within

[9] As defined by the Multi-Tier Framework (MTF) developed by the World Bank Energy Sector Management Assistance Program (ESMAP). MTF classifies energy services in tiers—starting from Tier 0 (no service) to Tier 5 (full service). For electricity, Tier 1 provides a basic service level, such as lighting and cell phone charging. This type of service, for example, can be provided by a small solar lighting kit. For more information kindly see "Bhatia, Mikul, and Niki Angelou. 2015. *Beyond Connections: Energy Access Redefined. ESMAP Technical Report;008/15*. Washington, DC: World Bank.

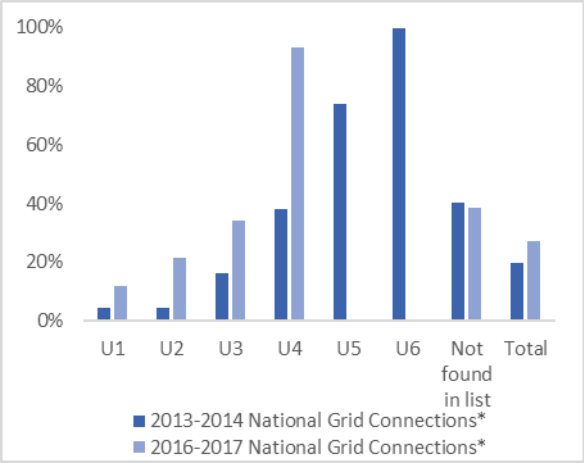
[10] Treating households that use EUCL electricity as main source of lighting as households with a grid connection.

quintiles, ranked by total household expenditure per capita, variation has remained large. Similarly, for 2016–2017, there is a large variation by Ubudehe category (see footnote for details)[11].

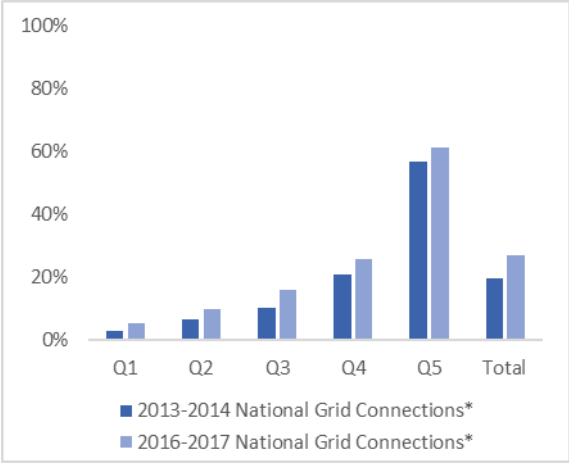
Gaps in electricity access persist between men and women, as female-headed households have lower access to both grid and off-grid electricity. Only 21 percent of female-headed households have access to electricity, compared with 31 percent of male-headed households.[12] Quality of electricity also presents gender gaps, where 80 percent of female-headed households and 70 percent of the male-headed households have Tier 0 electricity, meaning their lighting needs are covered by traditional sources of lighting such as candles and kerosene lamps. Connected single-headed households are mostly concentrated in grid-connected urban areas with Tier 1–5 technology. However, female-headed households are unlikely to have grid connections due to affordability constraints in covering connection fees and monthly bills and are therefore more likely to resort to simple and cheaper off-grid solutions such as solar lanterns.

Figure 3. Grid Electricity Access 2013–2014 and 2016–2017

By Ubudehe category



By income quintiles



2. **Source: EICV4 and EICV5.**
3. **Note: *Houses that use electricity as their main source of lighting.**

[11] Rwanda's tradition of community and team-work is reflected in the Government's categorization of 'Ubudehe'. The categories reflect the level of support each household receives from the GoR in the form of the social protection program. The categories separate population by vulnerability and range from abject poor, who have no land or livestock, to money rich, a group with land and livestock, and often salaried jobs. The categories are useful to delineate household poverty but are not completely equivalent to other welfare assessments. Notably, this categorization is based on the consumption level and not income/cash level. For low-income households, significant consumption may come from non-cash consumption. Not all households in the EICV5 are assigned an Ubudehe.
[12] MTF survey, 2018.

Average consumption of electricity for all quintiles remains very low—within the first tier of household tariff categories: 0–15 kWh per month. With the increase in flat rate tariff between 2013–2014 and 2016–2017, and subsequent increase in tariff for higher-tier consumers, more households decreased consumption to the first tier,[13] and this trend is likely to continue with the tariff increment in 2020. Among the few households in the poorest quintile which consume electricity, 97 percent consumed 15 kWh or less a month in 2016–2017.

The poor spend more on electricity as share of their household budget than the rich**.** On average, electricity consumers (those who reported positive spending on electricity for the last four weeks) spent 1 percent of their budget on electricity in 2016–2017, an improvement from the 1.59 percent for 2013–2014. The share of electricity expenditure increases as household income decreases, even though consumption increases with income. The poor spent 1.5 percent of their income in grid electricity while for the richest quintiles, the percentage was less than 1 percent for 2016–2017 (EICV5).

Affordability constraints have recently led to a slowdown of the market for SHSs. While the pace of grid electrification has increased, off-grid access expansion has slowed down despite the GoR providing debt financing through the BRD and the implementation of a strong policy and regulatory framework. The off-grid market slowed down from about 100,000 SHSs sold in 2016/17 to around 85,000 systems sold in 2017/18 and 75,000 in 2018/19 (through April). Of all the solar lighting products sold in 2018, 8 percent were sold to Ubudehe 1, 41 percent to Ubudehe 2, and 51 percent to Ubudehe 3. Additionally, only 13 percent of the solar lamps and 5 percent of SHSs sold in 2018 were bought by Ubudehe 1, displaying only few households in Ubudehe 1 category can afford SHSs. Very similar challenges are prevalent in the market for clean cooking solutions.

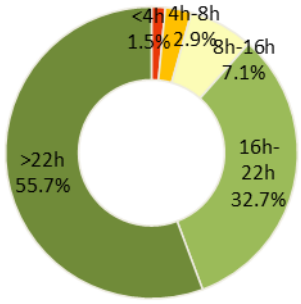
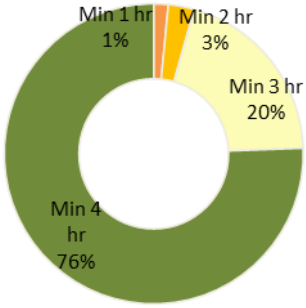
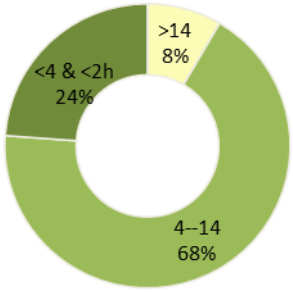
1.1.2.4. Remaining Challenges: Efficiency of Electricity Service Delivery

System losses remain relatively high at 19 percent and outages and system reliability issues remain common, creating service constraints and barriers to further sector modernization and regional integration into the East Africa Power Pool (EAPP). An MTF survey conducted by the World Bank suggests that only about 56 percent of households have power more than 22 hours per day on average, and many are using backup solutions to cope with insufficient hours of service and power outages (the survey results showed that the main backup sources for lighting are mostly candles [66 percent] and

[13] Tariff reforms in recent years: In 2015, a tariff reform changed the price of electricity from RWF 134 to 150 per kWh, followed by another tariff reform in 2016 that increased the flat rate to RWF 182 per kWh for all residential and nonresidential customers. In 2017, the tariff scheme changed from the flat rate to a block structure. For residential usage less than 15kWh per month, the price was set at 89 RWF per kWh; for residential usage between 15 kWh and 50 kWh per month, the price was set at 182 RWF per kWh; and, for residential usage higher than 50 kWh, the price was RWF 189 per kWh. In August 2018, tariff reforms, blocks 1 and 2 stayed the same while block 3 tariffs increased by RWF 21 per kWh to RWF 210 per kWh. In the latest tariff reform in January 2020, there was an increase of the second and third tier tariffs to RWF 212 and RWF 249 respectively.

torches/flashlights [24 percent]). A total of 92 percent of households responded that they do not use any backup solutions for their larger appliances. Similarly, at 19 percent, the electricity transmission and distribution losses in Rwanda still illustrate poor operational efficiency and are also a direct source of lost revenues through unbilled electricity. Poor quality of electricity services hinders economic growth as well as undermines consumer confidence in the utility, making application of cost-reflective tariff rates difficult and, in effect, harming financial sustainability of the power sector. The frequent fluctuations in voltage and frequency also create barriers to Rwanda taking advantage of lower-cost power imports from the EAPP.

Figure 4. Rwanda MTF Survey Results on Electricity Service Quality (2017)

Duration Day	**Duration Evening**	**Reliability**
Out of 24 hours	Out of 4 hours (6–10 p.m.)	No. of outages and duration
		

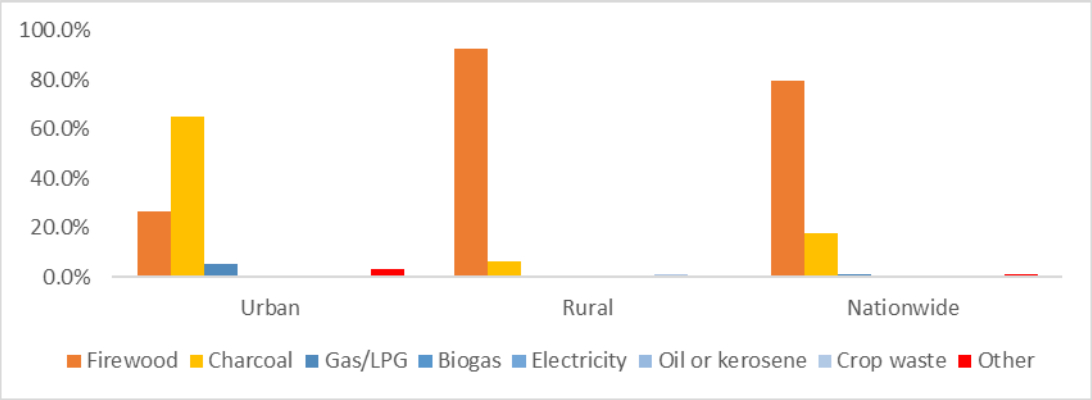
4. Source: The World Bank 2017.

1.1.2.5. Remaining Challenges: Clean Cooking solutions

Progress toward cleaner cooking solutions has been much slower, with nearly 80 percent of the households using firewood for cooking, limiting the impact on health and deforestation. Firewood accounts for about 93 percent of the fuel used for cooking in rural areas and 26.3 percent in urban areas, with charcoal accounting for another 65.1 percent (EICV5). With solid biomass such as firewood and charcoal so prevalent in Rwanda, the use of traditional cooking technology to meet cooking needs is also common. More than half of the households use three-stone fires for cooking. Rwanda's high population growth and density has exerted pressure on natural resources especially forests. Additionally, unsustainable production of charcoal contributes to deforestation, forest degradation, and air pollution. In Rwanda, most charcoal (86 percent) is produced inefficiently and by use of traditional earth mound kilns with average thermal efficiency of about 12 percent. Fuel switching from traditional biomass toward alternative modern fuels and modern biomass energy technologies can help alleviate some of this huge burden, and the associated costs of health care, productivity loss, and reduced quality of life.

While three-stone fires are common, there are households at all consumption levels using efficient stoves indicating a potential savings on fuel expenditures. Households with low consumption levels in quintiles 1 and 2 are dependent on traditional cooking technology such as three-stone fires (about 74 percent and 67 percent respectively) and self-built stoves (13 percent and 15 percent respectively) as their primary cooking device (figure 5). As households move to higher consumption levels, the share of three-stone fires goes down while the use of self-built stoves increases. A noteworthy point is that households across all consumption quintiles are using efficient stoves, between 10 percent and 16 percent of each consumption quintile. The use of efficient stoves is also seen equally across urban areas (14 percent) and rural areas (13.4 percent). Efficient stoves reduce the amount of fuel households require and thus result in saving time or the money a household spends on fuel. Manufactured stoves are less common; only 4.7 percent of high-consumption households in quintile 5 have switched to such stoves.

Figure 5. Primary Source of Cooking Fuel for Households



Source: EICV5 2016–2017.

Access to clean cooking is still a significant bottleneck in improving the health and well-being of Rwandan households. This huge dependence on biomass coupled with traditional stoves for cooking causes major health issues and deforestation. Household air pollution (HAP) from solid fuel use is the fourth leading risk factor for morbidity and mortality in Rwanda, and respiratory infection the leading cause of life lost.[14] It is estimated that more than 7,383 premature deaths in Rwanda are attributable to HAP annually with the total welfare losses of US$674 million per year.[15] About 76 percent of households spend on average 7 hours acquiring fuel, either by collecting or purchasing it, and preparing the fuel for their stoves, with a disproportionate burden on households using firewood. Women and girls disproportionately spend more time engaging in cooking-related activities and bear

[14] Institute for Health Metrics and Evaluation. Country Profile: Rwanda. http://www.healthdata.org/rwanda (accessed Jan 26, 2018).
[15] World Bank and Institute for Health Metrics and Evaluation, 2016. *The Cost of Air Pollution: Strengthening the Economic Case for Action.* Washington, DC: World Bank.

the burden of drudgery. Women and children are more susceptible to HAP, and chores relating to cooking take a considerable amount of their time, which otherwise could have been used for other productive areas such as employment.

The market for efficient and clean cooking solutions is small and nascent but has potential to grow and expand. The local production process for improved cookstoves is artisanal with limited manufacturing and scale. This is mainly due to a lack of promotion or incentives to entrepreneurs, dedicated support to clean cooking enterprises, and limited financing options and high interest rates. However, there are some opportunities that can help support private enterprises move forward and to scale. Cooking enterprises are eligible for value added tax and import duty exemptions. There are a few clean cooking promotion activities and ongoing pilots to test new products and business models. Thus, there is a need to promote technology development, technology transfer, and localization based on local cooking culture and to provide financing and knowledge support.

The National Strategy for Transformation, Energy Sector Strategic Plan, and Rwanda Universal Energy Access Program

The NST1, 2017–2024, aims to make Rwanda among the first countries in Africa to achieve universal electrification, with investments guided by an advanced geospatial National Electrification Plan (NEP), and the first to achieve less than 50 percent reliance on traditional cooking fuels. The NST1 identifies the importance of universal energy access for achieving the envisioned social transformation and aims at expanding electricity access to 100 percent of households by 2024. Electrification investments under the NST1 are being guided by an advanced geospatial NEP prepared in 2019, which lays out the areas to be electrified by the grid by 2024 and those where off-grid solutions will step in before the grid arrives (48 percent off-grid and 52 percent grid connections). Furthermore, to improve the quality and reliability of electricity services, the Energy Sector Strategic Plan (ESSP) sets out targets for reducing power interruptions and expanding electricity access to productive users. Recognizing the harmful health and economic impacts of using biomass in traditional cookstoves, the ESSP also aims to reduce the number of households using traditional cooking fuels from 79.9 percent in 2016/17 to 66.6 percent by 2020/21 and 42 percent by 2024 by replacing wood and charcoal with clean cooking options.

Table 1. Rwanda's Objectives for the Energy Sector under ESSP (2017/18–2023/24)

ESSP Objectives	Baseline (2017)	Target (2023/24)
Achieve universal electrification (Tier 1 or more)	40.7% (29.7% on-grid,	100% (52% on-grid,

ESSP Objectives	Baseline (2017)	Target (2023/24)
	11% off-grid)	48% off-grid)
Reserve margin	n.a.	15%
Average number of interruptions per year	265	92
Average total duration of interruptions per year	44 hours	14 hours
Reduce transmission and distribution network losses	22%	15%
Expand electricity access to productive users[a]	72.6%	2020/21: 100%
Households using traditional cooking technologies	83%	42%

Source: MININFRA 2018.

Note: a. According to the ESSP, productive users use energy for activities that enhance income and welfare and include health and education facilities, public infrastructure, and industry.

Table 2. Investment required for the ESSP Objectives Relevant to the Program (US$, millions)

No	ESSP Objective	Initiative	2019/20	2020/21	2021/22	2022/23	2023/24	Total
1	**Increase grid-electricity access.** Increase grid-access to electricity for households to 52% and for productive users to 100%	Grid-connected households	96.30	104.30	112.80	121.90	131.70	**567.00**
		Productive users	10.00	10.00	1.10	1.10	1.10	**23.00**
2	**Enhance the efficiency of electricity service delivery**	Distribution network investment	7.27	3.27	7.15	5.50	0.70	**24.00**
		Transmission network investment	39.03	7.20	54.42	23.16	22.00	**146.00**
3a	**Off-grid electricity**	Solar home systems and	22.00	27.10	25.50	27.40	29.40	**131.00**

No	ESSP Objective	Initiative	2019/20	2020/21	2021/22	2022/23	2023/24	Total
	access. Increase off-grid-access to electricity to 48%	mini-grids						
3b	**Clean cooking:** Halve the number of households using traditional cooking technologies	Provision of improved cookstoves	29.30	31.50	33.9	36.40	39.10	**170.00**
	Total investment requirement		**203.90**	**183.37**	**234.87**	**215.46**	**224.00**	**1,062.00**

5. Source: Rwanda's ESSP.
6. Note: These exclude the objectives associated with generation expansion, street lighting, and development of oil and gas strategic reserves.

The achievement of the NST1 targets will require a substantial acceleration of electrification efforts—from about 230,000 connections per year (including both grid and off-grid access) to over 500,000—and the creation of new markets for clean cooking, both requiring a combination of public and private investment. Public investment is estimated to be in the order of US$1.06 billion (see **Error! Reference source not found.**), which will require concerted efforts in financing from the GoR and development partners. Public investment will focus on grid electrification, transmission and distribution grid reinforcement, utility operations, and measures to catalyze private investment in off-grid electrification and clean cooking, especially for areas with poor affordability that are not attractive to the private sector. An estimated US$370 million of private finance is expected to be mobilized between now and 2024 to support the implementation of off-grid solutions. Private funding will be the main driver in development of power generation, off-grid electrification, and clean cooking.

The Rwanda Universal Energy Access Program (RUEAP) is the GoR's multi-donor program to achieve the objectives of the NST1 and ESSP, and the GoR has solicited donor support around a common framework that builds on experiences and lessons learned from past electrification projects in the country. The preliminary donor commitment so far amounts to a total of about

US$684 million to be mobilized toward the achievement of the ESSP objectives as far as possible (**Error! Reference source not found.**). The ESSP requirement for on-grid access is US$590 million, against the mobilization of public funds under the program of US$366 million, which leaves a gap of approximately US$224 million. The amount of public funds raised for improving the reliability of electricity supply and reducing transmission and distribution losses includes investments planned under the ESSP as well as beyond. For off-grid electrification and clean cooking, the RUEAP aims to leverage private investment through targeted subsidy schemes.

The proposed Rwanda Universal Energy Access Program includes financing from IDA, the World Bank-administered Clean Cooking Fund (CCF), Agence Française de Développement (AFD), OPEC Fund, SFD, Korea EDCF, AfDB and EIB. The GoR has allocated funding between the donor partners in a manner aimed at ensuring adequate coverage across the different targets of the ESSP. All donors to the multi-donor program were allocated districts across Rwanda in which to support grid access to electricity which, in accordance with the ESSP budgets, requires the bulk of funding. In addition, the World Bank funding addresses the off-grid and clean cooking segment, and a small portion of the transmission and distribution stabilization segment, while the AfDB funding addresses most of the transmission and distribution stability and reliability segment (Table 3). Although the funding mobilized through the program may not meet the needs of the ESSP in its entirety, the program will go a long way in contributing to the targets of the ESSP.

The larger multi-donor RUEAP supports the GoR's strategy to implement a 'last push' to reach universal electrification, make a step-change in access to clean cooking, and enhance efficiency of electricity services for all consumers. Access to modern energy service in the bottom 40 percent of the income distribution, while growing, is still limited. Only about 5 percent of the lowest income quintile households have electricity access (compared to 61 percent of the highest income quintile) and the electricity access rate in rural areas is about 15 percent (compared to about 76 percent in urban areas). Even the consumers who use electricity cope with unreliable supply (see Figure 4). Targeted government interventions will be needed to catalyze private solutions in reaching poorer segments of the population**.** The affordability of energy services provided by the private sector however remains a major challenge, especially in the remote rural areas. The market for off-grid solar solutions has slowed down in recent years as higher-income segments have been saturated.

1.2. Relevance to Higher Level Objectives

Increasing access to energy and enhancing the efficiency of electricity service delivery is aligned with the objectives and targets of the NST1 of the GoR. The NST1 is anchored on three pillars, namely The Economic Transformation Pillar, The Social Transformation Pillar, and The

Transformational Governance Pillar. The NST1 recognizes availability and access to quality, affordable, and reliable energy as fundamental to Rwanda's economic growth and assigns specific targets to the continued development of the energy sector, for example,

(a) The Economic Transformation Pillar, Priority Area 4, Objective No. 23 states that the Government will scale up electricity generation and improve electricity quality, affordability, and reliability;

(b) The Economic Transformation Pillar, Priority Area 7, Objective No. 47 states that the Government aims to halve the number of households depending on firewood as a source of energy for cooking from 79.9 percent (2016/17) to 42 percent by 2024; and

(c) The Social Transformation Pillar, Priority Area 5, Objective No. 69 states that access to electricity will be scaled up to all from 34.5 percent (estimation in 2017) to 100 percent in 2024 in collaboration with the private sector to reach off-grid areas and investments in grid expansion.

The proposed program is fully aligned with the World Bank Group's twin goals of ending extreme poverty and promoting shared prosperity as well as with the Country Partnership Framework (CPF) for FY21–FY26 for Rwanda, by directly contributing to the CPF objective of 'Expanded Access to Infrastructure and the Digital Economy'. By improving households' livelihoods through access to modern energy, including in rural and peri-urban areas, which are home to a disproportionate share of Rwanda's poor and vulnerable, the supported intervention contributes to the World Bank's twin goals of eliminating extreme poverty and promoting shared prosperity. Objectives 3 of the CPF reads 'Expanded Access to Infrastructure and the Digital Economy.'[16] The CPF highlights the economic and developmental importance of accessible and reliable energy service delivery to the households, businesses, and public institutions in Rwanda. Affordable, reliable, and accessible energy service is crucial for the country's private sector development as the productivity and competitiveness of the private sector are hampered by high electricity prices and frequent power outages. The CPF explicitly outlines the proposed project to address these constraints through providing needed investments in energy access and quality improvement and collaborating with other development partners to achieve Rwanda's universal electrification target.

The proposed program's activities are aligned with the higher-level goals for Rwanda as set out in the Systematic Country Diagnostic (SCD, June 2019). Among the priorities and associated action areas identified in the World Bank's SCD for Rwanda, published in June 2019, are (a)

[16] The World Bank Group. 2020. *The Country Partnership Framework for The Republic of Rwanda for the Period FY21–26.*

addressing cross-cutting constraints on private sector development and (b) engaging the private sector for infrastructure sustainably. The proposed project promotes private sector involvement in the off-grid electrification and clean cooking solutions segments. The project will also contribute to a more sustainable and balanced approach toward investment in Rwanda, by supporting sector expansion through the least-cost methods defined in the NEP, use of competitive procurement procedures, and leveraging private investment through strategic use of concessional financing. The project is in alignment with the SCD for the promotion of gender equality, including promotion of employment and entrepreneurship and access to finance for women.

The proposed program. is aligned with two of the six reform priorities for high growth identified in the joint study of the GoR and the World Bank: Future Drivers of Growth in Rwanda. Reform Priority 4 of the study is to 'Enable the Emergence of Competitive Domestic Enterprises'. The study also calls out the high cost of electricity as an important input to production and one of the cross-cutting constraints to growth of export of Rwanda's products. Reliability of electricity supply is pointed out as a constraint to production, as almost a third (31.5 percent) of firms participating in the Integrated Business Enterprise Survey reported access to reliable electricity as a major challenge.[17] The report also views increase in reliability of electricity as one of the factors that could increase the competitiveness of electricity for electricity trade. The project addresses this priority by pursuing electrification in the most cost-effective manner following the NEP, targeting productive users for electrification, promoting the participation of private sector firms in expanding electricity access and clean cooking, and financing strengthening of the distribution network. Reform Priority 6 of the study is to 'Develop Capable and Accountable Institutions of Governance'. The project tackles this priority by financing technical assistance (TA) and building capacity of the resources in REG and other relevant public agencies and institutions working on the energy sector.

The proposed program will contribute to maximizing financing for development through targeted support to the private sector. According to the ESSP, the private sector is taking the lead in investments in off-grid and clean cooking segments. Therefore, the project is set up to provide targeted, results-based subsidies to make off-grid and clean cooking solutions provided by the private sector affordable to end-users.

The RUEAP program will finance some of the most important mitigation actions under Rwanda's updated nationally determined contribution (NDC), and it is expected to benefit from results-based payments through the purchase of emission reduction credits by the Carbon Initiative for Development (Ci-Dev), a World Bank-administered trust fund that makes

[17] National Institute of Statistics of Rwanda. 2017. Integrated Business Enterprise Survey in Rwanda 2017

payments based on avoided GHG emissions. The NDC defines Rwanda's contribution as emission reductions compared to a counterfactual, business-as-usual scenario. In the energy sector, the NDC's mitigation measures relevant to RUEAP include the promotion of grid-connected hydropower generation (supported by Component 2a of the RUEAP), off-grid solar electrification (Component 3a), as well as clean and efficient cook stoves (Component 3b). The Results-based Financing (RBF) from Ci-Dev, if accessible to the program, would complement the output- and outcome-based payments being made for off-grid and/or clean cooking solutions (delivering a robust set of resources available to the sector throughout the output-outcome-impact value chain). Ci-Dev funds would only be able to be negotiated after Board approval due to the need to operationalize the trust fund's forthcoming post-2020 Paris Agreement Framework and obtain donor approval of the final terms, and as such are expected to be processed as Additional Investment Project Financing later.

The proposed program will further support Rwanda's advance toward achieving SDG7. The SDG7 tracking report released in 2019 noted that between 2010 and 2017, Rwanda's pace of expanding electricity access was the fastest among the least-electrified countries. The current project will provide a substantial push to Rwanda's progress toward achieving SDG7. By financing grid densification and last mile connectivity, helping improve grid reliability, enhancing the affordability of international standard off-grid SHSs, and facilitating the transition from firewood-based cooking to modern cooking solutions, RUEAP will offer comprehensive support to the GoR's endeavors in expanding access to affordable, reliable, sustainable, and modern energy services.

The proposed program is well-timed to continue the support that the World Bank has provided over the last decade toward the GoR's energy sector agenda, as it will directly support the GoR's final push toward Universal Energy access by 2024 and will help kick-start the move toward universal access to clean cooking by 2030. The grid electrification and off-grid access components of the project will help materialize the GoR's final push toward universal electrification, and the clean cooking component of the project will help create a market and targeted subsidy mechanisms to achieve universal access to cleaner cooking solutions by 2030 (with the interim target of halving the number of Rwandans using inefficient traditional cooking methods). The project scope and timing are also important in supporting the GoR in meeting its efficiency and performance targets in 2024. Further, through its support to distribution network enhancements, the project will prepare Rwanda in time for regional interconnection with the EAPP.

Keeping in consideration the COVID-19 pandemic, the proposed program design is aligned with the GoR's ERP and the World Bank Group's COVID-19 Crisis Response Approach. The Government's COVID-19 ERP, approved during May 2020, recognizes infrastructure, including

electricity, as important to supporting economic recovery.[18] The ERP, in consideration of the slowdown of electrification projects under implementation, focusses on continuing rollout of grid and off-grid access to boost productivity and promote immediate job creation, and targets connection of 350,000 households to grid electricity and 100,000 households using off-grid solutions during the fiscal year 2020/21.

Following the grid connection road map while rolling out connections to households, administrative centers, health centers, educational facilities, and trade centers will add much needed support to the ability of public facilities to provide services to the more vulnerable populations in the rural areas, further supporting the social protection nets outlined in the ERP and the World Bank Group's Crisis Response Approach. The ERP also envisages that implementation of these projects will contribute to immediate job creation and improve the livelihood of citizens. By financing the expansion of electricity access, the project directly contributes to the GoR's ERP.

Additionally, the World Bank Group's COVID-19 Crisis Response Approach, approved on June 2020, aims to preserve past economic gains and support resilient, inclusive and sustainable economic and social recovery through the following four pillars: 1) saving lives, 2) protecting poor and vulnerable people, 3) saving livelihoods, preserving jobs, and ensuring more sustainable business growth and job creation, and 4) strengthening policies, institutions and investments. By supporting the electrification of health centers, financing electrification of remote and low-income areas, creating employment opportunities through the project works and through supporting off-grid electricity and clean cooking companies, and providing capacity building to concerned government agencies, the project supports all pillars of the World Bank's COVID-19 Crisis Response.

1.3. Description of the program developer

The Government of Rwanda has undertaken reforms in the energy and water sector, which have been concretized by the separation of energy from water operations. The main objectives being to have sector focused and efficient operations; attract more investment; improve planning and accountability; and increase access to services by the population to drive sector performance towards the targets envisaged in the NST1 and other national goals.

To this end, Government adopted the corporatization model as a vehicle to implement the required reforms. The law repealing EWSA Law of 97/2013 of January 31, 2014 paved the way for the creation of two corporate entities, which were subsequently incorporated in July 2014 with 100% government shareholding. The Rwanda Energy Group Limited (REG Limited) and its two

[18] Economic Recovery Plan: "Infrastructure development is a critical productive sector that catalyzes broader economic growth by boosting productivity and has the potential to contribute significantly to creation of immediate jobs during the recovery phase."

subsidiaries; The Energy Utility Corporation Limited (EUCL) and The Energy Development Corporation Limited (EDCL) entrusted with energy development and utility service delivery while the Water and Sanitation Corporation (WASAC) has the mandate to develop and operate water and sanitation infrastructure and deliver related services in the country.

The Rwanda Energy Group Limited was incorporated to expand, maintain and operate the energy infrastructure in the Country through its two subsidiaries the Energy Utility Corporation Limited (EUCL) and the Energy Development Corporation Limited (EDCL). The objective of creating these subsidiaries amongst others was to ensure focused attention to enhancing efficiency in utility operations on one hand and ensure timelier and cost-efficient implementation of development projects on the other hand. Moreover, the REG holding structure provides the overall coordination and ensures effective development of energy and investment plans.

Overall, the group structure is aimed to ensure the autonomy and efficiency of the EDCL and EUCL.

The Energy Utility Corporation Limited (EUCL) was incorporated to have devoted attention in providing energy utility services in the Country through operations and maintenance of existing generation plants, transmission and distribution network and retail of electricity to end-users. In executing its mandate, the Company will strive to achieve;

- Optimized generation capacity and economic plant dispatch to meet short and long-term energy supply requirements,

- Enhanced operational efficiency (progressive system loss reduction, billing and collection efficiency, network reliability and high quality of service),

- Improved customer service, and

- Network growth and increased connections within the foot print of electrified areas thereby making an effective contribution to the EDPRS targets.

The Company has four main processes feeding into the core business; Policies planning, Marketing planning and development, Distribution planning and development within already electrified areas and Operation & Maintenance of Power Plants and Transmission & Distribution Networks owned by the Utility. The utility will also play a key role in the execution of Power Purchase/Power Sales Agreements with IPPs and other regional utilities for import and export.

The Energy Development Corporation Limited (EDCL) was incorporated to have devoted attention to;

- Increasing investment in development of new energy generation projects in a timely and cost efficient manner to expand supply in line with EDPRS and other national targets,

- Develop appropriate transmission infrastructure to evacuate new plants and deliver energy to relevant distribution nodes; and

- Plan and execute energy access projects to meet the national access targets. This ring-fenced approach to development is designed to enhance accountability of development resources with the various stakeholders while at the same time opening space for increased private sector participation.

1.4. RUEA Program Cost

The total program investment cost **(684.3 US$ millions)** of the RUEAP is detailed in table 3.

Table 3.Structure of Multi-Donor RUEAP and Constituent Development Partner Projects (US$, millions)

Program Components	World Bank-led Project With proposed co-financing by AFD, OPEC Fund, SFD, and Korea EDCF		AfDB-led Project. Co-financed by EIB		Total Donor Financing	Financing Gaps Compared to the ESSP
1. Increasing Access to Grid Electricity	World Bank	90.0	AfDB	64.7	365.5	224.5
	AFD	85.4	EIB	85.4		
	OPEC Fund + SFD	40.0				
	Subtotal	**215.4**	**Subtotal**	**150.1**		
2. Enhancing the Efficiency of Electricity Services	World Bank	30.0	AfDB	207.5	259.4	n.a.
	AFD	0.0	EIB	21.9		
	Subtotal	**30.0**	**Subtotal**	**229.4**		
3. Increasing Access to Off-grid Electricity and Clean Cooking	World Bank	32.0	AfDB	0.0	42.0	259.0
	Korea EDCF	10.0				
	Subtotal	**42.0**	**Subtotal**	**0.0**		

Solutions						
4. Technical Assistance, Institutional Capacity Building and Implementation Support	World Bank	8.0	AfDB	5.0	17.4	n.a.
	AFD	2.2	EIB	2.2		
	Subtotal	**10.2**	**Subtotal**	**7.2**		
Total		**297.6**		**386.7**	**684.3**	483.5

1.5. Concept of Strategic Environmental Assessment (SEA)

Strategic Environmental Assessment (SEA) is a tool for assessing environmental implications of program, Policy and Project (PPPs) and ensuring the integration of these implications into the formulation and implementation of the PPPs. SEA is flexible in structure and adaptable to specific decision-making processes and their socio-economic and political contexts. SEA guides the formulation of policies, plans, and programs as it assesses their potential effects on the environment through processes involving broad stakeholder participation. SEA enhances environmental awareness, integrates environmental sustainability into decision making, facilitates coordinated action across development sectors, and contributes to the attainment of environmentally sound, integrated, and balanced development policies, planning, and programs.

SEA further strengthens strategic decision-making as it evaluates and integrates considerations of environmental factors and their inter-linkages with economic and social considerations. The integrative capacity of SEA may be understood as a continuum. At one end, it may mainstream environment with economic and social concerns into strategic decision-making. At the other end, it may achieve full integration of environmental, social, and economic factors into a holistic sustainability assessment.

SEA is based on key principles of sustainability including early proactive consideration of the environmental effects of strategic actions; broad institutional and public engagement; analysis and integration of qualitative and quantitative information within a dynamic, interactive framework; early warning of potential cumulative effects and large-scale changes; and identification of best practicable options that can be articulated from the policy level to the individual project level. SEA complements and strengthens Environmental Impact Assessment (EIA) at the project level by: identifying prior information needs and potential impacts; addressing strategic issues and concerns that may relate to project justification; and streamlining the project review process.

SEA guidelines are based on the principle that the public has both a right to be informed of policies, plans, and programs, as well as to express opinions on these PPPs, have comments taken into account, and be informed of final decisions and reasons why they were taken. SEA is undertaken as a process within a dynamic of continuous, interactive, and broadly participatory decision-making processes. SEA recognizes the social dimension of sustainable development and the critical role of human capital in development.

SEA provides a flexible framework that accommodates the iterative nature of policy and planning, engages stakeholder institutions (public, private, and civil society) in the various steps involved in the formulation and implementation processes of the PPPs, and builds a sustainable support base. An effective SEA is an adaptable and continuous process that focuses on strengthening governance and institutions.

SEA aims to ensure that environmental issues are addressed from an early stage in the process of formulating plans and programs and incorporated throughout this process.

1.5.1. Essence and Benefits of Strategic Environmental Assessment

1.5.1.1. Essence of Strategic Environmental Assessment

SEA is a process of preliminary identification and consideration of the possible negative impacts into environment and human health caused by the implementation of any plan, programme or other strategic document. The goals of SEA are: 1) improving plan or programme the way to minimize its potential negative environmental impact and to maximize positive impacts, and 2) ensuring that possible negative impacts that cannot be avoided are properly managed and offset during implementation of the plan or programme.

In the other words, the goal of SEA is to ensure that developers optimize their plans and programs and make them most beneficial for environment and human health; while, if the full safety cannot be achieved, the potential hazards shall be thoroughly described, and the information shall be provided to the decision-makers, in order to allow them consider expected risks and benefits.

In order to ensure the effectiveness of SEA process, it is essential that the Strategic Documents consider several alternative options for achievement of the identified goals. In this case the SEA allows decision-makers to consider the most environment friendly option.

One more important aspect is that SEA is transparent process based on the public participation. Persons, whose living conditions and health might be influenced by the implementation of plan and programme, shall be entitled to express their interests and have it respectively taken into consideration in the decision-making process. Besides this, society is inexhaustible source of ideas not only for

public authorities, but for the experts as well. Planners and SEA experts may thus benefit from proposals provided by concerned citizens.

1.5.1.2. Benefits of SEA

As we have already mentioned in the beginning of this SEA, in order to be successful, the strategy shall be properly justified and shall enjoy public support.

In general, the following are the main benefits of SEA:

- Environmental assessment and corrections of the plans or programmes at the early stages of planning process will result in much lower costs for the state, then environmental impact assessment for each particular project and improvement of situations caused by improper planning;
- At the plan/programme development stage, it is possible to consider more and wider alternatives, then later, at the implementation stage.
- Pro-actively informs the development of plans and programs;
- Identifies the opportunities and constraints which the environment places on development;
- Provides guidelines to ensure that development is within sustainable limits;
- Has the ability to integrate across areas, regions or sectors;
- Improves the way in which cumulative effects are dealt with in environmental assessments,
- Focuses on the maintenance and enhancement of a chosen level of environmental quality, rather than on minimizing individual impacts.

The fundamental benefit of SEA is that it aims to integrate the concept of sustainability into the formulation of plans and programmes.

1.6. Rationale of the SEA for RUEAP

The concept of sustainable development requires EIA to be expanded beyond projects level. SEA is the assessment of impacts of policies, plans, programmes which are higher than the project level. SEA shall involve impacts identification and analysis of the Electricity Access Roll out Programme (EARP) in order to establish its potential cumulative effects on environment over the long-term.

For effective integration of decision making with sustainable development criteria, SEA has proven an effective tool in restraining environmental degradation at national and global levels.

As mentioned earlier, SEA and project level EIA have a close tiering relationship, similar to tiering from policy to project (the policy poses the general objectives for the planning, plans are the general framework for the formulation of programs and the programmes orient the preparation of concrete development projects). According to this tiering approach, the type and detail of environmental information necessary depends on the relevant needs of decision makers.

In this case of RUEAP one needs general and qualitative environmental information to identify major environmental problems, without dealing with specific impacts. As a continuation of EARP, by applying the screening of PPPs that need SEA the following observations have been made:

(i) RUEAP has to be in compliance with national legislation on the environment.

(ii) RUEAP is made for sectors characterized by likely negative environmental impacts infrastructure project (in this case, energy infrastructures); the effects and of the area likely to be affected are characterized by:

- Probability, duration, frequency and reversibility of the effects.
- Cumulative nature of the effects.
- Risks to human health or the environment (for example, due to accidents);
- Magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected).
- Value and vulnerability of the area likely to be affected due to:
  - special natural characteristics or cultural heritage;
  - exceeded environmental quality standards or limit values; or
  - intensive land-use.
- Effects on areas or landscapes that have a recognized national or international protection status.

(iii) RUEAP activities are related to a big area at the national level; hence basing on the above observations, SEA is required for EARP; proceed to the implementation of SEA under the supervision of REMA.

1.7. International Legislations, Conventions and treaties

1.7.1. Environmental International Conventions

Rwanda is a signatory to a number of conventions on sustainable development and is a member of various bilateral and multilateral organizations. This assessment has identified some of the relevant conventions and treaties that Rwanda ratified or signed. Rwanda has signed and ratified the following environmental international conventions which are to some extent in line with this program and the national policies and laws:

- The international Convention on Biological diversity and its habitat signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 017/01 of 18 March 1995;
- The CARTAGENA protocol on biodiversity to the Convention on Biological biodiversity signed in NAIROBI from May 15, to 26, 2000 and in NEW YORK from June 5, 2000 to June 4, 2001 as authorized to be ratified by Law No 38/2003 of 29 December 2003;

- The United Nations framework Convention on Climate Change, signed in Rio de Janeiro in Brazil on 5 June 1992, as approved by Presidential Order No 021/01 of 30 May 1995;
- The Kyoto Protocol to the framework on climate c h a n g e adopted at Kyoto on March 6, 1998 as authorized to be ratified by Law No 36/2003 of December 2003;
- The RAMSAR International Convention of February 2, 1971 on Wetlands of International importance, especially as water flows habitats as authorized to be ratified by Law No 37/2003 of 29 December 2003;
- The STOCKHOLM Convention on persistent organic pollutants, signed in STOCKHOLM on 22 May 2001, as approved by Presidential Order No 78/01 of 8 July 2002;
- The ROTTERDAM International Convention on the establishment of the international procedures agreed by states on commercial transactions of agricultural pesticides and other poisonous products, signed in ROTTERDAM on 11 September 1998 and in New York from 12 November 1998 to 10 September 1999 as approved by Presidential Order No 28/01 of August 2003 approving the membership of Rwanda;
- The Basel Convention on the Control of Tran boundary Movements of Hazardous wastes and their disposal as adopted at Basel on 22 March 1989, and approved by Presidential Order No 29/01 of 24 August 2003 approving the membership of Rwanda;
- The Montreal International Conventional on Substances that deplete the Ozone layer, signed in London (1990), Copenhagen (1992), Montreal (1997), BEIJING (1999), especially in its article 2 of London amendments and Article 3 of Copenhagen, Montreal and Beijing amendments as approved by Presidential Order no 30/01 of 24 August 2003 related to the membership of Rwanda;
- The Bonn Convention opened for signature on June 23, 1979 on conservation of migratory species of wild animals as authorized to be ratified by Law No 35/2003 of 29 December 2003;
- The Washington agreement of March 3, 1973 on International trade in endangered species of Wild Flora and Fauna as authorized to be ratified by presidential Order No 211 of 25 June 1980.
- EAC Protocol on Environment and Natural Resources Management, 2006. Article 3 of this Protocol states that "it is a protocol of general application and shall apply to all activities, matters and areas of management of the environment and natural resources of the Partner States, including environmental impact assessment and environmental audits";
- The EAC Regional Environment Impact Assessment Guidelines for shared ecosystems, 2005;

1.7.2. International agreements

The following table indicates different agreements, date of signature and date of ratification where Rwanda is a signatory:

Table 4. Environmental assessment related agreements

No	Agreement	Date of signature	Date of ratification
1	Agreement on the biological diversity	10/06/1992	18/03/1995
2	Agreement in Context of the United Nations on the climate changes	10/06/1992	18/08/1998
3	Agreement related to the fight against desertification	10/06/1992	22/10/1998
4	The agreement Vienna on the protection of the ozone layer		6/12/2002
5	Agreement of Ramsar related to humid zones of international importance particularly the wild housing	1971	6/6/2003
6	International Agreement for the trade of	20/10/1980	18/01/1981
	The species in the process of disappearance (IATSPD)		
7	Conservation Agreement of the animals of the migrating wild species (CMS)	23/06/1979	06/06/2003
8	African Agreement on the nature conservation and natural resources	15/09/1968	20/05/1975

These treaties and international agreements are relevant for the protection and the conservation of the environment and in particular the biodiversity in Rwanda together with the mobilization of funds as well at the bilateral and multilateral level.

1.7.3. African Development Bank ISS Structure and Summary

1.7.3.1. Integrated Safeguard Policy Statement

The Bank's Integrated Safeguards Policy Statement sets out the Bank's own commitments to and responsibilities for delivering the Integrated Safeguards System (ISS): to (i) ensure the systematic assessment of environmental and social impacts and risks; (ii) apply the OSs to the entire portfolio of Bank operations; (iii) support clients and countries with technical guidance and practical support in

meeting the requirements; (iv) implement an adaptive and proportionate approach to environmental and social management measures to be agreed with clients as a condition of project financing; (v) ensure that clients engage in meaningful consultations with affected groups; and (vi) respect and promote the protection of vulnerable groups, in a manner appropriate to the African context.

1.7.3.2. Operational Safeguards (OSs)

The OSs are intended to:

- Better integrate considerations of environmental and social impacts into Bank operations to promote sustainability and long-term development in Africa;
- Prevent projects from adversely affecting the environment and local communities or, where prevention is not possible, minimize, mitigate and/or compensate for adverse effects and maximized development benefits;
- Systematically consider the impact of climate change on the sustainability of investment projects and the contribution of projects to global greenhouse gas emissions;
- Delineate the roles and responsibilities of the Bank and its borrowers or clients in implementing projects, achieving sustainable outcomes, and promoting local participation; and
- Assist regional member countries and borrowers/clients in strengthening their own safeguards systems and their capacity to manage environmental and social risks.

Considering the program characteristics and the program area, operational safeguards triggered by the RUEAP are the following:

OS1: Environmental and Social Assessment: The overarching safeguards governs the process of determining a project's environmental and social category and the resulting environmental and social assessment requirements: the scope of application; categorization; use of a SESA and ESIA, where appropriate; Environmental and Social Management Plans; climate change vulnerability assessment; public consultation; community impacts; appraisal and treatment of vulnerable groups; and grievance procedures. It updates and consolidates the policy commitments set out in the Bank's policy on the environment.

OS 1 is relevant for the program as it governed the way the process was conducted with consideration first of project categorization, preparation of Environmental social Management Pan, the way issues were addressed including climate change vulnerability, public consultation, community impacts…etc

OS 2: Involuntary Resettlement: Land Acquisition and Compensation. This safeguard consolidates the policy commitments and requirements set out in the Bank's policy on involuntary resettlement, and it incorporates refinements designed to improve the operational effectiveness of those requirements. It embraces comprehensive and forward-looking notions of livelihood and assets,

accounting for their social, cultural, and economic dimensions. It also adopts a definition of community and common property that emphasizes the need to maintain social cohesion, community structures, and the social interlinkages that common property provides.

OS 3: Biodiversity and Ecosystem Services. The overarching objective of this safeguard is to conserve biological diversity and promote the sustainable use of natural resources. It translates into OS requirements the Bank's commitments in its policy on integrated water resources management and the UN Convention on Biological Diversity. The safeguard reflects the importance of biodiversity on the African continent and the value of key ecosystems to the population, emphasizing the need to "respect, conserve and maintain the knowledge, innovations and practices of indigenous and local communities...and to protect and encourage customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or sustainable use requirements.

Power distribution lines construction are always associated with vegetation clearing, cutting of trees. This should be appropriately mitigated and monitored for conservation of ecosystem services and sustainable use of resources, reason why the OS 3 is relevant to this project.

OS 4: Pollution Prevention and Control, Greenhouse Gases, Hazardous Materials and Resource Efficiency. This safeguard covers the range of impacts of pollution, waste, and hazardous materials for which there are agreed international conventions and comprehensive industry-specific standards that other multilateral development banks follow. It also introduces vulnerability analysis and monitoring of greenhouse gas emissions levels and provides a detailed analysis of the possible reduction or compensatory measures framework. This operational safeguard is not too relevant although the emissions through different phases could affect the greenhouse gases.

OS 5: Labour Conditions, Health and Safety. This safeguard establishes the Bank's requirements for its borrowers or clients concerning workers' conditions, rights and protection from abuse or exploitation. It covers working conditions, workers' organizations, occupational health and safety, and avoidance of child or forced labour.

Labour conditions, health and safety are very interlinked and constitute important elements to be monitored during implementation of this project.

1.7.3.3. Project categorization

Category 1: projects are likely to induce significant and/or irreversible adverse environmental and/or social impacts, or to significantly affect environmental or social components that the Bank or the borrowing country considers sensitive

Category 2: Project operations likely to cause less adverse environmental and social impacts than Category 1 – Category 2 projects are likely to have detrimental site-specific environmental and/or social impacts that are less adverse than those of Category 1 projects. Likely impacts are few in number, site-specific, largely reversible, and readily minimized by applying appropriate management and mitigation measures or incorporating internationally recognized design criteria and standards.

Category 3: Project operations with negligible adverse environmental and social risks – Category 3 projects do not directly or indirectly affect the environment adversely and are unlikely to induce adverse social impacts. They do not require an environmental and social assessment.

Category 4: projects involve Bank lending to financial intermediaries that on-lend or invest in subprojects that may produce adverse environmental and social impacts.

Financial intermediary subprojects equivalent to Category 1 and Category 2 are subject to the relevant OS requirements, as if they were directly financed Category 1 or Category 2 projects

Given the preliminary analysis of the program impacts that are not adverse and significant in nature and readily minimized by appropriate mitigation measures, this project falls in the category 2 considering the AfDB Integrated Safeguards System.

1.7.3.4. Incorporating climate change into development efforts

The interaction of development interventions with the physical and ecological environment may result in such unintended consequences as loss or degradation of natural and cultural resources and assets and biodiversity; unsustainable production and consumption, in particular, of energy; and increased vulnerability to climate change and climate variability. Therefore, the Bank requires an assessment of vulnerability to climate change as part of the environmental and social assessment process for its public and private sector operations; any mitigating measures that result from that assessment are included in the operation with measures that result from the larger environmental and social assessment itself.

1.7.4. World Bank Environmental and Social Framework (ESF)

The EDCL Team has reviewed the World Bank Environmental and Social Framework (ESF) and its associated standards applicable to RUEAP and demonstrated how these standards will be complied with considering the local context. Ten ESSs on Access to Information represent the framework of safeguard mechanisms applied by the WB for the sake of interests of beneficiaries, clients, stakeholders and that of the Bank. Applying these standards allows avoiding adverse impacts on the environment and people’s lives, minimizing and mitigating potential unfavorable environmental and social project and risks and impacts.

These WB standards are:

- Environmental and Social Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Environmental and Social Standard 2: Labour and Working Condition
- Environmental and Social Standard 3: Resource Efficiency and Pollution Prevention and Management
- Environmental and Social Standard 4: Community Health and Safety
- Environmental and Social Standard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- Environmental and Social Standard 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities;
- Environmental and Social Standard 8: Cultural Heritage
- Environmental and Social Standard 9: Financial Intermediaries
- Environmental and Social Standard 10: Stakeholder Engagement and Information Disclosure.

This Program will trigger ESS1, ESS2, ESS3, ESS4, ESS5, ESS6, ESS8, ESS9 and ESS10

1.7.4.1. Summary of anticipated Environmental and Social Risks and Associated Mitigation Measures by each triggered WB ESS

ESS1: Assessment and Management of Environmental and Social Risks and Impacts

The potential E&S risks and impacts are related to construction of power distributions lines, rehabilitation of the old Ntaruka HPP, and distribution of SHS and clean cooking solutions. The major risks and impacts include significant OHS issues including management of oils and lubricants for turbines, transformers, and support infrastructures, and management of lead/acid batteries. There are also potential risks and impacts on biodiversity, natural resources, and/or cultural heritage and related community health and safety risks because of civil works related to construction and rehabilitation. The TA component comprising policy and regulatory improvement may have direct and/or indirect E&S risks and impacts. The project has prepared ESF instruments (ESMF, RPF, SEP, LMP, and ESCP) to manage these risks and impacts. In addition, when project sites are identified, site-specific ESSs instruments (ESMPs, RAP as required) for subprojects will be prepared, implemented, and monitored according to the ESF instruments during the project implementation. Each ESMP will incorporate a solid waste management plan, an LMP, and/or an OHS plan as required.

ESS2: Labor and Working Conditions

Anticipated key labor risks and impacts are mainly associated with the planned construction works and investments related to improving grid stability and operation efficiency, including Ntaruka HPP rehabilitation. There may be risks of child labor associated with the use of local labor. Due to the discrete nature of these activities, labor camps and influx are not anticipated. To ensure health and safety of workers, a Health, Safety, and Environmental Plan in line with Good International Industry Practice and EHS Guideline for Electric Power Transmission and Distribution will be prepared as part of each ESIA/ESMP. Also, the project has prepared LMPs that set out the way in which project workers will be managed including a Code of Conduct to mitigate GBV-related risks according to the national laws and the World Bank ESS2 requirements.

ESS3: Resource Efficiency and Pollution Prevention and Management

Potential risks and impacts include (a) pollution in relation to management of oils and lubricants for turbines and transformers, solar batteries and panels, and construction/rehabilitation activities and (b) environmental damage due to civil works and related extraction of excess sands and gravels), waste, and domestic waste. Also, the TA part, including the policy and regulatory development/improvement activity may have an impact on resource efficiency and pollution management. Conversely, the project will have significant positive impacts to improve access to energy and efficiency of energy services delivery. The off-grid solar power and clean cooking component will also contribute to Rwanda's priority mitigation actions, GHG emission reduction, and the reduction of deforestation and forest degradation and indoor air pollution. The project has prepared the ESMF, SEP, and ESCP to manage the risks and impacts, which will be further detailed in site-specific ESIAs/ESMPs for subprojects during the project implementation.

ESS4: Community Health and Safety

Anticipated community health and safety risks are related to increase in crime, prostitution, GBV, and other related social risks. The project could also contribute to potential structural safety risks such as electric shocks during connections, and road accidents due to increased number of vehicles during construction/rehabilitation. There will be also potential risks and impacts to community health and safety related to generation of wastes, noise, and dust related to construction/rehabilitation works; and transportation and operation of solar batteries (for example, fire and explosion risks); and recycle/disposal of used solar batteries containing hazardous waste and solar panels. The project has prepared the ESMF (comprising guidelines for management of solar batteries and panels, application of World Bank Group EHS Guidelines for Electric Power Transmission and Distribution, and Electromagnetic Interference and Electrocution), RPF, SEP, and ESCP to manage these risks and

impacts, which will be detailed in site-specific ESIAs/ESMPs for subprojects during the project implementation.

ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

The project will involve civil works in on-grid connection for a portion of the currently unelectrified households across different parts of the country. These activities will involve expropriation and restriction on land use. Resettlement impacts are mainly expected to be temporary and largely economical. No voluntary land donation is anticipated under this project. The project has prepared an RPF that gives guidance to the implementing agencies during project implementation on how to deal with resettlement and expropriation issues. In addition to the RPF, the client has prepared an ESMF, SEP, and ESCP (comprising specific gendered social assessment). The preparation of Ntaruka's E&S audit has identified legacy risks and prepared remedial actions for implementation.

ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

The proposed investments related to construction of power distribution lines and rehabilitation of Ntaruka HPP could have potential risks and impacts on biodiversity conservation and sustainable management of living natural resources. The Ntaruka HPP rehabilitation could have potential impacts on aquatic biodiversity/living natural resources and ecological flows. The TA related to policy and regulatory improvement may have direct/indirect impacts on ESS6. Also, the clean cooking solutions may have impacts on forest and other resources if biomass sources and other supply chains are not properly identified and managed in a sustainable manner as per the GoR's laws and World Bank ESSs. The project has prepared an ESMF, SEP, and ESCP to manage these risks and impacts, which will be detailed in site-specific ESIAs/ESMPs for subprojects during the project implementation. The E&S audit for Ntaruka HPP rehabilitation is also under way with an objective to identify legacy risks and propose feasible remedial measures for implementation.

ESS8: Cultural Heritage

Although no impacts to cultural heritage are anticipated, the project has included 'chance finds procedure' in the ESMF if previously unknown cultural heritage is encountered during the project implementation stage, which will be also included in the site-specific ESIAs/ESMPs for subprojects and in all contracts relating to construction or rehabilitation works.

ESS10: Stakeholder Engagement and Information Disclosure

The project has prepared an SEP that identifies the key stakeholders and the approaches to be used to consult with them and ensure their participation throughout the project cycle. It contains a summary of

the consultations held during the preparation and a comprehensive list of stakeholders. It also sets clear procedure for establishing a project-specific GRM proportionate to the potential E&S risks and impacts of the program and project.

1.8. Approach and methodology

In general, the Environmentalists started the Strategic Environmental Assessment (SEA) for RUEAP as a continuation of Electricity Access Rollout Program (EARP) with reviewing the relevant information on the RUEAP Program area, review of the existing SEA for EARP, review of existing Program documents, review of the relevant guidelines, policies, regulatory and institutional framework related to SEA in the context of Rwanda Universal Access Program. Upon reviewing the existing information on this program area, a detailed analysis of the area was carried out through site visits, interviews with EARP program staff, REG branch staff, NGOs, local community, and local authority. The aim of the site visit was to assess the implementation of the SEA of EARP recommendations and assess the surrounding environment (physical and human) of the proposed RUEAP program,

After collecting the data from the site visits, an analysis was done to assess activities under the proposed program direct, indirect, and cumulative impacts. These impacts were then weighed on their significance based on whether they are direct or indirect, their frequency, whether they were reversible or irreversible, time of occurrence, among others. It is those impact activities that were considered in elaborating the updated SEA recommendations for RUEAP as an instrument which will lead the implementation of the program by updating the key environmental impacts, mitigation measures, alternatives with reference to the results from assessment report of EARP and key environmental issues addressed by SEA recommendations in energy sector especially ecosystem degradation during energy installation and climate change.

Table 5.Methodological Compatibility matrix according to specific objectives

Objective	Methods and Techniques	Expected results
Identify all relevant potential environmental risks and social concerns that may arise as a result of the program and the program projects that it will support	Field visits, observation, mapping, pictures, interviews with key stakeholders, review of World Bank and National Environmental and Social Standards documents, SEA reports and WBG/AFDB Environmental, Health, and Safety Guidelines (EHSGs)	- Potential environmental impacts identified - Potential social impacts identified - Compatibility and Conflicts of the project and social and natural environment identified.
Specify appropriate roles	Review of relevant national documents	Identification and analysis of Role

Objective	Methods and Techniques	Expected results
and responsibilities of involved stakeholders in the implementation of the SEA	on policy, law, institutional and regulatory framework governing SEA/ESIA; Interviews with key stakeholders	and responsibilities of government organisations in the implementation of SEA Identification and analysis of PIU capacity, Administrative Districts, and organisation arrangement to implement SEA
Develop subproject review procedures as well forms, guidance and checklists to apply technical input for the subprojects	Develop a guidance document for procedures, forms, checklists to apply technical input for the subprojects	Guidance document for procedures, forms, checklists for subprojects.
Develop a screening procedure to identify the environmental and social issues associated with the subprojects	Review of World bank and national guidelines and procedures for screening the projects to not/undergo Environment assessment.	Screening criteria for environmental and social impacts of subprojects. Screening criteria include trading centres without electricity connections, environmental baseline conditions of these commercial centres and other populated areas without power supply and the social economic environment within these administrative districts. Subprojects are classified in High, Substantial, Moderate, and low risk.
Prepare an ESMP that can be applied to manage the identified environmental and social risks and set out the monitoring plan that will be undertaken to confirm correct ESMP delivery	Prepare the ESMP in compliance or conformity with World Bank and Rwanda social and environment ESMP requirements.	ESMP with potential social and environmental positive and negative impacts and their enhancement measures
Develop the ToR for	Prepare the ToR, with consideration of	ToR for appropriate safeguards

Objective	Methods and Techniques	Expected results
appropriate safeguards instruments (such as ESIAs) as appropriate and required	World Bank and Rwanda social and environment safeguard instruments	instruments
Review and make an assessment of the capacity of the national project implementation entities, to screen subprojects and monitor the implementation of the project ESMP; and make proposals for capacity enhancement as appropriate	Review and assessment of capacity, gaps and capacity need for the national project implementation entities (REG-EDCL PIU and identified Administrative Districts) to screen subprojects and monitor the implementation of the project ESMP. The assessment will be done through consultation with key staff in those entities	Organizational and institutional framework for implementing ESMP Role and responsibility of organisations Key staff to implement ESMP Gaps and capacity needs
Provide estimates for the budget required for project ESMP implementation	Costing of activities required for the implementation of ESMP. The costing will cover cost associated with rehabilitation of environmental and social damages and staff allowance to monitor the ESMP implementation	- Estimation of ESMP budget
Define appropriate environmental and social standards performance indicators	Propose a set of indicators to monitor the environmental and social standards performance. Those indicators should be SMART (specific, measurable, achievable, realistic and time bound).	A set of SMART Indicators to monitor the environmental and social standards performance
Provide practical information resources for implementing the SEA	Provide practical information resources for implementing the SEA	Guidelines for training and capacity building Guideline for preparing site specific environmental Management and rapid Environmental assessment checklists

2. LEGISLATIVE, POLICY AND INSTITUTIONAL FRAMEWORK

2.2. Introduction

Under this chapter, the EDCL team undertaken time to review national and international legislative and policies which will guide the implementation of the program and taken time to integrate the policies and institutions involved in this program into the practice during preparation of the associated environmental and social safeguards instruments.

This chapter reviews also the relevant legal and institutional arrangements that would hinder or guide the development of the RUEAP program in line with national and international laws. Being a signatory to various international conventions and laws, it is important that Rwanda's national Policies, programs and projects are in line with these laws, and so some of the relevant international conventions are reviewed in this chapter.

Vision of the energy sector is to contribute effectively to the growth of the national economy and thereby improve the standard of living for the entire nation in a sustainable and environmentally sound manner.

The energy policy vision contributes directly to achieving Rwanda's Vision 2050, medium and long-term goals. It also contributes to promoting Rwanda's achievement of the Sustainable Development Goals (SDGs) especially poverty reduction, gender empowerment and sustainable growth. The mission of the energy sector is to create conditions for the provision of sufficient, safe, reliable, efficient, cost- effective and environmentally appropriate energy services to households and to all economic sectors on a sustainable basis.

2.3. National Legislations

2.3.1. Legislative framework

The Rwandan regulatory framework for environmental management is based on the Law on Environment (2018), which establishes a comprehensive legal framework to regulate the protection and management of the environment in Rwanda.

In addition to general provisions, the law regulates the field of the natural environment (soil, subsoil, water resources, biodiversity, and atmosphere), the human environment, the obligations of the State and local authorities, community participation, incentives, control, monitoring and inspection as well as preventive and repressive measures.

In addition to this law, the environmental legal framework consists of a series of laws, decrees and orders including Law n° 70/2013 of 02/09/2013 Governing Biodiversity in Rwanda, Expropriation Law N° 32/2015 of 11/06/2015, Law n°21/2011 of 23/06/2011 governing Electricity in Rwanda, Law

no 47bis/2013 of 28/06/2013 determining the management and utilization of forests in Rwanda among others.

Table 6. National Legislative Framework relevant to the RUEAP Program

The Constitution	Relevance	Compliance aspects
Constitution of the Republic of Rwanda of 2003 revised in December 2015	It should be noted at the outset that, all laws and regulations in Rwanda must be aligned with principles in the Constitution. The Rwandan Constitution was approved in a national referendum and adopted in Parliament on 25th December 2015. It defines the principles and overall legal framework for the management of the water, energy, land and agricultural domains.	This study assesses the project in a manner that signifies the effect it will have on both the natural and social environment and to best ensure the protection of sensitive environmental resources and social aspects.
Law on Environment No 48/2018 of 13/08/2018	The most relevant legislation for this project is the Law on Environmental Protection, conservation and Management. This is the law that regulates the protection of environment in Rwanda. The law sets out the general legal framework for environmental protection and management in Rwanda. It also constitutes environment as one of the priority concerns of the Government of Rwanda. Under the fundamental principle on national environmental protection policy develops national strategies, plans and programs, aiming at ensuring the conservation and use of sustainable environmental resources. The Relevance of this law lies in the fact that it empowers stakeholders to take legal actions against the developer (REG) for any negative environmental and social consequences that may result from the implementation of the current project.	This study complies with the requirements for impact assessment and the consideration of the required environmental and social criteria.

The Constitution	Relevance	Compliance aspects
General guidelines and Procedures for SEA, 2010	Rwanda Environment Management Authority (REMA) has developed guidelines for SEA to complement the existing Environmental Impact Assessment (EIA) guidelines for Rwanda. The goal is to expand the application of environmental assessment principles and practices to the formulation and implementation of development policies, plans, and programs (PPPs).	These policies, plans, and programs (The case of Rwanda Universal Energy Access Program - RUEAP) involve actions to promote economic development and poverty reduction that potentially will have significant effects on the environment.
Expropriation law N° 32/2015 of 11/06/2015	The law determines the procedures relating to expropriation in the public interest. Only Government order expropriation in the public interest. Article 4 stipulates that: "Every project, at any level, which intends to carry out acts of expropriation in the public interest, shall budget for valuation of the property of the person to be expropriated and for fair compensation".	An SEA study was undertaken indicating that the project does not degrade the environment and Such land or place suits the program projects.
Law governing biodiversity in Rwanda (N° 70/2013 of 02/09/2013)	Article 9 of the law governing biodiversity in Rwanda on biodiversity management plan states that: "The control, containing and eradication of an invasive species shall be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs. Any action taken to control, contain and eradicate an invasive species shall be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment".	This project is not located in any other Protected Areas. Yet the study considerers flora and fauna resources and addresses how best to protect such remaining resources

The Constitution	Relevance	Compliance aspects
	Article 34 on Impact assessment and expert evidence stipulates that before issuing a permit, the issuing authority shall, in writing, require the applicant to submit an independent environmental impact assessment or expert evidence.	
Law governing electricity in Rwanda as modified to date (No 52/2018 of 13/08/2018 – modifying law No 21/2011 of 23/06/2011)	This Law governs activities of electric power trading within or outside the national territory of the Republic of Rwanda. This law establishes a system of authorizing licenses for transmission, distribution and Sale of electric power (Art. 5). The license is obtainable after a due filled application and payment of a license fee as determined by the regulatory agency. Art. 8 under this law stipulates that the regulatory agency ensures prior to the issuance of a license, that the concerned individual or institution respect the rights of users and environment protection. Under this law, there is an establishment of Universal Access Fund whose main purpose is to optimize access to electricity in all areas of the country through cost effective means and minimized support. A Presidential Order determines the functioning of the Universal Access Fund. With regards to the Right of Way, Art 47 provides for an authorization to operate in a public or a private domain to be granted for electricity transmission or distribution license holder. However, the Art 48 provides for an expropriation of right of way for public interest. The right of way is necessary to the operators in	This program makes provision for the expansion of rural distribution lines to improve access to electricity. And the SEA was prepared to safeguard the rights of users and the environment.

The Constitution	Relevance	Compliance aspects
	production, transmission, distribution and supply of electricity. It shall be exercised in accordance with the standards set by the regulatory agency. Expropriation shall be conducted in accordance with the Law governing expropriation for public interest. In case of issues arising from interference with property, Article 49 provides for their settlement and stipulates that complaints from license holders regarding interference with their property, including right of way, shall be brought to the regulatory agency for handling, and when deemed necessary, to the courts in accordance with laws.	
Law governing land in Rwanda (N° 43/2013 OF 16/06/2013)	Land in Rwanda has emerged as one of the most pressing issues facing the government of Rwanda and Rwandan citizens, heralding a need for broad information sharing about land matters coupled with solid research on land issues that can feed an adaptive policy environment. Article 34 stipulates that the landowner shall enjoy full rights to exploit his/her land in accordance with the provisions of this Law and other laws. The State recognizes the right to freely own land and shall protect the landowner from being dispossessed of the land whether totally or partially, except in case of expropriation due to public interest.	This SEA considers the ownership and use of land, specifically taking note of land tenure and related compensation matters
Law determining the management and utilization of forests in Rwanda	The proposed lines alignments will clear vegetation and trees. Construction activities entail clearing of trees to pave way for power line erection activities.	EDCL has the duty to conserve and protect forests and consultations with authorities shall be held to make sure there are

The Constitution	Relevance	Compliance aspects
(N°47bis/2013 of 28/06/2013)		no prohibited activities that may negatively affect proper forest management.
Law n°49/2018 of 13/08/2018 determining the use and management of Water Resources in Rwanda.	Law regulating the use, conservation, protection, and management of water resources. It defines the rules to the use, conservation, protection and management of water resources.	The program will be implemented in context that avoids contamination of water resources and over use or water during the project different phases.

2.4. Policy framework

Table 7. Key national policies relevant to the RUEAP program

Policy	Relevance	Alignment to the policy
The Vision 2050 and National Strategy for Transformation (NST1 2017-2024)	The National Strategy for Transformation has among other outcomes, the "increased access to basic infrastructure (water, sanitation, electricity, ICT, Shelter achieved)". Vision 2050 and NST1 shall enable the establishment of a viable infrastructure, which will be capable of addressing its current and future shortcomings and shall contribute to significant growth and economic development of Rwanda, in order to achieve the development objectives that are set out in both policy documents for the benefit of the Rwandan people.	The RUEAP is a vital program that will improve on the chances of realization of the Vision 2050 (through the NST1), with emphasis on the distribution of electricity to the community, that will in turn boost the process of industrializing the country, diversifying economic activities in rural areas and creating employment
The National Environment and	This Environment and Climate Change Policy reaffirms our commitment to address	Energy is mentioned as one of those sectors that the

Policy	Relevance	Alignment to the policy
Climate Change Policy (2019)	climate change and our resolve to lessen the potential hardships that climate change may pose to the sustainable development of our country. The policy, therefore, seeks to provide strategic direction on environment and climate change in Rwanda, bearing in mind its linkages with our socio-economic development.	policy takes a key interest in. The policy is to provide guidance and direction in addressing the problem of climate change, while enabling the country to adapt and mitigate the effects of climate change. This SEA provides for an assessment of the impacts of the project measured against criteria for sustainability, including health, quality of life, long-term sustainable socioeconomic development, sound environmental management and optimal use of natural resources. The implementation of the project will result in reduced vulnerability and increased livelihood potential
Energy Policy (2015)	The purpose of the Energy Policy is to respond to the Rwandan population's energy challenges and needs for economic and social development within a viable and sustainable environmental framework.	This study recognizes that the generation, provision and distribution of energy in Rwanda is a key factor for economic growth and must be implemented in a sustainable manner, avoiding negative impacts as far as is possible, and where not possible reducing such impacts through effective mitigation. The policy

Policy	Relevance	Alignment to the policy
		recognises the need to mitigate both physical, social and environmental aspects.
The Rwanda Rural Electrification Strategy (2016)	This Strategy was developed with the objective of ensuring that Rwanda's households have access to electricity through the most cost-effective means by developing programmes that will facilitate both the end users to access less costly technologies and increase private sector participation in the provision of these solutions	The RUEAP program is to be implemented in the context of improving access to electricity and accelerate economic development.
The Energy Sector Strategic Plan (2018/19 – 2023/24)	The ESSP will ensure effective delivery of the targets for the energy sector as set out under the National Strategy for Transformation (NST-1) and guide the implementation of the National Energy Policy (NEP). The ESSP thus functions as a plan that serves to translate policy directives and principles into concrete measures necessary to reach medium-term targets, reflecting current resource constraints and risk and uncertainties. This ESSP reviews the current status of the sector and outlines high-level target objectives (HLTOs). These have been determined on the basis of political ambitions and rigorous technical analysis. The HLTOs apply to all subsectors and serve to translate the policy goals laid out in the NEP and NST-1 into tangible outcome indicators achievable by the end of the NST-1 period (2018/19 to 2023/24).	This SEA recognizes that the generation, provision and distribution of energy in Rwanda is a key factor for economic growth and must be implemented in a sustainable manner, avoiding negative impacts as far as is possible, and where not possible reducing such impacts through effective mitigation. The policy recognises the need to mitigate both physical, social and environmental aspects.
National Policy	EIA process operates within and towards	The SEA process has

Policy	Relevance	Alignment to the policy
on EIA (2003)	the global concept of sustainable development. It is intended to achieve benchmarks and embrace commitment to international environmental conventions agreed upon in Ramsar (1971), Vienna (1985), Montreal (1990), Rio (1992), Kyoto (1998), and Stockholm (2001) to all of which, Rwanda is a party. EIA also provides a framework for promotion of efficient decision-making in project approval. Lastly, EIA enables implementation of environmental safeguards to mitigate significant negative impacts, avoid ecological damage and large-scale irreversible loss of natural resource.	confirmed the environmental sustainability of the project and was undertaken in the context of compliance of existing laws and international legislations. Appropriate measures were recommended to mitigate the possible adverse impacts.
Biodiversity Policy (2004)	This Policy recognizes that that Rwanda's viability is dependent on the conservation of its biological resources as these resources contribute significantly to livelihoods, food sovereignty, health, the environment, cultural diversity and the economy.	A system to conserve protected areas is proposed by the study. Degraded ecosystems if any will be restored and recovery of threatened systems will be promoted through the implementation of the project. All potential sources of impacts on biodiversity were identified through the environmental assessment and appropriate mitigation measures recommended.
The National Wetlands policy Management Policy (2015)	Sanctions are provided for the ones who: Clears or drains a wetland without a written authorization Erects, constructs, places, alters, displaces or destroys any structure	This SEA identifies environmentally sensitive wetlands that will be impacted during construction

Policy	Relevance	Alignment to the policy
	that is in, under or on a wetland; Disturbs a wetland by practicing boring or by excavating a tunnel in a way that is likely to have negative effects on a wetland; Destroys, damages or disturbs any wetland in a way that is likely to have negative effects on plants, animals or their habitats. Introduces any exotic plant or animal species that is likely to harm wetlands. Draws the soil from the wetland or practices bushfire in the wetland; Omits, neglects or refuses to protect shores against environmental degradation; Pursues an activity subject to suspension or prohibition.	and details how these impacts need to be optimally managed to protect wetland resources.
National Water Policy	This policy must ensure the sustainable management and development of water resources in a coordinated and integrated manner to secure and provide water of an acceptable quality and quantity for all social and economic needs.	This SEA recognizes that the protection of water resources through the prevention of water pollution from erosion, siltation, oil spills, creosote and sanitary
The National Gender Policy, 2004	The general purpose of the National Gender Policy consists in clearly defining the mainstreaming process for gender related issues into all development sectors, to promote gender equality and equity in Rwanda	This SEA focuses on and emphasizes the importance of considering gender aspects in the design and implementation of the project.

2.5. Institutional Framework

The country's institutional architecture for promoting environmental sustainability has also improved. The establishment of REMA in 2006 provided the country with the institutional machinery for supporting the implementation of the environmental policies and laws. REMA has helped to ensure the engagement of the population in development of Rwanda's environmental policies and laws. Globally, poor people who are largely dependent on natural resources continue to have precarious livelihoods.

Table 8. Key national institutions relevant to the RUEAP

Name	Mandate	Responsibility in the Program
Ministry of Infrastructure (MININFRA)	The mission and purpose of the MININFRA include among others to: • Initiate, develop and maintain sustainable power generation facilities to supply clean, cost-effective and uninterrupted energy for the country and the region. • To initiate programs aimed at increasing access to affordable energy, water and sanitation, and transport infrastructure and related services for the population. • To ensure that the development of policies and strategies concerning national infrastructure are in line with regional integration and harmonization policies with the EAC. • To supervise the implementation of quality standards and norms, cost effectiveness, response to environmental sustainability, safety and cross-cutting issues in infrastructure development. • To supervise activities meant to elaborate, monitor and assess the implementation of national policies and programs on matters relating to habitat and urbanism, transport, energy, water and sanitation.	Compliance with Energy related policies and regulations, capacity building, resource mobilization; orient and supervise the functioning and management of public institutions, agencies and companies under the Ministry", including the Rwanda Energy Group (REG) and its subsidiaries (EDCL&EUCL)
Ministry of Finance and Economic Planning(MINECOFIN)	**MINECOFIN** is responsible for Macroeconomic policy instruments, resource mobilization, and coordination of development partners and allocation of budgets to different Ministries and sectors.	MINECOFIN is charged with overseeing and advising on the formation of various Funds to implement the TUEAP

Name	Mandate	Responsibility in the Program
	It is also concerned with mainstreaming natural resources and environment concerns in the budgetary	
Ministry of Environment (MoE)	The MoE is responsible for: • The development and land use; • The development of environmental policies and procedures; • The protection of natural resources (water, land, flora and fauna) • The environmental legislation, •The biodiversity and other environmental aspects.	To oversee the environmental protection and compliance with the laws environmental related
Rwanda Environment Management Authority (REMA)	Under the supervision of the Ministry of Environment, REMA is in charge with the management of environment throughout Rwanda. The functions of REMA include (1) to advise the Government on legislative and other measures for the management of the environment or the implementation of relevant international conventions, treaties and agreements in the field of environment, as the case may deem necessary. (2) to take stock and conduct comprehensive environmental audits and investigations, to prepare and publish biannual reports on the state of natural resources in Rwanda. REMA as the Environmental Authority has the mandate to conduct environmental monitoring to make sure the recommendations of the Environmental	REMA has a cross-sectoral mandate to ensure that proper environmental safeguards are observed in the planning and execution of all development projects; REMA carries out its own monitoring largely through Inspectors and District Environmental Officers

Name	Mandate	Responsibility in the Program
	studies and proposed mitigation measures are implemented.	
Rwanda Standards Board (RSB)	It is a public institution established by Rwanda Government Legislation N° 50/2013 of 28/06/2013 determining the mission, organization and functioning of the Rwanda Standards Board to undertake all activities pertaining to the development of Standards, Conformity Assessment and Meteorology services in the country. It is the only body with powers to define and possess national standards. Public services and public or private firms must present their standards to RSB for adoption at national level. RSB publishes standards documents that establish specifications and procedures designed to maximize the reliability of the materials, products, methods, and/or services people use every day. Standards address a range of issues, including but not limited to various processes/systems to help maximize product functionality and compatibility, facilitate interoperability and support consumer safety, trade promotion and public health.	Ensuring the project's works, materials, equipment etc. are in conformity with established standards for electricity transmission
Rwanda Development Board (RDB)	RDB is a government department that integrates all government agencies responsible for the attraction, retention and facilitation of investments in the national economy. RDB was established in 2009 to coordinate, spur and promote national	Issuance of environmental compliance Certificate

Name	Mandate	Responsibility in the Program
	economic development RDB deals also with issuing of EIA Certificate for investment projects	
Rwanda Energy Group Ltd (REG)	REG through: - EDCL was mandated to: a) Increase investment in development of new energy generation projects in a timely and cost-efficient manner to expand supply in line with EDPRS and other national targets; b) Develop appropriate transmission infrastructure to evacuate new plants and deliver energy to relevant distribution nodes; **c)** Plan and execute energy access projects to meet the national access targets. - EUCL the Energy Utility Corporation Limited (EUCL) was incorporated to have devoted attention in providing energy utility services in the Country through operations and maintenance of existing generation plants, transmission and distribution Network and retail of electricity to end-user.	REG is the overall Authority responsible for the implementation of the RUEAP program
Administrative Districts (Local Government entities)	The Ministry of Local Government has six programs and directorates that are mandated to implement the ministry's core mission of ensuring the coordination of good governance and high-quality territorial administration programs to promote economic, social and political development throughout the nation.	The proposed program falls within jurisdiction of several Districts across the country. The relevant Technical District personnel directly involved with the project may include the Vice

Name	Mandate	Responsibility in the Program
	The districts as defined local government entities, responsible for the provision of Access to basic services, including roads, electricity, water, sanitation, and solid waste management. Local governments have financial autonomy (fiscal decentralization); are in charge of implementing local projects; are encouraged to contract private operators for infrastructure O&M; prepare and implement consolidated district development Plans.	Mayor for Economic Development, Vice Mayor Social Affairs, Infrastructure OSC, District Environmental Officer, District Planner, Community Development Officer, Health Officer, Forestry Sector Land Manager, District and Sector Agronomists, District Water and Sanitation Officer and District Electrical Engineer.
Local community (Environmental clubs)	The purpose of the Community Development is to improve the climate for community development through Government support for communities and to ensure that Government decisions, activities and outcomes are compatible with the principles of sustainable community development.	The community Environmental Clubs will play key role in implementing this SEA by being consulted for empowerment, human rights, inclusion, social justice, self-determination and collective action.

3. DESCRIPTION OF ELECTRICITY ACCESS ROLLOUT PROGRAMME

3.2. Introduction

The EARP process was kicked off during the National Electricity Access Program Donor Roundtable which was held in Kigali on the 23rd March 2009 during which the development partners re-affirmed the support for the GoR's efforts to advance mainstreaming the sector wide approach (SWAP) in the energy sector, with the overall objective of rapid growth and poverty reduction.

Under this objective, there is a need of creating jobs in the rural areas by providing more access to electricity. The SWAP framework and process is a means of steering away from business as usual modalities of fragmented aid delivery to the energy sector, project-by-project; towards a sector development perspective led by Government and shaped by the basic tenets of donor engagement consistent with the Paris declaration on aid effectiveness. It is anchored in national priorities, alignment, harmonization, and joint accountability and managing for results.

In light of the high and sustained investments of the Program and financing requirements for technical assistance and implementation, the Partners agreed that every effort should be advanced to seek ways and means of lowering unit connection costs over the program period via the mainstreaming of established good practices in choice of equipment and materials, network design and construction methods and practices.

The Partners and sector institutions also endorsed the proposed 80-10-10 shared financing policy: GoR and Development Partners (80%), EWSA (10%), and Customers (10%), for meeting the grid investment requirements of the five-year Program. To enhance sustainability of the Program over the longer term, the share financed by development partners would be expected to shrink coupled with a corresponding increase in the Rwandan share of program financing.

For effective and timely implementation of the annual grid connection targets called for under the Access program and sustainability thereof, it was found essential for EWSA to operate as a commercial enterprise and be accorded a sufficient level of operational autonomy.

The Partners and sector institutions expressed strong support for the five-year Program and together pledged contributions totaling US$ 357.3 million, representing 95 % of the financing for technical assistance and investment requirements of the US$ 377 million National Access Program. Irrespective of the financing mechanism(s) utilized, where practical and in accordance with the policy of their government or organization, the Development Partners adopted the partnership principles consistent with the Paris declaration on aid effectiveness as outlined in the MOU signed by the Partners on July 3, 2008.

The nature of the EARP activities gave rise to environmental and social concerns during the preparation and implementation of the project as the program activities are located throughout Rwanda. However, a spatial coverage of the program may emerge during the programme preparation for the planning and construction of stations, substations, the transmission, and distribution network.

Therefore, in compliance with Organic Law on Environmental Protection of Rwanda and the World Bank's Safeguards Policies, the GoR, represented by EWSA prepared a Strategic Environmental Assessment (SEA) with the aim of establishing a mechanism to determine and assess future potential environmental and social impacts of the EARP, and then set out mitigation, monitoring and institutional measures to be taken during implementation and operations of the proposed investments/activities, to eliminate their adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The programme has been implementing its activities basing on the requirements and recommendations of the SEA.

Due to variation of programme activities locations and timing, Environmental Assessments (Environmental Management Plans and Environmental Impact Assessment) have been conducted for the project subcomponents. However, EARP being a programme, a SEA has been developed and found to be a long term and sustainable tool for all EARP activities.

3.3. Background of the Electricity Access Rollout Programme (EARP)

The Government of Rwanda, in its effort to sustain economic growth, has increased and stabilised the power production since the severe power shortages in 2004. However, infrastructure bottlenecks in the urban areas and limited access in the rural areas have emerged as a significant constraint. One of three major strategic objectives of the Economic Development and Poverty Reduction Strategy (EDPRS 2008-2012) is to expand access while also improving the quality and lowering the cost of economic infrastructure – especially transport, power, and communications.

In connection with the mentioned strategy, the Government of Rwanda through Energy, Water and Sanitation Authority (EWSA) has embarked on a country-wide ***Electricity Access Program*** to realize the primary EDPRS target for the electricity sector of tripling access by 2012 to about 16 percent of households and at least 50 percent of identified public institutions in health, education, and local administration. This will require about 160'000+ with new grid connections and will also include efforts to reach rural consumers and service providers currently off the national grid.

In this regard, EWSA has established a new Electricity Access Scale-up Roll-out Program (EARP) as a part of its corporate structure. The program will be implemented within the framework of a Sector Wide approach (SWAp) to encompass all donors active in the sector under one common sector investment program. The overall investment envelope for the first SWAp time (2009-2013) was

estimated at $378 million, for the program period covered by the Prospectus that has been endorsed by all the partners and key sector institutions in Rwanda, including EWSA.

3.4. Objectives of the EARP

The overall objectives of the Electricity Access Roll-out Project included:

- To increase access to electricity according to the above targets;
- To increase revenues from electricity by utilizing the existing and added infrastructure optimally;
- To apply new appropriate proven technologies with the primary aim of reducing costs and increasing reliability;
- To reduce overall project cost by the implementation of appropriate technologies and standards applicable for the market;
- To reduce technical and commercial losses of electricity through the correct metering procedures and through the design of more efficient systems

The programme specific objectives were two-fold:

i) Increasing electricity access to households and priority institutions at a scale consistent with the targets of the EDPRS and;
ii) Assisting the GOR mainstream the energy sector-wide approach (SWAp) and process by establishing a functioning donor partnership framework for sustained financing of investment and capacity strengthening, aligned with national priorities and results.

Several development partners so far have committed to support the program including World Bank IDA, World Bank GEF/ESMAP CEIF, African Development Bank, BADEA, OFID, Saudi Funds, Netherlands, Japan, and others.

3.5. EARP Programme components

The project had three components (a) Grid Roll-out; (b) Green connection; and (c) Technical assistance, capacity strengthening, and implementation support.

(a) **Grid rollout -** The program financed Medium Voltage (MV) and Low Voltage (LV) grid reticulation, distribution grid strengthening and rehabilitation to reach the required transfer capacity to the targeted areas and customer connections including partial subsidies of connection costs for qualifying households, and priority institutions.

(b) **Energy Efficiency Component "Green connections" -** The project financed a range of activities to improve affordability for the consumers and reduce the need for additional generation resources. The program would include energy efficient Compact Fluorescent Lamps (CFLs), incentives to promote the use of solar hot water heaters sold through private

dealers and specific initiatives to buy down connection costs for the poorest households including mainstreaming of the use of low cost “ready boards” in homes.

(c) **Technical assistance, capacity strengthening, and implementation support –** This component supported components (a) and (b) outlined above that are linked to the first project development objective. Additionally, this component will support the second development objective of mainstreaming the SWAp framework and process.

4. IMPACT EVALUATION OF EARP PROGRAM

This section of SEA presents the results of an impact evaluation of Rwanda's Electricity Access Roll-Out Program (EARP) on various user levels. The first result of this evaluation is that EARP – one of the largest ongoing national electrification programs in the Rwanda – is not only ambitious, but also effective in connecting households, health stations, administrative offices, Businesses and schools since 2009.

Before EARP started in 2009, only about 6 percent of all households and only one percent of rural households had had access to electricity making it a country with one of the lowest electrification rates in the world. Rwanda has electrified its population at one of the fastest rates in the world over the past decade. Through EARP, Investments in grid extension have increased grid connections from 6 percent in 2009 to 45 percent in March 2021, while off-grid access has more than doubled since 2016 and is estimated at 15.9 percent in March 2021. Table 9. indicates that Grid access of productive use is remarkably high, reaching, as of March 2021, 100 percent of hospitals, 93 percent of health centers (compared to only a third on average in Sub-Saharan Africa), and 80 percent of primary and secondary schools (compared to a quarter for Sub-Saharan Africa on average)

Table 9.Electricity Access for HH and Productive use (March 2021)

Category		Connected (%)
Households	On-grid	45%
	Off-grid	15.9%
Cell Office		69.46%
Coffee Washing Station		54.24%
District Office		100.00%
Health Center		99.80%
Hospitals		100.00%
IDP Model Villages		67.35%
Milk Collection Centers		97.64%
Sector Offices		100.00%
Schools (Primary, Secondary, TVET, Universities)		89.23%
Irrigation pumping and Water pumping stations		45.24%
Province/District Offices		100.00%
Others		77.38%

There are around 60.9 percent of households in connected areas but nonetheless leaving a considerable part of around 40 percent of the population being unserved. The vast majority of

the non-connected households are detained by affordability reasons related to the connection fees and location in remote areas far from the Grid.

Since the kick-off of EARP, connected households have increased their lighting usage tremendously and obtain new appliances, mostly for consumptive purposes. Total energy expenditures are reduced due to substantial reductions in expenditures for kerosene, batteries, and diesel generators. The substantial reduction of dry-cell battery consumption and diesel generators after grid connection is another important impact, also from an environmental perspective. The availability of electricity in the communities clearly has shown a significant effect on the daily routine of rural dwellers.

In terms of productive take-up, Enterprises that have the highest connection rates and that are most positively affected by electrification are mills, hairdresser, copy shops, and welding shops. Generally, as results of EARP implementation, we observe a slight increase of business activities in connected communities. Some enterprises emerge and existing enterprises partly extend their operation hours, products, and services. In most of these cases, though, electrification of enterprises causes a redistribution of income, because demand is mostly coming from within the community or neighboring communities.

The share of grid connected health centers has increased from 30 to 99.8 percent since the kick-off of EARP. While appliance usage increased considerably in connected health centers, a similar increase can also be observed among non- connected health centers. This shows that many of the appliances used for basic health care can also be run on other energy sources, solar panels, or generators, to which virtually all non-connected health centers have access to. Hence, the main effect of grid electricity on health care quality is the reduction in operation costs of appliances as well as higher convenience. Lower operation costs enable the health centers to operate appliances more intensively.

It is furthermore often mentioned that Electricity Access Rollout Program has facilitated the attraction of trained staff from urban areas to the community, not only as it improves working conditions, but also because electricity in their home places increases their quality of life. Also schools have mostly connected as soon as the grid became available. Here, electricity has mostly been used for improving administrative processes in the school and also to improve the offered educational services. Altogether, EARP has reached its goals of substantially increasing the electrification rate in the country and impact hopes associated with electrification are justified.

5. RUEAP PROGRAM DESCRIPTION AND JUSTIFICATION

5.2. Program Development Objective

The Program Development Objective (PDO) is to increase access to modern energy for households, enterprises, and public institutions and enhance the efficiency of electricity services in Rwanda.

PDO Level Indicators

(d) People provided with new or improved electricity service (CRI[19]; Number[20]);
(e) Enterprises provided with new or improved electricity service (Number);
(f) Public institutions (clinics, schools, and administrative centers) provided with new or improved electricity service (Number);
(g) People provided with new or improved clean access to cooking solutions (Number);
(h) Reduced voltage fluctuations in Rwanda's backbone transmission lines (Percentage);
(i) Generation capacity of energy constructed or rehabilitated (CRI; MW);
(j) Reduction of net CO_2 emissions through off-grid electrification and clean cooking solutions (tCO_2eq).[21]

5.3. Program Location

The Increasing Access to Grid Electricity is expected to cover all the 27 administrative districts of Eastern, Western, Northern and Southern provinces of Rwanda.

5.4. Program Components

The program consists of **four** components reflecting distinct groups of project activities, as summarized in table 10.

Table 10. Proposed RUEAP Program Components

Area/Investment Need	Details
1. Increasing Access to Grid Electricity	
Grid access	Grid connections for households, commercial, and industrial consumers, and public institutions.
2. Enhancing the Efficiency of Electricity Service	

[19] CRI = Corporate Results Indicator
[20] Assuming household size of 4.3 people per household as per EICV5.
[21] The emission factors used to arrive at CO_2 emissions reduction are indicated in Table 2.1 in Annex 2: Economic and Financial Analysis.

Area/Investment Need	Details
Rehabilitation of the Ntaruka HPP	Ensure availability of low-cost renewable energy generation in Rwanda, through the rehabilitation of the Ntaruka HPP.
Installation of automatic voltage regulator on 220kV system networks, Installation of power system stabilizers and governing systems on main generators	To reduce voltage rises due to low loading on 220 kV; improve network responses to fluctuations and load loss; prepare EAPP regional interconnection.
Building of GIS	Building of Rwanda's power system GIS.
Installation of smart meters	Completing installation of smart metering for all distribution transformers and medium/large customers. Identify and curb sources of commercial/technical losses and phase imbalances.
3. Increasing Access to Off-grid Electricity and Clean Cooking Solutions	
RBF for off-grid solar and cooking solutions.	RBF for (a) off-grid solar connections to reach poorer and more remote areas and (b) clean cooking solutions, with business models and financing instruments yet to be determined.
4. Technical Assistance, Institutional Capacity Building and Implementation Support	
TA	Address sector performance improvements; forward-looking options for sector development including clean cooking.
Capacity building	Planning, skills development, audit and compliance (and others to be identified).
Implementation Support	Support EDCL Program Coordination Unit (PCU) functions (staff); Support the SWG secretariat staff.
RETF grant from the CCF	Market development and TA for the clean cooking sector

Note: HPP = Hydropower Project

5.4.1. Component 1: Increasing Access to Grid Electricity

The technical foundation of the universal electrification program of the GoR is established in the NEP finalized in 2019. Considering the 52 percent on-grid and 48 percent off-grid split established in the ESSP as an input, the plan defines a combination of extension and densification of

the national grid and deployment of off-grid solution throughout the country that represents the least-cost option to supply forecasted demand for 2018–2024. The electrification decision is made at ‘cell’ level, which represents an administrative unit in Rwanda. The model takes as key inputs the population and population density, topography, distance from the grid, income level, and cost of electrification alternatives and provides as an output the distribution of grid extension and off-grid solutions across different cells that achieve universal electrification by 2024 at the least cost. The costing of electrification components, such as of the LV and MV lines, transformers, and poles were reviewed by the World Bank during the preparation of the NEP and were found to be appropriate. The NEP also provides detailed investment requirements to expand the grid to the cells marked for grid electrification, forming the basis of the investment requirements under Component 1 of RUEAP.

It is against this background that REG has targeted an annual connection rate of 200,000 between 2020 and 2024 (including households and enterprises). It is estimated that the average unit connection cost, including backbone infrastructure, is around US$603–US$758, projecting an annual financing need ranging between US$120 million and US$150 million. This component provides financing toward grid connections of new consumers, including financing of grid extensions and consumer connections.

The joint Development partners respectively for this component is expected to connect about 458,000 households and 30,000 enterprises in selected 27 districts of Rwanda (see

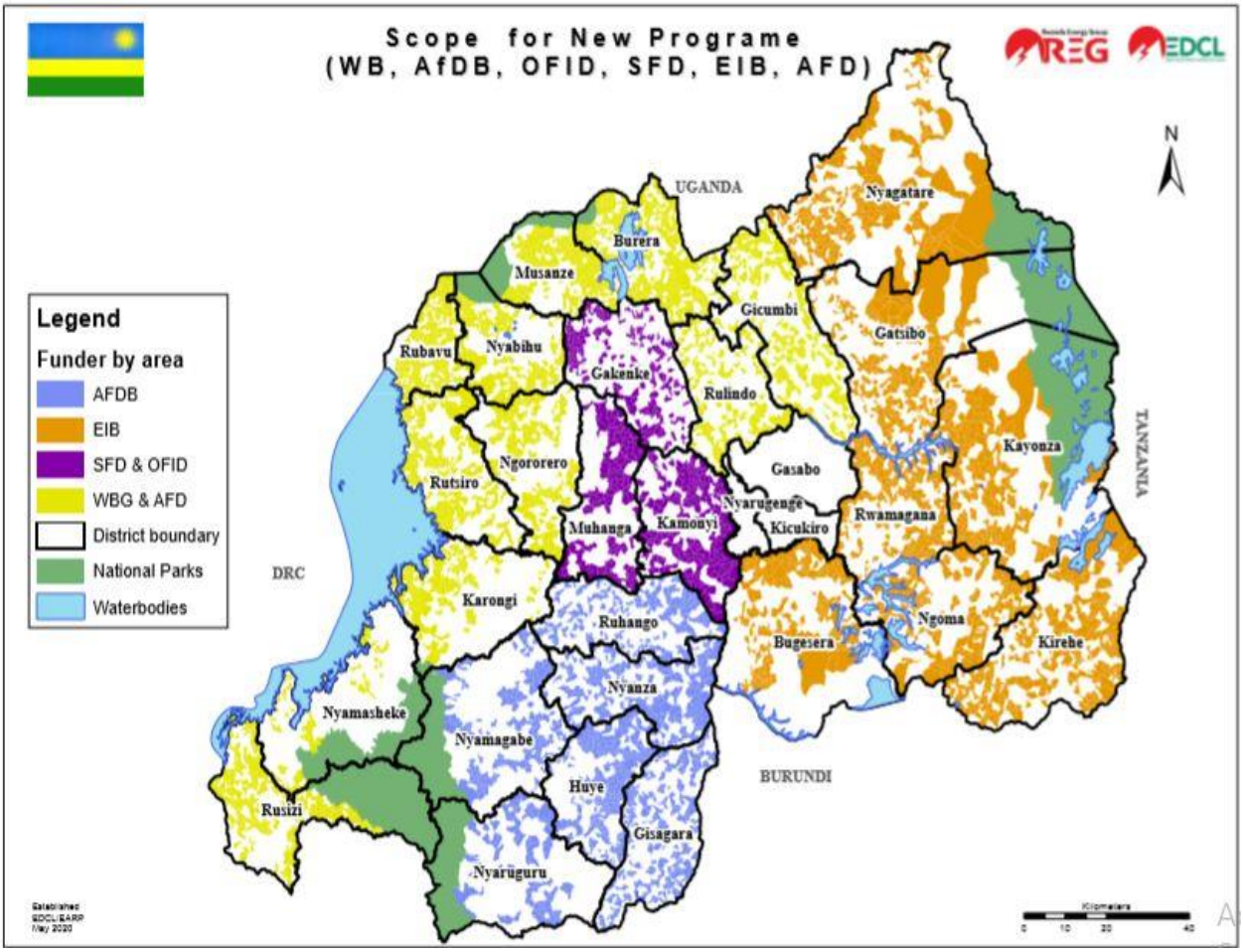


Figure 7). This comprises of connecting about 125,000 households and 5800 enterprises through World Bank financing, connecting about 105,000 households and 11,500 enterprises through AFD financing, connecting about 60,470 households and 4,370 enterprises through AFDB financing, connecting about 104,276 households and 4,935 enterprises through EIB financing, Further, the OPEC Fund and the SFD in parallel co-financing to this component, for connection of about 63,000 households and 3,000 enterprises.

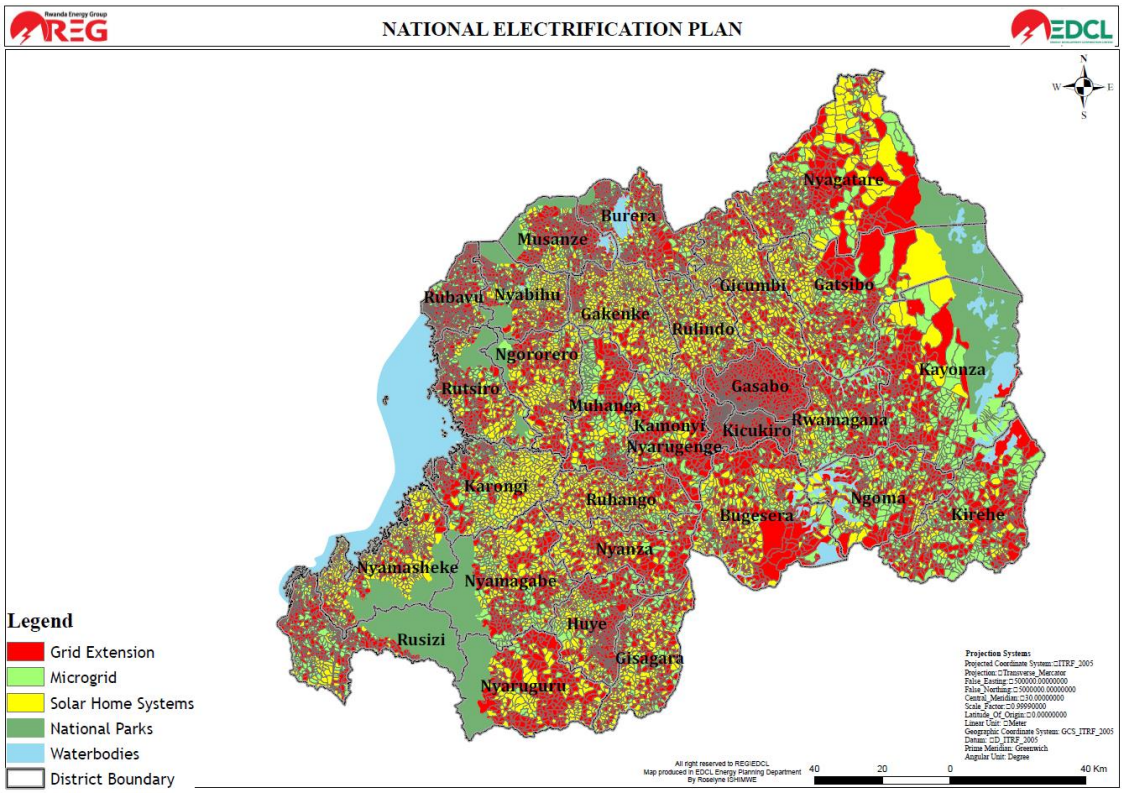


Figure 6. Rwanda NEP Output

Source: **REG.**

The implementation approach for Component 1 will follow the guidelines in the NEP, and the procurement and implementation methods that have delivered success in the past decades. In combination with the implementation approach laid out in the NEP, the EARP will use a combination of engineering, procurement, and construction (EPC) contractors and local contractors to speed up the connection rate. Procurement packages will include several internationally procured EPC packages to implement backbone infrastructure. Goods packages for line construction materials for installation of connections will also be procured internationally, while labor contracts will be locally procured to implement the last mile connections. EDCL plans to adopt good labor practice, such as setting a female workforce quota for procurement packages and project staff to increase female participation in the project.

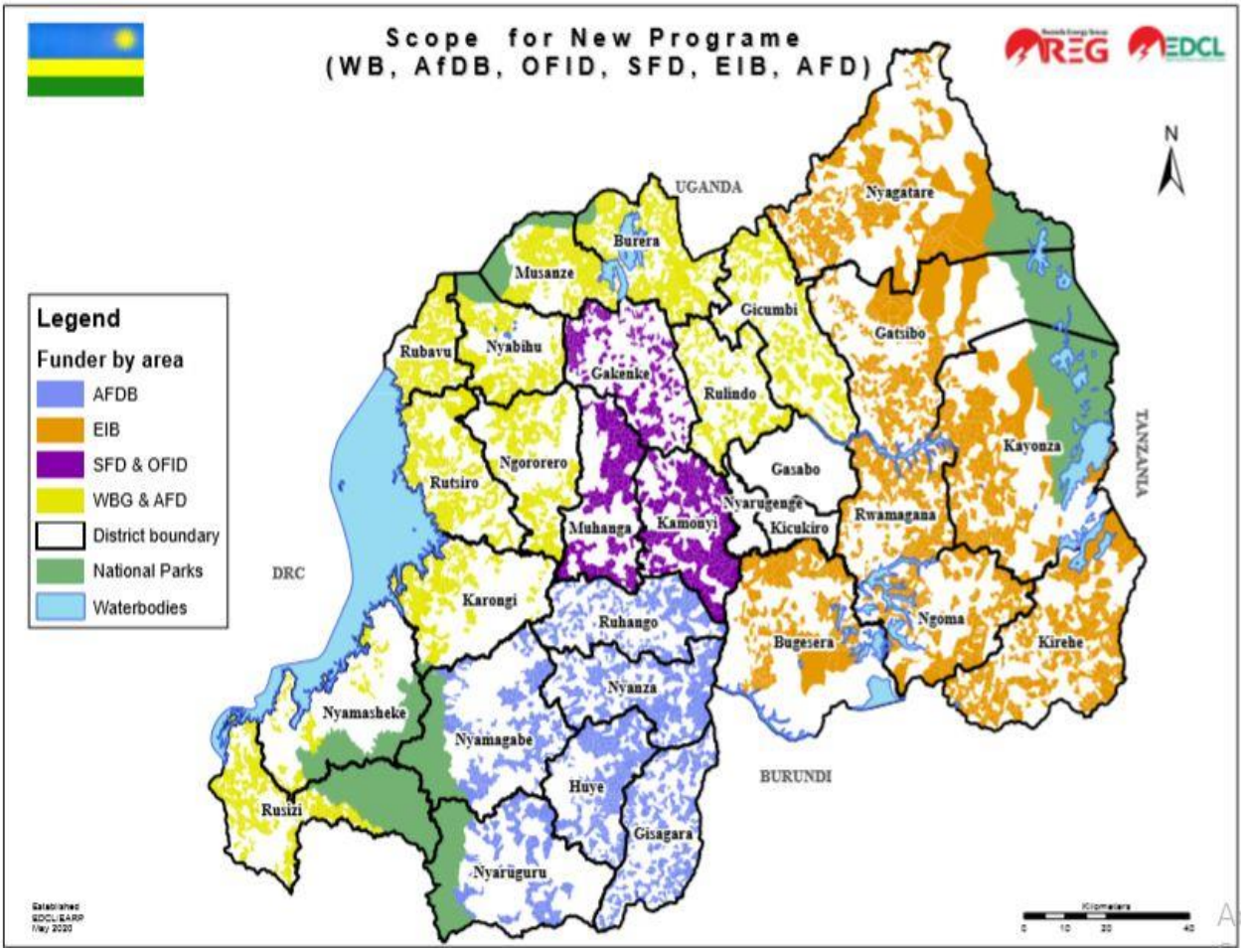


Figure 7. On-grid Access District Allocation to the Development Partners

Source: REG.

A connection policy, introduced in 2017, which allows for household connections without an advance payment, will contribute to increase in the annual grid connection rates. The grid electricity connection policy was revised in 2017 to remove the upfront payment of connection fees, which was a barrier to expanding access. Consumers in Rwanda can now get connected to grid electricity without payment of upfront connection fees, which is deducted from payments for purchase of units of electricity. The EARP has been able to accelerate the electrification rate after revision of the connection policy.

Climate change mitigation. Since the grid electricity in Rwanda is dominated by hydropower (48 percent of installed generation capacity in 2019), providing grid electricity to households in Rwanda is expected to mitigate emissions from the lighting alternatives that households will otherwise use. Over a lifetime of 20 years, the grid electrification component is expected to mitigate 1.7 million tons of CO_2 equivalent against the alternative sources of lighting.

Climate change adaptation. From the perspective of climate and disaster risks, Rwanda's exposure rating is high for extreme temperature, extreme precipitation and flooding, and drought. These risk

considerations are toward climate adaptation factors in the design of the physical infrastructure that will be built for expanding electricity access. The electric wires, poles, and other infrastructure to be built for grid densification will use materials resilient to high temperatures and the construction will accommodate for the impact of potential flooding. Thus, the electricity access investments under the project will improve the resilience of Rwanda's distribution network toward climate risks.

The Increasing Access to Grid Electricity is expected to cover all the districts countrywide, however the programme activities may differ from each district or zone. The programme activities are divided in four phases which are:

i. Design and Planning Phase
ii. Construction Phase
iii. Post Construction Phase (Operations)
iv. Decommission Phase

i. Design and Planning Phase

During the design phase, the expected activities:

- **Site Selection and Routing**: adequate survey and mapping are carried out for new transmission and distribution routes, stations and substations site selection to avoid sensitive ecosystems, densely populated areas that would cause immense land acquisition and resettlement.
- **Land Acquisition /Compensation**: acquisition of land owned by the general public where the identified routes for the distribution network including the location for the cabins and creation of Right of Way (ROW) and station and substation location fall in accordance with the Resettlement Policy Framework (RPF) and a separate Resettlement Action Plan (RAP) to address the compensation related concerns of the project.

ii. Construction Phase

During the construction phase, the following key activities are expected to occur:

Horizontal and Vertical Clearances: Clearing of the path where the distribution infrastructure will pass is the initial activity that will occur during the construction phase. This done is in order to create the vertical and horizontal clearance required when constructing electricity transmission lines.
The clearing process will follow the national and international dimension in installation of distribution and transmission networks specified below.

Provision of Site Access: this activity consists of the provision and maintenance of all access from the main highways to the distribution line routes during erection as required. Access roads shall be constructed in such a way that they can be used for maintenance of the line by four-wheel drive

vehicles. The length of the access road is the distance between the edges of public roads to the tower, stations, or substations location.

Clearing of Right-of-Way: An electric line right-of-way (ROW) is a strip of land that an electric utility uses to construct, maintain, repair or replace an overhead or underground power line. The ROW allows the utility to provide clearance from trees and other structures that could interfere with the line installation, maintenance, and operation. This activity requires the clearance of the right-of-way, fell any vegetation, and dispose of waste material along the entire length of the transmission lines. The transmission line right-of-way is 12 meters wide for the 30 kV lines symmetrical about the centreline. All trees, snags, stumps, shrubbery, ant hills and undergrowth exceeding 2 meters in height as measured on the downhill site are cut to a maximum stump of 20 cm along the right-of-way. All trees adjacent to the right-of-way which could fall across the conductors or against the towers will be cut.

Excavation Works: After the transmission and distribution network path has been cleared as specified above, there will be excavation related works related to construction of access and maintenance roads, excavations works for creating the foundations for erecting the towers.

Construction of Foundation: foundations will be designed for all specified tower types, for any type of soil to be found, both in dry and fully submerged conditions, and for rock. Tower foundations will normally be of reinforced or mass concrete type. Concrete foundations will be the standard foundation for the poles and towers. Excavation will be confined to a minimum working area consistent with efficient operations.

Erection of Towers: Tower structures that will be erected will be of the self-supporting lattice-type steel frame with square bases. The general outlines of the towers may be varied but the general dimensions, phase spacing, clearances, and the configuration of the conductors and earth wire must be approved.

MV/LV Substations" Cabins": MV/LV mini substations or cabins shall be installed in different sites along the transmission path. These mini substations will play the role of stepping down the electricity from MV to LV before distributing to consumers. These substations are basically small housing units made of concrete and fitted with transformers and electrical gadgets.

iii. Operation and Maintenance Phase

During operation phase the expected activities include, operation and maintenance of the transformers, circuit breakers, circuit switches and capacitors that will have been installed during the construction phase.

Line Route (ROW): a permanent area of land will be kept to accommodate the transmission line, when completed. A parallel strip of land through those sections of the route which pass through

vegetation shall be completely cleared. In addition, any tree that may fall in the direction of the overhead line shall be cleared.

Routine maintenance is carried out along the ROW to ensure the appropriate clearances between towers, conductors and vegetation and other objects are maintained according to the required safety/operation specifications listed above. A 12m wide path along the line route will be required in the absence of a public road. Maintenance is normally carried out twice a year (dependent on-site conditions).

iv. Decommissioning

Decommissioning of the programme will involve dismantling and removing all the structures from mini substation sites, dismantling the supporting infrastructure (towers) and all those structures that were associated with this project implementation. Some of the impacts of this project phase are similar to those that have been discussed during construction and operational phase.

But there are those impacts that are specific to project decommissioning after the project life is over. After the project decommissioning, RUEAP will rehabilitate the site to its former status or near what it was before the project was commissioned. RUEAP will be responsible for preparing the decommissioning plan as specified by the Law on Environment, the project proponent remains responsible for this. As per the regulations of REMA the proponent will bear the costs for decommissioning and site rehabilitation.

5.4.2. Component 2

An elaborated technical and economic feasibility study for the rehabilitation of the Ntaruka HPP under Component 2 of the project was carried out in 2018 and was reviewed by the World Bank. The World Bank review found the feasibility study to be adequate for proceeding with appraisal of the rehabilitation of the HPP. Key technical observations from the review are highlighted as follows:

(k) **Civil works.** The civil works are in good condition except for minor repairs required in the concrete structure.

(l) **Hydraulic steel structures.** The scope of the rehabilitation includes replacement of gates at the intake which is recommended. The penstock is in good condition and its overdesigned thickness will secure safe operations for many years to come. Recommendations were made to verify the need for a safety valve at the base of the surge shaft at the beginning of the penstock and the potential installation of an ecological outlet

at the bottom of the dam to connect the upstream and downstream natural reservoirs (Lake Burera and Lake Ruhondo respectively) when the HPP is not operating.

(m) **Hydromechanical works.** The shafts are in bad condition and need to be replaced for all three units of the plant; the rest of the mechanical components including guide vanes, runners, and draft tubes are damaged by cavitation, which is fairly normal after several years of operations, and need to be treated and repaired. The three governors and parts of the operating systems also need to be replaced

(n) **Electromechanical works.** The scope of replacement of electromechanical components covers nearly all systems and components yet the scope of work may increase once the contractor will dismantle and open up the casings, boxes, and boards. It was recommended that the contract be designed so as to accommodate all the potential variants and to provide for a sufficient level of contingencies.

(o) **Dam safety.** The Ntaruka Dam must comply with the World Bank dam safety standards under the new Environmental and Social Framework (ESF). The risk classification of the dam is being carried out through an E&S audit and will inform the type of technical review that is required, including the need for update/preparation of all relevant dam safety plans.

(p) **Cost estimate.** The cost estimates for the rehabilitation are rather on the high side but the higher estimate may leave margin for any contingencies that may arise when the actual rehabilitation is carried out.

The utility has established that the cause of incidences of voltage fluctuations occur quite frequently, owing to low loading of the 220 kV network. Installation of automatic voltage regulators on the 220 kV system network would reduce/eliminate voltage fluctuations, hence protecting network equipment and reducing incidences of blackout. The proposed investments are recommended through a study on electricity interconnectivity in the Nile Equatorial Lakes countries and would also prepare Rwanda's electricity grid for regional interconnection.

Installation of smart meters for MV and LV customers was started under the ongoing World Bank-funded RESSP. In continuation of the pursuit to identify and curb sources of technical and commercial losses, REG will continue to install smart meters for large consumers, and in addition, install smart meters on all distribution transformers on the electricity network. This will enable REG to easily identify feeders that are susceptible to commercial/technical losses and use the information to identify solutions, while also identifying transformers that are unevenly loaded and causing network

imbalances, and similarly use the information to identify solutions. The project will also fund purchase of meter test benches for both prepaid and postpaid meters, in a bid to develop local capacity to continuously monitor the quality of the meters on the electricity network.

5.4.3. Component 3

Quality assurance for off-grid SHSs and clean cooking solutions. SHSs and clean cookstoves must adhere to quality standards to create trust and confidence in the market. All off-grid SHSs imported to Rwanda must comply with the requirements of the Ministerial Guidelines on Minimum Standards Requirements for Solar Home Systems, which includes guidance on product quality standards as well as service-level requirements, warranty periods, and the terms of after-sales care. To be eligible for RBF financing, OSCs will be required to comply with these Ministerial Guidelines and submit a business plan detailing the commercial viability of service provision through combined customer contribution and RBF financing, including for the provision of adequate after-sale services, which shall be granted until three months after the expiration of the warranty (two years for Tier 1 systems, as specified by the Ministerial Guidelines). A customer service Code of Conduct will be signed by all participating providers and will detail the standards that the verification process will evaluate against.[22] OSCs will also be required to submit a detailed plan for supporting the increase of affordability of off-grid solutions over time, in synergy with existing GoR safety net programs, for example, through training and participation to the off-grid labor market and/or public works. The clean cooking solutions will also adhere to government guidelines as well as incorporating international good practice. The project will provide technical assistance to further review and improve the government standards and testing. It will also draw on the cookstove testing lab which is being established by the RSB and provide technical assistance to improve local product design and encourage local solutions to be eligible for the project. See section II B for details on the technical eligibility requirements and minimum performance levels for clean cooking solutions.

5.5. Programme opportunities

- Both the rural and urban population highly need electricity for various uses
- Electrified villages shall attract people from scattered habitat to live in the agglomeration and enjoy the benefits of electrification
- People have been impatiently waiting for electrification to start up or improve many businesses which require electricity
- Communities are willing to give a small portion of their land for the programme activities as they are the ones to benefit from electricity connection.

[22] Building on the one developed by GOGLA: https://www.gogla.org/consumer-protection.

- In most of the programme areas, have the purchasing power to pay their contributions for electricity connections
- The need for capacity building of farmers and other beneficiaries will bring more people who need training
- Residents in the programmes areas will have opportunities for employment, hence raising their livelihoods
- Funds for the programme planning, implementation, monitoring and evaluation are available

5.6. Programme constraints

The status quo assessment that included the scoping phase and situation assessment phase of the program highlighted some of significant issues and concerns.

Key issues in the situation assessment included the following:

- The difficulties to deal with scattered habitats
- Environmental issues which require continuous mitigation measures during the implementation of the programme for MV lines
- Expropriation exercise which requires continuous evaluation and compensation

5.7. Project Beneficiaries

The direct project beneficiaries will include households, enterprises, and public institutions in Rwanda. Households, enterprises, and public institutions that will gain access to electricity or clean cooking solutions will benefit from the use of modern energy in economic and non-economic ways. For the purpose of the Results Framework, the project includes educational facilities, health facilities, and administrative facilities in the category of "public institutions". Specific focus will be on female beneficiaries to address existing gaps in energy and clean cooking access, such as affordability, awareness, and employment opportunities (see section IV.E for details). Non-economic benefits for households will include reduced exposure to harmful emissions. Besides new access, households, enterprises, and public institutions who are already connected to the grid will benefit from more reliable electricity service, which will improve productivity of their electricity use through fewer disruptions and less damage to equipment and appliances. Beneficiaries of access to cleaner cooking solutions are expected to attain better economic outcomes from use of time saved through spending less time collecting/using cooking solutions that require longer time collecting and using the fuels.

EDCL, EUCL, and REG will be direct beneficiaries of the project through asset investment and capacity building. REG is expected to benefit from higher cost recovery through improved

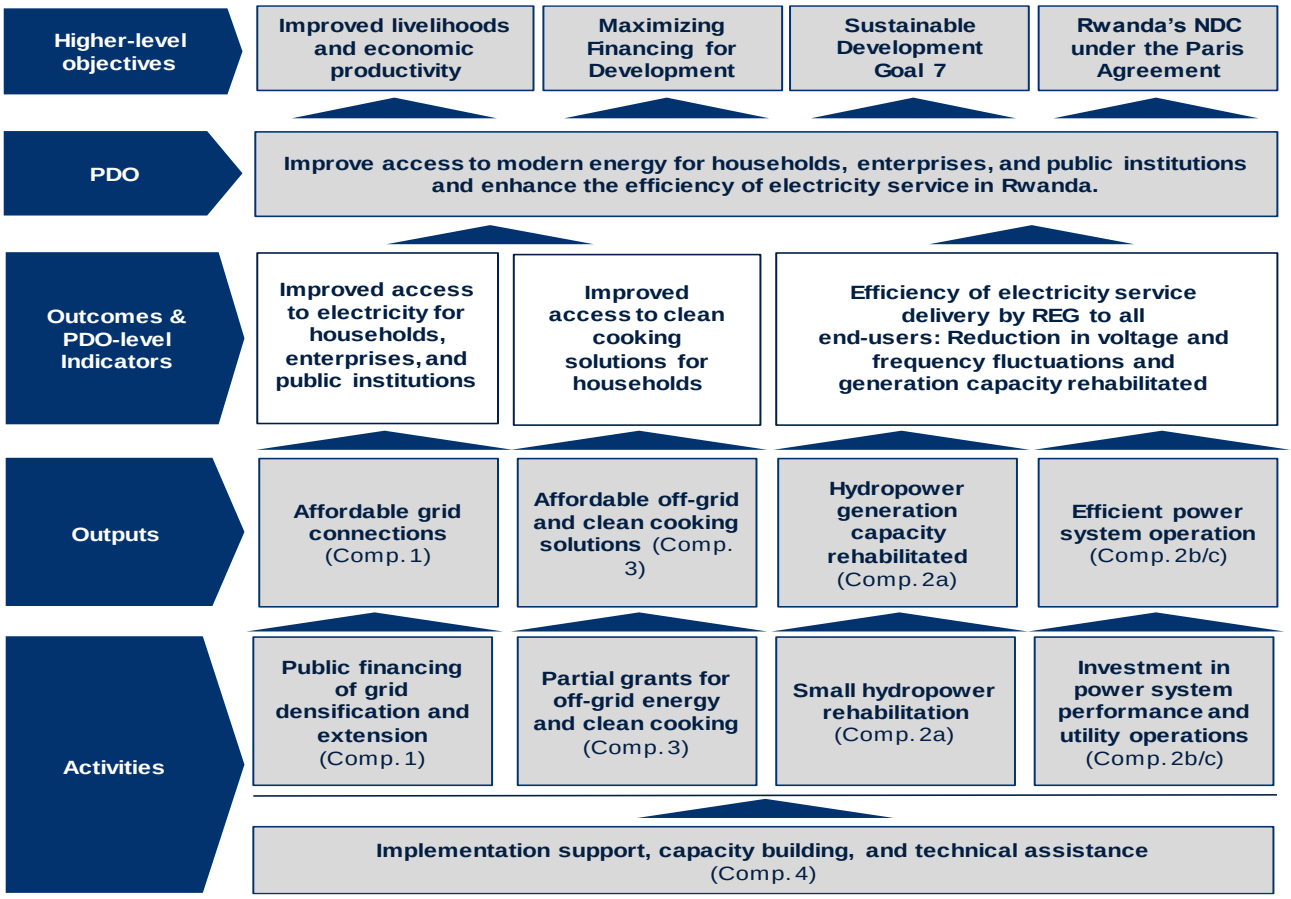
operational efficiency (improved quality of service and lower technical and commercial losses), and higher revenues through increased electrification rate and improved quality of service. Consequently, the GoR will benefit because improved cost recovery for REG should ease the burden of fiscal transfers to REG, helping the GoR target other priority sectors.

Providers of off-grid and clean cooking solutions will benefit from results-based subsidies for off-grid and clean cooking solutions. It is expected that competitive pressures will lead to these subsidies being passed on to consumers to make products and services more affordable. The off-grid and clean cooking solutions providers will also benefit from the better enabling environment with awareness raising, technical assistance, capacity building, and policy improvement activities for their long-term sustainable business development in the sector.

5.8. Results Chain

By improving access to modern energy access and efficiency of electricity service, the project aims to improve household livelihoods and economic productivity. The theory of change is visualized in Figure 8. *Theory of Change of the Proposed Program*.

Figure 8**. Theory of Change of the Proposed Program**

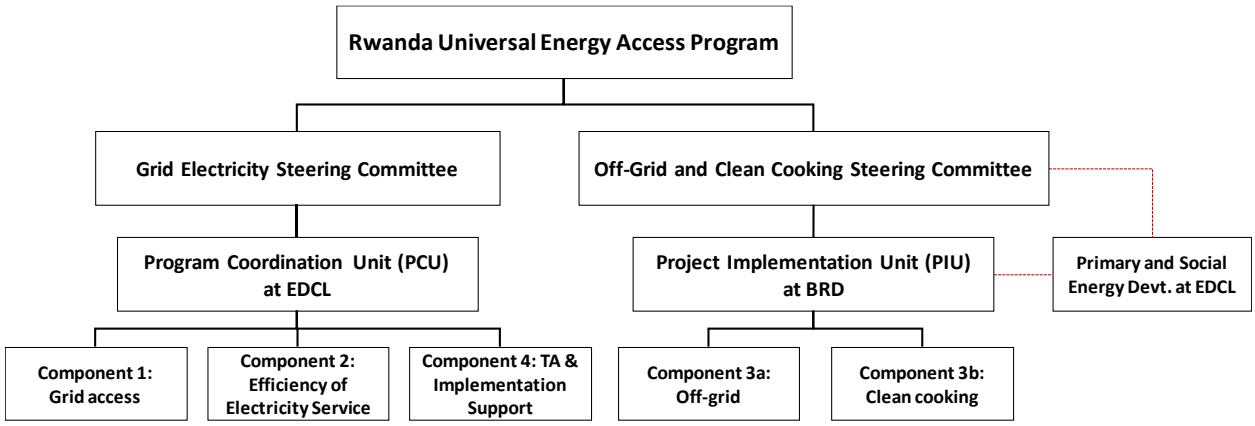


Source: Disclosed ESMF, 2020

5.9. Program Implementation Arrangements

The program will be jointly implemented by EDCL and BRD. The implementation arrangements have been designed to manage the multi-donor RUEAP, and all projects within the program will be managed by two implementing agencies, with EDCL covering all grid-related components and the overall program coordination, while the BRD will implement the off-grid and clean cooking component. Using the same implementation arrangements for the overall multi-donor program, instead of creating separate implementing units for each project in the program, is expected to substantially reduce coordination costs, eliminate duplication of effort and transaction costs for the GoR, enhance the efficiency of implementation, and help streamline development partner coordination of the program.

Figure 9: **Overview of Institutional and Implementation Arrangements**



Components 1, 2, and 4 of the RUEAP program will be implemented by EDCL. While EDCL has been implementing donor-funded projects, there is recognition that the RUEAP program is large and EDCL's current workforce may be too constrained to effectively manage the extra workload that the program imposes. For this reason, for reinforcing EDCL to manage the program, a PCU will be created within the structure of EDCL to provide the leadership that will run the program in coordination with the departments within EDCL. In addition, EDCL will be strengthened appropriately by recruiting additional relevant staff within the existing EDCL structure, who will provide support to ensure effective implementation of the program. The extra staff recruited to support the program will be funded by the program during the program duration. The PCU will be disbanded at the conclusion of the program, while it is hoped that EDCL will be able to maintain the staff recruited within EDCL departments on their structure, so that the program leaves a stronger EDCL structure in place.

EDCL's implementation of Subcomponent 2c will draw on EUCL's technical expertise, as needed. This will include seconding relevant EUCL staff to EDCL for the duration of the assignment.

The EDCL PCU, which will provide overall leadership for the program, will be staffed appropriately to manage the RUEAP, and will be housed within EDCL. The PCU will be headed by a program manager who will report directly to the managing director of EDCL (**Error! Reference source not found.**). The program manager will have the overall responsibility for (a) program implementation management and coordination and (b) program monitoring and evaluation (M&E) and reporting. Within the PCU, the program manager will be supported by high-level staff to head program functions such as procurement, finance, safeguards, contract management, and any other function that is deemed to require high-level leadership. In addition, the PCU will also house a project coordinator for each group of participating development partners to provide the program manager coordination management and support for each participating development partner group.

The EDCL PCU will draw upon the existing, and newly recruited, resources from EDCL departments for implementation support. Error! Reference source not found. presents the existing departments of EDCL that will be engaged for the implementation of different components of the program, including technical, operational, procurement, financial management (FM), planning, and legal components. These departments will be strengthened by additional staffing to ensure timely implementation of the program.

Table 11. Proposed Implementation Arrangement within EDCL

EDCL Department	Program Component/Activity
EARP	Component 1: Grid electrification Component 2: Subcomponents pertaining to the improvement of the reliability and strength of the distribution network[a]
Generation and Transmission	Component 2: Rehabilitation of the Ntaruka HPP and transmission-related subcomponents
Primary and Social Energy Development	Component 3: Off-grid electrification and clean cooking (technical aspects of implementation)
Procurement Management	Support day-to-day implementation of procurement processes for the program, under the supervision of the senior procurement specialist(s) in the PCU
Administration and Finance	Support day-to-day FM of the program, under the supervision of the senior FM specialist(s) in the PCU
Transaction and Legal	Support day-to-day contract management for the program, under the supervision of the senior contract management specialist(s) in the PCU

EDCL Department	Program Component/Activity
Planning	Support overall planning and implementation of the program
Human Resources	Support human resources related tasks of the program
Information Technology (IT)	Support IT related tasks of the program
Monitoring and Evaluation	Conduct Monitoring and Evaluation for the program

Note: a. some of the subcomponents under Component 2 may also require the engagement of relevant departments of EUCL. This would require a Project Implementation Support Agreement between EDCL and EUCL.

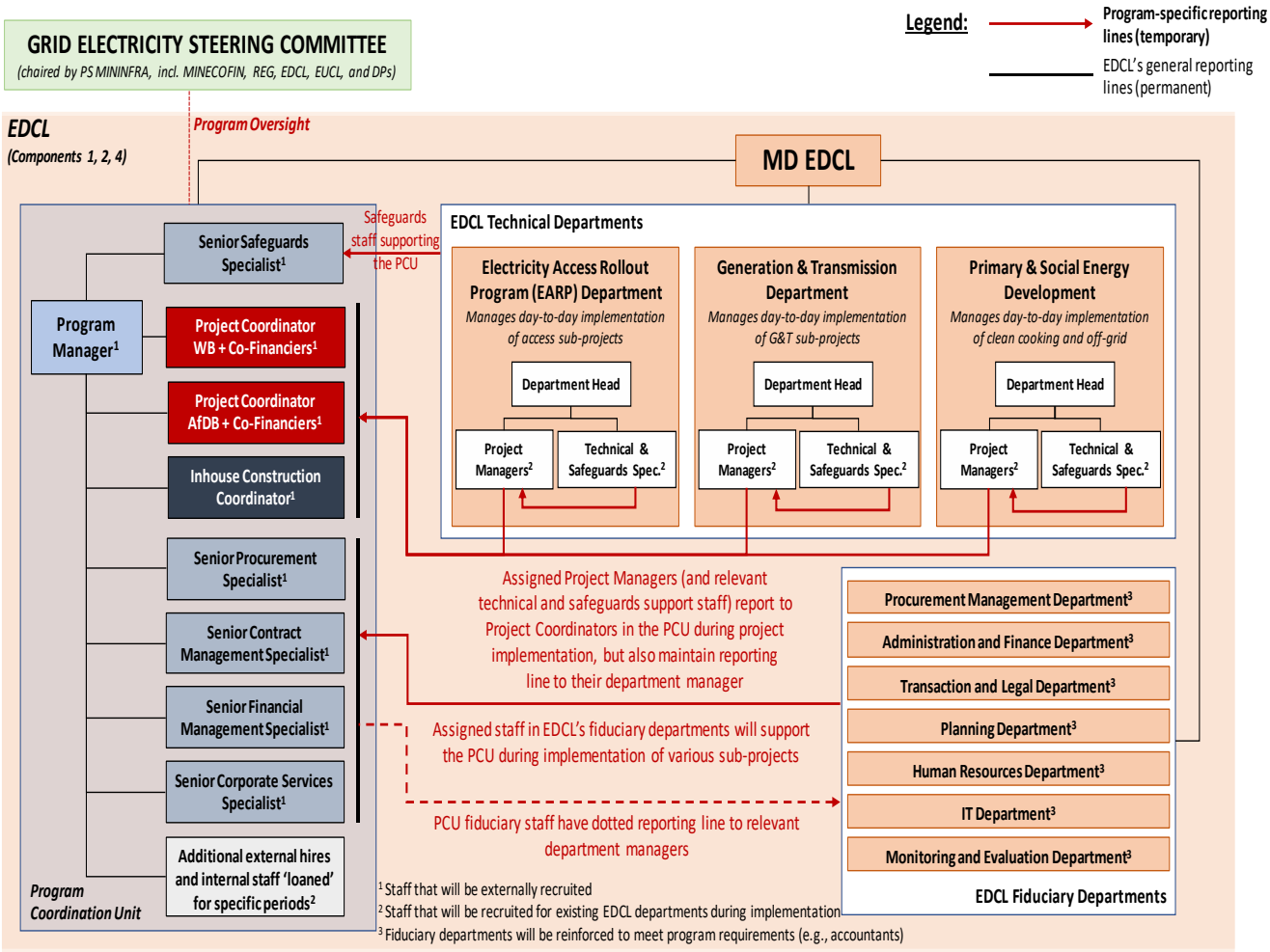
EDCL will appoint or recruit project managers within EDCL technical departments who will report to the project coordinators in the PCU for program functions but will also maintain their existing reporting lines to their department manager. The project managers shall be supported by relevant specialists from the EDCL structure, who will be assigned to the program by the directors of the respective departments for implementation of the program. Given the scale of the program, additional resources will be recruited by EDCL and supported by the program. The Government has identified the resource gaps in the implementation structure, and these will be filled by funding through the program.

For fiduciary responsibilities, the program will draw resources from the existing fiduciary departments of EDCL including Planning, Procurement Management, Administration and Finance, and Transaction and Legal. Considering the scale of the program, some of these departments may require substantial reinforcing to meet the program requirements. The heads of these departments will appoint specific staff to work on the electrification program. These staff will also maintain dual reporting lines to their respective fiduciary specialists within the PCU (for example senior procurement specialist, senior contract management specialist, and senior FM specialist) as well as to the respective department heads.

Two Steering Committees will be established at the Program Level to provide high-level government oversight and strategic guidance to the EDCL-PCU for components 1, 2, and 4 and to the BRD-PIU for component 3. The Grid Electricity Steering Committee will be chaired by the permanent secretary (PS) of MININFRA and its members will include PSDG-MINECOFIN, CEO-REG, MD-EDCL, MD-EUCL, and Program Manager, who will be the Committee Secretary. The Off-Grid and Clean Cooking Steering Committee will also be chaired by PS-MININFRA and will include PS-MINECOFIN, CEO-REG, CEO-BRD, MD-EDCL, representatives from the Ministry of

Environment, RSB, and Local Administrative Entities Development Agency (LODA), and the Program Manager. The Development Partners will be observers in both Steering Committees. The Steering Committees will meet every quarter, or as needed, during project implementation to review implementation progress, discuss emerging challenges, and identify mitigating measures.

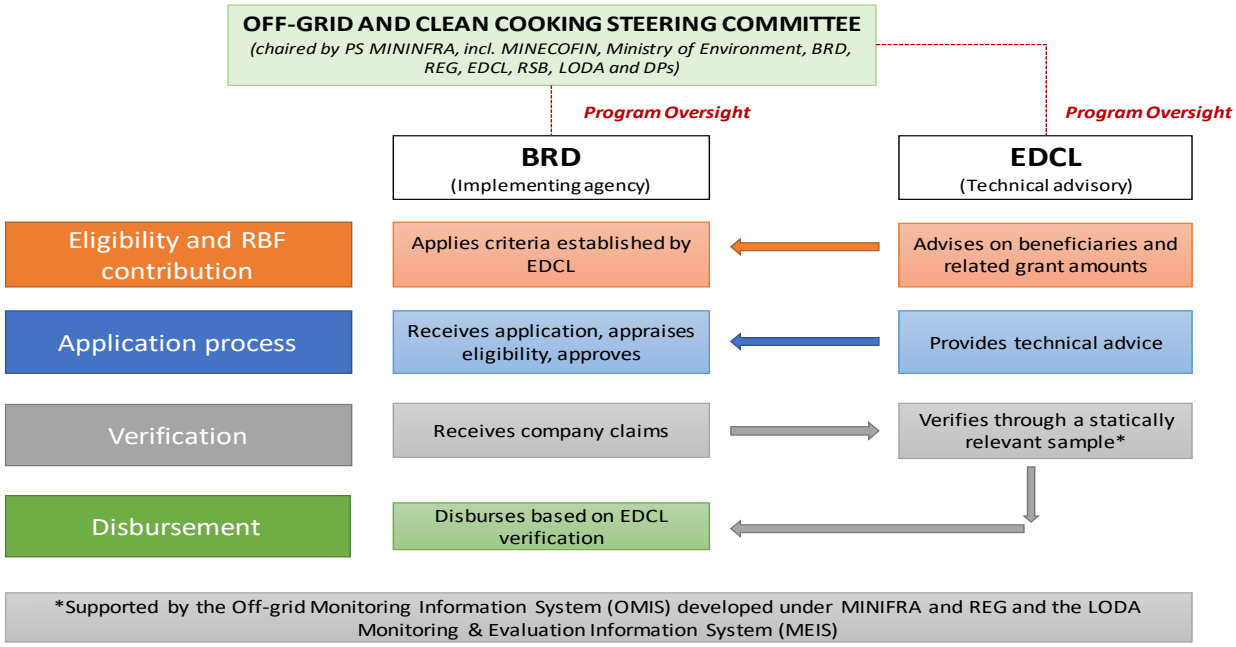
Figure 10. Detailed Program Implementation Arrangements for Components 1, 2, and 4



The BRD will implement Component 3, supported in certain technical aspects by EDCL. For the off-grid electrification and clean cooking subcomponents under Component 3, the BRD will take the lead in implementation while EDCL will cover certain technical aspects of implementation and verification. The process flow is illustrated in Figure 12. The eligibility criteria and associated subsidy amounts for households belonging to different Ubudehe categories will be in line with the Cabinet-approved concept for the nationwide RBF. The BRD will receive applications from interested private sector firms for both off-grid access and clean cooking (under separate windows), appraise and approve eligible firms, with EDCL providing technical advice in the evaluation process. As the eligible firms expand operations across target consumers, they will be able to submit claims for disbursement under the RBF to the BRD. The claims will be verified through a statistically relevant

sample before funds are disbursed by the BRD. In terms of the Environment and Social Management System (ESMS) for this component, the BRD also has an adequate established ESMS under its REF that will apply to this component.

Figure 11. Coordination between BRD and EDCL under Component 3



B. Results Monitoring and Evaluation Arrangements

M&E of project implementation progress and results indicators, as well as progress toward achievement of the PDO, will be the responsibility of the EDCL PCU and the BRD PIU. The two implementing agencies shall ensure adequate M&E staffing to support M&E activities. The two implementation units will be responsible for collecting, verifying, and collating information, integrating the M&E reports, and submitting to the World Bank both the quarterly and annual progress reports. The implementing agencies will establish a database for each component of the project to periodically monitor the evolution of implementation, outputs, and results, with systems for regular data gathering and processing of information required to monitor the main performance indicators and intermediary indicators as defined in the Results Framework.

The EDCL PCU and the BRD PIU will collect gender-disaggregated data and reports from other participating entities of the program and present progress in achieving the key and intermediate indicators to the World Bank in the project quarterly and annual progress reports. The implementing agencies and the SWG secretariat will be responsible for integrating the results from the program into overall sector performance indicators and preparing sector reports for the biannual SWG Joint Sector Performance Review discussions.

The project will carry out a follow-up impact evaluation survey three years into the implementation of the project. The baseline survey of the EARP was completed in mid-2014 and the follow-up survey is scheduled for 2020. The impact evaluation follow-up survey and assessments shall be jointly led by the EDCL PCU, the BRD PIU, and the SWG secretariat with support from specialized TA.

There will be two midterm (in-depth) reviews of the project; the first one taking place 18 months after project effectiveness.

5.9. Key Lessons learnt

By pooling finances from multiple donors toward achieving grid electrification objectives of the GoR, the program aims to replicate the success of the energy sectorwide approach (eSWAp) adopted in 2009 which led to a fourfold increase in grid electricity access in Rwanda between 2009 and 2018. RUEAP is a part of a sectorwide program that replicates the design elements of eSWAp in terms of developing a framework for coordination between donors and country stakeholders for integrated technical, financial, and implementation planning for the sector. Similar to the approach that led to setting up of the EARP, the current program pools financing from multiple donors toward the overall financing requirements of the GoR for grid electrification, with the GoR allocating respective financing amounts to different districts. This is different from a project-specific approach where each donor would have developed individual projects leading to substantial duplication of efforts for the Government.

The program is also using lessons learned from previous projects under the eSWAp/EARP to enhance project readiness and implementation arrangements. Technical capacities of the implementing agencies that require further strengthening (for instance, contract management and staffing for environment and social risk management) have been identified and are reflected in the design of the RUEAP.

6. DESCRIPTION OF ENVIRONMENT AND SOCIAL BASELINE OF THE PROGRAM

This section describes the overall baseline conditions of Rwanda in terms of social and biophysical environment.

6.1. Location and Size

Rwanda is a small mountainous landlocked country, located in Central Africa, at latitude 2. 00 S and longitude 30. 00 E, bordered to its South by Burundi, Tanzania to its East, Uganda to its North and the Democratic Republic of Congo (DRC) to its West. Rwanda has a total surface area of 26, 338 km^2 of which the total land area is 24, 948 km^2 and 1, 390 sq. km is surface water.

6.2. Physical Environment

6.2.1. Climate

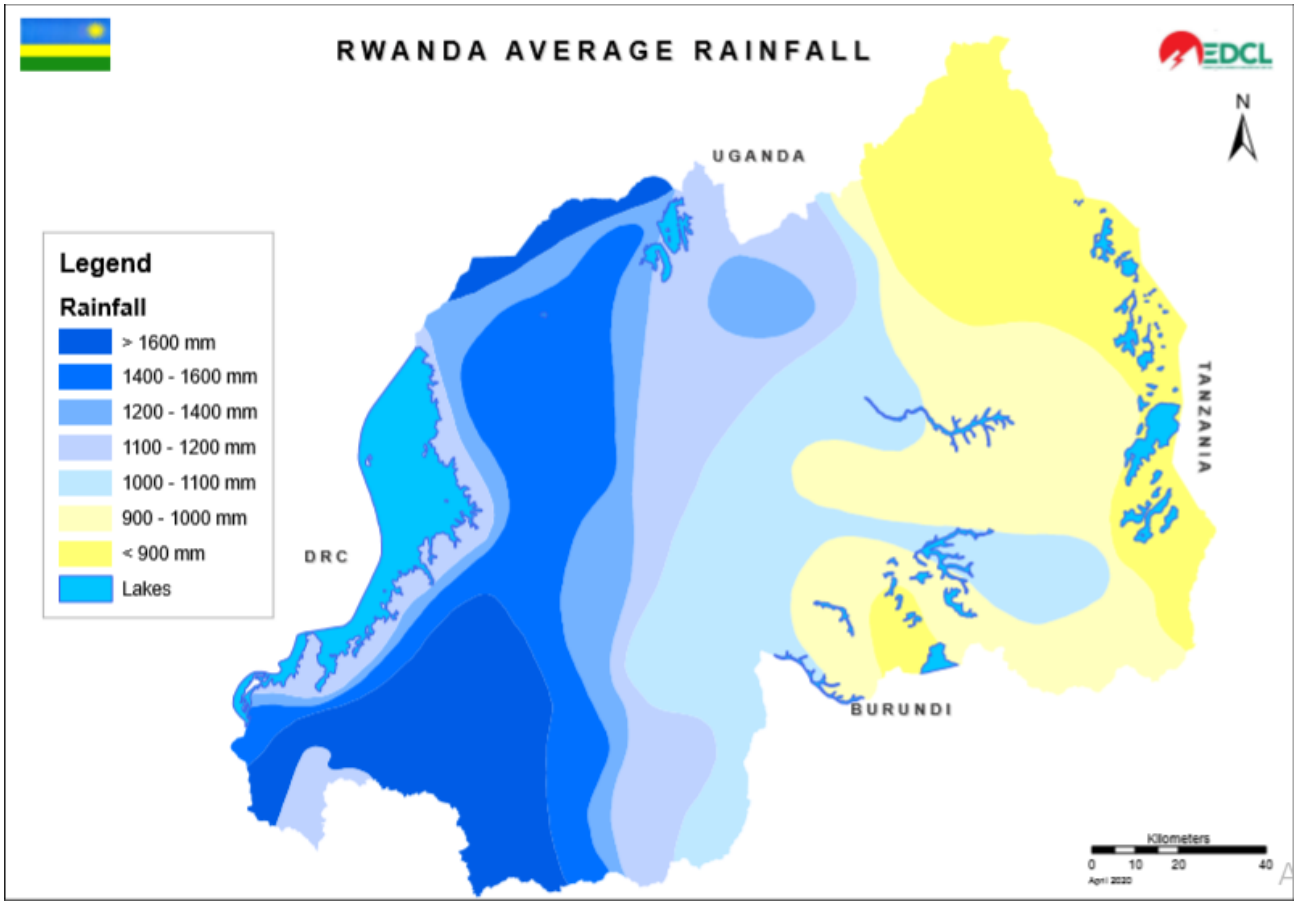
Rwanda enjoys a tropical temperate climate due to its high altitude. The average annual temperature ranges between 16°C and 20°C, without significant variations. Rainfall is abundant although it has some irregularities. Winds are generally around 1-3 m/s. In the high regions of the Congo-Nile ridge, average temperatures range between 15 and 17°C and the rainfall is abundant. The volcanic region has much lower temperatures that can go below 0°C in some places. In areas with intermediary altitude, average temperatures vary between 19 and 21°C and the average rainfall is around 1000 mm /year. Rainfall is less irregular, and sometimes causes periods of drought. In the lowlands (East and Southeast), temperatures are higher, and the extreme can go beyond 30°C in February and July-August. The absolute temperature of 32.8°C was recorded in the Southeast by Karama-Plateau station on the 4th of September 1980. Thermic constraints are more considerable there than in the remaining part of the country. Rainfall is less abundant in that region (700 to 970 mm/year).

Weather in Rwandan is determined by the rainfall patterns. Thus, the climate of the country is characterized by an alternation of four seasons of which two are wet and the other two are dry. However, one can notice that rainfall is generally well distributed throughout the year, despite some irregularities. Eastern and South-Eastern regions (Umutara, Kibungo, Bugesera, Mayaga) are more affected by prolonged droughts while the northern and western regions (Musanze, Rubavu, Nyamagabe and Gicumbi) experience abundant rainfall that usually causes erosion, flooding, and landslides.

The quantity of total annual rainfall varies between 800mm in the North-East of Rwanda (Eastern Umutara) and 1600 mm in the natural forest of Nyungwe and in the high lands of the North-West (Kinigi). The decrease in rainfall is observed in the region of Bugesera (900 mm) and in the Western part of Rubavu district (1200 mm). The increase of rainfall is observed in some regions like Kibungo (Gahororo, 1200 mm); in the South-West (Mibirizi, 1450 mm) and in the natural forest of Gishwati

(1350 mm). The region that is characterized by the highest rainfalls (over the average isohyets of 1200 mm) is in the western half of the country, from Byumba to Kibeho and from Kinigi to Mibirizi including the region bordering Lake Kivu.

Figure 12 **Annual average rainfall distribution**



6.2.2. Relief

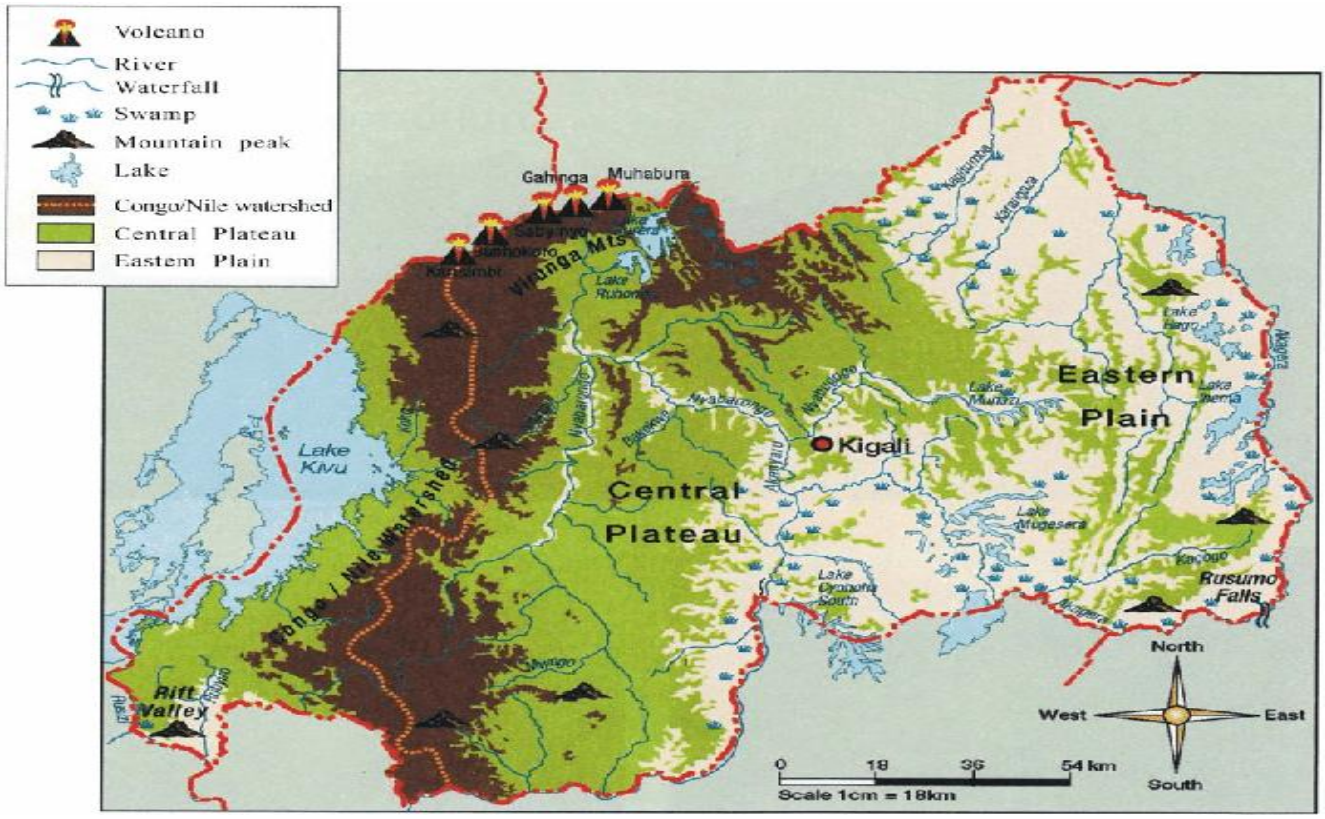
The Rwandan relief is hilly and mountainous with an altitude varying between 900 m and 4507 m. The components of that relief are:

Congo-Nil Ridge over laying Lake Kivu with an altitude between 2500 m and 3000 m. It is dominated in the North-West by the volcanic ranges consisting of five volcanic massifs of which the highest is Karisimbi with 4507 m. **The central plateau** presents a relief of hills with an altitude ranging between 1500 m and 2000 m. **The lowlands of the East** are dominated by a depression characterized by hills with more or less round top and 1000 to 1500 m in altitude. Northern **(BUBERUKA)** highlands, Located near the border with Uganda, include parts of the Northern and Eastern provinces. The lowlands of the South-West in **Bugarama plain** with an altitude of 900 m are part of the tectonic depression of the African Rift Valley.

6.2.3. Catchment and Hydrology

Rwanda has a relatively big quantity of water: rivers, lakes and marshes and occupy a surface area of 211000 ha or about 8% of the national territory (lakes: 128000 ha, rivers: 7260 ha and marshes: 77000 ha).

Figure 13: Rwanda Relief and climate



6.2.4. Surface water

Rwanda has a dense hydrographical network of ± 2 km/km² (length of the superficial flow network by km² of surface). The country is divided into two hydrographical basins with a separating line called Congo-Nile Ridge, moving from the North to the South and ± perpendicular to the volcanic chain, making natural obstacles exchange between the catchment's basins of the Northern Kivu and the Southwest of Uganda and those of Rwanda.

In the West of that line there is the Congolese basin (33% of the surface of the national territory) that drains 10% of water resources of the country. It comprises rivers Sebeya, Koko, Rusizi, Rubyiro, as affluent of Lake Kivu (around 1000 Km2 on the Rwandan side, 490 m of maximum depth), Ruhwa and many other small rivers (around 127 rivers).

In the East of the Congo Nile Ridge there is the Nile basin which covers 67% of the National territory and drains 90% of Rwandan waters by two main rivers namely Nyabarongo and Akagera. The latter is the main affluent of Lake Victoria with an average outflow of 256 m3 /s at Rusumo station and thus considered as the source of the Nile. The basin of the Nile in Rwanda comprises a lot of small lakes

(Burera, Ruhondo, Cyohoha South, Mugesera, Muhazi, Rwampanga, Mihindi, Mirayi and many others). Those lakes are not very deep (5 to 7 m of depth) except for Lake Burera and Ruhondo which are 65 to 173 m deep.

6.2.5. Groundwater

The outflow of the ground renewable water resource is estimated at 66 m^3/s. Out of this, the 22,000 known sources contribute an output of 9 m^3/s. In general, little information is available on ground water resources.

6.2.6. Lakes

Rwanda has some 28 lakes of significant size. Six among the largest are entirely within the national territory: Ruhondo, Muhazi, Mugesera, Ihema, Rwanyakizinga and Burera. Three others, Rweru, Cyohoha and Kivu, are shared with neighboring countries. The largest and most spectacular is Lake Kivu, so large as to seem almost like a sea to the landlocked inhabitants.

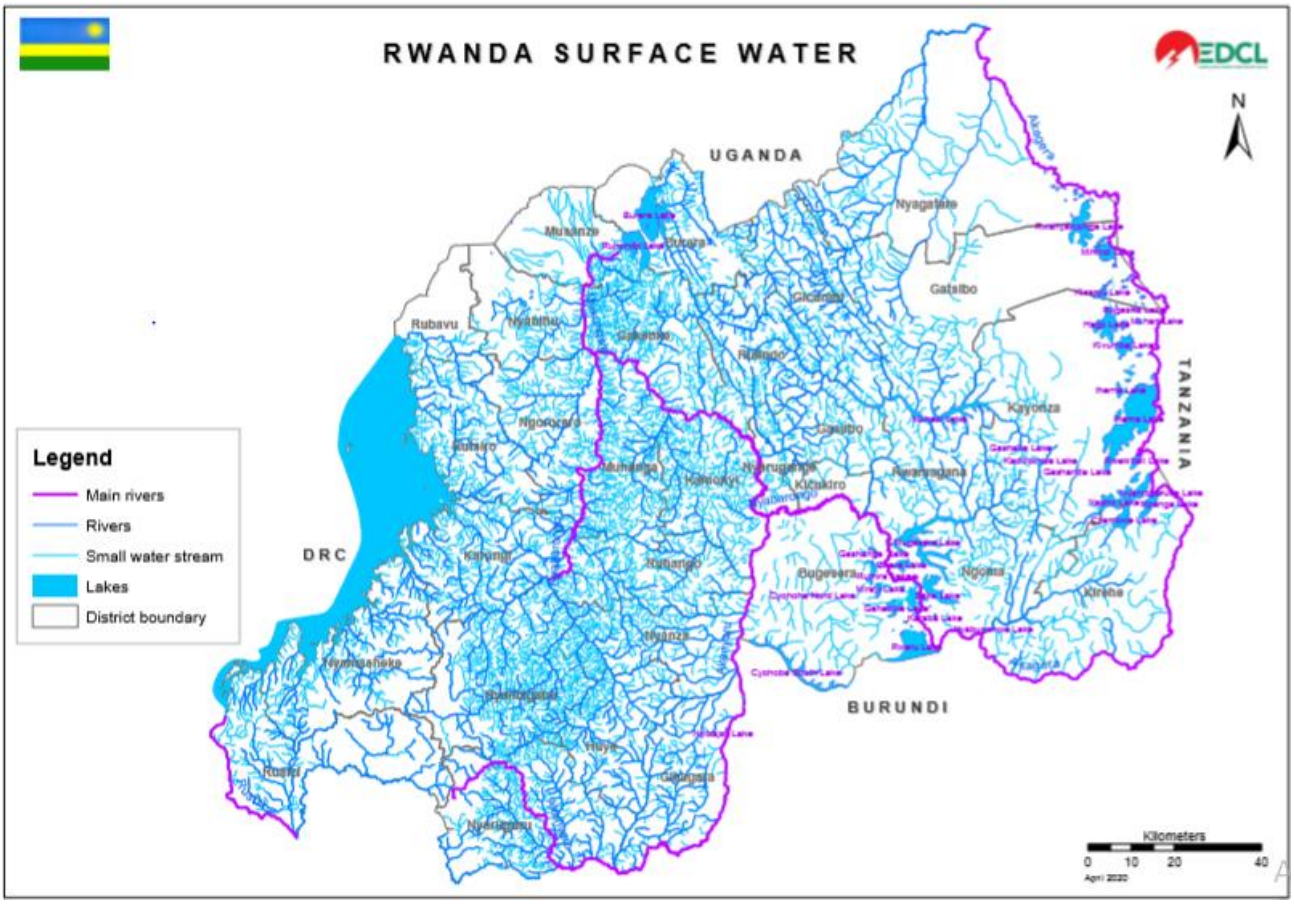
Lake Kivu lies at 1, 460m above sea level and is 90 km long (north-south) and 49 km wide (eastwest). From an average depth of 240 m, it plunges to a maximum depth of 490 m. Lake kivu has a rough, jagged coast and contains numerous islands, including Nkombo and Iwawa.

Lake Kivu lies on the border with Congo in Western Rwanda at the foot of the Virunga Volcanoes. Kivu's shores are densely populated and the principal town on the Rwandan side is Rubavu. Although it is supplied with fish, the lake is poor in fauna but rich in volcanic substance. Great volumes of dissolved methane gases ((~60 km3 STP) that may be developed as energy sources exist in its deep waters. Lake Kivu drains to the south into Lake Tanganyika by the swiftly descending Ruzizi River.

6.2.7. Quality of water

In Rwanda the quality of water is generally good with a pH ranging between 6 and 7.5. Surface water often carries sediments and in mining and volcanic regions, the water can contain arsenic, lead, mercury, fluoride, iodide and other toxic metalloids and heavy metals. The physio-chemical pollution of water is not frequent due to the small level of industrialization and use of agricultural chemical inputs. The microbiological pollution is often observed, and it comes from various domestic wastes and debris carried by rain water towards the natural environment. The pollution of water courses and lakes by the water hyacinth and other harmful aquatic plants is a phenomenon that is very recent and alarming in Rwanda.

Figure 14: **Surface water**



6.2.8. Wetlands

Wetlands cover a total area of 164,000 ha or about 6% of the territory. The wetlands include a variety of ecosystems, ranging from large, permanently flooded swampy peat-lands to smaller, seasonally flooded wetlands with a more mineral soil. The main swamps are Akanyaru (30,000 ha) on the border with Burundi, Mugesera Rugwero in the southeast, Kagera swamps along the Tanzania border in the east, Nyabarongo (10,000 ha) and the Rugezi wetlands (5,000 ha) in the north.

The wetlands serve as troughs for sediment particles and play an important role in the national water balances by acting as a buffer, thus reducing the maximal flow rates during the rainy season and maintaining a relatively high flow rate during the dry season.

Currently, an estimated 94,000 ha have been brought under agriculture, the large majority of this being spontaneous agriculture with maize, sweet potatoes and beans. In addition, the wetlands are used for a variety of traditional activities including the collection of leaves to make handicrafts, extensive grazing and making of bricks. Wetlands also provide a spawning habitat for fish, and are of great significance for biodiversity conservation. The wetlands are composed of marshes, lakes, rivers and brooks representing around 14.9% of the national territory of which 6.3% consist of marshes and 8.6% of lakes, water courses and pools of permanent or seasonal fresh water.

In the highlands of the North-West, there are: lakes Burera and Ruhondo as well as the marshes of Rugezi. In the Central and the East of the country, wide marshes are those of Nyabarongo, Akanyaru

and Akagera rivers. Many cuvette lakes connect with rivers and most of them are located in the Akagera National Park. From the Southeast to the North-West, there are lakes like Cyohoha in the South, Mugesera, Rweru, Sake, Cyambwe, Ihema, Milindi, Rwanyakizinga, Kivumba, etc.

Given the importance that the Government of Rwanda attaches to wetlands, in 2003 Rwanda ratified the Ramsar Convention or convention on wetlands and has already registered on the Ramsar list the site of Rugezi and identified other potential sites that will be registered in the future, like the complex of Mugesera-Rweru, Kamiranzuvu marshes and the wet zones of the Akagera National Park. In addition, an action plan for the implementation of the Ramsar Convention was developed in June 2004. The wetlands ensure several functions and provide numerous services to people. For instance, they ensure control of floods and the recharge of underground waters. They play the role of alleviating the erosive force of water and thus facilitate the deposit of sediments in suspension that could block water courses downstream.

6.3. Geology and soils

6.3.1. Soils

According to the Geological Map of Rwanda, the regional geology consists of pelitic rocks and Quartz Phyllites (Cyurugeyu Superformation), Granites to Granite-Gneisses, Quarzites and Mica-Schists, Amphibolites and Mylonites (Huye Complex) as well as Quartz-Phyllites and Meta-Volcanics (Nyungwe Formation). The greater part of the geological structure is occupied by such lithological varieties of Rocks. Rwanda shows well developed drainage pattern that belongs to dendritic and trellis types. Metamorphic rocks form the major part of the rock mass and some magmatic rocks are also present. Major rock types observed in the area are granitic gneiss, quartzite, schists and amphibolites. The dominant soils are the result of alteration of the granite and the gneiss. Disruption of drainage due to tectonic movements of the Pleistocene caused the formation of alluvial valleys. They consist of alluvium and colluvium in the basin as result of the erosion. They have generally colluvial and alluvial in the valleys around the rivers. The soils of the top of the mountains are products of granite and gneiss and have resisted erosion.

Soils derived from schistose, sandstone and quartzite formations found in the Congo-Nile Ridge and Soils derived from old volcanic materials found in the plateau of the south west of the country. Over the RUEAP subproject area, most of the valley slopes extending from river banks to the top of the ridges are cleared for cultivation of various crops of a seasonal nature. As a result, soil cover is well exposed for potential erosion. A few patches of new forest plantations of eucalyptus and pines can also be seen on the valley slopes.

6.3.2. Use of soils

The exploitation of land employs around 70% of the active population. Land resources are thus limited and coveted resulting in overexploitation and inappropriate use of lands with disastrous consequences on land resources and on environment in general. In mountainous area, steep slope lands are deforested and used for staple crops under high rainfall precipitation, with often accelerated land degradation through water erosion, poorer soil fertility, increased floods and landslides, and overall, food insecurity and poverty. Appropriate land uses combined with soil and water conservation measures then become a must; in some sites, active erosion mainly caused landslide hazards which increase sediments in rivers. Other than that, erosion has also formed gully bodies through the slopes of mountainous area.

Land use activities including infrastructure development may increase the potential of occurrence of landslides and erosion in various ways, which include destabilization of rock masses by cuts in slopes, improper stockpiling of materials, destruction of vegetative cover during site clearing and uncontrolled surface run-off during storms may increase the erosion rate. Riverbanks are composed of alluvial and proluvial loose-fragmental soils. Thus, the activities may increase erosion and landslides rates at various points along the banks of rivers and in some lateral ravines.

Intensive cultivation occurs along the steep slopes predominant in the area without proper soil conservation techniques hence accelerating soil erosion. However, it is worth mentioning that terracing as a measure for soil erosion control is practiced in some parts of the project area. Extensive deforestation to meet energy demands has further reduced the soils ‘ability to withstand the scouring effects of rain in the upland watersheds has had serious downstream implications. When viewed against that background, therefore, it is easy to appreciate that the project would have negligible incremental impact on the rates and overall patterns of erosion. Nevertheless, erosion is of relevance to slope stability, which is in turn relevant to the design of the project and the conduct of operations such as excavation and borrowing. The specific measures will be taken to address these considerations.

6.3.3. Highland soils

The highland soils are particularly prone to erosion and landslides especially regions of the Congo-Nile ridge, valleys and lowlands (peat lands) as well as highland meadows. Soils of foothills of the Congo-Nile Ridge and of other transition regions between the central plateau and highlands are fertile but, due to deforestation and inappropriate agricultural practices, they are vulnerable to erosion.

6.3.4. Soils of the central plateau

The central plateau covers the regions of South and South-East. The soil types are hill Ferro soils and valley histosoils. The slopes of hills are exposed to erosion notably in the case of clay-sandy or

gravely soils.

6.3.5. Soils of the lowlands

They cover the Eastern and South-eastern regions and are Ferro soils with savannah vegetation. Similar to the region of Bugesera, the river-lake complex along Nyabarongo and Akanyaru rivers underwent serious leaching. In addition, the geological structure of soils in those regions allows rain waters to infiltrate deeply into soils, and that can partly explain the lack of runoff waters and shallow brooks.

6.3.6. Soils of valleys

These are soils of histosoil and peat soil types that constitute potential agricultural and energy wealth (case of intermountain basins of Kamiranzovu and Rugezi). In the wide water surfaces of eastern regions like Umutara and Bugesera, as well as the Rusizi region (Bugarama), the valleys are of vertisoil and alluvial types are fertile. The slope slight as they may be, are threatened by erosion due to the weak permeability of soils. The exploitation of peat for fuel production purposes would require a preliminary development plan for swampy areas. In fact, any extraction of peat is associated with drainage and exudation, two factors likely to impact negatively on the crucial role of wet ecosystems and swamps in regulating the hydrology. Moreover, the exploitation of mines and quarries spoils the landscape and more often constitutes a source of soil erosion, water pollution and pose a danger to human health. A good number of queries are not rehabilitated and always left open.

6.3.7. Biological Environment

Rwanda is covered with diverse ecosystems that include mountains, ombrophile forests, gallery forests, savannahs, wet and aquatic zones, wood and agro ecosystems. All these ecosystems have a rich flora and fauna.

6.3.8. Protected areas

The fauna and the flora can be better preserved and protected thanks to the establishment of a system made of protected areas like national parks and forest reserves to which the best management is applied. However, through time and due to human activities, these conservation areas have been reduced considerably.

6.3.9. Forests

Rwanda's remaining natural forests, the Nyungwe Forest, the Gishwati Forest and the Mukara Forest, are highland forests around the volcanoes, have a high degree of biological diversity and rare animal species, such as mountain gorillas, Ruwenzori colobus monkeys and golden chimpanzees. It is

estimated that there are 2150 plant species to be found in Rwanda, with around 700 species of these acknowledged to have medicinal value. Towards the east of the country lies the Akagera National Park, the Mutara game reserve forests galleries and wooded savannahs. Population pressures have already drastically reduced the land area of the natural forests of Rwanda from about 30% to presently fewer than 10% in less than a century. The deforestation of Rwanda's remaining forests is also the result of high fuel wood consumption. Heavily populated and cultivated areas adjacent to the natural forest, as well as the recent wars, have resulted in massive deforestation and loss of genetic diversity within Rwanda's natural forest.

Clearance for farming and pasture land has also contributed to the reduction in forest cover, as well as harvesting for fuel wood and timber for housing and small scale mining. Production of export crops is also a factor in forest destruction: half the forests around the volcanoes in the North were cleared for pyrethrum plantations in the 1960's, and areas around the Nyungwe In southern and western province were cleared for tea plantations. Preliminary estimates indicate that the protected areas and forest reserves were seriously damaged as a result of recent wars. From an estimated pre-1994 total surface area of 417,000 ha, it is thought that they have been reduced to approximately 226,000 ha. Specifically, the Akagera National Park was reduced to less than one-third of its original size when the Umutara prefecture was created in 1996 for the resettlement of returning refugees. The Gishwati Forest has all but disappeared (from a pre-war estimate of 37,000 ha, only about 2,000 ha now remain.

6.3.10. National Parks/Forest Reserves at a Glance

Rwanda has four national parks. They are all protected wildlife reserves and ecosystems and include the Akagera National Park, Nyungwe National Park, Gishwati-Mukura National Park and the Volcanoes National Park. Gishwati-Mukura was created in 2015 and is hence the youngest national park created. The Rwanda Development Board (RDB) is responsible for the overall management of all the national parks, related infrastructure and promoting tourism. The RDB is assisted by other government agencies and ministries. In some cases, like that of the Akagera and Gishwati-Mukura National Park, the government entered into long term agreements with private partners to help run some park activities

These areas are exclusively reserved for the protection of flora and fauna, eco-tourism, biodiversity conservation, and for geological formations of scientific and aesthetic value. The geographical distribution of those parks on the national territory is a guarantee of the conservation of biological diversity representative of the fauna and flora of the country.

6.3.11. Volcanoes National Park

Spanning on a 160 Km2 area in the Northern part of Rwanda, Volcanoes national park is the oldest national park in Africa, created in 1925. It was initially a small area around Karisimbi, Mikeno and

Visoke volcanoes which was gazetted to protect the Mountain gorillas which were facing the threat of extinction as a result of poaching. In 1929, the park was extended into Rwanda and the then Belgian Congo and was named Albert national park managed and run by the Belgian Colonial Authorities. During early 1960s, the park was divided as Rwanda and Congo gained their independence and by the end of that decade, the park was almost half of its original size (340 Km2 to 160 Km2. Volcanoes National Park is home to Mountain Gorilla (Gorilla beringei beringei); golden monkeys (Cercopithecus mitis kandti), Spotted Hyena (Crocuta crocuta), buffaloes (Syncerus caffer), elephants, black-fronted duiker (Cephalophus niger), and bushbuck (Tragelaphus scriptus). The park also harbors 178 bird species including at least 29 endemics to Rwenzori mountains and the Virungas. The Volcano National Park -VNP also host 245 species of plants of which 17 are predominant, including 13 orchid internationally protected, 115 species of mammals, 27 species of reptiles and amphibians and 33 species of arthropods. Some of these species are endemic while others are internationally protected.

Nyungwe National Park Located in the South West corner of Rwanda, Nyungwe National Park is an untouched natural rainforest that is filled with exciting biodiversity. Nyungwe National Park was established in 2004 and covers an area of approximately 1000 km² of rainforest, bamboo, grassland, swamps, and bogs. The nearest town is Rusizi, 54 km to the west. Mount Bigugu is located within the park borders. Nyungwe is surely one of the world's most beautiful and pristine mountain rainforests. It's believed to be one of Africa's oldest forests, staying green even through the Ice Age, which explains its diversity. The Nyungwe forest has a wide diversity of animal species, making it a priority for conservation in Africa. The forest is situated in a region in which several large-scale biogeographical zones meet and the variety of terrestrial biomes provides a great span of microhabitats for many different species of plants and animals. The park contains 13 different primate species (25% of Africa's total) with habituated chimpanzees and 12 other primates species (including a 400-strong troop of habituated Ruwenzori Black & White Colobus), 85 mammal species, 275 species of birds of which 26 are endemic in the Albertin Rift and 3 are on the red list of the IUCN (Bradypterus graueri, Crypto spiza shelleyi and Apdis argentea), 32 amphibian and 38 reptile species and 1068 plant species of which 140 species of orchids, 260 species of ligneous and herbaceous plants, 24 species of trees. Many of these animals are restricted-range species that are only found in the Albertine Rift montane forests ecoregion in Africa. In fact, the number of endemic species found here is greater than in any other forest in the Albertine Rift Mountains that has been surveyed. The forest, which reaches its maximum altitude of 3000 metres above sea level, is of particular interest for the presence of colonies of chimpanzees (Pantroglodytes - Blumenbach, 1775) and Angola colobus (Colobus angolensis - Sclater 1860).

6.3.12. Akagera National Park

The savannah in the North Eastern Rwanda is used as the Akagera National Park; it covers 900km² situated between 1300-1825 m of altitude. This park was created in 1934 to protect animals in three ecoregions: savannah, mountain and swamp. Conserving biodiversity in this ecosystem has been challenging due to increasing pressures, potential loss of habitat and species or lack of up-to-date data, etc.

This park has a set of compounds that define its high importancy, the Akagera major components are: Forest fringed lakes, papyrus swamps, savannah plains and rolling highlands. Akagera has exceptional levels of biodiversity, partly due to its position at the confluence of different vegetation zones. The extensive systems of freshwater lakes and associated papyrus swamps form the largest protected wetland in central Africa. Its biodiversity has a double origin; both native and introduced species make the Akagera fauna and flora diversity. The wildlife in the Akagera National Park comprises 90 species of mammals of which 47 species of big mammals, 530 bird species, 35 fish species, 9 species of amphibians and 23 species of reptiles. Four animal species are protected by the CITES (Convention on International Trade of Endangered Species) namely Loxodonta Africana, Sincerus caffer, Panthera leo and Tragelaphus oryx. The flora of the Akagera National Park is diverse and 6 species of orchids are recorded. The ANP is dominated by the grass savannah and different species of acacia trees; the most found in the forest savannah.

Introduced 'Masai' giraffe, black rhino, elephant, buffalo, zebra and duikers are major herbivorous of the Akagera National Park. Whereas for the large predators only leopard (Panthera pardus) and hyaena (Crocuta crocuta) can still be found in the park. Although lion once occurred throughout Akagera, the population has been wiped out mostly through poisonings by cattle herders seeking to protect their livestock. A reduction in the prey-base due to heavy poaching would also have contributed to their demise. Smaller predators are still well represented with healthy populations of several mongoose species, viverrid species, serval (Leptailurus serval) and side-striped jackal (Canis adustus).

6.3.13. Gishwati-Mukura National Park

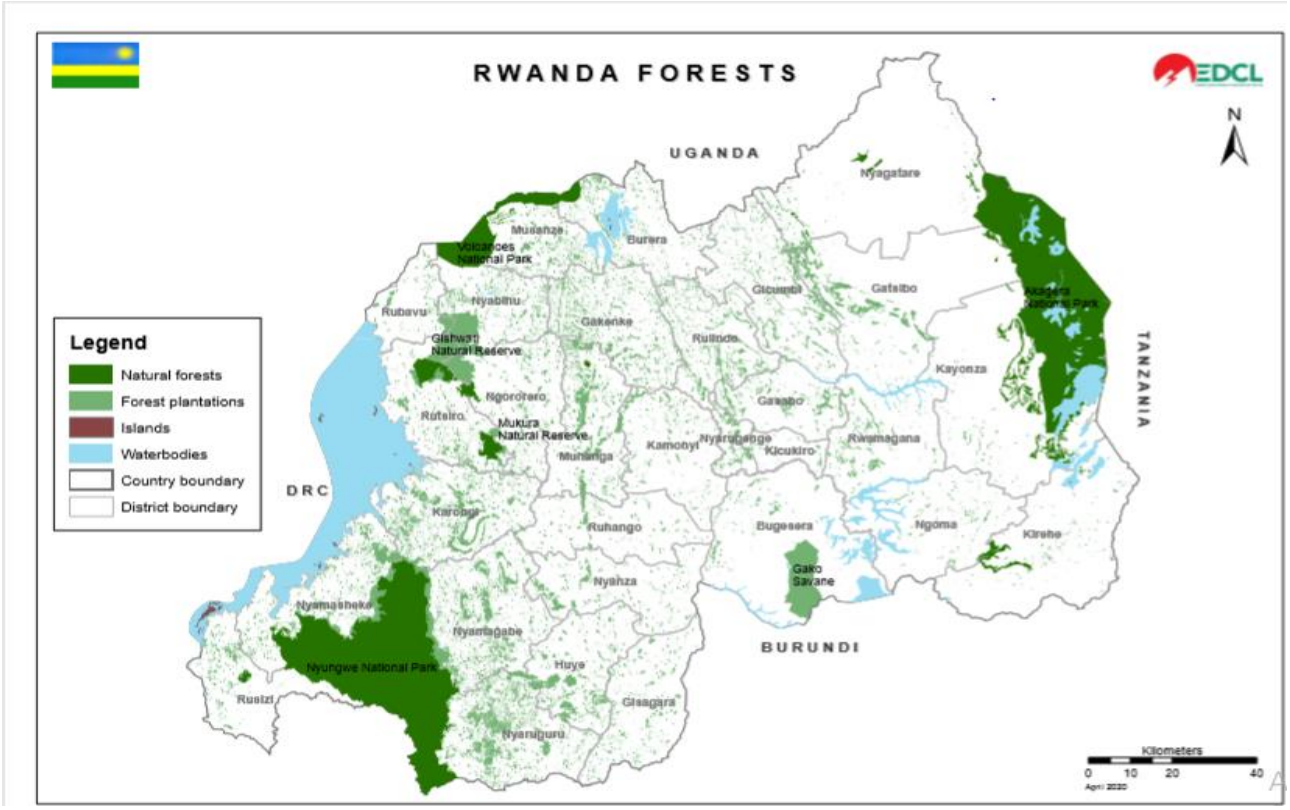
Presently, Gishwati-Mukura forest reserve is known for a wide range of fauna, including four species of primates: the eastern chimpanzee, the golden monkey, the blue monkey, and the l'hoest's monkey (also known as mountain monkey); more than a dozen species of East African chimpanzees; mammals such as red river hog, the black-fronted duiker, the southern tree hyrax, among others. Conservationists have also reported seeing the black and white colobus, another species of primates. The forest reserve also boasts about 60 species of trees, including indigenous hardwoods and bamboo. Gishwati and Mukura natural forests were originally earmarked as forest conservation zones in 1933.

According to the draft law of October 15, 2014, the Gishwati-Mukura National Park will cover a total surface area of 3,427.46 hectares with Gishwati forest (1,439.72 hectares) and Mukura forest (1,987.74 hectares). The government has also dedicated an area covering 992.48 hectares to a subsequent buffer zone to deter human encroachment. Over the past decades, the Gishwati-Mukura area was nearly depleted largely due to resettlement, livestock farming and smallholder farms in the aftermath of the 1994 Genocide against the Tutsi.

Relic forests and gallery forests The Gishwati forest that covered 21.000 ha before 1981, consisted of only 600 ha in 2002. The natural forest of Mukura that stretches on 3.000 ha in 1960 covered only 800 ha in 2002. Regarding tree species and altitude, it is similar to that of Gishwati (2000~3000 m). Relict forests and savannahs in the East are located around the Akagera Park and have a variety of endemic and rare species whose majority is used in traditional medicine. Gallery forests accommodate an important biodiversity with endemic and rare species. That is for instance the case of the Blighia unijugata, Grewia forbese, Rhus vulgaris, Pterygota mildbraedii and Ficus sp.

In general, for a period of about 40 years, the surface area of the natural forests of Rwanda underwent a decrease of about 65% between 1960 and 2002. The search for arable lands, extensive farming, illegal felling of forests for firewood, production of wood for charcoal and poles for building in urban areas, as well as a land mismanagement have drastically contributed to the reduction of the surface area of forests.

Figure 15: Forests in the program area



6.4. Biodiversity of wetlands

The ecosystems of the Rwandan wetlands inhabits a rich biological diversity in terms of vegetation and animal species (more than 104 plant species have been identified), except for Lake Kivu, Bulera and Ruhondo that have some liminologic problems. The Lake Kivu contains a very poor aquatic flora and the density of the phytoplankton is relatively low due to the lack of mixture of layers with a biozone limited at 60 m to 70 m (the nutrients are found at the bottom of the lake). The ichthyologic fauna is also poor with 31 fish species due the volcanic origin of the lake. Most lakes of the Akagera National Park are very rich in biodiversity with phytoplankton, fish species and ornithological fauna. The flora is dominated by the Cyperus, Phragmithes, Phinix, etc. The Water Hyacinth (Eichornia crassipes) is present and has started spreading covering more important surfaces of the lakes, thus posing a threat to their biological diversity. Some lakes like Cyambwe, Rwampanga and Rweru are particularly rich in hippopotamuses and crocodiles. One can also find many other lakes such as Nasho, lakes of Gisaka and Bugesera that contains phytoplankton that is very rich in biodiversity and flora that is mainly dominated by papyrus with Cyperus papyrus mixed with Miscandium violaceum and Nymphea nouchallii. All these lakes are associated with gallery forests onshore or on small islands. Concerning the Northern lakes (Bulera and Ruhondo), the aquatic flora and fauna are poor due to the physico-chemical situation unfavourable to their development and the isolation of the two lakes. The concentration of the plankton is less important in Lake Bulera than in Ruhondo. They have 48 species grouped in 4 families (chlorophyceous, Cyanophyceous, pyraphytes and bacillariophyceous). Lake Muhazi is land locked, isolated, and its ichthyologic fauna is very limited. One can find three endemic species and other nine introduced from outside. The lake is very rich in phytoplankton.

The macroflora of the marshes is mostly composed of wide spaces of papyrus with some zones of Miscanthidium. The low layer is covered with Cyclosorus stratus. The fauna of big rivers and associated marshes comprises ungulates, carnivores, primates, rodents, lagomorphous, insectivorous and birds.

6.4.1. Biodiversity in agricultural systems

Demographic pressure and intensive agricultural practices in combination with diversified agropastoral practices; deforestation, bush fires and urbanization have disrupted the ecosystem functions. These changes caused secondary formation consisting essentially of graminaceous plants, numerous seasonal or perennial species alternating with crops. Agricultural arable land presently covers around 52% of the total surface area of the country and is permanently cultivated (RNRA 2012). The time between two growing seasons is the only period of respite. These areas have various crops that play an essential role in the national economy. These crops are usually grouped in two categories: subsistence and cash crops. Some of the food crops include; sorghum, beans (Phaseolus

vulgaris), eleusine (Eleusine corocana), Colocases (Colocasia antignorum), maize (Zea mays), rice (Oryza sativa), wheat (Triticum sp), barley (Hordeum vulgare), peas (Pisumsativum), soja bean (Soja hispada), peanut (Arachis hypogea), sweet potato (Ipomea durcis), potato, cassava (manihot esculanta) and banana (Musa). The importance of each crop varies according to regions. Some crops, like bananas, potatoes, different varieties of wheat, sorghums and beans are subject to high commercial trade. Potatoes, beans, cassava and bananas are present everywhere for the daily diet of the people. The cash crops are very few. They are limited to coffee, tea and pyrethrum.

6.4.2. Pastoral zones

In Rwanda, the essential part of animal husbandry is limited to the family and a small number of animals per household. As agriculture occupies the biggest portion of land, the cows graze in paddock, some parts of marginal lands and limited pasturelands mainly Gishwati national reserve and Umutara. This obliges farmers to adopt the semi-permanent farming and grow fodder crops such as Tripsacum laxum, Setaria spp, Desmodeum spp, Pennisetum purpureum, Mucuna pruriensis, Cajanus cajan, Calliandra calothyrsis, Leucaena diverifolia, Sesbania sesban, etc. However, we can notice the development of ranching in Umutara and Gishwati. Other pastoral land is very limited and distributed all over the country. These areas are prone to bush fires, trampling and sometimes overgrazing. The latter is the main cause of reduction of the biological diversity as it exterminates the most precious species along with pyrophyle species with small bromatologic value such as Eragrostis spp, Sporobalus spp and Digitaria spp.

6.4.3. Woodlands

Tree planting in Rwanda was limited to some plants around households such as Ficus thoningii, Euphorbia tirucalli, Erythrina abyssinica, Vernonia amygdalena, Dracaena afromontana, etc., but the cultivation of woody perennials for timber, energy generation or other services was not part of the customs. That resulted in a massive exploitation that quickly proved its limits. The first forest plantations were created in 1920 and 1948 and only consisted of Eucalyptus. Later on, other species were introduced. These were namely Pinus spp, Callistris spp, Grevillea robusta, Cedrella spp, Cupressus. The Arboretum of Ruhande (RAB Station) has 206 species among which 146 feuillus, 56 resinous and a species of bamboo. Those species proved to be dangerous for the biological patrimony because they used to drain and acidify places that are already acid, what caused the reduction or even the extermination of the undergrowth. Thus, planting those species would lead to erosion. The covered surface area was estimated at 256,300 hectares in 1998. Despite efforts of diversifying tree species, we estimate that 99% of trees consisted of Eucalyptus spp.

6.5. Socio-economic and Environment

6.5.1. Population and Demographic Characteristics

6.5.1.1. Gender distribution of the population per Administrative District

In a bid to promote a sustainable and equitable development as a subsequent impact of any development projects, gender needs to be mainstreamed into the day-to-day development initiatives. This is important for the design and implementation of projects that are responsive to the practical needs of women, households, and to those of communities in general.

Table 12. Gender thematic distribution in 27 administrative Districts

#	Administrative District	Number of females per 100 males	Sex of the Household-heads: Male-Headed	Sex of the Household-heads: Female-Headed	Sex of the Household-heads: De facto Female-Headed
1	Nyanza	108	67	28.1	4.9
2	Gisagara	114	60.1	33.5	6.4
3	Nyaruguru	116	68.3	25.3	6.4
4	Huye	110	59.7	31.6	8.8
5	Nyamagabe	104	69.5	25.3	5.2
6	Ruhango	108	63.9	28.2	8
7	Muhanga	110	65.9	26.9	7.2
8	Kamonyi	105	68.7	24.6	6.6
9	Karongi	104	68.4	23.7	7.9
10	Rutsiro	109	75.5	20.7	3.8
11	Rubavu	108	70.1	23.1	6.8
12	Nyabihu	109	66.5	26.7	6.8
13	Ngororero	120	60.7	27.5	11.9
14	Rusizi	102	72.1	22.7	5.1
15	Nyamasheke	115	67	28.7	4.3
16	Rulindo	105	68.1	27.6	4.3
17	Gakenke	107	67.7	23.9	8.3
18	Musanze	120	70	20.5	9.4
19	Burera	114	61.8	26.3	11.9
20	Gicumbi	111	73.9	22.5	3.6
21	Rwamagana	103	66.4	27.4	6.2
22	Nyagatare	110	71.1	24.1	4.9

#	Administrative District	Number of females per 100 males	Sex of the Household-heads: Male-Headed	Sex of the Household-heads: Female-Headed	Sex of the Household-heads: De facto Female-Headed
23	Gatsibo	106	71.6	25.1	3.3
24	Kayonza	110	62.6	26.2	11.2
25	Kirehe	110	68.5	25.3	6.2
26	Ngoma	116	66.2	27.8	6
27	Bugesera	112	70.6	23.7	5.7

Source: EICV5

The table above shows that in all administrative districts, the female population in all thematic is greater than the male population which shows that female will have to play the big role in this project implementation and therefore contribute to the development and increment of household income which increase also the role of the woman in the society. As one of the gender mainstreaming strategies, the project has prepared the gender action plan (GAP) which should be implemented to make sure that the woman is not left behind by the project but ensures their full involvement in the project activities as shown that they represent a big number in the population.

6.5.1.2. Education

It has been observed almost everywhere that education can help lift someone out of poverty when well educated. It is also the case that children from poor households tend to get less education than their more-affluent peers. Both effects appear to hold true in Rwanda (EICV5).

While 13% of household heads have a secondary education or higher, the figure is 18% for the non-poor and just 2% for the poor; and while 57% of the non-poor have no school diploma or certificate, the figure is 79% for the heads of poor households. Between 2014 and 2017 the proportion of those with a Hight school certificate, or bachelor's degree or higher, rose from 6% to 8%, while the fraction of those without a certificate fell by just over two percentage points.

Table 13. Education of the population in the project area by gender and age

Administrative District	population aged 6 and above who have ever attended school	Percentage of the population aged between 6 and 30 who have attended school	Net Attendance Rate (NAR) at primary school Male	Net Attendance Rate (NAR) at primary school Female	Net Attendance Rates (NARs) in secondary school Male	Net Attendance Rates (NARs) in secondary school Female	Literacy rate of the population aged between 15 and 24	Literacy rate of the population aged 15 above	Computer literacy rate of the population aged between 15 and 24	Computer literacy rate of the population aged 15 and above	Population aged between 16 and 30 who attended tertiary education
Nyanza	86.8	64.2	88.6	88.4	20.5	25.1	91.6	72.1	8.8	5.7	2.1
Gisagara	83.5	51.8	79.5	86.8	7.5	16.3	79.7	64.5	6.7	5.0	1.8
Nyaruguru	82.3	63.5	86.0	86.9	15.4	23.2	82.0	63.5	6.6	5.8	3.1
Huye	86.9	56.7	83.7	84.6	17.0	23.5	85.1	68.0	4.9	5.3	2.4
Nyamagabe	85.3	62.6	90.8	91.3	17.1	19.6	86.1	70.4	4.3	3.9	1.0
Ruhango	89.7	65.8	89.2	94.7	20.8	21.1	81.3	70.5	15.4	7.5	3.5
Muhanga	88.4	58.6	89.8	95.4	19.6	24.8	79.5	72.5	11.1	9.4	4.1
Kamonyi	90.5	61.6	88.1	90.5	20.6	25.0	92.3	76.7	5.6	5.2	2.1
Karongi	86.3	64.9	90.5	92.2	18.8	23.4	90.0	71.5	9.2	6.8	2.6
Rutsiro	81.4	58.7	85.5	86.9	22.0	21.5	88.2	64.0	3.6	2.7	0.7
Rubavu	84.1	57.8	88.0	84.2	26.2	25.5	84.7	70.9	13.2	13.1	4.8
Nyabihu	86.5	59.8	87.2	84.8	21.8	24.1	84.6	67.2	7.5	5.1	1.9
Ngororero	84.0	58.6	88.7	89.4	10.9	12.5	87.3	66.2	3.8	2.8	0.4
Rusizi	88.5	59.9	87.6	89.2	21.6	24.6	81.3	67.4	7.1	4.9	0.7
Nyamasheke	87.4	65.7	89.9	91.3	19.8	28.0	92.0	74.7	10.6	6.4	1.8
Rulindo	87.5	57.2	92.1	86.3	20.9	33.6	89.4	74.4	6.9	6.5	2.8
Gakenke	87.2	60.9	90.4	89.4	19.3	24.8	85.2	70.1	9.5	6.2	1.5
Musanze	88.6	59.6	90.5	93.6	24.2	36.9	87.3	74.2	13.2	11.5	3.6

Administrative District	population aged 6 and above who have ever attended school	Percentage of the population aged between 6 and 30 who have attended school	Net Attendance Rate (NAR) at primary school Male	Net Attendance Rate (NAR) at primary school Female	Net Attendance Rates (NARs) in secondary school Male	Net Attendance Rates (NARs) in secondary school Female	Literacy rate of the population aged between 15 and 24	Literacy rate of the population aged 15 above	Computer literacy rate of the population aged between 15 and 24	Computer literacy rate of the population aged 15 and above	Population aged between 16 and 30 who attended tertiary education
Burera	84.4	58.2	93.3	94.2	20.8	21.1	89.2	68.5	8.3	6.4	1.1
Gicumbi	85.6	59.6	90.1	91.0	20.6	24.9	90.3	72.5	6.4	5.4	2.3
Rwamagana	88.2	55.8	84.9	91.3	22.7	26.4	91.3	78.1	10.3	8.1	1.5
Nyagatare	84.9	55.5	76.9	79.7	15.9	22.6	84.4	71.4	6.1	4.2	1.5
Gatsibo	84.9	59.6	86.4	86.7	11.0	20.8	84.7	67.0	5.4	4.2	1.8
Kayonza	85.8	58.6	79.2	81.6	14.0	22.9	82.4	70.4	7.0	5.4	0.4
Kirehe	87.5	60.9	82.9	87.9	17.3	18.9	82.3	70.2	3.9	2.7	0.9
Ngoma	85.9	60.4	87.1	88.5	21.2	24.1	85.5	71.5	11.7	7.7	4.1
Bugesera	84.8	57.0	85.9	82.0	16.2	16.9	85.7	72.4	8.0	6.7	2.1

Source: EICV5

As the table above shows, the literacy rates decrease as the ages increases, which shows the efforts of the Government of Rwanda among the population and all children benefiting the free education and fighting children drop out. However the computer literacy is still low and even very low in very rural areas like Rutsiro and Kirehe administrative districts whereas in urban like districts like Rubavu, Musanze and Muhanga administrative districts the rate is a bit high exception done by Ruhango with higher rate though rural administrative district and Huye with low rate though it is the urban administrative district. This exception may be coming from chances in the samples.

6.5.1.3. Poverty distribution per administrative District

According to EICV5 report, the main poverty line is set at RWF 159,375 per adult equivalent per year in the prices of January 2014. This is the same poverty line that was used to measure poverty in 2014 using the EICV4 data, and a detailed discussion of how the line was chosen may be found in the EICV4 poverty profile report. Extreme poverty is measured using a poverty line of RWF 105,064 per adult equivalent per year, again in the prices of January 2014. This is the cost of buying enough food to provide an adequate number of calories, with a diet that reflects the observed behavior of poor households, but it does not make any allowance for non-food spending. The key finding from the EICV5 survey is that the headcount poverty rate – which measures the percentage of people who are poor – was 38.2% in 2017. This is slightly lower than the poverty rate of 39.1% observed in 2014, however, the difference between the poverty rates of 2014 and 2017 is statistically insignificant.

The table below shows the poverty and extreme poverty distribution in the project area

Table 14.Poverty and extreme poverty distribution in 27 Administrative Districts.

#	Administrative District	EICV5 Poverty	EICV5 Extreme Poverty
1	Nyanza	46.5	16.0
2	Gisagara	55.6	25.6
3	Nyaruguru	52.4	28.1
4	Huye	40.2	12.9
5	Nyamagabe	48.6	17.7
6	Ruhango	38.0	15.0
7	Muhanga	32.6	13.8
8	Kamonyi	22.3	8.7
9	Karongi	52.7	21.3
10	Rutsiro	49.5	24.4
11	Rubavu	35.7	14.6
12	Nyabihu	46.8	18.0
13	Ngororero	47.7	20.8
14	Rusizi	33.5	12.8
15	Nyamasheke	69.3	41.5
16	Rulindo	54.2	23.2
17	Gakenke	34.2	13.1
18	Musanze	40.7	18.1
19	Burera	49.8	19.9
20	Gicumbi	34.7	13.4

#	Administrative District	EICV5 Poverty	EICV5 Extreme Poverty
21	Rwamagana	18.9	4.8
22	Nyagatare	44.8	20.1
23	Gatsibo	42.1	18.8
24	Kayonza	26.7	8.5
25	Kirehe	44.6	18.5
26	Ngoma	37.8	14.0
27	Bugesera	40.3	17.8

Source: EICV5

The low poverty rates in the city of Rwamagana district are evident, as are the relatively high poverty rates in Nyamasheke administrative district of Western Province and Nyaruguru as well as in Gisagara administrative districts of Southern Province respectively.

According to EICV 5 Poverty rates and the distribution of the poor are very important for targeting purposes. A government intervention that helps the rural population would help 93% of the poor; on the other hand, 57% of the benefits would go to the non-poor, since the rural poverty rate is 43%. The national poverty rate of 38.2%, just 2.8 percentage points are attributable to urban poverty, while the remaining 35.4 percentage points are due to rural poverty, which strengthen the need of Rural Electrification as a way to alleviate poverty among the population.

6.5.2. Energy sources of Households

Energy is the essential in the community lives and is taken as a measure of environmentally friendly the community is becoming through the use of energy sources with less CO2 emissions and environmental degradation. The table below summarizes the source of fuel in project area and give a clear picture of which effort is needed for climate resiliency and poverty alleviation in the Rwandan community.

Table 15.Energy sources distribution in 27 administrative Districts

#	Administrative District	Primary fuel used for lighting: Electricity distributor	Primary fuel used for lighting: Oil Lamp	Primary fuel used for lighting: Firewood	Primary fuel used for lighting: Candle	Primary fuel used for lighting: Lantern	Primary fuel used for lighting: Solar panel	Primary fuel used for lighting: Batteries	Others	Primary fuel for cooking: Firewood	Primary fuel for cooking: Charcoal	Primary fuel for cooking: Crop waste	Others
1	Nyanza	14	0	2	2	5	63	14	0	94	6	0	1
2	Gisagara	10	0	12	3	2	65	7	1	96	3	0	1
3	Nyaruguru	9	0	13	5	1	63	7	1	96	4	0	1
4	Huye	14	2	6	7	5	54	12	1	88	11	0	0
5	Nyamagabe	9	1	10	5	0	66	10	0	96	3	0	0
6	Ruhango	20	2	2	3	5	65	3	0	95	3	1	1
7	Muhanga	20	2	3	4	4	61	7	0	89	10	0	0
8	Kamonyi	18	4	1	8	5	58	6	1	89	10	1	0
9	Karongi	14	1	5	2	1	56	21	0	92	7	0	0
10	Rutsiro	11	2	8	5	0	59	14	1	97	3	0	0
11	Rubavu	41	2	7	14	3	32	0	1	59	40	0	1
12	Nyabihu	17	1	7	9	3	60	2	2	88	12	0	0
13	Ngororero	7	1	13	2	2	67	8	1	97	3	0	0
14	Rusizi	32	3	4	5	1	43	11	1	86	12	0	1
15	Nyamasheke	22	4	6	5	2	46	15	1	98	2	0	0
16	Rulindo	15	1	2	7	0	61	10	4	94	6	0	1
17	Gakenke	12	1	3	1	2	75	5	1	97	2	0	1
18	Musanze	32	1	8	13	1	43	2	0	81	19	0	0
19	Burera	18	1	4	3	3	66	6	0	92	6	2	0
20	Gicumbi	12	1	2	10	1	71	2	1	96	3	0	0

#	Administrative District	Primary fuel used for lighting: Electricity distributor	Primary fuel used for lighting: Oil Lamp	Primary fuel used for lighting: Firewood	Primary fuel used for lighting: Candle	Primary fuel used for lighting: Lantern	Primary fuel used for lighting: Solar panel	Primary fuel used for lighting: Batteries	Others	Primary fuel for cooking: Firewood	Primary fuel for cooking: Charcoal	Primary fuel for cooking: Crop waste	Others
21	Rwamagana	28	3	0	8	4	46	9	1	77	18	4	1
22	Nyagatare	15	0	0	5	1	67	11	0	90	6	2	2
23	Gatsibo	14	1	1	4	1	62	17	0	92	5	3	0
24	Kayonza	19	4	1	5	12	48	11	1	92	8	0	0
25	Kirehe	16	1	1	1	17	57	6	0	95	4	0	1
26	Ngoma	18	3	2	2	27	39	8	2	86	8	5	1
27	Bugesera	19	0	1	5	0	70	4	0	91	8	0	1

Source: EICV5

According to the table above, it is clear that the project area community still relies on the forest felling to cook and this is an indicator of what happens inside their homes. The much depending on firewood increases the risk of indoor air pollution which is source of many respiratory diseases in the community without forgetting the CO2 emissions from this burning. The charcoal is also used by many populations in urban like districts mostly secondary cities like Rubavu, Musanze, Huye, Muhanga and Kamonyi with a high rate use of charcoal with Rwamagana also among the big users of charcoal. All these energy sources/fuels are the main cause of deforestation and emit a great deal of CO2 emissions, hence the need to promote the fuel which is environmentally friendly and make it affordable to the community members. Against this need the clean cooking solutions and LPG constitutes a response to this environmental issue.

6.5.3. Human settlements

The Rwandan settlement pattern has been scattered since time immemorial. It has for long been characterized by the traditional use of land associated with the ancestral lifestyle, but which does not

correspond any more to the present environmental and economic constraints. It is in that perspective that the present policy of the Government of Rwanda regarding settlement consists of encouraging a clustered habitat commonly known as «IMIDUGUDU».

In most urban areas, Rwanda has not yet developed city master plans. There are only plans of different towns of which some have expired and need updating. Urban centers developed spontaneously without taking environmental aspects into consideration. Sanitary facilities are insufficient and sometimes inadequate in city centers. In suburban zones known as spontaneous quarters, solid wastes are piled in disorder, drinking water is rare, and rainwater draining gutters are insufficient. Thus, diseases are frequent in those areas, the degradation of environment is more pronounced and living conditions are poor.

City development should normally be based on urban planning documents like the "Urban management master plan (SDAU)". Presently, only two centers have got that kind of document and the SDAU of Kigali and Rwamagana are under development. The policy of city development which is under finalization is aimed at supporting districts in their efforts to quickly get urban planning documents integrating environmental aspects.

6.5.4. Cultural Heritage

As per ESS8, the objective of the Cultural Heritage is to protect it from the adverse impacts of project activities and support its preservation, to address cultural heritage as an integral aspect of sustainable development, to promote meaningful consultation with stakeholders regarding cultural heritage and finally promote the equitable sharing of benefits from the use of cultural heritage. The cultural heritage encompasses tangible and intangible heritage, which may be recognized and valued at a local, regional, national or global level, as follows: Tangible cultural heritage, which includes movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Tangible cultural heritage may be located in urban or rural settings, and may be above or below land or under the water; Intangible cultural heritage, which includes practices, representations, expressions, knowledge, skills as well as the instruments, objects, artifacts and cultural spaces associated therewith that communities and groups recognize as part of their cultural heritage, as transmitted from generation to generation and constantly recreated by them in response to their environment, their interaction with nature and their history.

Rwanda's cultural heritage, seen from a general perspective, is rich and diversified. But it has, for long, been regarded as being a sector of minor importance, and, because of such consideration, failed to play its basic role of developing the nation.

However, there is no doubt cultural heritage is one of the main pillars for sustainable development.

Rwanda's cultural heritage is rich and diversified; it contains Sacred hills, forests and trees with legendary history, traditional huts and royal palace countrywide, churches and other colonial buildings and structures, caves and rocks with bas-reliefs marking the legendary or historical events that have occurred on the site, thermal springs and wells used for ritual purposes, genocide against Tutsi memorial sites and designated burial sites which are located in different administrative districts where the project activities will be implemented.

The environmental and social assessment also takes into consideration the significance of intangible cultural heritage that may be materially affected or put at risk as a result of the project. For example, project activities may require cutting of trees or the movement of boulders that are used for cultural or religious practices and are considered sacred. If potential risks and impacts are identified, measures and actions to avoid, mitigate, and/or manage them are put into place. For example, it may be possible to arrange for protection in place, or for scheduled visitations, or community-sanctioned movement of such sacred items. Protection and preservation of national cultural heritage consolidate national unity, social cohesion, cultural freedom and recognition of community identity.

Therefore, Government of Rwanda and its partners have the obligation to preserve and perpetuate this cultural heritage for present and future generations because, on the one hand, it brings in a lot of money as do agriculture, industry, gold or oil and, on the other, it maintains harmony and social balance between peoples. A chance finds procedure is a project-specific procedure which will be followed if previously unknown cultural heritage is encountered during project activities. It will be included in all contracts relating to construction of the project, including excavations, demolition, movement of earth, flooding or other changes in the physical environment. The chance finds procedure will set out how chance finds associated with the project will be managed. The procedure will include a requirement to notify relevant authorities of found objects or sites by cultural heritage experts; to fence-off the area of finds or sites to avoid further disturbance; to conduct an assessment of found objects or sites by cultural heritage experts; to identify and implement actions consistent with the requirements of this ESS and national law; and to train project personnel and project workers on chance find procedures, this have been detailed in Environmental and Social Commitment Plan (ESCP) developed under this Project, a sample of the chance find procedure is attached to this SEA.

6.5.5. Agriculture

The agriculture production system in all 27 district and is based on small family exploitations whose production is consumed by the owners at more than 80 %. The systems of crops are complex, based on the diversification of productions and the association of crops. Seven main crops, namely banana, bean, sweet potato, cassava, sorghum and potatoes, of which the first five are present in 90 % of production units and constitute the common basis for all the regions of Rwanda.

Great investments in modern agriculture and research-based agriculture using fertilizers and improved seeds on consolidated lands, pumping irrigation on hillsides, etc., have allowed great productions of maize, soya beans, voluble beans, wheat, Irish potatoes and rice. This achievement results in Ministry of Agriculture (MINAGRI)'s decision of putting in place specialized centers for policy implementation and research under Rwanda Agriculture and Animal Resources Development Board (RAB). The recent survey has proved that the agriculture is the most important sector of the Rwandan economy and contributes considerably to poverty reduction. For instance, from 2011 to 2013 the total production of vegetables increased by 9% and their exports while fruits production increased by 18%. Their exports counted an increase from 15.4 ('000 Tons) in 2012 which generated 5,013,260 USD to 31.9 ('000 Tons) which generated 9,494,442 USD (see Rwanda Statistical Yearbook, 2014).

However, the extensive agriculture practiced by the majority of Rwandan population contributes to the degradation of environment. Moreover, the agricultural intensification at the level of projects was often realized without taking into account environmental drawbacks accrued from inputs like (mineral fertilizers, pesticides, herbicides and used techniques).

6.5.6. Animal husbandry

The pastures consisted mainly of family fallows and marginal lands considered as inappropriate to agriculture such as the undergrowth. The limited subsisting pastoral areas were badly used because farmers did not master the management of pastures. That was showed by the overgrazing and overexploitation caused by trampling, degradation and disappearance of vegetation cover. The MINAGRI policy of keeping cattle in shed known as "zero grazing" program has significantly limited environmental degradation and crops damage, which was also a source conflicts between neighbors but this program also helps the people to have sufficient fertilizer household-based and many of the farmers are mobilized to make and use organic compost from their cows and other natural vegetation.

Moreover, the demographic pressure has progressively led to the semi intensification or intensification of fodder resources used to feed animals. Hence, animal husbandry, essentially made of cattle, was progressively transformed. This resulted in considerable increase of milk production from 257,450 in 2008 to 628,266 tons in 2013 and beef meat production increased from 24,889 to 29,807 tons in 2013 (see Rwanda Statistical Yearbook, 2014).

Animal husbandry has also contributed to poverty reduction through a RAB-MINAGRI program called "One Cow per Every Poor household in Rwanda". This program has decreased the number of malnourished children countrywide and has considerably contributed to poor household food security and assisted the poor household to increase the agriculture production due to the availability of the organic manure.

Table 16.Economic activities of the population in 27 Administrative Districts

District	Total number of jobs carried out and job status: Wage farm	Total number of jobs carried out and job status: Wage non-farm	Total number of jobs carried out and job status: Independent farmers	Total number of jobs carried out and job status: Independent Non-farm	Total number of jobs carried out and job status: Unpaid non-farm and other	Distribution of workers and broad economic activity: Agriculture	Distribution of workers and broad economic activity: Industry	Distribution of workers and broad economic activity: Services
Nyanza	63	56	146	28	3	213	32	51
Gisagara	86	47	157	27	4	244	23	54
Nyaruguru	60	44	131	30	4	192	26	51
Huye	73	65	141	32	1	216	29	66
Nyamagabe	88	68	167	48	8	259	40	79
Ruhango	57	43	130	23	1	190	28	36
Muhanga	53	65	146	29	4	204	30	62
Kamonyi	72	69	168	26	4	243	42	54
Karongi	75	62	149	34	4	228	39	59
Rutsiro	72	37	154	25	2	229	23	37
Rubavu	73	78	108	64	8	185	36	110
Nyabihu	81	39	121	26	3	205	23	41
Ngororero	77	68	176	40	8	260	45	65
Rusizi	92	95	199	55	11	297	56	100
Nyamasheke	66	69	168	29	3	243	38	52
Rulindo	68	60	153	27	3	221	41	49

District	Total number of jobs carried out and job status: Wage farm	Total number of jobs carried out and job status: Wage non-farm	Total number of jobs carried out and job status: Independent farmers	Total number of jobs carried out and job status: Independent Non-farm	Total number of jobs carried out and job status: Unpaid non-farm and other	Distribution of workers and broad economic activity: Agriculture	Distribution of workers and broad economic activity: Industry	Distribution of workers and broad economic activity: Services
Gakenke	92	66	183	38	2	280	49	51
Musanze	75	71	140	38	4	218	37	73
Burera	80	48	153	43	4	236	26	66
Gicumbi	74	41	185	25	3	264	19	46
Rwamagana	66	85	163	43	9	235	45	85
Nyagatare	159	86	258	59	12	423	41	110
Gatsibo	110	63	207	44	5	320	38	72
Kayonza	77	52	156	37	4	235	23	68
Kirehe	99	42	169	33	4	269	32	46
Ngoma	72	37	151	27	4	228	18	47
Bugesera	88	68	169	41	4	260	48	62

Source: EICV5

From the above table we clearly see that the main activity in the project area is predominantly agriculture which means that most of the rural population in Rwanda depend on farming and the findings from the table above show that the industry sector is still under exploited. People need to shift from agriculture to industry and get more income from non-farm services. Th electricity access is anticipated to boost the development where many households are ready to use it to develop the other off farming activities including using mills, hair cutting saloon, welding, carpentry with machine among many other services. NST1 recognizes access to electricity as one of the main factors which will help in its achievement.

7. ALTERNATIVES AND OPTIONS FOR RUEAP

The purpose of this chapter is to examine the possible alternatives for delivering the goals and objectives of the programme. For this particular programme, some options have been considered. In seeking the best alternative, the "status quo" or "do nothing" option and the actual on grid electrification were considered and the alternatives analysis shows that the RUEAP implementation emerged as the best alternative.

7.1. Alternative Routes

An analysis of alternative routes is undertaken through mapping and involvement of all the stakeholders in this selection process. At the end of this process, alternative routes will selected among the possible ones, based on the following general siting criteria (which are related to socio-economic and environmental values):

i. Avoidance of restricted zones (forests, parks);
ii. Distance from zones of landscape value;
iii. Distance from mountain edges, preference for valley routings;
iv. Distance from urban areas;
v. Route with constant slope;
vi. Minimization of infrastructure crossing (e.g. highways, other power lines, etc.).

7.2. On-Grid Electrification

Provide on-grid electrification. This is the alternative that is proposed by this programme. Through this all target sectors will be provided with electricity from the existing grid system and the new ones to be constructed. The programme is expected to significantly reduce demand for firewood, as this is the primary source of heating and lighting in Rwandan communities. This alternative will contribute positively to improving the lives of the target communities through reduced exposure to smoke, improvement in living conditions, increased communication via use of mobiles and opportunities for seeking alternative livelihood options. Local government institutions will also benefit through reduced time and money spent on sourcing firewood from local communities, as well as increase in accessibility to information through various media sources, children education and health facilities service delivery, internet and improved communication.

7.3. No Project Alternative

A No Project (Do nothing option) alternative would primarily mean that the status quo will be maintained and in a sense the social and environmental impacts (adverse) will not occur. However, the

positive benefits will be forgone in terms of providing more access to electricity to the Rwandan population which would have in turn spurred and contributed to socio-economic growth.

If the "do nothing option" was considered, some benefits would be missed out and it would meet the following:

- The pressure on the use of fuel wood would remain;
- There would be no conservation of the fragile and diminishing forest cover of the country since there would be no provision of an alternative source of energy;
- The benefits of the programme for domestic electricity supply would be missed out,
- The benefits from access to electric power for schools and public institutions such as health centres would be completely lost,

During the construction phase there would be no temporary employment opportunities for local contractors,

- There would be no employment or supply services and provisions for workers and to contractors,
- Within the respective program areas there would be no opportunities for petty trading and small business service provision along the power line routes,
- Potential beneficiary enterprises such as small industries and other agricultural processing businesses lacking electricity would still be affected,
- Data management with computers and communication facilities like access to internet, charging of mobile phones; electric lighting at night, extended opportunities for work and study would be evidently missed out,
- Socio-economic development would not be achieved if the programme is not implemented,
- Generally, employment opportunities that would be created by the programme would be miss out,

7.5. Comparison of Alternatives

The second alternative "providing on-grid electrification" is the most feasible in light of the easy availability of hydropower in the country, the positive social and environmental benefits, and most importantly because this is what the local communities prefer. The third alternative of "no-build" is not feasible because electricity is included as a measure of development in a village and therefore is always given high priority in the list of socioeconomic developmental activities for any country. It is impossible for the government to overlook this demand especially since the country is a major

generator of hydropower energy. While there will be no environmental cost from this alternative, with increasing population it is expected that the demand for fuel wood will increase each year, putting very heavy pressure on the already dwindling forest resource.

8. EVALUATION OF IMPLEMENTATION OF SEA RECOMMENDATIONS OF EARP.

8.1. Positive or beneficial impacts of EARP Program

i. Increased rural development and employment.

The EARP program has contributed to the development of the rural areas during the construction phase and during the operation phase as a result of energy availability.

ii. Household energy use

The most considerable improvement at the household level can be expected in terms of lighting, where connected households see lighting as the main advantage of electricity. Almost these connected households, switched totally from traditional (kerosene, candles, torches batteries) to modern electric lighting sources.

Having electric lighting yielded significant benefits for households who have done away with traditional lighting sources in term of increased kids' study time at home, an impact on access to information (TVs, radios and mobile phones).

We found that another major effect of electrification was that it significantly reduced expenditures on energy after they had replaced traditional energy sources like kerosene and batteries. And they no longer needed to spend money on charging their mobile phones outside their homes.

iii. Social infrastructures

Education and health facilities, , churches and administrative offices have been electrified by EARP program.

Figure 16.SIMBI Health Center and Saint Jean Bosco secondary School in Huye District

In the case of health centers, those that had been connected to the grid said their work had improved. The main use of grid electricity was for lighting followed by use for medical machines and for administrative tasks, medicine storage and sterilizing, this changed the methods of working environmental conditions and hence improve the quality of service delivery to the customers.

The most important benefit was that it reduced costs; Health Centers that weren't connected paid three times more for power because they used diesel, but actually the health facilities save more money and deliver the high quality of services to the patients and improve the health of the people

iv. **Micro and Small Enterprises**: Mills, carpenter workshops, Hairdressing shops, commercial center developed, welding workshops and bars and restaurants are being electrified by EARP Program.

Figure 17.Trading center in Bugesera District

Mills were the main beneficiaries of being connected to the grid. Most switched from diesel engines to electricity. And new mills emerged because input costs were dramatically reduced, and productivity increased.

Figure 18.Milling machine in commercial center of Rwabicuma sector/Nyanza District

Hairdressing shops also benefited for cost and convenience reasons. They used electricity for razors, phone charging services and radio or TV to entertain. Before grid electricity they had used power sources such as car batteries which were expensive and cost a lot to run.

Carpenter workshops equipped with electrical carpenter machinery are considered to have the highest socio-economic impact on the local community. Furniture of considerably higher quality can be produced in less time.

Figure 19.Charpentry workshop in MARABA Sector/Huye

Small kiosks, bars and restaurants mostly used electricity for lighting and in a few cases for radio, TV, or refrigeration. Electricity meant that they were more attractive to customers.

EARP Program has contributed to the improvement of activities in public and private institutions like schools, Sector and District offices by use of computers and internets modems for purposes.

The provision of electricity in rural areas is widely believed to be a stimulus to increased agricultural productivity and output through irrigation and mechanization, to the growth of rural industries, and to raising the living standards of rural people.

This is characterized by the development of irrigation and commercial farms in Eastern Province.

EARP Program have also contributed in the development of agro processing industries like coffee washing stations and coffee processing plants, tea factories, maize milling, milk collections and processing.

The EARP Program have contributed also to the development of access to clean water by electrifying water treatment plants and water pumping stations.

8.2. Negative impacts of EAR Program

Impact on private land and residential houses

Some Residential Houses are found to be crossed by Medium Voltage Lines and are likely to be the cause of safety issue and health issues. To mitigate this REG used different ways of communication including Media (RTV was used) and in different meetings to create awareness on the danger of living under the MV lines, the guidelines that limit people to establish their buildings under the same line and the allowed buildable distance from the MV/HV Center line. The lines are designated to deviate the built area, However, whenever the designing teem deems it necessary to pass above the house, the affected people is compensated for the house and the land on it, and the house is removed before the construction works start. However, some people build under the line after the MV lines are constructed.

Figure 20.MV Line passes above the residential house and through the forest plantations in Nyanza District

Figure 21.MV above the house in Gisagara District

Destruction of forest plantation

Some Medium Voltage lines were found passing through the forest plantations of eucalyptus, Calitris pine and agroforestry plantation of Grevillea, Cacia, Alnus, Cedrella and ornamental trees of casualina, Spatodea and, the Right of Way are always cleaned for safety purposes. However, the lines are designed to avoid the maximum of these species. Where possible the deviation is used to avoid passing through any forest.

Figure 22.MV Line passes through Forest plantations in Gabiro/ Gatsibo district

Impacts on critical ecosystems

Some line routes of the Medium Voltage are found passing through the critical ecosystem like marchlands that may affect the biodiversity of the marchlands. However, to mitigate these impacts on the ecosystem, only steel poles are used in the marchlands.

Figure 23.Cyunuzi mashland in Kirehe District, Umuvumba in Nyagatare District

Figure 24.MV Line through Rice plantation in marshland in Nyanza District

Bird Strikes/Collusions

Transmission and distribution networks have been a potential source of bird strikes that get entangled to the lines causing their injury or even instant death according to the local populations

8.3. Anticipated challenges based on lessons learnt from on-going program (EARP)

8.3.1. Anticipated program challenges

The resettlement impacts present different challenges which should be handled fully so that the program be implemented smoothly. With respect to previous program implementation the main challenges included relocation issues, compensation payment delays, encroachment, disclosures

meeting participation, contractors delaying starting which affect the relevancy of the RAP (Resettlement Action Plan), certified valuators using not updated asset prices and contractors using not enough skilled safeguards staffs. All challenges were addressed in the previous program but also, they served as a lesson learnt for this project to implement with least challenges due to the preparedness at hand. The table below illustrate the challenge, which is anticipated, the reason that would contribute to the defect and the way to overcome the challenge which should be used for effective preparedness and timely project implementation.

Table 17**. Anticipated challenges**

Challenge	**Reason**	**How the challenge will be addressed**
Citizens Relocation issues	PAPs with family conflicts will pose a serious issue to the project involving physical relocation. Some other social issues like asset which were given like a collateral also may delay the relocation process. PAPs which are not on board due to different reason especially when they are not in the country and deny giving the power of attorney.	- Engage fully local authorities and community court known as ABUNZI to handle family and social issues involving litigation to be resolved in advance. - To use public treasury account for compensation to people who are not on board during the required time as stipulated in the expropriation law in public interest 32/2015 of 11/6/20015.
Compensation payment delays	PAPs with family conflicts will pose a serious issue to the project involving physical relocation. Some other social issues like asset which were given like a collateral also may delay the relocation process. PAPs which are not on board due to different reason especially when they are not in the country and deny giving the power of attorney. PAPs who do not have the land titles` PAPs without the Bank account PAPs without National ID	- Engage fully local authorities and community court known as ABUNZI to handle family and social issues involving litigation to be resolved in advance. - To use public treasury account for compensation to people who are not on board during the required time as stipulated in the expropriation law 32/2015 of 11/6/20015. - Work closely with Local Government Officials to deliver the required documents for compensation on time and the

Challenge	Reason	How the challenge will be addressed
		District One Stop Center role will be crucial.
Encroachment	PAPs who can build houses in the Right of Way with intention to be compensated for their houses after the cut-off date is proclaimed.	- To work closely with local Government Officials for timely information transmission. - Contractor staffs on board should regular check the irregular activities in the line routes. - To establish Grievance Redress Committees at all local administrative levels and make sure that they are trained for timely reporting. - To announce the cutoff date to all concerned PAPs using UMUGANDA (Community works) and community assemblies' meetings.
Disclosures meeting participation	PAPs who are not available during the public disclosure and hence do not raise their issues on time due to different reason such as people who are not in localities during the disclosure time, people who were not informed of the disclosure activity, People who neglected the attending due to their mindset.	- Work closely with Local Government Officials and GRC for mobilization to attend, and the relevancy of the meeting. - Prepare in advance the disclosure and be communicated publicly in different meetings assembling public.
Contractors delaying to start which affect the relevancy of the RAP	Some contractors may delay to start the works or may even fail to deliver and quit without any single activity as the case experienced by RESSP for Overseas Infrastructure Alliance (India) Private Limited which completely failed to deliver and this resulted in the contract termination	- Procurement should consider the past performance of the contractor within the country for the same duties where possible.

Challenge	Reason	How the challenge will be addressed
	after two years of delay.	
Independent Certified valuators using not updated assets prices	Valuators who use the prices which are not up to date and result in over valuation or under valuation of assets because the prices that are set by IRPV are updated annually and based on real market value.	- Regular inspection of valuators during asset inventory exercises and be ready to notice any inconsistency in the valuation on time. - To work closely with IRPV to handle the insolvent valuators.
contractors using not enough skilled safeguards staffs	Contractors who make internal recruitment and recruit inexperienced staff due to different reason including the reason that experienced worker are expensive, hence they fail to perform the safeguards duties properly.	- EDCL should make sure that every safeguard staff's CV is approved by the project for competitiveness and ensure the delivering of the contractor's safeguards.

9. NATURE AND EXTENT OF KEY ENVIRONMENTAL IMPACTS OF RUEAP ACTIVITIES.

9.1. Environmental and Social Management Plan (ESMP)

For the purposes of this Environmental and Social Management Plan (ESMP), the activities in the RUEAP that are likely to have adverse impacts are mainly expected to arise from the RUEAP components activities.

Mitigation measures involve avoiding of impact altogether, minimizing the impact, rectifying the impact and gradual elimination of impact over time. Depending on the nature, these measures will be implemented by all stakeholders and REG will oversee the overall coordination of its implementation Mitigation measures are twofold: biophysical and socio-economic. Bio-physical measures relate to issues of project siting, re-vegetation and preventive measures like bush clearing, erosion, sedimentation and pollution control and good construction practices, proper waste management, Setting regulatory that promotes environmental preservation for component four which will involve new regulations and taxation policy, and application of Environmental Guidelines for Contractors. Socio-economic measures will include education and awareness, hygiene and sanitation training, rules and regulations and institutional support (including skills training and knowledge transfer) and avoiding to the extent possible the physical relocation of the Project affected People (PAPs), where not possible, PAPs should be fully compensated in compliance with World Bank ESS5, and National Expropriation Law 32/2015 of 11/6/2015 concerning the expropriation in public interest. The following table provides the generic Environmental and Social Management Plan (ESMP) and gives a link between the impacts of project activities and the mitigation measures put in place to minimize the adverse impacts and enhance the positive impacts during different project phases.

Table 18: Environmental and Social Management Plan

9.1.1. Planning and design phase

Project components/ Activities	**Negative Impacts**	**Mitigation Measures**	**Responsibility**	**Cost Estimates (USD)**
Temporally Land Acquisition/Permanent land acquisition**,** physical displacement and assets loss	Dispute and possible conflict over the land identified can arise owing absence of compensation and dialogue with the PAPs.	Ensure that the land identified for the project is acquired as per the requirements of the Government of Rwanda and World Bank guidelines in relation to land acquisition, resettlement and compensation. Involve and meaningfully engage the PAPs, general public including administration, and local/traditional leaders in the transparent acquisition of the land. PAPs should be compensated prior to construction work and be given enough time to relocate where physical displacement is involved and this should be done in compliance with ESS5 of WB on Involuntary resettlement. Utilize the RPF document available and develop RAP to be used in temporary acquisition of the land and outline how the assets loss will be compensated.	EDCL EDCL-PCU, Contractors	Included in the contract
Site Selection	Poor selection of project site for the substation sites,	Avoid construction sites in or near sensitive ecosystems where Possible. Any activity that is located within the sensitive ecosystem or protected	EDCL EDCL-	Included in the contract

Project components/ Activities	Negative Impacts	Mitigation Measures	Responsibility	Cost Estimates (USD)
	RoW transmission and distribution lines and be an environmental degradation threat that include the destruction of sensitive ecosystems such as wetlands or protected areas.	area, should ensure that any increase in pollution levels is as small as feasible, and amounts to a fraction of the applicable short-term and annual average air quality guidelines or standards as established in the project-specific environmental assessment. Do not select land that contravenes the regulations of the Government of Rwanda in relation to natural resources and sensitive ecosystems. Where there is no alternative for ROW in wetland ecosystems, ensure that existing water flow regimes and irrigation channels is maintained and/or re-established where they are disrupted due to works being carried out.	PCU, BRD	
Procurement (tendering, bidding, and selection)	Poor recruitment of contractors without environmental and social consideration affects the implementation.	Solar companies should submit certificates of good working relationship with Enviro serve company which oversees e-waste management including recycling options in Rwanda. They should submit the waste management Plan for spent solar panels and batteries before being awarded contracts by the PIU.		
Plan Designs	Poor designs of plans, inadequate equipment, and machinery specification	Ensure during planning and design to incorporate environmental sound design concepts as appropriate. All designs, equipment and machineries including solar systems to be procured should include instructions on their environmental		

Project components/ Activities	Negative Impacts	Mitigation Measures	Responsibility	Cost Estimates (USD)
	Inadequate and poor designs and plans including equipment and machinery can possibly cause environmental degradation and occupational hazards	specifications and requirements. All instructions or planning for civil, mechanical, engineering and electrical specifications including technical specifications must have stringent environmental obligations in accordance with the World Bank Group guidelines (such as WBG EHS guidelines), international or local guidelines whichever emerges as stringent in terms of environmental and social requirements. Documentation of availability of specific personal protective equipment and training needed to respond to an emergency. Job safety analysis to identify specific potential occupational hazards and industrial hygiene surveys, as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards. Design should be done by considering the line routes and project locations where the environmental and social impact is the lowest.		
	Poor planning of worksite waste management posing threat to environment and public health	Preliminary environmental and social assessment studies that include environmental impact assessment, planned mitigation measures, compensation measures as well as monitoring and follow up Programs	Contractors	Included in the contract

Project components/ Activities	Negative Impacts	Mitigation Measures	Responsibility	Cost Estimates (USD)
Technical assistance, policy and regulatory improvement	Poor planning and setting the regulations without considering environmental and social impact of the regulations. Unemployment due to the taxation increase on charcoal and decrease on the clean cooking stove due the promotion of environmental protection through energy efficiency.	- Reviewing taxes of cook stoves equipment by putting in this sector the intensive that will make the cook stove affordable to the community. - The energy source/fuel to be used in the cook stove should be tested for the emissions and the biomass with lower emissions shall be used. - Reducing the tax of LPG (*Liquefied Petroleum Gas)* which will reduce the buying price to the community, which will help to reduce the pressure on the forest. - Increasing the tax on charcoal which is massively used by the community to reduce by the half the population who depends on firewood. - People who previously should be given the alternative and priority in the promoted fuel eg: Clean cooking stove.	REG RURA RSB MoE REMA	Included in Technical Assistance budget

9.1.2. Construction phase

Project components/ Activities	Negative Impacts	Mitigation Measures	Responsible	Cost Estimates (USD)

Construction of new access roads to or from existing road for transportation of the poles, transformers and other accessories	Loss of vegetation and potential soil erosion, siltation Fugitive dust may be emitted from construction works and stockpiles of materials including machinery as well as from truck traffic. This could cause health related impacts to the communities around and workers in the project site Stockpile and construction waste, increased water use, generation of wastewater Noise pollution from construction machines and vehicles,	- Environmental guidelines as stipulated in the contract specifically: Implement soil erosion control measures such as protecting stockpiles through the use of silt fencing. Reduced slope angles should be used to minimize soil erosion during construction or to avoid surface run off and preventing siltation. - Additional plantation and embankment using removed topsoil is recommended near sensitive locations. - Conversion of access roads to new routes and roads - The dirt roads and exposed construction areas should be moisturized during the dry season to prevent or minimize the fugitive dust emissions. - Storage areas should be located outside of the habitation area Environmental and compliance monitoring by environmental officers Workers in the project site must be equipped with the necessary and required Personal Protective Equipment (PPE) prescribed by the construction industry	EDCL Construction Contractors, EDCL-PCU	Included in contract

	Accidents and hazards for both workers and general public from erection of steel poles concrete work. Injuries can result from trips and falls and other physical and mechanical hazards. Loss of livelihoods such as crop, trees	- Ensure safe design of the network structures - Provide provision to keep people away from the working site - Establish a Health and Safety construction plan covering all activities in compliance with the best Health and Safety Working practices/conditions. - Provide insurance to workers. - Provide adequate PPE for all workers and spare items for visitors. - Provide FIRST AID kits and have among the personnel persons having competencies in first aid assistance. - compensation of assets to be damaged including crops and trees.		

Noise	Noise and Vibrations from Equipment Operation Noise from construction activity may be significant.	- Transmission lines construction works will be carried out during daylight hours. If power outages are required, it may be necessary to carry out some works at night or weekends. In such cases, the local population will be informed sufficiently in advance through local media - All workers in the project site must be equipped with the necessary and required Personal Protective Equipment (PPE) prescribed by the construction industry but not limited to facilities to protect against noise impacts, safety helmets, boots, dust masks, gloves, overall, goggles etc. - Reduce vehicle speeds (stick to recommended speeds) in populated areas - For workers noise levels shall be kept below 80 dB (A), wherever possible. In case of exceeding this value, hearing protections must be provided to workers and warning signs must be installed - Notify nearby residents and businesses at least 24 hours in advance if particularly noisy activities are anticipated.	EDCL Construction Contractors,	Included in the contract

Health and safety	Accidents at workplace during construction from operating of machineries and equipment by workers.	- Development of an EHSP for the construction phase, in advance of construction activities - Development of EHSP for the construction phase (shall include Waste Management Plan), in advance of construction activities - Implementation of health and safety workshops for construction workers - Hire only experienced workers for specific jobs, such as working at heights, handling large equipment and machinery, handling hazardous material, which required highly specialized training. Train workers accordingly in regard to working at heights, electrical safety, vehicular safety, handling of hazardous materials, PPE, use of first aid and rescue techniques, emergency response, poisonous snakes etc. - Provide first aid kits and fire extinguishers at all Project sites Forbid alcohol and other drugs at construction sites. - Limit occupational exposure to EMF (Electro Magnetic Field) by use of shielding	EDCL, EUCL Construction Contractor	Included in construction costs

		materials, and train workers accordingly. - The employer should ensure that qualified first-aid can be provided at all times. Appropriately equipped first-aid stations should be easily accessible throughout the place of work. - All workers entering the construction site must be equipped with PPE including goggle, factory boots, overalls, gloves, dust masks, among others. The PPE should be those that meeting the international - standards of PPE.		
	Community Health and Safety	- Ensure that traffic is not interfered by construction through proper traffic management - Notification of the public on upcoming construction, in advance of construction period - Public education and outreach efforts to provide information about hazard awareness, upcoming construction activities, safety measures, reporting unsafe conditions and environmental impacts, in advance of construction period - Inform population along public roads in advance		

		in case of transporting heavy equipment - Provide adequate security measures to prevent accidents and injury (e.g. keeping speed limits on public roads, grounding objects) - Provide adequate security to prevent public access to the substations, work sites, hazardous materials and waste		
Traffic.	Risks from Traffic Disruption, Congestion and/or Road Accidents	- Collaborate with local communities about traffic and pedestrian safety, in advance of construction period.	Construction Contractors, RUEAP , Coordination Unit.	Included in the contract
Dust and Air Emission	Air Emissions and Ambient Air Quality)	- Reduction of speed and limited movement of vehicles - Use dust-suppressing water on unpaved roads, e.g. spraying of water with watering trucks in advance of transportation activities - Cover truck beds with tarps during material transport - Use dust-suppressing water spray during civil works, where necessary Store and handle material appropriately to limit dust (e.g. protect cement with tarpaulins)	EDCL Construction Contractors,	

		- Use equipment with dust suction devices in enclosed spaces during civil works, where necessary		
Cultural heritage demolition, cemeteries	Establishment of distribution lines can lead to unearthing genocide sites hence cause cultural strife.	- Consultation should be undertaken with local authorities and communities to ensure that potential genocide memorial sites are avoided. - Accidental unearthing of such sites should be culturally handled in accordance with the cultural sites and requirements. - Avoid sitting infrastructure where people will be disturbed and where resettlement could be an issue. - Chance find procedures attached to this document on annex 11 will be followed in any archeological or culture heritage property is found.	EDCL should make contacts with local authorities and engage good collaborations.	
Excavation and construction may cause the damage and loss of culture properties.	Destruction of physical cultural property such as graves, found Archaeological Property among others	- All necessary and adequate care shall be taken to minimize impact on cultural properties which includes cultural sites and remains, places of worship including temples, mosques, churches and shrines, etc., graveyards, monuments and any other important structures as identified during design and all properties / sites / remains notified. No work shall spillover to these properties,	EDCL should make contacts with local authorities and engage good collaborations.	Included in the project cost.

		premises and precincts. - The Contractor will be responsible for familiarizing themselves with the "Chance Finds Procedures" in case culturally valuable materials are uncovered during excavation or any project activities, including, annex 11. - Stop work immediately following the discovery of any materials with possible archeological, historical, paleontological, or other cultural value, announce findings to project manager and notify relevant authorities; - Protect artifacts as well as possible using plastic covers, and implement measures to stabilize the area, if necessary, to properly protect artifacts; - Prevent and penalize any unauthorized access to the artifacts; and - Restart construction works only upon the authorization of the relevant authorities. - The Chance Finds Procedures have been prepared to remedy such issues;		
Destruction of	Impact on existing	- Destruction of the existing infrastructures should	EDCL	Included in the

existing infrastructures	infrastructures (water pipelines, existing power lines, telecommunications lines, fiber optic)	be avoided. - In case of transmission line or other infrastructures is damaged, the project will repair the damages and remove it in other appropriate site.	Contractor	contract
Soil and Water pollution	Harmful and dangerous/Hazardous material	- Regular maintenance of all vehicles and machines at regular service stations, if possible. - Maintenance and re-fueling of the construction equipment only on sealed and enclosed areas. - Store all liquid materials (e.g. fuel, engine oil, etc.) and lubricants in locked tanks and on sealed and roofed areas. - Store construction material as bags of cement etc. in containers in order to avoid rinsing out. - Provide proper sanitation facilities. - Design bunds around and oil collecting system beneath transformers to prevent contamination of soil and groundwater. - Remove contaminated soil if spills occur and handle as hazardous waste. - Collect contaminated spill materials and manage as hazardous waste.	EDCL Contractor	Included in contract

		- Prior to final disposal, retired transformers and equipment containing PCB should be stored on a concrete pad with curbs sufficient to contain the liquid contents of these containers should they be spilled or leaked. The storage area should also have a roof to prevent precipitation from collecting in the storage area. Disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCB. - The NTARUKA HPP has Asbestos Containing Materials (ACM) and should be handled safely by: Training of staff who can potentially meet the material to avoid damage and prevent exposure. - The asbestos removal should comply with the Prime Minister's Instructions determining procedure for eradication of asbestos materials...52N° 002/03 of 05/05/2015.		
Risks from Waste	Non-hazardous waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation	- Construction contractor will have to clarify with local authorities, where different kind of wastes may be disposed of - Development of Waste Management Plan within the contractor's ESMP	EDCL Contractor.	Included in the contract

	activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office wastes. Hazardous waste includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills.	- Train workers in handling and disposal of recyclable, sanitary, solid, liquid and hazardous waste Segregate hazardous waste and store in suitable drums or containers in secure facilities (fitted with roofs, concreting, bunds etc.), and clearly identify hazardous waste. - Dispose of oil-contaminated soil in adequate storage facilities. - Store scrap metal (iron, steel, copper, etc.) onsite for later recycling including material already stored onsite. - Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences. - Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes. - Avoiding or minimizing the generation waste		

		materials, as far as practicable. - Where waste generation cannot be avoided but has been minimized, recovering and reusing waste. - Where waste cannot be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner		
Social Impacts		- Prioritize employment of local people for construction works (skilled and unskilled workers). - Improve recruitment of women for construction works. - Health awareness workshops for workers by a health expert. Develop and implement a Grievance Redress Mechanism	EDCL Contractor.	Included in contract
	GBV (Gender based Violence) /SEA (Sexual Exploitation Abuse)/SH (Sexual Harassment)/VAC (violence against children)	- The contractor should attend and actively partake in training courses related to OHS, HIV/AIDS, GBV and VAC as requested by my employer. - Adhere to a zero-alcohol policy during work activities, and refrain from the use of illegal substances at all times.	EDCL Contractor; GBV Task force	Included in the contact

		- Consent to a police background check. - Treat women, children (persons under the age of 18), and men with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. - Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate. - Not participate in sexual contact or activity with children—including grooming or contact through digital media. - Mistaken belief regarding the age of a child is not a defense. - Consent from the child is also not a defense or excuse. - Not engage in sexual harassment—for instance, making unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct, of a sexual nature, including subtle acts of such behavior.		

		- Consider reporting through the GRM (Grievance Redress Mechanism) or to my manager any suspected or actual GBV or VAC by a fellow worker, whether employed by my employer or not, or any breaches of this Code of Conduct.		

9.1.3. Operation phase

Components/ Activities	**Negative Impacts**	**Mitigation Measures**	**Responsible Inst**	**Cost Estimates (USD)**
Operation of maintenance	Employee and Public Health are at risk of fire	- Develop Environmental Health and Safety Plan (EHSP) and implement it conveniently. - Erect fire walls between or at new transformers foreseen in switchyard of s/s YTPC to prevent spreading of fire in case of an accident. - Storing flammables away from ignition sources and oxidizing materials. - Providing bonding and grounding of, and between, containers and additional mechanical floor level ventilation if materials are being, or could be, dispensed in the storage area. - Where the flammable material is mainly comprised of dust,	EUCL	Maintenance cost

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)
		providing electrical grounding, spark detection, and, if needed, quenching systems. - Defining and labelling fire hazards areas to warn of special rules (e.g. prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment). - Providing specific worker training in handling of flammable materials, and in fire prevention or suppression.		
Electric and magnetic fields	Electric and magnetic fields	- Shifts will be used to avoid long exposure to electromagnetic field during line and substations maintenance. - Evaluating potential exposure to the public against the reference levels developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). Average and peak exposure levels should remain below the ICNIRP recommendation for General Public Exposure. - Considering siting new facilities so as to avoid or minimize exposure to the public. Installation of transmission lines or other high voltage equipment above or adjacent to residential properties or other	EUCL	Maintenance cost

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)
		locations intended for highly frequent human occupancy, (e.g. schools or offices), should be avoided; - If EMF levels are confirmed or expected to be above the recommended exposure limits, application of engineering techniques should be considered to reduce the EMF produced by power lines and substations. Examples of these techniques include: Shielding with specific metal alloys; Burying transmission lines; Increasing height of transmission towers; Modifications to size, spacing, and configuration of conductors		
Solid waste	Little if any solid waste will be generated which includes conductor and tree cuttings	- All left over conductor cuttings to be disposed appropriately or be returned to the store for proper disposal. - Proper budgeting of materials to reduce wastage practice 3 Rs of waste management: reduce, reuse, recycle of materials. - Properly Manage storage, transfer, and disposal of transformer oils according to industry standards.	EUCL	Maintenance cost

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)
Ntaruka HPP operation.	Reservoir sedimentation; Changes to hydrological flow, Downstream community may be affected, sedimentation may affect biodiversity and production of Hazardous and non-hazardous wastes	- Carry out of watershed management in the reservoir area to minimize erosion and sedimentation in the Ntaruka reservoir; and Maximize useful life of the reservoir through continuous monitoring and use of sedimentation model for calculation of reservoir sedimentation. - Maintain downstream flow through allowing the minimum ecological flow rate and following approved reservoir operation procedures. - Ensure proper waste management and use RURA licensed companies for waste collection and transportation to specific dumpsites on a regular basis. (For more about waste management plan refer annex 14)	EDCL Contractor EUCL	Maintenance cost

9.1.4. Decommissioning

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)
Transformers, cables	Waste Debris from Equipment and Machines	- Ensure all the machines and equipment are disposed in the right places, Explore available recycling opportunities	EDCL	Included in decommissioning cost
CFLs Poor disposal of used CFLs	Likely to lead to ground and surface water contamination. CFLs contain mercury a hazardous heavy metal (substance) that is harmful to aquatic resources, soil resources and human population. Soil contamination is a likely adverse impact if the CFLs are dumped in an open dumping site without mitigation measures and controls. Soil contamination could impact on agriculture.	- Develop a waste disposal plan for the disposal of the CFL lamps. - Replacing existing transformers and other electrical equipment containing PCB, and ensuring appropriate storage, decontamination, and disposal of contaminated units; - Prior to final disposal, retired transformers and equipment containing PCB should be stored on a concrete pad with curbs sufficient to contain the liquid contents of these containers should they be spilled or leaked. - The storage area should also have a roof to prevent precipitation from collecting in the storage area. - Disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCB.	EDCL	Included decommissioning cost

Components/ Activities	Negative Impacts	Mitigation Measures	Responsible Inst	Cost Estimates (USD)
Disposal of obsolete batteries waste	- Adequate waste receptacles and facilities should be provided at project sites/camp sites	- Ensure that all spent/obsolete batteries from the solar panels are recycled	EDCL	
Health and safety	Accidents during decommissioning including oil spills	- Apply the accidents reduction /mitigation impacts specified in the construction phase of the project	EDCL	Included in decommissioning cost

9.2. Environmental and Social Monitoring Plan

This section sets out requirements for the monitoring of the environmental and social impacts of the RUEAP subprojects. Monitoring of environmental and social indicators will be mainstreamed into the overall monitoring and evaluation system for the project. In addition, monitoring of the implementation of this SEA will be carried out by REMA and PIU Environmental and Social Safeguards Specialists.

The objective of monitoring is twofold;

1. To alert project authorities (i.e. EDCL primarily) by providing timely information about the success or otherwise of the environmental management process outlined in this SEA in such a manner that changes can be made as required to ensure continuous improvement to RUEAP environmental management process (even beyond the project's life).
2. To make a final evaluation in order to determine whether the mitigation measures incorporated in the technical designs and the ESMP have been successful in such a way that the pre-project environmental and social condition has been restored, improved upon or is worse than before and to determine what further mitigation measures may be required.

9.2.1. Monitoring of environmental and social indicators

The goals of monitoring are to measure the success rate of the project, determine whether interventions have resulted in dealing with negative impacts, whether further interventions are needed, or monitoring is to be extended in some areas. Monitoring indicators will be very much dependent on specific project contexts.

9.2.2. **Monitoring of participation process**

The following are indicators for monitoring of the participation process involved in the project activities.

Number and percentage of affected households consulted during the planning stage.

- Levels of decision-making of affected people.
- Level of understanding of project impacts and mitigation.
- Effectiveness of local authorities to make decisions.
- Frequency and quality of public meetings.
- Degree of involvement of women or disadvantaged groups in discussions.

Monitoring of implementation of mitigation plans lists the recommended indicators for monitoring the implementation of mitigation plans.

9.2.3. Evaluation of Results

The evaluation of results of environmental and social mitigation can be carried out by

comparing baseline data collected in the planning phases with targets and post-project situations.

A number of indicators would be used in order to determine the status of affected people and their environment (land being used compared to before, how many clean water sources than before, etc). In order to assess whether these goals are met, the EDCL EDCL-PCU Environmental and Social safeguard Specialists with technical support of the two environmental and social to be hired by EDCL will indicate in the EMP, parameters to be monitored, institute monitoring milestones and provide resources necessary to carry out the monitoring activities.

The following are some pertinent parameters and verifiable indicators/questions to be used to measure the SEA process, mitigation plans and performance.

- Does the project have the environmental and social safeguards specialist?
- Have the Civil Works from Contractors got considerable legal right to enforce the ESMP?
- At what rate are the civil works been monitored by EDCL and by the REMA?
- How many violations of the contractors/transporters have been recorded and at what rate are they occurring?
- How many RAPs have been fully executed before civil works?
- How many outstanding complaints and level where they are pending?
- How many recorded grievance cases have been settled within one year?

9.2.4. Monitoring of **SEA** implementation

In addition to the Project Reports and ESMPs required under, an Annual Audit on this SEA Implementation will be prepared by the EDCL. In addition, each large project that has been subject to an ESIA study (or RAP etc.) will also be required to produce a social and environmental audit report.

Table 19.Environmental and Social Monitoring Plan

Potential impacts	Mitigation measures/Targets	Indicators	Monitoring frequency	Timeline	Estimated costs	Institutions responsible for monitoring
Impact due to line routes selection close to sensitive ecosystems	-Line routes selection will be done in close consultations with institutions responsible of natural resources management (REMA, Rwanda Water Board, Rwanda Forestry Authorities)	-Number of involved institutions consulted	On monthly basis	Pre-construction phase	-	EDCL, REMA, RFA, Rwanda Water Board, District authorities
Impact due to line routes selection crossing the private land	- To align routes alongside roads and footpaths where possible.	Number of Line routes selected alongside roads	On monthly basis	Pre-construction phase	-	EDCL, REMA, District Authorities
Impact due to line routes selection crossing the settlements	- To avoid line routes crossing the private lands where possible - To avoid line routes crossing the settlements	No line routes crossing the settlements	On monthly	Pre-construction phase	-	EDCL,

Potential impacts	Mitigation measures/Targets	Indicators	Monitoring frequency	Timeline	Estimated costs	Institutions responsible for monitoring
			basis			REMA, District Authorities
Destruction of forest cover and crops along the line corridor.	-To respect the line corridor -Only marked trees will be felled. - Reforestation program for replacement of cleared trees. - Compensation of destroyed crops and trees.	Line corridor respected Number of tree seedlings Number of Compensation files (PAPs)	On regular basis	Construction phase Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA, District Authorities EDCL, REMA, RFA
Temporary /Limited Fugitive Dust and Noise	-Installation of dust screens. -Regular watering of access routes to reduce dust. -Provision of dust masks to workers	- Number of Dust screens installed Number of Dust masks provided to workers	On regular basis	Construction phase Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA. EDCL, REMA.
Soil erosion	-Proper backfilling of soil	- Number of	On	Construction	To be included	EDCL,

Potential impacts	Mitigation measures/Targets	Indicators	Monitoring frequency	Timeline	Estimated costs	Institutions responsible for monitoring
	cut -Proper compaction	localities where Soil cut backfilled properly Platforms compacted properly	regular basis	phase	in the Bill of Quantities of the construction	REMA.
Solid waste	Engage the handling company to the recommended dumping site -	Number of contracted companies mandated for waste collection	On regular basis	Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.
Noise Pollution	-Use of mufflers Regular repair of silencers -Operation during daylight hours only -Provision of earmuffs to site Workers	- Number of Mufflers installed Maintenance logs -Operation logs - Number of Ear muffs provision	On regular basis	Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.

Potential impacts	Mitigation measures/Targets	Indicators	Monitoring frequency	Timeline	Estimated costs	Institutions responsible for monitoring
		and numbers				
Vehicle Emission	-To use of low sulphur diesel -To use of mufflers on heavy equipment and vehicles	-Low sulphur diesel used - Number of Mufflers installed Reduced machinery use	On regular basis	Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.
Workers Health and Safety	-To train all site staff -To provide PPE to all workers	- Number of Site staffs trained - Number of PPE provided to all workers	On regular basis	Construction phase	To be included in the Bill of Quantities of the construction	EDCL, REMA
Accident/Hazards	- To provide Personal Protective Equipment (PPE). -to do a strict monitoring on movement of personnel and materials to and	- Number of PPE provided -Movement of personnel monitored	On regular basis	Construction phase and operation phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.

Potential impacts	Mitigation measures/Targets	Indicators	Monitoring frequency	Timeline	Estimated costs	Institutions responsible for monitoring
	from the site.					
Polychlorinated biphenyls (PCBs) Impacts	To avoid the use of Materials with PCBs.	Number of BOQ reviewed for the no PCBs containing materials	On regular basis		To be included in the Bill of Quantities of the construction	
Fire risk	A robust fire prevention program and fire suppression system should be developed by the contactor for use in each cabin.	Number of a robust fire prevention program developed	On regular basis	Operation phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.
Bird Strikes/Collusions	-The routing of the distribution and transmission network should avoid areas known to be migratory routes for birdlife.	Number of areas known to be migratory routes for birdlife avoided.	On regular basis	Operation phase	To be included in the Bill of Quantities of the construction	EDCL, REMA.

10. GENDER CONSIDERATIONS

Rwanda has shown strong political will and target-driven gender policies. For example, the Economic Development and Poverty Reduction Strategy[23] focused on sector strategies that enable women and men to participate, access, control, and benefit equally from growth processes in a way that recognizes their different needs with regard to access to finance, exposure to GBV, and control of assets. Despite declining poverty levels, female-headed households are still more likely to be poorer than male. While women's labor force participation and unemployment rates are similar to men's, the quality of employment is lower.[24] Women are rarely represented in the ranks of managers, professionals, and other high-paid jobs and are overrepresented in low-paying or unpaid jobs.[25] According to the United Nations Development Programme's estimates, the female gross national income (GNI) per capita amounts to 77 percent of the male GNI.[26]

However, several gender gaps persist in the energy sector in Rwanda:

Gender gaps in energy access. Nationwide, female-headed households show lower access rates for both grid and off-grid electricity. EICV5 data indicate that only 19 percent of household electricity connections are to female-headed households, who represent 25 percent of all households**.** Similarly, the MTF survey[27] reveals a gender gap in access to electricity in general, including off-grid electricity. As of 2016, only 21 percent of female-headed households have access to any source of electricity, against 31 percent for male-headed households. In urban areas, female-headed households have significantly lower access to the grid than their male counterparts but are more likely to have off-grid solutions, mainly solar lanterns or solar lighting systems. In rural areas, female-headed households have poorer access to both on-grid and off-grid electricity.

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[23] MINECOFIN. http://www.minecofin.gov.rw/fileadmin/templates/documents/NDPR/EDPRS_2.pdf.

[24] Occupational gender segregation is often due to explicit and implicit gender biases, negative stereotypes, limited exposure, and social norms at school and home, circumventing opportunities for enrollment and retention in, for example, Science, Technology, Engineering, and Mathematics (STEM) subjects. Women who do enter STEM professions are likely to face a host of challenges, including (a) gender stereotypes and norms, (b) explicit or implicit biases in the workplace, (c) lack of mentors, (d) limited networks due to small numbers of women working in the sector, (e) issues maintaining work-life balance and the care burden, (f) gender wage gaps, and (g) sexual harassment and safety concerns, among others.

[25] Rwanda Systematic Country Diagnostic (SCD).

[26] The 77 percent is obtained by dividing the estimated GNI per capita, female (2011 purchasing power parity $) 1,708 by estimated GNI per capita, male (2011 purchasing power parity $) 2,218. http://hdr.undp.org/en/countries/profiles/RWA.

[27] Koo, Bonsuk, Dana Rysankova, Elisa Portale, Niki Angelou, Sandra Keller, and Gouthami Padam. 2018. *Rwanda - Beyond Connections: Energy Access Diagnostic Report Based on the Multi-Tier Framework (English)*. Washington, DC: World Bank. http://documents.worldbank.org/curated/en/406341533065364544/Rwanda-Beyond-connections-energy-access-diagnostic-report-based-on-the-multi-tier-framework.

Quality of electricity supply gap. A total of 80.3 percent of female-headed households are in Tier 0 for access to electricity, compared with 70.9 percent of male-headed households. In Tiers 1–5, the share of male-headed households is higher than the share of female-headed households, and the gap is wider in higher tiers. The gender gap for Tier 0 is wider in urban areas, where most households are connected to the grid, than in rural areas or nationwide. Female-headed households have a much harder time connecting to the grid than male-headed households do.

Health and time burden gaps: In line with the fact that women are the main cooks in 78 percent of households, they also suffer more from health issues associated with indoor air pollution: 12.4 percent of women age 15 or older experienced cough in the last 14 days, compared with 3.6 percent of men age 15 or older. Similarly, 5 percent of young girls under age 15 experienced cough in the last 14 days, compared with 3.5 percent of young boys under age 15. Similarly, in rural areas, women spend an average of 80 minutes a day acquiring fuel, compared with 40 minutes for men. In urban areas, time spent acquiring fuel is halved, but the gap between men and women remains. Women who use an improved cookstove spend an average of 61 minutes a day acquiring fuel, compared with 81 minutes for women who use a three-stone stove and 78 minutes for women who use a traditional stove.

Affordability gaps. The main driver of the gap in energy access is affordability, reflecting that female-headed households are on average poorer than male-headed households in Rwanda. For 60.7 percent of female-headed households and 52.4 percent of male-headed households, the main barrier that prevents them from connecting to the grid is the high connection cost. About 69.5 percent of female-headed households are not willing to pay for the connection fee under any given terms, compared with 40.1 percent of male-headed households. The results may be because fewer female household heads (76 percent) than male household heads (90 percent) are employed. The gender gap in WTP indicates that gender-targeted financing mechanisms are required to increase grid connections for female-headed households. WTP for an off-grid solar solution that allows a household to reach Tier 1 for access to electricity is significantly lower for female-headed households (63.2 percent) than for male-headed households (43 percent). These findings point to differences in income and therefore affordability constraints regarding the connection cost. The Government's

measures to improve affordability of electricity under **RUEAP**, including connection subsidies and the focus on off-grid electrification to areas with higher shares of low-income households, are expected to reduce this gender gap. With regard to clean cooking, female-headed households are more likely to use a three-stone stove than male-headed households are, and male-headed households are more likely to use a traditional stove than female-headed households are. Female- and male-headed households are nearly equally likely to use an improved cookstove, despite the higher stove price. Similarly, female-headed households are less willing to pay for an improved cookstove than male-headed households are, especially at the full price of RWF 3,000. While WTP increases when a payment plan is offered, 25 percent of female-headed households will not pay for a cookstove under any given terms, compared with 19.3 percent of male-headed households. For female-headed households, WTP increases significantly if the price of the improved cookstove is reduced to RWF 1,000: 83.5 percent will pay upfront or with a payment plan of 6 or 12 months. Gender-targeted subsidies for improved cookstoves could significantly improve access to improved cookstoves.

Gaps in access to financing. Gaps in affordability are partially linked to gaps in access to financing. Initial analysis on gender gaps related to financial services in Rwanda indicate that female applicants account for 29.3 percent and male applicants for 59.9 percent of the loan beneficiaries by volume (considering savings and credit cooperatives and banks). For savings and credit cooperatives, female applicants account for 25.6 percent and male applicants for 63.2 percent of the loan beneficiaries by volume. In addition, on lending by banks to female applicants currently stands at 20.7 percent versus 79.3 percent for male applicants.

Gender gaps in employment in the energy sector. REG has conducted a baseline assessment of institutional gender gaps (out of 1,153 REG staff, 208 are female) and the formalization of gender focal points at REG. Based on a workshop in March 2018, REG management adopted an action plan that will reduce the gender gap and ensure a harassment-free environment. No baseline data exist for female employment in the off-grid and clean cooking sectors.

RUEAP incorporates three levels of gender actions:

At the program design level, several measures are introduced to ensure affordability of electricity access and clean cooking solutions to address the lower-than-average income level of female-headed households. These measures include connection subsidies for grid customers and the ability to pay the remaining connection fee over time, results-based subsidies for off-grid connections, promoting pay-as-you-go (PAYG) type business models for off-grid that allow consumers to pay over time, and targeted incentives in the clean cooking RBF.

At the program implementation level, EDCL has put together a Gender Action Plan for RUEAP which focuses on closing gender gaps in energy access and employment in the energy sector. The Gender Action Plan includes, among others, the following actions:

Public awareness activities with large participation from women stakeholders, to ensure that female-headed households and female beneficiaries in general, can benefit from electricity connections and clean cooking solutions under the project, and to ensure strong participation of women in community decisions related to the project. The Gender Action Plan also includes awareness raising among communities on the role of men and women in domestic energy management, such as firewood collection.

Promoting employment by contractors and companies benefitting from RBF, with a target of reaching at least 10 percent female employees at various project roles without any pay gap. To achieve these objectives, EDCL and the BRD will adopt good labor practice, such as setting a female workforce quota for procurement packages and project staff.

Promoting female entrepreneurship in clean cooking through TA and training on entrepreneurship and, if necessary, improvements in policy and regulatory environment. As part of the TA and training, the project is planning targeted training for women entrepreneurs in the clean cooking space; both for what concerns management and technical skills and matters related to the clean cooking supply chain (and opportunities in the various aspects of stove technology, fuel provision, customer care, and after-sale services), as well as related to financial literacy and opportunities (access to formal channels of credit, provision of collaterals for bank loans, access to cooperatives, leasing and other instruments, and so on). The TA component will also review the policy and regulatory environment as it relates to female entrepreneurship and will propose adjustments as

necessary. Relevant gaps related to this are the limited access to, and high cost of financing for women and potentially non-land asset based lending as a way to encourage more women to invest.

Capacity building for program staff on infectious diseases (for example, SEA, violence against children [VAC], and GBV; see above for details).

At the sectoral level, MININFRA has adopted an Infrastructure Gender Mainstreaming Policy outlining how the sector will strive to mainstream gender in its policies, plans, processes, programs, and projects from 2017 to 2022. Key priorities include, for example, strengthening institutional and human resource capacity for gender equality promotion in the infrastructure sector, enhancing the gender responsiveness in infrastructure subsectors, and improving access to job opportunities and earnings for women from different infrastructure investments. Occupational gender segregation is often due to explicit and implicit gender biases, negative stereotypes, limited exposure, and social norms at school and home, circumventing opportunities for enrollment and retention in, for example, STEM subjects. For women who do enter STEM professions, they are likely to face a host of challenges, including, among others, (i) gender stereotypes and norms, (ii) explicit or implicit biases in the workplace, (iii) lack of mentors, (iv) limited networks due to small numbers of women working in the sector, (v) issues maintaining work life balance and the care burden, (vi) gender wage gaps, and (vii) sexual harassment and safety concerns.

The objectives of the gender actions under the program are reflected in the Results Framework and monitoring arrangements.

The project aims to achieve that 25 percent of household electricity connections are to female-headed households, compared to a baseline (from EICV5 data) of only 19 percent. This reflects the project-design elements mentioned as well as the awareness raising efforts under the project implementation-related elements.

The project aims to achieve 15−20 percent female employees at various project roles without any pay gap, reflecting EDCL and the BRD adopting good labor practice, such as setting a female workforce quota for procurement packages and project staff.

Citizen engagement. The GoR prioritizes accountability to citizen feedback in the electricity sector. All new regulations in the sector are subject to public commenting period and are discussed in stakeholder workshops. Besides the measures outlined in the project-specific SEP, the following actions are taken by the relevant institutions under the project:

To inform its grid electricity service, REG conducts annual customer satisfaction surveys and will start publishing these starting in 2020 under the new RUEAP. The publication is reflected in the Results Framework.

The design of the RBF mechanisms for off-grid and clean cooking will be subject to regular reviews that will incorporate household feedback, to be gathered as part of the awareness campaign activities that are being implemented for both subcomponents.

11. PUBLIC AND STAKEHOLDERS' CONSULTATION

This section outlines the public information and consultation process that accompany the completion of SEA for Rwanda Universal Energy Access Program. Reference was made to relevant national and international requirements for stakeholder engagement and public disclosure. The main elements of the approach developed by the EDCL Team to facilitate the informed participation of the project's stakeholders in the development of the studies are then described. Finally, the public information and consultation activities were performed at the different stages of the studies, the organisations and institutions reached are indicated and the concerns, expectations and recommendations are reported.

Public consultation, or simply consultation, is a regulatory process by which the public's input on matters affecting them is sought. Its main goals are in improving the efficiency, transparency and public involvement in large-scale projects, Program or laws and policies. Public consultations were held primarily during the following periods namely Field visits and Literature review (Laws, strategies, policies decrees among others).

11.1. Why is public consultation important?

Public Consultation improves the quality of rules and programmes and also improves compliance and reduces enforcement costs for both governments and citizens subject to rules. Public consultation increases the information available to governments on which policy decisions can be based.

Public Consultation increases the level of transparency and it may help to improve regulatory quality by: Bringing into the discussion the expertise, perspectives, and ideas for alternative actions of those directly affected; helping regulators to balance opposing interests; Identifying unintended effects and practical problems. Using pre-notification it is possible to foresee more easily the consequences of some planned policies, becoming one of the most productive ways to identify administrative burdens; Providing a quality check on the administration's assessment of costs and benefits; Identifying interactions between regulations from various parts of government; Consultation processes can also enhance voluntary compliance for two reasons: first because changes are announced in a timely manner and there is time to adjust to changes, and second because the sense of legitimacy and shared ownership that gives consultation motivate affected parties to comply. Consultation can also have some impact if it is used for

amending legislation. Changing legislation using public consultation is more difficult and time-consuming than when amending less formal government policy documents.

11.2. RUEAP Stakeholders

Key stakeholders have been identified and initial discussions held with decision making bodies, key stakeholders, sector institutions and specialist experts were made on the very concepts and nature of the proposed project, giving emphasis on levels of public participation, role of key stakeholders and joint contributions of these actors to the success of the project. In addition, the scope of the proposed project and possible means of maximizing local communities' social, economic, and environmental benefits from the project implementation were underlined. Key stakeholders identified for consultation during preparation of this SEA include but not limited to the following:

At national level:

- Ministry of Environment (MoE);
- Ministry of Infrastructure (MININFRA);
- Rwanda Environment Management Authority (REMA);
- Ministry of Finance and Economic Planning (MINECOFIN);
- Rwanda Development Board (RDB);
- Rwanda Land Use and Management Authority (RLUMA)

At local level:

- Local Government Administration (Districts, Sectors, Cells and Villages);
- REG District Branches and
- Potential Project Affected People (PAPs);
- Beneficiaries of the program

List of consulted people is attached on this SEA report.

11.3. Public participation – methods and process

Public participation and community consultation have been taken up and should continue to be an integral part of social and environmental assessment process of the program. Consultation is used as a tool to inform project affected people, beneficiaries and stakeholders about the proposed activities both before and after the development decisions are made. It assisted in identification of the problems associated with the program as well as the needs of the population likely to be impacted. This participatory process helps in reducing the public

resistance to change and enabled the participation of the local people in the decision-making process.

Initial Public consultation has been carried out with Administrative districts within the program area, key institutions involved in program implementation and land acquisition. Further consultation is planned during the preparation and implementation of Resettlement Action Plans. The objectives of those consultations are to minimize probable adverse impacts of the project and to achieve speedy implementation of the program through bringing in awareness among the community on the benefits of the project.

During the Public consultation, the EDCL Team applied different participatory methods, namely; interviews, face-to-face discussions, focused group discussions (FGD) and official meetings with stakeholders. Stakeholders consulted were informed on the proposed project and by using the key guiding questionnaires, the study was able to guide discussions and obtain relevant information on the likely impacts of the project activities.

11.4. Tools used during public consultation

11.4.1. Public hearings

A hearing is a public meeting on a particular regulatory proposal at which interested parties and groups can comment in person. Regulatory policymakers may also ask interest groups to submit written information and data at the meeting. A hearing is seldom an independent procedure; rather, it usually supplements other consultation procedures. During the Strategic Environmental Strategy (SEA), the EDCL employees conducted public hearings in the surveyed areas across the country; several meetings were conducted based on their occupation and locations. Examples of the people who participated in the public hearings included local leaders (mayors, Executive Secretaries of the sectors, cells and villages), Traders, Teachers, Farmers, students, doctors, youth committees and women committees among others.

Figure 25.Consultation with Local Communities in Nyamasheke District

Consultation in Musanze District

Consultation in Nyabihu District

11.4.2. Focus group discussions.

The focus group discussion (FGD) is a rapid assessment, semi-structured data gathering method in which a purposively selected set of participants gather to discuss issues and concerns based on a list of key themes drawn up by the researcher/facilitator (Kumar 1987).A focus group involves encouraging an invited group of participants to share their thoughts, feelings, attitudes and ideas on certain subject. To keep the session on track while allowing respondents to talk freely and spontaneously, the facilitator uses a discussion guide that lists the main topics or themes to be covered in the session. It serves as a road map that guides the facilitator in covering the list of topics and keeping the discussion on track.

The number of items in the guide is generally kept to a minimum to leave enough time for in-depth discussion. It should focus only on relevant research issues. The sequence of topics in the guide usually moves from general to specific ones. The Environmental and social safeguards staffs employed this tool where it was possible to gather some important information that concerned the EARP and RUEAP activities, people from different walks of life participated in focus group discussions.

Figure 26.Consultation with ES of Kayenzi cell and Opinion Leaders in Ruhango District

11.5. Activities Performed

This section present stakeholder engagement activities that were performed until the date this updated SEA report is made available. It also highlights the stakeholders reached, key concerns, expectations and issues raised by stakeholders, stakeholders' comments on proposed corridor options and stakeholders' comments on the SEA report.

Round 1: Initial consultation meetings as part of the environmental and social scoping exercise, with a limited number of key institutions or decision makers and other key informants; Informative and consultative meetings with local administrative authorities, government technical services and villages opinions leaders from the study area.

Round 2 of consultations: This is being performed through individual exchanges with key technical staff from each one of the concerned institutions, developer, districts, sectors and cells either physically or on the phone. The draft SEA report was shared by email to the representatives as per the signed attendance lists during the first phase of consultations. This

was also seen as an opportunity to document any additional concerns or expectations raised by the stakeholders.

11.6. Results from consultation of stakeholders

Initial one-to-one consultation and meeting were held with government or private institutions, academicians, and researchers, concerned administrative districts officials, Administrative Sector level and few numbers of members of local communities, the detailed consultation outcome is available on annex 3 of this SEA.

Results from consultation rounds performed to date are briefly described hereafter and in annex 3, including the activities undertaken, the organisations/institutions that were met and the key concerns and expectations that were raised. Detailed consultation reports for each consultation round, including meeting minutes and registers of participants' signatures are included in Annexes 3.

12. MONITORING AND EVALUATION

12.1. General objective of Monitoring and evaluation

Monitoring and evaluation is a key component of SEA and is an integral part of RUEAP responsibility and obligations. It has the following general objectives:

- Monitoring of compensation progress, of specific situations of economic or social difficulties arising from the implementation of the compensation process, and of the compliance of the actual implementation with objectives and methods as defined by and National regulations and International Principles including AfDB and WB principles.
- Audit of the completion of compensation, through and assessment of the short- mid- and long-term impacts of the compensation on affected households, their incomes and standards of living, the environment, local capacities, housing, etc.

Monitoring allows to correct implementation methods "in real time" during Project implementation, and to check whether general objectives have been met and whether compensation program can be deemed complete. Monitoring and auditing include an internal tier and an external tier.

12.2. Internal Monitoring

12.2.1. Objectives

Monitoring will address the following aspects:

- Social and economic monitoring: follow-up of the status of potential land speculation, environmental and health situation, livelihood restoration including agriculture, small businesses, employment and other activities;
- Monitoring of vulnerable people
- Technical monitoring: supervision of infrastructure construction where relevant, and grievances and grievance management system

12.2.2. Indicators and Frequency of Monitoring

During the active phase compensation, the following five key progress indicators will be measured internally by RUEARP on a quarterly basis:

- Numbers of households and individuals affected by Project activities;
- Numbers of households and individuals displaced as a result of Project activities;

- Numbers of households and individuals resettled by the Project;
- Grievances (open, closed); and
- Amounts of compensation paid per category (structures, land, crops, others).

12.3. External Monitoring

RUEAP will hire a suitably qualified external social and Environmental auditors with significant experience in compensation to carry out two reviews annually with reviews focusing on the assessment of compliance with social commitments contained in Rwanda legislation, AfDB and/or in the World Bank and other development partners Principles.

Objectives of these six-monthly reviews are as follows:

- To assess overall compliance with the SEA and other social commitments made in the Environmental and Social documentation,
- To verify that measures to restore or enhance Project-Affected Peoples' quality of life and livelihood are being implemented and to assess their effectiveness,
- To assess the extent to which the quality of life and livelihoods of affected communities are being restored in an appropriate manner.

Beyond commitments identified in this SEA, this review will also assess overall compliance with other mitigation measures to address non resettlement-related social impacts. The types of commitments that will be verified by the external monitoring expert include the following:

- Pollution prevention - dust and noise management in communities,
- Community safety - awareness raising programs in communities on communicable diseases; community awareness of project traffic routes and traffic safety briefing,
- Infrastructure and services - reinstatement of damaged infrastructure and compensation process; project use of water not affecting communities; and roads shared with the public are maintained in reasonable condition
- Community liaison - community awareness of project activities; complaints procedures; camp rules; recruitment process; project traffic speed limits; pre-warning of blasting, noisy activities, and other planned disruptions; procurement process and regular community meetings and access to community liaison officers,

- Grievance management – follow up of grievances reported; accessibility of Community Liaison Officers; community awareness of complaints procedures and complaints close out.

13. CONCLUSION

The SEA study for RUEAP is a continuation of SEA for Electricity Access Rollout Programme (EARP) as designed and approved in 2012. This SEA study for RUEAP revealed that the EARP program and its activities have had the potential positive impacts on the surrounding and connected communities, both directly and indirectly. However, the study revealed some negative impacts as result of Implementing EARP activities. These impacts are related to destruction of vegetation cover/crops, line routes whereby in some locations MV distribution lines passe through the forest plantations (forest damages or destruction and/or removal) and marchlands, MV lines through the above residential houses, impacts related to fugitive dust emitted from construction works and stockpiles of materials, impacts related to noise Pollution due to the machinery and equipment used to undertake heavy equipment, impacts on soil (which can cause the soil erosion) and water, Storage and treatment of wastes and impacts on Workers or community Health and Safety. From the results of assessment and key environmental issues addressed by SEA for EARP recommendations, the study revealed that the key environmental impacts, mitigation measures, alternatives, and recommendations of SEA for EARP remain applicable to RUEAP during all phases of program activities to inform decision makers and ensure environmental concerns are appropriately integrated in each project of the program. Considering the nature and location of the project countrywide, the potential impacts associated with the proposed electrification program development are of a nature and extent that can be limited, avoided, and eliminated by the application of appropriate mitigation measures. The implementation of Rwanda Universal Energy Access program (RUEAP) is bound to be executed in a sustainably efficient manner and will comply with the proposed mitigation measures and regular monitoring done as per the Environmental and social management and monitoring plans issued in this report.

14. RECOMMENDATIONS

The study recommends the following:

- The programme should be implemented as it has no adverse impacts on the environment.
- During implementation of the program alternatives should be considered on the route, and right of way, choice of the construction materials, choice of the reuse and disposal of wastewater and solid wastes.
- Further some activities should require deep and thorough analysis prior to implementation of specific project and this should be considered during the preparation of the Contractor Environmental and Social Management Plan.
- The monitoring and evaluation process of the SEA should be done in parallel with the monitoring and evaluation of EARP activities to minimize costs and save time.
- The environment and Social safeguards specialists should always be available at the site to report any concerns for urgent mitigation. They should ensure enforcement of Environment, social, Health and Safety requirements as per the relevant legislations.
- Due diligence will be considered for the social and environmental studies which will guide the implementation of the program (CESMP).
- In case, a contractor is hired, He/she should always consult the project manager/engineer to maintain a clear understanding of all the project aspects and their mitigation measures.
- The contractors and consultants (Supervising firm) must have required staff with vast experience in social and environmental or community development matter.
- An environmental and social audit should be carried out annually to ensure compliance with the SEA impact mitigation measures and minimization.

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16. LIST OF APPENDICES

Annex 1: Team of Experts who prepared and contributed to the Strategic Environmental Assessment.

Name	Qualification and experience
TUYISHIME Pascal	✓ Environmental Safeguards Specialist at REG/EDCL. ✓ ESIA Expert registered in Rwanda Association of Professional Environment Practitioners (RAPEP). ✓ Master of Science in Environmental Economics and Natural Resources Management. ✓ Bachelor of Science in Environmental Health Sciences. ✓ 10 years working experience in Environmental protection, Hygiene and Sanitation. ✓ Sample of Related conducted studies include but not limited to; ✓ ESIA for 110kVNyabarongoI-Nyabihu TL, ✓ ESIA for electrification of MV and LV LINES in Ngororero, Karongi, Rutsiro and Burera Districts; ✓ ESIA for MV and LV Electrification lines of Kavumu and Nyagisozi Cells in Busogo Sector of Musanze District to be developed by EDCL; ✓ EMP for plant design, supply and installation of low voltage and medium voltage lines for productive users in RWANDA ✓ ESIA for Nyamugali Substation ✓ ESIA for 110kVMukungwa-Nyabihu These studies were approved by RDB. ✓ Development of ESF related tools (ESMF, RPF, SEP, LMP, ESCP and Gender Action Plan for

	Rwanda Energy Access and Quality Improvement Project (EAQIP) under RUEAP. These studies were approved by World Bank, AfDB & European Investment Bank (EIB). ✓ Preparation of the RAP and ESIA, EHSP for EPC South, West, East, North and KIGALI Network Strengthening for all phases.
KARANGANWA Papias	✓ Environmental Specialist. ✓ Studied Environmental sciences at National University of Rwanda ✓ 10 years of work experience in environmental studies and Environmental monitoring ✓ Sample of related conducted studies include but not limited to; ▪ ESIA and ESMP for electrification of Nyagatare and Burera funded by BADEA ▪ ESMP for electrification of Karongi and Rutsiro (SEAP projects) ▪ ESIA for Upgrade of Rubavu electrical network from 6.6Kv to 30kV ▪ ESMP 22OkVSymbion-Rubavu TL ▪ ESMP of 110kVGahanga-Bugesera T.L These studies were approved by RDB. ✓ Related trainings include ESIA, Environmental Audit and RAP,
MUSONERA Martin	✓ Environmental Specialist at REG. ✓ Registered on UNFCCC Roster of Experts ✓ Registered in UNFCCC Consultative Group of Experts (CGE) on the NDCs and MRV arrangements and the enhanced transparency

	framework (ETF) for the French-speaking Africa and LAC Region ✓ Studied physics at National University of Rwanda ✓ Studied Energy and Environment at University of Illinois at Urbana–Champaign, United States ✓ Master of Business Administration ✓ 8 years of work experience in environmental studies, Environmental monitoring and carbon finance ✓ Sample of Related conducted studies include but not limited to; o ESIA of 30KV Line from Gabiro Substation to Gabiro commercial Firm. This study was approved by RDB o Environmental and Social Management Plan (ESMP) for projected supported by GEF-Global Environment Facility for construction of rural Infrastructure in Karongi, Nyamasheke and Rusizi Districts. This study was approved by AfDB o Development of Environmental And Social Management Framework and Resettlement Policy Framework for Rwanda Energy Access and Quality Improvement Project (EAQIP). These studies were approved by AfDB & European Investment Bank (EIB). Related trainings include ESIA, ESA, RAP, Environmental Audit, GHG Inventory
UWIZEYE Willy	- 12 years of experience in Social Sciences from different institutions. - Social Safeguards Specialist at REG-EDCL; - Master of Art in Public Administration and

	Management (Social sciences) from KABALE University, Uganda 2012; - Bachelors of Social sciences majored in Sociology, 2009; - District Community Development and Gender officer in World Bank Founded projects (SPIU MINAGRI LWH-RSSP); - Health and Social Worker from Compassion International RWANDA-Office; - Community Health Worker Supervisor; - Development of WB ESF related tools (ESMF, RPF, SEP, LMP, ESCP and Gender Action Plan for Rwanda Energy Access and Quality Improvement Project (EAQIP) under RUEAP. These studies were approved by World Bank, AfDB & European Investment Bank (EIB). - Preparation of the RAP and ESIA, EHSP for EPC South, West, East, North and KIGALI Network Strengthening for all phases. Related Experience and training in Health and Safety.
NTAWUMENYA Daniel	✓ Environmental Safeguards Specialist at REG; ✓ Master's studies in Environmental sciences at UR. ✓ GIS Specialist ✓ More than 10 years of professional experience ✓ Related trainings include ESIA and RAP
NYINAWAMWIZA MUGANGA Petronille	✓ Social Safeguards Specialist at REG. ✓ More than 10 years of professional experience
MUKAMURIGO NGARAMBE Illuminée	✓ Social Safeguards Specialist at REG. ✓ More than 10 years of professional experience

HAKIZUWERA Jean Paul	✓ GIS Specialist at REG. ✓ ESIA Expert registered in Rwanda Association of Professional Environment Practitioners (RAPEP). ✓ More than 8 years of professional experience

Annex 2: List of people consulted.

S/N	FULL NAME	POSITION	CONTACT
NYABIHU DISTRICT			
1	HABANABAKIZE JEAN CLAUDE	VM ED	0788323716
2	BAVUGIRIJE JUVENAL	IOSC DIRECTOR	0782719494
3	TWAHIRWA JEAN BAPTISTE	DLVO	0788525182
4	NDAYISABA FELIX	DEO	0788521342
5	GAHAMANYI SYLVESTRE	SPECIAL GROUPS REPRESENTATIVE	0788512673
6	MUNYANEZA JOSEPH	VM ED	0788359600/0784646459
7	SINDIKUBWABO GILBERT	IOSC DIRECTOR	0783316101
8	NKEZABERA COME	DLVO	0788630022
9	TUYIKORERE ALEXANDRE	DEO	0788624483
10	SAKINDI MATHIEU	SPECIAL GROUPS REPRESENTATIVE	0788814953
11	ENG. MAZIMPAKA EZGAD	DISTRICT ELECTRICAL ENGINEER	0788798468
GICUMBI DISTRICT			
1	BANGIRANA JEAN MARIE VIANNEY	ES-SECTOR	0788828342
2	UWIFASHIJE VALENTIN	SECTOR LAND	0788657644

		MANAGER	
3	MULINDABYUMA DIOCLES	SECTOR AGRONOMISTT	0788568005
4	MUNYARUGEREROANASTASE	CIVIL STATUS AND NOTARY	0788830104
5	MURAYIMUNGU M CLAIRE	CNF SECTOR	0783832289
MUSANZE DISTRICT			
1	NSABIMANA ELVIS	BM	0788600505
2	MPUHWE ANDREW	V/MED	0788471491
3	SEBASORE J	DIR OSC	
4	HAKIZAYEZU ALPHONSE	ELECTRICAL ENGINEER	0785618605

S/N	FULL NAME	POSITION	CONTACT
GAKENKE ADMINISTRATIVE DISTRICT			
1	NDAYISENGA P. FRED	CRNO/MINAZI SECTOR	0785234298
2	NDATIMANA ALFRED	INTERNAL AUDITOR	0783142324
3	MULANGI RONALD	INTERNAL AUDITOR	0788821049
4	MUNYANEZA EMMANUEL	RUSHAKI/ESJOMA	0785157405
5	NDAGIJIMANA ZEPHANIE	RUSHAKI/GS KARUNGU	0788282228
6	NSENGIYUMVA FRANCOIS	SECTOR ACCOUNTANT /RULI S	0789310019
7	J BOSCO TWUZUYEMBAZI	GS MUYUNGWE	0788632672
8	TWIZEYIMANA ALPHONSE	RP RULI	0788219865
9	MUSENGAYUMVE FRANCOISE	GS CONGOLI	0788435115
10	NTIRENGANYA	GAKENKE DISTRICT	0788764009

	EPIMAQUE		
11	NSEKANABO ALEXANDRE	GS KIREBE/KARAMBO	0788885014
12	NSENGIYUMVA EMMANUEL	KIVURUGA/GAKENKE	0783857161
13	EMMANUEL	BHIO/GAKENKE D	0788786172
14	MUGWANEZA PACIFIQUE	EP RWANKUBA/HEADTEACHER	0788217713
15	HAKIZIMANA CALLIXTE	GS.BUSAN/H.TEACHERANE	0783017831
16	MUKANDAKALI REGINE	H.TEACHER MUYONGWE/GAKENKE	0783217500
17	HATEGEKIMANA THEONESTE	ACCOUNTANT	0788814967
18	SAFARI JEAN BOSCO	TUTULAIRE	0788540008
19	UMUTESI EMERTHE	RULI	0783017998
20	MUKARUGWIRO ANGELE	MUHONDO	0783494701
21	NYIRAHAKIZIMANA DOMITILLE	COKO	0788798457
22	HAGENIMANA LEONIE	MINAZI	0787195543
23	BUREGEYA JEAN DAMASCENNE	GASHENYI	0783261903
24	MUZINDUTSI JEAN PIERRE	GASHENYI	0783261903
25	NAMBAJIMANA JEAN	NEMBA	0788416116
26	NDORIMANA D	GASHENYI	0788584366
27	MUKANOHELI PENINE	KIVURUGA	0781288576
29	HARAGIRIMANA GERARD	RULI/H.TEACHER	0780260448
30	NDACYAYISENGA WELLARS	RULI/H.TEACHER	0788513641

31	MUGISHA THEOPHILE	DIRECTEUR/KAMUBUGA	0783259300
32	MUNYEMANA GRATIEN	DIRECTEUR/BUYANGE/MATABA	0786934427
33	K. PHOCAS	H.T.E.P. RUKORO 2	0788538793
34	NDAGIJIMANA FRODOUARD	H. TEACHER	0788825250
35	BICAMUMAMUKUBA JMV	H.TEACHER	0788503783
36	MANIRAKIZA ELISOPHON	H.TEACHER/MINAZI	0783123482
37	RURANGIRWA FERDINAND	H.TEACHER CYABINGO	0788595009
38	SOBUGA FAUSTIN	H.TEACHER	0783026186
39	BISENGIMANA JANVIER	E.S MUHONDO	0788519625
40	HAKIZIMANA JEAN BOSCO	ES KARAMBO	0788843161
41	NDANGIZI KAGOBORA ETIENNE	ES RUSHASHI	0788880200
42	NDACYAYISENGA PATRICK	ES COKO	0788536416
43	NSENGUMUREMYI CASSIEN	ES AI NEMBA	0786830734
44	RWIZIGURA SESHOBA AIMABLE	E.C/GASHENYI	0788303816
45	MUKEBWAMANZI GAUDENCE	ES /KIVURUGA	0788490228
46	MWISENEZA ERIC	ES MUGUNGA	0786831999
47	MUKESHIMANA ALICE	ES CYABINGO	0788844080
48	NKURUNZIZA J.BOSCO	ES/SECTOR	0788510793
49	UWIMANA CATHERINE	UMASOC GAKENKE	0788453885
50	AIME FRANCOIS	VICE MAYOR ED	0788490284

	NIYONSENGA		
51	NKURANGA JOSEPH	DES	0788302738
52	CHARLES R. NSANZABANDI	DM	0788591168
53	MUKANGANGO FLORA	DAF/NEMBA DH	0788456811
54	Dr KANEZA DEOGRATIAS	DG NEMBA HOSPITAL	0781795074
55	MBONYINSHUTI ISSAIE	ES MATABA	0788352032
57	DUSABIMANA ALEXIS	COMPTABLE DISTRICT	0788838847
58	KAMANA ALPHONSE	COMPTALE MUZO SECTOR	0782275410
59	HABUMUMUREMYI JEAN BAPTISTE	SCHOOL MANAGER	0788806827
60	HAGUMIMANA STRATON	SCHOOL MANAGER	0788822339
NYAMAGABE ADMINISTRATIVE DISTRICT			
1	KARINGANIRE INNOCENT	REG BM	0788528456
2	EUGENE	REG T.E	0788723325
3	UWIZERA DESIRE	NYARUGURU Dir OSC	0788062030
4	NKUBITO GILDAS	Ag. Dir OSC	0788350349
GISAGARA ADMINISTRATIVE DISTRICT			
1	DOMINIQUE BAKENERINZUNGU	REG MANAGER	0783776603
2	MAURICE BAYINGANA	DIRECTOR OSC	0788884288
3	HABINEZA JEAN PAUL	VMED	0788588110
4	KABANDA CLAUDE	ENVIRONMENT OFFICER	0788417857
5	SAFARI PACIFIQUE	ELECTRICITY OF MAINTAINANCE	0782444762
NYANZA DISTRICT			
1	MARCEL HABIMANA	REG/EUCL	0788474543
2	NSHIMYUMUREMYI	NYANZA DISTRICT /ELECTRICAL	0783142948

	EPHRON	ENGINEER	
3	HABIMANA EVARISTE	NYANZA Dir of OSC	0788660969
4	USENGIMANA PHILBERT	DISTRICT ENV.OFFICER	0788822963
HUYE ADMINISTRATIVE DISTRICT			
1	KAYIBANDA OMAR	BRANCH MANAGER	0788849900
2	SEBUTEGE ANGE	MAYOR	0788847243
3	MUSAFIRI JEAN PIERRE	DIRECTOR I.OSC	0788440182
NYARUGURU ADMINISTRATIVE DISTRICT			
1	NTEZIRYIMANA AUGUSTIN	CUSTOMERCARE AND ETAT CIVIL/NYABIMATA SECTOR	0781139508
2	NYANDWI J.BOSCO	LAND ADMIN/NYARUGURU DISTRICT	0788537785
3	BAHORANIMANA BARNABÉ	REG BRANCH MANAGER	0788330061
4	MUKWIYE J.PIERRE	DIR. OF LAND/NYARUGURU DISTRICT	0788635205
BUGESERA ADMINISTRATIVE DISTRICT			
1	NZAMURAMBAHO VALENS	ELECTRICAL ENGINEER	0781133517
2	MUDASINGWA ALEX	REG-BUGESERA BM	0788850441
3	NYANDWI EMMANUEL	LAND MANAGER/MAREBA SECTOR	0788578309
4	FAIDA JUSTINE	FINANCE AND ADMINISTRATION OFFICER/RUHUHA SECTOR	0788802388
5	NKURUNZIZA K. EGIDE	Ag. Dir OSC	0788660005
6	NDAHAYO J.CLAUDE	FINANCE&ADMIN OFFICER/NYARUGENGE SECTOR	0783334373
7	MINANI EMMANUEL	LAND MANAGER	0783486118
KARONGI ADMINISTRATIVE DISTRICT			
1	NIRAGIRE THEOPHILE	V/MAYOR ED	0788437799
2	WILLY UWIZEYE	SSS-EDCL	0788350349
3	TUYISHIME PASCAL	ESS-EDCL	0783776603

4	NTAKIRUTIMANA GASPARD	ES MUBUGA	0782341912
5	NIYONSABA CYRIQUE	ES GITESI	0782341903
6	AYABAGABO FAUSTIN	ES BWISHYURA	0782341915
7	HABIMANA PROTEGENE	ES GASHALI SECTOR	0782341202
8	NKUSI MEDARD	ES RUGABANO	0782341910
9	NSENGIYUMVA R. SONGA	ES MUTUNTU	0782841909
10	MUDACUMURA APHRODIS	ES MURUNDI	0782341908
11	UWIMANA PHANUEL	ES MURAMBI	0782341916
12	KUZABAGANWA VEDASTE	ES RWANKUBA	0782341913
13	UWIMANA EMMANUEL	SLM/GITESI	0783722220
14	UWIMBABAZI ELIE	SLM/RUGANDA	0784692538
15	MBATEZIMANA JOSIANE	ETAT CVM	0783420942
16	ISAAC MANANTIRENGANYA	ENGINEER	0785418187
17	GATERANO ETIENNE	SLM/MUNK	0787474941
18	DUSENGIMANA DAMIEN	BRANCH MANAGER	0788646444
19	RUKESHA K.EMILE	ES RUBENGERA SECTOR	0782341901
20	HAVUGIYAREMYE THARCISSE	LAND MANAGER RUBENGERA	0787478144
21	NIKUZE MICHEL	LAND MANAGER RUGABANO	0788901951
22	NSANGANIRA VIANNEY	ES/SECTOR	0782341911
23	NSHIMYUMUREMYI JOEL	BILLYING OFFICER	0783764640
24	DUSABIMANA CONCORDE	TWUMBA SLM	0788897120
RUTSIRO ADMINISTRATIVE DISTRICT			
1	RUTAYISIRE M. DEO	ES RUHANGO	0788404433
2	HAGENIMANA MATTHIEN	DISTRICT ELECTRICAL ENG.	0785543637
3	MUKESHIMANA MARIE ALICE	SLM	0784559765
4	KAGABA JEAN BAPTISTE	LAND MANAGER	0788869735
5	NDAGIJIMANA ALOYS	LAND MANAGER	0787124020
6	HARERIMANA XAVERIEN	LAND MANAGER MANIHIRA	0782520656
7	NIZIYIMANA AIME ADRIEN	ENVIRONMENTAL OFFICER	0788873199
8	KABARE JEAN PAUL	EUCL/RUTSIRO BRANCH	0788761884
9	RUGABA ABEL	AGRONOME/RUSEBEYA	0783533819

10	IREMISHAKA PASCAL	SLM /GIHAGO	0782799596
11	SEKAMANA THEOPHILE	SLM/RUHANGO	0782799596
RUBAVU ADMINISTRATIVE DISTRICT			
1	NZABONIMPA DEOGRATIAS	V/MAYOR ED	0788672349
2	NTIBATEKEREZA INNOCENT	ELECTRICAL ENGINEER	0782375205
3	NIYIBIZI NTABYERA HUBERT	DIVISION MANAGER	0788612838
4	NDUWAYO ELIE	SLM/CYANZARWE	0785828657
5	BUREGEYA EVARISTE	SLM/KANAMA	0788634822
6	CAMUBANDI FRED	SLM/BUSASAMANA	0782371571
7	KABERA	SLM/KANZENZE	0788828722
RUSIZI ADMINISTRATIVE DISTRICT			
1	KANKINDI LEONCIE	V/M ED	
2	MURAGIJIMANA PIE	LAND MANAGER-BWEYEYE	0782700535
3	BYIRINGIRO ZEPHANIE	SLM-NYAKABUYE	0783874455
4	DUKUZUMUREMYI ANNE MARIE	SES/NYAKARENZO	
5	HABIMANA EMMANUEL	S/E GASHORA	
6	BANZUBAZE THOMAS	LAND MANAGER	0788823112
7	NIYOMUGABO YUSUF	LAND MANAGER-NKANA-NKOMBO	0785367066
8	MUSHIMIYIMANA JANVIER	ES OF THE SECTOR	
9	RUKESHA EMMANUEL	ES BUTARE SECTOR	
10	NDAMYIMANA DANIEL	ESAI OF THE SECTOR	
11	FRANCIS KIIZA	SLM-RUSIZI	0788666453
12	RWANGO JEAN DE DIEU	ES/NZAHAHA SECTOR	
13	KAMANYANA EVELYNE	SLM-GIHEKE	0788297003
14	HATEGEKIMANA CLEVER	ES GIKUNDAMVURA	
15	MUNYEMANA PROSPER	T.E RUSIZI BRANCH	0788687802
16	HABIMANA MATHIAS	ELECTRICITY M.ENG.	
17	NTIKUGURURWA GERVAIS	ES BUGARAMA	
18	NTWUHARUWE NAPOLEON	AIR OF SECTOR	
19	CYIMANA NESTOR	SCM /GIKUNDAMVURA	0783124545

20	MURAGIMANA PIE	SLM/BWENGE	
21	HAGENIMANA JEAN DE DIEU	ES GIHEKE	
22	IRAGUHA BASILE	SLM- NKUNGU	0785104394
23	IBONABYOSE JEAN DAMASCENE	SLM	0783213796
24	KARANGWA ALEXIS	DISTRICT DASSO COORD.	
24	NIYIBIZI JEAN DE DIEU	ES GIHURWE SECTOR	
25	HABIMANA MATHIAS	RUSIZI DISTRICT ELECTRICITY MAINTENANCE ENGINEER	0783617435
25	BISENGIMANA EUGENE	AI ES NYAKABUYE	
27	NZEYIMANA JEAN BEN FONTAINE	LAND MANAGER KAMEMBE	
28	NZABANDORA PIERRE	LAND MANAGER BUGARAMA	0783590493
29	IZADUKIZA MARIE CLAIRE	SLM NYAKARENZO	0785264349
30	NYIRANEZA RACHEL	SLM GASHONGA	
31	MUKANYANGEZI CHANTAL	SLM MUGANZA	0783016005
32	NEMA ESTHER	SLM MURURU	0787182553
NGORORERO ADMNISTRATIVE DISTRICT			
1	PATRICK UWIHOREYE	V/MAYOR ED	0788545643
2	KAYANGE CARINE	INFRASTRUCTURE	0787334115
3	NIYOYITA FRANCIS	SLM/NDARO	0788564399
4	UWIMANA JOSELYNE	SLM/NYANGE	0788641112
5	MUNYANEZA FABIEN	INTERN/NGORORERO	0788830286
6	NTEZIRYAYO PHILPPE	SLM/HINDIRO	0784471454
7	MUJYANAMA MATHIAS	SLM//KAGEYO	0782692628
8	MAPENDANO JMV	SLM/NGORORERO	0788657078
9	IHORIKIZA MARIE CLAUDINE	SLM/MUHORORO	0783221747
10	MUGEMANA J. BOSCO	SLM/KABAYA	0783275902
11	TWAYIGIRA J.DE DIEU	SLM/MATYAZO	0789677311
12	KAGABO NOEL	SLM/KAVUMU	0785180169
13	HABINEZA SIMON PIERRE	T.E NGORORERO	0788811532
14	KAYANGE JEAN D AMOUR	ES SECTOR /NGORORERO	0788620002

15	NSANZIMANA AIMABLE	SLM/BWIRA	0787075556
16	BIZIYAREMYE J. CLAUDE	SLM/GATUMBA	0785757058
17	NTAYIMANA JP CELESTIN	DIR.OSC	0783693888
RULINDO ADMINISTRATIVE DISTRICT			
1	MULINDWA PROSPER	V/MAYOR ED	0788600037
2	RUBAYITA ERIC	ES KINIHIRA SECTOR	0782796385
3	MUTUYIMANA JEANNETTE	ES CYUNGO SECTOR	0784322193
4	BIZUMUREMYI AL BASHIR	D ES RULINDO	0788547558
5	NIYONIRINGIYE FELICIEN	DIRECTOR OF OSC	0788493929
6	AYABAGABO ILDEPHONSE	SLM	0783355552
7	NSABIMANA EMMANUEL	SLM	0785382920
8	MUHAWENIMANA DESIRE	SECTOR LAND MANAGER	0788755252
9	NZEYIMANA JEAN VEDASTE	ES MBOGO	0783392112
10	NDAGIJIMANA FRODUALD	ES/RWIGE	0783405137
11	MWUMVINEZAYIMANA FIACRE	E/S B. SECTOR	0788470845
12	KAYIRANGA J. NEPO	OSC LAWYER RULINDO HQ	0788436425
13	NSENGIYUMVA CHARLES	LAND ADMIN	0788449981
14	NDAHAYO LEOPOLD	SLM /CYUNGO	0788891554
15	SEBAZUNGU J.BAPTISTE	SLM /KISARO	0786423947
16	UWANYAGASANI	SLM/NTARABANA SECTOR	0788656852
17	NDARUHUTSE JEAN CLAUDE	SLM/RUKOZO	0783059986
18	NDIKUMANA ERNESTE	SLM/MBOGO	0783195950
19	IYAKAREMYE PASCAL	SLM/BUYOGA	0783215819
20	TWIZERIMANA JEAN BERCHMAS	SLM/RUSINE	0788618494
21	MUSHIMIYIMANA JEAN PIERRE	DASSO CYINZUZI SECTOR	0787435972
22	NIYONSABA SYMPHORIEN	SLM/BUSHOKI	0784467531
23	MUHIGIRA ANTOINE	ES OF SECTOR	0788533519
24	SHUMBUSHO PAPIAS	ES OF RUTONDE CELL	0789175521
25	UMUBYEYI MEDIATRICE	ES/TUMBA SECTOR	0783306572

26	NZEYIMANA PIERRE CLEVER	ES/BUSHOKI SECTOR	0783311642
27	UWIRINGIYIMANA THOMAS	RULINDOHQ/BUSHOKI	0788696663
28	NYIRAMUGISHA CHRISTINE	SLM/BASE	0785633484
29	KUBWAMUNGU ELIE	GOOD GOVERNANCE/MASORO	0788608277
30	UGIRIMBABAZI CONCESSA	S/E KAJEVUBA	0789175507
31	MUHAYIMANA CELESTIN	RULINDO REG-MANAGER	0788797778
32	UMUHOZA MARIE GRACE	SLM/MASORO	0788414574
33	NKUNDABERA FAUSTIN	SLM/CYINZUZI	0783632573
MUHANGA ADMINISTRATIVE DISTRICT			
1	KAYIRANGA INNOCENT	VICE MAYOR ECONOMIC	0788520131
2	KAYIRANGWA VESTINE	ACTING ES/S	0785575186
3	BIGIRIMANA J.PAUL	ACTING ES/S	0781727602
4	BAZIZANE PACIFIQUE	ACTING ES/CYEZA SECTOR	0787900774
5	MUKAMUTARI VALERIE	ES SHYOGWE	0784561490
6	DUKUNDANE SERGE	SLM SHYOGWE	0785990904
7	NTEZIYAREMYE GERMAIN	ACTING ES KIYUMBA	0788553485
8	NYAMINANI AIMABLE	ACTING ES	0788561296
9	NTAWURUHUNGA CHARLES	ELECTRICAL ENGINEER	0785835558
10	MUKASETI ROSINE	REG BRANCH MANAGER	0788520131
11	NZABONIMPA ONESPHORE	Dir OSC MUHANGA DISTRICT	0788442779
12	NSENGIMANA SILAS	ES/NYAMABUYE	0788629892
13	NDAYISABA AIMABLE	ES KABACUZI	0788486630
14	NSHIMIYIMANA JEAN CLAUDE	ES KIBANGU	0788616367
15	BYICAZA CLAUDE	Ag MUHANGA	0788602586
16	NIRAGIRE EZECHIEL	WATSAN	0782171069
17	MVUYEKURE EDOUARD	SLM/RONGI	0781114939
18	RUZINDANA FIACRE	AIR ES/MUHANGA	0788736203
19	HAKIZIMANA ALPHONSE	SECTOR LAND MANAGER	0788482728
20	MUSHIMIYIMANA ESPERANCE	S.LAND MANAGER	0783206589
21	HAGENIMANA EMMANUEL	S.LAND /M.NYAMABUYE	0789591123

22	NIYONSENGA ALPHOSE	SECTOR LAND MANAGER	0783892666
23	NDACYAYISABA ILDEPHONSE	SECTOR LAND MANAGER	0785007928
24	NYIRAMUNINI MUKIZA SOLEIL	SECTOR LAND MANAGER	0781289049
25	HABINEZA INNOCENT	SECTOR LAND MANAGER	0788766534
26	NKUBITO AMOS	SECTOR LAND MANAGER	0782128300
27	NKURUNZIZA J.M.V	SECTOR LAND MANAGER	0788884419
28	NTURANYENABO EMMANUEL	SECTOR LAND MANAGER	0782017643
NGOMA ADMINISTRATIVE DISTRICT			
1	MUKANTWALI MARCELLINE	DATA MANGER/RUKIRA SECTOR	0786432904
2	BATANGANA REGIS	REG BRANCH MANAGER	0788330024
3	MUTABAZI CELESTIN	DIRECTOR OF OSC	0788611586
4	KANAYOGE ALEXIS	ES NGOMA	0788384535
5	TURYAREBA SYLVESTRE	ELECTRICITY ENG.NGOMA	0788437936
6	SEMATABARO MBWECK	DISTRICT ENV.OFFICER	0788537075
GATSIBO ADMINISTRATIVE DISTRICT			
1	NYIRINGANGO JEAN DE DIEU	BM/REG	0788330018
RWAMAGANA ADMINISTRATIVE DISTRICT			
1	NIYOMUNGERI RICHARD	E.S/MUNYIGINYA SECTOR	0788595546
2	MUKAGIHANA DATIVE	LAND OFFICER/ MUNYIGINYA SECTOR	0786108059
1	IGOOMA STEPHEN	BM/REG	0788480959
3	MUGEYO LIVINGSTONE	LAND MANAGER/MUHAZI SECTOR	0788591456
4	RUTAREMARA J. CLAUDE	LAND MANAGER/FUMBWE SECTOR	0788538801
5	MUKANDAYISHIMIYE OLIVE	DISTRICT EME	0783701390
6	RUBANGUTSANGABO	LAND VALUER	0788767091

	ANSELME		
KAYONZA ADMINISTRATIVE DISTRICT			
1	MUNYENTWALI JOSEBEL	FINANCE&ADMINISTRATION MANAGER/NYAMIRAMA SECTOR	0788848953
2	TWIZEYIMANA KALISA ERIC	REG BRANCH MANAGER	0788330019
2	DUKUZUMUREMYI EPIPHANIE	DISTRICT EME	0786313798
3	GAKUNZI EMMANUEL	Dir OSC	0788529572
4	KARANGWAYIRE CHARLOTTE	LAND OFFICER/KABARONDO	0784374384
5	UZABAKIRIHO LAUBEN	UMUTURAGE/CYABAJWA	0726734100
6	TWIZEYEMUNGU NOWA	USHINZWE ISIBO KABARONDO	0780551826
7	NSENGIYUMVA PATRICE	UMUTURAGE	0725177731
8	NSENGIYUMVA CELESTIN	UMUTURAGE CYABAJWA	0726521958
9	NDUWAYEZU	UMUTURAGE	0726007636
10	NTAWUKIRUWABO FERETIEN	UMUTURAGE	0728087993
11	MUNYANEZA JEAN DAMASCENE	MUTEKANO	0783100784
12	UWIMANA SAMSON	UMUJYANAMA	0789213265
13	MBONIGABA JEAN PAUL	UMUTURAGE	0782928661
14	MANIRAGUHA LAURANT	UMUTEKANO	0788368627
15	NIZEYIMANA ERIC	MUTWARASIBO	0788749340
16	NSHIMIYIMANA JEAN PIERRE	MUTWRASIBO	0785192602
17	NDAGIJIMANA EMMANUEL	USHINZWE UMUTEKANO	0788278367
18	MUSAYIDIZI ANANIAS	ES OF CELL	0788675111
NYAGATARE ADMINISTRATIVE DISTRICT			
1	MUSHABE DAVID CLAUDIEN	MAYOR/NYAGATARE	0788588011
2	NIYONKURU BENOIT	BM/REG	0783145746
3	SAM GATUNGE	Dir OS SOCIAL	0788407892
4	MUGENZI	ENVIRONMENTAL	0783589143
5	MANIHIRA JEAN CLAUDE	BUILDING INSPECTOR	0785638861
6	UWIZEYIMANA ETIENNE	ELECTRICAL ENGINEER	0783870999
KAMONYI ADMINISTRATIVE DISTRICT			

1	BAHIZI EMMANUEL	DES	0783124092
2	KALISA ROSINE	REG-MANAGER	0788553013
3	ABRAHAM UKWISHAKA	DIRECTOR/OSC	0783090582
4	RUBADUKA SAMSON	DIRECTOR/PM&E	0783439678
5	KABALISA VALUAS	DDMO	0788826134
6	UZABATUNGA BERTRARD	SLM GACURABWENGE SECT.	0788554693
7	MINANI JEAN PAUL	TEACHER (RUBONA PRIMARY)	0787133517
8	NISHIMWE ALLERUA	TAILLEUR/GACURABWENGE	0724099492
9	HITAYEZU FIDELE	UMUCURUZI/RUBONA	0728436062
10	HAKUZIYAREMYE XAVER	UMUCURUZI/RUBONA	078367790
11	NDIHOKUBWAYO AROYS	UMUCURUZI/RUBONA	0783481202
12	NSENGIYUMVA JUVENSI	UMUCURUZI	
13	BIKORIMANA PASTOR	EPR	
14	NSENGIYUMVA JEAN	UMUHINZI/UMWUBATSI	0785225985
KIREHE ADMINISTRATIVE DISTRICT			
1	MUNGWAKUZWE	HEAD TEACHER/G.S.GASENYI	0788235848
2	MUPENZI THEOGENE	REG BRANCH MANAGER	0788440961
1	MUZUNGU GERALD	MAYOR/KIREHE	
2	EGIDE MASUMBUKO	CUSTOMER CARE OFFICER	
3	MARC NTIRENGANYA	ELECTRICIAN	
4	BUTETO MONIQUE	DISTRICT IRRIGATION OFICER	
5	NGIRABAKUNZI OCTAVIEN	DISTRICT ENVIRON. OFICER	
6	KALINDA M.VITAL	FOREST&NR	
7	MUNYANEZA WILLIAM	DIR OSC/KIREHE DISTRICT	

Annex 3: Detailed Findings from consultative meeting

Observation / Points raised by stakeholders	**Suggestions by stakeholders and proposed action in this SEA**

Observation / Points raised by stakeholders	Suggestions by stakeholders and proposed action in this SEA
There is no problem with assets valuation. But there are considerable delays in compensation payments; Some cases of expropriation are also pending. Delays are generally due to errors not because of lack of funds but due to errors in Bank account numbers. The delay in compensation is an issue. REG should find a way to address all outstanding issues related to expropriation. Delayed people due to lack of the required documents should not stop the project to move on The project should consider employing local people for their economic development	Local authorities should help the local population to secure the required document for a file to be complete. Local authorities should work hand in hand with SACCOs (bank) to avoid errors in accounts numbers. REG has inventoried all old cases from district, and all have undergone the valuation, there payment is being done. Compensation payments should be done before the commencement of project works. Local government officials should have a permanent eye on hired certified valuator for the quality of valuation but also they should speed up the activity of signing the forms within their offices so that they can be transferred to EDCL for payment Local people who are physically capable will be given the priority for employment.
Electricity can help them to go on the same speed as the country, they said that the country development is leaving theme behind because they lack major infrastructures including lack of access to reliable electricity. The safety of the line will be safeguarded and different activities like welding, haircut, showing movies… Please we are capable, for physical work, consider giving us the job as we are ready to serve but also for development.	The project will be implemented, and they will be having electricity at the end of it. They should safeguard the electrical line and be ready to make this project productive by implementing the activities and project that are energy based and develop the areas. People who are ready and physically capable will be given the priority in employment as casual workers.
There is an issue of poverty to local people, there is likelihood that they will not have the fund to purchase	Client who want cash power, they get it free of charge and they pay 50% as they consume until

Observation / Points raised by stakeholders	Suggestions by stakeholders and proposed action in this SEA
the cash power and make installation. Can the project help them in terms of installing their houses?	the debt finished.
The project is appreciated. The compensation should be handled efficiently. The district will help to speed up the compensation process and there will be the public awareness campaign after the project effectiveness and when all the lots are identified and marked. The encroachment after the cut off date will be avoided to the extent possible. When the projects are expected to get started?	The valuation process will involve the local government officials as per Rwandan expropriation law. The involvement of the district will make the job easy. The program effectiveness is expected in beginning of 2021.
The project is appreciated and any help for its implementation will be rendered. Community mobilization will be carried out for a smooth asset inventory and valuation. The local authorities will help the valuer to avoid any delay and inconsistency in valuation. The district staff presented the priority areas that urgently need electricity and suggested that this should be the basis for planning on electrification within the district.	The district priority sites to be connected, will be handed over to EDCL Planning so that they can be taken into consideration. They will always be consulted before the implementation of any project so that what is being done to them should be done considering the district priority
Some district staff presented the priority areas that urgently need electricity and suggested that this should be the basis for planning on electrification within the district. The information about compensation on the project being implemented should be shared with district so that they can handle different relevant claims	The district priority sites to be connected, will be handed over to EDCL Planning so that they can be taken into consideration. The information about expropriation is available on REG website and every PAP can access his/her own account.

Observation / Points raised by stakeholders	Suggestions by stakeholders and proposed action in this SEA
The community appreciated this program and they are waiting impatiently the starting. They said that they are expecting a lot from this program, like getting casual jobs, but also it will help them in the employment creation like welding, using mill, haircut saloon but also they are fed up of darkness caused by the lack of electricity access	The district priority sites to be connected, will be handed over to EDCL Planning so that they can be taken into consideration. They will always be consulted before the implementation of any project so that what is being done to them should be done considering the district priority
Due to the big pace of development we are undergoing, everyone needs access to electricity ever. Anything that you will need will be granted from the district as the main stakeholder. However, any planning on new sites to be connected should take into account the priority from district. Always contractor do not pay labors on time. The contractor should pay his workers on time. How will your project protect workers from accidents?	The Project team appreciated the effort of the district engagement and told the consulted people that the sites as prioritized by the district will be handed over to EDCL planning department for their consideration. However, after the project effectiveness, the project team will also consult the district to update the data. The project will use World bank/AfDB environmental health and social guidelines to comply with occupational health and safety and Labor Management Procedure (LMP) is being prepared so that detail concerning worker right should be captured and monitored for effective implementation.
There is a problem of information sharing concerning expropriation process and update. What will you do improve this? The Health and safety of workers should be given the value, and workers be given the Personal Protective	The information on the update for expropriation for PAP can be now accessed through website on the link: https://www.reg.rw/customer-service/expropriation/ Health and safety will be complied to World Bank Standards, and the priority will be to

Observation / Points raised by stakeholders	Suggestions by stakeholders and proposed action in this SEA
Equipment.	eliminate the harm, but where not possible to Personal Protective Equipment will be used to ensure the safety of workers, employers , Visitors and the public.
The community appreciated this project and they are waiting impatiently the starting. They said that they are expecting a lot from this project, like getting casual jobs, but also it will help them in the employment creation like welding, using mill, haircut saloon but also, they are fed up of darkness caused by the lack of electricity access.	The district priority sites to be connected, will be handed over to EDCL Planning so that they can be taken into consideration. They will always be consulted before the implementation of any project so that what is being done to them (they service they are receiving) should be done considering the district priority
Compensation of losses is an issue since the payments process is long. After having collected the signed lists of beneficiaries on which the damaged assets and owed amount is mentioned, the lists are sent to continue the journey to Kigali EDCL headquarter to MINECOFIN, which pays beneficiaries through BNR (Banque National du Rwanda) then from their the compensation is deposited to the beneficiary's account. The process is too long. The district has the two dumpsites where waste is sorted. However, Inorganic waste is becoming accumulated and will have to be transported for recycling industries.	District officers suggested the decentralization of not only the funds for compensation and expropriation but also to be given the EIA/SEA report and involve its officers in the planning and implementation of RUEARP subprojects The project will conduct public consultations during environmental and social studies and reports will be disclosed to the public.

Observation / Points raised by stakeholders	Suggestions by stakeholders and proposed action in this SEA
The existing electricity service is single phased, and this only facilitates us only for lighting purposes, we cannot use machines.	There is another project under Enabel which has started doing the upgrade from single phase to three phases.
We are ready to manage electronic waste; However, the problem is that we normally do not get the totality of this waste due to scavengers who always go everywhere looking for the recyclable waste as illegal business. There are also people who do not know/do not care that if electronic material is used up should not be disposed of with other waste, but should be given to people/companies who can treat them. We advise you to mobilize solar home systems companies to fully work with us and avoid to the extent possible the scavengers. People using these solar Home Systems should be mobilized and make sure that at the end of solar system life, especially those batteries, they give them back to the company that sold the device to them, so that they can safely arrive at this e-waste recycling facility which was done for that purpose.	The safeguards team through Renewable Energy Fund (REF) PIU in the Development Bank of Rwanda (BRD) will liaise with all solar Home Systems companies on this issue. They will be mobilized to mobilize the clients and give a regular report on the status of devices and the waste management arrangement in place. Only companies which have a certificate of good working relationship with this e-waste recycling facility will be awarded contract. All companies shall submit the waste management plan before being awarded contract for trading solar home system.

Annex 4: Chance find procedures under RUEAP

Chance find procedures under Rwanda Universal Energy Access Program will be designed as follows:

- Immediate stop the construction activities in the area of the chance find.
- Delineate the discovered site or area.
- Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be present until the responsible local authorities take over. The Institute of National Museum of Rwanda shall be responsible for significant movable and immovable cultural property that pertains to Rwanda history, heroes and the conservation of historical artefacts and the National Museum shall be responsible for significant movable and immovable cultural and natural property pertaining to collections of fine arts, archaeology, anthropology, botany, geology, zoology and astronomy, including its conservation aspect. Institute of National Museum of Rwanda Cultural Properties Division take over. The address of Institute of National Museum of Rwanda is as follows:
    - Rwanda, Huye
    - Address: SH 1RD 2
    - P.O.BOX 6397, Kigali
    - +250730741093
    - +250783379597
    - E-mail: info@museum.gov.rw
- Notify the supervisory Engineer who in turn will notify the responsible local authorities and the Institute of National Museum of Rwanda Cultural Properties Division immediately (less than 24 hours).
- Contact the responsible local authorities and the Institute of National Museum of Rwanda Cultural Properties Division who would be in charge of protecting and preserving the site before deciding on the proper procedures to be carried out. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the Institute of National Museum of Rwanda Cultural Properties Division (within 72 hours). The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, including the aesthetic, historic, scientific or research, social and economic values.

- Ensure that decisions on how to handle the finding be taken by the responsible authorities and the Institute of National Museum of Rwanda Cultural Properties Division. This could include changes in the layout (such as when the finding is an irremovable remain of cultural or archaeological importance) conservation, preservation, restoration and salvage.
- Implementation for the authority decision concerning the management of the finding shall be communicated in writing by the Institute of National Museum of Rwanda Cultural Properties Division; and
- Construction work will resume only after authorization is given by the responsible local authorities and the Institute of National Museum of Rwanda, Cultural Properties Division concerning the safeguard of the heritage.
- These procedures must be referred to as standard provisions in construction contracts, Safeguards Procedures for Inclusion in the Technical Specifications for Contracts. During project supervision, the Site Engineer in collaboration with the contractor safeguards shall monitor the above regulations relating to the treatment of any chance find encountered are observed.
- Relevant findings will be recorded by the safeguards and will be reported in monitoring and Evaluation Report on quarterly basis to the World Bank, and Implementation Completion Report on safeguards part will assess the overall effectiveness of the project's cultural property mitigation, management, and activities when the chance find encountered during the implementation.

Annex 5: PROJECT BRIEF OF "Rwanda Universal Energy Access Program"

1. **Developer**

Name: Energy Development Corporation Limited-EDCL

Representative: Eric MIHIGO

Phone: 0788306390

Email: emihigo@edcl.reg.rw, info@edcl.reg.rw

Website: www.edcl.reg.rw

2. **Program Description**

Program Name: Rwanda Universal Energy Access Program

Purpose: The Rwanda Universal Energy Access Program aims at achieving 100% households' access to electricity by 2024. The program will consist of distribution projects including Medium and Low Voltage.

Location of the program activities: The program will be implemented countrywide

Main program activities: The main activities of the program will be the construction of mediums and low voltage electrical lines and connections service.

Specifically, the activities will consist of: **(i)** Topographical survey; (ii) Compensation of affected crop; (iii)Site mobilisation and bush clearing**;** **(iv)**Supply and transport of material**;** (v) Construction of poles foundations **(vi)**Poles erection; (vii) Stringing; (viii) Installation of power transformer; (viii) connection service

Types of Materials to be used: Steel poles, concrete poles, wooden poles, conductors with cables of 70/12 ACSR and accessories.

Lines configuration:

- Medium Voltage Line with Voltage level of 30 kV
- Low Voltage Line with Voltage level of 0.4 kV for tri phase and 0.23 for single phase.

3. **Key relevant Environmental Baseline Information**

Climate condition

The program area (countrywide) is situated within tropical region and has humid climate. The region experiences alternate season of climate. The temperature is decreasing from eastern region of the country to the western part of the country whereas the rainfall is increasing from the eastern part of the country to western part of the country.

Hydrology

Hydrography network is divided in two catchments: Nile catchment with Nyabarongo, Akagera and Akanyaru main rive; Congo river catchment wit Rusizi, Sebeya and Rubyiru as main rivers

Relief and Soil

The relief is inclined from the west to East with Congo Nile divide on west, central plateau and lowlands on east as well as highlands in northern part of the country. The principal types of soils in the country are dominated by oxisols in east; inceptisols and ultisols in cental and western part of the country.

Fauna and Flora

The program area has no specific natural flora and is mainly characterized by grown flora. Noticeable flora includes trees that are exotic, mainly dominated by eucalyptus trees that have been extensively planted in the hillsides and play a vital role in controlling soil run off that is prevalent in the sleep hillside. Other floral species that can be observed in the project areas include Grevillea, Cyprus and Pine.

The program area has known significant species of wildlife and avifauna. However, domesticated animals like goats, chickens, pigs and cows are kept by the local communities at small scale level. There are also a few wild small animals and insect species including toads, frogs, several types of insects and reptiles

Major Environmental and Social Impacts

The program will have a wide range of environmental and social implications. In general, successful implementation of the Program will have high socio-economic benefits to the people. The environmental and social impacts identified include:

A. Potential Positive or Beneficial Impacts

Successful implementation of the Program will have numerous socio-economic benefits including:

- Universal access to electricity facilities leading to improved standard of living and better education;
- The Program will contribute to increase in local development and employment as the population are likely to be employed during the construction phase and after construction employment creation through increased business activity and electricity related investments as a result of energy availability;

- In the construction phase there will be temporary employment opportunities for local contractors and those who will be employed or supply services and provisions for workers and to contractors;
- Within the respective project areas there will be opportunities for petty trading and small business service provision on construction site;
- The program is expected to contribute to rural community's well-being associated with improved services, stability, work opportunities, settlements, health, empowerment and education training;
- Improved social service delivery in housing developments, hospitals and schools. Stable access to power in rural residential areas and social sectors will also contribute toward improving the quality of life for women and children through time saving on household work and care giving, and through increased employment opportunities;
- The long-term direct positive impact is therefore in access to reliable electricity supplies, which will lead to better provision and easier management of goods and services, and enable new facilities for processing and storage. Data management with computers is made possible and communication facilities like Internet can be made available, as also charging for mobile phones; also, electric lighting adds to security at night and enables extended opportunities for work and study;
- It would improve financial, managerial and administrative skills to the community due to the electricity access; It would support sustainable development in the commercial sector (shops, bars, and restaurants); to small and medium industries (flour mills, rural water supply installations, tanneries, and coffee processing plants), to the residential sector by replacing/reducing the consumption of woody biomass and petroleum products used for lighting and motive power, to education (kindergarten, elementary schools, junior secondary schools, secondary schools and technical colleges), and to the health sector (pharmacies, health centers and hospitals).

In brief, the program would assist in the facilitation of economic growth and create long-term employment opportunities for the poor, including women, thereby increasing income levels and reducing poverty.

B. <u>Potential Negative Impacts</u>

1. Land Acquisition

There is no need of land acquisition for the construction of the line and connection services, and yet compensation for some crop should be done.

Consultations and discussions with the concerned population and local authorities, then compensation according to the national procedures will be fulfilled before the implementation of the project.

2. **Destruction of vegetation cover/crops**

Vegetations and crops in line routes will be cleaned for the construction of power lines according to the standards regarding ROW for power lines.

Mitigation measures:

During line route selection emphasis will be placed avoiding sensitive ecosystems, densely populated settlements and farmlands in order to avoid impacts associated with resettlement, compensation and relocation.

Eventual damage to trees shall be limited as far as possible, and any removals should be undertaken in consultation with the landowner still it always a public property.

3. **Fugitive Dust**

Fugitive dust shall be emitted from construction works and stockpiles of materials including machinery as well as from truck traffic. This could cause health related impacts to the communities around the road and workers in the project site.

Mitigation measures

Fugitive emissions from roads and site work to be eliminated or minimized by applying water on a need basis to dirt roads, unpaved surfaces and exposed construction areas during the dry season. The dirt roads and exposed construction areas should be moisturized during the dry season to prevent or minimize the fugitive dust emissions.

4. **Vehicular Emission**

During the construction of the transformer, increased use of heavy equipment and machinery could cause increased vehicular emission (CO_2) in the atmosphere and will cause to some extent some form of atmospheric pollution. This impact though is expected not to be significant and to last only up until the construction phase.

5. **Noise Pollution**

The machinery and equipment that will be used to undertake heavy equipment will cause noise pollution in the immediate surroundings of the project areas. The impact is expected to last only during the construction phase and will be short term in nature and not very significant. The

equipment and machines that will be used are mainly trucks and these do not normally generate noise to levels that would be of concern or harmful to the residents.

Mitigation measures

All equipment and machinery installed must be tested to verify if they are compliant with the national acceptable standards. Noise emitting equipment should comply with the applicable Rwanda noise standards and should be properly maintained. Major part of the Project sites is far enough of residential zone. All workers in the project sites must be equipped with the necessary and required Personal Protective Equipment (PPE) but not limited to facilities to protect against noise impacts, earmuffs, safety helmets, boots, dust masks, gloves, overall, goggles, hearing protection etc.

6. **Impact on soil and water**

The program does not anticipate extensive use of motorized equipment and machinery that use fuel oil and lubricants that could impact on soil and water from accidental spills or unsound disposal or handling. However motorized vehicles will be used and that can cause oil spills.

Mitigation measures

For the waste oil or used oil, the company contracted will collect the used oil for proper disposal. All waste oils and lubricants from maintenance of construction equipment should be segregated and disposed properly in accordance with the similar waste disposal plan.

7. **Bird Strikes/Collusions**

Transmission and distribution networks are known to be a potential source of bird strikes that get entangled to the lines causing their injury or even instant death. This is especially more significant when birds migrate from one point to another and usually get struck by these transmission lines.

Mitigation measures

The routing of the distribution and transmission network should avoid areas known to be migratory routes for birdlife.

8. **Storage and treatment of waste**

Solid waste materials during the construction include paper wrapping, scrap metal, excavated soils, polythene, plastic, metal containers; liquid wastes including especially oily water and might cause pollution if disposed not appropriately. Waste oil is an output of the project that poses potential environmental hazard in case of poor handling and disposal methods.

Mitigation measures

Develop a solid waste disposal plan which includes the provision of receptacles at strategic points within the construction site, recycling programmes for recyclable wastes, separation of wastes; and remove wastes from the site to the recommended waste management site. Warning signs against littering and dumping within the construction site should be erected by the contactor. The contractor should make attention and avoid the use of transformer with PCBs.

9. Fire Hazards/Accidents

During the construction phase the chances of fire hazards occurring cannot be overlooked due to the use of combustible machinery and equipment in undertaking the construction works.

Mitigation measures

The contractor is expected to provide equipment for fire suppression as stipulated in the tender documents. Emergency zones should be planned and developed where necessary.

10. Workers Health and Safety

Adverse impacts on the worker's health and safety is likely to occur especially through worker's interaction with the equipment and machines. Accidents are likely to occur during construction and operations when the equipment are in use, and further to this if workers are exposed to the air emissions and incessant noise of the equipment could lead to potential harm on health of the workers.

Mitigation measures

- All workers entering the construction site must be equipped with PPE including earmuffs, overalls, gloves, dust masks, among others. The PPE should be those that meet the international standards of PPE. Personal protection gear must be provided, and its use made compulsory to all. The entire workforce of the plant should be trained in the use of protective gear, handling of chemical products, electric safety equipment, procedures for entering enclosed areas, fire protection and prevention, emergency response and care procedures;
- 'Restricted ENTRY' signs should be installed to keep away unqualified workers from access to restricted areas;
- Machines and Equipment must be operated only by qualified staff and a site supervisor should always be on site to ensure adherence;
- The contractor should develop an Emergency Response Plan for handling any emergencies arising thereof during the construction;

- A perimeter fence should be constructed all around the project site to keep away unauthorized persons from the site;

CONCLUSION

In concluding, a successful implementation of the Program will have, in general, high socio-economic benefits to the population. Based on the environmental impacts and mitigation measures sorted out, the program is environmentally and socially viable with negligible adverse environmental impacts that have been mitigated.

Some of the impacts are inevitable and can only be minimized. If the Mitigation measures, proposed in this project brief are implemented, the impacts of the project will either be eliminated or minimized to a manageable and sustainable level.