BTC

BELGIAN DEVELOPMENT AGENCY

FORMULATION REPORT

ENERGY SECTOR:

IMPROVING ACCESS TO RELIABLE ON-GRID ELECTRICITY SERVICES FOR HOUSEHOLDS AND PRIORITY PUBLIC INSTITUTIONS

BELGIAN CONTRIBUTION TO EARP

RWANDA

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LA COOPÉRATION BELGE AU DÉVELOPPEMENT .be

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ABBREVIATIONS

AFD	Agence Française de Développement
AfDB	African Development Bank
BADEA	Arab Bank for Economic Development in Africa
BE	Kingdom of Belgium
BTC	Belgian Technical Cooperation (Belgian Development Agency)
CB	Capacity Building
CBF	Capacity Building Fund
CNA	Capacity Need Assessment
DGD	Directorate of Development Cooperation and Humanitarian Aid
DI	Director of Intervention
DP	Development Partners
EA	Environmental Assessment
EC	European Commission
EARP	Electricity Access Roll-out Program
EMP	Environmental Management Plan
EPC	Engineering, Procurement and Construction
ESMF	Environmental and Social Management Framework
ESSP	Energy Sector Strategic Plan
EDPRS	Economic Development and Poverty Reduction Strategy
EWSA	Electricity, Water and Sanitation Authority
GDP	Gross Domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GIS	Geographic Information System
GoR	Government of Rwanda
HDI	Human Development Index
HH	Household
HIV	Human Immunodeficiency Virus
HR	Human Resources
HV	High Voltage
ICP	Indicative Cooperation Program
ICT	Information and Communication Technology
IT	Information Technology
ITA	International Technical Assistance
JICA	Japan International Cooperation Agency
KIKI	Kigali-Kiyumba
KIST	Kigali Institute of Science and Technologies
kWh	Kio Watt Hour (unit of energy)
LV	Low Voltage

MDG	Millennium Development Goals
M&E	Monitoring and Evaluation
MINAFFET	Ministry of Foreign Affairs and Cooperation
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Economic Planning and Finance
MINEDUC	Ministry of Education
MININFRA	Ministry of Infrastructure
MINIRENA	Ministry of Environment and Lands
MOH	Ministry of Health
MoM	Minutes of Meeting
MoU	Memorandum of Understanding
MTR	Mid Term Review
MV	Medium Voltage
NGO	Non-Governmental Organization
NL	The Netherlands
OECD	Organisation for Economic Co-operation and Development
OFID	OPEC Fund For International Development
O&M	Operation & Maintenance
OP	Operational Policy
OPEC	Organization of the Petroleum Exporting Countries
PAPs	Project Affected People
PIN	Project Identification Note
PIU	Project Implementation Unit
PM	Project Manager
PMO	Prime Minister's Office
PMU	Project Management Unit
PSC	Project Steering Committee
PSCBS	Public Sector Capacity Building Secretariat
PV	Photovoltaic
QCC	Quality Control Committee
RAF	Responsible for Administration and Finance
RAP	Resettlement Action Plan
RBS	Rwanda Bureau of Standards
RDB	Rwanda Development Board
REMA	Rwanda Environment Management Authority
RURA	Rwanda Utilities Regulatory Agency
RPF	Resettlement Policy Framework
RPPA	Rwanda Public Procurement Authority
ROW	Right Of Way

SCBI	Strategic Capacity Building Initiative
SEDP	Sustainable Energy Development Project
SME	Small and Medium Enterprise
SoV	Source of Verification
SPIU	Single Project Implementation Unit
SWAp	Sector Wide Approach
SWG	Sector Working Group
SWH	Solar Water Heater
SWOT	Strengths, Weaknesses, Opportunities, Threats
TA	Technical Assistance
TFF	Technical and Financial File
ToR	Terms of Reference
UN	United Nations
WB	World Bank

EXECUTIVE SUMMARY

The Indicative Cooperation Program (ICP 2011-2014) between Belgium and Rwanda allocates a total grant envelope of 55 million euro to the energy sector in Rwanda, split over four interventions: (i) geothermal energy development-, (ii) access to energy-, (iii) feed-in-tariff- and (iv) capacity building component. The present document covers the access to energy component that has a total Belgian contribution of 17 million EUR and a duration of 4 years plus two extra year for the Specific Agreement.

The general objective of this intervention is the provision of sufficient, reliable and affordable energy for all Rwandans. The specific objective is to improve the access to reliable on-grid electricity services for households and priority public institutions in rural Rwanda.

It should be regarded as the Belgian contribution to the nationwide Electricity Access Roll-out Program (EARP), the focus remaining on the electricity grid extension with the construction of new transmission and distribution lines connected to the national electricity network. In addition, the present intervention will be involved in targeted strengthening of the existing network and in several other activities aiming at increasing the sustainability of the electrification program.

With the support of technical assistance, the intervention will give a special attention to the respect of harmonized quality standards to increase the sustainability, quality and security of the new installations. Resources will also be allocated for adapted development and implementation of Environmental Management Plan (EMP) and Resettlement Allocation Plan (RAP). In order to improve operation and maintenance of the network infrastructure, several specific capacity building activities will be developed and supported. Last but not least solutions to support low-income beneficiaries to afford the electricity connection will be tested in the intervention area.

The intervention will be executed in joint responsibility between the Energy, Water and Sanitation Authority (EWSA) and the Belgian Development Agency (BTC).

Considering the specificity of the fast evolving context, flexibility will be given to the project in terms of intervention area for grid extension and grid strengthening. Instead of including in the Technical and Financial File (TFF) a predefined list of lots to be built, this mandate is given to the Project Steering Committee (PSC) based on a list of objective criteria and an analysis that will be conducted by the intervention.

1 ADOPTED OPERATING PROCEDURE

1.1 Context

1.1.1 ICP Rwanda-Belgium 2011-2014

The Indicative Cooperation Program (ICP 2011-2014) between Belgium and Rwanda, approved on May 18th 2011, allocates a total grant envelope of 55 million euro to the energy sector in Rwanda, split over 4 interventions:

- geothermal energy component (27M€)
- access to energy component (17M€)
- feed-in tariff component (6M€)
- capacity building component(5M€)

The present document is for the formulation of the access to energy component.

1.1.2 EARP

Rwanda's Electricity Access Roll-out Program (EARP) is designed to achieve the GoR stated targets. These targets call for the total number of electricity connection to increase significantly, with a special emphasis on connecting social infrastructures-health facilities, schools and administrative offices. EARP is a nationwide program operating under the Energy Water and Sanitation Authority (EWSA) which has set up a program management department for this purpose.

The access to energy component of the ICP between Belgium and Rwanda is identified has the Belgian contribution to EARP. The formulation of the intervention is co-managed by the EARP coordinator, Edward Kasumba.

1.2 Mission Management and Approach

1.1.3 Missions phases

1.2.1.1 Phase 1: Preparation of the mission

- Gather and review all documents
- Inform the local stakeholders of the formulation mission and ensure their participation
- Organize the logistical aspects of the formulation mission
- Approve ToR for the formulation

1.2.1.2 Phase 2: Field missions of the formulation team (12/01/2013-24/01/2013)

- Synchronize with the formulation missions for the geothermal development and for the capacity building in the energy sector project
- Involve the stakeholders: GoR at Ministry level, EWSA and EARP, Belgian Embassy, other donors/investors through the Energy Sector Working Group
- Hold a debriefing with the stakeholders after each mission

1.2.1.3 Phase 3: Writing of the formulation report and the financial and technical file

- Elaborate formulation report and TFF
- Collaborate with different services at BTC (operations desk, controlling, transversal themes)
- Write implementation modalities, based on the organizational assessment
- Share TFF with partner

1.2.1.4 Phase 4: BTC peer review

- Share the document internally at BTC level and with pertinent external resources for input

1.2.1.5 Phase 5: Restitution of the TFF in the partner country

- Present the TFF to the stakeholders including the Belgian Embassy cooperation attaché
- Adapt the TFF during the mission
- Present the final version at the end of the mission to the technical and administrative partners, to the attaché for development cooperation and to the resident representative of BTC

1.2.1.6 Phase 6: Approval of the TFF

- Finalize the TFF and formulation report and submit to the QCC
- QCC
- Transfer the TFF to the steering committee for approval
- Transfer the TFF to the DGD

1.1.4 Formulation Team

1.2.1.7 Partner involvement

The contribution of the partner (EWSA, Ministries, other relevant stakeholders) is crucial to the success of the formulation. The formulation is co-managed by EARP coordinator.

The role of the partner is to:

- Provide expertise
- Organize/facilitate meetings
- Give guidance on harmonization between stakeholders and projects (EARP modalities)
- Provide general sector information (policies, strategies, laws,…)
- Share all relevant information on management, organisation, on-going and upcoming tender procedures and their status
- Contribute to the report by writing and/or checking the documents in all stages of the

formulation

- Review and informally approve the documents before sending to the donor to start the formal approval process
- Participate in all meetings and field visits

A Steering Committee approves the terms of reference of the missions and the present TFF. This ad hoc steering committee consists of:

- MINECOFIN and/or MINAFET
- MININFRA
- EWSA
- DGD
- BTC

1.2.1.8 BTC involvement

- **Experts BTC Brussels**

Two energy experts from BTC Brussels are in charge of the project formulation: Frederik Van Herzeele (manager of the formulation) and Yannick Thomas.

The BTC manager of the formulation will be responsible for:

- Determining the methodology to be followed for the different aspects of the formulation planning process.
- Coordinating the different tasks of the formulation team and guiding them through the agreed methodology
- Taking the final responsibility for the formulation results and accompanying the formulation team during the entire process and particularly during the two field visits
- Finalising the TFF writing and be responsible to defend it in the QCC in Brussels

- **BTC project staff**

The BTC staff at EWSA of the on-going energy projects in Rwanda will support the formulation.

- **BTC representation**

The representation office offers logistic support for the missions and provides early in the process relevant documents, and information on execution modalities on-going in other Belgian interventions.

- **Other BTC HQ staff**

Other staff involved in the formulation process are:

- Transversal experts (gender, HIV, environment)
- Operational desk
- Controlling, for the elaboration of the implementation modalities
- Human Resources

- **Consultants**

Two external consultants have performed the organizational assessment of EWSA as foreseen in the ICP.

1.3 Validation of the identification

The project identification note (PIN) has been elaborated in 2011 and approved in December 2011. Given the last advancements of the EARP, the PIN can be completed by some updates.

- **On the summary description of the intervention (point 1)**

The first phase of EARP is currently ending; the period 2013 – 2018 is known as the EARP II. GoR is determined to build on the success of the first phase and learn lessons that can help to deliver on the challenging 48% on-grid electrification target over the coming 5 years. These targets call for the total number of on-grid electricity connections to increase from 335,000 at the end of 2012 to one million by 2018.

The total cost of required investments is estimated to 570 million USD on the period 2013 - 2018. This represents a considerable financial challenge that can only be met with massive Government funding and support from development partners.

The EARP appointed the company SOFRECO to assist the Planning and Design Unit to carry out the planning, design, costing and a capital investment program to achieve the targets. This planning work captures all potential consumers in GIS and estimates the cost of the needed installations. The zones to be electrified are then divided in several lots with the bigger lots grouped for EPC contracts and smaller lots to be dedicated for local contractors and EWSA in house construction. The lots are prioritized according to their average connection costs. More details on this study are provided in Annex 9.6.

- **On the target group and the location of the intervention (point 4)**

At the end of 2012, EWSA counted 335,416 connections.

The location of the intervention will depend on priority area at the time of the intervention. Since the exact timing of the intervention is still unknown, the decision of the location will be taken by the PSC during the project implementation. Criteria for the decision are described in the TFF.

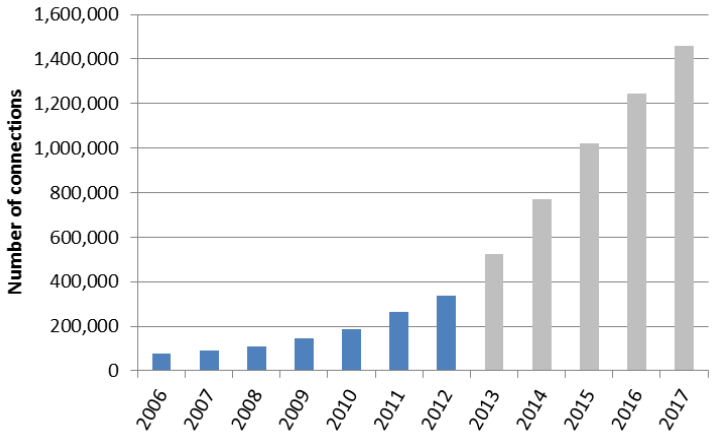
- **On the synergy with other bilateral and multilateral donors and ICP of the EC with the national agenda of harmonization and alignment (ACCRA) (point 6)**

The following table shows how partners are intending to contribute to EARP II:

DP's and funders	Amount in USD (million)	Date of agreement (tentative)	Effectiveness date	Date of closure	Comments
AfDB	41	June 2013	2014	2018	18 Grant + 23 Loan
GoR	4	June 2013	2014	2018	Counterpart to AfDB
Netherlands	25	2014			Grant
OFID	12	Sept 2012			Loan
WB	60	Feb 2013	Apr 2013	June 2016	Credit
AFD	10	2014			On hold
Belgium	22	2014	2014	2017	Grant
EU	??	2014			On hold
Total expected	**174**				
Total needs	**570**				To reach 48% target

The cost estimation of 1000 USD per connection is based on the EARP I experience. According to the PIN, the € 17 M investment may provide around 21,000 new connections. However, the actual number of new connections will probably be smaller given the facts that (i) EARP II shall reach new customers that are on average more expensive because further to the grid than EARP I, (ii) some investments are needed to strengthen the existing grid to avoid overloading by the grid extension, (iii) part of the budget shall be allocated to sustainability aspects that are not covered in the 1000 USD/connection. Instead of 21,000 new connections, the Belgian contribution to EARP is thus expected to contribute to around 14,500 new connections.

The achievements up to end of 2012 and the current targets for 2017 are presented in the following chart:



- **On the measures to be taken to ensure the sustainability of the intervention after its closure (point 8)**

Near-term actions to strengthen EWSA, including targeted capacity building shall be developed in synergy with the capacity building intervention.

Long term actions to ensure commercial viability of EWSA have been initiated by the GoR:

- Gradual introduction of cost reflective tariffs through use of cheaper energy sources, increasing low-cost generation
- Reduction of system losses
- Restructuring electricity tariff customer categories and increasing average tariff: a study on the impact of electricity tariff is to be conducted by EWSA in collaboration with the WB. This study will give recommendations on the actions to be undertaken to improve electricity affordability.

2 ANALYTICAL RECORD OF THE INTERVENTION

Initial record

National Number DGD	3012660
BTC Navision Code	RWA 12 081 11
Partner Institutions	Ministry of Infrastructure Energy, Water and Sanitation Authority (EWSA)
Duration of Specific Agreement	48 months
Duration of implementation	36 months
Rwandan Contribution	EUR
Belgian Contribution	17 000 000 EUR
Estimated date for the signature of the specific agreement	XX-XX-2012
Intervention Sectors	Secteur principal : Energie - Transmission et distribution d'électricité Sous-secteurs : Energie - Politique de l'énergie et gestion administrative
General Objective	The development of the energy Sector is enhanced in order to power the socio-economic development of the country and to contribute to the welfare of its people
Specific Objective	Access to reliable and cost effective electricity services for households and priority public institutions in rural areas is improves in line with EDPRS targets
Intermediate Results	

Amendments to initial record:

- Even if the effective execution phase shall be 36 months, the duration of the specific agreement and the implementation were both extended for the following reasons:
    - The execution phase officially begins at the date of the signature of the specific agreement but the project then enters its effective start-up phase, of about 6 months, during which project human resources will be hired, bank accounts will be opened, first cash call will be made, baseline activities and first year planning will be done, culminating in the production of the start-up project report.
    - The biggest contracts for grid extension activities shall have a duration of 18 months but can only start once other activities have been completed (quality standards, EMP and RAP design)
    - Experience shows that tight time schedule in tender preparation does not serve the quality of the contracts
    - Experience within EWSA shows that bureaucracy can delay public tender procedures
- The Rwandan contribution consists in several components discussed during the formulation as specified in the TFF.
- Given the current uncertainties on budget availability and timing, the line for estimated date for the signature of the specific agreement has been removed.
- The intervention sectors were translated in English.
- The General objective has been modified during the formulation to focus on the mission of the partner institution newly defined for EDPRS 2012-2017. The new global objective is shared with the other energy ICP components.
- The Specific objective has been modified during the formulation to specify the scope:
    - Cost effectiveness of electricity services was removed of the objective because it depends on too many elements that are out of the sphere of influence of this project only (as availability of cost-effective generation capacity, financial viability of EWSA,…). Nevertheless, cost effectiveness is within the sphere of interest of the project. For this reason, the concept of “energy affordability” has been placed in the general objective.
    - The specific objective explicitly focus on on-grid electricity as it is the vocation of EARP. More explanation on the rationale to focus on on-grid electricity is given in the TFF.
- The Intermediate results were completed during the formulation exercise

Amended record

National Number DGD	3012660
BTC Navision Code	RWA 12 081 11
Partner Institutions	Ministry of Infrastructure Energy Water and sanitation Authority (EWSA)
Duration of Specific Agreement	72 months
Duration of implementation	48 months
Rwandan Contribution	448.252 EUR
Belgian Contribution	17.000.000 EUR
Intervention Sectors	Main sector : Energy – Electricity transmission and distribution Sub-sector : Energy – Energy policy and management
General Objective	The energy sector is able to provide sufficient, reliable and affordable energy for all Rwandans
Specific Objective	The access to reliable on-grid electricity services for households and priority public institutions in rural areas is improved
Intermediate Results	1) Rural electricity access is increased through national electricity grid extension 2) Electricity grid reliability is increased through existing grid strengthening 3) Electricity grid access affordability is improved through pilot activities in the intervention area 4) Local capacity is strengthened within EARP and EWSA utility

3 SECTOR CONTEXT

3.1 General context

Energy sector has remained a central priority for the Government of Rwanda that aims to support economic growth, social services, and address the basic energy needs of the poor to improve their quality of life. Approximately 85% of the national primary energy use comes from biomass. Of the 15% of non-biomass primary energy, petroleum products accounts for about 11% and electricity for only 4%.

Access to electricity is only 16% at the end of 2012, mostly concentrated in Kigali and other cities. Electricity access has grown from a very low base of 46.000 connections in 2000 to the present 335.416 connections (end 2012).

3.1.1 Electricity Production

3.1.1.1 Thermal power

The total installed capacity for all the fuel generators is currently **37,8 MW.**

To face several energetic crisis's caused by the hydro power plants production decline and a growing electricity demand, Electrogaz and the government of Rwanda installed thermal generators in Jabana: Jabana I in 2005 (7,8 MW) and Jabana II in 2009 (20 MW)

A diesel generator as rental power of the Aggreko company was also connected to the electrical network in Gikondo (10 MW).

3.1.1.2 Renewable thermal power

A pilot plant to generate electricity from the methane gas in the Kivu Lake was commissioned in 2009 near Gisenyi. Its installed capacity is **4,2 MW.**

The large reserves of methane gas dissolved in the bottom of Lake Kivu are under study for several years. The total potential is estimated to 700 MW to be shared between Rwanda and DRC. A part of this gas can be considered as renewable fuel. The government gave development and operation of methane gas to the private sector through a PPA (Power Purchase Agreement). A new pilot plant of 25 MW in Kibuye (KivuWatt) is currently in development and should be operational through a PPA in 2013.

3.1.1.3 Hydropower

The total available hydropower capacity is currently **51,6 MW** (Installed capacity: 56,9 MW).

This capacity is mostly located in the North of Rwanda, currently 27,4 MW (Ntaruka, Mukungwa, Gihira, Gisenyi, Rugezi, Keya, Nkora and Cyimbili). In the South of the country, the new power plant of Rukarara adds 9 MW to the national grid. Rwanda also imports 14,5 MW power from regional hydropower projects of Rusizi I and Rusizi II at the border with DRC and Burundi. The total off-grid micro hydro capacity is only a few kilowatts.

3.1.1.4 Solar power

The photovoltaic panels of mount Jali have a total installed capacity of **250 kW**. Those installations were commissioned and connected to the national grid in 2007 in the frame of the Rwanda – Rheinland-Plalz (Germany) partnership.

Most of the health centres, public buildings and primary and secondary schools located in rural areas

remote from the grid are electrified with solar PV off-grid installations.

3.1.2 Electricity Transport and Distribution

3.1.2.1 Electricity transport

The national transmission grid consists of 385 km of high voltages lines (289 km on 110 kV and 96 km on 70 kV).

The 110 kV lines transport electricity between Kigali and the North (Mukungwa and Ntaruka substations) and between Kigali and the South-West (Mururu substation) with a new line segment of 15 km connecting Karongi to Kibuye since 2008. There are 14 substations of 110 kV on those lines.

The 70 kV line transports electricity between Kigali and the East (Rwinkwavu substation). There are 4 substations of 70 kV on this line.

A medium voltage network (6,6 kV, 15 kV and 30 kV) is rapidly extending in Rwanda to meet the ambitious electrification target.

3.1.2.2 Electricity distribution

In cities and regional centres, electricity is distributed through low voltage networks (220/380V) that are connected to the national transmission grid via transformation stations.

The number of customers connected to the distribution networks has grown significantly from 77.000 at the end of 2006 to 335.416 end 2012, i.e. about 16 % of the population has currently access to electricity.

By 2017, the government aims to deliver 48%. on-grid electricity access rate.

In addition to the lack of access to electricity, the high price per kWh is another of the main immediate issues to be addressed in the electricity sector. Currently the retail tariff is 134 FRW/kWh for domestic consumers and 126 FRW/kWh for large commercial and industrial consumers. The current price would be even higher without government subsidies, which include a waiver on import duties and on imported fuel plus a direct subvention to EWSA to offset the high price paid for the electricity produced by the rented generator.

3.2 Policy context

3.2.1 Vision 2020 and the importance of the energy sector

In its **Vision 2020** document, written in 2000, the GoR described what Rwandan society and economy should look like in 2020. The major aspiration was to transform the country into a middle income country. The accomplishment of this ambition would require an annual economic growth rate of at least 7%. In order to bring about the necessary rise in the standard of living of the population, growth would also have to be Pro-Poor, giving all Rwandan's the chance to gain from the new economic opportunities.

Vision 2020 has been converted into action by a series of medium-term strategic plans. The first was the **Poverty Reduction Strategy (PRSP)** finalized in 2001. This was the Government of Rwanda (GoR)'s first systematic assessment of the actions needed to reduce poverty and generate pro-poor economic growth. It was followed by the Poverty Reduction Strategy Paper (PRSP) which covered 2002-2006, and subsequently the Economic Development and Poverty Reduction Strategy (EDPRS I) covering the period 2008-2012.

EDPRS I (2008-2012) marked a distinct change in the approach to development. A key conclusion of

the PRSP experience was that the social sectors (particularly health and education) had been well addressed through the previous programmes, while the real economy i.e. the sectors dealing with the production of goods and services, had not. Priority was, therefore, given to accelerating growth, creating employment and generating exports. These were to be catalyzed through public investment in infrastructure, and through regulatory reform. These strategies were intended to reduce the costs and risks of doing business and to create an attractive environment for private sector investment and activity.

During the last few years, Rwanda's economy has been growing at an annual average rate of 8.3%. In its new Economic Development and Poverty Reduction Strategy (**EDPRS II 2012-2017**), the GoR is even projecting an average annual growth of 11.5% between 2013 and 2018. According to the GoR's vision, economic growth will be, among other things, driven by the **uninterrupted provision of energy at prices that are stable and regionally competitive**. Therefore, access to modern sources of energy (petroleum and electricity) at affordable prices will be essential if the country is to achieve this objective. These energy sources are crucial when it comes to developing the services sector and the industry in Rwanda.

On the other hand, the provision of cost effective and appropriate energy solutions to the poor must also contribute to poverty alleviation, particularly in rural areas where energy services are currently scarce or expensive.

3.2.2 The evolution of the Energy sector

Given the GoR's high ambitions, no single energy source on its own will be able to meet the energy needs of the country in the coming years. Each energy source has its own unique characteristics and the choice of the most appropriate source of energy depends on its foreseen use. The figure below, taken from the ESSP 2013-2018., illustrates the proportion of energy the GoR expects to obtain from bio-products, petroleum products and electricity for different uses in the future. The red arrows illustrate where significant increases in the use of particular energy sources are expected in order to drive the economic growth or the poverty reduction targeted under the EDPRS II.

	Transport	Heating and Cooking	Lighting	Modern Domestic and commercial Technologies	Industrial processing
Bio-products	Small fraction of transport expected to use Biofuels	Bio-products dominate; transition away from wood to charcoal and Biogas.		none	Small use of Bio-products e.g. wood burning for tea processing
Petroleum	Vast Majority of transport will continue to use petroleum products	LPG will be used but will remain a luxury for the urban wealthy	Kerosene may be used but Electricity will dominate	none	Petroleum to be used for heavy machinery or where grid connections are unavailable
Electricity	Electric Vehicles not envisaged in the next 5-years	Electricity will not make economic sense for heating and cooking	We expect a significant increase in both on and off-grid electricity for lighting	Electricity will be the only possible option	We expect a significant increase in Electricity use for industrial processing

From the figure above, it is clear that bio-products will remain the most appropriate and cost-effective source of energy for heating and cooking. The 5-year strategy of the GoR for the period 2013-2018. is to encourage cleaner, more efficient and sustainable uses of bio-products by transitioning away from wood to more advanced technologies such as biogas and by making the production and use of charcoal more efficient.

As far as petroleum is concerned, it is clear that the demand for this source of energy will continue to rise. The envisaged eradication of the need to burn diesel for electricity production will be more than off-set by the increased need for petroleum products in transportation, particularly aviation, and heavy industry.

Finally, though it currently represents a small portion of Rwanda's Energy mix, electricity will become very important in the future since it is necessary for modern sectors such as manufacturing and ICT. Therefore, increasing levels of both access and generation capacity is vital if the country is to achieve the levels of economic growth and poverty reduction that are targeted over the coming 5-years.

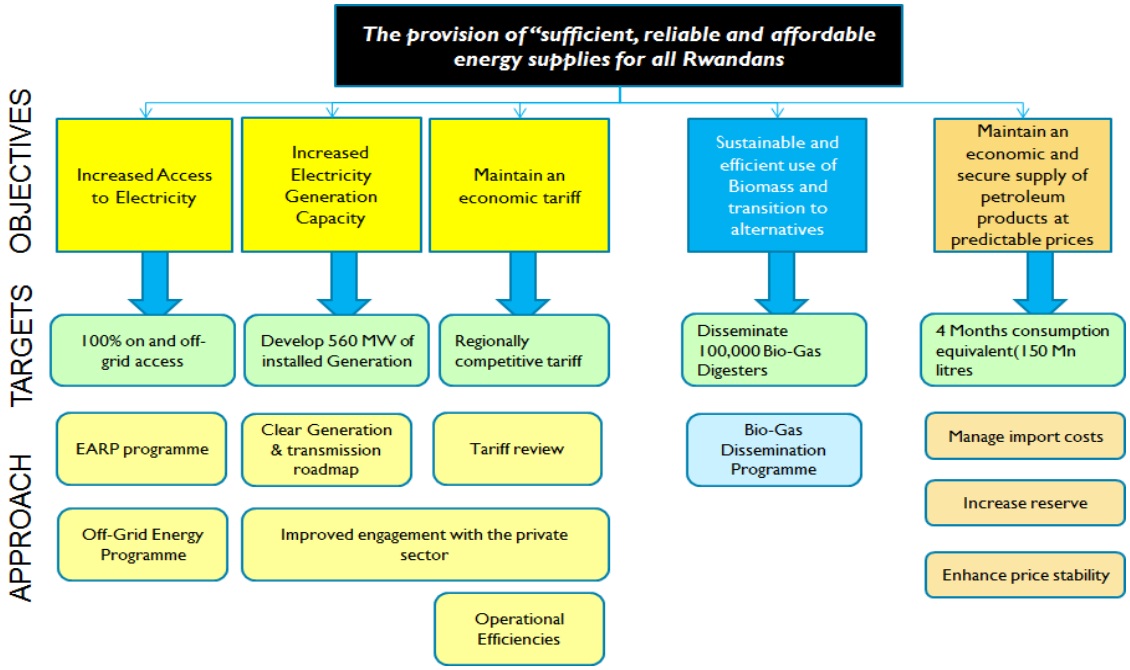
3.2.3 EDPRS II and the electricity sub-sector

In order to make sure that the energy sector effectively contributes to economic growth and poverty alleviation, the GoR has set specific objectives and targets in the EDPRS II[1] for the energy sector:

1. Increase Rwanda's electricity generation capacity to 563 MW, leveraging large-scale private sector investment by 2017/2018;
2. 48%. of the Rwandan urban and rural households have access to electricity, by 2018.
3. Electricity in Rwanda needs to be provided at a regionally competitive tariff

[1] Economic development and poverty reduction strategy (EDPRS II), 2013 – 2018, S*haping our development,* final version

[2] Based on preliminary information provided by EWSA.



The strategic approaches for all three objectives are discussed in more detail below.

3.2.3.1 Increasing electricity generation capacity

For this objective, the focus is on the exploration and use of alternative and renewable sources of energy such as geothermal energy. The GoR is well aware that the investments needed to increase the production of electricity can not only be provided by the government. Therefore, a lot of effort will have to go into attracting private sector investors through Public Private Partnerships (PPPs). One of the ideas in the Energy Sector Strategic Plan is to create an Energy Development Fund that will finance technical and commercial feasibility studies for specific projects in which a private investment is required. Moreover, the GoR will continue to streamline the process of obtaining licenses and permits for private companies.

3.2.3.2 Increasing access to electricity

As far as the "Access to Electricity" is concerned, the strategic approach of the GoR, proposed in the Energy Sector Strategic Plan 2013-2018 . and the EDPRS II, is twofold:

- On the one hand, the GoR wants to continue its efforts, under the EARP programme, to connect rural households to the national electricity grid.
- On the other hand, the GoR also emphasises the need for off-grid solutions, especially in remote geographical areas where levels of consumption are too low to justify a grid extension and connections to the national grid. In such cases, the GoR is envisaging off-grid solar power and hydro power installations to provide electricity to the local population.

3.2.3.3 Assuring and maintain a regionally competitive tariff

The current electricity tariff is heavily subsidized, with about 20% of EWSA's revenue coming through government subsidies in 2011/12[2]. These subsidies were introduced to insulate consumers from the

[2] Based on preliminary information provided by EWSA.

impact of the costly diesel-powered electricity generation EWSA needed to employ as other generation capacity failed to keep pace with consumer demands. As a first step to evolve towards a regionally competitive tariff, the GoR has decided in its Energy Sector Strategic Plan to transition away from rental diesel by 2015. As a result the costs to EWSA of generating electricity is expected to drop significantly and by then it might no longer be necessary to grant direct subsidies to the electricity tariff. This means that by then EWSA's tariff will have to become completely cost reflective.

But transitioning EWSA away from operational subsidies is only one part of assuring a regionally competitive tariff. In fact, there are a number of areas through which EWSA could increase operational efficiency, thus reducing operation and maintenance costs and increasing revenues. Since the operational costs of EWSA have a direct impact on the height of the tariff, improvement of operational efficiency would certainly contribute to a further decrease of the electricity tariffs.

3.2.3.4 Conclusion

As demonstrated above, GoR's focus for the electricity sub-section in the coming years is on increasing electricity generation and transmission/distribution capacity. In summary, the strategy of the GoR is to assure the "provision of sufficient, reliable and affordable energy supplies for all Rwandans".

The target shift in the electrification strategy is likely: move from 70% on-grid electricity access to a more realistic 48% on-grid electricity access by 2018. Even if the target is moved downwards, the project is still relevant given the amount of investment needed even to reach the 48% electrification target.

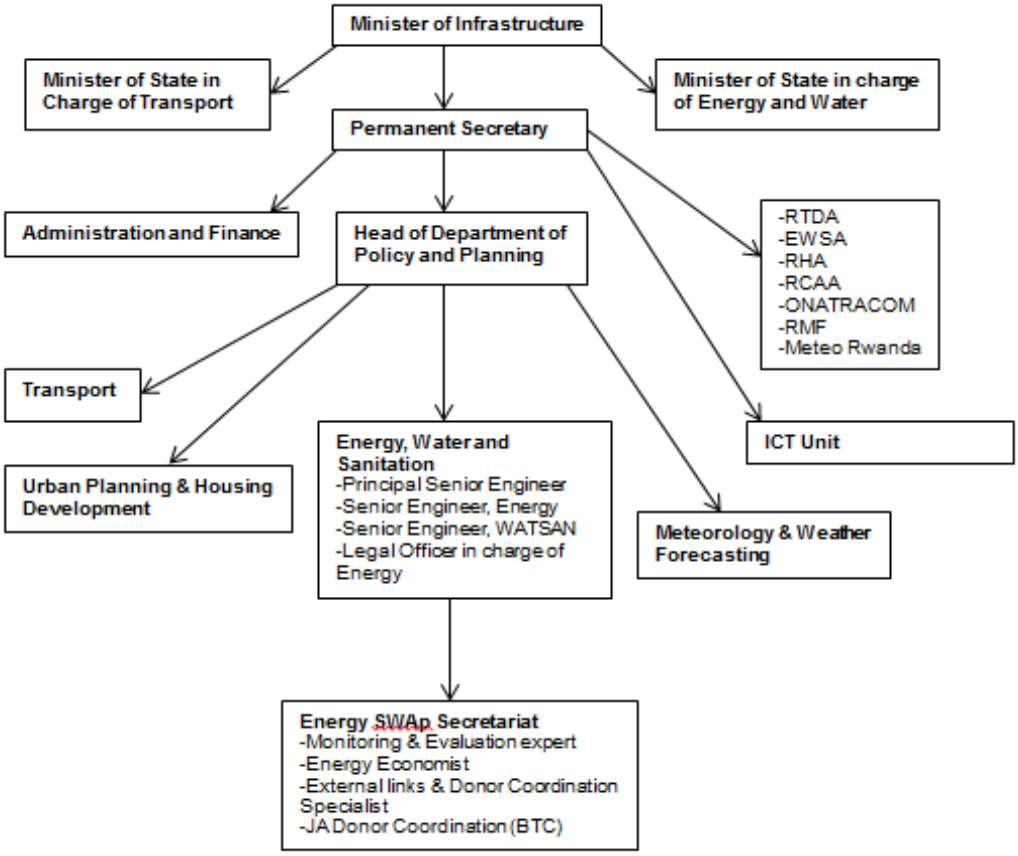
The remaining 52% of the population should be provided with off-grid solutions. The bulk of the off-grid access is expected to be provided by the private sector and is out of the scope of this intervention.

3.3 Institutional framework

3.3.1 MININFRA – Ministry of Infrastructure

3.3.1.1 Organisation Structure

The Ministry of Infrastructure covers the following sectors: Transport, Urban planning & Housing Development, Meteorology and Weather Forecasting and Energy, Water and Sanitation.



MININFRA is headed by the Minister of Infrastructure, Hon. Albert NSENGIYUMVA; the Minister of State in charge of Energy and Water, Hon. Emma Francoise ISUMBINGABO; the Minister of State in charge of Transport, Hon. Alexis NZAHABWANIMANA and Permanent Secretary James KAMANZI. Both Ministers are members of Cabinet, and the everyday activities of the Ministry are carried out by the organisational units tasked with specific functions, administered by the Permanent Secretary.

In addition to its subsectors, MININFRA also consists of the following departments:

1. Information Communication Technology (ICT) – tasked with the management of MININFRA's IT and communications requirements
2. Planning Unit – which works across all sectors, and is tasked with program management, budgeting and planning
3. Administration & Finance – who manages the financial resources as well as the administrative burden of the Ministry
4. Special Unit - tasked with providing capacity building and technical assistance for all sub-sectors.

The intervention focuses on the Energy sector, which has been invigorated recently by the SWAP secretariat, tasked with overall communication, monitoring and evaluation and coordination within the energy sector.

3.3.1.2 Mission and purpose

To ensure the sustainable development of infrastructure and contribute to economic growth with a view to enhancing the quality of life of the population.

Core Functions:

- To develop institutional and legal frameworks, national policies, strategies and master plans relating to transport, energy, habitat and urbanism, meteorology, and water and sanitation subsectors;
- To initiate programs to develop, rehabilitate and maintain an efficient and integrated national transport infrastructure network, including roads, bridges, airports, railways, and water transportation which will contribute towards economic development and regional integration;
- 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, develop and facilitate urban development programs with a view to providing affordable shelter with due regard to adequate water and sanitation facilities for the population and promote grouped settlement (Imidugudu);
- To initiate programs aimed at increasing access to affordable energy, water and sanitation, and transport infrastructure and related services for the population;
- To develop a customer focused meteorological service to deliver accurate and timely weather and climatological information to government and private institutions;
- 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 work towards implementation of programs to enhance human resource capacities under the transport, energy, habitat & urbanism, water and sanitation, and meteorology sub-sectors respectively;
- 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 and meteorology;
- To support and supervise infrastructure development programs under the decentralized structures under the respective sub-sectors as per the District Development Programs in each district;
- To facilitate, promote and engage the private sector to invest in infrastructure;
- To orient and supervise the functioning and management of public institutions and agencies under the Ministry of Infrastructure including existing agencies such as the Road Maintenance Fund (RMF), Office National des Transports en Commune (ONATRACOM), Rwandan Civil Aviation Authority (RCAA), EWSA, RTDA and other agencies to be formed under its sub-sectors;

- To supervise actions to mobilize resources and partnerships in the area of infrastructure and mobilize resources for MININFRA programs.

3.3.2 EWSA – Energy Water and Sanitation Authority

3.3.2.1 History

EWSA is a company that distributes power and water in Rwanda. As a national utility, the company has been in existence since 1976, as ELECTROGAZ. ELECTROGAZ was founded in 1939 as "REGIDESO" by the colonial masters supplying water, electricity and gas to RWANDA-URUNDI with its Headquarters in Bujumbura. The company was later divided into REGIDESO Rwanda and REGIDESO Burundi in 1963.

In 1976, REGIDESO Rwanda became ELECTROGAZ and was granted the monopoly for the production and distribution of water and electricity in the country. After the 1994 genocide, there was an increase in urban settlements, thus increased demand for water and electricity. The installed capacity for water and electricity supply could not sustain the increased demand, which called for further investments.

In 1999, a law was passed removing the monopoly on electricity and water supply. This encouraged independent power producers to start their operations. In 2003, ELECTROGAZ was placed under a management contract with Lahmayer International to manage and restructure ELECTROGAZ in collaboration with Hamburg Water Works for 5 years. This lasted for only two years and in March 2006 the management contract was terminated and it reverted to the Government of Rwanda.

The Board of Directors of the company was asked to appoint new management and restructure the utility to meet the needs of the nation better. Under the new management, ELECTROGAZ has grown, repositioned and become innovative to serve the customer. Under law N°43-44/2008 of 09/09/2008, ELECTROGAZ was spilt into RECO (Rwanda Electricity Corporation) and RWASCO (Rwanda Water and Sanitation Corporation).

Based on the law no 43/2000 of 7/Dec/2010, the National parastatals charged with water and electricity distribution RECO & RWASCO have been merged and given the name EWSA that is Energy, Water and Sanitation Authority.

3.3.2.2 Mission

EWSA mission is "To provide sufficient and quality water and electricity to its customers at affordable and sustainable rates that support the socio-economic development of the country"

EWSA's obligations include, but not limited to:

- Coordination of all activities related with programmes aimed at development and exploitation of energy sources,
- Sensitisation of users of energy of any kind and water in any way possible, as well as sanitation infrastructure,
- Proper management of electricity infrastructure, gas, petroleum products, water and sanitation,
- Other obligations included in the law establishing EWSA.

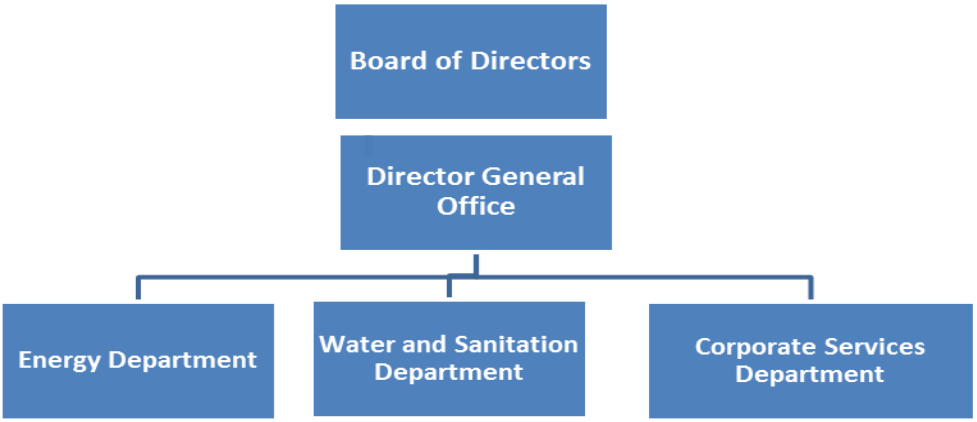
3.3.2.3 Key objectives

- Financial: Achieve financial solvency for the company.

- Technical: Improve the scope and reliability of the supply and distribution of water and electricity, including requests for new connections for all provinces and for all type of customers.
- Operational: Increase the efficiency of operations, reducing cost and increasing the amount of water and electricity produced per employee.
- Commercial: Drastically improve commercial operations and services.

3.3.2.4 Organizational setup

Legally, EWSAs structure and staff level is determined under the Prime Minister's Order N°41/03 of 20/05/2011. The organizational chart below illustrates the high-level organizational structure of EWSA.



Since early 2013, the organizational chart, including the number of staff members being reviewed and a draft version of the new chart has been submitted to the cabinet of the Minister of Infrastructure[3]. The draft version of the new organizational chart maintains the high-level organizational structure, as depicted above. However, there is a difference between the number of staff foreseen in the PM's Order and the new proposition.

In general, the Energy Department is responsible for developing and operating Energy infrastructure in EWSA, while the Water and Sanitation Department has the same role for infrastructure related to water provision and sanitation. The Corporate Services Department bundles all support functions such as HR, financial management, etc.

3.3.3 The Energy Department within EWSA

Complementing EWSA's high level structure explained above, the Energy Department's detailed structure is explained below. Since the water and sanitation department is out of scope of the present intervention, the further analysis below will not focus on the functioning of this department.

Within the Energy Department, there currently exist three substructures:

- The **Energy Development Directorate** is responsible for the development of new Energy Generation infrastructure.
- The **EARP Unit** is actually a SPIU for rural electrification. In the organizational chart, this SPIU is directly attached to the Deputy Director General Energy (see TFF)
- The **Electricity Utility Directorate** is responsible for operating and maintaining existing electricity generation, transmission and distribution infrastructure. In fact, after completion,

[3] Information based on a draft version that was not yet approved by cabinet.

infrastructure developed one of the first two previous substructures is handed over to this Utility Directorate.

3.3.4 Legislative framework

3.3.4.1 Electricity Law

Rwanda's draft Electricity Law was enacted into law in June 2011 and gazetted in July 2011. The law on electricity governs the activities of electric power production, transmission, distribution and trading both within and outside the national territory of Rwanda.

The primary objectives of the law are:

- Liberalization and Regulation of electricity sector;
- Harmonious development of power supply for all population categories and for all the country's economic and social development sectors in the framework of laws in force;
- Setting up economic conditions enabling electric power sector investments;
- Respect for the conditions of fair and loyal competition and for rights of users and operators.

The Electricity Law gives the Ministry in-charge of electricity the rights to provide concession Agreements to firms, and provides the legal basis for the Rwanda Utilities Regulatory Agency (RURA) to approve and grant licenses for the production, transmission, distribution and sale of electricity, the conditions for licensing, and addresses the rights and obligations of the license holders. The Law specifies that the electricity market of Rwanda shall be a single market based on free and open third party access to the transmission and distribution networks based upon the principles of regulated access to ensure a transparent and non-discriminatory market place.

The Electricity Law authorizes the issuance of an International Trade License for the import and export of electric power across the borders of Rwanda, and for the supply and sale to eligible customers in conformance with sector policies and other laws in force. The Law also provides for a "Universal Access fund" to provide greater access to rural and other un-served areas.

3.3.4.2 Feed in Tariff's

Recently a study on the Renewable Energy Feed In Tariff (REFITT) has been conducted, determining the new structure by developing a system methodology for the purchase of energy by the off taker from small sized hydropower plants and other renewable energy sources. Power generation projects from 50 kW up to 10 MW are considered. These REFITT's are developed on a cost recovery plus return basis to encourage mobilization of private investors. Other projects which fall outside this scope can still be considered to the off taker for consideration.

So far, only the REFITT for hydro has been validated. The other REFITT await benchmarking with other regulatory authorities.

The objectives of the renewable energy feed in tariffs:

- To create an enabling environment for renewable electricity power generation in Rwanda;
- To establish a guaranteed price for electricity generated from renewable for a fixed period of time that provides a stable income stream and an adequate return on investment;
- To create a dynamic mechanism that reflects market and economic developments;
- To provide access to the grid and an obligation to purchase power generated;

- To establish an equal playing field with conventional electricity generation;
- To create a critical mass of renewable energy investment and support the establishment of a self-sustaining market.

3.3.4.3 Power Purchase Agreement (PPA)

A Power Purchase Agreement is a contract between two parties, one who generates electricity for the purpose of sale (the seller) and one who is looking to purchase electricity (the buyer). In the case of Rwanda, the seller is an Independent Power Producer and the buyer is EWSA. The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operation, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination. A PPA is the principal agreement that defines the revenue and credit quality of a generating project and is thus a key instrument of project finance.

3.4 Belgian strategy in the sector and operational experiences

3.4.1 ICP Rwanda-Belgium 2011-2014

The Indicative Cooperation Program (ICP 2011-2014) between Belgium and Rwanda, approved on May 18th 2011, allocates a total grant envelope of 55 million euro to the energy sector in Rwanda, split over 4 interventions:

- geothermal energy component (27M€)
- access to energy component (17M€)
- feed-in tariff component (6M€)
- capacity building component(5M€)

This strategy is very wide, and synergies between the different components exist and will be stimulated.

3.4.2 On-going and recently closed BTC projects

3.4.2.1 EPRER

Project name	EPRER : Access to electricity for the rural population by utilization of renewable energy
Description	Interconnection of the electric lines of the West (Rustiro, Rubavu) and the South (Nyaruguru) Electrification of 50 health centers with solar energy. Construction of the Micro-hydro power plant of Rukarara II (2MW). Financial support of the national and regional institutions of energy EWSA and that of EGL.
Location	Southern, Northern, Eastern and Western provinces of Rwanda
Duration	36 months + 12 months
Budget	€ 17 532 659 (Be) € 1 801 000 (GoR)
Lessons learned	- Build-up the capacity in EWSA and retain skilled staff - Stabilize the unrealistic energy strategy - Improve stakeholders activities alignment - Follow-up maintenance strategy - Follow-up administration processes (expropriations, authorizations, etc.) to ensure that delays are not caused by bureaucracy - Take into account slow procurement process

3.4.2.2 MCH I & MCH II

Project name	MCH : Construction of micro hydro power plants
Description	Construction of the Micro-hydro plant of Keya (2.2 MW), Nkora (0.68 MW) and Cyimbili (0.30 MW)
Location	Western province, Rutsiro and Rubavu districts
Duration	48 months
Budget	€ 8.134.492 (Be) € 180.000 (GoR)
Lessons learned	- Take into account the lack of capacity in local civil works companies - Improve operations and maintenance of the

	installations by the owner - Focus on analysis and management of the water turbidity (de-silting, riversides management, etc.) - Follow-up administration processes (expropriations, authorizations, etc.) to ensure that delays are not caused by bureaucracy - Improve BTC visibility for the beneficiaries

3.4.2.3 IREARPPP

Project name	IREARPPP : Increase rural energy access in Rwanda through public private partnership
Description	Construction of the Micro-hydro power plant of Rukarara II (2MW).
Location	Southern province, Nyamagabe district
Duration	60 months
Budget	€ 4.125.000 (UE)
Lessons learned	- Focus on early contract transparency to avoid future contractual issues - Strengthen presence on construction site to insure that the planning is followed by the contractor - Build-up the capacity in EWSA and retain skilled staff - Follow-up administration processes (expropriations, authorizations, etc.) to ensure that delays are not caused by bureaucracy

3.4.2.4 KIKI

Project name	KIKI : Construction of the 30 kV power transmission line Kigali-Kiyumba
Description	Medium-voltage line and its extensions cover a total distance of over 80 km, while the low voltage line covers over 20 km in the districts of Kamonyi and Muhanga.
Location	Southern province : Districts of Kamonyi and Muhanga
Duration	48 months
Budget	€ 3 750 000 (Be) Rwf 183 000 000 (GoR)
Lessons learned	- Build-up the capacity in EWSA and retain skilled staff - Follow-up administration processes (expropriations, authorizations, etc.) to ensure that delays are not caused by bureaucracy

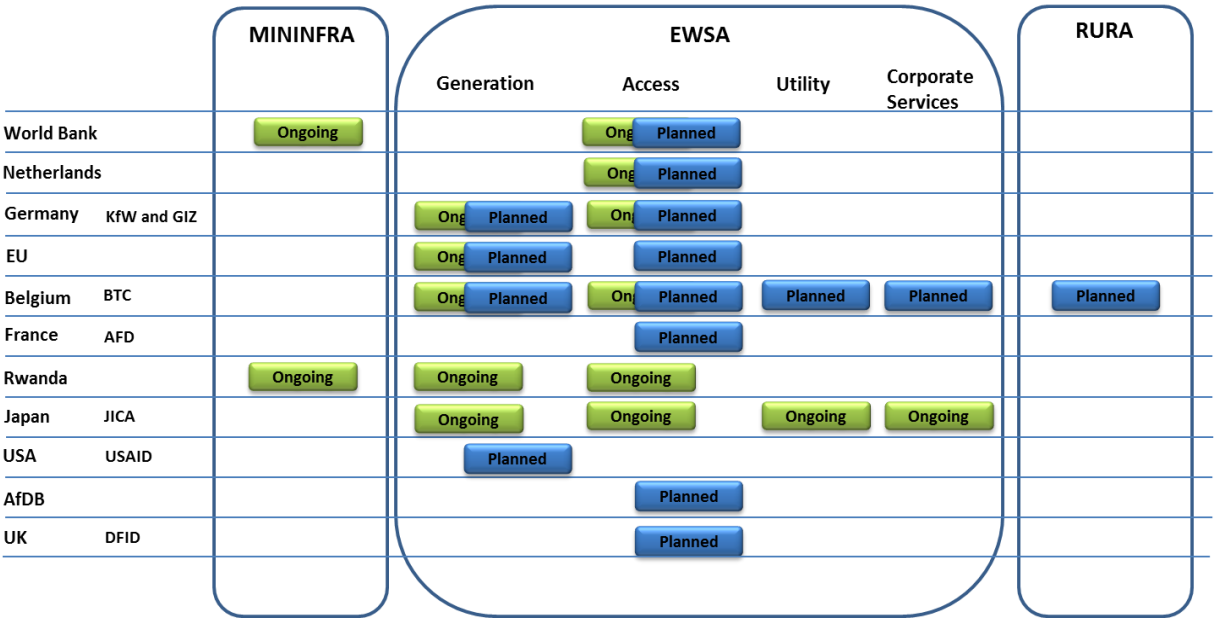
3.5 Interventions by other donors, principal lessons learned and possible synergies

3.5.1 General

The following table presents the current on-going and planned interventions of Development Partners and GoR in the energy sector in Rwanda. The information is based on data collected during interviews with the mission and has been completed by the eSWAP Secretariat.

The large majority of the interventions focuses on new generation, transmission and distribution infrastructure.

DP's Infrastructure interventions in the Energy sector (situation Q1 2013)



Funding source	Programme/ Project	Type	Areas of focus	Amount	Dates / Duration
World Bank	Gicumbi Project	**Infra**	Electrification of the Gicumbi area from Rukomo to Rwesero (78Kms of MV and around 4000 Households)	4,4 M$	n.c
	Janja Project	**Infra**	Electrification of Gakenke district (56 Kms of MV and around 3000 consumers)	5,1 M$	n.c
	Gikomero project	**Infra**	Electrification of Gikomero and Rutunga sectors of Gasabo district. (20Kms and 2000 consumers)	1,4 M$	n.c
	Northern Province	**Infra**	200 Kms of Low Voltage line + 10,000 connections in the Northern province	900 MRWF	n.c
	National electrification planning	**Plan**	SOFRECO consultancy to make a 5 year national electrification plan for the whole country.	n.c	n.c
	EARP	**Infra**	EARP phase 1	75 M$	n.c

	SED Project -	**Infra**	Geothermal Compact (New global geothermal facility) co financed by GEF and AFREA/Netherlands and NDF	8 M$ - 50 M$	n.c
	Planned	**Infra**	Regional Rusumo Falls Hydropower Project including the transmission network- possible co-financing from AFDB, Netherlands Embassy and others	Est 490 M$	n.c
	Planned	**Infra**	60M USD for Electricity Access Scale-up and Sector-wide Approach Development Project + 10M USD for green connexions (GEF), solar water heaters, PV and efficiency	70 M$	2013-2017
	Support to SCBI	*CD*	*18 experts in the EWSA Electricity Development Directorate and in the Corporate Services*		*2012-2015*
Embassy of NL	Bungwe Project	**Infra**	Gicumbi and Butaro districts (43Kms of MV line and 3000 consumers)	4,3M$ 49,MFrw	n.c
	Western Province	**Infra**	150 Kms of MV line under construction in the Western Province	1,3 M$	n.c
	Western Province	**Infra**	295 Kms of LV line in the Western province + 25,000 connections	1,300 MRrw	n.c
	EARP	**Infra**	EARP phase 1, through MINECOFIN, implemented by EWSA	30 M€	2009
	NELSAP/NBI	**Infra**	Interconnexion project	24.75 M$	n.c
	Kivuwatt Project	**Infra**	transmission line Kigali to Goma with KfW and AfDB	25 M $	n.c
	PAREF Project	**Infra**	Delegated cooperation to BTC	10 M€	2008-2013
	RBEP Biomass	**Infra**	Biomass projects and renewable energy in Rwanda, Burundi, DRC, implemented by IFDC	20 M€	n.c
	ENDEV	**Infra**	Contribution managed from The Hague	70 M€	n.c
	Planned	**Infra**	Rusomo Falls project with Rwanda, Burundi and Tanzania	12 M€	n.c
	Planned	**Infra**	Possible support to EARP 2nd phase	20 - 25 M€	July 2013 ?
KfW / GIZ	Planned: Co-financing of the Hydro Master Plan	**Plan**		150 K€	n.c
	Regional transmission lines	**Infra**	Co funding regional line between Rwanda and DRC with AfDB (19M €) and the Netherlands (25 M € through KfW) Transmission line between Burundi (3M €) and Rwanda (19M €) + co funding EU	n.c	n.c

			(16M € through KfW)		
	Planned: RUSIZI 3	**Infra**	Hydropower project (145MW), support in development phase,	22 M€	n.c
	Capacity Building in EGL	**CD**	Risk mitigation facility at regional level (Rwa, Ug, Ken, Tza, Bdi) with EU: envelope managed by the African Union	50M €	n.c
	Planned		EARP phase 2	n.c	n.c
	Planned: RUSOMO	**Infra**	KfW could finance transmission lines	n.c	n.c
Belgium	EPRER I + complement	**Infra**	Interconnection of the electric lines of the West (Rustiro, Rubavu) and the South (Nyaruguru) Electrification of 50 health centers with solar energy. Construction of the Micro-hydro power plant of Rukarara II (2MW). Financial support of the national and regional institutions of energy EWSA and that of EGL.	17,5 M €	Ongoing
	Planned	**Infra**	National Electricity Access Rollout Program EARP 2	17 M€	2014 ?
	Planned	**Infra**	Geothermal Development	27 M€	2014 ?
	Planned	**Infra**	Private sector participation through development of adequate FIT	6 M €	2014 ?
	Planned	**CD**	Institutional Strengthening and capacity Building	5 M €	2014 ?
EU	IREARPPP	**Infra**	Rusizi III: Evacuation & distribution line to Rwanda + safety assessment of Rusizi I & II dams	4,1 M €	n.c
	Under discussion, while programming the 11th FED	**Infra**	Support of energy sector in Rwanda and in the region	Est 100 M$	2014 ?
	In preparation:	**Infra**	Geothermal Development / EUEI PDF : Geothermal Initiative for Eastern Africa	n.c	
AFD	Cyanika Miko Project	**Infra**	Electrification of Nyamagabe district. (8Kms of MV and 712 consumers)	1,3 M$	n.c
	EROP			3.3 M€	
	Planned	**Infra**	Contribution to EARP 2	10M U$	2014 ?
	Planned	**Plan**	Co-financing of the Hydro Master Plan	150 K€	n.c

GoR	Eastern province	**Infra**	Electrification of 6 districts in the Eastern province + 50,000 consumers.	68.6 M$	By end of March 2013
	Planned	**Infra**	Contribution to EARP 2, counterpart to AfDB	4 M$	2013 - 2018
Japan	JICA CD intervention	**CD**	Technical Cooperation Project for EWSA's Capacity Building for Efficient Power System Development	4,5 M$	From Mar, 2011 to Feb, 2014
		Infra	Grant Project for Improvement of Substations and Distribution Network	30 M$	From Feb, 2012 to Sep, 2013
		Infra	Geothermal Energy Development		
USAID	Planning phase				
AFDB	**Planned**	**Infra**	Contribution to EARP 2	41 M$	2013 - 2018
OFID	**Planned**	**Infra**	Contribution to EARP 2	12 M$	Sept 2012

3.5.2 Energy Sector Working Group

Since 2008 the GoR has started the implementation of its second generation Poverty Reduction Strategy, the EDPRS. This strategy represents the development agenda aligned with Vision 2020 and the Millennium Development Goals (MDGs).

For this strategy to be viable and successful in the long term the Sector Working Groups approach is vital. With involvement of all stakeholders at all relevant levels the way forward can be clear and within reach.

The overall objective of the SWGs is therefore to:

- Provide a forum for dialogue, ownership and accountability of the development agenda by all stakeholders at Sector level.
- Build synergies in policy formulation, implementation and enhance regular reviews.

More specifically this translates to:

- Develop and update the Sector Strategic Plan (SSP)
- Develop and update the Sector Logical Framework (logframes);
- Develop, update and validate sector M&E Frameworks
- Conduct Joint Sector Reviews (JSR) at least twice a year as per planning calendar;
- Review and validate Public Expenditure Review (PER) reports;
- Develop Sector wide Approaches (SWAPs).

Recent reports underline the need to further strengthen this approach and to highlight its usefulness in the energy sector. With this in mind Mininfra has created the SWAp secretariat, which will function as the focal point for the whole energy sector. This secretariat has been charged with the monitoring and

evaluation of all energy projects as well as with the general communication between all involved actors. It is relatively new and is therefore not yet fully functioning, but progress is being made and logistic support is in the pipeline.

3.5.3 Other DP's in EARP

3.5.3.1 World Bank

The WB is proposing an additional financing of about $60M credit for EARP following an original credit amount of $70M.

The proposed additional financing is a scaling-up of the original well-performing project. There are no major changes related to overall project design with the same three components:

a) National Grid Rollout ($45M): (A) Grid intensification in urban and peri-urban areas, (B) Electrification of new districts and sectors, including MV extensions and LV reticulation, (C) Backbone MV/HV grid strengthening, Improved Operational Capacity and Service Network Expansion

b) Green connections ($5M): Energy efficiency (SWH and PV systems for social institutions, efficient lighting) and solutions adapted for low-income households.

c) Technical Assistance, Capacity Strengthening, and Program Implementation Support ($10M)

The project has been approved by the board of executive directors in February 2013.

3.5.3.2 OFID

In September 2012, the OPEC Fund For International Development (OFID) approved an additional funding of $12M to the initial $10M. This funding is attached to WB funding - national grid rollout component (a).

3.5.3.3 Netherlands

The Government of Netherlands has been contributing to EARP with € 30 M since June 2009. The contribution for a second phase (€ 21 M) will be negotiated in 2013 once the full amount has been spent.

NL is and will fully be aligned with the WB intervention. There is no specific activity requested. NL only requests annual reports and uses entirely the Rwandan system and responsibility for implementation and audits. So far the satisfaction of the donor on the project performance is excellent.

3.5.3.4 African Development Bank

AfDB has committed to contribute to EARP II with a combined loan and grant amounting to US$ 41 M. The global strategy is alignment with Government of Rwanda priorities, following the same execution modalities as the WB.

3.5.3.5 JICA

Within EARP, the intervention of JICA (US$ 30 M) is focusing on the improvement of substations and distribution network. The intervention timeframe is from February 2012 until February 2014.

There are four components:

(i) Rehabilitation of substations in Kigali (Jabana and Gikondo)

(ii) Upgrading of substations in Musha and Rwinkwavu

(iii) Upgrading of Distribution Networks in Huye from 6.6kv to 30kv

(iv) Expansion of Distribution Network in Kigali

3.5.3.6 EU

EU is considering a significant contribution to EARP II within its next European Development Fund (2014-2020) for Rwanda but the EDF is currently on hold.

3.5.3.7 AFD

France has contributed with a subvention of € 3.3 M with to components:

(i) Districts electrification (material, equipment and connection works)

(ii) Support to the financial direction of EWSA

The convention for this contribution was signed in 2010 and a contribution for the second phase is being considered but the French development cooperation is currently on standby.

4 ADDITIONAL STUDIES

No additional study has been performed for the formulation exercise. However several studies that are external to the formulation have guided the formulation. A summary of those studies is annexed to the formulation report.

5 TECHNICAL AND FINANCIAL FILE

See file hereby.

6 RISK ANALYSIS

See TFF hereby for general risk overview.

6.1 Other point of attention

6.1.1 On the location of the intervention

The decision of the exact location of the intervention shall be taken by the Project Steering Committee (PSC), based on a set of criteria's as described in chapter 2.5 of the TFF.

This choice is driven by the uncertainty on the timing of the commitment for the Belgian contribution to EARP:

- The timing of most financial commitments (including the Belgian commitment) is very uncertain because of economic and/or political constrain. This uncertainty has delayed the compilation of a detailed country planning for the second phase of EARP.
- Nevertheless, following the economic logic, development partners are willing to implement the lots that are high in the priority list (i.e. where the connexion cost per household is the lowest) to get the most results in term of number of connexions.
- Given the high density of population in the Northern and Western province, most development partners are willing to work in those areas. WB and AfDB commitments being already effective in 2013, they should concentrate their work in those provinces. During the formulation, the Rwandan counterpart has explicitly asked Belgium to participate in the electrification of the Eastern province to balance WB and AfDB efforts in the North and the West.
- Even if the Eastern province can be a good option, the exact location has to be carefully assessed once the timing is secured to insure results and coherence. Given the uncertainty on the effectiveness date of the Belgian commitment, the timing can only be secured once the specific agreement has been signed.

6.1.2 On the implementation modalities

Implementation modalities are detailed in chapter 5 of the TFF. The main implementation modality for this intervention is "Co-management". The modalities have been chosen for the following reasons:

- For the sake of consistency, the implementation modalities are similar in each component of the Belgian-Rwandan energy sector portfolio.
- The EWSA Organizational Assessment (Performance Assessment on Financial Management and Procurement) performed by BTC in 2012 assessed EWSA procurement and financial management as not ready for national execution.

7 CROSS CUTTING THEMES

See TFF hereby.

8 REFERENCES

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- EARP Environmental and Social Management Framework (2009)
- EARP Resettlement Policy Framework (2009)
- Economist Intelligence Unit Report on Rwanda (May 2012)
- Indicative Cooperation Program (ICP) Belgium – Rwanda 2011- 2014
- Common Performance Assessment Framework (CPAF) (April 2011)

8.2 Contact List

DETAILED LIST OF CONTACTS FOR THE ENERGY SECTOR & ENERGY SECTOR WORKING GROUP

No.	NAMES	INSTITUTION	POSITION	TEL & EMAIL	TEL
2	**Antoon DELIE**	Belgian Embassy	Development Counselor	antoon.delie@diplobel.fed.be	788305984
3	**Ahmad PARSA**	BTC	Programme Officer	ahmad.parsa@btcctb.org	788301896
4	**Frederik VAN HERZEELE**	BTC	Engineer	frederik.vanherzeele@btcctb.org	(+) 3225051885
5	**Yannick THOMAS**	BTC	Infra Expert	yannick.thomas@btcctb.org	
6	**Jean Yves SALIEZ**	BTC	Resident Representative	jean-yves.saliez@btcctb.org	788305667
7	**Valéry PIROTTE**	BTC	Delco Energy	valery.pirotte@btcctb.org	788399713
8	**Benoit PIRET**	BTC	Programme Officer	benoit.piret@btcctb.org	788381835
19	**Fred SMIET**	Embassy of the Kingdom of the Netherlands	First Secretary Regional Affairs	fred.smiet@minbuza.nl	785341462
22	**Marc BUCHMANN**	EU		marc.buchmann@eeas.europa.eu	
23	**Michel ARRION**	EU	Head of Delegation	michel.arrion@eeas.europa.eu	585738
26	**Anatalie MUTETELI**	EWSA	EWSA DDGCS	amuteteli@ewsa.rw	788519362
47	**Rutagarama UWERA**	EWSA	Geothermal Energy	rwella@yahoo.com	788350132
48	**Yves MUYANGE**	EWSA	Director General	ymuyange@ewsa.rw	788307149
66	**Edward KASUMBA**	EWSA	EARP Coordinator	ekasumba@ewsa.rw	788414470
68	**Keith KALYEGIRA**	EWSA	Strategic Advisor	keith.kalyegira@gmail.com	786133355
72	**Paul RUGAMBWA**	EWSA	e swap Coordinator	rugambwa_paul@yahoo.com	782496125
74	**Mark RUKATA**	EWSA	DD Electricity Utility	mrukata@ewsa.rw	788307238
81	**Theogene RUKUNDO**	EWSA	Head of IT unit	trukundo@ewsa.rw	788308561
85	**Yussuf UWAMAHORO**	EWSA	DDG EWSA	yuwamahoro@ewsa.rw, yussuf.uwamahoro@gmail.com	788863791
96	**Anicet NSENGIYUMUA**	EWSA	SCBI Coordinator	ansengiyumua@ewsa.rw	788508853
102	**Benjamin ATTIGAH**	GIZ/EWSA	Programme Manager Energising Development (EnDev)	benjamin.attigah@giz.de	788301634
105	**Naceur HAMMAMI**	IREARPPP Project (EWSA) – Technical Assistant	International Expert on Renewable Energy, Energy Saving and Rural Energy	naceurhammami@gmail.com	0788302080 / 0788822854
106	**Satoko NISHIGORI**	JICA	Programme Manager/Economic Infrastructure	nishigori.satoko@jica.go.jp	788300749
108	**Yoshiyuki KUDO**	JICA	team Leader EWSA Training	kudo-yh@n-koei.jp	078 43 79 258
111	**Eva PAUL**	Kfw	Project Manager	eva.pail@kfw.de	788796594
118	**Benjamin NZEYIMANA**	MINAFETT	Desk Officer		783223656
119	**Charlotte UWASE**	MINALOC	ICT Specialist	charuwase@yahoo.fr	788760650

120	**Jean de Dieu NDACYAYISENGA**	MINEAC	PROFESSIONAL IN CHARGE OF INFRASTRUCTURE	jdndacyayisenga@mineac.gov.rw	783733236
121	**Alex MURRAY S.**	MINEAC	Economist	amz.mineac@gmail.com	788817711
126	**Ronald NKUSI**	MINECOFIN	Dir. External Finance	ronald.nkusi@minecofin.gov.rw	750200436
130	**Janvier AHIMANISHYIZE**	MINECOFIN	External Resources Mobilization Expert	janvier.ahimanishyize@minecofin.gov.rw	788529103
144	**Gareth WALSH**	MININFRA	Strategic Advisor to MoS for Energy Water & Sanitation	gareth.walsh@tb-agi.org	788308803
148	**James KAMANZI**	MININFRA	Ps & Chair of the ESWG	james.kamanzi@mininfra.gov.rw	788306394
151	**Christian RWAKUNDA**	MININFRA	Director General for Planning	christian.rwakunda@mininfra.gov.rw, chrisrwakunda@hotmail.com	788306635
158	**Vincent BAHINGANA**	EWSA	Advisor to DDGE	amreal28@yahoo.co.uk	788357651
159	**Laetitia NDUWIMANA**	EWSA	M&E Specialist , e-swap	ndlaeti@yahoo.fr	788403890
161	**Alain HARELIMANA**	MININFRA/ICF	Capacity Building Coordinator	harelimanaa@gmail.com	782790270
176	**Marc MUPENZI**	PSCBS	Economic Cluster Specialist	marc.mupenzi@pscbs.gov.rw	788307232
177	**Stella MUGABO**	PSCBS	Executive Secretary	stella.mugabo@pscbs.gov.rw sfmugabo@gmail.com	788304906
178	**Peter MALINGA**	PSCBS	Coordinator Technical Services	peter.malinga@pscbs.gov.rw	788304908
179	**Joanne MUHAYA**	PSCBS	BTC Project coordinator	joanne.muhaya@pscbs.gov.rw	
186	**Peace KALIISA**	RDB	Energy Focal Person	Peace.kaliisa@rdb.rw , pkaliisa@gmail.com	788312898
191	**Alfred BYIGERO**	RURA	Director of energy regulation	by-alfred@rura.gov.rw; albyigero@yahoo.com	788758071
192	**Valens KUBWIMANA**	RURA		valens.kubwimana@rura.gov.rw	788437171
193	**Annick MUHAMA**	RURA	Director for Energy Regulation	annick.muhama@rura.gov.rw	788597482
194	**Venerande MUKAMURERA**	RURA		venerande.mukamurera@rura.gov.rw	788620584
195	**Regis GATARAYIHA**	RURA	Director General	regis.gatarayiha@rura.gov.rw	
196	**Innocent RUTAYISIRE**	RURA		innocent.rutayisire@rura.gov.rw	788511263
197	**Mugaba IBRAHIM**	RURA	Power Transmission Officer	ibrahim.mugaba@rura.gov.rw,	788841106
198	**Jean Clement NSHUBIJHO**	RURA	"Head of Section Gas, Petroleum and Renewable Energies"	clement.nshubijeho@rura.gov.rw	788433175
199	**Mark CYUBAHIRO BAGABE**	RBS	Director General	markbagabe@yahoo.com	788304197
200	**Anaclé NAHIMANA**	SNV	RE Advisor	andahimana@snvworld.org	788859138
201	**Clarrise N. FASHAHO**	SOSOMA Industries Ltd	Sales Manager	nyicla15@yahoo.fr	788383189

202	**Eric MUNYARUKATO**	Stadt werke M	Maintenance engineer	ericmunyarukato@yahoo.fr	788307701
203	**Lulisa NYIRUBUSHI**	Training Centre/EWSA	Head of Training Centre	rlulisa@ewsa.rw	784556655
204	**André HABIMANA**	UNIDO	Head of UNIDO Operations	A.HABIMANA@unido.org	788526628
205	**Brian FRANTZ**	USAID	Assistant director	bfrantz@usaid.org	788386060
206	**John KAMBARE**	VIRUNGA	Engineer	kagubare@gmail.com	
207	**Paul BARINGANIRE**	World Bank	Co-Chair (Senior Energy Specialist)	pbaringanire@worldbank.org	788381251

8.3 Planning and meetings

Planning

Mission in January 2013

FVH = Frederik Van Herzeele, UR = Uwera Rutagarama,
YT = Yannick Thomas, EK = Edward Kasumba,
JE = Joris Elegeert, AH = Alain Harelimana,
FC = Fabian Clément, RR = JYS, AP = Ahmad Parsa, BP= Benoit Piret,

Date	Day	Agenda
Saturday 12/01		Arrival in KIGALI
Sunday 13/01	**0**	- literature review - discuss formulation approach - Division of tasks - Planning proposal - ppt formulation process
Monday 14/01 Morning	**1**	**08.00 – 09.00: Meeting at BTC Representation** **FVH, YT, JE, FC, AP, BP** **10.30 – 11.30: Meeting at Belgian Embassy** **Antoon Delie, Minister Counselor** **FVH, YT, JE, FC, AP** > present teams, scenario and approaches > confirm planning, meetings and working sessions
Monday 14/01 Afternoon		**14.00 - 15.30: Individual meetings with formulation Co-managers + PSCBS** **FVH, UR, YT, EK, JE, AH, FC, AP, BP** > present teams, scenario and approaches > confirm planning, meetings and working sessions
Tuesday 15/01 Morning	**2**	**09.00 – 11.00: Kick Off Meeting** including **MININFRA, EWSA, MINECOFIN, MINAFET, PSCBS, RR, EMBASSY representatives** > present teams, scenario and approaches > confirm planning, meetings and working sessions (Powerpoint presentation is available)
Tuesday 15/01 Afternoon		**14.00 – 15.00: Working Session FOR teams** **FVH, YT, JE, FC, AP, BP** Meeting with RR stakeholders **14.30 – 17.00: Working Session EARP** **Edward Kasumba, EARP coordinator** **YT** **15.00-17.00: EU delegation / GIZ** **FVH, JE, FC, EU, GIZ, WB, KfW, USAID, NL Embassy** Presentation on the "Energizing Development (Endev)" programme

Wed 16/01	**3**	**08.30-10.00: Meeting with the World Bank** **Paul Baringanire, Senior Energy Specialist** **JE, YT, FVH, FC** Present teams, scenario and approaches Overview of their current and future interventions in the NRJ sector **10.00-11.30: Meeting with the Embassy of the Netherlands** **Fred Smiet, First Secretary Regional Affairs,** **JE, YT, FVH, FC** Present teams, scenario and approaches Overview of their interventions in the NRJ sector **11.30-13.00: Meeting with JICA** **Satoko Nishigori, Economic Infra Program Manager** **Hiroyuki Kobayashi, Chief Representative** **JE, YT, FVH, FC** Present teams, scenario and approaches Overview of their interventions in the NRJ sector **14.30-16.00: Meeting with the EU** **Michel Arrion, Ambassador, Head of Delegation** **Daniel Schaer, Chef de Section Politique** **JE, YT, FVH, FC** Present teams, scenario and approaches Overview of their interventions in the NRJ sector **16.30: Meeting with KFW / GIZ** **Eva Paul, KfW Project Manager** **Benjamin Attigah, GIZ Programme Manager** **JE, YT, FVH, FC** Present teams, scenario and approaches Overview of their interventions in the NRJ sector
Thursday 17/01	**4**	**08.00 – 10.00: Meeting with EWSA** **Yussuf Uwamahoro, DDG ES** **Vincent Bayingana, Advisor to DDGE** **Anicet NSENGIJUMVA, SCBI coordiantor** **JE, YT, FVH, FC** **10.30 – 12.00: Meeting with PSCBS** **Gillian Turnbull, AGI Advisor** **Judith Kaitesi Katabarwa, M&E Planning Specialist** **Shema , Advisor to ES** **Joanne Muboya, BTC Project Coordinator** **Marc Mupenzi, Economic Cluster Specialist** **JE, FC, BP** Present teams, scenario and approaches Overview of their interventions in the NRJ sector (SCBI) **11.00-12.30: Meeting with AfDB** **Ephrem RUTABOBA, Energy Water and Sanitation Specialist** **YT, FVH** **14.00 – 16.00: Meeting with MININFRA**

		Christian Rwakunda, Acting Head of dept Policy & Planning **Emmanuel Hategerimana, Principal Engineer Energy, Watsan** **JE, FC** **15.00 – 16.30: Working session with co-manager EARP** **Edward Kasumba, EARP coordinator** **YT** **16.00: Meeting with RURA** **Annick** **François Régis GATARAYIHA, Director General, RURA** **Béata MUKANGABO, Head of Corporate, legal and Industry Affairs Department** **JE, FC** **14.00-18.00 : Working session Geothermal Development** **FVH, UR**
Friday 18/01	**5**	**08.00 – 10.00: Meeting with EWSA Corporate Services** **Anathalie, Director Corporate Services** **JE, YT, FVH** **15.00 – 17.00: Debriefing RR** **JYS, AP, JE, YT, FVH, FC, BP** Sharing insights acquired during the first mission week.
Saturday 19/01	**6**	**07.30 – 19.00: Rukarara Field visit**
Sunday 20/01	**7**	Preparation debriefing of stakeholders
Monday 21/01	**8**	**08.00-12.00: Working Session with Alain Harelimana at MININFRA** **AH, JE, FC** Joint analysis of available information and discussion on strategic orientations for the intervention. **09-00 – 12.00: Working session EARP** **Edward Kasumba, EARP coordinator** **Dieudonné Ngizwenayo, EARP Director of Planning and Design** **Elie Makeba Nzeyimana, EARP M&E Specialist** **Andrew Atterbury, EARP Director of Finance** **YT, FVH** **14.00: Workforce Development Authority** **Irenée Nsengiyumva, Deputy Director General Training** **FC** **16.00 – 16.45: Rwanda Bureau of Standards** **Mark Cyubahiro Bagabe, Director General, RBS** **JE, FC** **17.00: JICA** **Mr. Yoshiyuki Kudo, team leader EWSA** **JE, FC**

Tuesday morning 22/01	**9**	**09.00-11.00: Meeting with PSCBS** **Stella Mugabo, Executive Secretary** **JE, FC** Discussion on strategic orientations for the intervention. **09.00-10.00: Meeting with USAID** **Brian Frantz, Assistant Director** **FVH, YT** **11.00: Meeting with MINECOFIN** **Ronald Nkusi, Director of External Finance Unit (EFU)** **Janvier Ahimanishyize** **JE, FC** Discussion on strategic orientations for the intervention. **12.30: Lunch with Antoon Delie for debriefing**
Tuesday afternoon 22/01	**9**	**16.30 – 17.30: Meeting with SCBI Coordinator MININFRA** **Gareth Walsh, SCBI Coordinator** **Paul, e-SWAP coordinator** **JE, YT, FVH, FC**
Wed morning 23/01	**10**	**08.00-12.00: Preparation debriefing** Finalization presentation for the debriefing FVH, UR (9.00-10.00)
Wed afternoon 23/01	**10**	**12.00 – 14.00 Debriefing with PS MININFRA** **James Kamanzi, PS MININFRA** **AH, YT, FVH, JE, FC**
Thursday morning 24/01	**11**	**09.00-13.00: Debriefing key stakeholders** including **MININFRA, EWSA, MINECOFIN, MINAFET, PSCBS, RR, EMBASSY representatives** Sharing conclusions for the 3 formulations Discussing and validating orientations for the 3 formulations (See **attached attendance sheet and ppt**)
Thursday afternoon 24/01	**11**	Departure

9 ANNEXES

9.1 MoM for Technical Validation

Minutes of Meeting for

Technical Validation of Formulation of the Energy Sector Project

"Improving access to reliable on-grid electricity services for households and priority public institutions" - Belgian contribution to EARP

RWA1208111

Ministry of Infrastructure, 22 May 2013

Context:

The meeting was held to approve two TFF (Technical and Financial File). The first was for electricity access (EARP) and the second for Capacity Building in the energy sector. The presence of several people involved in these two projects enriched the discussions with important inputs useful for both projects.

Participants:

Members of steering committee or their representatives:

Antoon DELIE – Minister-Councelor at Embassy of Belgium
Emmanuel HATEGEKIMANA - MININFRA
Robert NYAMVUMBA – DDGE EWSA
Jean-Yves SALIEZ – Resident Representative BTC

Other participants:

Benjamin NZEYIMANA - MINAFFET
Edward KASUMBA - EARP/EWSA
Guy BOMBO - MININFRA
Theoneste HIGANIRO - MININFRA
Daniel H. SHIM - MININFRA
Geoffrey NDASHIMYE - NCBS
Gillian TURNBULL - NCBS
Ahmad PARSA - BTC

The Resident Representative of BTC introduced the meeting by reminding its objective, being the technical validation of the TFF (Technical and Financial File) of the project by Rwanda, an important milestone in the bilateral validation process of the TFF, before presenting it to the Belgian Ministry of Development Cooperation.

The Coordinator of EARP and Co-manager of the formulation presented the main components and structure of the project (the situation analysis, the strategic orientations, the intervention framework, the resources, the implementation modalities and the next steps) and the main changes to the proposal, resulting from the internal validation committee at BTC Brussels.

Discussions

Clarification was sought on the duration of the project and the collaboration among several institutions (RDB, MINCOM, and MININFRA).

It was clarified that the project is totally integrated in the existing EARP program and the national electrification plan. EARP also collaborates with all the above institutions regarding the industrial zones as per the MINCOM plan and the investment unit at RDB.

One important point raised concerned the lack of clarity on what the project expects people will be capable to do at the end of the project. This underlined the need to have in M&E, monitoring of *skills transfer*.

Considering the importance of skill transfer, it was suggested that the TAs be given a coaching and mentoring function to the various relevant staff at EARP and that this be reflected in the ToRs for the TAs (as they will be the engine of change). The need for this was acknowledged and accepted to be incorporated in the ToRs as this had not been reflected.

It has been requested to have more clarity on who are the counterparts of the ATs. The diagram of the personnel of the project has to be clearer concerning the counterpart and show the clear link between each TA and his/her counterpart.

It was also requested that a capacity building plan and M&E framework for skills development under the intervention be developed with the assistance of NCBS (former PSCBS) to have a clear roadmap on how the skills will be transferred.

As the project includes an industrial attachment component, and as NCBS is now also responsible for the development of the capacity of the private sector, there should be a synergy and coordination with the NCBS capacity initiative with the private sector to avoid duplication.

It was also stressed that there should be a good coordination between the two projects funded by Belgium in the energy sector (Electricity Access and Capacity Building) especially in relation to capacity development.

One point of attention for the project team will be the settlement or coordination of different interests in expropriation issues and planning design between road department of MININFRA and EARP/EWSA.

The TFF is approved by the Project Steering Committee taking into consideration of the above suggestions and inputs from the participants.

Signed by:

ANTOON DELIE
MINISTRE CONSEILLER [illegible]
COOPERATION AU DEVELOPPEMENT

Antoon DELIE - EMBASSY OF BELGIUM

Emmanuel HATEGEKIMANA - MININFRA

Robert NYAMVUMBA - EWSA

Jean-Yves SALIEZ - BELGIUM DEVELOPMENT AGENCY (BTC)

9.2 MoM for Quality Control Committee

CTB

AGENCE BELGE
DE DÉVELOPPEMENT

COMITÉ DE CONTRÔLE DE LA QUALITÉ 09/07/2013

« Energy Sector: Improving access to reliable on-grid electricity services for households and priority public institutions (Belgian contribution to EARP) » - RWA 12 081 11 – NN3012660

PRÉSENTS:

Luc LANGOUCHE, Luc TIMMERMANS, Xavier ROUHA, Yannick THOMAS, Rudi POULUSSEN, Maïté VOLLEMAERE, Kristien BAUDUIN.

GÉNÉRALITÉS

- Bonne appréciation générale du dossier.
- Le CCQ attire l'attention sur le fait que le dossier ne pourra pas être soumis au Ministre pour un engagement en 2013 en raison de l'atteinte du plafond du cavalier budgétaire 2013 (idem pour le dossier Energy Capacity Building).
- Le CCQ partage le souci de l'attaché d'avoir une synergie entre les 3 dossiers du secteur énergie (Capacity Building ; Geothermal Development et Roll-Out).
- Les données factuelles seront vérifiées et le cas échéant actualisées avant la signature de la Convention Spécifique vu le laps de temps entre la rédaction du dossier et la soumission au Ministre.
- Ajouter le PV de la validation technique en annexe du rapport de formulation (RdF).
- Expliciter dans le RdF
  - Le choix de ne pas sélectionner de zones géographiques spécifiques.
  - Le choix de la modalité d'exécution.
- Le CCQ demande à la partie belge de se prononcer sur l'activité de renforcement des capacités (R4) du projet Roll-Out alors qu'une intervention est dédiée au renforcement des capacités (Energy Capacity Building). Ce point devra être à l'agenda de la SMCL et la décision devra figurer dans le PV des deux dossiers présentés conjointement.

DÉCISION: A, sous réserve de la prise en compte des remarques du PV, et moyennant l'accord préalable de la DGD.

Luc LANGOUCHE
Directeur OPS CTB

Luc TIMMERMANS
Chef de service D.1.3 DGD

ANNEXE : REMARQUES SPÉCIFIQUES

RAPPORT DE FORMULATION:

- Compléter la liste des Abréviations : OFID.
- Point 1.3 :
  - P.10 Tableau : Remplacer pour la Belgique « June 2013 » par « 2014 » et dans le titre de la colonne « (tentative) ».
  - P.11 Harmoniser les chiffres avec le point 3.5.1. du DTF.
- P.18 Point 3.2.3 Actualiser les chiffres (notamment 1000 MW et 70%).
- P.19 Point 3.2.4 : Préciser qu'au moment de la formulation, la nouvelle stratégie n'était pas encore sortie. Elle sera intégrée dans le DTF le cas échéant.
- P.35 Point 4 Etudes additionnelles : Aucune étude n'a été faite ; mais préciser que des données du MTR EARP, sorties en juillet 2012, ont été à l'origine de certains choix opérationnels. Référer à ce document en annexe (MTR).
- P.42 Point 8 Références: Etoffer la liste des documents de références, y inclus le rapport du CPAF et la liste des personnes rencontrées.

DOSSIER TECHNIQUE ET FINANCIER:

- P. 4 Abréviations : Compléter la liste: OFID, BADEA.
- P.9 Point 1. Analyse de la situation :
  - Actualiser les chiffres.
  - Aligner l'analyse de la situation sur l'intervention Energy Capacity Building.
- P.13
  - Point 1.3.3. Ajouter un bas de page clarifiant « EPC ».
  - Point 1.3.4 Tableau : Remplacer pour la Belgique « June 2013 » par « 2014 » et dans le titre de la colonne « (tentative) ».
- P.14 Point 2.1. Référer au chapitre 2.3.1.
- P.24 Point 3.3.2. Résultat 2 : Ajouter une sous-activité sur l'harmonisation avec les autres bailleurs.
- P.26 Point 3.3.3.2. Activité 3.2 : Expliquer que le projet va prendre en compte effectivement les recommandations de l'étude de la Banque Mondiale.
- Pp 33 et suiv. Point 3.6. Analyse des risques : Ajouter une note en bas de page explicitant les différenciations d'appréciation des risques (avec Energy CB).
- P.33 Point 3.6.1 Dernière ligne du tableau : Préciser « Weak harmonization of DP's in EARP ».
- P.33 Point 3.6.2 Première ligne du tableau : Différencier le risque entre EWSA (high) et EARP(low).
- P.36 Point 4 Ressources : ajouter un chapitre « Dépenses avant la signature de la CMO ».
- P.44 Point 5.3.1.2. Dépendant de la décision de la SMCL concernant le R4 (cf. Remarques générales), le PSCBS sera retenu ou pas comme membre de la SMCL.
- Pp.62 et suiv. Point 7.1 Cadre logique : Compléter le CL avec les estimations chiffrées mentionnées dans le chapitre 3 (p. 22).
- P.73 Point 7.3.3.1 Ajouter dans ses tâches : réaliser la baseline.

9.3 MoM for Steering Committee

Minutes of Meeting for

Technical Validation of Formulation of the Energy Sector Project

"Improving access to reliable on-grid electricity services for households and priority public institutions" - Belgian contribution to EARP

RWA1208111

Ministry of Infrastructure, 30 July 2013

Context:

As the previous time, this meeting was also held for the final validation of the two TFF (Technical and Financial File). The first was for electricity access (EARP) and the second for Capacity Building in the energy sector.

Participants:

Presences:

Erwin De WANDEL – Embassy of Belgium, Head of Cooperation
Christophe BUNZINYA – MINECOFIN
Paul RUGAMBWA – MININFRA
Alain HARELIMANA – MININFRA
Peter MALINGA – NCBS
Siméon KWITEGETSE - EARP/EWSA
Anicet NSENGIYUMVA – EWSA
Gillian TURNBULL, NCBS, AGI Advisor
Vincent BAHINGANA – EWSA
Emmanuel HATEGEKIMANA-MININFRA
Vincent MPAKA - EWSA
Ahmad PARSA – BTC.

Summary of the presentation and decision:

The Representative of BTC reminded participants about the objective of the meeting, being the final validation of the TFF (Technical and Financial File) of the Project by the steering committee in Rwanda, the last important milestone is the bilateral validation process of the TFF, before starting the process for the signature of the specific agreement.

As requested by the Quality Control Committee in Belgium, the meeting discussed two topics and made the following decision:

1- The capacity building component of the EARP project (Result 4) on the side of "Capacity Building Intervention" is relevant and it should be maintained in the TFF of that project for the following reasons:

   a. No guarantee that both projects will start simultaneously

   b. Specific capacity building needs linked to EARP do not fit in the niche chosen by this project

   c. Total envelope of this project not sufficient to cover all the capacity building needs (geothermal development intervention will also have its own capacity building component)

   d. Having CB components in each intervention does not prevent effective coordination, through active cooperation with NCBS in all interventions.

      Capacity building assessment and planning tools will be coordinated by NCBS, MININFRA and EWSA

2- The official figures for electrification targets are those of ESSP 2013-2018.

3- The Power Network Expert and the Change Management Expert will operate within the framework of SCBI pilot within the energy sector.

Signed by:

Erwin De WANDEL - EMBASSY OF BELGIUM

Emmanuel HATEGEKIMANA - MININFRA

Christophe BUNZINYA – MINECOFIN

Vincent MPAKA - EWSA

Ahmad PARSA - BELGIUM DEVELOPMENT AGENCY (BTC)

9.4 EARP - Mid Term Review Report

This chapter summarizes the MTR report of the first phase of EARP. The report is the outcome of an independent MTR Panel conducted between May and July 2012 on the electricity access work being carried out by EWSA under contract between the WB and the GoR. The overall objective of the MTR was to assist to refine and enhance effectiveness of phase II of the EARP based on the lessons learned to date.

9.4.1 Major findings

9.4.1.1 Overall

The rate of new electricity connections has been excellent. The number of customers connected to the system has risen from about 187.000 in December 2010 to about 300.000 in April 2012 and continues to increase at a rate of over 10.000 connections per month. Despite the success to date and for a number of reasons, the achievable target for 2017 could be lower than projected. Some fundamental approach changes would make the future targets more realistic and achievable.

The first phase of EARP has captured “low hanging fruit”, targeting customers near the existing network but the second phase will have to connect customers with more complex construction challenges, probably at higher costs.

9.4.1.2 Demand

EARP is adding many low-consuming connections (mainly households consuming less than 20 kWh/month) – a worrisome fact as operational costs cannot be covered by revenues from sales of electricity. The consumption levels will increase but this will occur slowly, 2-5%/year according to international experience.

9.4.1.3 Matching supply to demand

As a result of new connections, the demand for electricity will increase, but slower than anticipated. If all currently confirmed & funded generation projects are realized on time, no additional capacity will be needed to cover the incremental demand from EARP through 2017.

9.4.1.4 Impact

Connecting households does improve welfare immediately but generally does not raise rural income quickly and directly; it often takes 10-15 years to properly measure the impacts of electrification on rural incomes. Nonetheless, productive uses of electricity can generate employment and raise rural incomes in the near term.

An EARP Socio-Economic Baseline Study undertaken as part of the July 2012 MTR of the project suggests the following results due to electricity connectivity: (i) improved lighting extending the number of working hours, (ii) extended shelf life/palatability and reduced spoilage due to refrigeration and cooling, (iii) emerging agro processing thus adding value to the products, reducing post-harvest losses and increasing incomes to the farmers. In addition electricity has also contributed to improved service delivery especially in health, education and administrative services where there are reports of: (i) providing services that were not possible such as vaccinations and improved laboratory tests, (ii) reduced operation costs especially in transferring of patients, and (iii) improved school performance, among others.

9.4.2 Key recommendations

9.4.2.1 Operational & Planning

Efforts seem mainly focused on new connections & transport lines. Attention has to be given on the following linked issues:

- Rehabilitate and/or reinforce the existing infrastructure
- Support sufficiently operation and maintenance of the expanded infrastructure
- Restructure the branches/substations with sufficient autonomy for taking decisions
- Merge EARP and EWSA connection works in a SPIU
- Outsource progressively non-core activities (HH connections, LV and MV line extensions) by private contractors

9.4.2.2 Future operations

The recommendations for future operations mainly deal with looking into alternative approaches to the connection policy:

- Compensate EWSA for servicing small clients a loss. This can be done in a few ways:
    - Pay a small fee to EWSA per “low-consumption” client for a few years to buy down the tariff for those clients
    - Raise the tariff for richer clients
    - Using other type of tariffs and subsidies to increase the consumption of electricity
- Differentiate connection charges to distinguish “deserving” and non-deserving” clients
- Change the way that new clients are connected: avoiding to connect automatically new clients that are expected to use electricity only sparingly but providing them alternatives to connect them to modern energy
- Leave the choice of different connection types to potential client:
    - PV system at subsidized cost, giving similar services as a 20 kWh/month connection at lower cost
    - Grid connection at the prevailing connection tariff which would be higher what it is today
- Identify how pico & micro hydro and PV can systematically be included as compliment to grid connection
- Improve and support the energy sector SWAP
- Coordinate very closely between EWSA and programs of ministries, agencies and NGOs that invest directly in productive enterprises.
- Create department within EWSA specially dealing with awareness raising, and supplying information to promote, facilitate and support productive use of energy.
- Reduce overall program costs

9.5 Technical Audit on KiKi electrical line

This audit made by the companies SHER and ELIA regarding the assessment of the lines 30 kV Mont Kigali – Kiyumba built in 2010 as one part of the Rwandese territory electrification projects funded by Belgian and Rwandese Authorities.

The mission was to check the technical viability and conformity of the construction of 30 kV Mont Kigali – Kiyumba lines (KiKi) in order to make recommendations for improvement of the technical specifications, norms and standards referenced in the tender documents.

Referring on the entire analysis, following general conclusions have been drawn:

- Even if technical specifications seem consistent, nevertheless a fully review should be carried out by eliminating references to standards that are unnecessary and superfluous in order to avoid confusion, misinterpretation and additional costs on the part of some providers or contractors;
- Even if rules for the design supports the work performed, it might still be necessary to analyse to see if elements which evolve in time such climatic conditions, amongst other environment observations needs to be taken into account;
- As an observation, the execution of the line is correct in general but for the future projects, appropriate operation controls at appropriate times need to be introduced during the execution of the line, such as earthing amongst other regular practices. At each adequate stage, the performance of these controls might be examined to comply with technical specifications and rules.

9.6 Electricity Network Planning and Design (SOFRECO)

The EARP appointed the company SOFRECO to assist the Planning and Design Unit to carry out the planning, design, costing and a capital investment program to achieve this goal.

SOFRECO was appointed as a Planning Consulting Firm with its mission's main objective to assist the newly formed Planning & Design Unit to meet the electrification targets through the following:

- GIS activities
- Electricity network design & planning activities
- Capacity building activities
- Training activities

The study digitally captured all potential consumers in the country and designed the network to provide grid access to 70% of the population by 2017 at minimum cost, considering available information, GoR relocation plans, growing demand, on-going projects, recently completed projects and the overall state of network development.

Each zone (South, North, Western, Eastern and Central) is divided into lots, each lot consisting of a group of transformer zones with MV and LV lines to be constructed. The bigger lots are grouped into Engineering, Procurement and Construction (EPC) contracts while the smaller lots are dedicated for local contractors an EWSA in house construction. The lots are prioritized for construction between 2013 and 2017. Factors such as distance from the line and importance of number of infrastructure are taken into consideration. The average connection cost plays a role in the prioritizing of electrification.

For example, the following table provides the lots division for the Eastern region:

	SUM MV LINES (km)	SUM LV LINES (km)	SUM TRANS FORMERS	SUM MV SWITCHGEAR	POTENTIAL CONN's	COST (USD)	COST/ CONN 75%
Lot1	93.85	161.6	66	4	11997	7 290 874	810
Lot10	72.45	126.2	48	5	9147	5 734 905	836
Lot11	88.45	123.1	57	2	5065	4 894 058	1288
Lot12	54.14	87.8	46	4	4956	3 808 412	1025
Lot13	44.18	66.4	44	0	2635	2 363 114	1196
Lot14	61.81	115.4	53	4	4971	4 373 122	1173
Lot15	66.30	87.5	44	2	3167	3 487 720	1468
Lot16	54.74	122.4	46	3	6568	4 809 004	976
Lot17	54.92	125.7	52	2	6713	4 877 870	969
Lot18	71.97	128.7	79	0	7247	4 732 336	871
Lot19	88.20	122.7	55	4	6286	5 057 796	1073
Lot2	41.44	85.4	45	0.0	6798	3 481 780	683
Lot3	81.92	136.2	50	2.0	9577	6 151 057	856
Lot4	75.84	120.3	59.0	4.0	8505	5 447 887	854
Lot5	118.99	177.0	72.0	4.0	11362	8 029 183	942
Lot6	85.44	139.7	54.0	7.0	9737	6 398 745	876
Lot7	84.10	182.4	77.0	3.0	10706	7 033 437	876
Lot8	118.37	220.4	72.0	6.0	14692	9 451 745	858
Lot9	66.57	142.4	74.0	0.0	10425	5 617 619	718
SUM EPC	**1423.68**	**2471.2**	**1093**	**56**	**150554**	**103 040 662**	**913**

	SUM MV LINES (km)	SUM LV LINES (km)	SUM TRANS FORMERS	SUM MV SWITCHGEAR	POTENTIAL CONN's	COST (USD)	COST/ CONN 75%
MV_LV1	10.31	23.7	8	0	1938	1 283 526	883
MV_LV10	14.99	22.61	15	0	1323	1 005 662	1014
MV_LV11	12.11	28.8	15	0	2179	1 258 346	770
MV_LV12	12.10	22.5	12	0	752	907 701	1609
MV_LV2	20.37	56.96	17	1	4137	2 548 117	821
MV_LV3	23.40	37.2	22	1	1711	1 516 435	1182
MV_LV4	42.41	64.8	35	2	3372	2 732 212	1080
MV_LV5	37.61	37.6	35	1	1895	1 665 021	1172
MV_LV6	22.01	26.8	21	0	1161	1 122 894	1290
MV_LV7	27.14	32.2	16	0	1110	1 441 104	1731
MV_LV8	13.97	51.7	20	0	2873	2 028 827	942
MV_LV9	21.00	32.6	15.0	1	1019	1 305 566	1708
SUM MV/LV	**257.42**	**437.26**	**231**	**6**	**23470**	**18 815 409**	**1069**

The SOFRECO services compiled the following deliverables for each lot:

- Scope of works, including project description
- GIS map of the project area and proposed network
- Detailed bill of quantities to be used in tender documents
- A list of materials to be used to order material from EWSA stores

For all the regions, the deliverables also include the following:

- Study reports
- Load flow analysis
- Single line diagrams of the existing network
- Compiled GIS Database containing all network spatial information as well as electrical attributes for the existing and proposed network.