Rwanda Energy Group

REG

2018 SEMINAR ON WATER RESOURCES MANAGEMENT & SMALL HYDROPOWER DEVELOPMENT FOR COUNRIES ALONG THE BELT AND ROAD 15 May-4 June 2018

RWANDA COUNTRY REPORT

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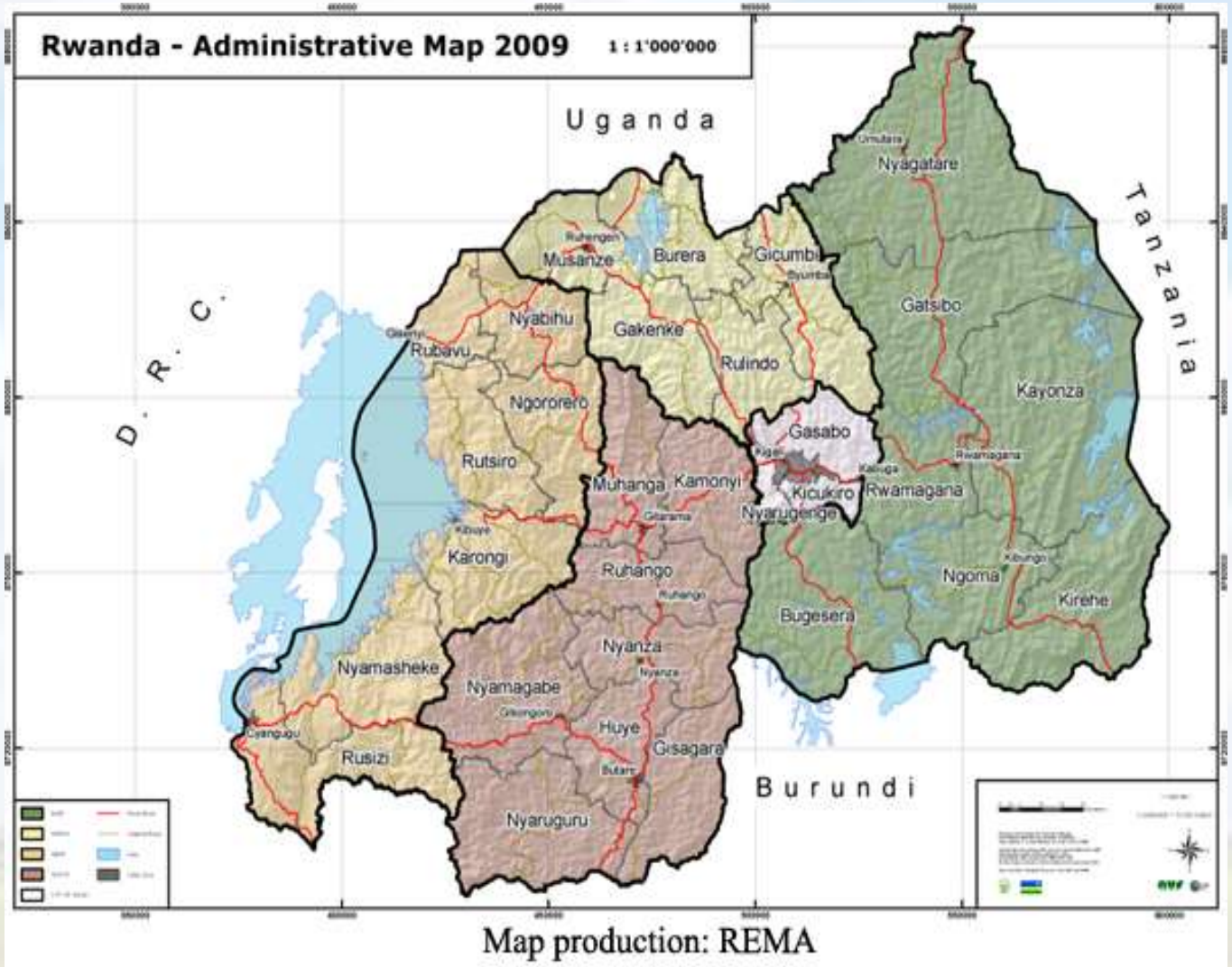
- DIFFICULTIES & BARRIERS IN WRM AND SHP DEVELOPMENT.

OVERVIEW OF THE COUNTRY
(Geography, Climate, Population, Economy)



Geography: The country is known as a Thousand hills Country due to its geographical features dominated by hills and mountains (4507m highest elevation). It is located in the east-central Africa. Area:26,388 sqkm. Capital city: Kigali; Neighbouring countries: As indicated on the map; Government type: Presidential Republic

Climate: The climate is tropical characterised with moderate rain and sun. Seasons: Short (Jan-Mid March) and long dry season (June-Mid Sept.), and short (Mid Sept- Dec) and long rainy seasons (Mid March- End May). Temperature varies between 20^0C-28^0C

Population: About 12 millions; population density: 472.6 per km^2

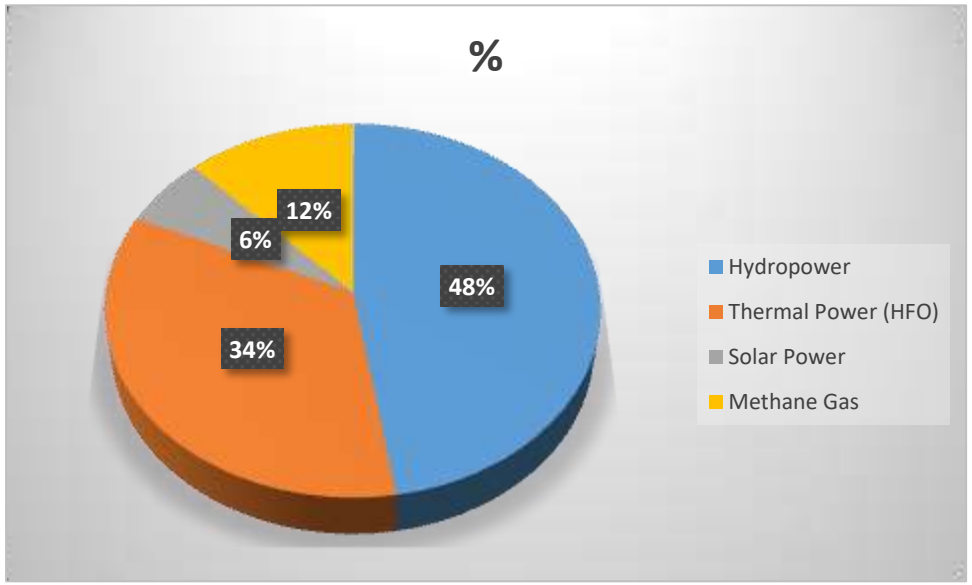
Economy: Based on the services, tourism, export of mineral, coffee and tea, and agro-processing industries; Currency: FRW; Growth:6.7%; GDP/Capita:$2,100; The target of GoR is to transform the country from low-income agriculture –based economy to a knowledge-based, serviced-oriented economy with a middle income status by 2024.

WATER RESOURCES DEVELOPMENT & MANAGEMENT

- ✓ Water is mainly used for agriculture/irrigation, domestic and industrial consumption, transport , recreation, and power generation , with a direct influence on the quality of life of the people, their health and overall productivity.
- ✓ Access to clean water: Rural areas: 71.9%; urban areas: 86.6%
- ✓ The Total water abstraction (surface & Ground-water) is evaluated at 499,468,512 m^3/year with irrigation coming first as a big water user.
- ✓ The country is divided into two major drainage basins: Nile basin extending to the eastern part of the country covering 67 % and delivering 90% of the national water uses, and the Congo basin extending to the west and covering 33% of land and deliver 10% of national water uses.
- ✓ The hydrological network includes numerous lakes and rivers and its associated wetlands.
- ✓ The water resources management is entrusted to Rwanda Water and Forestry Authority (RWFA)and the water supply by Water and Sanitation Corporation (WASAC)
- ✓ The water law in place (water use permit, conservation & management of wastelands- a buffer zone of 50 meters requirement, tree-plantations around banks of lakes and big rivers).

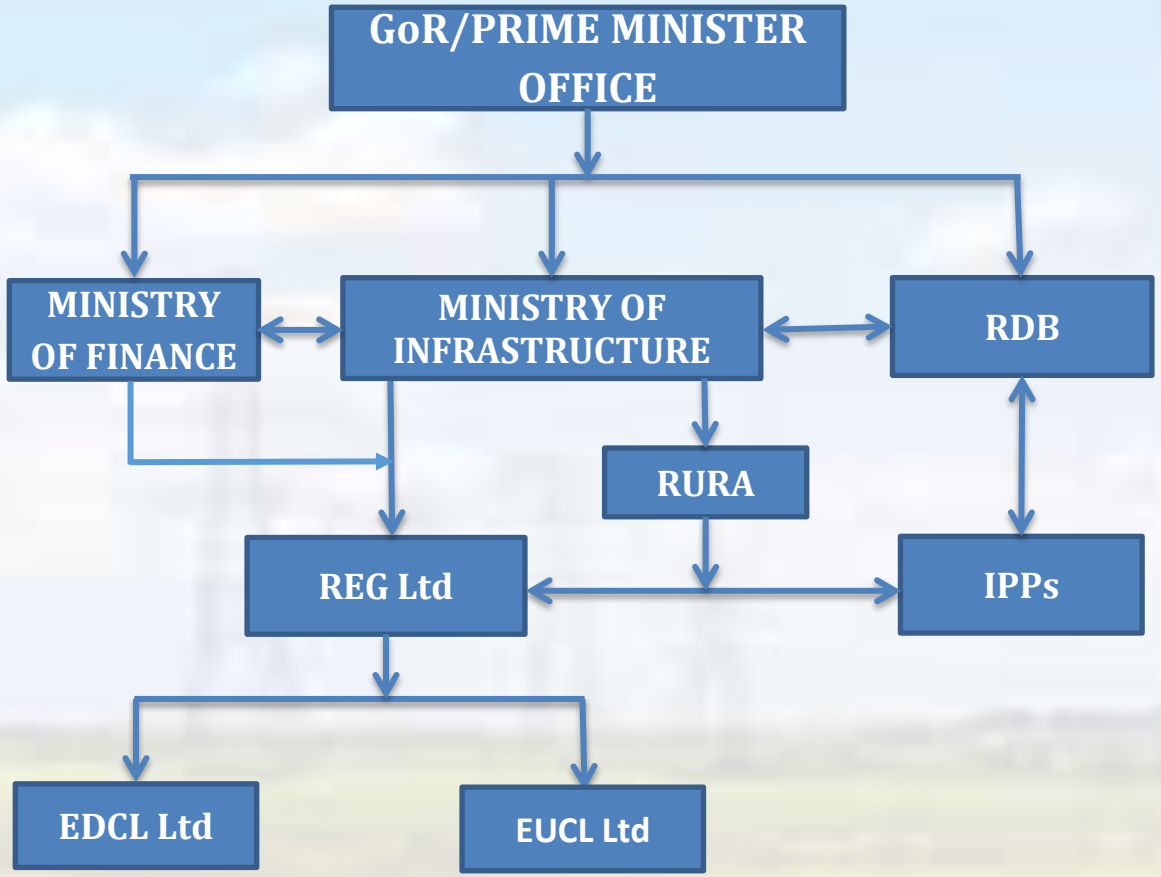
GENERAL CONDITION OF ENERGY AND POWER OF THE COUNTRY

- **Generation**: The installed capacity is now 210.9 MW



- **Access**: 42% access with 31% (grid) and 11% (off-grid)
- **Development Strategy**: The target for 2024 is 563 MW installed capacity, 100% access (52% on-grid and 48% off-grid).

Organization of energy sector & IPPs business Process



GENERAL CONDITION OF ENERGY AND POWER OF THE COUNTRY……Cont'd

- ✓ Energy System Frequency: 50Hz
- ✓ Level of Voltage: High Voltage:110kV & 220kV); Medium Voltage: 15 kV & 30kV; Distribution/Low Voltage: 220V/1ph & 380/3ph

END-USER TARIFF

S.N	Type of Consumer	Consumption (kwh)	Tariff (USD)
1	Residential	[0-15]	12 cents
		]15-50]	25 cents
		>50	26 cents
2	Non-Residential	[0-100]	25.9 cents
		>100	26.3 cents
3	Small industries including Water treatments plants, Water pumping stations and Telecom towers	126	17 cents
	Medium industries	]0.4kV- 15kV]	12 cents Plus charges for Q
	Large industries	]15-33kV]	11 cents Plus charges for Q

FEED-IN TARIFF: Established by Regulatory Authority (RURA) in consultation with all the stake holders. It varies depending the technology and the installed capacity

CONDITION OF HYDROPOWER DEVELOPMENT

(Definition of big/small Hydropower, Installed capacity, SHP installed & Potential capacity)

Definition

- ✓ Pico: <50kW
- ✓ Mini:]50 - 500kW]
- ✓ SHP:]500 - 10,000]
- ✓ Big: >10,000kW

Hydropower installed capacity

- ✓ The hydropower installed capacity is 104.5MW, that is 48% of the total country installed capacity

SHP Installed Capacity & Potential

- ❑ **SHP installed capacity: 25.65MW & Potential: 100MW**
- ✓ Fifteen (15) projects at PPA signing stage totaling 30.8MW
- ✓ Eight (8) projects at PPA negotiations stage totaling 18.108MW
- ✓ Three (3) projects with approved feasibility study totaling 6.8MW
- ✓ Eleven (11) Projects at feasibility study stage review totaling 9.612MW
- ✓ Twelve (12) Projects at Seeking MoU stage totaling 9.911MW
- ✓ Eight (8) Projects at Pre- feasibility study stage totaling 13.909MW

HYDROPOWER PROJECTS TO BE CONSTRUCTED & REHABILITATED >50MW

UNDER CONSTRUCTION

- **GoR**
- ✓ Rusumo: 80/3 MW
- **IPPs**
- ✓ Rwaza-Muko:2.6MW
- ✓ Nyundo:4.5MW
- ✓ Rukarara V & Mushishito: 5MW
- ✓ Kavumu: 0.334MW
- ✓ Kigasa: 0.195MW

PLANNED

- **GoR**
- ✓ Nyabarongo II: 43.5MW
- ✓ Butamwa PSP: 40MW; Juru PSP: 40MW; Rusizi III: 147/3MW
- **IPPs**
- ✓ Basel &2: 5.8MW; Ngororero: 2.4MW
- ✓ Ntaruka A: 2MW; Rwondo: 2.6MW
- ✓ Rukara VI: 9.7MW
- ✓ Mpenge I & II:0.951MW
- ✓ Nyirahindwe I&II: 1.268MW
- ✓ Nyirantaruko: 1.263MW
- ✓ Muhembe: 0.323MW

TO BE REHABILTATED

- **GoR**
- ✓ Ntaruka HP: 11.2MW
- **IPPs**
- ✓ Mukungwa II: 2.5 MW
- ✓ Rugezi : 2,2 MW
- ✓ Keya : 2.2MW
- ✓ Nkora:0.680 MW
- ✓ NBBO:0.500MW

BARRIERS IN WRM AND SHP DEVELOPMENT

BARRIERS IN WATER RESOURCE MANAGEMENT

- ✓ **Over-exploitation of water resources (** water demand keeps increasing for agriculture, domestic & industrial uses);
- ✓ **Land use practices** (erosion to wetlands (sedimentation in rivers & lakes);
- ✓ **Pollution**(untreated waste, use of chemical fertilizers, etc)
- ✓ **Invasive species** for lakes & rivers (Water hyacinth, aquatic weeds);
- ✓ **Climate change** (prolonged droughts & floods);
- ✓ **Insufficient water** resources especial in western and south provinces;
- ➢ **Way forward:** Policies have been put in place to mitigate the above mentioned barriers.

BARRIERS IN SHP DEVELOPMENT

- ✓ Lack of adequate investment for IPPs project implementation;
- ✓ High Generation cost (limited inhouse expertise, a land-locked country which increase the importation cost);
- ✓ Sedimentation due to geographical features of the country;

PHOTOS - COPERATION BETWEEN REG AND HRC

MoU between REG/ EDCL and HRC

- ✓ **Signature Date**: June 2017
- ✓ **Purpose**: Technical cooperation and technology transfer to promoting hydropower and other renewable energies

PHOTOS - COPERATION BETWEEN REG AND HRC

Training on SHP

PHOTOS……CONT'D

Certificates award

PHOTOES……CONT'D

Site investigation during the training

A WORD OF THANKS

- We could not end this presentation without extending our Sincere Gratitude to the Government of People Republic of China trough the Ministry of Commerce (MOFCOM) for the financial support to make this seminar happening the accorded us to be in position to attend this Seminar.

- We extend our Thanks to HRC for successful organization and conducting this seminar event. Thanks to entire HRC team dispatched to the organization for all the assistance accorded us to have the seminar and stay in a conducive environment.

- Lastly, Our Thanks goes to fellow trainees for kind cooperation and interactions during 3 week stay.

GOB BLESS EVERY ONE

Rwanda Energy Group

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THANK YOU