



Powering Healthcare in Rwanda

Market Assessment and Roadmap
for Healthcare Facilities



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Acronyms

Term	Definition		
AfDB	African Development Bank	ERP	Economic Recovery Plan
ASH	African Strategies for Health	ESMAP	Energy Sector Assistance Management Program
ATP	Ability to pay	ESSP	Energy Sector Strategic Plan
BMS	Battery management system	EUCL	Energy Utility Corporation Limited
BOO	Build-own-operate	GDP	Gross domestic product
BOOT	Build-own-operate-transfer	GoR	Government of Rwanda
BT	Build-transfer	HC	Healthcare centre
CA	Contracting authority	HF	Healthcare facility
CAPEX	Capital expenditure	HFE	Healthcare facility electrification
CBHI	Community-based health insurance	HMIS	Health Management Information System
CDPF	Capacity Development Pooled Fund	HRHS	Human Resources for Health Secretariat
CPA	Complementary package of activities	IHSSP	Integrated Health Systems Strengthening Project
D-REC	Distributed renewable energy credit	ICT	Information and communications' technology
DFI	Development financial institution	IP	International partners
DSM	Demand-side management	LCOE	Levelized cost of energy
EDCL	Energy Development Corporation Limited	LOD	Lease-operate-develop
EMS	Energy management system	LPG	Liquefied petroleum gas
EPC	Engineering, procurement, construction	MEL	Monitoring, evaluation and learning

MINEFOCIN	Ministry of Finance And Economic Planning	PC	Personal computer
MINIJUST	Ministry of Justice	PD	Project developer
MININFRA	Ministry of Infrastructure	PDO	Project development objective
MMI	Military medical insurance	PIC	Public Investment Committee
MoE	Ministry of Environment	PPP	Public-private partnership
MoH	Ministry of Health	PPPSC	PPP Steering Committee
MOU	Memorandum of understanding	PSCBS	Public Sector Capacity Building Secretariat
MPA	Minimum package of activities	PSE	Private sector engagement
MSH	Management Sciences for Health	PUE	Productive use of energy
MTF	Multi-tier framework	PV	Photovoltaic
NEP	National electrification plan	RAMA	Rwandaise d'Assurance Maladie
NGO	Non-governmental organization	RBC	Rwanda Biomedical Centre
NRH	National referral hospital	RBF	Results-based financing
NST	National Strategy for Transformation	RDB	Rwanda Development Board
O&M	Operation and maintenance	REG	Rwanda Energy Group
OFH	One Family Health	RHSSP	Rwanda Health Systems Strengthening Project
OPEX	Operating expenses	RURA	Rwanda Utilities Regulatory Authority
OOP	Out-of-pocket	RWF	Rwandan Franc
PAOP	Power Africa Off-grid Project	SSA	Sub-Saharan Africa
PAYG	Pay-as-you-go	USD	US Dollar
PBF	Performance-based financing		

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01 |

Introduction



Objectives, Scope and Approach

The Powering Healthcare Roadmap for Rwanda was developed by Sustainable Energy for All (SEforALL), under the **Power Africa-funded Powering Healthcare Africa Project**.

Rationale

- Rwanda has one of the fastest rates of electrification of Sub-Saharan countries and is aiming for 100% electricity access by 2024, including healthcare facilities.
- Data on powering healthcare facilities are sparse, outdated, and stored in multiple locations, especially data of last-mile facilities that still need to be connected to the main grid.
- There is a need to understand the investment requirement to bridge the energy access gap in healthcare facilities, as well as adequate models for long-term delivery of electricity, to help the government and development partners take informed decisions.

Roadmap objectives

01

Provide the government and its development partners with data on the scale of the remaining energy gap in the healthcare sector, including unelectrified or semi-electrified facilities.

02

Provide strategic information and implementation guidelines needed by the government and its partners to allocate investments for powering healthcare in a sustainable manner.

03

Provide options of long-term sustainable models including innovative models for delivery of continuous and reliable electricity service.



Methodology

Data were collected through various qualitative and quantitative methods including:

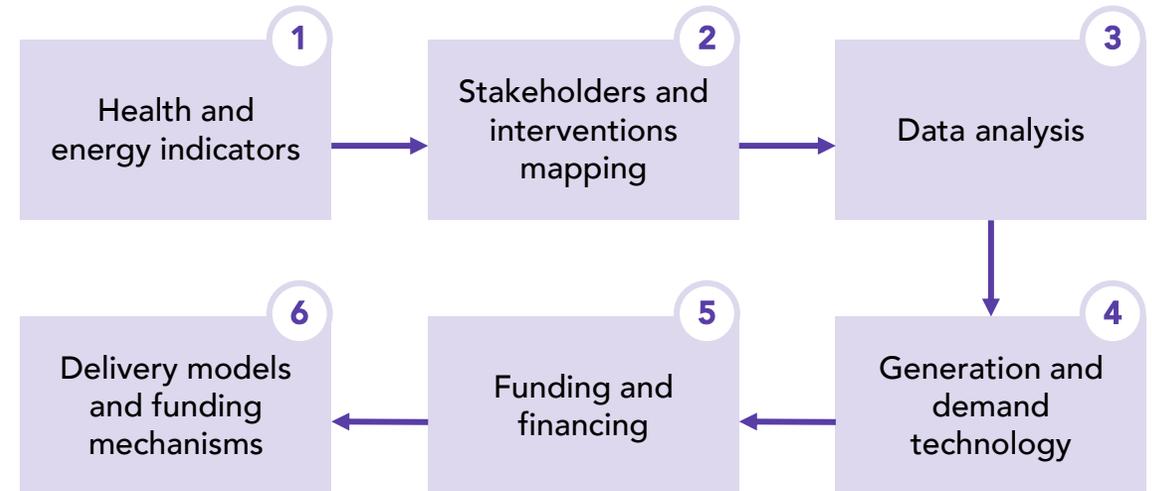
- Review, meta-analysis and synthesis of documents
- Stakeholder mapping
- Semi-structured interviews
- Data collection from 10 facilities (seven hospitals and three healthcare centres)
- Design and costing of standardized off-grid and back-up PV solar technology systems based on available data from line ministries, development partners and field visits
- Co-creation, validation and dissemination of market assessment and roadmap.

The Market Assessment and Roadmap was developed in close collaboration with key stakeholders in the energy and health sectors, including the Ministry of Health (MoH), Ministry of Infrastructure (MININFRA), the Rwanda Energy Group (REG), the Energy Development Corporation Limited (EDCL) and several other key stakeholders representing international development partners, NGOs and the private sector in Rwanda.

Approach

The Market Assessment and Roadmap consists of several components, including mapping of stakeholders and interventions, data analysis, technology assessment, funding and financing mechanisms, delivery models and a roadmap for powering healthcare facilities (HFs) in Rwanda. The Market Assessment and Roadmap for Health Facilities is presented in the following chapters.

Market assessment and roadmap



02

Market Assessment



CHAPTER 2.1

Energy Access & Healthcare Data

Sources: 2019-20 Rwanda Demographic and Health Survey;
World Bank data; 05th Population and Housing Census 2022



61%

Population with access to electricity.

- 47% connected to the national grid
- 14% via off-grid systems



203/100,000

Maternal mortality rate (2020)

Average global: 211 (2017)

Average Sub-Saharan Africa: 533



30/1,000

Infant mortality (up to 1y, 2021 data)

Average global: 28

Average Sub-Saharan Africa: 50



26%

Share of healthcare posts not connected to the grid. 100% of tertiary and upper healthcare facilities are connected to the grid and have a backup genset.



1.09/1000

Number of skilled healthcare workers (physicians, nurses and midwives) per 1000 people. WHO recommends a ratio of 4.45/1000.



67 years

Life expectancy (2020 data)

Female: 69 / Male: 64

Average global: 72 years

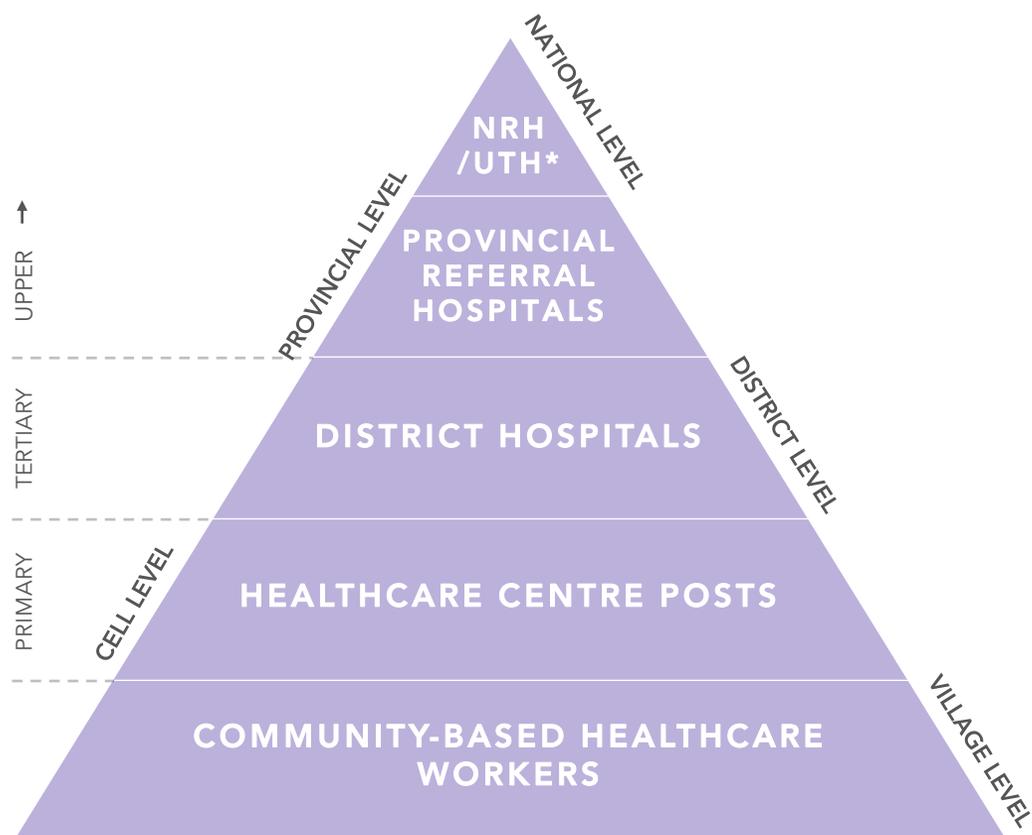
Average Sub-Saharan Africa: 61

Healthcare facility data: Key findings

- Rwanda has a mixed healthcare system and most healthcare facilities (HFs) deliver primary healthcare (82%).
- The MoH estimates that there are 2,139 HFs in Rwanda.
- The primary healthcare service is largely publicly owned (67% ownership) with different levels of functionality (each primary HF serves more than 8,300 people).
- The private sector currently plays a minor role in the primary healthcare sector (33% of HFs), and a significant role in the tertiary and upper healthcare sectors (88% and 41% of HFs, respectively).
- HFs are mostly concentrated in the Kigali area (Nyarugenge, Gasabo), mainly thanks to private HF contributions.



The Rwandan healthcare delivery System



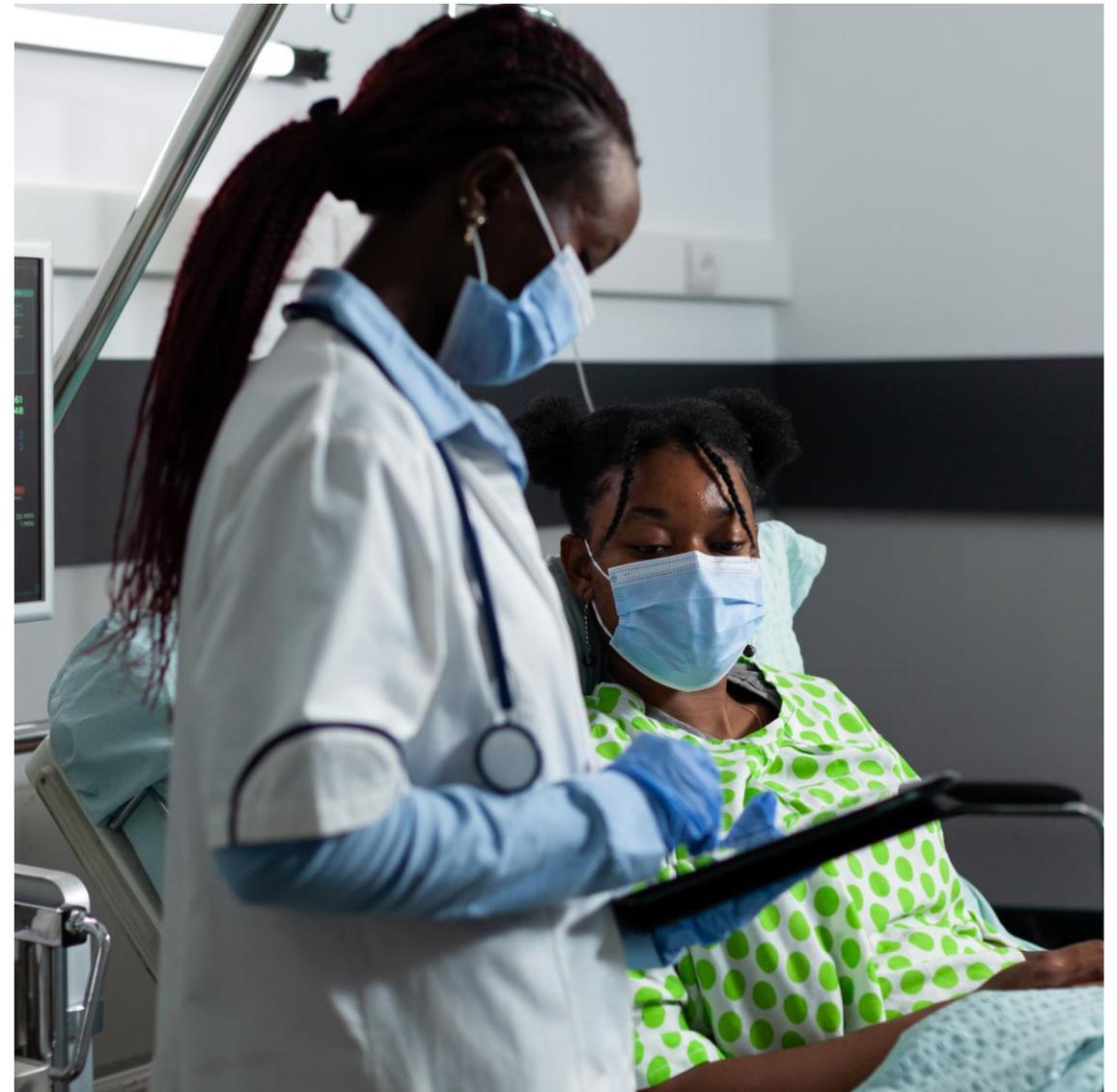
* NRH: National Referral Hospital
 UTH: University Teaching Hospital

Sources: [USAID, 2013. Rwanda Health System Strengthening. Design Team Summary Report](#)

LEVELS	ADMIN. STRUCTURES	IMPLEMENTING AGENCIES	HEALTH FACILITIES	HEALTHCARE ROLE
National	Parliament / Government	Ministry of Health	Tertiary Hospital	Specialized hospitals; medical training
Provincial	Governors	Provincial Hospital	Provincial Hospital	Mentorship, supervision of healthcare services
District	District Councils / Executive Committee / District Health Unit	District Hospital / Hospital Board	District Hospital	Provide government-defined “complementary package of activities (CPA)” ; provide care to patients referred by the primary healthcare centres; carry out planning activities for the health district and supervise district healthcare personnel
Sector / Umurenge	Elected councils / Executive secretary and staff	Healthcare Center / Healthcare Centre Committee	Healthcare Centre	Provide government defined “minimum package of activities at the peripheral level (MPA)” (i.e., curative, preventive, promotional, and rehabilitation services); supervise healthcare posts and community healthcare workers operating in their catchment area
Cell / Akagari	Elected councils / Executive secretary and staff	Healthcare Post / Community Health Worker	Healthcare Posts	Similar to healthcare centres, including curative out-patient care, certain diagnostic tests, child immunization, growth monitoring for children under five years
Village / Umudugudu	Village council / Village coordinator and staff	Community Healthcare Workers	Community Healthcare Workers	Prevention, screening and treatment of malnutrition, integrated management of child illness; provision of family planning and maternal and newborn health, DOT, HIV, TB and other chronic illnesses; behavioural changes and communication (health education)

Rwanda has 2,139 health facilities

	HEALTH FACILITY	MGMT	UNITS	CATCH. AREA
UPPER HEALTHCARE	Referral Hospitals	Public	3	13 M
	Provincial Hospitals	Public	3	2.8 M
	University Teaching Hospitals	Public	3	-
	Specialized Centres/Hospitals	Public	4	-
	Hospitals	Private	9	-
TERTIARY HEALTHCARE	Secondary-Level Teaching Hospitals	Public	9	-
	District Hospitals	Public	34	400,000
	Private Clinics	Private	198	-
	Laboratories	Private	2	-
	Private Dispensaries	Private	115	-
PRIMARY HEALTHCARE	Healthcare Centres	Public	513	26,000
	Healthcare Posts	Public	658	11,000
	Healthcare Posts	Private	588	
TOTAL			2,139	

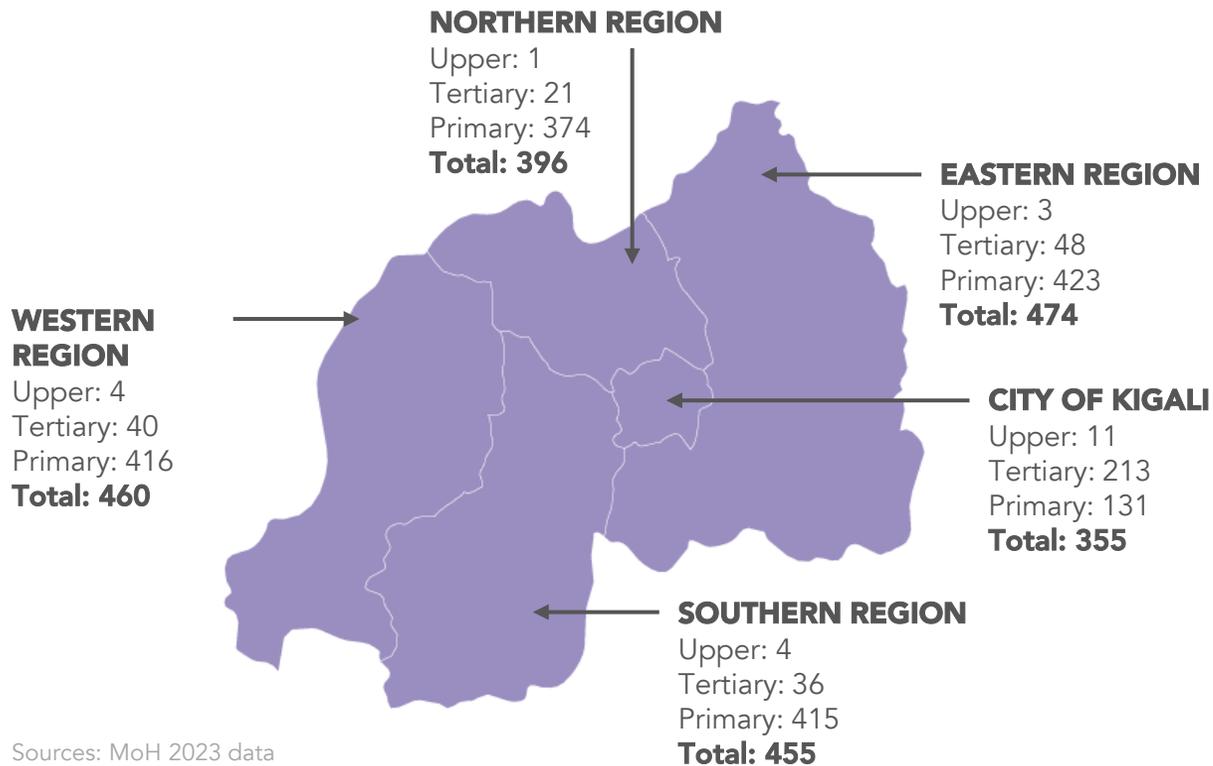


Geographic distribution of healthcare facilities

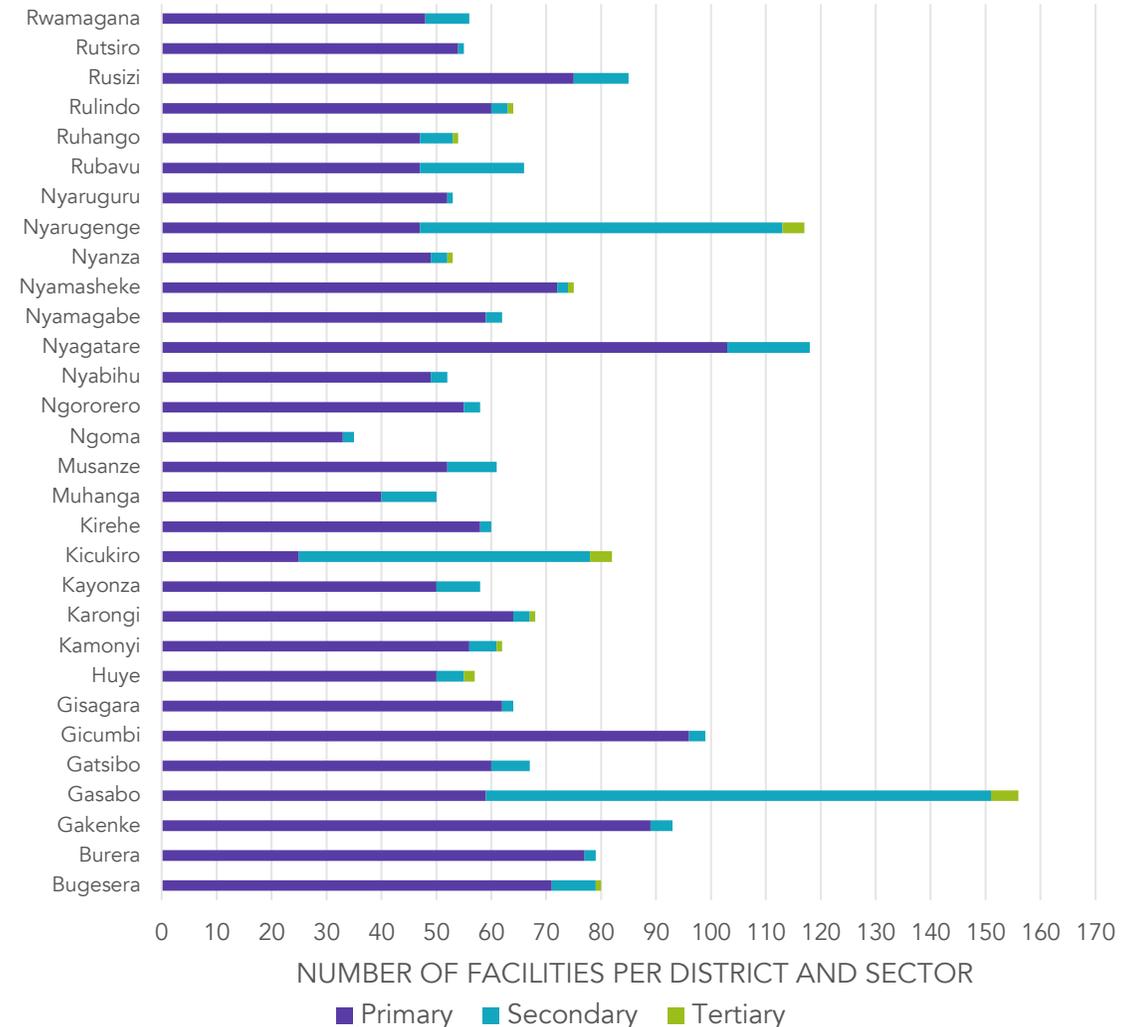


1.6 healthcare facilities per 10,000 people

Healthcare facilities are evenly distributed across the five regions in Rwanda, with the lowest number located in the Kigali region.



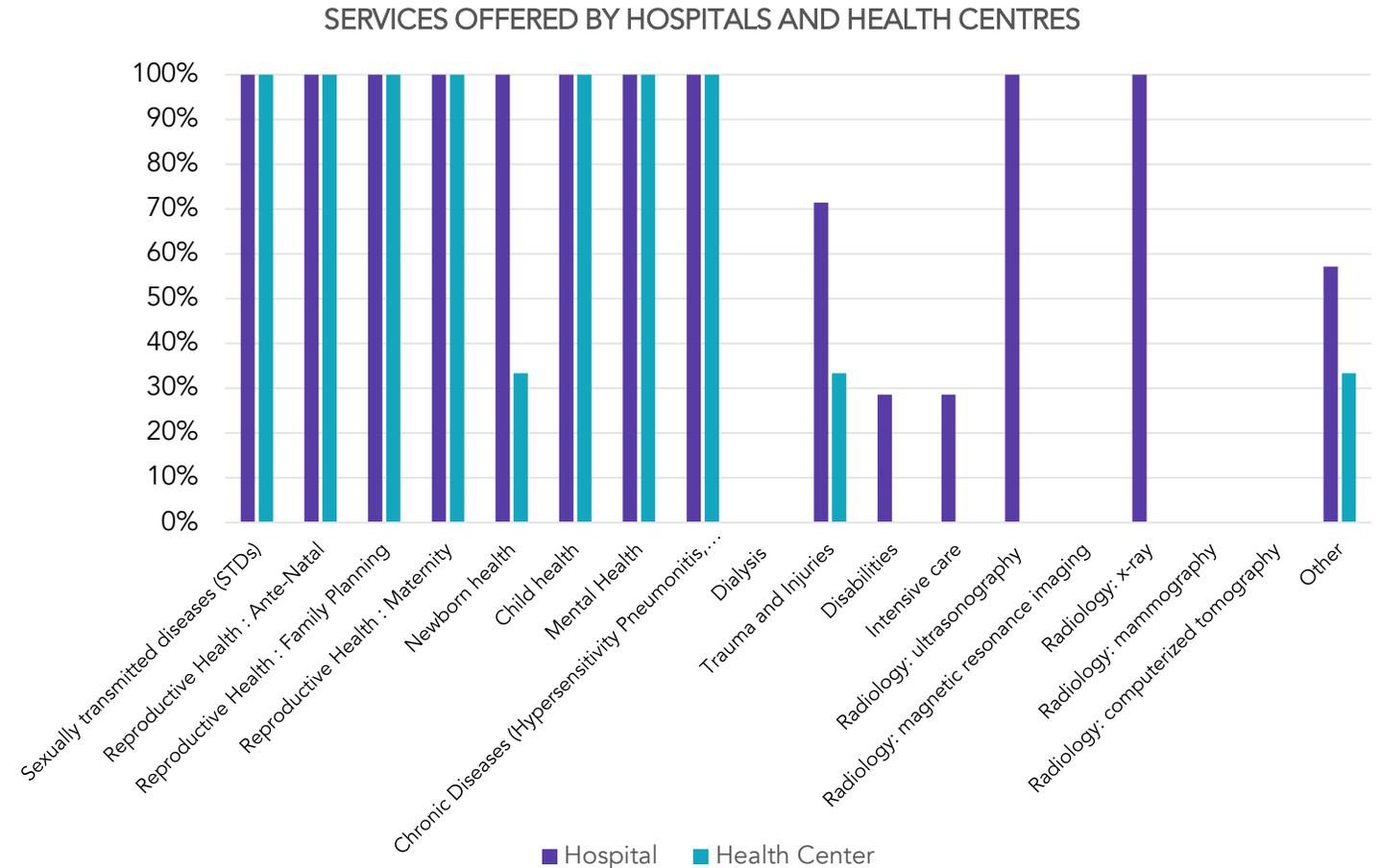
Sources: MoH 2023 data



Different healthcare services are offered by hospitals and healthcare centers

- In terms of what they offer, hospitals differ from health centres as they offer radiological services, treatment for trauma and injuries, are equipped with intensive care units and offer additional services for people with disabilities.
- The health wards prioritized by stakeholders in terms of needs for improvement are:
 - Maternity
 - Neonatology
 - Laboratories
 - Surgeries

KEY FIGURES	HOSPITAL	HEALTH CENTRE
Average current bed capacity	189	15
Average patients per day	125	75



The health sector in Rwanda

Rwanda's health sector is structured around nine priorities defined in the following documents:

- i) the National Strategy for Transformation (NST1) for the period of 2017– 2024,
- ii) the fourth Health Sector Strategic Plan (HSSP4) for 2018/19 – 2023/24, and
- iii) a Health Financing Strategic Plan for 2018-2024

1 Reduction of the prevalence of stunting

2 Improvement of maternal mortality and child health

3 Construction and improvement of health infrastructure

4 Strengthening health sector financing and health service delivery

5 Increasing the quality of human resources for health

6 Ensuring availability and sufficient resources to finance the delivery of health services in line with the Health Sector Strategic Plan

7 Strengthen disease prevention awareness and reduce communicable and non-communicable diseases

8 Digitalizing health services to enhance data-driven decisions and prioritization of resources

9 Institutionalizing and scaling up innovations and new proven impact interventions to accelerate Universal Health Coverage (UHC)

Health sector performance

Maternal mortality

Maternity mortality rate declined between 2005 and 2015 from 750 to 210 per 100,000 live births respectively. The 2020 rate was at 203/100,000, less than the average global in 2017 (211) and then average in Sub-Saharan Africa (533).

The Government aims to reduce the rate further to 126/100,000 by 2024.

Infant mortality

Infant mortality is 30 per 1,000 live births. This is slightly higher than the average global (28) and lower than the average in Sub-Saharan Africa (50).

The Demographic and Health Survey (DHS) carried out in 2019/20 showed a correlation between infant mortality and income, as seen in the graph.

Source: World Bank data, [UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023](#)

Human resources (HR)

Current figures show that there are 1.09 skilled healthcare workers (physicians, nurses and midwives) per 1000 people. This is four-fold lower than WHO's recommendation of 4.45/1000.

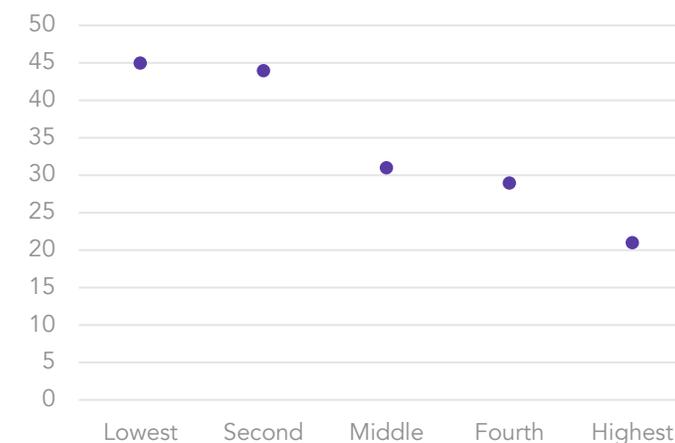
The NST-1 goal for 2024 is to enhance HR compared to 2013/14 figures:

- One medical doctor per 7,000 people from 10,055
- One nurse per 800 people from 1,142
- One midwife per 2,500 from 4,037

Life expectancy

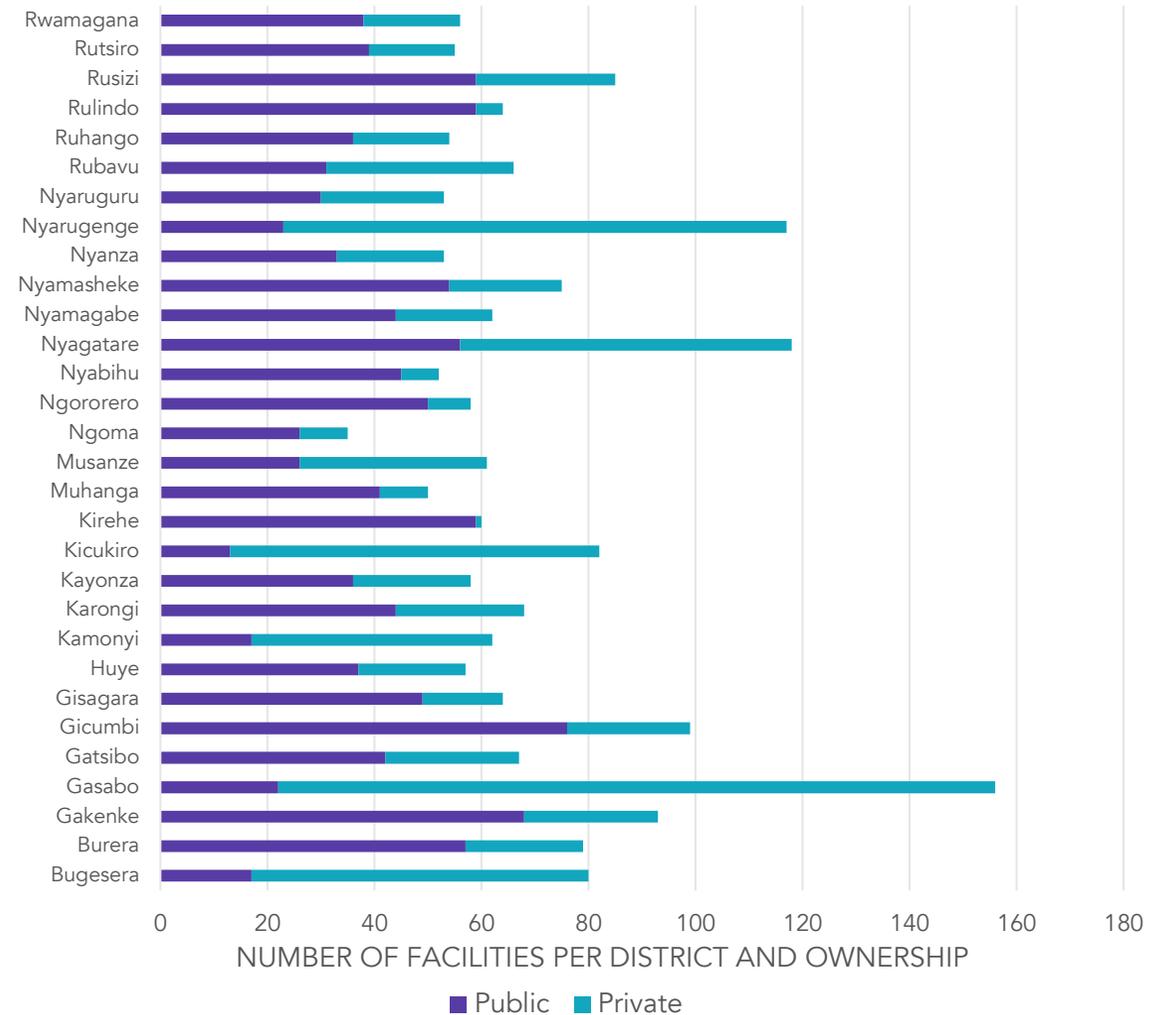
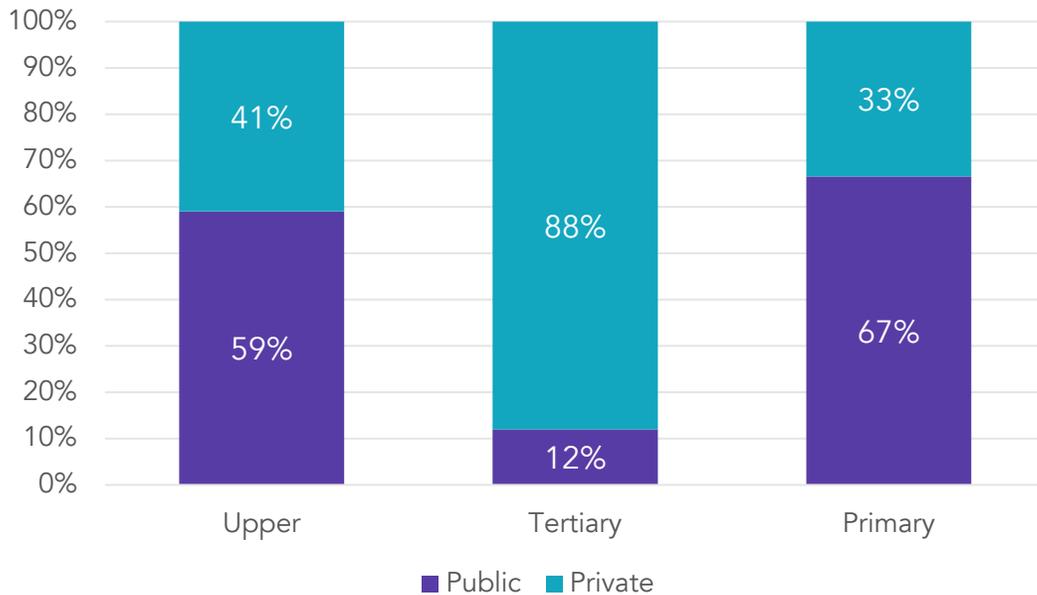
Rwandans' life expectancy has increased by 7% over the last decade from 62.5 years in 2010 to 66.8 in 2020.

INFANT MORTALITY RATE BY WEALTH QUANTILES



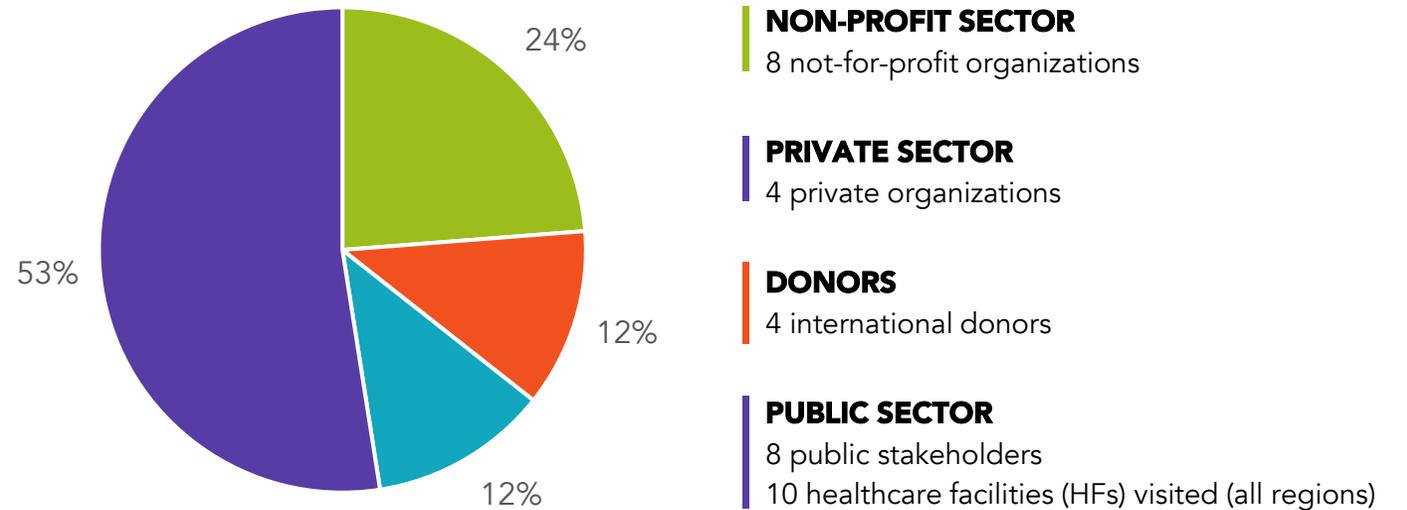
Primary and tertiary HF are predominantly public, while tertiary are private

- The updated 2023 data from the MoH show that most primary and upper healthcare facilities are owned and operated by the government (59% and 67% respectively).
- The private sector plays a major role in tertiary healthcare facilities (88%).



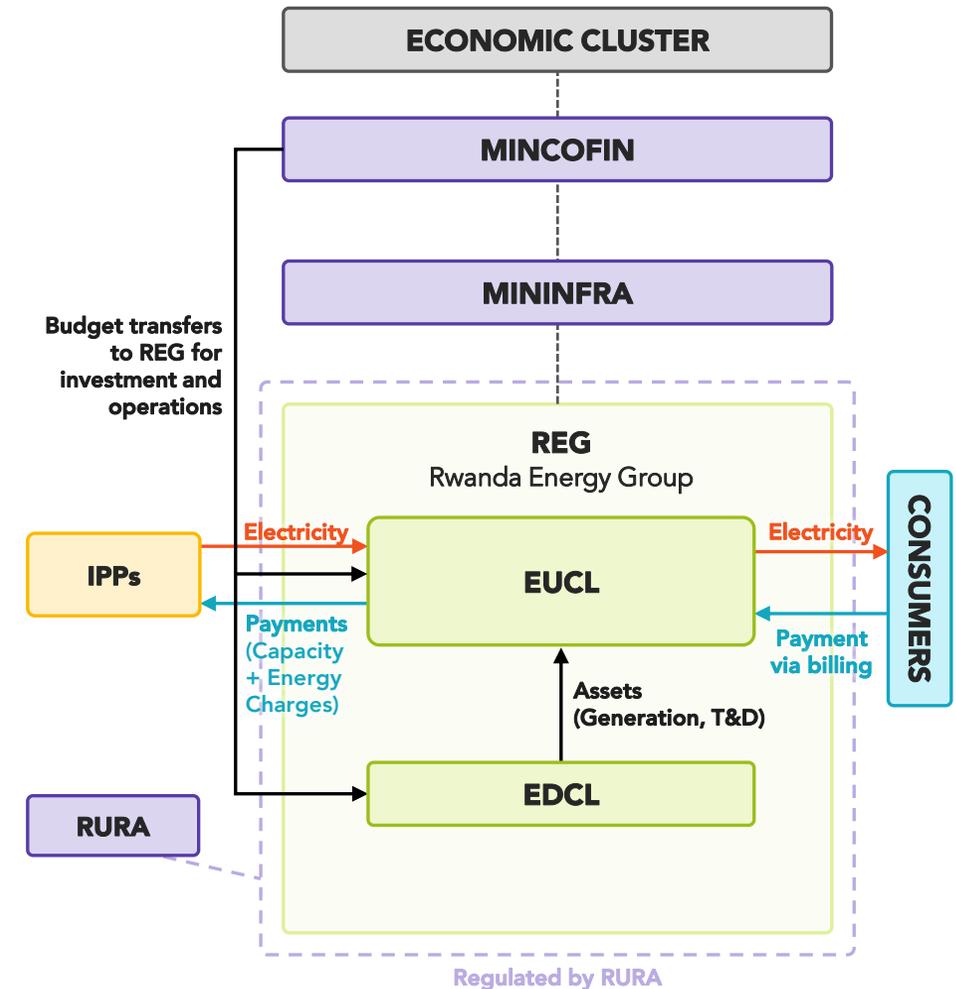
Enabling Environment

Interviewed stakeholders



The Rwandan electricity delivery system

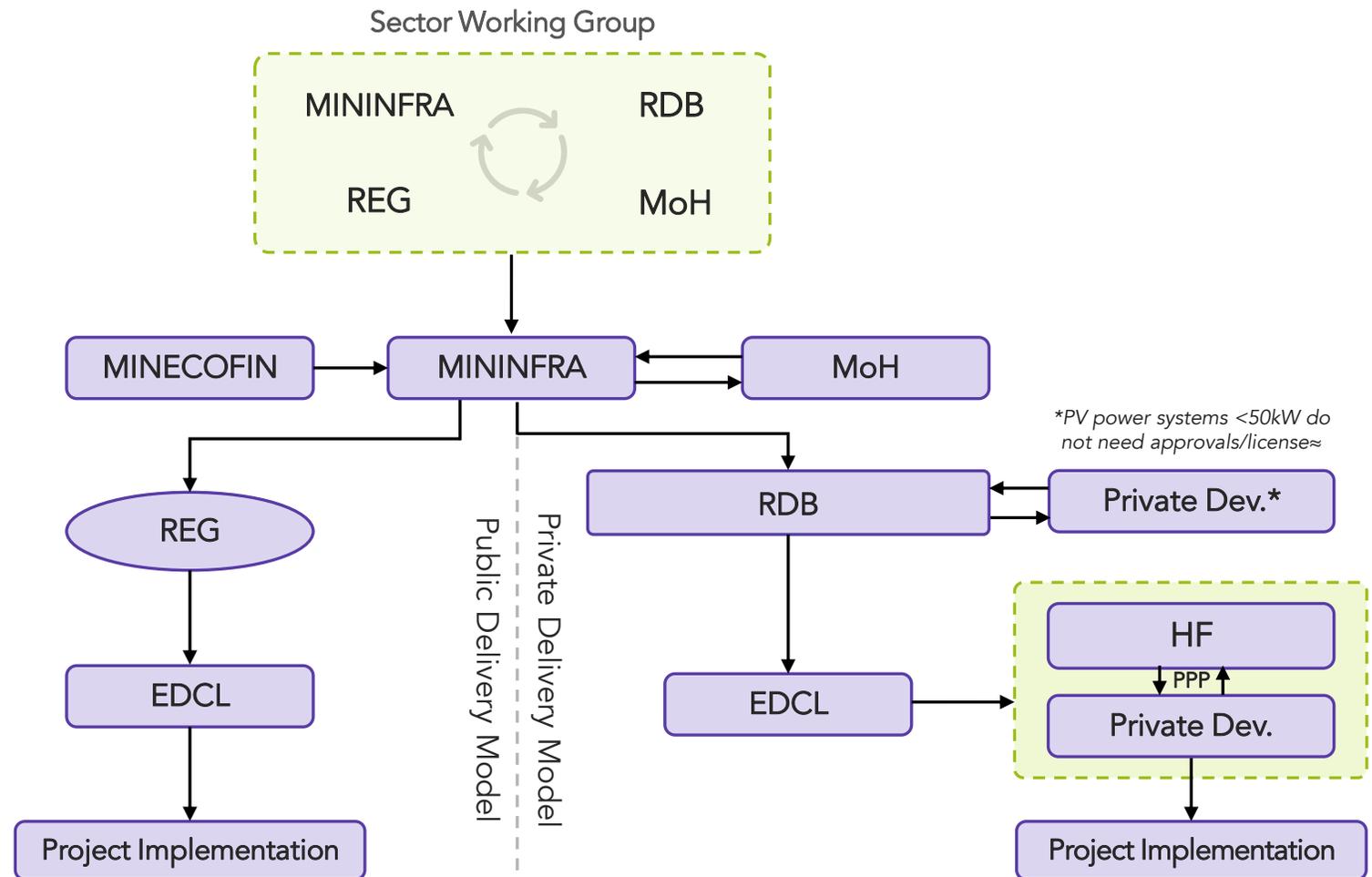
- The MINECOFIN and the MININFRA are the policymakers shaping the enabling environment for energy provision in Rwanda:
 - The MINECOFIN allocates the budget for energy investments and operations.
 - The MININFRA develops energy policies and targets
- Projects are executed by the national utility company, the Rwanda Energy Group (REG) owned by the government and divided into two departments:
 - The EUCL is responsible for the operation and maintenance of grid connection lines
 - The EDCL is in charge of public investments in new energy generation projects.
- Rwanda Utilities Regulatory Authority (RURA) sets the tariffs for energy prices in Rwanda.
- The EDCL develops the Energy Access Rollout programme, in which the expansion of access to electricity in Rwanda is planned.
- The EDCL is the main contact for private energy investors that want to operate in the field of energy, both on-grid/off-grid and for clean cooking.



Sources: Investment Opportunities in the Rwandan Energy Sector TRAIDE Rwanda

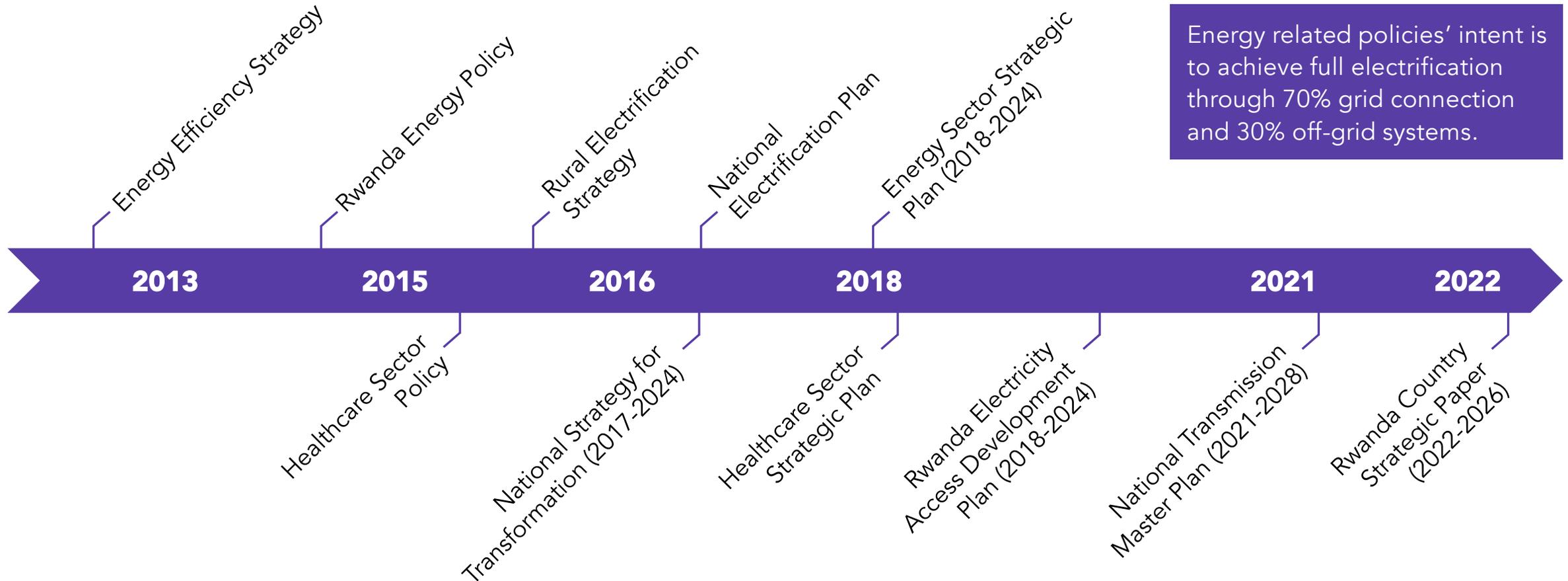
A Sector Working Group leads the implementation of HFE projects

- The Sector Working Group is a pivotal exchange among institutions planning and prioritising HFE projects in the country
- HFE projects vary between public- and private-oriented setups: in the first case, the REG leads the implementation, while in the second case the RDB manages the interactions between the private developer and other public actors (EDCL, HFs).
- HFE can run under a PPP between the private developer, the MoH and/or the healthcare facility.



Sources: Consultations with MININFRA

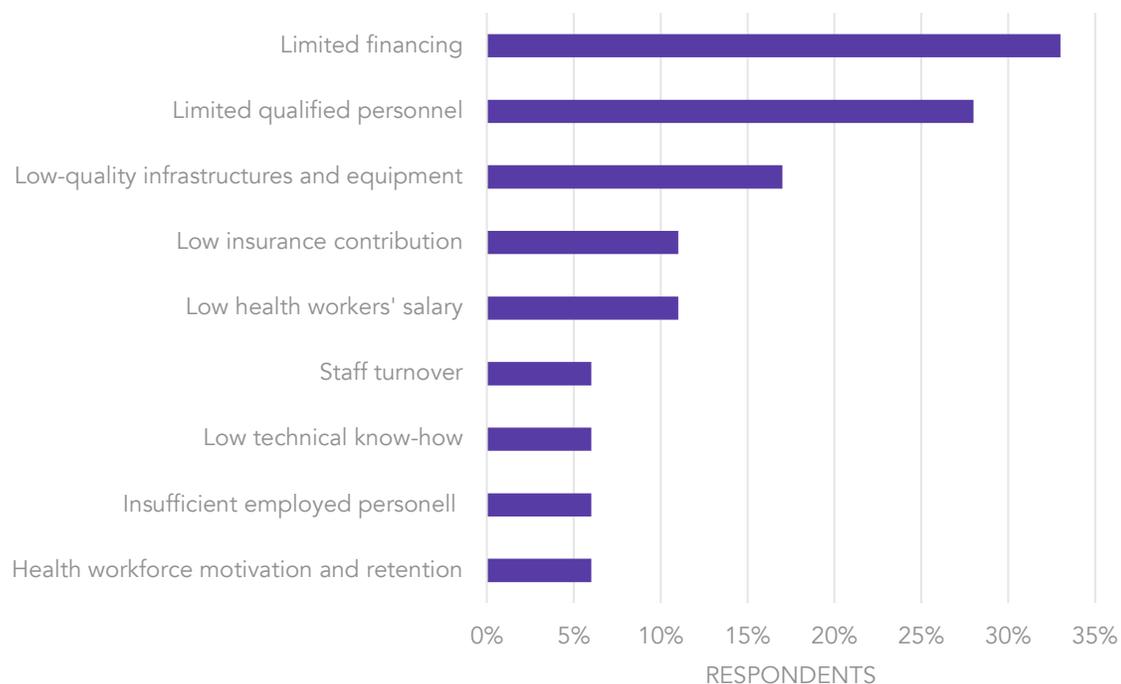
Energy policies aim to reach full connectivity by 2024



Energy access and healthcare: Stakeholders' perceptions

Limiting financing undermines healthcare services

The main obstacle identified as hindering healthcare services is limited financing followed by a lack of qualified personnel.

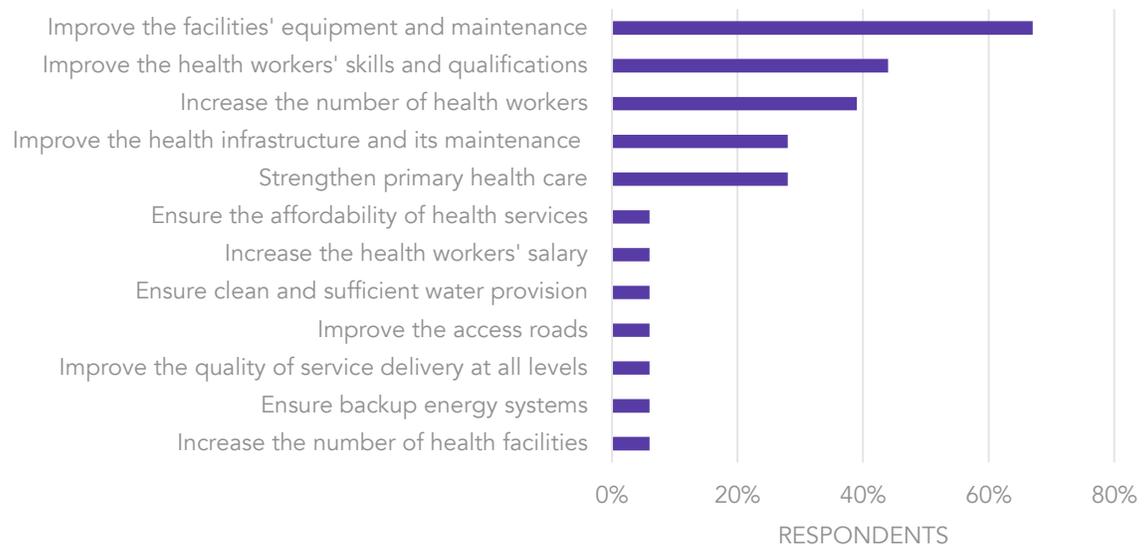


Sources: Stakeholder consultations

Better equipment maintenance is needed

Stakeholders see room for improvement in the equipment at healthcare facilities (both energy-related and medical), as well as equipment maintenance. They also identify a lack of skilled healthcare workers.

Stakeholders highlight the fact that margins for improvement may leverage on: (i) specialized personnel with experience abroad; (ii) latest-generation surgical and diagnostic equipment; and (iii) skilled technicians for using healthcare machinery.



Energy access and healthcare: Findings and recommendations

Effective policies can accelerate HFE

- The whole of Rwanda is targeted to be electrified by 2024 using either grid extensions or off-grid technologies. Connecting the whole country by means of grid extension is the primary goal.
- The Health Sector Strategic Plan foresees a powering strategy with a focus on healthcare posts.
- The location of HFs is one of the key selection criteria used to define priority in the Energy Sector Strategic Plan (ESSP), together with productive uses, education facilities and population density.
- There is no dedicated policy targeting HFE specifically, whereas a comprehensive approach has been adopted and HFE is included in the broader ESSP (2018-2024).
- Considering that the MININFRA has already allocated huge investments to increase the centralized energy generation capacity, the national priority should be given to boost grid extension and decentralized systems to achieve universal access to electricity.
- HFs' electricity bills are subsidized by the government (facilities can claim taxes paid on electricity bills).

Stakeholder consultations; MINECOFIN, 2015.

List of energy supply equipment exempted from value added tax

Stakeholders have different views with regard to priorities and obstacles

- Donor, private and not-for-profit stakeholders do not agree regarding the lack of specific plans for HFE since it strongly depends on the stakeholder's nature and role in the health and energy sector.
- Most donor, private and not-for-profit stakeholders believe there is an adequate integration between on-grid and off-grid plans to power HFs, while the following obstacles are also identified:
 - Lack of an enabling environment for off-grid investors, not only for the initial investment for operating the systems.
 - Lack of subsidies for mini-grids, similar to government subsidies for grid connection costs (90% of subsidy). This would imply the need to set a tariff and adopt an automatic subsidy.
 - One major obstacle is the long-term sustainability of energy facilities.
 - Lack of management approach of the HFs.
- The government promotes investments in HFE (e.g., no connection fee and reduced tariffs since facilities enjoy tax exemption for renewables). It also favours the process for establishing and operating private HFs, which is well defined by the MoH, even if there is limited stakeholder awareness on such topics.

Enabling environment: Findings and recommendations

There is still room for improvement

- Only 39% of interviewed stakeholders perceived that the policies and plans to power HFs are sufficiently integrated. Specifically, they would prioritize following interventions:
 - Increase investments for maintaining health facilities
 - Coordinate with local communities to find synergies between multiple projects, such as those targeting health facility, telecom towers and community electrification;
- There is good coordination among donors, practitioners and institutions with still some room for improvement to effectively improve actions at a decentralized level.
- Permit/authorizations processes are perceived as too slow.
- Regulations and investments are mostly focused on new installations and not on existing ones.

Sources: Stakeholder consultations

Coordination, effectiveness and inclusion of private sector is key

- Public institutions should explore a comprehensive communication plan to duly update stakeholders about energy-related plans/policies and thus increase their awareness about the sector. Events and newsletters should be regularly managed to keep them informed.
- Improve communication channels (also by using ICT solutions) between institutions/government and decentralized authorities in order to properly train/shadow/enhance their capabilities in implementing policies and strategies in an effective manner.
- Donors and practitioners should take such coordination into consideration since the competition is high in such a small and almost saturated market.
- Improve the identification of issues at ministry level by updating the data set of primary HFs with additional data (energy, infrastructure)
- Timing for project development affects the project budget considerably and the attractiveness of the potential investments, thus processes should be facilitated and timing should be clearly defined and respected.
- Low maintenance and lifespan of infrastructures, including medical equipment and energy power systems, negatively impact the healthcare delivery system, thus policymakers and donors should effectively promote and open up opportunities for private service providers from the energy sector.
- Building sustainable business models should consider assets' lifespan.

Enabling environment: Findings and recommendations (cont'd)

Priorities should be reassessed and gaps identified

- Strategic priorities to strength Rwanda's healthcare sector should include the energy-related asset and its long-term sustainability, whereas the National Health Sector Strategic Plan 2018–2024 does not adequately integrate such aspects.
- Considering that MININFRA has already allocated huge investments to increase the centralized energy generation capacity, the national priority should be given to boost grid extension and decentralized systems to achieve universal access to electricity.
- A stakeholder self-assessment reveals that the level of preparation is sufficient among only 44% of internal staff.
- Cost-reflective tariff in mini-grid projects is the objective of a negotiation with RURA, but a tool able to calculate the tariff is missing.

Sources: Stakeholder consultations

Strong planning and commitments needed, while skills and tools are in place

- Strategic planning should duly take into consideration:
 - Safety of electrical installation and equipment, especially adaptation of existing equipment
 - Backup energy systems to ensure reliable healthcare services
 - Efficient appliances to reduce the load profile and energy expenditure
 - Integration of the energy-related aspects into the Health Management Information System.
- A strong government commitment on distribution and last-mile connections is needed, one that takes a deeper look at the connection of more customers and public services into the system by means of grid extension or off-grid systems, and thus reducing investments in energy generation for the upcoming period. An enabling environment should be favoured to effectively pursue such a commitment.
- Internal staff should be more involved in continuous learning, especially on demand-side management (DSM) strategies and ICT.
- Skills/experience should be duly taken into consideration to assign assignments.
- Specialized expertise would be required in the health and energy sectors, even leveraging on experience gained abroad.
- Adopt a tool to standardize the calculation of the cost-reflective tariff, to reduce uncertainty in off-grid projects' financial planning. This is particularly relevant to community mini-grids where the health facility is considered an anchor load, though with a limited ability to pay.

Data Insights



26% or 326

Share and absolute value of healthcare posts without a connection to the grid



30% or 97

Share and absolute value of healthcare posts using solar power



72%

Healthcare facilities (HFs) with basic water services



96.2%

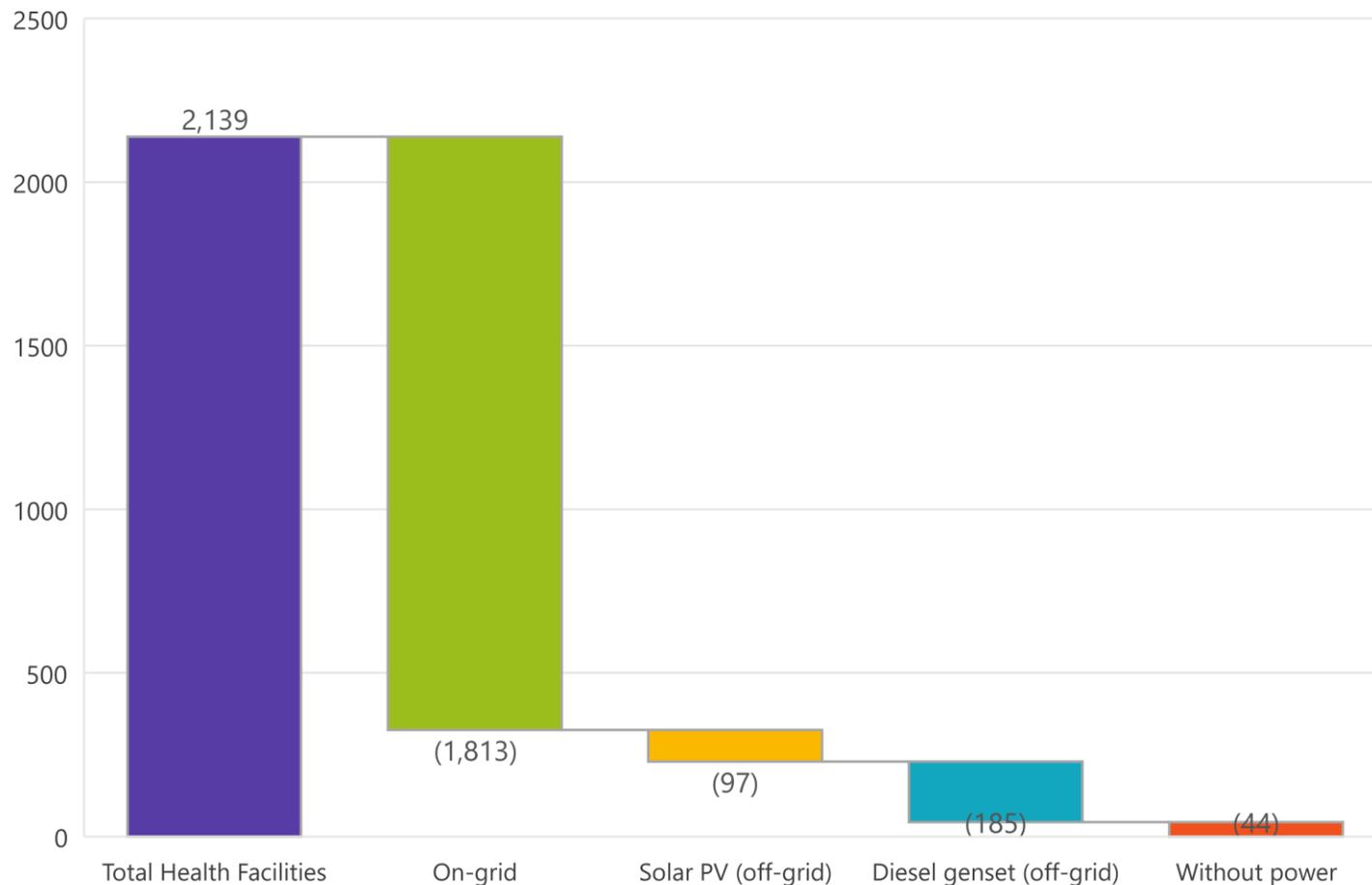
HFs considered fully functional (including healthcare centres and posts)



100%

Share of tertiary and upper HFs with grid connection and fuel backup systems

Sizing the access gap – The market opportunity covers solar PV systems with different access status



Majority of HFs are on-grid

Opportunity: moving from diesel-based back-up systems to renewables should be explored through cost-benefit analysis.

About one-third of off-grid HFs are powered by Solar-PV systems, including standalone and mini-grid systems

Opportunity: System repowering for improving reliability and type of healthcare services could be explored*.

Majority of off-grid HFs are powered by diesel genset

Opportunity: moving from fossil fuel-based systems to renewables is an opportunity for sustainable HFE.

Minority of HFs are un-electrified

Opportunity: achieving 100% HFs with access to reliable electricity supply.

100% of health centers and 74% of health posts are grid-connected

Note: 2023 data are not available for 218 out of 326 healthcare posts (HPs) (66%)

ADMINISTRATIVE STRUCTURE	HEALTHCARE FACILITIES	GRID-CONNECTED FACILITIES	NOT OFF-GRID FACILITIES
NATIONAL	Tertiary Hospital	100%	0%
PROVINCIAL	Provincial Hospital	100%	0%
DISTRICT	District Hospital	100%	0%
SECTOR	Healthcare Centres	100%	0%
CELL	Healthcare Posts	74% (920 HPs)	26% (326 HPs)

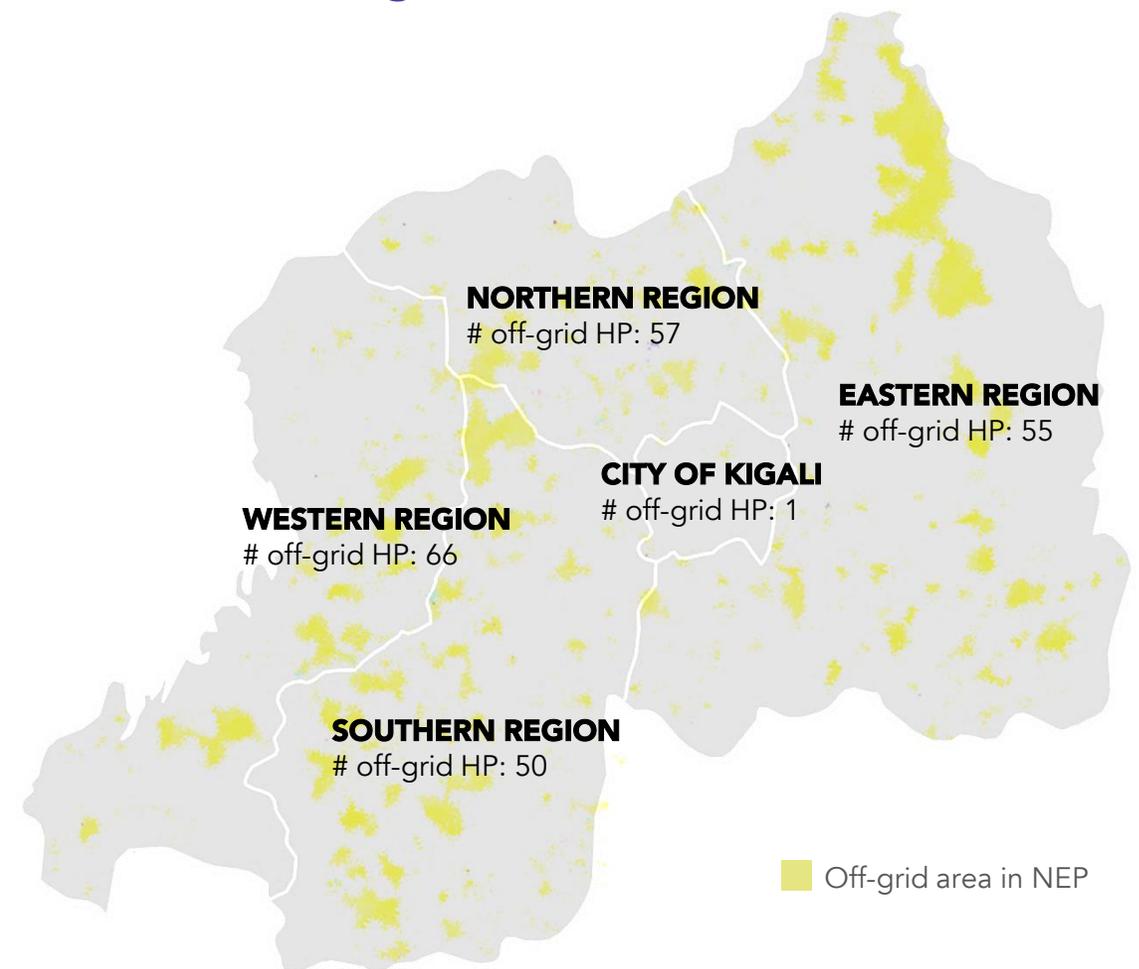
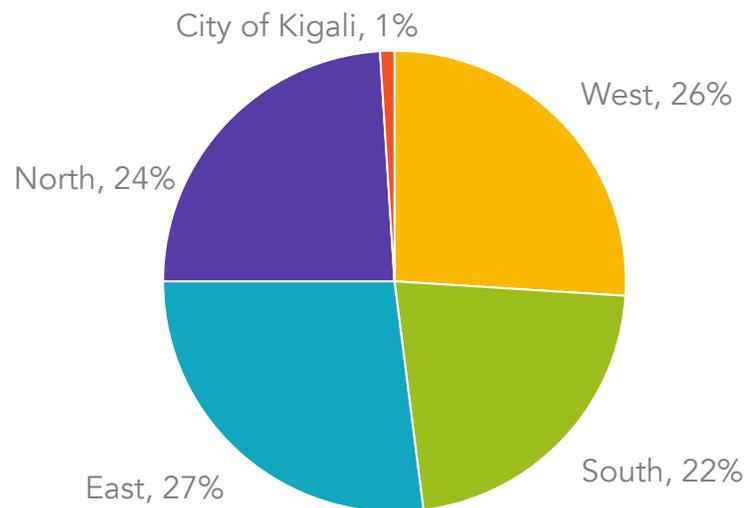
	ENERGY SOURCES OF OFF-GRID FACILITIES	SOLAR-PV TECHNOLOGY
USING DIESEL GENERATOR	57%	185
USING SOLAR TECHNOLOGIES	30%	97
WITHOUT ELECTRICITY	13%	44
TOTAL	100%	326

86 powered by standalone systems
11 powered by mini-grids

Sources: Self-processing of data provided by the MoH, January 2023, adjusted with [MoH data 2019](#)

Off-grid HFs are evenly distributed within the country

- Most off-grid HFs are located in the West, while in the city of Kigali there is only one off-grid post.
- Off-grid HFs are homogenously distributed across the regions, except for the Kigali region.



Source: National Electrification Plan 2018. Extract from TRAIDE, Investment Opportunities in the Rwandan Energy Sector, 2020. Coordinates are available for 280 out of 326 HPs.

Buildings' quality is key for effective medical services

Key responsibilities:

- The Ministry of Infrastructure (MININFRA) is the entity responsible for the buildings.
- The Ministry of Health (MoH) is responsible for all the equipment and technological systems (including medical, water, energy, safety of electrical installation).
- MoH's priority regarding HF infrastructure is the safety of the electrical installation and equipment, especially adaptation of existing ones, with a focus on tertiary and upper HFs.

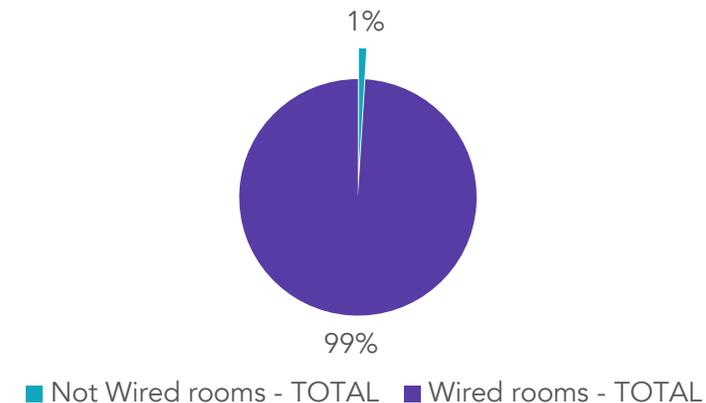
The quality of the healthcare service strongly depends on the status of the infrastructure and its capacity to host medical electrical devices.

Surveys of 10 HFs revealed the following related to building characteristics:

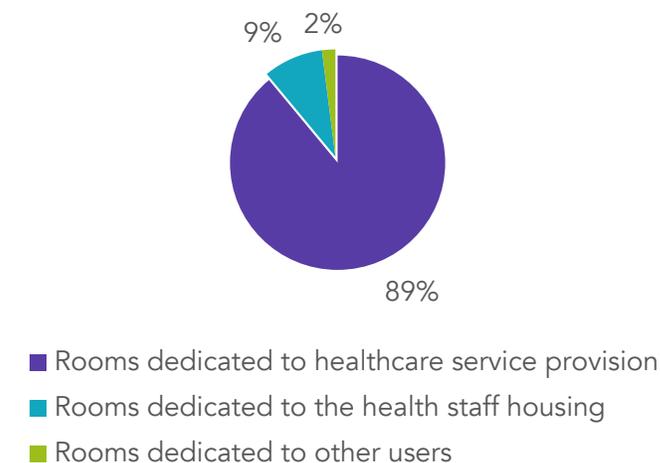
- 100% have iron sheet roofs.
- 90% have walls made of burnt/stabilized bricks with cement, while the remaining 10% have walls made of cement blocks.
- 80% have floors made of cement screed, while the remaining 20% are made of concrete/stone.
- 100% have glass windows.
- 99% of the HFs' rooms are electrically wired.
- 89% of the HFs' rooms are dedicated to healthcare services provision (e.g., staff accommodation).

Sources: field survey targeted Hospitals and Health Centers

ROOM WIRING



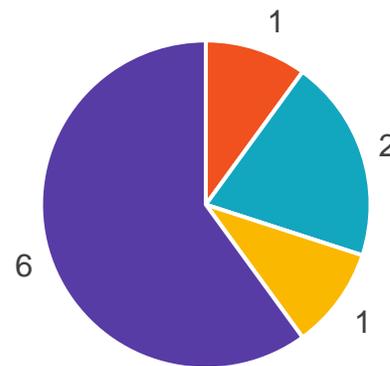
HF'S ROOMS BY USAGE



Site visits identified grid interruptions and sporadic energy-related accidents

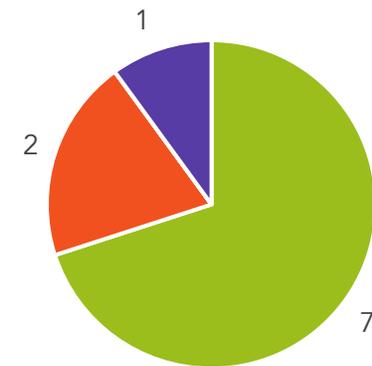
- While carrying out the study, the team visited seven hospitals and three health centres to evaluate the grid quality and safety for people and equipment.
- All of the facilities had experienced interruptions in the month before the visit, and more than half of them experienced at least eight interruptions.
- Most of the facilities reported no electricity-related accidents, while only one reported more than eight accidents in the last month.

INTERRUPTIONS DURING THE LAST MONTH



■ Never
 ■ 1 per month
 ■ 3-4 per month
■ 8 per month
 ■ >8 per month

ACCIDENTS DURING THE LAST MONTH



■ Never
 ■ 1 per month
 ■ 3-4 per month
■ 8 per month
 ■ >8 per month



WASH is essential part of healthcare provision

WASH-related characteristics in the surveyed HFs:

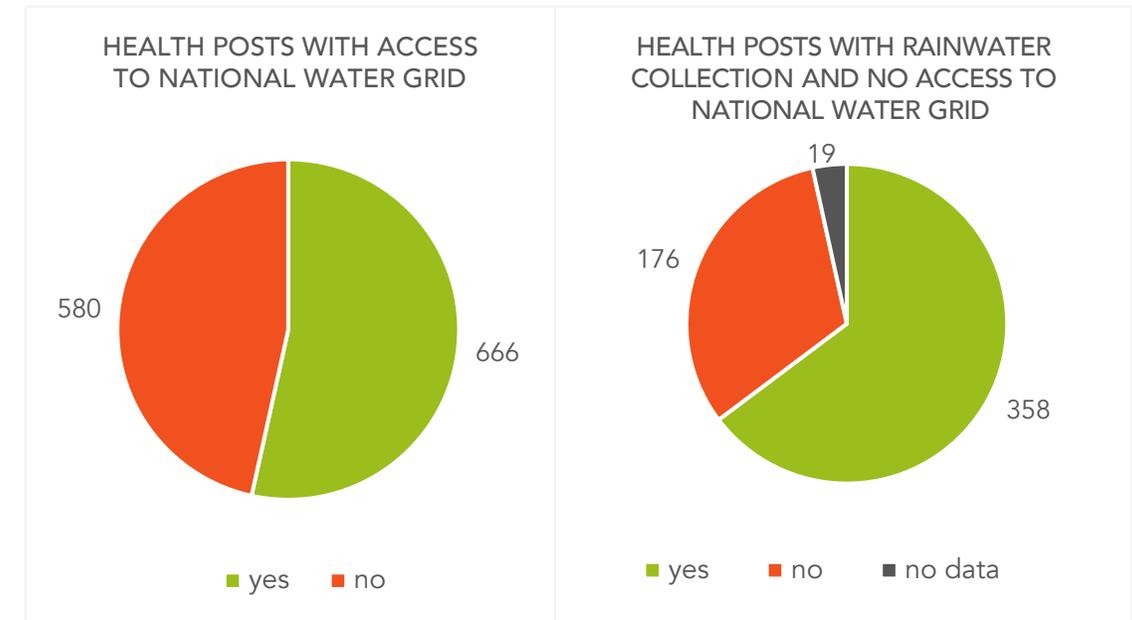
- 50% have water purification systems
- 40% have water pumping systems
- 100% have access to national water grid*
- 50% of the surveyed HFs have covered pit latrines

Water consumption and expenditure:

- Hospital's average daily water consumption is 31,000 litres/day
- Health centres' average daily water consumption is 10,000 litres/day
- 90% pay a monthly fee for the water supply
- Water price is around 320 RWf/m³ ([link](#))

* Data confirmed by field survey and UNICEF data for Rwanda ([link](#))

WATER-RELATED DATA FOR PRIVATE AND PUBLIC HEALTHCARE POSTS AT NATIONAL LEVEL



Sources: field survey; MoH data; [WASAC Tariffs & Charges](#) (last retrieved March 2023)

ICT technologies and telemedicine adoption is key for modern healthcare services

1 Status of telemedicine and ICT adoption

- Only half of stakeholders interviewed are aware of the adoption of telemedicine in Rwanda.
- Two-thirds of stakeholders interviewed are aware of the adoption of ICT services in the Rwandan health sector, however half of them estimate an early stage of ICT services, with their adoption in hospitals only, and the other half estimate a good quality and diffusion of ICT services.
- Stakeholders’ divergency reveals a lack of awareness and information on the matter and an uneven adoption of ICT services.

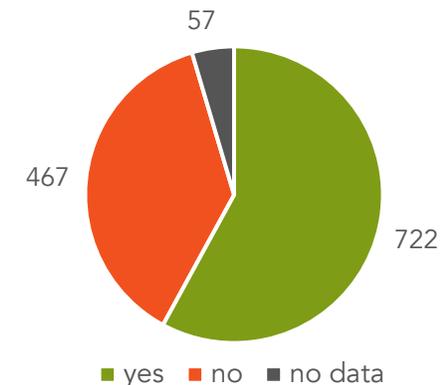
2 How ICT currently serves the health sector



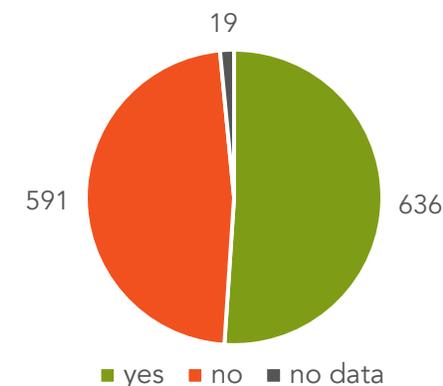
3 Opportunities for ITC to integrate energy and health sectors

- ICT and even blockchain technologies can help to keep track of customers' payments and better coordinate different services.
- ICT can enable remote monitoring of the power components for better O&M of generation but also appliances.
- ICT supports customers to access online services.
- PCs and internet connectivity can enable telemedicine.
- ICT provides impactful data for blended fundraising and advocacy actions.

HEALTH POSTS OWNING COMPUTERS



HEALTH POSTS WITH AN INTERNET CONNECTION



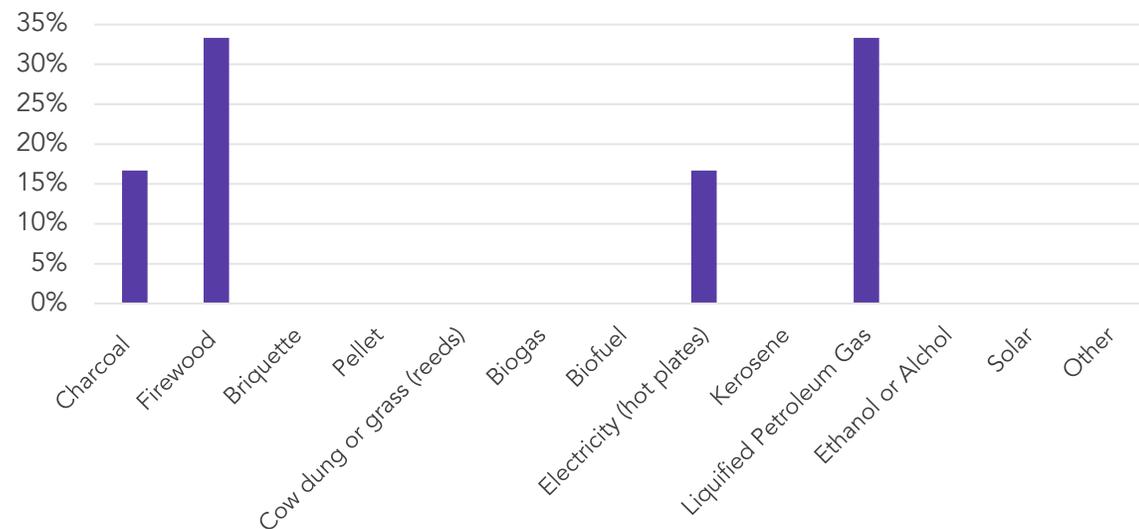
Sources: Stakeholder consultations

Cooking and heating can further drive energy demand in health facilities

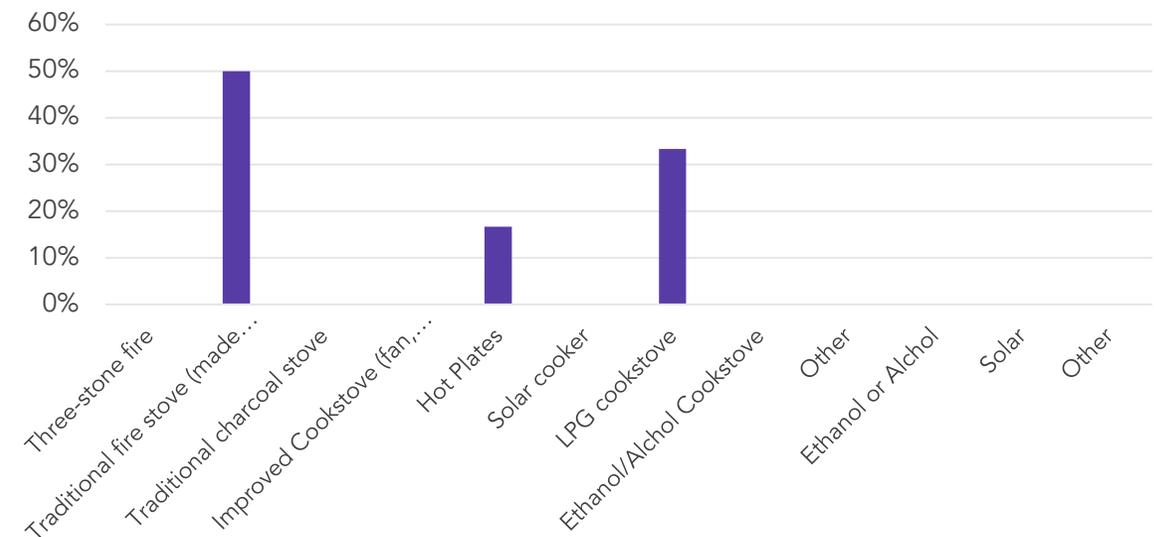
According to the Energy Sector Assistance Management Program (ESMAP), only 2% of the population in Rwanda has access to clean cooking equipment.

Firewood and LPG are the most used fuels in the surveyed HFs, with a preference for firewood in healthcare centres and LPG in hospitals.

Sources of energy for cooking and heating



Equipment used for cooking and heating



Source: [RISE indicators Rwanda](#); Field survey data

Data insights: Findings and recommendations

Different databases exist that should be revised

- The government databases are managed by the MoH and the Rwanda Energy Group (REG).
- There is an opportunity to merge the different repositories between the MOH and REG.
- The external databases should be revised with more up-to-date data.
- Government databases are more granular than external sources.
- Updated data about the HFE sector are not easily accessible and quite fragmented.
- Open-source datasets are not regularly updated and data on HF energy sources are poor.
- Only 17% of stakeholders interviewed said that access to sectoral data was easy, while 33% perceived it to be moderate and 33% difficult or very difficult. No language barrier was reported by the majority.

Data can be streamlined and enriched

- Facility types are not always aligned in terms of nomenclature; some facilities may have more than one name, thus creating confusion.
- There are available and updated data on HF operation status but without details on services provided.
- Facility ownership data are available and updated.
- Data on connection to the national grid are available and updated.
- Data on source of electricity for off-grid HFs are partial or not updated.
- There are no available data on backup systems.

Powering WASH is an opportunity

- Provision of clean water is vital for the delivery of healthcare services.
- Availability of power would enable electrical water pumping and purification.
- Lack of water-related data should be addressed to sustain specific water projects as part of an integrated water-energy approach.

Data insights: Findings and recommendations (cont'd)

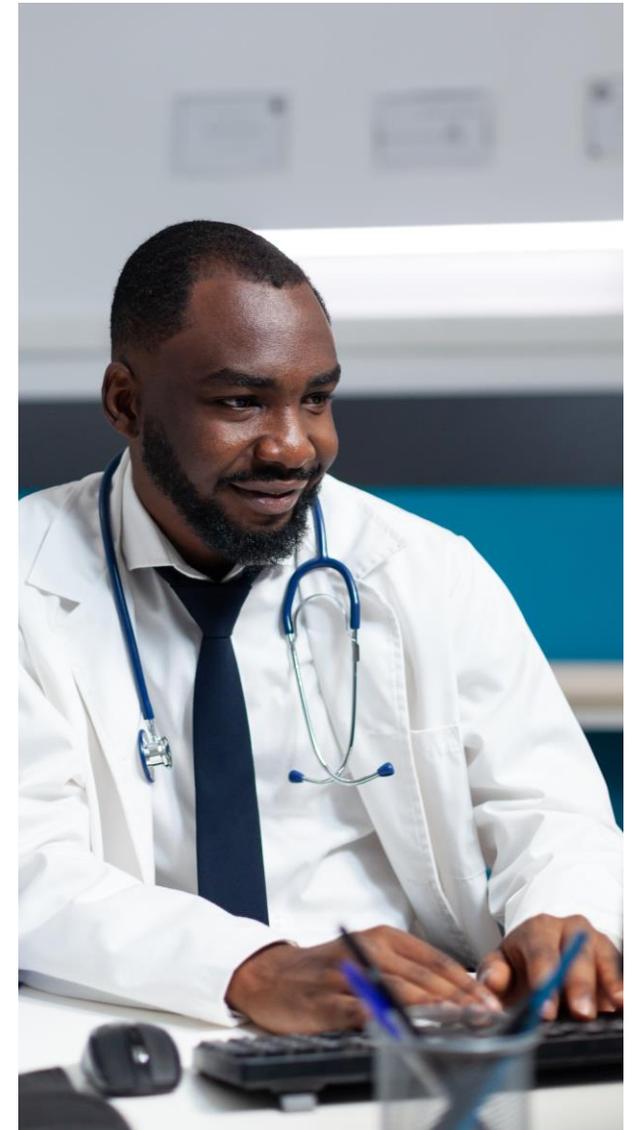
ICT and telemedicine implementation require an appropriate enabling environment

Need:

- Even if the government is promoting ICT services and telemedicine, there is still a lack of awareness among stakeholders and uneven adoption in the healthcare sector.
- Adopting simple, user-friendly and cost-effective ICT solutions able to better support both patients and healthcare personnel is recommended.
- Provision of adequate ICT infrastructure is critical for adoption and diffusion of both HFE projects (e.g., planning and monitoring) and IT healthcare services (e.g., data and service management).
- Provision of adequate ICT infrastructure enhances patients' confidence in the system.
- Responsible institutions/agencies should undertake actions to better support HFs and patients to access information, with a focus on improving data sharing from primary HFs to central institutions/agencies.
- Donors should promote and support gathering of impactful data for blended fundraising and advocacy actions.

Enabling environment:

- Addressing the need for HF personnel training on ICT and telemedicine technology is recommended.
- Institutional regular training courses can potentially enhance knowledge and skills of HF operators (clinicians, technicians, managers, administrators) by increasing work efficiency and effective utilization of ICT technologies, to be adopted in O&M energy systems as well.
- A comprehensive legal and regulatory e-policy framework that regulates the adoption and implementation of telemedicine should be pursued. It should adequately address issues of security, confidentiality and privacy that slow down its adoption.



Generation and Consumption Technology



800 Wp / 1.7 kWh

PV power solution and useful storage capacity required to power off-grid healthcare posts



2.1 kWh

Useful storage capacity required to provide back-up power to grid-connected healthcare posts



7.7 kWh

Useful storage capacity required to provide back-up power to grid-connected healthcare centres



~\$8.1 / Wp

CapEx cost to deploy power solutions to healthcare posts, including rewiring

Current energy demand and expenditure of healthcare facilities

	HOSPITALS	HEALTHCARE CENTRES	HEALTHCARE POSTS
ELECTRICITY CONSUMPTION*			
Daily	825 kWh	5.2 kWh	2.1 kWh
Monthly	24,750 kWh	157 kWh	63 kWh
ELECTRICITY EXPENDITURE**			
electricity bill (monthly)	4,534,244 RWF (\$4,172)	18,953 RWF (\$17.4)	0
fuel-based backup (monthly)	166,005 RWF (\$153)	26,183 RWF (\$24.1)	29,692 RWF (\$27.3)
Total (monthly)	4,700,249 RWF (\$4,324)	45,137 RWF (\$41.5)	29,692 RWF (\$27.3)

* Data on the daily demand of the hospitals and health centres were gathered during the site surveys; electricity expenditure considers an electricity tariff equal to 186 RWF/kWh and diesel average price of 1591 RWF/litre.

** The exchange rate used is \$0.00092/RWF (as per February 2023)

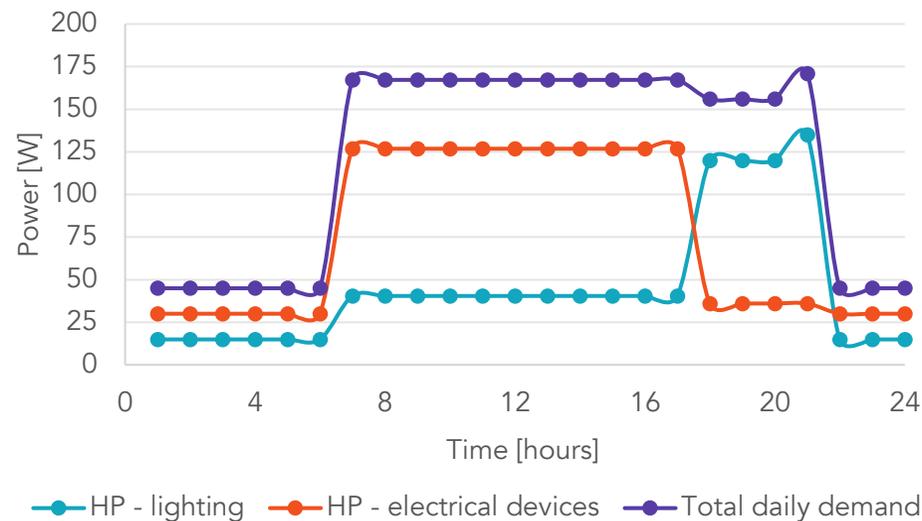




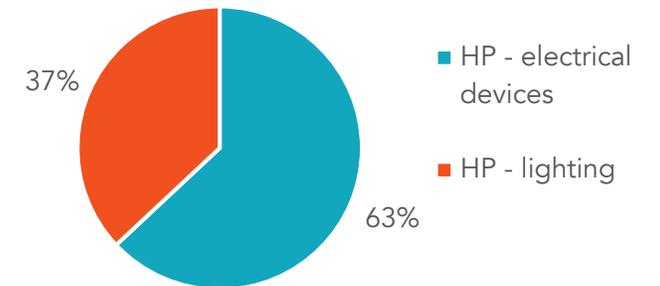
Effective demand and ideal load profile for healthcare posts

- Current daily energy demand observed is 2.1 kWh.
- The effective daily demand, considering current levels of suppressed demand, is estimated at 2.9 kWh.
- More than a third of electricity demand is attributed to lighting.
- Healthcare staff accept patients from 7am to approximately 5pm. After that, the load is attributed to night lights and phone chargers.
- There is no seasonality observed in the daily load. Although changes in disease frequency across a typical year are observed, each disease represents a peak in a different period, resulting in an overall balancing of healthcare delivery services and related energy needs.

DAILY LOAD PROFILE DISAGGREGATED BY LOAD TYPE



SHARE OF LIGHTING AND OTHER ELECTRICAL DEVICES

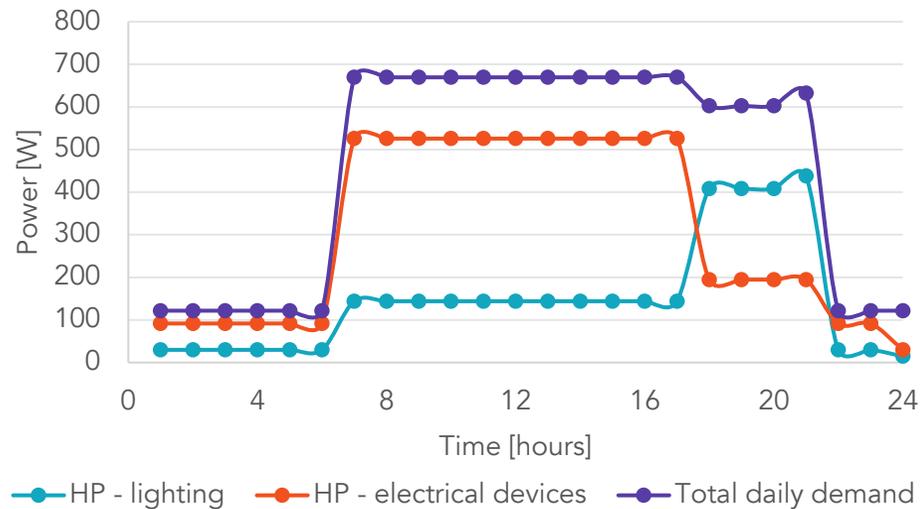


Source: field surveys

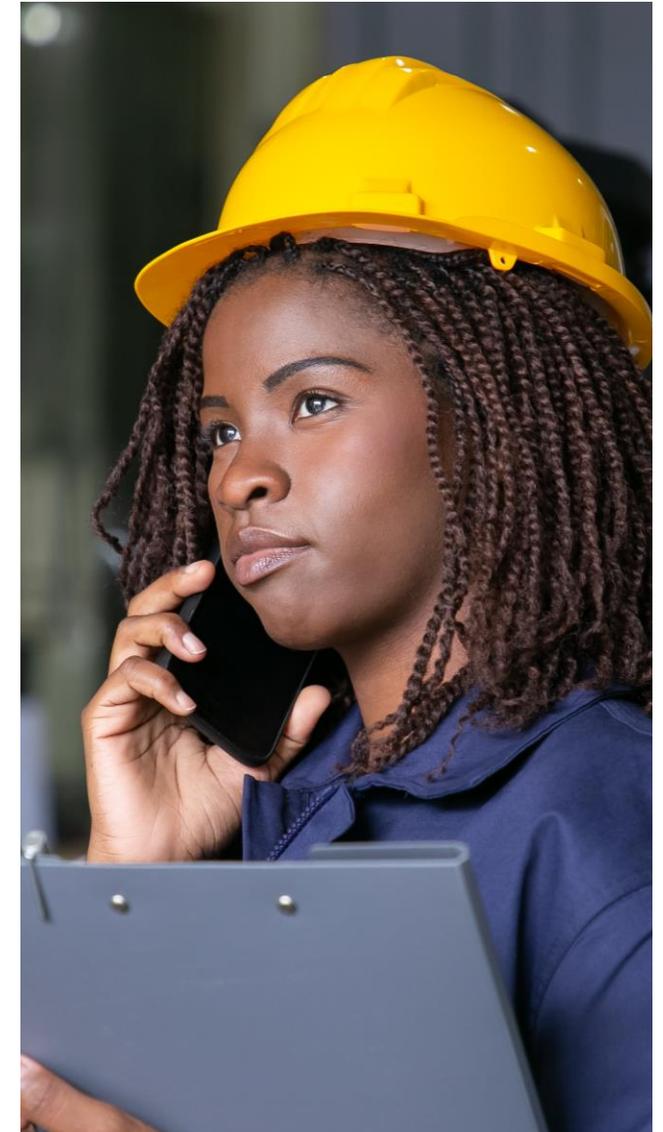
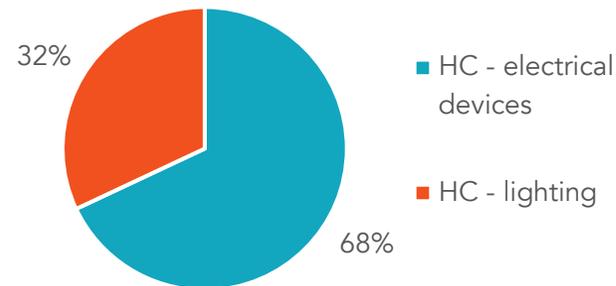
Effective demand and ideal load profile for healthcare centres

- Current daily energy demand observed is 5.2 kWh.
- The effective daily demand, considering current levels of suppressed demand, is estimated at 10.9 kWh.
- Less than a third of electricity demand is attributed to lighting, which can be observed in the load profile, where load during the daytime is higher than the night peak at 9pm.
- There is no seasonality observed in the daily load. Although changes in disease frequency across a typical year are observed, each disease represents a peak in a different period, resulting in an overall balancing of healthcare delivery services and related energy needs.

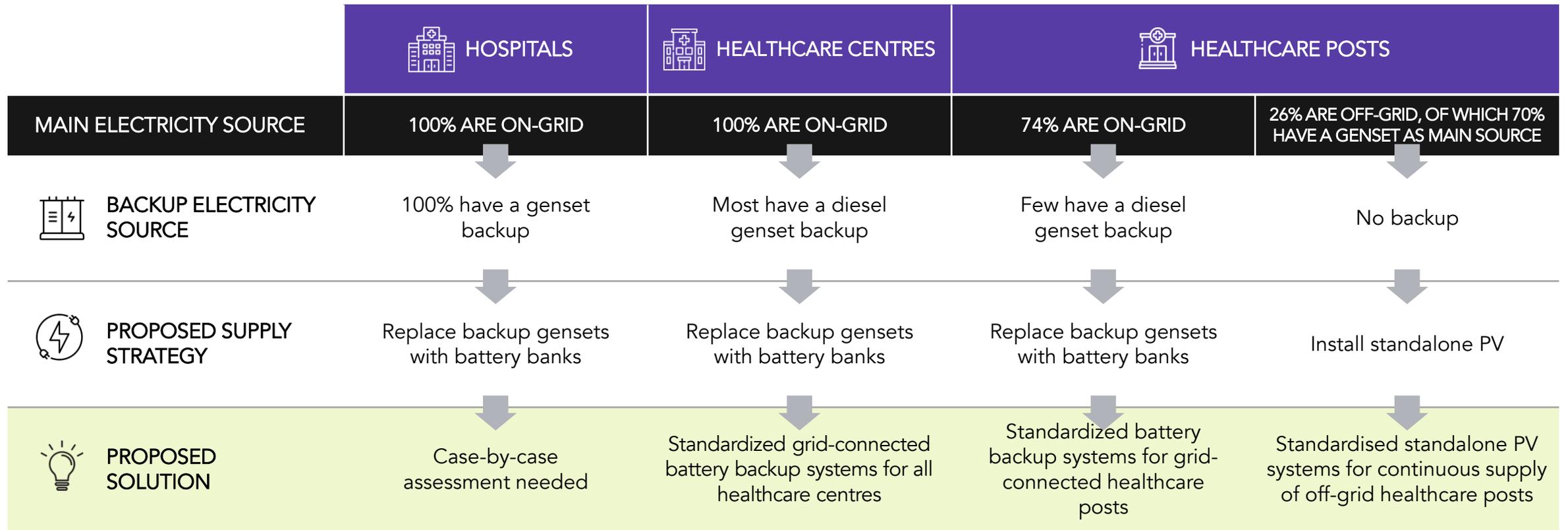
DAILY LOAD PROFILE DISAGGREGATED BY LOAD TYPE



SHARE OF LIGHTING AND OTHER ELECTRICAL DEVICES



Proposed solutions and costs are designed according to their current energy sources



Off-grid health posts require a 800Wp stand-alone power solutions

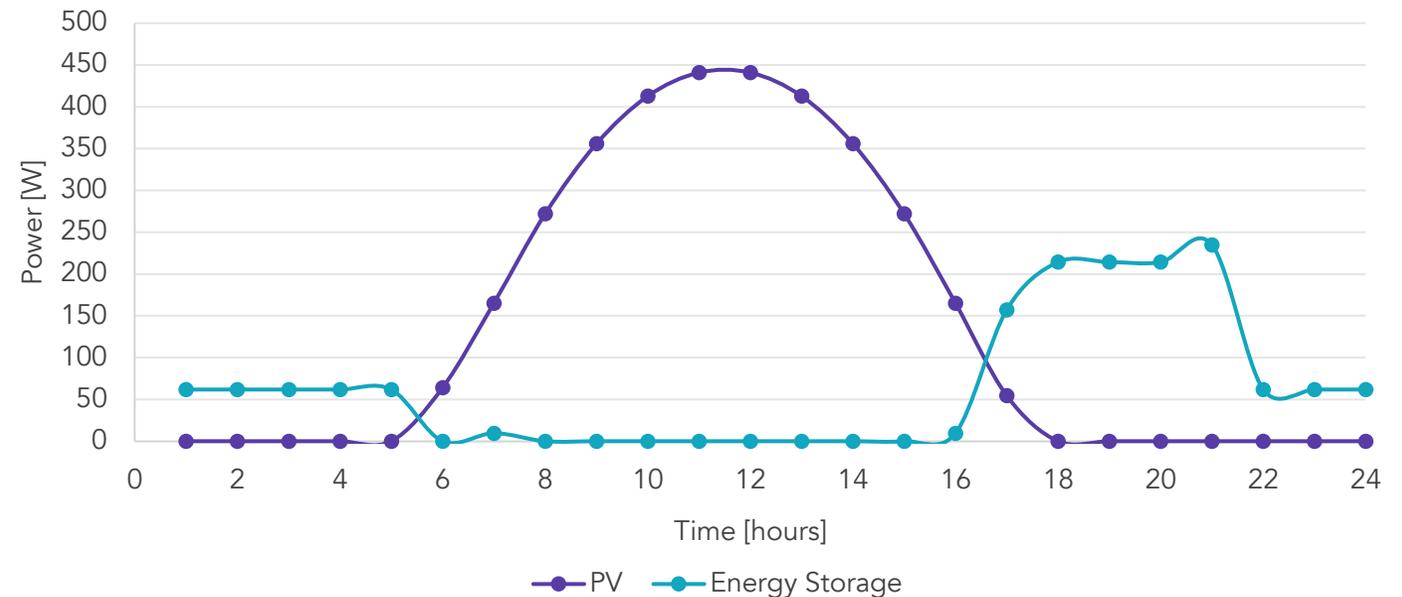
Sizing assumptions:

- 24/7 electricity supply
- 100% energy from renewable sources
- Sizing autonomy of 12 hours
- Sizing based on ideal energy demand
- Battery technology: lithium battery
- Daily depth of discharge: 70%
- Grid (wiring) losses: 3%
- Water pumping system not included in this design but recommended in a water-energy integrated project

PERFORMANCE INDICATOR	ANNUAL OUTPUT
Solar-PV generation	1,245 kWh
Battery conversion losses	139 kWh
Grid losses	32 kWh
Net electricity generation	1,075 kWh
PV share in energy mix	100%
Diesel share in energy mix	0%

COMPONENT	INSTALLED CAPACITY
PV array	0,8 kWp
Diesel generation	0
Energy storage (lithium)	2,4 kWh

ENERGY GENERATION AND BATTERY DISCHARGE PROFILE

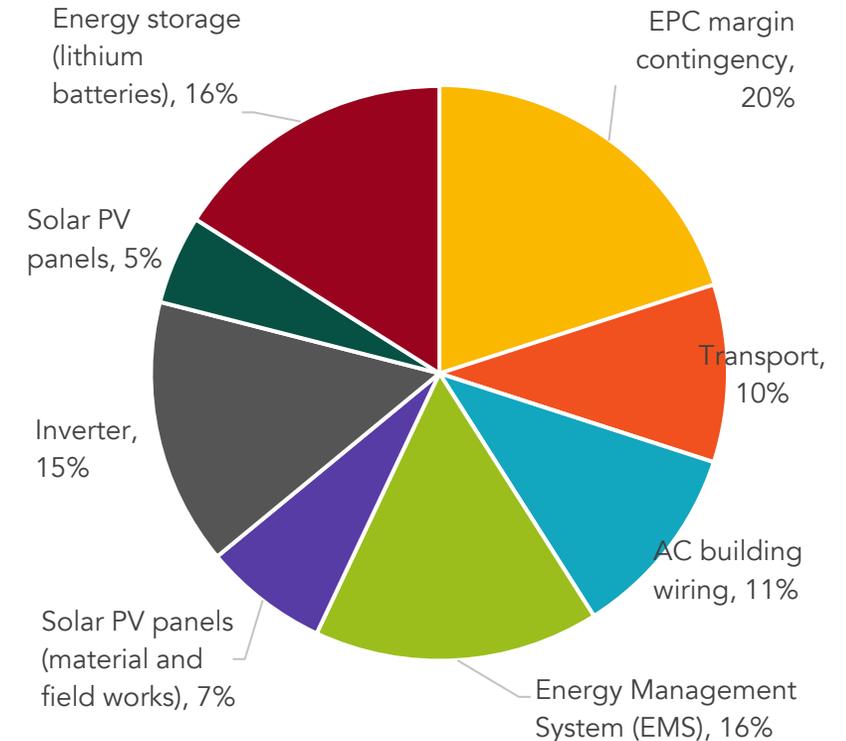


Off-grid standalone for healthcare facilities would cost \$8,1/Wp

ITEM	UNIT	QUANTITY	UNIT COST (\$)	TOTAL COST (\$)
CAPEX				
Energy Storage (lithium batteries)	\$/kWh	2.4	421	1,012
Solar-PV panels	\$/kWp	0.8	369	295
Inverter	per unit	1	1,001	1,001
Solar-PV panels installation (material and field works)	\$/kWp	0.8	556	445
Energy Management Systems (EMS)	Per unit	1	1,054	1,054
AC building wiring	fortfait	1	723	723
Transport	per system	0.1	6,322	632
EPC margin and contingency	%	25		1,290
Total				\$6,451 \$8,1/Wp
OPEX				
Annual total	% of CAPEX	5	323	323

Assumptions:

- Tax exemption for RE projects taken into account
- Including building wiring
- Excluding soft costs (e.g project development and management, insurance, financing costs, etc.)
- Soft costs should fall in the range of 10-15% of CAPEX, depending on the project scale, the developer's nature and project's complementary activities.
- OPEX excludes lithium battery replacement foreseen between year 7 and 11 of operation.



Proposed solutions and costs for healthcare centres and healthcare posts

	HEALTHCARE CENTRES		HEALTHCARE POSTS	
	GRID-CONNECTED	GRID-CONNECTED	GRID-CONNECTED	OFF-GRID
PROPOSED SOLUTION	11 kWh lithium-ion batteries	3 kWh lithium-ion batteries	800 Wp solar-PV + 2.4 kWh lithium battery	
CAPEX REQUIRED	\$9,483	\$3,885	\$6,451	



Technology: Findings and recommendations

Off-grid PV and backup solutions can provide continuous power

- While the grid is expanding in Rwanda, there are some healthcare posts that would be better served with off-grid PV technologies. Those could be deployed rapidly to meet the country's targets by 2024, while leveraging private sector investments.
- Grid-connected HFs will always need some form of back-up solution, in order to supply the facility during blackouts while work take place to expand and enhance the grid, or to serve as UPS systems once the grid quality is stabilized.
- Renewable energy components are tax exempted, while medical equipment is not. This hampers the adoption of energy-efficiency equipment, which would drive the energy demand and, consequently, the implementation on HFE.

Budget has to made available to invest in such solutions

- Stakeholders are not aligned in prioritizing investments in energy-efficient medical appliances with respect to other actions in the healthcare sector.
- Stakeholders are aligned in prioritizing investments in energy supply systems with respect to other actions in the healthcare sector.
- Stakeholders interviewed perceive a high cost of electricity, and the national electricity supply does not guarantee a continuous service. Diesel back-up units are not perceived as an affordable solution to cover such an interruptions.
- HFs experience limited budget for: (i) paying all salaries, (ii) purchasing medicines, and (iii) purchasing medical and other electrical equipment, including energy-related equipment.

Technology: Findings and recommendations (cont'd)

Actions and commitments are needed in various segments

- **Supply technology:** Replacing fuel-based gensets with standalone PV and/or storage can guarantee a continuous electricity supply for the HFs without depending on fuel availability or emitting greenhouse gases. They can improve the operations of the HFs in a sustainable manner.
- **Tax exemptions:** Competent bodies (the Rwanda Revenue Authority and the Ministry of Finance and Economic Planning (MINECOFIN)) should consider extending tax exemption status to medical equipment, even pursuing a new amendment to the East Africa Customer Management Act.
- **Energy-efficient medical appliances:** In order to proliferate energy-efficient medical appliances in HFs, promoting awareness and investments are necessary on:
 - energy access with long-term sustainability as a prerequisite for investing in energy efficiency
 - saving in energy expenditure by using energy-efficient appliances
 - medical appliance standardization and maintenance
- energy-efficient medical appliances at the PHC service delivery level
- the direct impact of energy access on healthcare quality
- **Cost of back-up systems:** adequate maintenance of back-up systems should be assured; adequate budget and resources for O&M of energy systems and electrical equipment should be planned by the MoH.
- **Risk assessment:** Decision-makers and financing entities should bear in mind the questions of private players: “What priority do on-grid and off-grid HFs, separately, assign to a reliable energy supply? Even if the current ability to pay (ATP) is aligned with estimated expenses for electricity, what if the HF budget is reduced or a clinical emergency occurs?” That exposes HFE projects to a high offtaker risk that should be de-risked by the government or financing entities to boost private sector engagement (PSE).

CHAPTER 2.5

Funding and Financing

Source: Ministry of Health. Health Resource Tracking Output report 2022; Ministry of Health. Fourth health sector strategic plan July 2018 – June 2023; UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023



6.7%

Fraction of healthcare expenditure over GDP



4.5%

Household out-of-pocket (OOP) expenditure as a fraction of total healthcare spending



Allocated funds (2023)

\$8,464 per public healthcare post
\$231,879 per public healthcare centre
\$1,331,756 per public hospital



15.3%

Share of national budget dedicated to healthcare



\$41 (2023)

Per capita government expenditure on healthcare



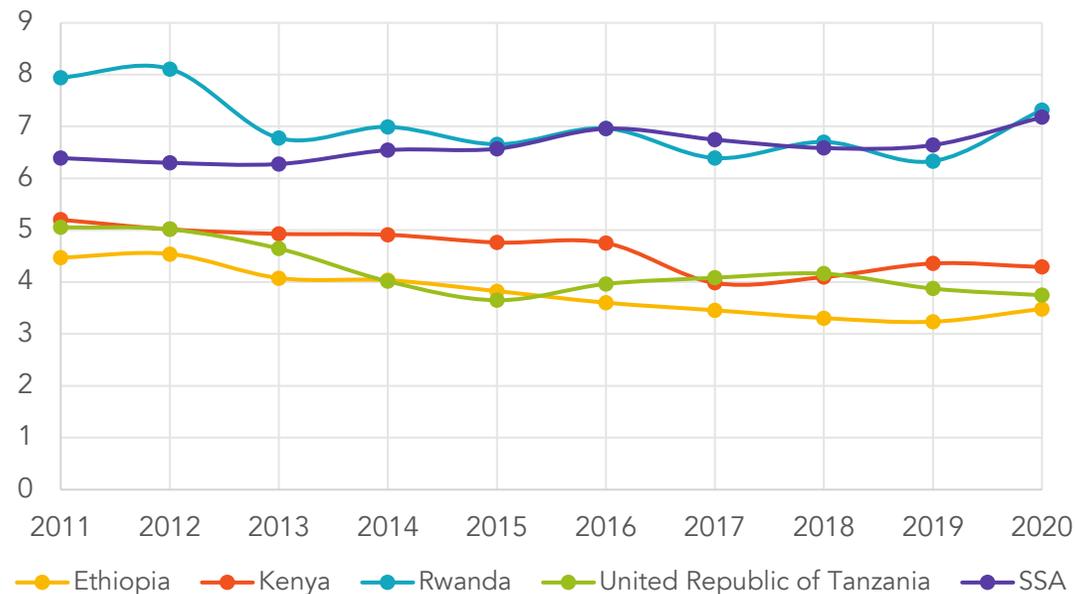
51%

Share of healthcare budget coming from Government of Rwanda

Annual government expenditure and budget for healthcare among the highest in SSA

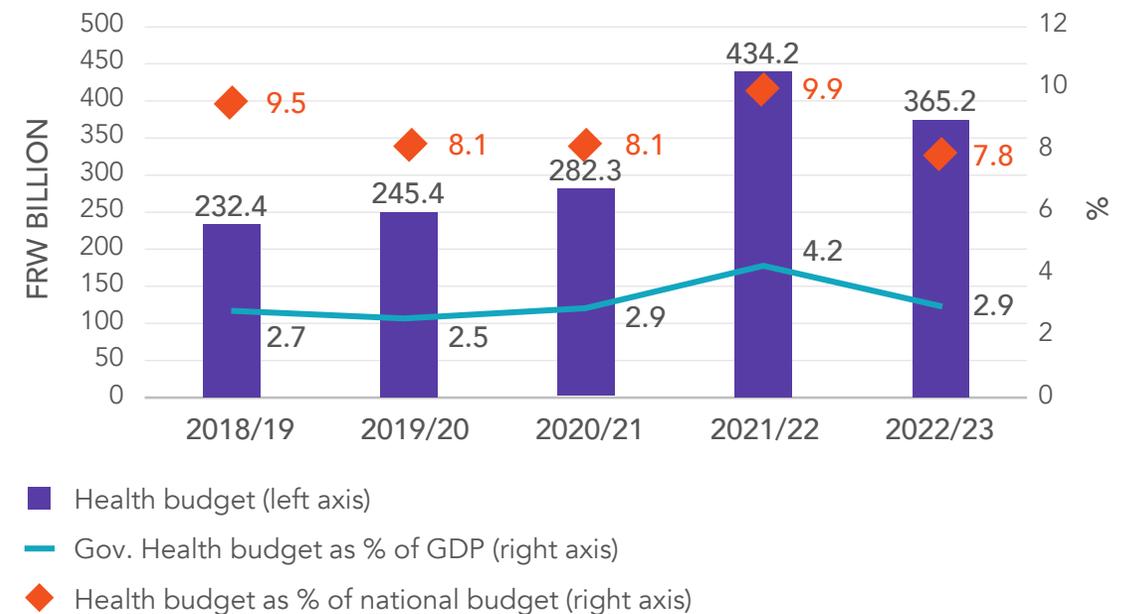
Rwanda's governmental expenditure on healthcare as a share of its overall expenditure is above the average spending of countries in Sub-Saharan Africa.

DOMESTIC GENERAL GOVERNMENT HEALTHCARE EXPENDITURE AS % OF GENERAL GOVERNMENT EXPENDITURE



The government's budget decreased from 2021 to 2022 by about 16%, mainly due to significant investments for COVID-19 vaccines.

HEALTHCARE BUDGET IN RWF BILLION AND AS A SHARE OF TOTAL BUDGET & GDP

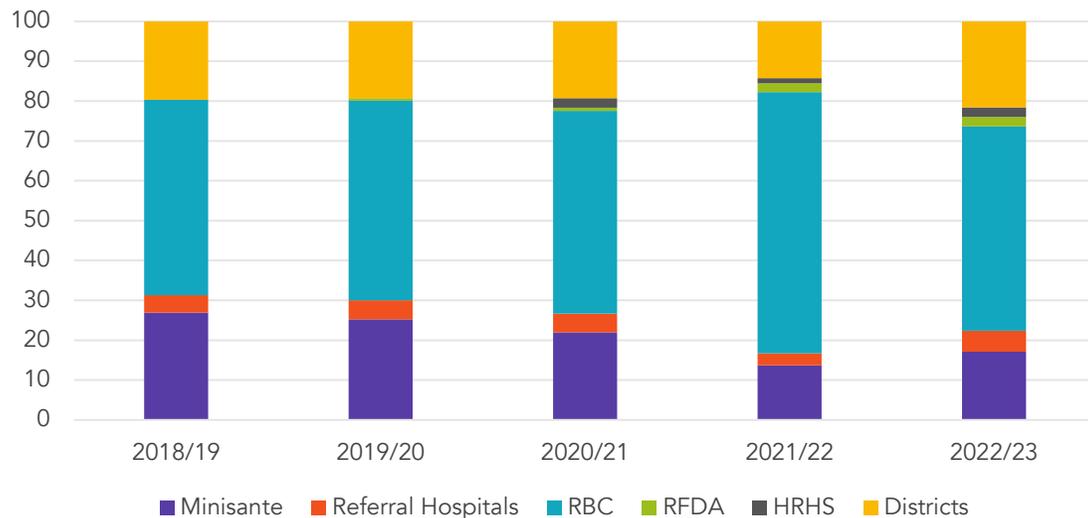


Sources: WHO indicators; UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023

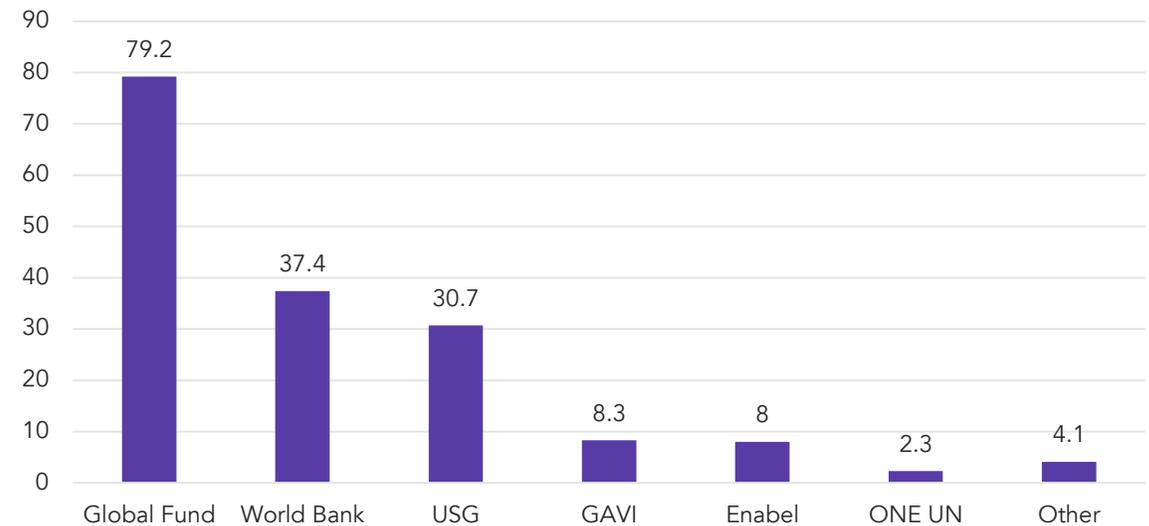
Healthcare is funded by different domestic and external sources

- Since 2018, the main agency supporting Rwanda's healthcare budget with more than 50% has been the Rwanda Biomedical Centre (RBC), followed by the districts' budget and the Human Resources for Health Secretariat (HRHS) of the MoH.
- The Global Fund, World Bank, US Government through PEPFAR, Enabel, GAVI Alliance and ONE UN are the main partners financing the health sector in Rwanda through the national budget. For 2022/2023 in total they have committed RWf 170 billion (\$ 155 million).

DOMESTIC HEALTH SECTOR BUDGET
Share of health budget by spending agencies (%)



EXTERNAL HEALTH SECTOR BUDGET
Main partners supporting the health budget by funding size in 2022/23 (in RWf billion)



Sources: [UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023.](#)

Public-private partnerships provide an opportunity for health facility electrification

- Opportunities in PPPs should be explored leveraging existing PPPs in the healthcare sector.
- Healthcare sectors have experienced PPPs in:
 - (i) manufacturing settlement for fighting malnutrition
 - (ii) ambulance services
 - (iii) primary HFs (healthcare posts, healthcare centres) operating models
- PPPs are often adopted by private hospitals.
- In the energy sector, PPPs have been adopted in the energy power generation sector, excluding mini-grids with no offtake commitment from the government, and are governed by the simplified licensing procedure from the Rwanda Utilities Regulatory Authority (RURA).
- No PPP at scale has been recorded in the country to date.
- The UNDP project “A Thousand Health Posts in the Land of a Thousand Hills” has been designed around an innovative PPP applied to a healthcare posts operating model.

Sources: Stakeholders’ consultation; GoR, 2018. *Public Private Partnerships Guidelines*; Joint SDG Fund. *A Thousand Health Posts in the Land of a Thousand Hills: Promoting Universal Health Coverage by Catalyzing Investments in Financially and Environmentally Sustainable Primary Health Care*



Various healthcare sector financing strategies can be explored

RWANDA HEALTHCARE FINANCING STRATEGIES FOR ACHIEVING UNIVERSAL FINANCIAL ACCESS

EFFICIENCY – VALUE FOR MONEY	INCREASE OF DOMESTIC RESOURCES	RISK POOLING – HEALTH INSURANCE
<ul style="list-style-type: none"> • PBF • Decentralization • Performance contract system (imihigo) 	<ul style="list-style-type: none"> • Community health cooperatives, performance-based financing • Public, private and community partnerships • Self-sustaining health facilities 	<ul style="list-style-type: none"> • Community-based health insurance (CBHI) • Social health insurance • Voluntary health insurance

Performance contract system (IMIHIHO)

Traditionally, *Imihigo* was a cultural practice where an individual would set targets or goals to be achieved within a specific period of time. The terminology is currently used to refer to a performance-based management tool, which is able to strengthen strategic planning, manage and improve service delivery in the local government system.

In a more practical way, any institution is required to sign a performance contract yearly with its supervising body outlining the key results and targets it will be expected to achieve over the year.

ARCHITECTURE OF RWANDA HEALTH FINANCING



Source: WHO, 2017. [Primary health care systems \(PRIMASYS\): comprehensive case study from Rwanda](#); AfDB, 2012. [Performance contracts and social service delivery – Lessons from Rwanda](#)



There are numerous private players in the HFE sector

Major investing opportunities in the HFE sector are related to:

- Standalone solar systems for households and other users like healthcare facilities
- Mini-grids using different sources of energy such as solar, hydropower, and biomass

Key energy private sector actors involved in renewable energy, including HFE:

- KivuWatt
- Hakan
- Symbion Power
- Gigawatt Global
- Mobisol
- Rwanda Mountain
- Ngali Energy
- Ignite Power
- Bboxx Capital
- Equatorial Power
- OffGridBox
- MeshPower
- Differ Group
- ECOS
- Empower New Energy
- East African Power
- Neseltec
- ARC Power
- RENERG
- Absolute Energy

Source: Stakeholder consultations

Investment ticket size for off-grid PV for HP is \$1.5 million



\$1.5 million

Investment ticket size of standalone PV for off-grid HP

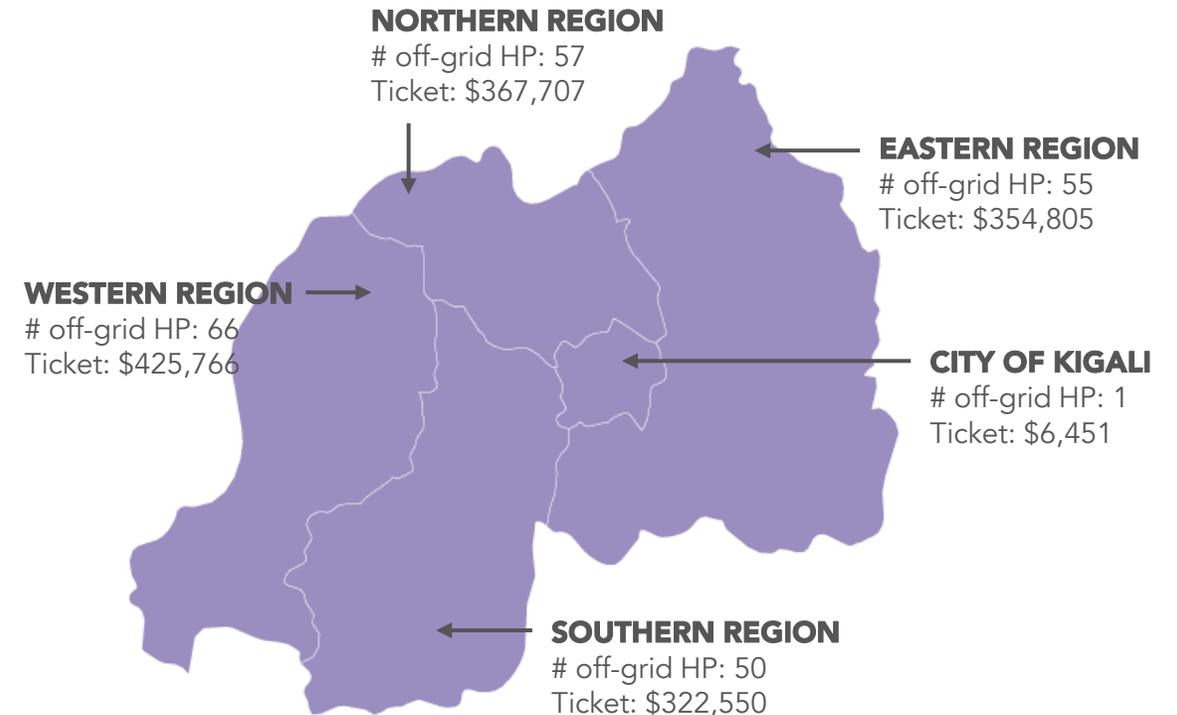
OFF-GRID HP DISTRIBUTION		EXISTING MINI-GRIDS	EXISTING STANDALONE SYSTEMS	HFE POTENTIAL
West	85	3	16	66
South	72	2	20	50
East	89	6	28	55
North	78	0	21	57
City of Kigali	2	0	1	1
TOTAL	326	11	86	229

Notes:

- Data include public and private HPs
- Out of the 11 existing mini-grids, 7 are operational as per EDCL

Assumptions:

- Each existing mini-grids electrifies an off-grid HP, for a total of 11 HPs
- Ticket size includes all EPC contract costs; it does not include soft costs (e.g., project development and management, financing and legal costs, complementary activities such as capacity building, etc.)



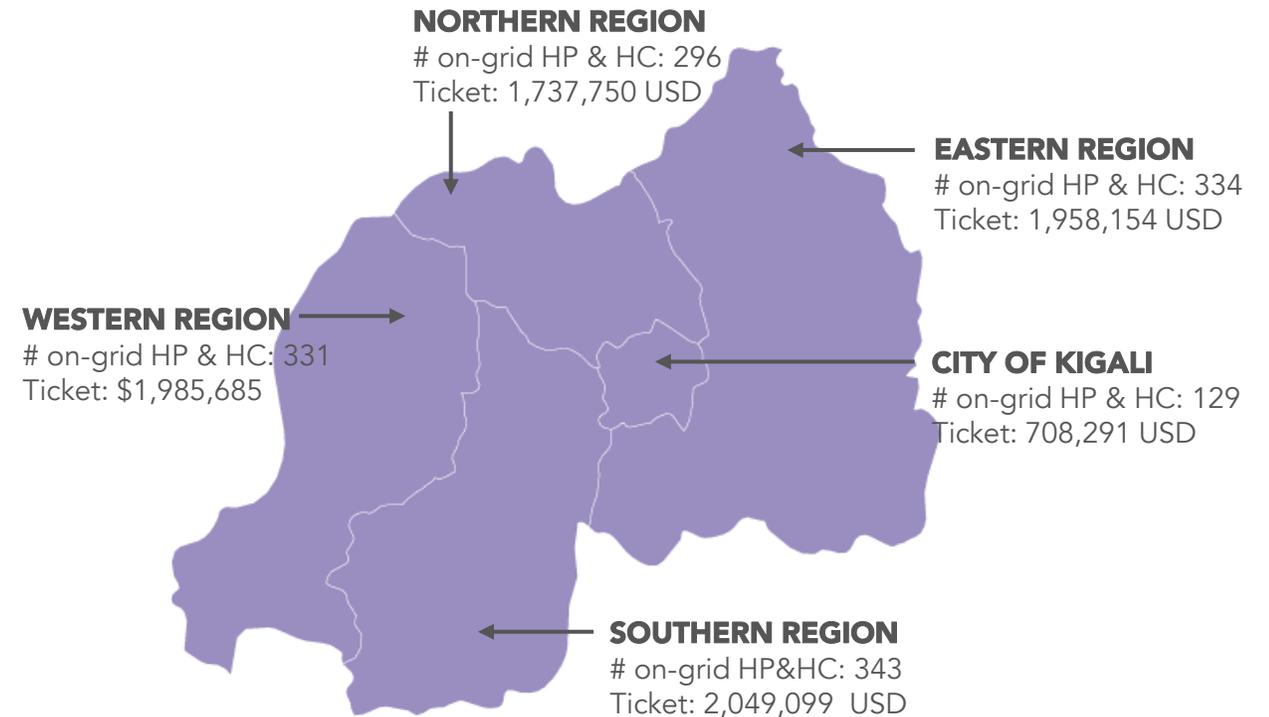
Investment ticket size for grid-connected back-up power for HC & HP is \$8.5 million



\$8.5 million

Investment ticket size of battery backup for grid-connected HC & HP

	ON-GRID HP	HP TICKET SIZE (\$)	ON-GRID HC	HC TICKET SIZE (\$)
West	206	800,310	125	1,185,375
South	215	835,275	128	1,213,824
East	216	839,160	118	1,118,994
North	191	742,035	105	995,715
City of Kigali	92	357,420	37	350,871
TOTAL	920	3,578,085	513	4,874,262



Funding and financing: Findings and recommendations

Off-grid power funding and access to finance can be further enhanced

- International donors have been funding off-grid pilot projects but nothing at a massive scale in Rwanda so far.
- Around 40% of stakeholders interviewed believe that existing financing mechanisms are not adequate to sustain HFE and ask for new and innovative options. Another 40% is not fully aware of available options, thus revealing a lack of clear and coordinated information.
- It is estimated that the government's financial capability allows for 8% increase/year of people with access to electricity by means of the national grid. To date, the REG plan is to connect 70% of people by grid extension and 30% by off-grid solutions.
- At the moment, the gap between the cost of services and income is a private risk for off-grid actors, including offtaker risk for connecting HFs.
- It is not easy for local companies to access finance.
- Healthcare budget changes in recent years were not aligned with GDP growth rate. This implies a possibility for the government to increase the healthcare budget through a growth-enhanced fiscal space.

Source: [CIF, 2022. Evaluation of the Scaling up Renewable Energy Program in Low-income Countries](#); [UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023](#)



Funding and financing: Findings and recommendations (cont'd)

Scaling-up projects, innovative finance and other mechanisms can attract investments

- Since international donors are willing to reduce the offtaker risk, the scaling-up phase is crucial. Specific funding windows and mechanisms as well as preliminary and enabling actions (e.g., pipelines) and binding agreements should be boosted.
- The limited approach of providing credit lines to private developers is not compatible with the nascent stage and small size of the Rwanda mini-grid market. It is recommended to:
 - explore a proper adoption of the compensation mechanism for off-grid projects, which is not in force so far.
 - focus on blended target/finance (domestic customers, HFs and other social facilities, PUE, etc), since HFs are often left behind in private initiatives due to a lack of compensation mechanisms for the extra costs associated with HF connections.
 - focus on long-term financing programmes.
 - adopt insurance/guarantee mechanisms to reduce the offtaker risk and open new opportunities for local developers who have limited access to local banks' financing for off-grid projects without an external guarantee.
 - support small businesses and HFs by providing de-risking services.
- The government should urgently adopt effective enabling mechanisms (e.g., PPP, compensation, subsidies) to attract private investments and developers in the off-grid sector.
- A potential option for the Rwandan market is to set up a subsidized tariff structure including on-grid and off-grid sectors, which needs a guarantee of recovery of the developer's revenue requirements. A massive fund programme for low-income customers connected by off-grid, mini-grid and standalone systems shall be explored as already successfully tested abroad.
- Developing de-risk mechanisms for lenders to enable affordable loans:
 - strengthened revenue base to enhance repayment capacity.
 - guarantees and grants to cushion credit risk losses, especially for local companies in order to incentivize international partnerships and access to finance.
 - loan must be concessional to be accessible.

Source: CIF, 2022. [Evaluation of the Scaling up Renewable Energy Program in Low-income Countries](#); UNICEF. [Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023](#)

CHAPTER 2.6

Delivery Models



Three delivery models are proposed for Rwanda

The public delivery model (or traditional ownership model): where a public entity provides grant funding and commissions an NGO or private company to design, purchase and install solar PV systems at the HF. The O&M is outsourced as well. The asset is owned by the public institution or agency. This is only applicable to standalone PV systems.

The not-for-profit delivery model: where a not-for-profit entity receives grants to build the power plant and transfers the assets to the public entity. This is only applicable to standalone PV systems.

The private model: where a private entity builds, owns and operates the power plant under a public-private partnership with the MoH. This model can be applied to both standalone systems and mini-grids. This is only applicable to standalone PV systems.

Each one of these three models serves a particular segment of health facilities and has its advantages and drawbacks. To achieve global access by 2024 and exploit all types and sources of funds that can support HF electrification, the GoR could consider combining these three models and study case by case, as per the appetite of the different funders and the country's regulatory framework.



A public delivery model can target all primary level HFs

MARKET SIZE

PRIMARY LEVEL HFs



513 on-grid HCs 920 on-grid HFs
 229 off-grid HFs

PROJECT FINANCING



BUSINESS MODEL DEVELOPMENT

The project developer (PD) is a public entity responsible for managing public tenders for health facility electrification (HFE). The project financing structure relies on domestic budgets coupled with external financing from donors, development banks and impact funds.

The PD primarily agrees with external financing entities a pipeline of off-grid HFs to be electrified in the short/mid-term before the grid arrival, as well as a pipeline of on-grid HFs to be provided with reliable back-up systems in the long-term.

The PD is the contracting authority in public tenders for engineering, procurement and construction (EPC) contractors. Depending on available finance and HFE governance, the PD defines the tender size and lots.

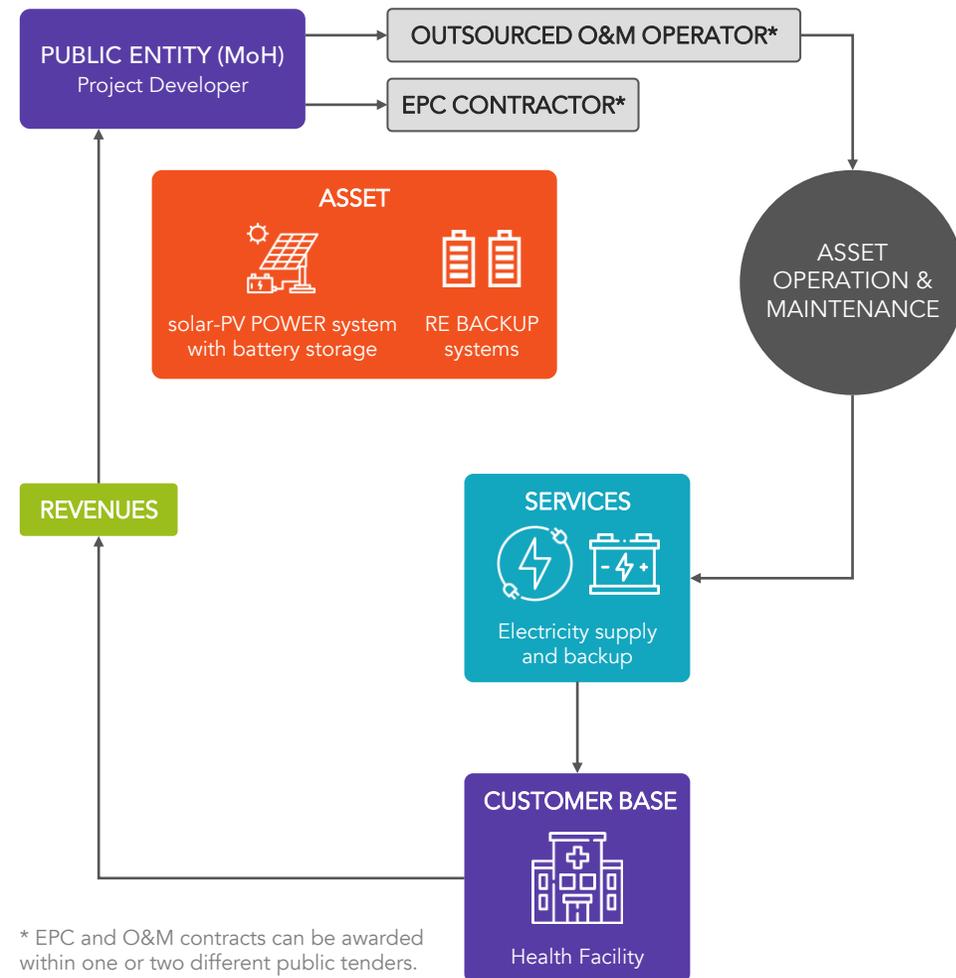
The EPC contractor operates under a standard progress payment structure to commission the energy systems.

BUSINESS MODEL OPERATION

Energy assets (solar-PV power system with battery storage or RE back-up system) are publicly-owned, and under the management of the Ministry of Health (MoH), along with any other HF equipment according to the applicable law.

The PD manages a public tender to outsource the performance-based O&M services of a large HF cluster to a private operator with a short-mid-term contract period before reaching 100% access to electricity at country level. Then, the PD may extend/amend the contract for back-up systems, O&M only, or launch a new tender tailored for back-up systems.

The PD is in charge of supplying electricity to the HF at the same electricity tariff applied to on-grid HFs. These revenues are to sustain the financial sustainability of the O&M activities, which are awarded to the outsourced O&M operator.



Applied examples of a public model

OPERATING MODEL	STAKEHOLDERS	FINANCING SOURCES	ASSET OWNERSHIP	APPLICATION
BOO in outsourcing to private entity	Public institutions, agencies, donors, DFIs, HFs, private actors	Domestic public finance, donors, DFIs, impact funds	Public	n.a.

Technology considerations:

- Large sized solar standalone systems serving Tier 3 energy needs

Preconditions:

- Active NGOs in the healthcare service delivery sector
- Grant/subsidized financing available to support large HF cluster EPC and O&M contracts
- MoH's commitment in handling EPC and O&M service contracts in outsourcing
- Clear definition of off-grid areas

Financing mechanisms:

- Grant
- Subsidized debt
- Public investment delivered through public tenders

Stakeholders' role:

- Public institutions/agencies: project developer and owner
- Donors/DFIs: sponsor and financing entities
- HFs: electricity off-taker
- Private actors: outsourced O&M operator

SWOT for a public model

STRENGTHS	<ul style="list-style-type: none"> • Large HF cluster EPC and O&M contracts can create economies of scale and drive costs down • Competitive offers at scale • Easy extension of O&M short-term contracts • Leverage on institutional capacity to manage EPC and O&M tenders at national or regional level 	<ul style="list-style-type: none"> • OPEX sustainability gap: about \$141/year* 	WEAKNESSES
OPPORTUNITIES	<ul style="list-style-type: none"> • Private Sector Engagement in performance-based O&M • EPC and O&M contracts targeting national or regional areas • Government-driven action in development and operation 	<ul style="list-style-type: none"> • Public management of cashflow for electricity payment 	THREATS

* Assuming

	ELECTRICITY CONSUMPTION (YEARLY)	ELECTRICITY BILL (YEARLY)	OPEX (YEARLY)	OPEX SUSTAINABILITY GAP (YEARLY)
HEALTH POSTS	1,059 kWh	196,974 RWf (\$181)	351,087 RWf (\$323)	154,113 RWf (\$141)

Considering the national HF electricity tariff of 186 RWf/kWh

A not-for-profit delivery model leverages different types of grants

MARKET SIZE

PRIMARY LEVEL HF's



513 on-grid HCs



920 on-grid HPs
229 off-grid HPs

PROJECT FINANCING



NOT-FOR-PROFIT CONTRIBUTIONS



DONORS



FOUNDATIONS

BUSINESS MODEL DEVELOPMENT

The PD is a not-for-profit entity able to operate in rural areas. The backbone of the project financing is a grant co-financed from donors and foundations to strongly support the not-for-profit contribution.

The PD preliminary agrees the target off-grid HF with the public entity (MoH) and signs a Memorandum of Understanding (MoU) for the HF electrification.

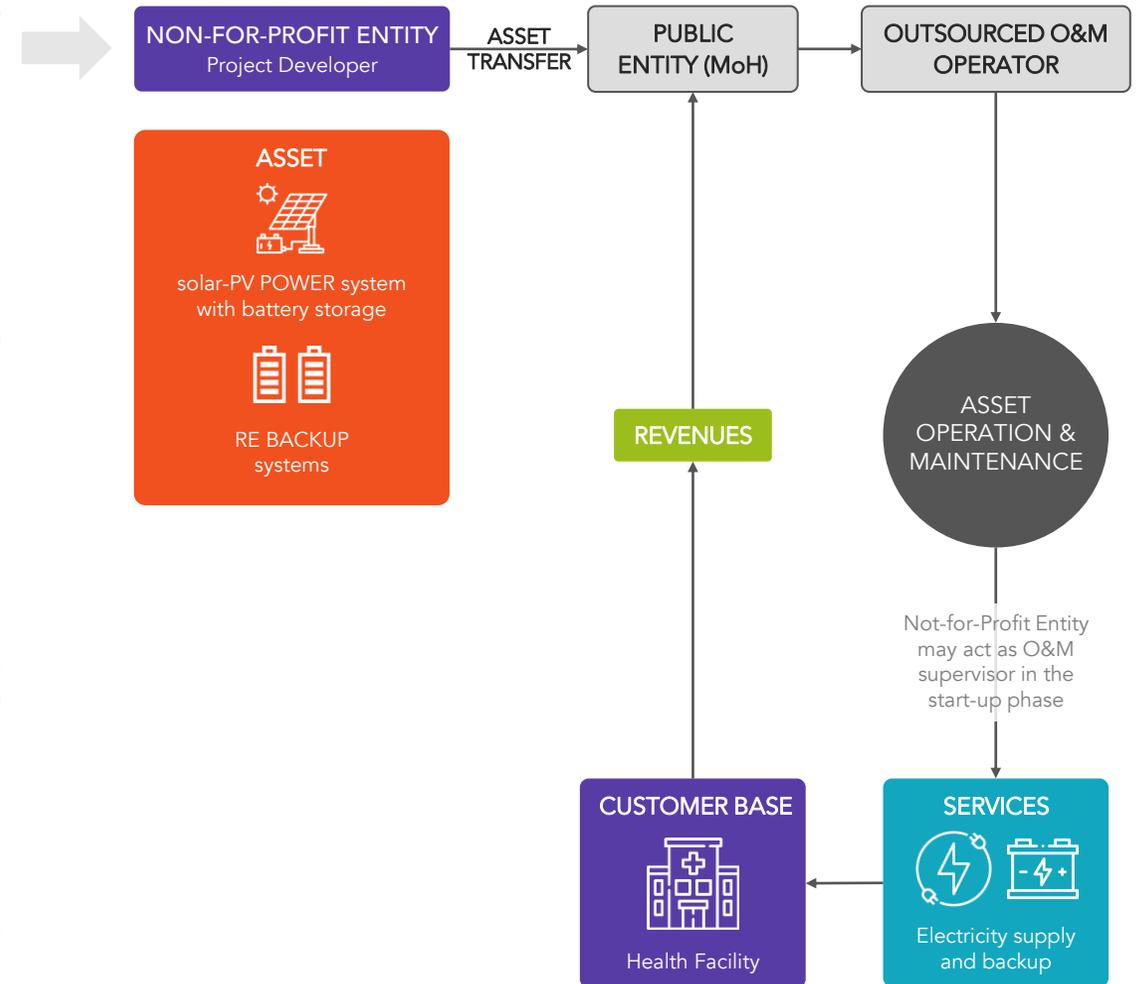
The PD deals with the commissioning of energy systems. Depending on its field of action/expertise, the PD may directly design, procure and construct the energy asset or rely on EPC contractors, under the donor's procurement rules.

BUSINESS MODEL OPERATION

The PD transfers the energy asset (solar-PV power system with battery storage or RE back-up system) once commissioned to the responsible public entity, which is the MoH as for any other HF equipment, in accordance with the applicable law.

As part of the funded project, the PD may act as O&M supervisor during the start-up phase (≤12 months).

Same as in the public delivery model, the public entity is in charge of supplying electricity to the HF at the same electricity tariff applied to on-grid HF's. These revenues are to sustain the financial sustainability of the O&M activities, which are awarded to an outsourced O&M operator by means of a public tender or including the HF by amending an active performance-based O&M contract.



Applied examples of a not-for-profit model

OPERATING MODEL	STAKEHOLDERS	FINANCING SOURCES	ASSET OWNERSHIP	APPLICATION
Build and transfer to public entity	NGOs, donors, public institutions, agencies, HFs, private actors	Not-for-profit co-financing, donors, domestic public finance	Public	n.a.

Technology considerations:

- Large-sized solar stand-alone systems serving Tier 3 energy needs

Preconditions:

- Active NGOs in the healthcare service delivery sector
- Grant financing available
- MoH's commitment in handling O&M service contracts in outsourcing

Financing mechanisms:

- Grant (RBF or outcome/milestone grant)
- Public in-kind contribution

Stakeholders' role:

- NGOs: Project developer and O&M supervisor in the start-up phase
- Donors: sponsor and financing entities
- Public institutions/agencies: public owner
- HFs: electricity off-taker
- Private actors: outsourced O&M operator

SWOT for a non-for-profit model

STRENGTHS	<ul style="list-style-type: none"> • Easy extension of O&M short-term contracts • Leverage on institutional capacity to manage O&M tenders at national or regional level 	<ul style="list-style-type: none"> • Very high grant financing (>70%) • OPEX sustainability gap: about \$141/year* 	WEAKNESSES
OPPORTUNITIES	<ul style="list-style-type: none"> • Private sector engagement in performance-based O&M • O&M can fall into a larger O&M contract targeting national or regional areas • Government-driven action in operation 	<ul style="list-style-type: none"> • Public management of cashflow for electricity payment 	THREATS

* Assuming

	ELECTRICITY CONSUMPTION (YEARLY)	ELECTRICITY BILL (YEARLY)	OPEX (YEARLY)	OPEX SUSTAINABILITY GAP (YEARLY)
HEALTHCARE POST	1,059 kWh	196,974 RWf (\$181)	351,087 RWf (\$323)	154,113 RWf (\$141)

Considering the national HF electricity tariff of 186 RWf/kWh



A private delivery model can be only applied to off-grid HPs

MARKET SIZE

PRIMARY LEVEL HF's



229 off-grid HPs

PROJECT FINANCING



PRIVATE CAPITAL



DONORS



FOUNDATIONS



DEVELOPMENT BANKS, IMPACT FUNDS

BUSINESS MODEL DEVELOPMENT

The PD is a private entity willing to invest and operate in rural areas. The backbone of the project financing is private capital coupled with at least one subsidized source of financing to reach business viability, such as debt or grant from donors, foundations, development banks or development/impact funds.

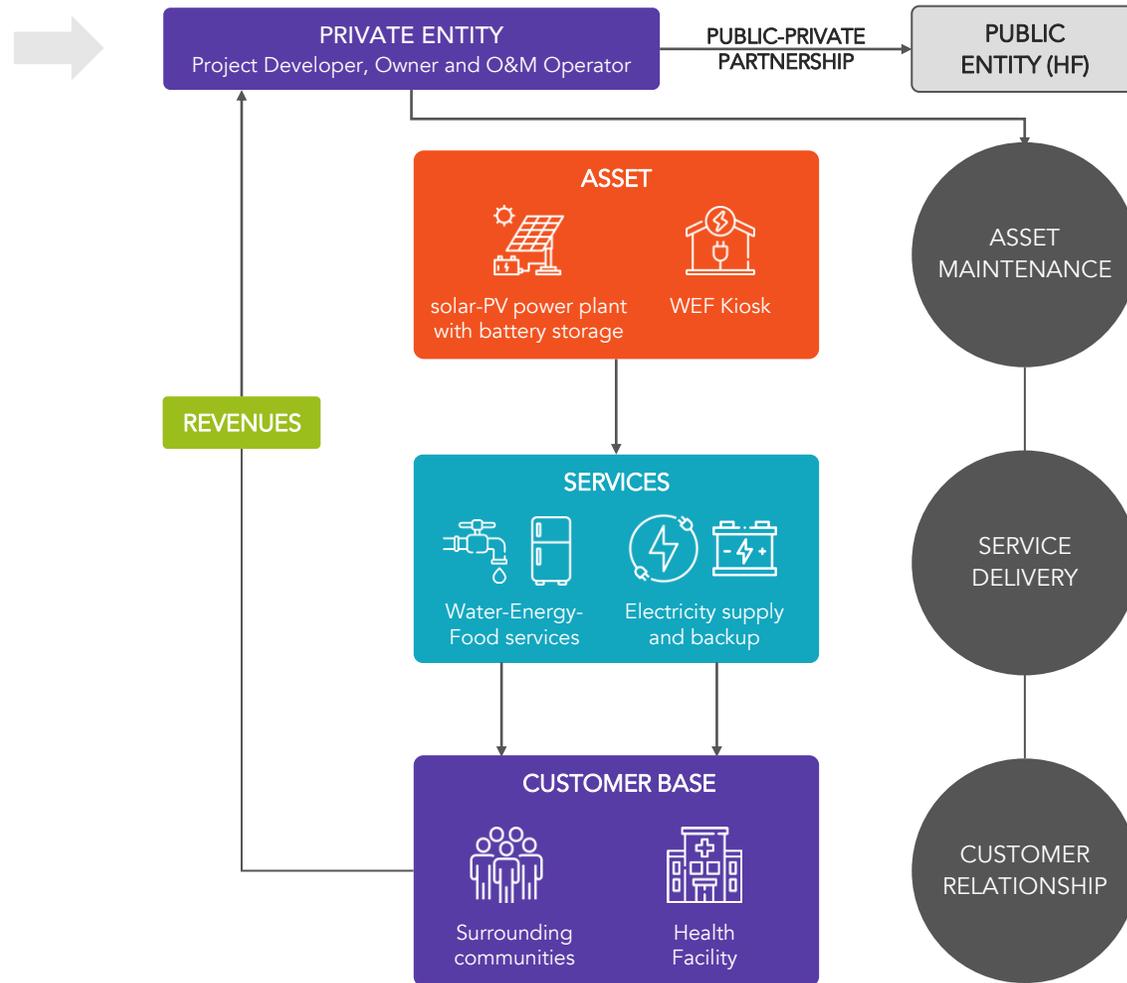
The PD negotiates a pipeline of off-grid HF with the public entity (MoH) and signs a PPP for HF electricity supply, including land, level of service and data sharing.

The PD deals with the commissioning of WEF kiosks and energy systems (in addition to grid distribution in the case of mini-grids). Depending on its nature, the PD may directly design, procure and construct assets or rely on EPC contractors, under the donor's procurement rules.

BUSINESS MODEL OPERATION

The PD owns the project asset (WEF kiosk and related solar-PV power plant with battery storage, including distribution grid in the case of mini-grids) and provides the following services: electricity supply to the HF and sale of WEF-related services to the surrounding communities (e.g., purified water, power bank and connectivity services, etc.). These revenue streams guarantee financial sustainability, while the HF electricity supply gives a minor or absent (in case of supply-for-free) contribution, depending on the PPP terms and the non-binding cooperation agreement* on grid arrival, which would imply the provision of energy back-up only.

The PD directly operates the business, including O&M activities, payments and customer relations.



Applied examples of a private model

OPERATING MODEL	STAKEHOLDERS	FINANCING SOURCES	ASSET OWNERSHIP	APPLICATION
Build, own, operate (BOO)	Private actors, donors, DFIs, public institutions, agencies, HFs	Private capital, donors, DFIs, impact funds	Private	OffGridBox

Technology considerations:

- Large sized solar stand-alone systems or mini-grids serving Tier 3 energy needs

Preconditions:

- Size of opportunity large enough for multiple players
- Active off-grid industry in the country/region
- Pilot/demonstration service-based models for HFs already commissioned and operational
- Grant financing available to boost the scaling-up
- MoH's commitment in signing PPPs with off-grid private developers/operators to clearly manage the HF's electricity supply
- Clear definition of off-grid

Financing mechanisms:

- Equity
- Junior or senior debt
- Grant (RBF or outcome/milestone grant)
- Financial guarantees

Stakeholders' role:

- Private actors: project developer, owner and O&M operator
- Donors/DFIs: sponsor and financing entities
- Public institutions/agencies: PPP counterpart
- HFs: electricity off-taker

SWOT for a private model

STRENGTHS

- Results-based approach
- Additional socioeconomic impact for surrounding communities
- High community engagement
- WEF nexus and PUE activities boost local development

OPPORTUNITIES

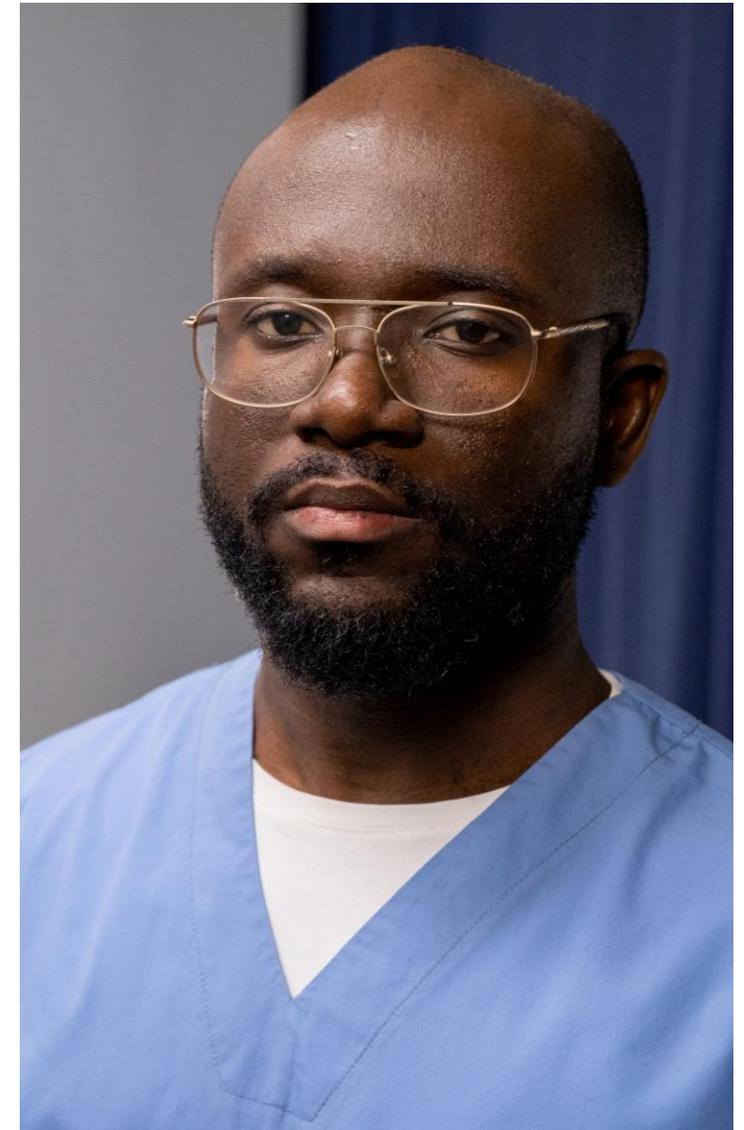
- Private sector engagement to pursue 100% access to electricity

WEAKNESSES

- High off-taker risk, both related to HFs and WEF-related services
- Medium/high grant financing (30-50%)

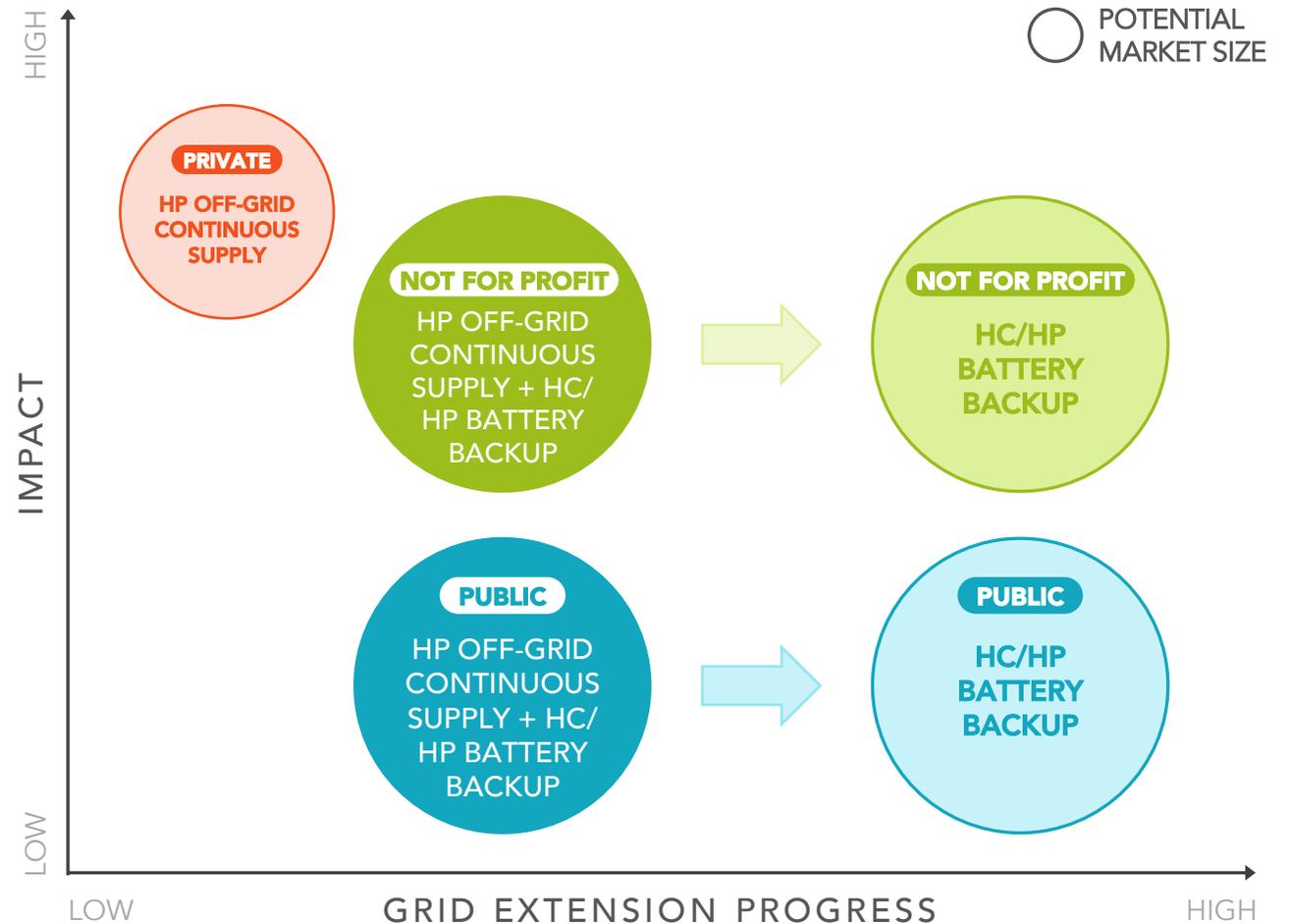
THREATS

- Grid arrival may reduce revenues (depending on PPP, electricity supply for HF could be for free and thus not affect cashflow)
- Dependence on Cooperation Agreement for standalone systems, and Memorandum of Agreement for mini-grids



There is no one-model-fits-all solution

- Impact of **private** delivery model is higher than others thanks to the WEF nexus and PUE approach, however the potential market size only targets off-grid healthcare posts.
- **Public** and **not-for-profit** delivery models target off-grid HPs and on-grid HPs/HCs.
- The impact a **not-for-profit** delivery model has is higher than the public one since, unlike the public entity:
 - A **not-for-profit** entity can raise additional funds for the initial investments and O&M of the facilities.
 - Given that the **not-for-profit** entity should be already engaged in healthcare services (pre-condition), there might be synergies between health and energy projects.
 - The **not-for-profit** entity can supervise the O&M in the start-up phase, given (i) its vocation for training courses and capacity building and (ii) its presence in the HFs already delivering healthcare services.
- **Public** and **not-for-profit** delivery models can be shifted into a back-up system once the grid arrives.
- **Private** delivery models cannot be sustainable if shifted into a back-up system once the grid arrives.



Delivery models & financing: Findings and recommendations

Stakeholders agree on certain aspects needed to deliver power

- Developers have identified the more relevant aspects affecting the delivery models:
 - asset maintenance
 - high investment costs
 - HF ability to pay and offtaker risk
 - low purchasing power in rural areas, and no high demand
 - bureaucracy and procedures, challenging identification of the responsible authority
 - Limited off-grid market
- Stakeholders do not fully trust in the HFs' capacity to implement new income generation activities, which could be complementary to the healthcare delivery services (only 22% of them estimate sufficient capacity).
- Stakeholders are fully aligned in:
 - supporting PPPs in the health sector
 - assessing a policy environment that is conducive to PSE



Delivery models & financing: Findings and recommendations

Despite the remarkable Government's progress in healthcare, there are still efforts needed to close the sustainability gap

- Assets should be maintained by the technology provider or service operator and not by HFs themselves, to achieve both long-term sustainability and OPEX reduction at scale.
- Strong commitment from development partners and financing entities to speed up the rural electrification programme, including HFE, is essential.
- The government should demonstrate clear commitment on HFE, but also on PSE in rural electrification.
- There needs to be more transparency and easier access to information about guidelines and policies for project implementation.
- The government and development partners should support the identification of anchor loads to make private-led HFE projects viable.
- Promoting business models including new income generation activities to be managed by HFs, would represent additional revenue streams for the HF cashflow. It should be explored, even if it is risky and requires expert development partners.
- Potential partnerships between private actors and HFs should be explored under a PPP model.
- Recognizing the remarkable progress the government has made in the healthcare sector, the following priorities in the Health Sector Strategy are recommended to pursue an effective PSE:
 - a. Attract more investors in both the healthcare and the energy sectors, which is an enabling factor for high-quality healthcare (e.g., telecom and petroleum companies to contribute towards funding the healthcare sector).
 - b. Urgently face the off-grid developers' need of covering the gap between the cost of service and the "revenue requirements" by adopting feasible solutions which could play a role in:
 - i. Setting a cost-reflective electricity tariff, and/or off-grid connection fee, or
 - ii. Adopting an automatic subsidy for off-grid projects.
 - c. Adopt alternative solutions to address different levels of risk depending on the developer's nature (e.g., some private actors would prefer to take the market risk instead of an automatic subsidy).
 - d. Encourage private sector with fair allocation of risks and balancing of gains in PPPs, taking into account uncertainty of health and HFE sectors.
 - e. Additional involvement and more connection with HF problems/challenges.
 - f. Better alignment and coordination among all governmental interventions.
 - g. Favour cross-sector partnerships.

03

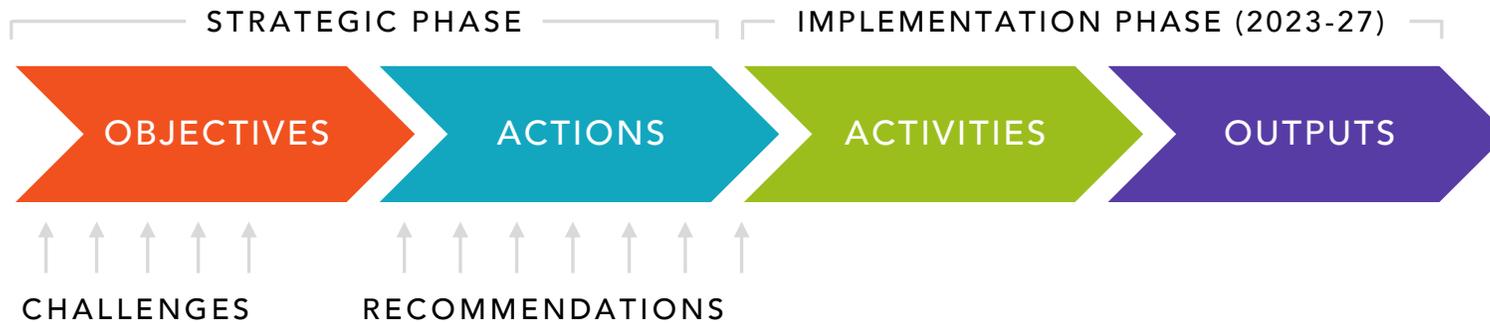
Roadmap: Powering Healthcare Facilities



POWER
AFRICA



The proposed roadmap for HF electrification and sustainable operation aims at closing a \$10 million gap



 \$1.5 million Investment ticket size of standalone PV for off-grid healthcare posts (HPs)	+	 \$8.5 million Investment ticket size of battery back-up for grid-connected healthcare centres and HPs
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Four challenges need to be tackled to reach health electrification goals

CHALLENGES	RECOMMENDATIONS	PROPOSED ACTIONS	STAKEHOLDERS
<p>01</p> <p>COORDINATION & COMMUNICATION ENGAGEMENT</p> <p>To ensure effective implementation of the integrated strategies for healthcare facility (HF) electrification and energy efficiency, with a focus on the engagement of decentralized authorities.</p>	<p>Recognizing good coordination among institutions in terms of integrated strategies and policies, a margin for improvement is identified to properly train/shadow/enhance decentralized authorities in implementing policies and strategies in an effective manner.</p>	<p>Define a communication plan, which is a policy-driven approach to ensure all parties have the latest updates on projects and objectives and are encouraged/driven to adopt practical actions. A communication plan may include follow-up events at regional/district level, newsletters, web conferencing, blogs, etc.</p>	<p>MoH, MININFRA, REG</p>
	<p>Even if local stakeholders are involved in the decision-making process, sign <i>Imihigo</i> and can follow-up updates on institutional websites, a lack of awareness and initiative has been identified in the HFE sector, including energy efficiency. Communication channels could be improved between institutions/government and decentralized authorities.</p>	<p>Priority communication channel between the GoR and select international donors.</p>	<p>MoH, Rwanda Development Board (RDB), donors</p>
	<p>Recognizing good coordination between the Ministry of Health (MoH), the Ministry of Infrastructure (MININFRA) and the Rwanda Energy Group (REG) to integrate healthcare and energy strategies, as well as productive use of energy (PUE) and the socioeconomic impact of rural electrification, including HFE, sharing priorities and planning with international donors, would allow for the alignment of financial resources and actions.</p>	<p>Arrange a harmonization roundtable for active and potential donors in HFE projects, including cross-cutting sectors, such as water-energy-food (WEF) nexus projects.</p>	<p>Donors</p>
<p>Increase coordination between donors and practitioners with different objectives (e.g., health, energy power systems, energy efficiency).</p>			

CHALLENGES	RECOMMENDATIONS	PROPOSED ACTIONS	STAKEHOLDERS
<p>02</p> <p>PRIVATE SECTOR ENGAGEMENT</p> <p>To favour an enabling environment and provide tangible opportunities for private actors willing to invest and operate in the HFE sector, including developers and specialized O&M service providers.</p>	<p>Favour cross-sector partnerships to support innovative private delivery models focused on the WEF nexus and PUE for broader access to electricity interventions than HFE alone, with a view to sustain the project viability and decrease the O&M costs for HFE as well.</p>	<p>Publish and update a comprehensive framework of donor funding windows for HFE projects, including cross-cutting sectors, such as WEF nexus projects, with a regional target.</p>	<p>Donors</p>
	<p>Favour origination of multi-country projects to attract investments and developers in Rwanda, which has a small off-grid HFE sector.</p>		
	<p>The National Electrification Plan is regularly updated to achieve universal access to electricity by 2024 (to date, 30% of people will be connected by off-grid solutions). This means that off-grid initiatives suffer from unclear delineations between on-grid and off-grid areas. Changes in this delineation have created uncertainty that has deterred private investment, especially in small countries like Rwanda. Thus, the government should urgently adopt adequate de-risking mechanisms to cover the gap between the cost of service and the "revenue requirements".</p>	<p>Adopt effective and urgent enabling mechanisms (e.g, PPP, compensation, subsidies and other de-risking mechanisms) and procedures to attract private investments and developers in the off-grid sector.</p>	<p>MININFRA, Ministry of Economics and Finance (MINECOFIN), REG, RDB, donors</p>
<p>Private actors may play a role for promoting business models based on public-private partnerships (PPPs) and/or active engagement of private actors in HF management, new income generation activities, energy systems provision and operation. Considering that PPPs are duly regulated, even if there is poor adoption in the HFE sector, donors should support demonstrations to encourage private sector engagement (PSE) and validate PPP models.</p>	<p>Donor-funded demonstration projects based on relevant PSE, including PPPs, in the HFE sector.</p>	<p>Donors, private stakeholders</p>	

Sources: REG; CIF, 2022. Evaluation of the Scaling up Renewable Energy Program in Low-income

CHALLENGES	RECOMMENDATIONS	PROPOSED ACTIONS	STAKEHOLDERS
<p>03</p> <p>RELIABILITY & SECURITY OF ELECTRICITY SERVICE</p> <p>Provide reliable, clean, sustainable and safe electricity services for HFs to effectively enable high-level healthcare delivery services</p>	Seek investor/donor support in improving the power supply quality through HF network supply reinforcements.	Installation of power transformers or transformer rings to boost voltage.	REG
	Leverage on PSE to boost the energy transition from inadequate and diesel-based solutions to sustainable, reliable and clean electricity services for HFs.	Outsource the energy system O&M (both power and back-up systems) to private actors by means of public tenders or PPPs.	MoH, private actors
	Reliable and affordable back-up solutions could notably improve the quality of healthcare services. Taking into consideration high expenditure and reliability of current diesel-based back-up, alternative options should be explored.	Define a set of sustainable back-up solutions on the basis of a reference cost-benefit analysis.	MoH, donors
	Ensuring 24/7 reliable electricity services is needed to provide high-level healthcare delivery services. Energy expenditure and consumption should be disaggregated by water data, and duly gathered and analyzed.	Allocate adequate resources for O&M of energy systems and electrical equipment, including maintenance of sustainable back-up solutions and energy efficiency devices. Depending on the delivery model adopted, the HF budget should be revised to cover such expenses, otherwise the MoH should manage the O&M service at central level.	MoH, donors, private and not-for-profit actors
	Energy demand management and energy efficiency are crucial to optimize operations of small-size power systems, and specifically for solar-PV systems. Technology (EMS, BMS) plays a role, but it is complementary to the offtaker's behaviour. Such integration is relevant in HFE applications, since it may directly affect battery storage lifespan as well as daily energy availability.	Provide training courses for stakeholders (at institutional and HF level) on demand-side management (DSM) strategy to optimize energy resources and promote energy efficiency.	MoH
Investigate the wiring installations of existing hospitals to avoid potential accidents in case of old infrastructure or poor cabling installations.	Carry out detailed electrical installation design reviews for vulnerable HFs.	MoH, MININFRA	

CHALLENGES	RECOMMENDATIONS	PROPOSED ACTIONS	STAKEHOLDERS
04 ACCESS TO ENHANCED DATA RELATED TO HFE	Open access to reliable data about the HFE sector is crucial to attract practitioners and investors since it reduces efforts in pre-feasibility studies, planning and access to finance, whereas data are not easily accessible and quite fragmented, and open-source databases have limited information.	Develop more advanced and comprehensive databases and IT platforms.	MoH, REG, donors
	Geolocate all HFs in the country to facilitate planning for basic infrastructure deployment.	Collect all the geo coordinates of HFs and include termination points for basic infrastructures such as water, electricity & network fiber.	MoH
	Regular data updating on projects and pipelines is crucial for all the stakeholders and gives institutions greater trustworthiness.	Plan a structured updating activity, assigning a specific task to public entity feeding data.	MoH, REG, donors
	Responsible institutions/agencies should undertake actions to better support both healthcare facilities and customers to access information.	Adopt simple, user-friendly and cost-effective solutions that can support both patients and healthcare members and facilitate its diffusion.	MoH
	Donors should be focused on promoting impactful data collection to support blended fundraising and advocacy actions.	Activate an integrated monitoring, evaluation and learning (MEL) platform for HFE projects, which interacts with HFE-related database.	donors
	Regular training can potentially enhance the knowledge and skills of technical and clinical personnel by increasing work efficiency and effective utilization of ICT technology.	Deliver public staff training on ICT technology.	MoH
	Digitalization of HFs allows for remote monitoring of HF infrastructure, including but not limited to energy power systems, and thus notably contributes to access to HFE-related data.	Invest in computers and internet access across HFs.	MoH

Proposed Implementation Phases for Sustainable Electrification of all Healthcare Facilities by 2027



PHASE 1:

Feasibility and tendering
2023 – 2024



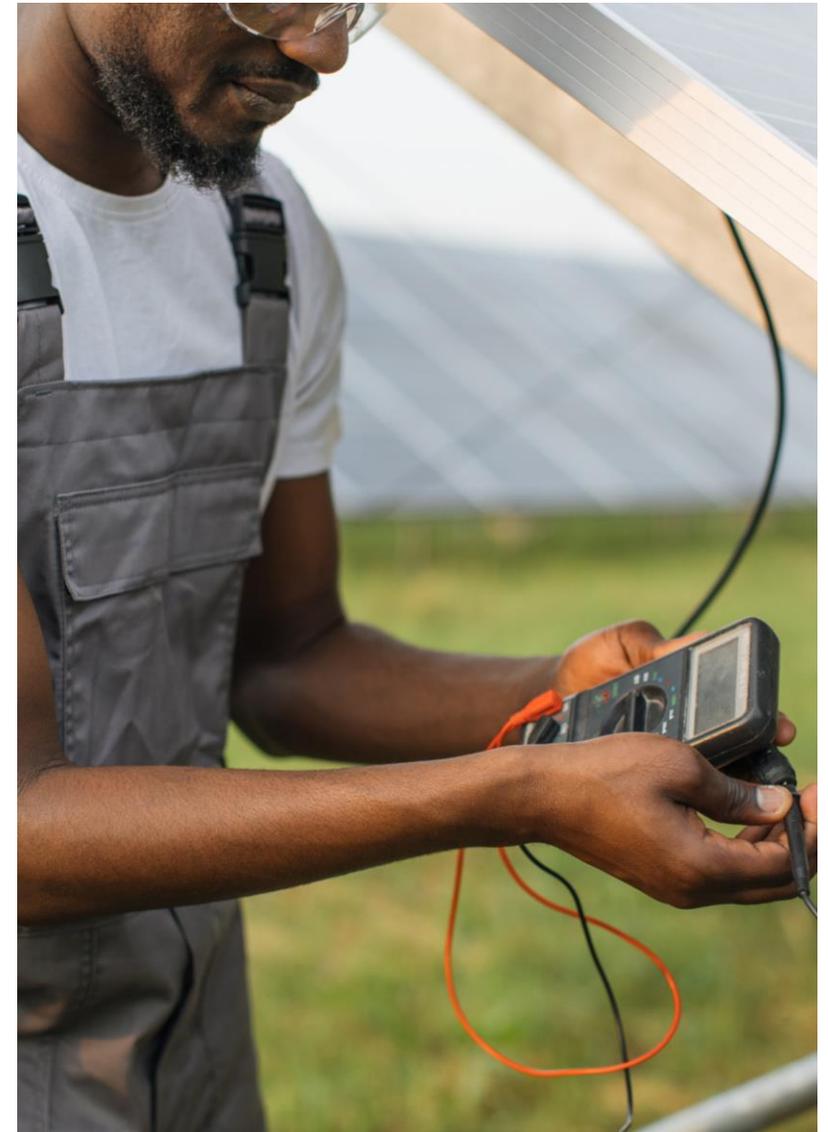
PHASE 2:

Piloting and demonstration
2024 – 2025



PHASE 3:

Scale up
2025 – 2027



**PHASE 1:**

Feasibility and tendering (2023 – 2024)

KEY ACTIVITIES

- Public entities engagement to define a communication plan for effective implementation of HFE projects
- Commit public and donor funds for sustainable HFE projects' implementation and operation
- Develop master documents for public tenders and PPP in the HFE sector, including technical specification for sustainable backup solutions
- Integrated data collection for HF energy-related data
- Improved access to HFE-related information by integrating and correlating existing databases, with guidelines for easy access
- Implementation and coordination of donor-led existing programmes for HFE project and their potential link with WEF nexus projects
- Develop an integrated MEL platform for HFE
- Establish a priority communication channel between the Government of Rwanda (GoR) and select international donors
- Define effective and urgent enabling mechanisms for the off-grid sector

KEY OUTPUTS

- Communication plan
- Financing framework
- Public tender and PPP format in the HFE sector
- MoH database updated with energy-related datasets
- HFE databases and IT platforms improved
- Guidelines for easy access to comprehensive HFE-related data
- Coordinated notices of donor funding windows for HFE projects
- MEL platform for HFE projects designed
- Priority communication channel established
- Enabling mechanisms for the off-grid sector adopted

**PHASE 2:**

Piloting and demonstration (2024 – 2025)

KEY ACTIVITIES

- Piloting of new HFE projects adopting one or more proposed delivery model, including provision of computers and internet access
- Piloting PPP for PSE
- Piloting public tenders for O&M services targeting small HF clusters in different regions
- Activate an integrated MEL platform for HFE projects
- Assuring a regular update of the HFE database
- Following-up the priority communication channel
- Design and delivery of training courses on the DSM strategy and ICT

KEY OUTPUTS

- HFs electrified by pilot projects adopting one or more proposed delivery model (public, not-for-profit, private)
- Pilot PPP signed in the HFE sector
- Pilot O&M service contracts completed to operate a cluster of HFs
- MEL platform for HFE projects adopted
- HFE databases regularly updated
- Priority communication channel active
- DSM/ICT training courses delivered



* EPC and O&M contracts can be awarded within one or two different public tenders.



PHASE 3: Scale up (2025 – 2027)

KEY ACTIVITIES

- Scaling-up of HFE projects adopting one or more proposed delivery model, including provision of computers and internet access
- Scaling-up previous PPP or signing new PPP for PSE
- Launch, award and implement public tenders for O&M services targeting large HF clusters at regional or national scale
- Assuring a regular update of the integrated MEL platform for HFE projects
- Assuring a regular update of the HFE database
- Following-up the priority communication channel
- Arrange a follow-up workshop on the DSM strategy and ICT

KEY OUTPUTS

- 100% HFs electrified (on-grid or off-grid)
- Scaled-up PPP signed in the HFE sector
- 100% of primary HFs covered by O&M service contracts (if not adopting a private delivery model)
- MEL platform for HFE projects regularly updated
- HFE databases regularly updated
- Priority communication channel active
- DSM/ICT follow-up workshop

04

Annex



Different types of stakeholders are involved in HFE

Public sector

- Institutions and agencies, as well as sampling healthcare facilities (HFs) for understanding the healthcare sector at different levels.
- Enabling environment, policy and regulatory frameworks, dataset, stakeholder coordination and governance.

Donors

- Presence in the country and contribution to country healthcare sector as well as to electrification projects.
- Sustainability and business models, access to finance, stakeholder coordination and governance.

Public sector developers

- Active players in the country with a relevant track record in powering healthcare facilities.
- Understanding of supply and demand market solutions, business models, public-private partnerships (PPPs), access to finance, challenges and opportunities.

Non-profit organizations

- Organizations involved in healthcare-related projects having a technical background in the energy sector and healthcare facility management.
- Coordination of ongoing and planned interventions, access to finance, challenges and opportunities.

Sources: [USAID, 2013. Rwanda Health System Strengthening. Design Team Summary Report](#)

Stakeholder consultations

Over 30 public, private, donor and not-for-profit sector stakeholders were consulted and interviewed as part of the development of the Market Assessment and Roadmap.

Donors



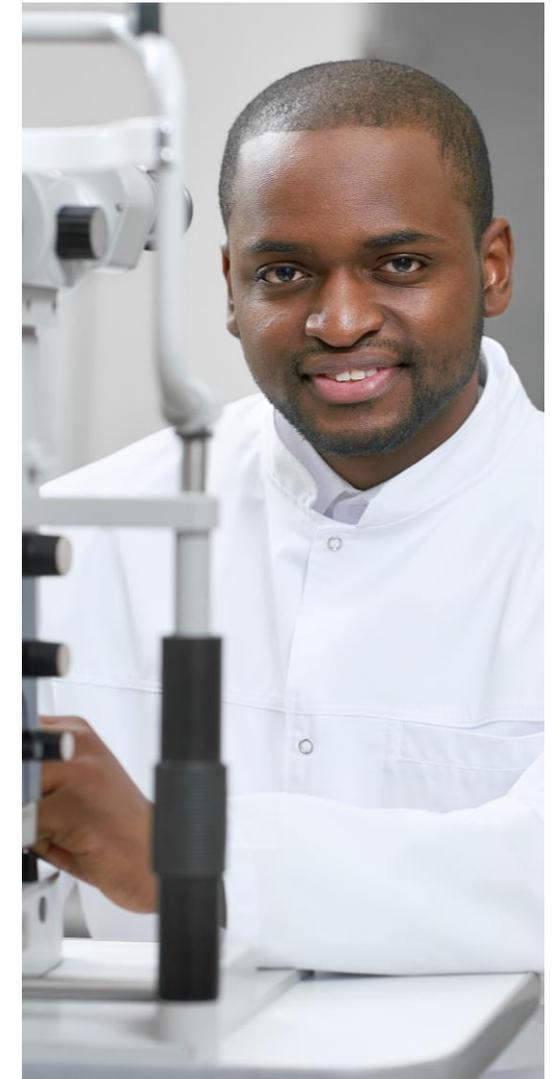
Private sector



Public sector



Non-profit sector



Regulatory Indicators for Sustainable Energy (RISE)

Rwanda's main indicators for power generation are the following:

- In 2022, the renewable energy installed was 135,478 MW, mostly consisting of hydropower plants and solar PV technologies.
- The renewable energy share over total generation was 56%.
- The hydropower share over total generation was 39%.

GLOBAL AVERAGE	REGIONAL ONE DOWN KENYA	RWANDA	REGIONAL ONE UP	REGIONAL AVERAGE SUB-SAHARAN AFRICA
60	73	78	N/A	39

RISE SCORES (OUT OF 100) PER PILLAR 2021

Source: [RISE indicators for Rwanda](#)



Mapping Interventions

HEALTH FACILITY ELECTRIFICATION

#	IMPLEMENTING ENTITY	PROJECT/ PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
1	Ministry of Defence (MoD)	Supporting Rwanda's Military Healthcare Services	MoD works with Partners in Health (PIH) to construct and equip new healthcare posts and could be an important partner in the rollout of the proposed private healthcare post model.	2018	Unknown	USAID	Donor/ Public	Rwanda health private sector engagement assessment, USAID, 2017
2	RTI International	Power Africa Off-grid Project (PAOP)	The goal of the PAOP is to provide support to private off-grid companies and make the markets in Sub-Saharan Africa more attractive for investment and operations.	2018	2022	USAID	Donor	Off-Grid Solar Market Assessment – Rwanda, PAOP, 2019
3	Ministry of Health (MoH), RBC, MINICOM, Rwanda Development Board (RDB)	National Strategy for Transformation (NST1)	Key strategic interventions include constructing and upgrading healthcare facilities with adequate equipment. Specific hospitals to be constructed and upgraded include those in: Ruhengeri, Munini, Byumba, Nyabikenke, Masaka, Gatunda, Gatonde and Muhororo. In addition, 17 healthcare centres will be constructed in the remaining areas that have no healthcare centres and an additional 150 healthcare posts will be created across the country. Furthermore, 100% access to electricity and water for healthcare facilities will be ensured by 2024.	2017	On-going (2024)	GoR	Public	NST1, 2017–2024, Government of Rwanda.
4	Government of Rwanda (GoR)	Economic Recovery Plan (ERP)	The ERP aims to guide the government on required key interventions across sectors that would provide support to households and boost employment and growth toward recovery. The main priorities for economic recovery are to contain the pandemic and strengthen the healthcare system (infrastructure, human resources, and information technology systems).	2020	2021	GoR	Public	Rwanda Energy Access And Quality Improvement Project, World Bank report PAD4005
5	Energy Utility Corporation Limited (EUCL)	Rwanda Energy Sector Strengthening Project (RESSP)	The project development objective (PDO) is to enhance the operational efficiency of the electricity utility and increase electricity access, by supporting: (i) urban and rural development, (ii) public sector management, (iii) and private sector development.	2016	Ongoing (2022)	World Bank	Donor	Rwanda Electricity Sector Strengthening Project, World Bank report RES46292

Mapping Interventions

HEALTH FACILITY ELECTRIFICATION

#	IMPLEMENTING ENTITY	PROJECT/ PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
6	Government of Rwanda	Energy Sector Strategic Plan (ESSP)	The ESSP sets out targets for reducing power interruptions and expanding electricity access to productive users, including healthcare and education facilities, public infrastructure, and industry, from 72.6% (2017) to 100% (2024).	2018	On-going (2024)	GoR	Public	https://www.reg.rw/fileadmin/user_upload/Final_ESSP.pdf
7	Development Bank of Rwanda, Energy Development Corporation Limited (EDCL)	Rwanda Energy Access and Quality Improvement Project	The PDO is to improve access to modern energy for households, enterprises, and public institutions and enhance the efficiency of electricity services in Rwanda. The third PDO is public institutions (clinics, schools, and administrative centres) provided with new or improved electricity service.	2021	On-going (2026)	World Bank/ Renewable Energy Fund (REF)	Donor	Rwanda Energy Access And Quality Improvement Project, World Bank report, 2020
8	NGO One Family Health	USAID Ivuriro Iwacu	The main goal of the USAID Ivuriro Iwacu activity is to establish an additional 72 healthcare posts through a public-private partnership with the MoH.	2019	2021	USAID	Donor/ Public	http://onefamilyhealth.org/usaids-award-will-support-ofh-expansion-in-rwanda/
9	NGO Society for Family Health (SFH)	SFH 80 new Health Posts	SFH will build and operate 80 healthcare posts in 12 Districts of the country. The KfW Facility's funds will mainly finance the construction of the healthcare posts, including their technical equipment.	2022	On-going (2026)	KfW Dev. Bank's Facility Investing	Donor	https://invest-for-jobs.com/en/projects/rwanda-society-for-family-health-sfh
10	Absolute Energy, Equatorial Power, ECOS	Rwanda Village-Grid Results-based Financing Programme (VG RBF)	The EnDev VG RBF project provided access to electricity to more than 10,000 people, achieving more than 20 social institutions gaining access to electricity: 50 kWp Rutenderi, 50 kWp Gatsibo (Absolute Energy); 120 kWp Gakagati (Equatorial Power); 11 kW hydropower plant (ECOS).	2013	2020	EnDev RBF Facility	Donor/ Private	Enhancing energy access in rural Rwanda. Village Grid Results-based Financing Project Closing Report. EnDev, 2021.

Mapping interventions

HEALTH FACILITY ELECTRIFICATION

#	IMPLEMENTING ENTITY	PROJECT/ROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
11	Empower New Energy	Rucanzogera small hydropower plant	The 1,9 MW (Tier 5) Rucanzogera hydropower plant will increase local power capacity, enhancing energy access for an estimated 10,000 people and electrifying streets, schools and medical facilities.	2019	2021	EEP Africa	Donor/Private	RWA14286-Rucanzogera Small Hydropower Plant-Fact Sheet, EEP Africa, 2019
12	East African Power	Bihongora multipurpose hydropower project	This project will combine a hydropower plant with a sustainable aquaculture business and a local mini-grid in the Rubavu District of Rwanda.	2019	2021	EEP Africa	Donor/Private	RWA14260-Bihongora Multipurpose Hydropower Project-Fact Sheet, EEP Africa, 2019
13	Neseltec	Kirehe mini-grid	30 kWp solar-PV mini-grid in Kirehe district.	2017	2018	EEP Africa	Donor/Private	Investment Opportunities in the Rwandan Energy Sector, 2018, TRAIDE
14	Off Grid Box	Power Africa Healthcare Electrification Grants to Solar Energy Companies & Pro-Poor Results-Based Financing Programme	Supported by the PAOP, OffGridBox containerized solution provides renewable energy and clean water to six rural healthcare facilities in Rwanda. The company will also set up a pay-as-you-go (PAYGO) business model, selling electricity and clean water to the surrounding communities.	2020	2022	Power Africa/USAID Rwanda/EDP Access2Energy Fund	Donor/Private	https://powerafrica.medium.com/usaid-power-africa-announces-2-6-c003fa75f004
15	REG, EDCL, EUCL	Electricity Access Scale-up and SWAP Development Project	The objective is to improve access to reliable and cost-effective electricity services for households and priority public institutions. The project has three components: (1) national grid rollout (2) green connections (3) technical assistance, capacity strengthening and implementation support.	2010	2018	World Bank	Donor	https://projects.worldbank.org/en/projects-operations/project-detail/P111567

Mapping interventions

HEALTH FACILITY ELECTRIFICATION

#	IMPLEMENTING ENTITY	PROJECT/ PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
16	MININFRA	Financing, Regulatory and Business Models	Financing, Regulatory and Business Models for universal access to electricity.	2019	2022	The Rockefeller Foundation	Donor	https://www.rockefellerfoundation.org/grant/grant-sustainable-energy-for-all-2019-6/
17	UNICEF/ SFH/SC Johnson/Abbott/ Imbuto Foundation	Universal Health Coverage	UNICEF works with partners to support the GoR in its efforts to improve the quality and access to primary healthcare services and achieve universal health coverage. The project aims to provide new healthcare posts across Rwanda, including laboratory testing, maternity, dental and ophthalmology consultations and access to an in-house pharmacy.	2018	ongoing	UNICEF / Embassy of Japan / private funds	Donor/ Private	https://www.unicef.org/rwanda/stories/rwanda-upgrades-local-health-posts-improve-access-health-services
18	UNDP	A Thousand Health Posts in the Land of a Thousand Hills	Promoting universal health coverage by catalyzing investments in financially and environmentally sustainable primary healthcare. The programme will enable the scale-up of healthcare posts in Rwanda with a start-up grant mechanism to enhance the quality of business-ready infrastructure by retrofitting buildings designated by the government as adequate healthcare post locations, including a performance-based grant scheme to electrify healthcare posts by private solar companies with long-term service packages to ensure sustainability.	2022	ongoing	Joint SDG Fund (UN)	Donor	https://sdginvest.jointsdgfund.org/proposals/thousand-health-posts-land-thousand-hills-promoting-universal-health-coverage-catalyzing

Mapping interventions

PERFORMANCE BASED FINANCING (PBF) PROGRAMME

#	IMPLEMENTING ENTITY	PROJECT PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL
1	NGO Memisa/Cordaid	PBF programme - Pilot in Cyangugu (Western province)	Performance-based financing (PBF) programmes provided healthcare workers and their facilities with monetary incentives when they achieved specific qualitative and quantitative performance indicators.	2001	Completed	World Bank	Donor
2	NGO HealthNet International (HNI)	PBF programme - Pilot in Butare (Southern province)	PBF is an output healthcare financing mechanism aimed at providing healthcare workers and their respective facilities monetary incentives when they achieve specified qualitative and quantitative performance indicators.	2001	Completed	World Bank	Donor
3	Belgian Technical Cooperation (BTC)	PBF programme- Pilot in Kigali City, Kigali Ngali and Kabgayi Health District	PBF is an output healthcare financing mechanism aimed at providing healthcare workers and their respective facilities monetary incentives when they achieve specified qualitative and quantitative performance indicators.	2005	Completed	Belgian Development Agency	Donor
4	MoH	PBF programme - Scale-up	PBF was scaled up as a national framework at many levels of service delivery from healthcare centres to MoH central level.	2006	Completed (2013)	GoR	Public
5	MoH	Hospital Accreditation System	Improve healthcare facilities' performance.	2012	Completed (2014)	GoR	Public
6	MoH	New PBF programme linked to hospital accreditation system - pilot	The two programmes were linked with a more comprehensive and deeper assessment of the quality of services.	2014	Completed (2016)	GoR	Public
7	MoH	New PBF programme linked to hospital accreditation system - Scale-up	The two programmes were linked with a more comprehensive and deeper assessment of the quality of services.	2016	On-going	GoR	Public
8	Community-based	Community PBF programme	Community PBF is implemented at the village level through the trained community healthcare workers (CHW) operational within each community. Healthcare posts are located at the cell level and due to their affiliation with private or faith-based organizations they are not integrated into the PBF system.	2008	On-going	GoR	Public

Source: Performance based financing procedures manual for health facilities (Hospitals and Health Centers), February 2021

Mapping interventions

INSTITUTIONAL CAPACITY BUILDING, GOVERNANCE AND PRIVATE ACTORS ENGAGEMENT IN THE HEALTH SECTOR

#	IMPLEMENTING ENTITY	PROJECT/ PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
1	Management Sciences for Health	African Strategies for Health (ASH)	ASH works to improve the health status of populations across Africa through identifying and advocating for best practices, enhancing technical capacity, and engaging African regional institutions to address healthcare issues in a sustainable manner. ASH provides information on trends and developments to enhance decision-making regarding investments in healthcare.	2011	2016	USAID/AFR	Donor	Rwanda health private sector engagement assessment, USAID, 2015
2	Abt Associates	Strengthening Health Outcomes through the Private Sector (SHOPS)	SHOPS focused on increasing availability, improving quality, and expanding coverage of essential health products and services in family planning and reproductive health, maternal and child health, HIV and AIDS, and other areas through the private sector.	2011	2016	USAID	Donor	
3	Abt Associates	SHOPS Plus	SHOPS Plus seeks to harness the full potential of the private sector and catalyze public-private engagement to improve health outcomes in family planning, HIV/AIDS, maternal and child health, and other areas.	2016	2021	USAID	Donor	
4	USAID/RWANDA	Global Development Alliance	USAID/Rwanda has made a special call for the submission of concept papers focused on improving the health status of Rwandans.	2014	2015	USAID	Donor	
5	GoR	Capacity Development Pooled Fund (CDPF)	CDPF is a multi-donor fund that aims to assure effective coordination of various agencies supporting capacity development initiatives in the healthcare sector.	2013	2017	Enabel	Donor	
6	Public Sector Capacity Building Secretariat (PSCBS)	Support to Capacity Building component	Focus on Capacity Building in Energy, Health, Decentralization and PSCBS.	2013	-	Enabel	Donor	Support To Strategic Approach To Capacity Building, Technical and Financial File, 2013-2017, The Belgian Development Cooperation, 2013.

Mapping interventions

INSTITUTIONAL CAPACITY BUILDING, GOVERNANCE AND PRIVATE ACTORS ENGAGEMENT IN THE HEALTH SECTOR

#	IMPLEMENTING ENTITY	PROJECT/ PROGRAMME NAME	BRIEF DESCRIPTION OF PROJECTS	STARTING DATE	STATUS/ COMPLETION DATE	FUNDING ENTITY	DELIVERY MODEL	REFERENCE
7	Management Sciences for Health (MSH)	Rwanda Health Systems Strengthening Project (RHSSP)	The RHSSP is to strengthen capacity through extensive technical support across five strategic areas: effective leadership and governance, sustainable health financing and private sector engagement, improved quality of care, evidence-based decision-making, and a mobilized, skilled workforce.	2014	2019	USAID	Donor	Realizing Rwanda's Vision for Health: accessible, accountable, affordable, and reliable health systems. RHSSP, 2014-2019, USAID
8	MSH	Integrated Health Systems Strengthening Project (IHSSP)	The IHSSP is assisting the Rwanda MoH with the aim of providing necessary technical assistance. Building institutional capacity and human resources for health and linking quality improvement to the element of PBF as well as improved utilization of data for decision-making and policy formulation will also be a key result area.	2009	2014	USAID	Donor	
9	NGO One Family Health (OFH)	OFH franchise network of healthcare posts	OFH develops and manages a franchised network of healthcare posts to increase access to high-quality, basic healthcare services and essential medications throughout the country. The franchise model catalyzes local nurses to become small business owners while bringing essential goods and basic healthcare to underserved populations, allowing for rapid scaling. A PPP is established between OFH and the Rwanda MoH. OFH's target was to operate 500 healthcare posts by 2017.	2012	2017	Ecobank/ GlaxoSmith Kline	Private/ Public/ Donor	One Family Health (OFH) profile 2014. IPIHD

Energy Policy Context

Landmark network and transformation plans

National Transmission Master Plan (2021–2028)

The document presents the plan for the development of the Rwandan transmission network and interconnection by 2028, including projects that are required for the operation of the transmission network. Future needs that may drive potential projects are presented in the demand-forecast methodology.

Rwanda Country Strategy Paper 2022–2026

This country strategy paper lays out the strategy that will guide the African Development Bank's (AfDB's) support towards achieving structural transformation in line with the country's first National Strategy for Transformation (NST-1) for 2017–2024, and the vision for 2050.

National Strategy for Transformation 2017–2024

The NST-1 starts from where the Economic Development and Poverty Reduction Strategy left off and continues in an effort to accelerate the transformation and economic growth with the private sector at the helm. It aims for the country to achieve middle-income status by 2035 and high-income status by 2050.

Energy Efficiency Strategy (2013)

Outlines initiatives to improve efficiency across generation, transmission and distribution, and end-user consumption.

Energy Sector Strategic Plan (2018–2024)

The plan deals with the effective delivery of the targets for the energy sector as set out under the National Strategy for Transformation (NST) and guides the implementation of the National Energy Policy, to achieve universal access by 2024.

Rwanda Electricity Access Development Plan (2018–2024)

The document presents the REG Electricity Access Development Plan for Rural and Urban Electrification.

National Electrification Plan (2018)

Detailed plan of on- and off-grid expansion including the identification of villages with strategic importance for the country as well as strategic schools, healthcare posts, cell offices, mineral processing plants and border villages among others.

Rural Electrification Strategy (2016)

The government developed this strategy with the objective of ensuring that Rwanda's households have access to electricity through the most cost-effective means by developing programmes that will allow both the end users to access less costly technologies and increase private sector participation.

Policies and guidelines

Rwanda Energy Policy (2015)

The policy outlines a long-term vision, provides high-level goals, and recommends clear and coordinated approaches for achieving that vision. The policy can guide the actualization of aligned implementation strategies related to the facilitation of businesses around the energy sector.

Ministerial Guidelines on Mini-grid Development (2019)

Guidelines help in streamlining the process for investors as well as clarify the procedure for mini-grid development under the off-grid sub-sector.

Public Private Partnership (PPP) Guidelines (2018)

The PPP Guidelines support the delivery of public infrastructure and services through PPPs in Rwanda. The guidelines provide an overview of the concepts and procedures to be followed, and requirements to be met, for successful implementation of PPP Projects. These guidelines should be used in conjunction with the PPP Law and Regulations, and other guidance issued periodically by the RDB.





Healthcare Policy Context

Landmark health sector plans and policies

Health Sector Strategic Plan 2018–2024

The Rwanda Health Sector Strategic Plan is the guiding document outlining national strategic directions to improve healthcare standards among Rwandans in the coming years. Its content reflects a comprehensive analysis of Rwanda’s health sector progress and situation to date.

Health Sector Financing Strategy (2018–2024)

The document represents an instrument for accelerating progress towards achieving Universal Health Coverage. It consists of four programmes that deliver off-grid solutions (standalone PV and mini-grids).

Health Sector Policy (2015)

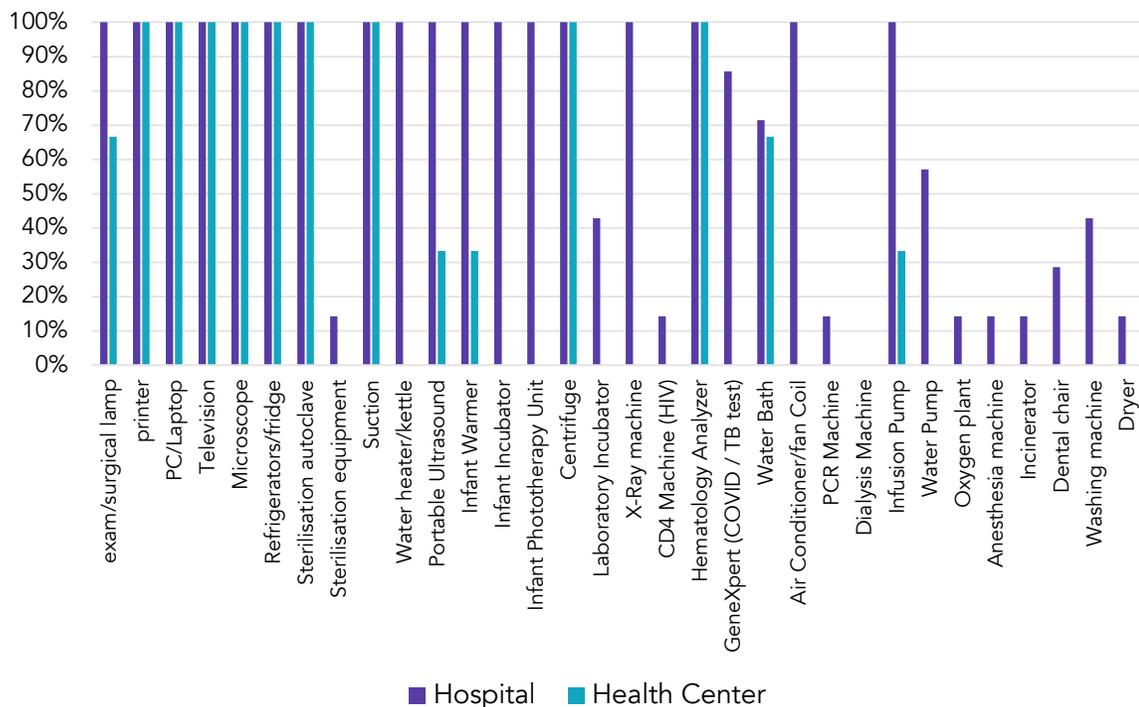
The Health Sector Policy is the basis of national health planning and the first point of reference for all actors working in the health sector. The overall aim of this policy is to ensure universal accessibility of equitable and affordable quality healthcare services for all Rwandans.

Sizing the Access Gap – Datasets and Databases

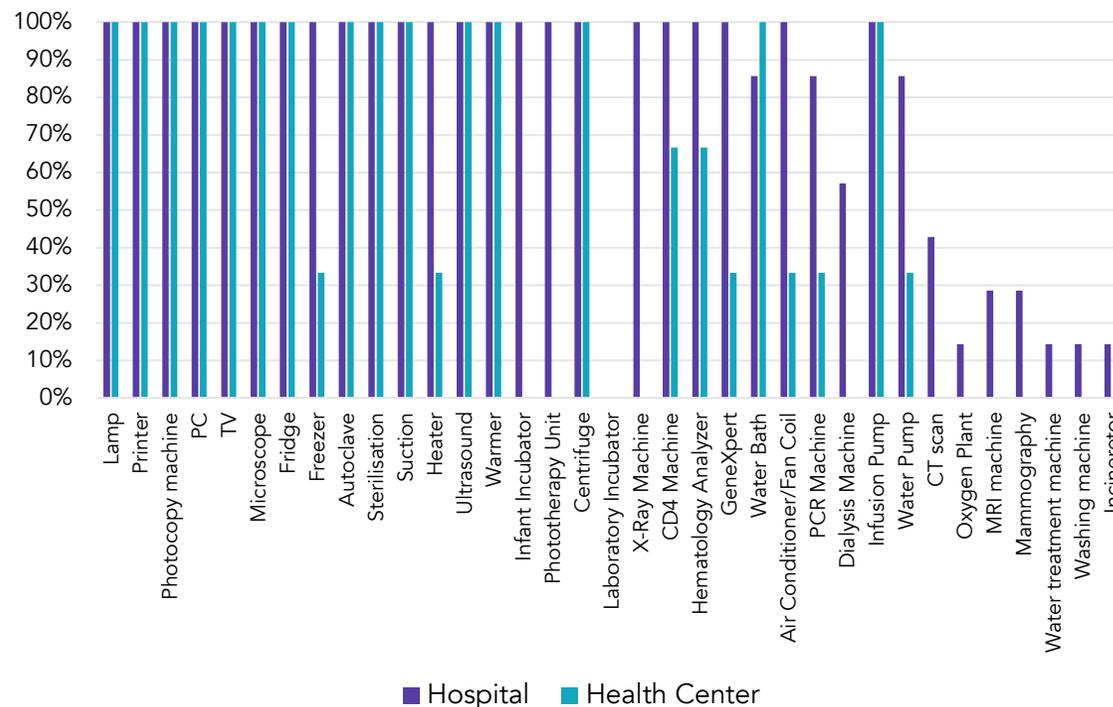
N.	YEAR OF LAST UPDATE	NAME	OWNERSHIP	ACCESS	INFORMATION	NO. OF HFS INCLUDED	HF LOCATION	ELECTRIFICATION STATUS	HF MANAGEMENT CATEGORY	UPDATE FREQUENCY
GOVERNMENT DATASETS/DATABASES										
1	2023	R-HMIS dataset	MOH	Limited (Link)	Rwandan Health Management Information System (R-HMIS) includes a comprehensive dataset on healthcare services and clinic data.	2,139	+	+	+	Monthly
2	n.a.	R-HMIS database- extract	MOH	Open source (Link)	Selected data from R-HMIS, including HF list, position, type, ownership and opening date.	1,526	+	-	+	n.a.
3	2022	Rwanda Electrical Geo-Portal	REG	Open Source (Link)	Online platform including geospatial datasets on D&T and customers.	All on-grid HFs included in the Customer class	-	+	-	6 months (as per NEP update)
INDEPENDENT DATASETS/DATABASES										
4	2021	Clean Energy Access Tool	EU-JRC	Open Source (Link)	Multi-criteria mapping tool with variables that can be selected according to a visualization query including access to electricity, travel time to facility, population served, proximity to grid, solar PV LCOE cost and emissions reductions.	607	+	+	-	n.a
5	2021	Energydata.info	WB	Open Source (Link)	Datasets on Electricity Transmission and Distribution Network, Population density, MTF Survey and RISE. None about healthcare.	Not provided	-	-	-	Yearly
6	2023	Humanitarian Data Exchange	UNOCHA, WHO	Open Source (Link)	Facilities type categorized by state according to different headings such as clinics, healthcare posts, health centres, primary healthcare centres, basic healthcare centres, comprehensive healthcare centres, cottage hospitals, dispensaries, federal medical centres, district hospitals, general hospitals.	572	+	-	-	Monthly

Load Assessment of Healthcare Facilities

Electrical devices currently owned



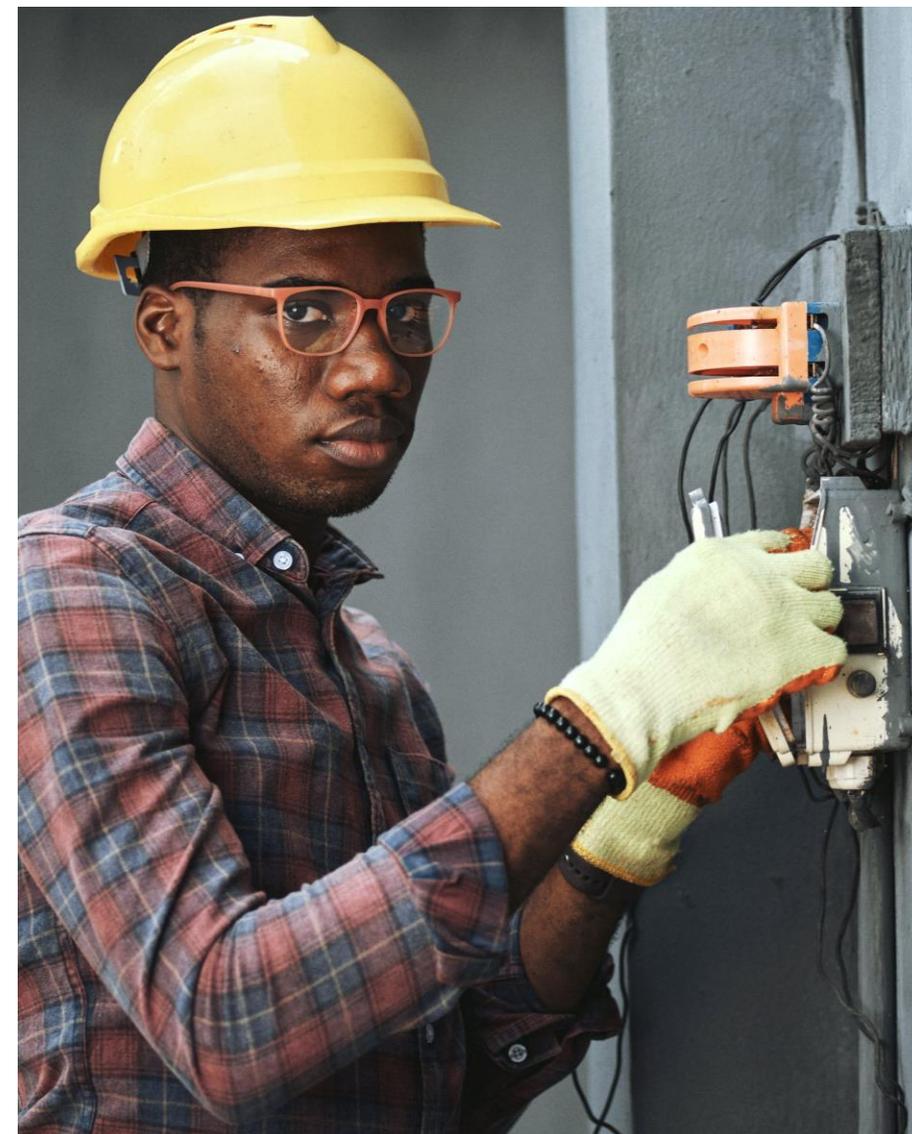
Electrical devices desired



Effective Demand and Ideal Load Profile for Healthcare Posts

ITEM	POWER (W)	QUANTITY	TOTAL CAPACITY (W)	UTILIZATION RATE (%)	TOTAL DEMAND (Wh/DAY)	WEIGHT ON DEMAND (%)
Interior lamp (public spaces)	15	8,00	120	30%	396	13.7%
Interior lamp (at night)	15	8,00	120	100%	480	16.6%
Interior lamp (offices)	15	1,00	15	30%	50	1.7%
Exterior lamp	15	1,00	15	100%	60	2.1%
Exterior lamp (at night)	15	1,00	15	100%	90	3.1%
Mobile charger	6	2,00	12	50%	90	3.1%
PC (laptop)	120	1,00	120	30%	396	13.7%
Fridge	120	1,00	120	25%	690	23.9%
Gynecological lamp	35	1,00	35	20%	77	2.7%
Microscope	20	2,00	40	20%	88	3.1%
Sterilizer	85	1,00	85	50%	468	16.2%
TOTAL			697		2,884	100.0%

Source: field surveys



Effective Demand and Ideal Load Profile for Healthcare Centres

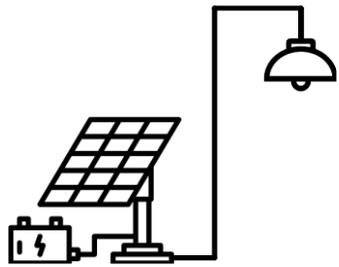
ITEM	POWER (W)	QUANTITY	TOTAL CAPACITY (W)	UTILIZATION RATE (%)	TOTAL DEMAND (Wh/DAY)	WEIGHT ON DEMAND (%)
Interior lamp (public spaces)	15	24	360	30%	1,188	11%
Interior lamp (public spaces) (at night)	15	24	360	100%	1,440	13%
Interior lamp (offices)	15	8	120	30%	396	4%
Interior lamp (private spaces)	8	6	48	100%	92	2%
Exterior lamp	15	2	30	100%	120	1%
Exterior lamp (at night)	15	2	30	100%	180	2%
Mobile charger	6	6	36	50%	414	4%
PC laptop	120	1	120	30%	540	5%
Fridge	250	1	250	25%	1,438	13%
Examination /surgical lamp	35	1	35	20%	105	1%
Printer	140	1	140	5%	77	1%
Television	200	1	200	30%	900	8%
Microscope	20	1	20	5%	11	0%
Sterilization autoclave	4,250	1	4,250	5%	2,338	21%
Suction	300	1	300	5%	345	3%
Centrifuge	325	1	325	5%	179	2%
Hematology Analyzer	350	1	350	25%	963	9%
Water Bath	140	1	140	5%	77	1%
TOTAL			7,114		10,901	100%

Source: field surveys and own data

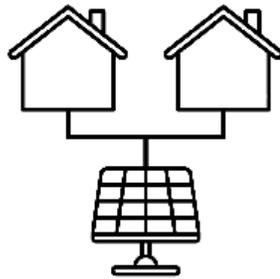


Electricity Supply Technologies

Off-grid

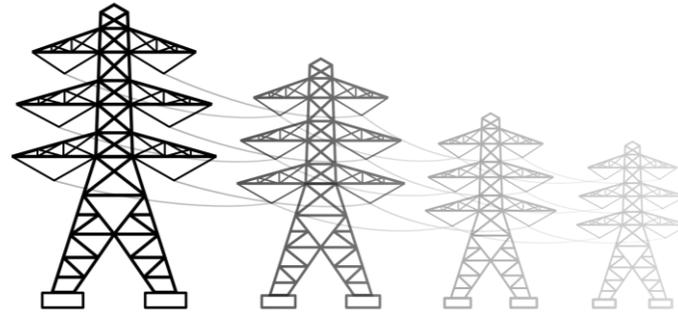


Standalone systems

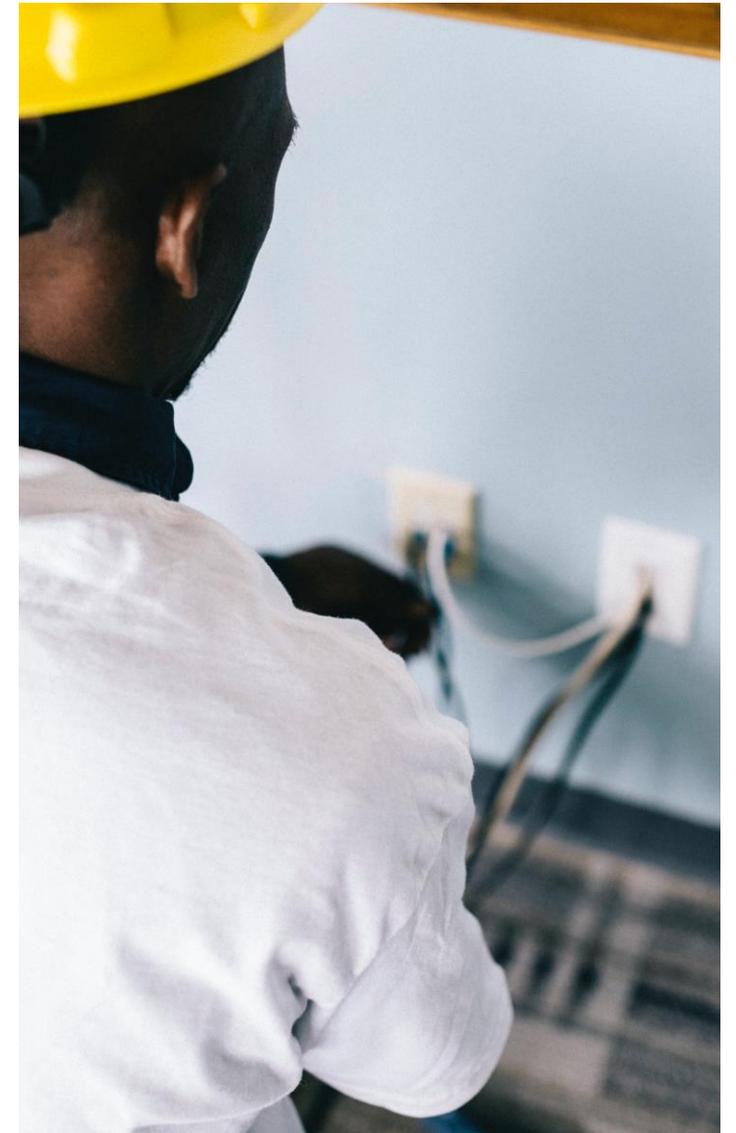


Mini-grids

On-grid



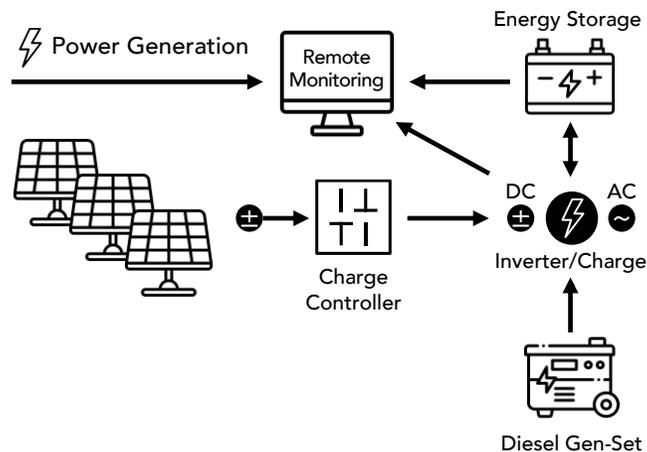
National grid



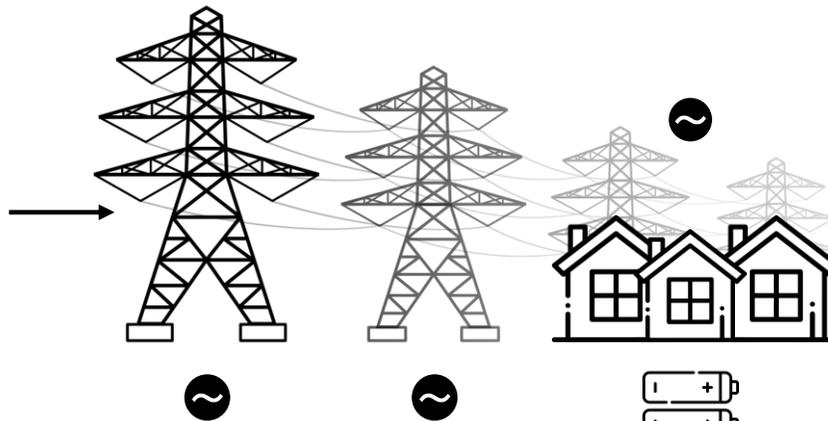
Mini-grids for HFE

- Mini-grids could be potentially suitable for providing reliable electricity supply to all the HF types, which may represent anchor loads.
- Potential space for mini-grid developers in the HFE sector in Rwanda is connecting off-grid healthcare posts, since all the other HFs are grid-connected.
- So far, there are no tangible opportunities, even in the mid/long-term period, to support on-grid HFs in Rwanda with a backup energy source, since a compensation mechanism for grid arrival is not in force, while MININFRA has signed a Memorandum of Agreement with mini-grid developers to de-risk a long-term off-grid operability under a BOOT model.

Production



Distribution



End-User

Technical specifications for mini-grid systems ready for future grid-connection:

- inverter with AC input
- inverter outputs (voltage and frequency values) aligned with national grid parameters
- monitoring system able to record also inlet energy vectors
- electrical protections (switches, surge arresters) installed on the grid side

Sources: SEforALL, 2021. From Procurement to Performance: Towards a private sector-led, service-based model to scale up sustainable electrification of public institutions; MININFRA, 2019. Ministerial Guidelines for Mini-grid Development.

Current situation regarding backup supply for HF

- Countrywide, in the period July 2021 to June 2022, the average duration per interruption was 18.59 hours/year while the number of interruptions was 45.67 times/year.
- All the tertiary and upper healthcare facilities (HFs) are grid-connected and have a fuel genset backup unit.
- With regard to primary HFs, all healthcare centres are grid-connected and have a fuel genset backup unit, while healthcare posts are not usually equipped with a backup unit.
- The fuel genset backup unit's size varies with the HF type: on average, hospitals have a 105 kVA genset, and healthcare centres have a 20 kVA genset.
- Costs:
 - The average cost for a diesel genset in the local market is around 300.000 RWF/kVA (USD 278/kVA).
 - Diesel gensets are usually provided through donations and are only used in case of power shortages.
 - Hospitals' average expenditure for running a genset is 166,005 RWF/month (USD 153/month).
 - Healthcare centres' average expenditure for running diesel backup unit is 26,183 RWF/month (USD 24/month).
- Diesel backup units are considered an unaffordable solution by stakeholders to cover the continuous interruptions, requiring a deep dive into alternative backup solutions.

Source: REG, Annual Report 2021-2022; Field Survey and MoH consultation.



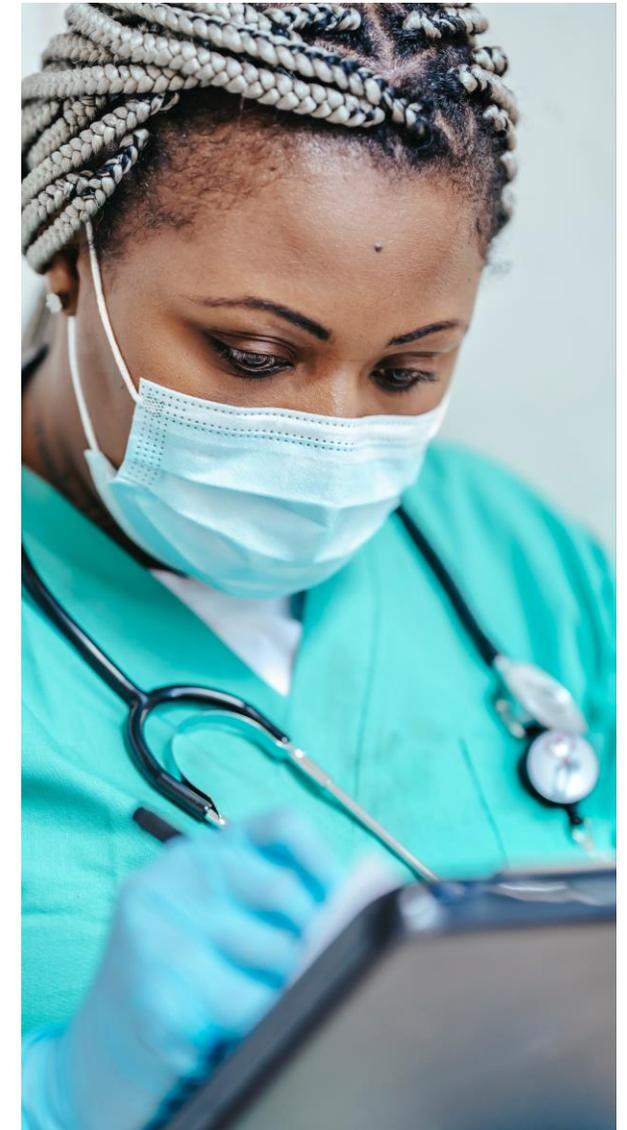
Service quality: Stakeholders' perception

Stakeholders' perception is relevant for assessing and planning upgrades in the healthcare sector:

- For 61% of interviewed stakeholders the service quality of primary HFs (healthcare centres and health posts) is low or very low.
- For 62% of interviewed stakeholders the service quality of national hospitals is high or very high.
- Interviewed stakeholders do not agree on the service quality of district and provincial hospitals.

LEVEL OF QUALITY OF EXISTING HEALTHCARE SERVICES PERCEIVED BY STAKEHOLDERS

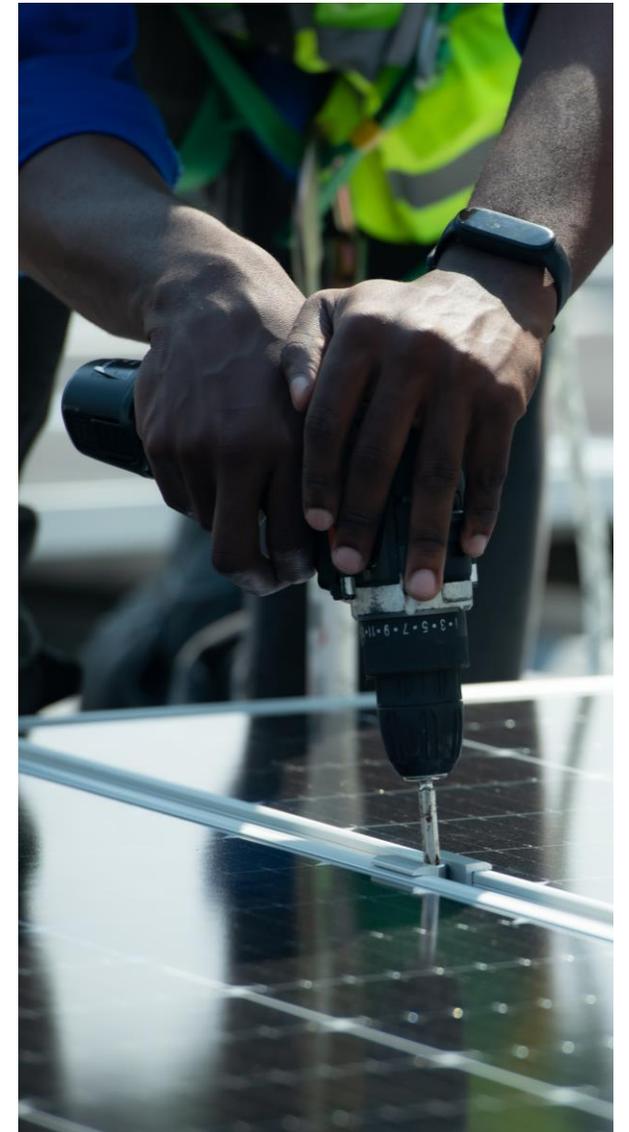
	NATIONAL LEVEL	PROVINCIAL LEVEL	DISTRICT LEVEL	SECTOR LEVEL	CELL LEVEL	VILLAGE LEVEL
VERY LOW	0%	6%	6%	17%	17%	11%
LOW	6%	28%	39%	44%	44%	28%
HIGH	56%	33%	22%	11%	11%	22%
VERY HIGH	6%	0%	0%	0%	0%	0%
BLANK	33%	33%	33%	28%	28%	39%



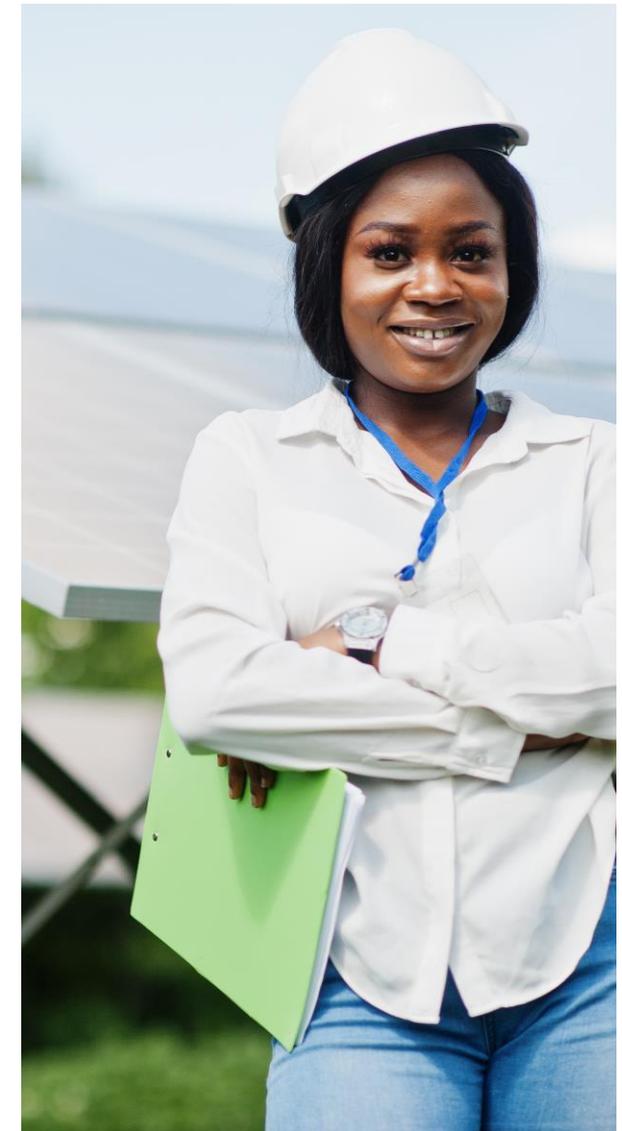
Indicative component standards for solar equipment

IEC and ISO standards are specifically required to be adopted in mini-grids according to the “Ministerial Guidelines for Mini-grid Development” (MININFRA, June 2019)

STANDARD	DESCRIPTION
SOLAR-PV STANDARDS	
IEC 61215	Crystalline silicon (c-Si) terrestrial PV modules – Design qualification and type approval. Includes tests for thermal cycling, humidity and freezing, mechanical stress and twist and hail resistance
IEC 61646	Thin-film terrestrial PV modules - Design qualification and type approval PV module safety qualification
IEC 61730	PV module safety quality. The certification defines different application classes: safety class 0 - restricted access applications; safety class 2 - general applications; safety class 3 - low voltage applications
IEC 60364	Protection against electric shock. Module safety assessed based on: durability; high dielectric strength; mechanical stability; Insulation thickness and distances.
IEC 61701	Resistance to salt mist and corrosion. Required for modules being installed near the coast or for maritime applications
INVERTER STANDARDS	
EN 61000-6-1:2007	Electromagnetic compatibility (EMC). Generic standards, immunity for residential, commercial and light-industrial environments.
EN 61000-6-2:2007	EMC. Generic standards. Immunity for industrial environments.
EN 61000-6-3:2007	EMC. Generic standards. Emissions standard for residential, commercial and light-industrial environments.
EN 61000-6-4:2007	EMC. Generic standards. Emissions standard for industrial environments.



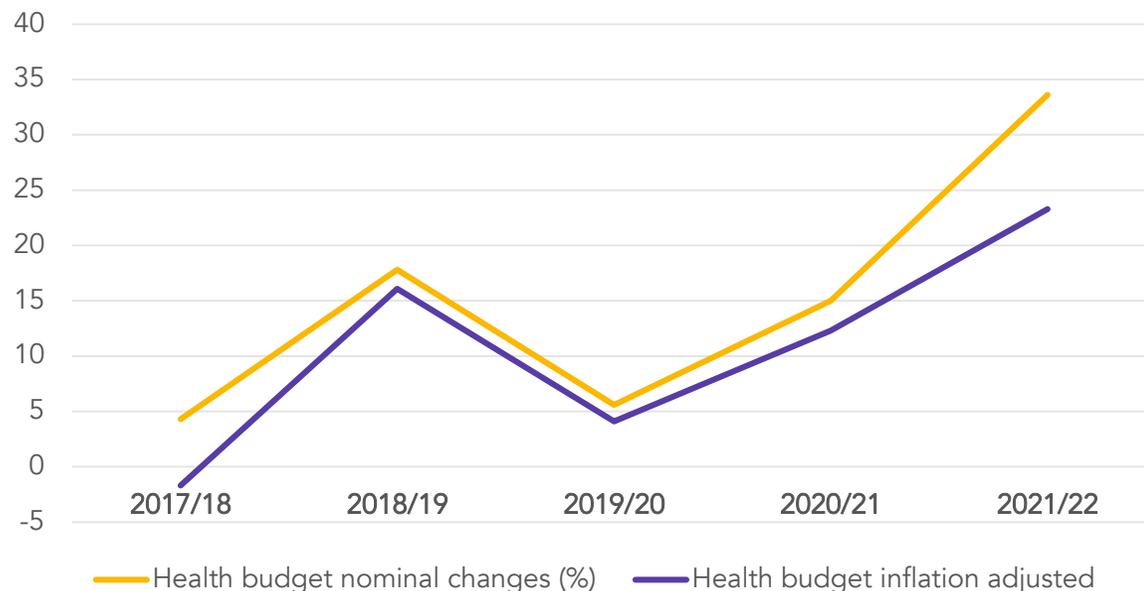
STANDARD	DESCRIPTION
INVERTER STANDARDS (CONTINUED)	
EN 55022: 2006	Information technology equipment- Radio disturbance characteristics. Limits and methods of measurement.
EN 50178: 1997	Electronic equipment for use in power installations.
IEC 61683: 1999	Procedure for measuring efficiency in Photovoltaic systems—Power conditioners.
IEC 61721: 2004	Characteristics of the utility interface.
IEC 62109-1&2: 2011/12	Safety of power converters for use in photovoltaic power systems.
IEC 62116: 2008	Islanding prevention measures for utility-interconnected photovoltaic inverters.
LITHIUM BATTERY STANDARDS	
IEC 62619	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications
IEC 62133	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications
IEC 61960	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications
BATTERY RECYCLING AND DISPOSAL STANDARDS	
Directive 91/157/EEC	Regulates the manufacture and disposal of batteries containing dangerous substances with the aim of improving their environmental performance
BS EN 61429	Marking of secondary cells and batteries with the international recycling symbol ISO 7000-1135
Directive 2006/66/EC	It mainly covers batteries containing hazardous elements such as mercury, cadmium or lead, and deals also with targets for waste battery collection rates



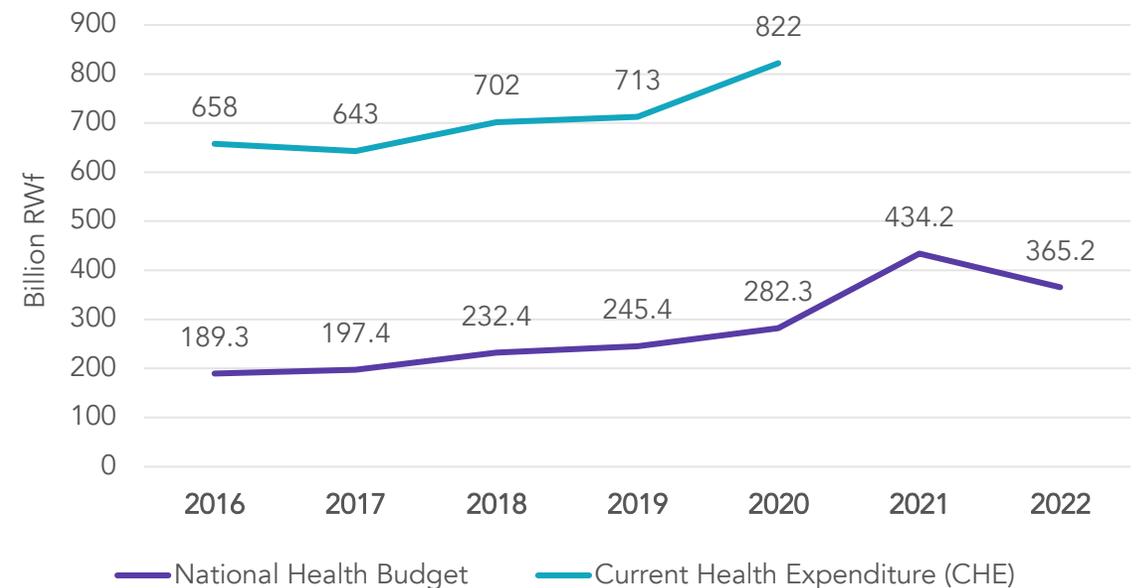
Annual Government budget: Relevance of inflation

In 2021/22, a nominal increase of 33.6% was recorded in the healthcare sector budget while the real (inflation adjusted) budget increase was narrower, recording 23.3%. To reduce this inflationary effect on budgets, there is a need to strengthen macroeconomic stability including maintaining inflation at a minimum level, namely below 5 per cent as a national target of inflation.

HEALTH BUDGET CHANGE: INFLATION ADJUSTED AND NOMINAL CHANGES



HEALTH BUDGET AND HEALTH EXPENDITURE



Sources: [UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023](#)

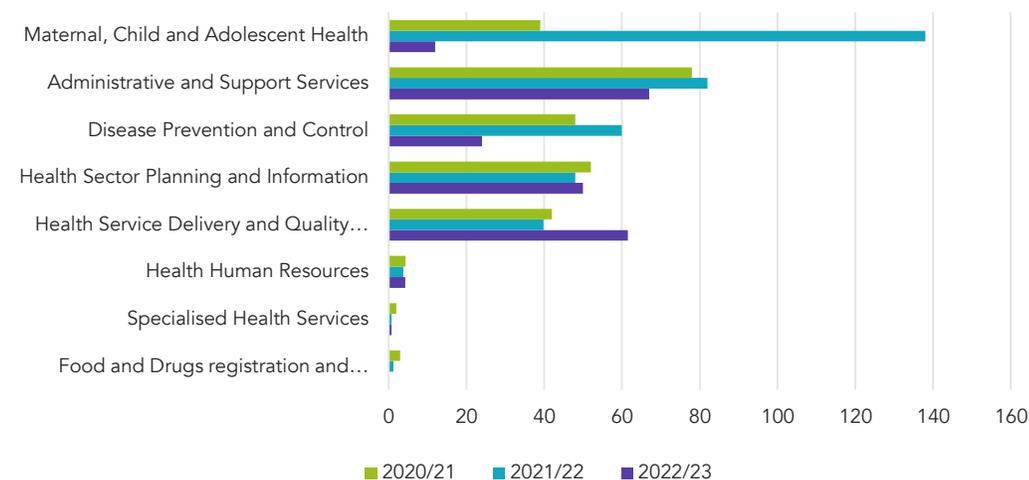
Annual Government budget: Relevance of inflation (cont'd)

Budget line dedicated to the Health Service Delivery and Quality, including HF infrastructure maintenance, is about 60% of the government budget, but just 10% of total health expenditure.

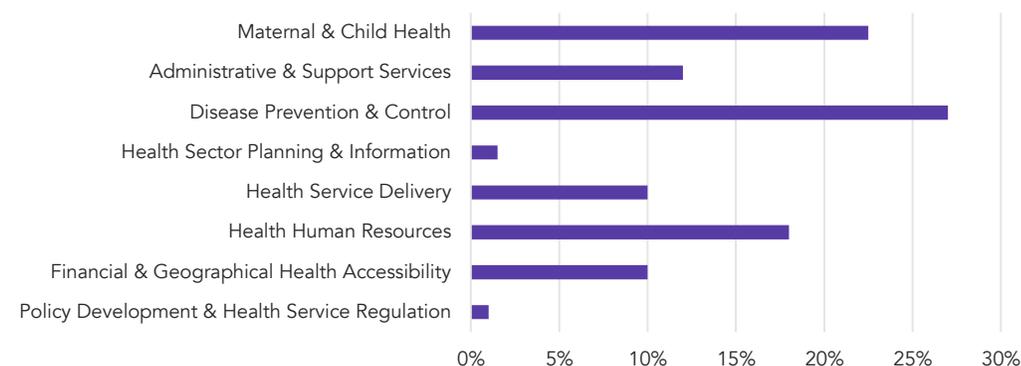
HEALTHCARE EXPENDITURE (2019–2020)	RWF (MILLIONS)
Domestic expenditure on healthcare	375,585
Public expenditure on healthcare (tax rev, etc.)	218,345
Private expenditure on healthcare – Total	157,240
Private expenditure on healthcare – Not OOP	128,068
Internally generated revenue (public HFs)	94,495
Private expenditure on healthcare (private HFs and pharmacies)	33,573
Private expenditure on OOP	29,172
OOP - Private HFs and pharmacies (co-payment and OOP)	18,672
OOP - Public HFs (co-payment) with an assumption of 10% of IGR	10,499
External (On- & Off-budget)	276,898
SBS – On-budget	69,972
External – On-budget	53,533
External – Off-budget	153,392

Sources: UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023; Ministry of Health. Health Resource Tracking Output report 2022; Ministry of Health, 2011. Rwanda Health Service Costing.

BUDGET ALLOCATIONS BY HEALTH SECTOR PRIORITIES IN RWF BILLION



HEALTH EXPENDITURE PER CATEGORY (2020)



Government costs per HF for 2023–2024

- By 2024, the mean per capita cost for healthcare is forecast at 44,827 RWF (USD 60), up from 27,415 RWF in 2018 (USD 36). This means that in six years, the mean per capita cost for healthcare will almost double.
- The highest expenditure is on healthcare centres, which, together with hospitals, manage chronic illnesses, immunization and the distribution of insecticide-treated mosquito nets.

LEVEL OF CARE	COSTS (MILLION RWF)		# HF	COST/HF
	2023	2024		
Community	34,797	37,065		
Healthcare post	6,056	7,146	658	10.86
Healthcare centre	129,298	116,732	513	227.55
Hospital	81,063	87,894	56*	1,569.53
National programme	79,995	70,442		
Health system cost	291,407	319,909		
Grand total	622,617	639,188		
Total cost per capita (mean)	44,610	44,827		

Sources: MoH. Fourth Health Sector Strategic Plan. July 2018 – June 2024. Self-processed data.



Complete List of Funding Agencies

Who financed the construction of facilities?

- MININFRA
- Partners in Health
- Catholic Church
- Adventist Church
- Enabel
- Anglican Church
- Rwanda Biomedical Centre

Who financed the equipment of facilities?

- MoH
- Global Fund
- Partners in Health
- Catholic Church
- Hospital itself
- Adventist Church
- CBC coag
- Enabel Program
- Anglican Church
- Rwanda Biomedical Center
- CBM
- EIB

Who financed the energy supply systems and/or connection of the facilities?

- MoH
- USAID
- UNDP
- Health centre itself
- Catholic Church
- Adventist Church
- Anglican Church
- EU
- GIZ
- EnDev
- World Bank
- AfDB
- SIDA
- EIB
- AFD
- EEP
- KfW Development Bank's Facility Investing
- The Rockefeller Foundation
- Joint SDG Fund
- REPP
- USADF
- EIB
- Saudi Fund for Development

Other types of financing

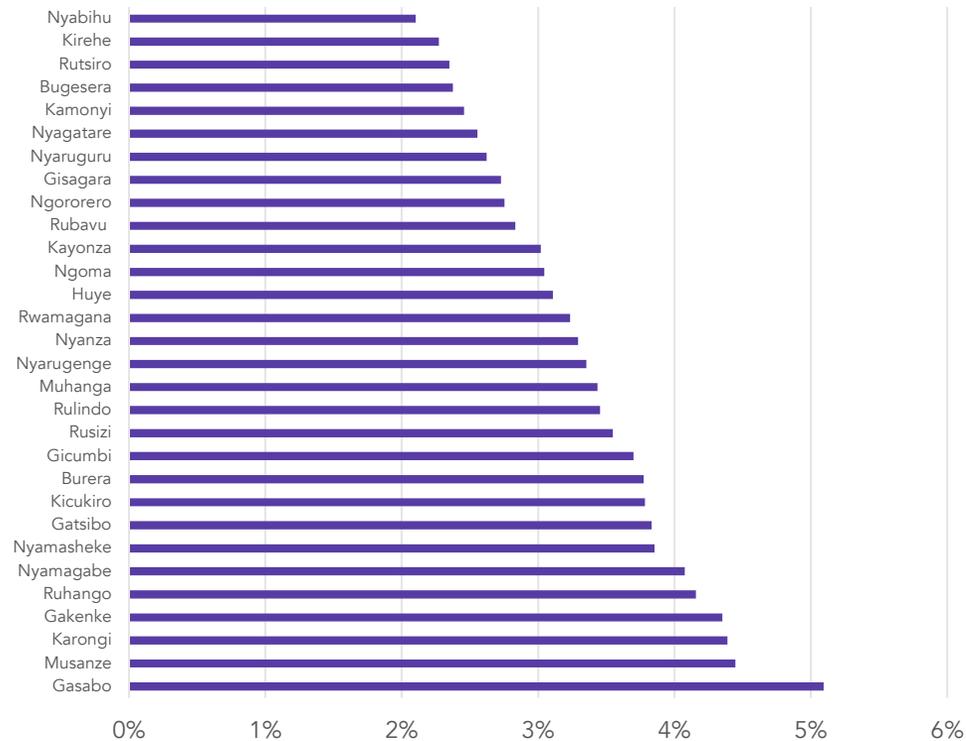
- SIDA (Swedish Development Agency) is supporting Universal Access to electricity through Loan Guarantees in partnership with the BRD and World Bank [link](#)
- BRD is managing and financing large-scale projects on renewable energy and energy efficiency, such as the Green Climate Fund.

Sources: stakeholders' consultations

State-level healthcare expenditure

- Around 10% of national healthcare expenditure is concentrated in districts of Kigali.
- A significant portion of healthcare expenditure goes to referral hospitals, which are located in the following districts: Huye, Gasabo, Nyarugenge, Ngoma, Karongi, Gasabo, Musanze and Kicukiro.

RWANDA HEALTHCARE EXPENDITURE PER ADMINISTRATIVE DISTRICT (%) (2017)



RWANDA HEALTHCARE EXPENDITURE PER ADMINISTRATIVE DISTRICT (%) PER LOCAL POPULATION (2017)



Sources: [Health Resources Tracking Output Report. Expenditure for FY 2015/16 and 2016/17.](#)

Public-private partnerships (PPPs) in Rwanda: Overview

The GoR approach to PPPs:

- The private sector can play a pivotal role in supporting the accelerated delivery of strategic national investments via PPPs.
- PPPs are an alternative method for procuring and delivering both quality infrastructure assets and quality services.
- Traditionally, infrastructure has been financed by the GoR through public procurement managed by the contracting authorities, which paid for the infrastructure works and assumed responsibility of the asset after completing construction. Thus, the long-term management of infrastructure assets and their related risks were the direct responsibility of the GoR.
- PPPs leverage public capital to attract private capital and undertake a larger shelf of infrastructure projects.
- PPPs bring in the advantages of private sector expertise and cost-reducing technologies as well as efficiencies in operation and maintenance of infrastructure.
- PPP projects need to balance the divergent needs of the commercial private interests with the objectives of inclusive growth of the GoR.
- PPP projects need both fair allocation of risks and balancing of gains amongst the private and government partners.
- The GoR enacted LAW N°14/2016 of 02/05/2016 for governing PPPs.

Sources: [GoR, 2018. Public Private Partnerships Guidelines](#)

The following PPP arrangements are embedded in law:

- Management Contract
- Build-Operate-Own (BOO)
- Build-Operate-Transfer (BOT)
- Lease-Operate-Develop (LOD)
- Any other arrangement as may be determined by an Order of the Prime Minister

Potential sectors for PPPs in infrastructure and services are the following:

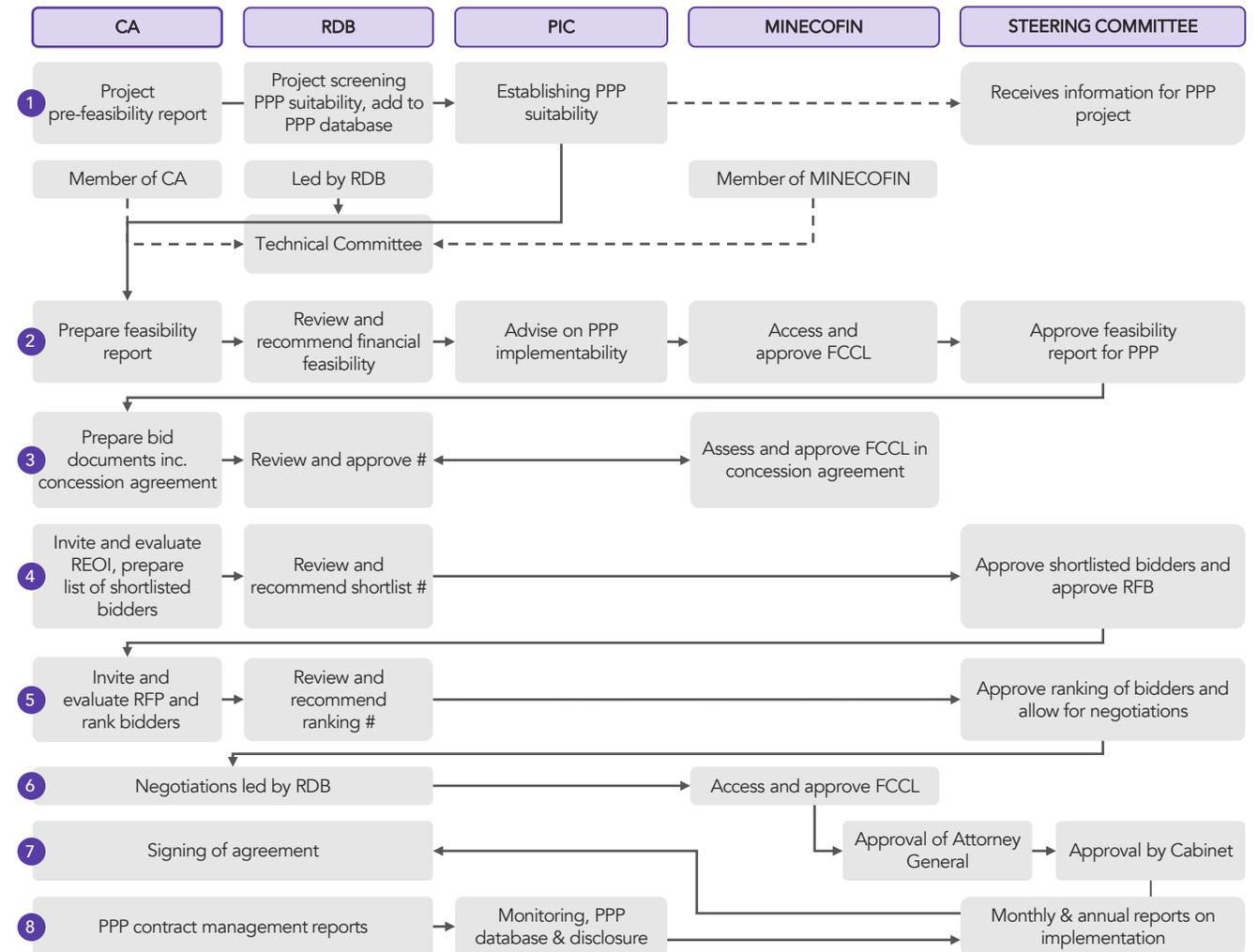
- Transportation, including roads, railways, airports, bridges, tunnels, waterways and inland ports
- Energy including water energy, gas energy, solar energy, wind energy, geothermal energy, biogas energy and peat
- Social affairs, including those related to education, culture, health, sports and leisure
- Tourism, including tourism related to history, hotels, parks and tourism attractions
- Natural resources and environment, including those related to forestry, oil and oil products, minerals, water sanitation and waste disposal
- Telecommunication and information technology
- Any other sectors as may be determined by an Order of the Prime Minister

PPPs in Rwanda: Overview

List of institutions and committees involved in PPP Project development and implementation:

- PPP Steering Committee (PPPSC)
- Contracting Authority (CA)
- Rwanda Development Board (RDB)
- Public Investment Committee (PIC)
- Ministry of Finance and Economic Planning (MINECOFIN)
- Ministry of Justice (MINIJUST)
- Rwanda Utility Regulatory Authority (RURA)

PROCESS FOR PPP-BASED PROCUREMENT



Sources: [GoR, 2018. Public Private Partnerships Guidelines](#)

Strengths and opportunities for PPPs in the HFE sector

STRENGTHS AND OPPORTUNITIES	PUBLIC SECTOR	PRIVATE SECTOR
Risk transfer to the private players	x	
Electrifying the community instead of the HF alone to decrease the cost of service	x	x
Bringing private actors into the HFE sector to make HFs more efficient with lower resources	x	
Access to public finance and investing mechanisms		x
Leveraging on the public partner to speed up the development process		x
Efficiency, fund mobilization, high impact, investing in risky areas	x	x
Attracting private investment by means of PPPs	x	x
To strengthen /innovate the existing institutional framework	x	
Easy scaling up	x	x
Identification of a replicable mechanism for promoting energy access	x	x
Identification of a replicable mechanism for promoting sustainable healthcare infrastructures	x	x

Sources: [UNICEF. Health Budget Brief. Investing in Children's Health in Rwanda 2022/2023](#)

Weaknesses, obstacles and barriers for PPPs in the HFE sector

WEAKNESSES, OBSTACLES AND BARRIERS	PUBLIC SECTOR	PRIVATE SECTOR
Long term PPPs tend to be costly		x
Long term sustainability is weak, after the donor funding, since there is no guarantees for "revenue requirements"		x
Private sector is mainly driven by revenues, not considering public necessities (service quality)		x
More suitable for primary healthcare (health posts, health centres)	x	x
Long approval process and bureaucracy		x
Risk of downplay social aspects in favour of business management	x	
Increased business risk due to a strong external condition		x
Pipeline/large projects justify the PPP development costs	x	x
Perceived off-taker risk associated to the public sector		x
Low commitment of public sector		x
Poor communication	x	x
Financial insecurity: PPP with local facilities would be good if de-risked by external actors. A key weakness is that a private operator cannot switch off the electricity supply in case of non-payment of monthly charges as it is a public and vital service.		x

Sources: stakeholders' consultations

Health sector financing mechanisms: Performance-based financing (PBF)

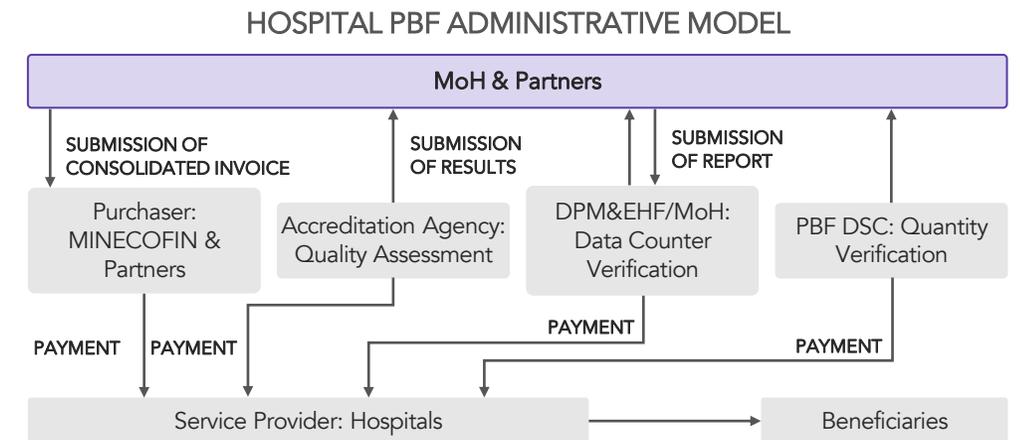
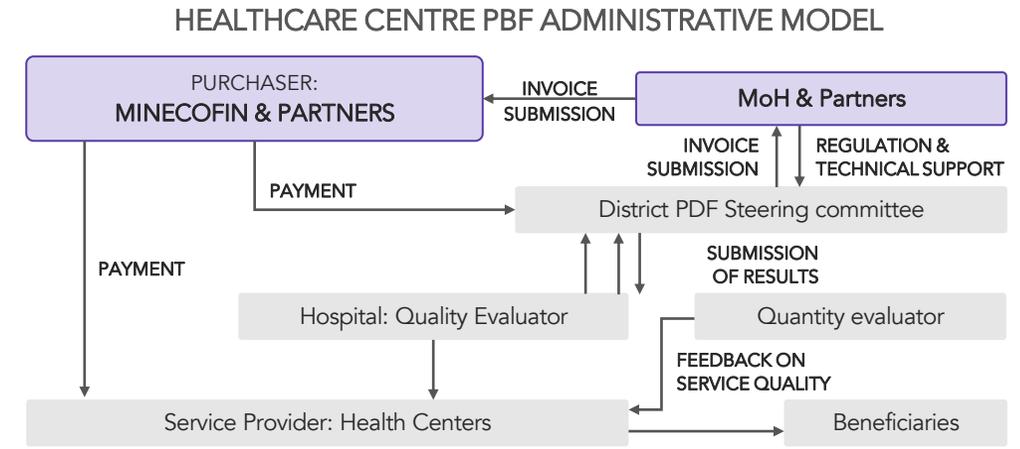
PBF is an institutionalized approach used for assessing quality levels in hospitals and healthcare centres. It represents a financing mechanism aimed at providing healthcare workers (and their respective facilities) a monetary incentive when they achieve qualitative and quantitative performance indicators.

Examples of such quantitative indicators are:

- Number of newborn babies who attend all four postnatal care visits
- Number of pregnant women who receive a full course (90+ days) of iron folic acid tablets
- Number of pregnant women with four standard antenatal care visits.

The Ministry of Health (MoH) oversees the management of the PBF, which regulates, supervises and facilitates the PBF implementation, as well as mobilizes and allocates resources. MINECOFIN is the main purchaser of performance results.

The District Steering Committee coordinates the PBF activities at the decentralized level, including the healthcare facility and the community.

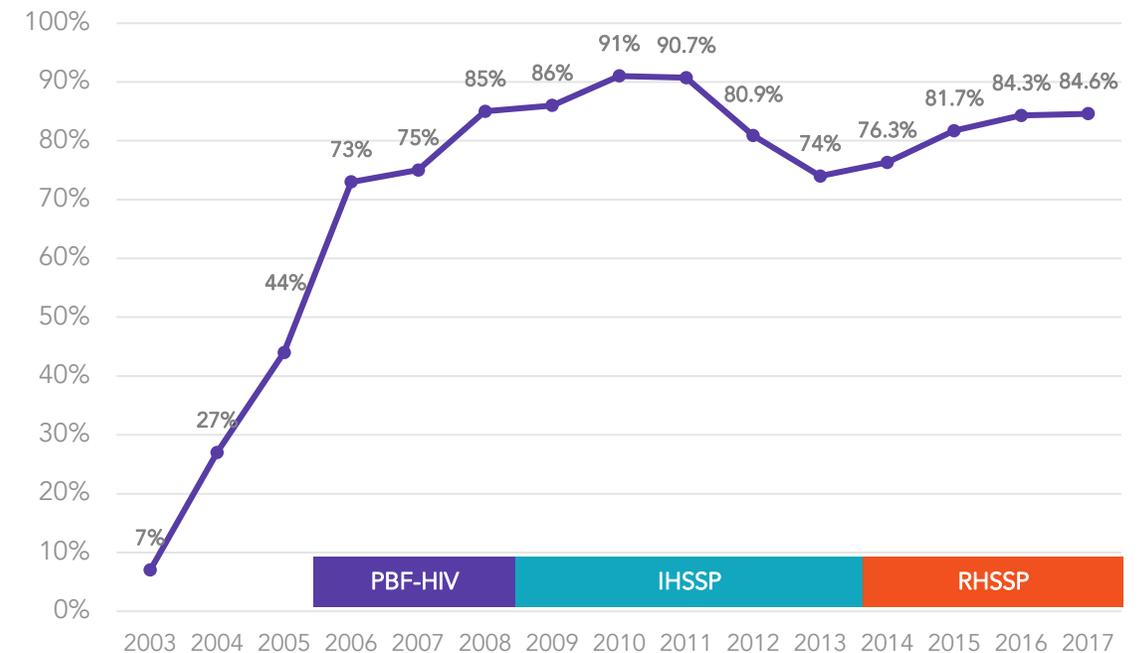


Source: [Ministry of Health, 2021. Performance Based Financing Procedures Manual for Health Facilities \(Hospitals and Health Centers\)](#)

Health sector financing mechanisms: Health insurance

- All Rwandans must be covered by health insurance according to the law.
- Rwandaise d'Assurance Maladie (RAMA), Military Medical Insurance (MMI) and Community Based Health Insurance (CBHI) are the main medical insurance schemes.
- In addition of those institutions, private insurance companies provide also health insurance products.
- The diversity of all those structures allows almost universal access to healthcare to the population.
- Rwanda is the country with the highest enrolment in health insurance in Sub-Saharan Africa.
- The government has the biggest role (87%) through the CBHI, RAMA and MMI, while private companies have a minor role.
- Insurance schemes in Rwanda can be grouped into three categories:
 - Public health insurance
 - Private health insurance
 - Donor-based Insurance

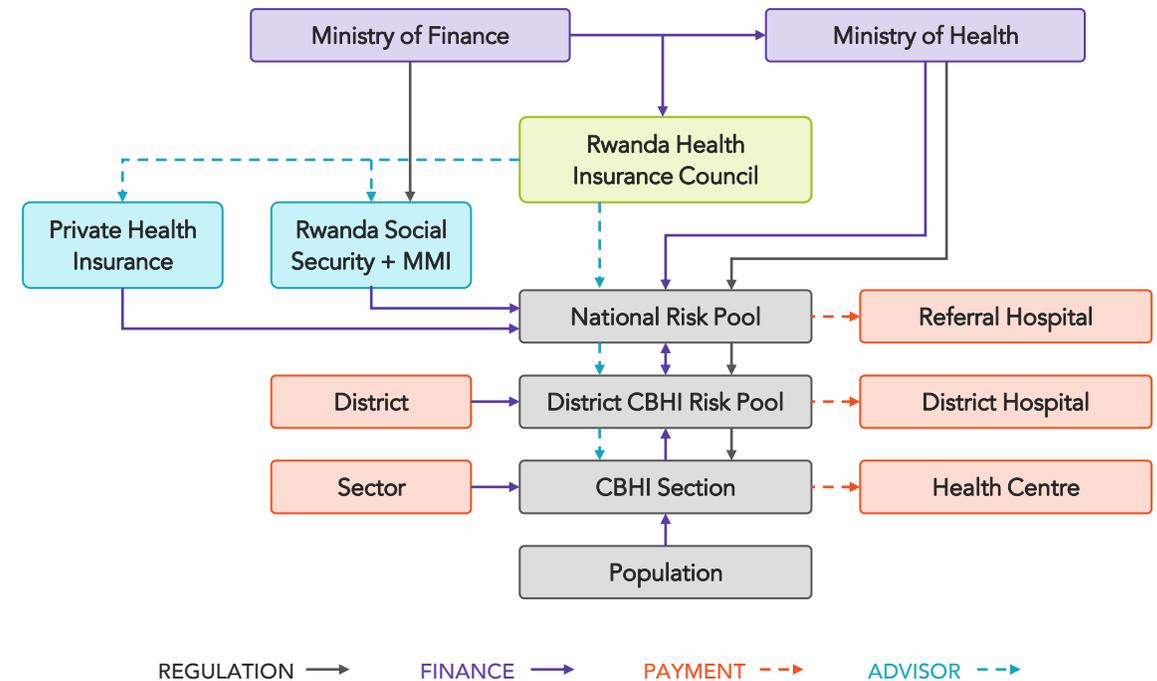
COMMUNITY-BASED HEALTH INSURANCE COVERTURE RATE



Source: Chemouni B., 2018. [The political path to universal health coverage: Power, ideas and community-based health insurance in Rwanda](#); ILO, [Social protection](#);

Health sector financing mechanisms: Community-based health insurance (CBHI)

- In Rwanda, all family members who are not insured by any other health insurance scheme are required to be registered and pay the CBHI.
- Management of the CBHI management is carried out at the district level, where each district in Rwanda has a fund for it.
- Each healthcare centre at the sector level is a CBHI section. In every village, cell and sector, there is a mobilization committee for CBHI, which deals with the collection of contributions and sensitization of the population.
- The contributions are made annually three months prior to the start of the annual fiscal, to avoid the loss of service to the sick people.
- The CBHI is diffuse and cover the entire family, however main problems are: (i) low quality healthcare, (ii) slow service and (iii) limitation in buying medicines, resulting in relevant out-of-pocket (OOP) expenses.
- The implementation of CBHI in Rwanda has reduced the OOP spending by patients, increased utilization of maternal healthcare and decreased catastrophic expenditure, but favouring wealthier patients than the poor.



Source: [Structure of the CBHI System in Rwanda](#); Koch, R., et al. [Does community-based health insurance protect women from financial catastrophe after cesarean section? A prospective study from a rural hospital in Rwanda.](#)

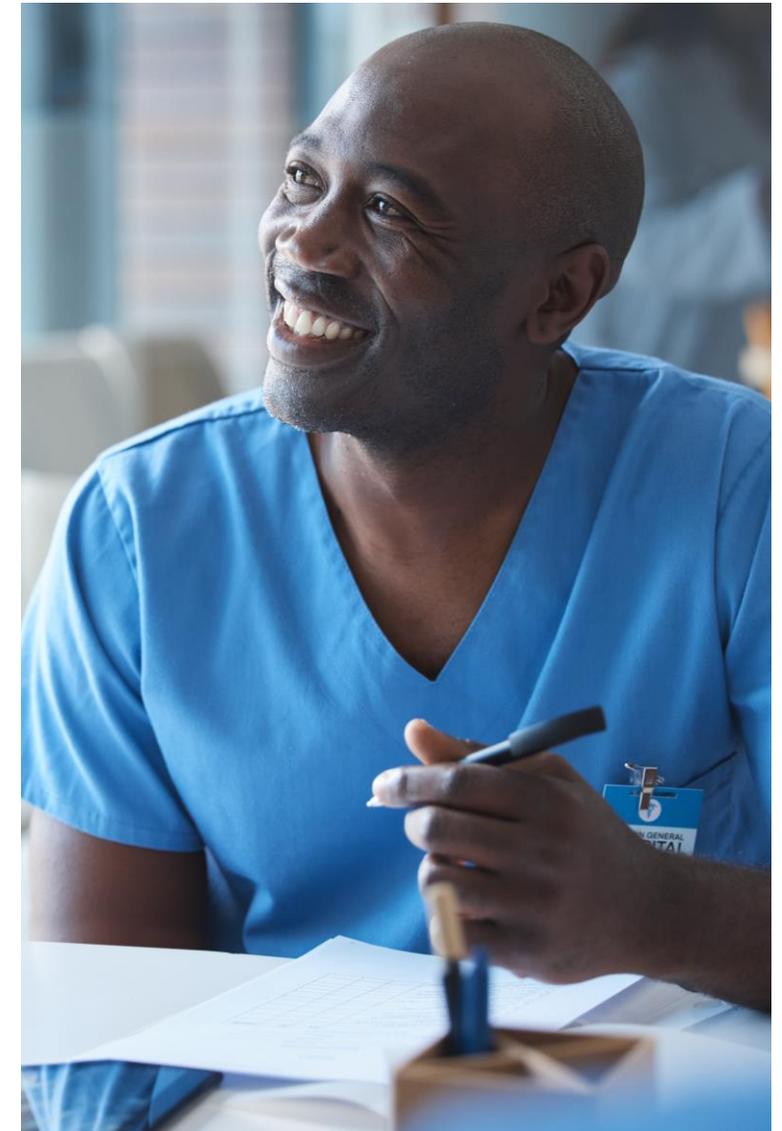
CBHI is based on a 4-tier wealth system (UBUDEHE)

Ubudehe classifies the population based on socioeconomic status and property, and it is used to design the CBHI household contributions.

Rwandans are charged an annual premium plus an OOP at the point of service provision, both adjusted by their socioeconomic status.

- Category 1 patients do not pay any annual premium or OOP; rather, the government and other donors pay 2000 RWF (~USD 2.40) per household member per year for them to be insured.
- Categories 2 and 3 patients pay a premium of 3000 RWF (~USD 3.51) per household member annually and a 10% co-pay for all hospital medical services.
- Category 4 patients pay 7000 RWF (~USD 8.19) per household member annually and cover 10% of hospital medical costs.

Source: [Structure of the CBHI System in Rwanda](#); Koch, R., et al. [Does community-based health insurance protect women from financial catastrophe after cesarean section? A prospective study from a rural hospital in Rwanda.](#)

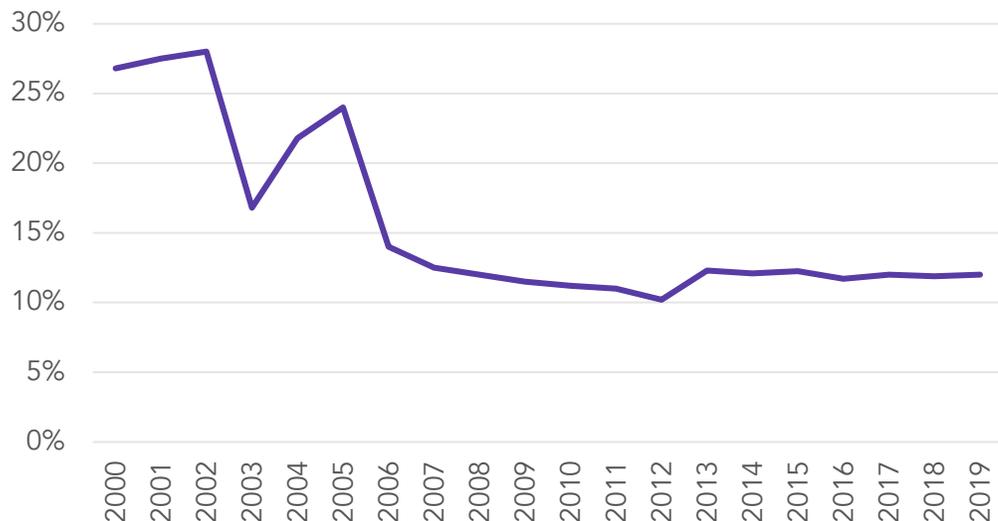


Healthcare sector financing mechanisms: OOP mechanism

Most stakeholders estimate that:

- Out-of-pocket mechanisms are not widespread in the country, neither in hospitals nor in healthcare centres.
- Both in healthcare centres and hospitals, the risk of not being paid is relatively low.

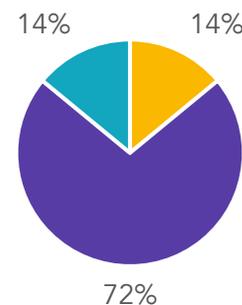
OUT-OF-POCKET EXPENDITURE (% OF CURRENT HEALTH EXPENDITURE)



Source: World Bank data on Rwanda; Stakeholder consultations

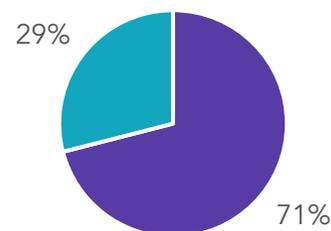
HOSPITALS

Hospital - How much out-of-pocket mechanism is diffused?



Very Low Low High Very High

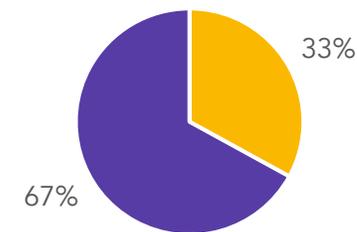
HOSPITAL - WHAT IS THE LEVEL OF RISK FOR NOT BEING PAID FOR THE SERVICE?



Very Low Low High Very High

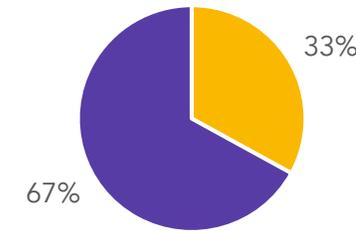
HEALTH CENTERS

Health Centre - How much out-of-pocket mechanism is diffused?



Very Low Low High Very High

HEALTH CENTRE - WHAT IS THE LEVEL OF RISK FOR NOT BEING PAID FOR THE SERVICE?



Very Low Low High Very High

Credit enhancement instruments in the HFE Sector

Guarantee mechanisms

Guarantees are sometimes required to attract appropriate funding, particularly for technologies and markets that are not yet mature. In many countries, governments and states provide offtake guarantees for real asset projects. These guarantees are often offered by a third party to hedge the project against default and loss of revenue.

Example: Donors, international funds, development banks, state government-backed guarantees

Concessional funding

A strategic blend of concessional funding (from development finance and philanthropic funds) and commercial funding by investors, encourages private capital flows, reduces risks and creates lower blended costs. This helps provide comfort to private investors and addresses their concerns around market and project risks.

Example: All-On USADF Off-grid Challenge Funds

Source: [SEforALL, Powering Healthcare – Nigeria Market Assessment and Roadmap](#); [EDCL, 2021. Strategic Environmental Assessment for Rwanda Universal Energy Access Program \(RUEAP\)](#)

Public financing

There are three main type of public financing to HFE projects:

- Subsidy on the EUCL electricity tariff for HFs.
- Off-grid private initiatives that negotiate electricity tariffs with RDB to reach the project viability, but without direct public subsidies on off-grid tariffs to meet the customers' ability to pay.
- BRD has created credit lines for off-grid solar financing in the local currency, both directly to companies as well as indirectly through financial institutions for purposes of promoting off-grid electrification.

Grant subsidies

Grants may subsidise CAPEX, including direct or indirect costs. Optimal outcomes are approximated with two forms of subsidy: one on outputs/milestones (pure grant), and the other at the market-entry or investment point (results-based financing, RBF).

Reference values in the HFE sector:

- RBF grant (up to 50%–60% of CAPEX);
- Pure grant (up to 20%–30% of CAPEX in advance)

Renewable energy credits

Renewable power systems generating electricity can trade in its equivalent value for credits that can be monetized as additional income. These could raise additional funds to add to the pool of revenue for healthcare facilities. However, such a mechanism requires a project at scale to be activated.

Example: Energy Attribute Certificates, carbon credits, D-RECs.

Equity from external investors

Equity financing is the process of raising capital through the sale of shares. By selling shares, a business effectively sells ownership in its company in return for cash. A startup that grows into a successful company will have several rounds of equity financing as it evolves, as it typically attracts different types of investors and may use different equity instruments.

Example: Angel investors and venture capitalists.

Source: SEforALL, Powering Healthcare – Nigeria Market Assessment and Roadmap; EDCL, 2021. Strategic Environmental Assessment for Rwanda Universal Energy Access Program (RUEAP)



Main elements of delivery models proposed for Rwanda

DELIVERY MODEL	OWNERSHIP MODEL	OPERATING MODEL	SERVICE PROVIDED	MODEL IN A NUTSHELL	APPLICATION
PUBLIC	public	build, own, operate in outsourcing to private entity (BOO)	Off-grid electricity supply for HF	The public entity builds solar-PV POWER systems to improve the HF asset and outsources the system O&M to a private entity.	Primary level HFs (healthcare posts)
			On-grid energy backup for HF	The public entity builds RE BACKUP systems to improve the HF asset and outsources the system O&M to a private entity.	Primary level HFs (healthcare centres & healthcare posts)
NOT-FOR-PROFIT	public	build and transfer to public entity (BT)	Off-grid electricity supply for HF	The not-for-profit entity builds solar-PV POWER systems funded by grant financing without PPP, and transfers asset to the public entity while remains to shadow the start-up phase	Primary level HFs (healthcare posts)
			On-grid energy backup for HF	The not-for-profit entity builds RE BACKUP systems funded by grant financing, and transfers asset to the public entity	Primary level HFs (healthcare centres & healthcare posts)*
PRIVATE	private	build, own, operate (BOO)	Off-grid electricity supply for HF & WEF-related services for communities (in addition to electricity supply for domestic and commercial off-takers in case of mini-grid)	The private entity builds solar-PV POWER systems under a PPP with the MoH, to provide HF with electricity supply, and sells water-energy-food (WEF)-related services to the surrounded communities (including domestic and commercial off-takers in case of mini-grid).	Primary level HFs (healthcare posts)

* Replacing diesel-based backup with RE BACKUP systems in tertiary and upper HFs is a potential option only if supported by not-for-profit financing to boost clean energy and energy savings, otherwise there is no space in the domestic budget; it is not considered a priority by the MoH, and it is not viable for private entities, thus it is not included in this study.

DELIVERY MODEL	PROJECT DEVELOPER	FINANCING SOURCES	FINANCING MECHANISMS	PRIVATE SECTOR ENGAGEMENT (PSE)	PUBLIC-PRIVATE PARTNERSHIP (PPP)	TECHNOLOGY	DELIVERY MODEL READINESS LEVEL
PUBLIC	Public entity	Domestic budget, donors, development banks, development/ impact funds	Public tender with progress payment structure	EPC contractor, Outsourced O&M Operator (awarded within one or two different public tenders)	NO	Stand-alone systems	To be tested. Concept is based on current diesel-backup procurement and O&M. Innovation lies in (i) performance-based O&M, (ii) cashflow for electricity payment
NOT-FOR-PROFIT	Not-for-profit entity	Not-for-profit contribution, donors, foundations	Grant (Results-based-Financing or outcome/ milestone grant)	Project Developer and O&M supervisor in the start-up phase (up to 12 months)	NO	Stand-alone systems	To be tested, as above.
PRIVATE	Private entity	Private capital, donors, foundations, development banks, development/ impact funds	Equity, junior or senior debt, grant (RBF or outcome/ milestone grant)	Project Developer, Owner and O&M Operator	YES	Stand-alone systems / mini-grids	Fully demonstrated. It is inspired to the OffGridBox model.

Business sectors with high potential for private sector engagement (PSE)

How does Rwanda differ from other countries in terms of opportunities?



Development of energy transmission and distribution infrastructure



Development of civil and WASH infrastructure



Development of health infrastructure



Provision and/or maintenance of medical equipment



Provision and/or maintenance services for energy equipment and power systems



ICT and digitalization services



Provision of advanced medical training and capacity building



High-level studies, analysis, assessments and external evaluations



Productive use of energy



Development of off-taker risk reduction mechanisms (e.g., insurance)

Source: Stakeholder consultation

Rwanda's attractiveness in a nutshell

How does Rwanda differ from other countries in terms of opportunities?

- Policies in place effectively drive the electrification programme
- Adequate coordination among institutions with respect to other Sub-Saharan Africa (SSA) countries
- Local government is well organized and willing to create new opportunities and partnerships
- Good ability to pay for electricity in comparison to other SSA countries
- Good decision-making processes and timing for implementing projects
- Readiness for quickly scaling up at a national level
- Efficient governance structure
- Enabling legal framework regarding doing business
- Easier access to finance in Rwanda than other countries for off grid projects
- Clear bureaucracy procedures level
- Well-known and proven RDB-led process for deploying off-grid energy projects
- Advanced accountability
- Good progresses in terms of local development and decentralization
- Low-risk country, with low corruption and high efficiency in funds management
- Stable and trusty Government

Source: Stakeholder consultation

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About SEforALL

Sustainable Energy for All (SEforALL) is an international organization that works in partnership with the United Nations and leaders in government, the private sector, financial institutions, civil society and philanthropies to drive faster action towards the achievement of Sustainable Development Goal 7 (SDG7) – access to affordable, reliable, sustainable and modern energy for all by 2030 – in line with the Paris Agreement on climate.

We work to ensure a clean energy transition that leaves no one behind and brings new opportunities for everyone to fulfil their potential.



Contact us to learn more

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