



**BTC**

**BELGIAN  
DEVELOPMENT AGENCY**

# TECHNICAL & FINANCIAL FILE

## RENEWABLE ENERGY FOR RURAL DEVELOPMENT PHASE 2 (RERD2) MOZAMBIQUE

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THE BELGIAN  
DEVELOPMENT COOPERATION **.be**

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## ACRONYMS AND ABBREVIATIONS

AFD	Agence Française de Développement (French Development Agency)
AfDB	African Development Bank
ARENE	Autoridade Reguladora Nacional da Energia
BTC	Belgian Technical Cooperation
CAPEX	Capital Expenditures
CB	Capacity Building
CNELEC	Conselho Nacional de Electricidade (The National Electricity Council)
DfID	United Kingdom Department for International Development
DGD	Directorate-General for Development Cooperation and Humanitarian Aid
DIPREME	Provincial Directorates of the Ministry of Mineral Resources and Energy
DUAT	Direito do Uso e Aproveitamento da Terra (Right to Use and Benefit from the Land)
EDF	European Development Fund
EDM	Electricidade de Moçambique (Mozambican Power Company)
EDP	Energias de Portugal
ElectriFi	Electrification Financing Initiative
EnDev	EU funded programme implemented by GiZ ‘Energising Development’
ETR	End term review
EU	European Union
€, EUR	Euro
FAO	Food and Agriculture Organization
FiT	Feed-in Tariff
FUNAE	Fundo de Energia (National Energy Fund)
GBP	United Kingdom Pound
GeTFiT	Global Energy Transfer Feed in Tariff
GIS	Geographical Information System
GiZ	(Deutsche) Gesellschaft für Internationale Zusammenarbeit
GoM	Government of Mozambique
HCB	Hidroeléctrica de Cahora Bassa
HH	Household
HIV	Human Immunodeficiency Virus
HQ	Headquarters
HR	Human Resources
IA	Implementation Agreement
ICP	Indicative Cooperation Program
ICT	Information and Communications Technology
IFAD	International Fund for Agricultural Development
IMU	Intervention Management Unit
IPP	Independent Power Producer
ITA	International Technical Assistant
JICA	Japan International Cooperation Agency
KfW	German Development Bank (Kreditanstalt für Wiederaufbau)
LED	Light Emitting Diode

MDG	Millenium Development Goals
MIREME	Ministério dos Recursos Minerais e Energia (Ministry of Mineral Resources and Energy)
MITADER	Ministry of Rural development (MITADER)
MONOP	Operational Monitoring report of the Country
MOTRACO	Mozambican Transmission Company
MTR	Midterm review
MZM/MZN	Mozambican Metical
M&E	Monitoring and Evaluation
NGO	Non-governmental organisation
O&M/OM	Operation and Maintenance
OPEX	Operational Expenditures
PAYG	Pay-As-You-Go
POP	Operational Planification
PPA	Power Purchase Agreement
PPP	Public-Private Partnership
PV	(Solar) Photovoltaic
RE	Renewable Energy
RECP	Renewable Energy Cooperation Programme
RERD1	Renewable Energy for Rural Development Phase 1
ResRep/RR	Resident Representative
SE4All	Sustainable Energy for All
SHS	Solar Home System
SMEs	Small and medium-sized enterprises
SNV	Netherlands Development Organisation
TA	Technical Assistance/ Technical Assistant
TFF	Technical and Financial File
ToR	Terms of Reference
UNEP	United Nations Environment Program
USD	United States Dollar
VAT	Value Added Tax

#### **Currency (February 2017)**

USD 1	= MZN 70
EUR 1	= MZN 76

#### **Energy Units:**

W	Watt
kW	Kilowatt (1.000 W)
MW	Megawatt (106 W)
GW	Gigawatt (109 W)
Wp	Watt peak
kWp	Kilowatt peak
Wh	Watt hour
kWh	Kilowatt hour
GWh	Gigawatt hour

## EXECUTIVE SUMMARY

The Indicative Cooperation Program (ICP 2013-2017) between Belgium and Mozambique allocates a total grant envelope of 16 million € to the energy sector in Mozambique, split over two interventions:

- Direct investments (Renewable Energy for Rural Development phase 2, 12M€)
- Institutional and organizational strengthening and capacity development at the Ministry of Energy (CBMIREME, 4M€)

These interventions will contribute to the economic productivity and social service delivery in rural Mozambique through the provision of sustainable, affordable and environment-friendly energy.

The present intervention builds on the results of the first intervention “Renewable energy for rural development”, that started in 2010 and focused on installations of photovoltaic systems in schools, health centres and administrative buildings as well as water pumping systems and development of micro-hydro with isolated mini-grids. It will also make use of the studies financed by RERD1.

The intervention will finance the construction of off-grid systems and demonstrate the most suitable management mode for those mini-grids. This activity will focus on large mini-grids allowing for the productive use of energy.

To increase the impact in terms of economic development and the sustainability of the energy service, economic uses of energy in a rural development perspective will be actively promoted and all the stakeholders will be involved from the planning stage.

The financing of the construction of the mini-grids (Activity R1.A3, EUR 6,120,000) will be conditional to the establishment of a suitable financial and management set-up in order to ensure that operation and maintenance costs are covered and that subsidies will be budgeted by FUNAE if needed.

The intervention will reinforce the technical and managerial skills of the operators.

The results of RERD1 will be consolidated by strengthening the operation and maintenance unit of FUNAE. The information systems will be integrated and the activity started during RERD1 on remote monitoring will be continued. Improving the metering and fee collection system in order to enforce payment for the service will be a major focus. Digitalisation of services is foreseen wherever it is possible, like pre-payment metering and monitoring systems.

The capacity building component is targeted at improving the project management skills of FUNAE at central level and at a better planning and coordination at the level of the Delegation in the Provinces.

The geographic focus will be on maximum two provinces, to be chosen amongst Zambezia, Nampula, Niassa and Manica.

## ANALYTICAL RECORD OF THE INTERVENTION

DGD National Number	3016524
BTC Navision Code	MOZ 15 034 11
Partner Institutions	Fundo de Energia (FUNAE)
Duration of Specific Agreement	6 years (72 months)
Duration of execution	5 years (60 months)
MOZ Contribution (estimate)	<p>Staff secondment: 150,000 €</p> <p>Transport in the Provinces: 18,000 €</p> <p>Office: 24,000 €</p> <p>TAX/VAT: 1,530,000 €</p> <p>Custom and other taxes: 600,000 €</p> <p>Total: 2,322,000.00 €</p> <p>Participation to investments: up to 10 m€ depending on FUNAE planning, (2018 FUNAE total budget for investments)</p>
Belgian contribution	12,000,000 EUR
Estimated date for Signature of Specific Agreement	2017
Intervention Sector	23210 : Energy generation, renewable sources – multiple technologies
Name	Renewable Energy for Rural Development Phase 2 (RERD2)
General Objective	Contribute to rural economic and social development by increased sustainable access to energy
Specific Objective	Increase access to energy in rural areas by investments in renewable energy systems and support mechanisms ensuring sustainability
Intermediate Results	<ol style="list-style-type: none"> <li>1. Mini-grids provide reliable and adequate energy services</li> <li>2. Technical and financial sustainability of existing systems is improved</li> <li>3. The capacity of FUNAE in planning and project management is improved</li> </ol>

# 1 SITUATION ANALYSIS

## 1.1 Social economic and political context

### 1.1.1 Demography

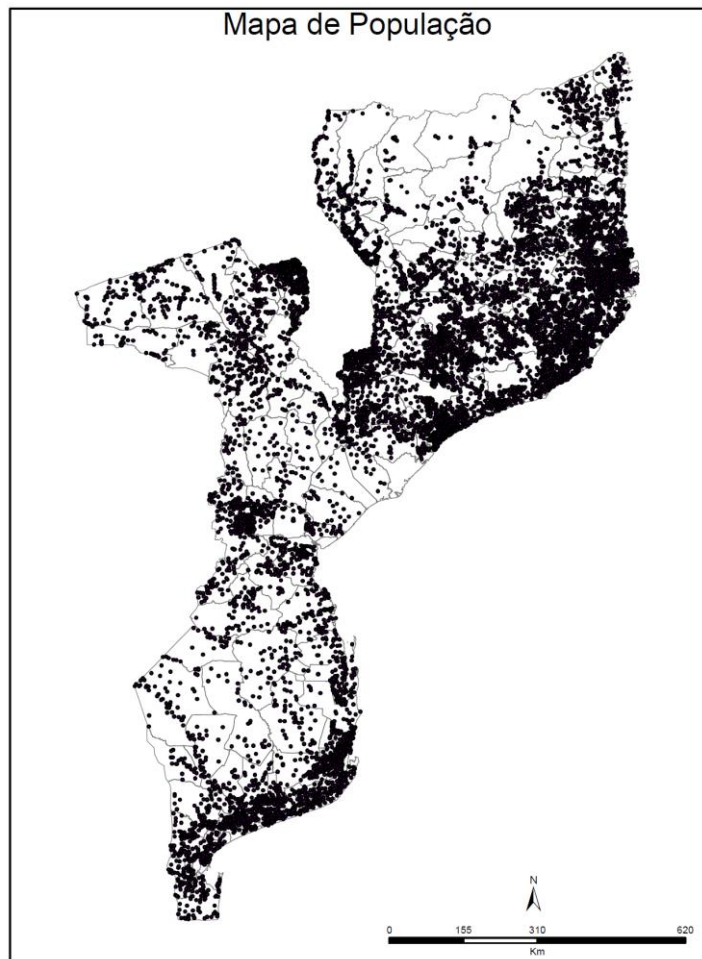
In January 2017, the country had an estimated population of 27,129,000 million<sup>1</sup>, of which 32% are urban and 68% rural. Rural population is very dispersed, with an average population density of 20 persons/km<sup>2</sup>. According to the Human Development Index of UNDP, 68.7% of the population lives below the poverty line of 1.90 USD/day at Purchasing Power Parity. Approximately 80% of the population depends on agriculture for their livelihood and the unemployment rate is estimated at around 22%.

### 1.1.2 Economy

Mozambique registered an economic growth above 7.5% from 2010 to 2015, reaching a Gross Domestic Product per capita estimated at USD 609. However, this growth did not translate into poverty reduction, and 2016 saw a fiscal crisis in the country. Despite its wealth in terms of mineral resources, energy and biodiversity, Mozambique development has mainly been built on the export of electricity from hydropower, agribusiness (biofuels production), coal, non-hydrocarbon minerals, with consequent low levels of productivity for the rest of the economy in general. The country's economy is vastly dependent on external investment.

The discovery of very large reserves of natural gas and the construction of liquefied natural gas (LNG) facilities in the north brings new investors to the country, but those developments have not yet reached a stage at which they are providing the government of Mozambique with taxes and its people with jobs, and thus have the potential to create serious social unrest. Many key poverty indicators for Mozambique have largely stagnated over the past decade, and the country's infrastructure of roads, telecommunications, railways and electricity is inadequate to keep up with the demands of investors, let alone population growth. This infrastructure is vulnerable to damage by floods and cyclones over much of central and northern Mozambique.

The Mozambican currency (MZN, Mozambique Metical) has fallen by 50% against the dollar between January and September 2016 after depreciating 32% in 2015, and the inflation rate reached 17.3% in April.



<sup>1</sup> Instituto Nacional de Estatística, Moçambique



Recent statistics for 2015 of the Human Development Index (HDI) show that Mozambique is ranked 181<sup>st</sup> out of 188 countries with a HDI value of 0.418. In comparison to 5 years ago there is a slight increase in the values concerning life expectancy (+2.2 to 55.5 years), mean years of schooling (+0.2 to 3.5), GNI per capita (+205% to 1,098) and the general HDI value (+0.021 to 0.418). Despite the positive trend in the HDI components and an average annual HDI growth of 1.03% since 2010, Mozambique has not been able to improve its ranking and remains below the average for other low human development countries (0.497 in 2015). Supporting the Renewable Energy sector will therefore benefit directly HDI indicators, such as sustainability, employment, trade, telecommunication, etc.

As part of the Human Development Index two other measures have been introduced: the Gender Development Index (GDI) on the one hand which offers sex-disaggregated data for the three dimensions of HDI (health, education and economic resources) and the Gender Inequality Index (GII) on the other hand, which reflects gender-based inequalities in three dimensions (reproductive health, empowerment, and economic activity). The GDI shows clearly that the HDI value for women (0.391) is substantially lower than for men (0.444), especially in terms of mean years of schooling (2.5 for women v. 4.6 for men) and GNI per capita (1,016 for women v. 1,184 for men). This results in a GDI value of 0.879, which places the country into Group 5 (low equality in HDI achievements between women and men, with an absolute deviation from gender parity of more than 10 percent). Concerning the GII Mozambique scores slightly better than on HDI values with a ranking of 139<sup>th</sup> of 159 countries and a value of 0.574. In comparison to other low HDI countries Mozambique scored well in the percentage of female seats in parliament (39.6%) and labour force participation rate (82.5% for women v. 75.4 for men), but scores very poorly in terms of secondary education (2.8% women v. 8.0 for men). For this reason, it is important to pay special attention to gender, which is an important cross-cutting issue of the RERD2 project.

Having a favourable environment for investors is important for the sector of renewable energy in Mozambique. World Bank has released the “Ease of Doing Business” report, where Mozambique is ranked 137<sup>th</sup> out of 190 countries with a score of 53.78. Although Mozambique is doing slightly better than the Sub-Saharan Africa average of 49.51, it is somewhat lagging behind in comparison to similar economies in the region and has lost three places in the ranking (53.82) in comparison to 2016. Last year Mozambique has made two significant changes in the business environment: due to increased registration and notary fees, starting a business has been made more difficult. However, Mozambique improved access to credit information by enacting a law that allows the establishment of a new credit bureau. In the field of dealing with construction permits and resolving insolvency Mozambique scores well with a ranking of respectively 30 and 65 out of 190 countries. Mozambique ranks 168<sup>th</sup> out of 190 economies on the ease of getting electricity with a score of 42.65 and scores substantially lower than the regional average (45.62) and the comparable economies in the region. In this aspect the direct benefit of investing in the sector of renewable energy is clear. Nevertheless, these figures show that the investment climate in Mozambique is far from ideal, but not substantially worse than in neighbouring countries.

According to the World Bank, the economic situation of Mozambique is slowly recovering after a difficult year 2016 in terms of inflation, currency and slow growth. In the first quarter of 2017 a GDP growth up to 2.9% was recorded, which is more than double the growth rate of the previous quarter. Due to a strong monetary policy the currency (MZN) has become more stable and has strengthened by 28% against the US dollar, while it contributed to a moderation of the inflation, which nevertheless remains very high (18%). It is likely that the strengthening of coal, aluminium and gas prices, as well as a recovery in agriculture and the positive evolution in the peace talks can boost the growth to 4.6% in 2017. However, due to a strict monetary policy Mozambique’s reference lending rate is now amongst the highest in sub-Saharan Africa and the average commercial bank lending rates, at 30%, are high for much of the private sector. Nevertheless, it seems that this policy will be able to loosen up

as the exchange rate, inflation and credit levels are showing positive signs. Furthermore, the United Nations Conference on Trade and Development (UNCTAD) reported that Foreign Direct Investment (FDI) in Mozambique fell to US\$3 billion in 2016, which is a drop of 11 percent from the previous year. This has put a strain on the Mozambican economy as FDI plays an increasingly important role in its economy. In 2013, Mozambique was ranked as the 39<sup>th</sup> largest recipient of FDI.

## 1.2 Mozambican Electricity Sector

### 1.2.1 Background

#### Key statistics (2014)

Installed electric generation capacity, 2,475 MW

Installed hydroelectric capacity, 2,275 MW

Fossil fuel capacity, 200 MW

Production, 4,962 GWh

Peak demand, 831 MW

Average losses in transmission 7%, and distribution 17%

Average electricity use per capita, 188 kWh

#### Electricity generation

Mozambique's hydroelectric potential is among the highest in Africa and the country is home to one of the largest hydro dams on the continent, the Cahora Bassa Dam, which has an installed capacity of 2,075 MW and produces electricity for Mozambique, South Africa, Zimbabwe, Botswana and the Southern African Power Pool. The dam plays an important role in Mozambique's economy as a source of foreign revenue. In 2014, 92% of the electricity was produced from hydropower, 7% from natural gas and 1% from fossil fuels. Generation is mostly state-owned, with 88% of the electricity produced by the hydroelectric of Cahora Bassa (Hidroeléctrica de Cahora Bassa - HCB), 6% by Electricidade de Moçambique (EDM), 2% by Independent Power Producers (IPPs) and 4% imported.

Mozambique has two large-scale hydro power projects in the pipeline and plans to expand its distribution and transmission system. These plans are essential since the domestic electricity deficit continues to grow and reached 985 MW in September 2015. Electricity demand is increasing by more than 8% annually.

#### Transmission and distribution network

The national grid is largely managed by the state-owned utility EDM. A small proportion of the lines are owned by HCB, and by the Mozambican Transmission Company (MOTRACO), which supplies power to the aluminium smelter.

The large distances between the generation facilities and the main consumers are a major challenge for electricity supply. Due to the location of natural resources in the country, power has to be transmitted from the west to the coastal region with its growing population. Since the end of the civil war, the government has put the emphasis on expanding the power grid. In 2012 all regional capitals were connected to the main grid. Until 2025 the government intends to further expand the transmission grid, particularly from the resource-rich north to the capital Maputo in the south.

## 1.2.2 Access rates

Estimates of the electricity access rates in Mozambique are very variable. The problem is due to the lack of definition of rural versus urban, of access by area coverage or by actual households connected, and whether one considers that previous household electrification by Solar Home Systems (SHS) is still valid (the majority of the systems installed until 2013 have stopped functioning). The last census dates from 2007 and a new census will be held in 2017.

EDM statistics state that in 2014 the electrification rate for households was 25 %, with 131 of the 141 administrative district headquarters connected to the grid.

To come with a more accurate number for the rate of rural electrification, (either on- or off-grid) one should know what is considered as rural and urban population, which part of these the EDM grid supplies, and how many people have off-grid access to electricity.

This data is currently unavailable, and estimates for rural electricity access lie between 1 and 10%, depending on how access is defined.

## 1.3 Institutional framework of the energy sector

### 1.3.1 Institutional partners

#### **Ministério dos Recursos Minerais e Energia (MIREME)**

The Ministry of Mineral Resources and Energy (MIREME) results from the merger of the Ministry of Energy and the Ministry of Minerals Resources. MIREME and the new Ministry of Economy and Finance (from the merger of Finance and Planning & Development) are said to become the two most powerful ministries in Mozambique.

MIREME is responsible for national energy planning, for studying, conceptualising and enacting energy policies and overseeing the operation and development of the energy sector. MIREME is represented through the Provincial Directorates of Mineral Resources and Energy (DIPREME) in all provinces. MIREME has the power to manage, plan, promote and control the inventory and use of energy resources, as well as for the development and expansion of natural gas and liquid fuels supply and distribution networks.

The National Directorate for Electrical Energy is a central technical body within MIREME that is responsible for the analysis, preparation and elaboration of policies in the field of electricity, renewable energy and atomic energy. Its main tasks are to: (i) elaborate and monitor the country's energy policy, (ii) promote the diversification of energy use and optimisation of the use of various energy sources, and (iii) promote and maximise the rational use of national energy sources.

#### **Conselho Nacional de Electricidade (CNELEC)**

The National Electricity Council is a public entity with legal personality created by the Electricity Law or Act (Law 21/97, from 1st October 1997). It has financial and administrative autonomy to ensure the enforcement of the energy law and to promote the development and expansion of energy services for the current and future consumers. This organisation is weakly staffed and is not yet entirely fulfilling its independent regulatory mandate although the situation is improving. It is not a fully independent entity, but has administrative and financial autonomy and a consultative mandate with regards to concessions, electricity tariffs and arbitration.

CNELEC shares regulatory functions with MIREME and other actors in the sector (like EDM or FUNAE) which fragments and weakens this key function. Besides, CNELEC is responsible for mediation and arbitration in disputes, for providing opinions on policies, projects, concession requests and new technologies and for supervising tenders. It should also provide advice to MIREME on EDM performance and tariff applications.

However, the above described situation will change sharply because of the recently approved law that creates the Autoridade Reguladora de Energia (ARENE) that should act as an independent regulator.

### **Electricidade de Moçambique (EDM)**

EDM is a vertically-integrated, government-owned electricity utility established in 1995 as national electrical utility, responsible for the generation, transmission, distribution and sale of electricity throughout the country, but is mostly a transmission and distribution company with few generating assets. EDM is a strong company at technical level, but it is not financially sustainable in the long run due to the lack of real tariff adjustments and its political mandate to expand access quickly.

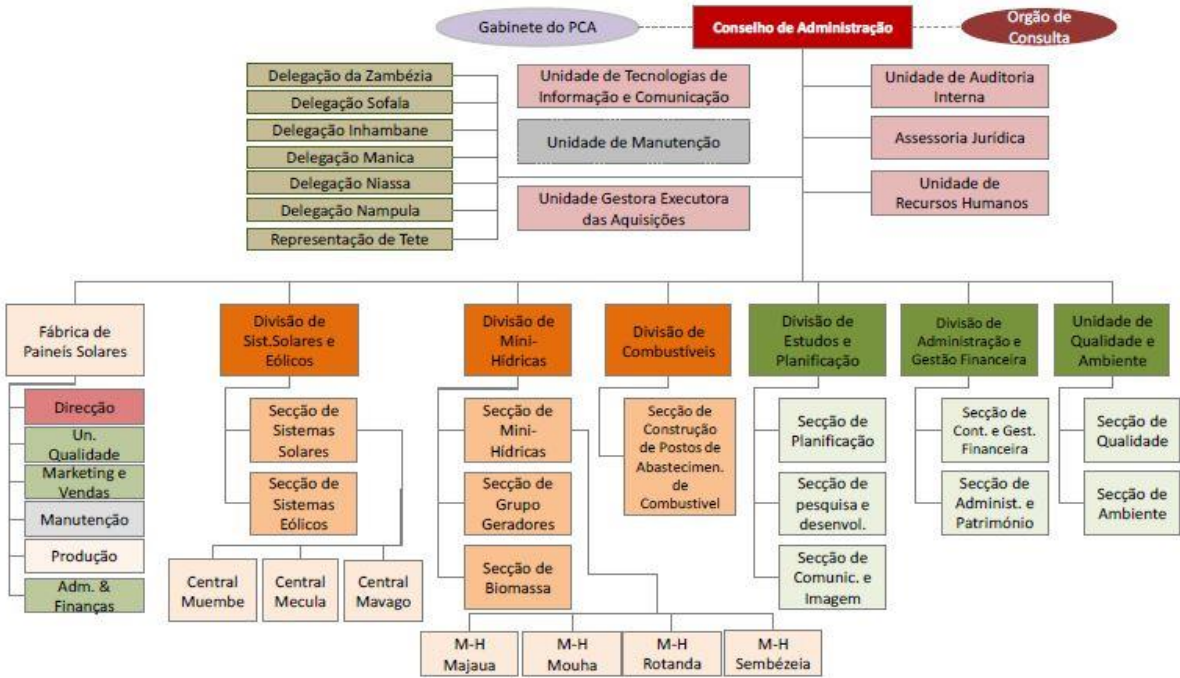
EDM operates with a three-year performance contract with the government and is one of the very few business entities in Mozambique that has a structure, management and measurable output delivery. EDM applies cross-subsidisation on a large scale. This can now be tracked thanks to the creation of appropriate business units and the separation of accounts. The existence of a uniform tariff structure throughout the country means that there is a transfer of funds from urban to rural areas. The electricity tariff of EDM is heavily subsidised.

EDM buys most of its power from HCB. EDM currently owns 240 MW of installed capacity, as well as the national power grid excluding lines owned by HCB and MOTRACO. At the end of 2014 EDM had electrified 131 of the 141 districts of Mozambique, but this usually represents the connection of the district headquarters only.

### **Fundo de Energia (FUNAE)**

FUNAE is a public institution established in 1997 under the jurisdiction of the MIREME, with financial and administrative autonomy. FUNAE operates at national level to develop, produce and use renewable energy, and promote energy conservation and rational and sustainable management of power resources. Since its establishment FUNAE has implemented numerous projects using renewable energy technologies to electrify schools, clinics and communities. FUNAE focuses primarily on the deployment of renewable energy. It operates at national level and has delegations at provincial level. Figure 1 below shows the organisational chart of FUNAE.

Figure 1 – Organogram of FUNAE



**FUNAE’s responsibilities include:**

- Providing financial assistance or financial guarantees and loans to enterprises whose objectives include the production, distribution and conservation of power in its various forms, as well as the dissemination of production techniques
- Offering financial assistance for the installation of power production or distribution systems, and installing such systems in rural areas not covered by the national grid
- Acquiring equipment and machinery used in the production and distribution of power, and financing or supplying financial guarantees for the purchase of such equipment, with a particular focus on new and renewable power sources
- Providing consulting services and technical assistance
- Publishing and funding studies and investigative papers on technologies for the production, distribution and conservation of power products or renewable power
- Promoting the installation or installing distribution networks of petroleum products in rural areas
- Promoting the development of biomass production and planting forests for this purpose
- Providing financial assistance for sourcing transportation of petroleum products for the supply of rural areas

FUNAE was historically created as a Fund to finance electrification projects in rural areas with the private sector. But it was “a Fund without funds” that needed to attract foreign donor’s investments. By attracting development partners and starting to implement the projects by itself, FUNAE evolved towards a rural electrification agency rather than a sole financial instrument, which could eventually prove difficult to manage in the long-term.

### **Delegations of FUNAE at provincial level:**

FUNAE has 7 delegations at provincial level, typically staffed with 4 to 8 people working under a Director. Some of the delegations serve two provinces, but it is planned that each province will eventually have a Delegation. The Delegations are under the responsibility of Delegates nominated by the Board (Conselho de Administração). FUNAE delegations work with DIPREME (the Provincial Directorate for Mineral Resources and Energy) in each represented province. DIPREME participates in the selection of priority sites with the FUNAE Delegations.

In general, the FUNAE Delegation plays a role in three areas:

- Accompanying, monitoring and follow-up of projects for rural electrification
- Providing support to the end users during the utilization period
- Manage and maintain the systems

FUNAE, as an organization, is financially autonomous, but FUNAE Delegations do not have financial autonomy. All provinces have more or less the same budget. Based on approved spending, their budget is replenished from Maputo.

Money received from Maputo is used to cover the cost of functioning (water, energy, communication, etc.) and to finance field visits. Bigger costs, like the rent for the buildings or the purchase of new furniture, are covered directly by Maputo.

All delegations are audited every year to keep their ISO 9000 and ISO 14000 certifications.

#### *Human Resources Management:*

Unlike the DIPREME, the FUNAE delegations have no autonomy in the area of Human Resources Management. All FUNAE staff is recruited and administered at the central level.

Staffing levels in the FUNAE Delegations are relatively low, especially compared to the number of installations that are managed. Staffing levels do not seem to depend to a large extent on the relative workload in each province.

#### *Planning and coordination*

FUNAE usually coordinates with DIPREME in all stages of the implementation of new projects (identification, data collection, and implementation). However, important dissimilarities exist between different provinces as to how this coordination is done and who is in the driver's seat: in some provinces, the DIPREME contact provincial directorates and local authorities and provides a list with priorities for investments, in other provinces, it is FUNAE that takes the initiative and that contacts all mentioned stakeholders. In this case, DIPREME is simply informed of priorities identified by FUNAE.

At provincial level, all main sector actors have meetings on a regular basis to brief each other on the progress of ongoing projects and discuss the sector planning.

The FUNAE delegations report on technical issues to their headquarters in Maputo. Non-technical information (progress in projects, number of projects, etc.) is shared on a regular basis with the DIPREME, either during the coordination meetings or in writing.

#### *Infrastructure and equipment*

The offices in all visited FUNAE delegations seem to be well equipped with furniture, computers, printers and office consumables. Moreover, the delegations have sufficient means of transport to conduct field visits.

### 1.3.2 Policies, strategies and regulation

An extensive overview of all relevant legal and regulatory frameworks is given in Annex 7.1.

These include:

- Electricity Act 1997
- 2009 Energy Strategy
- 2011 Strategy for New and Renewable Energy
- Energy Sector Strategy 2015-2024
- National Strategy for Energy Conservation
- Electricity Master Plan Study (from 2004)
- Mozambique Transmission Backbone Project (from 2011)
- Renewable Energy Atlas Project
- Transmission and Distribution Master Plan Study (Draft final report from 2013)
- Renewable Energy Feed-in Tariffs Project (Draft final report from 2013)

The most relevant document for the project is FUNAE's Strategic Plan 2015-2019.

The four strategic areas are:

- Increasing access to energy in rural areas.
- Guaranteeing the sustainability and maintenance of the projects.
- Production and sales of 16 MW of solar panels.
- Securing FUNAE's institutional sustainability.

**Strategic Area 1: Increase the access to energy in rural areas** will be realised with on-going efforts to give electricity to schools and health centres, also including energy for water pumping, administrative posts and 4 fuel stations. 400 villages are targeted for electrification.

**Strategic Area 2: Guaranteeing the sustainability and maintenance of the projects** subdivided in strategies for (i) PV systems and local management committees, (ii) for the fuel stations, (iii) mini-hydro power plants, (iv) involvement of the private sector and (v) marketing and promotion of small solar systems and pico-hydro power plants.

FUNAE foresees to reinforce the involvement of the communities, to secure maintenance, to reinforce the logistic capacity, to develop the operational capacity and to secure sustainability. 300 Management Committees will be trained to become better equipped for their tasks, which include surveillance of systems, arrangement for repairs and collection of fees.

The private sector involvement is mentioned as an absolute need for rural energy provision. The way to engage the private sector is to reinforce the cooperation platform, to define negotiation models, to provide incentives for establishment of industries producing components for renewable energy and for the use of renewable energy for water provision

**Strategic Area 3: production and sales of 16 MW PV panels** during the period 2015-2019. FUNAE plans to optimize the production process and to reduce costs, to establish a distribution chain nationwide and to implement a maintenance practice for the production plant.

**Strategic Area 4: To secure institutional sustainability.** Here five major points are highlighted:

- Secure financial resources (establishment of PPP's, new development partners, more government resources, increase of payments of end users)
- Develop institutional capacity (improved institutional processes, quality of work force and adequate infrastructure)
- Develop the capacity to intervene and monitor projects (communication, Global Information System (GIS) use, and remote control of isolated systems)
- Keep the labour force motivation high by education and professional formation in strategic areas, training in all areas of FUNAE's mandate, identification of new competences necessary in view of new challenges, development of a Human Resources policy on retaining personnel, improvement of the labour conditions
- Continuous improvement of the Management Systems

The transversal issues of HIV/Aids and Gender policy are also mentioned, including some relevant actions.

## 1.4 Belgium and other donor activities in the energy sector

### 1.4.1 Belgium (RERD1)

The Renewable Energy for Rural Development (RERD) intervention in Mozambique started on September 2010. The intervention was part of the 2009-2012 Indicative Cooperation Programme (ICP), signed between Belgium and Mozambique in April 2008. It lasted 60 months for a total amount of € 15 million. It was implemented by FUNAE and BTC.

Early 2010, the Dutch Ministry of Foreign Affairs expressed interest in supporting the Belgian intervention, and increased the total donor budget of the project to € 23.3 million. The Mozambican contribution to the project was around € 3 million.

The first area of intervention implemented the following components:

- Photovoltaic projects were planned to electrify around 700 institutions such as, schools, health centres, administrative centres, homes of teachers and nurses, etc.
- The wind component planned the implementation of 50 wind pumping projects for irrigation, but soon it became evident during implementation of the RERD that wind pumping was not the least-cost option. Therefore, the decision was taken to leave wind water pumping but keep solar water pumping at communal facilities. With the available budget it was decided to carry out wind resource mapping in five, mostly coastal locations for the implementation of small-scale, not grid-connected wind energy projects.
- Hydropower projects focused on four activities: (i) identification of sites with hydropower potential, (ii) pre-feasibility studies, (iii) tendering feasibility studies, and (iv) tendering for design and construction.

The second intervention area involved a microfinance component to be developed with the objective of creating a renewable energy market in the rural areas of Mozambique, but was cancelled later on due to low presence of micro finance institutions in rural areas

The third area was to increase the technical and administrative capacity of FUNAE through various mechanisms: (i) providing international Technical Assistance (TA) by placing 3 people to work within FUNAE (ii) providing funds for hiring consultants, for equipment (iii) financing training courses, and (iv) financing the set-up of new delegations.



## CBMIREME

The upcoming “Capacity Development of the MIREME“ intervention has the objective to enhance the performance of MIREME and CNELEC/ARENE in advancing access to renewable electricity in rural areas.

The intervention has 3 strategic areas:

1. The capacities of the MIREME at central level are strengthened in order to improve the energy sector planning and policy-making.
2. The capacities of the DIPREME are strengthened in order to improve energy sector planning, coordination and monitoring and evaluation in selected provinces.
3. Efforts of transforming CNELEC into an independent and capable regulator for the new and renewable electricity sub-sector are supported.

A third Belgian intervention for capacity building of FUNAE has been cancelled but some of the activities are taken over in RERD2.

### 1.4.2 Other donors

The main donors are the World Bank, EU, AfDB, Norway, the Netherlands, Sweden, France, Germany and UK.

The **World Bank** is one of the main donors in the energy sector in Mozambique. Through its “Energy Development and Access Programme”, it has financed support to EDM, to FUNAE (solar PV development in 242 hospitals and 30 villages) and support to the Ministry of Energy for a budget of 14 million USD. The World Bank is currently working on the ‘National Electrification Strategy’ that should be ready end of 2017.

The **European Union (EU)** has financed rural electrification in Cabo Delgado, Tete and Sofala with EDM, PV electrification in rural areas with FUNAE and capacity building in energy planning and management for the Ministry of Energy. Under the 11<sup>th</sup> EDF, the EU has rural development (€325 million) has one of its two focal sectors. EU interventions will help, on one hand, to improve food security and nutrition, through production improvement, access to food and to markets through appropriate transport infrastructure, further to nutrition-specific interventions. On the other hand, the EU support will aim at enhancing rural competitiveness by fostering the conditions for sustainable growth of micro, small and medium-sized enterprises in rural areas. Improvement in the physical access to markets and energy will form an essential component of the support. The programme will concentrate in the two provinces of Zambezia and Nampula. The Financing Agreement is expected to be signed end of 2017.

The **Africa-EU Renewable Energy Cooperation Programme (RECP)** is a multi-donor programme that supports the development of markets for renewable energy in Africa. In Mozambique, **RECP** is currently planning the ‘Mozambique Energy Project Preparation Facility’, that has the objective of facilitating investment in renewable energy by creating a suitable environment and providing direct support to private companies and project developers. It will have three components on policy advisory to the relevant institutions, information and support to the local and international private sector, and access to finance and support to project development.

Despite a recent reduction of their contribution in absolute terms, the energy sector remains the most important sector for **Norway** in Mozambique, with an annual budget around Norwegian Kroner 50 M

(€ 5.4 M). The last years Norway has supported rural electrification in Cabo Delgado and grid extension in Gurue -Cuamba –Lichinga and Namacurra –Pebane. Today Norway focusses more on larger infrastructure projects and urban projects.

Technical assistance and capacity development are provided to EDM as well as to MIREME. There are plans to invest in the Mozambique-Malawi interconnection project and in the STIP (Short Term Investment Programme) from EDM.

In parallel, a capacity building programme (around € 4 M over 3 years) currently under development by Norway will have the following characteristics:

There will be no distinction between renewable or non-renewable energy in the capacity building component. Norway will deal with both on grid and off grid in planning.

This programme will work with MIREME on improving energy sector planning and policy making on a very pragmatic level.

It will not encompass activities directly targeting the DIPREMEs, nor FUNAE but it will remain important to involve them in certain tasks

There will be a component in support of CNELEC with the intention to work on developing the capacity of the regulator, including their capacity to handle licensing applications.

Norway financed 2 studies for FUNAE:

- Strategy for Maintenance of Solar PV systems (Estratégia da manutenção dos sistemas fotovoltaicos).
- Strategy on Private Sector Involvement in the Renewable Energy sector (Estratégia para o envolvimento do sector privado na electrificação rural e acesso à energia renovável em Moçambique). The study was completed by a local Consultancy Company (Intellica). The results did not give concrete indications on how to take next steps to involve the private sector.

**Sweden** is engaged together with co-financing of Norway and Denmark in rural electrification (grid extension and household connections) in Sofala, Manica, Tete and Niassa Provinces. Sweden also is embarking on the rehabilitation of the hydro power stations in Mavuzi and Chicamba.

The **Agence Française de Développement (AFD)** is supporting Mozambique in the fields of energy, water, peri-urban, transport and health. The main AFD partner in the energy sector is EDM and the MOTRACO electric transmission company.

The on-going financing of projects is: (i) the gas power plant of 160 MW in the south of the country, (ii) the development of Tsate hydro (50 MW) in Manica region in cooperation with the KfW (Kreditanstalt für Wiederaufbau) and the Swedish International Development Cooperation Agency, (iii) € 50 million for the renovation of the hydroelectric power plants of Mavuzi and Chicamba. Through its financing, AFD contributes an additional 36 GWh per year of renewable energy at low cost. AFD is also a major contributor to the Energy Development and Access Programme (€ 20 M) which helps improve access for the majority of the population that is not connected to the grid. **Energising Development (EnDev)** is an energy access partnership currently financed by seven donor countries: the Netherlands, Germany, Norway, Australia, United Kingdom, Switzerland and Sweden and is implemented by GIZ. EnDev Mozambique is involved in the densification of the grid, peak and micro hydropower plants, small photovoltaic systems and improved cook stoves. The main strategy of EnDev Mozambique is to

reach a functional setup based on four pillars: a knowledge base, a base of funding, a base of the private sector and a village development base.

The grid densification component focuses on peri-urban areas with a high percentage of poor households (> 90%) and uses techniques and innovative financial solutions for connection to the grid. The PicoPV and SHS activities are undertaken to work closely with private sector partners. EnDev provides training for importers, wholesalers and retailers of solar products on technical, quality and business aspects. The solar component also focuses on creating training centres, testing facilities and a research centre, while also funding marketing and awareness campaigns.

Hydroelectric activities include establishing a commercial operation model and securing grants to partially finance the investment. The programme focuses on areas with high economic potential. The EnDev process enables local contractors in the design and installation and maintenance of facilities. The project established a centre of excellence of hydropower in Chimoio and actively seeks connections and links with financial institutions. The EnDev biomass component supports the implementation of the Biomass Energy Strategy (BEST). It does so by supporting marketing and awareness activities, introducing new types of improved cook stoves and ensuring product quality.

The **German Development Bank KfW** is active in Mozambique in the Development, Budget Support, and infrastructure (energy and transport) sectors. The on-going energy projects are: (i) rehabilitation of the hydropower of Mavuzi (52 MW) and Chicamba (38 MW), an investment of € 100 million, in which KfW provides a loan of € 18 million for EDM, (ii) development of hydropower plant of Tsate (50 MW) in the Manica region. The feasibility study was completed at the end of 2014, a loan of € 50 million for EDM is estimated (iii) GetFIT Mozambique (reapplication of the example of Uganda). The main objective of GetFIT programme is to support Mozambique in the pursuit of development that is climate resilient and low in carbon and resulting in growth, poverty reduction and climate change mitigation, supporting public and private projects in the generation of renewable energy. New loans from KfW are currently on standby.

The **Department for International Development (DfID)** is developing a GBP 22.5 million programme to promote (i) improved cook stoves, (ii) SHS and in particular PAYG, and (iii) the production use of energy. The programme would aim to catalyse the provision by the private sector of off-grid renewable energy services and products and help put in place a conducive environment for a market-based approach. This will lead to improved access to energy for people and communities currently without modern energy.

The programme will have 5 windows: (i) finance, with some grant financing available and a challenge fund, (ii) TA for business development, (iii) demand activation (awareness, education, product availability), (iv) Research & Development coordination, and (v) institutional strengthening. Of great importance is the plan to establish a line of credit with concessional terms for small off-grid renewable energy projects, which is one of the major gaps for the activation of the private sector in this area. DfID has also made an organisational assessment of FUNAE, with several proposals for reforming its structure. It is not implemented yet.

With its "National Power System Development Master Plan Study", **JICA** is working on a 'Least Cost Production Plan' to compare different energy mixes for the country (Coal, hydro, gas, biomass).

**ElectriFI**, the Electrification Financing Initiative initiated by FMO, the Dutch Entrepreneurial Development Bank, with funds from the European Commission and Power Africa, has launched two call for proposals for private investment financing in the energy sector. However, currently, there are no projects in Mozambique, thereby illustrating the difficulty of private investments in the country.

The **SE4All** (Sustainable Energy for All, multi-donor initiative) , Africa Hub manages amongst other activities a regional Green Mini-Grid Market Development Program. In April 2017 it has released a report 'Mini Grid Market Opportunity Assessment: Mozambique'.

### 1.4.3 Energy Sector Working Group

The Energy Sector Working Group (ESWG) gathers representatives from the government, donors, international implementing partners and NGOs. The group is meant to be a donor coordinating mechanism and is subdivided in three subgroups; namely FUNAE, EDM and MIREME-CNELEC subgroups.

## 1.5 Summary of main challenges in the electricity sector

### 1.5.1 Institutional issues

- The recent changes in the institutional context: new Minister, creation of MIREME, creation of the Autoridade Reguladora Nacional da Energia (ARENE), etc.
- Institutional challenges within the sector especially on roles, responsibilities and mandates: FUNAE working as an off-grid electricity utility, MIREME and EDM assuming certain regulatory roles, etc.
- Institutional communication between actors exists but could be improved both vertically (reporting, feedback loop, etc.) and horizontally. Challenges of coordination between the different actors in the field / fragmentation (MIREME, EDM, FUNAE and others).
- Division of labour between sector actors not necessarily based on economic analysis of available options (on-grid or off-grid solutions).
- Sector planning and especially its effective implementation by the different actors could be further improved.
- All sector actors have the same difficulty to recruit sufficient qualified staff members: the Energy Strategy mentions the necessity for the sector development to invest massively in qualified human resources especially for contracting and negotiating purposes as well as for regulating, implementation of activities, and operations and maintenance.
- Early stage and immature Renewable Energy sub sector in the overall governmental and non-governmental institutions in comparison with neighbouring countries.
- The precarious financial sustainability of EDM which has a high debt mostly due to the low electricity tariffs and the duty to extend the grid according to Government's plans and directives.
- The lack of clear and open tender procedures for the large energy investments, like gas-fired plants, coal-fired plants, and large hydros.

### 1.5.2 Regulatory issues

- Existing policy and regulatory framework to be clarified (e.g.: energy efficiency, mini-grid, etc.).
- In the Energy Strategy, the GoM recently reformulated the role of the State in the regulatory functions, creating a regulating entity for the energy sector, including electricity, transport and distribution of gas and combustibles, with the necessary autonomy and independence. This specific point refers to the transformation of the CNELEC into ARENE.
- Energy and electricity tariffs not decided by independent regulator and not cost reflective

### 1.5.3 Barriers for private investment

The private sector faces several barriers to invest in renewable energy in Mozambique:

- Regulatory incentives such as reduced import duty are provided by the law but are not applied, and import rules in general are unclear
- The government has a limited understanding of the requirements of sustainable PPP agreements
- It is difficult to charge cost reflective tariffs for the provision of services because consumers are either unable or unwilling to pay
- The regulatory framework is not conducive to the development of the private sector
- Poor access to finance and high interest rates
- Exchange rate risks
- Risks linked to the legal framework in the event of dispute and to business licensing requirements
- Capital controls limit foreign currency exports and even imports
- Ownership of the land, DUAT (land use title).

## 1.6 Rural electrification

The vast majority of the rural Mozambican population is poor, the population density is low and households are scattered in hamlets, creating particular problems for all rural infrastructure investments.

There are three possibilities for rural electrification:

1. Extension of the main grid
2. Isolated mini-grids
3. Standalone solutions, for example Solar Home Systems

### 1.6.1 Rural electrification options

#### 1.6.1.1 Grid-based rural electrification

Grid extension is a rural electrification solution that is sometimes overlooked. In Mozambique EDM is extending its power lines quite successfully to cover villages of rural areas, however the truly rural population falls outside the scope of this electrification.

From an economic point of view, grid extension is not always the best option. The connections EDM serves, even in urban areas, are not cost covering due to the uniform and very low national tariff and the low level of demand of the connected households. In rural areas, many households cannot afford even the cost of the connection and do not have access to electricity even if the grid passes over their house.

In Mozambique, grid connections are considered not viable when<sup>2</sup>:

- The distance from the grid is over 140 km and the load is less than 600 kW
- The distance from the grid is over 70 km and the load is less than 300 kW

This leads to the obvious conclusions that grid electricity will not always be the solution for most of the poor scattered hamlets in Mozambique, and the viable alternative are small and decentralised services.

#### 1.6.1.2 Isolated grids or mini-grids

Mini-grids are defined as one or more local generation units supplying electricity to domestic, commercial, or institutional consumers over a local distribution grid. They can operate in a standalone mode and can also be connected to the central grid when available.

Mini-grids can use renewable energy or diesel generators. The latter have less capital expenditure, but relatively high operating costs. Hybrid mini-grids also have a number of advantages.

RE mini-grids can have distinct advantages over central grid extension and other decentralised energy options in providing access to reliable and affordable electricity.

- Compared to central grid extension, RE mini grids **can be less expensive** due to lower capital cost of infrastructure (depending on distance) and lower cost of operation by avoiding transmission and distribution losses
- In countries with power shortages, electricity supply through the central grid, especially in rural areas, may not be reliable. In such regions, RE mini-grids **can ensure better energy security**
- Mini-grid developers have the potential to access capital beyond the traditional power sector, and may be able to provide **quicker access to electricity** than central grid extension that may be prone to bureaucratic hurdles and slow implementation
- Unlike other decentralised energy options like solar home lighting systems and off-grid lighting products, mini-grids can provide electricity to not only residential loads like lighting and phone charging, but also to commercial loads like mills and oil presses
- Development and operation of mini-grids can create local jobs but require training as some tasks require a skilled technician. Other, such as fee collection and basic monitoring, are relatively easier to teach.
- If connected to the National grid in a later stage, the mini-grids can improve grid stability
- Mini-grids can be modular to adjust to the growth of the population. Mini-grids are often an intermediate solution between lack of access and long term national grid access.

However, there are also several challenges to successfully deploying RE mini-grids and specially to ensuring their long-term sustainability. These challenges include:

- High up-front capital costs
- Low load factors and low electricity sales, reducing feasibility
- Often higher tariffs compared to central grid consumers, which might be hard to implement. However, the isolated character of mini-grids is an advantage for the introduction of different tariffs. See annex 7.3 for some tariff calculations

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<sup>2</sup> Rural Electrification Strategy Plan for Mozambique. Final Report. Norplan and KanEnergi. November 2000.

- Insufficient financing support and investment due to the lack of profitability
- Lack of capacity to ensure reliable and efficient operation and maintenance over time, or a high overhead cost of this capacity
- Uncertainty in the face of possible future central grid extension: the mini-grid power is almost always more expensive (cost/kWh) than grid power, and clients that are given the choice will switch to the cheapest option.
- Challenge of low subsidized grid electricity tariff
- Political interference in roll out program of national grid and deviation from original planning

Well-designed policies and appropriate institutional arrangements along with effective financing mechanisms can address many of these challenges and enable the successful and sustainable deployment of renewable energy based mini-grids.

In conclusion, there are clear circumstances in which a mini-grid is likely to be financially sustainable. These include:

- (i) a high load factor,
- (ii) a so-called anchor load, mostly a productive and financially sustainable end-use,
- (iii) costs contained by good design and management,
- (iv) effective management of the installations, including the setting and collection of tariffs that keep pace with inflation
- (v) local conditions such as distance from the production plant to load centre, and access to site.

#### ***Solar mini-grids***

Due to the high solar insolation in almost all parts of Mozambique and to the steadily decreasing costs of PV technology and its modularity, this technology is becoming more attractive to use for mini-grid supply (often in hybrid systems with diesel as backup).

The fact that PV-supplied mini-grids can be modular is a big advantage that allows for an optimal design of the installation, and they can be used in combination with existing diesel plants. Only minor investments have to be made in order to guarantee future expansion due to demand growth.

The use of solar mini-grids is for productive use is challenging and must be implemented together with low consumption and energy efficient appliances.

#### ***Hydropower mini-grids***

Under certain circumstances (micro-, mini-) hydropower can be more appropriate and profitable than other energy supply options. The unit costs of hydropower vary across a wide range as they are site specific, unlike solar technology.

Their design requires costlier studies than for other renewable energy resources, as it is site specific, but hydropower has the advantage over solar systems that it does not require battery storage. Moreover, the water can be used for other purposes, like irrigation.

Annex 7.2 describes some commonly used operator models for mini-grids.

### **1.6.1.3 Stand-alone solutions based on solar photovoltaic**

Stand-alone solar systems range from a few Watt to a few thousand Watt, and serve individual households or buildings. This technology is sometimes the lowest cost solution and the most sustainable, especially when ownership is transferred to the beneficiary.

#### ***Solar lanterns***

A solar lantern is a miniature PV system in a small, robust unit. The solar module is often a separate small panel that can be put temporarily on the roof, on the ground or in a support, connecting to the lantern via a simple plug-in lead. Some lanterns - generally more powerful and more expensive - also include a power outlet for phone charging and/or operating a radio.

#### ***Solar Home Systems***

Small SHS are generally composed of a small PV panel that can be mounted on the roof or other structure, a few LED lamps (2 to 4), a sealed module which incorporates the battery, controller and eventually an inverter and also several sockets or connectors for phone charging or other uses, and the package comes already pre-wired, with “plug-and-use” connectors. Some solar home systems can power a television or a radio. Larger SHS can power fridges or other electrical appliances like laptops, fans, etc. Such systems have been installed by RERD1 on schools, health centres and administrative buildings.

#### ***Battery charging***

Another possibility in rural areas where the population is much dispersed is battery charging from the grid or mini-grid or energy shop. Battery charging, although costly on a per unit basis, fits perfectly with the disbursement pattern of people (they only buy “energy” in small amounts, i.e. candles, kerosene or pen batteries). The problem lies in the initial acquisition cost of the battery and its limited life if people are not properly instructed in its use. Experiences shows that battery charging stations as an added business can work well, instead of an “energy kiosk” that only sells energy.

#### ***Dissemination approaches***

Different commercial approaches have been used in disseminating solar PV systems: the vendor model, the fee for service model, a lease model and the institutional model. Recently an approach for the dissemination of PV systems that avoids many of the pitfalls of the other models is the Pay-As-You-Go (PAYG)<sup>3</sup> model where the user pays a monthly fee and owns the system after a certain number of payments. The presence of a mobile network is required for a PAYG system, which can heavily reduce the operational cost by remotely switching on/off a solar system depending on payments.

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<sup>3</sup> PAYG is a kind of microfinance facility for household energy systems that have relatively high up-front capital costs for off-grid consumers. There is an information technology system that underlies the platform, allowing automated payments and system monitoring / activation. The range of payment and verification systems includes GSM-enabled mobile money payments, scratch cards and tactile keypads, or premium SMS. In essence PAYG allows manufacturers and distributors to act on behalf of their customers to access financing through working capital and other funds.



## 1.6.2 Existing experiences in Mozambique

### 1.6.2.1 Electrification with PV stand alone and mini-grids

#### *Government of Korea PV mini-grids*

In 2015 and 2016, FUNAE (Fundo de Energia) has installed 3 PV mini-grids in 3 district headquarters in the Niassa province with loan from the Government of Korea (35 mUSD). The plant in Muembe has 400 kWp capacity, for 370 consumers, the plant of Mavago has a capacity of 550 kWp, and had 598 customers and the plant of Mecula has a capacity of 350 kWp, and had 371 customers. The energy of the three plants benefits households, public institutions including health centres, schools, police stations, market and ward office, and shops and small workshops. In the period before the installation of photovoltaic plants, the sites were powered by diesel generator sets, which worked four hours/day. However, the cost of electrification comes at a staggering 25,000 USD/HH. Those three sites have been connected to the main grid a few years later.

#### *The 50-villages Project*

From 2011 to 2016, the “Projecto 50 Vilas” (50-villages Project) financed by Portugal has installed 50 PV systems of 4 kW each in rural areas across the country, with the exception of Cabo Delgado province.

The project’s main goal is the electrification of social infrastructure facilities such as schools, health centres, administrative offices, the homes of teachers and nurses, some public lighting and shops. These nano-grids with 8 to 15 connections do not seem to be financially viable under the current conditions. The site selection was not done based on a needs assessment and willingness to pay but by a top-down approach in which the locations were chosen by the government.

The users pay a differentiated flat-fee. With two operators the fees are not able even to cover operation costs. There is a local management commission that is responsible for collecting the fees and apparently there have not been many problems. Maintenance problems have arisen, for example, there is no distilled water to top the batteries, nor money to buy it.

### 1.6.2.2 Electrification with hydropower mini-grids

FUNAE has some experience with mini and small hydropower development. RERD1 contributed to the development of a projects pipeline, with feasibility studies and a methodological approach.

Small hydropower has a relatively high capital cost. One micro-hydropower project was recently implemented at a cost of € 24,700/kW, mostly due to the lack of interest of private contractors to tender for it. Under RERD1 and up to the end of 2015 three mini-grids with hydropower have been implemented with a total installed capacity of 754 kW (Muhoa 100 kW; Sembezeia 62 kW and Majaua 592 kW co-financed by the EU and FUNAE). RERD financed the 31 km grid extension of the Majaua mini-hydro plant.

Activities of the micro hydropower component of the multi-donor partnership EnDev (Energising Development) project (formerly: Access to Modern Energy Services in Mozambique, AMES-M) started in 2007. Since then, the project has participated in the development of 11 pico/micro hydropower systems, all of them at the mountainous Manica and Sussundenga districts of the Manica Province. The systems range in capacity from 16 to 30 kW and all are anchored in a productive activity, mostly grain milling with the operator selling electricity through a very basic grid during the evening hours. The installations were built with costs below € 3,000/kW, however this low-cost approach proved not to be sustainable in a number of cases where problems with the technology have quickly surfaced.

A Non-Governmental Organisation (NGO) called Voluntary Services Overseas has been involved in the province of Manica in recuperating the mini-hydro of Chitunga, formerly abandoned after damages by floods. The project of 32 kW will supply electricity to 150 families and several shops and workshops, schools, clinic, etc. The innovative aspect is the strong involvement of the community in all stages of planning and implementation (by providing labour) and for the management with a Community Management Committee.

#### 1.6.2.3 Electrification with diesel mini-grids

There were 64 diesel-based mini-grids implemented by FUNAE which were managed by local “management committees”. The electricity fees are supposed to be collected by the committee (flat rate tariff for a 4 to 8 hours/day service). Many mini-grids have stopped due to lack of funds for fuel, spare parts and maintenance<sup>4</sup>.

Some of these places have been connected to the main EDM grid in the meantime, but it is estimated that there are still many non-operating and obsolete grids.

#### 1.6.2.4 Electrification with hybrid PV and gasification

In Titimane, under the scope of the partnership between Energias de Portugal and UNEP, a project was developed to produce electricity from cotton pellets in a hybrid solar/biomass system. The aim was to demonstrate economic feasibility of an off-grid system in a rural community. An agreement was signed in 2015 between EDP, EDM, FUNAE and the cotton company. However, the partners never obtained the authorization for the legal framework of the project, namely the approval of the regulatory framework and the licensing of the concession contract, from the Ministry of Natural Resources and Energy. The project was cancelled in July 2017.

## 1.7 Recommendations and conclusions from RERD1

The **End Term Review of RERD1** and the **Value for Money Audit**<sup>5</sup> concluded with the following main recommendations:

### 1.7.1 Sector planning and investments

- Further **geographic concentration** is needed in order to increase effectiveness of the actions and eventually the likelihood of making an impact on the socio-economic development of the selected areas.
- Correct **sizing** is important : hydro power plants of **less than 100kW are not cost effective**; the audit evaluates the costs of Sembezeia Hydro power plant at 10,000 EUR/kW, or 1388 EUR per household allowing lighting, battery charging and radio. A Solar Home System yielding the same benefit would cost about 350 EUR. **In the absence of potential for productive uses of energy, FUNAE should opt for individual solar PV systems.**
- More consideration should be given to the appropriateness of technology to be implemented in a specific project. This should be strongly supported by a thorough needs assessment and feedback from future users with regards to their energy demands and financial capabilities. Project investments must be supported by **comprehensive feasibility studies**, not only technical but also financial/economic, in addition to social and environmental impact assessments.

<sup>4</sup> Low Carbon Mini-grids: “Identifying the gaps; building the evidence base” - Volume 1 – IED, November 2013.

<sup>5</sup> Renewable Energy for Rural Development, Value-for-money Audit, Deloitte, December 2014

- **Productive uses of energy** should be included in the demand assessment. Isolated mini-grids should be developed depending on site-specific details, and with increased involvement of users that have an intrinsic interest in maintaining the equipment.
- The audit recommends to consider the opportunity to contract PPP with **the private sector** for the construction of mini-hydros. However, it recognises the fact that under the prevailing regulatory conditions, the investors will not have a fair return on investments, and that investments costs should be made available to FUNAE.
- Looking at the **improvements for planning within FUNAE**, there is a need to further consolidate and streamline all existing databases that can turn into a comprehensive GIS Asset Management planning and monitoring system for renewable energy. An integrated GIS management tool can be used to its full potential in terms of achieving better monitoring and reporting on all systems, sharing information within departments and improved planning.
- One of the best capacity building actions is to help FUNAE build a sound and efficient **Project Management System**, according to the best international standards, in order to apply it across all projects that FUNAE plans to develop in the future.
  - Price comparison of photovoltaic systems installed by BTC with those funded by the World Bank in Mozambique shows an unexplained difference of 18%. Recommendations include reviewing the award criteria, publishing tenders on several websites and in English, and ensure transparency on currency and tax treatment.
  - Regardless the execution modality chosen between partners, the key to operational efficiency is the creation of a **dedicated Project Management Team**, empowered with an adequate level authority, decisional powers and autonomy to act on the project.

### 1.7.2 Sustainability

- The requirements for **O&M of the systems** developed by the projects seem to have initially been underestimated and FUNAE's capacity to carry out such activities might have been overestimated. FUNAE maintenance resources (staff and material) are overstretched with the current workload of maintaining the backlog of only solar systems installed in the past and currently under its entire responsibility. Once the contractor's responsibility for maintenance has ended for solar systems and mini-hydropower plants and grids built by RERD1 project, as well as solar plants built with support of other projects, FUNAE capacity for ensuring proper maintenance will be overwhelmed.
- The assumption that adequate **funding level for O&M** could be secured by the government seems compromised, and so is the expectation that it could be covered by the user's tariffs.
- **A rolling long-term O&M plan must be prepared**, properly costed and ideally stretching over a 5 years period and presented to the Ministry for facilitating funding allocations on yearly basis.
- The **maintenance unit of FUNAE must be transformed** in an O&M division and organised as a utility operator with a sufficient autonomy.
- MIREME should issue clear instructions to FUNAE concerning the tariff setting mechanism for users of off-grid electricity, possibly in line with those applicable to national grid users. Additionally, include FUNAE in the same subsidy mechanism as it is currently done for the main national grid in order to obtain **good funding for good operation and maintenance of off-grid energy systems**.

- **Prepaid meters must be installed**, specifically for mini-grid users as to ensure a fair and reliable tariff collection system.
- The operation by FUNAE of the existing hydro sites is not sustainable; the audit recommends developing solutions to transfer the ownership or **sub-contract the management responsibilities** to a qualified operator. Local alternatives should be explored so that FUNAE becomes a supervisor of the maintenance process rather than the main actor.

## 1.8 Lessons learned from other donors

### 1.8.1 Sector planning and investments

- For large projects, grid extension at medium voltage (MV) is often cheaper than a solar/hydro mini-grid. However, the comparison with grid extension was rarely or never made, and investment costs never challenged, due to institutional setup. Indeed, FUNAE is in charge of isolated grids, while grid extension is the mandate of EDM. For example, the 3 mini-grids financed with Korean support have been installed in places where the government was planning to extend the grid and presently the 3 locations are connected to the grid. This lack of coordination and foresight means a squandering of assets that could have been better used somewhere else. Besides, the cost of those grids per connection was extremely high.
- For remote areas, the difficult logistics increase the costs of installations and the provision of maintenance services, such as supplying spare parts and sending back products under warranty.
- Installations in institutional buildings are often oversized. For example, many schools were electrified in spite of the fact that they do not provide night courses. Electricity has little uses in government administrative buildings except to charge phones. The largest impact is observed in health centres, where working at night, having communication means and a proper cold chain for vaccines does improve the health services. The electrification of staff housing also has a high impact on staff motivation, due to better living conditions. The main challenge for these systems is the maintenance, from a technical perspective and from a budget perspective (insufficient budget for maintenance, largely due to low payments rates). The tariffs practiced are estimated by FUNAE to cover approximately 50 % of the costs of operation. Compared to an individual system the collective systems have less 'ownership' and seem to be less sustainable. It could be better to promote individual systems for teachers and nurses than to provide expensive mini-grid solutions for them.
- The only attempt so far to involve the private sector has failed (Titimane)

### 1.8.2 Sustainability

- FUNAE has secured financing from many more donors along the years. There are hundreds of installations all over the country, but most of these installations stopped functioning because of lack of maintenance.
- Willingness to pay is low: a recent study (2016) made by 3E in five locations ranging from 1000 to 12,000 inhabitants observed an average willingness to pay from 175 MzM/month, the lowest being 150 MzM/months and the highest 214 MzM/month. FUNAE's observations rate that poor households can pay from 100 to 400 MzN/Months, average households 500 to 800 MzM/month and affluent 800 to 2000 MzM/month. A lot of people cannot afford to pay the upfront connection cost (MzM 3,000 – the cost of connecting a house to the grid). This low consumption sometimes contrasts with the high installed capacity of some mini-grids.
- Institutional clients (hospitals, administrative centres, schools) can be more difficult to deal with, as the corrective measures in case of non-payment, such as cutting electricity supply,

are more difficult to implement.

- Public lighting is a free service until now, and consuming a large part of the electricity produced. In principle, public lighting should be paid for by public services at the local applicable tariff.

### 1.8.3 Regulatory issues

- There is currently no regulation about mini-grids: mini-grids are either state-operated (FUNAE) or operated in a rather informal way.
- There are no provisions for compensating the investor when a mini-grid is connected to the grid.
- There is also the perception that if it is government-supplied, one is not obliged to pay for energy. Especially in the places where there was a diesel mini-grid managed by the local authorities, these perceptions are difficult to oppose.
- FUNAE has recently realised the unsustainability of the previous choices and is now introducing prepayment meters in all connections

## 1.9 Conclusion

The current fiscal crisis, with the instability of the local currency and very high commercial lending rates, is not creating a very favourable environment for the development of businesses by the private sector. Public finances are under strain and the problem of maintenance and financial sustainability of the investments, both made by RERD1 and RERD2, remains acute. With 100% grant for the investment, the operation costs have to be minimized by a careful choice of technology and a very good quality of construction.

The sustainability of the installations financed by RERD1, as all systems under the responsibility of FUNAE, is not guaranteed under the present conditions. Operation and maintenance have to be strengthened in their organisational, technical and financial aspects.

Due to several factors, mini-grids are expensive to build and to run in Mozambique. Correct dimensioning based on a socio-economic survey is essential. The rural population is extremely poor and the ability to pay is low. Rural electrification in Mozambique, as in any other country, needs subsidies, but in the present fiscal situation of the country, those will be hard to come by. To reap the economic benefits of electrification, and thus contribute to reducing the poverty of the rural areas, this intervention should be part of a broader rural development programme, actively developing productive uses of energy. In this way, the number of clients able to pay for the service will be higher and make the infrastructure more sustainable.

Hydropower is a good option because of its flexibility, simple technology and relatively low maintenance costs. RERD1 has financed studies for a number of sites, that will be the starting point for this intervention.

Regulatory issues such as tariff setting are central to financial sustainability. Synergy is thus essential with the CBMIREME intervention that will work with the newly established regulator ARENE. Active collaboration will be needed with the main donors such as the EU, who is planning a large rural development programme, and initiatives such as RECP, working on policy issues.

## 2 STRATEGIC ORIENTATIONS

### 2.1 Building on the results of RERD1

The intervention will build on the positive outcomes of RERD1 and take into account the recommendations and conclusions of the End Term Review as described in 1.5.

More specifically, the intervention will ensure the sustainability of the infrastructure built under RERD1 by:

- Strengthening the operation and maintenance of the solar PV systems
- Continuing the implementation of the pre-payment systems on the three mini-hydros built under RERD1 and study the most suitable operator model.
- Continuing the implementation of the remote monitoring systems on the solar PVs.

The intervention will make use of the existing pre-feasibility and feasibility studies for mini-hydro produced by RERD1. Those studies will first be revised and completed when deemed necessary, as not all of them are at the same stage.

The potential sites will be assessed against at least the following criteria:

- availability of information in the Renewable Energy Atlas
- potential of the sites for economic development. Current or future presence of other donors in the field of rural development and complementary activities making use of energy (mills, cold chain, irrigation, entertainment ...)
- access
- security
- technical feasibility (needs assessment, load forecast, hydrology)
- socio-economic feasibility (willingness and ability to pay)
- quality of the existing pre-feasibility and feasibility studies: technical standards, climate risk assessment
- time schedule
- financial feasibility
- budget and availability of complementary funding from FUNAE or other donors if necessary
- willingness of future users and motivation of local authorities
- plans of EDM for grid extension
- viable operator model
- environmental impact assessment

The intervention will continue strengthening the maintenance unit and the use of GIS and data base for asset management, and supporting the Delegation of FUNAE in the Provinces in sector planning.

## 2.2 Actively promoting productive uses of energy

To achieve the general objective of economic and social development, this intervention will broaden its scope and fit into a larger rural development perspective. Indeed, studies have shown that providing access to electricity is not enough for economic activity to pick up by itself. This has two consequences: first, the economic impact does not materialize, and second, electrical schemes suffer from a lack of customers able to pay for the connection.

The sites to be developed will have a potential for productive uses of energy, covering both upgrading of existing economic activity and support for the creation of new businesses. Assessing this potential will be part of the baseline studies for the pre-selected sites.

In the rural areas of Mozambique, potential productive uses of energy include grain mills, solar irrigation, solar pumps, cold storage of food, entertainment, metal works, wood works, refrigeration, TV and entertainment.

The type of stakeholders for the socio-economic studies will thus be larger than those usually involved in an energy access intervention, including the Ministry of Rural development (MITADER), the Ministry of Agriculture, the Ministry in charge of the development of small and medium enterprises and micro finance institutions. It should also include NGOs and civil society organisations working in the area of rural and private sector development.

In Mozambique, this includes amongst others:

- CTA: Confederation of Trade Associations
- GAPI (Gabinete de Apoio as Pequenas Industrias): financial institution, giving credit to SMES, micro-finance, risk-sharing instruments, capacity building for SMES
- SDAE : District Service for Economic Activities

The intervention will also contact donors active in the rural development sector (IFAD, PROSUL (SNV), GIZ, CARE, FAO, World Bank, EU) who are planning to finance agribusinesses or other economic activities in the same areas.

An example of detailed methodology can be found in 'EUEI PDF –GIZ 'Productive use of energy- PRODUSE - A manual for electrification practitioners'.

## 2.3 Building hydro mini-grids

As highlighted in chapter 1, mini-grids can be a real opportunity for rural electrification in Mozambique. Considering the size of the country, the current grid and its extension plans, it will take decades before all the country will be covered by the EDM grid.

Hydropower is a relatively simple technology, and allows for continuous operation and flexible regulation of electricity output. It is low-maintenance and cost effective when properly sized. However, the design has to be of good quality and based on hydrological measurements; given the vulnerability of Mozambique to climate change, the infrastructure has to be designed to be flood resistant.

For those reasons, the intervention will focus on a small number (1 to 3) hydropower mini-grids, depending on the budget, and based on pre-feasibility and feasibility studies developed by RERD1. As it is proved that very small hydropower plants are not cost effective (see lessons learned), and to allow for productive uses of energy, the intervention will target an installed power of 200kW to 1 MW.

For low domestic uses of electricity such as lighting and charging phones, the Solar Home Systems are more cost-effective. The smaller individual systems (solar lanterns, SHS) market is considered as a private sector retail business. The market development and private sector support needed for these systems will be covered by the large BRILHO intervention financed by DfID.

## 2.4 Focusing on a limited number of provinces

The recently completed Renewable Energy Atlas shows the potential for the different electrification options: the highest potential for off-grid development is found in the northern half of the country, due to the region's sparse grid network and high population.

Focusing on a limited number of Provinces is a recommendation of the end-term review and of the value for money audit. Furthermore, the choice of the area is conditioned by the availability of hydropower resources. For those reasons, the **investments** of the RERD2 intervention will be localised in a maximum of two Provinces, to be chosen amongst the following : Zambezia, Niassa, Manica, Nampula.

The choice of those provinces is justified by their potential for hydropower development and the availability of pre-feasibility and feasibility studies developed by RERD1.

Zambezia is the second most populated province after Maputo, is centrally located and has a good potential for more agriculture development; Nampula is also relatively densely populated; both provinces are the focus of the EU rural development programme. Niassa is more sparsely populated and Manica is substantially covered by the main grid.

The security situation will be monitored during the implementation of the project and the geographical focus will be adapted if necessary.

The **capacity building component** of the RERD2 in the FUNAE Delegation will start in Zambezia, with replication to other Delegations if feasible.

## 2.5 Financial sustainability and payment of services.

### Maintenance

Many past projects lacked effective maintenance mechanisms. Recently this omission is taken up by the new maintenance unit of FUNAE, created in 2014, which had difficulty in collecting all the relevant project data. The department works on a complete database integrating older project data, which will be used for the planning of maintenance and repair. However, this unit seems not to be fully integrated in the FUNAE organigram, and the mini-hydros, still managed by FUNAE to date, are under the hydropower division. There is thus the need to define the place of operation and maintenance in the institutional framework of FUNAE.

A convincing sign of progress towards service delivery is the set-up of the so-called 'green line', to collect queries and complaints. However, the lack of spare parts and knowledge about the installed systems and the large distances involved hinder the quick resolution of problems.

Regular maintenance at the community level is expected to be provided by the local management committees in the villages. When a problem occurs, which is above their competence, the management committees call the 'green line' to report the problem to FUNAE. Those requests are collected at central level by FUNAE and then dispatched to the FUNAE Delegation in charge. Preventive maintenance plans exist sometimes, but execution is hampered by lack of spare parts, and limited skills. Repairing the systems usually takes a long time for these same reasons.



For Solar PV systems, there is a maintenance strategy for solar PV: “Estratégia da manutenção dos sistemas fotovoltaicos 2014-2020”. The next steps are described in “Implementação da Estratégia da manutenção dos sistemas fotovoltaicos”.

For the mini-hydropower plants that are managed by FUNAE, there is currently no O&M strategy, and there is no cost estimates.

Maintenance requires budgets that need to be foreseen in the state budget, included in a contract, or generated through revenue.

#### Payment for service

The management committees in the villages are in charge of collecting the fees, usually a flat fee of 400 MZM/month. Electricity tariffs are not cost-covering which negatively affects maintenance budgets, and thus also maintenance and reliability of the service, and ultimately the willingness to pay. FUNAE estimates that if all fees were effectively paid, it would cover 50% of operation and maintenance costs, thereby demonstrating the need for subsidies at present tariffs levels. However, a more precise estimation is necessary to include O&M costs in FUNAE annual budget.

Procurement and installation of prepayment meters could improve the payment rate. FUNAE is starting to implement this system on the hydro mini-grids. This effort will be followed up by the intervention since the payment is up-front, it reduces the financial risk by improving the cash flows and requires an improved revenue management system. The system eliminates billing delay, removes cost involved in disconnection/reconnection, enables controlled use of energy, and helps customers to save money through better energy management.

To raise awareness on the benefit of the “pay for services” approach, the project will support FUNAE in creating communication materials to show people that they can access services of better quality (e.g. light) for less than what they are currently paying.

#### Connections

Connection costs to a mini-grid can be high for a household or business (up to 100\$ for cabling and meter, including interior installation). This can be prohibitive for poor rural households. Subsidising these connections will be considered by the intervention. Systems whereby connection cost is recovered through the tariff will be analysed.

The intervention can cover connection costs and interior installation of public institution building.

The intervention will thus work on several axes to address the maintenance issue:

- The organizational set-up in FUNAE will be reviewed to improve the functioning of the maintenance unit;
- New mini-grid operator models as described in 7.2 will be assessed and developed when relevant and the role of each stakeholder will be defined contractually.
- Payment will be enforced with pre-payment meters;
- Monitoring systems will be reinforced;
- The intervention will provide capacity building to the existing maintenance teams in the Delegations
- Communication and awareness campaigns will help to encourage the approach of paying for the service.

The capacity building efforts will focus on two major components:

- Improving the **financial sustainability** of the existing and future systems (Result 2), by strengthening the information systems, the sharing of information between departments, the integration and use of GIS as maintenance and monitoring tool, the internal processes in FUNAE concerning O&M, and the fee collection procedures. The interactions with the private sector in the case of public private partnership will also need to be well formalized and adequate training provided. This concerns both HQ and Delegations of FUNAE. The focus will be the Delegation of FUNAE in Zambezia as a pilot with replication to other provinces where feasible.
- Improving **project management skills** and tools at HQ level, as it was recommended in the final evaluation of RERD1, and improving the skills of the Delegation in Zambezia in sector planning and coordination. Coordination with provincial authorities will be especially important in the view of widening the scope of the project to productive uses of energy.

## 2.6 Synergies with CBMIREME and other projects.

The most relevant to RERD2 are CBMIREME and the programmes of DfiD, EU and RECP.

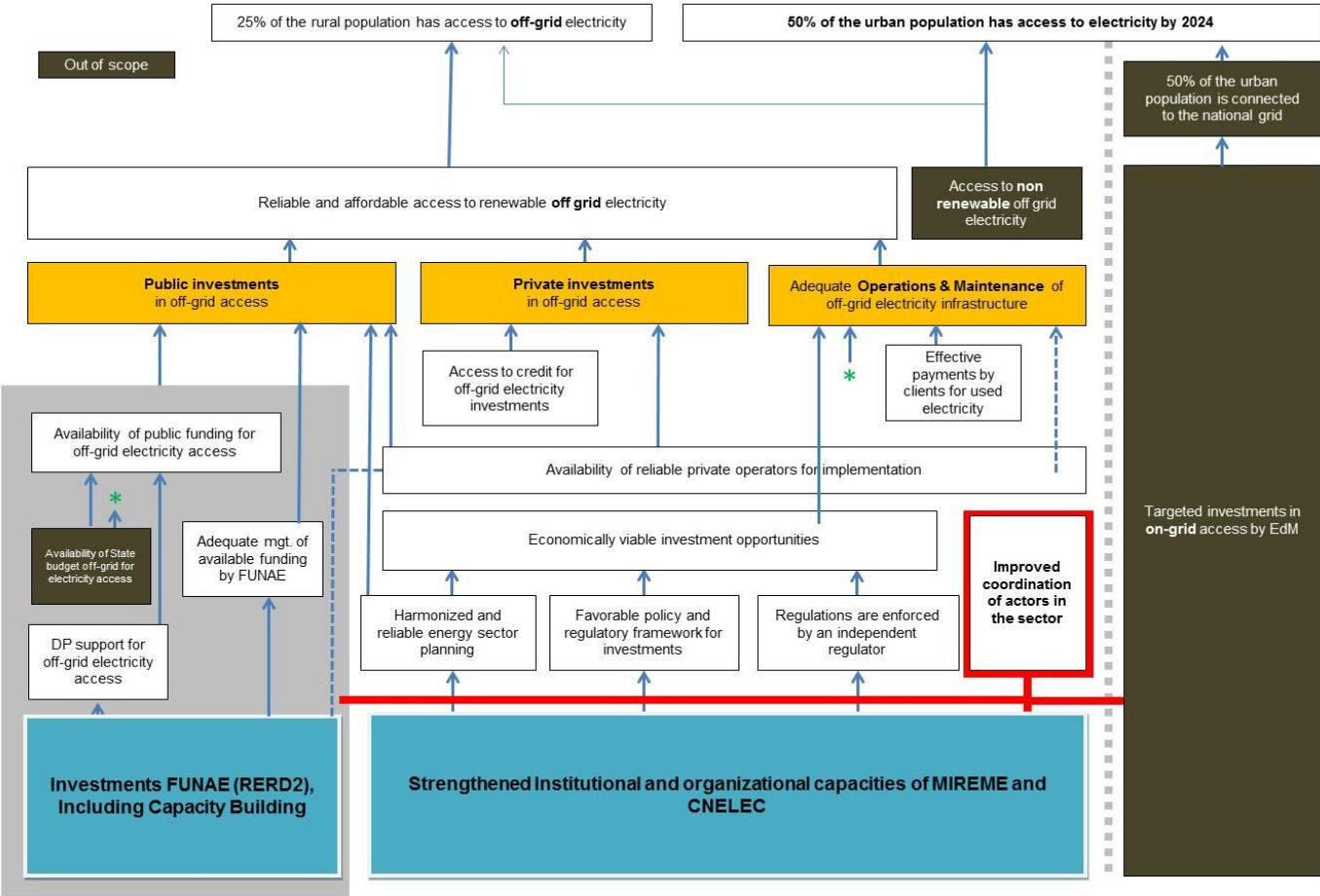
If the programme resumes, synergies with DFID will be actively searched, as the 5 years programme “BRIHLO Energy Africa Mozambique” (GBP 35 million) has funds for mini grid development, start-up grants for new businesses including working capital loans, and technical assistance for legal and technical advice to the private sector. It will also investigate the feasibility of PAYG mechanisms, and has a component in policy reforms and institutional strengthening. Those last two components are especially relevant to RERD2. DFID has also made an institutional assessment of FUNAE on which the intervention can build its capacity development plan. The EU rural development programme, focused in Zambezia and Nampula, could be a good opportunity to place RERD2 in a broader perspective.

The RECP ‘Mozambique Energy Project Preparation Facility’ has a policy advisory component that will also be relevant to RERD2.

Last but not least, CBMIREME will work on policy issues; the support to the newly approved regulatory agency ARENE is of utmost importance to RERD2. Indeed, at the core of financial sustainability of the mini-grids is the question of tariffs, which is a competence of the regulator.

The partners already coordinate their efforts through the energy sector working group, to share information on scope, objectives, means and activities. Belgium is an active member.

## 2.7 Theory of change



The Theory of Change represents in a schematic way how the Belgian-Mozambican interventions in the electricity sector (in blue at the bottom of the figure) will contribute to the achievement of the national objectives for the sector (Energy Strategy 2015-2024), which are represented at the top of the page:

- Provide access to electricity to 50% of the urban and peri-urban population by 2023.
- Provide off-grid access to electricity to 25% of the rural population by 2023.

Some elements are mentioned in the scheme but are considered as being “out of scope” for the Belgian support to the Mozambican electricity sector (they are marked in dark grey).

The elements in light grey are related to the FUNAE and subject to this intervention, while the one in the centre bottom refers to the MIREME and CNELEC/ARENE intervention recently approved

The Belgian support to the energy sector is concentrated on off-grid electricity. EDM’s contribution to the national objective of electrifying 50% of the urban and peri-urban population via on-grid electricity is out of scope for this initiative. The focus of the BTC intervention is on new and renewable sources of energy and this is in line with the second energy access objective of the GoM to achieve 25% electrification of the rural population by 2023.

For the elements that are “within scope”, the arrows between the different elements represent (semi-) causal relationships between them and they can be “read” as follows, starting from the bottom of the scheme.

## 3 OPERATIONAL PLANNING

### 3.1 Overall objective

The overall objective of the project is to contribute to Rural Economic and Social Development by Increased Sustainable Access to Energy.

### 3.2 Specific objective

The specific objective of the project is to increase access to energy in rural areas by investments in renewable energy systems and in support mechanisms to ensure sustainability.

### 3.3 Expected results and activities

The activities will accompany FUNAE in implementing the strategy described in Chapter 2.

#### 3.3.1 Result 1: Mini-grids provide reliable and adequate energy services (6,400,000 €)

The mini-grids to be developed under this component target relatively large hydro powered mini-grids (~200kW- 1 MW), giving access to relatively high amounts of power, allowing for productive use. Focusing on larger site development will achieve a critical mass where there are economies of scale, metering is feasible, and financial and technical sustainability is improved.

#### **R1.A1 Review and update of existing feasibility and baseline studies and site selection in view of productive uses of energy. (200,000 €)**

The goal of this activity is to identify mini-grid sites amongst the existing shortlist developed by FUNAE during RERD1.

Site	Province	Power	Estimated costs (CAPEX)	Status of existing studies	Comments
Berua	Zambezia	1,9MW	16,176,735 USD	2016 AQUALOGUS feasibility study	Possibility of interconnecting with the network of Majaua, co-financed by RERD1 and EU. Good potential for agrobusiness
Meponda-Machele-	Niassa	520 kW	4,900,000 EUR	2015 TRACTEBEL (grid) 2013 GESTO-CENORVIA (feasibility)	
Luaice 1, 2, 3	Niassa	520 kW	4,900,000 EUR	2016 AQUALOGUS (pre-feasibility and execution)	Possibility of hydros in cascade Possibility of one grid with several hydros Good economic potential
Mavonde	Manica	680 kW	6,966,000 EUR	2014/2015 Royal Haskoning pre-feasibility and feasibility	
Luchima-Ntimbe	Niassa	225 kW	5,235,859 EUR	2014 GESTO CENORVIA pre-feasibility	
Luanga	Niassa	1MW	9,413,000 EUR	2014 GESTO CENORVIA pre-feasibility	Possibility to feed in the main grid
Muralelo	Nampula	280 kW	2,500,000 USD	2014 GESTO CENORVIA pre-feasibility	
Nintulo	Zambezia	108 kW	2,358,198 USD	2015 CANAS TAVEL execution	

**One to three sites will be selected by the Steering Committee.** For those sites, the studies have to be revised and updated, to fit in the framework of productive uses of energy, to check for the quality of the methodology of the socio-economic studies, and to ascertain their technical quality and their financial sustainability.

The potential sites will be assessed against the criteria described in 2.1.

The projects to be developed should have a potential for productive uses of energy, covering both upgrading of existing economic activity and support for the creation of new businesses. Assessing this potential will be part of the baseline studies for the pre-selected sites, along with the other criteria listed in 2.4.1.

The preliminary study will also include a mapping of relevant existing programmes and potential partners, to identify opportunities to link up with on-going initiatives, including micro-lending programmes and technical assistance to SMEs.

This activity will be completed within a maximum of 24 months, and the site selection will be validated as explained in R1. A3.

#### ***R1.A2 Awareness and stakeholder consultations (150,000 €)***

Involving local communities from the start is recommended to improve mini-grid design, ensure local support, mobilise contributions and increase local ownership, and to improve the protection of the systems against theft and vandalism that was observed in the systems installed under RERD1. It can also raise awareness on energy use (safety) and energy efficiency, improve billing and revenue collection and prevent conflict between a potential private operator and the users. The most suitable management model can also be discussed, setting clear ownership and responsibilities between generation and distribution activities, tariff setting and fee collection, and monitoring activities.

The awareness campaign will include an element to inform the future users about profitable utilisation of electricity, targeting more specifically business owners and farmers and key decision makers (local authorities, microfinance institutions, energy service providers).

This campaign will thus be designed and launched with FUNAE at the start of every mini-grid investment project.

This campaign will also include a study specific to the site, to determine how gender issues can be embedded in the intervention, including in the broader part of productive uses of energy. The opportunities for gender mainstreaming are described in 6.2.

#### ***R1.A3 Mini-grid development with productive uses of energy (6,000,000 €)***

The start of this activity is conditional to the assessment by the Steering Committee of the following seven points.

The Resrep will request the mandate to start this activity to BTC HQ. This will take place at the latest 24 months after the start of the execution phase of the intervention.

The installed power of the mini-grids will range between ~200 kW and 1MW.

1. Projects have to be supported by **comprehensive feasibility studies**, not only **technical** but also **financial and economic**, in addition to **social and environmental impact assessment**.

A methodology for such feasibility studies will be developed under component R3. A1.

2. **Financial feasibility has to be proven before approval of each project:** a mechanism to cover CAPEX and OPEX costs will be agreed upon at the start of the project, based on a sound financial study. The level of necessary (cross) - subsidies will be determined and agreed upon with FUNAE.
3. The most appropriate **business model for operation and maintenance** will be selected before starting the project amongst the possibilities listed in Annex 7.2: community-based, private operator, government owned, hybrid operator. When private sector is involved, a supervision mechanism by FUNAE and/or the local authorities will be developed and a contract model will be agreed upon. The main alternatives to private management are community management or public management by FUNAE or by local authorities. Both these options require strong support such as training of operators and managers, coaching on site, long term supervision of technical and financial management, etc.
4. **Realistic tariffs** will be agreed upon and wherever feasible, pre-payment meters will be installed. Payment for the provision of energy has to be enforced. Standardised pre-payment meters can be purchased in large quantities by the intervention, to allow FUNAE to connect more customers to the mini-grids in later stages. For hospitals and clinics, a system needs to be devised in which a clinic is not cut-off from power during the night.
5. **A training plan for operators, managers and technicians** will be worked out. The tender for construction can include a two years operation period with obligation to train the future operators.
6. To enhance **productive uses of energy**, at implementation stage, the following activities (non-exhaustive) should be agreed with another donor organisation:
  - Technical assistance to business owners, institutes or vocational, schools, equipment vendors,
  - Technical trainings (skills to operate and maintain equipment ...)
  - Access to finance/micro finance

#### **R1.A4: Result dissemination (50,000 €)**

Considering the innovation and demonstration character, the dissemination of results and lessons learned will be an important aspect. The intervention will therefore:

- Compile lessons-learned at different stages of activity implementation, most likely before completion.
- Use the outputs of monitoring and evaluation activities to publish results.
- Produce info-graphic material to be distributed and placed in websites.
- Publish results in local and international media, papers, conferences, etc.

### 3.3.2 Result 2: Technical and financial sustainability of existing systems is improved (1,260,000 €)

#### **R2.A1 –Operation and maintenance processes are strengthened (200,000 €)**

Under this activity, the maintenance unit will be strengthened and preferably transformed into an O&M division, and the activities started under RERD1 on training of technicians and on manuals for operation and maintenance will be continued.

This activity will also study the possible contractual arrangements between FUNAE and private operators for the delegation of operation and maintenance activities under the current Mozambican law.

Particular attention will be paid to budgeting and financing of OM activities, ideally secured as much as possible from tariffs collection. However, it is likely that the budget will show a shortfall and that the need for subsidies remain, which should be secured by state budget. This activity will determine as accurately as possible what is the level of subsidies that is required for the sustainability of the existing systems.

#### **PV systems:**

FUNAE has a strategy for maintenance of photovoltaic systems described in “Estratégia da manutenção dos sistemas fotovoltaicos 2014-2020”. This strategy is complemented by a plan of action ( “Implementação da Estratégia da manutenção dos sistemas fotovoltaicos”).

The implementation will be continued along the lines described in the final report of ‘Implementação da Estratégia da manutenção dos sistemas fotovoltaicos’ (table in Annex 7.9):

- Update of databases of existing systems
- Development of preventive maintenance
- Spare parts stock management
- Budgeting of maintenance costs
- Disseminate information material on good practices from users

For the PV systems installed on health centres, schools and administrative buildings, the transfer of the responsibility of the maintenance to the line Ministries could be foreseen but depends on their capacity.

#### **Mini-hydro:**

For mini-hydro generation, there is no specific maintenance strategy and FUNAE is taking over the operations after the contractual period of maintenance by the contractor. Operation manuals exist and the establishment of procedures is on-going, but needs to be consolidated. The activity will focus on the follow up of the tender launched in 2017 for the operations of the three mini-hydros built under the RERD1 intervention.

This line can also finance study tours to countries that have a more developed rural electricity sector such as Tanzania and Kenya, for example, to take stock of the different experiences.

## **R2.A2 – Strengthening of information systems (200,000 €)**

**Information systems** are applied in FUNAE. The computerisation of the organisation is complete and technically everything is in place for the tasks. There is a database of existing systems and FUNAE uses a GIS system but the existing databases are not systematically linked to it. The GIS team has limited strategic orientation. As a consequence, GIS is mainly used for cartographic tasks, with limited use as a tool for management, planning and decision making. Recently the GIS department came under the lead of the Planning Division of FUNAE.

There is no shared information system in place to systematically collect, store and organise information/data from different FUNAE departments. Project databases do not allow for an easy analysis of the state of affairs at one point in time. Project management is done with Excel sheets, not allowing for instant oversight of financial flows related to project progress, or for oversight over all projects carried out.

This activity wants to improve the use of digital technologies by FUNAE, for a better internal management and a better service towards its partners. Topics for this activity are:

- Geographical Information System: going beyond a static database, by using the GIS system to identify new sites, to manage assets, to take decisions and to improve planning, including with the other institutions.
- Integration of monitoring and maintenance into a management platform, for an improved management of existing installations.
- Digital surveys for needs assessments, baseline studies, customer feedback, monitoring and evaluation, for quicker, better and more professional surveys at a lower cost.

## **R2.A3 – Remote metering and monitoring systems allow for more efficient maintenance of the systems (360,000 €)**

Remote monitoring can bring real benefits to decrease maintenance costs and avoid unnecessary inspection visits. Maintenance team activities can be better targeted to installations showing a problem in the monitoring results. Part of the problems can often be solved remotely by a phone call with the user, and monitoring information can help troubleshooting when a user calls the “linha verde” (green line, helpdesk).

Substantial funds have been invested during RERD1 on monitoring systems.

FUNAE is currently working with three different technologies:

- Victorn Energy, South Africa Supplier, 4 systems installed.
- Belgian campus, South Africa supplier, 4 systems installed.
- EMS, supplier Portugal.

Under this activity, the TA will assist FUNAE to take stock of the pilot phase and to decide on a system that appropriately addresses the needs and guarantees value for money.

This activity will finance the study of the best options and provide for the procurement of additional systems, together with focused trainings of the technicians to properly operate them.



#### **R2.A4 – Implementation of payment systems (500,000 €)**

For schools, hospitals, and administrative buildings, currently the fee is 400 MZN per month and is budgeted in the relevant line Ministries. There is a need to monitor the revenues collected by this stream and agree with the relevant Ministries and District authorities if there is a problem with fee collection.

Specifically, for mini-grids, it will be crucial to ensure a fair and reliable tariff collection system. Pre-paid meters have proven to be an adequate solution in other countries and are starting to be implemented in Mozambique. The use of mobile payment is also operational for EDM clients and this possibility could be studied for isolated grids.

Connection fees to the mini-grids are also an important element to take into account. They might need to be subsidized for the most vulnerable users.

This activity will provide for purchase of pre-payment meters and for connection subsidies.

### **3.3.3 Result 3 : Capacity building of FUNAE in planning and project management (2,750,000 €)**

#### **R3.A1 –Project management is improved at FUNAE central level (100,000 €)**

This component will support improvements in project cycle management and financial management and thus bring an answer to FUNAE's requests to increase the capacities of its staff members to analyse, negotiate and implement project proposals.

Moreover, in order to guarantee a financial viability, FUNAE needs to develop a methodology for attracting private sector, but also improving the development of tariffs strategy and cost recovery.

Proposed activities:

- Capacity needs assessment and Functional review of key processes related to the project management and financial management
- Strengthening the capacities of responding to the call of proposals, marketing, study on Tariffs, socio-economic surveys and willingness to pay surveys
- Development of Business Models to work with the private sector
- Development of Project analysis and contract management skills
- Development of enhanced and clarified working procedures, templates, tools and processes

Means:

- Long Term Technical Assistant, medium-term consultancies, trainings, workshops, mentoring, coaching, equipment, exchange of experience with other countries
- Intervention change manager

### **R3.A2 –The capacity of selected delegations of FUNAE are strengthened in sector planning and coordination (200,000 €)**

Work on the capacities of FUNAE also means working on the development of its capacities at provincial level, through a specific support to the delegations of FUNAE. This will start with in-depth analyses (functional reviews) of existing core, management and support processes at provincial level.

- Important functions that need to be analysed are strategic planning, communication and reporting, monitoring and evaluation and HR processes.
- The goal of this exercise is to identify areas where existing individual, organizational and institutional capacity should be strengthened at provincial level.
- Based on the above mentioned analysis, the intervention will develop and implement specific activities to accompany the necessary changes in the functioning of the delegations of the FUNAE. For most functions, this exercise will include a support to the process of enhancing or redefining working procedures and implementing them.

Proposed activities:

- Capacity needs assessment, Functional review of key processes related to sector planning at provincial level (existing reporting lines, bottlenecks,)
- Development of enhanced and clarified working procedures, templates, tools and processes together with:
- Building of individual and organizational capacities related to sector planning at provincial level through Technical assistance, peer-to-peer coaching, consultancies, trainings, workshops, field visits like inter-provincial study tours, mentoring, coaching, basic ICT equipment, etc.
- Supervision of private sector

Means:

- Long Term Technical Assistant, medium-term consultancies, trainings, workshops, mentoring, coaching, equipment, etc.

### **R3.A3 – International Technical assistance (2,250,000 €)**

The terms of reference of all TA will contain a knowledge transfer component to ensure its effects in terms of capacity building.

The following TA is foreseen for RERD2:

**International intervention manager** (full time), **rural development, business or economic background**, overseeing the various aspects of the intervention, with a focus on financial sustainability of the investments, economic development of the rural areas, and capacity building of FUNAE.

**Intervention Change manager**, (full time)

**International renewable energy specialist** (full time), following all investments from a technical point of view from the needs assessment stage to the tendering and construction stage and to the operation and maintenance stage.

**Capacity building expert**, working at provincial level (1/2 time, shared with the Capacity Building MIREME intervention), building capacity at DIPREME and FUNAE delegations.

This activities will be part of results 2 and 3.

### **3.4 Geographical orientations**

As described in 2.4, the investment part of the RERD2 intervention will be localised in a maximum of two Provinces, to be chosen amongst the following : Zambezia, Niassa, Manica, Nampula.

The component of the capacity building in FUNAE Delegation (R3.2) will start in the Delegation of Zambezia, with replication to the other Delegations if feasible.

### **3.5 Indicators and means of verification**

See logical framework, Annex 7.4.

Indicators will be made gender sensitive where possible. Baseline values on electricity access and other indicators will be collected for each individual site.

### **3.6 Description of beneficiaries**

#### **3.6.1 Direct beneficiaries**

##### Households:

On an individual household level, access to electricity will allow lighting and communication (phone, radio). Later on, people could buy electrical appliances such as televisions, fans, and fridges to improve their living standards.

##### Institutions:

Access to electricity will also provide the population with a better health service (medical care, vaccination, disinfection, etc.), better school facilities (equipment), better water quality and quantity at less effort. Personnel in these public infrastructures (administrative facilities, health centres, and schools) will benefit from electrification by having substantially better working and living conditions. This will be an incentive for these people to perform their job.

##### Small businesses:

Mini-grids also provide sufficient power for productive use by SME's, cooperatives etc. This can foster entrepreneurship and improve transformation processes. This category of beneficiaries is more likely to be able to pay for the service and is thus favourable to the financial sustainability of the project. However, promoting productive uses of energy will require good synergy with other donors and an active involvement of the beneficiaries and the local authorities from the very start of the intervention planning stage.

## 3.7 Risk Analysis

### 3.7.1 Implementation risks

Description	Probability	Impact	Risk level	Mitigation measures
Instability due to local elections in 2018 and presidential elections in 2019 leads to insecurity in the provinces, which would hamper the implementation of activities and project quality.	Medium	Medium	Medium	<ul style="list-style-type: none"> <li>The geographical concentration will be adapted to the security situation. The focus will be on two provinces amongst the following: Zambezia, Manica, Nampula, Niassa</li> </ul>
Difficult access to sites due to natural occurrences (heavy rains) which block roads	Medium	Medium	Medium	<ul style="list-style-type: none"> <li>In the planning of activities, consider the period from December – February as months not suitable for works/rehabilitations but for other activities (procurement/acquisition of goods, trainings, etc.)</li> </ul>
Slow pace of intervention due to procurement procedures	Medium	Medium	Medium	<ul style="list-style-type: none"> <li>Optimised implementation modalities based on lessons learned from RERD1</li> <li>Projects will build on existing studies developed by RERD1</li> <li>All travel, study tours and surveys in BTC management mode.</li> <li>Vehicles purchased on RERD1 must be made available to the project staff when needed</li> </ul> <p>Within the IMU :</p> <ul style="list-style-type: none"> <li>Procurement expert for the program</li> <li>Support of international Rafi</li> </ul>
Resistance to change in FUNAE	Medium	High	Medium	<ul style="list-style-type: none"> <li>Full-time long term technical assistance with adequate profile regarding capacity reinforcement and change management (see budget line A03 05)</li> <li>Budget for activities and support devoted to sustain change processes (see Z03 04 Missions cost)</li> <li>Involve FUNAE staff on change processes and build on the high degree of openness showed by the management of FUNAE.</li> </ul>

### 3.7.2 Development risks

Description	Probability	Impact	Level	Mitigation measures
Low private sector interest for operating mini-grids	High	High	High	<ul style="list-style-type: none"> <li>• The intervention works on several axes, including with other actors that the private sector.</li> <li>• Create enabling conditions for private sector interest in mini-grids, including receptiveness of FUNAE (activity R1.A2 , R3.A4)</li> <li>• Start with outsourcing only operation and maintenance</li> <li>• Make a thorough economic feasibility study and attract private sector with interesting business models</li> <li>• Involve private sector from the start and build a sustainable model for public-private partnership for the operation of grids.</li> <li>• Envisage other management modes than the private sector</li> <li>• Small mini-grids can be clustered for operation &amp; maintenance to form an attractive package</li> <li>• Make a careful selection of sites and target large sites with economic potential</li> </ul>

Financial sustainability of the systems is problematic	Very High	High	Very High	<ul style="list-style-type: none"> <li>• Better estimation and budgeting of OM costs in Feasibility studies</li> </ul> <p>Mitigation measures for reducing OM Costs :</p> <ul style="list-style-type: none"> <li>• Continue implementation of preventive maintenance</li> <li>• Make a strong users awareness campaign on correct use of systems (PV) to lower OM costs</li> </ul> <p>Mitigation measures for increasing OM resources:</p> <ul style="list-style-type: none"> <li>• Inform the authorities on real OM costs of mini grids and advocate for government subsidies</li> <li>• Propose a well-studied adapted tariff structure</li> <li>• Increase revenue collection by generalizing use of pre-payment systems (R2 A3)</li> <li>• Involve local authorities at the planning stage and define their role in the project to increase willingness to pay</li> <li>• Design the project in a rural development perspective that promotes economic uses of energy to increase ability to pay</li> </ul>
Lack of policy and regulation for mini-grids hampers private sector interest. No operational independent regulator.	Medium	Medium	Medium	<ul style="list-style-type: none"> <li>• Planned establishment of ARENE as independent regulator</li> <li>• Support from CBMIREME to CENELEC on regulatory functions</li> <li>• Make seminars targeted to the private sector on regulatory issues</li> </ul>

### 3.7.3 Reputation risks

Description	Probability	Impact	Risk level	Mitigation measures
High numbers of non-functioning RERD1 installations	High	High	Very High	Capacity building, monitoring systems and reinforcement of FUNAE Delegations (R2; R3)
Technical failure or low quality of mini-grid construction	Medium	Very high	Medium	Strong ITA; review of feasibility studies (R1 A1)

### 3.7.4 Financial risks

Risk description	Probability	Impact	Risk level	Mitigation measure
Import taxes exemption not granted	Very High	Low	Low	<ul style="list-style-type: none"> <li>Request (import and VAT) tax exemption for the importation of quality PV systems</li> <li>Cooperation with other donors to put reduction of fiscal barriers as a priority <ul style="list-style-type: none"> <li>Use locally produced TUV certified PV panels</li> </ul> </li> </ul>
Low value for money of bids for construction contracts	High	High	High	<ul style="list-style-type: none"> <li>Publish tenders in English; publish internationally</li> <li>Make feasibility studies of high quality (R1.A1)</li> <li>Tender in euros</li> <li>Split tenders for power plant and for distribution network</li> </ul>
Establishment of capital controls on foreign currency accounts in Mozambique	Low	High	Medium	<ul style="list-style-type: none"> <li>Derogation to have a DB EURO account in co-management</li> </ul>
Forced conversion of foreign currency accounts into local currency	Low	High	Medium	
Devaluation of the local currency	High	High	Very High	
Delayed refund of VAT	High	High	Very high	<ul style="list-style-type: none"> <li>Continue with the existing set up for VAT compensation as in RERD1</li> <li>After the first two years of project execution, make an assessment of VAT refund.</li> </ul>

## 4 RESOURCES

### 4.1 Financial Resources

#### 4.1.1 Mozambican contribution

The Mozambican contribution consists in the following elements:

- Secondment of a full-time intervention change manager for the whole duration of the project (salary and expenses).
- Local transport at provincial level by the delegations.
- Provision of office premises (with Internet connection, water and electricity services and security) and in the selected pilot province(s) and office furniture.
- According to the terms of the General Development Cooperation convention signed on the 11th of May 2001 between the Kingdom of Belgium and the Republic of Mozambique, and the terms of the Specific Convention for the project (Article 8 Privilege and immunities), stating that any tax, including VAT on the supplies and equipment, works, and services, is to be covered by the Government of Mozambique.
- As FUNAE is referred to as the agency responsible for the Mozambican contribution to the project, it will pay all taxes, customs, or other related fees on supplies, equipment, works, and services, as foreseen by Mozambican legislation, and this for all execution modalities (“Co-management and BTC management”) This is considered as part of the Mozambican contribution to the project.
- Financial contribution to projects (e.g. shares in a PPP construction or other public investments).
- Future operation and maintenance of the public assets.

#### 4.1.2 Belgian contribution

The Belgian contribution amounts to € 12 million.

The detailed budget is given below, with an indicative budget chronogram in Annex 7.5



			Mode	Amount in €	%	Y1	Y2	Y3	Y4	Y5
<b>A</b>	<b>Increase access to energy</b>			<b>10.410.000</b>	<b>86,8%</b>	<b>940.000</b>	<b>860.000</b>	<b>4.060.000</b>	<b>3.850.000</b>	<b>700.000</b>
A	01	<i>Mini-grids provide reliable and adequate energy services</i>		6.400.000	53%	250.000	50.000	3.050.000	3.000.000	50.000
A	01	01	Review and update of existing studies	BTC management	200.000		200.000	0	0	0
A	01	02	Awareness and stakeholder consultations	BTC management	150.000		50.000	50.000	50.000	0
A	01	03	Mini grid development	Co-management	6.000.000				3.000.000	3.000.000
A	01	04	Result dissemination	BTC management	50.000					50.000
A	02	<i>Technical and financial sustainability of existing systems is improved</i>			1.260.000	11%	140.000	260.000	460.000	300.000
A	02	01	Planning, operation and maintenance	BTC management	200.000		20.000	60.000	50.000	50.000
A	02	02	Strengthening of information systems	BTC management	200.000		20.000	50.000	50.000	50.000
A	02	03	Implementation of remote monitoring systems	Co-management	360.000		50.000	50.000	160.000	100.000
A	02	04	Implementation of payment systems	Co-management	500.000		50.000	100.000	200.000	100.000
A	03	<i>Capacity building of FUNAE in planning and project management</i>			2.750.000	23%	550.000	550.000	550.000	550.000
A	03	01	Project management at FUNAIE HQ level	BTC management	100.000		20.000	20.000	20.000	20.000
A	03	02	Capacity building of Delegations	BTC management	200.000		40.000	40.000	40.000	40.000
A	03	03	Technical assistance	BTC management	2.250.000		450.000	450.000	450.000	450.000
A	03	04	Surveys, field trips, workshops and seminars, study tours	BTC management	200.000		40.000	40.000	40.000	40.000
<b>X</b>	<b>Contingencies</b>			<b>326.000</b>	<b>2,7%</b>	<b>0</b>				<b>326.000</b>
X	01	<i>Contingencies</i>			326.000		0			326.000
X	01	01	Contingencies	Co-management	163.000					163.000
X	01	02	Contingencies	BTC management	163.000					163.000

<b>Z</b>	<b>General Means</b>			<b>1.264.000</b>	<b>10,5%</b>	<b>263.400</b>	<b>211.400</b>	<b>212.400</b>	<b>211.400</b>	<b>365.400</b>
Z 01	<i>Personnel Costs</i>			690.000		138.000	138.000	138.000	138.000	138.000
Z 01 01	Regional Administration & Finance	BTC management		450.000		90.000	90.000	90.000	90.000	90.000
Z 01 02	Finance/admin/procurement staff	BTC management		120.000		24.000	24.000	24.000	24.000	24.000
Z 01 03	Driver	BTC management		120.000		24.000	24.000	24.000	24.000	24.000
Z 02	<i>Investment costs</i>			40.000		40.000	0	0	0	0
Z 02 01	ICT/ERP	BTC management		40.000		40.000	0	0		0
Z 03	<i>Operating Costs</i>			372.000		77.400	73.400	74.400	73.400	73.400
Z 03 01	Office consumable	BTC management		12.000		2.400	2.400	2.400	2.400	2.400
Z 03 02	Communication costs	BTC management		30.000		6.000	6.000	6.000	6.000	6.000
Z 03 03	Fuel and maintenance	BTC management		60.000		12.000	12.000	12.000	12.000	12.000
Z 03 04	Mission costs	BTC management		105.000		21.000	21.000	21.000	21.000	21.000
Z 03 05	Other operation costs	BTC management		5.000		1.000	1.000	1.000	1.000	1.000
Z 03 06	Office rental	BTC management		150.000		30.000	30.000	30.000	30.000	30.000
Z 03 07	Office renovation and maintenance	BTC management		10.000		5.000	1.000	2.000	1.000	1.000
Z 04	<i>Audit, Follow-up and Evaluations</i>			162.000		8.000				154.000
Z 04 01	Audit	BTC management		50.000		0				50.000
Z 04 02	Mid-term and final evaluation	BTC management		80.000		0				80.000
Z 04 03	Follow-up and backstopping	BTC management		32.000		8.000				24.000
	<b>Total</b>			<b>12.000.000</b>	<b>100,0%</b>	<b>1.203.400</b>	<b>1.071.400</b>	<b>4.272.400</b>	<b>4.061.400</b>	<b>1.391.400</b>

<b>Co-management</b>	<b>7.023.000</b>		<b>100.000</b>	<b>150.000</b>	<b>3.360.000</b>	<b>3.200.000</b>	<b>213.000</b>
<b>BTC management</b>	<b>4.977.000</b>		<b>1.103.400</b>	<b>921.400</b>	<b>912.400</b>	<b>861.400</b>	<b>1.178.400</b>

## 4.2 Human Resources

### 4.2.1 Project staff

The list of the project staff is indicated in the following table (see also organisational structure in chapter 5 and Terms of Reference in annex 7.6):

The appointment of the FUNAE Intervention Change Manager at the early start of the intervention is a key element, as well as the availability of the technical assistance.

The international Rafi and the international technical assistant in the Province will be financed half from RERD2 and half from CBMIREME.

The administrative staff will be pooled with the CBMIREME intervention.

Position	Quantity x Duration	Remarks	Budget	Type
Intervention Change Manager	1 x 60 months	Part of the Intervention Management Unit <b>Under FUNAE contract</b> Funded by FUNAE	FUNAE	
Intervention Manager-rural development and private sector technical assistant	1 x 60 months	International Technical Assistant (ITA) Part of the Intervention Management Unit <b>Under BTC contract</b> Funded by the intervention	RERD2	Long term Technical assistance
International Technical Assistant at Provincial level, Capacity building, DIPREME/FUNAE.	Pooled with CBMIREME Budget : 50% x 60 months	International Technical Assistant (ITA) Part of the Intervention Management Unit <b>Under BTC contract</b> Funded at 50 %by the RERD2 intervention	50% RERD2 50% CB MIREME	Long term Technical assistance

Position	Quantity x Duration	Remarks	Budget	Type
RAFi: Responsible for Administration and Finance  The RAFi will work and be financed at 50% on MIREME + 50% on RERD2	Pooled with CBMIREME  Budget : 50% x 60 months	International Technical Assistant (ITA)  Part of the Intervention Management Unit  <b>Under BTC contract</b>  Funded at 50% by the RERD2 intervention	50% RERD2  50% CB MIREME	Support functions  Time shared according to needs between CBMIREME and RERD2 interventions.
Secretary/Administration Officer	Pooled with CBMIREME  Budget : 1 x 60 months	National profile  <b>Under BTC contract</b>  Funded by the intervention	100% on RERD2 General Means	
Accountant	Pooled with CBMIREME	National profile  <b>Under BTC contract</b>	100% CBMIREME	
Procurement Officer	Pooled with CBMIREME	National profile  <b>Under BTC contract</b>	100% CBMIREME	
Drivers	2 x 60 months	National profile  <b>Under BTC contract</b>  Funded by the intervention	100% on RERD2 General Means	

#### 4.2.2 Project consultancies

Additional expertise will be obtained through framework or specific consultancy contracts or BTC partnerships. This expertise can be short or medium term.

### 4.3 Material Resources

#### 4.3.1 Transport

Seven Toyota Pick-ups have been purchased at the end of RERD1. Those vehicles will be at the disposal of both CBMIREME and RERD2 projects. Besides, three liaison vehicles (one Ford Focus and two Ford Everest) will be at the disposal of both projects in Maputo and in the provinces.

No other vehicle will be purchased on RERD2.

#### 4.3.2 ICT

ICT material and telecom costs for the staff under BTC-contract are covered by the intervention. A budget of € 20,000 is foreseen for ICT investments.

#### 4.3.3 Offices

Due to lack of space in FUNAE office in Maputo, an office will be rented for the IMU, preferably close to FUNAE head office in Maputo.

Office space will be provided by FUNAE in the FUNAE Delegations in the provinces when needed.

## 5 IMPLEMENTATION MODALITIES

### 5.1 Legal framework and administrative responsibilities

The legal framework for the project is given by the Specific Agreement, to be signed between the Belgian Minister for Development Cooperation and the Mozambican Ministry of Energy at the end of the formulation process. This Technical and Financial File will be attached to this Specific Agreement.

The legal framework of the intervention “Renewable Energy for Rural Development Phase 2” is determined by:

- The General Agreement signed between Mozambique and the Kingdom of Belgium on the date of 11<sup>th</sup> of May 2001.
- The Indicative Cooperation Programme (2013-2017) signed between Mozambique and the Kingdom of Belgium
- The **Specific Agreement** signed between the Government of Mozambique and the Government of Belgium, hereinafter referred to as the Parties. The present Technical and Financial File (TFF) will be an integral part of the Specific Agreement. In the event of conflict between the TFF and the Specific Agreement, the latter will prevail.

#### **Mozambican Party:**

The Mozambican Party called FUNAE as the entity that is responsible for the intervention.

FUNAE Chief Executive Officer is designated as Sponsor, responsible for achieving the results and the specific objective of the intervention.

FUNAE CEO acts as Authorising officer, who is responsible for authorising and liquidating expenditure following the modalities laid down in this TFF. (S)he may also designate a deputy Authorising officer.

#### **Belgian Party:**

The Belgian Party designates the Directorate-General for Development Cooperation and Humanitarian Aid (DGD) as the entity that is responsible for its contribution to the intervention.

The Belgian Party entrusts the execution of its obligations to the Belgian Technical Cooperation (BTC). Therefore, an Implementation Agreement (“IA”) is concluded between BTC and the Belgian State.

BTC is represented in Mozambique by its Resident Representative.

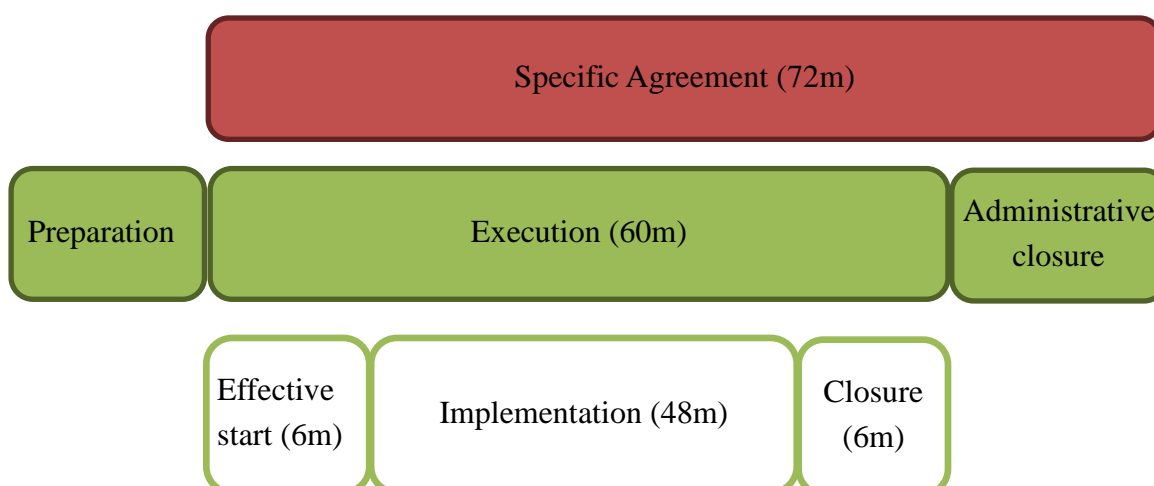
The Resident Representative of BTC acts as Co-authorising officer and Sponsor for the Belgian Party.

### 5.2 Life cycle of the intervention

The Specific Agreement pertains to a 72-month period, starting from the date of its signature.

The execution of the intervention is planned for a period of 60 months.

The life cycle of the intervention comprises three main phases: Preparation, Execution and Administrative closure.



The BTC start-up and closure guides for interventions constitute the documents of reference for the preparation, start-up and closure phases.

The administrative and financial management guide of BTC in Mozambique constitutes the working base for the implementation phase.

### 5.2.1 Preparation

The preparation phase of the intervention starts between the technical approval of the TFF by the steering committee and the signature of the Implementation Agreement between the Belgian State and BTC.

The following key actions must be performed during the preparation phase:

- Preparation of necessary regulatory steps
- Identification of human resources to be mobilised
- Mobilisation of the partner country counterpart
- Launch of the recruitment of international and national staff
- Preparation of any public contracts (Tender Specifications) needed for the Exhaustive Baseline
- Preparation of any other public contracts
- Opening of the Main account
- Preparation of procurement (Tender Specifications) of equipment

Expenditure that may be made during this phase – known as "prior to the IA (Implementation Agreement)" – may only be expenses related to recruitment and intervention logistics.

Staff costs	
Staff recruitment costs	15.000€
Logistics costs	
Purchase of ICT equipment	20.000€
Total	35.000€

## 5.2.2 Execution

The execution phase consists of 3 sub-phases: effective start, implementation, operational closure.

### 5.2.2.1 Effective start

The effective start phase of the intervention will last maximum 6 months and ends with the validation of the start-up report by the steering committee.

At the beginning of this phase the management of the intervention unit takes up its duties and the intervention opening steering committee takes place.

The following key actions must be performed during this step (some ensure continuity with actions undertaken during the preparation phase):

- Finalisation of the recruitment processes of national and international technical assistance and installation of staff in their function;
- Opening of the accounts of the intervention and establishment of the mandates of intervention staff;
- Dispensing necessary training;
- Pursuing any public contracting for establishment of the Exhaustive Baseline;
- Establishment of the operational management guide on the basis of this TFF, where applicable also on the basis of the operational management manual of the intervention, referring to BTC's Administrative management manual applicable for the bilateral cooperation programme in the partner country;
- Operational and financial planning of the intervention;

The steering committee validates the following elements:

- The intervention's operational management manual
- The first operational and financial planning
- The Exhaustive Baseline work plan

The minutes of this steering committee meeting and the elements that it validates constitute the start-up report.

### 5.2.2.2 Implementation

The operational implementation of the intervention begins upon the approval of the start-up report by the steering committee and ends upon the approval of the closure planning by the steering committee.

### 5.2.2.3 Operational closure

The closure phase begins at the latest 6 months before the end of the execution of the intervention.

Planning of closure: Three months prior to the closure phase, a detailed planning of the activities and expected products from this phase will be elaborated by the Intervention unit management and submitted for approval to the steering committee.

Final Report: It will be drawn up and submitted for approval to the steering committee three months

after the end of operational activities. This Final Report will include the operational and financial closure documents (see point 5.5.5.1).

Six months before the end of the Specific Agreement it is not allowed anymore to make any commitment without the prior agreement of the Authorising officer and Co-authorising officer.

At the end of the Specific Agreement, it is not allowed anymore to make any expenses unless they are related to commitments that have been officially endorsed in the steering committee minutes.

### **5.2.3 Administrative closure**

The Final Report is updated at the end of the operational closure period and sent by BTC to DGD for final acceptance request. Once this report is approved by DGD the intervention is administratively closed.

In accordance with the Specific Agreement, after financial closure of the intervention, unused funds are recuperated by the Belgian State. For that purpose, the Mozambican Party undertakes to transfer back to BTC the bank account balances and non-eligible sums at the end of the operational closure period.

## **5.3 Organisational structure of the intervention**

The intervention is anchored in FUNAE as an Intervention Management Team. It will collaborate with all the divisions as required by the needs of the intervention.

### **5.3.1 Steering committee**

The steering committee is the instance that manages the success of the intervention, i.e. the achievement of the results and the contribution to the Specific objective defined in the TFF.

The below composition constitutes an adaptation of the composition identified in “Capacity Development of the MIREME and the CNELEC” TFF, in order to integrate FUNAE in the voting members.

#### **5.3.1.1 Composition**

The steering committee consists of the following members or their representatives:

- The Permanent Secretary of the Ministry of Energy, chairperson of the steering committee.
- BTC Resident Representative, co-chairperson of the steering committee.
- A representative of the Ministry of Foreign Affairs and Cooperation of Mozambique.
- A representative of CNELEC
- The CEO of FUNAE, acting as authorizing officer.

All members can designate a delegate for the steering committee in case they are not able to attend the meeting. Representatives of the Ministry of Energy and FUNAE (other than the Steering Committee members) can attend the meeting as observers. The project Direction will attend the Steering Committee meetings as reporters.

The steering committee may invite, as an observer, any other person who may contribute to the intervention.



### 5.3.1.2 Principal responsibilities

- Ensure that the commitments made by the Parties are respected;
- Approve the annual operational and financial planning of the intervention;
- Validate the Exhaustive Baseline report (exhaustive matrix)
- Assess the state of progress of the intervention and the achievement of the results and the specific objective on the basis of monitoring reports (MONOP and Results reports) and approve the recommendations;
- Examine the audit reports and approve the implementation plans of the actions that are elaborated to respond to the recommendations of the reports;
- Examine the mid-term and final review reports, approve the recommendations that are given therein and approve the implementation plans of necessary actions;
- Validate proposed Grant Agreements and Cooperation Agreements that were not planned in the TFF;
- Approve any adjustments or modifications to the Technical and Financial File, while respecting the specific objective and the legal duration and budgetary envelope fixed by the Specific Agreement and while ensuring all actions are feasible;
- Initiate technical review or financial audit missions at any time;
- Ensure that human resources made available to the intervention are managed in an optimal way;
- Resolve any management problems related to the financial or material resources, or to the interpretation of the TFF;
- Supervise the intervention closure process and approve the Final Report.

### 5.3.1.3 Functioning mode

- The functioning mode of the steering committee is fixed as follows:
  - The steering committee is convened by invitation of its chairperson, usually every half year.
  - The chairperson and co-chairperson of the steering committee are to assess, on a case-by-case basis, whether to act quickly, whether to individually consult steering committee members or to convene an extraordinary meeting.
  - The steering committee draws up its internal rules of procedure, while respecting the provisions of the intervention's legal framework.
  - The Opening steering committee of the intervention convenes for the first time (at the latest) within three months following the signature of the Specific Agreement.
  - The steering committee takes decisions following consensus.
  - The minutes of each meeting are signed by the chairperson, by the Authorising officer (if other person than chairperson of the steering committee) and by the Resident Representative of BTC. A copy of the signed minutes is sent to all other participants by the chairperson of the steering committee. A copy of the signed minutes is also sent to the Embassy of Belgium.
  - The steering committee also has a meeting at the latest 3 months before the end of the intervention activities in order to examine the draft of the Final Report and to prepare closure formalities.

- The intervention unit is responsible for preparing the steering committee meeting and ensures the secretariat thereof. The secretariat role is detailed in the internal rules of procedure.

### 5.3.2 The Intervention Management Unit (IMU)

The IMU is composed of the intervention management, the technical staff and the support staff. This IMU will be located in Maputo and will share a part of its resources with the intervention CB MIREME.

#### 5.3.2.1 Intervention management

FUNAE appointed **Intervention Change Manager** acting as the authorizing officer for the Mozambican side for all matters executed in joint responsibility. The **Chair Person of FUNAE** (Presidente do Conselho de Administração) will be designated as the Intervention Change Manager;

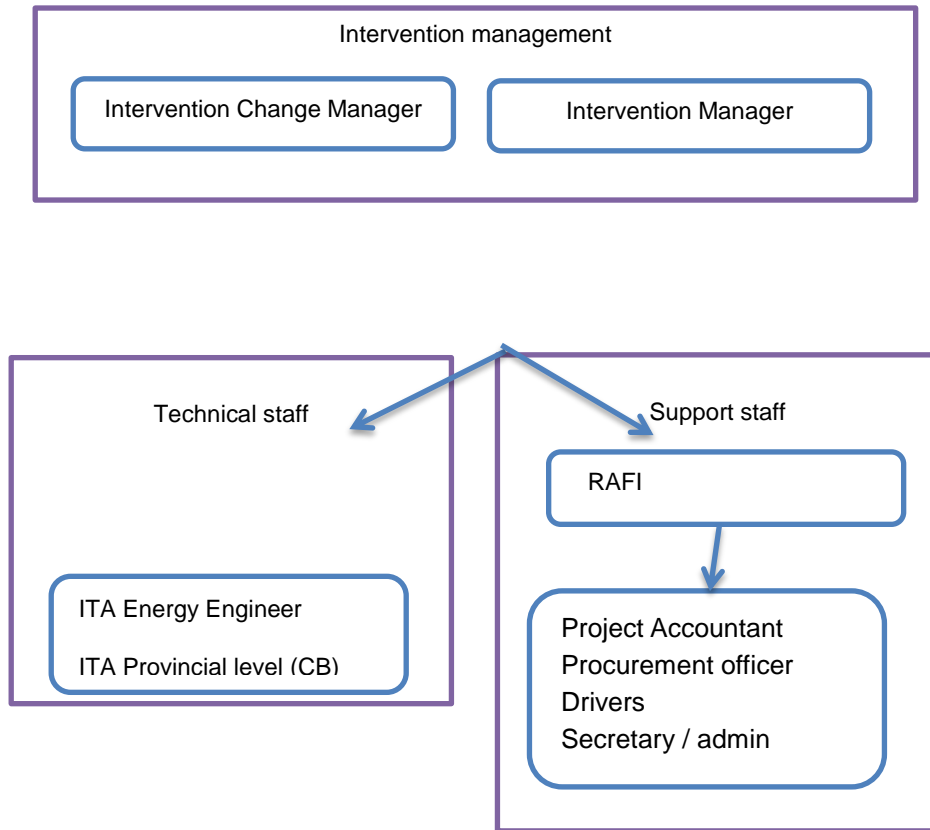
The main responsibilities of the Intervention Change Manager will include:

- Determine, together with the Intervention Manager, the overall direction of the change process within the FUNAE, in line with the strategic orientations given by the Ministry.
- Determine and continuously refine, together with the BTC intervention manager, the strategy for implementing the intervention.
- Ensure realism in plans for the implementation of the change in the context of other on-going change activities in Funae.
- Muster internal support for the change process through proactive communication on the importance and the advancement of the change process, both to higher and lower levels of the organization.
- Guarantee the maximum coordination with all the Directions in the Ministry

The BTC contracted **Intervention Manager** who is subjected to approval by the partner country party (see 5.5.1 for the HR management modes and Annex 7.6 for the job profile) has the following principal responsibilities:

- To organize, coordinate and supervise the execution of the intervention activities in the geographical areas in accordance with the approved work plans;
- To ensure good management of the intervention resources (material, financial and human);
- To write the biannual progress reports, annual reports and the final report and submit them to the Steering Committee;
- To provide timely compilation of progress reports and budgeted work plans for the following period for consideration by the Steering Committee;
- To propose adjustments or modifications to the content of the TFF; within the boundaries of its mandate;
- To supervise the preparation and tendering of contracts for procurement of works, goods and services; to coordinate the tendering processes and to ensure they are executed according to the appropriate procedures;
- To assure the administrative support of the Steering Committee (secretariat, agenda, documents, minutes; dissemination of minutes);
- To assure the administrative and financial management of the project according to the applicable procedures;
- To organize the recruitment of the human resources executing the intervention.

### 5.3.2.2 Organogram



## 5.4 Operational management of the intervention

The practical modalities of operational management of the intervention will be made explicit and detailed in an Operational intervention management manual. It will include the reporting requirements.

### 5.4.1 Operational planning

Every year the Intervention management prepares operational and financial planning for the upcoming year which is to be validated by the steering committee.

This annual planning includes the four following elements:

- Planning of activities
- Planning of public contracts
- Planning of Grant Agreements
- Financial planning

It will be drawn up following the procedures and models supplied by BTC. Operational planning will follow the logical framework format and will serve as the basis for financial planning.

## 5.4.2 Human Resources Management

### Responsibilities:

- The International Technical Assistants financed by the Belgian contribution will be recruited and hired by BTC.
- Each partner (BTC and Mozambique) is responsible for the recruitment and selection of local staff that it will hire.
- The Party hiring the employee is responsible for all employment contract administration.
- The Intervention management is responsible for the follow-up and evaluation of intervention staff members that it is hierarchically supervising.

### Job openings and recruitment:

- All jobs are open for women and men and women will be encouraged to apply.
- For recruitment, the job ads will take into account the Terms of Reference (ToR) and the competence profile that constitutes the job architecture.

### Legislation governing the employment contracts:

- The contracts of international staff recruited by BTC are governed by Belgian legislation.
- The contracts of national staff recruited in the partner country are governed by partner country legislation.
- Consultancy or reiterative expertise contracts following a call for tenders are governed by applicable public procurement regulations (either from Belgium or from the partner country).

### Contract extension:

- Any extension of the contract of the international staff must be approved by the steering committee.
- Other contract extensions within the Intervention Management Team must be approved by the Intervention Change Manager and the Intervention Manager as well as the institution signing the contract.

### Missions:

- Missions of the Intervention Manager and the Intervention Change Manager are approved by their hierarchical supervisor.
- All missions of other intervention team members must be approved by the Intervention Change Manager and/or by the Intervention Manager. Missions of human resources shared between both interventions in the Energy sector will be validated by the intervention management of the intervention for which the missions are carried out, with no objection from the other intervention management<sup>6</sup>.
- Missions abroad financed by the Belgian contribution have to be approved by the BTC Resident Representative.
- The modalities for establishing mission orders and reports as well as the rates and procedures applicable for per diem and mission costs will be those given in the Administrative management manual applicable to the development cooperation interventions between Mozambique and Belgium signed by the Authorising officer and the Co-authorising officer.

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<sup>6</sup> Program board will be the ideal platform to agree upon the time allocation of these shared human resources

### 5.4.3 Mandates

#### Co-management budget lines

The mandates for the commitments linked to the co-management budget lines are shown in the table below.

Mandated for the partner	Mandated for BTC	Threshold
Intervention Change Manager or his/her replacement	Intervention Manager or his/her replacement	< 25,000 €
Authorising officer or his/her replacement	Co-authorising officer or his/her replacement with Ad hoc mandate	> 25.000€ (or following the rules of each organisation)

For payments the mandates are:

Mandated for the partner	Mandated for BTC	Threshold	Type of account
Intervention Change Manager or his/her replacement	RAFI or Co-authorising officer or his/her replacement	< 200,000 €	Main and operational bank account
Intervention Change Manager or his/her replacement	Intervention Manager or his/her replacement	< 25,000 €	Operational bank account
Authorising officer or his/her replacement / deputy	Co-authorising officer or his/her replacement	> 200,000 (or following the rules of each organisation)	Main and operational bank account

#### Donor-country managed budget line ('BTC management')

For BTC management budget lines, BTC is responsible for commitments and payments.

### 5.4.4 Financial management

#### 5.4.4.1 Bank accounts

##### Co-management

As from the signing of the Specific Agreement, a main account in EUR must be opened by BTC with Deutsche Bank. This main account is operated under the double signature of BTC. The reasons for this set up are the following:

- It is not allowed to have a co-management system on an account held by a MOZ national agency
- To mitigate the risk of MZN devaluation which put the project's budget under pressure

Before all payments, FUNAE will ask BTC for non-objection, following the mandates described under chapter 5.5.3, which will secure the principle of co-management.

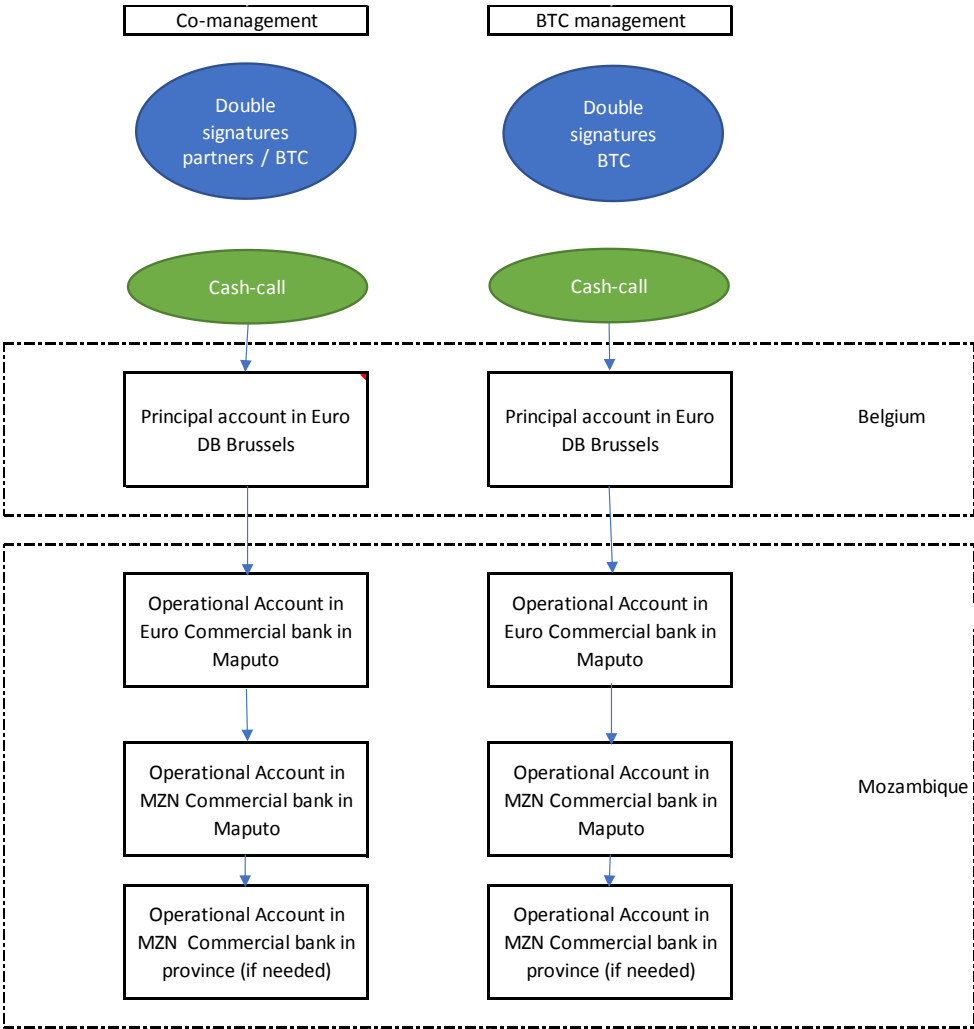
This main account is used for receiving BTC funds and for feeding the operational account when needed.

An operational account will be opened at a commercial bank in Maputo following the same principles: double signatures of BTC after a non-objection of FUNAE.

BTC is responsible for the addition/retrieval of signature mandates of the mandataries for the accounts while respecting the internal rules of its organisation. In case of modification, BTC will notify the bank about the change and formally inform FUNAE about it.

**BTC management**

For payments linked to budget lines with the mention 'BTC management', BTC will open accounts for which only BTC staff will have a signature mandate.



**5.4.4.2 Fund transfers**

As from the notification of the Implementation Agreement between the Belgian State and BTC and after the main accounts are opened, transfers will be made by BTC into those accounts.

In order to receive the following transfers, the intervention must submit a cash call with the local BTC Representation, following BTC procedures.

The amount of the cash call corresponds to the estimated treasury needs for the following quarter. BTC transfers funds at the beginning of the quarter and possibly in several instalments. In case of emergency, the intervention may submit an early cash call but it has to explain the need thereof.

The funds are only transferred on the following conditions:

- Accounting documents of the quarter that precedes the cash call must be forwarded to BTC.
- All required reports must be forwarded to BTC.
- The Action plan and the follow-up of the audit and/or MTR must be updated.

BTC's treasury management rules (transfers to operational accounts, petty cash management...) apply.

#### **5.4.4.3 Budget overruns and budget changes**

The budget of the intervention sets out the budgetary constraints within which the intervention must be executed.

The total amount of the budget of the Belgian Party as well as the budget of the Mozambican Party of the intervention as laid down in this document and in the Specific Agreement may not be changed except by an Exchange of Letters between the signatories of the Specific Agreement (see point 5.7 "Adaptation of TFF" below).

For the budget of the Belgian Party, overruns of the total budget by execution mode or of the total budget of general means are not allowed, except if approved by the steering committee on the basis of a budget change proposal which is drawn up by the intervention team according to BTC procedures. A budget change proposal is also required in the following cases:

- For a result or a section of the general means (Z-01, Z-02, etc.), with the amount of the overrun exceeding 10% of the last approved budget amount for this result or this section.
- For a budget line, with the amount of the overrun exceeding 20% of the last approved budget amount on this line and strictly exceeding 50,000€.

For such budget changes, written approval by the steering committee is required.

For the annual budget of the budget of the Belgian Party there are no constraints, except for the general means where the annual budget may not be overrun by more than 5%.

The budgetary reserve of the budget of the Belgian Party may only be used following preliminary approval of the steering committee.

The intervention must ensure proper control and a regular budgetary follow-up of commitments in order to anticipate the management of any necessary budget changes.

#### **5.4.4.4 Accounting and justification of expenses**

The accounting documents are compiled and approved on a monthly basis following BTC procedures. The tool to be used is the tool supplied by/agreed upon with BTC. The accounting documents must be signed by the Intervention management, except for account that are solely managed by BTC. The accounting documents that must be forwarded to the local BTC Representation include a digital file and if required, the supporting documents as well as the bank statements and petty cash statements. The accounting documents must be up-to-date, detailed and reliable and meet applicable accounting standards and rules.

Eligible expenditure is an expenditure that is:

- identifiable, certified by probative supporting documents, entered into the accounts in accordance with applicable standards;
- related to the activities and criteria defined in the TFF and required for the achievement of the results;
- planned in the budget and entered on the appropriate budget line;
- respecting principles of good financial management.

#### **5.4.4.5 Management of goods and stocks**

Each good and piece of equipment acquired by the intervention must receive an inventory number and must be recorded in an inventory register. Every half year, a formal inventory must be made and signed by the Intervention management. The use of the good is strictly limited to intervention activities. During the intervention, a good may be transferred to the trust and assets of a partner instance provided a formal transfer deed is drawn up and BTC procedures are followed.

Stocks must be monitored exhaustively to ensure that all transfers are authorised, followed with appropriate means and regularly controlled. The Intervention management must ensure formal monthly control of the stocks.

At the end of the intervention, the allocation of various goods, equipment and stocks will be defined in the Closing steering committee minutes.

### **5.4.5 Public Procurement Management**

BTC as well as FUNAE are public-law entities. Consequently, they must respect public procurement laws and apply the principles of transparency, competition and equal treatment of candidates.

Belgian public procurement legislation applies for purchases financed under 'BTC-management' budget lines; FUNAE public procurement legislation applies for purchases financed under jointly managed budget lines ('Co-management').

Regardless of the system used, public procurement management requires rigorous planning and careful follow-up. Public contracts managed by the intervention will consequently be part of quarterly operational monitoring (state of progress and operational planning).

#### **5.4.5.1 BTC-managed public procurement**

The following activities will be managed by BTC (BTC-management'):

1. Investments for the start-up of the intervention
2. Independent audits
3. Review (MTR and ETR)
4. Studies and Expertise
5. Services and supply of goods, which does not involve FUNAE responsibility afterwards
6. Study tours and field missions



#### **5.4.5.2 Jointly managed public procurement management**

Public contracts financed under jointly managed (Co-management) budget lines are managed following the Mozambican public procurement code. The Call for Tenders will refer to the source of funding offered by Belgium. These public contracts may pertain to works, supplies and services or intellectual services.

For these public contracts, commissioning will be assumed by FUNAE, which signs the contract or its amendment. BTC for its part provides a Notice of no objection ('ANO') for the various steps of the public contract (**tender specifications, call for tender, notification, award and signing of the public contract, provisional and final acceptance and the signing of any amendment**), which notice will pertain to the proper use of Belgian Development Cooperation funds. Practical modalities for providing a Notice of no objection (thresholds, stakeholders) will follow the rules established by BTC and following the mandates defined under point 5.4.3 Mandates.

The Intervention teams play a key role both in elaborating the Call for Tenders and in evaluating the tenders received. They ensure that selection and award criteria are defined appropriately.

BTC will only pay if the contractor of the public contract has performed the contract in compliance with good practice and with the terms and conditions of the contract. So, BTC will also ensure the public contract is performed and that acceptance of the public contract is justified. Payment will only be made upon presentation of the Acceptance report.

Jointly managed public procurement will be used for tendering all works involving a post-project responsibility for FUNAE.

All disbursement will be linked to tender procedures. The BTC Resident Representative or the agent designated by him/her will give his/her no-objection during each phase of each procurement like written in "BTC involvement in procurement" here under, and at disbursement phase.

#### ***Procurement unit***

The project will use FUNAE's dedicated procurement unit UGEA (Unidade Gestora Executora das Aquisições) under the authority of the head of the Legal Department. This procurement unit will be reinforced if necessary.

The procurement cell, counting 5 members, has extensive experience in working with Mozambican procurement legislation.

At each meeting or decision of this procurement cell concerning the project, a member of the BTC project team or of the REP MOZ will be invited, if this is not the case any decision of this cell may be called into question, with the same consequences set out in point "BTC involvement in procurement"

#### ***Procurement legislation***

For this project, the Mozambican procurement legislation (Decree no 54/2005 of 13 December 2005, and Decree Nr 5/2016 of 8 March 2016 concerning Regulamento de contratacao de Empreitada de obras publicas, fornecimento de bens e prestacao de servicos ao Estado)) will be used, as is the case for a government-funded project.

BTC will follow the Belgian legislation for all the expenses in BTC-management.

### ***Transparency of procurement***

The members of the Steering Committee shall have access on demand to all administrative, financial or technical documents regarding the procurement for the project.

All tender documents will be kept during the project at the IMU level and after it duly archived at FUNAE level and made available to audits for at least 7 years.

### ***BTC involvement in procurement***

FUNAE will ask the BTC Resident Representative for a no-objection on the following procurement steps:

- Before publication of tenders (technical specifications/ terms of reference).
- Before tender awarding.
- At the provisional and final appraisal/ acceptance of the works, services or deliveries, including final payment

The Resident Representative (RR) will provide his agreement in compliance with the BTC's internal regulations on delegation of financial authority.

The Intervention Management Unit (IMU) will be part of all FUNAE procurement procedure. The IMU will have to approve all decisions, included technical request or TOR and all execution monitoring of the contract. FUNAE will insure that the Intervention Management Unit is part of all steps and approved it, if not BTC Resident Representative may refuse the all process and payment.

## **5.4.6 Management of Grant Agreements**

In accordance with Article 8 of the BTC Law, BTC can provide financing to one or more third-party instances for the achievement of part of the activities of the intervention or for an own action of that instance that contributes to the achievement of the objectives of the intervention.

Grants will be awarded in accordance with the modalities described in the BTC guide for the elaboration and follow-up of Grant Agreements.

Public or private instances that are awarded grants are called "beneficiary-contractors". The beneficiaries of the actions funded by the grants are called "final beneficiaries".

### **5.4.6.1 Grants identified in this TFF**

The Grant Agreements identified under the framework of the intervention are listed in the table below:

For each grant scheduled, a dedicated budget line is clearly identified in the budget, as well as the award modality, the beneficiary-contractor, its status and the number of final beneficiaries concerned.

In summary:

Budget line	Name of activity	Budget (€)	Award modality	Beneficiary -contractor	Status (public/private)	Number of final beneficiaries
A.01.02	Awareness and stakeholder consultations	Max 150,000 €	Call for proposals	NGOs	Private	To be defined
Eligibility criteria		Include: <ul style="list-style-type: none"> <li>- Exclusion criteria: irrelevant or absence of legal status; activity falling outside the scope of the legal mandate of the potential contractor.</li> <li>- Minimum capacities required in technical, operational or financial terms: annual financial reports, yearly audits, financial procedure manuals available.</li> </ul>				
Evaluation criteria		Include: <ul style="list-style-type: none"> <li>- Sustainability (including after the end of the Specific Agreement) in financial or content terms</li> <li>- Added value of the proposal from a social, economic or environmental point of view</li> <li>- Realism of the proposal</li> <li>- Compliance of the proposal compared to the objectives of the Specific Agreement</li> <li>- Overall cost and eligibility of costs</li> <li>- Cost–benefit ratio</li> <li>- Level of innovation</li> <li>- Expected impact</li> <li>- Contribution to the transversal themes</li> </ul>				
Types of eligible beneficiary-contractors		NGOs				

### Special case with beneficiary-contractors not identified by name in this TFF

For each grant for which the beneficiary-contractor has not been identified, prior approval must be obtained from the steering committee (COPIL) on the basis of a clearly reasoned justification, which is laid down in a report.

Also:

1) BTC will notify the Belgian State about each Grant Agreement amounting to less than or equal to 500,000€. For the purpose, the Resident Representative will regularly transfer to the Belgian Embassy the list of beneficiaries of Grant Agreements including the object and amount of these Agreements.

2) Grant Agreements of a budget in excess of 500,000€ with a beneficiary-contractor that is not listed in the TFF will be submitted for approval by the Belgian administration.

#### 5.4.6.2 Case where a Grant is not provided for in the TFF

If the use of a Grant Agreement is not provided for in this TFF but originates with the management of an ongoing intervention, it is necessary to obtain approval of the steering committee (COPIL), which is laid down in a report, on the basis of a clearly reasoned justification why, for this case, the public procurement approach does not apply. The above modalities concern notification to the Belgian State on the beneficiaries of the grants where the approval of the beneficiaries by the Minister of Development Cooperation obviously applies.

### 5.4.7 Management of Specific Cooperation Agreements (ASCs)

The public-public or horizontal Cooperation Agreements with a public partner, which for BTC can take the form of Framework Cooperation Agreements (ACC), which are operationalised through Specific Cooperation Agreements (ASC).

This type of agreement will be used in case an intervention aims to promote the synergy between public expertise originating with other, in the first place, Belgian public authorities, whilst cooperation with a non-Belgian contracting authority is also possible.

For this type of Agreements, the public interest and the 'non-profit' notion are key. The contracting authorities work together in view of jointly ensuring the execution of public service duties.

Specific Cooperation Agreements will be signed following the modalities described in BTC's Framework/Specific Cooperation Agreement Guide.

#### 5.4.7.1 The Specific Cooperation Agreement is identified by name in this TFF

No specific Cooperation Agreement is identified under the framework of the intervention at this stage.

#### 5.4.7.2 Case where a Specific Cooperation Agreement is not identified by name in the TFF

A Framework Cooperation/Specific Cooperation Agreement partnership can be considered during execution. It must not necessarily be identified during formulation. In this case, the intervention team will have to obtain approval of the steering committee and follow the procedure described in the Framework Cooperation/Specific Cooperation Agreement Guide in order to start the process.

There are two possibilities:

- Either there already is a Framework Cooperation Agreement with the desired partner, so the team can directly start the procedure for setting up a Specific Cooperation Agreement for the desired activity; or,
- No Framework Cooperation Agreement has been signed between BTC and the public institution with which one wants to work, so the intervention team starts the process for BTC to consider concluding a corresponding Framework Cooperation Agreement.

#### 5.4.7.3 Validation of a Specific Cooperation Agreement

The general rule for managing a Specific Cooperation Agreement is to respect applicable procedures for the commitment and monitoring of expenses at BTC.

Like for any other expenses, expenditure for Specific Cooperation Agreements must be planned in the existing planning tools.

Framework Cooperation/Specific Cooperation Agreements will be signed under BTC management, i.e., only BTC can sign as a contracting authority and use the Belgian system.

Payments are monitored and controlled, in accordance with applicable procedures of BTC.

## 5.5 Monitoring and Reviews

Monitoring and Reviews support the needs for accountability, continuous learning and strategic steering.

(See BTC's "More Results" guide for guidelines and checklists)

	Responsibility	System	Frequency	Users
Exhaustive baseline	Intervention unit	BTC	Unique	Intervention, steering committee, BTC Rep Office
Operational monitoring	Intervention unit	BTC	Quarterly	Intervention, BTC Rep Office as well as steering committee
Results monitoring	Intervention unit	BTC	Annual	Intervention, BTC Rep Office, steering committee, Embassy
Mid-term Review	BTC HQ: OPS Advisor/Outsiders	BTC	Unique	Intervention, BTC, steering committee, DGD
Final Review	BTC HQ: OPS Advisor/Outsiders	BTC	Unique	Intervention, BTC, steering committee, DGD
Final monitoring	Intervention unit	BTC	Unique	Intervention, BTC Rep Office, steering committee, DGD

### 5.5.1 Exhaustive Baseline

From the start of the intervention, the intervention team should take ownership of the monitoring framework defined in this TFF. This includes having a complete monitoring matrix indicating the situation of reference and target values for the intervention indicators. The monitoring framework of the intervention will be aligned with existing systems/methodologies (if possible).

The Exhaustive Baseline report is drawn up following the schedule defined in the start-up phase (see point 5.4.2) (maximum 9 months after the Opening steering committee). It is presented to the steering committee, which takes cognisance thereof and approves the way in which the intervention will monitor its results.

The Exhaustive Baseline report contains the following elements:

- Monitoring matrix
- Risk management plan
- Updated operational planning

### 5.5.2 Quarterly operational monitoring (MoNop)

The quarterly operational monitoring is based on annual planning.

Every year the Intervention management prepares operational and financial planning for the upcoming year, which is to be validated by the steering committee.

Operational monitoring is a continuous process based on this planning; it is consolidated quarterly.

Quarterly monitoring includes:

- Planning of the activities and its update;
- Financial planning and its update;
- Planning of public contracts and Grant Agreements;
- The state of progress of activities and expenses planned for the preceding quarter;
- Monitoring of risk management;
- Monitoring of human resource management of the intervention;
- Follow-up of steering committee decisions.
- Follow-up of Audit recommendations
- M&E matrix
- POP

It will be drawn up following the procedures and models supplied by BTC.

### 5.5.3 Annual Results monitoring

Results monitoring covers the "strategy" part of the results framework on an annual basis: output – outcome and, to a lesser extent, the level of impact.

The Results report constitutes an essential basis for monitoring the intervention and its possible changes (at the budget level as well as the activities level, the schedule, indicators, etc.). This report is jointly signed by the Intervention Change Manager and the Intervention Manager.

The steering committee validates or rejects its recommendations (strategic steering).

### 5.5.4 Final monitoring (Final Report)

Final monitoring guarantees that the key elements of the performance of the intervention are transferred to the partner organisation and BTC as well as to the members of the steering committee and ensures that the lessons learned are registered in their "institutional memory". In addition, the Final Report triggers the administrative closing of the intervention by the Belgian State.

#### Content

- Summarize the results obtained at the end of the implementation of an intervention;
- Documentation on lessons learned;
- Overview of administrative and financial information.

The Final Report must be finished at the latest 1 month before the Closing steering committee.

After approval by the steering committee, the Final Report is transmitted to the Belgian Embassy.

### 5.5.5 Reviews and Audits

#### Reviews:

The main function of Mid-term and Final Review exercises is to provide an external point of view on the performance of the intervention as well as to conduct an in-depth analysis of the ongoing or concluded development process. Reviews are therefore used to:

- Analyse whether it is necessary to reorient interventions in order to achieve the specific objective;
- Provide the necessary information for strategic decision-making;
- Identify the lessons learned and reflect on them;

While the reviews are conducted by independent external actors, they play an important role in accountability on the performance of the intervention. Reviews are steered by BTC's Operations Directorate following applicable processes. Reviews must be presented to the steering committee in order to assess and decide which recommendations are withheld, who is responsible and who will follow up on them. These decisions are included in full in the steering committee minutes.

The MTR will be conducted in the second year of execution and will contribute to the assessment of the intervention by the Steering Committee.

In addition, each of both governments may, if applicable, proceed to an external evaluation of the achievement of the objectives and of various aspects of the execution of the intervention.

#### Audits:

The intervention must be audited at least once in the course of the activities implementation period.

Note: As a precautionary measure, financing of two audits will be earmarked in the intervention's budget.

The audit will cover:

- Verification that the intervention accounts reflect reality;
- The maturity of the internal control system and the respect of the procedures;
- Verification whether the means of the intervention were used economically, efficiently and effectively.

The steering committee may ask for additional audits if it considers them necessary. The steering committee asks BTC to elaborate the Terms of Reference and to select the audit company. The audit company must be an independent company that is certified to international standards. BTC will communicate the Audit report to the steering committee. Intervention management must elaborate an action plan in order to improve the internal control system and show that corrective measures have been taken and applied.

Moreover, every year, the accounts of BTC are audited by a Board of Auditors. In this context, the Auditors may also conduct audits of interventions jointly managed by BTC. The audit committee of BTC can also ask that an intervention be audited by the internal BTC auditor.

The partner authorities may also proceed to an audit. In the case of an audit of the intervention by the

national control institutions, verification of compliance with the national system may not be conducted where the TFF clearly defines that the BTC/Belgian system must be used. In addition, the scope of control must be limited to activities defined in the budget under the co-management modality, since the activities defined following the "BTC management" modality are under the sole responsibility of BTC and may therefore only be subjected to control by its own institutions/jurisdictions.

All auditing reports will be shared between the parties and presented to the steering committee. Audits may be conducted jointly.

## 5.6 Adaptation of TFF

For any changes to the Specific objective of the intervention, the duration of the Specific Agreement, the total budget defined in the Specific Agreement, a justified request must be submitted by the partner to the Belgian State after having been approved by the steering committee. If Belgium accepts the request an Exchange of Letters is signed by both parties.

For any other changes of the TFF, FUNAE and BTC may during intervention adapt this Technical and Financial File in function of the evolving context and of the progress of the intervention.

For any of the aspects below, preliminary approval of the steering committee is required for:

- The disbursement mode of the contributions of the Belgian Party and of the Mozambican Party
- The results
- Budget change proposals (§5.5.2.3)
- Competences, qualifications, composition and functioning mode of the steering committee
- The approval mechanism of adaptations to the TFF
- The results indicators and indicators for the specific objective
- The financial implementation modalities of the contribution of the Parties

BTC informs the Belgian Embassy if such changes are made.



## 6 CROSS CUTTING ISSUES

### 6.1 Environment

The use of renewable energy to replace other forms has a recognized net positive impact on the environment.

Rural electrification solutions most often replace other lighting options, such as kerosene lamps, candles or torchlights that use disposable batteries. Replacing any of these alternatives by a solar system has a clear positive effect on the local environment. In the case of kerosene lamps, the replacement by a solar system also has a net health impact due to improved indoor air quality.

For productive use, most often the mini-grid replaces a diesel generator alternative, thus replacing a fossil fuel solution with negative impact on environment and climate with a renewable energy solution. The immediate negative impact of mini-grids is limited to using a certain surface for the installation. After a certain period (estimated at 10 years in general), battery replacement is needed, and existing batteries need to be recycled rather than dumped in the environment.

For hydro mini-grids, the environmental impact can be important, and needs to be studied carefully in a specific Environmental and Social Impact Assessment (ESIA) before starting any further work. In general, run-of-river hydropower plants have limited impact on the environment, if well-constructed and well managed.

In all applications financed by the project, energy efficiency will be the first entry point. Currently, solar mini-grids are found where people use incandescent lamps (40 W) while a 5 W LED light could suffice. This is due to a lack of incentives for investing in energy efficiency for the user (in the case of flat fees for instance) or the operator (over-dimensioned installations, not needing any form of energy efficiency, or even having a financial interest in higher consumption by the users). The intervention will promote energy efficiency (and especially lighting) in awareness campaigns.

Environmental aspects (battery recycling, impact assessment quality control, CO<sub>2</sub> reduction, energy efficiency measures) will be systematically included as a theme in the capacity building activities.

### 6.2 Gender

The opportunities for gender mainstreaming support are as follows:

- Need for mechanisms to consider gender issues in energy provision and use
- Need for local-level market analyses to identify and increase productive uses of electricity for women's small businesses;
- Promotion of women as energy entrepreneurs in sales and servicing of home energy systems and appliances.
- Support for managers, Directorates, Gender Units and Gender Focal Points to develop understanding of and capacity for gender mainstreaming in core work areas.
- Promotion of women's entry into technical education and training programs.
- Identify needs of women employees and provide support for their full participation in training programs and career advancement.
- collect data on gender and energy and to use it to inform policy making, for instance introduction of measures to promote equitable access to green energy technologies by women, facilitating access to funding, investing in training especially for young women, promoting participation of women in the related decision making among others.

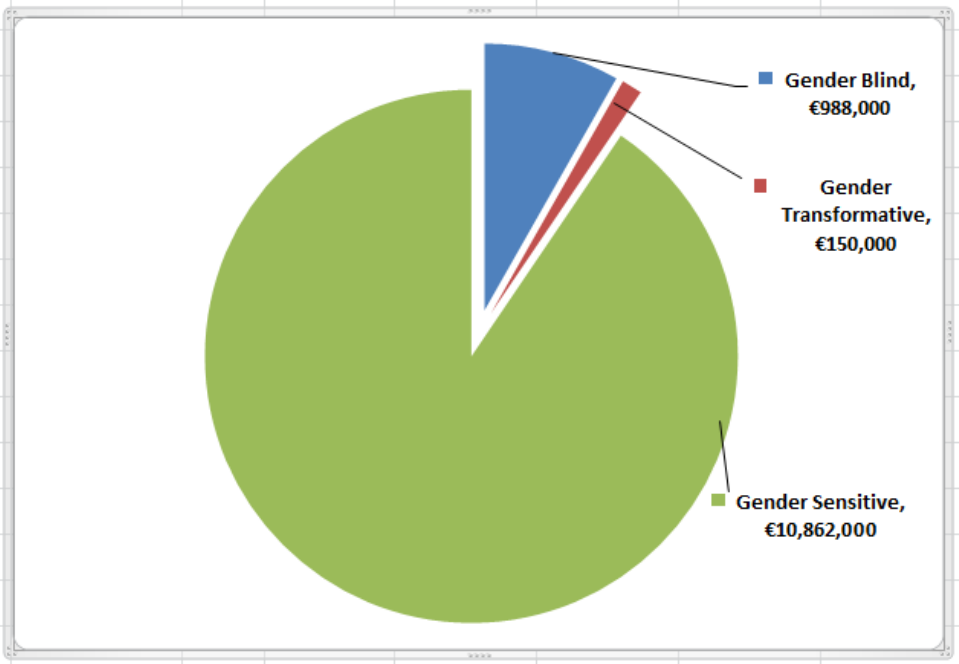
Moreover, the intervention will:

- Strive for parity in the IMU and provide sensitizing activities for IMU staff on gender issues
- Integrate gender in all ToR for trainings, consultations, studies, analysis, ... in order to have as a first perspective the needs and the interests of the different targets groups
- Work on staff recruitment, development and retention with a specific focus on female staff

When applying the Gender Budget Scan to the project, it appears that:

- 8.23% are expenses considered "gender-blind" (in blue), which are not expected to have a different effect/impact for women or men (the operational and investment costs under the *General Means* fall under this category like for instance, office or programme vehicle maintenance costs).
- 90.52% are expenses "gender-sensitive" (green) which means actions taking into account present gender differences, mainly for practical needs. (alleviation of tasks, distances covered, different modes of use of assets...). The monitoring and evaluation system is considered being gender-sensitive (differentiation of data, numbers, statistics, monitoring of gender-specific indicators...).
- 1.25% are specific actions targeting women or men and aiming to reduce the gender gap (equal representation in steering committees, strengthening of women leaders...) or to correct an unequal situation (career promotion, salary equity, working conditions...). Such matters are referred as "transformative" activities (red), which aim to change gender relations (relations at the political, economic, social, cultural... level). These positive actions allow women not only to participate on an equal footing to the development processes, but to impact them by taking part in decision-making processes. Examples of "gender transformative" activities are: an increase local ownership, raise awareness on energy use and energy efficiency. Targeting especially women as future users both in business as farmers.

No activities of this project are directly linked to the gender machinery. There is for example no action strengthening "gender instances" by means of capacity development activities targeting gender focal points in partner institutions.



		Mode	Amount in €		%	Y1	Y2	Y3	Y4	Y5
<b>A</b>	<b>Increase access to energy</b>		<b>10.410.000</b>		<b>86,8%</b>	<b>940.000</b>	<b>860.000</b>	<b>4.060.000</b>	<b>3.850.000</b>	<b>700.000</b>
A 01	<i>Mini-grids provide reliable and adequate energy services</i>		6.400.000		53%	250.000	50.000	3.050.000	3.000.000	50.000
A 01 01	Review and update of existing studies	BTC management	200.000	Green		200.000	0	0	0	0
A 01 02	Awareness and stakeholder consultations	BTC management	150.000	Red		50.000	50.000	50.000	0	
A 01 03	Mini grid development	Co-management	6.000.000	Green				3.000.000	3.000.000	0
A 01 04	Result dissemination	BTC management	50.000	Green						50.000
A 02	<i>Technical and financial sustainability of existing systems is improved</i>		1.260.000		11%	140.000	260.000	460.000	300.000	100.000
A 02 01	Planning, operation and maintenance	BTC management	200.000	Blue		20.000	60.000	50.000	50.000	20.000
A 02 02	Strengthening of information systems	BTC management	200.000	Green		20.000	50.000	50.000	50.000	30.000
A 02 03	Implementation of remote monitoring systems	Co-management	360.000	Green		50.000	50.000	160.000	100.000	0
A 02 04	Implementation of payment systems	Co-management	500.000	Green		50.000	100.000	200.000	100.000	50.000
A 03	<i>Capacity building of FUNAE in planning and project management</i>		2.750.000		23%	550.000	550.000	550.000	550.000	550.000
A 03 01	Project management at FUNAIE HQ level	BTC management	100.000	Green		20.000	20.000	20.000	20.000	20.000
A 03 02	Capacity building of Delegations	BTC management	200.000	Green		40.000	40.000	40.000	40.000	40.000
A 03 03	Technical assistance	BTC management	2.250.000	Green		450.000	450.000	450.000	450.000	450.000
A 03 04	Surveys, field trips, workshops and seminars, study tours	BTC management	200.000	Green		40.000	40.000	40.000	40.000	40.000
<b>X</b>	<b>Contingencies</b>		<b>326.000</b>		<b>2,7%</b>	<b>0</b>				<b>326.000</b>
X 01	<i>Contingencies</i>		326.000			0				326.000
X 01 01	Contingencies	Co-management	163.000	Blue						163.000
X 01 02	Contingencies	BTC management	163.000	Blue						163.000
<b>Z</b>	<b>General Means</b>		<b>1.264.000</b>		<b>10,5%</b>	<b>263.400</b>	<b>211.400</b>	<b>212.400</b>	<b>211.400</b>	<b>365.400</b>
Z 01	<i>Personnel Costs</i>		690.000			138.000	138.000	138.000	138.000	138.000
Z 01 01	Regional Administration & Finance	BTC management	450.000	Green		90.000	90.000	90.000	90.000	90.000
Z 01 02	Finance/admin/procurement staff	BTC management	120.000	Green		24.000	24.000	24.000	24.000	24.000
Z 01 03	Driver	BTC management	120.000	Green		24.000	24.000	24.000	24.000	24.000
Z 02	<i>Investment costs</i>		40.000			40.000	0	0	0	0
Z 02 01	ICT/ERP	BTC management	40.000	Blue		40.000	0	0		0
Z 03	<i>Operating Costs</i>		372.000			77.400	73.400	74.400	73.400	73.400
Z 03 01	Office consumable	BTC management	12.000	Blue		2.400	2.400	2.400	2.400	2.400
Z 03 02	Communication costs	BTC management	30.000	Blue		6.000	6.000	6.000	6.000	6.000
Z 03 03	Fuel and maintenance	BTC management	60.000	Blue		12.000	12.000	12.000	12.000	12.000
Z 03 04	Mission costs	BTC management	105.000	Blue		21.000	21.000	21.000	21.000	21.000
Z 03 05	Other operation costs	BTC management	5.000	Blue		1.000	1.000	1.000	1.000	1.000
Z 03 06	Office rental	BTC management	150.000	Blue		30.000	30.000	30.000	30.000	30.000
Z 03 07	Office renovation and maintenance	BTC management	10.000	Blue		5.000	1.000	2.000	1.000	1.000
Z 04	<i>Audit, Follow-up and Evaluations</i>		162.000			8.000				154.000
Z 04 01	Audit	BTC management	50.000	Blue		0				50.000
Z 04 02	Mid-term and final evaluation	BTC management	80.000	Green		0				80.000
Z 04 03	Follow-up and backstopping	BTC management	32.000	Green		8.000				24.000
	<b>Total</b>		<b>12.000.000</b>		<b>100,0%</b>	<b>1.203.400</b>	<b>1.071.400</b>	<b>4.272.400</b>	<b>4.061.400</b>	<b>1.391.400</b>

		31190000								
<b>Co-management</b>	<b>7.023.000</b>				<b>100.000</b>	<b>150.000</b>	<b>3.360.000</b>	<b>3.200.000</b>	<b>213.000</b>	
<b>BTC management</b>	<b>4.977.000</b>				<b>1.103.400</b>	<b>921.400</b>	<b>912.400</b>	<b>861.400</b>	<b>1.178.400</b>	

## 6.3 Digitalization

Digital technologies will be used to improve the monitoring systems (remote monitoring). To ensure a maximum recovery rate of payments, the pre-paid meters and payment with mobile money will also be introduced, by taking advantage of existing experience of the electricity utility EDM.

Digital survey methods, for example with digital processing of the images taken by drones (purchased by RERD1), will be considered.

## 7 ANNEXES

1. Policies, strategies, regulatory frameworks
2. Mini-grid operation models
3. Some examples of tariff cost calculation for mini-grids
4. Logical Framework
5. Chronogram
6. Profile of the TA
7. Strategy of maintenance, next steps
8. Assessment of FUNAE
9. Key studies

## 7.1 Policies, strategies, regulatory frameworks

### *Electricity Act 1997*<sup>7</sup>

In 1997, Mozambique reformed the electricity market by adopting the Electricity Act, which was introduced with the aim of regulating electricity production, transmission, distribution and sales. The act established the principle that all activities should be carried out under concessions and created the advisory body CNELEC as well as FUNAE.

In theory, the Electricity Act opened up all areas of electricity production, distribution and sales to private operators through concession contracts, issued by the Ministry of Mineral Resources and Energy. However, the involvement of private sector operators has been limited so far. A number of supporting decrees issued subsequently under the Electricity Act have defined the roles of CNELEC, awarded the concession for the operation of the transmission network to EDM and established the methodology by which tariffs are set.

### *The 2009 Energy Strategy*

On March 10, 2009, the Council of Ministers (Cabinet) approved the Energy Strategy<sup>8</sup> with the vision to guarantee the availability of energy to respond to the challenges of a sustainable socio-economic development. This document encourages the use of new and renewable sources of energy, particularly solar (photovoltaic and thermal) and wind power. As most of the Mozambican electricity generation comes from large-scale hydropower, one defines “**new and renewable energy sources**”, to differentiate large-scale hydropower and from other kinds of renewable energy, such as solar, wind and bioenergy<sup>9</sup>.

This strategy encourages the private sector and civil society to get involved in the dissemination of solar heating, photovoltaic and wind energy. Government particularly encourages the establishment of companies and associations for the production, commercialisation, assembling and maintenance of solar and wind energy in the rural areas.

This strategy also reinforces CNELEC as a regulator for the electricity sector what has de facto not happened and reinforces FUNAE as a key player in off-grid rural dissemination of renewable energy sources for development, mostly for public services and government institutions. The difference between off-grid and on-grid is not clearly defined.

### *The 2011 Strategy for New and Renewable Energy*<sup>10</sup>

The Strategy for the Development of New and Renewable Energy was approved by the Council of Ministers (Cabinet) on May 17, 2011 and is to be implemented over a 15 year period from 2011 to 2025. This strategy for New and Renewable Energy Development was developed almost in parallel with the Energy Sector Strategy and both documents cover almost the same time period and it seems that it was conceived to complement the Energy Sector Strategy in the area of renewable energy generation. However, closer examination of the objectives in the two documents reveals a number of inconsistencies. The objectives have not been harmonised completely between the different strategies. The basis for calculation of these quantified goals is unclear.

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<sup>7</sup> Law No. 21/97 (1997, October 1) (The Electricity Act), Republic of Mozambique.

<sup>8</sup> Estratégia de Energia (Boletim da República, I Série, no 22, Suplemento, Conselho de Ministros, Resolução 10/2009 de 4 de Junho), 2009.

<sup>9</sup> Hydropower is also included as a new and renewable energy source, but the limit is nowhere in the policy documents defined. However, 1 MW is the upper limit of the hydropower projects that FUNAE defines as small.

<sup>10</sup> Estratégia de Desenvolvimento de Energias Novas e Renováveis para o Período de 2011 - 2025, Ministério da Energia, 2011.

The strategy intends to regulate and promote the use of renewable energy sources, with the objective of creating conditions for communities living far away from the national grid to access energy resources. The strategy addresses mostly solar and wind energy and small hydropower resources.

The 2011 strategy followed the earlier approval on October 14, 2009 of the “**Policy for the Development of New and Renewable Energy**”<sup>11</sup>, with the objective of promoting the use and exploitation of available renewable energy resources, in order to accelerate people’s access to modern energy sources and to create a platform supporting investment in this subsector.

The objectives of this strategy are to: (i) improve access to quality energy services, through renewable energy sources; (ii) develop technology for use and conversion of renewable energy sources; and (iii) promote and accelerate public and private investment in renewable energy resources.

This strategy identifies a large number of actions to develop the knowledge and regulatory framework for the expansion of the utilisation of renewable energy sources and technologies in Mozambique. The strategy is separated into two action lines, one for the isolated, off-grid systems and another for the systems connected to the EDM grids.

For off-grid solar systems the strategy proposes to:

- Start a programme for the large-scale introduction of PV for lighting and water pumping systems.
- Start a programme for the large-scale introduction of solar water and space heating.
- Promote the manufacture, commercialisation and installation of PV systems for small loads and of water and space heating systems.
- Approve regulations for the manufacture, commercialisation and installation of PV systems for small loads and of water and space heating systems.
- Establish fiscal incentives and licensing to stimulate private sector participation.
- Establish centres of demonstration and dissemination of solar technologies.

For off-grid wind energy and hydropower similar measures are followed.

The following fiscal incentives were devised to stimulate private sector participation in the off-grid sector:

- Import tax exemptions on electrical equipment imports are to be applied to rural electrification and expansion projects and new connections<sup>12</sup>.
- Value Added Tax (VAT) exemptions are to be given for all rural electrification and expansion projects and new connections<sup>13</sup>.
- Foreign companies contracted to implement rural electrification and expansion projects and new connections are to be exempted from corporate profit tax.

However, the above fiscal benefits, pricing mechanisms, feed-in tariffs and other financial incentives as well

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<sup>11</sup> Política de Desenvolvimento de Energias Novas e Renováveis (Boletim da República, I Série, no 41, Conselho de Ministros, Resolução 62/2009 de 14 de Outubro), 2009.

<sup>12</sup> A 5% import tax is levied on “essential and capital goods”, 7.5% on “intermediate beneficial goods” and 20% on consumer products. All these different taxes have been applied to PV products depending on the skills of the clearance agent and the acceptance of the custom officials.

<sup>13</sup> Actually 17% VAT over the Cost of Insurance and Freight price is applied. But, Law No. 3/2012 provides a favourable VAT rate (calculated over only 40% of the Cost of Insurance and Freight value) for rural electrification projects with a component undertaken by a government agency.

as regulations and licensing procedures are not yet structured, making commercial and private investments in renewable energy sources less attractive.

#### ***Energy Sector Strategy 2015-2024<sup>14</sup>***

The energy sector strategy 2015-2023 has been recently updated for 2015-2024 (but targets are still until 2023), is articulated around the following five axes:

##### Axe 1: Production and Transport of Electric Energy

Under this axe the different objectives and targets of the Government of Mozambique (GoM) for electricity production through large hydropower plants, gas-to-power plants and coal plants are described. This axe also covers the topic of electric energy transmission through the national grid and the reinforcement of interconnection and export capacities with the neighbouring countries.

##### Axe 2: Production and infrastructure for fossil fuels

This axe focuses on the storage and the use of fuels (Liquid Natural Gas, Liquefied Petroleum Gas) in the country.

##### Axe 3: Distribution and Access to electricity and fuels

The different objectives and targets of the GoM on Access to electricity and fuels in the country are under this axe. It also contains the sector objectives for the generation of Renewable Energy.

##### Axe 4: Financing and Prices

This axe regroups the ambitions of the GoM on attracting (external) private investments and on making energy prices cost-reflective. Current sources of finance are insufficient to realise access to modern energy services for decades to come.

##### Axe 5: Organization and Institutional Capacity

This axe includes the ambitions of the GoM on the creation of **sufficient institutional and organisational capacities in the state-owned companies** in the energy sector. Under this axe, a number of activities are mentioned to refine the existing legal framework and to develop a national workforce for the sector. This axe also covers the ambition **to create a competent and independent Energy Sector Regulator (targeted in the MIREME capacity building project)**.

From what is mentioned above, it is clear that the GoM in its Energy Sector Strategy recognises the **important role of private investors** for the development of the energy sector. The Strategy even mentions a specific target on private investments: for the 2014-2024 planning period the sector should attract an average of USD 2 billion per year.

The strategy sets two important goals relevant for this TFF:

- In the context of distribution and access to electricity, the goal is to expand access to electricity progressively, with greater focus on urban and peri-urban areas and development areas, in order to reach all the districts and 50% of the population by 2023.

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<sup>14</sup> Estratégia da Energia 2015-2024, versão 11 de Abril de 2014.

- In the context of New and Renewable Energies, the goal is to launch a programme of administrative posts or Solar Villages in rural areas, selected based on (i) performance criteria, (ii) the existence of productive projects and (iii) absence or poor coverage by the electrical network, and reaching 25% of the population.

It should be noted that the two goals are not cumulative, as they concern different sets of population.

Achieving the 50% grid access target by 2023 would require a considerable increase in the rate at which EDM is currently connecting new customers. EDM has between 2011 and 2014 been connecting about 120,000 households per annum and would need to connect an additional 57,000 households per annum above its current rate of connections if it was to meet the 50% access target by 2023<sup>15</sup>. But in the future EDM will have more difficulties in connecting new households as in this respect “low-hanging fruits” have already been connected and now EDM will have to extend lines into peri-urban and rural households. Based on estimates from World Bank experts the connection costs will be between USD 580 per connection for ordinary requests to over USD 2,100 per connection for other connections, i.e. those connections which are mostly likely to happen in the future.

### ***National Strategy for Energy Conservation***

The energy conservation issue is hardly mentioned in the National Energy Strategy 2014-2023. The responsibility for energy conservation is given to FUNAE as one of their tasks. The Strategy says that FUNAE should promote the conservation and rational management of the country’s energy resources in a sustainable way. The financial means given to FUNAE should be used for improving the quality of the energy (electricity) and reduction of losses in the central grid under the responsibility of EDM. The financing of energy savings does not seem to be included when it comes to a conservation strategy for each of the economic sectors. The Strategy for Conservation and Sustainable Use of Biomass Energy is partially covering for that part of the energy conservation policy (Section 3.3.1.3). That document mentions forest conservation with increased energy prices for energy from sustainably managed forests, improved cutting techniques, improved technologies for the transformation to charcoal, penalising the use of hard coal, tax measures facilitating the use biomass energy and improved inter-institutional coordination.

### **Additional policy frameworks**

The Government has developed a set of policies and laws to promote rural electrification; they include amongst others:

**The Electricity Master Plan Study (from 2004)**<sup>16</sup>: The Master Plan was prepared for the period 2005 to 2019 and included feasibility studies and project documents for the projects planned for the first 5 years. The Master Plan addressed increased access to electricity, poverty reduction and economic development. Several projects related to transmission and distribution, also including rural electrification and rehabilitation of existing networks as well as load dispatch, were defined.

**The Generation Master Plan Study (from 2009)**<sup>17</sup>: The Master Plan has investigated domestic as well as regional generation expansion scenarios for the 20 year study period 2010 – 2030. For the first 10 years-period the plans are based on realistic projects that have been studied to feasibility level, while for the last 10 years-period also projects studied at prefeasibility levels were candidates for development.

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<sup>15</sup> Mozambique Energy Sector Policy Note, Energy Sector Policy Work, World Bank Report No: ACS17091, November 30, 2015.

<sup>16</sup> Electricidade de Moçambique (2004). Electricity master plan. Norconsult, Maputo.

<sup>17</sup> Ministry of Energy “Generation Master Plan”, 2008, Maputo, Mozambique.



**The Mozambique Transmission Backbone Project (from 2011)**<sup>18</sup>: The aim is to wheel power from the north, where most of the generation takes place to the load centres in the south, while also providing access to the central region of the country. Furthermore, it will allow for the power trade with other Southern African Development Community member States through the Southern African Power Pool.

**Renewable Energy Atlas Project**<sup>19</sup>: This tool aims to identify potential sites for energy generation on the basis of renewable energy. This covers particularly the solar energy, wind, mini-hydro, biomass, water, geothermic and carbon credit energy.

**The Transmission and Distribution Master Plan Study (Draft final report from 2013)**<sup>20</sup>: The Master Plan is an update of the Electricity Master Plan from 2004 and takes into account the Generation Master Plan from 2009. The scope of validity of this Master Plan is from 2012 to 2027.

**Renewable Energy Feed-in Tariffs Project (Draft final report from 2013)**<sup>21</sup> [11]: The aim of the study is to support preparation of legislation, which will enable independent power producers of renewable energy electricity to inject power into the national grid.

## 7.2 Mini-grid operator models

Mini-grid operator models<sup>22</sup> describe the organisational structure of mini-grid implementation and operation. The four main mini-grid operator models are the **utility, private sector, community and hybrid models**. These models differ based on who owns the power generation and distribution assets, and who operates and maintains the system, and they are further defined according to relationships with customers. Successful deployment of each model depends on its unique context: the natural environment (e.g. geography, energy resources and climate/weather conditions), the local socio-economic context, and the policy and regulatory environment.

Mini-grids can have two operational entities, a small power producer and a small power distributor. Mini-grid operators can fulfil both roles (the generation and distribution) and must thus be allowed to produce and sell power either to public power distributors or directly to end-users via mini-grids.

In the **utility operator model** the utility is responsible for all mini-grid operations. The funding is usually secured from the national treasury or government. The utility operates the mini-grids in much the same way that it operates the national electricity network. Power is generated by the utility, fed into the distribution grid and supplied to the consumers, usually at the same rates paid by the utility's customers connected to its main grid. Thus, utilities usually cross-subsidise electricity tariffs for mini-grids. Utilities, given adequate financial and human capacities to manage mini-grids, could rapidly install a large number of mini-grids in rural areas. However, utilities usually do not invest voluntarily in mini-grids because they often consider mini-grids as a non-core business and because mini-grids are rarely profitable in existing regulatory frameworks. Therefore, when utilities manage mini-grids, most of the time they are directed to do so by the government.

In **private operator models**, a private entity plans, builds, manages and operates the mini-grid system. The funding depends on private equity and commercial loans as well as some form of government support,

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<sup>18</sup> The Mozambique transmission backbone project, retrieved from [www.edm.co.mz/index.php?option=com\\_docman&task](http://www.edm.co.mz/index.php?option=com_docman&task).

<sup>19</sup> Renewable energy atlas for Mozambique, retrieved from [www.FUNAE.co.mz](http://www.FUNAE.co.mz).

<sup>20</sup> The transmission and distribution master plan study, retrieved from <https://www.dropbox.com/s/c9z82cq56z7anr2/Final%20Master%20Plan%20Update%20Report%20Volume%203.pdf>

<sup>21</sup> Renewable energy feed-in tariffs project for Mozambique, retrieved from [www.FUNAE.co.mz](http://www.FUNAE.co.mz)

<sup>22</sup> Adapted from the Renewable Energy Cooperation Programme Mini-grid Policy Toolkit.

e.g. grants, subsidies, results-based financing, or public sector loan guarantees. Pure private sector operator models in which all the investment comes from private sources are rare but do exist. The private sector is often better suited (than utilities) to manage smaller mini-grids.

Scalable private sector models include the franchise approach, the ABC (Anchor-Business-Community) approach, the clustering approach and the local entrepreneur approach. All of these approaches are designed to meet the challenge of having little revenue from end-users at each site while facing inevitable management and operational costs. Some of these approaches can overlap and a mini-grid operator may implement them at the same time.

- The **franchise approach** bundles management costs at the franchiser level and minimises this burden for the franchisee. With a large number of franchisees, economies of scale in theory outweigh the additional management costs of the franchising structure.
- In the **ABC model**, the operator strives to select sites where (A) anchor customers such as telecom tower companies, factories or lodges can provide a reliable cash flow, (B) the mini-grid can be extended to high potential local businesses, and (C) direct power supply to customers is only seen as a top-up to the revenues from the first two customer groups.
- In the **clustering approach**, a number of villages situated close to each other are electrified by non-interconnected mini-grids that are bundled under one operational management structure to save on overheads, labour, travel and transport costs.
- The **local entrepreneur approach** takes advantage of the fact that a local entrepreneur is constantly on site. The local entrepreneur operates the system and owns parts of the generation and distribution assets. He/she typically has a well-established social network, reducing costs for security, money collection, etc.

In **community-based models**, the local community owns, operates and manages the system and provides all services for the benefit of its members. The financing is typically highly grant-based with some community contributions (financial or in-kind). The planning, procurement of equipment, installation and commissioning is often done by third parties, as local communities rarely have the technical and economic expertise to develop and implement mini-grids. To allow long-term operation of the system, it is essential that community operated mini-grids at least charge tariffs that cover reinvestment/depreciation, operations and maintenance costs. Small community models require working social and decision-making structures in the village to prevent conflicts. Communities most often use the **cooperative approach** for mini-grid ownership and management.

**Hybrid operator models** combine different aspects of the three models presented above. Investment, ownership and operation of a mini-grid might not be carried out by the same entity. Joint venture or specific contractual arrangements between different actors are applied. Generation and distribution of electricity may be split and carried out separately by government utilities, private companies or communities in the form of small power producers and small power distributors. Alternatively, the duties and responsibilities can be split according to who builds, owns, operates and maintains the system. It is essential to clearly define roles and responsibilities prior to commissioning. No matter which form of hybrid model is used, it depends on a regulatory framework that accommodates 'mixed' ownership and management, as well as the political will of the utility to allow or pursue it.

Usually, different forms of contractual arrangements are applied in hybrid operator models:

- The **public private partnership approach** can be seen as any form of private sector involvement with a contract between a public and a private party. A public partner can for example finance, own and manage the mini-grid while contracting a private partner to operate and maintain the power generation system.
- This can take the form of a **Renewable Energy Service Company** approach, where these companies work similarly to utilities at a smaller scale. The equipment is purchased and owned by the government while the service company operates and maintains the systems and collects fees from the users.
- Another PPP approach is the **concession model** where the holder of a concession, which is usually a private company, enjoys beneficial terms for providing electricity services to rural communities. Their beneficial terms can be an electricity supply monopoly, preferential market access for a certain period of time (typically from 15 to 25 years, in a defined geographical area) or specifically designed tariff or the area
- In the **Power Purchase Agreement** (PPA) approach the distribution assets and the generation assets are not in the hands of one entity. In these cases, a contract (the PPA) for delivery of electricity has to be signed by the parties.

## 7.3 Some examples of tariff cost calculation for mini-grids

Table 7.2.1 - Calculation with correct dimensioning of PV system.

Parameter	Amount	Units	
Households	100	HH	
W/HH	50	Wp	
Total system power	5,000	W	
Investment costs:	70,000	€	
PV	10,000		
Batteries	20,000		
Inverters	10,000		
Grid	15,000		
Wiring, etc.	5,000		
Installation	10,000		
Daily production @ 4h sun/day	20	kWh	
Daily sales (70%)	14		
Yearly sales	5,110	kWh	
Project lifetime	20	years	
Costs/year:			€/kWh
Investment	3,500		0,685
O&M parts 5%/year	350		0,068
O&M salaries (1 operator)	3,000		0,587
Battery replacement	1,000		0,196
Profit	0		0,000
Total including CAPEX			1,536
Total if CAPEX is subsidised			0,851

(Note: these calculations are simplified to illustrate orders of magnitude, they do not take into account inflation and other parameters).

Table 7.2.2 - Calculation with over-dimensioning of PV system.

Parameter	Amount	Unit	
Households	100	HH	
W/HH	500	Wp	
Total system power	50,000	W	
Investment costs:	700,000	€	
PV	100,000		
Batteries	200,000		
Inverters	100,000		
Grid	150,000		
Wiring, etc.	50,000		
Installation	100,000		
Daily production @ 4h sun/day	200	kWh	
Daily sales (70%)	14		
Yearly sales	5,110	kWh	
Project lifetime	20	years	
Costs/year:			€/kWh
Investment	35,000		6,849
O&M parts 5%/year	3,500		0,685
O&M salaries (1 operator)	3,000		0,587
Battery replacement	10,000		1,957
Profit	0		0,000
Total including CAPEX			10,078
Total if CAPEX is subsidised			3,229

Table 7.2.3 - Calculation with larger number of households and correct dimensioning of PV system. (e.g. clustered mini-grids)

Parameter	Amount	Unit	
Households	1,000	HH	
W/HH	50	Wp	
Total system power	50,000	W	
Investment costs:	700,000	€	
PV	100,000		
Batteries	200,000		
Inverters	100,000		
Grid	150,000		
Wiring, etc.	50,000		
Installation	100,000		
Daily production @ 4h sun/day	200	kWh	
Daily sales (70%)	140		
Yearly sales	51,100	kWh	
Project lifetime	20	years	
Costs/year:			€/kWh
Investment	35,000		0,685
O&M parts 5%/year	3500	0,5	0,068
O&M salaries (1 operator)	3,000		0,059
Battery replacement	10,000		0,196
Profit	0		0,000
Total including CAPEX			1,008
Total if CAPEX is subsidised			0,323

## 7.5 Logical framework

Overall Objective	Indicators	Means of Verification	Baseline values	Target	assumptions
<i>Rural Economic and Social Development is promoted by increased sustainable access to energy</i>	Poverty indicators of target areas	<ul style="list-style-type: none"> <li>Government statistics (Instituto Nacional de Estatística)</li> <li>UNDP</li> </ul>	<ul style="list-style-type: none"> <li>Zambezia: 70.5%</li> <li>Nampula 54.7%</li> <li>Niassa 31.9%</li> <li>Manica 55.1%</li> <li>Nat.average 54.7%</li> </ul> (UNDP 2010 Report on MDG)		Successful integration of the RERD2 intervention with other interventions promoting productive uses of energy.
<i>Specific Objective</i>	Indicators	Means of Verification			assumptions
<i>Access to energy in rural areas is increased by investments in renewable energy and in support mechanisms to ensure sustainability</i>	Access to electricity in rural areas	<ul style="list-style-type: none"> <li>Existing multi-tier framework surveys (SE4All)</li> <li>Household surveys</li> </ul>	5.97% of rural population (Global Tracking framework)	7.97% of rural population of one province	Target based on Zambezia population data

Result 1	Indicators	Means of Verification	Baseline values	Target	Assumptions
Mini-grids provide reliable and adequate energy service	<ul style="list-style-type: none"> <li>Multi-tier framework (World Bank)</li> </ul>	<ul style="list-style-type: none"> <li>Household surveys</li> </ul>	5.97% of rural population (Global Tracking framework)	7.97% of rural population of one province	Suitable operator models can be found
Activities for R1	Actors involved	Estimated Budget			assumptions
R1.A1: Review and update of existing feasibility and baseline studies and site selection in view of productive uses of energy (socio economic surveys)	Consultancy, NGOs, FUNAE, business associations, businesses, other donors, local authorities	€200,000	13 existing studies on PV and hydro	1 to 3 studies revised and updated	<ul style="list-style-type: none"> <li>Quality consultants are found</li> <li>The existing FUNAE pipeline for mini-grids is relevant to the objective</li> <li>Existing studies are of good quality</li> </ul>
R1.A2: Awareness and stakeholder consultations for each site including the private sector	NGOs, FUNAE, business associations, businesses, local authorities	€50,000	0 campaigns	1 to 3 awareness campaigns performed on future sites	NGOs and actors with sufficient knowledge of local conditions can be found
R1.A3: Mini-grid development with productive uses of energy	Private sector, FUNAE, consultants, NGOs, communities, local authorities	€ 6,120,000	3 large existing hydro mini grids (Sembezia, Murora, Majaua) and 3 large solar mini grids	1 to 3 additional large hydro mini-grids	<ul style="list-style-type: none"> <li>A financially sustainable management system for mini grid is agreed upon</li> <li>Enforcement of payment for services</li> <li>Sufficient ability to pay</li> </ul>
R1.A4 Result dissemination	FUNAE	€ 50,000	0 publications	Minimum one publication	



Result 2	Indicators	Means of Verification			assumptions
Technical and financial sustainability of existing systems is improved	<ul style="list-style-type: none"> <li>Revenues from the systems</li> </ul>	<ul style="list-style-type: none"> <li>Baseline for systems and for payments</li> <li>Systems database</li> <li>FUNAE accounts</li> </ul>	Fee collection at 50 %	Fee collection raised to 80 %	<ul style="list-style-type: none"> <li>Continuity in management and continued openness to other stakeholders</li> <li>Users are willing and able to pay for the energy services</li> <li>FUNAE is open to a level of decentralization process giving more autonomy to the Delegations, including financial.</li> <li>Agreement can be found on tariffs and subsidies</li> </ul>
	<ul style="list-style-type: none"> <li>Percentage of systems working</li> </ul>	<ul style="list-style-type: none"> <li>Baseline for systems and for payments</li> <li>Systems database</li> </ul>	Working systems: 50%	80 % of working systems	
	<ul style="list-style-type: none"> <li>GIS implemented beyond a static database and used for planning and asset management purpose</li> </ul>	<ul style="list-style-type: none"> <li>GIS system</li> <li>Activity reports</li> </ul>	GIS currently not used = 0%	GIS interconnected with other data bases and used for planning purposes 100%	
	<ul style="list-style-type: none"> <li>The existing maintenance strategy for PV is implemented</li> </ul>	<ul style="list-style-type: none"> <li>Satisfaction surveys about FUNAE</li> <li>Operation and maintenance report</li> </ul>	PV maintenance strategy implemented at 25 %	PV maintenance strategy implemented at 80%	

Activities	Actors involved	Estimated Budget			assumptions
R2.A1 Planning, Operation and maintenance	FUNAE with focus on maintenance unit, and other relevant divisions (solar, mini-hydro)	€ 200,000	Maintenance unit half functional 50%	Maintenance unit strengthened 90%	Integration with other departments is simulated  Qualified human resources are kept in FUNAE
R2. A2 Strengthening of Information systems	FUNAE maintenance unit and delegations	€ 200,000	Data base and GIS not connected  Information not shared between departments  0%	GIS and data base connected and used for asset management, site identification and planning  100%	Integration with other departments is simulated  Qualified human resources are kept in FUNAE
R2 A3 Implementation of monitoring remote monitoring systems	FUNAE delegations in the provinces and relevant divisions	€ 360,000	8 systems installed; 3 different technologies	One technology chosen.  Number of systems installed according to budget	Monitoring systems are adequate for the targeted systems.
R2 A4 Implementation of payment systems (metering, fee collection, pre-payment)	FUNAE maintenance unit and Delegations in the provinces	€500,000	1000 Meters and pre-payment systems purchased but not operational yet  0 % of systems operational	Pre- payment (for domestic users) and meters systematic on the mini-grids financed by RERD2  100% of mini-grids equipped with pre-payment systems	Users are willing and able to pay for services

Result 3	Indicators	Means of Verification	Baseline value	Target	assumptions
The capacity of FUNAE in planning and project management is improved	<ul style="list-style-type: none"> <li>Capacity building plan</li> <li>Quality of tender documents</li> <li>Quality of socio-economic survey methodology</li> <li>Quality of working procedures</li> </ul>	<ul style="list-style-type: none"> <li>Surveys</li> <li>Activity reports</li> <li>Coordination reports</li> </ul>	<p>No plan for capacity building</p> <p>No standard method for socio-economic surveys</p> <p>Incomplete procedures</p>	<p>Agreed plan for capacity building</p> <p>Standard template for surveys</p> <p>Working procedures are operational</p>	<ul style="list-style-type: none"> <li>Continuity in management</li> <li>Cooperation between divisions</li> <li>FUNAE retains qualified human resources</li> </ul>
<b>Activities</b>	<b>Actors involved</b>	<b>Estimated Budget</b>			<b>assumptions</b>
R3.A1 Project management is improved at HQ level	<ul style="list-style-type: none"> <li>FUNAE relevant divisions in HQ</li> </ul>	€ 100,000	Processes and working procedures not updated	Clear processes and tools for project management	<ul style="list-style-type: none"> <li>Integration with other departments is simulated</li> <li>Qualified human resources are kept in FUNAE</li> </ul>
R3.A2. Capacity building of Delegations in sector planning and coordination	FUNAE maintenance unit and delegations	€ 200,000	Planning process with DIPREME unclear	Clear working processes and structure; Technicians better trained	<ul style="list-style-type: none"> <li>Qualified human resources are kept in FUNAE</li> <li>More autonomy for FUNAE Delegation</li> </ul>
R3 A3 Technical assistance	BTC	€2,250,000			<ul style="list-style-type: none"> <li>Experts with adequate profiles are found</li> </ul>
R3 A4 Surveys, field trips workshops and seminars, study tours	FUNAE and BTC staff	€200,000			

## 7.6 Chronogram

				Year 1				Year 2				Year 3				Year 4				Year 5			
Budget code		Results/activities		T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
A	01		Mini-grids provide reliable and adequate energy services																				
A	01	01	Review and update of existing feasibility and baseline studies and site selection in view of productive uses of energy																				
A	01	02	Awareness and stakeholder consultations for each site including the private sector																				
A	01	03	Mini-grid development with productive uses of energy																				
A	02		Technical and financial sustainability of existing systems is improved																				
A	02	01	Planning, operation and maintenance																				
A	02	02	Strengthening of information systems																				
A	03	03	Implementation of monitoring and remote monitoring systems																				
A	04	04	Implementation of payment systems (metering, fee collection, pre-payment)																				
A	03		The capacity of FUNAE in planning and project management is improved																				
A	03	01	Project management is improved at HQ level																				
A	03	02	Capacity building of Delegations in sector planning and coordination																				
A	03	03	Technical assistance																				
A	03	04	Surveys, field trips, workshops and seminars, study tours																				

## 7.7 Technical Assistants Profiles

Two Technical Assistants are foreseen for RERD2, in addition to a shared TA resource (working with DIPREME and FUNAE delegations on capacity building).

They will have the following profiles:

### 7.7.1 BTC ITA Intervention Manager

#### Job objective

Manage the intervention in order to ensure optimal execution of the intervention – within the set programme framework.

#### RESULTS AREAS

Results area 1: As Intervention manager	
Manage the operational and financial planning	
in order to ensure a smooth start-up, progress and the results of the intervention.	
Main tasks:	<ul style="list-style-type: none"> <li>• Start up and close the intervention with attention for proper planning and decision making and good representation of stakeholders;</li> <li>• Elaborate the multi-year planning, in consultation with Programme coordination and with the partner as per agreements;</li> <li>• Determine, in consultation with the partner, realistic change objectives throughout the results chain (which products, which mutually related transition/change management activities);</li> <li>• Elaborate the operational and annual planning;</li> <li>• Ensure the evaluation system is followed up;</li> <li>• Plan and organise the needs for internal and external expertise;</li> <li>• Manage the main risks and opportunities and take preventive and corrective measures.</li> </ul>
Results area 2: As Intervention coordinator	
Coordinate the activities and ensure their execution, in compliance with set arrangements and procedures	
in order to achieve the intervention objectives.	
Main tasks: To be included in the above:	<ul style="list-style-type: none"> <li>• Monitor the activities and regularly report on the state of progress;</li> <li>• Ensure the administrative and financial monitoring of the Belgian contribution to the intervention in accordance with applicable arrangements and procedures;</li> <li>• Mainstream the transversal and priority themes in the interventions;</li> <li>• Be the primary contact person for the stakeholders of the intervention, including the Programme coordination.</li> </ul>
Results area 3: As Knowledge manager	
Coordinate the knowledge building process and ensure that the results thereof are disseminated	
in order to ensure a knowledge-based programme approach.	
Main tasks:	<ul style="list-style-type: none"> <li>• Stimulate a methodological learning approach (action-research);</li> <li>• Contribute to the reflections on strategy choices, methods and instruments of the Programme;</li> <li>• Participate in the Extended Coordination meetings of the Programme.</li> <li>• Ensure knowledge sharing with intervention stakeholders.</li> </ul>

Results area 4: As People manager	
Lead the team of which one is the hierarchical supervisor	
in order to have qualified and motivated staff.	
Main tasks:	<ul style="list-style-type: none"> <li>• Put in place an appropriate organisation in terms of roles and responsibilities</li> <li>• Ensure that the roles and procedures which the head office has determined are respected;</li> <li>• Determine the objectives and priorities of the staff members;</li> <li>• Contribute to the recruitment of staff members;</li> <li>• Motivate, coach and follow up staff members;</li> <li>• Create an atmosphere of trust and accountability;</li> <li>• Develop the competencies of co-workers;</li> <li>• Promote a positive internal atmosphere and manage conflicts within the entity.</li> </ul>
Results area 5: As Facilitator	
Capacity development of partner entities	
in order to contribute to the improvement of their organisation, processes and systems and of their staff's competencies.	
Main tasks:	<ul style="list-style-type: none"> <li>• Assess the maturity of management of partner entities;</li> <li>• Advise partner entities on actions to be taken to improve their management as well as how to implement these actions;</li> <li>• Facilitate the change process;</li> <li>• In association with the partners, adapt the organisational structure, optimise the processes, improve the systems and strengthen staff competences.</li> </ul>
Results area 6: As member of the Formulation team	
Provide the necessary inputs in his/her area of expertise	
in order to contribute to the production of the Technical and Financial File.	
Main tasks:	<ul style="list-style-type: none"> <li>○ Contribute to the development of the preparation scenario: method, planning, budget, team;</li> <li>○ Contribute to actions and products outlined in the formulation scenario, such as missions, consultative meetings, studies, aide-mémoire and chapter of the Technical and Financial File.</li> </ul>

### **Positioning**

Whose subordinate are you? (Whom do you report to?)	Resident Representative
Who do you supervise?	Number of <b>direct co-workers</b> the jobholder supervises <b>hierarchically</b> : variable (maximum 8) Functions: NTA, ITA Number of <b>indirect co-workers</b> the jobholder supervises <b>hierarchically</b> : variable

**Autonomy**

Entitled to decide independently on the following: (without explicit consent of the supervisor)	<ul style="list-style-type: none"><li>• Methodology</li><li>• Organisation of one's own work</li><li>• Proactive actions to manage daily problems and risks</li></ul>
Authorisation from the management is required for the following:	<ul style="list-style-type: none"><li>• Implementation of new instruments, procedures, processes</li><li>• Actions pertaining to major problems or risks</li><li>• Matters with a budgetary impact</li><li>• Decisions that have a general impact on BTC intervention</li><li>• Decisions that exceed the scope of the function</li></ul>

**Diploma and/or level of education required for the job**

- Master in management, economy, rural development or equivalent.

**Experience required for the job**

- At least 5 years of relevant experience in steering interventions/projects and international cooperation; experience with more than one intervention/project is an advantage;
- Preferably experience in private sector issues and of the interfaces between private and public sector such as public-private partnerships.
- A thorough experience in development contexts.
- At least 5 years of overseas experience, of which part in sub-Saharan Africa. Knowledge of the country and/or experience working in Mozambique is an advantage.

**Technical skills required for the job**

- Broad and in-depth insight in all aspects of development cooperation
- Thorough knowledge of project management methodologies
- Preferably experience in the energy sector.
- Skills and experience in capacity building activities and change processes.
- Reasonable level of Portuguese and willing to learn
- Good level of English

**Innovation**

Normal level of innovation.

## 7.7.2 BTC ITA Energy Engineer

### Job objective

As Expert:

Contribute to the expected results of the intervention by executing activities with stakeholders, and ensure knowledge building and knowledge management of the intervention.

### Results areas

Results area 1: As Expert	
Contribute to the implementation of the intervention by providing inputs for planning, execution, coordination, follow-up and monitoring, and evaluation of activities	
in order to ensure that the results of the intervention (outputs – outcomes) are achieved within the set execution deadline.	
Main tasks:	<ul style="list-style-type: none"> <li>• In the matter of planning: <ul style="list-style-type: none"> <li>○ Analyse the situation and the needs;</li> <li>○ Determine the activities and outputs in a participatory way;</li> </ul> </li> <li>• In the matter of execution: <ul style="list-style-type: none"> <li>○ Provide the necessary inputs for activities to be organised well;</li> <li>○ Determine technical specifications when preparing procurement documents;</li> <li>○ Identify additional technical expertise required for implementing the activities;</li> <li>○ Contact and establishing relations with all interesting or needed stakeholders;</li> </ul> </li> <li>• In the matter of monitoring and evaluation: <ul style="list-style-type: none"> <li>○ Permanently update information so that it is available at any time, mid-term and end-of-term of the intervention, to the M&amp;E systems and that the performance of the intervention can be measured;</li> <li>○ Update the factual data to be fed into the decision-making process;</li> <li>○ Put in place a genuine learning dynamic through permanent monitoring of activities fostering short learning loops;</li> <li>○ Develop/complete the databases in order to allow for digital and up-to-date management of information;</li> <li>○ Provide for mechanisms and methods allowing for correct scientific monitoring of results.</li> </ul> </li> </ul>
Results area 2: As Advisor	
Provide the necessary technical inputs in one's sector/thematic area of expertise	
in order to achieve technical performance in accordance with national and international norms and standards.	
Main tasks:	<ul style="list-style-type: none"> <li>• Remain informed of recent interesting evolutions in the specific area of expertise;</li> <li>• Participate to scientific and technical forums in that specific area;</li> <li>• Present the necessary strategy and technical papers with and for the partner depending on the needs;</li> <li>• Carry out required prospecting to remain innovative and creative in achieving the expected change;</li> <li>• Participate to all meetings of the technical committee and exchange platform in one's area of expertise;</li> <li>• Provide structured and comprehensible feedback to all team members.</li> </ul>
Results area 3: As Facilitator	



Organise knowledge building and knowledge management in one's sector or thematic area of expertise	
in order to create an inclusive, informed climate of trust within the intervention.	
Main tasks:	<ul style="list-style-type: none"> <li>• Put in place a learning climate;</li> <li>• Establish a setting that is conducive to writing, reflection, self-criticism and self-assessment;</li> <li>• Help members of the interventions become familiar with literature research;</li> <li>• Help members of the interventions become familiar with writing scientific or vulgarised articles;</li> <li>• Develop platforms where virtual or live ideas are shared;</li> <li>• Introduce new technologies in the learning process;</li> <li>• Explore and develop digitisation with the Digit4Dev expert of the Belgian development agency;</li> <li>• Produce all kinds of information formats (blogs, videos, newspapers articles, scientific articles...).</li> </ul>
Results area 4: As Facilitator	
Capacity development of partner entities	
in order to contribute to the improvement of their organisation, processes and systems and of their staff's competences.	
Main tasks:	<ul style="list-style-type: none"> <li>• Assess the maturity of management of partner entities;</li> <li>• Advise partner entities on actions to be taken to improve their management as well as how to implement these actions;</li> <li>• Facilitate the change process;</li> <li>• In association with the partners, adapt the organisational structure, optimise the processes, improve the systems and strengthen staff competences.</li> </ul>

**Positioning:**

Whose subordinate are you? (Whom do you report to?)	Intervention Manager
Who do you supervise?	Number of <b>direct co-workers</b> the jobholder supervises <b>hierarchically</b> : 0

**Autonomy**

Entitled to decide independently on the following: (without explicit consent of the supervisor)	<ul style="list-style-type: none"> <li>• Organisation of one's own work</li> <li>• Proactive actions to manage daily problems and risks</li> </ul>
Authorisation from the management is required for the following:	<ul style="list-style-type: none"> <li>• Implementation of new instruments, procedures, processes</li> <li>• Actions pertaining to major problems or risks</li> <li>• Matters with a budgetary impact</li> <li>• Decisions that exceed the scope of the function</li> </ul>

**Diploma and/or level of education required for the job**

A Master's degree in engineering in the renewable energy sector or equivalent.
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**Experience required for the job**

Is a number of years of relevant professional experience required to perform the job? Is a certain general experience required, for instance, within a certain sector? It concerns the experience required to perform the job independently.

- At least 5 years of relevant experience in the sector or thematic domain.
- International experience is an asset

**Technical skills required for the job**

The technical or organisation-specific knowledge and skills required to perform the job successfully (for instance, languages, programming languages). Please indicate both the degree of specialisation (depth) and the diversity (width) of the required technical expertise.

- At least five years of experience in the planning, design and supervision of energy systems.
- A thorough experience in renewable energy engineering, preferably with emphasis on small hydropower systems
- Knowledgeable about energy access and rural electrification issues.
- Experience with the design and implementation of mini-grids is a strong advantage.
- Skills and experience in capacity building activities and change processes.
- At least 5 years of overseas experience, of which part in sub-Saharan Africa. Knowledge of the country and/or experience working in Mozambique is an advantage.
- Team spirit and communication skills with colleagues and project partners of different social levels.
- An analytical mind and a good technical writing and reporting capacity.
- Knowledge of common ICT-applications, GIS-software and modelling software is an advantage.
- Excellent knowledge of the English language.
- Reasonable knowledge of Portuguese language.
- He/she will be in good health, and accept frequent field visits to remote areas.
- He/she is sensitive to the cross-cutting issues of the Belgian cooperation (environment, gender, HIV/AIDS, children's rights and social economy).
- Familiar with Management for Results
- Knowledgeable about change theories
- Knowledgeable about system approaches
- Knowledgeable about knowledge management and knowledge building
- Technology-savvy

### 7.7.3 BTC ITA Capacity development and change management expert – 60 months (shared with the intervention ‘Institutional and organizational Strengthening and Capacity Development at the Ministry of Energy’)

#### Job objective

Contribute to the expected results of the intervention by executing activities with stakeholders, and ensure knowledge building and knowledge management of the intervention. Accompany and support the comprehensive baseline study from a provincial point of view

Support DIPREME (and FUNAE Delegations) management in the organizational change through coaching and mentoring of involved staff.

Provide strategic guidance and coaching to all actors involved in the intervention at provincial level

Provide technical advice/coaching related to capacity development

Support the participatory planning process through active participation in the dialogue, advice on capacity building issues relevant to the project specific objective and expected results

Provide technical input into the preparation of terms of reference for the various studies and capacity building activities subcontracted and support the implementing agency to ensure their adequate implementation

Support and provide technical advice for recruitment of specific technical international and national expertise required for the project implementation

Ensure coherence and coordination of project strategies and activities for areas related to capacity building

Support, develop and implement a project monitoring and evaluation plan

Play a role in facilitating the change by paying attention to signs of resistance and developing strategies to overcome this resistance together with involved staff

Organize, coordinate and technically supervise the implementation of project activities (including the comprehensive baseline) in accordance with the approved work plans

Contribute to the operations reports to be submitted to the SC

Report regularly to the PM

Contribute to the preparation of financial and procurement planning and budgeted work plans

Establish and maintain good working relationships with project participants, counterpart agencies, donors and other relevant organizations and government agencies

Share information about the project with other organizations and agencies as needed.

Liaise and co-ordinate project activities with other relevant technical assistance projects

#### Results areas

<b>Results area 1: As Expert</b>	
Contribute to the implementation of the intervention by providing inputs for planning, execution, coordination, follow-up and monitoring, and evaluation of activities	
in order to ensure that the results of the intervention (outputs – outcomes) are achieved within the set execution deadline.	
Main tasks:	<ul style="list-style-type: none"> <li>• In the matter of planning: <ul style="list-style-type: none"> <li>○ Analyse the situation and the needs;</li> <li>○ Determine the activities and outputs in a participatory way;</li> </ul> </li> <li>• In the matter of execution: <ul style="list-style-type: none"> <li>○ Provide the necessary inputs for activities to be organised well;</li> <li>○ Determine technical specifications when preparing procurement documents;</li> <li>○ Identify additional technical expertise required for implementing the activities;</li> <li>○ Contact and establishing relations with all interesting or needed stakeholders;</li> </ul> </li> <li>• In the matter of monitoring and evaluation: <ul style="list-style-type: none"> <li>○ Permanently update information so that it is available at any time, mid-term</li> </ul> </li> </ul>

	<p>and end-of-term of the intervention, to the M&amp;E systems and that the performance of the intervention can be measured;</p> <ul style="list-style-type: none"> <li>○ Update the factual data to be fed into the decision-making process;</li> <li>○ Put in place a genuine learning dynamic through permanent monitoring of activities fostering short learning loops;</li> <li>○ Develop/complete the databases in order to allow for digital and up-to-date management of information;</li> <li>○ Provide for mechanisms and methods allowing for correct scientific monitoring of results.</li> </ul>
<b>Results area 2: As Advisor</b>	
Provide the necessary technical inputs in one's sector/thematic area of expertise	
in order to achieve technical performance in accordance with national and international norms and standards.	
Main tasks:	<ul style="list-style-type: none"> <li>• Remain informed of recent interesting evolutions in the specific area of expertise;</li> <li>• Participate to scientific and technical forums in that specific area;</li> <li>• Present the necessary strategy and technical papers with and for the partner depending on the needs;</li> <li>• Carry out required prospecting to remain innovative and creative in achieving the expected change;</li> <li>• Participate to all meetings of the technical committee and exchange platform in one's area of expertise;</li> <li>• Provide structured and comprehensible feedback to all team members.</li> </ul>
<b>Results area 3: As Facilitator</b>	
Organise knowledge building and knowledge management in one's sector or thematic area of expertise	
in order to create an inclusive, informed climate of trust within the intervention.	
Main tasks:	<ul style="list-style-type: none"> <li>• Put in place a learning climate;</li> <li>• Establish a setting that is conducive to writing, reflection, self-criticism and self-assessment;</li> <li>• Help members of the interventions become familiar with literature research;</li> <li>• Help members of the interventions become familiar with writing scientific or vulgarised articles;</li> <li>• Develop platforms where virtual or live ideas are shared;</li> <li>• Introduce new technologies in the learning process;</li> <li>• Explore and develop digitisation with the Digit4Dev expert of the Belgian development agency;</li> <li>• Produce all kinds of information formats (blogs, videos, newspapers articles, scientific articles...).</li> </ul>
<b>Results area 4: As Facilitator</b>	
Capacity development of partner entities	
in order to contribute to the improvement of their organisation, processes and systems and of their staff's competences.	
Main tasks:	<ul style="list-style-type: none"> <li>• Assess the maturity of management of partner entities;</li> <li>• Advise partner entities on actions to be taken to improve their management as well as how to implement these actions;</li> <li>• Facilitate the change process;</li> <li>• In association with the partners, adapt the organisational structure, optimise the processes, improve the systems and strengthen staff competences.</li> </ul>

**Positioning:**

Whose subordinate are you? (Whom do you report to?)	Intervention Managers CBMIREME and RERD2
Who do you supervise?	Number of <b>direct co-workers</b> the jobholder supervises <b>hierarchically</b> : none Number of <b>indirect co-workers</b> the jobholder supervises <b>hierarchically</b> :2 -5 Functions: drivers, administrative staff

**Autonomy**

Entitled to decide independently on the following: (without explicit consent of the supervisor)	<ul style="list-style-type: none"> <li>• Organisation of one's own work</li> <li>• Proactive actions to manage daily problems and risks</li> </ul>
Authorisation from the management is required for the following:	<ul style="list-style-type: none"> <li>• Implementation of new instruments, procedures, processes</li> <li>• Actions pertaining to major problems or risks</li> <li>• Matters with a budgetary impact</li> <li>• Decisions that have a general impact on BTC/the interventions</li> <li>• Decisions that exceed the scope of the function</li> </ul>

**Diploma and/or level of education required for the job**

Relevant Master's diploma
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**Experience required for the job**

*Is a number of years of relevant professional experience required to perform the job? Is a certain general experience required, for instance, within a certain sector? It concerns the experience required to perform the job independently.*

<ul style="list-style-type: none"> <li>• 5 years experience in supporting change processes in public organizations</li> <li>• Professional experience in developing countries is an advantage;</li> <li>• Experience of governance, institutional strengthening, change management and capacity building principles, strategies and techniques</li> <li>• Excellent planning, management and organizational skills</li> <li>• Capacity to undertake activities in a participative, culturally sensitive and consultative manner, ensuring counter-parts actively participate and develop understanding and ownership</li> <li>• High level interpersonal and communication skills and a demonstrated ability to communicate and negotiate effectively with a diverse range of groups</li> <li>• Demonstrated capacity to work independently as well as contribute positively in a team environment</li> <li>• Sensitivity to gender and environment issues</li> <li>• Capacity to negotiate and manage conflict.</li> <li>• Strong coaching and mentoring skills</li> <li>• Excellent communication and report writing skills.</li> <li>• A high level of computer literacy, including Word, Excel, Internet, E-mail, Power Point</li> <li>• Excellent Portuguese and good level of English</li> </ul>
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**Technical skills required for the job**

*The technical or organisation-specific knowledge and skills required to perform the job successfully (for instance, languages, programming languages). Please indicate both the degree of specialisation (depth) and the diversity (width) of the required technical expertise.*

<ul style="list-style-type: none"> <li>• Familiar with Management for Results</li> <li>• Knowledgeable about change theories</li> <li>• Knowledgeable about system approaches</li> <li>• Knowledgeable about knowledge management and knowledge building</li> <li>• Technology-savvy</li> <li>• French, Dutch, English, Spanish, Portuguese – depending on the need; local languages where relevant</li> </ul>
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**Innovation**

Normal level of innovation.
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## 7.7.4 BTC International Administrative and Financial Responsible (RAFI)

### Job objective

The Financial and Administrative Officer is responsible for the financial and administrative management of the interventions

### RESULTS AREAS

<b>Results area 1: As Manager</b>	
Prepare the budget and financial reporting	
in order to ensure efficient use of funds and reliable financial reporting.	
Main tasks:	<ul style="list-style-type: none"> <li>• Monitor the budget of the programme in view of meeting the budgetary framework;</li> <li>• Report the budget situation to stakeholders to facilitate decision making;</li> <li>• Ensure the efficient use of the funds;</li> <li>• Elaborate proposals for budget adjustments and financial planning;</li> <li>• Carry out cost analyses;</li> <li>• Supervise and consolidate accounting;</li> <li>• Monitor the cash position and approve disbursements.</li> <li>• The TA will have the following responsibilities in the interventions:</li> <li>• Budget management and financial reporting</li> <li>• Monitor budget execution</li> <li>• Report budget situation to stakeholders to facilitate decision-making</li> <li>• Monitor efficient use of funds</li> <li>• Draft budget change proposals and financial planning</li> <li>• Make cost analyses</li> <li>• Supervise, consolidate and validate accounting</li> <li>• Monitor cash position and approve payments</li> <li>• Procurement, contracts and logistics</li> <li>• Draft tender plan</li> <li>• Coordinate procurement process</li> <li>• Ensure manage and control of grant contracts</li> <li>• Supervise management of equipment, vehicles and infrastructure</li> <li>• Manage fiduciary risks, internal control and audit</li> <li>• Identify and evaluate fiduciary risks</li> <li>• Set-up performant internal control system</li> <li>• Monitor evolution of risks as well as impact of risk measures</li> <li>• Develop action plans based on audit reports and implement them</li> <li>• Capacity building of partner institutions</li> <li>• Assess financial and administrative management of partner institutions</li> <li>• Advice partner institutions on improvement actions and on how to implement them</li> <li>• Facilitate change processes</li> <li>• Manage the financial and administrative team of the program</li> <li>• Set-up adequate organisation in terms of roles and responsibilities</li> <li>• Plan activities</li> <li>• Define together with staff their objectives</li> <li>• Motivate, coach and follow-up staff</li> <li>• Develop staff competences</li> </ul>
<b>Results area 2: As Officer</b>	
Ensure efficient procurement management, contract management and logistics – if no public procurement expert is present –	
in order to contribute to the smooth progress of the interventions, including the procurement procedures and contractual obligations.	
Main tasks:	<ul style="list-style-type: none"> <li>• Elaborate the public procurement plan</li> </ul>

	<ul style="list-style-type: none"> <li>• Supervise the procurement process;</li> <li>• Elaborate, manage and control Grant Agreements;</li> <li>• Supervise the management of equipment, vehicles and infrastructure.</li> </ul>
<b>Results area 3: As Manager</b>	
Manage fiduciary risks, the internal control and audit action plans	
in order to manage the risks and not to jeopardize the objectives.	
Main tasks:	<ul style="list-style-type: none"> <li>• Identify and evaluate fiduciary risks;</li> <li>• Put in place an appropriate internal control system;</li> <li>• Monitor the evolution of risks and the impact of risk mitigating measures;</li> <li>• Elaborate action plans following audits and monitor their implementation.</li> </ul>
<b>Results area 4: As Facilitator</b>	
Capacity development of partner entities	
in order to contribute to the improvement of their organisation, processes and systems and of their staff's competencies.	
Main tasks:	<ul style="list-style-type: none"> <li>• Assess the maturity of the financial and administrative management of partner entities;</li> <li>• Advise partner entities on actions to be taken to improve their management as well as how to implement these actions;</li> <li>• Facilitate the change process;</li> <li>• In association with the partners, adapt the organisational structure, optimise the processes, improve the systems and strengthen staff competences.</li> </ul>
<b>Results area 5: As People Manager</b>	
Lead the team of which one is the hierarchical supervisor	
in order to have qualified and motivated staff.	
Main tasks:	<ul style="list-style-type: none"> <li>• Put in place an appropriate organisation in terms of roles and responsibilities</li> <li>• Ensure that the roles and procedures which the head office has determined are respected;</li> <li>• Determine the objectives and priorities of the staff members;</li> <li>• Contribute to the recruitment of staff members;</li> <li>• Motivate, coach and follow up staff members;</li> <li>• Create an atmosphere of trust and accountability;</li> <li>• Develop the competencies of co-workers;</li> <li>• Promote a positive internal atmosphere and manage conflicts within the entity.</li> </ul>
<b>Results area 6: As Expert</b>	
Support the Representation and projects/programmes by providing them with one's technical expertise	
in view of optimising the operationalisation of the Representation, the projects/programmes and of minimising the prevailing risks in the area of expertise.	
Main tasks:	<ul style="list-style-type: none"> <li>• Participate actively to determining the operational strategy of BTC in the area of expertise (annual action plans);</li> <li>• Develop and disseminate the instruments and framework documents pertaining to the area of expertise and ensure compliance;</li> <li>• Advise officers about every administrative step that falls outside the framework;</li> <li>• Develop and use a network of contacts in the area of expertise with similar organisations (like BTC) that operate in the country of intervention;</li> <li>• Ensure an optimal flow of information in the area of expertise between the programmes, the Representation and the central services;</li> <li>• Represent BTC in all aspects of the area of expertise vis-à-vis external instances.</li> </ul>

## Positioning

<u>Whose subordinate are you?</u> (Whom do you report to?)	Resident Representative
<u>Who do you supervise?</u>	Number of <b>direct co-workers</b> the jobholder supervises <b>hierarchically</b> : 5 to 10 Functions: accountants, administrative staff, procurement staff Number of <b>indirect co-workers</b> the jobholder supervises <b>hierarchically</b> : 5-10 Functions: drivers, security guards, accounting assistant... => Total number of hierarchically subordinate workers: 5 to 15

## Autonomy

Entitled to decide independently on the following: ( <i>without explicit consent of the supervisor</i> )	<ul style="list-style-type: none"> <li>• Organisation of one's own work</li> <li>• Proactive actions to manage daily problems and risks</li> </ul>
Authorisation from the management is required for the following:	<ul style="list-style-type: none"> <li>• Implementation of new instruments, procedures, processes</li> <li>• Actions pertaining to major problems or risks</li> <li>• Matters with a budgetary impact</li> <li>• Decisions that have a general impact on BTC/the programmes/interventions</li> <li>• Decisions that exceed the scope of the function</li> </ul>

## Diploma and/or level of education required for the job

Master in management, applied economics or finances
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## Experience required for the job

<ul style="list-style-type: none"> <li>• At least 5 years of professional experience in financial management</li> <li>• Any experience in auditing, risk management, financial management in the public sector or in change management is an important asset</li> <li>• Experience with leading a team</li> <li>• International experience is an asset</li> </ul>
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## Technical skills required for the job

<ul style="list-style-type: none"> <li>• Good knowledge of the standard IT applications</li> <li>• English, Portuguese is an asset</li> <li>• Good knowledge of financial management</li> <li>• Experience in audit, risk management, public finance management, public procurement or change management are an important added value;</li> <li>• Experience in team management;</li> <li>• Experience in an international context is an added value;</li> <li>• Very good hands-on knowledge of IT tools;</li> <li>• Proficient in English. Working knowledge of French. Knowledge of or willing to learn Portuguese.</li> <li>• Strong written and analytical skills;</li> <li>• Good communicator and team player;</li> <li>• Excellent with figures;</li> <li>• Result- and solution- oriented;</li> <li>• Organisation skills;</li> <li>• Accurate;</li> <li>• Proactive;</li> <li>• Willingness to travel to Manica and Sofala Province and the target districts of RERD II</li> </ul>
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## Innovation

Normal level of innovation
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### 7.7.5 FUNAE Intervention Change Manager

FUNAE will assign an Intervention Change Manager to support the project management team and the intervention.

- Responsibilities of the Intervention Change Manager will include:

Determine, together with the BTC intervention manager, the overall direction of the change process within the FUNAE, in line with the strategic orientations given by the SC.

Determine and continuously refine, together with the BTC intervention manager, the strategy for implementing the change process that is realistic given the organization's history of change, the 'change levers' available and the likely resistance to be encountered.

Positively reinforce steps forward in the change process in FUNAE by using his/her own influence in the organization.

The intervention change manager will act as an authorizing officer for the Mozambican side for all matters executed in joint responsibility.

## 7.8 Strategy for maintenance of solar PV, next steps

#	Objectivos prioritários	Principais Resultados	Impactos gerados	Próximos Passos
1	Caracterizar o número de projectos existentes em Moçambique e respectiva localização	<ul style="list-style-type: none"> <li>Base de dados com o número de projectos existentes</li> </ul>	<ul style="list-style-type: none"> <li>Conhecimento detalhado sobre os projectos existentes para planeamento futuro</li> </ul>	<ul style="list-style-type: none"> <li>Continuar a recolher informação sobre os SPVs existentes e realizar actualizações</li> </ul>
2	Caracterizar as necessidades de realização de manutenções (p.e. recorrência, timings) e mapear com a capacidade do FUNAE	<ul style="list-style-type: none"> <li>Definidas a necessidades de manutenção e o aumento da capacidade de manutenção (p.e. pessoas)</li> </ul>	<ul style="list-style-type: none"> <li>Estruturação das necessidades de manutenção e definição do aumento de capacidade a realizar</li> </ul>	<ul style="list-style-type: none"> <li>Implementar no terreno as necessidades de manutenção (p.e. periodicidade) e aumentar a capacidade</li> </ul>
3	Aferir qual a necessidade de sobressalentes que é necessário ter em <i>stock</i> para que não existam quebras de funcionamento	<ul style="list-style-type: none"> <li>Identificada a necessidade de sobressalentes a ter em <i>stock</i></li> </ul>	<ul style="list-style-type: none"> <li>Estruturação das necessidades de <i>stocks</i> a ter em armazém</li> </ul>	<ul style="list-style-type: none"> <li>Iniciar a compra de materiais sobressalentes em falta</li> </ul>
4	Atribuir a responsabilidade de manutenção a instaladores que tenham dado provas de um bom histórico ou <i>players</i> de maior dimensão seja a nível nacional ou provincial	<ul style="list-style-type: none"> <li>Definidos os pressupostos que deverão servir de apoio à negociação do FUNAE com os prestadores de serviços</li> </ul>	<ul style="list-style-type: none"> <li>Formalização dos pressupostos necessários para os prestadores de serviços de manutenção</li> </ul>	<ul style="list-style-type: none"> <li>Incorporar os pressupostos definidos na próxima negociação com os prestadores de serviços e rever as actuais</li> </ul>
5	Criar procedimentos de registos de ocorrências	<ul style="list-style-type: none"> <li>Base de dados de registo de ocorrências</li> </ul>	<ul style="list-style-type: none"> <li>Registo e estruturação das ocorrências verificadas para análise de necessidades</li> </ul>	<ul style="list-style-type: none"> <li>Actualizar a base de dados</li> </ul>
6	Aumentar os anos de garantia dos instaladores	<ul style="list-style-type: none"> <li>Definidos os pressupostos para a estipulação do número de anos de garantia dos instaladores face à manutenção do</li> </ul>	<ul style="list-style-type: none"> <li>Formalização dos pressupostos necessários para os prestadores de serviços de manutenção</li> </ul>	<ul style="list-style-type: none"> <li>Incorporar os pressupostos definidos na próxima negociação da garantia com os prestadores de serviços</li> </ul>
7	Fiscalizar a actividade dos prestadores de serviço	<ul style="list-style-type: none"> <li>Modelo de fiscalização dos prestadores de serviço (recorrência, qualidade, custo-benefício, etc)</li> </ul>	<ul style="list-style-type: none"> <li>Formalização do processo de fiscalização</li> </ul>	<ul style="list-style-type: none"> <li>Aplicar o processo de fiscalização aos actuais e futuros prestadores de serviço</li> </ul>

8	Criar um sistema de certificação de instaladores e um processo de revalidação dessas certificações	<ul style="list-style-type: none"> <li>Sistema de certificação e revalidação das certificações</li> </ul>	<ul style="list-style-type: none"> <li>Formalização e aumento da qualidade e maior exigência face aos prestadores de serviço</li> </ul>	<ul style="list-style-type: none"> <li>Aplicar o processo de certificação aos actuais e futuros prestadores de serviço</li> </ul>
9	Criar base de dados de anomalias e definir a logística de actuação no caso de anomalias	<ul style="list-style-type: none"> <li>Base de dados de registo de anomalias</li> </ul>	<ul style="list-style-type: none"> <li>Registo e estruturação das anomalias verificadas</li> </ul>	<ul style="list-style-type: none"> <li>Actualizar a base de dados</li> </ul>
10	Definir a Logística de armazenamento do material de substituição o mais próximo dos locais	<ul style="list-style-type: none"> <li>Modelo de armazenamento do material de substituição em locais próximos dos SPVs</li> </ul>	<ul style="list-style-type: none"> <li>Identificados os locais, processo e dimensão para os armazéns</li> </ul>	<ul style="list-style-type: none"> <li>Iniciar o contacto com proprietários</li> </ul>
11	Levantar/identificar os utilizadores (quem paga, tipos de utilização, quem é responsável)	<ul style="list-style-type: none"> <li>Identificados os Utilizadores/ beneficiários</li> </ul>	<ul style="list-style-type: none"> <li>Estruturação dos responsáveis pelos SPVs e respectivos contactos</li> </ul>	<ul style="list-style-type: none"> <li>Continuar o levantamento</li> </ul>
12	Definir as competências necessárias para as diferentes funções da área de manutenção	<ul style="list-style-type: none"> <li>Modelo de funções e competências da manutenção</li> </ul>	<ul style="list-style-type: none"> <li>Aumento da assertividade e dos requisitos dos colaboradores afectos à manutenção</li> </ul>	<ul style="list-style-type: none"> <li>Ajustar o modelo actual</li> </ul>
13	Formar técnicos sobre técnicas de gestão e manutenção	<ul style="list-style-type: none"> <li>Interlocutores do FUNAE formados</li> </ul>	<ul style="list-style-type: none"> <li>Conhecimento interno dos outputs gerados e dos próximos passos a efectuar na implementação</li> </ul>	<ul style="list-style-type: none"> <li>n.a.</li> </ul>
14	Implementar procedimentos de manutenção preventiva e periódica a rastrear. Criar um procedimento de rastreio periódico de avarias e implementar medidas correctivas	<ul style="list-style-type: none"> <li>Procedimentos de manutenção preventiva e correctiva definidos/formalizados</li> </ul>	<ul style="list-style-type: none"> <li>Normalização das actividades de manutenção a nível do FUNAE e aumento da facilidade de monitorização</li> </ul>	<ul style="list-style-type: none"> <li>Assegurar o cumprimento dos procedimentos</li> </ul>

15	Implementar um sistema de georreferenciação e monitorização dos equipamentos	<ul style="list-style-type: none"> <li>Modelo de monitorização (<i>template, reporting, responsáveis</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Aumento da capacidade de monitorização da implementação da georreferenciação</li> </ul>	<ul style="list-style-type: none"> <li>Incorporar o modelo de monitorização nas actividades diárias do FUNAE</li> </ul>
16	Criar <i>stocks</i> de segurança de equipamentos e consumíveis	<ul style="list-style-type: none"> <li>Calculados os <i>stocks</i> de segurança necessários</li> </ul>	<ul style="list-style-type: none"> <li>Identificados os equipamentos e consumíveis a adquirir</li> </ul>	<ul style="list-style-type: none"> <li>Adquirir os equipamentos e consumíveis a consumir</li> </ul>
17	Criar um mapa de planeamento e registo de manutenções	<ul style="list-style-type: none"> <li>Template e base de dados criada</li> </ul>	<ul style="list-style-type: none"> <li>Aumento da capacidade de monitorização das manutenções</li> </ul>	<ul style="list-style-type: none"> <li>Actualizar a base de dados</li> </ul>
18	Planear o material a levar em cada uma das visitas	<ul style="list-style-type: none"> <li>Formalizado o material a levar em cada uma das visitas</li> </ul>	<ul style="list-style-type: none"> <li>Normalização interna das actividades</li> </ul>	<ul style="list-style-type: none"> <li>Assegurar o cumprimento</li> </ul>
19	Criar uma <i>checklist</i> das várias tarefas a realizar na visita aos sistemas	<ul style="list-style-type: none"> <li>Checklist criada</li> </ul>	<ul style="list-style-type: none"> <li>Normalização interna das actividades</li> </ul>	<ul style="list-style-type: none"> <li>Assegurar o cumprimento</li> </ul>
20	Fazer o report das acções realizadas	<ul style="list-style-type: none"> <li>Realizado o PMO da implementação</li> </ul>	<ul style="list-style-type: none"> <li>Aumento da monitorização da implementação</li> </ul>	<ul style="list-style-type: none"> <li>Continuar o PMO na implementação da estratégia</li> </ul>
21	Criar procedimentos de boas práticas para utilizadores	<ul style="list-style-type: none"> <li>Criada brochura de boas práticas</li> </ul>	<ul style="list-style-type: none"> <li>Melhoria da utilização dos SPVs por parte dos utilizadores</li> </ul>	<ul style="list-style-type: none"> <li>Assegurar a distribuição do folheto</li> </ul>
22	Fazer o registo de falhas/fenómenos ocorridos	<ul style="list-style-type: none"> <li>Base de dados criada</li> </ul>	<ul style="list-style-type: none"> <li>Registo e estruturação das falhas/fenómenos ocorridos</li> </ul>	<ul style="list-style-type: none"> <li>Actualizar a base de dados</li> </ul>
23	Periodicamente fazer o <i>check-up</i> ao sistema de acordo com uma <i>checklist</i> previamente definida	<ul style="list-style-type: none"> <li>Check list de Check-up ao sistema criada</li> </ul>	<ul style="list-style-type: none"> <li>Normalização interna das actividades</li> </ul>	<ul style="list-style-type: none"> <li>Assegurar o cumprimento</li> </ul>

## 7.9 Key studies

Solar Photovoltaic systems for social infrastructure and village electrification in Mozambique: Study of existing systems in two provinces, November 2010, GIZ/Endev

Building Energy Access Markets, Case study 1, FUNAE solar PV community mini-grids, Mozambique, 2015, GIZ/ENDEV

Private sector PV market development – the role for FUNAE, 2015, BTC

Feasibility study for hybrid systems in Mozambique, FIT, 2016, 3E

Apresentação do Relatório de Desenho Estratégico, Projecto de assistência técnica para apoio à reestruturação organizacional do FUNAE, October 2016, DFID

Estratégia da manutenção dos sistemas fotovoltaicos, 2014-2020, FUNAE,

Implementação da Estratégia da manutenção dos sistemas fotovoltaicos, Leadership Business Consulting, FUNAE

Investment Incentives for Renewable Energy in Southern Africa, The case of Mozambique, 2013, Trade Knowledge Network, IISD

Low Carbon mini-grids, identifying the gaps and building the evidence-base on low-carbon mini-grids, November 2013, IED

Rural Electrification Strategy Plan for Mozambique. Final Report. Norplan and KanEnergi. November 2000.