



# TANZANIA RURAL ENERGY MASTER PLAN DEVELOPMENT

## KEY ASSUMPTIONS AND AGREED TARGETS

---

Updated 16 November 2017



Multiconsult



## REPORT

PROJECT	<b>TANZANIA RURAL ENERGY MASTER PLAN</b>	DOCUMENT CODE	129841-IR-REMP Assumptions-targets
SUBJECT	Key Assumptions and Agreed Targets	ACCESSIBILITY	Open
CLIENT	<b>REA – Rural Energy Agency</b>	PROJECT MANAGER	Mari Sofie Furu
CONTACT	<b>Mr. Emanuel Yesaya</b>	PREPARED BY	Consultant team
DATE	05 JULY 2017. REVISED 16 NOVEMBER 2017	RESPONSIBLE UNIT	1088 Multiconsult AS

## TABLE OF CONTENTS

ABBREVIATIONS .....	2
1 Introduction.....	3
2 Summary of key assumptions .....	3
2.1 Scenario development .....	3
3 Access targets .....	4
3.1 Electricity.....	4
3.2 Cooking Energy .....	5
4 Definitions .....	6
5 Summary .....	7

### ABBREVIATIONS

GDP	
REMP	Rural Energy Master Plan
PSMP	Power System Master Plan
MV	Medium Voltage
GoT	Government of Tanzania
KPI	Key Performance Indicators
DP	Development Partner(s)
REF	Rural Energy Fund
REA	Rural Energy Agency

## 1 INTRODUCTION

The Inception Report for the Rural Energy Master Plan presented key assumptions and principles for the development of the Rural Energy Master Plan. This included

- ◆ Assumptions for scenario development
- ◆ Targets for electricity access and connectivity
- ◆ Definitions and terminology

The objective of this document is to summarize the most central assumptions, targets and definitions that have been agreed between the Consultant and the Client and its Reference Group as the basis for the final Rural Energy Master Plan. Further details are provided in the Inception Report.

While some adjustments, in particular with regard to the specific targets, may be agreed between the Consultant and the Client toward the completion of the Rural Energy Master Plan if deemed appropriate or necessary, the consent by the Client to these assumptions and guiding targets is an important premise for the further work.

We propose the document be shared with the Ministry of Energy and Minerals and the Reference Group for the Rural Energy Master Plan for later reference.

## 2 SUMMARY OF KEY ASSUMPTIONS

### 2.1 SCENARIO DEVELOPMENT

The team considered two different categories of drivers to develop scenarios. Based on this exercise, an **ambitious yet realistic base-case scenario for the likely development paths was drawn out. This scenario creates the basis for setting the targets for the planning period, as well as for the assessment of the plan's policy, institutional, and financing implications:**

- ◆ **External factors**, macro-economic or other national level development outside the control of sector policy makers.
- ◆ **Strategic priorities and responses** that sector policy makers make in setting targets, establishing strategies and implementing their mandates.

The development paths of these drivers, and the implications for the base case scenario, are shown in Table 1.

*Table 1 Drivers and Assumptions for REMP Base-Case Scenario*

External factors	Historic and Current trend	Assumptions of base case scenario
1. Population growth & urbanization	<b>2006-15: average population and urban growth rates stable at about 3.1% and 5.6%; 2016-25 IMF projections: 2.98% and 4.98%, respectively.</b>	<ul style="list-style-type: none"> <li>❖ Macro economic indicators largely according to trend.</li> <li>❖ Sector policy and overall financial viability steadily but slowly improving</li> <li>❖ Continued high-level support to the sector with steady increase in human resources and implementation capacity</li> <li>❖ PSMP implemented according to plan</li> </ul>
2. Economic growth, industrialization and investment climate	2006-16: average real GDP growth rate 6.5%; 2017-22 projections: 6.7%. Industry value added grows at an average rate of 8.3%, 2006-16. Ranking in Doing Business 2017 is 132 of 190.	
3. Technology costs and options	Lighting Africa has helped standardize the market, while technology and business model innovations have reduced costs. The market is	

	currently taking off for off-grid lighting, but also mini-grid options.	❖ Effective donor coordination and increasing pace of investment going forward ❖ While off-grid technologies and costs improve, this met by consistent policy prioritization in favor of grid electrification.
4. Effective PSMP implementation	Implementation of planned projects and investments since 2012 have been heavily delayed and TANESCO's financial position is very weak, with external support dependent upon implementation of reform efforts.	

Strategic responses and priorities		Assumptions of base case scenario
5. Access definitions and ambitions	<b>Primary focus on «access», but also consideration of «connectivity». Cooking efforts related to modern techs and fuels only and not efficient stoves.</b>	❖ Balanced expansion and REMP rooted in optimization, least-cost and value-for-money principles. ❖ KPIs based on “Multi-tier access framework”, not only access to grid. ❖ Logical and reasonable balance of technologies and on- and off-grid, and attention given to cooking energy, reflecting opportunities and constraints related to ability-to-pay, financing and human resources.
6. Policy support and priorities	This driver largely plays out in other drivers, but emphasizes a general domestic and international push to both expand access and improve the financial performance of TANESCO, as well as an effective cooperation between GoT and DPs.	
7. Institutional capacity	The capacity of institutions are clearly stretched, especially in implementing DP programs. Going forward, efforts to expand capacities and improve effectiveness of institutional arrangements will be key.	
8. Availability and sources of funding	The sector is prioritized by GoT, as are funding of REF, although actual funding is consistently less than budgeted. Substantial DP interest, although challenges in terms of turning this into projects in timely manner.	

### 3 ACCESS TARGETS

The targets which will guide the development of the Rural Energy Master Plan reflect the base-case scenario in that they are *ambitious, yet realistic with a high level of effort from involved stakeholders at different levels*. The plan for achieving these targets including the implications in terms of financial resources, policy-level and institutional efforts, and other measures, will be developed in the next phases of development of the Plan.

While the targets may be adjusted toward the completion of the Rural Energy Master Plan if deemed appropriate or necessary and agreed between the Consultant and the Client, the consent by the Client of the guiding targets is an important premise for the further work.

#### 3.1 ELECTRICITY

The following 2030 targets were agreed upon in the Inception Phase and will guide the development of the Plan:

- ◆ **Connectivity** (for definition see Table 3)      **75%**
- ◆ **Access** (for definition see Table 3)      **≈100%**

Details including assumed relative importance of different strategies for connectivity are show in Table 2.

Table 2 Connectivity and Access rates

High-level Targets: REMP Base-case	Baseline 2016	Target 2022	Target 2030
<b>1. Connectivity – Baseline and Targets</b>	<b>16.3%</b>	<b>40%</b>	<b>75%</b>
<i>Of which (definitions see Table 3):</i>	5.0%	= 15%	= 50%
<i>National grid</i>	+ 0.2%	+ 5%	+ 10%
<i>Mini-grid</i>	+ 10.5%	+ 20%	+ 15%
<i>Stand-alone solutions giving at least Tier 2 access</i>			
<b>2. Access – Baseline and Target</b>	<b>54.55%</b>	<b>70%</b>	<b>100%</b>

### 3.2 COOKING ENERGY

The inception phase concluded that further analysis in Phase 2 was necessary to establish the level of quantitative, ambitious and realistic REMP targets for use of improved cookstoves, modern fuels, and reductions in biomass consumption.

With the insight gained through the analyses presented in this Memorandum, and based on discussions and feedback from the Client, the targets presented in Table 25 will be used to guide the further development of the Rural Energy Master Plan's Cooking Energy Action Plan.

The targets are ambitious and will represent significant efforts. That is, more ambitious than the Moderate Scenario. Challenges related to a range of factors including but not limited to awareness building and education, private sector development, ICS production capacity, regulatory factors related to standardization and control of forest activities, coordination of stakeholders, continued electrification progress, and financial mobilization should be expected. Achieving the targets will require a significant scaling up of efforts to overcome these challenges, and faster market reactions to efforts.

PARAMETER	REMP TARGET
<b>Biomass fuels</b>	Reduce the amount of people who use firewood or charcoal as primary cooking energy to half of the population
<b>Improved cookstoves (ICS)</b>	Increase the use of ICS to 40% of the population using biomass fuels for cooking
<b>Liquid Petroleum Gas (LPG)</b>	Ensure availability of LPG in all towns and district centre and increase use of LPG for cooking to a fourth of the population
<b>→ % of population with improved cooking</b>	Ensure that at least two-thirds of the population use a form of improved cooking solution
<b>→ Wood fuel demand</b>	Overall reduction compared to 2016 consumption

## 4 DEFINITIONS

The terminology employed by the consultant in the development of the Rural Energy Master Plan have been presented to the client and the key definitions relevant for the above confirmations are repeated in Table 3 Key definitions for REMP terminology.

Table 3 Key definitions for REMP terminology

Term	Definition
<i>Connectivity</i>	Population being <b>directly served by</b> , either national grid-based electricity services, isolated or mini-grids, or stand-alone systems that provide at least Tier 2 access ( <i>general lighting + phone +TV + Fan</i> ).
<i>Access</i>	<p>Population living in/around localities served by electricity and thus reaping benefits from these services with an opportunity to gain connectivity. Also been referred to as “proximate access”.</p> <p>Ratio given by “Access to electricity services = [Total Number of Benefiting Population/Total Population]</p>
<i>National Grid</i>	All publicly (TANESCO) operated main- and isolated-grids. <b>Provides “Connectivity”</b> .
<i>Mini-grid</i>	<p>A mini grid consists of one or several power production units (for example hybrid PV + diesel or wind + diesel) of a capacity going from some kW to a few MWs. Power is distributed via MV lines to a larger area than the micro grid. (example: several villages, with MV transmission lines and LV distribution lines). Could be connected to the national grid from establishment or at a later point of time, or stay isolated. <b>Provides “Connectivity”</b>.</p> <p>Generally, mini-grids are private – meaning mini-grids owned and operated by any legal entity other than TANESCO. <b>Provides “Connectivity”</b>.</p>
<i>Stand-alone solutions</i>	<p>Technologies, products, etc. that provide a minimum electricity service level (Tier 2) to specific households, businesses or institutions without connection to any centralized network. Typically, &gt;20 Wp installed. Both produce (generally from solar power) and supplies electricity in one location and serves one beneficiary – e.g. households. Solar Home Systems (SHS) can be included to this category. <b>Provides “Connectivity”</b>.</p> <p>Pico-PV products do not provide our definition of Connectivity and are not included.</p>
<i>Tier 2 Access s</i>	Direct electricity service that can provide at least the following services: General lighting AND Charging (phones, mobile, other appliances) AND Television AND Fan.

## 5 SUMMARY

The above summarizes the basis for the further development of the Rural Energy Master Plan:

- ◆ The assumptions for the base-case scenario
- ◆ Agreed key targets that will guide the development of the Rural Energy Master Plan are:
  - Access and Connectivity
  - **Connectivity** (for definition see Table 3)      **75%**
  - **Access** (for definition see Table 3)      **≈100%**
  - Cooking Energy
  - **% of population with improved cooking:** Ensure that at least two-thirds of the population use a form of improved cooking solution
  - **Wood fuel demand:** Overall reduction compared to 2016 consumption
- ◆ The central definitions that will be used in the Rural Energy Master Plan.

This basis has been presented to REA and main stakeholders in the Inception meetings and through the Inception report, as well as in October 2017 (for cooking energy) who have been invited to comment. The comments received during the meetings have been taken into consideration. Written comments have not been received and the Consultant concludes that it represents a correct basis for the Rural Energy Master Plan development.