### Chapter 13

### **GIS Database Development**

### Chapter 13. GIS Database Development

### 13.1. Introduction of GIS

One of the important tasks of this Rural Electrification Master Plan Study is to develop a GIS (Geographical Information System) database to serve as a useful tool for planning rural electrification projects. The GIS system is a digital mapping system that can handle not only numerical data, such as population of the village and the number of commercial and public facilities, but also graphic information on the map. There are some different types of computer software for GIS systems in the world, but since many ministries in GRZ have an experience more or less of using ArcGIS, which is developed by ESRI in USA and the most popular software, the Study Team selected the latest version of ArcView 9.1, the primary package of ArcGIS as the standard GIS system for this Study.

### 13.2. The GIS Database

### 13.2.1.Experience of Using GIS System

As of November 2006, DoE has neither GIS software nor a computer in which GIS software is installed, which means that DoE virtually has no professional skills to use GIS.

ZESCO uses GIS system for its business but only modestly and there appears to be no standardization. We found that one/some ZESCO's branch office(s) is/are using GIS system to manage the power system data such as transmission and distribution line routes, but the file format is different from that of ArcGIS and hence it would be difficult to incorporate the database as it is into the Rural Electrification GIS database that is created in Arc format.

REA, in the meanwhile, has GIS system, the latest version of ArcView 9.1, which is installed in their computer. In the beginning of this Study, REA's usage of GIS system is still limited to collecting GIS database from other Governmental organizations and ZESCO, and they have no experience of developing GIS database of its own for planning rural electrification projects. However, REA recruited a GIS expert, who has enough experience of GIS usage in a water service company, and they have started to utilize GIS in the actual planning of rural electrification including data collection of the site using GPS device.

In short, the counterpart organizations that will be responsible for updating the Rural Electrification GIS database needs training of basic operations of GIS during the project period before going into the details of the database excluding one GIS expert.

#### 13.2.2. Existing GIS Data

The Study Team obtained various GIS database from REA during the first mission in April/May 2006, which was originally owned by other related organizations such as Ministries. This database includes basic and necessary geographic information for this project, such as administrative boundaries, roads, and location of public facilities. These data shall be fully or partially incorporated into the Rural Electrification GIS Database.

REA is classifying the database into the "source" organization, which makes us find easily where each database comes from. However, the information regarding the time of data collection, the database updating, and the original map data that each GIS database referred to are not necessarily available. Therefore, we assume that the accuracy of these databases varies. For instance, by combining the topographical database with the village database on a same map, we find that some villages are positioned in a lake, and this kind of strange incidents, i.e. data input errors, occurs occasionally.

During the second field survey in Zambia, JICA study team obtained the Zambia Health Facility

Census Database compiled in October 2006, based on the field study by JICA between 2004 and 2006, on behalf of the Ministry of Health. The database compiled the information of health facilities in whole Zambia based on the same GIS maps that we obtained during the first field survey. The following table shows the GIS database that the Study Team has obtained so far.

Ministry	Item					
Agriculture and Cooperatives	Agro region, Farmers block, Resettlement area					
Commerce, Trade and Industry	N.A.					
Community development and Social Services	N.A.					
Education	Basic school (electrified / unelectrified / no water service), Secondary school, Village centre, Roads (Main / Others)、Railway, National parks, River (Major / Others), Wetland, Dam, Drainage, Administrative boundaries (Nation / Province / district)					
Energy and Water development	Energy Power systems (330kV - 11kV, existing and plan), Hydropower stations (existing and plan), Diesel Power stations (existing and plan), Substations (existing and plan)					
	Water affair Kafue River (river basin, sub basin, stream flow), Kafue Lake, Kafue Wetland, Zambezi River (agro climate, grow day, evaporation, annual rainfall, runoff, temperature in July and November, rapid point), Zambezi Lake, Zambezi Wetland, Luapula River, Environmental impact assessment in 1995, 2005 and 2015, Environmentally sensitive area, Priority management area, Wetland birds					
Health	N.A.					
Home Affairs	N.A.					
Land	N.A.					
Local Government and Housing	N.A.					
Mines and Minerals Development	Mines, Minerals					
Tourism, Environment and Natural Resources	Forest, Grassland, Termitary, Administrative boundary, Rivers, Roads, Railways					
Works and Supply	N.A.					
Central Statistics Office	Administrative boundary (Nation, Province, District), Constituency, Roads (Trunk, Major, Others)					

 Table 13-1
 GIS Database Obtained during the First Mission

Source: JICA study team

Ministry	Item
Health	Health Facility Census

Table 13-2	<b>GIS</b> Database	<b>Obtained during</b>	the Second Mission

Source: JICA study team

By scrutinizing each database, we find that some roads and administrative boundaries are recorded in different route and shapes that really have to be identical, and it's difficult to judge which data is the most probable without the information regarding the accuracy of each map. However, these errors are in general minor and acceptable in terms the purpose of this Study to develop a "nation-wide" Master Plan. The most appropriate data shall be selected case by case for the Rural Electrification GIS database.

In general, extension of distribution networks is made along the route of existing roads, thus lack or inaccuracy of road information strongly affects the accuracy of project plans. On top of that, geographic information of GIS system is less reliable than the paper-based maps. Hence the Study Team has improved the quality of GIS road data by comparing the GIS data with the paper-based 1/250,000 maps, which were issued by the Ministry of Lands. A drawback of paper-based maps is that they were originally published in 1986, more than twenty years ago, and they may lack a lot of information on new or reconstructed roads.

Accuracy of the length of distribution lines, which is essential for estimating the construction cost and for optimising the distribution system planning, also depends on the contour data that give the information of each site's elevation, but none of obtained GIS maps provide the information as such. Because it is physically difficult to obtain / make this information and Zambia is a relatively gently rolling land, the length of distribution lines are calculated assuming the plane land.

### 13.2.3.Coordinates System of GIS database

There are a lot of coordinates systems that ArcView can deal with, but the obtained GIS databases do not have the explicit coordinates system. In this case, the ArcView automatically defines the coordinates system as "GCS\_Assumed\_Geographi", which may cause errors in positioning. Appropriate definition of coordinates is necessary for accurate positioning.

The Study Team combined the GCS\_Assumed\_Geographic based map and the UTM (Universal Transverse Mercator) based map. These maps are almost consistent with each other. The UTM projection is adopted as the standard in this Study.

The UTM is mainly used for the large scaled map (1/10,000 - 1/200,000) as an international standard. UTM divides longitude into the projection of Zone 1–Zone 60 (longitude of a Zone equals 6 degree = 360 km), and divides latitude into North and South Zone, which makes 120 Zones in total.

The error of one Zone is within 6/10,000 in the UTM projection. Theoretically, the UTM projection displays the map of one Zone seamlessly and it does not display the different Zones simultaneously within the abovementioned margin of error.



Source: JICA study team

Figure 13-1 Southern African UTM Zones

As shown in Figure 13-1, Zambia belongs to the UTM Zones from 34S to 36S, and over half the area of Zambia is positioned in Zone 35S. The Zone 35S is basically used in this study. The ArcView can shift the coordinates to another system without difficulty. To obtain more accurate distance in western Zambia near Angola, and eastern Zambia, near Malawi, UTM 34S or 36S should be used, of course.

### 13.2.4. Newly Acquired GIS Data

The purpose of this Study to collect existing GIS databases and to develop a new database specialized for planning rural electrification by adding necessary information that has not been recorded as GIS format or even never collected systematically. The following is data are collected through the Provincial Workshops in November 2006 and are incorporated into the database:

- Existing medium-voltage distribution network (33kV 11kV)
- > Candidate Rural Growth Centres (RGCs) for electrification

The existing distribution network, especially medium voltage level, and RGCs data are crucial for developing the Master plan. The power system data in the existing GIS database needs to be improved because of the inaccuracy and incompleteness of some power system information. The Study Team distributed the paper-based 1/250,000 maps to branch office staffs of ZESCO and asked them to trace the power system on it by hand drawing, which was compiled into electronic GIS data. Figure 13-2 shows the updated map of the existing distribution systems.

Information regarding RGCs is also added to the database, including their position, demographic data, and priority order for electrification. The position of RGC is shown in Figure 13-3.



Figure 13-2 Distribution Network in Zambia



Figure 13-3 Rural Growth Centres Listed in Electrification Candidate

In the last result, this Study developed GIS database including the demand forecast of RGCs, electrification mode and year, and distribution expansion plan etc. as shown in Figure 13-4.



Figure 13-4 Example of Final GIS Database

### 13.2.5.GIS Training

The GIS training was held on 9<sup>th</sup> and 12<sup>th</sup> November 2007 at REA with support from GIS expert of REA. The staffs of DOE, REA and ZESCO took this 2-day training course for GIS. This training covered the basic operation of ArcView and how-to utilize GPS device into this Study to improve efficiency of data collection. The tutorial manual was distributed to participants; about 15 people touched the software and became familiar with it. They realized importance of GIS for this kind of project because they need to draw the actual plan on Zambian map. It can manage the map and database with ease. However, the problem is that they don't have enough license of ArcView. It is better to have at least one license by one organization to share and update the data each other.



Figure 13-5 GIS Training

### Chapter 14

### **Rural Electrification Master Plan by 2030**

### Chapter 14. Rural Electrification Master Plan by 2030

#### 14.1. Purpose of Development of Master Plan and Development Flow

To execute rural electrification projects in Zambia, a systematic implementation plan that indicates electrification targets, electrification order, electrification method, time schedule, and required budget is necessary. Therefore, a systematic implementation plan was developed as the Rural Electrification Master Plan (REMP) targeting 2030 along the following principles:

- > Develop logical, objective, numerical/quantitative, and convincing Master Plan
- Adopt decentralized planning process
- > Provide realistic financial plan to be implemented



#### Figure 14-1 Flowchart of Rural Electrification Master Plan Development

The development flow of the REMP is shown in Figure 14-1. As was explained in Chapter 4, a Rural Growth Center (RGC) was selected as the electrification target in the REMP. Based on the information submitted from District Planners in the Workshop held in all the 9 Provincial Centers, 1,217 RGCs were selected as electrification candidates. This is called "Decentralized Planning Process." Then, the potential daily peak demands for the 1,217 unelectrified RGCs were forecasted by using the demographic data of these 1,217 RGCs and analysing the data collected from 19 electrified RGCs in the Socio-Economic Survey. Using the size of the potential peak demand, 1,217

RGCs were given an initial ranking (refer to Table 5-11 in Chapter 5). This process is the application of "Demand Criteria."

Next, the unelectrified RGCs located on a route of a transmission/distribution line extension were grouped to form a Project Package. Each Project Package was then broken down to several Components by shorten the length of the transmission/distribution line extension and introducing stand-alone electrification mode (such as mini-hydro, Solar Home System, or diesel generator) to supply the RGCs where the transmission/distribution line would not reach. For all Components, the Unit Life Time Cost (US\$/kWh) of each electrification mode was estimated, and electrification mode having the least Unit Life Time Cost was selected as the optimal Case for each Project Package. This process is the application of "Supply Criteria", which was used to select the optimal electrification method for each of the 1,217 RGCs.

For all Project Packages with the optimal Case, Financial Indicators such as Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were calculated, and the final electrification priority of Project Packages was determined by the value of Indicators. Finally, Project Packages were grouped into Annual Project Phases from 2008 to 2030 by the uniform total project cost per year. The process is referred to as "Technical Aspect Analysis."

In addition to the "Technical Aspect Analysis", a "Social Aspect Analysis" (such as for ability to pay, willingness to pay, and prioritized property for electrification) was carried out by using the data collected during the Socio-Economic Survey (refer to Chapter 4).

In this Chapter, applied methods and findings after the process of "Creation of Project packages" in the "Technical Aspect Analysis" are explained. Policy recommendation, elaborated with Stakeholders by taking into account the "Social Aspect Analysis" results, is also introduced in Chapter 15 as a part of conclusion of this Master Plan Study.

#### 14.2. Creation of Project Packages and Subdivided into Project Components

As it was explained in Chapter 5, 1,217 RGCs were initially ranked by the size of potential demand (application of Demand Criteria). Based on this initial ranking, Project Packages or cluster of RGCs electrified by a transmission/distribution line extension were created (refer to Figure 14-2). Process of making Project Package starts from the highest ranked RGC. Along the route to the highest prioritized RGC, some unelectrified RGCs may exist. These RGCs were clustered or grouped into a Project Package as candidates to be electrified by a transmission/distribution line extension project.



Figure 14-2 Concept of Project Package

Then, each Project Package was subdivided into several Components by shortening the length of transmission/distribution line extension. The process of a Project Package subdivided into Components is shown in Figure 14-3. For example, all the RGCs are connected to transmission/distribution line in Case 1. Then, instead of extending the line to RGC #1, it is electrified by a stand-alone electrification mode (such as Solar Home System, Mini-Hydro, or Diesel Generator) as shown in Case 2. In Case 3, RGC #2 is also isolated and electrified by the stand-alone mode. In Case 4, RGC #3 is additionally isolated. Finally, only RGC #5 is electrified by the line connection, and all other RGCs are electrified by the stand-alone mode as shown in Case 5.



Figure 14-3 Process of a Project Package Broken Down to Cases

This process resulted in grouping the 1,217 unelectrified RGCs into 180 Project Packages subdivided into 835 project Components. In the next step of "Selection of Optimal Electrification Mode for Each RGC", the optimal Case for each Project Package is determined.

### 14.3. Selection of Optimal Electrification Method for Each RGC

#### 14.3.1. Definition of Unit Life Time Cost

To select the optimal electrification mode for each RGC and define the optimal Case for each Project Package, some criteria were necessary. In general, Financial Indicators (such as FIRR and EIRR) are the most suitable selection criteria. These criteria, however, were not applicable here, since the Financial Indicators for an electrification mode of the Solar Home System (SHS) would always have negative values. This situation would occur under the assumption that SHS equipment would be sold outright to customers and they would operate and maintain (O&M) the equipments. In this situation, there would be no future income from the operation of SHS. Thus, in the calculation of the Financial Indicators, only expenditure for initial cost (equipment cost) and O&M expenses would be appear.

As an alternative criterion of the Financial Indicators, "Unit Life Time Cost in Net Present Value (US\$/kWh)" was adopted in this study. The method of calculating the Unit Life Time Cost in Net Present Value is shown in Equation 14-1.

Unit Life Time Cost in Net Present Value (US\$/kWh)

=F<sub>NPV</sub>{[Construction/Initial Cost (US\$)+Total O&M Cost for Life Time (US\$)]}

÷ Total Amount of Electricity Consumable during the Life Time (kWh) (Equation 14-1)

 $F_{NPV}{X}$ : Function of converting value of X into the Net Present Value (US\$)

First, the net present value ("Total Life Time Cost") was calculated from the necessary construction/initial cost and O&M cost for life time of each electrification mode (US\$). Next, the total amount of electricity consumable during the life time of each electrification mode (kWh) was worked out ("Life Time Consumable Electricity"). Then, the Unit Life Time Cost in Net Present Value of each electrification mode was estimated by dividing the Total Life Time Cost by the Life Time Consumable Electricity. Finally, electrification mode having the least Unit Life Time Cost in Net Present Value was selected as the optimal electrification mode for each RGC and the optimal Case for each Project Package. The assumed Life Time for each electrification mode is summarized in Table 14-1.

 Table 14-1
 Assumed Life Time for Each Electrification Mode

Electrification Mode	Life Time
1) Transmission/Distribution Line	30 years
2) Solar Home System	15 years for SHS Panel 5 years for Battery
3) Mini-Hydro	40 years
4) Diesel Generator	20 years

14.3.2. Results of Selecting Optimal Electrification Method

The Unit Life Time Cost in Net Present Value of each electrification mode was calculated for all 835 Project Components made up from 180 Project Packages. The component with the least value was selected as the optimal electrification mode for a Project Package. The number of Project Packages for each combination of electrification mode was summarized in Table 14-2. The majority is either the combination of distribution extension and SHS or that of transmission and distribution extension (56 and 55 Project Packages respectively). It is also found that only three of the mini-hydro power plants, among 29 possible candidate sites considered in this study, are feasible: a Project Package each for the combination of mini-hydro, SHS and distribution extension, for the combination of mini-hydro only. The diesel generator option was not selected in any of the Project Package, since the operation cost is too high due to the fuel price (also refer to Appendix-E Current Situation of Diesel Generation in Rural Area).

 Table 14-2
 Number of Project Packages in Each Combination of Electrification Mode

Co	Combination of Electrification Mode									
Transmission	Distribution	SHS	Mini-Hydro	FIUJELLI ALKAYE						
0	0			55 ( 30.6% )						
0	0	0		27 ( 15.0% )						
0				39 ( 21.7% )						
	0	0		56 ( 31.1% )						
	0		0	1 ( 0.6% )						
		0	0	1 ( 0.6% )						
			0	1 ( 0.6% )						
-	-	-	-	180 (100.0%)						

The number of RGCs and households for each electrification mode were also summarized in Table 14-3. Approximately 80% of RGCs and 95% of households fall under electrification by transmission/distribution line extension. Only 4 RGCs or 9,702 households will be electrified by three mini-hydro power plants. As the SHS market, 241 RGCs are identified and their names are listed by Province in Table 14-6.

 Table 14-3
 Number of RGCs and Households Electrified by Each Mode

Electrification Mode	RGC	HH		
Transmission/Distribution Line Extension	972 ( 79.9% )	1,008,622 ( 94.5% )		
Solar Home System Installation	241 ( 19.8% )	49,405 ( 4.6% )		
Mini-Hydro Power Development	4 ( 0.3% )	9,702 ( 0.9% )		
Total	1,217 (100.0%)	1,067,729 (100.0%)		

#### 14.4. Electrification Priority of Project Package

#### 14.4.1.Calculation of Financial Indicators

For all 180 Project Packages (with each optimal Case), Financial Indicators (namely FIRR and EIRR) were calculated. The assumptions used for the calculation were summarized in Table 14-4. It is important to note that the calculation of the Financial Indicators excluded all SHS in Project Packages. As discussed earlier, it was assumed tat the O&M costs would be borne by the beneficiaries, and that there was no income from the operation of SHS installation.

isumption (kwh)		Tal.	11115	ĸ	03 3	2		
163		Metered Households						
163			0-300 kW	'h 102	0.026	i		
5,931			301-700 kW	'h 145	0.036	5		
			>700 kW	'h 236	0.059	)		
331		Mont	thly fixed charg	je 8,475	2.12			
54								
1,609		Commercial Tariffs		245	0.061			
12,904		Mont	thly fixed charg	je 43,841	10.96	i		
337		Social Tariffs		201	0.050	)		
125		Mont	thly fixed charg	je 34,839	8.71			
144						_		
58		Annual	Increase Rate					
58		Households		2.9%				
455		Commercial Consumers		2.9%				
215		Social Consumers		2.9%				
250								
181		A Unit Hammer Mill Service Ratio	o (HH/HM)	174				
438								
696		Annual Tariff increase		1.0%				
438		Zesco Collection Efficiency		90%				
297								
297								
V		0						
4.000.00	1.00	Opera	ation Costs					
4,000,000		Percentages of Initial Capital Cos	st					
		· · · · · · · · · · · · · · · · · · ·	DL	SHS	C	iesle	ŀ	lydro
	0.892	Operation & Maintenance	1.00%	1.00%	0.024	US\$/kWh	0.024	US\$/kWh
	01002	Customer care	0.10%	0.00%	0.10%	000	0.10%	000
		Overbeads	0.10%	0.00%	0.10%		0.10%	
	0 70	Depreciation	3.3%	6.60%	5.00%		2 50%	
	on o	Fuel Cost	-	-	0.27	US\$/kWh	-	
e Energy		Bulk S	Supply Tariff					
e Energy K	US \$	Bulk S	Supply Tariff	K US\$				
Energy K 65,534	<b>US \$</b> 16.38	Bulk S	Supply Tariff	K US \$ 5 0.016				
∋ Energy K 65,534	<b>US \$</b> 16.38	Bulk S	Supply Tariff 6	<b>K US \$</b> 5 0.016 1.0%				
Energy K 65,534 K / Month US\$	US \$ 16.38	Bulk S	Supply Tariff 6	K US\$ 5 0.016 1.0%				
e Energy K 65,534 K / Month US\$ 37,197	US \$ 16.38 5 / Month 9.30	Bulk S Increase pa Infra	Supply Tariff 6 ation Rate	K US \$ 55 0.016 1.0%		1		
€ Energy K 65,534 K / Month US\$ 37,197	US \$ 16.38 5 / Month 9.30	Bulk S Increase pa Infra Foreign Currency	Supply Tariff 6 ation Rate	<b>κ US \$</b> 5 0.016 1.0% 2%		1		
	163           163           163           163           5,931           331           54           1,609           12,904           337           125           144           58           455           215           250           181           438           696           438           297           297           K           4,000.00	Sumption (KMP)           163           163           5,931           331           54           1,609           12,904           337           125           144           58           58           455           215           250           181           438           696           438           297           297           297           0.892	Semigraphic (Viright)     Metered Households       163     Metered Households       163     5,931       331     Mon       54     Mon       12,904     Mon       12,904     Mon       12,904     Mon       14     Mon       58     Annual       58     Households       215     Social Consumers       250     Commercial Consumers       250     Annual       438     A Unit Hammer Mill Service Rati       438     Zesco Collection Efficiency       297     297       K     US\$       0.892     Operation & Maintenance       Customer care     Overheads       0.70     Epreciation	K         US\$         Operation Consumers           250         Commercial Consumers         Commercial Consumers           163         Metered Households         0-300 kM           331         Monthly fixed charg         0-300 kM           337         Social Tariffs         0-300 kM           125         Monthly fixed charg         0-300 kM           125         Monthly fixed charg         0-300 kM           125         Commercial Consumers         0-300 kM           255         Commercial Consumers         0-300 kM           250         Annual Increase Rate         0-300 kM           181         A Unit Hammer Mill Service Ratio (HH/HM)         438           696         Annual Tariff increase         2-300 kM           297         297         297         0-300 kM           0.892         Operation & Maintenance         1.00%           0.892         Operation & Maintenance         1.00%           0.970         Depreciati	Semigravity         Metered Households         N           163         0-300 kWh         102           163         301-700 kWh         126           5,931         301-700 kWh         126           331         Monthly fixed charge         8,475           54         700 kWh         245           1609         Commercial Tariffs         245           12,904         Monthly fixed charge         43,841           337         Social Tariffs         201           125         Monthly fixed charge         34,839           144         Social Tariffs         2.9%           58         Monthly fixed charge         34,839           144         Social Consumers         2.9%           250         Social Consumers         2.9%           250         Social Consumers         2.9%           250         A Unit Hammer Mill Service Ratio (HH/HM)         174           438         Zesco Collection Efficiency         90%           297         297         297         297           0.892         Operation & Maintenance         1.00%         1.00%           0.892         Operation & Maintenance         0.00%         0.00%           <	Semigration (KV0)         Lams         K         USE           163         0-300 kWh         102         0.026           5,931         301-700 kWh         102         0.026           331         301-700 kWh         102         0.026           331         Monthly fixed charge         8,847         2.15           54         245         0.061           12,904         Monthly fixed charge         3,841         10.06           337         Social Tariffs         201         0.050           125         Monthly fixed charge         3,841         10.06           337         Social Tariffs         201         0.050           144         58         Annual Increase Rate         10.050           58         Households         2.9%         2.9%           215         Social Consumers         2.9%         2.9%           250         Annual Tariff increase         1.0%         2.9%           250         Annual Tariff increase         1.0%         2.9%           257         Social Consumers         2.9%         2.9%           2597         Social Consumers         2.9%         2.9%           297         297         2	Metered Households         No. 0021           163         0-300 kWh         102         0.026           5,931         301-700 kWh         145         0.036           5,931         301-700 kWh         145         0.059           331         Monthly fixed charge         8,475         2.12           54         245         0.061         0.050           1,609         Commercial Tariffs         201         0.050           337         Social Tariffs         201         0.050           125         Monthly fixed charge         34,839         8.71           144         Monthly fixed charge         34,839         8.71           58         Households         2.9%         2.9%           215         Social Consumers         2.9%         2.9%           250         A unit Hammer Mill Service Ratio (HH/HM)         174           438         Zesco Collection Efficiency         90%         297           297         297         297         90%         245           0.892         Operation & Maintenance         1.0%         0.024         US\$kWh           0.892         Operation & Maintenance         1.0%         0.0%         0.1% <tr< td=""><td>Metered Households         L         COST           163         0-300 kWh         102         0.026           5,931         301-700 kWh         125         0.036           331         Monthly fixed charge         8,475         2,12           54         -         -         0.061           1,609         Commercial Tariffs         245         0.061           12,904         Monthly fixed charge         8,475         2,12           54         -         -         0.050         -           12,904         Monthly fixed charge         34,841         10.96         -           337         Social Tariffs         201         0.050         -           144         -         -         2.9%         -         -           58         Households         2.9%         -         -         -           144         Social Consumers         2.9%         -         -         -         -           58         Households         2.9%         -         -         -         -         -           141         A Unit Hammer Mill Service Ratio (HH/HM)         174         -         -         -         -</td></tr<>	Metered Households         L         COST           163         0-300 kWh         102         0.026           5,931         301-700 kWh         125         0.036           331         Monthly fixed charge         8,475         2,12           54         -         -         0.061           1,609         Commercial Tariffs         245         0.061           12,904         Monthly fixed charge         8,475         2,12           54         -         -         0.050         -           12,904         Monthly fixed charge         34,841         10.96         -           337         Social Tariffs         201         0.050         -           144         -         -         2.9%         -         -           58         Households         2.9%         -         -         -           144         Social Consumers         2.9%         -         -         -         -           58         Households         2.9%         -         -         -         -         -           141         A Unit Hammer Mill Service Ratio (HH/HM)         174         -         -         -         -

 Table 14-4
 Assumptions for Financial Indicator Calculation

14.4.2. Final Electrification Priority Order of Project Packages by Financial Indicators

The final electrification priority order of Project Packages in the Master Plan was determined by FIRR (calculated excluding the SHS portion for Project Packages), since it was the most important indicator to evaluate the project's financial viability and the project's capacity to redeem a loan. The final priority order of Project Packages was shown in Table 14-5, together with the Unit Life Time Cost in Net Present Value, project costs with each electrification mode, and EIRR for each of Project Packages (a sample of the financial indicators' calculation process is also shown in Appendix-F).

Project Packages are listed in the order of priority (set by FIRR) for each Province in Table 14-6. In the table, the optimal electrification mode selected for each of RGCs is also indicated. The number of Project Packages and RGCs electrified by each mode are summarized by Province in Table 14-7.

Province	# of PP	# of Elec. RGCs by DL	# of Elec. RGCs by SHS	# of Elec. RGCs by Hydro	Total # of RGCs
Central	19	105	19		124
Copperbelt	16	105	24		129
Eastern	25	104	18		122
Luapula	18	98	23		121
Lusaka	5	36	4		40
Northern	32	140	55		195
North-Western	18	94	24	4	122
Southern	21	140	33		173
Western	26	150	41		191
Total	180	972	241	4	1,217

Table 14-7 Number of Project Packages and Electrification Mode for RGCs by Province

### 14.5. Allocation of Project Packages into Annual Project Phases

As summarized in Table 14-8, US\$ 1,103 million is needed to implement all 180 Project Packages. This translates to approximately US\$ 50 million per year for 22 years from 2008 to 2030.

 Table 14-8
 Necessary Electrification Project Cost by 2030 in Each Mode

Electrification Mode	Cost in US\$
Transmission/Distribution Line Extension	1,022,385,240 ( 92.7% )
Solar Home System Installation	58,489,689 ( 5.3% )
Mini-Hydro Power Development	22,210,313 ( 2.0% )
Total	1,103,085,242 ( 100.0% )

Then, the prioritized 180 Project Packages are grouped into 22 Annual Project Phases each requiring US\$ 50 million, as shown in Table 14-9.

FIDD			Feeder	Trans./Dist.	CUIC Court	Their Cost	Total Project	Laure I.V.	Project	Project
FIRE	Substation	Province	8	Line Cost	SHS Cost	Hydro Cost	Package	Least Life	Package	Package
Ranking		COSCIER .	Package	(1155)	(US\$)	(US\$)	Cost	Time Cost	FIRR	FIRR
1	leoka	Northern	1 1 1	673 272	990 123		1 663 395	0.0092	22.0%	59 9%
2	Arela	Fontom	2 2	4 000 020	_000,120		1,000,000	0.0002	20.00	57.5%
	Azere	Castern	4 - 4	1,039,930			1.033,330	0.0000	20.3%	27.276
3	Kapin Mposhi	Central	2 - 2	2,701,295			2,701,296	0.0064	18,1%	50.2%
4	Kansunswa	Copperbeit	1 - 8	4,522,824			4,522,824	0.0078	13.2%	35.1%
5	Azele 2	Eastern	2 - 1	2,596,212			2,596,212	0.0080	12.1%	34.1%
6	Azele	Eastern	1 - 2	1,608,120			1,608,120	0.0080	12.0%	33.9%
7	Azele 3	Eastern	1 - 2	3,388,392			3,388,392	0.0082	11.5%	32.4%
8	lsoka	Northern	2 - 1	747 576	1.243.873		1 991 449	0.0167	11.0%	29.5%
9	Azele 1	Fastern	1 5	3 600 612	1.00 101010		3,600,612	0.0085	11.0%	31 1%
10	Nidola 1	Convertigat	1 4	3,675,672			3 675 672	0.0087	10 8%	29.5%
10	ivadia i	Coppenden	1 - 4	3,073,072			3,073,072	0.0007	10.076	23.370
11	Lundazi	Eastern	3-2	2,(33,588			2,733,568	0.0094	9.5%	26.1%
12	Chipata	Eastern	2 - 2	4,280,904	416,277		4,697,181	0.0100	9,2%	26.3%
13	Mbereshi	Luapula	1 - 3	2,620,728	622,820	C	3,243,548	0.0116	9,1%	22.2%
14	Azele 5	Eastern	1 - 3	7,189,452		E	7,189,452	0.0096	8.7%	25.6%
15	Kasama 1	Northern	1 - 2	4,137,372	483,813		4,621,185	0.0105	8.7%	24.9%
16	Senanga	Western	1 - 1	2 146 932			2 146 932	0.0102	8.5%	23 3%
17	Mbereshi	Luanula	2 11	1.854.468			1 854 468	0.0100	8 4%	23.9%
18	Kitwa	Connerhelt	1 1	2 269 080	368.850		2 637 930	0.0114	8 2%	22 6%
10	Azolo 3	Eastern	3 3	4 528 160	000,000	-	4 539 160	0.0101	9 70/	73.90/
13	AZEIE Z	Casteni	2 2	4,000,100			4,530,100	0.0101	7.70	23.076
20	Luwingu	Northern	3-3	1,395,468		12 C	1,395,468	0.0103	1.175	23.276
21	Mpongwe	Copperbelt	3 - 2	2,048,868	80,283		2,129,151	0.0107	7.6%	22.8%
22	Mongu 2	Western	2 - 3	5,644,512	460,417		6.104,929	0.0112	7.5%	22.1%
23	Nchelenge	Luapula	1 - 4	2,087,748	364,872		2,452,620	0.0127	7.5%	19.1%
24	Azele 3	Eastern	2 - 1	2,509,596		1	2,509,596	0.0105	7.5%	22.6%
25	Azele 1	Eastern	2 - 2	3,545,532	1,139,130		4,684,662	0.0130	7.1%	21.9%
26	Mongu 2	Western	1 3	4 102 704	219 028	-	4 321 732	0.0114	7 1%	20.9%
27	Mumhwa	Central	1 2	2034072	684 666		2 719 730	0.0133	7 09/	21 30/
20	Nebalance	Luapula	2 2	4 207 552	205.205	-	4 452 047	0.0133	2 00/	10 10/
20	Nekanda	Mortham	4 4	9,221,002	1 004 005		4.452.347	0.0121	0.0%	19.1%
28	Ivakonde	Normem	2	3,076,272	1,064,965		4,141,237	0.0154	0.7%	10.6%
30	Mongu	western	1 - 4	3,890,700	-		3,890,700	0.0119	5.9%	19.0%
31	Muzuma 2	Southern	2 - 1	3,703,968		i	3,703,968	0.0125	5.6%	17.7%
32	Luwingu 3	Northern	2 - 5	4,202,496		1	4,202,496	0.0126	5,5%	17.4%
33	Samfva 2	Luapula	2 - 2	2,752,596			2.752.596	0.0139	5.0%	14.4%
34	Luano	Cooperbelt	1 - 3	2 387 772	284,120		2 671 892	0.0148	4.9%	15.5%
35	Mbereshi 1	Luanula	2.5	6313 140	559 897		6 873 037	0.0147	4 9%	15.2%
36	Minala	Northern	2 4	5 112 504	2 547 823		7 660 307	0.0174	4 996	17 1%
27	Dansula	Control	1 1	500 616	2,041,023		E00.616	0.0146	4 69/	13 78/
20	Persuo	Central		4 496 200			1 400 200	0.0140	4,0%	1.0.7 70
- 30	MISOTO	Castern		1,400,230	244.000	<u>.</u>	1,400,230	0.0139	4.0%	14,476
39	Azele 4	Eastern	2 - 3	5,366,628	341,958		5,708,616	0.0140	4.6%	15.4%
40	Kabwe 1	Central	3 - 3	4,443,228			4,443,228	0.0136	4.5%	10.0%
41	Solwezi	North-Western	1 - 1	3,196,692			3,196,692	0.0134	4.5%	16.3%
42	Senanga	Western	3 - 3	4,424,004			4,424,004	0.0138	4,4%	15.6%
43	Luwingu 2	Northern	2 - 5	6,526,008	·		6,526,008	0.0135	4.4%	16.3%
44	Victoria Falls	Southern	3 - 1	1,662,120	1,365,257		3,027,377	0.0213	4.4%	16.0%
45	Kabwe 2	Central	1 - 2	5,905,008			5,905,008	0.0137	4.3%	15.9%
46	Luano	Connerbelt	2.4	2 782 080	512 429		3 294 509	0.0165	4 3%	13.8%
47	Senanga 3	Western	1 2	5 513 508	9 181 18 M	-	5 513 508	0.0141	4 2%	15 7%
41	Nidola	Connertialt	1 3	4 705 756			4 725 756	0.0143	A 195	14 694
40	INDOID .	Copperbeit	2 2	4,720,700	214.524		4,723,730	0.0143	4,170	14.076
49	Nitwe	Copperbeit	2 - 3	2,322,004	314,331		3,237,333	0.0171	4.0%	11.976
50	Samiya 1	Luapula	2 - 3	4,234,788		-	4,234,788	0.0153	3.5%	13.2%
51	Samfya	Luapula	1 - 1	1,286,388	293,925	5	1,580,313	0.0169	3.7%	14.6%
52	Muzuma 1	Southern	2 - 1	2,582,172	2,251,605	1	4,833,777	0.0243	3.6%	14.0%
53	Mwinilunga 1	North-Western	1 - 0		3.070.610	2,654,970	5,725,580	0.0195	3.6%	14.5%
54	Mporokoso	Northern	2 - 6	7,404,372	1.1		7,404,372	0.0148	3.6%	14.3%
55	Kawambwa Tea	Luapula	1 - 6	4,996,188	401,485		5.397.673	0.0183	3.5%	10.4%
56	Mbereshi 1	Luanda	1 - 3	4 493 664	531 461	7	5.025 125	0.0170	3.4%	12.7%
57	Samfya 2	Luarula	1 2	4 748 220	2011201		4 748 220	0.0150	3 30/	12 4%
50	Kaoma	Weetam	4 2	3 270 700	307 622		3 769 420	0.0168	3.3%	12.49/
50	Maningundura	Central	1 2	6 207 070	501.002		6.949.000	0.0100	2,40	12.90
29	e e e e e e e e e e e e e e e e e e e	Central	1 - 2	0,327,072	521,627		0,040,099	0.0100	3,1%	13.2%
60	Luwingu 1	Northem		7,400,916			7,400,916	0.0157	2.5%	13.2%
61	Isoka	Northern	3 - 2	4,738,824		1	4,738,824	0.0160	2.9%	12.9%
62	Kasama 2	Northern	1 - 4	7.680.960			7,680,960	0.0162	2.8%	12.3%
63	Kalabo	Western	1 - 3	6.112.368	723,406	· .	6,835,774	0.0174	2.7%	13.0%
64	Muzuma 3	Southern	1 - 3	4,332,960		C	4,332,960	0.0166	2.7%	12.1%
65	Pensulo 1	Central	2 - 5	5.346.756			5,346,756	0.0164	2.7%	12.5%
66	Luwingu 3	Northern	1 - 3	3,819,528			3,819,528	0.0161	2.6%	13.0%
67	Lundazi	Eastern	1.2	2 785 860	1 479 405		4 265 265	0.0240	2 394	11 5.06
69	Monau	Western	2 5	7 310 376	1,41,5,405		7 310 376	0.0167	3 30/	12 20/
00	Nobelenae 1	Lungula	1 3	4,019,070		1	4 931 435	0.0107	2,076	40.40
70	Liminal:	Nothom	1 3	7 722 075		-	7 700 070	0.0100	2.379	10.170
70	Cuwingu	I VCR LITETTI	- 4	1,122,9/2			1,122,912	0.0165	2.2%	12.376
/1	Senanga 2	westem	2 - 2	2,/39,744			2,739,744	0.0171	2.2%	11.8%
72	Kabwe	Central	2 - 5	6.232.788	225,782	2	6,458,570	0.0180	2.1%	11.5%
73	Senanga 3	Western	2 - 3	7,618,536			7,618,536	0.0174	2.1%	11.6%
74	Kapiri Mposhi	Central	1 - 6	5,497,848	399,856	I J.	5,897,704	0.0189	2.0%	11.0%
75	Kalabo	Western	2 - 1	2,756,268	794,187		3,550,455	0.0216	1.8%	11,4%
76	Senanga 2	Western	1 - 3	3,328,452			3,328,452	0.0187	1.8%	10.2%
77	Mporokoso	Northern	1 - 5	4 094 712			4 094 712	0.0182	1 7%	10.6%
78	Muzuma 1	Southern	1 4	6 212 494	1 331 370		7 543 863	0.0220	1 7%	10 1%
70	Monau 1	Western	1 7	6 200 740	2847 020		0 220 204	0.0244	4 69/	11 10/
20	Lundari 1	Eastern	4 0	4 245 024	2,041,330		4 015 004	0.0241	1.0%	10.00/
00	Luildazi i	Castern	- 3	4,215,024	1.641.47	-	4,215,024	0.0184	1.5%	10.8%
81	Kaoma	westem	1 - 2	3,539,376	1,801,008	-	5.340,384	0.0288	1.5%	8.5%
82	Mazabuka	Southern	1 - 3	3,732,048	738,598		4,470,646	0.0279	1.5%	3.5%
83	Luwingu 2	Northern	1-5	7,625,988		5	7,625,988	0.0182	1.5%	11.0%
84	Mfuwe 1	Eastern	1 - 5	4,821,120	175,869	1	4,996,989	0.0190	1.5%	10.7%
85	Solwezi	North-Western	2 - 4	2,663,712			2,663,712	0.0188	1.5%	10.4%
86	Kafwe Town	Lusaka	1 - 3	1,582,632			1,582,632	0.0199	1.5%	9.2%
87	Mumbwa	Central	3.4	6.012 576			6,012,576	0.0191	1 3%	10.2%
88	Lundazi	Eastern	2.7	8 256 276			8,256,276	0.0203	1 294	9 1%
89	Isoka 1	Northern	9 9	4 628 999			4 628 000	0.0199	1 39/	9.5%
90	Muzuma 3	Southern	2 6	5 051 084			5 251 284	0.0200	1 194	9.4%
	CONTRACTOR OF A DESCRIPTION OF A DESCRIP	A THE REPORT OF A DESCRIPTION OF A DESCRIPANTO OF A DESCRIPTION OF A DESCRIPTION OF A DESCRIPTION OF A DESCR		The second se			The second se		E . T /9	

### Table 14-5 Final Electrification Priority of Project Packages by 2030 (1/2)

EIDO.			Fe	eec	ler	Trans./Dist.	0110 0	In the Case	Total Project	·	Project	Project
FIRE	Substation	Province		8	ř.	Line Cost	SHS Cost	Hydro Cost	Package	Least Life	Package	Package
Ranking	Curstander	1 States	0-	ak.	-	(1105)	(US\$)	(US\$)	Cost	Time Cost	EIDD	EIDD
- 24		in the second second	F a	Cho	ayle.	(033)	100 505		0.570.000	0.0000	FIRM	EIRA
91	Luano 2	Copperbeit	1	-	5	6,468,768	109,535	<u></u>	6,578,303	0.0208	1.1%	8.8%
92	Isoka 1	Northern	2	-	1	4,419,792			4,419,792	0.0196	1.196	9.8%
93	Azele 4	Eastern	1	-	4	11,500,056	Q=		11,500,058	0.0193	1.0%	10,1%
0.4	New SS at Lukala	Western	1		5	8 474 078			8 474 078	0.0228	1 096	8 0%
07	New 55 at Londid	Webtern	-	-	0	10,001,000		· · · · · · · · · · · · · · · · · · ·	10,004,000	0.0220	1.0.0	10.00
83	Mongu 1	western	4	-	×.	10,201,080		V	10,201,080	0.0193	1.0%	10.2%
96	Mpika	Northern	1	- 4	1	1,251,288	508,921		1,760,209	0.0260	0.9%	9.5%
97	Mkushi	Central	1	-	7	5,977,476	951,259		6 928 735	0.0257	0.8%	7.1%
0.0	Naholonga 1	Luopula	2		4	7 155 849		1	7 155 849	0.0215	0.0%	0 204
00	Nonelenge 1	Luapuia	4	-	-	1,133,040			7,100,040	0.02.13	0.0.90	0.570
88	Luwingu	Northern	2	-	5	8,742,008	726,748	e ()	7,468,756	0.0216	0.7%	9,7%
100	Mfuwe	Eastern	1	4	3	7.515.828			7.515.828	0.0203	0.6%	9,5%
101	Mazabuka t	Southorn	3		8	8 055 689	<u></u>	7	B DEE BRO	0.0222	0.8%	7 7%
101	Mazabuna I	Sourien	-	-	0	0,000,000		2	0,000,000	0.0222	0.070	1.770
102	Maposa	Copperbelt	2	-	4	3,617,136			3,617,136	0.0221	0.4%	8.1%
103	Chinsali	Northern	2	-	1	1,129,140	1,201,445	8 4	2,330,585	0.0438	0.4%	6.3%
104	Senanda	Western	2	12	3	8 819 172			8,819,172	0.0213	0.4%	8 7%
105	Kasama	Manihan	2		Ē	7 077 100	20.	1	7 677 199	0.0217	0.170	0.5%
100	Nasama	Northern	4	-	0	1.0/1.132			1,011,132	0.0217	U.470	0.070
106	Kasama	Northern	1	-	3	2,891,484	2,822,026		5,713,510	0.0372	0.3%	8.7%
107	Mpika	Northern	2	-	3	3.820.824	1.316.505	2	5,137,329	0.0276	0.3%	8.4%
108	Moika	Northern	3	12	1	2 813 918	1 384 900	· _ · ·	3 009 818	0.0311	0.0%	8 2%
100	WIDING .	normern	-	13	-	2,010,010	1,504,000	0 0	0,000,010	0.0011	0.076	0.270
109	Azele.d	Eastern	2	-	2	3,756,780		- U	3,/56,/80	0.0221	0.0%	8.4%
110	Maposa	Copperbelt	1	-	6	9,154,296	37,124		9,191,420	0.0238	-0.3%	7.3%
111	Chinili	Luanula	1	-	4	4 341 060	90,503		4 431 583	0.0255	-0.4%	6 4%
110	Advantages	Control	2		2	4 442 004			4 442 004	0.0257	0.5%	E 704
112	Manibwa	Manhai	4	-	0	7,442,804			7,442,804	0.0207	-0.3%	0.7%
113	Mpika 1	Northern	1	-	2	7,672,860	0.	4	7,672,860	0.0240	-0.5%	7.3%
114	Kitwe	Copperbelt	3	-	8	6,919,884	201,447		7,121,331	0.0282	-0.7%	4.7%
115	Sesheke	Western	1	-	4	8,686,008	к	1 8	8,686,009	0.0253	-0 7%	8.4%
110	Chilundu	Couthorn	4	1	2	2 250 044	208 014	-	2 654 055	0.0070	0.00	0.10
110	Sindiad	Sounem	1	1	3	3,308,044	200,011	· · · · · · · · · · · · · · · · · · ·	3,004,000	0.0218	-0.8%	0.1%
117	Azele 0	Lastern	1	-	3	7,118,712	142,129		7,260,841	0.0246	-0.8%	7.3%
118	Mkushi Farm Block	Central	1	-	5	7,162,452	665,468		7,827,920	0.0300	-0.8%	5.1%
110	Chipata	Eastern	+	-	4	8 050 016	481 549	2 8	6 540 584	0.0267	-0.0%	6 8%
100	Descule 1	Control		1	1	5 202 405	401,040	1	5,000,004	0.0040	0.0%	7.070
120	rensulo 1	Gentral	1	-	4	5,382,180			0,382,180	0.0246	-0.9%	1.1%
121	Mazabuka 1	Southern	3	-	8	8,448,248		( )	6,448,248	0.0262	-1.0%	6.1%
122	Muzuma 2	Southern	1	-	4	7,654,932	254,481		7,909,413	0.0255	-1.0%	7.0%
123	Chinsali	Northern	3	-	1	710 749	813 602	1	1.524.740	0.0510	-t n94	5 494
124	Now SC at Mahaman	North Wester	2	1	E	11,871,000	010,002	-	11,671,000	0.0050	1 10/	8 70/
124	New 33 at Kabompo	NORTH-WESTERN	4	-	2	11,071,020			11,071,020	0.0203	-1,170	0,170
125	New SS at Lukulu	Western	2	-	2	5,237,244	1,774,905		7,012,149	0.0335	-1.2%	6.1%
126	Sinazongwe	Southern	1.	-	8	5,275,908	805,526		6,081,434	0.0320	-1.2%	4.9%
127	Kahwa	Central	1	1.2	7	8 657 012		1	8 857 012	0.0265	-1 396	8 1%
100	Man CC at Zambani	Marth Master	- 21		2	5 200 000	224 145	17	5,700,705	0.0077	1.000	0.110
148	New 55 at Zambezi	North-Western	4	-	4	0,308,080	334,113		0,702,790	0.0277	-1.0%	0.3%
129	Zambezi 1	North-Western	1	-	4	8,354,180	279,755	1 A A A A A A A A A A A A A A A A A A A	6,633,935	0.0275	-1.6%	.6.3%
130	New SS at Mwinilunga	North-Western	4	121	0	A HORN AND A		8,688,211	8,688,211	0.0261	-2.0%	4.8%
131	New SS at Zambezi	North-Western	1	1	8	10 004 364	1 185 245		11 189 809	0.0327	.2.7%	4.7%
101	New 55 at Latituezi	nocur-western	-	-		10.004,004	1,103,245		100,000	0.0021	2.2.10	9.770
132	Luano 1	Copperbeit	1.	-	4	4,4/9,010	134,174		4,013,090	0.0341	-2.4%	3.4%
133	Samfya 1	Luapula	1	-	5	8,764,040	N		6,764,040	0.0317	-2.4%	4.1%
134	Muzuma 1	Southern	3	-	1	2.671.272	353,962		3.025.234	0.0340	-2.4%	4.6%
135	Pansulo 2	Central	7	1	2	12 876 408	184 408	5	13 040 814	0.0308	-2 5%	4 8%
100	I CHISTIC L	O	-	-	-	4 747 040	70,000	1	4.707.700	0.0000	0.00/	4.40/
130	Mpongwe	Copperbeit	2	-	1	1,/1/,848	79,938		1,797,780	0.0330	-2.0%	4.1%
137	Senanga 1	Western	1	-	4	17,644,176	1.00	i i	17,644,176	0.0308	-2.6%	4.6%
138	Pensulo 2	Central	1	-	5	10.138.284			10,138,284	0.0317	-2.8%	4.4%
120	Lupen t	Connorhalt	2		A	8 202 902	0		8 202 000	0.0247	2.0%	2 0%
150	Edding 1	Coppenden	-	-		0,200,000			0,200,000	0.0047	-2.070	0.070
140	New SS at Chilundu	Lusaka	2	-	1	12,229,164	306,618		12,535,782	0.0355	-2.8%	2.9%
141	Coventry	Lusaka	1	-	4	5,448,276	145,637	i i	5,593,913	0.0370	-3.0%	2.2%
142	Mpika 2	Northern	1	-	3	9 631 764		e	9.631.764	0.0331	-3.1%	4.0%
143	Kaoma	Western	2	1	2	8 192 820	015 827		0 008 247	0.0378	-2 104	3 496
145	reaonna	Western	-	-	-	0,102,020	810,021	-	0,000,247	0.0010	0.170	0.470
144	Mpika	Northern	2	-	3	11,886,696			11,886,696	0.0354	-3.4%	3.2%
145	Mazabuka 1	Southern	1	-	4	4,611,924	tu (		4,611,924	0.0374	-3.5%	2.4%
146	New SS at Mwinilunga	North-Western	3	-	2	3 620 916		°	3 620 916	0.0357	-3.5%	3 1%
147	New SS at Musicilus	North Monter	2		4	0.000.000	1	2	0,000,000	0.0380	2 804	2 104
1.17	Man CC - Marinunga	Marth M.	-	1	1	2,000,082	4.440.490	10 007 101	0,000,002	0.0000	0.0%	3.170
148	New 55 at Mwinilunga	North-Western	1	-	1	1,980,492	1,448,173	10,867,131	20,302,796	0.0556	-3.8%	0.4%
149	Fig Tree	Central	1	-	6	7,295,940	262,271		7,558,211	0.0422	-3.9%	1.6%
150	Leopard's Hill	Lusaka	1	-	11	12,860,964			12,860,964	0.0378	-4.0%	2.5%
151	Serenie	Central	1	-	3	7 325 532	1		7 325 522	0.0388	4 704	2 4%
150	Vistoria Talla	Couttrant	1	1	4	5 101 002	207 222		E 400 002	0.0000	4.20	0.00
104	victoria Falls	soumem	4	-	4	5,194,092	281,028		0,482,320	0.0478	-4.2%	U.3%
153	New SS at Mufumbwe	North-Western	1	-	1.	13,583,916	342,885		13,926,801	0.0438	-4.5%	1.4%
154	Kalabo	Western	3	-	5	16,060,140	532,911		16,593,051	0.0422	-5.0%	2.1%
155	Kaoma	Western	3	-	3	10.689.516	8	2 - S	10.689 516	0.0449	-5 196	0.8%
158	Mnongwe	Connerhalt	4	1	5	8 590 008	149 027		8 733 033	0.0424	5 10/	1 704
100	in purgwe	oopperbeit	1	-	2	0,008,890	145,021		0,755,025	0.0454	-0.190	1,7 20
157	Muzuma	Southern	2	-	2	4,124,628	Y	é (	4,124,628	0.0434	-5.3%	1.5%
158	Kasempa	North-Western	2	-	4	6,585,084	319,324		6,904,408	0.0499	-5.3%	0.2%
159	Chipili	Luapula	2	-	2	8,145,792	199 099	5	8.344 891	0.0488	-8 0%	0.7%
180	Cohuazi	North Western	2		F	10 115 604	100,000	-	10 115 804	0.0407	8.00	O FO
100	Joiwezi	norun-western	10	-	2	10,110,004			10,113,004	0.0467	-0.0%	0.0%
161	Isoka 1	Northern	3	-	1	5,762,340	80	i i	5,762,340	0.0482	-6.0%	0,7%
162	Sesheke 1	Western	1	-	5	12,350,988	968,951		13,319,939	0.0531	+8.0%	0.1%
183	Muzuma	Southern	1		5	5 281 740		$\gamma = -\gamma$	5 281 740	0.0532	-R 194	-0 7%
194	Mages	Lungula	1	É	0	1 810 704	202.025	-	1 000 010	0.0975	0 10	0.00
104	ividi isa	Luapula	4	-	3	1,019,784	203,035		1.022,819	0.0019	-0.1%	-2.5%
165	Chilundu	Southern	2	-	8	8,734,500	N		8,734,500	0.0525	-8.5%	-0.2%
166	Victoria Falls	Southern	1	-	5	3,954,312			3,954,312	0.0662	-6.6%	-3.1%
187	New SS at Mumberi	North-Western	4	-	2	8 636 402	2	1	6 636 402	0.0522	-R 894	0.0%
100	Man CC at Char	Manth Manth	1	F	-	0,000,482	057 007		9,000,782	0.0023	7.0%	0.070
108	New 55 at Unavuma	norm-western		-	8	0,411,204	357,387		0,708,591	0.0641	-7.0%	-1,7%
169	Muzuma	Southern	3	-	1	2,869,452	213,808		3,083,260	0.0579	-7.0%	-0.5%
170	New SS at Kabompo	North-Western	1	-	4	11.623.500			11.623.500	0.0579	-7.0%	-1.9%
178	New SS at Chama	Eastern	2	-	5	11 377 900	0	15 S	11 377 800	0.0530	.7 094	.0 194
111	New 00 at Unama	-asien	-	-	14	11.577.800			11,577,800	0.0036	-7.0%	-0.1%
172	New SS at Chama	Eastern	1	-	3	14,867,712	-		14,867,712	0.0609	-7.8%	-1.3%
173	Chinsali	Northern	1	-	4	9,725,076	S		9,725,076	0.0673	-7.8%	-2.6%
174	New SS at Chilundu	Lusaka	1	1	1	5,460 912	364 872		5 825 784	0.0634	-8 1%	-1 1%
175	New CC at Number	Easter		1	P	8 440 514	424.072		8 070 047	0.0744	0.1%	4 400
110	New 55 at Nyimba	castern	1	-	0	0,449,544	421,373	¢	0,8/0,91/	0.0744	-8.2%	-4.4%
176	Kasempa	North-Western	1	-	4	3,180,492	254,357		3,434,849	0.0679	-8.7%	-3.0%
177	Maamba	Southern	1	-	8	15.099.588	71,983	1	15.171.571	0.0800	-9.8%	-3.8%
179	Secheka 2	Western	4	17	4	21.945.800	1110-000	-	21.045.800	0.0742	-10 204	.2 704
1/0	Meaner 2	restern		-	7	21.840.000			21,840,000	0.0/43	10.270	-2.1%
1/9	mansa	Luapula		-	9	1,031,272	(38,142		8,268,414	0.1071	-12.6%	-5.0%
180	Mbala	Northern	1	-	2	5,990,868	599,286		6,590,154	0.0964	-13.1%	4.2%
	Total		-	-	-	1.022 385 240	58 489 689	22 210 313	1,103 085 242	-	1	ar 3

### Table 14-5 Final Electrification Priority of Project Packages by 2030 (2/2)

## Table 14-6Electrification Priority of Project Packages by Province (1/12)Central Province

Provincial Ranking	1	2	3	4	5
Substation	Kapiri Mposhi	Mumbwa	Pensulo	Kabwe 1	Kabwe 2
District	Kapri Mposhi	Mumbwa	Serenje	Kapiri Mposhi	Chibombo
· · · · · · · · · · · · · · · · · · ·	KPG Market	Mumba	Mukando	Nchembwe	Falace Chipepo Mukuni-Ngombe
DCC- NO	Lukanda	Maimwene settlement		Kafulu	Chilwa
ROUSDYDL	Luashimba	Chiwena		Koni Bunda Community	Kaswende
					Waya
· · · · · · · · · · · · · · · · · · ·	Page 1	Ngabwe			
	3	Кароро		-	10.000
RGCS BY SHS		Chikonkomene			
	0	Nambwa		- K	

Provincial Ranking	6	7	8	9	10
Substation	Nampundwe	Pensulo 1	Kabwe	Kapiri Mposhi	Mumbwa
District	Mumbwa	Serenje	Kabwe	Kapri Mposhi	Mumbwa
	Muchabi	Lukulu HC, Sch, Mkt	Lukall Community School	Chilese	Big Concession
	keezwa	Nakatambo	Joslas Chiwala Farm	Kaloko	Kaindu
and the second second	Shibuyunji	Katikololo	Chilumba	Fikola	Mpusu
RGCs by DL	Siachele	Musangashi	Katuntulu Com. School	Chankomo	Kamiliambo
	Myooye	Nsala	Likumbo	Lunchu	
	Nalubanda	2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Mpima Dairy Scheme Shed	Mubalashi	
	Mukulaikwa		Mubofwa		
RGCs by SHS	Chipeso		Chipepo	Nkole	
	Muchenje		1.1.1		8
	Mamvule				34

Provincial Ranking	11	12	13	14	15
Substation	Mkushi	Mumbwa	Mkushi Farm Block	Pensulo 1	Kabwe
District	Mkushi	Mumbwa	Mkushi	Serenje	Kabwe
	Chalata	Matala	Old Mkushi	Mailo	Kangomba Health Centre
	Kasalamakanga	Naluvwi	Masansa	C. Saili	Kafumba
	Ndabala	Chibuluma	Makolongo	Kawama	Munwa Basic School
	Malali	Luili	Lubuto	Masase	Kafulamase Basic School
RGCs by DL	Nkumbi	Nakanjoli	Masansa	C. Serenje	Kalwelwe Rail Station
	Nshinso	Chikanda	Kanyenshya Resettement Scheme	and the second second	Munyama B. School
	Munsakamba	Nalusanga	Mpale_Tuyu	0	Kapuku Fish Camp
	Lunsemfwa		Chikupili		
	Chitina	2			1 a
RGCs by SHS	Fibanga		Chikwasha	1	
	Musofu		Chingombe	V	
	Kalombe		Fiwila		

Provincial Ranking	16	17	18	19
Substation	Pensulo 2	Pensulo 2	Fig Tree	Serenje
District	Serenje	Serenje	Chibombo	Serenje
	Talayi	Mpelembe	Shimukuni	Chibale
	Mushili	Machende	Waya	Nchimishi
	Kasanka	Njelele	Mukulushi	Kofi Kunda
RGCs by DL	Sokontwe	Chalilo	Chamuka	Mpande
Concept South St	Chipe	Gibson	Lifwambula	
	Chipundu	Katongo	Kabangala	- 12
	Kapumbu	Chipundu	Momboshi	
RGCs by SHS	Musolo		Kasosolo	
			Kayosha	

## Table 14-6Electrification Priority of Project Packages by Province (2/12)Copperbelt Province

Provincial Ranking	1	2	3	4	5
Substation	Kansunswa	Ndola 1	Kitwe	Mpongwe	Luano
District	Mufulira	Ndola	Kitwe	Mpongwe	Chililabombwe
and the second sec	Kawama East	Twapia	Musakashi	Mulela	Kalilo
	Murundu	George Camp	Luela	St. Anthony	Mimbula Block
	Mupambe	Sakania	Lungo		Kansoka
	Luansobe	Chichele	Council Farm		- Martine A
RGCs by DL	Mutundu North (Conner Bar)				
	Mokambo	1			
	Mutamba			- 2	
	Kafironda	and a		- 1	Children Chi
	Lukoshi	0 -			
_			Minsenga	Kapili	Chisangwa
				lpumbu	
	j			Mushine	4
RGCs by SHS	1	9		Machiya	
				Luswishi	
	2			Munkunpa	
			-	Munsongwe	

Provincial Ranking	8	7	В	9	10
Substation	Luano	Ndola	Kitwe	Luano 2	Maposa
District	Chililabombwe	Masaiti	Kitwe	Chingola	Luanshya
	Kamiteta	Mutaba	St. Joseph	Mutenda	Kaf Miss
	Fitobaula	Kambowa	Nkana	Muchinshi	Kamifungo
	Kawama	Kanglonga	Emerald Mining Area	Ipafu	Shombe
DOC-L-DI	Lubansa	Chondwe	Kambila	Milopa	Chilobwe
RGUS BY DL	Mingomba	Mupapa	Kabombo	Muchinshi	Kawama
	Kasapa	Chikumbi	Chibuluma Mine Area	Kansoka	Kangalati
	Contraction of the second s	Sector State Sector Sector	Chapula	Milulu Mitambo	Lima
E _ E _ E				Milulu Kabamba	
RGCs by SHS	Kanenga		Kandole	Mutenda	
	Chilimina		Chantete		

Provincial Ranking	11	12	13	14	15
Substation	Maposa	Kitwe	Luano 1	Mpongwe	Luano 1
District	Luanshya	Kitwe	Lufwanyama	Mpongwe	Lufwanyama
	Chifulube	Mukutuma	Mbalango Mine Farm Block	Mukumbo	Kambilombilo
	Maposa	Saw-Milts	Kapilamikwa	Shingwa	Nchakwa
	Kafubu	Kalisha	Kangalati	Kasamba	Lumwana
	Kaf GRZ	Michinka	St. Mary's		Kanyafimbolo
	Kakolo	Kafubu Depot	Kantende		Mushingashi
	Chinondo	Chamanza Resettlement	Fumbwe		Fungulwe
RGCs by DL	Kapupulu	Kameme	and the second		Funda
to come case office	Misaka	Milopa			Mapunga
		Kansoka			Kalweu Kasakalabwe
		Lumpuma		-	
	5.5	Kapimbe			
	10 mm	Chimoto			-
		Kankunko			
RGCs by SHS	Salati	Chikabuke	Chinemu	Chitabale	
	Constant -	ASSAULT AND A STORE	and the second second	Luela	

Provincial Ranking	16
Substation	Mpongwe
District	Mpongwe
	Mpongwe
	Lukanga
	Chowa
	Mukubwe
DOC- NUDI	Mushipushi
RGUS DY DL	Chisanga
	Musofu
	Ibenga
	Chibuli
	Kotinteden
	Chisapa
	Chinwa
RGCs by SHS	Mikata
	Matete
	Fidashi

### Table 14-6Electrification Priority of Project Packages by Province (3/12)Eastern Province

Provincial Ranking	t	2	3	-4	5
Substation	Azele	Azele 2	Azele	Azele 3	Azele 1
District	Katete	Katete	Katete	Petauke	Katete
	Chindenza School	Mtandaza RHC	Chimutende,	Kapungwe	Chinkhombe
	Chitawe RHC		Kapeya Farms	Chikalawa	Nyembe
RGCs by DL	and the second		and the second second		Matunga School
10001-100-0301 <del>0</del> 0-0300-0		(E)			Chisale
					Kafunka
PGCs by SUS					
ROUS by SHS					- 8

Provincial Ranking	6	7	8	9	10
Substation	Lundazi	Chipata	Azele 5	Azele 2	Azele 3
District	Lundazi	Chipata	Petauke	Katete	Petauke
	Sikatengwa	Kasenengwa Rural Centre	Mwanjawanthu	Kagoro	Nyamphinga
	Mwase	Madimawe Rural Health Centre	Mumbi	Kafumbwe School	and the second second
RGCS by DL	Mwata	Madzimoyo Sec. Schoo	Matonje	Kapirimphika	
		Chinyaku Palace	Kaulu	Taferansoni	a - 2
RGCs by SHS		Maguya			
		and the second se			- 61

Provincial Ranking	11	12	13	14	15
Substation	Azele 1	Msoro	Azele 4	Lundazi	Lundazi 1
District	Katete	Mambwe	Petauke	Lundazi	Lundazi
	Kamphambe	Kasamanda	Nyamphande NSS	Mchereka	Mwimba
000-1-DI	Chilasa	Nkhoko	Monde	Mphamba	Kazonde
RGUS by DL	estimation and		Misolo	Khulamayen	Phikamalaza
				Chasefu	
RGCs by SHS	Zemba		Kalongo Mwape	ZASP	
	Kalimeta		Muliio	Mapamba	
	Kenje		1 Contract of	Lumimba	

Provincial Ranking	16	17	18	19	20
Substation	Mfuwe 1	Lundazi	Azele 4	Mfuwe	Azele 6
District	Mambwe	Lundazi	Petauke	Mambwe	Chadiza
1	Ncheka	Emusa	Mng'omba School	Chasela	Naviluri
	Kamphasa	Kapichila	Sasali	Nsefu	Madziayera
	Kamphasa	Egichakeni	Chikowa	Chilanga	Manie
	Ncheka	Kazembe	Ukwimi	Chilanga	and the second sec
RGCs by DL	Chikowa	Nkhanga			
10 10 10 10 10 10 10 10 10 10 10 10 10 1	Chikowa	M Mphanga			
		Chikomem		1	
		Hoya			
		Mtambali			10.00
RGCs by SHS	Nyamaluma				
		10.16			14 14

Provincial Ranking	21	22	23	24	25
Substation	Azele 6	Chipata	New SS at Chama	New SS at Chama	New SS at Nyimba
District	Chadiza	Chipata	Chama	Chama	Nyimba
· · · · · · · · · · · · · · · · · · ·	Zingalume	Chinunda	Kaozi Settlement	Muyombe	Chipembe
	Chikonka	Kmgubudu	Mangwere	Kanselele	Mulira
	Chigwe	Mphomwa	Mabinga	Mnauke	Mtilizi Scheme
	Kapachi	Mphomwa Tse-tse	Sitwe	Bulbe	Vizimumba Central
RGCs by DL	Kalemba	Kapara	Kalinkhu		Hofmeyre
and the second second	Vubwi	Maguya	Chifunda		Ndake
	Mchenjera	Chiparamba	Manga		Mchimadzi Scheme
	Conception of the second	Chisengu	a service and		Chambula
			A second s		Chimphanje
1	Chiwaula	Lima Com. School	1)		Mbilisao
RGCs by SHS		Mwanya	2.4		Kacholola
		and a starting			Kalingindi
					Wilison
					Chalubilo

### Table 14-6 Electrification Priority of Project Packages by Province (4/12)

Provincial Ranking	1	2	3	4	5
Substation	Mbereshi	Mbereshi	Nchelenge	Nchelenge	Samfya 2
District	Nchelenge	Nchelenge	Nchelenge	Nchelenge	Samfa
	Mwansabombwe	Chipashi Island	Kambwali	Nile Kapambwe	Lubwe
	Chipepa	Shabo (Kapambwe	Mubamba	Kenani	Mbilimamwenge
	Mbereshi	Kanyembo	Kabosha	Mabo Kafutuma	Mundubi
	Mukamba		Nchelenge boma	Mwatishi Farm block 2	
RGCS by DL	Salanga		Kashikishi	Kabole	1
	Lufubu		Nshinda	Mununga	
	Chipunka		Kampampi (Chipakila)	Kabuta Central	S
			Chilongo (Mtepuke)	Kaputa	
	Chama		Lukwesa	Kaputo	
RGCs by SHS	Kalamba	3			3
	Muyembe				1

Provincial Ranking	8	7	8	9	10
Substation	Mbereshi 1	Samfya 1	Samfya	Kawambwa Tea	Mbereshi 1
District	Mwense	Samfa	Samfa	Kawambwa	Mwense
	Mwense	Chinsanka	Mano	Township	Mulundu
	Musangu	Katanhsya		Katungulu	Kashiba
	Lubunda	Mabo-Ninge		Mushota	Mutima
POC- burDI	Mulonga	Twingi		Mukuma	Kanyemba
ROUSDYDL	Lukwesa			Chama	Chibondo
	Mumpolokoso		1 1	Lengwe	Kabila
	Kapala			Mufwaya	2 Mar 202
1 K	Mununshi				1 States
RGCs by SHS	Chibwe		Ndoba	Kanengo	Muchinga
			Mibenge	Chibote	Katuta

Provincial Ranking	11	12	13	14	15
Substation	Samfya 2	Nchelenge 1	Nchelenge 1	Chipili	Samfya 1
District	Samfa	Chiengi	Chiengi	Mansa	Samfa
	Kasaba	Puta	Chienge	Mwenda	Kalimankonde
	Mwansakombe	Kalobwa	Lambwe Chomba	Chipili	Bwalya Mponda
DCC- LUDI	Mwewa	Kalembwe	Lupiya	Luminu	Kapilibila
ROUSDYDL	Isandulula Peri-urban (	Mukunta	Kasembe	Mukonshi	Kasomalunga
	Miponda	Kafulwe	Mwabu	Mutipula	Konikalila
		Sambula	Kampinda		Nsamba
RGCs by SHS				Mutwewankoko	
		1			1.1

Provincial Ranking	16	17	18
Substation	Chipili	Mansa	Mansa
District	Mansa	Mansa	Mansa
	Munshinga	Ntoposhi	Mulumbu
	Masonde Farming Block	Mutiti	Chintu
	Mano	Kabunda	Mikula
RGCs by DL	Kalaba	Kapanda	Kasongwa sub borna
Sector Brancher Ma			Milambo
			Kundamfumu
)i []			Mulumbi
	Chisunka	Mwanachama	Kasoma lwela
	Mbaso	Bukanda	Lukola
	C. C	1.0 10 0.000	Kalasa kando
RGCs by SHS			Mansa Ressettement Scheme
	5		Kalyongo
			Chipete

### Luapula Province

Table 14-6	<b>Electrification Priority of Project Packages by Province (5/12)</b>
	Lusaka Province

Provincial Ranking	1	2	3	4	5
Substation	Kafwe Town	New SS at Chilundu	Coventry	Leopard's Hill	New SS at Chilundu
District	Kafue	Luangwa	Lusaka	Chongwe	Luangwa
1	Kabweza	Boma	Mwembeshi mano	Nankaga	Rufunsa
	Manyonyo	Kapoche	Ipongo	Kapongo	Luangwa Bridge
	Tukunka	Mwalilia	Kasupe	Lishiko	and the second
		Katondwe	Kamano	Chinkuli	
	1	Chitope	Chowa	Katoba	
	1	Kaunga	Chipapa VC	Shantumbu	
RGCs by DL		Mphuka	Chinyongola	Chinyunyu	
		Manuele		Nyamanongo	2
	04 C	Kakaro		Chivota	
		Chiriwe		Mwalumina	2
	34	Luangwa Sec		Lwimba	
	5			Mwachilele	3
	5-			Nchute	12+
500 L 500		Kavalamania	Muswishi		Nvalugwe
RGCs by SHS					Shikabeta

Chunga

		Northe	ern Province (1/	2)		
Provincial Ranking	1	2	3	4	5	1
Substation	Isoka	Isoka	Kasama 1	Luwingu	Nakonde	
District	Isoka	Isoka	Kasama	Luwingu	Nakonde	111
	Ntipo Kafwimbi	Chisanga	Njeke Basic School	Nyela		
1000	diagona	and a second strength of	Namakwi	Lupili Market	Chilolwa	- 11
RGCs by DL			Musa	Etipone Basic School and Chief Chipelo's	liendela	
1 m 2 m 1	a			Makalongo Basic School	Wulongo	
					Kantongo	11
	Muliro	Musanya	Lwabwe		Chisanzu	11
Provincial     1       Ranking     1       Substation     Isok       District     Isok       RGCs by DL	Chibale	Peleti	1.000	- 12	Senka	11
		Kalulu	a second second		Shemu	
1.82		Kalela			Sumbi	1

Kayambi

### Table 14-6Electrification Priority of Project Packages by Province (6/12)Northern Province (1/2)

Provincial Ranking	6	7	8	9	10
Substation	Luwingu 3	Mbala	Luwingu 2	Mporokoso	Luwingu 1
District	Chilubi	Mbaia	Chilubi	Mporokoso	Mporokoso
A Maria Malancia	Chiwele	Mpulungu Central	Mwiima	Nsama Sub Borna	Mukupakaoma
	Kashitu	Isoko	Kantanta	Chishamwamba	Chitoshi
	Chilamba	Chilumba	Chichile	Katutwa	Mulenga M
POC- IN N	Kambashi	Musende	Chitupila	Malama	Menga Basic School and Clinic
ROUS DY DE	Mule	Posa, Muzabuwera, Mupata (Itim	Kawasa	Kambobe	Laurent Chita Basic School and C
	Kapofu	Isunga	Katamba	Mporokoso	
	Mbabala	1.000	Chabukasansha	Munwa	
			Maela	Chiwala	1
		Kasaba Bay			A 10
	1	Vyamba	8		
		Tanganyika	£		
RGCs by SHS		Mumila		140.	14
1233418.08		lyendwe			
	15-	Chisha			
		Chitimbwa RHC			

Provincial Ranking	11	12	13	14	15
FIRR Ranking	61	62	66	70	77
Substation	Isoka	Kasama 2	Luwingu 3	Luwingu	Mporokoso
District	Isoka	Mporokoso	Chilubi	Luwingu	Mporokoso
	Sansamwente	Sikapila	Kawena	Bwalinde	Chalabesa
	Kawngu	Kapatu	Kanama	Tolopa Basic School	Mutotosho
	COLUMNS .	Malaila	Kanama	Nsanja Basic School	Chewe
		Z Chanda	Nsumbu RH	Chikumanino Market	Kalabwe
RGCs by DL		17.0000000	Bukotelo	Chief Tungatis Palace and Scho	Sunkutu
1990 (Deletion) (270) (deletion)				Kapisha School	
				Ipusukilo Mission	
				Chaitungubala Basic School	
				Lwena Basic School and Cilnic	
RGCs by SHS					
	2		100 C	11.0	

Provincial Ranking	16	17	18	19	20
Substation	Luwingu 2	Isoka 1	Isoka 1	Mpika	Luwingu
District	Chilubi	Isoka	Isoka	Mpika	Luwingu
	Matipa	Thendere	Mulekatembo	Mufubushi Resettlement	Kanfinsa
	Mofu R4			192	Mufili Basic School
Sector and the	Mubili				Saili Basic School
RGCs by DL	Lwata				Chitofwe Basic School
1.1	Isangano				Lwenge Basic School
				4	Tungati Basic School and Clinic
	1			2000	Nsombo
RGCs by SHS				Nabwalya	Musungu
		201			Kalundu

## Table 14-6Electrification Priority of Project Packages by Province (7/12)Northern Province (2/2)

Provincial Ranking	21	22	23	24	25
Substation	Chinsali	Kasama	Kasama	Mpika	Mpika
District	Chinsali	Kasama	Kasama	Mpika	Mpika
	Ketani	Kachuma	Henry Kapata	Katongo Kapala	Katibunga
	Chilanga	Lukulu RR Scheme	Ngoli	Lucembe	
	Mwalala	Chilubula	Mwamba	Kanchibiya Farm Block	
RGCs by DL	Nashinga	Chishimba			
	Masongo	Munkonge			
	1	Chiombo			
		Lukulu North			
	Konja	1	Rosa	Chikakala	Lwanya
	Malekani		Kapolyo	Kopa	Mukwikile
	Kabanda		Chimbola		Mukungule
0	Chifulo		M Mfino		
	Mumba		Chamfubu		
DOC - HUSUS	Nkulungwe		Ndasa		
ROUS by SHS			Nsampa		
			C Weyaya		
			Chimba		
			Makasa		
			Chitimukulu		
			Chisau		

Provincial Ranking	26	27	28	29	30
Substation	Mpika 1	Chinsali	Mpika 2	Mpika 1	Isoka 1
District	Mpika	Chinsali	Mpika	Mpika	Isoka
	Chalabesa Hospital	Kasomo	Muwele	Mbati	Kampumbu (Kamrinsu)
	Mpepo HC, Sch, Palace		Mupamadzi Farm Block	Chambeshi Sch, Mkt	
RGCs by DL	Mansha Farm Block		Chiunda Ponde	Mayuka	
				Kabinga	
H.				Fube	
		Mbesuma area			
RGCs by SHS		Chungulo			
		Kampemba			
	S	Shimwalule			

Provincial Ranking	31	32
Substation	Chinsali	Mbala
District	Chinsali	Mpulungu
	Lundu	Kavumbo
	Chitimba	Uningi
RGCs by SHS	Chikanda	Chalele
	Chimbwese	Chimula
	Lameck	Kaka
	Chimbele	St-Pauls
	Lufila	Kawimbe
	Musonko	Mwamba
	Kabangama	
	Chilombo	
	Shiwan'gandu area	
	Mulakupikwa	
		Kalukanya
RGCs by SHS	Matanga	
RGCs by SHS		Kaluluzi
		Mwiluzi
		Mpande

### Table 14-6Electrification Priority of Project Packages by Province (8/12)North-western Province

Provincial Ranking		2	3	4	5
Substation	Solwezi	Mwinilunga 1	Solwezi	New SS at Kabompo	New SS at Zambezi
District	Solwez	Moinilunga	Solwezi	Kabompo	Zambezi
	Mushindomo	1	Kimsala	Kaula	Chinyngi
	Tumva		Kamalamba	Kawanda	LIVOVU
			Kangwena	Ndunga	Kashona
RGCs by DL		2 m	Kibanza	Kashinakazhi	Kakoto
			Chikola	Lusonia	
				Manyinga	
		6		Chiteve	
		Salujinga			Lukunyi
DOC NUCLO		Jimbe			
mous by ono		Nyakaseya			
		Katweku			
RGCs by		Ikelenge			
Mini-Hydro					

Provincial Ranking	8	7	8	9	10
Substation	Zambezi 1	New SS at Mwinilunga	New SS at Mwnitunga	New SS at Zambezi	New SS at Mwinilunga
District	Zambezi	Mwinilunga	Mwinilunga	Zambezi	Mwnilunga
and the second se	Matorido	Ntambu		Dipalata	Kawiku
1	Miomboy	Samuteba		Likungu	Mukangala
	Muvembe	Chisengisengi		Chitokołoki	Lwakela
DOC NUT	Mwanpe			Ishima	
nous by bu				Mpid	
				Kakeki	
				Nyakulena	
-				Lwatembo	
	Nguvu	Tornu		Lunywe Basic School	
BOC- NUCLE	Kavenge	Lumwana		Chiseng	
ROCS by ono				Katontu	
				Chizuzu	
1000		Kanyama	Mwiniunga BOMA		1
RGCs by		Kakoma			
Mini-Hydro					
Contraction of the					

Provincial Rapking	11	12	13	14	15
Substation	New SS at Mwinilunga	New SS at Muturnitwe	Kasempa	Solwezi	New SS at Mumbezi
District	Mwiniunga	Mutumbwe	Kasempa	Solwezi	Solwez
	Chbwka	Mushima	Mateko	Kapji	Mukumbi
	Mudunyama	Kikonge	Nselauke	Musaka	Mumbezi
	Kanongesha	Lalafuta	Dengwe	Mulonga	Musele
	Kampenba	Matushi	Kamakuku	Kalilele	Shilenda
l l l l l l l l l l l l l l l l l l l	Chwoma	Kashma W	Kalengwa	Sanda	
	Kamapanda	Kaminzeke	Kashima E	Mujena	
RGCs by DL		Munyambala	Kalombe	Mumena	
		Milup			
		Musonweji			
		Shukwe			
	19	Kakiakasa			
		Chowe			
		Kamabuta	2011 - 11 - 11 - 11 - 11 - 11 - 11 - 11		
DOC+ NUCLO		Myamdafuka	Myombe		
ROUS by SHO			Lunga		
HGCs by Mini-Hudeo					
100000					

Provincial Ranking	16	17	18
Substation	New SS at Chavuma	New SS at Kabompo	Kasempa
District	Chavuma	Kabompo	Kasempa
	Sanjongo	Sakandingo	Kabele
	Kakhoma	Samende	Kantenda
	Kalombo	Mukolo	Shivuma
	Lingundu	Nyangwali	Moungu
POC LUDI	Lukolwe	Chinkonkwelo	
ROUSDYUL	Kamisaniba	Dongwe	
	Chinwandumba	Chivengele	
	Kambuya		
	Mandalo		
	Chambi		
	Chivombo		Kalongwa
	Mukelangombe		Maako
RGCs by SHS	Nyathanda		Kamakeoh
			Lubofu
			Kanooo
RGCs by			- Mail 68 0
Mini-Hydro			

# Table 14-6Electrification Priority of Project Packages by Province (9/12)Southern Province (1/2)

Provincial Ranking	1	2	3	4	5
Substation	Muzuma 2	Victoria Falls	Muzuma 1	Muzuma 3	Muzuma 1
District	Kalomo	Livingstone	Namwala	Namwala	Namwala
1	Kauwe	Sinde	Baambwe	Mbeza	Moobola
		Mulala	Ngabo	Niko	Namakaka
RGCs by DL	5	Sakurita	The second se	Ichila	Itapa
		Majeledi		Bweengwa	Muchila
2		Katubia	1		Chilala
1		Smachuma	Kalundu	-	Namusenga
		Chilizya	Shapopa		Luchena
	2	Kananga	No.57 (Lubanda)	1£	Mbila
		Inonge	Itumbi		Mabombo
RGCs by SHS	24	Zimba Hills Settlemen	ts		
a service of the service of the	200	Napenzi			1
	1	Malimba			2
		Nyawa Central			3
	33	Simango			

Provincial Ranking	6	7	8	8	10
Substation	Mazabuka	Muzuma 3	Mazabuka 1	Chilundu	Mazabuka 1
District	Mazabuka	Namwala	Monze	Siavonge	Monze
	Ngwezi	Nakamboma (Namakaka)	Njola Camp	Chiawa Central	Namakube
	Nwanachmgurela	Makaba	Kaumba	Mafungautsi	Bbombo
	Naluama	Simaubi	Ntambo Agricultural Camp	Mugula mano	Hakasenke
	Maggobo	Nalutanga	Mujika	Mulila Nsolo	Namilongwe
	Neganega	Kachenge	Chisuwo Agric Camp	Chisakila	Haatontola
		Mangonza	Manungu A	Mulangwa	Malende
DCC- NUDI	0		Manungu B	A CONTRACTOR OF CONTRACTOR	Kazungula
RGCS by DL	§		Lweeta Agric Camp	£	Hufwa
	21		Chlyobola Agricultural Camp		Katimba
	2		Muzuri (Kamuzya East)	5	Simeweendengwe
	1		Namateba Agricultural Camp	1 <sub>1</sub>	Silwili
	2			0	Hamusankwa
	2				Sikalinda Resettlement
				· · · · · ·	Hamapande
Deer Lucius	Mbaya Musuma			Kanyangala	
ROUS BY SHS	Upper Kaleya				

Provincial Ranking	11	12	13	14	15
Substation	Muzuma 2	Sinazongwe	Muzuma 1	Mazabuka 1	Victoria Falls
District	Kalomo	Sinazongwe	Namwala	Monze	Livingstone
	Nkandanzovu	Chipepo	Kantengwa	Kayuni	Makunka
	Darphan	Sinakaimbi	Aler	Keemba	Ma Hundred
	Kinnertone	Munyati		Chungu Agric Camp	Sekute
	Bbilili	Siacheka		Nteme	Mubalu
	Simakakata	Chiyabi		Malundu	Mambova
	Mutala	Sinamalima		Bankaila	Mahelituna
1 K 1 I I	Chikoli	Chabulabwambe	-		Mandia
are stad		Siabwengo			Mayumbelo
RGCs by DL		Siambabala			
	)	Mudonki			2 ····
	1	Mwalede			
	2	Nangombe			1
		Siamejele			
	1	Hangoma			1
		Siampande			
		Malyango			1
		Siangwaze			
	Nguba	Mwerya	Muwezwa		Sinde
11111111111		Mundoza	Makunku		Ngwezi Mataki
RGCs by SHS	5	Simuloongo	Banamwaze		
and the second	1	Nzala			1
	23	Chaposwa			5

# Table 14-6Electrification Priority of Project Packages by Province (10/12)Southern Province (2/2)

Provincial Ranking	16	17	18	19	20
Substation	Muzuma	Muzuma	Chilundu	Victoria Falls	Muzuma
District	Choma	Choma	Siavonge	Livingstone	Choma
	Luyaba	Kanchomba	Munyama	Manyemunyemu	Kasukwe
	Kanchele	Moyo	Sikoongo	Siadazya	Kabimba
	and the second s	Singani	Gwena	Kasiya	1
	P	Mukamunga	Chaanga	Zangala	
DCC+ bu DI	1	Manyati	Sianyoolo	Siambelele	
RGUS BY DL		Gamela	Namoomba	Natebe	
	21 N	a second s	Malengo	Katapazi	<u></u>
	4		Ibbwemunyama	Sichilore	1.
	10		Syangwemu	Simwizi	1
· · · · · · · · · · · · · · · · · · ·	1		Dibbwi		1
DCC- NUCLO					Nachanowe
ROUS DY SHS	-				3

Provincial Ranking	21
Substation	Maamba
District	Sinazongwe
	Kabanga
	Napatizya
	Muuka
	Siameja
	Dengera
	Masuku
RGCs by DL	Mweemba
	Kafwambila
	Siansalama
	Namafulu
	Siatwiinda
	Chilele
	Sulwegonde
	Ngoma
GUS DY SHS	

## Table 14-6Electrification Priority of Project Packages by Province (11/12)Western Province (1/2)

Provincial Ranking	•	2	3	4	5
Substation	Senanga	Mongu 2	Mongu 2	Mongu	Senanga
District	Senanga	Senanga	Senanga	Mongu	Senanga
Sector Street Street	Lui-mwemba	Sinunga	Naloio	Nangula	Ngundi
	Liangati	Liliachi	Nangucha	lkabako	Silumbi
		Nasilimwe	Kataba	Kaande	Songa
RGCs by DL		Nasilimwe	Sianda	Mawawa	
				Mweeke	
		14 H		Siwa	1 ( )
			and designed as a second second	Namitone	
RGCs by SHS		Sumi	Nangoma		

Provincial Ranking	6	7	8	9	10
Substation	Senanga 3	Kaoma	Kalabo	Mongu	Senanga 2
District	Senanga	Kaoma	Kalabo	Mongu	Shangombo
	Nande	Kazabami	Makuku	Kasheke	Mulele
	Sitoti	Kalumwange	Sishekanu	Likutwe	Mutomena
	Beshe	Shitwa	Lwanda	lkwiichi	
RGCs by DL	Matebele	Namaloba	Mbanga	Ushaa	+ 1
were parameters	Namatoya		Nangili	Sitoya	110
		5 5 5	2	Mombo	
		-3.0		Sikusi	
		Kabapupu	Malasha		
			Liuwa		
			Mishuwundu		
RGCs by SHS			Kuuli		
		(F));	Munde	2	
		112	Mulinga		- 6
			Likapai		

Provincial Ranking	11	12	13	14	15
Substation	Senanga 3	Kalabo	Senanga 2	Mongu 1	Kaoma
District	Senanga	Kalabo	Shangombo	Mongu	Kaoma
	Likondwana	Ndau	Nangweshi	Mukangu	Shinono
	Kalengola	Kama	Kaania	Luandui	Namilaugi
	Kaunga Lueti	Ngangu	Sioma	Nalikwanda	Longe
RGCs by DL	Keyana	Таро	Palace	Nakato	Mukandamina
	Namono	Mulundumano	10	Kalundwans	Kankwanda
				Lukweta	Nkeyama
		2	-	Simulumbe	
		Mwandi		Litawa	Shishamba
		Lulambo		Liande	Kalale
				Namengo	Lombelombe
RGCs by SHS				Contraction of the local sector	Chiluli
		11 Q			Mimpongo
				1	Kandende
					Njonjolo

Provincial Ranking	16	17	18	19	20
Substation	New SS at Lukulu	Mongu 1	Senanga	Sesheke	New SS at Lukulu
District	Lukulu	Mongu	Senanga	Sesheke	Lukulu
	Lukulu Township	Kaba Hill	Namabuka	SITULU	Simakumba
	Mwanambuyu	Kaungeta	Mata	Mwandi	Namayula
	Mwito	Lukalarrys	Mwanamwalye	Katima	Mitete
	Lishuwa	Miulwe	Sibukali	Mabumbu	Kakulunda
	Winda	Nalwei		Lusinina	
RGCs by DL	Muyondoti	Ndondo		Lipumpu	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Kawaya	Nasange		12.00	
	Lukau	Nandombe			174.8°
	Naimbu	Loona			- 12 [ 7
		Ndanda			
	1				Watopa
RGCs by DL	T				Kakwacha
RGUS by SHE		1.S.			Lupui
					Chinonwe

## Table 14-6Electrification Priority of Project Packages by Province (12/12)Western Province (2/2)

Provincial Ranking	21	22	23	24	25
Substation	Senanga 1	Kaoma	Kalabo	Kaoma	Sesheke 1
District	Shangombo	Kaoma	Kalabo	Kaoma	Sesheke
	Shangombo	Luamba	Tuuwa	Mayukwayukwa	Magumwi
	Kaunga Mashi	Kahokoto	Sikongo	Kapili	Sichili
	Sipuma	Kafunda	Liumba	Mangango	Loazamba
	Natukoma	Mushiwala	Liumena	Naliele	Bwina
DOG- NUN	Nambolomoka	Mbanyutu	Siluwe	Lukena	Mulobezi
RGCS by DL	and the state of the	Nkenga	Kalumbu	Lyamunale	and the second se
		Namasheshe	Loke West	Nyango	
		Mukunkiki	Salunda	and the second sec	
		Lubuka	LULANUNYI		1
		Lui	Nyengo		
		Nyambi 2	Mbalala		Senamba
		Afumba	Muyumbana		Mushukula
		Nakayembe	Namatindi		Kasompa
RGCs by SHS		Namando	Kalenga		6 18 St.
1		Mulwa	Lutwi		
	V		Sihole	14	14
			Lueti		

Provincial Ranking	26
Substation	Sesheke 2
District	Sesheke
	Nawinda
	Luampungu
	Sinjembela
	Lusu
RGCs by DL	Imusho
	Ngweze
	Mazaba
	Silumbu
	Kalobolelwa
RGCs by SHS	Kaloboleiwa

Annual Project Phase	FIRR	Substation	Province	Feeder & Package	Project Package Cost (USS)	Cumulative Cost	Project Package	Project Package
T. Departer 11622	1	lsoka	Northern	1 - 1	1,663,395	1,663,395	22.0%	59.9%
	2	Azele	Eastern	2 - 2	1,899,938	3,563,331	20.5%	57,5%
	3	Kapiri Mposhi	Central	2 - 2	2,701,298	6,264,627	18,1%	50.2%
	4	Kansunswa	Copperbelt	1 - 8	4,522,824	10,787,451	13.2%	35.1%
1 28	5	Azele 2	Eastern	2 - 1	2,596,212	13,383,663	12,1%	34.1%
	0 7	Azele	Eastern	1 - 2	1,608,120	14,991,783	12.0%	33.8%
2000	2	Azele 3	Northern	2 - 1	3,355,382	20 371 824	11.0%	32.4%
2008	9	Azele 1	Fastern	1 - 5	3 800 812	23,972,238	11.0%	31.1%
	10	Ndola 1	Copperbelt	1 - 4	3.675.672	27.647.908	10.8%	29.5%
	11	Lundazi	Eastern	3 - 2	2,733,588	30,381,496	9.5%	26.1%
	12	Chipata	Eastern	2 - 2	4,697,181	35,078,677	9.2%	26.3%
	13	Mbereshi	Luapula	1 - 3	3,243,548	38,322,225	9.1%	22.2%
	14	Azele 5	Eastern	1 - 3	7,189,452	45,511,677	8.7%	25.6%
	15	Kasama 1	Northern	1 - 2	4,621,185	50,132,862	8,7%	24.9%
1	10	Senanga	Western	1 - 1	2,146,932	52,279,794	8.5%	23.3%
- Fid	10	Viture	Connarhalt	2 - 1	1,804,408	56 772 102	8.4%	23.8%
	10	Azele 7	h	1 - 3	4 538 160	61 310 352	8.2%	23.8%
	20	Luwingu	Northern	3 - 3	1,395,468	62,705,820	7.7%	23.2%
	21	Mpongwe	Copperbeit	3 - 2	2,129,151	64,834,971	7.6%	22.8%
Desire in	22	Mongu 2	Western	2 - 3	6,104,929	70,939,900	7.5%	22.1%
2010	23	Nchelenge	Luapula	1 - 4	2,452,620	73,392,520	7.5%	19.1%
	24	Azele 3	Eastern	2 - 1	2,509,598	75,902,116	7.5%	22.6%
1.18	25	Azele 1	Eastern	2 - 2	4,684,662	80,586,778	/_1%	21.9%
1.00	20	Murphus	Costral	1 - 3	4,321,732	84,905,011	7.0%	20,8%
	28	Nchelenge	Luanda	2 - 4	4 452 947	92 080 198	8.8%	19.1%
	29	Nakonde	Northern	1 - 2	4.141.237	96,221,433	6.7%	16.6%
2010 2011 2011 2011 2011 2011	30	Mongu	Western	1 - 4	3,890,700	100,112,133	5.9%	19.0%
	31	Muzuma 2	Southern	2 - 1	3,703,968	103,816,101	5.6%	17.7%
	32	Luwingu 3	Northern	2 - 5	4,202,498	108,018,597	5.5%	17.4%
	33	Samfya 2	Luapula	2 - 2	2,752,596	110,771,193	5.0%	14.4%
	34	Luano	Copperbelt	1 - 3	2,671,892	113,443,084	4.9%	15.5%
	35	Mbereshi 1	Luapula	2 - 5	6,8/3,03/	120,316,122	4.9%	15.2%
2011	30	Bosculo	Control	2 - 4	(,000,32/	127,970,449	4.8%	12.7%
	38	Msoro	Eastern	1 - 1	1,486,296	130 062 361	4.6%	14.4%
	39	Azele 4	Eastern	2 - 3	5,708,616	135,770,977	4.6%	16.4%
	40	Kabwe 1	Central	1 - 3	4,443,228	140,214,205	4.5%	16.0%
- H	41	Solwezi	North-Western	1 - 1	3,196,692	143,410,897	4.5%	16.3%
	42	Senanga	Western	3 - 3	4,424,004	147,834,901	4.4%	15.6%
1	43	Luwingu 2	Northern	2 - 5	6,526,008	154,360,909	4.4%	16.3%
	44	Victoria Falls	Southern	3 - 1	3,027,377	157,388,285	4.4%	16.0%
	40	Kapwe 2	Connorbalt	1 - 2	2,904,500	103,293,294	4.3%	10.8%
	40	Senanoa 3	Western	1 - 2	5,284,008	172 101 311	4.3%	15.0%
2012	48	Ndola	Copperbelt	1 - 3	4 725 758	176 827 067	4.1%	14.8%
	49	Kitwe	Copperbelt	2 - 3	3,237,335	180,064,402	4.0%	11.9%
	- 50	Samfya 1	Luapula	2 - 3	4,234,788	184,299,190	3.9%	13.2%
	51	Samfya	Luapula	1 - 1	1,580,313	185,879,504	3.7%	14.6%
	52	Muzuma 1	Southern	2 - 1	4,833,777	190,713,281	3.6%	14.0%
	53	Mwinilunga 1	North-Western	1 - 0	5,725,580	196,438,861	3.6%	14.5%
	55	мрогокозо	Ivormern	2 - 0	5 207 872	203,543,233	3.0%	14.3%
	58	Mhereshi 1	Luarula	1 - 3	5 025 125	214 268 031	3.4%	12.7%
	57	Samfva 2	Luapula	1 - 3	4,748,220	219.014.251	3.3%	12.4%
2013	58	Kaoma	Western	4 - 2	3,768,420	222,782,871	3.2%	13.4%
	59	Nampundwe	Central	1 - 5	6,848,699	229,631,370	3.1%	13.2%
	60	Luwingu 1	Northern	1 - 5	7,400,916	237,032,288	2.9%	13.2%
1	61	Isoka	Northern	3 - 2	4,738,824	241,771,110	2.9%	12.9%
	62	Kasama 2	Northern	1 - 4	7,680,980	249,452,070	2,8%	12.3%
1	84	Kalabo	Southorn	1 - 3	0,830,774	200,287,844	2.170	12.1%
	85	Pensillo 1	Central	2 - 5	5 348 758	265 987 560	2.1%	12.5%
	66	Luwingu 3	Northern	1 - 3	3,819,528	269,787,088	2.6%	13.0%
2014	67	Lundazi	Eastern	1 - 2	4,265,265	274,052,353	2.3%	11.5%
	68	Mongu	Western	2 - 5	7,319,376	281,371,729	2.3%	12.3%
	69	Nchelenge 1	Luapula	1 - 3	4,821,120	286,192,849	2.3%	10.1%
	70	Luwingu	Northern	1 - 4	7,722,972	293,915,821	2.2%	12.3%
	/1	Senanga 2	Western	2 - 2	2,739,744	296,655,365	2.2%	11.8%
	72	Kabwe	Central	2 - 0	0,408,5/9	303,114,135	2.1%	11.0%
	74	Kaniri Mooshi	Central	1 - 6	5 897 704	316 630 374	2.0%	11.0%
	75	Kalabo	Western	2 - 1	3,550,455	320,180,829	1.8%	11.4%
2015	76	Senanga 2	Western	1 - 3	3,328,452	323,509,281	1.8%	10.2%
in the second second	77	Mporokoso	Northern	1 - 5	4,094,712	327,603,993	1.7%	10.6%
	78	Muzuma 1	Southern	1 - 4	7,543,983	335,147,856	1,7%	10.1%
	79	Mongu 1	Western	1 - 4	9,228,684	344,376,540	1.6%	11.1%
	80	Lundazi 1	Lastern	1 - 3	4,215,024	348,591,564	1.5%	10.8%
	81	Mazabuka	Southern	1 - 2	4 470 848	358 402 504	1.0%	3.0%
	83	Luwingu 2	Northern	1 - 5	7.825.099	388 028 582	1.5%	11.0%
	84	Mfuwe 1	Eastern	1 - 5	4,996,989	371.025.571	1.5%	10.7%
	85	Solwezi	North-Western	2 + 4	2,663,712	373,889,283	1.5%	10.4%
2010	86	Kafwe Town	Lusaka	1 - 3	1,582,832	375,271,915	1.5%	8.2%
	87	Mumbwa	Central	3 - 4	6,012,576	381,284,491	1.3%	10.2%
	88	Lundazi	Eastern	2 - 7	8,256,276	389,540,767	1.2%	9.1%
	89	Isoka 1	Northern	1 - 1	4,628,988	394,169,755	1.2%	9.5%
	- 90	Muzuma 3	Southern	12 - 6	5.251.284	399.421.039	1.1%	8.4%

 Table 14-9
 Annual Project Phases by 2030 (1/2)

Piped Data         Piped Data         Control         Piped Data	Annual	FIRR	Substation	Province	Feeder L	Project Package	Cumulative Cost	Project Package	Project Package
20         1000 f.         2010         2.412 22         2.0200 H.         1111         312           2017         24         Narde L.         2.810         1.04         4.910         1.04         4.910           2017         24         Narde L.         2.810         1.050 0.96         1.050 0.96         1.050         4.910         4.910           201         Macub         Zeneral         1.0         6.413 0.910         4.910         4.910           201         Macub         Zeneral         1.0         6.413 0.910         4.910         4.910         4.910           2018         Macub         Zeneral         1.0         6.515.91         7.910         4	Project Phase	Ranking	in the second se		Package	Cost (USS)	(USS)	FIRE	EIRR
90         Asia 4         State         S		41	Lugno 2	Northam	3 . 1	4 410 703	410,410,114	1.1%	0.0.1
917         94         New Size (Loko)         Avesam         1 - 8         6474 (29)         333 (24) (26)         10%         6455           93         Monal a         Varian         1 - 10         102 (20)         443 (26) (20)         10%         6455           93         Manuarg 1         Lange 3         2 - 4         105 (20)         443 (26)         0 - 5         655           93         Lange 3         Lange 3         2 - 4         105 (24)         444 (24)         0 - 6         10%         10%         10%         10%         10%	2017	01	Arele 4	Eastern	1 . 4	11 500 056	421 010 100	1.0%	10.15
Bit         Morgan         Varian         2 - 8         (0.251)         44.524.34         (0.25)         44.524.34         (0.25)         44.524.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.540.34         (0.25)         45.550.350.350.350.350.350.350.350.350.35		04	New 55 at Lukulu	Wastern	1.5	8 474 976	430 304 165	1.0%	6.9%
91         Myka         Northerm         1         1         199220         4250         92         92           20         Multimizing1         Lange         2         1         1         2         1         1         2         1         1         1         2         1         1         2         1	1 100000 38	- 98	Mongu 1	Western	2 - 8	10 201 680	440,505,848	1.0%	10.2%
27         Muchain Description         1         7         6.2027         4.202         0.1%		98	Mpika	Northerm	1 + 1	1,760,209	442,356,055	0.9%	9.5%
38         Netwing 1         Jack Ja         2         4         7         7         16         0.1%         0.1%         0.1%           2018         101         Marsha 1         Lahm         2         6         0.550 16         0.7%         0.1%           101         Magas Coperate         2         6         0.555 06         0.755 06         0.55 06 </td <td></td> <td>97</td> <td>Mkuishi</td> <td>Central</td> <td>3 + 7</td> <td>6,928,735</td> <td>449,284,790</td> <td>0.5%</td> <td>7.1%</td>		97	Mkuishi	Central	3 + 7	6,928,735	449,284,790	0.5%	7.1%
201         100         Mouse         Eastern         1         -         7 <th7< th=""> <th7< th=""> <th7< th=""> <t< td=""><td>-</td><td>98</td><td>Nobelenge 1</td><td>Luapula</td><td>2 . 4</td><td>7,155,648</td><td>456,440,438</td><td>0.5%</td><td>6.3%</td></t<></th7<></th7<></th7<>	-	98	Nobelenge 1	Luapula	2 . 4	7,155,648	456,440,438	0.5%	6.3%
101         Marea         Image: Amount of the second of th		00	Luwingu	Northern	2 - 5	7,468,756	463,000,104	0.7%	9.7%
2018         010         Magnutu 1         Control         2         6         6.06.400         477.45.000         6.05         6.15         7.75           104         Magnutu 2         2         3         2.13	8	100	Mtuwe	Eastern	1 + 3	7,515,828	471,425,022	0.6%	9.5%
100         Magoca         Comparison         2         6         3.4.7.128         44.1.027         6.4.5         6.7.1.5           101         Christen         2         0         2.2.3.3.5.5         45.5.2.3.5.5         6.4.5         6.7.5.5           102         Kasawa         Northerm         2         0         2.7.2.5         459.2.4.3.5         6.4.5         6.7.5           101         Mayaa         Northerm         2         0         7.7.5.5         6.7.5.7.5         6.7.5.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         6.7.5         7.7.5         6.7.5         7.7.5         6.7.5         7.7.5         6.7.5         7.7.5         6.7.5	2018	101	Mazabuka 1	Southern	2 - 6	8,055,668	477,480,690	0.6%	7.7%
10:         Obrasia         Northerm         2         1         2.33545         483.24311         0.45         6.35           10:         Selection         2         1.0         2.00		102	Maposa	Copperbeit	2 + 4	3,617,138	451,097,826	0.4%	8.1%
104         Seriadga (107)         104 (107)         Seriadga (107)         104 (107)         105 (107)		103	Chinsali	Northern	2 + 1	2,330,585	483,428,411	0.4%	63%
103         Exama         Description         2         3         2         103         2         3		104	Senanga	Western	2 - 2	9,919,1/2	492,247,583	0.4%	\$75
100         Adama         Northerm         1         -3         0         13315         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 223         0.33         200 (00) 233         200 (00) 233		105	Kasama	Northern	2 - 0	7,077,132	499,324,715	0.4%	
102         MP24.3         Differim         2         3         Differing         11/2         Differing         2         3         Differing         0         Differing         0         Differing         0         Differing		106	Kasama	Northern	1 + 3	5,713,510	505.038,225	0.3%	8.7%
100         Max.u         District         3         1         2         3         3         1         3         1         3         1         1         0         0         2         1         1         0         0         1         0         0         1         1         0         0         1         1         0         0         1         1         0         0         1         0 <th0< th=""> <th0< th="">         0         <t< td=""><td>1.1.2</td><td>107</td><td>Mpika</td><td>Northern</td><td>2 - 3</td><td>5,137,329</td><td>510,175,564</td><td>0.3%</td><td>8.4%</td></t<></th0<></th0<>	1.1.2	107	Mpika	Northern	2 - 3	5,137,329	510,175,564	0.3%	8.4%
100         Description         1         0         <	1	108	Mpka	Northern	3 . 1	3.993.010	014,1/4,1/0	0.05	8.275
111         Obji         Diskola         1         4         4 421 481         515 508 30         0 45         0 45           112         Morebas         Certral         1         2         772/265         545 509 30         0 55         757           113         Mpla 1         Normer         1         2         772/265         545 509 70         0 75 <td>2019</td> <td>110</td> <td>Harris</td> <td>Concerteit</td> <td>1 . 6</td> <td>0 101 410</td> <td>437 100 370</td> <td>0.24</td> <td>7.3%</td>	2019	110	Harris	Concerteit	1 . 6	0 101 410	437 100 370	0.24	7.3%
112         Munches         certral         2         3         442/304         555(8)         0.55         0.55           114         Kites         Operated         3         6         7.721.33         550.971.028         0.75         475           110         Sethek         Weisem         1         -4         5.65.001         0.75         475           2000         Title         Chinda         Southern         1         -3         5.64.205         5.04.77.02         0.75         475           2000         Title         Chinda         Southern         1         -4         5.64.205         5.03.17.07         6.75         475           103         Mazanka I         Southern         1         -4         5.64.205         6.95.7         7.75           103         Formula         Southern         3         0         6.44.324         96.550.442         1.05.         6.75.7           103         Formula         Southern         3         1         7.021.46         650.4269         1.05.7         6.75.7           103         Mazanka I         Southern         3         1         1.021.46         650.4269         1.05.7         6.75.7		111	Choli	E LIANCE	1 . 4	4 431 563	531 563 933	-0.4%	6.4%
113         Mpsis 1         Normism         1         2         7:673-80         434,869-69         -0.95         7:97           110         Bethele         Weylam         1         -4         8:665.000         509.477,030         -0.95         6:455           111         Assa 6         Statem         1         -3         7:200.410         0.95         6:45           111         Assa 6         Statem         1         -3         7:200.410         0.95         0.95         6:45           110         Macana 2         Statem         1         -4         7:600.410         0.95         7:75         0.95         6:45         0.95         7:75           110         Macana 2         Southerm         1         -4         7:600.412         0.95         7:75         0.95         7:75         0.95         7:75         0.95	1 2	112	Mimbuch	Central	2 . 3	4 442 904	A36 004 837	-0.5%	675
114         Fine         Coperties         3         6         7/21/33         550/21/024         -0.75 <th< td=""><td>6</td><td>143</td><td>Moka 1</td><td>Northern</td><td>1 . 2</td><td>7 672 560</td><td>543.669.697</td><td>-0.5%</td><td>735</td></th<>	6	143	Moka 1	Northern	1 . 2	7 672 560	543.669.697	-0.5%	735
110.         Sentese         Western         1         4         8.09.500         250.477.00         -0.75         6.94.5           2020         117         Asta 6         Statem         1         3         7.260.541         57.51.01         -0.75         6.95.7           110         Chance         Statem         1         -3         7.260.541         57.51.01         -0.95.7         7.51.21         -0.95.7 </td <td></td> <td>114</td> <td>Kitwe</td> <td>Copperteit</td> <td>3 + 8</td> <td>7,121,331</td> <td>550,791,028</td> <td>-0.7%</td> <td>4.7%</td>		114	Kitwe	Copperteit	3 + 8	7,121,331	550,791,028	-0.7%	4.7%
10         Chungu         Southerm         1         2         240-200         200-301		115	Sesheke	Western	1 + 4	5,655,006	559,477,036	-0.7%	6.4%
117         Asyle 6         Exestim         1         3         7200441         675 351 033         -0 85         725 35           100         Musch zmillion         Carpora         Fastam         1         4         4440,444         44,250,417         -0 95         483           101         Fastam         1         -4         6445,244         964,255         -0 95         483           121         Mazahus 1         Santhem         3         0         6445,244         965,366,444         -105         755           123         Mazahus 1         Santhem         3         -1         10,214,265         0.05,024,027         -105         86,55           123         Hard Sant atompo         North Wretern         2         10,214,266         0.05,024,027         -105         86,57           120         Hard Sant atompo         Santhweiter         1         6         0.014,344         0.05,270         0.05,140,017         -105         0.05,140,017         -105         0.05,140,017         -105         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017         0.05,140,017		110	Chlundu	Southern	1 . 3	3 654 055	563,131,091	-0.9%	0.1%
2020         118         Musch Fam Blos         Central         1         5         7.527 202         677 216.85         -0 PK         615           10         Depuse         Fassuin 1         Central         1         -4         4.844.844         84.846.417         -0 PK         48.85           121         Mazahas 1         Southern         1         -4         6.432.142         956.366.42         -0 PK         7.85           122         Mazahas 1         Southern         1         -4         7.604.412         656.502.25         -1 DK         7.60           123         Mara 5.811.4440         Version         2         -1 DT 146         657.101.60         -1 27.5         677.101           123         New 5.811.4440         Version         2         2         5.752.726         453.466.417         -1 375.6         673.5           123         New 5.811.4440         Version         1         4         6.453.03         484.612         -1 375.6         673.5           123         New 5.811.4440         Version         1         6         6.453.03         484.612         -1 375.6         673.5           120         Lanal         Central         1         7         6.453.03<	Same 3	117	Azele 6	Eastern	1 - 3	7,260,541	570,391,932	-0.8%	73%
110         Ongota         Fasterni         1         4         64,84,355,165         550,125,250         0.05         715,151           121         Mazakuka 1         Southern         3         6         64,443,245         586,850,442         1.05%         615,155           121         Mazakuka 1         Southern         1         4         7,004,433         0.05,002,253         1.05%         617,650,012         1.15%         645,155           121         Maratika 2, Kabergo Konskiwstein         2         5         1.101,025         617,050,017         1.15%         645,155           123         Maratika 1, Kabergo Konskiwstein         2         7         7,021,164         657,950,021         1.15%         617,55         61	2020	118	Miushi Farm Block	Central	1 - 5	7,827,920	576,219,852	-0.6%	6.15
120         Fanala 1         Cantal         1         4         5.33:16         90.12; 590.42; 590         4.0 Pk         6.71:5           121         Muzuka 2         Southem         1         4         7.60:43; 690.442; 691.455         4.05:454         4.05:454         4.05:454         4.05:454         4.05:454         4.05:452         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:42         4.05:		110	Chipata	Fastum	1 - 4	6,540,554	864,760,416	-0.0%	A A K
121         Mazakuka 1         Southerm         3         0         6.448,246         996,880,844         1.0%         6.15           2021         Stanuka 2         Southerm         1         4         7,204,413         604,002,323         1.0%         645, 645,624,297           2021         125         New 3.5 at Lukuu Western         2         2         7,021,46         644,745,166         617,766,617         1.1%         6.15, 645,630,017         1.1%         6.15, 615,630,017         1.1%         6.15, 615,630,017         1.1%         6.15, 615,630,017         1.1%         6.15, 615,630,017         6.15,630,017         1.1%         6.15, 615,630,017         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,000         1.1%         6.15,730,0	8	120	Fensulo 1	Central	1 - 4	5,352,180	590,142,598	-0.9%	7.1%
122         Mutuch 2         Southern         1         4         7604 413         604 500 223         11 5%         765           2021         124         New S.S. at Kaborgo, North. Western         2         5         11 271 626         617 626 617         11 1%         617 626 617         11 1%         617 626 617         11 1%         617 626 617         11 1%         617 626 617         11 2%         618 617 626 617         11 2%         618 617 626 617         11 2%         618 617 626 617         11 2%         618 617 626 617         11 2%         618 617 616 617 616 617 616 617 616 617 616 617 616 617 616 617 616 617 617	a 2	121	Mazabuka I	Southern	3 - 9	6,448,248	596,590,844	-1.0%	61%
123         Chrval         Northam         3         1         1.252.400         606.024.007         -1.65         6.65           2021         125         New 5.5 at Lotu, Western         2         2         7.012.146         615.766.001         -1.55         615.           126         Stranger         Southerm         1         -7         6.657.260         615.46         615.46           127         Kabwe         Carrela         1         -7         6.657.102         63.746.60         -1.55         615.           128         New 5.3 Larbetz         Darbiv/Western         1         -6         6.657.02         63.746.60         615.         65.5           120         Terminal         Southern         1         -6         6.657.86         65.7		122	Mutuma 2	Southern	1 - 4	7,909,413	604,500,257	+1.0%	7.0%
124         New 35 at Laku,         2         2         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         817/20/201         11/21/202         61/202		173	Chinsali	Northern	3 - 1	1,524,740	606,024,997	-1.0%	8.4%
2021         126         New 5.8 at Lattue         Vester         2         2         7,012,146         624,120         1.55         6.15           127         Kalwe         Certral         1         -7         6,281,334         631,346,407         1.55         6,453           128         New 5.3 At Zarbez         Nort-Western         1         -4         6,453,334         449,703,346         635           129         Zarbez         Nort-Western         1         -6         6,453,334         449,703,342         1.65         635           130         New 5.3 at Latter         Nort-Western         1         -6         11,866,056         600,611,013         2.25         455           131         New 5.3 at Latter         Nort-Western         1         -6         611,308,62         2.45         455           132         Sampto 1         Lapold         1         -6         611,308,62         2.45         4.55           133         Sampto 1         Lapold         2         1         1.147,766         649,041,52         2.45         4.55           2023         Sampta 1         1         5         1.038,047,027         2.55         4.55         4.55 <t< td=""><td>1</td><td>124</td><td>New SS at Kabompo</td><td>North-Western</td><td>2 - 5</td><td>11,671,020</td><td>617,696,017</td><td>-1.1%</td><td>6.7%</td></t<>	1	124	New SS at Kabompo	North-Western	2 - 5	11,671,020	617,696,017	-1.1%	6.7%
126         Sinzbongue         Southerm         1         7         8         0.081/34         0.03 /24060         1.2%         4.43           128         New S5 at Zarbaz         North-Weatern         2         2         5.702.76         643.166.60         1.6%         655.77           128         New S5 at Zarbaz         North-Weatern         4         6.683.354         464.77         613.166.60         655.77           120         New S5 at Zarbaz         North-Weatern         4         6         8.688.211         653.471.60         2.57         465.67           130         New S5 at Zarbaz         Soperteen         1         6         7.754.960         2.575.14         2.57         4.455           131         Samon 1         Soperteen         1         6         5.762.960         2.455         4.455           132         Seconger Carba         2         1         1.777.786         9.981.922         2.455         4.455           133         Persub 2         Carba         1         4         1.764.417         1.753.546.746         2.55         4.455           132         Persub 2         Carba         1         1         2.117.157.956         2.55         4.55 <td>2021</td> <td>125</td> <td>New SS at Lukulu</td> <td>Western</td> <td>2 . 2</td> <td>7,012,149</td> <td>624,708,166</td> <td>-1.2%</td> <td>6.1%</td>	2021	125	New SS at Lukulu	Western	2 . 2	7,012,149	624,708,166	-1.2%	6.1%
127         Kabov         Central         1         7         8,897,015         637,042,6415         -1,35         -0,155           128         New 25,81 Zenobez         North Western         1         -4         6,833,235         648,140,407         -1,85         63,53           129         Zambazi         North Western         1         -4         6,843,235         649,733         245         64,75         745	(2005) (C. 19	126	Sinazongwe	Southern	1 - 8	6,081,434	630,789,600	-1.2%	4.9%
Liss         New Sol at Zentez         New Tork Western         Z         S. A. 22 (20)         Poils, A. Vol.         Ites         O.           150         Verw Sol at Manufung         North Western         I         -0         6.883 203         668 783 246         6.85           2022         131         New Sol at Zentez         North Western         I         -0         6.883 203         668 783 246         2.25         4.85           2022         132         Lune 1         Coppertent         I         -4         4.61 306         674 246         4.45         2.45         4.45           132         Lune 1         Coppertent         I         -4         4.61 306         674 246         4.95         2.45         4.85           133         Manuful Usgold         I         -1         1.077 186         698 802 786         2.45         4.85           134         Manuful Usgold         I         -1         1.077 186         698 802 786         2.45         4.85           135         Persold 2         Central         I         -5         10.188 246         770 854 608         2.95         4.85           140         Manuful Usgold         I         -4         1.198         11.198 <td>1 3</td> <td>127</td> <td>Kabwe</td> <td>Central</td> <td>1 - 7</td> <td>0,007/012</td> <td>637,445,612</td> <td>-1.3%</td> <td>6.1%</td>	1 3	127	Kabwe	Central	1 - 7	0,007/012	637,445,612	-1.3%	6.1%
120         New 25 at Weinings         Nume version         1         0         0.003 and 0.00         0.004 and 0.00         0.005	1 3	128	New 33 at Lamber	North Western	2 1 2	0,702,700	249 793 149	1.0%	0.3%
101         Num of all all analysis         Num of all statement         1         0         1118 000         000 001 001 001         221         421           2022         132         Luncii         Copentelli         1         4         4 010 001         014 074 852         2 014         4 010           132         Maumual         Doublem         3         1         3 000 2014         014 074 852         2 014         4 010           132         Maumual         Doublem         3         1         3 000 2014         014 074 852         2 014         4 010           135         Manorge         Copentelli         2         -1         1 077 105 46 000         2 016         4 050           2031         135         Pensolo 2         Central         1         -5         1 0108 024         705 56 026         2 016         4 050           2031         135         Pensolo 2         Central         1         -5         1 0108 024         705 56 026         2 016         4 050           2031         135         Manoria         1         4         1 020 024         705 56 026         3 050         2 016         1 050         2 016         1 050 027         2 016         2 016         2		190	Lampezi i New 22 of March et al.	North Western	4 . 0	0,033,032	142 171 172	1 0.3	445
100         100 <td></td> <td>134</td> <td>New 55 at Zamban</td> <td>Month Washern</td> <td>1 . 6</td> <td>11 150 400</td> <td>AAG AA1 101</td> <td>.2.2%</td> <td>4.7%</td>		134	New 55 at Zamban	Month Washern	1 . 6	11 150 400	AAG AA1 101	.2.2%	4.7%
2022         133         Santha         1         -         0         1744 200         581 2002         24 45         4 15           134         Muzania 1         Bieldherm         3         -         1         302 225         66 64 004 102         2         4 45         4 55           135         Persula 2         Capatrial         1         -         1         1.777.76         498 200,774         -         2.55         4.85           130         Mpongwe         Copatrial         1         -         5         10.1777.76         498 200,774         -         4.55           2023         132         Persula 2         Central         1         -         5         10.132.244         70.002.172         2.95         3.05           140         New 25 at Chiundu         Listaka         2         -         1         1.255.772         2.95         3.05         2.255         1.05           141         Mpixa 2         Nottiwesterm         1         -         3         9.065.247         7.06.235.03         2.55         2.55         3.15         1.5         4.55         3.05         4.55         3.15         4.55         3.05         3.05         3.05         3	6	132	Luano 1	Copperbelt	1 . 4	4 613 690	674 274 852	.7.4%	345
136         Maurius 1         Bertherm         2         1         13222 224         664 004 122         2 445         4455           135         Pensulu 2         Central         2         2         13,040,316         664 004 120         2 445         4455           136         Magnitye         Copertell         2         1         1,177,176         988 802,74         2,655         4455           137         Sertinga 1         Western         1         4         11,664,172         716,546,02         2,655         4455           2023         137         Pensulu 2         Central         1         -4         10,543,02         2,265         445           140         Mew 32 81Chlumbu         Loadsa         2         -4         0,278,007         722,274         445,144         -2,95         3,055           141         Covertry         Lusaka         1         -4         6,553,013         751,105,653         3,075         2,245           142         Maya 2         Northwestern         2         2         3,050,247         769,849,23         3,055         3,155           144         Meya 1         Northwestern         2         4         0,059,927         799,927,	2022	133	Samha 1	Luapula	1 - 5	6 764 040	651 038 992	.24%	4.1%
136         Persul 2         Central         2         2         13.04.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01.01         40.01.01 <td></td> <td>134</td> <td>Muzuma T</td> <td>Southern</td> <td>3 . 1</td> <td>3 025 234</td> <td>684 064 120</td> <td>-3.4%</td> <td>4.6%</td>		134	Muzuma T	Southern	3 . 1	3 025 234	684 064 120	-3.4%	4.6%
130         Monogane         Compertent         1 <th1< th=""> <th1< th=""></th1<></th1<>		135	Persulo 2	Central	2 - 2	13.040.814	697,104,940	-2.5%	4.8%
137         Serung 1         Western         1         4         17.044.175         720.450.923         2.0%         4.5%           139         Launo 1         Coppetbell         2         4         0.289.002         720.450.950         2.0%         4.5%           140         New 32 at Changu         Lotaka         1         4         0.649.013         751.155.489         3.0%         2.2%           141         Coventry         Lotaka         1         4         0.649.013         751.155.489         3.0%         2.2%           142         Maxala         Notherm         2         3         0.092.447         760.853         757.02         3.1%         4.0%           2024         144         Maxala         Notherm         2         3         0.092.47         760.853         757.02         3.1%         4.0%           2024         144         Maxala         Notherm         2         3         1.092.47         760.853         757.02         3.1%         4.5%           2024         144         Maxala         Noth-Western         1         1         3.020.91         750.892.730         3.5%         3.5%           2025         148         Mew 82.at Mwininga<		136	Mpongwe	Copperbell	2 - 1	1.797.786	698,902,726	-2.6%	4.1%
2023         138         Persulo 2         Central         1         5         10.138.24F         720.080.160         2.2%         4.45           140         New 35 at Chlundu         Losaka         2         1         12.250.452         720.080.167         2.2%		137	Senanga 1	Western	1 + 4	17,644,176	716,546,902	2.01	4.6%
AUX3         139         Luano I.         Coppetent         2         4         0.293.00         722.072.094         2.295.         3.01           140         New S2 at Chundy         Lusaka         1         1         2.201.05         (42.501.075.01.01.075.01.075.01.01.075.01.01.075.01.01.075.01.01.075.01.01.075.01.01.075.01.01.075.01.01.01.01.01.01.01.01.01.01.01.01.01.	2022	138	Pensulo 2	Central	1 + 5	10,138,264	720,685,186	-2.8%	4.4%
140         New S2 at (Diutudu Lusaka         2         1         12/202/82         753,108,689         2.955           141         Covertry         Lusaka         1         4         6,553,013         751,108,689         3.055         2.255           142         Mpxa 2         Northerm         1         3         9,066,247         709,732,865         -3,175         4.057           2024         144         Mpxa 1         Northerm         2         -3         11,686,696         719,732,866         -3,175         4.457           146         Mey S2 at Mwnilunga North-Western         3         2.300,916         756,932,30         -3,55         3.115           147         New S2 at Mwnilunga North-Western         1         -1         30,200,916         756,952,30         -3,55         3.115           148         New S2 at Mwnilunga North-Western         1         -1         30,200,916         756,952,12         -3,95         4.055           150         Leopard 118         Lusaka         1         -1         30,200,916         -3,955         4.055           2025         151         Sectimer         1         -3         7,325,532         847,104,630         4.255         2.455         2.553	2923	139	Luano 1	Copperbeit	2 - 4	6,293,909	732,978,994	-2.9%	3.0%
161         Conventry         Lunaka         1         4         6,653,013         751,108,683         3,005         2.25           2024         Kapma         Western         2         3         9,056,247         769,653,703         -3,115         4,057           142         Kapma         Western         2         3         9,056,247         769,653,703         -3,115         2,455           143         Mazaoka         3         0,056,724         769,853,723         -3,255         2,455           144         New S2 at Winikinga         North-Western         1         -4         3,600,910         759,967,128         -3,955         3,155           146         New S2 at Winikinga         North-Western         1         -1         20,352,723         -3,955         3,155           150         Leopard's 1111         Leopard's 1111         Leopard's 1111         Leopard's 1111         -5         7,255,226         813,356,373         -4,95         2,455           151         Serving         C-4         5,442,520         855,556,556         4,255         0,357           152         Victura Fala         5,314,556,556         4,255         0,357         1,455         1,455           152<		140	New SS at Chilundu	Lesala	2 + 1	12,535,/82	/45,514,776	-2.9%	2.8%
142         Maxim         1         3         9,021,742         700,742,453         -3,1%         4.0%           2024         144         Maximal Northerm         2         3         9,024,747         700,755,703         -3,1%         4.0%           145         Mazabuka 1         Southerm         1         -4         4,011,924         789,327,233         -3,2%         2,4%           146         New S3 at Manilunga North-Western         3         -2         3,020,916         759,426,238         -3,5%         3,1%           147         New S5 at Manilunga North-Western         2         -4         9,020,927         759,027,228         3,0%         0,45%           148         New S5 at Manilunga North-Western         1         -1         150,023,02778         3,0%         0,45%           150         Legeards 1118         Lawas         1         -1         150,023,02778,033         4,0%         2,0%         1,0%         1,0%         2,0%         1,0%         1,0%         1,0%         1,0%         1,0%         1,0%         2,0%         1,0%         1,0%         2,0%         1,0%         1,0%         2,0%         1,0%         1,0%         1,0%         1,0%         1,0%         1,0%         1,0% <td></td> <td>141</td> <td>Coventry</td> <td>Lusaka</td> <td>1 - 4</td> <td>5,593,913</td> <td>751,108,689</td> <td>-3.0%</td> <td>2.25</td>		141	Coventry	Lusaka	1 - 4	5,593,913	751,108,689	-3.0%	2.25
142         Kaoma         Western         2         3         0.008,247         709,838,703         -3         15,1         24,5           144         Mpx,1         Northwin         1         -4         4,011,924         709,838,703         -3         15,1         24,5           145         Mex S3 at Mwiniunga         North-Western         1         -4         4,011,924         729,857,128         -3,55         245           146         New S3 at Mwiniunga         North-Western         1         1         23,020,916         759,829,235         -3,95         0,45           147         New S5 at Mwiniunga         North-Western         1         1         23,020,916         759,821         -3,95         0,45           148         Fig Tree         Central         1         -0         7,559,216         17,90,83         4,95         2,45           150         Leopard 118         Lewske         1         -1         120,252,226         47,706,530         4,25         2,85           151         Securitier         1         -7         13,265,021         850,286,050         4,25         0,35           2026         154         Kabo         Worth-Western         1         7	3	142	Mpika 2	Northern	1 - 3	9,631,764	760,740,463	-3.3%	4.0%
2024         144         Mpxx 1         Northerm         2         2         11,850,068         781,272,320         3.455         3.255           145         Maxabuka         Southerm         3         4         3.020,915         769,859,230         3.555         3.155           147         New S5 at Mwinkunga North-Western         2         4         9.099,92         799,857,128         3.055         3.155           2025         146         Fig Tree         Central         1         1         3.030,2766         115,1250,223         3.055         4.55           2025         150         Lexpard 1 III         Lixske         1         1         3.732,5532         847,104,630         4.255         2.45           150         Lexpard 2 IIII         Lixske         1         1         3.732,5532         847,104,630         4.255         2.45           151         Seretie         Central         1         7         3.260,801         650,117,51         4.555         1.45           152         Victura Fails         Southerm         2         4         5.44,022         806,511,751         4.55         1.45           153         New S5 at Muruhume         North-Westerm         1	1.652	143	Kaoma	Western	2 + 3	9.098,247	769,835,700	-3.1%	2.4%
140         Mazzouka 1         Southerm         1 + 4         4         401/244         780,32/320         -3.25         2.45           140         New S 2 at Mwinlunga         North-Western         2 - 4         9.009,992         799,957,128         -3.65         3.15           143         New S 2 at Mwinlunga         North-Western         1 - 1         20.302,912         799,957,128         -3.65         3.95         0.45           2025         149         F.g. Tree         Central         1 - 0         2.55,221         3.26,311,124         -3.05         0.45           150         Secrets         Central         1 - 0         7.325,552         44,704,650         4.25         2.45           151         Secrets         Central         1 - 7         13.206,076         4.25         2.45           152         Victora Fals         Southerm         2 - 5         10.590,201         4.55         1.45           153         New S3 at Mulmidwe         North-Western         1 - 7         13.206,201         383,106,20         2.05         2.15           154         Kabona         Western         3 - 2         4.124,403         300,402,222,24,40         4.15         1.5           159         Moutum	2024	144	Mpka 1	Northern	2 . 2	11,990,090	781,725,395	-7.4%	3.25
140         New S2 at Munikunga North-Western         2         3.020,910         799.057,128         3.355         3.15           2025         148         New S2 at Munikunga North-Western         1         1         20.252,728         3.955         0.455           2026         146         Fig. Tree         Central         1         6         7.558,211         3258,923         3.955         0.455           150         Leopard 1111         Luskxiz         1         1         12.058,211         3265,923         4.755         2.455           151         General         1         3         7.055,923         447,104,630         4.275         2.455           152         Victorus Falls         Southerm         2         4         0.452,923         4.275         2.455           153         New S3 at Mutriture         North-Western         1         7         13.620,801         883,106,803         4.275         2.455           2026         154         Kabro         Western         2         2         4.054,603         4.275         2.155           155         Kaona         Western         2         5         10.680,516         9.0378,318         4.155         1.455		145	Mazabuka 1	Southern	1 + 4	4,011,924	796,337,320	3.5%	2,4%
147         New SS at Wunitunga North-Western         2         4         9,009,902         799,007,128         -3,0%         3,1%           2025         148         New SS at Wunitunga North-Western         1         -0         7,555,211         203,07,16         319,35,023         3,0%         0,4%           150         Leopard's Lill         Lusaka         1         -1         12,05,02,04         509,779,093         4,0%         2,2%           151         Serenje         Central         1         -3         7,325,532         447,104,500         4,2%         2,4%           152         Victora Falis         Southern         2         -4         5,462,320         852,386,053         4,2%         0,3%           2026         154         Kalsko         Western         2         -5         10,520,051         860,512,751         4,5%         1,4%           154         Kalsko         Western         3         -3         10,652,051         833,108,083         -4,5%         1,5%           155         Kalsko         Western         2         -2         4,124,023         902,592,346         -5,1%         0,2%           156         Kalsko         Western         2         2	8	140	New SS at Nevnilunga	North-Western	3 . 2	3,620,916	759,958,235	-3.5%	3.1%
148         New 35 at Mwrnianza, North Western         1         1         2020         181,250,223         -3,9%         0.4%           2025         150         Lexopard 5 Hill         Juneska         1         -11         21,250,254         32,9%         -4,9%         22,5%           151         Servele         Central         1         -3         7,255,320         647,164,630         -4,2%         24%           152         Victora Fails         Southerm         2         -4         5,422,200         855,586,950         -4,2%         0.3%         1.4%           2026         153         New S5 at Multimbue North-Western         1         -7         13,220,801         860,513,751         -4,5%         1.4%           2026         155         Kaona         Western         3         -3         10,650,516         893,796,318         -5,1%         0.2%         2.1%           2026         155         Kaona         Western         2         -4         1,24,021         2007,233,340         -5,1%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2%         0.2% <td></td> <td>147</td> <td>New SS at Mwinilunga</td> <td>North-Western</td> <td>2 . 4</td> <td>8,099,592</td> <td>/39,057,128</td> <td>-3.5%</td> <td>- 215</td>		147	New SS at Mwinilunga	North-Western	2 . 4	8,099,592	/39,057,128	-3.5%	- 215
2025         Image in the contrain         Image in the contrain <thimage contrain<="" in="" th="" the="">         Image in the</thimage>	1200 - C	148	New 32 at Mwiniunga	Pionth-Western	1	20,302,796	#12.359.923	3.9%	0.4%
Image: Second	2025	149	rig tree	C WILL BE		12 040 044	020,918,134	-3.9%	1.0%
100         Victoria Fails         Content         1         2         4         5.422,332         852,358,950         4.215         2.235           2026         153         New SS at Muhumbwe         North-Western         1         -         7         13.220,801         860,513,751         4.575         1.415           2026         154         Kalabo         Western         2         -         0         0.529,525         2.051         383,100,802         -         2.175         2.175           155         Kasona         Western         3         -         0         0.529,525         360,513,763         4.575         2.175           156         Moonawe         Coopertheit         1         -         0         9.733,022         992,529,346         6.175         1.755           157         Mozima         Southern         2         -         4         0.564,456         971,558,376         4.375         0.275           159         Chipit         Luapuia         2         2         9.344,891         921,991,356,376         4.375         0.275           160         Southern         2         3         1.622,819         921,991,911,150         4.075         0.75     <		151	Generic	Cantral	1 . 3	7 335 633	847 104 630	4.04	2.23
100         Product rate         Commit         4         -         0.742,200         502,800,800         -         -         2.25           153         New S5 at Mulmitwe Month-Western         1         7         13,220,807         600,513,751         4,555         1.45%           155         Kasona         Western         2         5         10,659,516         693,769,316         -5,175         2,135           156         Macona         Western         2         2         4,124,623         200,653,965         -5,375         1,575           157         Muzuima         Southem         2         2         4,124,623         206,653,965         -5,375         0,275           158         Kasempa         North-Western         2         2         9,344,562         973,553,376         -5,375         0,275           159         Chipit         Luapula         2         2         9,344,891         922,973,340         -6,057,976         -6,057         0,775           160         Solwesi         North-Western         2         5         10,115,694         922,916,871         -6,057         0,775           161         Issia 1         North-Western         1         5         5,25	-	185	Veterra	Southart	1	1,040,034	28.9 824 724	747	850
2026         Number of the state         1		153	New SS at Muhanhee	North-Western	1 . 7	13 974 601	805 513 751	4.5%	14%
155         Kacona         Western         3         -         3         0.0666,516         0000000         200000         200000         20000000         200000000         2000000000000000000000000000000000000	2026	154	Kalabo	Western	2 . 8	18 593 051	883 10A 800		2.1%
100         Monoave         Coopertielt         1         -         5,733,023         992,529,346         -         -         1.75           157         Mazuma         Southem         2         2         4,124,628         906,653,968         -         5,375         1.55           158         Kasempa         North-Western         2         -         4         6,924,408         913,558,370         -         5,375         0.275           159         Chupil         Lubpula         2         -         2         6,344,891         921,653,376         -         5,375         0.275           160         Selvesi         North-Western         3         -         1         5,762,340         937,761,211         -         0.075         0.175           161         Isska 1         North-Western         1         -         5         10,115,604         932,761,211         -         0.075         0.175           162         Selveke 1         Western         1         -         5         12,714,00         955,110,1,150         -         0,075         0.175           163         Muzuma         Southern         1         -         5         9,214,00         955,110,1,15		155	Kasena	Western	3 + 3	10.669.514	893,798,318	-5.1%	0.8%
107         Muzuma         Southerm         2         2         4,124,628         906,653,968         4,33%         1,5%           2027         158         Kasempa         North-Western         2         4         6,924,408         913,558,378         -5,3%         0,2%         0,2%         0,0%         0,7%         0,2%         0,0%         0,7%         0,2%         0,0%         0,7%         0,2%         0,0%         0,7%         0,2%         0,0%         0,7%         0,2%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,7%         0,0%         0,0%         0,7%         0,0%         0,0%         0,7%         0,0%	1	150	Moonowe	Copperbelt	1 + 5	8,733,023	902 529 340	-6.1%	1.7%
108         Kasempa         North-Western         2         4         0.924406         913.558.376         -3.35         0.215           2027         159         Chipli         Luxpula         2         -         2         9.344.891         921.003.207         -0.0%         0.75           160         Solvesi         North-Western         2         -         2         9.344.891         922.018.871         -0.0%         0.255           161         Isoka 1         North-Western         3         -         5         10.115.8024         932.018.871         -0.0%         0.255           162         Sesheke 1         Western         1         -         5         13.19.938         951.191.159         -0.0%         0.155           162         Sesheke 1         Western         1         -         5         521.740         958.205.706         -0.1%         -0.7%         0.2%           2029         165         Chiundu         Southern         2         -         9.734.500         965.940.209         -6.5%         -0.2%           2029         166         Victona Falls         Southern         1         5         3.924.312         970.894.521         -6.6%         -0.1%		157	Muzuma	Southern	2 . 2	4,124,628	P06.653 96a	-5.3%	1.5%
2027         159         Chip8         Luapula         2         -         9.344.891         921,603,207         -         0.0%         0.7%           160         Solvess         North-Western         3         -         1         5.763,340         937,781,211         -         0.0%         0.7%         0.6%         0.6%         0.7%         0.6%         0.6%         0.6%         0.6%         0.6%         0.6%         0.6%         0.7%         0.6%         0.7%         0.6%         0.6%         0.7%         0.6%         0.6%         0.7%         0.6%         0.6%         0.6%         0.7%         0.6%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.6%         0.7%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.7%         0.6%         0.0%         0.6%         0.0% <td></td> <td>158</td> <td>Kasempa</td> <td>North-Western</td> <td>2 + 4</td> <td>5,904,408</td> <td>\$13,558,376</td> <td>-4.3%</td> <td>0.2%</td>		158	Kasempa	North-Western	2 + 4	5,904,408	\$13,558,376	-4.3%	0.2%
ISOLY         160         Solvest         North-Western         2         6         10.115.804         022.015.871         4.0%         0.255           161         isska 1         Northerm         3         1         5.763.340         037.761.211         -0.0%         0.75           162         Seatheke 1         Western         1         5         13.319.099         951.101.150         -6.0%         0.75           163         Muzuma         Southerm         1         -5         5.251.746         0405.32.090         -6.1%         -2.7%           164         Mansa         Luapula         2         -3         1.822.519         958.005.709         -6.1%         -2.5%           165         Chiundu         Southerm         1         -5         3.945.212         970.894.521         -6.6%         -3.1%           166         Victora Falls         Southerm         1         -2         5.635.492         977.531.013         -6.6%         -0.0%           168         New SS at Chawuma         Southerm         1         -2         5.635.99         044.520         004         -7.0%         0.1%           169         Muzuma         Southerm         3         -1         3.06	1012	159	Chipli	Luapula	2 . 2	9,344,891	921,903,287	-8.0%	0.7%
161         Isoka 1         Northerm         3         1         6,762,340         937,781,211         -8.0%         0.7%           162         Sestheke 1         Westerm         1         -5         13,319,029         551,140         950,382,890         -0.1%         0.1%           163         Muzuma         Southerm         1         -5         5,281,140         956,382,890         -0.1%         -2.7%           164         Manaa         Lubpula         2         -3         1,822,519         958,295,706         -6.1%         -2.5%           165         Chundu         Southerm         2         -9         9,734,500         995,940,209         -6.5%         -0.2%           166         Victoria Fails         Southerm         1         -5         3,954,312         970,894,521         -6.6%         -3.1%           167         New SS at Chavuma         North-Western         1         -2         56,3042         977,531,013         -6.6%         -0.0%           168         New SS at Kabompo North-Western         1         4         11,625,509         995,096,294         7.0%         -1.7%         0.8%           170         New SS at Chavuma         Eastern         2         -5	2421	160	Solves	North-Western	3 - 5	10,115,604	932,018,871	0.0%	0.5%
162         Sesheke 1         Western         1 + 5         13.319.036         951.191.150         -6.0%         0.1%           103         Muzuma         Southern         1 + 5         13.219.036         951.191.150         -6.0%         0.1%           104         Masa         Jobber         1 + 5         5.281.740         965.032.0%         -6.1%         -0.7%           105         Chiundu         Southern         2 + 3         1.822.519         958.025.706         -6.1%         -2.5%           105         Chiundu         Southern         2 + 8         9.734.500         966.940.209         -6.5%         -0.2%           106         Victoria Falls         Southern         1 + 5         3.924.312         970.894.521         -6.6%         -3.1%           107         New SS at Chavuma         North-Western         1 + 2         6.635.492         977.531.013         -6.6%         -0.1%           108         New SS at Chavuma         Southern         3 + 1         3.083.200         987.085.492         0.0%         -1.7%         0.6%           109         Muzuma         Southern         1 + 4         11.62.500         998.086.364         -7.0%         -1.7%         0.6%           170	1	161	isaka 1	Northern	3 - 1	5,762,340	937,781,211	-8.0%	07%
163         Muzuma         Southern         1 + 5         5,281,740         956,352,890         -6,115         -0,715           164         Mansa         Luapula         2 + 3         1,822,619         958,205,706         -6,115         -0,715           165         Chiundu         Southern         2 + 8         9,734,500         966,940,209         -6,55         -0,215           2029         166         Victoria Falls         Southern         1 + 5         3,954,212         970,894,521         -6,655         -0,215           167         New SS at Mumber         1 + 5         3,954,212         977,831,013         -6,855         0,015           168         New SS at Chavuma         Southern         1 + 5         5,856,962         977,531,013         -6,855         0,015           169         Muzuma         Southern         1 + 8         6,768,591         064,290,4004         -7,015         1,715           169         Muzuma         Southern         1 + 4         11,623,500         989,906,964         -7,015         1,975           170         New SS at Chavina         Eastern         1 + 3         14,307,712         1,025,251,875         -7,0%         -1,9%           171         New SS at Chavina		162	Sesheke 1	Western	1 . 5	13,319,939	951,101,150	-6.0%	0.15
164         Mansa         Lubpy/a         2 - 3         1.822.519         958.205.706         4.115         -2.55y           2029         165         Chilundu         Southerm         2 - 8         9.734.500         965.940,209         -6.55s         -0.21s           2029         166         Victora Fails         Southerm         1 - 5         3.954.312         970.994.521         -6.65s         -0.21s           167         New SS at Mumbezi         North-Western         1 - 2         6.836.492         977.531.013         -6.65s         -0.01s           168         New SS at Charuma         North-Western         1 - 8         6.785.591         644.209.404         -7.01s         -1.75s           169         Mazama         Southerm         3 - 4         3.068.260         987.382.864         -7.01s         -0.5s           170         New SS at Charua         Southerm         1 - 4         11.622.500         989.006.364         -7.01s         -0.5s           171         New SS at Charua         Eastern         1 - 3         14.867.712         1.025.51.876         -7.65s         -2.65           172         New SS at Charua         Eastern         1 - 3         1.4.567.712         1.024.976.952         -7.65s <td< td=""><td>1</td><td>163</td><td>Muzuma</td><td>Southern</td><td>1 - 5</td><td>5,291,740</td><td>956,382,890</td><td>-6.1%</td><td>-0.7%</td></td<>	1	163	Muzuma	Southern	1 - 5	5,291,740	956,382,890	-6.1%	-0.7%
100         Chrunou         portmem         2 - 8         9,734,500         905,140,209         -6.5%         -0.2%           2029         166         Victoria Fails         Southerm         1 - 5         3,954,312         970,894,521         -6.6%         -3,1%           167         New SS at Mumber;         North-Western         1 - 2         6.65,942         977,531,013         -6.6%         -0.0%           168         New SS at Chavaina         Southerm         3 - 1         3,083,200         957,531,013         -6.6%         -0.0%           169         Mazama         Southerm         3 - 1         3,083,200         957,053,064         -7.0%         -0.5%           170         New SS at Kabompo North-Western         1 - 4         11.622,500         959,006,364         -7.0%         -0.5%           171         New SS at Chavas         Eastern         2 - 5         11.377,600         1.010,364,164         -7.0%         -0.1%           172         New SS at Chavas         Eastern         1 - 3         14,667,712         1.025,253,076         -7.0%         -0.1%           173         Charas         Bastern         1 - 4         9,726,771         1.047,673,654         -8.2%         -1.1%           174 <td>3</td> <td>164</td> <td>Mansa</td> <td>Luapula</td> <td>2 - 3</td> <td>1,822,619</td> <td>958,205,709</td> <td>-6.1%</td> <td>-2.5%</td>	3	164	Mansa	Luapula	2 - 3	1,822,619	958,205,709	-6.1%	-2.5%
2029         ico         Victoria Para         poumerin         1 + 5         3.924.312         Victoria Para         d.65%         -3.1%           167         New SS at Munbezi         North-Western         1 + 2         5.630.492         977.531.013         -6.6%         -0.7%           168         New SS at Chavuma         Southern         3 + 1         3.083.200         987.531.013         -6.6%         -0.7%         -1.7%           169         Mazama         Southern         3 + 1         3.083.200         987.633.2864         -7.0%         -1.7%         0.6%           170         New SS at Chavuma         Southern         1 + 4         11.823.500         999.6063.24         -7.0%         -1.9%           171         New SS at Chavuma         Eastern         1 + 4         11.823.500         999.6063.26         -7.0%         -1.9%           172         New SS at Chavuma         Eastern         1 + 3         14.667.712         1.025.251.676         -7.0%         -1.3%           2029         172         New SS at Chavuma         Eastern         1 + 4         9.725.076         1.034.076.952         -7.6%         -2.6%           173         Chavas         North-Western         1 + 4         9.725.076         1.0		165	Chilundu	Southern .	2 . 8	9,734,500	905,940,209	-0.5%	-0.2%
International Science         Internatescience         International Science <thi< td=""><td>2029</td><td>100</td><td>Victoria Fails</td><td>Southern</td><td>1 . 5</td><td>2,904,312</td><td>970,894,521</td><td>-0.0%</td><td>-3.1%</td></thi<>	2029	100	Victoria Fails	Southern	1 . 5	2,904,312	970,894,521	-0.0%	-3.1%
International posterior statem         I = 0         0.100,001         0.000,001,000         0.000,001,000         0.000,000,000,000         0.000,000,000,000,000,000,000,000,000,0		140	New SS at Character	Noth Western	1 2	0,030,492	977,531,013	+*8.0+ T (M)	0.0%
Income         New SS at Kabompo         North-Western         1         4         11623.500         999.006.364         -7.0%         -1.9%           171         New SS at Kabompo         North-Western         1         -4         11623.500         999.006.364         -7.0%         -0.1%           171         New SS at Chama         Eastern         2         -5         11.377.600         1.010.364.164         -7.0%         -0.1%           172         New SS at Chama         Eastern         1         -3         14.667.712         1.025.253.076         -7.0%         -0.1%           172         New SS at Chama         Eastern         1         -3         97.25.076         1.034.978.852         -7.0%         -2.65           173         Chinadu         Lunaka         1         -1         5.52.5784         1.040.802.737         -8.15         -1.1%           176         New SS at Nymba         Eastern         1         -6         6.870.917         1.047.673.654         -8.2%         -4.4%           176         Kasempa         North-Western         1         -4         3.43.4546         1.051.108.503         -8.7%         -3.8%           177         Maamba         Southerm         1		100	Manual A	Sautharr	3	1,043,543	067 183 864	-7.0%	-1.7.5 A 8N
171         New S5 at Chama         Eastern         2         5         11.377.600         1.010.364,164         -7.0%         -0.1%           2029         172         New S5 at Chama         Eastern         1         -3         14.867,712         1.025,251,876         -7.0%         -1.3%           2029         173         Chama         Eastern         1         -3         14.867,712         1.025,251,876         -7.0%         -1.3%           173         Chama         Northern         1         -4         9.725,076         1.034,976,952         -7.6%         -2.6%           174         New S5 at Chlundu         Lunaka         1         -5         5.57.64         1.040,902,737         -8.1%         -1.1%           176         New S5 at Nymba         Eastern         1         -6         6.870,917         1.047,673,654         -8.2%         -4.4%           176         Kasempa         North-Western         1         -4         3.434,549         1.051,108,503         -8.7%         -4.4%           177         Maamba         Southern         1         -6         15.771,1085,202,073         -9.6%         -3.8%           2030         178         Sexhefe2         Western         1	. 8	170	New SS at Kabomro	North-Western	1 . 4	11 673 500	999 002 324	7.54	-10%
172         New SS at Chama         Eastern         1         3         14.667.712         1.025.251.676         -7.0%         -1.3%           2029         173         Chinasii         Northern         1         4         9.725.076         1.034.976.952         -7.6%         -2.65%           174         New SS at Chlundu         Lutaka         1         1         5.525.764         1.040.902.737         -8.1%         -1.1%           176         New SS at Nymba         Eastern         1         -0         6.870.917         1.047.673.654         -8.2%         -4.4%           176         New SS at Nymba         Eastern         1         -0         6.870.917         1.047.673.654         -8.2%         -4.4%           176         Kasempa         North-Western         1         -0         1.517.571         1.046.500.073         -9.6%         -3.8%           177         Maamba         Southern         1         -0         1.517.571         1.056.200.073         -9.6%         -3.8%           2030         178         Seshete 2         Western         1         -4         21.945.000         1.088.225.073         -10.2%         -2.7%           179         Mansa         Lubola         1 </td <td></td> <td>171</td> <td>New 55 at Chama</td> <td>Eastern</td> <td>2</td> <td>11 377 405</td> <td>1.010 354 144</td> <td>-7 (A)</td> <td>A 16</td>		171	New 55 at Chama	Eastern	2	11 377 405	1.010 354 144	-7 (A)	A 16
2029         173         Chinase         Northerm         1         4         9.725,076         1.034,976,952         -7.6%         -2.6%           174         New S.3 at Chlundu         Linaka         1         1         5.825,784         1.040,802,737         -8.1%         -1.1%           175         New S.3 at Chlundu         Linaka         1         -1         5.825,784         1.040,802,737         -8.1%         -1.1%           176         New S.5 at Nymba         Eastern         1         -0         6.870,017         1.047,673,654         -4.2%         -4.4%           176         Kasempa         North-Western         1         -4         3.434,549         1.051,108,503         -8.7%         -3.0%           177         Maamba         Southerm         1         -8         15.171,571         1.056,250,073         -9.6%         -3.8%           2030         178         Sesthethe 2         Western         1         -4         21,945,000         1.058,220,073         -10.2%         -2.7%           179         Mantaa         Liabutta         1         -5         8.259,414         1.046,450,697         -12.6%         -5.0%           180         Mathaa         Liabutta         1<		172	New SS at Chama	Eastern	1 . 3	14 567 712	1,025 251 874	-7 BM	-1.3%
174         New 3.5 at Chilumdu         Lutaka         1         1         5.825.784         1.040.802.737         -8.1%         -1.1%           175         New 3.5 at Nymba         Eastern         1         -0         6.870.917         1.047.673.654         -8.2%         -4.4%           176         Kasempa         North-Western         1         -0         6.870.917         1.047.673.654         -8.2%         -4.4%           170         Kasempa         North-Western         1         -0         1.571.571         1.056.280.073         -9.6%         -3.2%           177         Maamba         Southerm         1         -0         15.171.571         1.056.280.073         -9.6%         -3.2%           2030         178         Sestheke 2         Western         1         -4         21.945.600         1.058.225.073         -10.2%         -2.7%           179         Mansa         Lubacka         1         -5         8.294.41         1.046.450.027         -12.5%         -5.0%           180         Mahsa         Lubacka         1         -5         8.294.41         1.046.450.027         -12.5%         -5.0%	and a state	173	Chinaali	Notthem	1 - 4	9,725,074	1.034,976,952	-7.6%	265
176         New SS at Nyimba         Eastern         1         6         6,870,917         1,047,673,654         -8,2%         -4,4%           176         Kastempa         North-Western         1         -4         3,434,640         1,051,108,503         -8,7%         -3,0%           177         Maamba         Southern         1         -4         3,157,1571         1,066,200,073         -9,6%         -3,2%           2030         178         Sesheke 2         Western         1         -4         21,945,000         1,058,226,073         -10,2%         -2,7%           179         Mansa         Luboula         1         -5         8,259,414         1,096,450,071         -12,0%         -5,0%           180         Mitrina         1         -5         8,259,414         1,096,450,072         -12,0%         -5,0%	2029	174	New 3.5 at Chilumdu	Lutaka	1 - 1	5.825.784	1,040,802,737	-8.1%	-1.1%
170         Kasempa         North-Western         1         -         4         3.434.540         1.051.108.503         -8.7%         3.0%           177         Maamba         Southern         1	1	175	New SS at Nyimba	Eastern	1 - 0	6,870.917	1,047,673,654	-8.2%	-4.4%
177         Maamba         Southern         1         -         6         15,171,571         1,066,300,073         -9,6%         -3,8%           2030         178         Sesheke 2         Western         1         -         4         21,945,000         1,088,225,673         -10,2%         -2,7%           179         Mansa         Luppida         1         -         5         8,259,414         1,096,455,087         -12,5%         -5,8%           180         Mansa         Luppida         1         -         2         2,5%         -         5,8%		178	Kasempa	North-Western	1 - 4	3,434,549	1,051,108,503	-8.7%	3.0%
2030         178         Sesheke 2         Western         1         4         21,045,000         1,088,225,073         -10,2%         -2,7%           179         Mansa         Luppila         1         +5         8,259,414         1,096,425,097         +12,0%         -5,0%           180         Minute         1         +5         8,259,414         1,096,425,097         +12,0%         -5,0%		177	Maamba	Saynhem	1 + 8	15,171,571	1,066,260,073	+9.8%	-3,6%
179 Manaa Lugoula 1 - 2 8,209,414 1,040,450,057 - 12,0% - 5,0%	2030	178	Sasheke 2	Western	1 4	21,945,000	1,068,225,673	+10.2%	-2.7%
	20202	179	Manaa	Luapora	1 . 5	8,209,414	1,090,495,087	-12.6%	-0.0%

 Table 14-9
 Annual Project Phases by 2030 (2/2)

#### 14.6. Targeting Electrification Rate in 2030

As shown in Table 14-10, the household electrification rate in 2006 is 20.4% nation-wide, being 47.6% in the urban areas and 3.1% in the rural areas (data from *Living Conditions Monitoring Survey Report 2004, Central Statistical Office, December 2006*). As of 2006, the number of households in 1,217 RGCs targeted in the master plan is 535,717, accounting for 23.4% in the national total, and this will be 1,067,729 in 2030. By 2030, DoE, REA and ZESCO aim to achieve household electrification rate 90% in the urban areas, 100% in 1,217 RGCs in the Master Plan, and 20% in the rural areas outside the 1,217 RGCs. Based on these targets, a household electrification rate of 66.0% in the nation-wide will be achieved in 2030, in which the rural electrification rate will be 50.6%. The growth of household electrification rates in urban areas, rural areas, and nation-wide during the Master Plan period are shown in Figure 14-4. The cumulative number of electrified RGC and rural electrification rate by 2030 are also shown in Figure 14-5. Figure 14-6 shows the rural electrification map of 1,217 RGCs with their electrification modes.

	2006				2030		
	# of HH	HH Ratio	# of Elec. HH	Elec. Rate	# of HH	# of Elec. HH	Elec. Rate
Urban	896,234	(39.0%)	426,608	47.6%	1,779,880	1,601,892	90.0%
Rural	1,403,408	(61.0%)	43,506	3.1%	2,787,102	1,411,604	50.6%
a) 1,216RGCs	535,717	(23.4%)	0	-	1,067,729	1,067,729	100.0%
b) Others	867,691	(37.6%)	43,506	3.1%	1,719,373	343,875	20.0%
Total	2,299,642	(100.0%)	470,113	20.4%	4,566,982	3,013,496	66.0%

 Table 14-10
 Targeting Electrification Rate in 2030





Figure 14-5 Transition of Cumulative Number of Electrified RGCs and Rural Electrification Rate by 2030



Figure 14-6 Rural Electrification Map in 2030

### Chapter 15

### **Conclusion and Recommendation**

### Chapter 15. Conclusion and Recommendation

#### 15.1. Conclusion

In this Study, the Rural Electrification Master Plan up to 2030 was developed. In the process of "Technical Aspect Analysis", the "Decentralized Planning Process" was adopted to identify 1,217 RGCs in rural areas as the electrification target. Next, "Demand Criteria (or potential daily maximum demand in each RGC)" and "Supply Criteria (or the "Unit Life Time Cost in Net Present Value")" were used to cluster (or group) 1,217 RGCs into 180 Project Packages, and to select the optimal electrification mode (among transmission/distribution extension, SHS, mini-hydro, and diesel generator) for each of the 1,217 RGCs. Then, based on the estimated cost for each Project Package, the final electrification priority of 1,217 RGCs in 180 Project Packages was determined by Financial Indicator (FIRR). Finally, these 180 Project Packages were grouped into 22 Annual Project Phases up to 2030, by the uniform annual project cost.

As a part of the Technical Aspect Analysis, Case Study (or pre-feasibility study level survey) was carried out. Among 29 potential mini-hydro development sites explored in Northern, Luapula, North-western, and Western Provinces, the Case Studies were executed at 2 sites: Chilanbwe Falls Site in Northern Province and Mujila Falls Lower Site in North-western Province. At these two mini-hydro Case Study sites, Socio Environmental Surveys were also executed and Project Briefs were prepared. The Case Studies for transmission/distribution extension were also executed at 3 sites: Kabwe in Central Province, Luangwa in Lusaka Province, and Mazabuka in Southern Province.

In addition, Socio Economic Survey was carried out, in the process of "Social Aspect Analysis." In the Socio Economic Survey, data were collected more than 1,300 interviewees in 90 RGCs: 71 unelectrified and 19 electrified RGCs. Based on the data collected in the Socio Economic Survey, the ability to pay, willingness to pay, and prioritized property for electrification were analyzed, and these results were used as basic information to elaborate policy recommendation with the involvement of Stakeholders.

The Study combined the outputs from the Technical and the Social Aspect Analysis, to develop a Comprehensive Rural Electrification Program. The development process of the Master Plan was subject of discussion with International Development partners, such as Japanese Bank for International Cooperation (JBIC), African Development Bank (AfDB), Development Bank for Southern Africa (DBSA) and World Bank (WB). As a result, the Development Partners have shown interest in financing the rural electrification projects in Zambia, and JBIC started considering providing Yen-Loan as a co-finance with WB, to realize this Master Plan.

Initial findings, results and outputs of this Study are as follows:

- 1) 1,217 Unelectrified RGCs were clustered (or grouped) into 180 Project Packages. The electrification priority order of 180 Project Packages, the optimal electrification mode for each of 1,217 RGCs, and the 22 Annual Project Phases up to 2030 are shown in Table 14-5, 14-6, and 14-9 respectively.
- 2) Although not many Project Packages' FIRR are attractive, considerable number of Project Packages show reasonable EIRR.
- 3) US\$ 1,103 million is required to realize all 180 Project Packages (including 1,217 RGCs) by 2030. This means approximately US\$ 50 million per year is needed from 2008 to 2030.
- 4) The target household electrification rate is set as 66.0% nation-wide, requiring a rate of 50.6% for the rural areas. This is achievable if DoE, REA and ZESCO success to increase the household electrification rate at 90% in the urban areas, 100% in 1,217 RGCs in the Master Plan, and 20% in the rural areas other than 1,217 RGCs by 2030 (refer to Table 14-10). It is essential that the Zambian Government makes appropriate investment to the rural electrification projects in the

Master Plan to meet these targets.

- 5) Since the annual amount of Rural Electrification Fund (REF) is much less than the required project cost to realize the Master Plan, in addition to making effort to increase the REF, utilization of the low interest loan from the international donors should be necessary.
- 6) In the nation wide, 241 RGCs are identified as Solar Home System Market.
- 7) Although a lot of mini-hydro potential sites exist in Zambia, only 3 sites (Mujila Falls Lower, Upper Zambezi, and West Lunga in North-western Province) were financially feasible.
- 8) Unelectrified households and business entities pay considerable amount of money to meet their needs using alternative energy sources (K59,141 and K75,315 respectively). In 2006, the estimated ability to pay for electricity monthly bill for households and business entities are K35,485 and K60,252 respectively.
- 9) The connection fee charged in rural areas by ZESCO (K2,873,000 for 1 Phase and K4,887,000 for 3 Phase) was much higher than the rural households' ability to pay (average monthly income by K910,757) and willingness to pay (K2,508,483).
- 10) Duration (usable daily hours of electricity) was the most important factor for unelectrified residents, compared to Urgency (years until electrified), Monthly Fee, and Connection/Initial Fee. Although 24 hours usage per day was the most preferred, unelectrified residents were eager to use electricity even for 5 hours per day (such as by SHS).

### 15.2. Recommendation

#### 15.2.1. Practical Use of Master Plan

Although the final electrification priority of Project Packages were determined by Financial Indicator (FIRR) in the Master Plan, the priority should be modified in practice and updated by taking into account the opinions of Zambian Government and Financial Organization, such as in the financial coordination with International Development Partners. For example, Zambian Government may wish to pay attention to the balance of development among areas/Provinces. Some of Financial Organizations may also wish to apply some project selection criteria as their loan conditions. Therefore, the staff members of DoE and REA need skills to merge the new criteria with the original Master Plan in a flexible way. Such skills and techniques could be transferred under the JICA Technical Cooperation Project scheduled to commence in 2008.

Since financial evaluation for SHS portion in each Project Package was excluded in the Master Plan, International Donors may not be willing to provide financial assistance for SHS projects. They may, for instance, wish to finance a Project Package with high priority ranking but excluding RGCs electrified by SHS in a Package. Even in such a case, however, maintaining an electrification priority order of SHS portion according to the priority of a Project Package, by providing subsidy utilising Rural Electrification Fund (REF) for SHS installation to households and business entities, is suggested. Regarding public facilities (such as school and hospital/clinic) in RGCs electrified by SHS, the installation cost is assumed to be provided from the Government Authorities (such as Ministry of Education and Ministry of Health).

### 15.2.2. Management of Rural Electrification Fund

The REF as currently funded is not sufficient to implement the Master Plan, and thus measures are needed to increase REF and methods of efficient and effective utilization of funds need to be considered. Firstly, the Zambian Government should allocate an adequate budget every year toward the REF as it does for other infrastructures, such as health and road sector. Secondly, the Rural Electrification Levy should be charged to the mining sector (which consumes 50% of the national total) and to the export of electricity. At the time of writing, it was uncertain what percentage of

levy should be charged to the mining sector, other industries and electricity export, but the Zambian Government was considering 5% electricity levy for them as a measure towards social responsibility, while the levy by the domestic consumers would remain at 3%. Thirdly, the REF needs to be efficient and effective in its management in order to ensure that the program runs smoothly. Such measures are also likely to attract the interest of Development Partners. Therefore, more transparency, accountability and efficiency are required in the process of electrification project selection and utilization of the REF. Fourthly, the electrification levy should be paid directly to REA, not through the Ministry of Finance and National Planning. Otherwise, the possibility remains that the rural electrification levy will be used for other purposes by the Government (such as a general account budget). Finally, electrification facilities funded by the REF (such as mini-hydro, but exclude SHS) should be owned by either REA or ZESCO, and leased to other private companies or local communities for O&M, if necessary.

#### 15.2.3. Increase of Electricity Access Rate

A high initial connection fee is one of the hindrances to increase electricity access, even in areas where distribution line has been extended. The tariff charged by utility companies should be capital cost reflective and thus reduction of the initial connection fee should be considered. In addition, the payment of initial connection fee by the consumers to the electricity network should be spread over a period of 3 to 5 years.

Setting up a technical standard for appropriate low cost electrification method could also contribute to increase the electrification rate in rural areas. Moreover, exemption of import tax for equipments used for rural electrification gives the advantage of reduced project cost and connection fee.

Finally, to create a price competitive market, supporting capacity development and formation of new companies to undertake rural electrification business, such as construction and operation & maintenance is recommended.

#### 15.2.4. Supporting Sustainable Electrification Business in Rural Area

Development of local capacity in simple operation and maintenance of electricity systems, such as SHS and mini-hydro, through a mobile training program provided by DoE and REA could contribute to making the rural electrification business sustainable. Development of the mobile training programs could be supported by JICA Technical Cooperation Project scheduled to commence in 2008.

