



# Rural Electrification Fund

## Renewable Energy Development in Zimbabwe



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# Who are we?

- The Rural Electrification Fund (REF) is the implementing arm of Rural Electrification Fund Board (REFB)
- REF is a statutory body governed by the Rural Electrification Fund Act (Chapter 13:20) with a specific mandate of providing energy and energy services to the rural communities of Zimbabwe in a cost-effective manner.



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- We are mostly identified by grid extension projects that we have done over almost 15 years that we been in existence
- In the era prior to 2012 we sporadically did solar projects
- The launch of the NEP in 2012 refocused REF to have an expanded mandate to promote the provision of electricity and **other modern energy services** to rural areas using renewable energy service technologies to the maximum extent possible



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## Mission

Empowerment of rural communities of Zimbabwe through harnessing of energy resources to ensure that all the people have access to adequate, reliable, least-cost and environmentally sustainable energy services.

## Vision

To achieve universal access to modern energy services by rural communities by 2030.



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## What is Access?

- Available physically nearby
  - ✓ i.e. within a district, not in Harare only
- Supported nearby
  - ✓ by local agents in case of challenges
- Affordable
  - ✓ at prices similar to or less than traditional fuels
- Available within a short time period after application
- Available generally in sufficient quantities for expected uptake to reach universal usage within xxx years



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# Background - Access

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The last two points imply that there are either government-supported active MES programme or private sector-led market development programmes that are not just on paper, but are actually rolling out a certain rate in certain project areas.

- Providing a 50 % grant per SHS in Harare, but without any signs of significant uptake, does not constitute access to SHS. Nor does it constitute an active SHS programme until it has some momentum.



# Grid Extension Projects



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Province	Primary Schools	Secondary Schools	Rural Health Centres	Govt Ext Offices	Chieftainships		Business Centres	Small Scale Farms	Villages	Others	Total Electrified to Date
					Grid	Solar					
Manicaland	421	228	165	70	26	1	190	61	307	129	1598
Mash Central	335	155	106	45	24	2	123	132	52	113	1087
Mash East	268	174	109	31	20	2	108	153	175	164	1204
Mash West	379	158	72	38	17	4	61	185	117	68	1099
Masvingo	272	193	129	49	27	1	169	50	164	88	1142
Mat North	251	121	82	57	29	8	85	16	21	59	729
Mat South	264	113	79	46	22	0	102	19	123	66	834
Midlands	186	122	91	31	34	5	89	106	179	43	886
Total Electrified	2376	1264	833	367	199	23	927	722	1138	730	8579
W.I.P.	67	24	17	7	7	0	9	1	1	4	137
Balance O/S	2556	759	221	-	44						3580



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# Solar Micro Grids



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Province	Secondary School	Primary Schools	RHC/ Clinics	Chiefs	Other	Total
Manicaland	16	1	23	1	0	41
Mashonaland Central	20	5	12	2	0	39
Mashonaland East	22	0	31	2	0	55
Mashonaland West	24	2	23	4	0	53
Masvingo	17	7	32	1	0	57
Matabeleland North	30	7	24	8	1	70
Matabeleland South	18	10	17	0	0	45
Midlands	26	3	30	6	0	65
<b>Total</b>	<b>173</b>	<b>35</b>	<b>192</b>	<b>24</b>	<b>1</b>	<b>425</b>



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# Solar Mini Grids

- Currently working on 5MW grid connected systems which will be piloted in 2 provinces by 2018
- We have an MOU with OurSun on solar mini grid development



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# BIOGAS



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- Derived from bio-degradable waste like animal and human waste
- Other than the energy benefits that are apparent,
  - Environmental conservation – through waste management and reduced deforestation
  - Fertiliser from slurry
  - Time management



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# Achievement and Plans



Province	Number of Institutions	Large / Municipal		Electricity Generation Pilot
		Completed	Feasibility completed	
Manicaland	2			
Mashonaland Central	5			
Mashonaland East	5	1		
Mashonaland West	3			1
Masvingo	3			
Matabeleland North	3			
Matabeleland South	6		1	
Midlands	6			
Harare	4			
<b>Total</b>	<b>37</b>	<b>1</b>	<b>1</b>	<b>1</b>



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# Mini Hydro



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Project Title	Province	Capacity	Project Cost (US\$)	Status	Benefits (MWh/Year)
Manyuchi Dam	Masvingo	1.4MW	2,800,000	Feasibility Study done, Licence application submitted to ZERA	408.8
Ruti Dam	Manicaland	0.9MW	1,800,000	Feasibility Study in progress	262.8



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# Rural Energy Master Plan

## **Baseline 20-year master plan**

grid electrification **and** off-grid energy services

detailed for first 5 years

high-level for subsequent 15 years

predictable electrification schedules (depending on availability of funds)

## **Dynamic software-based planning tool**

objective prioritisation

always current (if information is regularly updated)

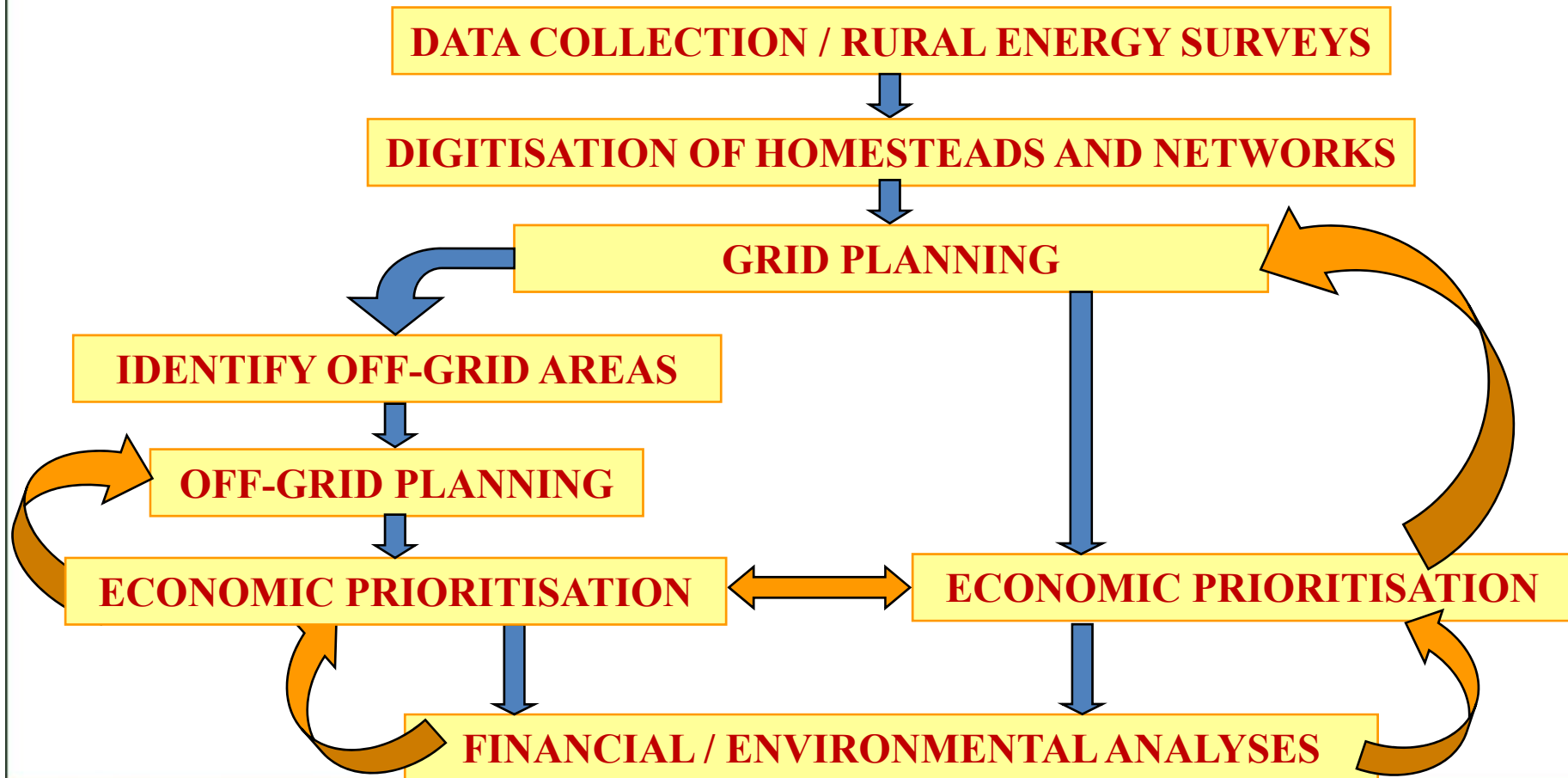
adaptable to changing criteria / circumstances



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# REMP Process



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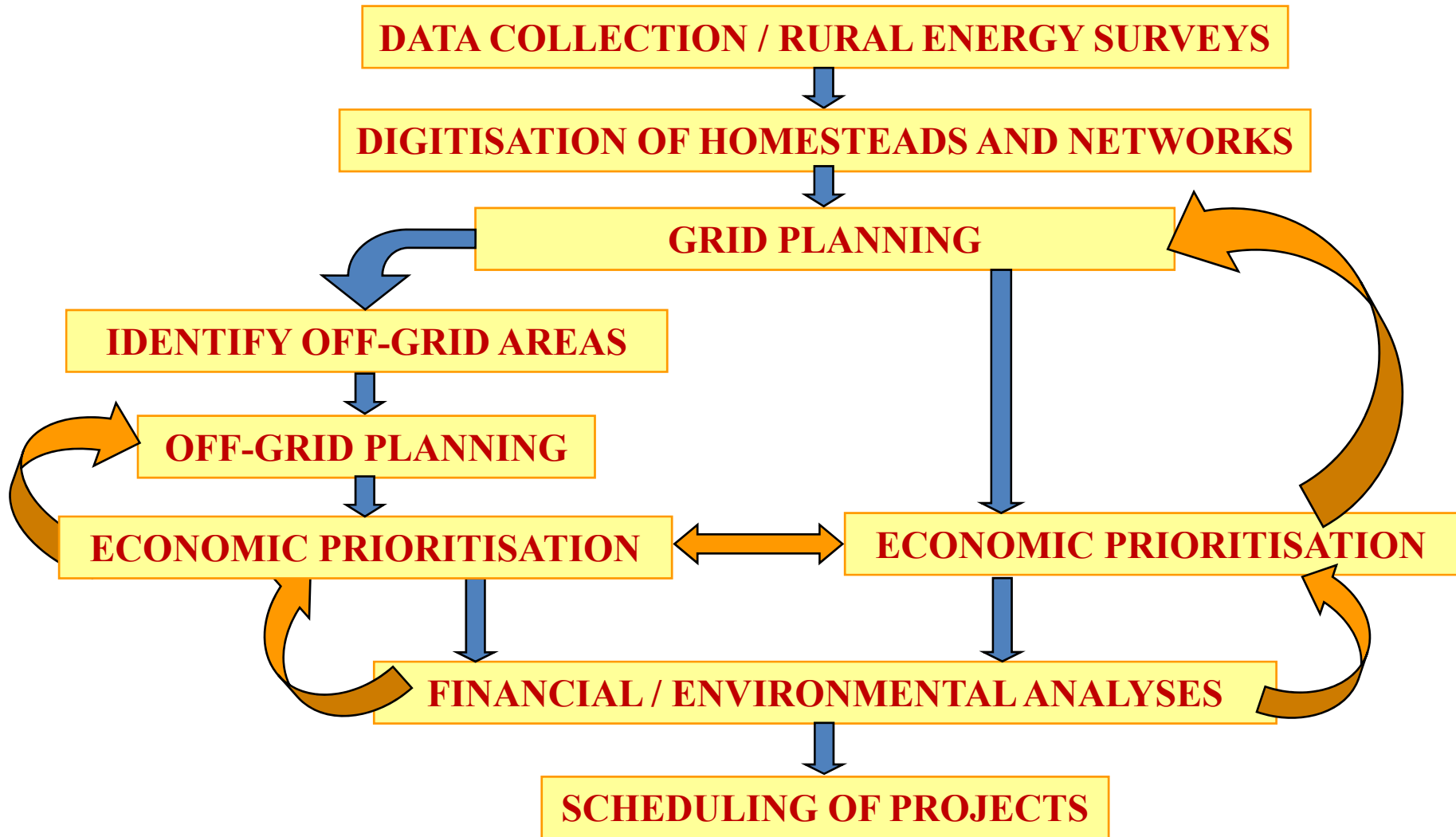
**SCHEDULING OF PROJECTS**

Harare

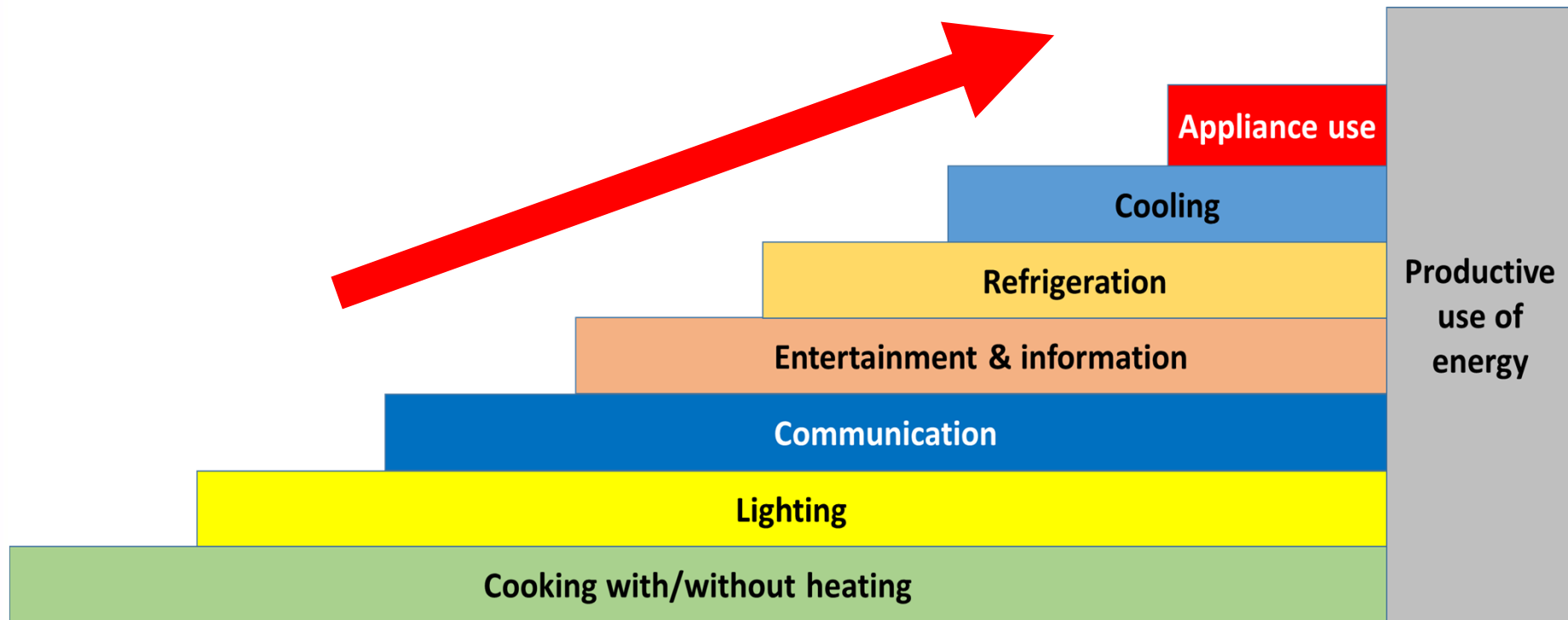
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# REMP Process



# Towards Productive use of Energy



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# Off Grid Plan

## Objectives

Develop approach for optimised planning of off-grid energy supply options in Zimbabwe

In the context of simplified REMP planning process this means:

### Costing relevant off-grid technologies

versus expected level of service

versus key geographical settlement patterns

### Assess relative viability

Understand outcomes and sensitivities



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# Approach

Planning approach based on the steps below. Steps 1-4 are iterative:

- 1) Geo-spatial analysis and clustering
- 2) Determine energy usage tiers
- 3) Determine cost of service delivery for various off-grid technologies
- 4) (Prioritisation of projects and options)
- 5) Repopulate the GIS



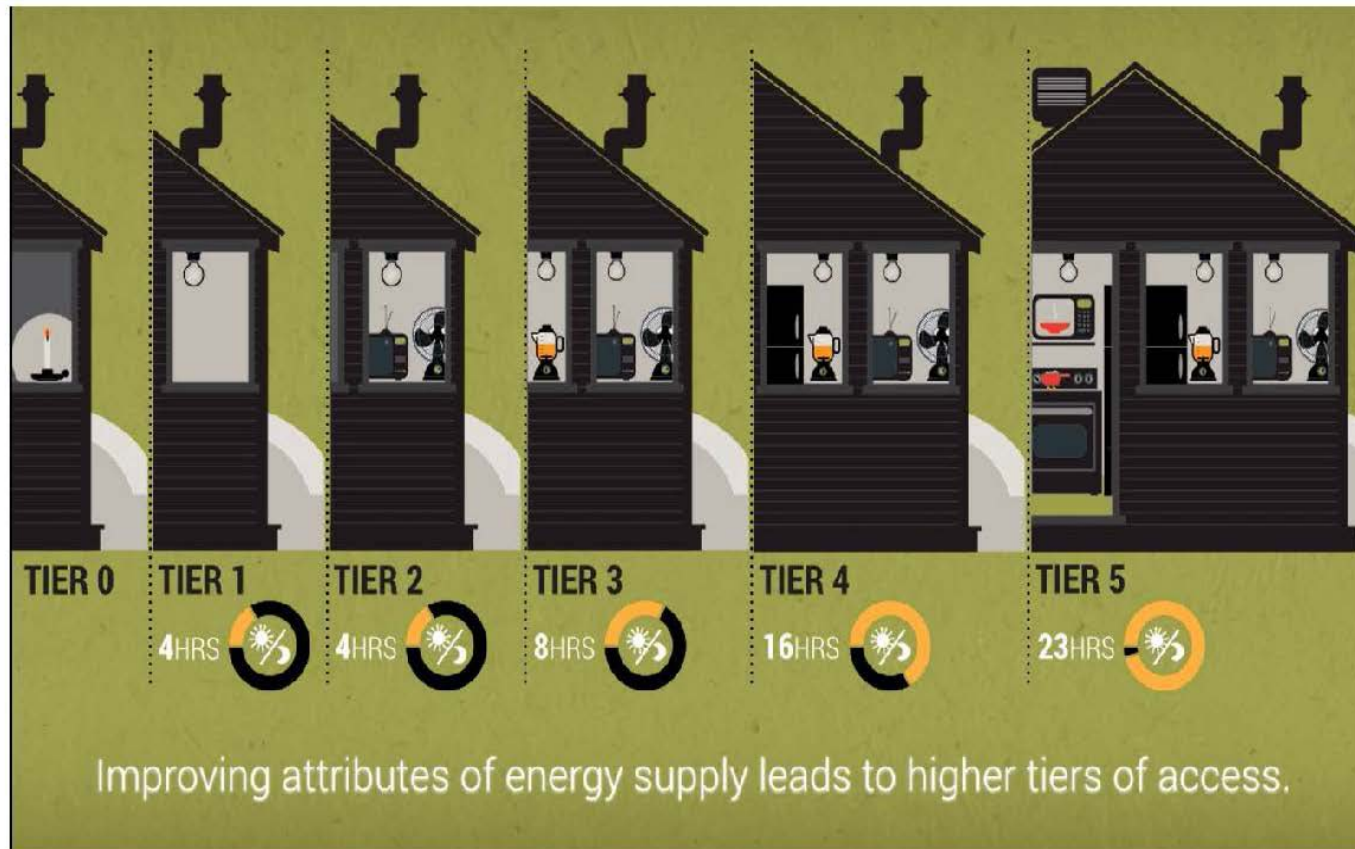
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# Multi-Tier Framework



## Defining Access as a Continuum of Service Levels





# Multi-tier Framework

## Multi-Tier Framework for Electricity

Multi-Tier Framework for Electricity

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Capacity		Capacity (from 3W to above 2kW) and ability to power appliances (applicable for off-grid solutions)				
Duration - day		From at least 4 hours a day to over 23 hours a day				
Duration - evening						
					From at least 1 hour in the evening to over 4 hours	
Reliability					Number and duration of outages (applicable for Tier 4 & 5 only)	
Quality					Voltage problems do not affect the use of desired appliances (Tier 4&5)	
Affordability					Basic service less than 5% of a household income (Tiers 3-5)	
Legality					Service provided legally (Tier 4&5)	
Health and Safety					Absence of accidents (Tier 4&5)	







# Achievements to Date

- Grid and Off Grid Plan for Western Region complete
- Economic and Financial Ranking thereof complete.
- 80+% of the master plan has been done



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# Projections

- New completion date set at October 2016
- Operationalisation – Jan 2017
  - Dedicated share of budget towards renewable



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# Siyabonga

## Questions



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