



# OFF-GRID ENERGISATION MASTER PLAN FOR NAMIBIA

***FINAL REPORT***

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## **LIST OF ACRONYMS**

<b>ECB</b>	<b>Electricity Control Board</b>
<b>EE</b>	<b>Energy Efficiency</b>
<b>GRN</b>	<b>Government of the Republic of Namibia</b>
<b>MAWF</b>	<b>Ministry of Agriculture, Water and Forestry</b>
<b>MME</b>	<b>Ministry of Mines and Energy</b>
<b>NAMREP</b>	<b>Barrier Removal to Namibian Renewable Energy Programme</b>
<b>OGEMP</b>	<b>Off-Grid Energisation Master Plan</b>
<b>PVP</b>	<b>Photovoltaic Pump</b>
<b>RE</b>	<b>Renewable Energy</b>
<b>RED</b>	<b>Regional Electricity Distributor</b>
<b>REDMP</b>	<b>Regional Electricity Distribution Master Plan</b>
<b>2005 REDMP</b>	<b>REDMP which was updated in 2005</b>
<b>REEE</b>	<b>Renewable Energy and Energy Efficiency</b>
<b>REEEI</b>	<b>Renewable Energy and Energy Efficiency Institute</b>
<b>RET</b>	<b>Renewable Energy Technology</b>
<b>SHS</b>	<b>Solar Home System</b>

## **EXECUTIVE SUMMARY**

### **Background**

This project, *Off-Grid Energisation Master Plan for Namibia (OGEMP)*, is one of several projects that have been initiated by the UNDP/GEF/MME Barrier Removal to Namibian Renewable Energy Programme (NAMREP). The underlying objective of the OGEMP is to provide access to appropriate energy technologies to everyone living or working in off-grid, pre-grid and “grey” areas.

The following are definitions of off-grid, pre-grid, and grey areas, as they are used in the OGEMP.

Off-grid areas are those areas that, according to the REDMP, will not have access to electricity within 20 years.

Pre-grid areas, as defined in the REDMP, are those areas that would not have access to electricity within 5 years. However, the OGEMP will only focus on providing access to pre-grid areas that would not have access to electricity within 10 years in the updated REDMP GIS database.

Grey areas are locations where it is not clear in the 2005 REDMP how or if access to electricity will be provided. Examples of grey areas include 1) informal settlements -- where the majority of the inhabitants either do not have access to electricity or clearly cannot afford it, and 2) farm worker settlements on commercial farms – although the farm owner may have access to electricity, the farm worker families most often do not. The OGEMP will focus on providing informal settlements with access to energy.

### **Energy Shop Approach**

The OGEMP will provide access to energy through an Energy Shop approach. The plan is to establish energy shops within a reasonable distance of the targeted communities. The energy shops would sell suitable, approved energy products and compatible appliances. Emphasis would be placed on energy technologies and appliances that utilise renewable energy and energy efficiency. The energy shops would also serve as payment collection centres for a national off-grid energy financing mechanism.

### **Energy Technologies**

The OGEMP recommends a broad range of energy technologies and appliances to be sold through energy shops. Suitable energy technologies and appliances would be available to households and businesses of all income levels. The OGEMP would furthermore recommend energy baskets, so that off-grid customers are presented with a complete energy solution.

### **Consumer Credit Finance Revolving Fund**

In addition to off-grid communities being provided with access to energy technologies, they would have access to credit finance. The credit finance would be provided via a OGEMP revolving fund, and would make energy solutions affordable to the even the lowest income households. It is envisaged that the revolving fund would offer 6-month, 1-year and 5-year loans at the prime interest rate.

It is envisaged that a private, centrally located contractor would be responsible for reviewing and approving all loan applications. During the first few years, the private contractor would also be expected to make monthly visits to all energy shops in order to

consult with customers about their loan applications. However, over the longer term the energy shops would be responsible for consulting with customers about loan applications, while the private contractor would retain the responsibility of reviewing and approving all loan applications.

### **Cost Estimate**

The following table summarises the estimated funding required by GRN/MME for the implementation of the OGEMP. Note that it has been assumed that the OGEMP revolving fund would provide loans equivalent to N\$ 400,000 per year per energy shop. As the table indicates, the estimated funding requirements vary from year to year. The estimated average funding requirement is N\$ 6,839,779 per year, and the estimated total requirement for the 20-year planning period is N\$ 136,795,585.

Year	New Energy Shops	Total Energy Shops	Subsidisation of the OGMP Revolving Fund (N\$)	Administration of the OGMP Revolving Fund (N\$)	Establish New Energy Shops and Monitor and Train Existing Energy Shops (N\$)	OGEMP "Driver", Sub-Contractors and Outputs (N\$)	Total (N\$)
1	13	13	4,308,757	1,288,912	834,600	1,151,000	<u>7,583,270</u>
2	13	26	7,229,483	2,080,505	1,024,400	1,129,000	<u>11,463,389</u>
3	8	34	7,384,262	2,561,357	893,200	823,120	<u>11,661,939</u>
4	8	42	6,964,166	3,061,342	1,010,000	838,465	<u>11,873,973</u>
5	8	50	5,861,773	3,486,312	1,126,800	855,149	<u>11,330,033</u>
6	8	58	4,631,449	3,559,069	1,243,600	858,659	<u>10,292,776</u>
7	7	65	3,496,117	3,188,815	1,296,200	800,309	<u>8,781,441</u>
8	7	72	2,680,776	2,806,735	1,398,400	804,105	<u>7,690,015</u>
9	7	79	1,950,721	2,422,256	1,500,600	808,053	<u>6,681,630</u>
10	7	86	1,305,954	2,035,418	1,602,800	812,158	<u>5,756,330</u>
11	7	93	746,474	2,198,263	1,705,000	816,428	<u>5,466,165</u>
12	7	100	229,637	2,360,542	1,807,200	820,869	<u>5,218,248</u>
13	7	107	-287,200	2,524,004	1,909,400	825,487	<u>4,971,692</u>
14	7	114	-804,036	2,688,698	2,011,600	830,291	<u>4,726,553</u>
15	7	121	-1,320,873	2,854,673	2,113,800	835,286	<u>4,482,886</u>
16	7	128	-1,837,709	3,021,980	2,216,000	840,481	<u>4,240,751</u>
17	7	135	-2,354,546	3,190,672	2,318,200	845,884	<u>4,000,210</u>
18	7	142	-2,871,383	3,360,806	2,420,400	851,503	<u>3,761,325</u>
19	7	149	-3,388,219	3,532,437	2,522,600	857,346	<u>3,524,164</u>
20	7	156	-3,905,056	3,705,627	2,624,800	863,424	<u>3,288,795</u>

**Table A - Summary of OGEMP Cost Estimate**

### **Planned Rollout of Energy Shops**

During the first two years of the OGEMP rollout plan, all 13 Regions would be focused on equally. During year 1, 1 energy shop would be established in each region, with a focus on urban, informal settlement areas. During year 2, 1 energy shop would again be established in each region, this time focusing on rural areas.

During years 3 - 20, the establishment of new energy shops would be performed according to a national priority plan, which is based on the point scoring system that is described in Section 4.2. 8 energy shops per year would be established during years 3 – 6, and 7 energy shops per year during years 7 – 20. At the end of 20 years, 156 energy

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shops would be operating. The following table shows the number of energy shops to be established in each Region for each of the 20 years.

	Total Number of Off-Grid, Pre-Grid and Informal Settlement Households *	Number of New Energy Shops to be Established Each Year during the 20-Year Planning Period																				Total Energy Shops	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
<i>Regions</i>																							
Caprivi	6,473	1	1				1									1						5	
Erongo	3,686	1	1	1	1						1	1				3		1	2		1	2	15
Hardap	3,320	1	1						1	1	1	1	2	1						2	2		13
Karas	2,752	1	1				1							1		2	1	1	2			2	12
Kavango	13,627	1	1		2	1	1	2	1	2				3	1	1			1	1		1	19
Khomas	22,607	1	1																		2	1	5
Kunene	6,066	1	1		2	2	3		2	1	1			1	1	2	1			1	2		21
Ohangwena	11,113	1	1	3				1	1					1									8
Omaheke	5,118	1	1				1	1	1	2			1	1	2	1	1	1		1			15
Omusati	9,299	1	1	1		1		2		1			1	1			1		2			1	13
Oshana	7,372	1	1		1	1																	4
Oshikoto	8,493	1	1	3	2	2							1					1					11
Otjozondjupa	6,628	1	1			1	1	1	1		2			1		1	1	2	1	1			15
<b>National Total</b>	<b>106,554</b>	<b>13</b>	<b>13</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>156</b>	

**Table B – Energy Shop Rollout Plan**

\* The total number of households per Region represents the number located within the market areas of the energy shops to be established in each Region. In some cases, there are households from one region that fall within the market area of an energy shop that would be located in a different region. As a result, the total numbers of households listed do not exactly represent the number of households located in the respective regions.

## **1. INTRODUCTION**

### **1.1 Background**

This project, *Off-Grid Energisation Master Plan for Namibia (OGEMP)*, is one of several projects that have been initiated by the UNDP/GEF/MME Barrier Removal to Namibian Renewable Energy Programme (NAMREP). The mission of NAMREP is to increase affordable access to RE services and accelerate market development for RE technologies by reducing institutional, information, human capacity, financial, technical, awareness and other market barriers.

NAMREP is comprised of the following six components:

- Component 1: Capacity Building
- Component 2: Removal of Institutional Barriers
- Component 3: Public Awareness and Social Acceptability
- Component 4: Removal of Financial Barriers
- Component 5: Removal of Technical Barriers
- Component 6: Demonstrations and Pilots

NAMREP's key stakeholders are:

- Namibian Ministry of Mines and Energy, as National Executing Agency
- UNDP Namibia, as GEF Implementing Agency
- GEF, as main financier
- DANIDA, as co-financing institution
- Renewable energy technologies (RET) suppliers
- RET users
- GRN institutions dealing with RET issues
- Financing and Capacity building institutions
- Utilities
- ECB, as a regulatory body

All of NAMREP's activities are managed by a small group of professionals that are known as the Project Management Unit (PMU). Mr. S.G. Hamutwe (Jr.) has been designated as the PMU's project manager for this project.

### **1.2 Objectives and Overview**

*Underlying Objective and Philosophy:*

The underlying objective of the OGEMP is to provide access to appropriate energy technologies to everyone living or working in off-grid, pre-grid and "grey" areas.

*Supporting Policy Statements:*

The following policies from the *Namibian White Paper on Energy Policy* clearly indicate the Government's commitment to the establishment of an Off-Grid Energisation Master Plan:

*"Government will promote the use of economically viable renewable technologies, as a complement to grid electrification, to improve energy provision to rural areas". (p 46)*

*"Government will ensure that funds made available for rural electrification will be allocated between grid and off-grid energy supply options, on the basis of their relative social and economic costs and benefits." (p 46)*

*Definition Off-Grid, Pre-Grid and “Grey” Areas in the OGEMP:*

Off-grid areas are those areas that, according to the REDMP, will not have access to electricity within 20 years.

Pre-grid areas, as defined in the REDMP, are those areas that would not have access to electricity within 5 years. However, the OGEMP will only focus on providing access to pre-grid areas that would not have access to electricity within 10 years in the updated REDMP GIS database.

Grey areas are locations where it is not clear in the 2005 REDMP how or if access to electricity will be provided. Examples of grey areas include 1) informal settlements -- where the majority of the inhabitants either do not have access to electricity or clearly cannot afford it, and 2) farm worker settlements on commercial farms – although the farm owner may have access to electricity, the farm worker families most often do not. The OGEMP will focus on providing informal settlements with access to energy.

*Energy Shop Approach:*

The OGEMP will provide access to energy through an Energy Shop approach. The plan is to establish energy shops within a reasonable distance of the targeted communities. The energy shops would sell suitable, approved energy products and compatible appliances. Emphasis would be placed on energy technologies and appliances that utilise renewable energy and energy efficiency. The energy shops would also serve as payment collection centres for the OGEMP revolving fund, and would advise and consult with customers regarding their loan applications.

*Annual Budget:*

A substantial financial investment by Government would be required to implement the OGEMP. In the 2000 REDMP, an annual funding amount of N\$5 million was proposed for off-grid energy access. This amount, however, was only a rough estimate. The detailed planning and cost estimates that have been performed for the OGEMP indicate that annual funding requirement would be approximately N\$ 6.8 million, although the amount would vary over the 20-year planning period. Details of the annual funding requirements are provided and discussed in Section 9 and Appendix II.

*Time Frame:*

The assumed time frame for the full implementation of the OGEMP is 20 years. This is consistent with what was assumed in the 2000 and 2005 REDMP.

*Flexibility of the OGEMP Database:*

The OGEMP has been prepared using an ArcView GIS database. The database allows large amounts of different types of data to be organised and managed. The database can be easily updated so that the master plan always reflects 1) the current situation on the ground and 2) the planning priorities of stakeholders/decision-makers.

*Compatibility with the 2005 REDMP:*

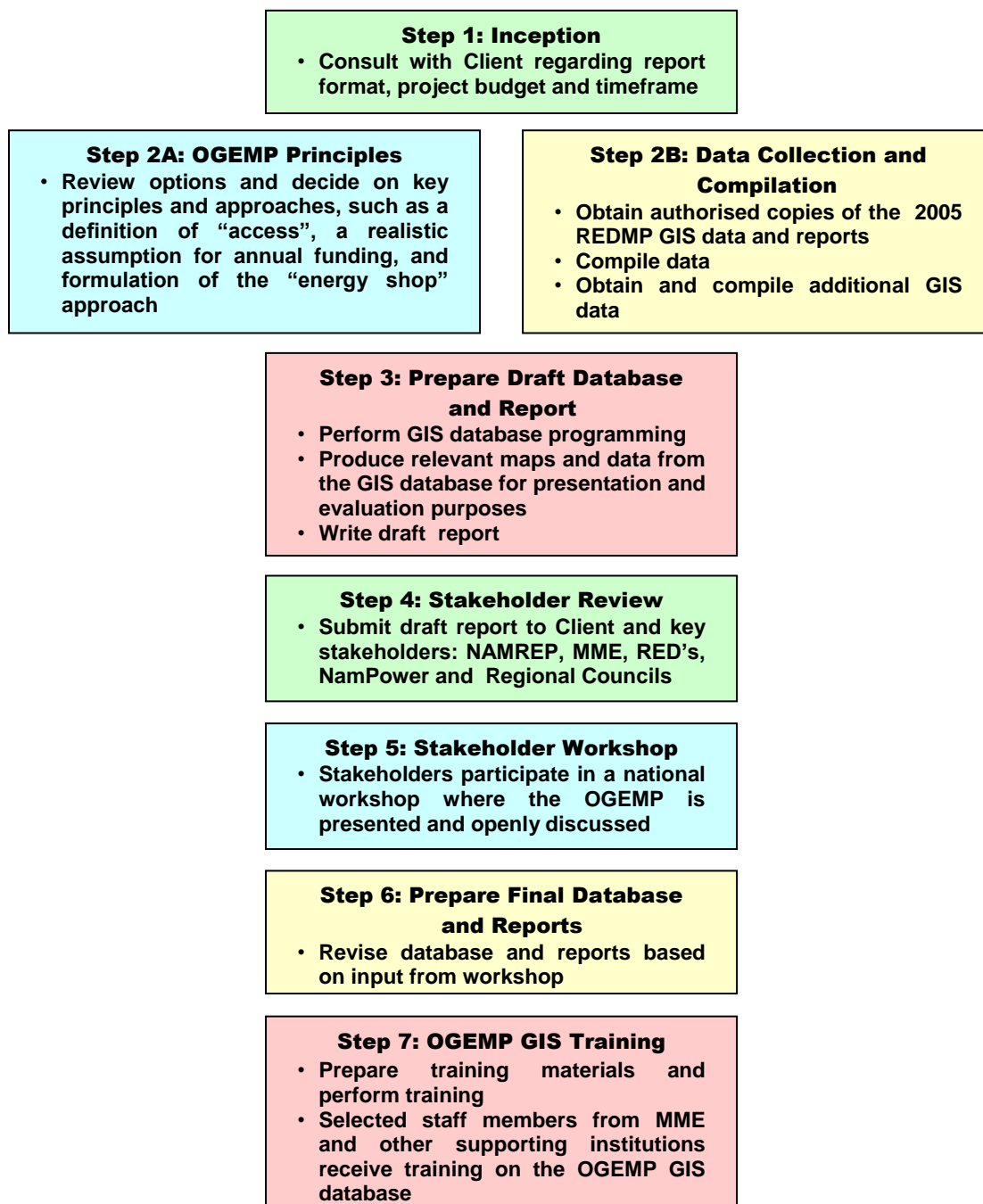
The Terms of Reference for this project imply that the OGEMP should be compatible with the 2005 REDMP. The majority of the input data in the GIS database is the same as what was used for the 2005 REDMP. Furthermore, the general structure of the OGEMP report is similar to the one of the 2005 REDMP National Overview Report. It should be noted, however, that the 2005 REDMP reports include extensive information regarding national and regional profiles. It was decided (after consultation with the Client) that the



OGEMP report should not attempt to reproduce this information. Instead, the reader is encouraged to refer to the REDMP reports for the relevant national and regional profile information regarding environmental conditions, socio-economic information, etc.

### 1.3 Project Framework

The project framework involves a number of steps that are summarised below.



*Figure 1 - Project Framework*

## **1.4 Outline of Report**

The following is an outline of the different sections of this report, excluding the Introduction – Section 1.

*Section 2 – Access to Energy* discusses the issues and assumptions regarding the provision of access to energy.

*Section 3 – National Profile* identifies the number of localities in off-grid, pre-grid and “grey” areas. As stated in Section 1.3, the reader should refer to the REDMP reports for extensive national and regional profile information.

*Section 4 – Off-Grid Master Planning* discusses the basic principles that guided the concept building for the OGEMP, provides an explanation of the point scoring system, and briefly covers the allocation of funding for implementation of the OGEMP.

*Section 5 – Energy Shops* discusses the details of establishing energy shops in off-grid areas as the proposed mechanism to provide access to energy.

*Section 6 – Energy Technologies* discusses the reasoning behind the recommended technologies and energy baskets.

*Section 7 – Consumer Credit Financing* discusses the recommended mechanism for making the energy technologies and energy baskets more affordable to off-grid consumers.

*Section 8 – Implementation* discusses important aspects and requirements of OGEMP implementation.

*Section 9 – OGEMP Cost Estimate* provides a summary of the costs and capacity of the OGEMP.

## 2. ACCESS TO ENERGY

### 2.1 Access as Defined in the 2005 REDMP

The 2005 REDMP report includes an in-depth discussion about defining access to electricity. In the end, having access to electricity is defined as being located within 500m of a LV transformer. Those households, businesses or institutions that are located within 500m of a LV transformer, but which do not want or cannot afford to get connected to electricity supply, do have access to electricity.

### 2.2 Access as Defined in the OGEMP

The approach taken in the OGEMP with respect to access to energy is similar to the approach taken in the 2005 REDMP. The OGEMP would provide households, businesses and institutions with access to energy by establishing energy shops within a "reasonable distance", wherever possible. The recommended number and locations of the energy shops involved a judgement of what would be cost effective based on an evaluation of GIS data, such as the location and density of localities and the number of households contained in the localities.

The proposed energy shops would generally be established at locations that are convenient for a number of localities. It is envisaged that existing filling stations, which are typically located on well-travelled roadways, could be good candidates to become energy shops. There are, however, many other existing businesses that could be good candidates to become energy shops and that would be evaluated in detail during the actual implementation of the OGEMP.

	Total Number of Off-Grid, Pre-Grid and Informal Settlement Households	Households located within 10 km of an Energy Shop		Households located within 20 km of an Energy Shop		Households located within 30 km of an Energy Shop	
		No.	%	No.	%	No.	%
<i>Regions</i>							
Caprivi	6,473	3279	50.7	4125	63.7	5200	80.3
Erongo	3,686	2176	59.0	3028	82.1	3526	95.7
Hardap	3,320	1415	42.6	2713	81.7	3122	94.0
Karas	2,752	1983	72.1	2272	82.6	2459	89.4
Kavango	13,627	6946	51.0	10,079	74.0	12,867	94.4
Khomas	22,607	22,472	99.4	22,498	99.5	22,577	99.9
Kunene	6,066	2152	35.5	3383	55.8	4932	81.3
Ohangwena	11,113	4156	37.4	9366	84.3	10,880	97.9
Omaheke	5,118	1819	35.5	3207	62.7	4374	85.5
Omusati	9,299	2288	24.6	7810	84.0	8888	95.6
Oshana	7,372	5700	77.3	6849	92.9	7257	98.4
Oshikoto	8,493	4018	47.3	6526	76.8	8013	94.3
Otjozondjupa	6,628	4325	65.3	5226	78.8	5890	88.9
<i>National Total</i>	<i>106,554</i>	<i>62,729</i>	<i>58.9</i>	<i>87,082</i>	<i>81.7</i>	<i>99,985</i>	<i>93.8</i>

**Table 1 - General Proximity of Households to the Planned Energy Shops**

\* The number of households per Region represents the number located within the market areas of the energy shops to be established in each Region. In some cases, there are households from one region that fall within the market area of an energy shop that would be located in a different region. As a result, the numbers of households listed do not exactly represent the number of households located in the respective regions.

	Total Number of Households*	Total Number of Planned Energy Shops	Ratio Households : Energy Shops
<i>Regions</i>			
Caprivi	6,473	5	1295 : 1
Erongo	3,686	15	246 : 1
Hardap	3,320	13	255 : 1
Karas	2,752	12	229 : 1
Kavango	13,627	19	717 : 1
Khomas	22,607	5	4521 : 1
Kunene	6,066	21	289 : 1
Ohangwena	11,113	8	1389 : 1
Omaheke	5,118	15	341 : 1
Omusati	9,299	13	715 : 1
Oshana	7,372	4	1843 : 1
Oshikoto	8,493	11	772 : 1
Otjozondjupa	6,628	15	442 : 1
<b>National Total</b>	<b>106,554</b>	<b>156</b>	<b>683 : 1</b>

**Table 2 – Number and Ratio of Energy Shops per Region and RED**

- \* The number of households corresponds to the market areas of the energy shops listed under each Region. In some cases, there are households from one region that fall under the market area of an energy shop located in a different region. Therefore, the total numbers of households listed do not exactly correspond to the regions listed.

### 3. NATIONAL PROFILE

Refer to the 2005 REDMP reports for detailed national and regional profiles.

#### 3.1 Off-Grid, Pre-Grid and Informal Settlements

The following table provides a summary of the number of localities and households that are classified as off-grid, pre-grid and informal settlements. Note that the data is based on locality data was utilised in the 2005 REDMP database, and on additional data for informal settlements which was obtained from the NPC - Bureau of Statistics and from the previous studies performed by CSA. The informal settlement data is based on data obtained from National Planning Commission Secretariat – Bureau of Statistics for the year 2000, and on estimates made by the Consulting Team during previous infrastructure planning projects that were performed in 17 different local authorities located throughout Namibia.

Regions	Off-Grid	Pre-Grid	Informal Settlements	Sub-Total
	Households	Households	Households	Households
Caprivi	3,055	960	2,458	6,473
Erongo	1,828	176	1,682	3,686
Hardap	1,106	214	2000	3,320
Karas	694	194	1,864	2,752
Kavango	6,385	3,004	4,238	13,627
Khomas	75	65	22,467	22,607
Kunene	4,010	456	1,600	6,066
Ohangwena	6,015	4,798	300	11,113
Omaheke	3,767	351	1000	5,118
Omusati	4,376	4,628	295	9,299
Oshana	1,511	2,261	3,600	7,372
Oshikoto	5,344	2,899	250	8,493
Otjozondjupa	2,378	520	3,730	6,628
<b>National Total</b>	<b>40,554</b>	<b>20,526</b>	<b>45,484</b>	<b>106,554</b>

**Table 3 - Number of Households in Off-Grid, Pre-Grid and Informal Settlement Areas**

\* The number of households corresponds to the market areas of the energy shops listed under each Region. In some cases, there are households from one region that fall under the market area of an energy shop located in a different region. Therefore, the total numbers of households listed do not exactly correspond to the regions listed.

## **4. OFF-GRID MASTER PLANNING**

### **4.1 Basic Principles**

The OGEMP recognises the following basic principles:

- **Funding for the implementation of the OGEMP would be limited**

GRN/MME would have limited funding with which to implement the OGEMP. There are approximately 106,554 households to be targeted by the OGEMP. Therefore, providing energy technologies (such as solar home systems) free of charge to all off-grid households, businesses and institutions would simply be too expensive and not feasible. It therefore has been concluded that off-grid households would need to purchase their energy technologies. The OGEMP accordingly proposes a plan by which off-grid households would have improved access to appropriate and affordable energy technologies. In this way, the limited funding that could be provided by GRN/MME would be utilised to provide the greatest possible benefit to the greatest number of people.
- **The OGEMP must be compatible with the REDMP**

The OGEMP utilises the same GIS database information that was utilised for the 2005 REDMP. The communities that are the focus of the OGEMP are the ones that would not have access to grid electricity within the next 10-20 years according to the 2005 REDMP. Informal settlements are also targeted by the OGEMP because they are not openly dealt with in the 2005 REDMP. The OGEMP is therefore compatible with the 2005 REDMP because it focuses on those communities that would not have access to electricity until far in the future.
- **The OGEMP should focus on a variety of options for renewable, cost efficient and practical energy technologies**

In line with the objectives and mission of NAMREP and UNGEF, the OGEMP recognises the need to propose energy technologies that are environmentally friendly, practical and that answer the end-user's actual needs. The OGEMP also recognises that consumers require a variety of energy technology options – one size does not fit all. The OGEMP therefore proposes a number of different types and sizes of energy technologies and energy efficient appliances. The technologies and appliances fall within a wide range of prices. Renewable energy technologies have been proposed whenever feasible and cost efficient.

### **4.2 Point Scoring System**

The OGEMP utilises nearly the same locality point scoring criteria that was used in the 2005 REDMP to determine the rollout plan. It should be noted however that the rollout plan for energy shops will only begin to follow the point scoring system in year 3 of the rollout. This is discussed in more detail in Section 5.3.

Informal settlement localities have been added to the OGEMP, however, the database information that was available for informal settlements does not indicate whether there are schools, clinics and other important institutions located within the informal settlements. The information only includes the locations of the informal settlements and the number of households. The lack of information may result in slightly lower point scores for a few informal settlements than would otherwise be the case if more information were available. It should also be noted that although the OGEMP point scoring indicates that 0 points will be scored for localities located less than or equal to 1 km from the grid, it was decided that informal settlements would always score 10 points

in this category. The reason for this is: while informal settlements are almost always located very close to the grid, the proximity appears to have little bearing on whether or not the informal settlements will receive access to the grid. Furthermore, even when the informal settlement households do have access to the grid according to 2005 REDMP criteria, the access is largely unaffordable. The OGEMP energy technology options would generally be more affordable and practical for informal settlement households.

The following table compares the locality point scoring system of the OGEMP to that of the 2005 REDMP.

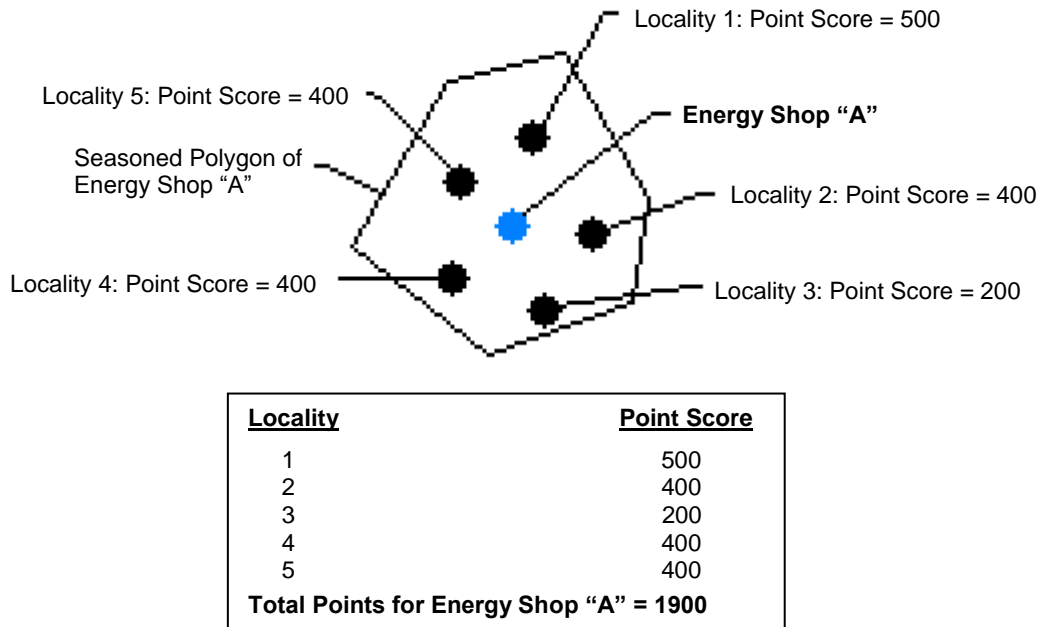
FACILITY/POINT SCORE ITEM	OGEMP POINT SCORE CRITERIA	2005 REDMP POINT SCORE CRITERIA
Constituency capital	80	80
<u>Health Facilities*</u>		
Hospital	80	80
Health Centre	60	60
Clinic	40	40
Outreach point	20	20
<u>Schools*</u>		
Senior secondary school (11-12)	60	60
Junior secondary school (8-10)	55	55
Combined school (prim & sec)	50	50
Senior primary school (5-7)	40	40
Junior primary school (1-4)	30	30
Hostel	60	60
<u>Other Infrastructures</u>		
Agricultural development centres*	60	60
Agricultural extension office*	20	20
Per borehole*	5	5
NamPost*	15	15
Per household to be connected	1	1
<u>Proximity to existing powerlines**</u>		
Village to powerline (0 to <=1km)	0	30
Village to powerline (>1 to <=5km)	10	20
Village to powerline (>5 to <=10km)	20	10
Village to powerline (>10 to <=20km)	30	0

\* No information available for informal settlement localities

\*\* 10 points will be scored to all informal settlements

**Table 4 - Comparison of Locality Point Scoring in the OGEMP and REDMP**

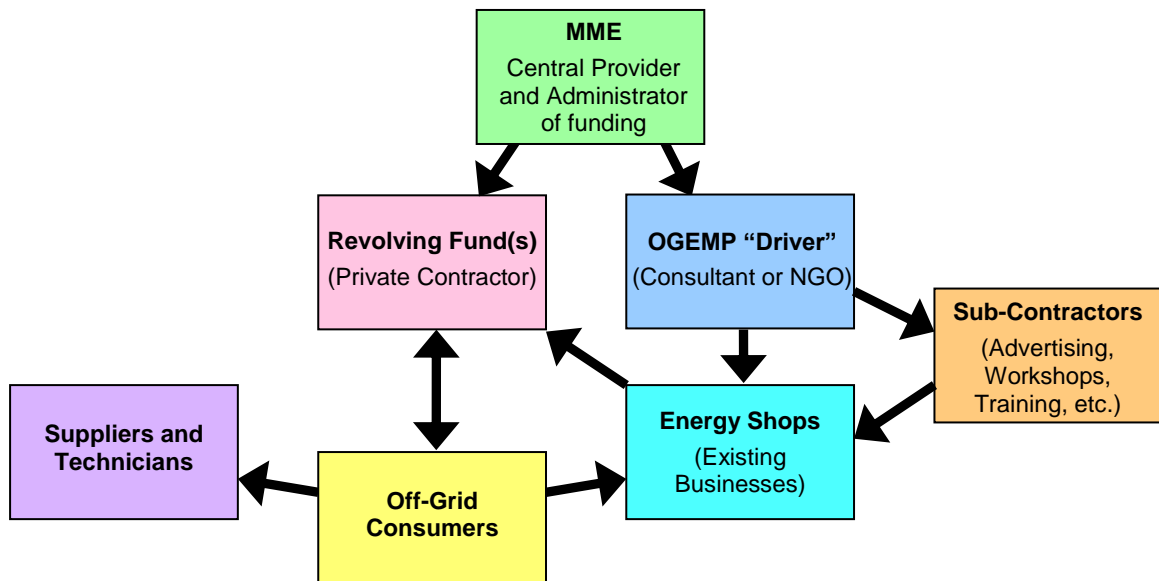
In the OGEMP, the locality point scores were used as input data to determine a point score for each energy shop. In the OGEMP GIS system, a “seasoned polygon” has been delineated for each energy shop. This polygon indicates the localities that are located nearest to a particular energy shop, which is equivalent to the market area of the energy shop. The point score for an energy shop is therefore determined by adding all of the locality point scores within its seasoned polygon. See the figure below for an example of how energy shop point scoring is performed in the OGEMP GIS database.



**Figure 2 - Example of Point Scoring for a Hypothetical Energy Shop**

### 4.3 Fund Allocation

MME would be responsible for the provision and allocation of funds required to subsidise and manage the OGEMP revolving fund, establish new energy shops, maintain and monitor existing energy shops, and perform awareness raising campaigns. The details of the funding requirements are discussed in Section 9. The following figure illustrates the general pattern for the allocation and transfer of Government funding within the OGEMP.



**Figure 3 - Allocation and Transfer of OGEMP Funds and Resources**



## **5. ENERGY SHOPS**

### **5.1 Description and Services to be Provided**

The objective of establishing energy shops is to provide the targeted communities with access to appropriate energy technologies. As indicated in Table 2 in Section 2.2, 156 energy shops would be established over the 20-year planning period.

The OGEMP implementation team would recruit existing, well managed businesses, in strategically desirable locations to sell the approved energy shop products -- these businesses would be the energy shops. It appears that existing petrol stations could be good candidates to provide energy shop services, since they are generally located on easily accessible roadways and are generally well managed businesses.

The following is a summary of the responsibilities and services to be provide by the energy shops:

- **Stocking of selected energy supplies**  
Energy shops would be expected to stock a few important energy supplies such as dry cell batteries, 12V car batteries (for lighting purposes), LPG gas and energy efficient light bulbs (DC and AC), and fuel-efficient wood stoves.
- **Take customer orders for a large variety of energy technologies listed in an OGEMP catalogue**  
Energy shops would provide customers with access to a large variety of energy technologies and compatible appliances via an OGEMP catalogue. Customers would place their orders for energy technologies and appliances with the energy shop. The energy shop would then co-ordinate the customer orders with suppliers or regional OGEMP supply warehouses. The energy products would then be delivered to the energy shops.
- **Consult with customers regarding their revolving fund loan applications**  
Energy shops would consult with customers regarding their revolving fund loan applications. During the first few years of the OGEMP implementation plan, the first established energy shops would receive significant support from the Revolving Fund private contractor in performing these consultations with customers. Over the longer term, however, all energy shops will be fully responsible for all local support to customers regarding their loan applications.
- **Collect loan payments from customers and follow up with customers who fail to make their payments**  
Energy shops would collect loan payments from customers and transfer the money to the central revolving fund administrator. Energy shops would also be expected to follow up with customers who fail to make their loan payments. It is envisaged that the energy shops would employ part-time "foot soldiers" to track down the customers who fail to make their loan payments. During the first few years of the OGEMP implementation plan, the first established energy shops would receive support from the Revolving Fund private contractor in dealing with customers who fail to make their loan payments. Over the longer term, however, all energy shops will be fully responsible for ensuring that an acceptable percentage of customers make their loan payments. A small financial incentive would be offered to energy shops to motivate them in this respect. In addition, energy shops who fail to ensure an acceptable loan payback percentage would be subject to losing their energy shop status.

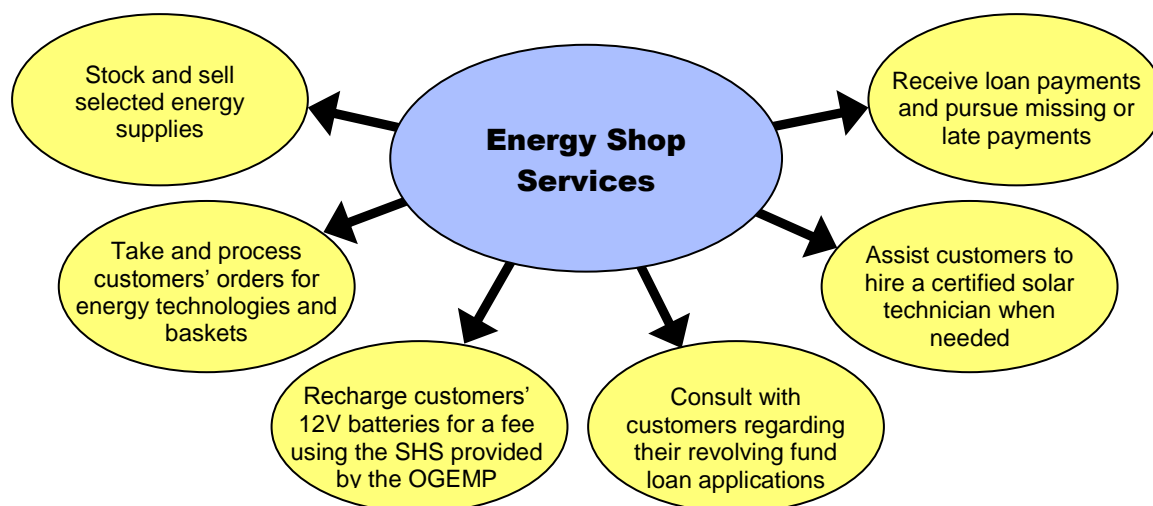


Figure 4 - Typical Services to be Provided by Energy Shops

## 5.2 Support to be Provided to Energy Shops

MME and the OGEMP “Driver” would provide a variety of support to energy shops to ensure that they are effective. The following is a summary of the types of support that would be provided:

- **Training**

Before beginning to offer energy shop services, selected staff from the shops would receive comprehensive training on subjects such as the objectives of energy shop services, details on energy technologies and appliances, procedures for placing energy product orders, approved solar home system installation technicians, etc.

- **Catalogues, Brochures and Demonstration/Display Items**

Energy shops would be provided with a comprehensive sales catalogue of all of the products to be offered. Professional looking brochures would also be provided to inform customers about the energy baskets and the revolving fund loan process.

- **Photovoltaic Panel System for 12V Battery Recharging**

Energy shops would be provided with a photovoltaic solar home system for the purpose of recharging customers’ 12V batteries, which they use for lighting, radio, etc, and cell phone batteries. The energy shops would be able to charge customers a standard, OGEMP-approved fee for this service.

- **Regional Awareness-Raising Campaigns**

The OGEMP Driver would ensure that the communities located within the vicinity of energy shops are informed about the services and products offered. Awareness-raising campaigns would be conducted regularly on radio shows, in newspapers, and in community forums such as village development committee gatherings.

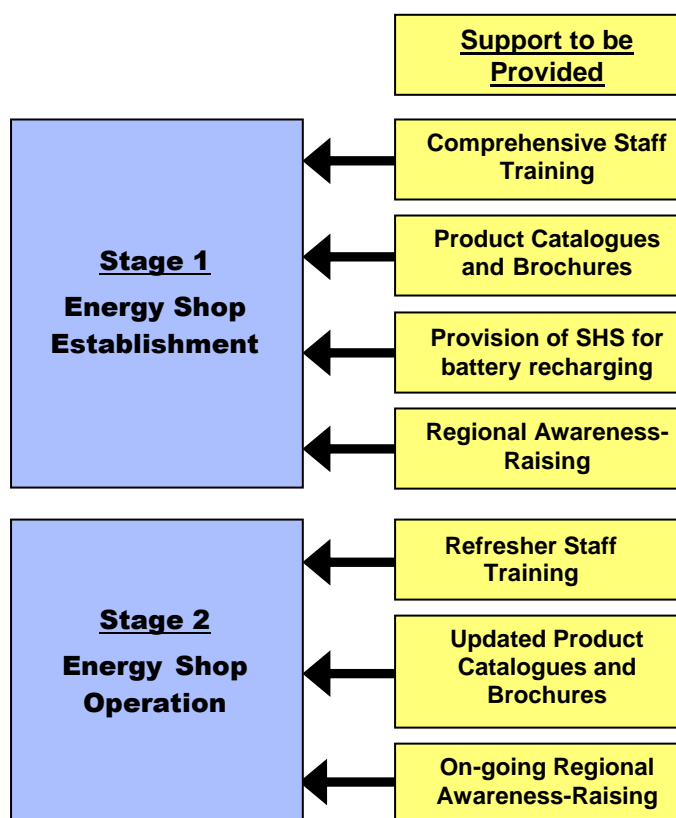


Figure 5 - Types of Support to be Provided to Energy Shops

### 5.3 Rollout Plan

The draft OGEMP was discussed in detail during a national stakeholder workshop. During the discussion of the proposed energy shop rollout plan, Regional leaders voiced strong support for establishing energy shops in each region during the initial stage of rollout. The rollout plan was revised accordingly and is summarised as follows:

- **Year 1: Focus on Urban Informal Settlements**  
 During year 1, 1 energy shop would be established in each region (13 total), with a focus on urban, informal settlement areas. In addition to providing local informal settlement households with access to appropriate energy technologies, the initial energy shops would also provide access to rural settlers who are able to travel to the urban centres.
- **Year 2: Focus on Rural Areas**  
 During year 2, 1 energy shop would again be established in each region, this time focusing on rural areas. In the Khomas region, however, the energy shop would again be established in Windhoek since nearly all of the targeted households are located in Windhoek's informal settlements.
- **Years 3 - 20: Rollout According to the Energy Shop Point Scoring System**  
 During years 3 - 20, the establishment of new energy shops would be performed according to the energy shop point scoring system that is described in Section 4.2. 8 energy shops per year would be established during years 3 – 6, and 7 energy shops per year during years 7 – 20.

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The following table shows the number of energy shops to be established in each Region for each of the 20 years.

	Total Number of Off-Grid, Pre-Grid and Informal Settlement Households *	Number of New Energy Shops to be Established Each Year during the 20-Year Planning Period																				Total Energy Shops
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<b>Regions</b>																						
Caprivi	6,473	1	1				1						1							1		5
Erongo	3,686	1	1	1	1							1	1			3		1	2		1	2
Hardap	3,320	1	1						1	1	1	1	2	1						2	2	13
Karas	2,752	1	1				1								1		2	1	1	2		2
Kavango	13,627	1	1		2	1	1	2	1	2			3	1	1			1	1			1
Khomas	22,607	1	1																		2	1
Kunene	6,066	1	1		2	2	3		2	1	1			1	1	2	1			1	2	21
Ohangwena	11,113	1	1	3				1	1						1							8
Omaheke	5,118	1	1				1	1	1	2			1	1	2	1	1	1		1		15
Omusati	9,299	1	1	1		1		2		1			1	1			1		2			1
Oshana	7,372	1	1		1	1																4
Oshikoto	8,493	1	1	3	2	2							1					1				11
Otjozondjupa	6,628	1	1			1	1	1	1			2		1		1	1	2	1	1		15
<b>National Total</b>	<b>106,554</b>	<b>13</b>	<b>13</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>156</b>

**Table 5 – Energy Shop Rollout Plan**

\* The total number of households per Region represents the number located within the market areas of the energy shops to be established in each Region. In some cases, there are households from one region that fall within the market area of an energy shop that would be located in a different region. As a result, the total numbers of households listed do not exactly represent the number of households located in the respective regions.

## **6. ENERGY TECHNOLOGIES**

### **6.1 Selection of Appropriate Technologies and Fuels, and Consideration of Hybrid Mini-Grid Systems**

The selection of appropriate technologies and fuels followed three criteria:

- Technologies and fuels that are readily available on the Namibian market
- Technologies and fuels that would, in combination, satisfy all basic household energy requirements
- Technologies that would require minimal operation and maintenance costs

The technologies and fuels that satisfy these criteria are dominated by common solar energy (photovoltaic) technologies for basic electricity supply and liquefied petroleum gas technologies for basic thermal energy supply. The extensive use of solar energy technologies as the technology of choice within the OGEMP might serve to strengthen the market for these technologies and support initiatives by Government such as the Solar Revolving Fund.

Solar Water Heaters (SWH) were largely omitted from the list of technologies, despite their proven value as a thermal energy technology for water heating, since it is assumed that the majority of rural off-grid households do not have piped water in their homes. Piped water with a minimum pressure is a requirement for most commercially available SWH's.

Similarly Photovoltaic Pumping (PVP), another cost-effective alternative to diesel water pumping, was also omitted since the OGEMP looks primarily at basic household energy requirements. Water provision is in many instances the responsibility of other entities, such as Government's Department of Rural Water Supply. Water pumping technologies are also very borehole specific and providing theoretical price estimates would not be sensible within the OGEMP. However, the Energy Shops proposed in the OGEMP would be ideally suited to offer basic advice on PVP's and could refer queries to PVP suppliers and act as rural agents for PVP suppliers.

Furthermore, the focus of the technologies was placed on decentralised stand-alone systems, rather than larger centralised systems such as hybrid mini-grids. This was due to the following reasons:

- There was no data available regarding the density of households in the off-grid and pre-grid localities. It would be impossible to recommend or plan mini-grids without making hundreds of field visits.
- Hybrid Mini-grids may be a more cost effective and versatile option for densely clustered localities, however they have higher investment costs and are typically operated by a well-qualified entity such as a Regional Electricity Distributor or Local Authority. The time required to co-ordinate with RED's, local authorities and local communities would be prohibitive, and would be a serious barrier to an effective and timely rollout plan.

Nonetheless, an Energy Shop and an energy manager would certainly be basic requirements for the successful operation of a hybrid mini-grid at a locality. As such the OGEMP's proposed Energy Shops could be adapted in the future to cater for hybrid mini-grids if and when they are established.

## 6.2 Recommended Energy Baskets

An energy basket is a combination of energy appliances and fuels that would cover the whole spectrum of a household's energy needs. Typically this includes basic electricity and thermal energy needs. Within the OGEMP, the energy baskets not only include the technology and fuels, but also the appliances that can effectively be operated on the particular technologies and fuels. In fact, the appliances (the *energy service*) form the basis for the selection of the type and size of technology. Satisfying energy needs and providing energy services is the underlying rationale behind the OGEMP, rather than encouraging the use of any specific technology or fuel. The energy basket information summaries thus comprise:

<b>A</b>	Appliances (e.g. gas plate, wood efficient stove, radio, microwave, grinder and refrigerator)
<b>A</b>	Technology (e.g. Solar 50W Direct Current, Solar 400 Watt Alternating Current)
<b>A</b>	Fuel (liquefied petroleum gas, wood)
<b>B</b>	Number of a specific appliance
<b>C</b>	The appliance cost
<b>D</b>	Energy requirements, where an appliance requires a purchased fuel
<b>E</b>	Monthly fuel cost
<b>F</b>	Monthly maintenance cost, where an appliances or technology needs replacement (the maintenance amount for solar systems includes the replacement of batteries after 3-4 years; the amount specified is the monthly amount which a household needs to "save" in order to purchase a complete new set of batteries after this period)
<b>G</b>	Total basket cost (includes technology and all appliances)
<b>H</b>	Total monthly cost is the amount a household will spend each month in order to ensure energy services over the long-term (the amount includes the funds "saved" for future battery replacements)
<b>I</b>	The Total amount reflects the sum of the cost of the energy basket plus expenses to operate the basket for one month

Note: Prices include 15% VAT, but exclude transport (from Windhoek) and installation. Prices are dated June 2006 and are subject to change. Updating energy basket prices will be an essential component of the implementation of the Off-Grid Master Plan.

Households - Option 3 Basket Contents								
Appliance / Fuel	Quantity	Appliance / Fuel Cost	Appliance / Fuel subtotal	Required energy	Units	Unit Cost	Monthly Fuel Cost	Monthly Maintenance Cost
Gas plate - double	1	\$ 150.00	\$ 150.00	4.60	kg/month	\$ 12.78	\$ 58.79	\$ -
Low power electric light 11 W CFL, fitting round bulkhead & gull-switch	6	\$ 293.00	\$ 1,758.00	-	Vah/month	\$ -	\$ -	\$ 48.83
Low Power radio	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	Vah/month	\$ -	<b>E</b>	<b>F</b>
Low power TV		\$ 0.00	\$ 1,000.00		Vah/month	\$ -		
Solar PV 100 - DC	1	\$ 11,500.00	\$ 11,500.00	-	-	-	-	\$ 20.00
9 kg LPG Cylinder (N\$ 173 deposit)	1	\$ 288.75	\$ 288.75	-	-	-	-	-
								Monthly cost
								<b>H</b> 127.62
<b>TOTAL</b>			<b>G</b> 15,026.75				\$ 58.79	\$ 68.83
								<b>I</b> 15,154.37

Figure 6 - Summary of Information Provided for Energy Technologies and Baskets

A further reason for focusing on energy services, rather than on the technologies, is to facilitate an easier understanding for the abilities and limitations of a certain technology. In the event of a household purchasing a specific basket, but adding inappropriate appliances, i.e. appliances not listed for that basket, any possible failure of that basket can then be more easily explained. This might lessen household disappointment and frustration and facilitate greater energy consciousness. Households in off-grid localities can choose an energy basket based on the energy service they require and the funds they might have available and are willing to spend. The operator of an Energy Shop can use the energy baskets to advise possible clients, without needing experience in solar system sizing. He can furthermore remove items from the basket in the event where a possible client already owns that particular appliance.

## **7. CONSUMER CREDIT FINANCING**

### **7.1 Recommended Consumer Credit Financing Mechanism**

The majority of off-grid consumers would not be able to afford a one-time purchase payment of the energy technologies and energy baskets. Consumer credit financing would therefore be needed.

The following points summarise the recommended consumer credit financing mechanism. It should be noted, however, that there are many details that would need to be sorted later, prior to the implementation of the OGEMP.

- **GRN/MME Funded Revolving Fund**

The proposed consumer credit finance mechanism would be a revolving fund that is subsidised by Government through MME. The amount to be provided by Government would vary from year to year. The estimated funding requirement is based on an average budget per energy shop of N\$ 400,000 per year. Refer to Section 9 and Appendix II for more details of the projected funding requirements.

- **Revolving Fund Loans to be Reviewed and Approved by an Administrator-Contractor**

As is the case currently with the Solar Revolving Fund, the OGEMP revolving fund would not be administered by Government. It is envisaged that a private contractor would be hired through a public tender process to serve as the Revolving Fund Administrator. The primary responsibility of the Administrator would be to review and approve loan applications, ensuring that this is done in a consistent and transparent manner.

- **Consultations with Off-Grid Customers Regarding Their Loan Applications**

Off-grid customers would be able to consult with a local representative regarding any questions they may have about the revolving fund and the loan applications. It is envisaged that during the first few years of rollout, the centrally-located Administrator-Contractor would provide travelling representatives who would visit each energy shop monthly to consult with customers. The energy shops would also be trained and expected to provide basic information to customers. Beginning in year 6, however, the energy shops would play a much bigger role in providing loan consultations and the travelling representatives of the Administrator-Contractor would be phased out.

- **Local Collection of Customers' Loan Payments**

Customers would be expected to make their loan payment instalments to the energy shops. As stated in Section 5.1, the Administrator would initially be responsible for pursuing persons who are delinquent on making their payments, but beginning in year 6 this would become a primary responsibility of the energy shops.

- **6-Month, 1-year and 5-Year Loan Payment Plans to be Available to Off-Grid Customers**

The current Government-funded Solar Revolving Fund offers its customers 5-year loans at a 5% fixed interest rate. The recommended revolving fund for the OGEMP would offer off-grid customers 6-month, 1-year and 5-year loans at the prime interest rate (currently 12.25%). A minimum purchase amount would be set for all three loan durations. The 6-month and 1-year loans would focus on making basic energy technologies and energy baskets affordable to the lowest income households. This would be important given the relatively high cost of most technologies and energy

baskets and the very large number of households who survive on extremely low monthly incomes. The 5-year loans would cater more to the low-to-medium income households who would like to purchase something more than the most basic energy basket.

The following figure illustrates the process of obtaining and loan from the revolving fund, as seen from the perspective of the customer.



**Figure 7 - An Off-Grid Customer's Step-by-Step Involvement with the OGEMP Revolving Fund**



## **8. IMPLEMENTATION**

### **8.1 Recommendation for an OGEMP Driver**

As stated in Section 5.1, 9 new energy shops would be established every year. At the end of the 20-year planning period, a total of 156 energy shops would be in operation. A significant amount of work would be required to establish and monitor the energy shops. Additional work would also be required to perform or manage awareness-raising campaigns. It is therefore recommended that the OGEMP implementation plan include a “driver” organisation. The OGEMP Driver would be a contracted NGO or consulting firm, which would also hire sub-contractors as needed. The following is a summary of the envisaged OGEMP Driver and sub-contractor activities:

- **Co-ordinate with Regional Councils and Recruit Existing Businesses to Become Energy Shops**

Co-ordinate with Regional Councils and Regional Council development planners regarding the proposed locations of energy shops. The location of the new energy shops would be finalised based on this co-ordination. The Driver would also visit the proposed locations of the energy shops, identify the best existing business in each area to act as the energy shop, and then recruit those businesses to become energy shops.
- **Organise Training of New Energy Shops**

Organise comprehensive training sessions for the new energy shops. It is estimated that two key staff members from each new energy shop would participate in a 1-week training course. The Driver would ensure that training manuals are prepared, a qualified trainer is hired, trainees are provided with accommodation and food, etc.
- **Oversee Preparation of Energy Shop Catalogues and Brochures**

Ensure that a comprehensive product catalogue is compiled, from which customers would select their energy technologies and baskets. The Driver would also oversee the design and production of sales brochures to be made available to potential customers at the energy shops.
- **Monitor Performance of Existing Energy Shops**

Travel regularly to existing energy shops to monitor the quality of the service provided.
- **Organise Refresher Training for Staff of Existing Energy Shops**

Organise refresher training sessions for existing energy shops. It is estimated that two key staff members from each existing energy shop would participate in a 3-day training course. The Driver would ensure that training manuals are prepared; a qualified trainer is hired; etc.
- **Organise or Perform Regional Awareness Raising Campaigns**

Perform (or hire a sub-contractor to perform) awareness raising campaigns within the areas of both new and existing energy shops.

## 9. OGEMP COST ESTIMATE

### 9.1 Key Assumptions

The following are some of the key assumptions that have been incorporated into the cost estimate. The reader should also refer the cost estimate spreadsheets (Appendix II), which much more information regarding assumptions that have been made.

- 13 new energy shops would be established in year 1 and in year 2. 8 energy shops per year would be established in years 3 – 6, and 7 per year during years 7 – 20.
- The OGEMP revolving fund would have enough funding to provide an average of N\$ 400,000 of loans per year per energy shop.
- 6-month, 1-year and 5-year loans would be offered at the prime interest rate (OGEMP cost estimate based on the current prime rate of 12.25 %). Minimum purchase amounts would be required for each loan duration.
- In order to ensure that the limited revolving fund money is available to the people who need it most – very low and low income families – the Administrator-Contractor would ensure that adequate loan funding is reserved for those people. The following table indicates the amounts to be reserved for each loan duration, the targeted consumer groups, and the equivalent amount of energy technologies and baskets that would be available for the budgeted amounts. Refer also to the detailed cost data provided in Appendix II, and the energy technology and energy basket information provided in Appendix I.

Loan Duration	Targeted Consumer Group	Average amounts to be reserved per energy shop out of the average total amount of N\$ 400,000 that would be budgeted annual for each energy shop	Minimum Purchase Amount	Equivalent number of purchases of typical energy technologies and energy baskets (EB)
6-month	Very-low income households	N\$ 9000	N\$ 300	24 Tso Tso or Vesto stoves
1-year	Very-low and low income households	N\$ 38,000	N\$ 1000	24 EB1's
5-year	Low to medium income households	N\$ 272,000	N\$ 3000	12 EB2's, 11 EB3's, 3 EB4's, 2 EB5's, 1 EB6, & 1 EB8
5-year	Off-grid businesses	N\$ 81,000	N\$ 20,000	1 EB14, or 3 EB15's, or 1 EB17
Total		N\$ 400,000		

**Table 6 – Breakdown of Reserved Loan Amounts (Average) per Energy Shop per Year**

- It has been recognised that some customers would default on their loan payments. The cost estimate assumes a 5% default rate for the 6-month and 1-year loans, and 10% for 5-year loans.

## 9.2 Summary of Cost Estimate

A detailed cost estimate was prepared to determine the annual funding requirements for the OGEMP.

The cost estimate indicates that average annual funding requirement would be N\$ 6,839,779 per year, and the estimated total requirement for the 20-year planning period would be N\$ 136,795,585.

The following table and graph provide a summary of the OGEMP cost estimate. Refer to Appendix II for the complete cost estimate.

Year	New Energy Shops	Total Energy Shops	Subsidisation of the OGMP Revolving Fund (N\$)	Administration of the OGMP Revolving Fund (N\$)	Establish New Energy Shops and Monitor and Train Existing Energy Shops (N\$)	OGEMP "Driver", Sub-Contractors and Outputs (N\$)	Total (N\$)
1	13	13	4,308,757	1,288,912	834,600	1,151,000	<u>7,583,270</u>
2	13	26	7,229,483	2,080,505	1,024,400	1,129,000	<u>11,463,389</u>
3	8	34	7,384,262	2,561,357	893,200	823,120	<u>11,661,939</u>
4	8	42	6,964,166	3,061,342	1,010,000	838,465	<u>11,873,973</u>
5	8	50	5,861,773	3,486,312	1,126,800	855,149	<u>11,330,033</u>
6	8	58	4,631,449	3,559,069	1,243,600	858,659	<u>10,292,776</u>
7	7	65	3,496,117	3,188,815	1,296,200	800,309	<u>8,781,441</u>
8	7	72	2,680,776	2,806,735	1,398,400	804,105	<u>7,690,015</u>
9	7	79	1,950,721	2,422,256	1,500,600	808,053	<u>6,681,630</u>
10	7	86	1,305,954	2,035,418	1,602,800	812,158	<u>5,756,330</u>
11	7	93	746,474	2,198,263	1,705,000	816,428	<u>5,466,165</u>
12	7	100	229,637	2,360,542	1,807,200	820,869	<u>5,218,248</u>
13	7	107	-287,200	2,524,004	1,909,400	825,487	<u>4,971,692</u>
14	7	114	-804,036	2,688,698	2,011,600	830,291	<u>4,726,553</u>
15	7	121	-1,320,873	2,854,673	2,113,800	835,286	<u>4,482,886</u>
16	7	128	-1,837,709	3,021,980	2,216,000	840,481	<u>4,240,751</u>
17	7	135	-2,354,546	3,190,672	2,318,200	845,884	<u>4,000,210</u>
18	7	142	-2,871,383	3,360,806	2,420,400	851,503	<u>3,761,325</u>
19	7	149	-3,388,219	3,532,437	2,522,600	857,346	<u>3,524,164</u>
20	7	156	-3,905,056	3,705,627	2,624,800	863,424	<u>3,288,795</u>

**Table 7 - Summary of OGEMP Cost Estimate**

## 9.3 Comments on Funding and Affordability

This objective of this study has been to provide a comprehensive plan for providing affordable access to energisation in off-grid, pre-grid and informal settlement areas. The plan assumes significant and long-term funding commitments on behalf of GRN. It may be that there are opportunities for GRN to obtain funding from international donors for the implementation of this plan. A comprehensive identification of possible donors would, however, be beyond the scope of work for this project.

The proposed energy baskets and credit loan scheme attempt to make suitable energisation solutions affordable for even the lowest income households. However, there are other problems to be addressed by GRN and MME regarding affordability and access. During the presentation of the OGEMP to the Honourable Minister of the Ministry

of Mines and Energy, the Honourable Minister suggested that rural households located in communal farming areas would be able to take advantage of the opportunities of the OGEMP much easier if they could more easily sell or trade their livestock. This point certainly needs to be further investigated and pursued by NAMREP and MME, in conjunction with MAWF.

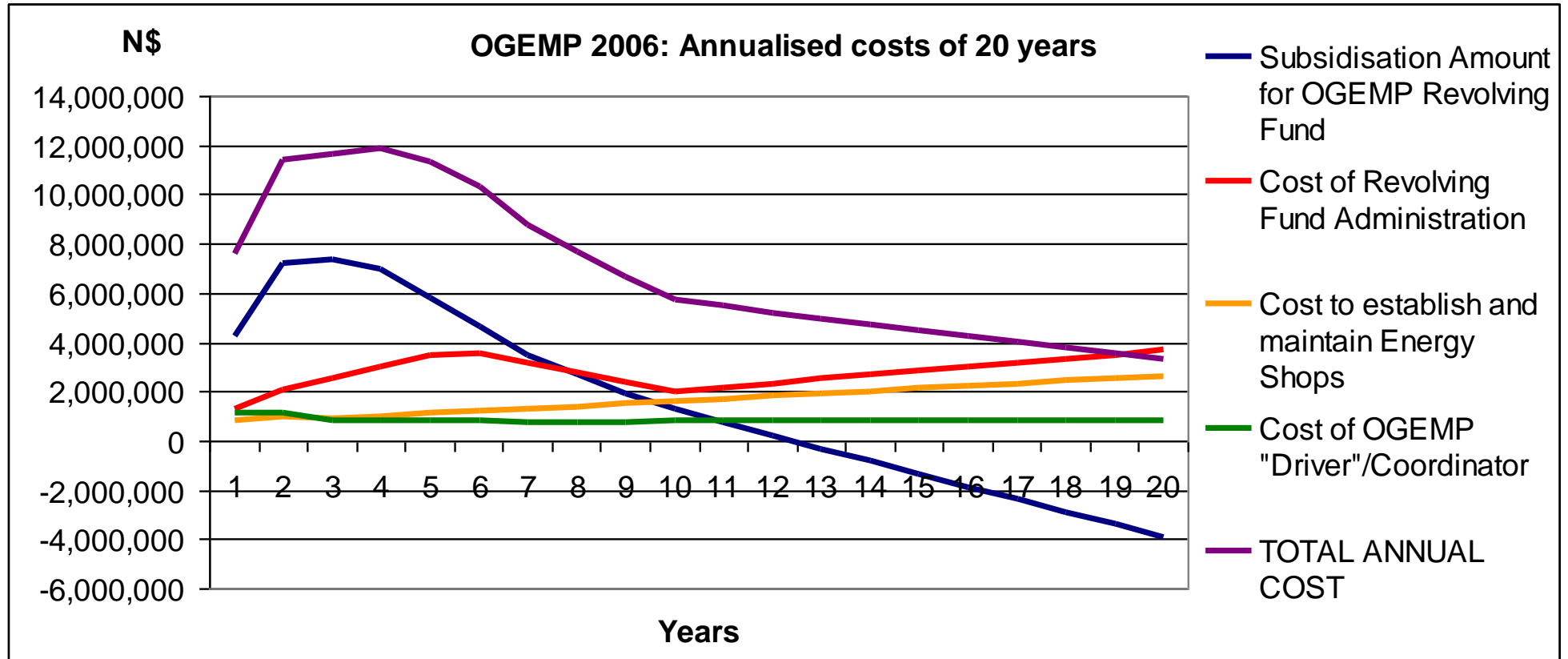


Figure 8 – Graphical Summary of the OGEMP Cost Estimate

# **APPENDICES**

**APPENDIX I**  
**RECOMMENDED ENERGY BASKETS,**  
**LIST OF TECHNOLOGIES,**  
**AND**  
**DATA REGARDING EXISTING FUEL**  
**CONSUMPTION PATTERNS**

# **APPENDIX II**

## **COST ESTIMATE SPREADSHEETS**



**APPENDIX III**  
**GIS DATABASE OUTPUT OF**  
**ENERGY SHOP DATA**

**APPENDIX IV**

**MINUTES OF MEETINGS WITH  
SELECTED KEY STAKEHOLDERS**

**Project:** Off – Grid Energisation Master Plan  
**Date:** 13.07.06  
**Company:** Konga Investment  
**Attendance:** Mr Ndadi Tshombe (Managing Director), Ms Teophilia Shekutamba (Konga Investment), Ms Loide Kalompo (Konga Investment), Ms Catherine Uunona (CSA), Mr Carter Hartz (CSA), Mr Robert Schultz (DRFN)

Issues to be considered:

- Maintenance
- Subsidies to lower the revolving fund interest rate.
- Income of people who don't have steady jobs.
- Do not propose 10 year duration loans because people generally don't want to pay off a loan for such a long period of time.
- The energy shop concept should consider the following:
  - Proper co-ordination
  - Consistency
  - Price competitiveness
  - Standard
  - Financial functions
  - Strategic partnership
- Revenue attraction and consider the SME's, don't cut them out.
- The function and business of staff must be clearly stated.

**Project:** Off – Grid Energisation Master Plan  
**Date:** 14.07.06  
**Company:** BP LTD  
**Attendance:** Ms Ester Hoveka (BP), Ms Catherine Uunona (CSA), Mr Carter Hartz (CSA), Mr Robert Schultz (DRFN)

- Advised the team to speak to the association of petrol stations.
- BP deals with a very effective, national distributor of LPG called NAMOX, who we definitely should speak with.
- Ms Hoveka advised the team on the following:
  - Look at various sources like AVM with City of Windhoek, Nampower.
  - Don't start from scratch, but integrate the concept into existing related activities.
  - Dealer's incentive, space, time, marketing strategy, sales increase etc.
  - Energy solution in peri-urban low income households.

**Project:** Off – Grid Energisation Master Plan  
**Date:** 17.07.06  
**Company:** Total LTD  
**Attendance:** Mr Mntuwabantu Nduvane (Managing Director), Ms Catherine Uunona (CSA), Ms Carter Hartz (CSA)

- The company owns petrol stations around the country which are hired by dealers.
- The dealers meet once a year at a dealer council meeting to discuss various developmental issues. This year the meeting will take place in mid August 2006.
- The company doesn't sell LPG gas but could introduce the energy shop concept to the dealers.
- The MD advised us to speak to the Directorate of Renewable Energy in South Africa (Mr Robert Maake), they have followed a similar energy shop concept but they are call Energy Centres.

**APPENDIX V**  
**INFORMATION REGARDING THE**  
**NATIONAL STAKEHOLDER**  
**WORKSHOP**

**OFF-GRID ENERGISATION MASTER PLAN  
ATTENDENCE LIST FOR THE NATIONAL STAKEHOLDER WORKSHOP  
20 JULY 2006**

No.	Name	Surname	Organization	Tel	Fax	Email
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6	Samuel	Nuuyoma	Erongo Regional Council	64-4105700	64-4105700	nuuyoma@erc.com.na
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24	Dr Ben	Mulongeni	Khomas Regional Council	2924312		
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**OFF-GRID ENERGISATION MASTER PLAN FOR NAMIBIA 2006**

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44	Noddy	Hipangelwa	MM/NAMREP	2848181	2848173	nhipangelwa@mme.gov
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49	Fransis	Sisamu	Zambezi Renewable Energy	0812752204	66252581/4	
50	Catherine	Uunona	CSA	237427	225704	
51	Carter	Hartz	CSA	237427	225704	
52	Robert	Schultz	DRFN			
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## **Off-Grid Energisation Master Plan**

### **Results from the National Stakeholder Workshop held on 20 July 2006**

#### **1. Clarification**

Under the OGEMP, renewable energy solutions are promoted by GRN (and possibly subsidised) but not non-renewable energy technologies. It is up to individuals to use non-renewable sources of energy.

#### **2. General Concerns**

Participants expressed concern for the electrification of bigger settlements.

Concern was expressed for the practicability of solar energy options in coastal areas.

While technocrats would be interested in the introduction of renewable energy options for longer-term economic and environmental benefits, politicians at the Regional Council level often have to take notice of the pressing needs of the rural poor as far as the shorter-term socio-economic advantages of electrification are concerned (notably the constant threat of burning shacks, and the limited study time of students due to a lack of proper lighting).

#### **3. Issues raised during the Discussions**

##### **3.1 Energy Shops:**

Energy Shops will be established with the aim of making renewable energy consumables and energy efficient applications available to the general public, possibly at a subsidised price. Only energy systems, as proposed in the individual energy baskets and supplied by the Energy Shops, will qualify for financing under a subsidised loan scheme that will be introduced under a revolving fund facility. Within the energy baskets, the individual customer requirements are matched with the proper energy needs. All goods and services sold by energy shops will be certified and their serviceability guaranteed. All these measures will be introduced in order to sustain the OGEMP and to ensure customer satisfaction.

Participants agreed that Energy Shops need to be established according to the marketing study that has been conducted and proposed by the consultants. Nine shops will be established per year over a period of 20 years. However, in order to launch the programme on a national basis, one energy shop will be established for political considerations in all 13 regions during the first year of commencement. It has been agreed that the Energy Shop will be established in an informal settlement, preferably in the regional capital. After year one, the Energy Shop programme will be evaluated and adjusted if need be. From year two to year 20, the Energy Programme will be implemented according to the point-score system developed for the implementation of the Rural Electricity Master Plan and adjusted by the consultants for the OGEMP. It has been agreed that Namibians are free to purchase products outside the political region in which they reside.

The role-out plan for the establishment of Energy Shops will consider different options, including the creation of a franchise system (Energy Shops™). This option could be especially relevant given the private sector business orientation of the Master Plan. Renewable energy technicians should play an active part in the introduction and operation of Energy Shops.

##### **3.2 Loan Facility:**

Consensus as reached that the initial capital outlay will need to be subsidised to make the scheme affordable for the rural poor. To make the acquisition more reasonable, the interest rate of a loan facility needs to be subsidised.

The loan applications under the revolving fund facility will be handled by the Energy Shops. The overall responsibility for the loan scheme rests with the Ministry of Mines and Energy. The Ministry will appoint a loan fund administrator in line with the applicable Treasury Instructions. Regional Councils will fulfil the function of introducing the loan scheme to the prospective beneficiaries, of raising awareness on the benefits of the system, and of assisting in the verification process of loan applications. Regional representation on the management of the loan facility should be considered by the loan administrator.

GRN is advised to actively engage the donor community in the establishment of a revolving loan fund for the implementation of the OGEMP. Donor assistance should be solicited specifically for the subsidisation of the interest rate.

The loan criteria need to be structured in a pro-poor way, as numerous rural dwellers (e.g. communal farmers) can afford to enter a loan agreement but would not be able to provide the collateral commonly required as income is not necessarily banked. In addition, payback intervals should match the income cycles that are commonly experienced within the Namibian agricultural sector.

#### **4. Specific Discussions**

What needs to be considered if Namibia wishes to pursue access to energy in rural areas?

- affordability for the rural poor
- introduction of life-cycle costing
- the concept of grid electrification, as applied in industrialised countries, is not necessarily applicable in a country with the population density of Namibia
- energy options that are based on renewable energy technologies need to provide for energy-intensive economic activities of SMEs (e.g. welding)
- the problem of theft needs to be addressed (e.g. introduce a recording system that is similar to the registration of vehicles), and technicians should play an active role in curbing theft
- participants agreed that theft of PV panels belonging to public institutions was more common than in cases where the panels are privately owned
- energy solutions that are based on renewable energy options should be declared a priority by GRN when dealing with the donor community, thereby reducing the dependency on non-renewable fuels as a rational priority

#### **5. Suggestions**

A mechanism for the collection and recycling of old or broken batteries needs to be introduced.

The role of Regional Councils within the framework of the OGEMP needs to be described once the Master Plan has been adopted. The role of the Regional Councils, especially with regard to the generation of electricity as a source of income, the establishment of Energy Shops and the introduction of loan schemes as a social function, as well as the use of renewable energy options by officials as a demonstration of the rational use of energy, needs to be emphasised.

An intensive awareness raising programme at grassroots level should run parallel with or even precede the implementation of the OGEMP.

The GIS-based point-score system for the roll-out plan of the Energy Shops needs to be explained as part of the high-level and grassroots awareness raising campaigns. It should be clear that data needs to be updated regularly with the help of the Regional Councils, so that the OGEMP remains relevant.



It was suggested to introduce safer forms of existing energy solutions (e.g. candles and paraffin-powered appliances) than to introduce new technologies that are often expensive to procure and that therefore meet resistance when introduced.

Policy implementers were advised to make use of unit costs rather than of installation/procurement costs when attempting to convince policy makers and end-users of the benefits of renewable energy options.

## **6. Corrections**

Change references to Konga Investment to 'independent service provider'.

**APPENDIX VI**

**PRESENTATION TO THE  
HONORABLE MINISTER AND  
PERMANENT SECRETARY OF THE  
MINISTRY OF MINES AND ENERGY**



# OFF-GRID ENERGISATION MASTER PLAN

PREPARED BY

ROBERT SCHULTZ

SOLAR AGE NAMIBIA



CHRISTOPH SCHUMANN

GEOCARTA NAMIBIA

25 NOVEMBER 2006



## I. PROJECT OBJECTIVE & DEFINITIONS

### Objective

To develop a long-term plan to provide improved access to energy for households and businesses located in Off-Grid, Pre-Grid and Informal Settlement Areas.

### Definitions

*Off-Grid:* Area that will not have access to the national grid for at least 20 years

*Pre-Grid:* Area that will not have access to the national grid for at least 10 years  
(Note: In the REDMP, Pre-Grid means no access for at least 5 years)

*Energisation:* A holistic approach to energy provision, that includes suitable solutions for lighting, cooking, and other appliances



OFF-GRID RURAL AREAS



INFORMAL SETTLEMENTS



**II. THE NEED FOR INTELLIGENT SOLUTIONS**

**Basic Facts to Consider**

- 1) There are approximately 106,000 households to be provided with access to energisation

Regions	Off-Grid	Pre-Grid	Informal Settlements	Sub-Total
	Households	Households	Households	Households
Caprivi	3,055	960	2,458	6,473
Erongo	1,828	176	1,682	3,686
Hardap	1,106	214	2000	3,320
Karas	694	194	1,864	2,752
Kavango	6,385	3,004	4,238	13,627
Khomas	75	65	22,467	22,607
Kunene	4,010	456	1,600	6,066
Oshana	6,015	4,798	300	11,113
Omaheke	3,767	351	1000	5,118
Omusati	4,376	4,628	295	9,299
Oshana	1,511	2,261	3,600	7,372
Oshikoto	5,344	2,899	250	8,493
Otjozondjupa	2,378	520	3,730	6,628
<b>National Total</b>	<b>40,554</b>	<b>20,526</b>	<b>45,484</b>	<b>106,554</b>

Table 3 - Number of Households in Off-Grid, Pre-Grid and Informal Settlement Areas



**II. THE NEED FOR INTELLIGENT SOLUTIONS**

**Basic Facts to Consider - continued**

- 2) It would be too expensive for Government to provide free of charge to all 106,000 households even a very basic solar home system (50W)

Item	Unit Cost	Number of Households	Amount (N\$)
Solar PV 50V - DC	6500	106,554	692,601,000
3 energy efficient lights (11 W CFL) with fixtures	879	106,554	93,660,966
<b>Total Amount</b>			<b>786,261,966</b>
<b>Required annual funding for a 20-year rollout plan</b>			<b>39,313,098</b>



## II. THE NEED FOR INTELLIGENT SOLUTIONS

### Initial Conclusions

- The proposed solution needs to focus on providing families and businesses with access to the purchase of energisation products.
- The energy products that are made available must be affordable, safe and truly meet the needs of the consumer.
- Consumers must be provided access to a variety of energisation options that provide energy solutions for a variety of households and businesses of different sizes, incomes and business types.
- The Master Plan should include informal settlements, where households are typically not connected to the grid.



## III. BACKGROUND ON THE DEVELOPMENT OF THE PROPOSED OGEMP FOR NAMIBIA

### General Types of Off-Grid Energisation Models

- *Ownership-based*: A model that provides households and businesses with access to purchase individual energy systems, such as solar home systems or rechargeable 12V batteries. The prices of the energy systems can be lowered through government subsidisation such as low-interest loans.
- *Fee-for-service*: A model whereby a private or public entity provides electricity to off-grid households for a fee, such as a tariff-based fee or a monthly flat fee. The fees can be lowered through government subsidisation.



### III. BACKGROUND ON THE DEVELOPMENT OF THE PROPOSED OGEMP FOR NAMIBIA

#### Ownership Model or Fee-for-Service?

The Consulting Team spent considerable time discussing the type of model that should be recommended and developed. It was decided that an ownership model should be developed for the following reasons:

- The potential for failure for fee-for-service models appear to be higher than for ownership models.
- Most of Namibia's off-grid households are dispersed and not well suited for mini-grid systems, which are the ideal system for fee-for-service models.
- A comprehensive ownership model would not conflict with or preclude future fee-for-service schemes that are developed and implemented by either the private or public sector.



### IV. OUTLINE OF THE RECOMMENDED OGEMP

The following are the general features of the recommended OGEMP:

#### ENERGY SHOPS

- Existing well-managed businesses in strategically well-placed locations would be recruited to act as Energy Shops. Therefore, no need for costly, new building construction or rental.
- Energy Shops would provide retail access to a variety of energy technologies at a range of prices.
- 156 Energy Shops to be established over a 20-year implementation period.

#### ENERGY BASKETS

- A wide range of affordable and appropriate energy technologies, compatible fuels and compatible appliances would be made available through the energy shops.
- Energy Baskets would be recommended to customers to provide a total energy solution to the household or business (ex. efficient cooking and lighting, instead of only lighting).



#### IV. OUTLINE OF THE RECOMMENDED OGEMP

##### REVOLVING FUND

- An OGEMP Revolving Fund would be established to make the energy baskets more affordable, especially for low income households.
- The revolving fund would be subsidised by GRN, but would be managed by a combination of a private, centralised administrator and the individual energy shops.
- The OGEMP recommends that 6-month, 1-year and 5-year loans at the prime interest rate should be offered.
- 6-month and 1-year loans would assist the lowest income households; 5-year loans would be suitable for medium income households and businesses.

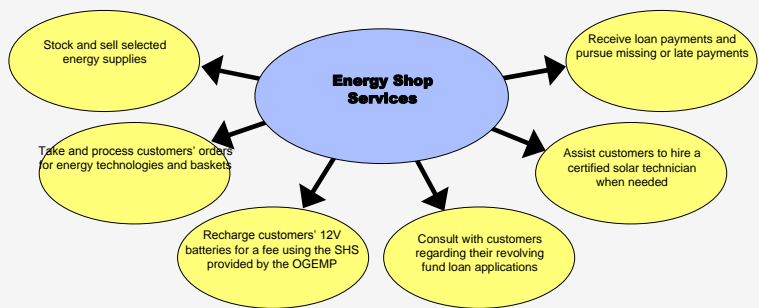
##### OGEMP NATIONAL DRIVER

- It is envisaged that a contractor (NGO, consultant, etc.) would be hired to act as the OGEMP Driver. The OGEMP Driver would liaise with Regional Councils and planners, evaluate locations for future energy shops, monitor existing energy shops, conduct awareness raising campaigns, etc.



#### V. ENERGY SHOPS IN MORE DETAIL

##### A. SERVICES TO BE PROVIDED BY ENERGY SHOPS



**BARRIER REMOVAL TO NAMIBIAN RENEWABLE ENERGY ENERGY (NAMREP)**  
**OFF-GRID ENERGISATION MASTER PLAN (OGEMP)**

**V. ENERGY SHOPS IN MORE DETAIL**

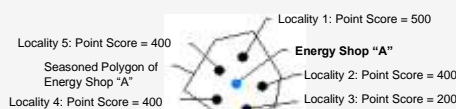
**B. ROLLOUT ACCORDING TO POINT SCORING**

A point scoring system has been developed to prioritise the roll-out of energy shops:

FACILITY/POINT SCORE ITEM	OGEMP POINT SCORE CRITERIA	2005 REDMP POINT SCORE CRITERIA
Constituency capital	80	80
<b>Health Facilities*</b>		
Hospital	80	80
Health Centre	60	60
Clinic	40	40
Outreach point	20	20
<b>Schools*</b>		
Senior secondary school (11-12)	60	60
Junior secondary school (8-10)	55	55
Combined school (prim & sec)	50	50
Senior primary school (5-7)	40	40
Junior primary school (1-4)	30	30
Hostel	60	60
<b>Other Infrastructures</b>		
Agricultural development centres*	60	60
Agricultural extension office*	20	20
Per borehole*	5	5
NamPost*	15	15
Per household to be connected	1	1
<b>Proximity to existing powerlines**</b>		
Village to powerline (0 to <=1km)	0	30
Village to powerline (>1 to <=5km)	10	20
Village to powerline (>5 to <=10km)	20	10
Village to powerline (>10 to <=20km)	30	0

\* No information available for informal settlement localities  
 \*\* 10 points will be scored to all informal settlements

Table 4 - Comparison of Locality Point Scoring in the OGEMP and REDMP



Locality	Point Score
1	500
2	400
3	200
4	400
5	400

Figure 10 - Points for Energy Shop "A" = 1900

**BARRIER REMOVAL TO NAMIBIAN RENEWABLE ENERGY ENERGY (NAMREP)**  
**OFF-GRID ENERGISATION MASTER PLAN (OGEMP)**

**V. ENERGY SHOPS IN MORE DETAIL**

**C. COMPREHENSIVE ROLLOUT PLAN OF ENERGY SHOPS**

Regions	Total Number of Off-Grid, Pre-Grid and Informal Settlement Households *	Number of New Energy Shops to be Established Each Year during the 20-Year Planning Period																		Total Energy Shops			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		19	20	
Caprivi	6,473	1	1				1				1						1					5	
Erongo	3,686	1	1	1	1						1	1				3		1	2		1	2	15
Hardap	3,320	1	1						1	1	1	1	2	1						2	2		13
Karas	2,752	1	1				1								1		2	1	1	2		2	12
Kavango	13,627	1	1		2	1	1	2	1	2		3	1	1				1	1			1	19
Khomas	22,607	1	1																		2	1	5
Kunene	6,066	1	1		2	2	3		2	1	1		1	1	2	1				1	2	21	
Ohangwena	11,113	1	1	3				1	1					1									8
Omaheke	5,118	1	1					1	1	1	2		1	1	2	1	1	1		1		15	
Omusati	9,299	1	1	1		1		2		1		1	1				1		2			13	
Oshana	7,372	1	1		1	1																4	
Oshikoto	8,493	1	1	3	2	2					1								1			11	
Otjozondjupa	6,628	1	1			1	1	1	1		2		1			1	1	2	1	1		15	
National Total	106,554	13	13	8	8	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7	7	7	156

Table 5 - Energy Shop Rollout Plan





## VI. ENERGY BASKETS IN MORE DETAIL

### A. INTRODUCTION

#### FOCUS ON AFFORDABLE SOLUTIONS FOR LOW INCOME HOUSEHOLDS

The OGEMP includes a few energy baskets that would be made affordable suitable for very low and low income households. Furthermore, the Consulting Team is actively developing new, low-cost energy basket ideas that will be tested in a comprehensive market study during early 2007.




## VI. ENERGY BASKETS IN MORE DETAIL

### B. A FEW EXAMPLES OF ENERGY BASKETS

#### ENERGY BASKET EXAMPLE 1 SUITABLE FOR A VERY LOW INCOME HOUSEHOLD

Energy Basket 1: Households - Option 1									
Appliance / Fuel	Quantity	Appliance / Fuel Cost	Appliance / Fuel subtotal	Required energy	Units	Unit Cost	Monthly Fuel Cost	Monthly Maintenance Cost	Total monthly operation & maintenance budget
12V Rechargeable Battery (105 ah)	1	N\$ 500.00	N\$ 500.00	-	Vah/month	-	-	N\$ 13.80	
Low power electric light 11 W CFL, fitting: round bulkhead & pull-switch	2	N\$ 293.00	N\$ 586.00	1800.00	Vah/month	N\$ 0.04	\$ 126.00	N\$ 16.28	
TsoTso Stove / Vesto Stove	1	N\$ 350.00	N\$ 350.00	40.00	kg/month	N\$ 1.13	\$ 45.20	N\$ 4.17	
SUB-TOTAL			N\$ 1,436.00				\$ 171.20	N\$ 34.24	N\$ 205.44
TRANSPORT OF PRODUCTS TO ENERGY SHOP			N\$ 150.00						
INSTALLATION			N\$ -						
TOTAL PRICE			N\$ 1,586.00						



## IV. ENERGY BASKETS

### B. A FEW EXAMPLES OF ENERGY BASKETS

#### ENERGY BASKET EXAMPLE 2 SUITABLE FOR A LOW INCOME HOUSEHOLD

Energy Basket 2: Households - Option 2									
Appliance / Fuel	Quantity	Appliance / Fuel Cost	Appliance / Fuel subtotal	Required energy	Units	Unit Cost	Monthly Fuel Cost	Monthly Maintenance Cost	
Dry cell battery radio	1	N\$ 120.00	N\$ 120.00	91.25	Vah/month	N\$ 0.45	N\$ 41.06	N\$ -	
Solar PV 19 - DC	1	N\$ 1,200.00	N\$ 1,200.00	0.00	-	N\$ -	N\$ -	N\$ 10.00	
Low power electric light 11 W CFL, fitting: round bulkhead & pull-switch	2	N\$ 293.00	N\$ 586.00	-	Vah/month	N\$ -	-	N\$ 16.28	
TsoTso Stove / Vesto Stove	1	N\$ 350.00	N\$ 350.00	40.00	kg/month	N\$ 1.13	N\$ 45.20	N\$ 4.17	
SUB-TOTAL			N\$ 2,256.00				N\$ 86.26	N\$ 30.44	N\$ 116.71
TRANSPORT OF PRODUCTS TO ENERGY SHOP			N\$ 400.00						
INSTALLATION			N\$ 400.00						
TOTAL PRICE			N\$ 3,056.00						



## VI. ENERGY BASKETS IN MORE DETAIL

### B. A FEW EXAMPLES OF ENERGY BASKETS

#### ENERGY BASKET EXAMPLE 3 SMALL SERVICE SME

Energy Basket 15: Small Service SME									
Appliance / Fuel	Quantity	Appliance / Fuel Cost	Appliance / Fuel subtotal	Required energy	Units	Unit Cost	Monthly Fuel Cost	Monthly Maintenance Cost	
220V electric light 15 W CFL with fitting	6	N\$ 30.00	N\$ 180.00	-	Vah/month	N\$ -	-	N\$ 3.67	
Cellphone charger	10	N\$ 90.00	N\$ 900.00	-	Vah/month	N\$ -	-	N\$ -	
Hair clippers	3	N\$ 120.00	N\$ 360.00	-	Vah/month	N\$ -	-	N\$ -	
HiFi - AC	1	N\$ 500.00	N\$ 500.00	-	Vah/month	N\$ -	-	N\$ -	
Battery charger (12V/10A/150W)	1	N\$ 1,450.00	N\$ 1,450.00	-	Vah/month	N\$ -	-	N\$ -	
Solar PV 200 - AC	1	N\$ 20,000.00	N\$ 20,000.00	-	-	-	-	N\$ 27.00	
TOTAL			N\$ 23,380.00				N\$ -	N\$ 30.67	N\$ 30.67
TRANSPORT OF PRODUCTS TO ENERGY SHOP			N\$ 1,000.00						
INSTALLATION			N\$ 1,400.00						
TOTAL PRICE			N\$ 25,780.00						



## VII. OGEMP REVOLVING FUND IN MORE DETAIL

### A. INTRODUCTION

#### OBJECTIVE OF REVOLVING FUND IS AFFORDABILITY

In order to make the energy baskets more affordable to households and businesses, consumer credit financing would be provided through a revolving fund.

#### INITIAL RECOMMENDATIONS REGARDING INTEREST RATES AND PAYBACK PERIOD

- 6-month, 1-year and 5-year loans at prime interest rate.
- Examples of monthly loan repayment amounts:
  - Energy Basket Example 1 for a Very Low Income Household:*
    - > Total Cost = N\$ 1,586
    - > 1-year, 12.5% loan: Monthly Payment = N\$ 148 / month
  - Energy Basket Example 2 for a Low Income Household:*
    - > Total Cost = N\$ 3,056
    - > 5-year, 12.5% loan: Monthly Payment = N\$ 70 / month



## VII. OGEMP REVOLVING FUND IN MORE DETAIL

### B. RESPONSIBILITIES AND AVERAGE AMOUNT OF FUNDING TO BE MADE AVAILABLE PER ENERGY SHOP PER ANNUM

#### ENERGY SHOP RESPONSIBILITIES

- Provide customers with information, brochures and application forms
- Receive and collect loan payment instalments

#### CENTRALISED ADMINSTRATOR RESPONSIBILITIES

- Review and approve loans
- Support Energy Shops to answer customer's questions
- Ensure that available funds are distributed equitably amongst the energy shops

#### AVERAGE LOAN FUNDING TO BE MADE AVAILABLE PER ENERGY SHOP PER ANNUM

- Estimated maximum amount of loans to be processed per energy shop per annum = N\$ 400,000
- Equivalent to 24 biomass stoves, 24 energy baskets for very low cost households, 30 energy baskets for low-medium households, and 4 energy baskets for small SME's per annum.



### VIII. ESTIMATED ANNUAL COSTS OF THE OGEMP

Average amount to be funded per annum = N\$ 6.8 million  
 Total amount to be funded over 20-year period = N\$ 137 million

Year	1	2	3	4	5	6	7	8	9	10
Total number of new energy shops to be established	12	13	8	8	8	8	7	7	7	7
Total number of energy shops established by end of year	12	25	34	42	50	58	65	72	79	86
Annual cost to subsidise the OGEMP revolving fund, excluding administration cost (Loan budget = N\$400,000 per energy shop per year, and loans approved for 6 months, 1 year and 5 years)	4,308,787	7,229,483	7,384,242	6,964,165	5,961,773	4,631,449	3,496,117	2,690,776	1,959,721	1,395,954
Annual cost of revolving fund loan approvals, consultations with customers, and loan collection activities	1,288,912	2,086,505	2,561,257	3,061,342	3,486,312	3,559,069	3,188,815	2,808,735	2,432,256	2,038,418
Annual cost to establish new energy shops and maintain existing energy shops	834,600	1,024,400	893,200	1,010,000	1,126,800	1,243,600	1,296,200	1,338,400	1,380,600	1,602,800
Annual cost of contracted OGEMP "Driver", Sub-Contractors and Outputs	1,151,000	1,129,000	823,120	838,465	856,140	858,859	800,300	804,105	808,853	812,158
<b>TOTAL ANNUAL COST</b>	<b>7,583,202</b>	<b>11,469,388</b>	<b>11,661,820</b>	<b>11,872,272</b>	<b>11,238,032</b>	<b>10,292,728</b>	<b>8,781,641</b>	<b>7,898,815</b>	<b>6,981,632</b>	<b>6,236,320</b>

Year	11	12	13	14	15	16	17	18	19	20
Total number of new energy shops to be established	7	7	7	7	7	7	7	7	7	7
Total number of energy shops established by end of year	93	100	107	114	121	128	135	142	149	156
Annual cost to subsidise the OGEMP revolving fund, excluding administration cost (Loan budget = N\$400,000 per energy shop per year, and loans approved for 6 months, 1 year and 5 years)	746,474	229,637	-287,200	-804,035	-1,320,873	-1,837,769	-2,354,546	-2,871,263	-3,388,219	-3,905,056
Annual cost of revolving fund loan approvals, consultations with customers, and loan collection activities	2,198,283	2,366,542	2,524,004	2,688,699	2,854,673	3,021,960	3,190,672	3,360,806	3,532,437	3,708,627
Annual cost to establish new energy shops and maintain existing energy shops	1,795,000	1,807,200	1,909,400	2,011,600	2,113,800	2,216,000	2,318,200	2,420,400	2,522,600	2,624,800
Annual cost of contracted OGEMP "Driver", Sub-Contractors and Outputs	816,428	820,889	825,487	830,291	835,286	840,481	845,884	851,503	857,346	863,424
<b>TOTAL ANNUAL COST</b>	<b>5,660,165</b>	<b>5,228,268</b>	<b>4,927,692</b>	<b>4,726,533</b>	<b>4,662,889</b>	<b>4,628,726</b>	<b>4,608,212</b>	<b>4,591,222</b>	<b>4,578,181</b>	<b>4,568,726</b>



### IX. THE RECOMMENDED WAY FORWARD

#### BP NAMIBIA - EARLY 2007 PILOT PROJECT FOR AN ENERGY SHOP AND MARKET STUDY IN A WINDHOEK INFORMAL SETTLEMENT

- To be funded by BP Namibia and supported by the City of Windhoek
- Comprehensive consumer testing market study of several low cost energy baskets
- Establishment of a pilot energy shop to sell only approved low cost energy baskets from market study

#### REEECAP - MID 2007 ESTABLISHMENT OF A FULL-SERVICE ENERGY SHOP IN A RURAL LOCALITY AND IDENTIFICATION OF PROCEDURES AND BEST PRACTICES FOR IMPLEMENTATION OF THE OGEMP

- The REEECAP Energy Shop project will establish the first full-fledged energy shop as proposed in the OGEMP
- Many of the details regarding training, implementation by a "Driver", administration and procedures of the OGEMP revolving fund, etc. will be sorted out during this REEECAP project.

#### MME DECISION ON WHETHER TO IMPLEMENT OGEMP FOR THE LONG TERM

- MME to make decision on whether OGEMP should be implemented
- MME to determine how the OGEMP should be funded: small levy on electricity; donors, GRN, private sector, etc. There are several options and possibilities for funding the roll-out of the energy shops -- costly Government subsidisation is not the only solution available.



**Thank You**

# **APPENDIX VII**

## **OGEMP NATIONAL MAP**