

Powering Economic Diversification  
- Puntland, Somalia -  
- Somaliland -

CA No. 623-A-00-0-00116-00

**Year End Report**

**October 01, 2001 – September 30, 2002**

Submitted  
By:



**ADRA  
SOMALIA**

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**Powering Economic Diversification Project**  
**Fourth Quarter Report**

**July 01 – September 30, 2002**

**and**

**First Year Report**

**October 2001 – September 2002**

**1. INTRODUCTION**

ADRA Somalia obtained USAID funding (CA# 623-A-00-01-00116-00 ) for a 3-year project (1 Oct 2001 – 30 Sep 2004) to support economic growth in Puntland, an area in northeastern Somalia entitled “Powering Puntland’s Economic Diversification”. Security and stability in Puntland has been uncertain as political struggles have led to armed conflicts subsequently removing the democratically elected leader. This instability has limited access and thereby making pursuit of project objectives difficult. To enhance the possibility for achievement of objectives while continuing involvement in Puntland – USAID has accepted for the project to expand the geographic region into Somaliland, the northwest region, where there has been more stability. The name of the project has therefore been altered and is now **Powering Economic Diversification (PED)**.

The project’s goal of promoting peace and stability by stimulating the development of an enabling environment for economic diversification through facilitating access to conventional and alternative or renewable energy technologies, remains the same even with the geographic expansion of the project.

The local counterpart in Puntland is the Puntland State Authority for Water, Energy and Natural resources (PSAWEN). The local counterpart in Somaliland is expected to be the Ministry of Public Works however collaboration discussions are still undergoing.

The project objectives are to:

1. Strengthen and develop local structures to market, install, manage and support conventional and alternative energy sources.
2. Stimulate private investment by creating a supply/demand-driven market around the local entrepreneurs, investors, Diaspora and consumers for conventional and alternative energy sources.
3. Increase human resources capacity to design, install and maintain conventional and alternative energy sources.

The project objectives are to be achieved in close collaboration with other implementing partners such as: Energy Alternatives Africa (EAA), CARE Somalia, and K-Rep Service Ltd. The project will also incorporate the use of local capacity wherever possible to minimize the effects of evacuation due to instability.

This report covers the activities that occurred from October 1, 2001 through September 30, 2002 with particular focus on the final quarter (July 01- September 30, 2002).

## **2. FIRST YEAR HIGHLIGHTS**

The first year of the project, while challenging, saw many objectives met. ADRA was able to conduct many of the activities planned for this period. However, due to insecurity many activities were not conducted as scheduled. While some objective supporting activities are behind schedule, project expansion has allowed for new opportunities to meet goals and react to lessons learned. Adjusted workplans, expanded regional focus and the current level of stability all contribute a positive outlook for future activity implementation.

A few of the highlights of this year's activities are:

- ❖ Finalization of collaborative relationship with local Puntland authorities
- ❖ Set-up of local office and introduction of project to business community, local authorities and local NGO's
- ❖ Sourcing project matching funds to support an Energy Improved Stoves Project in collaboration with local NGO
- ❖ Procurement of alternative energy packages
- ❖ Creation of demonstration sites highlighting alternative energy
- ❖ First phase implementation of project activities such as training, public awareness, capacity building (SEE QUARTER HIGHLIGHTS FOR DETAILS).
- ❖ Expansion of project activities to Somaliland
- ❖ Development of linkages with regional and international alternative energy suppliers
- ❖ Establishment of Energy Sector Think Tank that is meeting regularly to discuss energy issues.

## **3. 4<sup>th</sup> QUARTERLY HIGHLIGHTS**

### **1. Photo-Voltaic (Solar) technician training (Puntland)**

- ❖ 16 electricians in Puntland were trained in photo-voltaic system installation and maintenance. These technicians are now qualified to be called upon by local businesses and suppliers to support the technical solar needs, such as solar system installation and maintenance, while also being available for future ADRA PED solar work in demonstrations and trainings. The technicians were identified through local businesses and while some are associated with these businesses, many are independent contractors doing electrical work freelance in Bosaso and the outlying regions. One trainee has already, within days of training completion, been hired for a solar installation.

## 2. Demonstrations (Puntland)

- ❖ ADRA's PED project has installed its first solar demonstrations sites. These sites were chosen for their strategic positioning along the main tarmac road from Bosaso to Gardo. The sites are receiving high people traffic and are contributing to our public awareness/marketing campaign.

## 4. PSAWEN Capacity Building (Puntland)

- ❖ ADRA staff carried out a capacity assessment with the Puntland State Authority for Water, Energy and Natural Resources. This assessment is intended to assist ADRA and PSAWEN in developing a comprehensive capacity building plan. From this plan, areas of capacity building appropriate to ADRA will be developed and implemented during year two. A copy of the original assessment tool (Attachment 1) and data compilation (Attachment 2) are included.

## 5. Conducting of preliminary activities in Somaliland

- ❖ Development of relationship with local authorities
- ❖ Investigation of local housing, office space, and cost of living
- ❖ Facilitation of focus groups for assessment of feasibility and interest level in various alternative energy sources.
- ❖ Informal demonstrations of small scale solar and charcoal replacement briquettes
- ❖ Creation of 2-year work plan for Somaliland PED activities
- ❖ Project coordinator attended the BSD training in Nairobi
- ❖ Business assessment by performed by K-Rep to develop training for 9 Bosaso businesses ready to take part in energy trade expansion activities (see Attachment 5)

## 4. CHALLENGES AND STRATEGIES TO OVERCOME THEM

### 4.1 First Yearly Constraints

#### 4.1.1 Restricted access to the project area due to insecurity

- ❖ Over the course of the project, international staff were evacuated from Puntland on 3 occasions. In early May, military buildup between opposing political factions escalated into outright fighting and as of May 7, 2002 all international staff were again evacuated due to security concerns. International staff were kept out of Puntland for almost 3 months. While this has significantly affected operations in some areas, we were able to move ahead in realistic and feasible ways. This has been the major and overall constraining factor that has affected, delayed and cancelled scheduled activities.

Strategy: Time spent in Nairobi was used productively to network and research energy applications, projects and experts for future use in PED. Staff training continued, both

within Puntland and also in neighboring areas, on a regular basis wherever possible. A key to the PED strategy is the expansion of activities to Somaliland, and decreased dependence on expatriate expertise. While activities in Somaliland have been under consideration in previous phases, ADRA deems that the time is right to spread the resources and assets to a more politically diverse arena so as to protect our implementation abilities in times of instability. PED has developed, based on continued security concerns, an adjusted workplan that we believe will allow us to:

- a) Continue to work in Puntland and conduct activities to support project objectives
- b) Begin activities in Somaliland to support project objectives
- c) Merge Somaliland and Puntland resources, activities and assets wherever possible

#### **4.1.2 Coordination and full utilization of partners**

- ❖ Coordination and full utilization with partners (EAA, K-Rep, CARE) was challenging especially as international personnel were forced to remain outside of Puntland for reasons of insecurity. First year planned activities had PED utilizing these partners far more than was possible. Dependence on outside experts and consultants created significant constraints to activity implementation, and delays caused trainings to be postponed with loss of some identified participants.

Strategy: In light of the difficulties, PED while continuing to utilize international expert consultants will increasingly identify and utilize local capacity. For example, business development services that are available locally will be tapped instead of bringing in business development service providers from Nairobi. PED will continue to assess the effectiveness of local expertise to provide the needed training. Where expatriate experts are necessary, PED will focus on using these experts not only to build local expertise in their respective fields, but also to build local training capacity for future activity implementation. For example, locally trained business service providers will work alongside expatriate trainers during PED training to build the local capacity so that the local entities can take control of the future training activities.

## **4.2 Fourth Quarterly Constraints**

### **4.2.1 Geographical/Locale issues**

- ❖ The fourth quarter was marked by a large geographical adjustment in the PED activity plan and this included large amounts of energy spent on re-aligning budgets, re-evaluating staff and assets, and a making necessary changes as they appeared. The project coordinator was moving between Puntland and Somaliland on a fairly regular basis, attempting to start-up in Somaliland while softening the blow of a scaling down in Puntland at the same time. This has created a less than perfect situation, as transition can typically create a period of discontent, uncertainty, lack of consistent systems, and lack of central headquarters. In Somaliland, we have been trying to *introduce ourselves with much of the time having no definite locale or approved mission.*

Strategy: The Somaliland office has is preparing for permanent status in Hargeysa. This is being done through documentation with authorities (Somaliland NGO agreement), and also through establishment of a permanent office location. A temporary staff member has been hired. Our first Somaliland event will occur in the first quarter of the second year, and that should facilitate development of a better understanding of ADRA, PED and why we are in the region. In Puntland, we are moving ahead with project activities but have also moved into new housing/office location and will be working with staff to create a new activity plan for year two based on new project resources and lessons learned.

#### **4.2.2 Staffing issues**

In Puntland we have had periods of project insecurity, with staff being unsure of their employment future. This has caused both loss of morale, and also loss of staff to more secure opportunities. In Somaliland, we waited to hire permanent staff until we had full USAID approval of Somaliland activities, and then have experienced a waiting period as we negotiate through the Somaliland NGO agreement.

Strategy: A temporary staff member has been hired and there is every indication she will remain with ADRA beyond her 3-month temporary period, becoming the permanent Administrative/Finance Assistant. At the same time, staff in Puntland have been consolidated and both regional offices will have 2 staff members doing fairly similar activities. A training in early November to acquaint all staff with ADRA, and also with the new path for PED will provide stability and direction. Staff will be brought in to Nairobi for supplemental training as soon as is feasible. The movement of the project coordinator from one region to another should become of less consequence in the near future.

### **5. COMPARISON OF PROJECT PLANNED AND ACTUAL ACTIVITIES**

The chart below lists the various activities from the approved work plan that have been on-going or scheduled during the current quarterly reporting period. The table also provides a description of the current status of the activities, explanation for any deviation and an estimation of new dates for completion of the activity. For a review of the year, see activity charts from previous report.

The expansion of the project into the Somaliland region required a new workplan specifically for Somaliland. While it is hoped that project activities (and thereby resources) from each region can be merged and shared in the near future, this will take some time. For this reason, 2-year workplans for each region have been separately designed. Planned activities in the following chart follow these workplans.

| Activity  | Activity Status   | Reason for Deviations   | Re-aligned Dates   |
|---|---|---|--|
| <b>Start Up Activities</b>  |   |   |  |
| 1. Establish partnerships with CARE, EAA and K-Rep Advisory Services  | Memorandum of Understanding signed with CARE, EAA contract signed. K-Rep contract agreed to and pending signing.  | Changes in project structure as relates to use of expatriate consultants has delayed signing with K-Rep.      | Final agreement expected to be signed in October of 2002       |
| 2. Recruit personnel  | All local and expatriate personnel are recruited and in place in Puntland. Temporary Somaliland staff in place, hiring of full-time staff planned   | New activities in Somaliland  | Somaliland permanent staff expected to be hired by November 15 |
| 3. Establish project office, purchase of needed materials/ equipment/ vehicle   | The project office is established in Bosaso. The necessary office equipment is purchased and in place. Somaliland temporary office is establishes and permanent office is being sought.   | No deviation from last report estimates for Puntland, new activities in Somaliland                            | Permanent offices expected in Somaliland by December 31        |
| 4. Project agreement with local authorities   | The MOU with local authorities in Puntland is signed  | No deviation from last quarter estimates  | Somaliland registration should be completed by October 31      |
| 5. Assessment of energy utilization / situation   | Initial energy field assessments have been completed. Reports and data compilation in Quarter 3 report. Small-scale assessment of energy use in Internally Displaced Persons camp implemented (see Attachment 3). New assessments underway in Somaliland. | No deviations from last quarter estimates   |  |
| 6. Establish "Energy Sector Think Tank"   | Energy Sector "Think Tank" established. Fourth meeting held in August 30, 2002<br>For Think Tank minutes see Attachment 4   | No Deviation  |  |
| <b>Objective 1</b>  |   |   |  |
| <b>Strengthen and develop local structures to market, install, manage and support conventional and alternative energy sources</b> |   |   |  |
| 1.1 Conduct institutional capacity assessment as baseline for civil authorities   | Institutional Capacity Assessment conducted see data compilation Attachment 2   | No deviations from last reporting period  |  |
| 1.2 Identification of existing entrepreneurs  | 9 Puntland participants are signed on for Business Planning training in October.<br>Identification of Somaliland entrepreneurs is underway  | No deviations from last reporting   |  |
| 1.3 Research, review & adapt training curriculum and conduct capacity building training of civil authorities.                     | General capacity building training curricula is being researched and reviewed by ADRA Training Coordinator with collaboration of CARE Somalia. Capacity assessment has been implemented   | Security concerns delayed actual assessment implementation, however capacity building plan is being developed | Capacity Building plan expected to be in place by mid-November |

| Activity   | Activity Status  | Reason for Deviations  | Re-aligned Dates                                       |
|--|--|--|--|
| 1.4. Assessment of capacity building training needs among local entrepreneurs.                       | Capacity assessments conducted (see data compilation Attachment 2) in Puntland. Capacity assessments for Somaliland will take place after identification of appropriate parties.   | No deviations since last reporting period  | Assessments scheduled in Somaliland for late November  |
| 1.5 Conduct regular meetings with civil authorities to plan, coordinate & inform program activities. | In Puntland, meetings with PSAWEN are being held on a regular basis.<br>In Somaliland, preliminary meetings are being held and will be formalized after signing of Somaliland registration documents   | No deviations since last reporting period  | Somaliland registration should be completed October 31 |
| 1.6 Conduct regular meetings with local chamber of commerce.   | Puntland: Formal meetings being held with Chamber of Commerce. Assessment of chamber is being developed<br>Somaliland: informal collaborations with Chamber of Commerce are underway.  | No deviations since last reporting period  |  |
| 1.7. Provide quarterly progress reports to civil authorities and donor.                              | Although PED has signed an MOU with Puntland's local authority, roles of members of local authority are not yet clear and so written reports have not been provided. However, during regular meetings with local authorities they have been briefed on the activities and plans of the project<br>ADRA has and will continue to provide written reports to USAID as per USAID guidelines and established schedule.   | Security concerns and administration changes have made partnership roles unclear in Puntland. Somaliland relationships have not yet had enough time to be established. |  |
| 1.8. Develop appropriate monitoring system   | Monitoring of activities has been an on-going process. Daily contact by email from the Nairobi office and at least once-monthly visits to the office in Bosaso by Nairobi staff has facilitated this monitoring. Financial control systems and procedures are in place and functioning. A system for local project staff action plan development and review has been developed on a weekly basis tracking movement towards project objectives. Regular monthly monitoring of activity schedule to actual is being conducted coupled with a monthly report of being submitted containing the past months events and coming months planned activities. Monitoring system and formats are being reviewed periodically to ensure that required information is being collected. |  |  |

| Activity   | Activity Status   | Reason for Deviations                     | Re-aligned Dates |
|--|---|---|------------------|
| <b>Objective 2</b>   | <b>Stimulate private investment by creating a supply-demand driven market around local entrepreneurs, investors, Diaspora and consumers for conventional and alternative energy sources.</b>  |   |                  |
| 2.1. Conduct market analysis for demand of alternative energy sources.   | Puntland: Initial energy field assessments have been completed. Reports and data compilation in Quarter 3 report. Small-scale assessment of energy use in Internally Displaced Persons camp implemented (see Attachment 3)<br>Somaliland: new assessments underway  | No deviations from last quarter estimates |                  |
| 2.2. Establish a demonstration site highlighting conventional & alternative energy uses and managed by individuals in the community                      | Puntland: 4 small, high traffic demonstration sites have been established (solar )<br>Somaliland: informal demonstrations of solar and charcoal replacement briquettes, scheduled formal demo of variety of energy options scheduled for late October   | No deviations from last reporting phase   |                  |
| 2.3. Market products and service possibilities.  | Radio and newspaper adverts in development for both regions. Mobile unit demonstrations were begun, with an opening demonstration in a village outside of Bosaso. More demonstrations were created (4) as part of the Photo-Voltaic training. These are also in off-grid villages outside of Bosaso. Demonstrations continue in Puntland and are planned for Somaliland | No Deviation                              |                  |
| 2.4. Assist entrepreneurs in strategies for accessing potential investors, targeting Somali Diaspora organizations, including links to existing websites | Puntland: loan funds discussed and web search conducted for outside sources.<br>Somaliland: focus group held with all MF providers and appropriate areas of collaboration identified. Meetings with rural MFI administrators are continuing. ADRA technical advisor for micro-finance expected in first week of second year and will assess and advise.                 | No Deviation                              |                  |
| 2.5. Facilitate and provide linkages for access to loans for entrepreneurs<br>Aimed at kick-starting micro & small business.                             | Puntland and Somaliland: K-Rep has and will continue to play an advisory role in this capacity. The project has contacted various potential donors to present the project activities and inquire as to possible interest in providing support in the form of loans.<br>Discussion with K-Rep about availability of larger products of up to \$2,500                     | No Deviation                              |                  |

| Activity  | Activity Status  | Reason for Deviations   | Re-aligned Dates  |
|---|--|---|---|
| 2.6. Review & adapt curricula for business development services training.   | Curricula reviewed and new business plan training adapted and ready to be implemented  |   | Business training scheduled for October 13, 2002  |
| 2.7. Conduct business development trainings.  | Training needs assessment completed (see Attachment 5)   | Security concerns have kept international staff and consultants out of Puntland since May 7 | Business Training will be designed and conducted beginning in first quarter of second year. |
| 2.8. Facilitate the participation of business community in ongoing CARE-sponsored Development Dialogue Workshop.  | <p>Puntland: In regular contact with CARE for scheduling coordination regarding next Development Dialogue Workshop. At present there is no set date for the next DDW but it is expected during the next quarter. All participating business owner/operators will be encouraged and invited to participate in the DDW</p> <p>Somaliland: DDW's are in second phase of implementation in Somaliland. Discussions on how best to collaborate are underway</p> | No deviation  |   |
| <b>Objective 3</b>  | <b>Increase Human Resource Capacity to design, install and maintain conventional and alternative energy systems.</b>   |   |   |
| 3.1. Conduct labor market assessment of what skills are necessary for marketing, installing, managing and supporting conventional and alternative energy sources. | <p>Puntland: Formal assessments of business needs are completed. Assessment of technical skills required to install, manage and support solar were also completed, as was a training for that specific field</p> <p>Somaliland: Informal assessments are underway. Formal assessments will take place once identification of participants is finalized</p>   | No deviations since last reporting period.  |   |
| 3.2 Advertise and recruit individuals & existing entrepreneurs to build the technical labor pool for energy sources.  | <p>Puntland: Recruitment is completed for solar phase, recruitment for other phases will take place as necessary</p> <p>Somaliland: Recruitment will be underway after the initial needs assessment</p>  |   |   |
| 3.3 Research review and adapt training curriculum to certify & license technicians and other  | <p>Puntland: First phase (solar) training implemented (see Attachment 6), and curricula translated and adapted as necessary.</p> <p>Somaliland: Training curricula adapted for Puntland will be used</p>   | Security concerns have kept international staff and consultants out of Puntland since May 7 | Licensing and certification parameters expected to be developed in second year.             |

| <b>Activity</b>  | <b>Activity Status</b>   | <b>Reason for Deviations</b>  | <b>Re-aligned Dates</b>                                  |
|--|--|---|--|
| <p>necessary labor in installing, repairing and maintaining conventional and alternative energy sources.</p> | <p>whenever possible in Somaliland. Adjustments and new material will be developed as necessary</p> <p>Assessing for certification and licensing will commence late in the project</p> |   |  |
| <p>3.4 Develop technology manual.</p>  | <p>General technology manuals exist. Specific tailoring to PED and translation to Somali will commence after training in both regions is underway</p>                                  | <p>Expansion of project requires that this phase wait until the new region catches up</p> | <p>Manual development to be considered in early 2003</p> |
| <p>3.5 Conduct technical skills trainings.</p>   | <p>Puntland: first round training complete</p> <p>Somaliland: trainees not yet identified</p>  |   | <p>Trainees to be identified November 15</p>             |

## 6. SUCCESS INDICATORS AND PERFORMANCE RATES

The Strategic Objective under which our indicators are designed is Strategic Objective #5: Increased Opportunities for More Productive Livelihoods. The project's specific and overall indicator for this initiative is: Increase in capacity and awareness of Puntlanders to trade in, install and maintain conventional and alternative energy system. Targets for third quarter are 20 businesses, 20 technicians, and outreach activities in two communities. The indicator is broken down into three segments and each are rated below.

| <b>Indicator</b>   | <b>Targets</b>   | <b>Actual Performance</b>   | <b>Adjustments/Comments</b>   |
|--|--|---|---|
| <b>5.2 Increase in capacity and awareness of Puntlanders to trade in, install and maintain conventional and alternative energy system</b>  | Targets for third quarter are 20 businesses, 20 technicians, and outreach activities in two communities.   | During the third quarter, the project trained 15 technicians, and has done outreach in two communities (Laq and Karin).   | Due to security and project adjustments targets have not been met. It is expected that 9 businesses will be trained in the first quarter of the second year in Puntland, and another 10 in Somaliland. Another 10 technicians can be expected to be trained also, these from Somaliland. Community outreach will surpass target expectations. |
| <b>5.2.1 - Rating on organizational capacity improvements with local civil authority, using a mix of quantitative and milestone scales</b>   | No baseline yet, this will be established at the beginning of the project. The target has been initially set at a 10 percentage point increase. to be finalized with the relevant stakeholders in the field at the start of the project.   | Capacity assessment complete with PSA WSENs. Baseline will be established from data compilation. Capacity Building plan expected to be developed during first quarter of second year, and implementation to begin during the same time  | Security concerns have slowed progress however baseline is being developed and capacity building will begin in next quarter   |
| <b>5.2.2 - Increase in businesses (expansions or start-ups) trading in energy as a result of improved access to and understanding of conventional and alternative energy systems</b> | Target is initially set at 3 new (or expanded) businesses within the first year of the project.  | No businesses have been identified that have indicated expansion or establishment at this time because of the project. However, the project has been working with interested business and there is interest to expand services and products which are being promoted. Additionally, at least one technician has been hired to conduct a solar system installation after the training. | We expected by the end of the second quarter that this target will be met. This will allow time for increased public awareness and demand for solar and mini-grid application. In addition initial business training will have been conducted, during which time the project will focus on business expansion planning                        |
| <b>5.2.3 Percent of technician trainees who are employed in energy technology within a twelve-month period of their training.</b>  | Target is initially set at 50% of trainees being employed within 12 months after their training at least once, based on an estimated absorptive capacity of the trainees and the initial need for these technicians in Puntland. This will be adjusted as necessary. The initial 50% target also allows for room to those technicians who may be difficult to track. | While the first training has only just been completed, one technician was hired immediately after for his first contract installing solar in a household setting.   |   |

# Powering Puntland's Economic Diversification - Puntland, Somalia -

CA No. 623-A-00-0-00116-00

## Attachments

|                  |                               |
|------------------|-------------------------------|
| Attachment One   | Capacity Assessment Tool      |
| Attachment Two   | Capacity Assessment Report    |
| Attachment Three | IDP Assessment Report         |
| Attachment Four  | Think Tank Minutes            |
| Attachment Five  | K-Rep Business Assessment     |
| Attachment Six   | Photo-Voltaic Training Report |

# ADRA Somalia

## CIVIL AUTHORITY CAPACITY BUILDING ASSESSMENT TOOLS(CACBAT)

Institution Name: Puntland State Authority for Water, Energy and Natural Resources

Conducted By: \_\_\_\_\_

Date: \_\_\_\_\_

| #        | CAPACITY INDICATORS  | RATINGS |   |   |   |   |
|----------|--|---------|---|---|---|---|
|          |  | 1       | 2 | 3 | 4 | 5 |
| <b>1</b> | <b>GOVERNANCE</b>  |         |   |   |   |   |
|          | A functioning Organizational Structure exist   |         |   |   |   |   |
|          | A written organizational values exist  |         |   |   |   |   |
|          | A written vision statement exist   |         |   |   |   |   |
|          | An authority limit levels exists (job roles authority)   |         |   |   |   |   |
|          | Mechanism for review & follow-up of activities exist   |         |   |   |   |   |
|          | Operational Manuals (procedures, manuals, etc) exist   |         |   |   |   |   |
|          | Sub-total  |         |   |   |   |   |
| <b>2</b> | <b>PLANNING</b>  |         |   |   |   |   |
|          | There is a written long-term plan  |         |   |   |   |   |
|          | There is a short-term strategic directions plan  |         |   |   |   |   |
|          | There is a written Annual Strategic Plan   |         |   |   |   |   |
|          | There is a Management Informations System(MIS)   |         |   |   |   |   |
|          | There is a Data gaghering & Recording and Management System                                      |         |   |   |   |   |
|          | Sub-total  |         |   |   |   |   |
| <b>3</b> | <b>FINANCE</b>   |         |   |   |   |   |
|          | The organization has a written Financial Policy  |         |   |   |   |   |
|          | The organization has a written Financial Procedures  |         |   |   |   |   |
|          | Is there an approved budget  |         |   |   |   |   |
|          | Financial reports prepared: accurately, timely and completely                                    |         |   |   |   |   |
|          | Computerized financial systems   |         |   |   |   |   |
|          | Bank Accounts mainted and updated  |         |   |   |   |   |
|          | Receipt and Payment vouchers:  |         |   |   |   |   |
|          | a) Exists  |         |   |   |   |   |
|          | b) Are pre-numbered  |         |   |   |   |   |
|          | c) Are properly accouted for   |         |   |   |   |   |
|          | d) Are authorized  |         |   |   |   |   |
|          | e) Are supported   |         |   |   |   |   |
|          | f) Are recorded  |         |   |   |   |   |
|          | Vouchers and their support documents filed chronologically                                       |         |   |   |   |   |
|          | Petty cash exist and is a reasonable amount  |         |   |   |   |   |
|          | Cash is kept in safe custody   |         |   |   |   |   |
|          | Advance policy exist   |         |   |   |   |   |
|          | Advance is properly authorized and recorded  |         |   |   |   |   |
|          | Auditing conducted periodically  |         |   |   |   |   |
|          | Audit reports prepared and archaived   |         |   |   |   |   |
|          | Sub-total  |         |   |   |   |   |
| <b>4</b> | <b>PROCUREMENT</b>   |         |   |   |   |   |
|          | Written Procurement Policy exist   |         |   |   |   |   |
|          | a) Procurement in eccess of <b>certain amount</b> are subjected to fair competition              |         |   |   |   |   |
|          | b) All procurements are competitive as to price and quality                                      |         |   |   |   |   |
|          | c) Procurements are authorized, properly supported and recorded                                  |         |   |   |   |   |
|          | d) Deliveries are verified as to price, quantity, quality and type                               |         |   |   |   |   |
|          | Sub-total  |         |   |   |   |   |
| <b>5</b> | <b>INVENTORY AND FIXED ASSETS</b>  |         |   |   |   |   |
|          | The organization has a written Fixed Assets Policy   |         |   |   |   |   |
|          | Fixed Assets are recorded in the fixed assets register   |         |   |   |   |   |
|          | Physical verification of fixed assets is conducted and documented periodically                   |         |   |   |   |   |
|          | A written Inventory Management Policy exist  |         |   |   |   |   |
|          | Inventory utilization is authorized properly, supported and properly recorded in Inventory regis |         |   |   |   |   |
|          | Stock counts are conducted regularly and documented  |         |   |   |   |   |
|          | Sub-total  |         |   |   |   |   |

# ADRA Somalia

## CIVIL AUTHORITY CAPACITY BUILDING ASSESSMENT TOOLS(CACBAT)

Institution Name: Puntland State Authority for Water, Energy and Natural Resources

Conducted By: \_\_\_\_\_

Date: \_\_\_\_\_

| #         | CAPACITY INDICATORS   | RATINGS              |                       |   |   |   |
|-----------|---|----------------------|-----------------------|---|---|---|
|           |   | 1                    | 2                     | 3 | 4 | 5 |
| <b>6</b>  | <b>PERSONNEL MANAGEMENT</b>   |                      |                       |   |   |   |
|           | A written Personnel Policy exist  |                      |                       |   |   |   |
|           | Personnel and staff manual exist  |                      |                       |   |   |   |
|           | An effective and fair local recruitment procedures exist                                |                      |                       |   |   |   |
|           | Personnel files are complete and properly maintained                                    |                      |                       |   |   |   |
|           | Staff Job Description exist   |                      |                       |   |   |   |
|           | Written staff contract exist  |                      |                       |   |   |   |
|           | Procedures for evaluating and measuring staff performance exist                         |                      |                       |   |   |   |
|           | Documentation and authorization of payroll exist  |                      |                       |   |   |   |
|           | Staff training and professional development exists                                      |                      |                       |   |   |   |
|           | Sub-total   |                      |                       |   |   |   |
| <b>7</b>  | <b>VEHICLE MANAGEMENT</b>   |                      |                       |   |   |   |
|           | Comprehensive vehicle usage policy exists   |                      |                       |   |   |   |
|           | Organization maintains a vehicle log-book.  |                      |                       |   |   |   |
|           | Sub-total   |                      |                       |   |   |   |
| <b>8</b>  | <b>TECHNICAL</b>  |                      |                       |   |   |   |
|           | Separate department for planning & development  |                      |                       |   |   |   |
|           | Training programs planned and documented  |                      |                       |   |   |   |
|           | Standard project proposals developed  |                      |                       |   |   |   |
|           | Departments use participatory methods in planning                                       |                      |                       |   |   |   |
|           | Database on all sections and properly recorded  |                      |                       |   |   |   |
|           | Regular project reports are prepared and filed  |                      |                       |   |   |   |
|           | Regular monitoring and evaluation mechanism exist                                       |                      |                       |   |   |   |
|           | Sub-total   |                      |                       |   |   |   |
| <b>9</b>  | <b>PUBLIC RELATIONS</b>   |                      |                       |   |   |   |
|           | Working relationship with community representatives                                     |                      |                       |   |   |   |
|           | Working relationship with community committees  |                      |                       |   |   |   |
|           | Working relationship with international agencies  |                      |                       |   |   |   |
|           | Organization attends and calls regular coordination meetings                            |                      |                       |   |   |   |
|           | Links with other government organizations   |                      |                       |   |   |   |
|           | Sub-total   |                      |                       |   |   |   |
| <b>10</b> | <b>SUSTAINABILITY</b>   |                      |                       |   |   |   |
|           | Longterm sustainability plans & policies are developed                                  |                      |                       |   |   |   |
|           | Regular inspection schedule for maintenance, procedures of facilities & equipment exist |                      |                       |   |   |   |
|           | Community contribution mechanism exist  |                      |                       |   |   |   |
|           | Cost Recovery Mechanism and user charges exist  |                      |                       |   |   |   |
|           | Users Charges Management Policy exists  |                      |                       |   |   |   |
|           | Users charges are periodically revised and reviewed                                     |                      |                       |   |   |   |
|           | Sub-total   |                      |                       |   |   |   |
|           | <b>Scores Obtained</b>  |                      |                       |   |   |   |
|           | <b>Maximum Scores</b>   |                      |                       |   |   |   |
|           | <b>Minimum Scores</b>   |                      |                       |   |   |   |
|           | <b>Percentage (%)</b>   |                      |                       |   |   |   |
|           |   | <b>KEY TO RATING</b> |                       |   |   |   |
|           |   | 1                    | Not functioning/exist |   |   |   |
|           |   | 2                    | Unsatisfactory        |   |   |   |
|           |   | 3                    | Needs Improvement     |   |   |   |
|           |   | 4                    | Adequate              |   |   |   |
|           |   | 5                    | Excellent             |   |   |   |

**PSAWEN ORGANIZATIONAL CAPACITY ASSESSMENT RESULTS**  
22 Sep 2002

| AREA OF ASSESSMENT   | SCORE<br>5 = strong<br>1 = weak |
|--|---------------------------------|
| <b>GOVERNANCE</b>  |                                 |
| A functioning Organizational Structure exists – By laws of PSAWEN in place and there is also a current Organizational Chart. However, the Department of Natural Resources exists only on paper, with a single employee who spends most of his time in Galcayo.           | 3                               |
| Written organizational values exist – These exist only as unwritten ideas  | 2                               |
| Written vision statement exists – This exists only as unwritten idea   | 2                               |
| Authority limit levels exists (job roles authority) – These are supposedly known and practised through some old regulations picked up from the Energy Authority in the past. These need to be reviewed, revised and re-written.  | 3                               |
| Mechanisms for review & follow-up of activities exist - These are supposedly known and practised through some old regulations picked up from the Energy Authority in the past. These need to be reviewed, revised and re-written.  | 3                               |
| Operational Manuals (procedures, etc) exist – No manual exists but there are unwritten procedures that they follow   | 2                               |
| <b>Average</b>   | <b>2.5</b>                      |
| <b>PLANNING</b>  |                                 |
| There is a written long-term plan – No written long-term plan  | 1                               |
| There is a short-term strategic directions plan - This exists only as unwritten idea   | 2                               |
| There is a written Annual Strategic Plan - This exists only as unwritten idea  | 2                               |
| There is a Management Information System (MIS) – Only the Energy Department of PSAWEN has some form of MIS, but this still needs a lot of improvement  | 2                               |
| There is a Data gathering & Recording and Management System - This exists only as unwritten idea   | 2                               |
| <b>Average</b>   | <b>1.8</b>                      |
| <b>FINANCE</b>   |                                 |
| The organization has a written Financial Policy – Policies from the former Energy Authority of the Central Government are practiced, but even these procedures are not systematically written and need updating.   | 3                               |
| The organization has a written Financial Procedures – Procedures from the former Energy Authority of the Central Government are practiced, but even these procedures are not systematically written and need updating.   | 3                               |
| Is there an approved budget- The budget is prepared by PSAWEN's Management Committee, and subject to the approval of the Ministry of Finance and the Parliament. Usually, the annual budget details allocations for operational costs, mainly for the Energy Department. | 3                               |
| Financial reports prepared: accurately, timely and completely – This is deemed needing improvement, specifically in the area of written procedures to be followed.   | 3                               |
| Computerized financial systems – There is some form of computerization at the Bossaso Power Station  | 2                               |
| Bank Accounts maintained and updated – This is observed in Bossaso only. PSAWEN offices outside of Bossaso do not have banking or cash facilitation arrangements, as there are no such facilities in some areas.   | 3                               |
| Receipt and Payment vouchers: - This is identified as one strong area, but mainly confined to the Bossaso Power Station  | 4                               |
| a) Exists – Yes  |                                 |

**PSAWEN ORGANIZATIONAL CAPACITY ASSESSMENT RESULTS**  
**22 Sep 2002**

| AREA OF ASSESSMENT   | SCORE                  |
|--|------------------------|
|  | 5 = strong<br>1 = weak |
| <b>FINANCE - cont.</b>   |                        |
| b) Are pre-numbered – Yes  |                        |
| c) Are properly accounted for – Yes  |                        |
| d) Are authorized – Yes  |                        |
| e) Are supported – Yes   |                        |
| f) Are recorded – Yes  |                        |
| Vouchers and their support documents filed chronologically - This is identified as one strong area, but mainly confined to the Bossaso Power Station   | 4                      |
| Petty cash exist and is a reasonable amount – Petty cash exists and seems quite adequate relative to PSAWEN's limited financial resource base. However, there is no written procedure about its administration | 3                      |
| Cash is kept in safe custody – This is observed mainly in the Bossaso Power Station where there are two vaults   | 3                      |
| Advance policy exist – This exists as an unwritten idea, allowing for some exceptions in some cases  | 2                      |
| Advance is properly authorized and recorded - This is observed mainly in the Bossaso Power Station   | 3                      |
| Auditing conducted periodically – Internal audit operates on monthly basis and focuses on Bossaso Power Station. There is also external audit from the Government- but this is unscheduled and unpredictable.  | 3                      |
| Audit reports prepared and archived - Internal audit operates on monthly basis and focuses on Bossaso Power Station.   | 3                      |
| <b>Average</b>   | <b>3</b>               |
| <b>PROCUREMENT</b>   |                        |
| Written Procurement Policy exist- This exists as an unwritten idea only  | 2                      |
| a) Procurement in excess of <b>certain amount</b> are subjected to fair competition  | 2                      |
| b) All procurements are competitive as to price and quality  | 2                      |
| c) Procurements are authorized, properly supported and recorded  | 2                      |
| d) Deliveries are verified as to price, quantity, quality and type   | 2                      |
| <b>Average</b>   | <b>2</b>               |
| <b>INVENTORY AND FIXED ASSETS</b>  |                        |
| The organization has a written Fixed Assets Policy - This exists as unwritten idea only  | 2                      |
| Fixed Assets are recorded in the fixed assets register- No fixed assets register   | 2                      |
| Physical verification of fixed assets is conducted and documented periodically – No physical verification  | 2                      |
| A written Inventory Management Policy exist – None   | 2                      |
| Inventory utilization is authorized properly, supported and properly recorded in Inventory registry – No   | 2                      |

**PSAWEN ORGANIZATIONAL CAPACITY ASSESSMENT RESULTS**  
**22 Sep 2002**

| AREA OF ASSESSMENT   | SCORE<br>5 = strong<br>1 = weak |
|--|---------------------------------|
| <b>INVENTORY AND FIXED ASSETS – Cont</b>                                     | <b>2</b>                        |
| Stock counts are conducted regularly and documented – <i>No stock counts</i> | <b>2</b>                        |
| <b>Average</b>   | <b>2</b>                        |
| <b>PERSONNEL MANAGEMENT</b>  |                                 |
| A written Personnel Policy exist   |                                 |
| Personnel and staff manual exist   |                                 |
| An effective and fair local recruitment procedures exist                     |                                 |
| Personnel files are complete and properly maintained                         |                                 |
| Staff Job Description exist  |                                 |
| Written staff contract exist   |                                 |
| Procedures for evaluating and measuring staff performance exist              |                                 |
| Documentation and authorization of payroll exist                             |                                 |
| Staff training and professional development exists                           |                                 |
| <b>Average</b>   |                                 |
| <b>VEHICLE MANAGEMENT</b>  |                                 |
| Comprehensive vehicle usage policy exists                                    |                                 |
| Organization maintains a vehicle log-book.                                   |                                 |
| <b>Average</b>   |                                 |
| <b>TECHNICAL</b>   |                                 |
| Separate department for planning & development                               |                                 |
| Training programs planned and documented                                     |                                 |
| Standard project proposals developed   |                                 |
| Departments use participatory methods in planning                            |                                 |

**PSAWEN ORGANIZATIONAL CAPACITY ASSESSMENT RESULTS**  
**22 Sep 2002**

| AREA OF ASSESSMENT  | SCORE<br>5 = strong<br>1 = weak |
|---|---------------------------------|
| <b>TECHNICAL – Cont</b>   |                                 |
| Database on all sections and properly recorded  |                                 |
| Regular project reports are prepared and filed  |                                 |
| Regular monitoring and evaluation mechanism exist                                       |                                 |
| Average   |                                 |
| <b>PUBLIC RELATIONS</b>   |                                 |
| Working relationship with community representatives                                     |                                 |
| Working relationship with community committees  |                                 |
| Working relationship with international agencies  |                                 |
| Organization attends and calls regular coordination meetings                            |                                 |
| Links with other government organizations   |                                 |
| Average   |                                 |
| <b>SUSTAINABILITY</b>   |                                 |
| Longterm sustainability plans & policies are developed                                  |                                 |
| Regular inspection schedule for maintenance, procedures of facilities & equipment exist |                                 |
| Community contribution mechanism exist  |                                 |
| Cost Recovery Mechanism and user charges exist  |                                 |
| Users Charges Management Policy exists  |                                 |
| Users charges are periodically revised and reviewed                                     |                                 |

**IDP Camp Bosaso**  
**Energy Survey**  
**Data Compilation**

**Said Fardhis**  
**ADRA Somalia**

| #        | Information Required  | Answers   |
|----------|---|---|
| <b>1</b> | <b>COOKING:</b>   |   |
| 1.1      | How many meals do you cook a day?   | Out of 27 HHs interviewed: 16 HH cook one meal/day, 4 HH (1-2 times/day), 5HH (2 times/day) and 2 HH (3 times/day). This question is not clear, does meal cooking include, also tea preparation and/or milk boiling   |
| 1.2      | How many people in your household?  | Average people/HH = 156 persons/27HHs=5.8 with a minimum and maximum persons/HH = to 3 and 11 respectively. 85% of these people are children and women.   |
| 1.3      | How much money do spend in cooking using firewood or charcoal?                        | IDP HHs usually use cheaper and poor quality fire wood and charcoal and spend 2000-3000 shs day depending on the # of times they cook meal/day (i.e only 2 out of 27HHs declared to spend Sh.so4000/day. Almost 95% of the IDP stated they spend sh.so2000/day. |
| 1.4      | Do you miss some meals because you could not afford to buy firewood or charcoal?      | 27 out of 27-interviewed HH responded yes to this question. Most HHs who normally cook one meal/day declared that they miss meals frequently either due lack of dry food or money to buy charcoal/firewood or even lack of both items.                          |
| 1.5      | Are happy in getting alternative source (such as solar cooker) when ever is possible? | 27 out of 27-interviewed HHs (100%) responded: Yes, but only if it is free (I think, this question might be understood that ADRA PPED will provide handouts of solar cookers).  |

|           |  |  |
|-----------|--|--|
| 1.6       | Are ready for training on cheaper solar cooker?                | 27 out of 27 responded: Yes if we get free solar cookers. What is a cheaper solar cooker? For me, you and other staff may be a \$5 dollar cooker is considered cheaper but for the IDPs such amount is beyond their reach. |
| <b>2</b>  | <b>ELECTRONICS:</b>  |  |
| 2.1       | Do you use radios?   | Only 2 HH out of 27 use Radio.   |
| 2.2       | How many batteries do you use per radio?                       | Each of them uses 4 dry cell pieces (1.5 V/piece)  |
| 2.3       | What is the cost of batteries (one set)?                       | One HH responded: Cost of one set of dry cell shs 12,000 whereas the other declared shs 15,000.  |
| 2.4       | How many times do you change radio batteries in a month?       | Both HHs change one time/month   |
| 2.5       | How many hours do you use the radio a day (average hours)?     | One HH uses the radio an average of 1 hour/day and the other one uses 30 – 45 minutes/day.   |
| <b>3.</b> | <b>Lights:</b>   |  |
| 3.1       | How lights in the house, if any?                               | 27 out of 27 HH (100%) responded none.   |
| 3.2       | What type of lighting (grid lighting, touch or kerosene lamp)? | 26 out of 27 HHs use Kerosene lamp. The widow lady with 9 orphans has not even a kerosene lamp.  |
| 3.3       | How much one touch costs?                                      | Questions 3.4, 3.5, All 27 HHs responded: not applicable   |
| 3.4       | How much does a touch battery costs (one set)?                 | not applicable   |
| 3.5       | Recurrence of battery change in a month?                       | not applicable   |

|     |  |  |
|-----|--|--|
| 3.6 | How much one Kerosene lamp costs?          | 25 out of 27 HHs responded : Kerosene lamp (small sized) costs Shs 30,000 and one HH said their kerosene lamp costs 37, 000 Shs, because it is medium sized. |
| 3.7 | How much one-liter kerosene costs?         | All of them do not know cost of one liter of kerosene. Anyway they use diesel which is cheaper.  |
| 3.8 | How much is the cost of kerosene per week? | Each of the above kerosene lamp users spend 7000 Shs/week to buy diesel (Shs 1000/day).  |

ENERGY THINK TANK MEETING  
ECONOMIC DIVERSIFICATION PROJECT  
30<sup>TH</sup> AUGUST 2002  
UNDP CONFERENCE – 3.00- 5.00P.M.

PRESENT

| NAMES                      | ORGANIZATION                | EMAIL ADDRESS  |
|----------------------------|-----------------------------|--|
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| 3. Charles Oloo            | AltEner                     | <a href="mailto:altenergykenya@yahoo.com">altenergykenya@yahoo.com</a>           |
| 4. Mohamed Y. Abshir       | RRC                         | <a href="mailto:waldo@todays.co.ke">waldo@todays.co.ke</a>                       |
| 5. Ndiao Solomon Okumu     | Solar Cookers International | <a href="mailto:sci@iconnect.co.ke">sci@iconnect.co.ke</a>                       |
| 6. Daniel Macharia Wanjohi | Energy Alternatives Africa  | <a href="mailto:dmacharia@iconnect.co.ke">dmacharia@iconnect.co.ke</a>           |
| 7. Tom Ogutu               | K-Rep Advisory Services     | <a href="mailto:togutu@k-repconsulting">togutu@k-repconsulting</a>               |
| 8. Mohamed Ali Mohamoud    | M.A.M. Bros. Co.            | <a href="mailto:koshin@wananchi.com">koshin@wananchi.com</a>                     |
| 9. Nicholas Wood           | Millinnium Fuel Project     | <a href="mailto:Nickwood@iconnect.co.ke">Nickwood@iconnect.co.ke</a>             |
| 10. Bernard Osawa          | Energy Alternatives Africa  | <a href="mailto:solar@iconnect.co.ke">solar@iconnect.co.ke</a>                   |
| 11. Mike Harries           | Kijito Windpumps            |  |
| 12. Erica Krug (chair)     | ADRA Somalia                | <a href="mailto:adrasomalia@yahoo.com">adrasomalia@yahoo.com</a>                 |
| 13. Hannah Ndungu (Sec)    | ADRA Somalia                | <a href="mailto:programs@adrasomalia.org">programs@adrasomalia.org</a>           |
| 14. Ken Selerio            | ADRA Somalia                | <a href="mailto:systems@adrasomalia.org">systems@adrasomalia.org</a>             |

Agenda

1. Introduction
2. Distribution/Review of last minutes
3. Update of energy activities in Somalia (Puntland and Somaliland)
4. Overview of Wind Energy
5. Presentation of Wind Energy
6. Discussions: Opportunities and Challenges in Somalia

AOB

- ❖ Schedule of next ESTT meeting
- ❖ Topic Agenda

1&2

Introduction by all in attendance. Distribution and Review of previous meeting minutes.

**Update of Energy Activities in Somalia (Puntland & Somaliland)**

ADRA is implementing a USAID funded project which is aimed at promoting peace and stability by stimulating the development of an enabling environment for economic diversification in Puntland through facilitating access to conventional and alternative or renewable energy technologies. Working in collaboration with three other implementing partners; Energy Alternatives Africa, CARE Somalia and K-

Rep Services Limited, the project's specific objective are to strengthen and develop local structures to market, install, manage and support conventional and alternative energy sources, stimulate private investment by creating a supply/demand-driven market around the local entrepreneurs, investors, diaspora and consumers for conventional and alternative energy sources and to increase human resources capacity to design, install and maintain conventional and alternative energy sources.

During the month of July, some of the activities covered in Puntland included technical training, business training and capacity building assessments. Currently, there are possible consideration of expanding the project to Somaliland. To begin with, ADRA is planning to hold Somaliland Energy Fair in October 27<sup>th</sup> through 29<sup>th</sup> October 2002. The idea is to provide opportunities for East African energy system suppliers and entrepreneurs to break into new and expanding market and also to provide opportunity for ADRA to gather information on energy needs and resources in Somaliland.

## **Wind Energy Overview**

Wind Energy-how, What, Where, Why ?

How does it work?

What can it do ?

Where is it appropriate? Developing county context

Why use wind?

### **Wind Energy – How Does It Work?**

The Wind Turbine, Which is installed on top of a tall tower, collects wind energy and converts it into electricity. The electricity is used to charge batteries, reduce the fuel consumption on a diesel generator, or drive a pump. Since the wind is intermittent, some sort of storage is usually incorporated into the system and back-up generators are often used.

### **Windmills – What Can They Do?**

#### *Mechanical windmills*

Mechanical windmills are primarily used to pump water for community, household or agricultural use

#### *Electrical windmills*

Electrical windmills connect to a power grid and produce energy converted to electricity for heating, transportation, and other mechanized power

### **Wind Energy – Where Does It Work?**

Wind resources necessary (4 m/s, 9 mph) for small scale turbines are available in most of the world.

Currently, wind energy programs are being used in:

|            |            |
|------------|------------|
| Argentina  | Botswana   |
| Cape Verde | India      |
| Jordan     | Kenya      |
| Mexico     | Mozambique |
| Oman       | Pakistan   |
| Sri Lanka  | Sudan      |

To name a few!!!

Wind Energy – Why Use It?

## Windpower for pumping Presentation by Mike Harries from Bob Harries Engineering Limited.

- ❖ Wind is one of the natural energy sources which is free and available all the time for the purpose of production of economical power to pump water or to generate electricity. The technology has been in existence more than 2000 years. Windpump needs no fuel and little maintenance and usually lasts 20 years or more.
- ❖ The cost of financing a windpump is often less than the cost of fuel and maintenance of running a diesel engine. When wind conditions are adequate, a windpump produces water more cheaply and with less trouble than an engine, and when the next fuel shortages occur the windpump will always produce water more cheaply and with less trouble than an engine. Windpumps are the most secure source of water.
- ❖ The kijito windpumps are direct mechanical windpumps with modern designs. The kijito windpumps are made in Kenya and are used in most parts of the country as well as other African countries namely Uganda, Tanzania, Nigeria, Sudan and Somalia among others.

### What are the conditions?

- The pumping capacity of the four sizes of Kijito windpump are indicated opposite for three types of wind regime. There is light mean windspeed, medium and strong. Through the windregime in a specific area, provides a guide to the pumping capacity of these machines for a range of pumping heads. The meteorological department in Kenya keeps data for windspeed though the department measures the wind only 2m above the ground level while the Kijito windpump is usually mounted 10m above the ground where it obtains much better exposure to the wind. This means that the figure obtained from the Department may be rather low since the meteorological department measures at only 2m.
- Windpumps are very sensitive to windspeed; any slight increase in windspeed results to increase in output of water. This means if there is 25% increase in windspeed, results to 100% increase in energy availability.
- Rotor: are scientifically designed for high aerodynamic efficiency. The blades are available in different sizes and are easily replaced if damaged by an individual. The power from the rotor is transmitted to the pump via a unique crank and rocker arrangement. All rotating components run on highest quality longlife ball and roller bearings which are easily lubricated in a few minutes only twice every year.
- Kijito windpumps are supplied on 30ft (10m) tripod tubular towers. However extension sections are available as options to increase the rotor height and get better performance. All towers are hinged at their bases to allow easy erection and servicing. This also greatly facilitates access to the borehole when the windpump is lowered and reduces borehole and pump maintenance time and costs.
- One of the many windpumps kijito has installed in Amboseli in 1990 which is still functional.

### Discussions

The technology would be appropriate in Somalia context but concerns regarding the measurement of wind data was debatable since there is no meteorological department in Somalia.

The members proposed to have solar cooking topic in the next meeting scheduled for October 2002.

# **ADRA - SOMALIA**

## **REPORT ON**

### **BUSINESS COMMUNITY TRAINING NEEDS ASSESSMENT: ALTERNATIVE ENERGY PROJECT**

*Presented by:*

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## **EXECUTIVE SUMMARY**

ADRA-Somalia is an organization that has operated in Somalia since 1992, implementing various development projects on institutional building and strengthening health and security. Currently ADRA is implementing a new project (powering Puntland's Economic Diversification – PPED) aimed at promoting the use of alternative energy.

PPED's strategy for promoting alternative energy focuses on linking experts in this field to the business community of Puntland to find feasible and realistic solutions to the growing energy demands of the people. This requires capacity Building, through training, of businesses that would want to partner with PPED project.

A training needs assessment was carried out in August 2002 in this connection. The assessment involved nine indigenous businesses in Bosaso, the economic center of Puntland. The respondents for the assessed businesses were owner/managers handling the day-to-day management of their enterprises. The assessment showed that the owner/managers had weaknesses in the following areas:

- Lack of awareness on alternative energy
- Analyzing the performance of their enterprises
- Record-keeping
- Application of records to decision making
- Mapping out strategies for expansion
- Setting business goals and targets
- Profitability analysis
- Stock management
- Delegating to staff

In response to these weaknesses, five training courses have been proposed. These are:

1. Alternative Energy awareness course
2. Business Planning course
3. Record Keeping course
4. Marketing course
5. Management Skills course

With regard to implementation of the training, the report gives four recommendations:

1. That the project develops and conducts the five proposed programmes according to the content, structure, participation and sequencing details provided in the report.
2. That the project concentrates, initially in training businesses that strongly display the characteristics of innovators/early adopters as per the criteria provided. According to the theory of adoption, such businesses are more likely to quickly embrace the alternative energy concept than those falling in the category of the ordinary majority.
3. That the project investigates ways and means for securing a fund for providing the participating entrepreneurs with credit, as a means for assisting them to venture in new business on alternative energy. This will enable quick adoption of the alternative energy business by the entrepreneurs without straining their present capital levels.
4. That the project commences a concerted public awareness campaign on alternative energy technology to stimulate demand. The campaign will enable the entrepreneurs to start the alternative energy initiatives on a more favourable businesses environment.

## **1.INTRODUCTION**

### **1.1 Background**

ADRA-Somalia is an organization that has operated in Somalia since 1992, implementing development projects on institutional building and strengthening, health and security. Currently ADRA-Somalia is engaged in implementing a new project, aimed at economic diversification through expansion of the energy sector. The new project, Powering Puntland's Economic Diversification (PPED), is implemented in collaboration with other organizations. One of the key actors to this collaboration is K-Rep, an institution specializing in micro-finance development.

*The strategy of the project implementation focuses on linking experts from the field of alternative energy to the business community of Puntland, to find feasible and realistic solutions to the energy demands of the people. One of K-Rep's collaborating roles is the identification of the training needs of the business enterprises interested to join the project, and then offering appropriate training to enable them start and manage alternative energy activities sustainably. The first training needs assessment of the project was carried out in 11-15 August 2002.*

### **1.2 Terms Of Reference**

According to the terms provide by ADRA and agreed upon with K-Rep, the consultant was expected to carry out assessment activities as follows:

#### **1.2.1 Previous to arrival in Bosaso:**

- Review business profile provided by ADRA Somalia,
- Request and review any other necessary information regarding assessment participants or implementation team,
- Design assessment tools based on provided information and K-Rep experience/methodology,
- Communicate with ADRA Somalia regarding draft assessment,
- Evaluate recommendations or comments from ADRA Somalia for final design of assessment.

#### **1.2.2 Upon arrival in Bosaso:**

i) Brief ADRA Somalia staff (Training Officer, Business Mobilizer and Project Coordinator) on assessment as follows:

- Review assessment tool, including explanation of design methods,
- Review logistics plan,
- Agree on work plan and individual responsibilities divided among team members,
- Make adjustments to assessment tool and logistics plan as per update from local staff.

ii) Conduct assessment with 13 local businessmen.

iii) Conduct de-briefing with ADRA Somalia staff to evaluate successes and lessons learned from the assessment and gather the staff's impressions on the assessment outcomes and directions.

#### **1.2.3 Output:**

Provide complete report including assessment methodology, findings, and recommendations for initial training program (a number of trainings for different levels of the business community),

suggestions for criteria for inclusion (based on the findings), recommendation for future assessment and final analysis of business community needs.

## 2. METHODOLOGY

### 2.1 Sample Size

The assessment was conducted with 9 indigenous businesses located in Bosaso, the commercial hub of Puntland. The sample businesses were quite varied in type and size as detailed here below:

| <b>Business Name</b>                                  | <b>Main Business</b>                        | <b>Person Interviewed</b> | <b>Position</b>             | <b>No of Staff</b>        | <b>No of Branches</b> |      |
|---|---|---------------------------|-----------------------------|---------------------------|-----------------------|------|
| 1) <i>Golis tele-communications</i>                   | <i>teleco-communications</i>                | <i>Aden Ali</i>           | <i>senior manager</i>       | 150                       | 5                     | CI   |
| 2) <i>Fadhisame Electrical Shop</i>                   | <i>electrical appliances</i>                | <i>Mohamoud Ismail</i>    | <i>managing patner</i>      | 3                         | 0                     | CIII |
| 3) <i>Noobir Electrical Shop</i>                      | <i>electrical appliances</i>                | <i>Ahmed Farah</i>        | <i>owner/ manager</i>       | 3                         | 0                     | CIII |
| 4) <i>Gufure Spare Parts</i>                          | <i>auto spares</i>                          | <i>Dahir Farah</i>        | <i>managing shareholder</i> | 15                        | 3                     | CII  |
| 5) <i>Marere Auto Spare Parts</i>                     | <i>auto spares</i>                          | <i>Said Mohamoud</i>      | <i>owner/ manager</i>       | 35                        | 6                     | CII  |
| 6) <i>Reebi Spare Parts</i>                           | <i>auto spares</i>                          | <i>Sahal Firdhiye</i>     | <i>manager</i>              | 15                        | 3                     | CII  |
| 7) <i>Jibril Contracting</i>                          | <i>construction (civil&amp;residential)</i> | <i>Abbas Jibril</i>       | <i>managing partner</i>     | 40 full-time<br>60 casual | 4 (site offices)      | CI   |
| 8) <i>City Center Enterprises</i>                     | <i>office furniture/ office automation</i>  | <i>Abirahiman Warsame</i> | <i>managing shareholder</i> | 4                         | 0                     | CIII |
| 9) <i>AL-fadhi Building Materials and Constrution</i> | <i>construction/ building materials</i>     | <i>Abdinasir Hussein</i>  | <i>managing patner</i>      | 50                        | 4                     | CII  |

(CI= Category I, CII= Category II, and C III= Category III. There is no formal classification existing in Puntland. The categorization here applied is one of expert judgment, which is arrived at by applying criteria such as number of employees, observed level of stocks/operations (which give reasonable insight on capitalization), and existence of formalized management structures, as described in 3.3.2)

## **2.2 Investigation Approach**

The assessment was carried out mainly using a semi-structured interview questionnaire. The consultant made intensive exploratory discussions with the entrepreneurs, to validate their expressed willingness to venture into the business of alternative energy technology, their business strengths and weaknesses and the perceived training needs. The methodology also included physical observation of the enterprises to gain insight on size, stocking levels, record keeping, and operating environment and procedures. These are all key factors that are important in training design.

## **2.3 The Assessment Instrument**

The interview questionnaire comprised of five parts to give the following:

- Bio- information: name, age, gender, education and training, language abilities.
- Basic facts on the enterprise: business name, size, major product, capital level, and sales level.
- Perceived training needs: as defined by the entrepreneurs functions in the business, what he feels to be weak areas visa a vis these functions, future plans for the business and the planned venture on alternative energy technology.
- Preferred training time and duration.
- Financial needs and loan experience of the entrepreneur.

## **3. FINDINGS**

### **3.1 Basic Information On Respondents**

Most of the respondents (7 out of 9) were in the age bracket 35-50 year. Education wise, 6 out of 9 had only attended secondary school, while one had attained first-degree level and two had gone up to second-degree level. All of them had received some form of post school training in subjects such as management, accounting, sales, marketing, and computer packages. Most of them did not have a technical background. Only one of them had a technical background in water and construction technology. Also majority (7 out of 9) indicated that they are English literate while all nine mentioned that they are fluent in reading and writing the Somali language

### **3.2 Basic Information On The Assessed Enterprises**

Businesses represented in the sample included auto spares shops (3), electrical-electronic/shops (2), construction company (1), construction materials and supplies (1), telecommunication (1) and office furniture/automation (1).

Out of 9 businesses, only 4 kept energy related materials and equipments, specifically petrol/diesel generators, electrical appliances, and, in two instances, solar lamps and panels. The fact that only 2 businesses (22%) carried some solar technology (and even then very few items) shows the low level of awareness on alternative energy options.

Almost all the respondents (7 out of 9) did not feel free enough to reveal their business capital and sales records principally due the volatile civil situation at the time of the assessment. They could not risk such information getting to the wrong people. In the few cases where the figures were given, it was not possible to verify them and therefore no capital and sales analysis could be carried out.

### **3.3 Issues That Could Define Training Needs At Different Enterprise Levels**

#### **3.3.1 Perceived weaknesses**

During discussions concerning the tasks they perform, and their work challenges, the respondents variously displayed weaknesses in the following areas:

- Analyzing the performance of their enterprises
- Record-keeping
- Application of records to decision making
- Mapping out strategies for expansion
- Setting business goals and targets
- Profitability analysis
- Stock management
- Delegating to staff
- Credit management

In addition, they had very low or no awareness on alternative energy.

#### **3.3.2 Classification of interviewed businesses**

Analysis of responses revealed that the assessed businesses fell into three categories, representing large, medium and small indigenous enterprises with characteristics as detailed below:

##### ***i) Category I (CI) enterprises:***

This category is made up of what one may define, in the Bosaso context, as large indigenous enterprises. The enterprises have over 50 employees, are headed by professionals. They have a branch network, a well-developed staff resource and a formalized management system. The concept of delegation is quite well applied within management. The employee structure features a cadre of well-educated departmental managers in charge of various operational functions, including merchandising, shop floor supervision, sales and marketing, financial management and accounts. The managers do feel that the businesses are growing very fast, with complexities that at times overtax their skills. Record keeping is done following the standard manual, or computerized system. These enterprises have been able to mobilize interest free capital either from dormant partners/shareholders, from the local scene or the Diaspora.

##### ***ii) Category II (CII) enterprises:***

The second category can be described as medium sized indigenous businesses. These enterprises have 15-50 employees, have branches either in Bosaso or other towns, but the management structure is not well formalized. The managers are not highly educated though they may possess more than average education. Often the owner is the overall manager backed by two or three

functional managers cum assistants. The concept of delegation is only starting to emerge, usually being applied only when the manager is out of the country or ill. The owner/managers are just struggling/starting to standardize their record keeping in manual form, or in computerized form based on the Quick Books system. The enterprises have been able to attract interest free (but not enough) capital from inheritance, investors in the local scene and/or relatives from home or the Diaspora. They are in the right stage for expansion, except that they are constrained by inadequate capital.

### ***iii) Category III (CIII) enterprises***

Category III enterprises can be described as small firms with less than 15 employees, rather operating from the level of the common shop. They do not have branches yet. Although they, at times, may have only two or three employees, they are distinguished from micro-enterprises by the fact that they have high capitalization. The owner is the visible manager assisted by shop floor workers. In the ordinary case, the owner manager will have average education or below, and applies fairly informal management. Records are not necessarily kept and if they are, it is in a rudimentary manner, the most common records being daily sales, purchasing, debtors and creditors books. Often the owner manager is not convinced of the need of further books of accounts and would rather forgo employing an accountant. Staffs are likely to be relatives, immediate or distant.

### **3.4 Issues That Could Define Training On Alternative Energy Awareness**

Analysis of the responses to questions on alternative energy indicated that, the majority of respondents:

- i) Did not have objective insight as to the likely demand potential for alternative energy products.
- ii) Had a low knowledge of alternative energy possibilities. Among the interviewed only three had some appreciable knowledge of this kind, principally because they had attended the previously organized ADRA one-day workshop on Alternative Energy Business Possibilities. As for the rest they were only reasonably versed on of solar panels and lanterns.

One firm, Golis Telecommunications, was in fact using solar panels for powering their communications equipment, while the other two had attempted to sell solar panels (Noobir Electric Shop) and solar lanterns (Fadhisane Electrical Shop) with discouraging experiences.

- 3) Were not aware of how they could go about sourcing alternative energy products. Other than depending on a customer walk-in/walk-out basis, they did not demonstrate a strong insight with regard to the potential for marketing these products.

- 4) Would wait for ADRA to create general and specific awareness on alternative energy before they could decide to venture into it as business.

### **3.5 Issues That Could Indicate Training Sequencing**

As to the duration of training seven out of eight people preferred short sessions spread over a two-week period at the longest. There was a 50/50 tie as to whether training should be conducted in the morning or evening hours, but all agreed that any training design should allow for some time to do some business in the day and that sessions should either fall between 8.00 or 9.00 a.m.-

12.00 noon, or 4.00-6.00 p.m. These preferences provide for very short hours of training that do not provide time efficiency, which would make courses unnecessarily too long. To improve time efficiency, it would be possible to lengthen training hours (8.00-1.00 P.M.) without losing the basic principle of leaving some time of the day for the trainees to attend to their businesses. However all respondents did express that they could take longer hours of training if it is organized outside Bosaso.

### **3.6 Issues That Could Define Financial Assistance Modalities And Consequent Training**

6 out of 9 respondents did not know of any loaning institutions. The other 3 respondents were aware of the Amaadha Danyarta (the K-Rep promoted micro-finance institution), and the Dahab Shir (a private bank). However they felt that these two financial institutions were not the right sources of credit for them, principally for two reasons:

- 1) The two institutions charge interest or service charge on loans, which the respondents viewed as contrary to the Islamic faith.
- 2) The two institutions cannot give the size of loans the respondents would consider worthwhile for their businesses

8 of the respondents felt that they would want to take loans for their businesses but only on condition that such loans did not attract interest/service charge so as not to conflict with their Islamic faith. The amount of loan that these respondents felt could benefit their businesses ranged between US\$ 10000-100000 with an average of US\$ 40000. This range is far beyond the loans being given by the local, K-Rep promoted, micro-finance institution (Amaadha Danyarta). For that reason, these businesses would require a different modality of financial assistance. It seems that individual loan scheme (rather than the group lending scheme) would be more suitable for these businesses.

## **4. CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Selection Criteria For ADRA's Alternative Energy Partner Enterprises**

It is recognized that doing business in alternative energy products and systems is a rather new concept in the Puntland. In this context, and within the theory of technology adoption, it is necessary to start by partnering with businesses that can effectively play the role of innovators (or early adopters). Such businesses are likely to display the following four major characteristics:

- They have high capitalization, such that they can easily enter into the alternative energy line, without necessarily requiring financial assistance
- They operate profitably, an indicator that they will most likely operate the alternative energy line of business profitably too.
- Their owners or managers are convinced that they can make profitable business out of the alternative energy options.
- The present business is not too much at variance with the alternative energy business concept. For example a hardware shop has a better fit with alternative energy technology than a restaurant. Also, the business of constructing residential houses has a strong

linkage in that the contractor can easily sell alternative energy systems as a means for powering the houses he is contracted to construct.

The innovators are likely to be businesses in categories II and I as presented above (3.3.2). Category III businesses can come in as possible early adopters, that is, the next lot likely to easily adopt the alternative energy business concept, but with heavier assistance than categories I and II.

The average case of micro- enterprises, which are one-person firms sometimes with one or two employees, with low capitalization and scale of operation, were not assessed. As investment in alternative energy systems is expensive, their ability to participate early in the project would be limited. Perhaps they could come at a later period as resellers of small items such as solar bulbs, torches, wiring accessories, small panels, e.t.c., bought from bigger firms in the innovator class( who would have the capacity to import and supply these items to smaller firms).

**RECOMMENDATION 1:** It is recommended for the project to initially concentrate its partnership to innovators and early adopter type of businesses, pre-selected using the above criteria.

## **4.2 Training Needs And Programs**

From the foregoing discussion of findings it is possible to identify the five training programs presented here below:

### **4.2.1 Alternative energy awareness course**

**Rational:** All respondents were found to have very low awareness on alternative energy technology and business possibilities. A businessperson cannot make business decisions on products he or she does not know well. For this reason, it is necessary to hold an awareness course that will expose the entrepreneurs to the whole portfolio of the alternative energy technologies that ADRA would like to promote.

**Content and structure:** Such training should include practical demonstrations as far as possible of products and systems design, information's on product prices and supply sources, group discussions on who are likely to be the clientele and business possibilities, and presentations on strategies being put in place for customer technical back-up. A question and wrap up session could help to clear any existing doubts on the part of entrepreneurs. In this course they would be invited to join, on application, the next course on business planning. The training could last two days, five hours each day, from 8.00-1.00 p.m. About 30-40 participants could attend this course. In the end, the course would act as a selection instrument for those really interested in continuing in the project.

**Participation:** This course would be initially organized for owner/managers of businesses in categories II and I. In firms with a well defined functional management, e.g., Golis Telecommunications, it would be strategic to include the functional/departmental managers because, first they are more likely than not to impact on the firms decision to venture in alternative energy, and two, ultimately they are the people who will implement such a decision. Later on, the training can be offered to category III firms. If enough trainees cannot initially be obtained from categories II and I then category III can be brought on board right from the start.

### **4.2.2 Business planning course**

The course would be a follow –up of the Alternative Energy Awareness Course described above.

**Rational:** The course would generally help to enable the entrepreneur to develop a business plan of the likely alternative energy enterprise he would want to start. The course would serve two specific purposes: one, to enable the businessperson investigate the viability of his business idea, and convince himself that he wants to go ahead with it; two, the businessperson will make a document that becomes his plan of action, and a point of reference for monitoring and evaluation by the project.

**Content and structure:** The course would ideally be conducted in three modules, three days each, five hours a day, following a simple business format. The modules can be presented as follows:

- MODULE 1: products selection, sourcing and marketing
- MODULE 2: investment requirements
- MODULE 3: financial projections and funding strategies.

A practical mode of instruction would be used where the trainer would provide input and the business person would use this input to write up a section of his business plan, with the trainers assistance where necessary, until the business plan is complete in the nine days. In the tenth day, the entrepreneurs would make presentations of their business plans to a selected audience of important personages and collaborating stakeholders. This would serve to publicize the project and enhance the entrepreneurs commitment to his business idea.

**Participation:** Only those who apply for it from the Alternative Energy Awareness Course would attend the business-planning course. The class would be rather small (not more than 20 people), due to the intensive trainer/ trainee interaction that is usually required in this type of course.

#### **4.2.3 Record-keeping course.**

**Rational:** Category III businesses were found to have very rudimentary records or no records at all, which may not provide their owner/managers the necessary data for informed decision-making. Also, the businesses would need to keep accurate records for purposes of monitoring once they join the project. It would therefore be strategic for the project to assist the owner/managers and staff who hold record keeping responsibilities, to gain the necessary skills in that area.

**Content and structure:** The course would be about five days, five hours each day, with the following content: source documents; posting of business transactions; budgets and cash flow projection; basic books for a small enterprise; balancing the books; simple statements for performance tracking; interpreting the accounts and statements for decision making. The course would be delivered in a practical manner, where trainees get the chance to try out their learning during the sessions.

**Participation:** Generally, the course would be aimed at businesses that do not have a professionally trained accountant, and these tend to be category III (3.3.2 above). As accountants are trained at a higher level than this course, those businesses with professionally trained accountants (categories II and I) would not, unless in an odd case, participate in this training.

#### **4.2.4 Marketing course**

**Rationale:** All respondents expressed that they were not conversant with marketing of

technology, such as alternative energy. This course would be designed to provide the businesspeople with greater insight into practical marketing of the alternative energy products. For it to be problem solving oriented and hence more effective, the trainees would attend this course only after they have already started their alternative energy business initiative, and begun to experience practical marketing challenges.

**Content and structure:** The course would cover: the meaning of marketing; the principle of customer orientation; market and sales analysis; the marketing mix; client build-up strategies; customer care; product mix; profitability analysis; and marketing strategies. This content can be delivered in a simplified way in four days, five hours each day.

**Participation:** Participants to this course would be owner/managers and employees in charge of marketing functions drawn from firms that start an alternative energy business initiative.

#### **4.2.5 Managerial skills course**

**Rational:** Most of the respondents expressed that they felt constrained in their present managerial capacity to expand their businesses although they had strong aspirations in that direction. This course would foster better management in the assisted businesses, thereby generally increasing overall business performance.

**Course content and structure:** The course could be conducted in five days, five hours per day. The mode of instruction would be experiential where the participants learn more from being involved rather than listening, as this is the preferred mode for soft skills development. Hence, there would be intensive application of simulated learning experiences (such as business games, role plays, group exercises, theatre, case stories, e.t.c.). The content would include: understanding functions of management; effective time management; managing of staff for better results; market and sales analysis for marketing decisions; marketing management for more market share; interpretation of financial records for managerial decision making; setting performance goals and targets and credit management. An ideal class for this course would be twenty-five people because of the high level of trainer /trainee interaction required.

**Participation:** Participants to this course would be owner/managers of business categories described above, who successfully start the alternative energy business line. However enterprises with a well-developed functional management could also be allowed to bring in the line or departmental managers since they also take substantial managerial responsibilities.

**RECOMMENDATION 2:** It is recommended for the project to develop and conduct the five training programs, as a proactive capacity building approach in promoting the alternative energy intervention in Puntland.

#### **4.3 Financial Support**

The findings show that nearly all respondents (8 out of 9) were in favor of taking credit for their enterprises. This underscores the high need for credit at this level of business community, to enable them to comfortably venture into alternative energy business. However institutions that can adequately cater for their needs are nonexistent in Puntland.

**RECOMMENDATION 3:** It is recommended that the project investigate ways of securing a fund for providing its partner businesses with appropriate credit. Such a credit system would ideally be designed and managed in collaboration with an institution like K-Rep. The knowledge

on credit management could be imparted as part of the managerial skills course described above (4.2.5). The emergent religious negativity with regard to service charge /interest on loan expressed by the respondents is a great impediment to the operation of a credit system according to the established best practices. However K-Rep is already studying this problem, emanating from its European Union supported micro-finance project in Puntland and Somaliland, and the experience there could come into the design of the Alternative Energy credit system.

#### **4.4 Publicity**

The general lack of public awareness on alternative energy means that a gap exists, which individual businesspeople cannot fill. Publicity would stimulate latent potential demand, which would in turn help the businesspeople to easily launch their alternative energy products into the market.

**RECOMMENDATION 4:** It is recommended that the project commences a concerted publicity campaign when the first businesses have already started to stock the products.

### **5. FUTURE ASSESSMENT OF TRAINING NEEDS**

It is recognized that the nine businesses that participated in the assessment were too few a sample, and that a higher quality of the results might have been achieved with a larger and more varied sample. However, due to the civil instability prevailing just a short time prior to the time of the assessment, almost all of the pre-selected interviewees had fled the country, and, therefore, it was not expedient to get a larger sample. Nevertheless, the small sample still enables the project to gain useful insight into the present needs in launching the alternative energy concept to the business community. A future assessment would concentrate on two points:

- To generate a more complete data base on the businesses that will finally be selected to participate in the project. This database will establish baseline parameters for purposes of impact evaluation of the project in future. For this assessment, the framework in 2 above would be expanded horizontally to include parameters such as capital, monthly expenses, average monthly revenue, average monthly profit, product range, age of the business, e.t.c., and vertically to include a longer list of assessed businesses.
- In the findings, it is indicated that, the sample did not include micro-businesses, such as the Amaadha Daanyta clients. Yet as the idea of alternative energy takes on, these might become important in re-selling small inexpensive products at competitive prices for the common man. It would therefore be important, in the future, to conduct an assessment of these businesses, especially with a view towards setting training needs as well as baseline monitoring parameters.

Capacity building is a longer-term rather than a one-shot input to development. It is hoped that this assessment will spin off a longer-term training intervention. Such intervention will clearly be dependent on the continued stability of the socio-political environment, which is at present quite unpredictable.

# **Puntland PV Training Report**

EAA –Conducted training course held in Bosasso between September 15<sup>th</sup> and 25<sup>th</sup>

## **0.0 Summary**

Over the period 14<sup>th</sup> to 25<sup>th</sup> September, training activities were conducted in Puntland by EAA consultants Mark Hankins (MH) and Daniel Kithokoi (DK), in conjunction with Omar Irbad of Horn Relief and the staff of ADRA. The activity involved preparation of training materials themselves, preparation of demonstration sites, in-class theory lectures and practical exercises in a workshop and in the field. 14 technicians from local companies that included cell phone companies, electrical shops and others, participated in the course. At the end of the activity, 4 demonstration PV lighting systems were installed in tea shops and establishments located strategically on the Bosasso-Galkayo road. All students were issued with course completion certificates.

## **1.0 Background**

- 1.1. 1.1 Early in the PPED project, solar electricity was identified as a technology with commercial potential to supply power to businesses and high income groups in off-grid areas. Businesses were contacted in several meetings and in one-on-one discussions, and invited to participate in activities with PPED.
- 1.2. 1.2 After numerous delays due to political problems, a training course was scheduled for September 2002.
- 1.3. 1.3 The training team, as mentioned above, included Mark Hankins (chief instructor), Daniel Kithokoi (practical instructor) and Omar Irbad (assistant instructor and translator). ADRA staff provided logistics and back-up.

## **2.0 Preparatory Activities**

- 2.1 2.1 Several weeks before the course, a preliminary trip was made by Bernard Osawa (EAA) to assist in selection of course participants. Students were selected in a process that involved application for the course and pre-testing to assess each student's knowledge of electricity and general math. ADRA's local office pre-selected applicant.
- 2.2 2.2 Training materials were prepared for the course. This involved translation into Somali of EAA standard educational material (see attached files). As well a variety of resource materials were put together (including magazines and handouts) to give the students information on the world-wide solar industry.
- 2.3 2.3 Toolkits. In order for solar electric technicians to be able to perform, they require a minimum of equipment. Toolkits were prepared for 12 participating technicians which included digital voltmeters, basic electrical tools (i.e. pliers, screwdrivers, etc.), writing materials and a training material pack which included the book "Solar Electric Systems for Africa". The students would only receive the tool kits if they successfully completed the course.
- 2.4 2.4 Sites selected and contracts with potential owners developed. The intention of the course was to provide students with skills that are as practical as possible. For this

reason, in addition to classroom and workshop activities, the course intended to give students experience in installing actual systems. Four interested buyers were selected in sites near Bosasso but off-grid (in Laag and Karen) agreements were made with each of the system buyers for them to keep the systems for a trial period.

- 2.5 Mounts and battery boxes were prepared for each of the selected sites by Horn Relief. As well, consumables (boards, cables, switches) for the course were prepared.
- 2.6 A training site was located at the OTP offices. It contained a classroom with white board and an area for conducting practical sessions with students.
- 2.7 Arrival of the consultants and final preparatory activities. The EAA consultants arrived one day before the course on the 15<sup>th</sup> September. On the 15<sup>th</sup> and 16<sup>th</sup>, they set up the training center, arranged materials. On the 16<sup>th</sup>, they visited and prepared the field sites for the installation of the equipment. Meetings were held with ADRA and the training team.

### **3.0 Classroom and Practical Activities**

- 3.1 The course proceeded as outlined in the table below. In general, theory activities took place in the morning and practical activities took place in the afternoon. Attendance was recorded each day; nearly all students attended class every day. Because of the short duration of the course (and the short time of the consultants in country), the students asked that the course be held on Friday the 20<sup>th</sup>, so work continued on Friday (with a short break for prayers).
- 3.2 Theory activities were conducted by Mark Hankins with the assistance of Omar Irbad. Omar Irbad translated as necessary, though most of the students could speak English. Several quizzes and homework activities were carried out a measure the progress of students on a day to day basis.
- 3.3 Practical activities were led by Daniel Kithokoi. All students were required to properly complete an "electric circuit board" which consisted of 12VDC switch, wires, bulb and junction.

**Table 1: Basic PV Installation Course Schedule**

| <b>Tuesday 17<sup>th</sup> Sep</b>  | <b>Wednesday 18<sup>th</sup> Sep</b>   | <b>Thursday 19<sup>th</sup> Sep</b>  | <b>Friday 20<sup>th</sup> Sep</b>  |
|---|--|--|--|
| <b>Day 1 PV Installation Course</b><br><b>AM 1</b><br><b>OR1:</b> Registration & Distribution of Training Materials <b>All</b><br><b>OR2:</b> Course Introduction <b>All</b><br><br><b>AM 2</b><br><b>OR 7:</b> Solar Energy and Community Development <b>MH</b><br><b>OR3:</b> PV Intro <b>OI</b><br><br><b>PM1</b><br><b>OR 11:</b> Intro to RE Sources <b>MH</b><br><b>1T</b> Overview PV Systems <b>MH</b><br><b>3T</b> The Solar Resource <b>MH</b><br><br><b>PM 2</b><br><b>2T</b> Basics of DC Electricity <b>Omar</b> | <b>Day 2 PV Installation Course</b><br><b>AM 1</b><br><b>Assessment Quiz</b><br><b>5T/P</b> Use of Voltmeter<br><br><b>AM 2</b><br><b>7T</b> Solar Cells & Solar Modules<br><br><b>PM 1</b><br><b>8T/P</b> Module Performance<br><br><b>PM 2</b><br>Wiring Practice Part I | <b>Day 3 PV Installation Course</b><br><b>AM 1</b><br><b>15P</b> Wiring Practice: Pt. II<br><b>Assessment Quiz</b><br><b>10/11T</b> Batteries Pt 1&2<br><br><b>AM 2</b><br><b>9P</b> Installation of Modules<br><b>17T</b> Charge controllers<br><br><b>PM 1</b><br><b>12P</b> Battery Demonstration<br><b>18T</b> Lamps and Lighting<br><br><b>PM 2</b><br><b>13T</b> Fuses<br><b>15P</b> Wiring Practice: Pt. II | <b>AM 1</b><br>Mounting solar mounts<br>Mounts preparation demonstration<br><br><b>AM 2</b><br>Solar modules demonstration<br>Types of solar mounts<br>Safety of solar mounts<br>Checking the practical boards<br><br><b>PM</b><br>Off   |
| <b>Saturday 21<sup>th</sup> Sep</b>   | <b>Sunday 22<sup>nd</sup> Sep</b>  | <b>Monday 23<sup>rd</sup> Sep</b>  | <b>Tuesday 24<sup>th</sup> Sep</b>   |
| <b>Day 5 PV Installation Course</b><br><b>AM 1</b><br><b>16T</b> Voltage drop, wire sizes<br><b>AM 2</b><br><br><b>PM 1</b><br><b>27T</b> Routine Maintenance<br><b>28T</b> Appliances<br><b>PM 2</b><br><br><b>29P</b> Lights & Appliances Practice<br><b>30T</b> Inverters and Voltage Converters   | <b>Day 6 PV Installation Course</b><br><b>PV Installation Course</b><br><b>AM 1</b><br>Preparation for System<br><b>14T</b> PV Circuits & Cable Layout Installation<br><b>AM2</b><br>Travel to Site<br><br><b>PM 1&amp;2</b><br>Site Preparation<br>Begin Installation     | <b>Day 7 PV Installation Course</b><br><b>AM &amp; PM</b><br>Installations of systems in Laag & Karen  | <b>Day 8 PV Installation Course</b><br><b>AM</b><br>Complete installations of systems in Laag & Karen Examination<br><br><b>PM</b><br>Exam<br>Course Evaluation<br>Course closing and provision of certificate by Hon. Mohamed of PSAWEN |

#### 4.0 Practical Installation Activities

- 4.1 Installations were carried out by students and teachers in 4 locations in Laag and Karen between the 22<sup>nd</sup> and 24<sup>th</sup> of September. As part of the training exercise, the students went through the planning work of the design and installation of the 4 systems. See attached drawings for details of each system.
- 4.2 The students were broken into 4 groups of between 3 and 4 students each, and were supervised by Omar Irbad and Daniel Kithokoi.
- 4.3 The systems were commissioned and turned over to the contracted owners on the 24<sup>th</sup> September.

#### 5.0 Final Marks

- 5.1 At the end of the course, the students were given a final theory exam. The Table 2 below shows the results of the students. Most students had satisfactory results. Most students had a good grasp of PV performance.

- 5.2 As a whole, where there was unsatisfactory performance it was related to language problems, use of tools and practical skills and general math skills. In general, older students (i.e. 20-30 year olds) had a much better education than younger ones.
- 5.3 The course was officially closed on the 24<sup>th</sup> September and a ceremony was officiated by PSAWEN representative Hon Mohamed.

**Table 2: Student Final Marks**

|    |                        | Quiz 1 | Quiz 2 | Practical Mark | Practical Speed | Installation Mark | Final Exam |
|----|------------------------|--------|--------|----------------|-----------------|-------------------|------------|
| SI | Name                   | 2/9/18 | 2/9/19 |                |                 |                   | 2/9/24     |
|    | Range                  | 0-5    | 0-5    | 0-3            | Rank (1-15)     | 0-5               | 12         |
| 1  | Abdulkadir Said Diriye | 5      | 4      | 1              | 13              | 3                 | 8          |
| 2  | Mohamud Abdullahi Isse | 4      | 1      | 2              | 5               | 3                 | 7.25       |
| 3  | Jama Ahmed Muse        | 5      | 5      | 2              | 7               | 3                 | 10.5       |
| 4  | Abdi Abdulkadir Aw-Ali | 2      | 3      | 1              | 8               | 4                 | 8          |
| 5  | Mohamed Abdi Musse     | 3      | 4      | 0              | 15              | 3                 | 7.25       |
| 6  | Ahmed Said Abdi        | 0      | 5      | 0              | 14              | 3                 | 8          |
| 7  | Abdirisak Ali Warfa    | 0      | 4      | 3              | 10              | 3                 | 8.25       |
| 8  | Mahad Rashid Yusuf     | 4      | 4      | 2              | 3               | 4                 | 8.5        |
| 9  | Liban Mohamed Yusuf    | 4      | 4      | 2              | 4               | 3                 | 7.5        |
| 10 | Abdulkadir Abdullahi   | 0      | 4      | 3              | 1               | 2                 | 5          |
| 11 | Mohamed Ahmed Mohamed  | 0      | 3      | 1              | 12              | 4                 | 5          |
| 12 | Yusuf Mohamed Jama     | 0.5    | 2      | 0              | 11              | 4                 | 5.5        |
| 13 | Liban Abdinur Hersi    | 1      | 4      | 1              | 6               | 3                 | 7.25       |
| 14 | Ibrahim Hared Isse     | 1      | 1      | 1              | 9               | 2                 | 4.5        |
| 15 | Osman Abdirahman Yusuf | NA     | 4      | 3              | 2               | 3                 | 9.5        |
| 16 | Jama Shire Samater     | NA     | NA     | 0              | NA              | 3                 | 6.5        |

## SOORANNADA SHS EE SALDHIG TUSAALAHA AH (SAMPLE BASIC SHS STANDARDS)

1. **Maroogsimaha:** Dhammaan maroogsimuhu waxay ahaan doonaan gudbiyeyaal maar ah oo tifaf badan ah. Jeeb-gudubka xarigga ugu yar ee la aqbali karo ee dhammaan mareeg-yaraha wuxuu noqon doonaa 2.5mm<sup>2</sup>. Xargaha hal-tiflaha ah lama aqbali doono.
2. **Mug-qaadka maayadda:-** Maayadda ugu sarreeya ee mareeg ma dhaafi doonto mug-qaadka qalabka ilaalinta qulqul-dhaafka ee ku xiran mareegtaas.
3. **Hoos-u-dhaca Voltage:-** Hoos-u-dhaca Voltage ee maroogsimaha ee u dhexeeya taxa PV iyo beekhaamiyaha ma dhaafi doono 0.24v (2% Voltage-ka magacaaban) marka la joogo maayadda ugu sarraysa ee cabbirka taxa. Hoos-u-dhaca Voltage ee u dhexeeya beekhaamiyaha danabaynta iyo dhammaan rararka ma dhaafi doono 0.6v (5% ee voltage-ka beteriga ee magaca ah). Voltage-yada, iyo hoos-u-dhacyada voltage waxaa lagu cabbiri doonaa dhammaan rararka ku xiran mareegta daaran..
4. **Qaab midabeed:** soo-jireenka soo socda ayaa loo isticmaali doonaan xarga-xirka laba-gudbiyaha maayadda qumman. Toganaha: Casaan, Tabanaha: Madow.
5. **Xirmooyinka Guntimaha iyo qaybiyaasha xagaleed:-**

Maroogsimaha waxaa la isku xiri doonaa iyadoo la isticmaalayo qaybiyaasha xagaleed ama isku-xirayaal duuban. Dhammaan xaglaha maroogsimaha waxaa la gelin doonaa gudaha sanduukh qaybiye xagaleed ama qafis kaasoo ah mid celin kara darroorta iyo habaaska oo u ah kuwo koronto-ma-gudbiye si sax ah.

6. **Badbaadiyaasha:** Badbaadiyaasha waxa loo xulan doonaa si aysan maayaddu ugu sarraysaa u dhaafin 80% mug-qaadka baadbaadiyaha. Badbaadiyaasha waxaa lagu xiri doonaa xarigga togan, waxaa weheliya, badbaadiyaashu waxay noqonayaan nooc si ballaaran loo helo. Badbaadiyaal kayd ah ayaa la dhigan doonaa.
7. **Furayaasha:** Tirada furayaashu waxay noqon doontaa mid le'eg tirada nalalka sida ka muuqata mareegaha hindisaha maraya. Dhammaan furayaasha waxaa lagu rakibi doonaa laguna adkayn doonaa dusha derbiyada joog 1.5m ka sarreeya sagxadda kebbisan. Dhammaan furayaashu waxay u muujin doonaan xaaladdooda DAARAN/DAMSAN si cad waxaana habboon in si gaar ah loogu talagalay maayaadda qumman ama ku cabbiran in aan ka yarayn 10A hadii qalab maayad talantaalli (AC) 240V la isticmaalo. Derbiyada dhoobada ah furayaasha waxaa lagu rakibayaa sallaxyo qori ah.
8. **Bareesooyin-dheddigga:** Bareesooyin-dheddigga maayadda qumman (DC) ee sooranaha ah oo keliya ayaa loo isticmaali doonaa dhammaan shaxannada, wax kaloo bareesooyin-dheddig ah lama aqbali doono.
9. **Xarga xirka iyo maroogsin xirka:** Maroogsin xirka dusha ku rakiban waxaa la xiri doonaa iyadoo lagu isticmaalayo gijjiyaal qumman meelo habboon si looga hortago debec (25sm dhegaatiyo). Maroogsin xirka gudaha ee muuqdaa wuxuu noqon doonaa mid si qurux leh u

dhisan, kama qaalloocan doono lignaanta ama jiiftada in la baajin waayo mooye. Guryaha derbiyada dhoobada ah leh, maroogsimaha, nalalka ama bareesooyin-dheddigga waxaa lagu giijin doonaa dhis alwaax ah oo ah mid sugan oo adag. Daldaloollada ka dhex samaysma agabka saqafka laga sameeyo ayaa la iska ilaalinayaa meeshii suuragal ah. Haddii ay jiraan daloollada caynkaas ahi waa la lingaxi doonaa lingax aan cimilo-gooreedda soo dayn si looga hortago darroor. Xargaha dhex mara daloollo ku yaalla saqafka waxaa lagu ilaalin doonaa galal ka xigsada dhaawac suuragal ah oo ka yimaada geesaha (qarka) fiiqan (wax jara).

10. **Beteriyada:-** Isku xirka gudaha ee beteriya waxaa la samayn doonaa iyadoo la isticmaalayo xirmooyin guntimeed ku qummaan. Xarga xirka xirmo-guntimeedyadu wuxuu ahaan doonaa mid sugan. Haddii ay suuragal tahay alxamid ayaa habboon in la isticmaalo si lagu giijiyo xargaha xirmo-guntimeedyada ishaysta. Xirmo-guntimeedu waxay noqondoonaan kuwo nadiif ah oo si giigsan loo xiray.
11. **Sanduukha Beteriga:-** Beteriga soolarka iyo mayaliyaha danabaynta waxaa lagu qafili doonaa gudaha sanduukh qori ah, kaasoo noqon doona mid uu gaari karo qofka xirxirayaa. Tani waxay tahay in la hubiyo in aan beteriya loo isticmaalin si khalad ah. Sanduukha beteriya isagana waxaa la dhigi doonaa meel hawo-mareen hagaagsan leh oo gaaritaankeedu adag yahay. Si kastaba ha ahaatee muujiyaasha beekhaamiyaha danabayntu waxay weli ahaan doonaan kuwo muuqda.
12. **Rakibaadda safka PV:** Rakibaadda dhalada waxaa laga samayn doonaa bir-sulub; waxaa lagu ranjiyi doonaa dhaxal-ka-hortag ah, laguna rakibi doonaa saqafka. Rakibaaddu waxay noqon doontaa hab uu dhaawaca ugu yari ku gaari doono saqafka. Dhammaan daloollada ka dhasha hawshaas waxaa lagu gufayn doonaa lingax biyo-kama-dhibcaan ah si looga hortago habayga. Xirmooyinka dhalooyin waxaa lagu rakibi doonaa meel sare oo u dhexaysa 10°-15° oo eegaya waqooyi ama koonfur oo ku xiran goobta oo keliya.
13. **Kaydka:** Qalabka u keydsan dayactirka waxaa u keeni doona macaamiisha shirkadda dab-gelinta. Kuwan waxaa ku jiri doona ugu yaraan hal (1) guluub oo kayd ah, badbaadiyaaal, ama xargaha badbaadiyaasha iyo biyo sifaysan.
14. **Waxbarista adeegsadhaha kamadambaaysta ah:-** Adeegsadhaha kama-dabaysta ah waxaa loo tababari doona kawsha saldhigga ah ee ugu yar iyo dayactirka habdhiska la rakibay inta lagu dhex jiro ama isla markaba ka dib hawsha dabgelinta.

**LAYLIYADA GACANKA QABASHADA EE XARGA XIRKA LOOGU**  
**TALAGALAY HABDHISYADA KORONTO EE SOOLARKA YAR YAR.**  
**(PRACTICAL EXERCISES FOR SMALL ELECTRIC SOLAR SYSTEMS)**

Hawlahan waxaa loo hindisay in ardayga loo baro si hordhac ahaan ah yeelka, farsamooyinka iyo mareegaha lagu isticmaalo habdhisyada koronto ee yar yar ee soolarka ee ka jira degaannada. Waxaa loo hindisey in lagu fuliyo guddiyo shaqo iyadoo kormeer lagu hayo. Ka soo ururinta

qalabka ee bakhaarka. Hubinta mareegta iyo layliyada qoraalka ah: waxay qayb ebyan ka yihiin hawl kasta.

**DIYAARINTA:-** ka hor inta aan shaqo gacmeed la qaban, waxaa habboon inuu baruhu:-

- a) Qaybiyo warqaddaan iyo muqul ka mid ah HABRAACYADA TIJAABADA:
- b) U sharxo si guud ahaaneed waxa ay layliyadani koobayaan.
- c) Soo bandhigo farsamooyinka xarga-xirka sida u-jarista maroogsimaha dhererka qumman iyo samaynta af-xarigyo sax ah.
- d) Ka tala-bixiyo agaasinka (isku-xigista) hawlgallada kala duwan loo qabanayo:
  - i) Ku-dhejinta yeelka ee sallaxyada.
  - ii) Dhigista maroogsimaha.
  - iii) Xirista guntimaha ee kama dambaysta ah.
  - iv) Tijaabooyinka iyo
  - v) Layliyada qoraalka ah.

Mareeg soo-bandhigid dhammaystiran ayaa habboon in la helo si ay baraha iyo ardaygu u tixraacaan.

**HAWSHA KOWAAD.** Hawshani waxay u baahan tahay in uu ardaygu xarga-xiro mareeg sahlan oo ka kooban fadhi nal guluub ah, qaybiye xagaleed ama wax u dhigma iyo fure (eeg shaxanka 1). Dhammaystirka ka dib waxaa habboon in uu baruhu hubiyo in dhammaan shaqada iyo guntimuhu ay yihiin kuwo gaarsiisan heer sooranno la oggolaan karo. Shaqada aan la oggolaan karin waa in dib loogu noqdaa.

isticmaalka HABRAACA TIJAABADA, tijaabooyinka caabbiga ma-gudbinta (1) iyo xiriirka/furista (2) waxaa habboon in uu soo bandhigo uuna sharxo baruhu. Ka dib ardaygu waxaa habboon inuu fuliyo keligiis/geed. Haddii uu sax yahay ka dib ku xir mareegta il-awoodeed oo soo bandhig.

LAYLIGA QORAALKA AH wuxuu u baahan yahay in uu ardaygu ka shaqeeyo tijaabooyinka mar labaad keligiis/geed uuna qoro natiijooyinka, uuna soo saaro naqshad mareeg iyo xarga-xir shaqo labadaba.

HAWSHA LABAAD tani waxay u baahan tahay ku darista fadhi nal dhuumeed, qaybiye xagaleed ama wax u dhigma iyo fure lagu daro mareegtii lagu sameeyey hawsha kowaad (arag shax 2). Guntimaha kama dambaysta ah ee nalka dhuumeed MA AHA in la sameeyo. Dhammaystirka ka dib baruhu waxaa habboon in uu hubiyo in dhammaan shaqada iyo guntimo-afeedyada ay yihiin heer sooranno la oggolaan karo. Shaqada aan la oggolaan Karin waa in dib loogu noqdaa.

Isticmaalka HABRAACA TIJAABADA Ardaygu waxa habboon in uu fuliyo tijaabooyinka caabbiga ma-gudbinta (1) iyo xiriirinta/furista (2) baraha oo kormeeraya. Haddii ay sax tahay mareegta waxaa habboon in lagu xiro il-awoodeed, baruhuna waxaa habboon in uu soo bandhigo oo uu fuliyo tijaabada danab sooca mareegta (6), taasoo kadib ardayga ay habboon tahay in uu fuliyo keligiis/geed.

LAYLIGA QORAALKA AH wuxuu u baahan yahay in uu ardagu fuliyo tijaabooyinka mar kale oo uu qoro natiijooyinka iyo sidoo kale soo saarsita naqshado mareegeed iyo xarga-xir ee shaqada.

HAWSHA SADDEXAAD Arrintani waxaa ku jira xarga-xirka (i) Bareeso-dheddig iyo bareeso lab, iyo (ii) Bareeso dheddig maayad talantaalli (AC) iyo bareeso lab ku socota hab ku habboon in lagu isticmaalo habdhis maayad qumman(DC).

Sidii hore oo kale, baruhu waxaa habboon in uu hubiyo in dhammaan shaqada iyo guntimaha afeed ay yihiin ilaa heer sooranno la oggolaan karo.

- i) Bareeso- dheddigga mayaad qumman ah (DC) iyo bareeso labka waxaa habboon in la xarga-xiro iyadoo la raacayo HABRAACA TIJAABO ee soo socda, tijaabooyinka loogu tala galay caabbiga ma-gudbinta (1) iyo xiriirinta/furista (2) la fuliyo. Iyadoo la isticmaalayo cabbire caabbi (ohmmeter) waxaa habboon in la hubiyo in xarigga toganaha ee bareesada lab gala uu ku xiran yahay biinka togan ee bareesada lab, in xarigga tabanaha ee bareesada dheddig uu ku xiran yahay biinka tabanaha ee bareesada lab iyo in aysan jirin wax mareeg-gaabad ah ee qafiska bareesada lab. Kadib mareegta waxaa habboon in lagu xiro il awoodeed iyo in danabka (6) laga tijaabiyo afka bareeso-dheddigta iyo iyadoo ay bareesada labi ay meesheedii fadhido. Haddii ay sax tahay bareeso-labta ayaa ka dib si ku meel gaar ah lagu xirayaa qalab koronto si loo muujiyo in ay shaqaynayso.
- ii) Baruhu waxaa habboon in uu sharxo sababta bareeso-dheddigta (AC)-da ah iyo bareeso-labta mar marka qaarkood loo isticmaalo habdhisyada DC-da ah iyadoo la caddaynayo in ayan ahayn dhaqan fiican haddii doorsi la heli karo. Caqabadaha waxaa habboon in la tilmaamo. Waxaa kaloo habboon in la sharxo in xarigga nool (Live) -L- loo isticmaalo togane ahaan waayo wuxuu sidaa furayaasha iyo badbaadiyaasha, iyo in dhexdhexaadka (neutral) -N- loo isticmaalo tabane ahaan. Xarigga dhulka (Earth) waxaa isagana lagu xiraa biinka dhulka ee bareeso-labka, loona daayaa isagoo adag. Soo-jireennada qaabka midabbada ee xargaha AC waxaa iyana habboon in la sharxo oo gudbiyaha buluugga ahna laga helo madow. Markii mareegtu ebyanto, tijaabooyinka ayaa habboon in laga qaado caabbiga ma-gudbinta (1) iyo xiriirinta/furista (2). Iyadoo la isticmaalayo Ohmmeter. Bareeso-labta waxaa habboon in la baaro danabkeeda saxda ah iyo in ay jirto mareeg-gaabad. Sidoo kale soo-bandhig sida xiriirinta xarigga dhulka loo tijaabiyo. Kadibna ku xir isha awoodda oo tijaabi (6) xagga bareeso-dheddigta afkeeda iyo bareeso-labta oo booskeedii fadhida. Haddii tani sax tahay, bareeso-labta waxaa si kulmeel gaar ah loogu xiri karaa qalab koronto si loo muujiyo in uu shaqaynayo. Sharrax in xarigga dhulka caadiyan loogu xiro qalfoofka macdanka ah ee qalabka koronto ayna habboon tahay in lagaga awdo gudbiyaasha togane iyo tabane labadaba ugu yaraan 250,000 ohm. Haddii ay qumman tahay soo bandhig.

LAYLIGA QORAALKA AH ee qaybaha i) iyo (iii) ee hawlahaan waxay ka kooban yihiin ardayga oo fuliyo tijaabooyinka keligiis/geed, isagoo qora natiijooyinka iyo isagoo soo saara naqshad xarig-xir ee labada mareegoodba,

Dhammaaystirka saddexda hawlood oo dhan ka dib, mareegaha waa in uu furfuraa ardaygu, laguna celiyaa bakhaarka.

**HABRAACA**  
**TJIBAABINTA/HAWLGELINTA EE HABDHISYADA KORONTO EE SOOLAR EE**  
**12/24V EE MAAYADDA QUMMAN (DC).**

(TESTING/COMMISSIONING PROCEDURE FOR 12/24 SOLAR ELECTRIC SYSTEMSV DC)

Jadwalkan tijaabooyinka ah, waxaa iska leh habdhisyada koronto ee soolarka yar yar ah oo ku siman 100wp kuna shaqeeya 12/24V DC oo keliya, kumana habboona dabgelineha waaweyn – Cabbire ujeeddo-badane leh baaxadaha soo socda wuxuu ku filan yahay dhammaan tijaabooyinka la qeexay:-

Caabbi: 0-250, 000 ohm.  
Voltage: 0-100V DC oo leh muujin danab.  
Maayad: 0- 10 amp.

Tijaabooyinka waxaa habboon in loo qaado nidaamka (isku xigidda) loo dejiyey, haddii ay hal tijaabo bixiso natiijo tabane ah, arrintani waxay tirtiri kartaa natiijooyinka tijaabooyinkii hore, kuwaasoo loo baahanayo in la fuliyo mar kale.

Tijaabooyinka inta aan la fulin ka hor, dhammaan xarga-xirka waxaa habboon in la dhammaystiro. Xirista kama dambaysta ah ee dhalada, beteriga iyo rarka ku xiran mayaliyaha

danabaynta, iyo xirista kama dambaysta ah ee nalalka dhuunta ah iyo rarka u nugul danabaysanka ee ku xiran irridaha mareegta.

#### 1) CAABBIGA MA MA-GUDBINTA

Tijaabadan laga qaado dhanka rarka ee mareeg kasta oo ka mid ah dabgelinta gooni ahaaneed waxaa loo fuliyaa in la go'aamiyo in magudbinta u dhexaysa gudbiyaashu ay saxan tahay iyo in aan wax mareeg-gaabad ahi dhicin xarga-xirka dhexdiisii.

Tijaabada waxaa la qaadaa iyadoo ay dhammaan furayaashu DAARAN joogaan, dhammaan rararku xiriir furan yihiin, fadhiyada nalalka dhuumeed ay xiriir furan yihiin oo ay nalalka guluubbadu DANSAN joogaan. Cabbiraha-ujeedo badane waxaa la geeyaa 0-2500 ohm.

Haddii akhriska la bixiyaa uu yahay mid ka korreeya 200,000 ohm, caabbiga magudbintu waa saxan yahay. Haddii uu akhrisku ka yar yahay 1 ohm waxaa jira mareeg-gaabad, badbaadiyaashuna waa ay qarxi lahaayeen haddii mareegta lagu xiriirin lahaa isha awoodda. Akhriska u dhexeeyaa labada qiime waxay muujiyaan in ay jirto dhibaato kale ay tahay in la baaro. Tusaale ahaan, magudbinta khaldani waxay jilcisaa rarka xiran. Kadib marka la saxo tijaabada waa in lagu celiyaa.

Figure 1:

#### 2) XIRIIRINTA MAREEGTA & FURAYNTA.

Tijaabadan dhanka rarka ee mareeg kasta ee dabgelinta oo goonnideeda ah waxaa loo fuliyaa in la go'aamiyo in dhammaan mareeguhu ay xiriirsan yihiin markii la furo, iyo in furayaashu ay shaqaynayaan iyo in furayaasha saxda ahi ay ku xiran yihiin fadhiyada nalalka/qalabka koronto ee saxda ah.

Tijaabada waxaa la fulinayaa iyadoo ay furayaashu DAARAN iyo DANSAN joogaan, iyadoo ay irridaha nugul ee nal-dhuumeedka iyo danabayntu ay mareeg-gaabad yihiin, iyo iyadoo ay irridaha nalalka kulka oo guluubbadu ku jiraan ama ay mareeg-gaabad yihiin (eeg shax-2)

Cabbiraha ujeedo-badane waxaa la geeyaa qaybta caabbiga, ama "gambaleelka xiriirinta" haddii uu jiro.

Ku bilow furayaasha oo dansan. Akhrisku waa in uu ka weynaadaa 200,000 ohm. Dabadeed u aad fure kasta gaar ahaan tiisa oo daar. Gambaleelku waa inuu yeeraa marka ay mareegtu daaran tahay. Haddii gambaleel aan la isticmaalayn, akhriska furayaasha mayalinaya irridaha mareeg-gaabad waxa habboon in uusan ka yarayn 1 ohm, kuwa uu saaran yahay rararka nalal kuleed ee guluub ahna ka yaraan 50 ohms. Iyadoo ku xiran awoodda watt/caabbiga guluubka. Ka dhig furaha mid DANSAN oo u gudub furaha xiga.

Haddii bareeso-dheddig irriddeedu aysan fure lahayn, waxay u baahan doontaa in la mareeg-gaabiyo si loo jilo furayntii.

Hubi in aad XIRIIR-FURTO DHANMMAAN MAREEG-GAABANAYAASHA kadib marka aad fuliso tijaabadan, oo ka dhig dhammaan furayaasha kuwo DANSAN

Figure 2

### 3) DHALADA & XARGA-XIRKA DHALADA.

Tijaabadani waa in ay go'aamiso in ay dhalada iftiin-koronto shaqaynayso iyo in loo xargo-xiray si sax ah. Saddex tijaabo oo kala gooni ah ayaa u baahan in la fuliyo.

VOLTAGE-KA MAREEGTA FURAN EE DHALADA (VOC) Cabbiraha waxaa habboon in la geeyo qaybta Voltage-ka DC (ugu yaraan 100v DC). Wax soo saarka Voltage ee gudbiyaasha ku xiran dhalada waxaa habboon in la cabbiro (eeg shax.3). In ku dhow 20V DC ayay tahay in laga filo hal dhalo ama laba dhalo oo barbarro ah, 40V DC labada dhalo ee taxanaha ah.

DANAB-SOOCA DHALADA Iyadoo uu cabbiruhu weli joogo qaybta heerka voltage baar in xarigga cabbiraha ee casi uu ku xiran yahay gudbiyaha cas iyo in uu xarigga cabbiraha ee madow uu ku ixran yahay gudbiyaha madow (eeg shax.3). Akhriska voltage-ku waxaa habboon in uu yahay togane. Yacni uusan ku lahaan wax sumad tabane ah hortiisa, ama ay ka hormarto sumad ku dar ah (+). Haddii ay sidan thay danab-soocu waa uu saxan yahay. Haddii akhriska voltage-ka ay ka horrayso sumad tabane ah (-) dhalada waxaa loo xiray si aan sax ahayn. Samee labada tijaabo mar kale haddii dib-u-xarig xir loo baahan yahay.

Figure 3

MAAYADDA MAREEG-GAABADKA EE DHALADA (ISC) Cabbiraha waxaa habboon in la geeyo in uu cabbiro maayada baaxad u dhexaysa 0-10 amp (arag shax.4).. Maayadda mareeg-

gaabadku waxay ku xirnaan doontaa jaan-gooyada awoodda ee dhalada iyo heerka faquuq ee soolarka. Haddii guutimaha xiriirinta ee xargaha cabbiraha ee soo gala cabbiraha ay tahay in la beddolo, hubi in aad dib ugu celisid meelahoodii hore.

Figure 4

#### 4) BETERIGA & XARGA-XIRKA BETERIGA.

Labadan tijaabo waxa loo sameeyaa in la go'aamiyo in uu beterigu habaysan yahay iyo in si sax ah loo xiray.

VOLTAGE-KA BETERIGA ka fur canannada ma-gudbiyaha ah afafka gudbiyaasha ka yimaada beteriga. Gee cabbiraha qaybta voltage-ka AC oo baar in uu jiro waxsoo saar voltage ka imaanaya beteriga (eeg shax.5). Arrintani waxay kaloo muujinaysaa in uusan badbaadiyuhu si lama filaan ah u qarxin muddada lagu dhex jiro shaqada dab-gelinta.

Haddii uu akhrisku muujiyo in uu beterigu joogo xaalad danab ee hoose, kula tali adeegsadaha in uu u oggolaado in uu danabaysmo ka hor inta uusan isticmaalin habdhiska.

DANAB SOOCA BETERIGA marka xarigga cas ee cabbiraha lagu xiro gudbiyaha cas oo xarigga madow ee cabbiraha lagu xiro gudbiyaha madow, akhriska voltage-ku waxaa habboon in uu ahaado togane (arag shax.5)., haddii kale, xarga-xirku waa mid aan sax ahayn.

Figure 5

#### 5) GUNTIMAHA KAMA-DHAMMAYSTA AH EE SOO GALA MAYALIYAHA DANABAYNTA .

Hadda adigoo isticmaalaya buug-yaraha mayaliyaha danabaynta, isku xir beteriga, rarka iyo dhalada iyagoo isugu xiga sida muuqata. Haddii uusan jirin wax buug-yare ahi, isugu xir isku-xigidda soo socota: horraysii beteriga, ka dibna dhalada ama rarka. (Haddii sabab uun darteed ay noqoto in aad kala furtid mar kale, uu samee isku-xigidda ah; marka hore dhalada, kaddibna rarka ama beteriga.

## 6) DANAB SOOCA IRRIDAHA MAREEGTA RARKA .

Tani waxa loo sameeyaa in la go'aamiyo in dhammaan irridaha ay khusayso loo xarga-xiro danab-sooca saxda ah. Qalabka koronto qaarkood ma shaqaynayaan haddii uu danab-soocu yahay mid aan sax ahayn, qaar kalena WAABA DHAAWACMI KARAAN. Habdhisyaada yar yar ee habraaca tijaabadan loo hindisay tijaabooyin ayaa loo baahanayaa in la fuliyo una badan gudbiyeyaasha lagu xirayo nal- dhuumeedyada iyo irridaha bareeso-dheddigyada.

Marka hore hubi in aadan ku dhaafin wax hoggaanno mareeg-gaabad ah meeshoodii iyo in ay dhammaan furayaashu dansan yihiin. Kadibna daar furaha guud ee ku yaal mayaliyaha danabaynta haddii uu jiro.

IRIDAHA NAL-DHUUMEEDYADA iyadoo uu cabbirahaagu weli joogo qaybta tijaabada voltage-ka ee ay dhammaan gudbiyeyaasha casi togane yihiin ayna dhammaan gudbiyeyasha madoobi tabane yihiin, ka dhig irrid kasta mid daaran, tijaabi, ka dhig mid dansan oo u gudub midda xigta ilaa aad tijaabisid dhammaan irridaha (arag shax.6).

Figure 6

IRRIDAHA BAREESO-DHEDDIGTA Danabsooca dhammaan iridaha bareeso-dheddigta waxaa kaloo habboon in la tijaabiyo(eeg shax.7). Bareeso-dheddigyada DC-ga ah daloolka weyn ee bareeso-labku galo waa kan toganaha ah, kan yarina waa tabanaha. Bareeso-dheddigyada qaraaxadda sigaarka ee baabuurka, barta dhexe waa toganaha iyadoo qafisku uu yahay tabane. Haddii bareeso-dheddigyo AC ah la isticmaalayo, daloolka nooli waa toganaha, iyadoo daloolka dhexdhexaadka ahi uu yahay tabanaha.

Haddii aad isticmaalaysid bareeso-lab xarga-xiran si aad u fulisid tijaabooyinka, hubi in uu bareeso-labku u xargo-xiran yahay si sax ah.

Markii tijaabooyinkan la fuliyo oo natiijooyinka saxda ah la helo, u gudub in aad xirto dhammaan fadhiga nal dhummeedyada. U fiirso in qaabka midabaynta ee gudbiyaasha ka imaanaya nal-dhummeedyada mid ka mid ah laga yaabo in uusan ahayn casaan/togane iyo

madow/tabane, sidaa darted hubi adigoo baaraya qoraal-sannadeedka ku yaala fadhiga nal-dhummeedka.

Figure 7

#### 7) BAARITAANKA MUQAAL EE KAMA-DAMBAYSTA AH.

Baar in dhammaan nalalku ay shaqaynayaan iyo in dhammaan daloollada bareeso dheddigtu ay shaqaynayaan iyadoo la gelinayo qalab koronto lagana dhigayo mid DAARAN.

Baar in dhammaan qalabka korontadu ay shaqaynayaan, haddii uu jiro gudbiye voltage baar in uu bixinayo baaxadda saxda ah ee voltage-yada. Baar in LEDs-ka iyo muujiyaasha kale oo ku yaal mayaliyaha danabaynta ay shaqaynayaan.

Muqaal ahaan baar dhammaan qaybaha muuqda ee dab-gelinta oo hubi in wax ku filan ee qalab-kayd (dhuumo, guluubyo, biyo sifaysan) ay meeshoodii fadhiyaan. Hubi in aan wax qalab ah ama agab ah aan gadaal loogu dhaafin meesha. Kadibna, u sharax qofka adeegsada sida loo isticmaalo habdhiska iyo sida loo fuliyo dayactir joogto ah. Ku dhaaf ogeysiis mayaliyaha danabaynta adigoo u sheegaya qofka isticmaalaya sida loo sameeyo xiriir haddii wax dhibaatooyin ah soo baxaan

### **TIJAABADA HOOS-U-DHACA VOLTAGE:-(TESTING FOR VOLTAGE DROP)**

Tijaabadan waa in la fuliyaa, dhammaan tijaabooyinka kale ka dib iyo baarista muuqaal ee kama-dambaysta ah. Ujeeddada tijaabadu waa in la xaqiijiyo in uu hoos-u-dhaca voltage-ku ka yar yahay 5%. Tijaabada waxaa loogu fulinayaa goonni ahaan mid kasta oo ka mid ah mareegaha rarka sida iyadoo ay dhammaan nalalka yihiin kuwo DAARAN ayna dhammaan rararka yihiin kuwo ku xiran.

Figure

AKHRIS VOLTAGE AYAA LAGU SAMAYNAYAA BETERIGA (VB) AKHRIS VOLTAGE AYAA LAGU SAMAYNAYAA AFKA MAROOGSINTA UGU DHEER (VL).

KA DIBNA  $VB - VL = VD$

VD WAXAA HABBOON IN AY KA YAR TAHAY 5% VOLTAGE-KA HABDHISKA.

MARKA LA EEGO HABDHIS 12V AH, TANI WAXAY KA YAR TAHAY 0.6V, MARKA LA EEGO HABDHIS 24V AH, TANI WAXAY KA YAR TAHAY 1.2V.