



**P**aper  
**R**ecycling  
**S**kills  
**P**roject

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## Request for funding

### Compressed Paper / Sawdust Bricks and Energy efficient Bio-mass Stoves

#### PRSP – A brief history

PRSP has been registered in The Gambia as a charitable organisation since 2001. Our main activity so far has been to collect waste materials - paper, card-board and fabrics. The waste paper is turned into hand made paper and this in turn is used to produce Art Gifts such as fabric covered note books, greeting cards and writing paper as value added products. These are sold to residents and tourists through our own shop or various retail outlets and hotels.

The funds raised are then used to buy exercise books, pens and pencils to be distributed free to schoolchildren all over The Gambia. To date PRSP has distributed over 45,000 free exercise books benefiting over 20,000 students and making a significant contribution to further education in the country.

Our working principles can be summarised by the 3 *E*'s:

From Wastepaper  
to Arts Gifts  
to Exercise Books

protecting the *E*nvironment  
providing *E*mployment  
supporting *E*ducation

## **The present:**

Thanks to two successive grants in 2005 and 2006 from the Plymouth Banjul Challenge PRSP has been able to purchase its own premises.

In March 2007 the Paper Mill became the first occupant in the **PRSP Craft Village**. Another 7 units are available for a variety of artists and artisans to join The Gambia's first ever establishment where traditional crafts are taught and preserved, new crafts researched and practised and the resulting products exhibited and marketed in an effective way. Additional facilities will include a conference / teaching centre and a restaurant.

Arts and Craft are an important element of the cultural heritage of The Gambia. They also play an essential role in the economic development of the country by providing goods for sale here and abroad. The ever increasing tourism sector will also benefit greatly from an institution where artists, artisans and craft people can creatively interact and produce goods of interest and quality.

## **Main Objectives:**

1. All profits generated by the RPSM Craft Village are converted into free exercise books for the School children of The Gambia.
2. To establish a Craft learning centre to help preserve the cultural heritage of The Gambia for future generations by holding workshops for local students and communities.
3. To establish links with foreign colleges and universities and to host student workshops teaching the importance that Arts and Craft play in assisting The Gambia to achieve economic development in a sustainable and responsible manner.
4. To support and develop the local community by providing employment opportunities, assist local infra-structure and use the centre as a focal point for building local capacity.

## **The Project:** **Compressed Paper Bricks & Fuel efficient stoves**

When collecting waste paper and card-board a high percentage of this waste is not suitable for producing our standard products. We have looked for some time to utilise this waste so it does not have to be disposed off in the normal “local” way, which is either back into a landfill or even burning.

One of our staff members was looking into ways how to harness the energy released by burning and some internet research has identified a number of projects. One such project has been in existence in South Africa since the mid 1980’s turning waste paper, mixed with sawdust, into compressed paper bricks. These are then used to replace charcoal or firewood as an alternative heat source for cooking in fuel efficient stoves.

We have carried out some test pressing and burning of bricks since November 2007 on an experimental scale and we now feel confident that a similar scheme can be operated here in The Gambia by PRSP. This would enable us finally to recycle all the waste we collect and expand our operation even further. All profits generated would of course go towards our ultimate objective of assisting education within The Gambia.

### **Objectives:**

1. To re-use or re-cycle as much paper and card waste created in a way beneficial to the community and the environment.
2. To benefit the community by introducing a new source of affordable cooking fuel and more fuel efficient cooking stoves both on a commercial and community level.
3. To benefit the environment by:
  - a) reducing paper and card waste both on a bulk level and within the community’s surroundings.
  - b) reducing the use of charcoal and wood by providing an alternative fuel source.

## **Considerations, restrictions and areas of concern:**

### **1. Existing Capacity**

Within the current operation at PRSP we operate at full personnel capacity. Any testing and research so far has been carried out and financed by our Craft Village Manager in his spare time on a “domestic” scale. As the Craft Village Project is presently at a conceptual stage he would act as the local co-ordinator for this particular initiative.

### **2. Application of scheme**

There are two potential uses for compressed paper / sawdust bricks.

- a) **Commercial:** For use in larger kitchens with integrated stoves and ovens – schools, hospitals, bakeries, local restaurants etc.
  - i. Some test burnings have been carried out in commercial stoves with very satisfying results. The traditional Gambian institutional stove is a brick build low-tech version of a rocket stove. Air flow for efficient burning or heating the pot is not controlled or regulated – this could be an additional area of research and improvement by applying a few basic construction principles.
  - ii. PRSP would be the main producer of bricks and supplier to the commercial market.
- b) **Community based:** For use in domestic, movable stoves for mainly outdoor use.

The traditional Gambian domestic stove is totally unsuited for using our new product as it lacks air flow control and a heating chamber able to utilise secondary combustion. The stove is used in two ways:

- i. **Charcoal** – this is placed into the top fire bowl and ignited. Only when its “fire” is self sustaining the cooking pot is placed over the charcoal – a great amount of energy is lost in the initial stages alone.
- ii. **Fire wood** – this is placed into the bottom fire chamber through a small opening and uses only primary direct heat to heat the upper bowl which in turn heats the pot – again a large amount of energy is wasted.
- iii. Small scale community based brick producers could be established to meet demand in the surrounding areas.
- iv. A prototype of a fuel efficient domestic stove has been build by a local artisan and tests have been satisfactory.

### **Conclusion:**

A dialogue has to be established about introduction of alternative stoves with organisations elsewhere which have already gone through this learning process. If funding can be made available a continuous training programme has to take place introducing locally manufactured suitable stoves for use with paper bricks but also more efficient use of other bio-fuel sources.

## **Proposal:**

We recommend to allow a 3 months research period to evaluate the feasibility of introducing this new technology into The Gambia on a large scale. Whilst it is evident that sufficient demand exists a number of actions need to be taken to verify this and justify the investment needed.

### **1. Secure Government Co-operation.**

Contact has to be established with the relevant Government departments to gain assistance and co-operation in implementing the scheme:

- Dep. of State for Energy
- Dep. of State for Forestry and the Environment
- Dep. of State for Agriculture
- Dep. of State for Health and Social Welfare
- Dep. of State for Fisheries and Natural Resources
- Dep. of State for Higher Education, Research, Science and Technology
- Dep. of State for Finance and Economic affairs
- National Environment Agency
- Gambia Technical Training Institute

### **2. Secure Stakeholder co-operation.**

#### **a) Potential suppliers of raw materials:**

Sensitise potential main suppliers, establish a workable supply chain and research quantities available.

- Kanifing Municipal Council
- Banjul Municipal Council
- Metro Trash – main private refuse collector
- Hotel Association
- ASSET
- Responsible Tourism Partnership
- Tour Operators Association
- Banks
- Insurance Companies
- Newspapers
- Printers
- Major Institutions – EU, UNDP, Embassies
- Supermarkets
- Timber yards
- Furniture manufacturers

## **b) Potential customers**

Sensitise potential commercial customers, establish demand and fuel use within the Greater Banjul area.

Hospitals

Schools

Bakeries

Hotels

Afra restaurants and other entertainment establishments

Institutional staff kitchens

## **3. Community sensitisation, involvement and feedback**

It is always hard to introduce new technology into the community to replace a system that has worked for a long time. The best way is to demonstrate the benefits to the community in a real life situation on a trial basis so people can experience the working of the new stoves and fuel and the resulting benefits themselves after initial training. Constant monitoring and data collection will be necessary.

50 Vesto stoves could be imported from New Dawn Engineering in Swaziland and a small brick production base could be established at the PRSP Craft Village.

## **4. Consultation and evaluation**

Engage the services of a consultant conversant with the intended set-up to advise on technology and to evaluate the research project with a view to initiate full introduction of the scheme.

## **5. Resources needed**

### **a) Personnel:**

#### **Internal:**

- 1 Project co-ordinator
- 1 Project assistant
- 2 Community training and liaison officers
- 3 Brick manufacturers

#### **External:**

- 1 Consultant for practical and technical advise and evaluation.

### **b) Equipment**

to produce 250 kg bricks / week

- 2 Brick making moulds with 4 base plates
- 1 Moulding table
- 1 Pressing table
- 1 Cement mixer
- 2 Wheel barrows
- Hand tools
- Drying boards
- 65 20ltr paper soaking containers
- 500 Material collection sacks
- 1 Set of scales
- Buckets and bowls
- 50 Vesto stoves ( imported )

## **Long term benefits in terms of Carbon Offset**

### **1) Introduction of compressed paper / sawdust bricks.**

- a) After the 3 months research period we are aiming to establish an initial production capability of at least 150 metric tonnes / year, 2880 kg / week.
- b) Energy content of bricks is similar to wood at approximately 16 mj/kg, resulting in a yearly output of 2.4 million mj replacing wood and / or charcoal usage.

### **2) Introduction of fuel efficient domestic Vesto stoves.**

- a) Tests carried out by and on behalf of New Dawn Engineering have shown the Vesto stove to be 3 times as efficient as an open fire stove similar to what is in use in The Gambia at present.
- b) Consequently only 1/3 of the fuel currently needed – be it wood, bricks or any other material – would be used.

### 3) **Transportation of fuel**

At present most fuel wood and charcoal is transported over long distances from the provinces to the Greater Banjul area. All our supplies would be sourced in the area of production and consumption achieving a saving of vehicle fuel for transportation.

### **Additional socio-economic benefits**

- Less domestic smoke emissions means less health hazards.
- Less fuel used for cooking means less income spent.
- Less fuel shopping means more time available for more productive activities.
- Establishing community based micro brick factories provides local employment.
- Establishing the PRSP brick factory provides employment.
- Establishing a domestic stove factory provides employment.
- New employment creation means additional training

### **Funding sought:**

To carry out the 3 month research project we are seeking funding of:  
( see attached spreadsheet )

US \$

### **Future funding needs:**

To establish the level of funding needed to introduce the full scheme into The Gambia will be a component of the consulting evaluation

### **Long term considerations:**

The Gambia is a small country with a considerable urban concentration along the coastal strip. Most commerce is taking place in this area and localised community based projects for paper brick manufacture could be established. These micro enterprises would use the local community's waste, turn it into an alternative fuel source, sell it back to the community thereby not only helping to keep the environment cleaner but also generating income for a number of families.

For the urban areas further research could be carried out to use agricultural residue waste instead of paper to produce alternative cooking fuel.