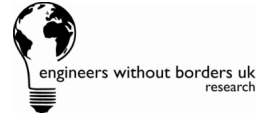


**engINDia & EWB-UK Research**

## **Project Proposal: Alternative to Batteries**

### **Full description of Problem:**

There are two daily power cuts of four hours each in Pabal and the surrounding villages. Many of Pabal's inhabitants use 12 volt batteries to supply their energy needs during power cuts. These batteries are expensive and often only last one year. Once batteries have ceased to hold enough charge they must be replaced, which is expensive, and although they are often passed on to someone with lower charge requirement, they are still eventually thrown away. Thus there are two main needs: 1) a cheaper method of supplying electrical energy during power cuts and 2) a method of increasing the life of lead acid batteries.

### **How the local community will use the proposed solution:**

One Pabal resident has asked a local electrician to make him a system that switches on a diesel generator just before his battery discharges below 50%. He hopes that this will help his batteries to last longer, but Sanjay is a relatively rich man in Pabal and can afford to invest in a diesel generator while most people cannot. Because of the likely cost of a system to prolong the useful life of lead acid batteries, it may not be that an alternative power source would be a more suitable option. An alternative power source could cater for one household or several or the entire community; it could supplement or even replace the existing system. The way that the community uses the proposed solution would very much depend on the scale of the solution.

Vigyan Ashram has used batteries in the past in conjunction with solar cells as a more environmentally friendly and more reliable alternative to state-provided electricity. However it was found that that the batteries had to be replaced every year at a cost of Rs. 8000. Since using solar cells only saves Vigyan Ashram Rs. 4000 per year on electricity, it is cheaper not to use solar cells. If an alternative to batteries could be made more cheaply than the current cost of batteries or is batteries could be made longer lasting, these solar cells could be of use to Vigyan Ashram.

### **Estimate of the economic benefit anticipated and plans for training of the local community:**

A cost-effective alternative to batteries would reduce the amount of money and time spent yearly on buying replacement batteries in Pabal.

Hopefully no training will be necessary for the manufacture or use of the solution. However if necessary Vigyan Ashram may be able to provide training; if not then training should be organized through an EWB placement.

**Full description of the local situation:**

Most people use hand-held torches for lighting outside and use an inverter to connect a 12V battery to a tube light for lighting inside their homes. Telephone booth operators use 12V, 1.4A rechargeable batteries to allow people to use phones during power cuts; these batteries generally last two to three years and cost about Rs. 700. The rechargeable 12V batteries used in torches cost Rs. 250 and last between one and two years. The 12V, 32A rechargeable batteries used by Vigyan Ashram currently last just over one year and cost Rs. 8000.

When electricity is available, many people use it to heat water for bathing. Several people own fridges, such as pharmacists (for rabies vaccinations and assorted other pharmaceuticals) and a lady who distributes pasteurized, homogenized cows' milk in factory-sealed bags. The local schools and some other people use computers. Tailors use sewing machines that have been modified to run off an electric motor in addition to the normal foot paddle. The launderer uses an electric iron but has a coal-fired iron that he uses during power cuts. The people most affected by power cuts are the students studying computing at the junior college and Vigyan Ashram. Most other people can work around the power cuts since they have alternative technologies (using batteries or attaching rabies vaccines to a freezer pack) or behaviors (having a bath a bit earlier or later in the day). The power cuts do however limit the potential for rural industry or information technology development. These type of businesses tend to avoid rural areas and instead focus around Mumbai because it has constant electricity.

Vigyan Ashram have noticed that power cuts in general conform to a regular pattern, but there are often exceptions and occasionally there is no power for many days (there was no power from 1<sup>st</sup> - 15<sup>th</sup> July 2005). The general pattern is:

Monday	0900 - 1300, 1700 - 2100
Tuesday	1100 - 1500, 1900 - 2300
Wednesday	0500 - 0900, 1300 - 1700
Thursday	0700 - 1100, 1500 - 1900
Friday	0900 - 1300, 1700 - 2100
Saturday	1100 - 1500, 1900 - 2300
Sunday	0700 - 1100, 1500 - 2100

There are also occasional power surges.

**Full description of relevant infrastructure available locally:**

People charge their batteries both by leaving them constantly attached to the mains or by connecting them when charging is required.

When batteries no longer hold enough charge to be useful people tend to give the battery to anyone who can find a use for it. It is possible to get batteries re-conditioned in Pabal, but since the cost is almost the same as the cost of a new battery, few people do this. Batteries, like all waste, are disposed of in one of several locations around Pabal, and then are probably scavenged.

**Useful background reading or resources:**

See engINdia Website: <http://www.engindia.net/resources.htm>

**Organisation Contact Details**

Name of Organisation      engINdia

Contact                      engindia@mit.edu

Web site                      www.engindia.net

Background information      engINdia exists to promote appropriate and sustainable engineering solutions in developing areas. Currently the program focuses on Pabal, Maharashtra, a rural village in India located 80 miles east of Mumbai. Pabal is home to Vigyan Ashram (see details below), an educational institution that focuses on rural technologies. The existence of Vigyan Ashram and Pabal's proximity to Mumbai made it the perfect starting point for engINdia.

engINdia is a partnership between 6 students from the University of Cambridge, Massachusetts Institute of Technology (MIT) and the Indian Institute of Technology Bombay (IITB). An expedition was conducted during the summer of 2005 to the area of Pabal, Maharastra. There, the engINdia team worked with Vigyan Ashram and the local community to gain an understanding and appreciation of the development issues faced by rural India which could be tackled through engineering.

Name of Organisation      Vigyan Ashram

Web site                      <http://vigyanashram.com/>

Background information      Vigyan Ashram is an educational institution situated just outside Pabal, Maharashtra, about five hours east of Mumbai. The focus of the institution is on rural education and enabling the rural population of Pabal and the surrounding areas to learn about technology and start their own businesses. The facility includes classrooms, labs, workshops, and living quarters for students. There is also a Fab Lab installed at the site (for more

information, see <http://fab.cba.mit.edu/>). VA is striving to become an internet service provider for the area and to that end many of the organization's activities are becoming focused on internet-related projects, such as internet kiosks for rural farmers. A few people at VA speak English, but some knowledge of Marathi or an interpreter will be needed in order to carry out work in the area.