

# SWAVALAMBAN

Mono Wheel Generator  
(SWMG)

*“A human powered lighting solution”*

## Final Report to World Bank

Submitted by Save Bombay Committee, India

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Bombay Committee

P R A K R U T I

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Title of Project: **Human power based lighting solution for nomadic and tribal people.**

Conducted by: **Save Bombay Committee, India**

**Final Status Report - June 2007 to June 2009**

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## **EXECUTIVE SUMMARY**

SWAVALAMBAN, meaning self-reliance, is a mono wheel cycle power generator that is pedalled by humans to generate electricity to light up homes, schools, community halls in rural and tribal regions facing severe power load-shedding and in some cases, are out of reach of the grid power. This device is christened as SWAVALAMBAN Mono Wheel Generator (SMWG), because it is an instrument of self reliance for the user. The key principle of SMWG is not only to spread the adoption of alternate sources of energy but also to promote the decentralization of production, distribution and maintenance by sharing the design of the device free of cost. For the fabrication cost of Rs.12,000 that includes four energy efficient lights costing Rs.1,400, the SMWG is a robust device that can be fabricated even with the existing low-technology/infrastructure in rural areas, thus reducing transportation and maintenance costs to a great extent. Forty minutes of pedalling can light up two 9W CFL lamps and two LED lamps for 1 hour, sufficient to enable children in a school hall to study. Or it is sufficient to provide general lighting to a small hutment with the two LED lamps for 10 hours. The design has been perfected over last 3 years for optimum performance that takes into account the ease of pedalling.

SMWG is the result of 3 years of effort that got a boost when Save Bombay Committee won India Development Marketplace (IDM) Award in 2007 and secured \$20,000 prize money for project development. So far, 111 SMWGs have been delivered and are being used in schools in rural areas of Maharashtra and Gujarat. Another 10 SMWs have been customized for water pumping. Many more SMWGs have been replicated using our design that we have placed in public domain. Local innovation has resulted in variants in SMWG such as water pumping devices, air compressors, juicers, mobile charging devices, etc.

## **MARKET NEED**

Chronic power shortage is affecting India's potential for progress and is proving to be a hurdle to educate children at the bottom of the economic pyramid and lift millions of people from below the poverty line. Small towns and villages are the most affected due to discriminatory public policy of denying power to the rural areas where severe load-shedding ranges from 2 to 18 hours a day. Thousands of rural residential schools, tribal residential schools (Adivasi Ashram Shalas) and town/village community halls all over the country cease to be productive during late evenings and nights due to absence of electricity. Also, thousands of villages in tribal belts of rural India are yet to connect to the power grid, forcing the people to suffer from darkness. Large numbers use kerosene lamp, a health and fire hazard. Also, reading by kerosene lamps is harmful to children. All that these poor people need is affordable and reliable source of light so that children can study and family can work extra hours from home for their own cottage enterprises.

Out of various renewable sources of energy, this was found to be most acceptable by the user. So we developed a more realistic/simple/cost-effective/robust solution for rural/tribal lighting.

## **IMPLEMENTATION**

### **Pre-World Bank assistance:**

On 15th August, 2006, Save Bombay Committee installed the first MWG at Ullash Parisar Prathishtan Adivasi Ashram Shala (UPP-AAS) at Karav, Kalyan Taluk, Thane District, Maharashtra. Since then, it has been striving to build the most suitable MWG for Indian conditions. The SMWG proved its worth during the first six weeks of its usage during the heavy rains towards the end of August and early-September of 2006. Even solar lights failed during this period that rarely saw sunlight.

### **First year of World Bank assistance:**

Save Bombay Committee (SBC) and Vigyan Ashram (VA) developed and finalized the design of the SMWGs. Initial production of the SMWG was carried out at Vigyan Ashram premises. As per the plan, the first 5 SMWGs were given free of cost to five Ashram Shalas. One SMWG was given to Indian Institute of Technology – Bombay for testing purposes. Apart from this, nine SMWGs were delivered at partly subsidized rates to different schools. New devices such as pedal powered fodder cutting machine, pedal-powered mobile charging unit, water pump on SMW, etc. were built. Portable generator for nomadic communities was also developed by VA.

VA organized workshops for training in SMWG fabrication. The participants were invited to Pabal, where they underwent training for a week. Trainees were provided with manual and bicycle drawing so that they can fabricate it on their own. This helped various schools to build their own SMWGs with the components provided. Trainees displayed their units in rural science fairs and won prizes. This created great awareness of the utility of SMWGs.

### **Second year of World Bank assistance:**

Objective during the second year was to:

- Rationalize the design and optimize electrical output
- Disperse production
- Reduce cost commensurate with optimum production

Operations during the first year showed that logistics and cost of transportation were the major bottle necks. Decentralisation of production so that SMWGs were fabricated nearer to the consumers enabled us to reduce the manufacturing cost from Rs 16,000 to Rs 12,000. It also enabled us to produce and distribute 66 MWGs and 10 water pumping devices during the second year of the implementation against 40 proposed in our submission plan. Our two production centres at Gujarat Vidyapeeth (GVP) and Ravi Krupa Trust (RKT) will continue to produce SMWGs in the third year of the project.

## **FINANCIAL SUMMARY**

A total amount of Rs.15,37,545 was spent to deliver 111 SMWGs and 10 water pumps to the buyers. This amount was partially borne by Save Bombay Committee (Rs.8,47,821) and the rest by the buyers themselves (Rs.6,89,724). Out of Rs.8,47,821 spent by Save Bombay Committee, Rs.8,10,000 has been provided by the World Bank grant.

### **Actual versus submission targets:**

The total revenue Rs.15,37,545 was achieved as against Rs.11,28,000 that we initially targeted in the World Bank submission, an increase of 36%. All our success to deliver 111 SMWGs and 10 water pumps as against 53 SMWGs proposed in the initial plan indicates the acceptance of our product by the target market.

	<b>As per initial plan submission</b>	<b>Actual</b>	<b>Increase/ Decrease</b>
<b>Revenue</b>			+ 36%
	1,128,000	1,537,545	
<b>Number of Mono Wheels</b>			+ 128%
	53	121	
<b>Overheads: Salary, Travel, etc</b>			Saving of 37%
	288,000	182,490	
<b>Spending by SBC above IDM 2007 grant</b>			
	37,821	-	-
<b>Spending by community</b>			+ 119%
	318,000	689,724	

<b>Summary of Expenses</b>	<b>Contribution by SBC</b>	<b>Contribution by others</b>	<b>Total</b>
<b>9 months in 2007-08</b>	146,750	86,600	233,350
<b>12 months in 2008-09</b>	491,860	374,028	865,888
<b>3 months in 2009-10</b>	209,211	229,096	438,307
<b>Total</b>	<b>847,821</b>	<b>689,724</b>	<b>1,537,545</b>

### **Few other metrics:**

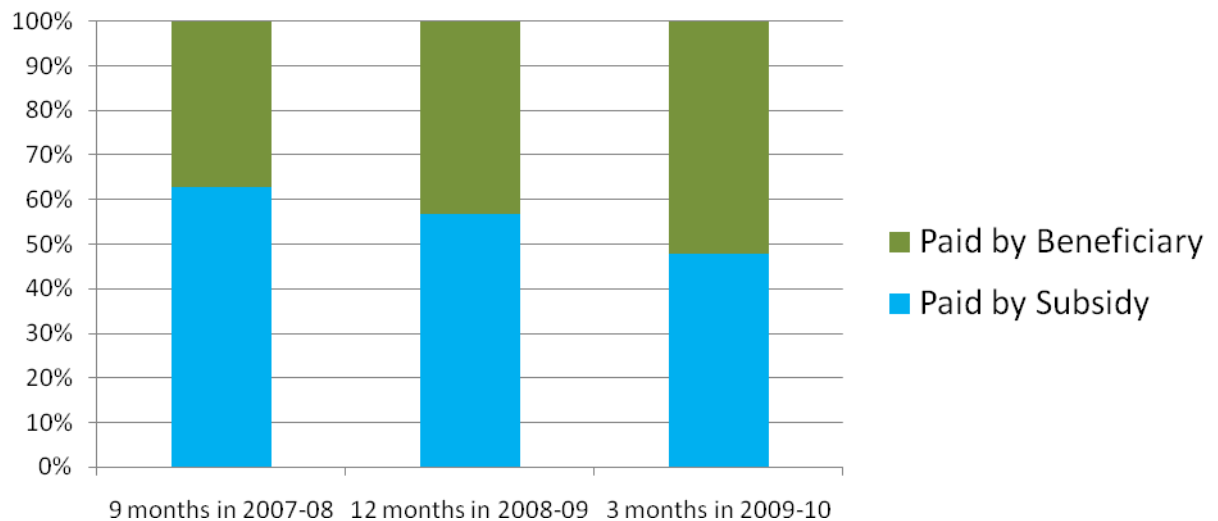
<b>Total Cost</b>	1,537,545
<b>Cost of 10 Water Pumps @ 6,000</b>	60,000
<b>Cost of 111 SMWGs over 2 years</b>	1,477,545
<b>Average Cost per SMWG over 2 years</b>	13,311
<b>Current Cost per SMWG</b>	12,000

<b>Total Expenditure</b>	1,537,545
<b>Overheads</b>	190,066
<b>Efficiency of Operation</b>	<b>88%</b>
<hr/>	
<b>Amount paid by others for 111 SMWGs</b>	689,724
<b>Price of 1 SMWG paid by buyer</b>	<b>6,214</b>
<b>Current Cost per SMWG</b>	<u>12,000</u>
<b>GAP in cost price and demand price</b>	<b>5,786</b>

All figures in INR

Progressively during the 2-year project, the percentage of the cost of SMWG that is paid by the beneficiary is increasing from less than 40% to more than 60%. This shows user acceptability of the product and his willingness to pay for our SMWG.

### Cost Structure for each SMWG



### SMWG COMPONENTS

The major components of Swavalamban are:

- Fabricated steel frame and cycle Parts
- DC Generator
- Battery
- Lamps
- Electronic parts and Meters

The current cost structure of SMWG is as below:

Component	Specifications	Approximate Cost in INR
Fabricated Steel Frame and cycle parts		3,000 to 4,000
DC Generator	DB 1411	1,350
Battery	40 AH	2,200 to 2,500
Lamps	Two LED lamps (each is a white LED lamp - 1W at 12V with 30 LEDs) and two 9W CFLs	350 each, with a total cost of 1,400
Electronic Parts and Meters	Charge Controller with LCD display with an integrated voltage indicator	750
Miscellaneous items, wages and distribution costs		1,800
<b>Total</b>		<b>12,000 (Approx.)</b>

### Improvements during the second year of project:

Fabricated Steel Frame and cycle parts: We tried various sections and rationalized the shape and size of the steel frame to make suitable for independent local fabrication. We also selected the cycle parts that can be procured locally, so that any replacement of cycle parts can be done by the users themselves.

DC Generators: We rationalized on DB 1411 which was specially developed for by Pranshu Electrical Works Pvt. Ltd., Aurangabad. We tried five models and based on customer feedback, we found that DB 1411 is most suitable for pedalling by students at Ashram Shalas and hence standardized on the same. Not only it was easier to pedal but also the cost (including transportation) came down from Rs. 2,800 to Rs. 1,350.

We ordered 99 generators during the second year of project. We consumed 77 generators (EC 1415 and DB 1411 models) and another 20 DB 1411 generators are kept in stock for future replacement as well as for production of more SMWGs.

Battery: The size of the battery that was used earlier was between 60 and 80AH. 40AH capacity batteries were found adequate after shifting over to DB 1411 generator. This reduced the cost of the battery, ranging from Rs. 2,200 to Rs. 2,500, depending on local prices, as against Rs. 3,500 as envisaged in the initial World Bank submission.

Lamps: We were previously using very small lamps with 10 LEDs that consumed 1W at 12V. The cost was Rs.150 each and 30 such lamps cost Rs.4,500. The luminosity was low. We have now standardized on an ultra bright white LED 1W at 12V lamp with 30 LEDs (two strips of 15 LEDs each) from the assembler SEATCO's Akshay Urja at Amravati. The luminosity is much better and this has permitted us to reduce total offering to two LED lamps and two 9W CFLs, costing Rs.350 each, with a total cost of Rs.1,400.

Electronic parts and Meters: Initial design had a separate volt meter, ammeter and charge controller. We eliminated the ammeter and integrated the voltage indicator on the charge controller. The overall cost came down to Rs. 750 from Rs.1,200 as per earlier design.



## **DISTRIBUTION**

VA kick-started the experimentation, manufacture of SMWGs from Pabal and SMWGs were distributed from there. Later on, observing that this was to be used in localities spread over a widespread geography covering Maharashtra and Gujarat, we evolved three production centres:

Gujarat Vidyapeeth, Amdavad, Gujarat: GVP Polytechnic School fabricated the steel frame, assembled the cycle parts, pulleys, v-belt, Etc., while SBC provided to them the lamps, electronic components and batteries. They have made 30 Swavalamban MWGs.

Ravi Krupa Trust, located at Lok Bharati Sanosara, Dist Bhavnagar, Gujarat: SBC provided a cash support of Rs. 6,000 per Swavalamban MWG made and they procured all components from sources identified by SBC, for which bulk prices were negotiated by SBC. They made 20 Swavalamban MWGs. In addition, 10 mono block pump cycles were also made for lifting water. These have proved very popular amongst the students of the Folk Schools who are mainly children of farmers and many have replicated these on their farms also. SBC sponsored three Annual fairs of the Lok Shalas in different locations and displayed the various uses of the Swavalamban MWGs energy generators as well as water pumping devices, air compressors and other uses in farming.

Amravati: Here we identified a fabricator Sushil Engineering & Trading Company (SEATCO) who fabricated the Swavalamban MWG and made and distributed 16 sets. SEATCO's Akshay Urja Shop also made Charge Controllers and LED and CFL lights that we standardized.

## **TRAVEL DETAILS**

### **During first year of World Bank assistance:**

During the first year, Save Bombay Committee made a trip to Pabal in Maharashtra. Vigyan Ashram, who worked with us in this project made multiple trips to Mumbai for coordination of the project. Our volunteers also visited different parts of Maharashtra and Gujarat on numerous occasions to promote SMWGs.

### **During second year of World Bank assistance:**

During the second year, we undertook trips to Vidarbha, Pune, Rural Thane district Saurashtra, Amdavad and Kutch regions and popularized the idea of the Swavalamban MWG.

### **Gujarat Yatra (03/08/2008 - 10/08/2008):**

The trip was planned to approach the institutes where residential educational activities are being undertaken in the remote rural areas and our aim was to reduce the dependence of the institutes on erratic grid supply. Our first visit was at Lokbharti Sanosara in Bhavnagar District of Gujarat where we met the Director of the Institute, Shri Arunbhai Dave. We then proceeded to Rajkot on the following day and met Shri Rajeshbhai Bhayani who is in charge of the Science Centre. Our next was at Morbi where the Orpat factory is located where the CFL

lights are assembled. We discussed the purpose of our visit and were keen on getting the CFLs for our MWG at an economical price. We then visited a few more organizations around Vadodara district, such as the Shroff Foundation and the Muni Seva Ashram in Goraj. These institutions carry village upliftment activity coupled with educational activity and were working out the possibility of introducing our SMWG to meet their energy needs.

Vidharbha Yatra (16/09/2008 -22/09/2008):

The programme was planned to check the MWG manufacture as we had identified one entrepreneur to fabricate our MWGs in Amravati Dist of Vidarbha as well as to promote the MWGs in Vidarbha region. We visited the entrepreneur Shri Vinay Vaidya who is active in the area of assembling LEDs as well as supplying solar gadgets and setting up entire projects on alternative energy lines. He was successful in redesigning the cycle frame of the SMWG. We also could locate a fabricator for fabricating the same. We then visited a number of ashram shalas and institutes in Vidarbha, for example, Anandwan, Lok Biradari Prakalp, Hemalkasa (Post Bhamragad, Dist Gadchiroli, 442710), Sewagram at Wardha, etc., where we promoted our SMWG.

Gujarat Yatra (11/11/2008- 22/11/2008):

We visited Gujarat Vidyapeeth to know more on the technical improvements done on the SMWG as per our discussions made during our correspondence done earlier with Shri Dharmendrabhai Kadia who heads the technical wing of the Institute. We subsequently visited various Lokshalas in the Saurashtra and Kutch areas to promote our SMWG.

Konkan Yatra (07/12/2008 – 10/12/2008):

We visited an ashram shala in Lanja Taluka, Ratnagiri district, where we had given the MWG design and had asked them to fabricate the frame. We also visited Dapoli area of Ratnagiri district to arrange for another manufacturer so that local manufacturing and distribution is possible.

Vidharbha Yatra (20/02/2009 - 22/02/2009):

The SMWGs that were fabricated in Amravati were ready for distribution so we worked out a programme of coordinating with the Ashramshalas and other institutes working in the area of education. Melghat region in Amravati district is remote and mountainous area and is inhabited mainly by Adivasis (tribal people). We visited some Adivasi Ashram Shalas and other organizations that are actively working in these tribal areas in the area of health and education. The areas are remote and hilly and so there is a genuine need of such gadgets like the MWG to meet up to the basic needs of the people.

### Vikramgad Yatra:

Vikramgad area in Thane district of Maharashtra has mountainous terrain and has ashram shalas located in remote areas where power supply is a perennial problem. We visited a couple of such schools run by Vanavasi Kalyan Kendra, where the need for SMWG was felt. We have been successful in promoting our SMWG to them and they have installed four SMWGs at Vikragadh and at the village Chalawat.

### Gujarat Yatra (February 2009):

This trip was specially planned to meet the Vice Chancellor of Gujarat Vidyapeeth, located in Ahmedabad, to discuss on the propagation of the SMWG concept amongst a wider area and to undertake further improvements to enhance its output. The technical department of the Vidyapeeth had been experimenting with different models of generators supplied to them and they had also tried to showcase the utility of SMWG for various other functions such as drawing up water, running a radio, etc. The director of Lokbharti institute too joined in as they have been actively promoting the SMWG.

### Gujarat Yatra (March 2009):

This trip to Meghraj, in the remotest and the last district of Gujarat state adjoining Rajasthan, was made to promote the SMWG. The urgent need of the area was for water as the district has been under drought since couple of years. We could convince the people that the MWG would be helpful to them in lifting the water as the area is undulating and water will have to be carried from a different elevation.

During April 2009, we visited Amdavad, Gandhinagar and Surendranagar districts. During May 2009, we visited Melghat area of Vidarbha and met the Kasturba Trust members who have installed three SMWGs. During June 2009, we visited Lok Bharati to follow up on the distribution of SMWGs.

## **DEVIATIONS FROM INITIAL PROJECT PROPOSAL**

### **Lighting solution for Nomadic communities:**

Nomadic tribals, who constitute 7% of India's population, live in small and unorganised hamlets. The unit developed was also intended to be commonly owned and jointly used by a cluster of families. But as the hamlets are far isolated and unorganised, common ownership and shared usage of SMWG was difficult to realise in such locations. Hence, the allocation for this project has been transferred for the usage in production and distribution of SMWGs.

The need for harnessing renewable source for lighting these isolated hamlets is important and relevant. We are busy on working on a programme for illuminating one thousand of such homes that is estimated to cost Rs 4.5 million and are currently seeking external support.

## **LOOKING AHEAD**

Save Bombay Committee has standardized the design that is most suitable for rural Indian conditions and that can be replicated very easily. Anyone interested in fabricating the SMWGs and distributing them can avail the design that we have placed in public domain. We have established good relationships with a reliable generator fabricator and component manufacturers that can be used by the interested. SBC is committed to extend all support in this direction. We are thankful to the World Bank for empowering us through this Award to provide a basic amenity the disadvantaged and the shunned of our society.

## APPENDIX A – Few Photographs

The comprehensive list of schools is:

**International Peace Day (Gandhi Jayanti, 2008) Samuha Kantan at Gujarat Vidyapeeth, Amdavad:** Here the SMWG is powered by PA system.



**Cycle Frame Design for fabrication at rural areas:**



**Cycles fabricated by a local blacksmith at Ravi Krupa Trust in Gujarat (August 2008):**



**Experimenting with water pumping at Vigyan Ashram, Pabal, Maharashtra (2007):**



**Cycle Prototype as on May 2007. Designed at Vigyan Ashram, Pabal, Maharashtra:**



**Cycle Prototype as on 2006, installed at Karav Tribal School:**



**Harshad Kamdar, the Head of the project, with Dilip Sankarreddy and Yogesh Kulkarni (left to right):**



## APPENDIX B – List of Schools

### Phase 1:

Sl. No.	Category	Components provided	Name	Buyer Contact details
1	Free Ashram Shala	Cycle frame+Generator +Transport	Karav Ashram Shala	Kalyan Taluk, Thane Dist, Maharashtra
2	Free Ashram Shala	Cycle frame +Generator +LED+Transport	Muni Seva Ashram run residential school	Vankuva in Baroda District (near Goraj)
3	Free Ashram Shala	Cycle frame +Generator+Battery+LED+Transport	Mangal Jeevan Trust, run by KALRAV, an orphanage	Sendranana near Sidhpur Dist Patan N. Gujarat
4	Free Ashram Shala	Cycle frame +Generator+Battery+LED+Transport	Shushil Trust	Khadir bet Rapar Taluka Dist Kutch
5	50% subsidy	Cycle frame +Generator +LED+Transport	Lok Bharati	Sanosara Dist
6	Testing Purpose	Cycle frame +Generator +LED+Transport	IIT-Bombay	Maharashtra
7	50% subsidy	Generator+LED	Hirkani Vidyalaya	Gawadewadi Dist Pune, Maharashtra
8	50% subsidy	Generator+LED	Chatrapati Shahu Ashramshala	Pachgaon, Dist. Kolhapur, Maharashtra
9	50% subsidy	Generator+LED	Dhanaji Nana Vidyalaya	Khiroda Dist Jalgaon
10	50% subsidy	Generator+LED	Jnanaganaga Vidyalaya	Manchi hill, Dst Ahmednagar
11	50% subsidy	Generator+LED	Lokmanya Tilak Vidyalaya	Chikhalgaon Dist Ratnagiri
11	50% subsidy	Generator+LED	Shri Gurudev Vidyamandir	Mozari, Dist. Amaravati, Maharashtra
12	50% subsidy	Generator+LED	Prathmik va Madhymik ashramshala	Rajputwadi, Dist Kolhapur, Maharashtra
13	50% subsidy	Generator+LED	Prayog Parivar	Ankoli, Dist Solapur, Maharashtra
14	50% subsidy	Generator	Gram Mangal	Aine, Dist Thane, Maharashtra
15	50% subsidy	Generator	Gram Mangal	Aine, Dist Thane, Maharashtra



**Phase 2:**

Sr. No	Name	Address	Phone Number	No of Students
16	J.C.KUMARAPPA MAHAVIDYALA. GRAM UDHYOG MANDIR.GADHADA,(SN). DIST.BHAVNAGAR,PIN :364750.	GRAM UDHYOG MANDIR.GADHADA,(SN). DIST.BHAVNAGAR,PIN :364750.	(02847)25301 6,253076	330
17	LOKBHARATI ADHYAPAN MANDIR.TALUKA SIHOR. DIST BHAVNAGAR.AT-MAHUVA.TALUKA MAHUVA,DIST BHAVNAGAR.	ADHYAPAN MANDIR. TALUKA SIHOR. DIST BHAVNAGAR.		52
18	KAILAS GURUKUL.MAHUVA SHREE SITARAM SEVA TRUST.AT- MAHUVA.TALUKA MAHUVA,DIST BHAVNAGAR.	SHREE SITARAM SEVA TREST. AT-MAHUVA.TALUKA MAHUVA,DIST BHAVNAGAR.	(2844)222090	98
19	SMT.N.S.DANKHARA U.B.V.BELA TALUKA TALAJA,DIST BHAVNAGAR,VIA TRAPAJ,PIN 364150	TALUKA TALAJA,DIST BHAVNAGAR,VIA TSAPAJ,PIN 364150	(2842)286391	373
20	SMT M.A.JANI JIVANSHALA AT.AMBARDI(JAM)TALUKA JASDAN,DIST RAJKOT	AT.AMBARDI (JAM)TALUKA JASDAN,DIST RAJKOT	(2821)277250	1200
21	LOK VIDHYALAYA-VALUKAD TALUKA PALITANA,DIST BHAVNAGAR,PIN 364270	TALUKA PALITANA,DIST BHAVNAGAR,PIN 364270	(2848)283344	775
22	GANGOTRI SANSKAR TIRTH AT. MANPUR .P.O.MANDVI, VIA PARAVADI, GARIYADHAR, DIST. BHAVNAGAR .PIN-364275	AT. MANPUR .P.O. MANDVI, VIA PARADAVI, GARIYADHAR, DIST. BHAVNAGAR .PIN-364275	9427496492	310
23	GRAM DAXINA MURTI AT. AMBALA TALUKA SIHOR DIST. BHAVNAGAR	AT. AMBALA TALUKA-SIHOR DIST. BHAVNAGAR		300
24	SHREE KASTURBA U.B. VIDHYALAYA TALUKA- PALITANA DIST BHAVNAGAR AT. MOTI PANIYALI PIN 364270	TALUKA- PALITANA DIST BHAVNAGAR AT. MOTI PANIYALI PIN 364270	(2848)280725	150
25	SHREE BALVANT PAREKH SCIENCE CITY AMBAVADI DIST- BHAVNAGAR.	AMBAVADI DIST- BHAVNAGAR.	(278)2205220/ 2206220	500
26	SAI ASHRAM, 135, PANDE LAYOUT KHAMLA NAGPUR	135, PANDE LAYOUT KHAMLA NAGPUR		53
27	M.D.SAMAJ SEVA MAHAVIDYALAYA P.G.(BOYS) HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	P.G. HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		150
28	M.D.SAMAJ SEVA MAHAVIDYALAYA P.G.(BOYS) HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	P.G. HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		125
29	M.D.SAMAJ SEVA MAHAVIDYALAYA P.G.(BOYS) HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	P.G. HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		75
30	M.D.SAMAJ SEVA MAHAVIDYALAYA GIRLS HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	GIRLS HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		320
31	M.D.SAMAJ SEVA MAHAVIDYALAYA GIRLS HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	GIRLS HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		300
32	SHIKSHAN MAHAVIDYALAYA BEd HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	BEd HOSTEL GUJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		100

33	SHIKSHAN MAHAVIDYALAYA MED HOSTEL GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	MED HOSTEL GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		50
34	KUMAR VINAY MANDIR GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	KUMAR VINAY MANDIR GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		75
35	KUMAR VINAY MANDIR GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD	KUMAR VINAY MANDIR GUJJURAT VIDHYAPITH, ASHRAM ROAD AHMEDABAD		75
36	M.D. GRAM SEWA MAHAVIDYALAYA DEPTT. OF MICROBIOLOGY (BOYS HOSTEL)GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	DEPTT. OF MICROBIOLOGY GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	(0)079-23274274, 07923274321 (M) 9427608309	46
37	M.D. GRAM SEWA MAHAVIDYALAYA DEPTT. OF MICROBIOLOGY (GIRLS HOSTEL)GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	DEPTT. OF MICROBIOLOGY GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	(0)079-23274274, 07923274321 (M) 9427608309	21
38	M.D. GRAM SEWA MAHAVIDYALAYA DEPTT. OF MICROBIOLOGY (GIRLS HOSTEL) GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	DEPTT. OF MICROBIOLOGY GUJJURAT VIDHYAPITH AT & PO: SADRA DIST- GANDHINAGAR PIN-382320	(0)079-23274274, 07923274321 (M) 9427608309	27
39	M.D.SHARIRIK SHIKSAN MAHAVIDHYALAYA SADRA TALUKA AND DIST-GANDHINAGAR.	M.D.SHARIRIK SHIKSAN MAHAVIDHYALAYA SADRA TALUKA, DIST-GANDHINAGAR.		50
40	M.D.SHARIRIK SHIKSAN MAHAVIDHYALAYA SADRA TALUKA AND DIST-GANDHINAGAR.	M.D.SHARIRIK SHIKSAN MAHAVIDHYALAYA SADRA TALUKA, DIST-GANDHINAGAR.		50
41	M.D.GRAM SEVA MAHAVIDHYALAYA,SADRA, TALUKA,DIST-GANDHINAGAR	M.D.GRAMSEVAMAHAVIDHYALAYA,SADRA, TALUKA,DIST-GANDHINAGAR		75
42	M.D.GRAM SEVA MAHAVIDHYALAYA,SADRA, TALUKA,DIST-GANDHINAGAR	M.D.GRAMSEVAMAHAVIDHYALAYA,SADRA, TALUKA,DIST-GANDHINAGAR		75
43	CENTRE FOR STUDIES IN RURAL MANAGEMENT RANDHEJA, TALUKA, DIST-GANDHINAGAR MRM (PG) HOSTEL	C.S.R.M RADHEJA ,RANDHEJA, TALUKA, DIST-GANDHINAGAR		50
44	CENTRE FOR STUDIES IN RURAL MANAGEMENT (GIRLS HOSTEL)RANDHEJA, TALUKA, DIST-GANDHINAGAR	C.S.R.M RADHEJA ,RANDHEJA, TALUKA, DIST-GANDHINAGAR		25
45	CENTRE FOR STUDIES IN RURAL MANAGEMENT (GIRLS HOSTEL)RANDHEJA, TALUKA, DIST-GANDHINAGAR	C.S.R.M RADHEJA ,RANDHEJA, TALUKA, DIST-GANDHINAGAR		25
46	SHRI HANUMAN VYAYAM PRASARAK MANDAL AMRAVATI.	AMRAVATI. , Maharashtra		466
47	ISKCON HOSTEL AT GALTARE, TAL WADA, DIST THANE	SRI SRI RADHA GOPINATH MANDIR,7,K.M MUNSHI MARG CHOWPATTY,MUMBAI-400007	23665500 FAX # 23665555	
48	ISKCON HOSTEL AT GALTARE, TAL WADA, DIST THANE	SRI SRI RADHA GOPINATH MANDIR,7,K.M MUNSHI MARG CHOWPATTY,MUMBAI-400007	SANAT KUMAR DAS AT GALTARE 99307 41788	17
49	ISKCON HOSTEL AT GALTARE, TAL WADA, DIST THANE	SRI SRI RADHA GOPINATH MANDIR,7,K.M MUNSHI MARG CHOWPATTY,MUMBAI-400007	23665500 FAX # 23665555	17

50	VANVASI KALYAN ASHRAM HOSTEL AT VIKRAM GADH TAL VIKRAM GADH DIST THANE.	SU-NIKETAN.KARVE ROAD.AABHYUDAY COLONY,VISHNU NAGAR,DOMBIVALI (W)-411202 DIST THANE. , Maharashtra	(2520) 203074	22
51	VANVASI KALYAN ASHRAM HOSTEL AT VIKRAM GADH TAL VIKRAM GADH DIST THANE.	SU-NIKETAN.KARVE ROAD.AABHYUDAY COLONY,VISHNU NAGAR,DOMBIVALI (W)-411202 DIST THANE.	(2520) 203074	13
52	VANVASI KALYAN ASHRAM HOSTEL AT CHALATVAD TAL VIKRAM GADH DIST THANE.	SU-NIKETAN.KARVE ROAD.AABHYUDAY COLONY,VISHNU NAGAR,DOMBIVALI (W)-411202 DIST THANE. , Maharashtra	NO PHONE	17
53	VANVASI KALYAN ASHRAM HOSTEL AT CHALATVAD TAL VIKRAM GADH DIST THANE.	SU-NIKETAN.KARVE ROAD.AABHYUDAY COLONY,VISHNU NAGAR,DOMBIVALI (W)-411202 DIST THANE., Maharashtra	NO PHONE	8
54	Dr Usha Meisher	Ramdarshan, Halar Road, Valsad, Gujarat 396 001		
55	Gram Seva Kendra	Bhalada, Tal Matar, Dist Kheda, Gujarat	(2694) 287637	
56	Gram Seva Kendra	Bhalada, Tal Matar, Dist Kheda, Gujarat	(2694) 287637	
57	Gram Seva Kendra	Dathely Dist Anand, Gujarat	(2694)287637	
58	Gram Seva Kendra	Dathely Dist Anand, Gujarat	(2694)287637	
59	Gram Seva Kendra	Dathely Dist Anand, Gujarat	(2694)287637	
60	Gram Seva Kendra	Bhallal, Tal Petlad, Dist Anand, Gujarat	(2696) 286616	
61	Gram Seva Kendra	Bhallal, Tal Petlad, Dist Anand, Gujarat	(2696) 286616	
62	Gram Seva Kendra	Bochsan, Dist Anand, Gujarat	(2696) 286883	
63	Gram Seva Kendra	Bochsan, Dist Anand, Gujarat	(2696) 286883	
64	Gram Seva Kendra	Bochsan, Dist Anand, Gujarat	(2696) 286883	
65	JeevanTirth	Jeevantirth, Juna KOBBA, Gandhinagar, 382009, Gujarat	079-23276236	500
66	Shri O.V. Sheth Community Science Centre	Rajkot, Gujarat		
67	Shri O.V. Sheth Community Science Centre (Air pressure model)	Rajkot, Gujarat		
68	Shri O.V. Sheth Community Science Centre (Water pumping model)	Rajkot, Gujarat		
69	Saurashtra Education Trust	Rajkot, Gujarat		
70	Saurashtra Education Trust	Rajkot, Gujarat		
71	Saurashtra Education Trust	Rajkot, Gujarat		

72	Urja Prkalpa, Gujarath Vidyapeeth	Ahmedabad, Gujarat		
73	Urja Prkalpa, Gujarath Vidyapeeth	Ahmedabad, Gujarat		
74	Urja Prkalpa, Gujarath Vidyapeeth (water pump model)	Ahmedabad, Gujarat		
75	Urja Prkalpa, Gujarath Vidyapeeth (juicer model)	Ahmedabad, Gujarat		
76	Urja Prkalpa, Gujarath Vidyapeeth (air compressor model)	Ahmedabad, Gujarat		
77	Aklavya School	Ahmedabad, Gujarat		

### **Phase 3:**

<b>Cycle No.</b>	<b>Details</b>
<b>78 - 88</b>	10 SMWGs in stock at Gujarat Vidyapeeth
<b>89-99</b>	10 SMWGs in stock at Ravi Krupa Trust
<b>100-111</b>	Experimentation and replacement
<b>10 Water Pumping devices</b>	10 pedal-powered water pumping devices in stock at Ravi Krupa Trust

## **APPENDIX C – List of Exhibitions**

<b>Sr. No</b>	<b>NAME</b>	<b>ADDRESS</b>	<b>PHONE NO</b>	<b>No of Visitors</b>
1	JeevanTirth - "School On Wheels" in Mini Truck	Jeevantirth, Juna KOBA, Gandhinagar, 382009	079-23276236	5,000
2	Shri O.V. Sheth Community Science Centre	Rajkot, Gujarat		
3	Balwant Parekh Science City	Bhavnagar		
4	Prem Ni Parab, a science fair in a Jain religious centre	Sayla		
5	Lok Vigyam Kendra at Lok Bharati	Sanosara		
6	Lok Vigyam Kendra	Valukud		
7	Urja Prkalpa (a alternative energy open exhibition) - Permanant display at Gujarat Vidyapeeth	Ahmedabad		
8	Hingaongaon School	Dist Pune, Maharashtra		
9	GMRT - Khodad science exhibition	Maharashtra		
10	Khiroda School	Dist Jalgaon, Maharashtra		

## APPENDIX D – Press

### **Nomads, tribals can plug in to pedal power**

June 24, 2007, Indian Express

Link: [www.indianexpress.com/news/nomads-tribals-can-plug-in-to-pedal-power/160430](http://www.indianexpress.com/news/nomads-tribals-can-plug-in-to-pedal-power/160430)

## APPENDIX E – Generator Models

The following generator models have been experimented in our SMWGs. Of these, DB 1411 has been standardized.

<b>Sl. No.</b>	<b>Generator Model</b>	<b>Specifications</b>
<b>1</b>	EB 2415	24V, 5.5A, 1500RPM, 90W, 6Kgcm
<b>2</b>	EC 1415 With Gear Box	14V, 5A, 266 RPM, 70W
<b>3</b>	EC 1415	85W, 7Kgcm, 14V, 6.3A, 1500 RPM
<b>4</b>	DB 1411 <b>(now standardized)</b>	52W, 1100RPM, 14V, 3.7A
<b>5</b>	DB 0815	40W, 1500RPM, 8V, 5A

Submission v/s Performance IDM 2007 Project 855	Initial Plan Submission to World Bank for first 2 years			Actuals: 1/7/2007 to 31/03/2008 (First 9 months)				Actuals: 1/04/2008 to 31/03/2009 (Next 12 months)				Actuals: 1/04/2009 to 31/06/2009 (Next 3 months)				Actuals: Total Project	
	Allocation	Quantity	Total in INR	Actuals	Quantity	Contribution by others	Total in INR	Actuals	Quantity	Contribution by others	Total in INR	Actuals	Quantity	Contribution by others	Total in INR	Quantity Total	Total in INR
<b>Overheads</b>																	
Salary	144,000	1	144,000	6,000	6		36,000				48,000				36,000		120,000
Travelling Expenses	144,000	1	144,000				3,950				46,540				12,000		62,490
Office Expenses			-				800										800
Promotion											2,000						2,000
Other exp											491				4,285		4,776
<b>Ashram Shalas</b>																	
Cost of Cycle frame by SBC	2,000	41	82,000	2,900	6		17,400	2,700	34		91,800	2700	3		8,100	43	117,300
Cost of Cycle frame for others				2,900	6	17,400	17,400	4,000	2	8,000	8,000					8	25,400
Cost of Cycle frame for RKT								4,000	10	40,000	40,000	4,000	20	80,000	80,000	30	120,000
Cost of cycle frame for GVP								4,000	20	80,000	80,000	4,000	10	40,000	40,000	30	120,000
Cost of Alternator Generator	2,800	41	114,800	3,400	12		20,400				138,996				26,872	111	186,268
Cost of Battery for GVP	3,500	41	143,500					2,200	20	44,000	44,000	2,300	10	23,000	23,000	30	67,000
Cost of Battery for Kutch								3,950	1		3,950					1	3,950
Cost of Battery for RKT								2,200	10	22,000	22,000	2,200	10	22,000	22,000	20	44,000
Cost of Battery for Others				3,000	12	30,000	36,000	2,200	34	74,800	74,800	2,500	14	35,000	35,000	60	145,800
Misc. items like Voltmeter	1,200	41	49,200	1,200	12	7,200	14,400									12	14,400
Cost of lamps for VA				4,500	10	6,000	45,000									10	45,000
Cost of lamps for others				4,500	2	9,000	9,000		37		37,000					39	46,000
Cost of lamps and Charge controllers for GVP	4,500	41	184,500						18		62,461		12		45,600	30	108,061
Cost of lamps and Charge controllers for RKT									10		23,650		10	23,650	23,650	20	47,300
Cost of lamps and Charge controllers for others				4,500	2	9,000	9,000						10		25,800	12	34,800
Cost of wiring switches, etc	1,000	41	41,000	1,000	12	2,000	12,000	1,000	79	48,800	79,000	1,000	20		20,000	111	111,000
Transportation	1,000	41	41,000	1,000	12	6,000	12,000	800	79	56,428	63,200	800	20	5,446	16,000	111	91,200
Cost of waterpump accessories for RKT												2,000	10		20,000	10	20,000
<b>Adivasi Padas</b>																	
Cost of cycle attachment	2,000	12	24,000														-
Cost of Alternator Generator	2,800	12	33,600														-
Cost of Battery	2,100	12	25,200														-
Missc items like Voltmeter and labour	1,200	12	14,400														-
Cost of lamps 15 Nos	2,250	12	27,000														-
Cost of wiring switches etc	1,000	12	12,000														-
Transportation	1,000	12	12,000														-
Cost of replacement repair margin	35,800	1	35,800														-
<b>Total Expenses</b>			<b>1,128,000</b>			<b>86,600</b>	<b>233,350</b>			<b>374,028</b>	<b>865,888</b>			<b>229,096</b>	<b>438,307</b>		<b>1,537,545</b>
Expenditure borne by SBC			1,128,000				146,750				491,860				209,211		847,821
Expenditure borne by rest						86,600				374,028				229,096			689,724

All figures are in INR  
SBC = Save Bombay  
Committee  
VA = Vigyan Ashram  
RKT = Ravi Krupa Trust  
GVK = Gujarat Vidyapeeth