

Using Solar Energy for improving Livelihood in Rural  
India -Vigyan Ashram's Experiences

# Log of Work In Progress

Work carried out under financial support of Dept of Science and Technology (SEED Division), Govt of India.

[www.dsttara.in](http://www.dsttara.in)



Village Pabal.. Approx 300kms from Mumbai (Western Part of India)

Training rural youth to establish technology based enterprises.

Technologies → **Improve Productivity** → **Reduce drudgery** : → **Energy .. Energy .. Energy**

# LED light for rural lighting

- i) Won 'Development Marketplace 2013' award by World Bank and trained 327 rural youth in Madhya Pradesh and Chattisgarh. They sold @ 3000+ light units till 2015.
- ii) Formed Bottom of the Pyramid Energy and Environmental Solutions Pvt Ltd. To manufacture LED lights.



**Till 2015 :**  
12 Solar Gram in tribal areas of MP -- 100% household having LED lights made by us.

# Livelihood Opportunities in Villages

→ Food Processing – Heating

→ Food processing – Dryer

→ Agriculture (Water Pump / Fans for poly house)

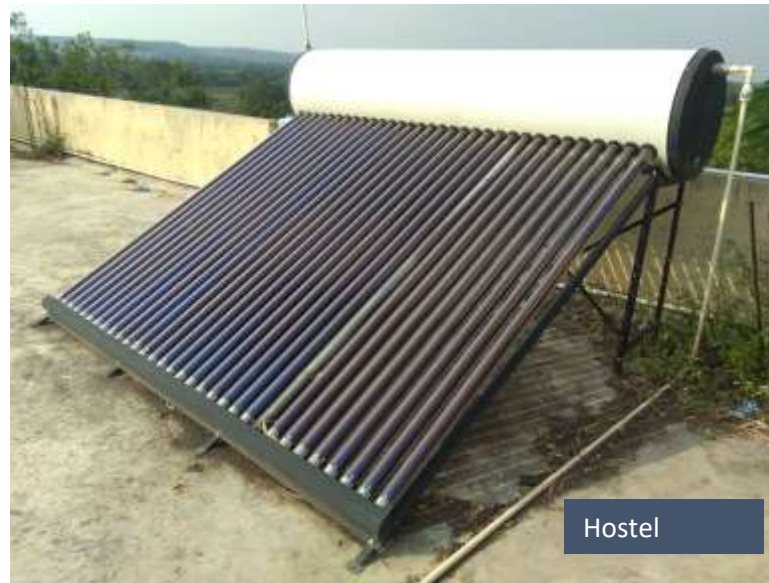
→ Machines / Rotary Motion



Solar park



Solar park



Hostel



Solar park

A) Solar Thermal

B) DC to DC Solar appliances

## Roasting of groundnut



5 Kg peanuts : Roasted : Time required is 1 hour  
Temperature : 160°C.

Cost saving : 35 gm LPG per Kg (Rs.2 (1.5 cents) per kg)

### **Work remaining to be done :**

Central processing facility for roasting ? Self  
Help Group offering Service at cost ? Business  
model to be developed

## Roasting of Rava (Semolina)



<https://vipul570blog.wordpress.com/solar-drum-roaster/>

## Evaporative Cooking

## Making Tomato Sauce / Thickening Milk (Basundi)



### For Sauce making:-

Quantity:- Max. 30 kg  
tomatoes

Time:- 3 hours

focused temperature -  
200°C.

### Advantages :

- Quality / Taste : Better
- Fuel saving : Rs.6 per Kg

### For Khoya making:-

10 litre milk to made into  
Khoya to make Gulab-Jamun

Time spent is : 4 hours

# Need DC Appliances for Solar Energy

DC – DC - AC

DC - DC

Most of the appliances available are for AC.

Additional cost associated with DC - DC - AC conversion

→ DC motors are 70% more efficient than AC

→ Solar energy is manufactured in decentralized way. DC – DC appliances are useful

# Economics of DC WATER PUMP AT VIGYAN ASHRAM

@ Aquaponics System at Pabal

## AC Pump on Solar

Pump required : 1 HP ( 746 watt)  
Pump cost : Rs. 4000/-  
With Solar Panel : Rs.55,000/-  
Pay back period : 3.5 yrs

## DC Pump on Solar

Equivalent Pump Required : 350 watt  
Pump cost : Rs.8131 /-  
With solar panel : Rs.22269/-  
Pay back period : 1.3 yrs



## Problems :

- Unavailability of DC pumps in the market
- Typically AC pumps are sold with DC systems
- Initial Cost of DC pumps. More HP is not required .. Appropriate head and flow.



## Immediate Application :

- i) Polyhouse air circulation
- ii) Blower for dryers
- iii) Cooling of homes
- iv) Chaff cutter / fodder cutting machine
- v) DC motors for food appliances



# Making Ladoo



→ Roasting of flour on slow heat

→ Continuous stirring to avoiding charring of flour



Installed 1 unit  
Work in progress to increase Batch Size from 1 kg  
to 4 kg per  
Automated .. Want to pilot 5 units



<https://amolkhamkar.wordpress.com/2018/06/21/nachani-besan-laddu-flour-roaster/>

# Cooler for Vegetable vendor

## Problem :

20-25 % weight loss per day – Direct loss  
Vegetables do not look fresh. Gets spoiled.

## Piloted a Cooling unit using solar

- 20-25 degree Celsius
- 60% humidity
- Reduce weight loss



Sr.No.	Vegetables	% weight loss	Store period
1.	Fenugreek	1.48%	3 days
2.	Cabbage	1.12%	6 days
3.	Tomato	2.51%	8 days
4.	Bottle Guard	1.34%	5 days
5.	Coriander	0.99%	4 days



# DRYER

Conventional Solar Dryer	Dome Dryer
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Less batch capacity	High Batch capacity
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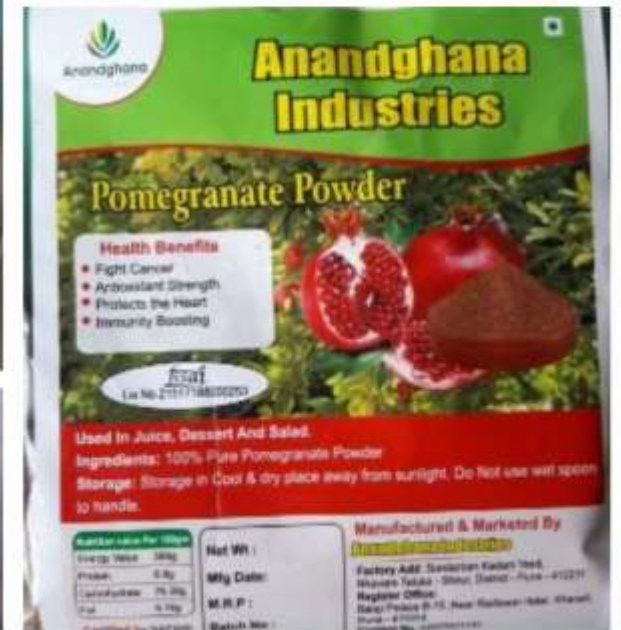
Heat capture is limited due position and location	Higher heat capture irrespective to position and location
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High manufacturing cost	Low manufacturing cost
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Process control NO	Process control YES
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Loss of quality of product	High quality of Product
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Easy to operate	Skill required
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# Solar for Art and Crafts

## AC Laser / Router

High cost of CO2 Laser /routers

Very quality Earthing requirement make it unsuitable for rural areas

## DC Solar Laser / Router

Only have needed functionality

DC supply .. No worry about Earthing requirement



## Summary :

- 1) Innovations are needed in AC-grid based appliances to Solar-DC based appliances.
- 2) Design and technical collaboration to perfect the solution into quality products.
- 3) Lots of scope in rural areas for use of solar energy
  - Thermal application
  - Rotary motion appliances
- 3) Create success stories and case studies for propagation.

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