



Appendix 1:

Potential Areas of Innovation for the Focal Areas of RIF

1) Solar

1.1 SOLAR DRYER

Solar drying is a process in which the sun heat is controlled to produce heat for drying product so that such product does not easily get spoiled or damaged and can be stored for a long time thereafter. There are different solar drying systems:

1. Traditional solar drying
2. Direct solar dryers
3. Indirect solar dryers
4. Forced Convection System is missing (insert this)
5. Hybrid (mixed) solar dryers

1.2 SOLAR COOKER

The solar parabolic cooker has a reflecting surface in the form of a parabolic dish, which concentrates the solar rays at a point at which the black cooking pot is placed.

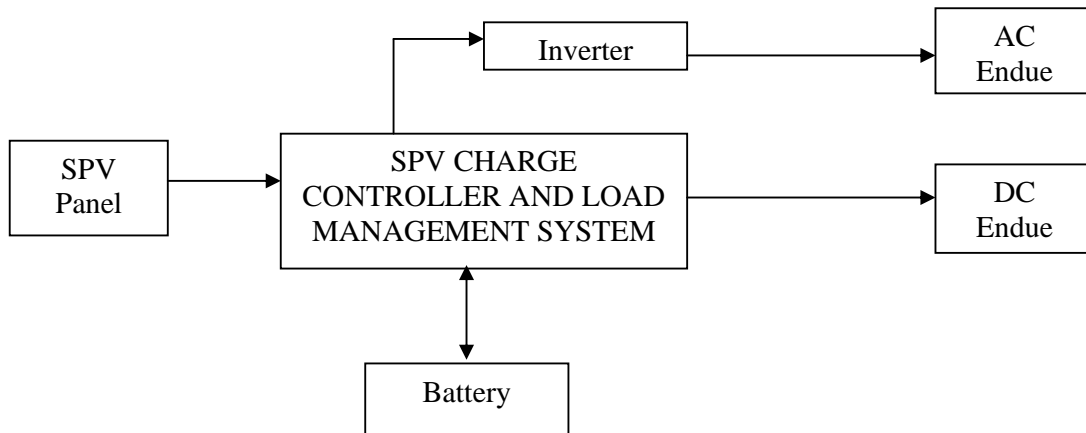
1.3 SOLAR PHOTOVOLTAIC

Photovoltaic cells convert light energy into electricity at the atomic level. Solar Cells are made of semi-conducting materials similar to those used in computer chips. When these materials absorb sunlight, the solar energy knocks electrons loose from their atoms, allowing the electrons to flow through the material to produce electricity. This process of converting light (photons) to electricity (voltage) is called the photovoltaic (PV) effect.

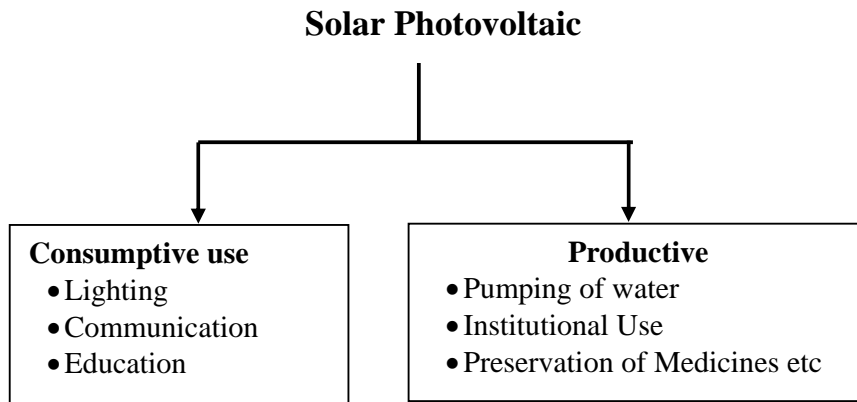


Appendix 1:

Potential Areas of Innovation for the Focal Areas of RIF Components of SPV System



A few innovation needed areas:





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2) Wind

Globally, wind power is a major renewable energy source. Given a good wind site (5-6 m/sec mean wind speeds), the wind is mightier than the sun. A combination of the two is even better – as the two by complimenting each other make for a more dependable system. And net metering would be fantastic in its capacity to decentralize the income generation to be made on energy by spreading income to the nooks and corners of the country. The few attempts to establish wind turbines in the country have either failed (for reasons needing another chapter); or, may have been very marginally successful – assessments remain.

A few innovation needed areas:

1. Development of wind home systems.
2. Wind mapping (feasibility study) and power generation calculation.
3. Wind water pumping



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3) Biomass

3.1 Biogas

The Technology

Biogas is a mixture of gas, mainly methane, produced by methanogenic bacteria while acting upon biodegradable materials in an anaerobic condition. To install a bio gas plant, the basic necessity is to have an adequate number of cattle in their farm - a minimum of two large cattle. The feed (cow dung and/or human manure) is mixed with equal volume of water and fed into a dome shaped digester where it is acted upon by methanogenic bacteria under anaerobic condition. From the initial starting of a biogas plant, it needs approximately 25 days for the gas to be generated. After that, a continuous supply of gas can be drawn provided the prescribed amount of feed is used in the digester daily.

Although there are several models of biogas plants, but work on one of the two basic designs available

- Floating metal drum type,
- Fixed masonry dome type,

Essential Components of the Technology for further innovation:

- A digester in which the slurry (dung mixed with water) is fermented;
- an inlet tank used to mix the feed and let it into the digester;
- A gas holder/dome in which the generated gas is collected;
- An outlet tank to remove the spent slurry;
- Distribution pipeline(s) to take the gas into the kitchen; and
- A manure pit, where the spent slurry stored

3.2 Improved Cooking Stoves:

The Improved Cook Stoves are modified version of the traditional cook stoves, designed to overcome problems that are inherent with the traditional stoves. ICS is made of local materials. The villagers themselves can easily construct it. Improved cook stoves are made of 3 parts mud/earth, 2 parts straw/husk and 1 part animal dung. The whole structure is plastered smooth with the same mud mortar. The iron plates are fitted on the potholes for pots. ICS technology has developed to the optimum level in that its design and installation are popular with users. It can be made in different sizes and capacities to suit the family size and pot size. It has more openings for pots/pans.

Picture 16

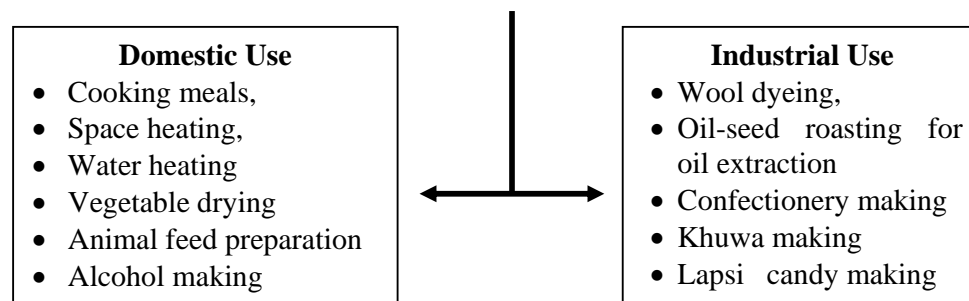


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It is cheap and easy to operate. There is no need to blow the fire regularly. Similarly, these stoves have been further modified, Institutional Improved Cook stoves, for use in the hospitals, hostels, barracks, teashops and restaurants. All traditional institutional cook stove can be turned into IICS as they are made of the local and cheap materials and it can be easily installed by masons or trained village males/females. These have been designed to save firewood and improve the sanitation and health conditions at work places.

Improved Cook Stoves



The various components of the ICS where innovation is sought:

- The fuel inlet for feeding the fuel (fire- hole)
- Pot Holders, according to the number potholders the ICS is named as single pot, double pot or triple pot ICS. The potholes are round funnel in shape; the pot bottom fits tight on them.
- Inbuilt baffle which allows the flame towards the second pot without losing heat
- Chimney, exit for smoke
- An opening to remove the soot so as to keep the chimney channel clear for smoke to exit easily



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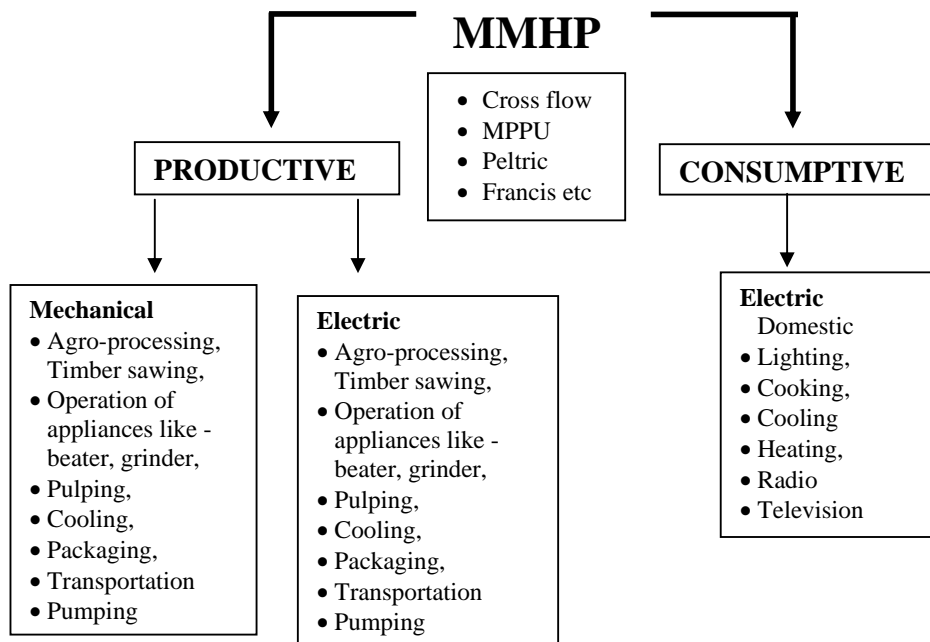
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4) Hydro

4.1 Micro Hydro

Innovative developments for micro hydro can be an additional asset to the promotion of the technology. The use of power generated by micro hydro stations can be categorized as productive and consumptive use.

- Consumptive use which takes place in or near the house.
- Productive use of power will be in the form of a) mechanical or b) electrical for Income Generating Activities



Potential Areas for Further Innovation:

The various components of a micro hydro installation are Civil Components: Structures designed to conduct water from source to the turbine for optimum energy generation. It has several sub-components described below.

- a) Turbines: The turbine converts energy from the falling water into rotating shaft power.
- b) Drive System: Transmits power from the turbine shaft to the generator shaft or the shaft powering other devices. It also has the function of changing the rotational speed from the one shaft to another when the turbine speed differs from the required speed of the alternator or device.



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- c) Electrical Systems: Convert mechanical power into electric power. This consists of a generator and alternator.
- d) Various end uses as per the MMHP flow diagram.