Solar Energy: Significant Savings in Rice Mills

"Energy is fundamental requirement for life and prosperity". This statement is known to everyone not only as a basic knowledge but also our experience in day to day living. Like Air, Water, Food, Clothing etc. Energy in the form of sunlight and heat is a requirement for sustaining life.

On governance front Prosperity is directly dependent on efficient management of country's Natural resources, Energy resources and Population.

Use and misuse of Power makes all the difference in our quality of life, comfort and health. It is well known and realized fact that climate change, leading to Catastrophes are mostly caused by human activity where excess of industrial development has caused increase in ambient temperature, creation of breach in the ozone layer around the globe and ultraviolet radiations from the SUN. Therefore the blessings from "Sun God" are negated by our own ignorance.(Call it inner darkness).

That much on philosophical plane.

On the ground let us see what we are doing with our Energy Resources in real terms

- **Coal and Petroleum**:- Limited Non Renewable Resources and their fast consumption in power generation and pollution management.
- **Hydro:-** Impacting environmental sustainability and damage to land and property, (enormous delay in implementation of projects.)
- **Nuclear:-** Creating risk of emissions
- **Renewable sources:-** Solar, Wind, Ocean, Tidal and Geo- thermal; inadequate Research and Development and harnessing:

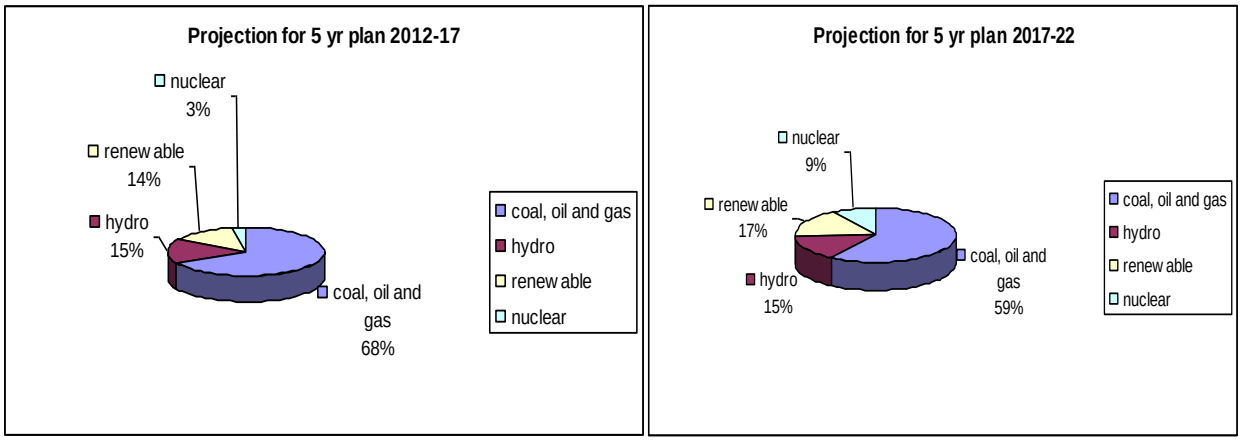
Manage Natural endowments by way of creating supply and demand imbalances, artificial scarcity, price wars and geo-political- economic stresses. That s' us - The most intellectually developed species on the planet.

Some specific numbers:-

India's Installed Power Capacity as on 31.05.2013 (in thousand MW)	
Coal, Oil and Gas(thermal)	**150**
Hydro	**39.6**
Renewable (wind, bio gas and solar)	**27.5**
Nuclear	**4.8**

The projections for the 12th five year plan (2012 – 2017) and 13th five year plan 2017 are as under

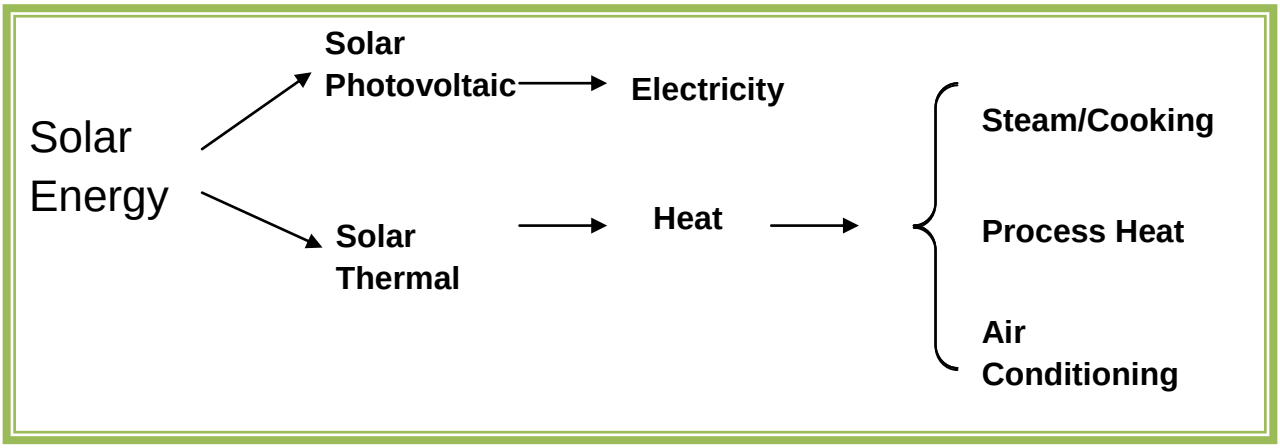
Reference – Article "Solar Energy" – A Solution of Power Requirement of India by Mr. C.R. Prasad (Former CMD,GAIL(INDIA,Limited.



SOLAR ENERGY

Energy deficit in India is presently at 12% of the peak demand, If India continues to grow at 8% for the next 10 years, the country's demand for power is likely to go up from 315 to 335 GW by 2017 which will require a generation capacity of 415 to 440 GW (Mckinsey Report). About 68.1% of India's energy generation capacity is from fossil fuels, with coal accounting for 58% of the total energy consumption.

One of the options for India to catch up the requirement is to take a lead in solar energy sector. Solar Energy is a radiant light and heat from the Sun and its harness using a range of ever evolving technologies such as Solar Heating, Solar Photovoltaic, Solar Thermal, Solar Architecture etc. Solar techniques include use of Photovoltaic Panels and Solar Thermal Collectors to harness the energy.

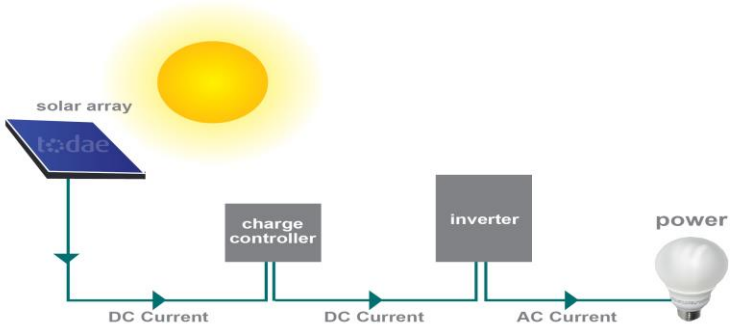


Solar energy utilization

Solar Thermal Collector

Solar PV Array

The Earth receives 174 Peta Watts (PW, 1 PW = 10 to the power of 15) of incoming solar radiation at the upper atmosphere. Approximately, 30% is reflected back to Space while the rest is absorbed by Clouds, Oceans and Landmasses. The amount of Solar Energy reaching the surface of the Planet is so vast that in one year it is about twice as much as obtained from all of the Earth's non – renewable resources of Coal, Oil, Natural Gas and mined Uranium combined



SOLAR INSTALLED CAPACITY IN INDIA

Sr. No.	States	Installed Capacity (MW)
1	Andhra Pradesh	23.15
2	Arunachal Pradesh	0.025
3	Chhattisgarh	4
4	Delhi	2.525
5	Goa & UT	1.685
6	Gujarat	824.09
7	Haryana	7.8
8	Jharkhand	16

9	Karnataka	14
10	Kerela	0.025
11	Madhya Pradesh	11.75
12	Maharashtra	34.5
13	Odisha	13
14	Punjab	9.325
15	Rajasthan	442.25
16	Tamil Nadu	17.055
17	Uttarakhand	5.05
18	Uttar Pradesh	12.375
19	West Bengal	2
Total		**1440.605**
Note : The data is compiled on the basis of information obtained from IREDA, NVVN, State Agencies and Project Developers		

Application of Solar Energy in Rice Mills and Agriculture Sector

Rice Milling is an energy intensive industry that is located all over India and is a major contributor national export earning. There are about 93000 rice hullers which produce150 million tones of rice annually. Out of them, 43000 rice hullers are raw and parboiled rice producers. These energy intensive traditional mills are facing an acute shortage of power due to frequent power cuts leading to inefficient operations and lower use of production capacity which leads to lower margins. Although some of the mills have started using captive power plants from the rice husk produced by them as fuel, there is a huge gap which is met by Diesel Generators.

- Average size of a rice mill is 40-50 tons per day.
- Energy consumption in raw rice process – 17-23 kwh/ ton
- Energy consumption in parboiled rice – 27-35 kwh/ton

In the parboiled process, rice is soaked in hot water for 6-8hrs, after which steam is bubbled though the soak tank for 15 minutes and then the paddy containing moisture is is dried by hot air to bring down the moisture content to 12-13%. This is followed by de shelling, polishing and screening.

Huge amount of power is required at every stage. More than 1 % or the turnover of the rice mills is spent on power costs. Though different sources of power – Grid, DG, Steam turbine/generator using husk is being used, around 20 % of the power used involves diesel and 25 % of the cost is spent on diesel.

Typical power consumption pattern in a rice mill-

Power Source	% of Total Units	% of Total Cost
Electricity thru GRID	55%	75%
DG	12%	20%
Steam turbine (using Husk)	25%	
DG cum Gasifier	8%	5%

Needless to state that the price of diesel (with or without subsidy) is going to increase substantially, making petro based power much more expensive than at present.

The industry will therefore, have to switchover to better options like solar power as a substitute to diesel.

Rice mills can use both the solar thermal collectors and the PV array route to produce heat and electricity respectively to make their operations cost efficient. Availability of large area of land and roof tops over drier sheds provides ample space to set up solar panels.

Typical Sheds Illustration / Picture Source: world wide open source.

Un-interrupted power supply is a pre-condition for viability of any industry where batch processing is required. In the agriculture sector, availability of Power is also crucial for irrigation as well as processing. In areas where processing is done at site, and there is inadequate grid power availability, the best solution is “Solar”.

Pay back 100 kW system		Payback With A.D.	Payback Without A.D.
Investment after Accelerated Depreciation(AD)	**Rs lakh**	**70**	**100**
Electricity saved per year	**lakh kWh**	**1.47**	**1.47**
Blended cost of electricity	**Rs/kWh**	**14**	**14**
Saving per yr of electricity	**Rs lakh/yr**	**20.58**	**20.58**
AMC Costs	**Rs lakh/yr**	**0.5**	**0.5**
Net saving per year	**Rs lakh/yr**	**20.08**	**20.08**
Pay back	**Years**	**3.40**	**4.86**

Typical pay back for a 100KW system.

As a thumb rule, the cost per KW of Solar Generation is in the range of rupee 1 per unit as against the grid power cost of rupees 7 – 10 per unit and rupees 17 – 20 per unit of DG set Power. The decision for investment therefore is to be taken by considering the need of (a) Continuous un interrupted power supply with no fluctuation in voltage.(b) Present cost of future money (inflation etc) (c) Possibility of optimizing hours of usage during day and night (time of the day). The details are worked out by specialized agencies, professional advisors, promoters and manufacturers

If all goes well, rice husk and solar power, two very unlike entities will come together to provide solution to energy woes for rice mills. Moreover, the evolving system promises zero emission of pollutants as well.

About the Author : *Shri. S. K Chawla is Entrepreneur -CEO of Winnerspitch, a consulting and Advisory firm for Energy Optimization. He is an industry veteran for now over 50 years having lead organizations and worked at board level of Navratna companies like PGCL and ONGC. He can be reached at email : skchawla@winnerspitch.com*